3.1 Transportation

Interstate 5 (I-5) is the only continuous, north-south interstate highway on the West Coast connecting Mexico, Canada, and points between. On I-5, the Columbia River Crossing between Portland and Vancouver provides connections to two major ports, deep-water shipping, up-river barging, two transcontinental rail lines, and a major international airport. It also provides critical infrastructure to support the movement of truck-hauled freight that is vital to the economy of the Portland-Vancouver region as well as to the Oregon and Washington state economies.

In addition, the I-5 crossing is the primary transportation link between Vancouver and Portland, and the only direct connection between the downtown areas of these cities. Residents of Vancouver and Portland drive, ride buses, bike, and walk across the I-5 bridges for work, recreation, shopping, and entertainment. On average, there were 134,000 trips over the I-5 bridges each day in 2005 (the base year for traffic analysis). Since 2005, traffic volumes have seen both negative and positive growth. The average number of daily trips over I-5 dropped between 2005 and 2009. Since 2009, daily trips have grown by 1 to 1.2 percent per year. Peak period trips (northbound afternoon trips) have recovered much faster, growing by over 8 percent per year since 2008.

The I-205 crossing of the Columbia River is located 6.5 miles east of I-5. I-205 is also an important transportation facility, but it serves more as a bypass and a suburban connection than a direct link between the cities of Portland and Vancouver.

One of the goals of the CRC project is to improve safety and mobility in the CRC main project area for automobile and truck traffic across the Columbia River, and to provide a facility that can meet the projected increase in transportation demand over the next 20 years. In particular, the project has the following specific objectives: (a) improve travel safety and traffic operations on the I-5 crossing's bridges and associated interchanges; (b) improve connectivity, reliability, travel times, and operations of public transportation modal alternatives; (c) improve highway freight mobility and address interstate travel and commerce needs in the main project area; and (d) improve the I-5 river crossing's structural integrity (seismic stability).

This section describes how the CRC project would affect travel patterns and mobility for cars, trucks, transit vehicles, transit riders, pedestrians, and bicyclists crossing the Columbia River. Existing conditions for these transportation modes are compared to projected 2030 conditions under the No-Build Alternative and to the effects—both beneficial and adverse—of the LPA options. This section addresses impacts within the main project area, as well as impacts related to the expansion of the Ruby Junction Maintenance Facility, the use of casting and staging areas, and modifications to the Steel Bridge. A comparison of impacts from the LPA and the DEIS alternatives is

TERMS & DEFINITIONS

Transportation Terms

Average – The average traffic condition is the vehicle flow on a weekday during the average month for a given time period, usually Tuesday, Wednesday, or Thursday.

Congestion – For highways, congestion is defined as occurring when the average speed falls below 30 miles per hour.

Demand – The total number of users attempting to access the transportation system, including those caught in congestion.

Peak – This is a more technical description of "rush hour" when travel patterns generate the most traffic, especially in a particular direction. The a.m. peak is from 6 to 10 a.m. The p.m. peak is from 3 to 7 p.m.

Queuing – The formation of a line of vehicles, typically forming behind a ramp meter, at a traffic signal, or awaiting a left turn from within a designated left turn lane.

Throughput – The number of users being served at a given time by the transportation system.

summarized in Exhibit 3.1-19. A more detailed description of the impacts of the DEIS alternatives on transportation is in the DEIS starting on page 3-3.

The information presented in this section is based on the CRC Traffic Technical Report, the CRC Transit Technical Report, the CRC Parking Utilization Study and the CRC Draft Environmental Impact Statement (DEIS), unless otherwise noted. These technical reports are included as electronic appendices to this Final EIS (FEIS).

3.1.1 New Information Developed Since the Draft EIS

Between the technical analysis conducted for the DEIS and new analysis conducted for this FEIS, some modest changes were made to the regional travel demand model used to forecast person and vehicle trip-making in the project area. Most of these changes were a result of periodic updates to the regional model as managed by Metro and consistent with the Portland area's Regional Transportation Plan (RTP) and the Vancouver area's Metropolitan Transportation Plan (MTP). These changes are summarized in Exhibit 3.1-1, and a preliminary description of the Oregon State Treasurer's Office financial review can be found in Section 3.1.3 and Chapter 4.

The most recent model version used to estimate trip-making for the FEIS is also being used for analysis of the Portland-Milwaukie Light Rail project.

Exhibit 3.1-1

Travel Demand Model Input Changes from DEIS to FEIS (Excluding Changes to the Transit Network)

Data	DEIS Alternative 3[a]	FEIS LPA
Regional Model Software Version Name	Hugo	Ivan
Number of Transportation Analysis Zones (TAZs)[b]	2,029 (includes Columbia County and parts of Yamhill and Marion Counties)	2,041 (Clark, Washington, Multnomah, and Clackamas Counties only)
Value of Time[c]	$9.88 / hr in 1994 dollars	$14.68 / hr in 1994 dollars
Downtown Vancouver Circulation	Base	Some changes in highway configuration
Posted Speed on I-5 Bridge	50 miles per hour	55 miles per hour[d]
Highway Network Changes	Based on the financially constrained 2004 RTP and 2005 MTP, plus project improvements.	Based on updated 2004 RTP and 2005 MTP, plus project improvements. RTP has no ramps to SE McLoughlin Boulevard in Portland from I-5 at the Marquam Bridge.
Park and Ride Demand Modeling	Unconstrained demand at all Oregon park and ride facilities; "shadow pricing"[e] only for Clark County lots.	"Shadow pricing"[e] employed for all park and ride lots in the region.
Land Use Changes	Regionally adopted assumptions regarding future employment and household growth by geographic area.	Reallocation of some employment and households to South Waterfront, downtown Portland, and Lloyd District from the rest of Portland.

a DEIS Alternative 3 most closely matches the LPA.

b TAZ = transportation analysis zone, which is a geographic area delineated by Metro for tabulating traffic-related data, especially journey-to-work and place-of-work statistics. A TAZ usually consists of one or more census blocks, block groups, or census tracts.

c Value of time (VOT) is generally defined as the amount a traveler is willing to pay in order to save time, or the amount they would accept as compensation for lost time. VOT is an important input into the evaluation of changes in travel demand associated with tolling. Based on additional research performed after publication of the DEIS, the VOT rate used in the model was adjusted to more accurately reflect the impacts of the LPA.

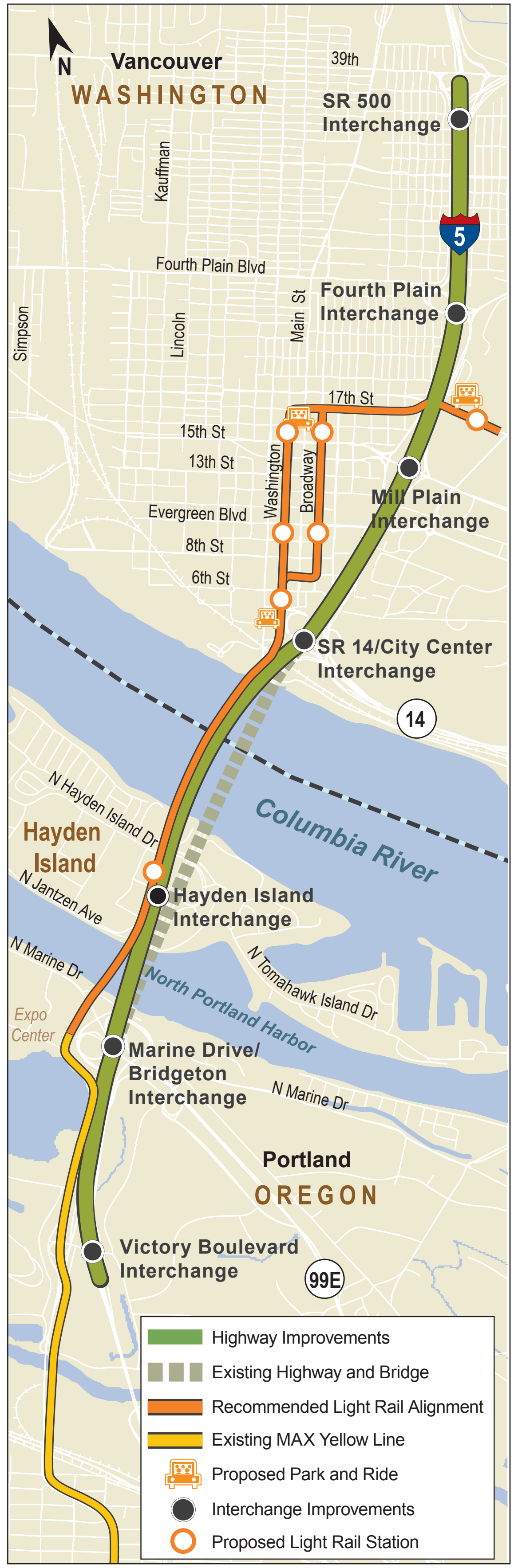
d Posted speed on the bridge is increased to reflect safety improvements and widening of the facility.

e "Shadow pricing" is a modeling technique used to constrain parking to the number of parking spaces available at a park and ride facility. It does not mean that parking at a facility would have a fee.

In addition to new information developed since the DEIS, the FEIS includes refinements in design, impacts and mitigation measures. Where new information or design changes could potentially create new significant environmental impacts not previously evaluated in the DEIS, or could be meaningful to the decision-making process, this information and these changes were applied to all alternatives, as appropriate. However, most of the new information did not warrant updating analysis of the non-preferred alternatives because it would not meaningfully change the impacts, would not result in new significant impacts, and would not change other factors that led to the choice of the LPA. Therefore, most of the refinements were applied only to the LPA. As allowed under Section 6002 of SAFETEA-LU [23 USC 139(f)(4)(D)], to facilitate development of mitigation measures and compliance with other environmental laws, the project has developed the LPA to a higher level of detail than the other alternatives. This detail has allowed the project to develop more specific mitigation measures and to facilitate compliance with other environmental laws and regulations, such as Section 4(f) of the DOT Act, Section 106 of the National Historic Preservation Act, Section 7 of the Endangered Species Act, and Section 404 of the Clean Water Act. FTA and FHWA prepared NEPA re-evaluations and a documented categorical exclusion (DCE) to analyze changes in the project and project impacts that have occurred since the DEIS. Both agencies concluded from these evaluations that these changes and new information would not result in any new significant environmental impacts that were not previously considered in the DEIS. These changes in impacts are described in the re-evaluations and DCE included in Appendix O of this FEIS. Relevant refinements in information, design, impacts and mitigation are described in the following text.

Exhibit 3.1-2

CRC System Improvements



Dimensions are approximate.

3.1.2 Existing Conditions

Transportation Study Area

The CRC project proposes improvements to I-5 from SR 500/39th Street in Vancouver to near Interstate Avenue/Victory Boulevard in Portland, and the addition of a high-capacity transit system within this same area (Exhibit 3.1-2). In addition to I-5 and transit improvements, the CRC main project area includes the following I-5 interchanges:

- Victory Boulevard
- Marine Drive

- Hayden Island
- SR 14
- Mill Plain Boulevard
- Fourth Plain Boulevard
- SR 500

Chapter 2 of this FEIS provides descriptions and additional maps of the highway and transit improvements evaluated by this project.

To build a better understanding of regional traffic conditions, the CRC traffic team analyzed the I-5 corridor well beyond the main project area—from Ridgefield in Clark County to the Marquam Bridge in downtown Portland. This 23-mile segment generally consists of three through-lanes in each direction and includes 23 interchanges. Regional highway analysis also included the I-205 corridor over the Columbia River.

Transit analysis included the transit "travelshed" using the I-5 corridor for interstate travel between the urban portion of Clark County, the City of Vancouver, North Portland, and the Portland Central Business District. Transit service within the project area is provided by two agencies: TriMet in Oregon and C-TRAN in Washington. Existing bi-state transit service includes local fixed-route bus service between Vancouver and the park and ride lot at Delta Park in Portland (with light rail service continuing on to downtown Portland), and commuter-oriented routes from Clark County park and ride lots and transit centers to central Portland or to other light rail stations in Portland.

TERMS & DEFINITIONS

Level-of-service (LOS)

A qualitative measure of roadway or intersection performance stratified as LOS A through LOS F:

- A = Free flow
- B = Reasonably free flow
- C = Stable flow
- D = Approaching unstable flow
- E = Unstable flow
- F = Forced or breakdown flow

TERMS & DEFINITIONS

Volume-to-Capacity (V/C) Ratio

The ratio of the traffic demand at a given intersection in an hour to the number of vehicles that can actually pass through that intersection.

Existing Transportation Facilities and Services

REGIONAL AND LOCAL STREET SYSTEM

Local traffic impacts are measured by performance standards for intersection levels-of-service, delay, and queuing. WSDOT, ODOT, the City of Vancouver, and the City of Portland all have defined standards for intersections, which were used to analyze the performance results of the LPA and LPA with highway phasing options. Detailed descriptions of these standards can be found in the CRC Traffic Technical Report, included as an electronic appendix to this FEIS, and are summarized below:

- City of Vancouver Performance Standards (also includes state facilities):
  - Signalized intersections – level-of-service (LOS) E in downtown and LOS D outside of downtown (Vancouver also considers build scenarios to meet standards if they perform no worse than the No-Build condition).
  - Unsignalized intersections – LOS E.
- ODOT Performance Standards:
  - Ramp terminals – volume-to-capacity (V/C) ratio 0.85 for existing (unchanged) ramp terminals and to evaluate existing and No-Build conditions), 0.75 for new ramp terminals.
  - Street intersections – ODOT has jurisdiction over intersections on Lombard Street and along Martin Luther King Jr. Boulevard between the I-5 Marine Drive ramp terminal and Columbia Boulevard. V/C

0.99 is used to evaluate existing and No-Build conditions, 0.75-0.85 at non-ramp terminal locations that would be constructed in the LPA (depending on the cross street roadway classification of the facility). For all other intersections in the study area under ODOT's jurisdiction, a V/C standard of 0.99 will be applied to the build alternatives.

- City of Portland Performance Standards:
  - Signalized intersections – LOS D (Portland also considers build scenarios to meet standards if they perform no worse than the No-Build condition).
  - Unsignalized intersections – LOS E.

The local street network within and near the main project area was divided into interchange areas to more closely examine changes in local street operations resulting from the various CRC alternatives (Exhibits 3.1-3 and 3.1-4).

The local street system in Portland was divided into four subareas with 25 key intersections:

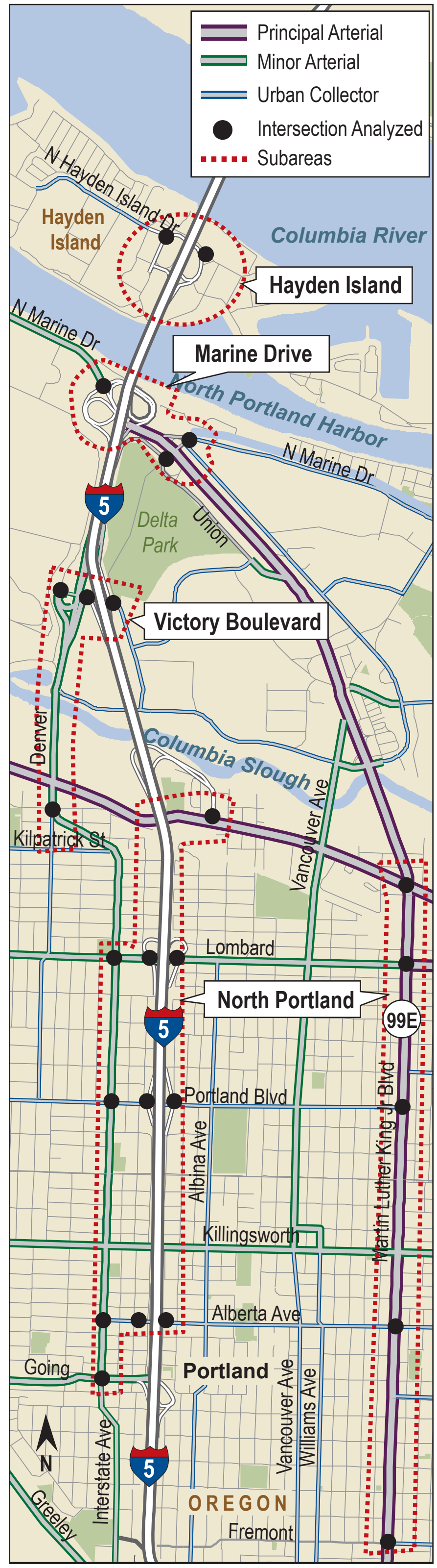
- **Hayden Island Interchange Area:** The two existing I-5 ramp terminals on Hayden Island.
- **Marine Drive Interchange Area:** The I-5 ramp terminal at Marine Drive, and two other key intersections along Marine Drive and Martin Luther King Jr. Boulevard near the I-5 ramp terminal.
- **Victory Boulevard Interchange Area:** Three intersections along Victory Boulevard that access the I-5 ramp terminals, and the Interstate Avenue/Argyle Street intersection.
- **North Portland Area:** Sixteen key intersections along Interstate Avenue between Going and Lombard Streets; the I-5 ramp terminals at Alberta Street, Portland Boulevard (renamed to Rosa Parks Way), Lombard Street, and Columbia Boulevard interchanges; and along Martin Luther King, Jr. Boulevard from Fremont Street to Columbia Boulevard.

The Vancouver local street system was divided into four subareas with 73 key intersections:

- **SR 500/Main Street Interchange Area:** Ten intersections, located primarily along 39th Street, including the ramp terminal at I-5 and the area bordered by P Street to the east, 35th Street to the south, Main Street to the west, and Ross Street to the north.
- **Fourth Plain Boulevard Interchange Area:** Fourteen intersections, located primarily along Main Street and along Fourth Plain Boulevard, including

Exhibit 3.1-3

Portland Interchange Areas



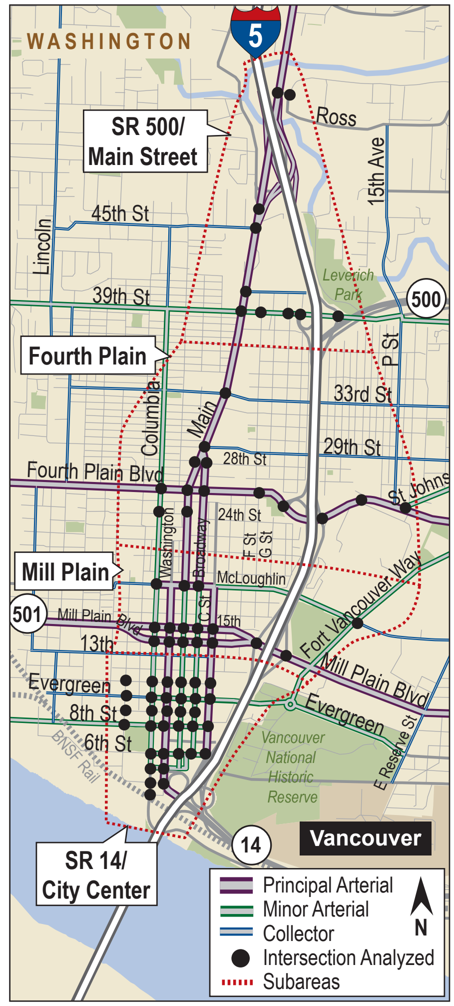
Not to scale.

the I-5 ramp terminal and the area bordered by Q Street to the east, 20th Street to the south, Columbia Street to the west, and 35th Street to the north.

- **Mill Plain Boulevard Interchange Area:** Sixteen intersections located primarily along Mill Plain Boulevard, 15th Street, McLoughlin Boulevard, and the I-5 ramp terminal at Mill Plain Boulevard; and the area bordered by Fort Vancouver Way to the east, 13th Street to the south, Columbia Street to the west, and 20th Street to the north.
- **SR 14/City Center Interchange Area:** Thirty-three local street intersections covering most of the downtown core, bordered by I-5 to the east, the Columbia River to the south, Esther Street to the west, and 13th Street to the north.

Exhibit 3.1-4

Vancouver Interchange Areas



Not to scale.

EXISTING TRANSIT OPERATIONS

Exhibit 3.1-5

Transit Travel Markets

Dimensions are approximate.

1. Portland Central City to Corridor Residential
2. Portland Central City to Washington Residential
3. Vancouver Central City to Portland Residential

Transit Markets

As shown in Exhibit 3.1-5, three key transit market areas have been defined for bi-state travel across the Columbia River:

1. Between the Portland central city and the project corridor residential areas.
2. Between the Portland central city and the Washington residential area of the project corridor.
3. Between the Vancouver central city and the Portland residential areas of the project corridor.

Exhibit 3.1-6 illustrates the existing transit centers and park and ride locations for TriMet and C-TRAN, while Exhibits 3.1-7 and 3.1-8 summarize the operating characteristics and facilities of these two transit agencies.

C-TRAN

Since November 2007, C-TRAN has been operating 10 local bus routes in downtown Vancouver. Generally, these local bus routes operate at 15- to 60-minute headways in the peak and off-peak periods, on weekdays and weekends. Three of these local bus routes, Route 4 – Fourth Plain, Route 37 – Mill Plain, and

Route 71 – Highway 99, have the highest percentage of bi-state riders and the highest local ridership. In 2007, C-TRAN extended Route 4 to Hayden Island and the light rail station at Delta Park. While crossing the Columbia River, Route 4 operates in general purpose lanes on I-5.

Within the CRC project area, C-TRAN also operates three limited bus routes: Route 44 – Fourth Plain Limited, Route 41 – Camas/Washougal Limited, and Route 47 – Battle Ground Limited. The 44 is a limited stop version of local bus Route 4, operating in peak periods with a headway of 30 minutes. The 44 crosses the Columbia River on I-5 in general purpose lanes and allows a transfer to light rail at Delta Park, but does not stop on Hayden Island. Routes 41 and 47 also connect to light rail at Delta Park. These routes both have peak headways of 120 minutes. All three of these limited routes have increased stop spacing and make fewer stops than local routes.

The C-TRAN network includes five express bus routes in the I-5 corridor: Route 105 – I-5 Express, Route 134 – Salmon Creek Express, Route 157 – Lloyd District Express, Route 190 – Marquam Hill Express, and Route 199 – 99th Street Express. These routes travel in general purpose lanes along I-5, but during the afternoon/evening peaks they use the northbound high-occupancy vehicle (HOV) lane on I-5 from Going Street to Marine Drive. Express buses operate on weekdays only and, except for Route 105, only during peak periods.

Exhibit 3.1-6

Existing Transit Center and Park and Ride Locations

Dimensions are approximate.

In addition to service in the I-5 corridor, C-TRAN provides express bus service over the Columbia River in the I-205 corridor. Routes include Route 65 – Parkrose Limited, Route 164 – Fisher's Landing Express, and Route 177 – Evergreen Express. During the morning peak Routes 164 and 177 use I-205, but return in the afternoon/evening using the I-5 HOV lane. These buses do not pick up or drop off passengers in the I-5 corridor. Further information related to existing C-TRAN service is included in the CRC Transit Technical Report, included as an electronic appendix to this FEIS.

Exhibit 3.1-7

Summary of 2005 Transit System Operating Characteristics

Transit Characteristic		TriMet	C-TRAN
Vehicles	Fixed route buses	655[a]	131[a]
	Light rail cars	109	N/A
Annual Revenue Hours	Fixed route bus	1,873,568	231,191
	Light rail	415,713	N/A
Maintenance Facilities	Buses	3	1
	Light rail	2	N/A

Source: 2005 National Transit Database.

a These totals include active fixed route buses, spares and contingency vehicles.

Exhibit 3.1-8
Existing Transit Facility Summary

	Transit Centers		Parking Spaces Available
Clark County I-5	Salmon Creek 99th Street BPA		513 600 175
		Total	**1,288**
Clark County I-205	Fisher's Landing Evergreen		560 500
		Total	**1,066**
Portland I-5	Expo Center Delta Park		300 304
		Total	**604**

Source: CRC Transit Technical Report 2009, Table 1-4.

TriMet

In the CRC main project area in north Portland, TriMet operates three local bus routes: Route 6 – Martin Luther King Jr. Boulevard, Route 8 – Northeast 15th Avenue, and Route 16 – Front Avenue/St. Johns. Route 6 travels along Martin Luther King Jr. Boulevard and across North Portland Harbor to Hayden Island. Route 8 provides service to Middlefield east of I-5 and facilitates a transfer to Route 16, which travels along Marine Drive, stopping at the Expo Center light rail station and the Rivergate area of Portland. Routes 6 and 8 are frequent service lines, with 15-minute headways all day on weekdays and weekends. Route 16 operates at 30-minute headways in the morning and afternoon weekday peaks only.

TriMet also operates the 5.8-mile MAX Yellow Line (light rail), which runs through North Portland and includes 10 stations between the Rose Quarter and its terminus at the Expo Center just south of North Portland Harbor. It runs at approximately 10-minute headways during the peaks and at 15-minute headways off-peak on both weekdays and weekends.

Existing Transportation Performance

EXISTING I-5 AND I-205 PERFORMANCE

This section summarizes existing traffic performance for the I-5 and I-205 study areas. Data were collected in 2005 and 2007 to assess conditions, and estimated growth was based on the 2009 travel demand models of the region. These data and their origins are from the Traffic Technical Report (included as an electronic appendix to this FEIS) which draws on a great number of sources, including data from regional and local government as well as data developed for project-specific analyses.

Existing (2005) Daily Traffic Levels

Average daily traffic volumes represent the average 24-hour weekday traffic on a roadway segment. In 2005, the I-5 bridges carried 134,000 vehicles each weekday. Similarly, the I-205 bridges, located 6.5 miles to the east, carried 146,000 vehicles each weekday.

Approximately 11,000 trucks crossed the I-5 bridges on an average weekday, accounting for 8 percent of all bridge traffic. On the I-205 crossing, 5 percent of all traffic is from trucks, with an average of 7,750 trucks per day. Although the I-5 crossing carried less total traffic than the I-205 crossing, it carries about 42 percent more trucks.

Existing I-5 Traffic Patterns in the CRC Main Project Area

The average length of a vehicle trip using the I-5 crossing is about 20 miles during the morning and afternoon/evening peaks. However, most vehicle trips using the crossing are only on I-5 for a short portion of their trip.

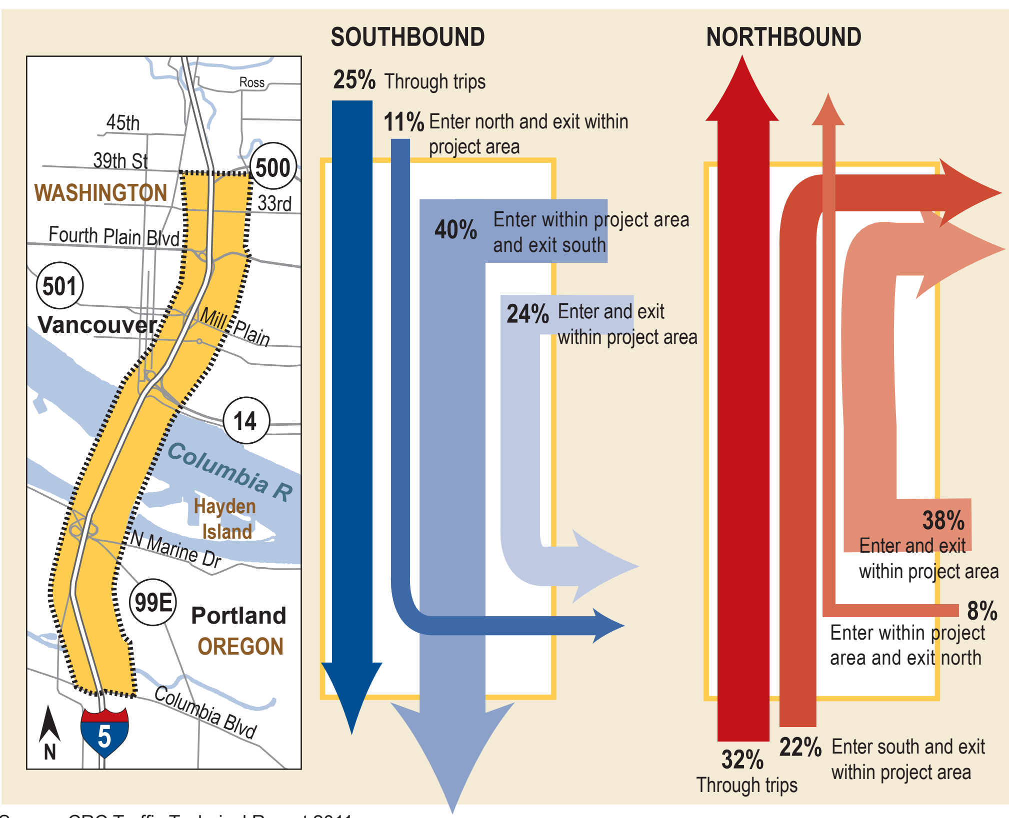
Exhibit 3.1-9 illustrates that a majority of vehicles on I-5 during peak travel periods enter and/or exit the freeway within the main project area. During the weekday morning peak traffic period (between 6 a.m. and 10 a.m.), only 25 percent of southbound traffic across the bridge travels through the entire project area; the other 75 percent enters and/or exits I-5 within the project area. During the afternoon/evening peak, only 32 percent of northbound traffic across the bridge consists of through-travel; the other 68 percent enters and/or exits I-5 within the project area.

Traffic Demand vs. Traffic Throughput

The terms **traffic demand** and **traffic throughput,** both used throughout this chapter, have different meanings. Traffic demand refers to the total number of motorists attempting to access the transportation system, including those caught in congestion. Traffic throughput is the total number of motorists actually able to travel through the transportation facility. When traffic demand exceeds traffic throughput, congestion occurs and some motorists are forced to take alternate routes or experience delays.

Exhibit 3.1-9

Vehicle Trips on I-5 in the CRC Main Project Area



Source: CRC Traffic Technical Report 2011.

Existing Peak Traffic Demand

Peak traffic demand is high within the main project area due to the limited number of Columbia River crossings between Vancouver and Portland, and due to I-5's connections with key east-west highways and arterial roadways immediately north and south of the Columbia River (such as SR 14 and the Hayden Island interchange). High traffic demand combined with short spacing between on- and off-ramps results in congestion and safety issues. For purposes of this FEIS, traffic congestion is defined as occurring when average vehicle travel speed on the freeway falls below 30 mph, indicating dense traffic and vehicle queuing.

Current (2005) traffic volumes are typically at their highest on weekdays during the 4-hour morning peak (6 a.m. to 10 a.m.) and the 4-hour afternoon/evening peak (3 p.m. to 7 p.m.), as indicated in Exhibit 3.1-10. During the morning peak, southbound traffic demand is greatest, whereas northbound traffic demand is greatest during the afternoon/evening peak.

Exhibit 3.1-10

2005 Vehicle Demand on I-5

Location	Demand
A.M. Peak[a] Demand (Southbound)	
Pioneer Street	9,800
I-5 Crossing	20,200
Going Street	23,300
P.M. Peak[b] Demand (Northbound)	
Pioneer Street	11,000
I-5 Crossing	21,400
Going Street	19,900

Source: CRC Traffic Technical Report 2011.

a Refers to 6 a.m. to 10 a.m.

b Refers to 3 p.m. to 7 p.m.

Southbound traffic demand is higher during the 4-hour morning peak than during the 4-hour afternoon/evening peak. During the morning, peak travel demand reaches 20,200 vehicles at the I-5 crossing. This demand exceeds the capacity of I-5, resulting in substantial traffic congestion, as discussed later in this chapter. Southbound traffic demand along the 23-mile I-5 study corridor ranges from a low of about 10,000 vehicles near Pioneer Street in Ridgefield to a high of over 23,000 vehicles north of the I-405 split at Going Street in Portland.

Northbound traffic demand is substantially higher during the 4-hour afternoon/evening peak than it is during the morning peak period. During this time period, northbound traffic demand at the I-5 crossing reaches 21,400 vehicles, exceeding the I-5 crossing's capacity and resulting in substantial congestion, as discussed later in this section. Northbound traffic demand along the I-5 corridor ranges from a low of about 7,000 vehicles near 139th Street in Clark County to a high of almost 24,000 vehicles near Fourth Plain Boulevard.

About 42 percent of daily truck movement across the I-5 bridges occurs from 9 a.m. to 3 p.m., when conditions are generally less congested and travel is more reliable for truck movement. The highest truck volumes occur between noon and 1 p.m., when trucks account for about 10 percent of traffic demand. The I-5 ramps with the highest truck volumes in the CRC main project area are the Marine Drive and Mill Plain Boulevard interchanges. During the truck peak hour at the Marine Drive interchange, trucks constitute 32 percent of the total traffic volume. During the truck peak hour at the Mill Plain Boulevard interchange, trucks constitute 7 percent of the total southbound on-ramp and northbound off-ramp traffic volume.

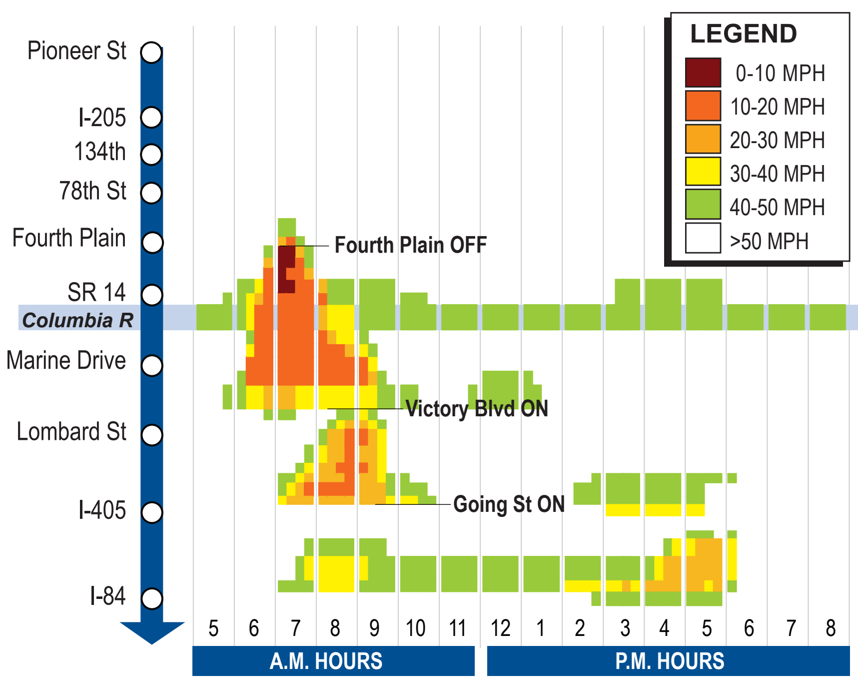
Existing Traffic Congestion and Travel Times

Illustrative profiles of traffic congestion show travel speeds at different locations and times in the CRC project area over the 16-hour period from 5 a.m. to 9 p.m. Exhibit 3.1-11 shows southbound traffic, and Exhibit 3.1-12 shows northbound traffic. These profiles help assess early morning, midday, and afternoon/evening congestion levels along the 23-mile study corridor. Different colors represent varying speeds by location. Congestion is defined in this study as occurring when travel speeds are less than 30 mph.

In the morning, congestion and queuing occur at the southbound I-5 bridge, the Delta Park lane drop, and north of the I-405 split. When this analysis was performed (2005), the I-5 crossing was congested because of its limited capacity and the downstream Delta Park bottleneck, where I-5 transitioned from three lanes to two lanes. As of fall 2010, this section of the highway from Victory Boulevard to south of Columbia Boulevard has been widened to three lanes. Congestion occurs north of the I-405 split due to high traffic demand on three lanes that eventually feed both I-5 and I-405. During the afternoon/evening, southbound congestion and queuing occur at the I-405 split and near the Rose Quarter/I-84 off-ramp.

Exhibit 3.1-11

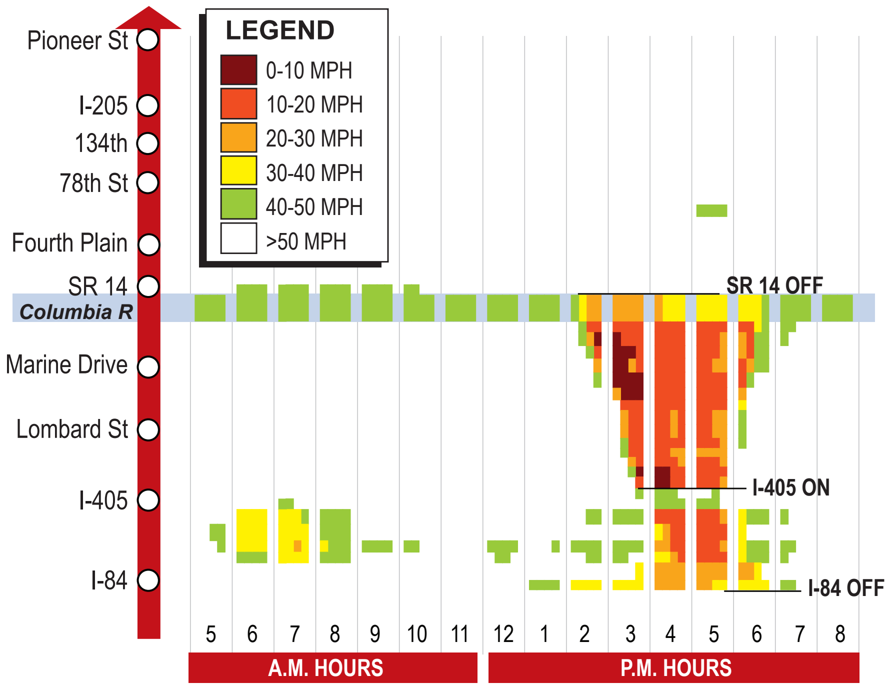
Speed Profiles 5 A.M. to 9 P.M. Existing (2005) Conditions, Southbound I-5



Source: CRC Traffic Technical Report 2011.

Exhibit 3.1-12

Speed Profiles 5 A.M. to 9 P.M. Existing (2005) Conditions, Northbound I-5



Source: CRC Traffic Technical Report 2011.

Northbound I-5 also experiences multiple hours of congestion. During the morning, queuing occurs between the I-84 on-ramp and the I-405 off-ramp. As shown in Exhibit 3.1-12, afternoon/evening congestion and vehicular queuing occurs between the Broadway Avenue on-ramp near the I-84 off ramp, and the I-405 off-ramp, and at the river crossing. The bridge bottleneck is more restrictive and results in a longer period of congestion than the Broadway/I-405 bottleneck.

Within the 4-hour morning and afternoon/evening peak periods, there are 2-hour periods where congestion is at its highest level. During the morning 2 hour "peak within the peak," the average southbound travel time between 179th Street and I-84 (16.6 miles) is 31 minutes. During the afternoon/evening 2-hour "peak within the peak," northbound travel time between I-84 and 179th Street is 38 minutes.[1]

Currently the I-5 bridges are usually congested for 2 hours in the morning and 4 hours in the afternoon/evening. I-5 and local streets experience congestion at the same time. Without improvements this congestion is expected to get worse. More information about future congestion can be found in the No-Build Alternative discussion later in this chapter.

Existing Peak Traffic and Person Throughput

Capacity constraints along I-5 limit the vehicular and person demand that can be served along the corridor in the peak travel directions (southbound during the a.m. peak, northbound during the p.m. peak). This demand is measured as vehicle and person throughput at the I-5 crossing.

During the morning peak, southbound vehicle throughput reaches 19,100 vehicles at the I-5 crossing. However, actual southbound vehicle demand is about 5 percent greater, as the bottleneck at the bridge limits the number of vehicles that can cross during the peak. For the westbound SR 14

1 Travel times include that portion of a journey only on the I-5 mainline. Delays due to queuing on I-5 entrance ramps or on arterials leading to the freeway are not included in the travel time estimates.

to southbound I-5 movement, vehicle demand exceeds the amount of traffic that is served by about 600 vehicles, resulting in congestion and delay on the SR 14 ramp. Some traffic volumes divert to alternative connections (such as downtown Vancouver streets).

Northbound vehicle throughput on I-5 during the afternoon/evening peak reaches 20,500 vehicles at the I-5 crossing. This represents only 96 percent of the actual peak demand (21,400 vehicles).

About 21,400 persons in vehicles and 1,500 persons in buses cross the southbound I-5 bridge during the morning 4-hour peak. During the afternoon/evening 4-hour peak, about 24,600 persons in vehicles and 1,200 persons in buses travel northbound over the bridge.

EXISTING LOCAL STREET PERFORMANCE

This section summarizes existing local street performance for peak hours of travel, based on traffic counts and other data from 2005 and 2007.

The Cities of Portland and Vancouver, WSDOT, and ODOT establish and monitor I-5 ramp and local street performance standards. Established standards include wait time at intersections and standards for queuing. Additional information on performance standards is provided earlier in this section under the local street system discussion and in the CRC Traffic Technical Report, included as an electronic appendix to this FEIS.

Local street congestion is most intense near the I-5 ramps and is influenced by the travel direction and length of time that I-5 is congested each day. When I-5 is congested, major arterials that provide east/west connectivity are also congested.

Existing Vancouver Local Streets

Despite localized vehicle queuing that currently affects up to 16 local intersections, 71 of the existing 73 study intersections in Vancouver meet performance standards during the morning peak. During the afternoon/evening peak, 72 intersections meet performance standards, with localized vehicle queuing affecting 18 intersections.

More than 97 percent of Vancouver's study intersections meet performance standards today.

During the morning peak, most traffic travels toward downtown Vancouver from areas to the north and east, and travels away from downtown during the afternoon/evening peak period. Main Street, the only north-south arterial roadway that passes through all four Vancouver subareas, carries higher southbound volumes in the morning (78 percent of total morning traffic volumes) and higher northbound volumes in the afternoon/evening (65 percent of total afternoon/evening traffic volumes).

Freight movements are heaviest within the I-5/Mill Plain Boulevard and I-5/Fourth Plain Boulevard interchange areas, both serving the Port of Vancouver. I-5 divides the Vancouver local street system, with community connections limited to Columbia Way, Evergreen Boulevard, Mill Plain Boulevard, McLoughlin Boulevard, Fourth Plain Boulevard, 29th Street, 33rd Street, and 39th Street.

In the morning, southbound I-5 is congested, and some commuters seek to bypass congestion on I-5 and SR 14 by circulating through downtown Vancouver to enter southbound I-5 at Washington Street. This adds traffic and congestion on local streets through downtown Vancouver.

All of Portland's study intersections meet performance standards today.

Existing Portland Local Streets

Despite localized vehicular queuing at several intersections, all 25 intersections studied in Portland currently meet performance standards established by the City of Portland and ODOT during both morning and afternoon/evening peaks. Most traffic on these local streets travels toward downtown Portland during the morning peak and away from it during the afternoon/evening. Correspondingly, north-south arterials carry higher southbound volumes in the morning and higher northbound volumes in the afternoon/evening. In North Portland, regional east/west travel is strongly oriented toward I-5 and downtown Portland in the morning, and away from these areas in the afternoon/evening.

Freight movements are heaviest within the I-5/Marine Drive interchange area serving the Port of Portland and the Columbia Boulevard industrial corridor. Freight movements are also heavy within the I-5/Columbia Boulevard interchange area serving the Columbia Corridor, and the I-5/Going Street interchange serving the Swan Island industrial area.

The Portland local street system is divided by I-5, with community connections across the freeway being mostly limited to interchanges and some local street over-crossings, including Skidmore, Alberta, and Ainsworth Streets and Schmeer Road. When I-5 is congested, commuters often travel on roadways parallel to I-5. Many of these motorists then enter I-5 via on-ramps from Interstate Avenue/Victory Boulevard or Marine Drive.

Along Interstate Avenue, the MAX light rail line receives priority over vehicles at traffic signals. This means that light rail trains generally get green lights when they arrive at signalized intersections in North Portland, which can add to intermittent traffic delays and backups to cross traffic when trains cross at these intersections.

Despite constraints, many pedestrians and bicyclists use the existing facilities to cross the Columbia River.

EXISTING CONDITIONS FOR PEDESTRIANS AND BICYCLISTS

Pedestrians and bicyclists often experience difficult conditions when crossing the Columbia River on the I-5 bridges. Sidewalks on the bridges are only about 4 feet wide and are separated from highway traffic by low barriers. The mixing of pedestrians and bicycles in these narrow facilities can cause safety problems. Pedestrians and bicyclists are exposed to high noise levels, exhaust, and debris. The grades on the bridge create high downhill speeds for bicyclists and difficult uphill climbs for some pedestrians and bicyclists.

The designated pedestrian and bicycle route between downtown Vancouver, Hayden Island, and the Marine Drive area is circuitous and requires users to navigate local street intersections (Exhibit 3.1-13). On the south side of the Columbia River, connections to the large Portland bikeway network exist via Marine Drive to the west and east of I-5, Martin Luther King Jr. Boulevard to the southeast, and Expo Road to the south. Directional or way-finding signing is confusing or non-existent in some places. Furthermore, the paths connecting the crossing to the larger bikeway network are narrow and place bicyclists close to high-speed traffic, which includes a high percentage of heavy vehicles and high noise levels.

Although there are constraints for pedestrian and bicycle travel across the Columbia River and North Portland Harbor, a substantial number of pedestrians and bicyclists use the existing crossing facilities. In September of 2007, 14-hour weekday counts (from 6 a.m. until 8 p.m.) were taken that showed 64 pedestrians and 304 bicyclists using the Interstate Bridge crossing. Because the count was not for a full 24-hour period, the project extrapolated a full day count of 80 pedestrians and 370 bicyclists. About twice as many bicyclists use the western bridge's sidewalk, primarily because it connects more directly with bicycle routes to the north and south. About 60 percent of the pedestrians crossing the Columbia River use the western sidewalk.

A multi-use pathway is located on the east side of the I-5 crossing of North Portland Harbor. The 14-hour counts showed about 30 pedestrians and 350 bicyclists using the pathway. For comparative purposes, pedestrian and bicycle counts were also conducted on the I-205 crossing. The 14-hour counts showed about 10 pedestrians and 190 bicyclists using the I-205 crossing's multi-use pathway, which meets current standards for pathway width.

Pedestrian and bicycle planning documents and maps from local jurisdictions were reviewed to develop an understanding of the existing and planned facilities in and near the CRC main project area. The maps were aggregated to show all pedestrian and bicycle existing and planned facilities (Exhibit 3.1-13).

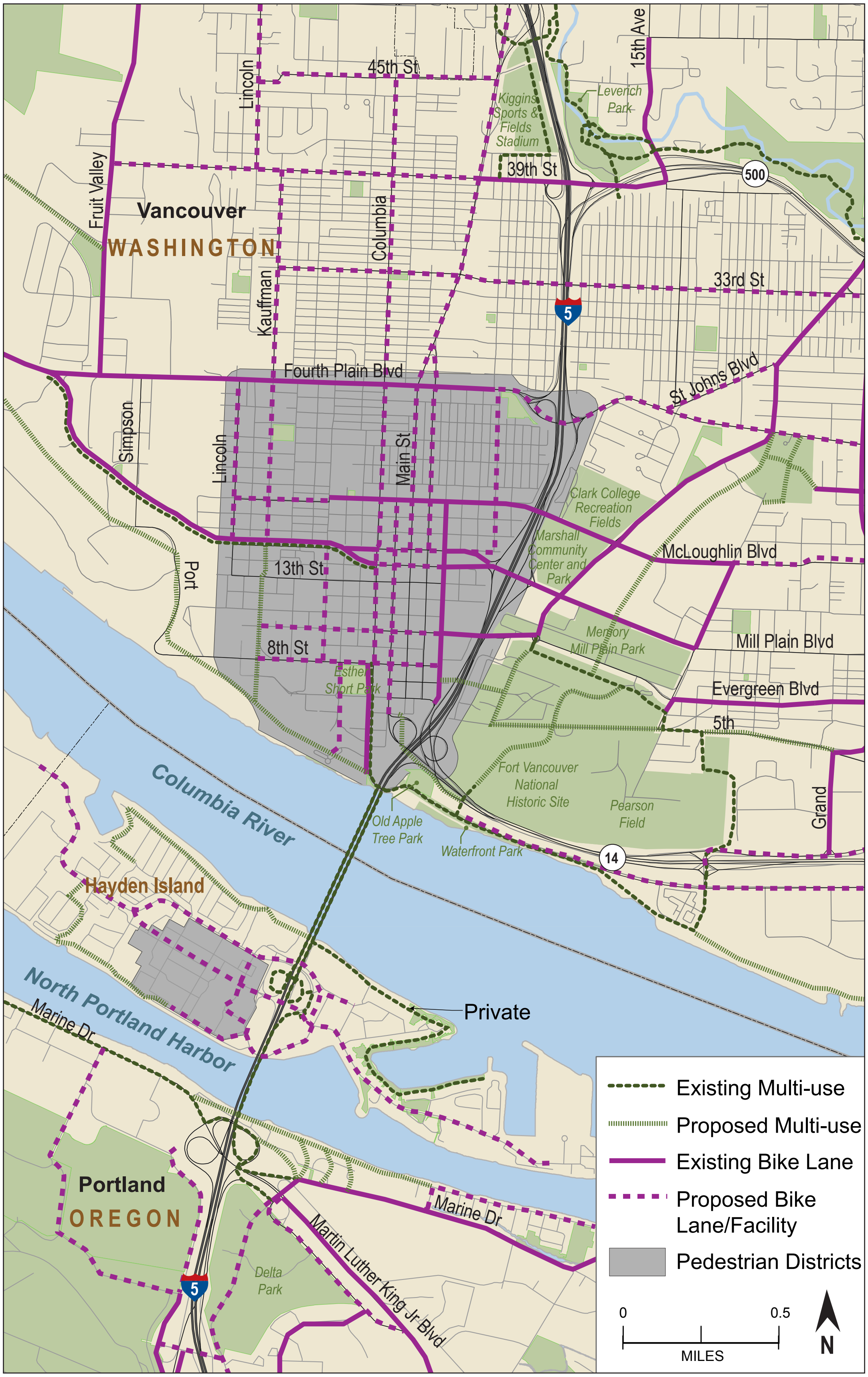
The Portland Transportation System Plan includes several proposed connections for pedestrians and bicycles, and these connections would improve accessibility and safety for users. Notable among the proposed improvements is the Bridgeton Trail along the Columbia River. This trail would improve the connection to the Marine Drive area from the east and provide users with an off-street multi-use pathway option that could eliminate the need to travel on Marine Drive. In addition, a proposed multi-use pathway along the Columbia Slough and along Whitaker Road would improve the connection from the south.

Numerous connections to regional pedestrian and bikeway facilities exist throughout Vancouver. The Waterfront Renaissance multi-use trail on the north bank of the Columbia River provides vehicle-separated access to the Confluence Land Bridge, Vancouver National Historic Reserve, and points farther east. The existing multi-use trail along Columbia Street enables access through downtown Vancouver and to the west and north of the city along Mill Plain Boulevard and Lower River Road towards Vancouver Lake. There are a number of east-west streets with bike lanes that cross I-5 and provide access to the Burnt Bridge Creek Greenway Trail and to the larger system of regional trails in Clark County.

The City of Vancouver has several major streets, such as Columbia Way, that have been identified as future bikeways. These improvements would increase north-south access throughout the city and provide straight-line connections to many neighborhoods and parks in Vancouver. Additionally, the City has

Exhibit 3.1-13

Existing and Proposed Pedestrian and Bicycle Facilities



Dimensions are approximate.

plans to extend the Waterfront Renaissance Trail west from the Columbia River crossing to serve future high-density, mixed-use development on the former Boise Cascade site.

EXISTING TRAFFIC SAFETY

I-5's crash rate in the CRC project area is double that of similar facilities in Oregon. Crash rates are measured in millions of vehicle miles traveled (MVMT).

The project's Purpose and Need statement includes provisions to improve river crossing safety and reduce vulnerability to incidents, to improve substandard bicycle and pedestrian facilities, and to reduce the seismic vulnerability of the existing bridges. This section discusses existing safety data within the CRC main project area, including data from ODOT's Safety Priority Index System (SPIS) and WSDOT's High Accident Location and High Accident Corridor records. A detailed crash analysis was conducted using a 5-year data set that included all collisions in the CRC project area. The data were analyzed by crash type and severity, location, time of day, truck involvement, and the effects of non-standard highway geometrics, bridge lifts, and traffic stops.

Because there have not been significant changes in the corridor with respect to traffic volumes or physical features, safety data from 2002 to 2006 are still representative of current conditions. The original analysis was conducted for years 2000 to 2004 and was updated to cover years 2002 to 2006. The results from these two 5-year periods were very similar. Updating to a more recent period would not likely produce a different result. The analysis and reporting of crash data focused on the 5-year period from 2002 to 2006 for the entire project area. The Oregon SPIS system and the Washington High Accident Location and High Accident Corridor systems are methods used by the respective states to identify specific unsafe locations for statewide comparisons. The 5-year period was used for the primary crash analysis because it provides a more thorough understanding of the safety problems.

Existing Number of Vehicular Crashes and Crash Rates

A comprehensive collision analysis was conducted for collisions reported between January 1, 2002, and December 31, 2006. During that 5-year period, 2,051 crashes were reported on mainline I-5 and its ramps within the CRC project area. An average of one reported crash occurred per day. The Washington segment of the CRC main project area had a crash rate of 1.58 collisions per million vehicle miles traveled (MVMT). This rate is nearly 60 percent higher than the most comparable rate (0.99 collisions per MVMT) for similar highways in WSDOT's Southwest region. In Oregon, the crash rate was 1.08 collisions per MVMT. This is nearly twice the average rate (0.55 MVMT) experienced on similar urban interstate facilities in Oregon.

Existing Vehicular Crashes by Type and Severity

The number, type, and severity of crashes reported in the CRC project area between 2002 and 2006 were compiled and plotted by direction (northbound and southbound) in 0.1-mile increments. Four crash types were reported: rear-end, side-swipe, fixed object, and other. Three severity types were reported: property damage only, injury, and fatality. Exhibits 3.1-14 and 3.1-15 show the number of crashes reported within the CRC project area in Oregon and Washington, respectively.

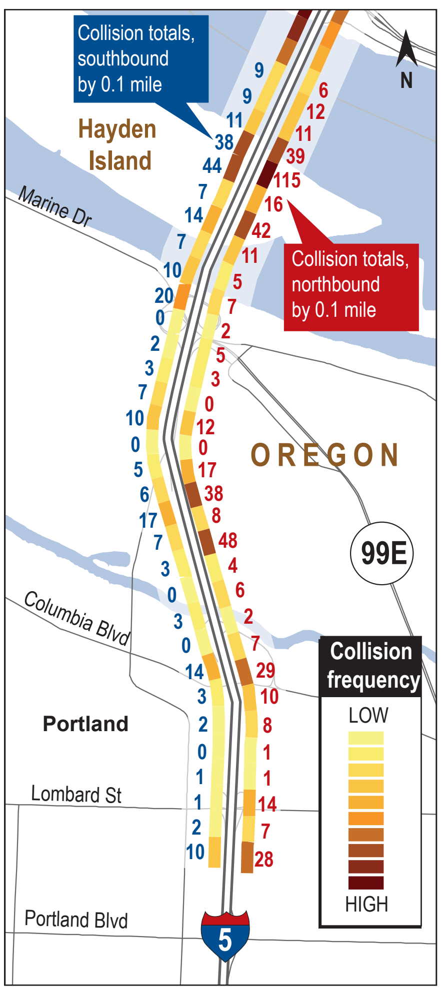
Southbound crashes in Washington happened at almost three times the reported northbound frequency. Fifty-seven percent were rear-ends, and 15 percent were side-swipes. This reflects recurrent southbound traffic congestion at and near the approaches to the bridge.

In Oregon, northbound crashes occurred at about twice the reported southbound frequency, reflecting high northbound congestion levels at and near the bridge approach. Seventy-seven percent of these crashes were rear-ends, and 13 percent were side-swipes.

About 61 percent of the total crashes had property damage only. Injury crashes accounted for almost all remaining collisions, and were more prevalent in the peak direction of travel, southbound in Washington and northbound in Oregon.

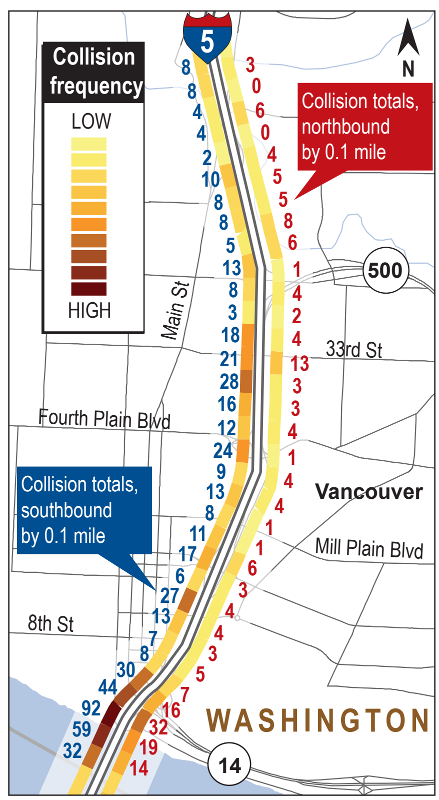
Three fatalities occurred during the 5-year study period from 2002 to 2006, representing 0.1 percent of all crashes. The three fatalities involved either a pedestrian or a bicyclist being struck by a vehicle or truck. Two of the three crashes occurred on southbound I-5 near the Interstate Bridge crossing, one near the Hayden Island southbound on-ramp, and one near the southbound SR 14 on-ramp. The third fatality occurred along northbound I-5, near the Victory Boulevard off-ramp.

Exhibit 3.1-14
Oregon Crashes (2002-2006)



Not to scale.

Exhibit 3.1-15
Washington Crashes (2002-2006)



Not to scale.

Existing Relationship of Vehicular Crashes to Highway Geometrics

While the existing I-5 highway and bridges generally meet design standards applicable at the time of their construction, motor vehicles have changed and standards have evolved over the years, reflecting continued research in areas such as vehicle operating characteristics, driver expectations, traffic volumes, and physical highway elements.

Non-standard geometric features are highly correlated with the type and frequency of crashes in the CRC project area.

Non-standard geometric features exist throughout the CRC project area, including short ramp merges/acceleration lanes, short ramp diverges/deceleration lanes, short weaving areas, vertical curves (crest and sag curves) that limit sight distance, and narrow shoulders. In the CRC project area, there are multiple non-standard features, with the greatest concentration on the Interstate Bridge and along its approaches.

The presence of non-standard design features is strongly correlated with the frequency and type of crashes. For example, non-standard acceleration and deceleration lanes at several on- and off-ramps contribute to a high number of rear-end and side-swipe crashes along northbound I-5, particularly at Hayden Island Drive, SR 14, and the downtown Vancouver/City Center off-ramp. Along southbound I-5, these non-standard lanes contribute to a high number of rear-end and side-swipe crashes at the Fourth Plain Boulevard, SR 14, Hayden Island Drive, and Victory Boulevard interchanges.

Non-standard weaving areas contribute to a high number of rear-end and side-swipe crashes along I-5, primarily southbound between SR 500 and Fourth Plain Boulevard, between Mill Plain Boulevard and SR 14, between Hayden Island Drive and Marine Drive, and between Marine Drive and Victory Boulevard.

Existing Vehicular Crashes During Bridge Lifts and Traffic Stops

The I-5 bridges are equipped with lift spans. Lifting the spans or stopping traffic for maintenance is allowed on weekdays between 9 a.m. and 2:30 p.m., overnight between 6 p.m. and 6:30 a.m., and any time on weekends. Weekday crashes that occurred within a 1-hour window of bridge lifts/traffic stops were analyzed for vehicles approaching the bridge.

Crashes are up to four times more likely to occur during bridge lifts and traffic stops associated with the bridge, and increase substantially during congestion.

Northbound crashes are three times more likely when a bridge lift or traffic stop occurs than when it does not. Southbound crashes are four times more likely during lifts or stops. Crashes during bridge lifts or traffic stops generally show a higher rate of rear-end crashes and greater injury frequency than crashes that occur during peaks, when stops and lifts are not allowed.

Existing Vehicular Crashes by Time of Day

The number of reported crashes is generally proportional to prevailing traffic volumes, except during late night periods when fixed-object and alcohol-related crashes increase. During periods when traffic volumes approach or reach congested levels, crashes increase faster than overall traffic volumes. The frequency of crashes during the congested peak periods is about twice the proportion during uncongested traffic periods. Rear-end crashes are the most prevalent in the CRC project area, and the higher frequency of such crashes during congestion could be the result of existing non-standard design features or vehicular queuing during peak conditions.

Trucks are involved in 12 percent of the crashes in the CRC project area.

Existing Vehicular Crashes Involving Trucks

Crashes involving trucks account for about 12 percent of all crashes reported on I-5 from Lombard Street to Main Street/Highway 99; this is approximately equal to or higher than the proportion of truck volume to all traffic.

In Oregon, 95 crashes involving trucks were reported. Forty-six percent of these crashes occurred southbound and 54 percent occurred northbound. In Washington, 160 crashes involved trucks. Seventy-two percent occurred southbound and 28 percent occurred northbound.

The rate of side-swipe crashes involving trucks is higher than any other type (39 percent). This is generally attributed to truck drivers attempting to change lanes in congested traffic and in short acceleration/deceleration lanes and weaving sections in the CRC project area.

Locations with high numbers of truck-related crashes are the Columbia Boulevard ramps, Victory Boulevard ramps, Hayden Island, and the northbound exit to Marine Drive. The SR 14 westbound to I-5 southbound on-ramp with its short turning radius, steep super-elevation, uphill grade, and short merging distance contributes to the higher number of truck-related crashes at the bridge approach.

Existing Identification of Safety Improvement Locations on State Highways

The Safety Priority Index System (SPIS) is the primary method for identifying locations of frequent crashes on state highways within Oregon. The SPIS score is based on 3 years of crash data and considers crash frequency, crash rate, and crash severity. ODOT bases its SPIS on 0.10-mile segments, to account for variances in how crash locations are reported. To become an SPIS site, a location must meet one of the following criteria:

- Three or more crashes have occurred at this location over the previous 3 years.
- One or more fatal crashes have occurred at this location over the previous 3 years.

Each year, a list of the highest scoring 10 percent of SPIS sites is generated, and the top scoring 5 percent of sites are investigated by the five Regional Traffic Manager's offices for safety problems. If a correctable problem is identified, a benefit/cost analysis is performed and appropriate projects are initiated.

A search of the most recent ODOT SPIS database, covering the 3-year period from 2006 to 2008, revealed that seven highway segments (four of which overlap) within the Oregon section of the CRC project area are among the highest 10 percent of SPIS sites in the state. Two of these locations are in the top 5 percent. These locations are summarized in Exhibit 3.1-16. ODOT does not include crashes on the interchange ramps or intersections in the calculations of SPIS rates for the highway.

Exhibit 3.1-16
ODOT SPIS Locations 2006-2008

Location	Mileposts	Number of Crashes	2009 SPIS Index	SPIS Rank
Columbia Boulevard interchange	305.90 to 306.09	29	69.48	top 5%
Hayden Island interchange	307.72 to 307.82	24	48.92	top 10%
Hayden Island interchange	307.81 to 307.90	12	53.25	top 10%
Hayden Island interchange	307.87 to 308.09	62	74.99	top 5%
Interstate Bridge bridgehead	308.06 to 308.17	16	46.60	top 10%
Interstate Bridge	308.10 to 308.19	17	47.12	top 10%
Interstate Bridge	308.28 to 308.38	19	49.64	top 10%

Source: CRC Traffic Technical Report 2010.

Prior to August 28, 2009 (and during the years for which the crash data in this document were collected and analyzed), WSDOT used two major programs to identify and correct potentially unsafe locations: the High Accident Location (HAL) and the High Accident Corridor (HAC) programs.

A HAL location is a location less than 1 mile long which has experienced a higher than average rate of severe crashes during the previous 2 years. The severity of a crash, the severity per million vehicle miles of travel, and the roadway access category are all taken into account to determine HAL locations.

A HAC is a section of state highway 1 or more miles long, which has a higher than average number of severe crashes over a continuous period of time. For the 5-year analysis period, the following statewide benchmark averages are calculated for each of the six roadway access categories:

- Total severity points per mile
- Total crashes per mile
- Severity points per crash per mile

Information provided by WSDOT revealed that within the CRC project area, the following five locations met the HAL criteria:

- Westbound SR 14 off-ramp to southbound I-5 on-ramp
- Southbound I-5 off-ramp to eastbound SR 14 on-ramp
- Southbound I-5 off-ramp to Mill Plain Boulevard
- Southbound I-5 off-ramp to Fourth Plain Boulevard
- 39th Street between the southbound and northbound ramp terminals

All of these locations are ramp-related, which supports the conclusion drawn from the crash analysis that there are safety issues with the ramps. There were no HAC locations identified within the CRC project area.

On August 28, 2009, WSDOT adopted guidance and direction that the HAL and HAC list (and the terminology) are no longer to be used for identifying and evaluating safety projects. Two new procedures are being developed that will make use of Geographic Information System (GIS) capabilities to screen locations across the state against adopted crash characteristics, and to use the information generated from this analysis as the basis for identifying potential safety improvements. The new methodology will define and use Collision Analysis Locations (or CALs) and Collision Analysis Corridors (or CACs).

EXISTING TRANSIT PERFORMANCE

This section focuses on transit performance measures that offer the greatest distinction among the CRC alternatives and options. These include mobility, reliability, accessibility, and efficiency. The CRC Transit Technical Report, included as an electronic appendix to this FEIS, describes these and other evaluation metrics in more detail.

Existing Transit Ridership and Mode Split

Nineteen transit vehicles per hour currently provide service over the I-5 bridges during the afternoon/evening peak period.

About 3,300 weekday daily transit passenger trips across the Columbia River used the I-5 corridor in 2006.[2] This includes approximately 1,400 trips on the four C-TRAN express bus routes and 1,900 local bus trips.

During the afternoon/evening peak, 67 percent of the persons crossing the river on I-5 northbound are in single-occupancy vehicles (SOVs), 27 percent are in high-occupancy vehicles (HOVs), and 6 percent use transit. These percentages account for persons in all vehicle types, including trucks, as well as trips made between origins and destinations that are outside the Portland-Vancouver region.

Existing Transit Travel Time Between Markets

Exhibit 3.1-17 shows existing transit travel times between representative locations in the CRC transit markets. Transit travel times include those for the northbound and southbound peak times. Traveling from Expo Center to downtown Portland on the MAX line takes approximately 30 minutes.

Exhibit 3.1-17

Existing Average Weekday total Transit Travel Times in the I-5 Corridor

Route	Travel Times (in minutes)
Two-Hour Morning Southbound Peak	
Salmon Creek to Pioneer Square (via C-TRAN Route 134)	36
Vancouver Mall to Lombard Transit Center (via LRT & Route 4L)	31
Two-Hour Afternoon/Evening Northbound Peak	
Pioneer Square to Salmon Creek (via C-TRAN Route 134)	44
Lombard Transit Center to Vancouver Mall (via LRT & Route 4L)	48

Source: 2005 CRC VISSIM analysis of I-5 and EMME/2 as cited in the CRC DEIS.

Note: See Exhibit 3.1-6 for the location of park and rides.

Existing Transit Operation and Maintenance Costs

Exhibit 3.1-18 summarizes the existing annual operation and maintenance transit costs for the study area. To provide the existing bi-state transit service,

2 The CRC On-Board Survey (November 2006).

the transit system requires a total of 2,383 weekday platform hours (with 28,668 vehicle miles traveled). This service results in an associated annual cost to operate of nearly $66 million.

TERMS & DEFINITIONS
Platform Hours

Elapsed time from when a transit bus or train pulls out of a garage into service to when it returns to the garage after completing its service.

Exhibit 3.1-18
Transit System Operation and Maintenance Costs

	Costs in 2007 Dollars
C-TRAN Local Bus	$21,177,000
C-TRAN I-5 Express Bus	$4,150,000
TriMet North Portland Local Bus	$33,111, 000
TriMet Light Rail (Yellow Line)	$6,799,000
C-TRAN Limited Stop Bus	$699,000
Total	**$65,936,000**

Source: C-TRAN, 2007 and TriMet, 2007.

EXISTING PARKING SUPPLY AND UTILIZATION

The project team completed a parking utilization analysis as well as an assessment of the project's impacts to on-street parking. The purpose of the study was to identify baseline on-street parking conditions and to ascertain potential parking-related impacts associated with light rail transit development in Vancouver. The study area boundaries include the Washington-Broadway couplet and 17th Street alignments, as well as a one- to two-block buffer area on either side of these streets. This buffer area was included so that the parking utilization and impact analysis would incorporate all available spaces within a reasonable walking distance of the affected streets and their individual blocks. In commercial areas, a two-block buffer was evaluated. Within residential areas, a one-block buffer was considered.

The inventory conducted for the CRC project found that there were 1,341 on-street parking spaces within the study area. Most of these spaces are signed and metered, but there are also some unregulated spaces. Peak occupancy for a parking area is expressed as the percent of parking spaces occupied within a limited area for a specific period of time. For this study, the peak occupancy was calculated on an hourly basis for each alignment. It should be noted that for the blocks studied with each alignment, different peak occupancy hours were identified, but all occurred during the study period from 10:00 a.m. to 2:00 p.m.

During the peak hour of on-street parking utilization, 43.2 percent of the total on-street spaces in the CRC study area were occupied, leaving 762 spaces out of 1,341 available for use. This peak occupancy finding closely correlates with the findings of the City of Vancouver's study of the core area (Williams 2008). In the City's study, a peak parking occupancy of 46.0 percent was identified for the core of downtown for the noon to 1 p.m. time period. A comparison of 43.2 percent in the larger study area and 46.0 percent in the core area shows that the occupancy during the peak hour for these two studies is within a 3 percent margin of error, which is relatively minor. These peak occupancy percentages are also much lower than the 85 percent occupancy goal[3] typically used to determine parking saturation.

3 The 85% peak occupancy is a standard level for measuring parking surpluses and deficiencies. Having an occupancy rate of 85% is considered full; the additional 15% is a buffer for unexpected peaks.

The downtown core area study was conducted in August of 2008, before the start of the school year when parking demand could be less than during other times of the year. Data for the larger Vancouver area was collected in November 2008 and January 2009. Even with this difference in observation times, parking in Vancouver appears to be relatively constant throughout the year. Seasonal changes do not appear to have an impact on existing patterns of on-street parking in the downtown area. Given that both studies had the same peak hour and had similar peak occupancy rates, data from both studies have been combined to analyze parking impacts from the CRC project.

Based on the on-street parking inventory, the assessment of parking utilization patterns, and the evaluation of parking impacts associated with the proposed project, the resulting conclusions for the downtown Vancouver study area are as follows:

- The City of Vancouver has 1,995 on-street parking spaces in the downtown study area (including both the area studied for the CRC project and from an earlier study of core area parking).
- The majority of on-street parking in downtown Vancouver is intended for customers and is designated as 2-hour or less.
- The common peak hour of vehicle occupancy is 12 p.m. to 1 p.m. for all on-street parking in the study area.
- The peak hour occupancy rate of the study area is 43 percent for the portion of downtown studied for the CRC project. For the portion of downtown previously studied (the core area) peak occupancy is 46 percent.
- The average length of stay for the CRC study area is 2 hours and 13 minutes.
- In the business core area, the Washington-Broadway Couplet alignment has a peak hour occupancy rate of 43.6 percent.
- North of the business core area, the 17th Street alignment has a peak hour occupancy rate of 33.0 percent.
- Existing occupancy rates for areas included in all four of the alignment alternatives considered in downtown are much lower than the 85 percent threshold which is typically used in parking analysis to represent full occupancy.

3.1.3 Long-term Effects

The following section compares the impacts of the LPA options described above with the No-Build Alternative and with the build alternatives evaluated in the DEIS. While the LPA is very similar to Alternative 3 as presented in the DEIS, it should be noted that changes in the transportation demand modeling and analysis process between the DEIS and FEIS have resulted in differences between the findings and conclusions for the LPA and for Alternative 3. Modeling differences are described in Exhibit 3.1-1. These differences also include different park and ride lot sizing assumptions between the DEIS Alternative 3 (Clark College MOS) and the LPA.

Development of Vehicle Traffic Volumes

This section compares traffic demand between the forecast No-Build and LPA in 2030. Traffic volume forecasts were developed as follows:

- Freeway traffic volumes were developed using the seven-step process summarized in the CRC Traffic Technical Report, included as an electronic appendix to this FEIS. The local roadway traffic volumes for Portland were developed using the five-step process summarized in the No-Build section.

- The growth rates used in the Vancouver study area were reviewed with, and agreed upon, by the City of Vancouver staff and are consistent with the adopted Vancouver City Center Vision (VCCV) Plan. The agreed-upon growth rates were applied to existing traffic volumes to forecast 2030 background traffic volumes. This resulted in traffic growth of approximately 50 percent in the morning and afternoon/evening peak periods over the 25-year period, which is approximately a 1.6 percent growth rate per year.

- Park and ride trips were generated for each of the facilities for the peak hour of adjacent street traffic. The trip generation rates were assumed to be similar to existing park and ride facilities located throughout the Portland-Vancouver metropolitan region. Park and ride trips were then assigned to the roadway network, based on origin and destination travel patterns, and evaluated as part of the overall intersection impact analysis. The origin and destination patterns for the park and ride trips were based on forecasts from the regional demand model.

- For financial planning, the Oregon State Treasurer has recommended that the project develop a conservative finance plan that will cover project costs even if 2030 traffic volumes (and thus toll revenues) are lower than the official population and employment forecasts indicate. Given the recent economic recession and other factors that can affect traffic volumes in any given year, this is a prudent approach to financial planning. The CRC project Finance Plan (Chapter 4 of this FEIS) reflects this recommendation. This conservative assumption for financing does not change the official population, employment, or travel demand projections used to develop project design or estimate project impacts in the FEIS. Project design is influenced much more by factors such as long-term trends in peak period volumes and by safety concerns, than by daily volumes. Long-term growth in peak period volumes has been much less affected, and safety factors are largely unaffected, by the recession. In addition, while a delay in meeting the 20-year traffic forecasts would be meaningful for financial planning, it would have little meaningful effect on the design of a facility intended to serve long-term needs and to last for many decades.

Summary of Key Long-term Impacts

Exhibit 3.1-19 compares key transportation performance measures for 2030 for the LPA and the DEIS alternatives. The performance of the LPA with highway phasing options is shown in parentheses. It should be noted that many factors were considered in the selection of the LPA beyond its transportation system impacts and benefits. In general, the LPA is consistently better at meeting the Purpose and Need of the project by providing superior performance in a more cost-effective manner.

Exhibit 3.1-19

Comparison of 2030 Direct Effects to Transportation

	Locally Preferred Alternative[a]						
Metric	LPA Option A	LPA Option B	No-Build Alternative	Alternative 2[g]	Alternative 3[g]	Alternative 4[g]	Alternative 5[g]
Vehicles over the I-5 crossing each weekday							
	178,500	Same as Option A	184,000	179,500	179,500	166,500	166,500
Vehicles over the I-205							
	214,500	Same as Option A	210,000	213,000	213,000	219,000	219,000
People over the I-5 crossing northbound, during peak period[b]							
In vehicles	35,300 (35,200)	Same as Option A	26,500	34,400	34,400	25,700	25,700
On transit	6,100	Same as Option A	2,200	5,350	6,350	5,150	6,450
Hours of congestion per day (northbound and southbound)							
	3.5-5.5 hours	Same as Option A	15.0 hours	Same as LPA	Same as LPA	10.75 hours	10.75 hours
Pedestrian and bicycle connections[c]							
	Provide continuous grade-separated multi-use path between Marine Drive and downtown Vancouver.	Same as Option A	No improvement in comparison with existing deficient conditions.	Same as LPA	Same as LPA	Improvements over the river but has at-grade crossings on Hayden Island.	Improvements but has at-grade crossings on Hayden Island.
Transit mode split in p.m. peak[d]							
	15%	Same as Option A	8%	13%	16%	17%	20%
Transit travel time from Mill Park and Ride to Expo Center							
	6 min	Same as Option A	13 min	8 min	7 min	14 min	8 min
Annual transit operations and maintenance costs ($ million)[e,f]							
	$76.3	Same as Option A	$70.0	$74.9	$72.7	$114.2	$104.7

Metric	Locally Preferred Alternative[a] LPA Option A	LPA Option B	No-Build Alternative	Alternative 2[g]	Alternative 3[g]	Alternative 4[g]	Alternative 5[g]
Traffic safety							
	Reduced congestion and improved highway design would reduce crashes.	Same as Option A	No improvement in comparison with existing conditions.	Same as LPA	Same as LPA	Improvement to highway design for safety, but some compromises on the existing I-5 bridges.	Improvement to highway design for safety, but some compromises on the existing I-5 bridges.
Transit safety and security							
	Light rail stations provide higher level of visibility and lighting than on-street bus stops. Stations would have additional safety measures incorporated into design.	Same as Option A	No improvement in comparison with existing conditions.	Additional buses could increase crashes but dedicated guideway improves separation of modes. Potential security issues would need to be addressed at less visible stations.	Same as LPA	High frequency of buses could increase crashes but dedicated guideway improves separation of modes. Potential security issues would need to be addressed at less visible stations.	Same as LPA

a Information in parentheses indicates impacts if the LPA Option A or B is constructed with highway phasing.

b Total number of people in cars and on transit vehicles using the I-5 crossing traveling north during the afternoon/evening peak period. For the No-Build Alternative the data reflects the volumes expected to be served based on capacity limitations for the I-5 crossing, and not the expected demand as it was estimated by the regional travel demand model. Transit persons for Alternatives 2, 3, 4 and 5 were factored based on Exhibit 3.1-39 of the DEIS to account for a shorter high-capacity transit extension ending at Clark College.

c Only bicycle and pedestrian improvements that differ between alternatives are described. A substantial number of additional bicycle and pedestrian improvements will be provided as part of the CRC project, including those at each interchange in the main project area.

d Percentage of people traveling over the I-5 crossing on transit vehicles in the afternoon/evening peak period, in the northbound direction. Of the alternatives developed for the DEIS, Alternative 3 is the most comparable to the LPA. However, the LPA reflects a shorter light rail line and therefore has less extensive geographic coverage for light rail service than was assumed for Alternative 3. These factors contribute to the lower transit mode split for the LPA.

e Total annual cost to run C-TRAN local and express routes, TriMet North Portland local buses, MAX Yellow Line, and high-capacity transit service.

f All costs are shown in 2007 dollars. Note that the LPA includes more light rail transit vehicles and shorter headways than the other alternatives and, accordingly, reflects higher operating and maintenance costs.

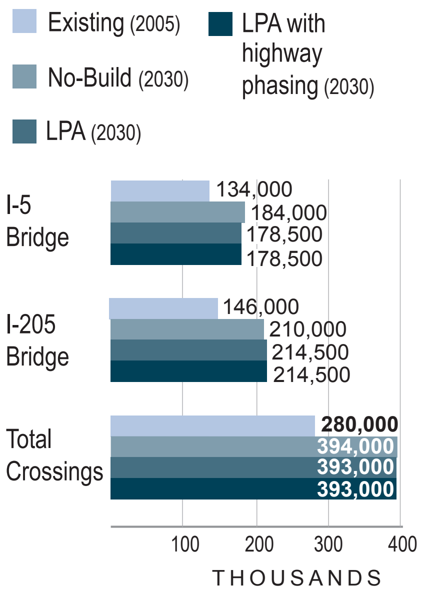
g Taking into account exclusive guideway length, park and ride structure, operating characteristics, etc., some of the transit metrics for these alternatives were extrapolated from data produced from modeling Alternative 3 using ratio differences between alignments.

I-5 and I-205 Traffic Levels

Exhibit 3.1-20 illustrates 2005 and 2030 average weekday traffic volumes under the No-Build, LPA, and LPA with highway phasing. With the LPA Options A and B, the 2030 average weekday traffic across the I-5 crossing is expected to be 178,500 vehicles. This is lower than the 184,000 daily vehicle trips predicted under the No-Build Alternative because of the introduction of high-capacity transit and a toll on the I-5 crossing. Daily traffic volume

Exhibit 3.1-20

Columbia River Crossing Vehicle Trip Comparison



Source: CRC Traffic Technical Report 2011.

on I-205 would increase slightly from 210,000 vehicles per day with the No-Build Alternative to 214,500 vehicles with the LPA, potentially adding to congestion on I-205.

With the LPA with highway phasing, the 2030 average weekday traffic across the I-5 crossing is expected to be 178,500 vehicles, lower than with the No-Build, but the same as the LPA Full Build due to the 10-lane configuration of each bridge option. Daily traffic volume on I-205 would increase to 214,500, representing an increased shift of traffic from I-5 to I-205 in comparison with the No-Build Alternative, but comparable to the LPA. Traffic volumes predicted for I-5 and I-205 reflect the amount of congestion in each corridor, the availability of alternative modes of travel (such as light rail in the I-5 corridor), and the tolling rates on I-5 with the LPA. Since tolls and congestion will vary by time of day, the traffic volume differences between I-5 and I-205 will vary between peak and off-peak periods.

I-5 PEAK TRAFFIC AND PERSON THROUGHPUT

During the 4-hour morning peak (6 a.m. to 10 a.m.), southbound vehicle throughput across the I-5 bridge with the LPA Options A and B is forecast to be 25,600 vehicles, an increase of 16 percent over 2030 No-Build conditions of 22,000 vehicles. While the southbound constriction at the bridge would be eliminated with the new crossing, recurrent traffic congestion from the downstream constriction located just north of the I-405 split would limit the traffic volume served across the I-5 bridges. With the LPA with highway phasing options, southbound vehicle throughput across the I-5 bridge is forecast to be 25,100 vehicles, an increase of 14 percent compared to 2030 No-Build conditions.

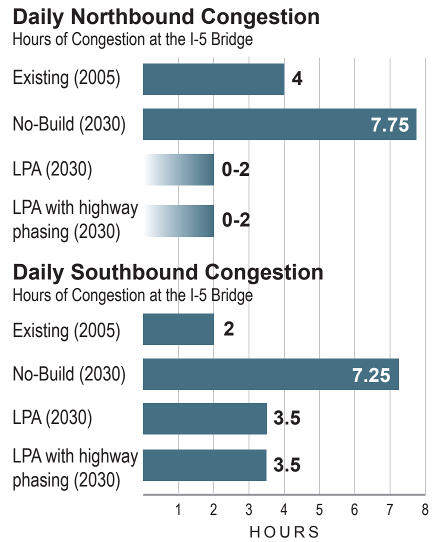
Under No-Build conditions, three southbound ramps in the CRC main project area would have vehicle back-ups during the 4-hour morning peak, while with the LPA, all southbound on-ramp traffic demand would be served except for the SR 14/City Center ramp, which would have vehicle back-ups during the 4-hour morning peak. These back-ups would also occur under the LPA with highway phasing. All LPA options would result in fewer vehicle back-ups at on-ramps than the No-Build Alternative, due primarily to reduced levels of congestion on the I-5 mainline.

During the 4-hour afternoon/evening peak (3 p.m. to 7 p.m.), northbound vehicle throughput across the I-5 bridge with the LPA Options A and B would increase to 29,400 vehicles, an increase of 45 percent over 2030 No-Build conditions of 20,300 vehicles. Elimination of the northbound constriction at the bridge would result in higher vehicle throughput for I-5 in the northbound direction. Under No-Build conditions, five northbound ramps in the CRC main project area would have vehicle back-ups during the 4-hour evening peak, while with the LPA and LPA with highway phasing alternatives, the number of northbound ramps with back-ups during the 4-hour evening peak would decrease to one (Mill Plain Boulevard), due primarily to reduced congestion at the bridge. Under the LPA with highway phasing, northbound vehicle throughput would be comparable to the LPA Full Build.

With the LPA, total person throughput on the I-5 Columbia River bridges is expected to be 36,750 persons in the southbound direction during the morning peak period in 2030, an increase of 32 percent over No-Build conditions (27,850 persons). An expected total of 29,200 persons or 80 percent of total person trips would be made in private vehicles, an increase of 16 percent over No-Build conditions. With the provision of high-capacity transit, up to 7,550 persons or 20 percent of all southbound person trips are forecast to use transit to cross the bridge during this period. With the LPA with highway phasing, total southbound a.m. peak period person throughput would increase to 36,100 persons, a 30 percent increase over No-Build conditions.

Exhibit 3.1-21

Hours of Congestion



Source: CRC Traffic Technical Report 2011.

During the afternoon/evening peak period, total northbound person trips making the I-5 Columbia River crossing are expected to reach 41,400, an increase of 44 percent over No-Build conditions (28,700 persons). With the provision of light rail transit, up to 6,100 persons or 15 percent of total person trips are expected to use transit to cross the Columbia River during this period. With the LPA with highway phasing, total p.m. peak person throughput would increase to 41,300, a 44 percent increase over No-Build conditions.

I-5 TRAFFIC CONGESTION – TRAVEL TIMES AND SPEEDS

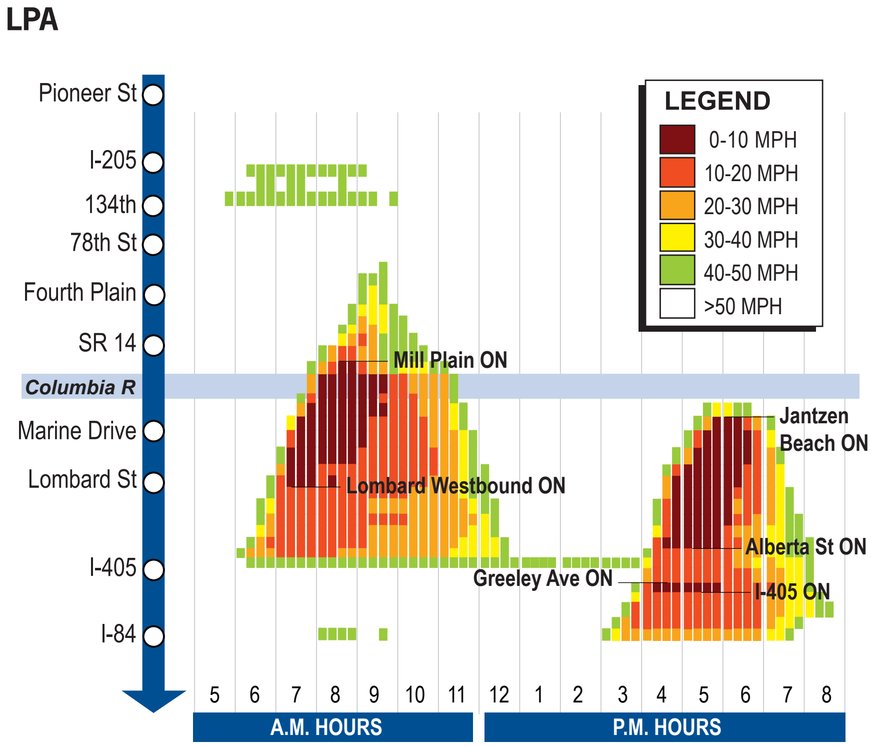
For the purpose of this FEIS, traffic congestion is defined as occurring when average vehicle travel speed on the freeway falls below 30 mph, indicating dense traffic and vehicle queuing. Congestion is measured in terms of the number of hours during a typical day when this condition occurs. Exhibit 3.1-21 presents daily hours of northbound and southbound congestion at the I-5 bridges for 2005 and 2030 under the No-Build, LPA, and LPA with highway phasing.

To further illustrate this delay, profiles of traffic congestion under the LPA were developed to show travel speeds at different locations and times over the 16-hour period from 5 a.m. to 9 p.m. Exhibit 3.1-22 shows southbound traffic, and Exhibit 3.1-23 shows northbound traffic. These profiles help the study team to assess early morning, midday, and afternoon/evening effects along the 23-mile study corridor. For comparative purposes, travel speed profiles for the No-Build Alternative are also included in Exhibits 3.1-22 and 3.1-23. Analysis of Option A and B results in the same speed profiles.

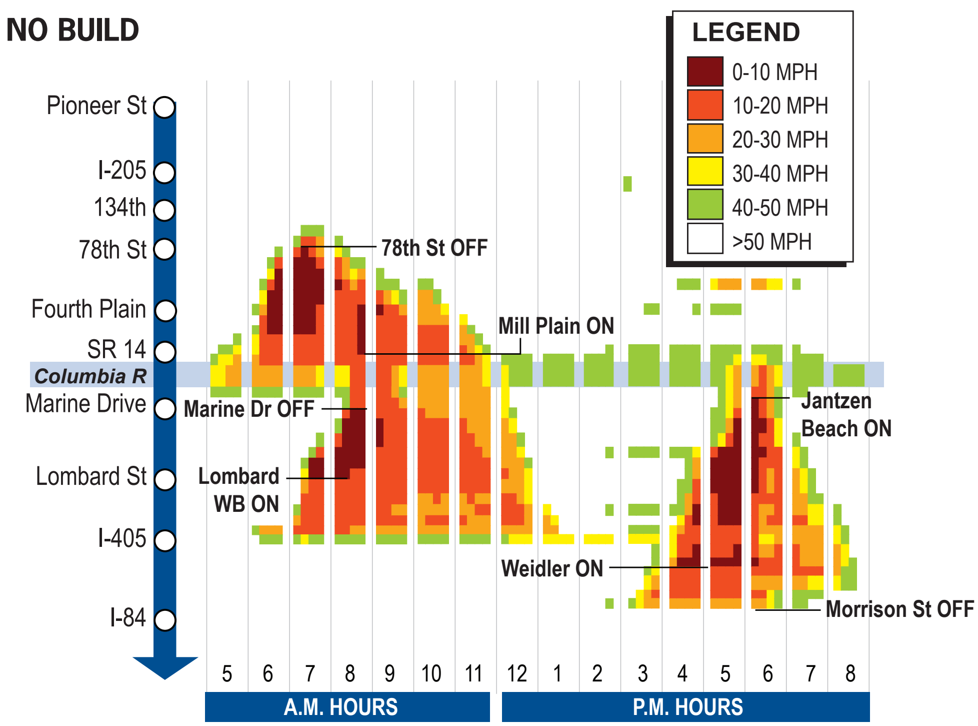
As shown in Exhibit 3.1-22, the LPA Options A and B would reduce the duration of 2030 southbound congestion in the vicinity of the I-5 crossing to 3.5 hours from 7.25 hours for the No-Build Alternative. The traffic congestion remaining at the bridge would result from the existing downstream bottleneck on I-5 just north of the I-405 split backing congestion up into the CRC main project area. The LPA would not exacerbate or worsen this existing bottleneck, although the CRC improvements would enable an increase in vehicle throughput of about 5 percent along I-5 just north of I-405.

Exhibit 3.1-23 shows estimated 2030 northbound traffic queues for the LPA Options A and B. This alternative would eliminate the northbound I-5 crossing bottleneck, as northbound queues would no longer extend from the

Exhibit 3.1-22
2030 Speed Profiles: 5 A.M. to 9 P.M., I-5 Southbound



Source: CRC Traffic Technical Report 2011.



Source: CRC Traffic Technical Report 2011.

Interstate Bridge to I-405 for multiple hours each day. The LPA would reduce the duration of northbound congestion at the I-5 crossing from 7.75 hours under the No-Build Alternative to less than 2 hours of delay, based on travel model output at the I-5 crossing.

Exhibit 3.1-24 and Exhibit 3.1-25 illustrate speed profiles of 2030 traffic congestion with the LPA with highway phasing from 5:00 a.m. to 9:00 p.m. for I-5 southbound and northbound, respectively.

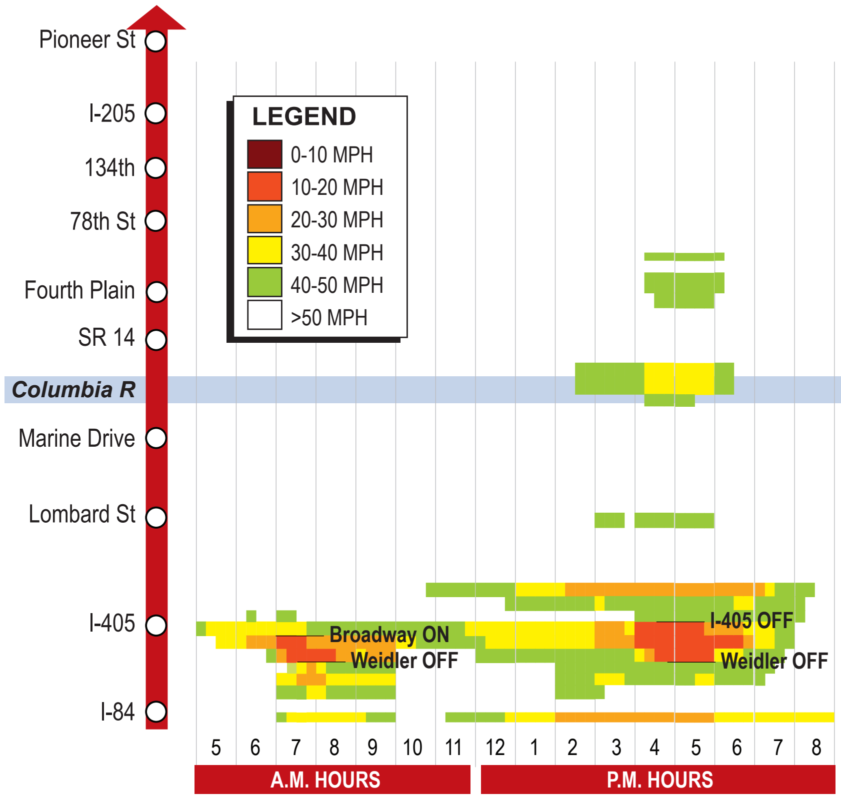
As shown in Exhibit 3.1-24, the LPA with highway phasing would reduce the 2030 AM peak southbound congestion in the vicinity of the I-5 crossing to 3.5 hours from 7.25 hours for the No-Build Alternative. As with the LPA Full Build, traffic congestion remaining at the bridge would result from the existing downstream bottleneck on I-5 just north of the I-405 split backing up congestion into the CRC main project area. The LPA with highway phasing would not exacerbate or worsen this existing bottleneck.

Exhibit 3.1-25 shows estimated 2030

Exhibit 3.1-23

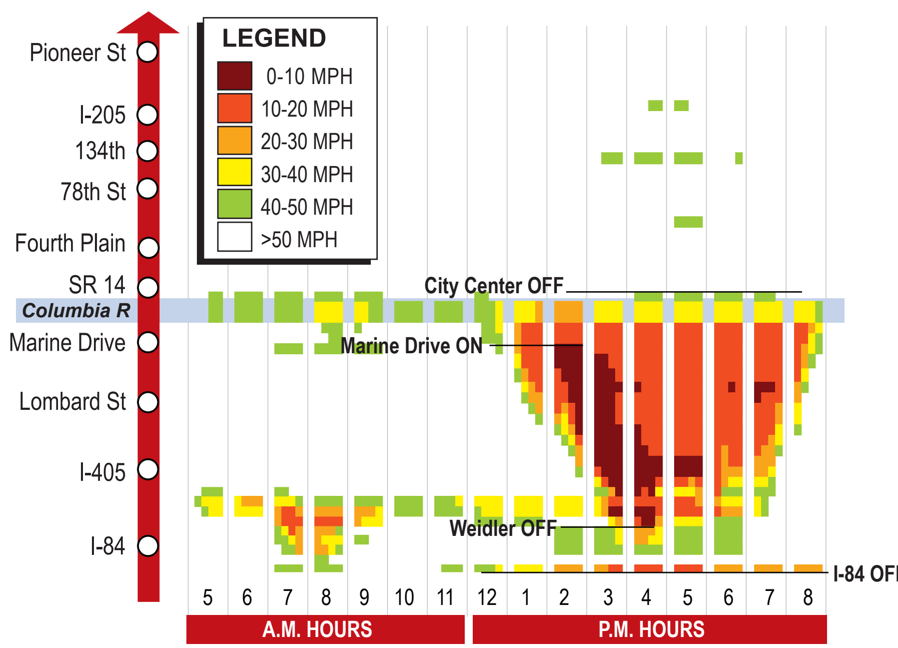
2030 Speed Profiles: 5 A.M. to 9 P.M., I-5 Northbound

LPA



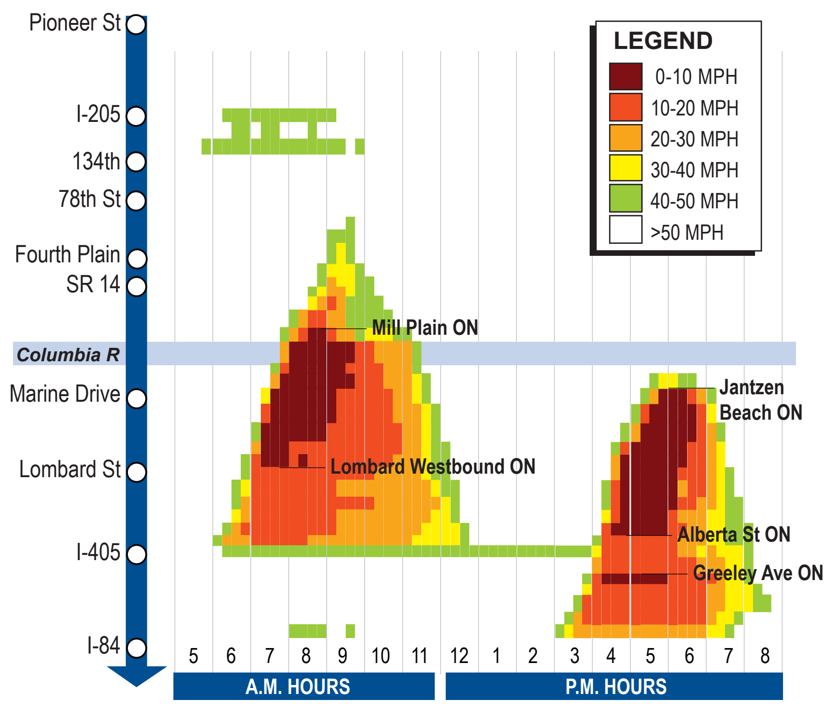
Source: CRC Traffic Technical Report 2011.

NO BUILD



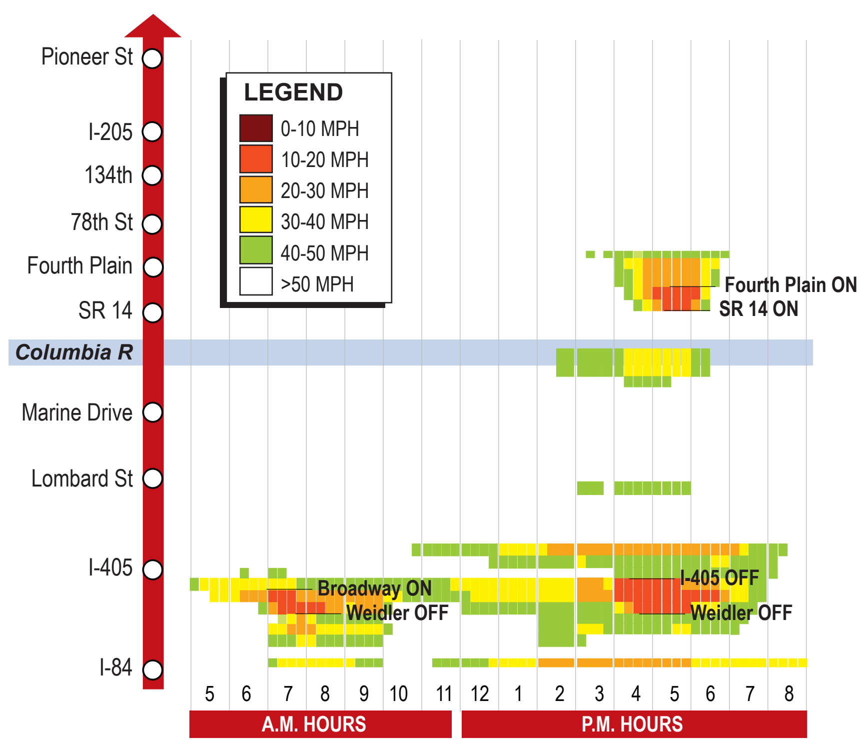
Source: CRC Traffic Technical Report 2011.

Exhibit 3.1-24
2030 LPA with Highway Phasing Speed Profiles: 5 A.M. to 9 P.M., I-5 Southbound



Source: CRC Traffic Technical Report 2011.

Exhibit 3.1-25
2030 LPA with Highway Phasing Speed Profiles: 5 A.M. to 9 P.M., I-5 Northbound



Source: CRC Traffic Technical Report 2011.

northbound traffic queues for the LPA with highway phasing. The LPA with highway phasing would reduce the duration of northbound PM peak congestion at the I-5 crossing from 7.75 hours under the No-Build Alternative to less than 2 hours of delay, based on travel model output at the I-5 crossing.

Vehicle travel time estimates were developed for peak travel directions. Compared to the No-Build Alternative, southbound trips along I-5 from 179th Street to I-84 would experience a 17 percent decrease in travel time during the morning peak, from 46 minutes under No-Build conditions to 38 minutes with the LPA and LPA with highway phasing. Vehicles traveling northbound along I-5 from I-84 to 179th Street during the afternoon/evening peak would experience a 45 percent decrease in travel time, from 44 minutes under 2030 No-Build conditions to 24 minutes with the LPA and LPA with highway phasing. It should be noted that this finding reflects conditions that are expected to occur for a limited period of time during the peak period, and does not reflect the differences in the overall reduction of delay between the LPA and LPA with highway phasing options over the 4-hour peak period, as discussed above.

Traffic Safety

The LPA would improve non-standard geometric and safety design features on the I-5 mainline and ramps within the project area. Improvements would be made to the existing short on-ramp merges/acceleration lanes and off-ramp diverges/deceleration distances, short weaving areas, substandard lane widths, vertical and horizontal curves that limit sight distance, and narrow or non-existent shoulders. The LPA would remove both Interstate Bridge lift spans. In addition, the LPA would substantially reduce traffic congestion compared to No-Build conditions.

As the number of vehicular collisions in the main project area is related to the presence of non-standard geometric design and safety features, which is exacerbated when traffic levels are at or near congested conditions, the LPA would substantially improve traffic safety in the area. It is estimated that the project would reduce average annual yearly collisions in the main project area from 750 under the No-Build Alternative to between 210 and 240 in the LPA.

This estimate was calculated by making the assumption that the highway geometric and safety improvements would result in a highway corridor that performed at least as good as an average, similar type of urban interstate facility in Oregon. The collision rate for similar urban, interstate facilities is approximately 0.55 collisions per MVMT. Applying this rate (with an allowance for a higher collision rate during congested periods and during late evening and early morning hours) to the forecasted traffic volumes over a year period generated an estimated annual collision total of between 210 and 240.

The safety findings would be similar for the LPA and the LPA with highway phasing options.

Local Street Circulation Changes

The LPA includes improvements to seven interchanges along a 5-mile segment of I-5 between Victory Boulevard in Portland and SR 500 in Vancouver. These improvements result in reconfiguration of adjacent local streets to complement the new interchange designs and include new street extensions, added travel lanes, and new and extended turn pockets at key intersections. The new facilities increase accessibility and mobility for vehicular, bicyclist and pedestrian travel. A further description of local street system changes is provided in Chapter 2.2.1.

Local Street Performance

Local street traffic performance is monitored and measured by the Cities of Portland and Vancouver, WSDOT, and ODOT based on the established performance standards for the facilities under their respective jurisdictions. Local street congestion is most intense near the I-5 ramps and is influenced by the travel direction and length of time that I-5 is congested during each weekday. This section summarizes 2030 No-Build and LPA local street performance at selected study intersections. Results are reported for the AM and PM peak hours of travel.

VANCOUVER LOCAL STREETS

The analysis of local street impacts in Vancouver focuses largely on intersections located west of the I-5 corridor. I-5 divides the Vancouver local street system, with community connections limited to Columbia Way, Evergreen Boulevard, Mill Plain Boulevard, McLoughlin Boulevard, Fourth Plain Boulevard, 29th Street, 33rd Street, and 39th Street. Freight movements are heaviest within the I-5/Mill Plain Boulevard and I-5/Fourth Plain Boulevard interchange areas, both serving the Port of Vancouver.

With 2030 No-Build conditions, local street congestion is most intense near the I-5 ramps and is influenced by the travel direction and length of time that I-5 is congested each day. When I-5 is congested, major arterials that provide east/west connectivity are also congested. Of the 86 intersections evaluated for the No-Build condition, seven would not meet acceptable operational standards during the morning peak and 24 would have unacceptable impacts associated with traffic queuing (back-ups). During the afternoon/evening peak period, seven intersections would not meet acceptable operational standards, while 25 would have unacceptable impacts associated with traffic queuing.

The addition of light rail transit in downtown Vancouver would be accompanied by changes to the local street system, including creation of a north/south one-way couplet for both light rail transit and vehicular traffic using Washington and Broadway Streets through the downtown core. Light rail transit would operate with traffic signal progression. Along the one-way couplet, vehicular traffic would be able to move with light rail transit, resulting in minimal delays except at intersections along Washington and Broadway Streets where turns across the tracks are allowed. These turns would be accommodated by separating the light rail transit green signal from the traffic green signal, similar to the practice currently used successfully in downtown Portland.

The transit alignment includes park and ride facilities along Columbia Street (Columbia) south of 5th Street, Mill Plain Boulevard (Mill) between Broadway and Main Streets, and at Clark College (Clark) near the light rail terminus. Approximately 570, 420, and 1,910 parking spaces would be provided at these locations, respectively. The park and ride lots would accommodate transit users who would drive to the lot, park, and then transfer to transit, as well as those dropped off by others. Peak hour vehicle-trip generation for each of these lots is a combination of park and ride trips (entering during the morning peak and departing during the afternoon/evening peak) and quick drop trips (entering and exiting during each peak). Park and ride trip generation for each lot is differentiated by parking trips and drop-off and pick-up trips. The Columbia Park and Ride lot would generate an estimated 310 morning and 280 afternoon/evening peak trips; the Mill Park and Ride lot would generate an estimated 225 morning and 205 afternoon/evening peak trips; and the Clark Park and Ride lot would generate 1,050 morning and 955 afternoon/evening peak hour trips.

With the LPA, the number of intersections analyzed increases to 92. During the 2030 morning peak under the LPA, 91 of these intersections would operate acceptably with improved, similar, or slightly degraded conditions. One intersection would degrade from No-Build conditions and would operate unacceptably: 29th Street at Main/Broadway Street. With the LPA with highway phasing, 90 intersections would operate acceptably with improved, similar, or slightly degraded conditions. Two intersections would degrade from No-Build conditions and would operate unacceptably – the intersection identified under the LPA plus the intersection of 39th Street at H Street.

During the 2030 afternoon/evening peak with the LPA, 89 of the 92 intersections would operate acceptably with improved, similar, or slightly degraded conditions. Three of the local intersections would degrade from No-Build conditions and would operate unacceptably. These include the intersections of Mill Plain Boulevard at C Street, 15th Street at C Street, and 39th Street at the I-5 southbound ramps. With the LPA with highway phasing, 86 of the intersections would operate acceptably with improved, similar, or slightly degraded conditions. Six intersections would degrade from No-Build conditions and would operate unacceptably – the three intersections identified under the LPA plus the intersections of 33rd Street at Main Street, 39th Street at H Street, and 40th Street at Main Street. Overall, both the LPA and LPA with highway phasing would improve local street operations in Vancouver in comparison with 2030 No-Build conditions.

PORTLAND LOCAL STREETS

The Portland local street system is divided by I-5, with community connections across I-5 limited to the following interchange and non-interchange crossing locations: Skidmore Street, Alberta Street, Killingsworth Street, Ainsworth Street, Rosa Parks Way, Lombard Street, Columbia Boulevard, Schmeer Road, Victory Boulevard, Martin Luther King Jr. Boulevard, Pier 99 Street, Jantzen Street, and Hayden Island Drive (overcrossings for non-motorized travel also exist at Failing Street and Bryant/Saratoga Streets). In addition to the interchanges, several local streets and nearby intersections are affected by traffic operations in the I-5 corridor.

Under 2030 No-Build conditions, 25 intersections were analyzed, one of which would not meet applicable performance standards during the morning peak hour – the intersection of Fremont Street with Martin Luther King Jr. Boulevard. During the afternoon/evening peak hour, five intersections would not meet applicable performance standards: Martin Luther King Jr. Boulevard with Fremont and Alberta Streets, Interstate Avenue with Argyle and Going Streets, and Marine Way with Vancouver Avenue.

With the LPA or LPA with highway phasing, Portland's local street operations would improve along the I-5 corridor relative to No-Build conditions. For example, at the I-5 interchange with Marine Drive, 2030 afternoon peak intersection performance would improve from V/C 0.82 (LOS F) with the No-Build Alternative to V/C 0.42 (LOS B) with the LPA. This indicates that the LPA would improve mobility and accessibility to this freight and employment corridor during the afternoon peak. Similar findings were observed during the morning peak. The LPA with highway phasing would improve the 2030 p.m. peak V/C to 0.64 (LOS B) from 0.82 (LOS F).

With either the LPA or LPA with highway phasing improvements, the total number of local intersections and ramps would increase to 38, primarily as a result of additional intersections associated with the local roads in the Hayden Island and Marine Drive interchange areas. During the 2030 morning peak hour, 37 of these 38 intersections and ramps would be expected to operate within acceptable standards, while one would fail to meet standards. The intersection of Interstate Avenue with Going Street is expected to fail to meet applicable performance standards and to require mitigation. During the 2030 afternoon/evening peak hour, with either the LPA or LPA with highway phasing improvements, all intersections would operate within acceptable standards.

Pedestrians and Bicycles

The existing pedestrian and bicycle facilities throughout the CRC main project area are outdated, potentially unsafe, and confusing to navigate. The width of the shared-use pedestrian and bicycle facility on the I-5 bridge is non-standard (generally no wider than 4 feet) and separated from traffic by the bridge girders and non-standard low barriers. The mixing of pedestrians and bicycles in this narrow facility can cause safety problems. Steep grades on the bridge create high downhill speeds for bicycles and difficult uphill climbs for some. In addition, pedestrians and bicyclists are exposed to high noise levels, exhaust, and debris. Nevertheless, the existing facilities are used by both pedestrians and bicyclists.

Several pedestrian and bicycle forecasting scenarios predict that pedestrian and bicycle travel demands would increase substantially if a new I-5 bridge is constructed with sufficient multimodal facilities. Pedestrian travel across the bridge would be expected to increase from 80 daily pedestrians today to between 600 and 1,000 daily walkers in 2030, an increase of 650 to 1,150 percent. The number of bicyclists predicted to use the crossing would increase from 370 today to between 900 and 6,400 riders in 2030, an increase of between 150 and over 1,600 percent. Generally, the proposed I-5 bridge would be expected to serve about five bicyclists for every one pedestrian.

MARINE DRIVE AND NORTH PORTLAND

With the LPA Option A, the proposed Marine Drive interchange area would be entirely grade-separated, with the local road network and multi-use paths running below the interchange. Pedestrian and bicycle improvements at the Marine Drive interchange would include a multi-use path for bicyclists and pedestrians constructed from the Marine Drive interchange, over Hayden Island and the Columbia River, to SE Columbia Way in downtown Vancouver. The general alignment of this multi-use path is illustrated in Exhibit 3.1-26 and would be provided under the freeway on-ramp. The path would be a minimum of 16 feet wide when on structures and would direct users with pavement markings and signage. Horizontal and vertical curves would be designed to provide improved sight distance and flow, and path components would meet ADA accessibility standards. On the west side of I-5, the proposed multimodal bridge would accommodate light rail, local vehicular traffic, bicyclists and pedestrians. Bicycle and pedestrian system improvements made by the LPA in the vicinity of the I-5/Marine Drive interchange are further described in Section 2.2-3.

For the LPA Option B, the configuration of the Marine Drive interchange area would be very much the same as the LPA Option A, described above, with two notable exceptions. A multi-use path would be provided across the North Portland Harbor on the west side of I-5, on the light rail bridge, instead of on the east side of I-5 under the on-ramp bridge as with Option A. This bridge would accommodate only light rail, bicyclists and pedestrians, and not local vehicular traffic. The pedestrian facility under Option B would not be covered and would not therefore provide rain protection as it would under Option A. In addition, the multi-use pathway on the west side of I-5 would follow a slightly different roadway alignment towards the Expo Center.

HAYDEN ISLAND

With the LPA Option A, from North Portland Harbor the new multi-use path would continue on the local multimodal bridge located parallel to and east of I-5 (Exhibit 3.1-26). The multi-use path across Hayden Island would be entirely grade-separated from vehicle traffic. This elevated path would continue north to connect with the Columbia River bridge. Pedestrians and bicyclists on Hayden Island would be able to access the multi-use path at Hayden Island Drive or Tomahawk Island Drive, via connection ramps. To improve east-west connections on Hayden Island, 6- to 8-foot-wide sidewalks would be provided along Jantzen Drive, Hayden Island Drive and Tomahawk Island Drive. Several island streets would also include bike lanes where improvements are made.

Under the LPA Option B, the multi-use path would enter Hayden Island on the east side of the light rail guideway bridge located parallel to and west of I-5 (Exhibit 3.1-26). The pathway would continue on a grade-separated facility north across the island, ultimately entering the easternmost cell below the bridge deck in the northbound bridge over the Columbia River. Pedestrians and bicyclists could access the multi-use path at the North Hayden Island Drive ramp or at the stairs or ramp at the Hayden Island light rail transit station.

RIVER CROSSING

The new northbound freeway bridge over the Columbia River would also accommodate a multi-use pathway under the highway deck. The multi-use path would be 16 to 20 feet wide, located within the superstructure above the bridge columns and below the bridge deck. The multi-use path would separate pedestrians and bicycle traffic with pavement markings. All pedestrian and bicycle improvements would meet ADA accessibility standards. The Project Sponsor's Council, WSDOT, and ODOT made a commitment to implement the recommendations of the Project's Pedestrian and Bicycle Advisory Committee. A copy of a letter dated October 28, 2009, outlining this commitment is available on the CRC Web site. Further

Exhibit 3.1-26
North Portland Bicycle and Pedestrian Improvements

LPA Option A

Dimensions are approximate.

LPA Option B

Dimensions are approximate.

discussion of bicycle and pedestrian facilities that would be developed with the LPA is included in Section 2.2.3

DOWNTOWN VANCOUVER

The multi-use path off the Columbia River bridge would provide access to downtown Vancouver via a ramp to the intersection of SE Columbia Way and Columbia Street. A second access to the Vancouver waterfront would be by stairs or elevator.

The multi-use path would provide connections to regional pedestrian and bikeway facilities that exist throughout Vancouver. These include the Waterfront Renaissance Trail on the north bank of the Columbia River, which provides vehicle-separated access to the Confluence Land Bridge, Vancouver National Historic Reserve, the Old Apple Tree Park, and points farther east. The city has plans to extend the Waterfront Renaissance Trail west of the Columbia River crossing to serve future high-density mixed-use development on the former Boise Cascade site. The existing bike route along Columbia Street enables access through downtown Vancouver and northwest along 15th Street towards Vancouver Lake. There are a number of east-west streets with bike lanes that cross I-5, providing access to the Burnt Bridge Creek Greenway Trail and to the larger system of regional trails in Clark County.

Sidewalks 12 to 18 feet in width would be provided along both sides of Washington Street and Broadway Street along the new light rail alignments, with ADA-compliant crosswalks at all intersections to 17th Street. In some areas, the sidewalk width includes planter strips.

EVERGREEN BOULEVARD AND COMMUNITY CONNECTOR

The existing I-5 overpass for Evergreen Boulevard would be rebuilt. The overpass would have bike lanes and 15-foot sidewalks, with clear delineation and signing. The new pedestrian and bicycle facilities would connect to existing routes along these streets. All improvements would meet ADA accessibility standards.

The new community connector would be built to the south and separate from the existing Evergreen overpass, but with a walkway structure built between the Evergreen overpass and the community connector. It would extend to about the south end of the Barracks Post Hospital building, and would include landscaping, pathways, and other public space. It would function as a lid over I-5 and as a "community connection" between downtown Vancouver and the Vancouver National Historic Reserve. This new public space is proposed as part of the project and provides space for pedestrian amenities and other benefits.

MILL PLAIN BOULEVARD INTERCHANGE

The Mill Plain interchange would receive several improvements for pedestrians and bicyclists. These include bicycle lanes, 12-foot sidewalks, clear delineation and signage, short perpendicular crossings at the ramp terminals, ramp orientations that would encourage high pedestrian visibility, and new connections to F Street and Marshall Park. The ramp crossings would be signalized; however, under both the existing condition and with the LPA, pedestrians are not/would not be permitted to cross Mill Plain Boulevard.

MCLOUGHLIN BOULEVARD AND 17TH STREET

McLoughlin Boulevard currently has designated bicycle lanes which would be retained. The impacted portion of McLoughlin would have bicycle lanes and 12-foot sidewalks rebuilt. Crosswalks and 12-foot sidewalks would be built along the alignment on 17th Street. All improvements would meet ADA accessibility standards.

FOURTH PLAIN BOULEVARD INTERCHANGE

The proposed interchange improvements would increase pedestrian and bicycle safety by adding eastbound and westbound bicycle lanes with a 6-foot sidewalk on the south side. Near where the ramp to northbound I-5 connects with Fourth Plain, there would be a 14-foot multi-use path running north/south to increase cycling and walking access to adjacent neighborhoods on the east side and to the proposed Clark Park and Ride. Bicycle storage would be provided for cyclists at the park and ride. Clearly marked ADA-compliant crossings would be placed at each intersection approaching the park and ride.

29TH STREET AND 33RD STREET

New I-5 overpasses would be built for 29th Street and 33rd Street. Each overpass would have bicycle lanes and 6-foot minimum-width sidewalks, with clear delineation and signing. The new pedestrian and bicycle facilities would connect to existing ones along these streets. All improvements would meet ADA accessibility standards.

SR 500 INTERCHANGE

39th Street would have approximately 6-foot sidewalks and 6-foot bicycle lanes on both the north and south sides from H Street to 15th Avenue where, today, sidewalks only exist on the north side. Also, connections would be made to an existing neighborhood path at N Street in the southeast quadrant of the interchange and to two existing paths at I Street in the northwest quadrant of the interchange. With the LPA with highway phasing option, bicycle and pedestrian improvements associated with phased highway improvements would also be phased.

Transit Performance

TRANSIT RIDERSHIP AND MODE SPLIT

LPA Options A and B include the construction of an approximately 2.9-mile extension of light rail facilities and services from the existing Expo Center Station in north Portland, across Hayden Island and through downtown Vancouver, terminating near Clark College. This alignment is illustrated in Exhibit 3.1-27. The extension of light rail would include construction of the light rail alignment, stations, park and ride lots, and other related facilities; and the purchase and operation of additional light rail vehicles. Adjustments would also be made to existing bus service to avoid duplication with light rail transit service.

The expansion of the light rail network for CRC, as well as for other planned expansions, requires two system upgrades. The expansion of TriMet's existing Ruby Junction Maintenance Facility is required to maintain an expanded fleet of light rail vehicles. Modifications to the Steel Bridge are necessary to accommodate greater light rail vehicle speeds on the bridge (these modifications will not impact vehicular, bicyclist or pedestrian travel).

The LPA includes five new stations with seven platforms, and three additional park and ride facilities north of the existing Expo Center Station. One station would be located on Hayden Island in Portland, three would be located in downtown Vancouver, and one would be located just outside of downtown Vancouver near Clark College. With the LPA, park and ride lots used for bi-state travel between Clark County and Portland would include the existing park and ride lots and the three proposed new park and ride lots: Columbia (approximately 570 spaces), Mill (approximately 420 spaces), and Clark (approximately 1,910 spaces).

The discussion of transit ridership and mode split in this section refers to the primary transit market traveling through the CRC main project area and not to the entire Portland-Vancouver metropolitan area. Mode split in this discussion differs from transit mode split identified in the person trip discussion presented earlier, because this section focuses primarily on potential travel markets where transit offers a reasonable alternative to travel in a personal vehicle. Accordingly, the transit mode split findings in this section exclude trips that could not reasonably be attracted to transit. This would include: 1) trips that use I-5 in the project corridor but pass entirely through the region without stopping, 2) trips that come into or leave the region with a local stop, and 3) freight traffic. All of these trips are included in the person trip discussion earlier in this section.

The travel market studies focused on the commute trip between the residential areas north of the Portland central city and the Portland central city, rather than on through trips or wider regional or intercity travel trips on I-5. The majority of daily transit trips between the central cities (Portland and Vancouver) and the rest of the project corridor are primarily home-based trips. Home-based trips include all trips that are made to or from a person's home to or from their place of work, school, or other activity.

Exhibit 3.1-27
LPA Transit Alignment

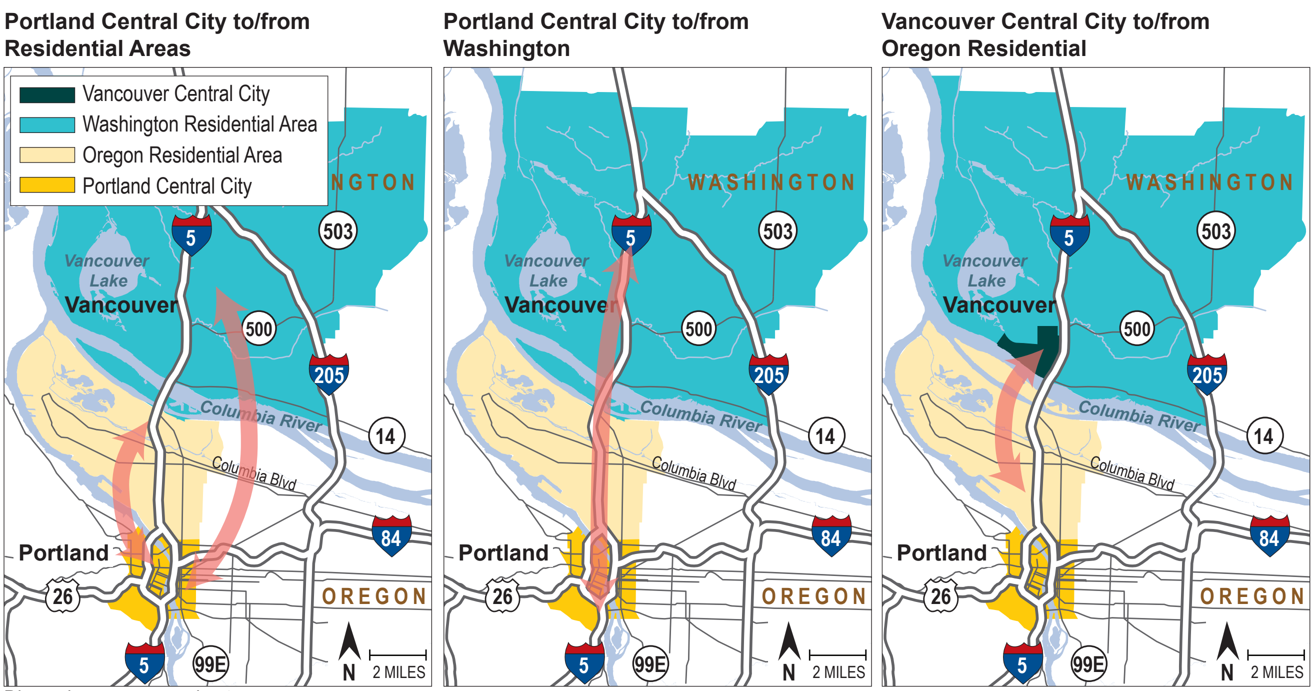
Dimensions are approximate.

As shown in Exhibit 3.1-28, there are three major markets for home-based transit trips in the project corridor:

- Between the Portland central city and the project corridor residential areas (in both states)
- Between the Portland central city and the broader Washington residential area of the project corridor
- Between the Vancouver central city and the Portland residential areas

Exhibit 3.1-28
Major Transit Market Locations

Market Origins and Destinations:



Dimensions are approximate.

Exhibit 3.1-29 shows the transit mode share for commute trips on an average weekday for 2005, the 2030 No-Build Alternative, and the 2030 LPA. The mode share reflects the percent of the total trips that are taken on transit for the major transit markets. Transit mode share increases substantially by 2030 for both the No-Build Alternative and the LPA. In the LPA, trips between the key markets have a mode split that exceeds that in the No-Build for all three transit service markets that were studied. With the LPA, the percent increase of transit trips is substantially greater than with the No-Build for the markets connecting Oregon and Washington commuters. Portland central city and Washington residential areas trips increase by 98 percent, and the Vancouver central city and Oregon share of project corridor trips increase by 50 percent.

Exhibit 3.1-29

Comparison of Average Daily Transit Mode Share in Key Markets in the Project Corridor

(2030 Average Weekday Trips and Percent Increase)

Markets (Origin and Destination Pairs)		2005	2030 No-Build		2030 LPA[b]	
Between:	And:	Transit Commute Trips	Transit Commute Trips	% Increase over 2005	Transit Commute Trips	% Increase over 2030 No-Build
Portland Central City (1,2,3)[a]	Project Corridor Residential Area (4-6, 12-18 and 21)	21%	31%	47%	39%	26%
Portland Central City (1,2,3)	WA part of Project Corridor Residential Area (13-18 and 21)	15%	22%	46%	38%	76%
Vancouver Central City (13)	OR part of Project Corridor Residential Area (4-6 and 12)	11%	26%	127%	39%	51%

Source: CRC Transit Technical Report 2010.

Note: Numbers and percentages are rounded.

a Numbers in parentheses indicate districts comprising a location. See Exhibit 3.1-28.

b Includes both Options A and B.

With LPA Options A and B, transit would account for 39 percent of trips between the project corridor and the Portland central city, 38 percent of the trips between the Portland central city and the Washington part of the project corridor, and 39 percent of the trips between the Vancouver central city and the Oregon part of the project corridor.

The LPA would more than double the number of transit passenger trips over the I-5 crossing, compared to the 2030 No-Build Alternative. For weekdays, there would be approximately 20,600 bridge crossings on transit, compared to approximately 10,200 trips under the 2030 No-Build Alternative. Of the transit passengers crossing the Columbia River under the LPA, about 18,700 would be on light rail transit (91 percent) and about 1,900 would be on buses (9 percent).

TRANSIT TRAVEL TIMES

Travel times vary by time of day, direction of travel and travel mode. Travel times improve for transit in the LPA Options A and B compared to the 2030 No-Build Alternative. More specifically, the LPA:

- Improves transit travel times region-wide
- Improves transit travel times relative to automobile travel times
- Improves reliability of transit travel times

As shown in Exhibit 3.1-30, the in-vehicle and total transit travel times for all of the origin and destination pairs that were studied would improve with the LPA, compared to the 2030 No-Build Alternative, with savings ranging from 6 to 24 minutes in the southbound direction during the morning peak period. For example, with the LPA a transit trip between downtown Vancouver and

Hayden Island would save a total of 6 minutes in comparison with the 2030 No-Build Alternative, while a trip between Clark College and Pioneer Square would save 24 minutes. During the afternoon/evening peak period in the northbound direction, travel time savings would range from 8 to 28 minutes. For example, a transit trip between Hayden Island and Vancouver would save an estimated 5 minutes in comparison with the No-Build Alternative, while a trip between Pioneer Square and Clark College would save 28 minutes (dropping from 72 minutes with the No-Build to 44 minutes with the LPA). Transit reliability between major origins and destinations would be higher due to the availability of light rail that travels in an exclusive guideway.

Exhibit 3.1-30

Comparison of 2030 Peak Period Total Transit Travel Time

Transit Trips				
Between:	**And:**	**2030 No-Build**	**2030 LPA**	**Minutes Saved with LPA**
Southbound in Morning Peak				
Downtown Vancouver	Hayden Island	16 minutes	10 minutes	6 minutes
Clark College	Pioneer Square	68 minutes	44 minutes	24 minutes
Northbound in Afternoon Peak				
Hayden Island	Downtown Vancouver	18 minutes	10 minutes	8 minutes
Pioneer Square	Clark College	72 minutes	44 minutes	28 minutes

TRANSIT SAFETY AND SECURITY

The extension of light rail north from its existing terminus at the Expo Center would cross several intersections at grade. Train frequency in the peak periods is estimated to have 7.5-minute headways with greater headways during off-peak periods. Positive traffic control such as signalization, signage and pedestrian treatments would be used to enhance the safety of other vehicles, pedestrians and bicyclists traveling near light rail vehicles. Transit security on vehicles and at stations and park and ride lots would also be addressed during the design, construction, and operational phases of the project. Examples of safety measures which may be designed into the project include:

- Physical barriers such as medians, fencing, landscaping, or chain and bollard (short, vertical posts) to help channel automobiles, pedestrians, and bicyclists
- Signage, tactile pavers,[4] audio warnings, and pavement markings at track crossings to alert individuals they are approaching tracks
- Active treatments such as flashing lights, bells, and illuminated and audible warning devices in traffic signals
- The creation of inviting, well-lighted platforms and station areas
- Maintaining clear sight lines for oncoming trains
- Implementing a public safety education campaign before the start of service

4 Tactile pavers, sometimes known as truncated domes, are textured surfaces placed at crosswalks and other locations to provide a safety warning to visually impaired persons using the intersection or facility.

Light rail would require expansion of the existing Ruby Junction Maintenance Facility in Gresham. Light rail vehicles using this maintenance facility would not be carrying passengers. The proposed expansion is unlikely to have an adverse effect on safety or security.

Vehicle Miles Traveled

Both Washington and Oregon have policy and law based on goals to reduce overall vehicle miles of travel by automobiles. In 1991, the Oregon Land Conservation and Development Commission (LCDC) adopted the Transportation Planning Rule (TPR) to further enhance the planning connection between land use and transportation. The TPR also requires that Metro reduce vehicle miles traveled (VMT) per capita by 10 percent over 20 years, and by 20 percent over 30 years. The State of Washington, City of Vancouver, and numerous other agencies have similar goals for VMT reduction.

Goals to reduce vehicle miles of travel do not directly apply to individual transportation projects. However, a VMT analysis was completed to determine the LPA's contribution to this effort. Exhibit 3.1-31 shows that by 2030, VMT is expected to increase in the region in comparison with existing conditions. However, despite increasing the number of lanes in the corridor, the LPA would contribute to a reduction in regional VMT in comparison with the No-Build Alternative. This would be accomplished with the use of congestion pricing and the extension of the light rail transit system into Vancouver. Also, improved interchange performance would draw vehicles back to the interstate that would have otherwise traveled greater distances on local street networks to avoid otherwise heavily congested segments of I-5.

Exhibit 3.1-31

Regional Vehicle Miles Traveled

9-Hour VMT			9-HR VMT Difference (from No-Build to LPA)[a]	% of Growth (from No-Build to LPA)
Existing (2005)	No-Build (2030)	LPA (2030)		
26,215,413	36,701,203	36,414,469	-286,734	-0.78%

a Includes both Options A and B.

In addition to reducing regional VMT, the LPA would improve speeds in the corridor by improving safety and providing add/drop lanes that reduce congestion.

Transportation Demand Management/Transportation System Management

Transportation demand management (TDM) measures seek to reduce the number of single-occupancy motor vehicles using the road system and transportation system management (TSM) measures are designed to improve the efficiency of existing roadways. Many region-wide TDM and TSM programs are already in place and supported by agencies and adopted plans. These programs are well coordinated and are having results. In most cases, the impetus for the TDM plan is from state-mandated programs: Oregon's

Employee Commute Options (ECO) rule or Washington's Commute Trip Reduction (CTR) law.

The CRC project provides TDM opportunities by promoting non-single occupancy vehicle (non-SOV) modes to fulfill more of the travel needs in the corridor. These include:

- Major new light rail line with connections to express bus and feeder routes operated by C-TRAN and TriMet
- Modern bicycle and pedestrian facilities that accommodate more bicyclists and pedestrians, and improve connectivity, safety, and travel time
- Park and ride facilities
- A variable toll on the highway crossing

In addition to these fundamental elements of the project, measures may be implemented that would help existing or expanded TSM programs to maximize the capacity and efficiency of the system. These include:

- Replacement or expanded variable-message signs (VMS) or other traveler information systems in the CRC main project area
- Continued incident response capabilities
- Queue jumps or bypass lanes for transit vehicles where multi-lane approaches are provided at ramp signals for entrance ramps
- Expanded traveler information systems with additional traffic monitoring equipment and cameras

On-Street Parking Impacts

The proposed project would result in impacts to on-street parking along the blocks fronting directly onto the light rail transit alignment. When considered in the context of available parking within one to two blocks of the impacted block faces, existing parking demand is not expected to exceed available supply. (See exhibit 3.1-32 for detailed findings.)

IDENTIFICATION OF IMPACTS

Exhibit 3.1-32 summarizes the existing parking supply, as well as demand, available surplus parking spaces, and percent of parking spaces utilized during the peak demand period along Washington and Broadway Streets. The exhibit also includes a summary of spaces remaining after the project is implemented, the surplus of spaces that would remain with the project (in comparison with existing demand), and the percent of remaining parking spaces utilized during the peak period. This information is augmented by a summary of total parking spaces not only along the block faces immediately adjacent to the project, but also within roughly a one- to two-block radius. Impacts to available parking supply in relation to demand can be determined from the data in this exhibit. It should be noted that the comparison of existing parking demand with available supply after construction of light rail does not consider the parking demand which might accompany redevelopment activity along the alignments or future public parking development projects. The nature of or potential for such redevelopment is unknown at this time, and it is anticipated that parking demand for such uses would be addressed at the time of development.

Washington Street Impacts

As indicated in Exhibit 3.1-32, there are several locations where the project would impact existing parking demand along the light rail transit alignment. For six blocks along Washington Street, the project would result in a total displacement of existing on-street parking. For six other blocks along Washington Street, the total parking supply that would be retained is less than what currently exists. On-street parking remaining with the LPA cannot accommodate all existing demand. In the aggregate, existing parking demand would equal 161 percent of the available remaining supply along Washington Street.

Demand for on-street parking that would no longer be accommodated on Washington Street after construction of light rail transit could be readily accommodated by surplus available parking along blocks in the immediate vicinity of the project, typically within a one- to two-block walking distance or less. When nearby parking space availability is also considered, existing demand within a one- to two-block corridor along the light rail transit alignment would consume only 69 percent of available supply. After accommodating relocated parking demand from the light rail transit alignment on Washington Street, 124 on-street parking spaces within one to two blocks of Washington Street would be available to accommodate future demand.

Broadway Street Impacts

Along Broadway Street, four blocks would see a total displacement of existing on-street parking. Along seven other blocks, some on-street parking would be retained after construction of light rail transit. A comparison of existing on-street parking demand with remaining available supply along Broadway Street indicates that existing demand would equal 102 percent of available supply.

Demand for on-street parking that would no longer be accommodated on Broadway Street after construction of light rail transit could be readily accommodated by surplus available parking along blocks close to the light rail transit alignment. When nearby parking space availability is considered, existing demand within a one- to two-block corridor along the light rail transit alignment would consume only 46 percent of available supply. After accommodating relocated parking demand from the light rail transit alignment on Broadway Street, 138 on-street parking spaces within one to two blocks of Broadway Street would remain available to accommodate future demand.

7th Street Impacts

Exhibit 3.1-32 also summarizes parking data and potential impacts for a segment of 7th Street between Washington and Broadway Streets. Currently, 59 percent of the available on-street parking along this street is utilized by existing demand. All of this parking would be removed by the project, but there is sufficient available space within one to two blocks to accommodate the demand. After relocation of existing demand along 7th Street, the on-street supply in the vicinity would be 79 percent utilized. Eight spaces would remain that could be used to accommodate future demand.

McLoughlin Boulevard Impacts

East of G Street to Marshall Center, 129 on-street parking spaces would be removed with the project on McLoughlin Boulevard to accommodate trackway and the terminus station. The on-street parking utilization studies conducted for downtown Vancouver were focused on parking spaces serving adjacent commercial and residential land uses. The spaces along McLoughlin, from G Street to the Marshall Center, are utilized differently, providing parking for community center users and for special events at the park. Therefore, the project team used a qualitative approach to analyzing parking utilization in this area, meeting with Marshall and Luepke Center staff to discuss peak periods and daily demand for parking. This coordination will continue and includes plans for allowing shared use of the Clark Park and Ride facility which will offset the loss of on-street parking.

17th Street Impacts

As illustrated in Exhibit 3.1-32, existing demand along 17th Street consumes 383 percent of the available supply. The project would eliminate on-street parking along six blocks of this street and would retain some parking along one block, the segment between Washington and Main Streets. With light rail transit, demand would exceed available supply along 17th Street by well over 100 percent. However, when consideration is given to available replacement parking within one to two blocks of each displaced block, all parking demand can be readily accommodated. In the aggregate, existing demand along 17th Street would equate to 70 percent of available supply within this one- to two-block area. After meeting the needs of parking demand displaced by light rail transit, 43 on-street parking spaces would remain to accommodate future demand in the area.

SUMMARY

In summary, even with a reduction in the number of parking spaces immediately adjacent to the proposed light rail transit alignment, there is sufficient surplus of spaces on block faces within a one- to two-block walking distance to accommodate the existing peak parking demand within the study area. Also, the City of Vancouver, C-TRAN, and Federal Transit Administration (FTA) will evaluate possible shared use agreements that will enable spaces within the park and ride facilities to be used to support special events, as well as existing or planned development.

Exhibit 3.1-32

On-Street Parking Impacts

Location	Existing on Adjacent Block Face				With LRT on Adjacent Block Faces			Including Adjacent and Nearby Spaces	
	Peak Hour Demand[a]	Spaces[b]	Peak Hour Surplus	Peak Hour % Utilized	Spaces Left	Peak Hour Surplus	Peak Hour % Utilized	Peak Hour % Utilized	Available for Future Use
Washington Street									
McLoughlin to 17th	3	10	7	30%	10	7	30%	72%	9
17th to 16th	4	14	10	29%	6	2	67%	43%	8
16th to 15th	2	8	6	25%	0	(2)	**+100%**	37%	12
15th to Mill Plain	2	9	7	22%	6	4	**33%**	32%	26
Mill Plain to 13th	3	13	10	23%	6	3	50%	34%	19
13th to 12th	6	10	4	60%	0	(6)	**+100%**	36%	23
12th to 11th	6	10	4	60%	5	(1)	**120%**	71%	12
11th to Evergreen	8	14	6	57%	8	0	**100%**	72%	11
Evergreen to 9th	11	11	0	**100%**	5	(6)	**220%**	**100%**	04
9th to 8th	13	13	0	**100%**	0	(13)	**+100%**	**100%**	**0**
8th to 7th	6	12	6	50%	0	(6)	**+100%**	83%	5
7th to 6th	3	6	3	50%	0	(3)	**+100%**	**86%**	3
6th to 5th	7	9	2	78%	0	(7)	**+100%**	**87%**	62
Totals	**74**	**139**	**65**	**53%**	**46**	**(28)**	**161%**	**69%**	**124**
Broadway Street									
McLoughlin to 17th	8	14	6	57%	12	4	67%	67%	4
17th to 16th	2	10	8	20%	2	0	**100%**	60%	2
16th to 15th	2	8	6	25%	0	(2)	**+100%**	21%	19
15th to Mill Plain	4	10	6	40%	5	1	80%	33%	14
Mill Plain to 13th	2	4	2	50%	0	(2)	**+100%**	19%	21
13th to 12th	1	12	11	8%	0	(1)	**+100%**	18%	28
12th to 11th	2	12	10	17%	7	5	29%	38%	21
11th to Evergreen	7	18	11	39%	7	0	**100%**	63%	17
Evergreen to 9th	3	2	(1)	100%	0	(3)	**+100%**	78%	5
9th to 8th	10	17	7	59%	2	(8)	**500%**	**92%**	2
8th to 7th	1	5	4	20%	6	5	17%	17%	5
Totals	**42**	**112**	**70**	**38%**	**41**	**(1)**	**102%**	**46%**	**138**
7th Street									
Washington to Main	9	11	8	82%	0	(9)	**+100%**	**100%**	0
Main to Broadway	7	16	9	44%	0	(7)	**+100%**	69%	8
Totals	**16**	**27**	**11**	**59%**	**0**	**(16)**	**+100%**	**79%**	**8**
McLoughlin Boulevard									
G St to I-5	--[c]	54	--	--	0	--	--	--	0
I-5 to Marshall Center	--[c]	75	--	--	0	--	--	--	0
Totals	**--**	**129**	**--**	**--**	**20**	**--**	**--**	**--**	**35**
17th Street									
Washington to Main	7	17	10	41%	4	(3)	78%	68%	7
Main to Broadway	12	19	7	63%	0	(12)	**+100%**	**95%**	1
Broadway to C St	4	11	7	36%	0	(4)	**+100%**	**86%**	3
C St to D St	3	9	6	33%	0	(3)	**+100%**	67%	4
D St to E St	6	13	7	46%	0	(6)	**+100%**	59%	9
E St to F St	0	14	14	0%	0	0	**+100%**	30%	16
F St to G St	4	12	8	33%	0	(4)	**+100%**	84%	3
Totals	**36**	**95**	**59**	**38%**	**4**	**32)**	**900%**	**70%**	**43**
GRAND TOTAL[d]	**168**	**373**	**205**	**45%**	**91**	**(77)**	**185%**	**63%**	**313**

Note: Bold data in columns that present Peak Hour Percent Utilized reflect locations where demand uses at least 85% of available capacity or street totals.

a Peak hour demand based on 2008/2009 data

b Parking space inventory updated to June 2011.

c These block faces are located outside of the parking utilization study area, and, consequently, no parking utilization data are available.

d Excludes McLoughlin Boulevard since data available is not comprehensive or complete.

3.1.4 Temporary Effects

The discussion of temporary effects associated with the LPA and LPA with highway phasing focuses on traffic and transit impacts during construction.

Traffic Construction Impacts

Construction of the LPA would result in temporary impacts to local and regional traffic operations. These impacts would include increased congestion on several major traffic facilities in the corridor, including I-5 and, potentially, I-205; impacts resulting from traffic relocations or detours and full or partial street closures; and increased truck traffic associated with construction activity. Impacts could also result from the intrusion of non-local traffic into residential areas as a result of temporary street closures and traffic detours, disruptions to vehicular and pedestrian access to businesses and community services, and the temporary loss of on- or off-street parking.

A major element of the LPA would be construction of new bridges over North Portland Harbor and the Columbia River to accommodate vehicular, light rail, and non-motorized traffic, coupled with a partial or complete reconstruction of I-5 from south of the Victory Boulevard interchange in Portland to north of the SR 500 interchange in Vancouver. Construction of bridges over the Columbia River is the most substantial element of the project, and this element sets the sequencing for other project components. The main river crossing and immediately adjacent highway improvements would account for the majority of the construction activity necessary to complete this project.

The LPA also includes complete reconstruction of freeway interchanges at Marine Drive, Hayden Island, SR 14, Mill Plain Boulevard, and Fourth Plain Boulevard. The I-5 interchanges at 39th Street and SR 500 would be modified, including the addition of a direct connection between SR 500 and I-5 to the north (not included in the LPA with highway phasing options). Another major element of the LPA would be construction of light rail stations, trackway, and park and ride lots between the existing Expo Center station and a station near Clark College in Vancouver. High levels of truck traffic are anticipated in connection with earthwork and the delivery of materials at the bridge crossings, freeway mainline segments, and interchanges. Several construction staging areas at various locations in the corridor would be needed.

Construction in the vicinity of Marine Drive is expected to include partial closure of this street and/or development of detour routing to accommodate vehicular traffic, particularly trucks moving between the freeway and the Columbia Corridor and Rivergate industrial areas. Temporary access may need to be provided to Delta Park and residential/business areas on the east side of the freeway and to the Expo Center on the west side. Existing transit, bicycle, and pedestrian connections must also be maintained, including access to the Expo Center light rail station and 40-Mile Loop Trail.

On Hayden Island the LPA provides for reconstruction of the existing I-5 interchange, including a new light rail station and track modifications to local traffic circulation, and the development of a local multimodal bridge between the island and the Oregon mainland (Option A) or a system of ramps with auxiliary freeway lanes (Option B). Temporary access routes would need to be maintained to ensure continual multimodal access to the island for residents and businesses, as well as connections on the island between areas to the east and west of the freeway. A high level of truck activity associated with freeway, bridge, ramp and local circulation facility construction is anticipated.

Construction within downtown Vancouver would likely require full or partial closure of sections of Washington Street, Broadway Street, 7th Street, and 17th Street, and a short segment of McLoughlin Boulevard, with impacts to both local and through traffic movement. Detour routes are available; however, there is a potential for traffic intrusion into the residential areas adjacent to 17th Street. Maintenance of business access at all times would be a challenge and would require close coordination with affected businesses and property owners. A high level of truck activity would be anticipated along the eastern end of McLoughlin Boulevard, associated with the earthwork and deliveries for construction of the Clark Park and Ride and transit station, and in the vicinity of the I-5/Mill Plain Boulevard interchange, which would be completely reconstructed.

With the LPA with highway phasing, construction traffic impacts would be similar to those identified above, with the exception of the deferral of some project elements such as improvements to the Victory Boulevard, Marine Drive and SR 500 interchanges. These deferrals would reduce construction traffic impacts associated with earthwork and materials delivery, and would eliminate certain construction work zones and their associated disruption to existing multimodal traffic circulation.

CONSTRUCTION ACTIVITIES SEQUENCE AND DURATION

Exhibit 3.1-33 displays the expected duration and major details of each element of the project. Due to construction sequencing requirements, the timeline to complete the LPA with highway phasing is the same as for the LPA.

Exhibit 3.1-33
Construction Activities and Estimated Duration

Component	Estimated Duration	Details
Columbia River bridges	4 years	• Construction is likely to begin with the bridges. • General sequence includes initial preparation, installation of foundation piles, shaft caps, pier columns, superstructure, and deck.
Hayden Island and SR 14 Interchanges	1.5 - 4 years for each interchange	• Each interchange must be partially constructed before any traffic can be transferred to the new structure. • Each interchange needs to be completed at the same time.
Marine Drive interchange	3 years	• Construction would need to be coordinated with construction of the southbound lanes coming from Vancouver.

Component	Estimated Duration	Details
Demolition of the existing bridges	1.5 years	• Demolition of the existing bridges can begin only after traffic is rerouted to the new bridges.
Three interchanges north of SR 14	4 years for all three	• Construction of these interchanges could be independent from each other or from the southern half of the project. • More aggressive and costly staging could shorten this timeframe.
Light rail	4 years	• The river crossing for the light rail would be built with the bridges. • Any bridge structure work would be separate from the light rail construction activities and must be completed before the light rail extension can be completed.
Total Construction Timeline	6.3 years	• Funding, as well as contractor schedules, regulatory restrictions on in-water work, weather, materials, and equipment could all influence construction duration. • This is also the same time required to complete the smallest usable segment of roadway – Hayden Island through SR 14 interchanges.

ROAD CLOSURES AND DETOURS

Typical construction methods would require road closures and/or detours in several locations. For I-5, it is anticipated that three southbound and three northbound lanes would be maintained during all weekdays, except when the final changeover occurs between the old bridges and the new bridges. During construction, I-5 traffic would be shifted onto temporary alignments, lanes and shoulders would be narrowed to accommodate equipment and workers, merge and exit distances would be shortened, posted speed limits reduced, and some traffic movements would be closed or detoured. When temporary lane closures are needed to accommodate construction and ensure safety, they would typically occur at night and on weekends. It is expected that all of the current movements at each interchange would remain open during construction, with the exception of those movements that would be permanently changed, as described below.

During reconstruction of the SR 14 interchange, it is estimated that connections between SR 14 and downtown Vancouver, and between I-5 and downtown Vancouver, could be closed for nearly 5 years. Connections between SR 14 and downtown Vancouver and between northbound I-5 and downtown Vancouver would be rerouted to Columbia Way or the Mill Plain Boulevard interchange.

The Evergreen Boulevard, 29th Street, and 33rd Street crossings of I-5 would likely be closed for up to a year, although the crossings at 29th Street and 33rd Street would not be closed simultaneously. N Jantzen Drive on Hayden Island could also be closed for nearly a year. Traffic would be detoured during those periods.

During Years 6 and 7 of construction, traffic from Hayden Island to I-5 northbound would be detoured via Columbia House Boulevard. Drivers from Hayden Island would cross the current northbound I-5 bridge, exit to SR 14 eastbound, make a U-turn at Columbia House Boulevard, and return via SR 14 westbound to I-5 northbound. The duration of this detour could be expected to last up to 2 years. Traffic from Hayden Island to I-5 southbound would not require a detour.

During construction, traffic would be shifted onto detour alignments within the Hayden Island and Marine Drive interchanges, and onto temporary detour ramps to access the Mill Plain and Fourth Plain Boulevard interchanges. Except for those mentioned above, such detours would not require any major out-of-direction travel. Closures and detours are summarized in Exhibit 3.1-34.

Exhibit 3.1-34

Road Closures and Detours

Alignment/ Movement Closed	Closes	Re-Opens	Approximate Closure Duration	Comment	Detour
Washington Street to SR 14 Eastbound	Summer Year 3	Summer Year 4	1 year	Opens as temp alignment from Columbia Street	Mill Plain Boulevard to SR 14 Eastbound/I-5
	Winter Year 8	Winter Year 8	1 month	Opens as final 4th Street to SR 14 Eastbound	Southbound to SR 14 Eastbound
Washington Street to I-5 Southbound	Summer Year 3	Summer Year 8	5 years	Re-opens as C Street to I-5 Southbound	Mill Plain Boulevard to I-5 Southbound
I-5 Northbound to City Center (C Street)	Summer Year 3	Summer Year 8	5 years	I-5 Northbound to City Center (C Street) reopens as final alignment	I-5 Northbound to Mill Plain/Fourth Plain
SR 14 Westbound to City Center (C Street)	Summer Year 3	Summer Year 8	5 years	SR 14 Westbound to C St reopens as SR 14 Westbound to 4th St with an option to Washington Street	Columbia House Boulevard/Columbia Way and/or Mill Plain Boulevard
Washington Street South of 5th Street/5th Street between Washington and Main Streets	Summer Year 3	Summer Year 8	4-5 years	Closed for I-5 Southbound to SR 14 Eastbound detour	Parallel streets
Evergreen Boulevard Overpass	TBD		1 year	Possibly separated out as an early contract before main CRC construction	Mill Plain Boulevard
29th Street Overpass	TBD		1 year	Same as above; closure would not occur at same time as 33rd	33rd Street Overpass
33rd Street Overpass	Follows 29th closure		1 year	Same as above; closure would not occur at same time as 29th	29th Street Overpass

Alignment/ Movement Closed	Closes	Re-Opens	Approximate Closure Duration	Comment	Detour
39th Street to I-5 Southbound	TBD		1-2 years	Close ramp, build cut and cover tunnel, then restore off-ramp	Main Street/Hwy 99 to I-5 Southbound and/or Fourth Plain Boulevard to I-5 Southbound
39th Street Overpass	TBD		1 year	Close 39th street, demolish old structure and build new	29th and 33rd Streets Overpasses
Jantzen Drive	Summer Year 2	Summer Year 3	1 year	Portion under I-5 closed for utility work	Hayden Island Drive

MAJOR STAGING SITES AND CASTING YARD

Staging of equipment and materials would occur in many areas along the project corridor throughout construction, generally within existing or newly purchased right-of-way or on nearby vacant parcels. However, at least one large site would be required for construction offices, to stage the larger equipment such as cranes, and to store materials such as rebar and aggregate. Suitable sites must be large and open to provide for heavy machinery and material storage, must have waterfront access for barges (either a slip or a dock capable of handling heavy equipment and material) to convey material to the construction zone, and must have roadway or rail access for landside transportation of materials by truck or train.

Three sites have been identified as possible major staging areas:

1. Port of Vancouver Parcel 1A site in Vancouver: This 52-acre site is located along SR 501 and near the Port of Vancouver's Terminal 3 North facility. Most of the property has an asphalt concrete surface. For staging purposes, any improvements would most likely be on top of this surface. Activities could consist of material storage, material fabrication, equipment storage and repair, and temporary buildings. An application for development of a portion of this site has recently been approved for Farwest Steel Corporation to develop a manufacturing and warehousing facility. If the site is developed as approved, it would reduce the area available for staging to approximately 22 acres.
2. Red Lion at the Quay hotel site in Vancouver: This site would be partially acquired for construction of the Columbia River crossing, which would require the demolition of the building on this site, leaving approximately 2.6 acres for possible staging.
3. Vacant Thunderbird hotel site on Hayden Island: This 5.6-acre site is much like the Red Lion hotel site in that a large portion of the parcel would already be required for new right-of-way necessary for the LPA.

A casting/staging yard could be required for construction of the Columbia River bridges if a precast concrete segmental bridge design is used. A casting yard would need to have access to the river for barges, including either a slip or a dock capable of handling heavy equipment and material; a large area suitable for a concrete batch plant and associated heavy machinery and equipment; and access to a highway and/or railway for delivery of materials.

Two sites have been identified as possible casting/staging yards:

1. Port of Vancouver Alcoa/Evergreen West site: This 95-acre site was previously home to an aluminum factory and is currently undergoing environmental remediation, which should be completed before construction of the CRC project begins. The western portion of this site is best suited for a casting yard.
2. Sundial site: This 50-acre site is located between Fairview and Troutdale, just north of the Troutdale Airport, and has direct access to the Columbia River. There is an existing barge slip at this location that would not have to undergo substantial improvements for use by the CRC project.

Construction activities associated with major staging and or casting sites could also temporarily impact traffic operations. These impacts include localized increases in roadway congestion associated with truck trips to/from the staging/casting areas as well as potential temporary road closures to facilitate delivery of oversized loads. Increased congestion and/or temporary road closures could also result in intrusion of non-local traffic into residential areas.

Bicycle and Pedestrian Construction Impacts

Construction of the LPA would also result in impacts to the existing bicycle and pedestrian circulation system in the CRC main project area. These impacts are identified and briefly discussed below by general location, moving from south to north.

MARINE DRIVE

Most pedestrian and bicycle movements at this interchange would remain in their existing configuration for the first several stages of project construction. The crossing point for the North Portland Harbor would remain on the existing freeway bridge for a period of time, but once the local multimodal bridge is built along with temporary connections at both ends, the north-south pedestrian and bicycle movement would shift to this location to allow highway construction to proceed.

Along the sidewalks attached to the highway ramp network below the existing North Portland Harbor structure, there would be the occasional need for pedestrian enclosures during the construction of overhead ramp structures. The enclosures would allow continuous access from areas east and west of the interstate to the harbor crossing. Similarly, pedestrian enclosures would be required on routes that travel below the new Marine Drive.

The existing signalized intersection on Marine Drive west of I-5 would continue to operate for pedestrians during construction and allow the same movements to be made that occur today. Roadway widening and reconstruction may require temporary closure of one or more of the existing crosswalks, but the ability to move east-west and north-south would be preserved until the intersection is no longer required for these routes. The completion of the new Marine Drive alignment would temporarily close the North Marine Drive trail between the existing interchange traffic signal and

Force Avenue, at which time the trail would also be reconstructed. During this work, the movement would be detoured south on Force Avenue to Expo Road, and then north to Marine Drive via the connections from the Expo Transit station. Once traffic shifts to the new Marine Drive alignment, the City of Portland street network and remaining bicycle and pedestrian paths can be built without the need for significant closures. The sidewalk between Marine Drive and the light rail station at the Expo Center would be maintained until it is realigned, and pedestrian access to the light rail station will be maintained at all times.

HAYDEN ISLAND

Prior to construction of the local multimodal bridge, the existing pathway on the North Portland Harbor (NPH) bridge would remain in place. The connection between the NPH bridge and the existing CRC bridge would be relocated around the east side of the interchange with a connection to the existing CRC bridge by way of a temporary switchback ramp to be constructed on the west side of the existing CRC bridge. Pedestrians and bicyclists would be able to access the temporary ramp from Hayden Island Drive.

Once the local multimodal bridge has been constructed, the path would be shifted temporarily to the new bridge. From there, pedestrians and bicyclists would be able to make their way to the temporary switchback ramp by way of Avenue A and Hayden Island Drive. The next route change would occur when the permanent connection to the new CRC bridge is made on the east side of the interchange and the temporary switchback ramp is removed. The connection from the bridge would touch down close to Tomahawk Island Drive. From the local multimodal bridge, pedestrians and bicyclists would navigate to the east side of the interchange by way of Avenue "A" and either Jantzen Drive or Hayden Island Drive. This route would be in place until the final multi-use path is constructed across NPH.

SR 14/COLUMBIA WAY

The access to the paths located on either of the existing Interstate Bridges would be maintained as long as they are open on the Oregon side of the Columbia River. In order to accommodate the piers for the new river crossings, Columbia Way must be realigned to the west of the interstate, which would close its sidewalk during construction. Movement between downtown Vancouver and the bridge paths, as well as access to the waterfront, would be available via the other sidewalks around and below the bridges. The path between Columbia Street and the existing southbound bridge must also be rebuilt to the south to avoid southbound approach structure columns.

The closure of the path across the southbound Interstate Bridge in Oregon would likewise close the path in Vancouver and move all pedestrians to the path across the northbound Interstate Bridge. To reach downtown they would either cross below the existing bridges on the attached paths or use a crosswalk to cross to the sidewalk along Columbia Way.

While the previously described detour leading to the southbound Interstate Bridge is under construction on Hayden Island, a temporary pedestrian connection between Columbia Way and the southbound Interstate Bridge would be built in Vancouver. The route would use temporary construction as well as elements of the proposed multi-use path. A crosswalk to the Columbia Way sidewalk would let users head north into the city or south toward the waterfront.

Once the northbound Interstate Bridge is no longer under vehicular traffic, the multi-use path structure connecting the northbound structure and Columbia Way can be completed. Combined with the partial construction of the City of Vancouver local street network, the full length of the multi-use path between Oregon and Washington can be opened for use.

EVERGREEN BOULEVARD

The Evergreen Boulevard overpass would be reconstructed in the first phases of CRC project construction. The demolition and replacement of the existing structure would close all access at this location for approximately 9 months. During this time, pedestrian and bicycle traffic would be detoured north to Mill Plain Boulevard via Fort Vancouver Way from the east and C Street from the west.

MILL PLAIN BOULEVARD

The north and south sidewalks and bike lanes along Mill Plain Boulevard would continue to be in operation once project work begins at the interchange, as the roadway would not be immediately affected. The demolition and replacement of structures would likely result in the need for temporary pedestrian enclosures below the work, with temporary full closures being possible at times. Once work to lower Mill Plain Boulevard begins, the sidewalks under the interstate would remain open and at their existing elevation while the roadway beside them is excavated. At a minimum, one bike lane would be provided on the roadway.

The ramp terminals at Mill Plain Boulevard, as well as the street's attached sidewalks, would be completed in halves (north side, then south side) so as to preserve pedestrian mobility through the interchange during the construction of either side. Temporary sidewalks or crosswalks would be provided, if needed, at the locations where the final sidewalks cross existing freeway ramp terminals.

MCLOUGHLIN BOULEVARD

The staged demolition and reconstruction of the I-5 overpass at McLoughlin Boulevard and the replacement of the I-5 to Fourth Plain Boulevard ramp structure over the roadway would require temporary pedestrian enclosures to remain in place for a significant period of time. As at Mill Plain Boulevard, temporary full closures during the structure work may be required.

The completion of the transit alignment and the associated roadway reconstruction would require significant excavation and represents a substantial change from existing conditions. The complexity of the integration of this work and the overhead freeway structure work has the potential to result in closures of the roadway and pedestrian paths for long durations. At this time, however, it is anticipated that an accessible route would remain available.

FOURTH PLAIN BOULEVARD

The Fourth Plain Boulevard overpass would be replaced in halves, demolishing the southern half of the existing structure and building the southern half of the new structure first, and then proceeding with the same method for the northern half. In order to maintain pedestrian traffic across the overpass during this work, a 6-foot path would be built on the southern side of the remaining northern half of the existing structure, with a 6-inch curb separating the path from motor vehicle traffic. Once the new southern half is complete, pedestrians would switch to the proposed sidewalk from F Street across the new overpass. A temporary sidewalk network east of I-5 through the freeway off-ramp terminal would link the existing sidewalk farther to the east with the completed sidewalk segment until Fourth Plain Boulevard grading and widening can be completed and the final sidewalk installed.

29TH STREET

Bicycles and pedestrians would likely be detoured to the 33rd Street I-5 crossing during the demolition and reconstruction of the overpass. The duration of the closure is estimated to be approximately 9 months.

33RD STREET

After the new 29th Street structure has been constructed, the existing 33rd Street overpass would be closed and demolished. Bicycles and pedestrians would likely be detoured to either the 29th Street overpass or the 39th Street overpass via P Street during demolition and reconstruction. The duration of the closure is estimated to be approximately 9 months.

Transit Construction Impacts

Roadway reconstruction for the light rail alignment would include restriping or rebuilding the road surface, rebuilding sidewalks in some sections, and constructing station platforms. Streetscape improvements would include removing, replacing, or adding street trees and landscaping, curb extensions, new signs and signals, and other measures to improve access to, and use of, the transit stations.

Construction of the light rail guideway in Vancouver streets would be managed with a sensitivity to the area's active urban environment. Maintaining access for motorists, delivery and service vehicles, cyclists, and pedestrians during business hours is a key component of construction plans. Streets would be open to traffic and pedestrians when possible, but would need to close during some construction activities (pedestrian access would always be maintained except for brief disruptions). Rather than partially closing lanes through the entire segment for long periods of time, there would be full traffic closures of short segments to allow construction to be completed in a much shorter time frame. Crews typically work within a three- to five-block area before moving to the next construction zone.

Impacts to transit service during construction could include delays, relocation or temporary elimination of bus stops, street detours, and a deterioration of reliability for bus routes using certain roadways and facilities within the corridor. LPA construction would impact bus operations along I-5, on Hayden Island, and in downtown Vancouver.

3.1.5 Mitigation or Compensation

Long-term Mitigation

TRAFFIC IMPACTS

Mitigation for long-term traffic impacts associated with the LPA focuses on impacts that were identified to local street intersections. No mitigation is required for the freeway or freeway ramps.

Local Street Mitigation - SR 500/Main Street/39th Street Interchange Area

No traffic mitigation is required in the SR 500/Main Street/39th Street Interchange Area.

Local Street Mitigation - Fourth Plain Boulevard Interchange Area

City of Vancouver and/or WSDOT, as appropriate, would monitor traffic operations and pursue the following mitigation measures recommended under the LPA:

- Monitor and adjust ramp meter rates at Fourth Plain Boulevard ramps, if/when these are installed in the future. When queuing from the ramp causes either ramp terminal to fail to meet the operational standard, ramp meter rates should be adjusted. Due consideration, but not equal weight, will be given to the local system to minimize queuing from the ramp meter. Emphasis will be on avoiding significant adverse impacts and traffic operational failures on the freeway system.

Local Street Mitigation - Mill Plain Boulevard Interchange Area

City of Vancouver and/or WSDOT, as appropriate, would monitor traffic operations and pursue the following mitigation measures recommended under the LPA:

- Add a third lane westbound on 15th Street between Washington Street and Columbia Street. Adding the third through lane will allow the drop lane at 15th Street and Washington Street to become a left/through lane adding additional capacity to the 15th Street corridor. This should be completed at such time as it is necessary to achieve the operational standards along the 15th Street corridor.
- Add a southbound right turn lane at 15th Street and Columbia Street. This should be completed at such time as it is necessary to achieve the operational standards at the intersection of 15th Street and Columbia Street.
- Add a third eastbound left turn at the Mill Plain interchange when needed in the future. The third eastbound left-turn lane should be added when eastbound left-turn volumes have increased to a level that causes the interchange to fail to meet acceptable operational standards. Monitor and adjust ramp meter rates at Mill Plain Boulevard on-ramps, if/when these are installed in the future. When queuing from the ramp causes either ramp terminal to fail to meet the operational standard, ramp meter rates should be adjusted. Due consideration, but not equal weight, will be given to the local system to minimize queuing from the ramp meter. Emphasis will be on avoiding significant adverse impacts and traffic operational failures on the freeway system.

SR 14/City Center Interchange Area

As all intersections would operate acceptably under the LPA and LPA with highway phasing, no traffic mitigation would be required.

Local Street Mitigation - Hayden Island Interchange Area

As all intersections would operate acceptably under the LPA and LPA with highway phasing, no traffic mitigation would be required.

Local Street Mitigation - Marine Drive Interchange Area
As all intersections would operate acceptably under the LPA and LPA with highway phasing, no traffic mitigation would be required.

Local Street Mitigation - Victory Boulevard Interchange Area
As all intersections would operate acceptably under the LPA and LPA with highway phasing, no traffic mitigation would be required.

Local Street Mitigation - Interstate Avenue Analysis Area
The following measures are recommended to mitigate unacceptable operations under the LPA and LPA with highway phasing:

- Going Street and Interstate Avenue:
  - Optimize light rail transit pre-emption at intersection.
  - Install advanced signal controllers to manage light rail transit pre-emption.
  - Change the westbound right lane into a through/right choice lane to allow traffic to continue westbound.

Local Street Mitigation - Martin Luther King Jr. Boulevard Analysis Area
As all intersections would operate acceptably under the LPA and LPA with highway phasing, no traffic mitigation would be required.

Local Street Mitigation - I-5 Ramp Terminals Analysis Area
As all intersections would operate acceptably under the LPA and LPA with highway phasing, no traffic mitigation would be required.

TRANSIT MITIGATION

There are some areas where project impacts cannot be fully avoided. In these areas, the project is being designed and would be managed to minimize and mitigate impacts. This section provides an overview of the minimizations and mitigations proposed for the transit-related impacts.

Safety and Security
Strategies such as crime prevention through environmental design (CPTED) and the use of police, private security patrols, and security cameras would be employed as appropriate to make the light rail facilities as safe and secure as possible. The existing policies and procedures developed by TriMet and FTA for light rail operations during a potential catastrophic event and to prevent terrorist activities would be expanded to include the CRC project and C-TRAN. Finally, design criteria such as platform location and length, pedestrian crossings, and alignment design would be used to ensure that the project operates safely.

Bicycles
The project would provide bicycle access to station locations by perpendicular access streets within each city's bicycle network. Station areas would include bicycle facilities, which could include secure storage areas. The project would coordinate with each governing jurisdiction to determine the appropriate number of bicycle storage facilities per station. Local jurisdictions should consider access to light rail stations as bicycle system plans are updated.

Pedestrians

The project would provide pedestrian access to stations by establishing "through-walking areas"—clear pathways free of street furniture or other impediments—adjacent to the planned station locations. The project would strive to maintain the width of these areas at approximately 7 to 8 feet in busy pedestrian locations such as downtown and 6 feet in areas with lower levels of pedestrian traffic.

PARKING MITIGATION

When on-street parking is removed, City of Vancouver policy calls for replacement parking to be provided within 750 feet. Given the constrained nature of the downtown area, it is very challenging to identify areas for replacement parking that would not displace businesses, travel lanes, parks, or other current uses. As described earlier in this section, the existing parking supply is greatly underutilized. The introduction of light rail will enable greater use of transit and reduce the need for parking spaces. Additionally, coordination between C-TRAN and the City would occur to develop shared parking use agreements that would allow non-transit riders to use the new park and ride facilities. The shared parking agreements would be subject to FTA approval and a determination that the shared use does not interfere with transit rider usage. City of Vancouver and project staff have been working closely on this issue, but have not identified existing land uses which should be displaced in order to provide more parking than is proposed with the park and rides and the sites listed below. The project team has worked with property owners and the City of Vancouver to identify the following mitigations for the loss of on-street parking:

- The addition of 50 spaces within the SR 14 loop.
- The acquisition of the existing city parking lot south of Smith Tower, which would be repurposed to serve Smith Tower residents.
- WSDOT would continue to coordinate with the City of Vancouver to develop an acceptable approach for complying with or receiving an exception from the City's policy regarding replacement parking.

Short-term Mitigation

SHORT-TERM TRAFFIC MITIGATION

Mitigation measures for construction impacts to traffic and highways would include a variety of activities, ranging from scheduling construction activities to minimize conflicts during peak travel periods to using alternative construction techniques or equipment. Measures that would be implemented as appropriate to mitigate the short-term traffic impacts associated with the LPA and LPA with highway phasing include, but are not limited to, the following:

- Work with appropriate jurisdictions to obtain approval of traffic control plans and any necessary agreements.
- Develop during final design, and maintain throughout construction, a program of coordination with and outreach to affected business and community interests to oversee the development and implementation of a transportation management plan. This plan would address a variety of traffic, transit, and alternative mode strategies designed to minimize

the transportation impacts of project construction. The plan would also identify detour routes where necessary to keep automobile, bicycle, pedestrian, and truck traffic moving. This would be particularly important during construction of the Marine Drive and Mill Plain Boulevard interchanges which serve the Port of Portland and the Port of Vancouver, respectively.

- As part of the outreach program, establish a telephone complaint and information system to be staffed around the clock by personnel with authority to require the contractor to initiate immediate corrective action.
- Wherever possible or practical, limit or concentrate work areas to minimize disruptions to vehicular traffic, bus, pedestrian, and bicycle circulation, as well as to business access.
- Identify, provide and/or advertise temporary parking locations to replace parking temporarily displaced by construction.
- Relocate affected loading zones, property accesses, bus stops, and other specially designated parking and access points before construction begins to allow new traffic patterns to be established.
- As appropriate, develop and implement functional and reasonable alternative construction techniques to minimize traffic impacts. These techniques could include activities such as limiting construction to non-daylight hours in certain locations. Use of two or three shifts per day to reduce construction time could be implemented in critical traffic areas, subject to development of adequate traffic control plans, noise control measures, and budget and schedule allowances.

SHORT-TERM BICYCLE AND PEDESTRIAN MITIGATION

During construction, the project would undertake measures to minimize impacts to bicycle and pedestrian mobility and safety through the main project area. As appropriate to the location and circumstances, such measures would include:

- Coordination with local jurisdictions and bicycle/pedestrian advocacy groups to disseminate information about construction activities and associated temporary closures and detours near construction zones.
- Temporary enclosures to maximize the safety of bicyclists and pedestrians traveling beneath the construction of structures associated with the highway or light rail improvements.
- Additional signage and/or lighting along popular bicycle and pedestrian routes that may experience an increase in vehicle traffic, and associated increased potential for vehicle and bicycle or pedestrian interactions, due to traffic detours.
- Separate queuing space or lanes for bicycles, level non-skid crossings of steel plates, and traffic calming measures in work zones to improve safety for bicyclists. If it is not possible to establish bicycle lanes within the work zone, provide alternate routes on parallel streets where convenient and effective.

SHORT-TERM TRANSIT MITIGATION

TriMet, C-TRAN, and other sponsoring agencies would implement measures to help communities and small businesses overcome the challenges of transit construction activities. Temporary effects of construction, such as increased bus travel times and increased passenger volumes at park and ride lots, would be mitigated in various ways. Mitigation measures would need to be instituted as long as bus routes are impacted, potentially until opening day of the light rail guideway.

Working with the two transit agencies, Transportation Management Associations (TMAs), and other organizations, the project would conduct a communications campaign to inform the public about these transit changes. Associated mitigation measures would be developed by WSDOT, ODOT, and transit agencies on both sides of the river. These agencies would communicate the new routing, the potential for more-crowded buses and slower travel times, and mitigation measures through TV, radio, email, a Web site, newspapers, and other multimedia instruments to broadcast rider alerts to potentially impacted customers.

The temporary effects of bridge and highway construction near downtown Vancouver would require mitigation for five C-TRAN bus routes: one local fixed route bus (4 – Fourth Plain), three limited stop peak period-only routes (41 – Camas/Washougal Limited, 44 – Fourth Plain Limited, and 47 – Battle Ground Limited), and one all day service express bus (105 – I-5 Express). These buses could use the Mill Plain Boulevard interchange exit to access downtown Vancouver.

Route 4 has all day service at 15-minute headways, and off-peak periods may be more congested due to lane closures, bridge lifts, etc. If needed, an additional bus or two would be provided to maintain existing headways on Route 4 during the nighttime hours, and headways would be adjusted, as needed, where ridership demand allows. A lane closure would have the potential to delay transit because it runs in general highway traffic along this section. If the lane closure occurs during the same time that the northbound ramp to downtown Vancouver is closed, then a second bus would be added, if needed, to compensate for the time required for the trip to Mill Plain Boulevard and back to lower downtown.

Light rail guideway construction could require rerouting the buses on Hayden Island. The existing Jantzen Beach Center transit center may not need relocation. Minor rerouting of the buses would be necessary as new ramps and access points are opened at the Hayden Island interchange. City streets would also be rebuilt in different locations, requiring a rerouting of the buses. The same communication campaign of rider alerts would be made for both C-TRAN and TriMet buses for all of these mitigation measures. The project will maintain paratransit services for qualifying, mobility-impaired Hayden Island residents, and will maintain construction-period shuttle service on the island when needed.

In downtown Vancouver, most buses run two directions on Broadway in the existing transit network, but there are also seven routes that run only southbound on Washington Street. No northbound routes or bus stops would need to be relocated because there would be ample lanes available for traffic to pass stopped buses. However, buses currently running south on Broadway would be permanently relocated to either Columbia or C Street.

The new routing through downtown Vancouver would need new signs and temporary bus stops. Rider alerts would be made through a communications campaign via the Internet, email, and hard copy postings on buses and at service stops.

Bus routes needing temporary relocation would receive temporary benches and shelters at service stops, depending on the duration of relocation (any relocation greater than 6 months would warrant such treatments) and the number of boardings per day. During construction, affected transit stops would be temporarily relocated to the nearest possible location on the same transit route without interfering with the construction process. Temporary sidewalks and/or pathways would be provided to replace any sidewalks and/or trails adjacent to the project that are affected by construction. To help minimize on-street parking impacts, temporary parking would be identified to mitigate the temporary loss of specific on-street parking due to construction. Mitigated parking losses would include displaced spaces reserved for disabled motorists, spaces identified as critically important to businesses for which no reasonable alternative exists, and others. Keeping businesses open and accessible during light rail construction would be a top priority of these agencies. Mitigation of short-term impacts to businesses during transit construction can be accomplished through a number of activities. These are discussed in Section 3.4, Land Use and Economics.

SHORT-TERM TRAVEL DEMAND MANAGEMENT (TDM) MITIGATION

The project will implement a TDM program to address traffic impacts during construction. The construction phase TDM program elements include 1) vehicles, facilities and equipment, 2) program delivery coordination, 3) focused marketing and outreach, 4) performance monitoring, and 5) incentives and promotions.

Specific measures to reach the identified trip reduction goal are described in the TDM and TSM Draft Report and in Chapter 2 of this FEIS. Funding availability and management capacity are the two main factors that will determine which measures would be implemented during construction. Congestion reduction strategies may include:

- Providing alternatives to SOV trips, for example, vanpools and/or increased transit service.
- Providing incentives to reduce automobile trips and encourage mode shifts to non-SOV trips, for example, supporting and/or providing information regarding localized transportation options, including transit, walking, biking, and carpools.
- Managing traffic and lane closures to avoid congestion and delay.
- Providing traveler information at key junctions to encourage traffic diversion from the I-5 corridor and crossing routes.
- Promoting continuous information campaigns to alert motorists of delay times within the corridor and of upcoming traffic pattern changes and detours.
- Incorporating transit priority measures where feasible.

- Working with employers whose employees must commute through the area to promote alternative work schedules.
- Instituting contractor incentives to shorten construction durations and encourage the use of lower-emitting construction equipment.

As current providers of TDM programs, the Cities of Portland and Vancouver are expected to participate in the implementation and delivery of services as part of the comprehensive, coordinated TDM effort. Details on funding levels, delivery of service, and focus of each TDM program element will be developed in cooperation with project partners at a later date.

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