NOTEBOOK 1

TAB D: COLUMBIA RIVER CROSSING BACKGROUND (2004-2006)

CRC project planning began in 2004 and the project formally started in early 2005. The previous regional studies of the CRC project area provided the underlying scope of this project, while coordination with stakeholder groups, the public, and a variety of local, state, and federal agencies provided important input on defining the specific needs this project should address and the purpose it should accomplish.

Key steps in the early development of the CRC project are summarized below. Additional details are provided in this section of the notebook.

SPRING 2005: CRC TASK FORCE

A 39-member CRC Task Force was formed in early 2005 to advise the CRC project on key decisions. The CRC Task Force consisted of leaders from a broad cross section of Oregon and Washington communities, including elected officials, public agencies, businesses, civic organizations, neighborhoods, freight, commuter and environmental groups.

Task Force Co-Chairs
Hal Dengerink, Chancellor, Washington State University, Vancouver
Henry Hewitt, Past Chair, Oregon Transportation Commission

Public Agencies
Commissioner Sam Adams, City of Portland
Mike Bennett, City of Gresham
Councilor Rex Burkholder, Metro
Serena Cruz Walsh, Multnomah County
Jeff Hamm, C-TRAN
Fred Hansen, TriMet
Dennis Osborn, City of Battle Ground
Dean Lookingbill, Southwest Regional Transportation Council
Larry Paulson, Port of Vancouver
Mayor Royce Pollard, City of Vancouver
Commissioner Steve Stuart, Clark County
Tom Imeson, Port of Portland

Environmental Organizations
Lora Caine, Friends of Clark County, Southwest Washington
Jill Fuglister, Coalition for a Livable Future, Oregon Neighborhood Associations

Community Organizations
Dave Tischer, Columbia Pacific Building Trades
Elson Strahan, Vancouver National Historic Reserve Trust
Jeri Sundvall-Williams, Environmental Justice Action Group
Bob Knight, Clark College
Dave Frei, Arnada Neighborhood Association, Southwest Washington
Brad Halverson, Overlook Neighborhood Association, Portland
Dick Malin, Central Park Neighborhood Association, Southwest Washington
Walter Valenta, Bridgeton Neighborhood Association, Portland

Statewide Freight Organizations
Jerry Grossnickle, Columbia River Towboat Association
Karen Schmidt, Washington Freight Mobility Strategic Investment Board
Tom Zelenka, Oregon Freight Advisory Committee

Statewide Commuter/Travel Organizations
Marie Dodds, Oregon/Idaho AAA
Dave Overstreet, Washington AAA

Local Economic Organizations
Bob Byrd, Identity Clark County
Monica Isbell, Starboard Alliance Company, LLC, Portland
Bart Phillips, Columbia River Economic Development Council, Vancouver
Jonathan Schleuter, Westside Economic Alliance, Portland

Trucking Industry Organizations
Bob Russel, Oregon Trucking Association
Larry Pursley, Washington Trucking Association
Chambers of Commerce and Portland Business-Based Organizations
Rich Brown, Bank of America, Portland
Ed Lynch, Greater Vancouver Chamber of Commerce
Grant Armbruster, Portland Business Alliance
Scot Walstra, NW Natural Gas, Vancouver (appt. by Greater Vancouver Chamber)

The Task Force was instrumental in developing the purpose and need for the project, developing the vision, and in narrowing the range of alternatives to address transportation issues in the corridor.

FALL 2005: DEFINING THE PROBLEMS AND CONSIDERING 70 POTENTIAL SOLUTIONS

One of the first and most important steps of any major project is to define why the project has been initiated, and what problem(s) it seeks to address. The Purpose and Need statement provides this definition for projects complying with the National Environmental Policy Act (NEPA), and serves as the basis for defining how project alternatives will be developed and evaluated. A reasonable alternative must address the needs specified in the Purpose and Need statement for the alternative to be considered in an environmental impact statement (EIS); thus, the Purpose and Need is an influential statement that guides future development of the project.

Using data developed by the I-5 Transportation and Trade Partnership, CRC worked with the public, tribal governments and partner agencies to define the primary problems in the project area: congestion, dangerous travel conditions, and travel demand that exceeds capacity.

In October 2005, the CRC Task Force adopted a “Vision and Values” document that outlined broad goals and priorities, and that served as a basis for developing evaluation criteria to measure and compare performance of different alternatives. Based on this document, the project team worked with local agency sponsors, the CRC Task Force, and state and federal permitting agencies to develop the Evaluation Framework, which outlined a process for generating and evaluating possible alternatives. The statement of purpose and need was finished and approved by FHWA, FTA, and the project’s local sponsoring agencies in January 2006.

Using data developed by the I-5 Transportation and Trade Partnership, CRC worked with the public, tribal governments and partner agencies to define the problems in the project area and agree on the purpose and need statement.

The Purpose and Need statement developed by the CRC Task Force is provided below.

> *The purpose of the proposed action is to improve I-5 corridor mobility by addressing present and future travel demand and mobility needs in the Columbia River Crossing Bridge Influence Area (BIA). The BIA extends from approximately Columbia Boulevard in the south to SR 500 in the north. Relative to the No-Build Alternative, the proposed action is intended to achieve the following 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 in the BIA; c) improve highway freight mobility and address interstate travel and commerce needs in the BIA; and d) improve the I-5 river crossing's structural integrity (seismic stability).*

Once the problems were identified, 70 ideas were discussed as potential solutions. The 70 ideas were suggested by the Task Force and members of the public. The ideas included 23 river crossing and 14 transit ideas. Evaluation criteria also were developed at this time.

Once the problems were identified, 70 ideas were discussed as potential solutions. The 70 ideas included 23 river crossing and 14 transit ideas.

SPRING 2006: NARROWING THE IDEAS

The Task Force developed and applied the criteria by which components were further evaluated and ultimately selected for inclusion in the Draft Environmental Impact Statement.

Continuing discussions with the Task Force and community, the CRC project team studied the river crossing and transit ideas, which included a tunnel under the Columbia River, a third highway crossing, and commuter rail. As a result of this discussion and analysis, the ideas were further narrowed to a set of four river crossing options and five public transit options.

SPRING – SUMMER 2006: TESTING PRELIMINARY CONCEPTS

Project staff performed two rounds of evaluation and screening to further narrow these options. Only transit and crossing components were screened at that time. Other elements that have since been included in the alternatives evaluated in the Draft EIS, such as pedestrian, bike, and roadway improvements, were advanced without screening.

The initial screening in April 2006 (Step A) eliminated river crossing types and transit modes that did not meet the project's purpose and need including a tunnel, high speed rail, ferry service, heavy rail, crossings in other locations, and others.

The initial screening process evaluated how well new crossings in these locations would meet the purpose and need of the proposed CRC action by improving congestion, transit performance, freight mobility, safety, and bicycle and pedestrian mobility within the I-5 corridor, and seismic stability of the Columbia River Crossing. While most of these alternatives could provide some degree of transportation benefit, they did little to address the purpose and need of the proposed action.

A second round of screening (Step B) in June 2006 evaluated the performance of the remaining 15 crossing and transit components in relation to criteria specified in the Evaluation Framework.

Components were scored on the following project values:

- Community livability and human resources
- Mobility, reliability, accessibility, congestion reduction, and efficiency
- Safety
- Regional economy, freight mobility
- Stewardship of natural resources
- Distribution of benefits and impacts

All of the components that entered this round were advanced for further evaluation. The screening did not highlight any clearly superior options or reveal any new fatal flaws that could not likely be mitigated with design refinements. However, further evaluations and additional information revealed important problems with a streetcar transit mode, low-level bridges, and a supplemental tunnel river crossing option.

Step A and Step B screening documents are included in this section of the notebook.

Columbia River Crossing Task Force Charter

The Task Force's role will be to provide input into the CRCP. Within the context created by the Strategic Plan, the Task Force will:

- Respond to and advise the joint Project Team on technical data and its policy implications leading to a Notice of Intent
- Provide advice to the Joint Commission Subcommittee throughout the EIS until the issuance of the Record of Decision
- Represent and report back to their representative organizations

Columbia River CROSSING

700 WASHINGTON STREET
VANCOUVER, WA 98660
360-737-2726 | 503-256-2726

Task Force Vision and Values Statement

ADOPTED

10-12-05

PURPOSE

The Columbia River Crossing Task Force Vision and Values Statement provides the foundation for developing criteria and performance measures that will be used to evaluate the I-5 Bridge Influence Area alternatives. The Columbia River Crossing Project NEPA process will include consideration of: crossing infrastructure; multimodal transportation; connectivity; high capacity transit; land use; funding; community and business interests; under-represented, low income and minority communities; commuter and freight mobility; maritime mobility; and the environment.

VISION

The Columbia River Crossing project will be developed through an inclusive and collaborative process that considers and gives weight to the work of the I-5 Trade and Transportation Partnership and delivers a financially feasible solution that sustains and stimulates a healthy community by addressing its mobility and transportation needs, increasing its business success and family prosperity, protecting its natural resources, and enhancing its quality of life.

VALUES

The Columbia River Crossing project should reach this vision through:

Community Livability

- Supporting a healthy community.
- Supporting a healthy and vibrant land use mix of residential, commercial, industrial, recreational, cultural, and historic areas.
- Supporting aesthetic quality that achieves a regional landmark.
- Recognizing the history of the community surrounding the I-5 bridge influence area, supporting improved community cohesion, and avoiding neighborhood disruption.
- Preserving parks, historic and cultural resources, and green spaces.

Mobility, Reliability, Accessibility, Congestion Reduction and Efficiency

- Providing congestion reduction and mobility, reliability, and accessibility for all users, and recognizing the requirements of local, intra-corridor, and interstate movement now and in the future.

- Providing an efficient transportation system through transportation system management, encouraging reduced reliance on single occupant vehicles, incident management, and increased capacity measures.

Modal Choice

- Providing modal choice for users of the crossing, including highway, transit, high-capacity transit, bicycle, and pedestrian modes.

Safety

- Ensuring safety for vehicles (trucks, autos, emergency, and transit), pedestrians, bicyclists, river users, and air traffic at the crossing.

Regional Economy; Freight Mobility

- Supporting a sound regional economy and job growth.
- Enhancing the I-5 corridor as a global trade gateway by addressing the need to move freight efficiently and reliably through the I-5 bridge influence area, and allowing for river navigational needs.

Stewardship of Natural and Human Resources

- Respecting, protecting, and improving natural resources including fish, wildlife habitat, and water quality.
- Supporting improved air quality.
- Minimizing impacts of noise, light, and glare.
- Supporting energy efficiency through design, construction, and use.

Distribution of Impacts and Benefits

- Ensuring the fair distribution of benefits and adverse effects of the project for the region, communities, and neighborhoods adjacent to the project area.

Cost Effectiveness and Financial Resources

- Ensuring cost effectiveness in design, construction, maintenance, and operation.
- Ensuring a reliable funding plan for the project.

Bi-State Cooperation

- Fostering regional cooperation and planning.
- Supporting existing growth management plans in both states.
- Supporting balanced job growth.

Columbia River CROSSING

FINAL

PROBLEM DEFINITION

December 27, 2005

Introduction

Major transportation agencies in the Vancouver-Portland region have joined together to lead development of transportation improvements to the 5-mile segment of Interstate 5 (I-5) between State Route (SR) 500 in Vancouver and Columbia Boulevard in Portland, including the bridges across the Columbia River (the I-5 Bridge Influence Area). Improvements are expected to address highway, vehicular freight, transit, pedestrian, and bicycle needs.

Function and Role of the I-5 Bridge Influence Area

I-5 is the only continuous north/south interstate highway on the West Coast, providing a commerce link for the United States, Canada, and Mexico. In the Vancouver-Portland region, I-5 is one of two major highways that provide interstate connectivity and mobility. I-5 directly connects the central cities of Vancouver and Portland. Interstate 205 (I-205), a 37-mile long freeway that extends from its connection with I-5 at Salmon Creek to its terminus with I-5 near Tualatin, provides a more suburban and bypass function and serves travel demand between east Clark County, east Multnomah County, and Clackamas County.

Operation of the I-5 crossing over the Columbia River is directly influenced by the 5-mile segment of I-5 between SR 500 in Vancouver and Columbia Boulevard in Portland. Known as the I-5 Bridge Influence Area, this segment includes eight interchanges, including connections with four state highways (SR 14, SR 500, and SR 501 in Washington and OR 99E in Oregon) and with several major arterial roadways, that serve a variety of land uses, and provides access to downtown Vancouver, two international ports, industrial centers, residential neighborhoods, retail centers, and recreational areas.

The existing I-5 crossing of the Columbia River consists of two side-by-side bridges that have lift spans. They were built four decades apart and the cost of each was financed with bridge tolls. The eastern bridge (serving northbound traffic) was built in 1917 and the western bridge (serving southbound traffic) was built in 1958. The two-bridge crossing, which served 30,000 vehicles per day in the 1960s, now carries more than 125,000 automobiles, buses, and trucks each weekday. While many of these trips are regionally-oriented (average trip length is 16 miles), it is estimated that 70 to 80 percent of trips using the I-5 crossing actually enter and/or exit I-5 within the 5-mile long I-5 Bridge Influence Area.

A second interstate highway river crossing is located 6 miles east (upstream) of the I-5 crossing. The I-205 Glenn Jackson Bridge, which opened in 1982, carries about 140,000 vehicles per day and is reaching its peak-hour period carrying capacity. This bridge has a fixed span. No other river crossing options in the metropolitan area are available between the two states. The next closest bridges for automobile use are located at Longview, Washington, 46 miles to the west, and at Cascade Locks, Oregon, 40 miles east of the I-5 bridge crossing.

A rail bridge is located about a mile west (downstream) of the I-5 crossing. The Burlington Northern-Santa Fe (BNSF) rail bridge was built in 1908 and features a swinging span to accommodate river traffic. The I-5 crossing's lift spans were designed to align with the rail bridge's swing span.

The I-5 Bridge Influence Area serves several broad travel markets:

- Through travel. These users travel from outside the Vancouver-Portland region to destinations that are also outside the region—for example, a freight or tourist trip from Seattle, Washington to Eugene, Oregon. These users represent about 7 percent of the total vehicle-trips crossing the river during the peak periods.

- Regional travel. Most of these users travel between Clark County and the Portland metropolitan area (Multnomah, Washington and Clackamas counties), or vice-versa, without stopping in the I-5 Bridge Influence Area. These trips account for about 47 percent of the total vehicle-trips crossing the river during the peak periods.

  Seven percent of the total trips crossing the river originate within the region and are destined outside of the region, or originate outside of the region and are destined within the region, for example, a trip from Salem, Oregon to Clark County.

- Local travel. Most of these users travel between the I-5 Bridge Influence Area and other locations within the Vancouver/Portland metropolitan area, or vice-versa. For example, a trip from a southeast Portland neighborhood to downtown Vancouver is considered a local trip. These trips account for about 32 percent of the vehicle-trips crossing the I-5 bridge during the peak periods.

  Two percent of the total trips crossing the river originate outside the region and are destined to a location within the I-5 Bridge Influence Area, or originate within this area and are destined outside of the region, for example, a trip from Longview, Washington to Portland Meadows.

- Internal travel. These users stay entirely within the I-5 Bridge Influence Area—for example, from downtown Vancouver to Hayden Island. This constitutes about 5 percent of the trips crossing the I-5 bridge during the peak periods.

Definition of the Problem

Current Problems	Details/Background
1. Travel demand exceeds capacity in the I-5 Bridge Influence Area, causing heavy congestion and delay during peak travel periods for automobile, transit, and freight traffic. This limits mobility within the region and impedes access to major activity centers.	Heavy traffic congestion has resulted from growth in regional population and employment and in interstate commerce over the last two decades. The existing I-5 bridge crossing provides 3 lanes of capacity in each direction, with a directional capacity of about 5,500 vehicles per hour. Travel demand currently exceeds that capacity during peak periods. As a result, stop-and-go traffic conditions last 2 to 5 hours in the mornings and afternoons. These conditions are aggravated by vehicle merges, traffic accidents, and vehicle breakdowns. Due to excess travel demand in the I-5 Bridge Influence Area, many travelers take longer, alternative routes such as I-205, or circulate on local streets to less direct I-5 interchanges. In addition, spillover traffic from I-5 onto parallel arterial roadways increases local congestion. Although the lift span is used only in off-peak periods, it affects travel reliability across the river and creates extensive traffic delays. The span is opened 20 to 30 times a month, with the greatest number of lifts occurring during the winter when water levels are at their highest. Each lift takes approximately 10 minutes, creating traffic delays that can last up to an hour. During peak periods when the lifts are not allowed, river traffic must maneuver a tight S-curve route through the rail bridge opening and the highest fixed span of the I-5 crossing, creating hazardous navigation conditions.
2. Transit service between Vancouver and Portland is constrained by the limited capacity in the I-5 corridor and is subject to the same congestion as other vehicles, affecting transit reliability and operations.	The I-5 bridge is a critical bi-state transit link for transit patrons traveling between Vancouver and Portland. Bi-state transit service includes local fixed-route bus service between downtown Portland and downtown Vancouver (using the I-5 bridge), commuter-oriented peak period express routes from Clark County park-and-rides and transit centers to downtown Portland on both I-5 and I-205, and I-205 shuttle service between Fisher's Landing Transit Center and the Parkrose Transit Center. Current congestion in the I-5 Bridge Influence Area has an adverse impact on transit travel speed and service reliability. Between 1998 and 2005, local bus travel times between the Vancouver Transit Center and Hayden Island increased 50 percent during the peak period. Local buses crossing the I-5 bridge in the southbound direction currently take up to three times longer during parts of the morning

	peak period compared to off peak periods. On average, local bus travel times are between 10 percent and 60 percent longer when traveling in the peak period direction. Commuter buses also experience congestion and incident-related delays. Commuter buses traveling southbound during the morning peak period have travel times between 45 percent and 115 percent longer than commuter buses traveling during off-peak periods. Commuter buses traveling northbound during the afternoon peak period have the advantage of using the northbound High Occupancy Vehicle lane, however, these buses still experience travel times between 35 percent and 60 percent longer than commuter buses traveling during the off-peak periods.
3. The access of truck-hauled freight to nationally and regionally significant industrial and commercial districts, as well as connections to marine, rail, and air freight facilities, is impaired by congestion in the I-5 Bridge Influence Area.	I-5 is the primary supply-chain for goods moving into and out of the Vancouver-Portland region and the Pacific Northwest. Access to nationally and regionally significant industrial and commercial districts, including the Ports of Vancouver and Portland, and connections to marine, rail and air freight facilities, is adversely affected by congestion in the I-5 Bridge Influence Area. Congestion is increasingly spreading into the off-peak periods (including weekends) used by freight carriers. Declining freight carrier access slows delivery times and increases shipping costs, diminishing the attractiveness of I-5 and the uses served by I-5, and negatively affecting the region's economy. Recent forecasts indicate that truck traffic in the region will double, and the logistics requirements for freight delivery time will become increasingly "just-in-time" – placing even more pressure on travel time reliability.
4. The I-5 bridge crossing area and its approach sections experience crash rates over two times higher than statewide averages for comparable urban freeways in Washington and Oregon, largely due to outdated design. Incident evaluations attribute crashes to congestion, closely spaced interchanges, short weave and merge sections, vertical grade changes in the bridge span, and narrow shoulders. In addition, the	Over 300 reported crashes occur annually in the I-5 Bridge Influence Area. Crashes have resulted in substantial property damage and injury; some have resulted in fatalities. The causes are: **Close Interchange Spacing** The 5-mile Bridge Influence Area contains eight closely spaced interchanges. These interchanges provide access to several east-west highways and arterial roadways that serve a mix of interstate, regional, and local trip purposes. The average distance between the interchanges is 1/2 mile, as compared with a recommended minimum spacing of 1 mile between interchanges located in urban areas. **Short Weave and Merge Sections** Short weave sections for vehicles entering and exiting the freeway generate backups and delay due to difficulty in

configuration of the existing I-5 bridges relative to the downstream BNSF rail bridge contributes to hazardous navigation conditions for commercial and recreational boat traffic.	maneuvering, especially for large trucks. The proportion of trucks is high because this segment provides arterial street access to both ports. Outdated designs for entrance and exit ramps cause backups onto the mainline at exit ramps. Most of the entrance ramps do not provide enough space for vehicles to merge safely with through traffic. **Vertical Grade Changes** Vertical grade changes in the bridge span over the Columbia River create sight distance limitations that reduce speeds and create potential hazards to motorists. **Narrow Highway Shoulder Width** Several segments of the I-5 Bridge Influence Area, including the I-5 bridge, have narrow inside and outside shoulders in both travel directions. In several locations, shoulders are as little as 1-foot wide (10- to 12-foot wide shoulders are standard). The lack of shoulders positions many motorists undesirably close to physical barriers that border I-5. Many drivers respond with caution by slowing down to increase separation from vehicles ahead and behind. Increased vehicle spacing reduces vehicle throughput and contributes to freeway congestion. In addition, the lack of safe areas for incident response, disabled vehicle pullout, and driver recovery also impairs the ability to manage highway operations and recover from events that interrupt traffic flow. **Hazards for River Navigation** The I-5 crossing's lift span cannot be raised during peak traffic periods. This requires river traffic heading downstream on the Columbia River to navigate under the bridge's high fixed spans near the middle of the river, then quickly turn to line up with the narrow opening of the rail bridge on the north side of the river. This maneuver is especially difficult during high river levels and could result in a collision between a vessel and one of the bridges.
5. Bicycle and pedestrian facilities for crossing the Columbia River in the I-5 Bridge Influence Area are not designed to promote non-motorized access and connectivity across the river. In addition, "low speed	The width of the bicycle/pedestrian facility on the I-5 bridge is substandard (6 to 8 feet) and located extremely close to traffic. Separated multi-use paths should be at least 10 feet wide. Bicycle and pedestrian connections between North Marine Drive, Hayden Island, and Vancouver require out-of-direction travel. For example, no connection exists for pedestrians or bicyclists wanting to stay on the west side of

vehicles" are not allowed to use the I-5 bridge to cross the river.	the bridge between Hayden Island and North Marine Drive. In addition, many of the I-5 Bridge Influence Area's features are not in compliance with Americans with Disabilities Act design guidelines. "Low speed vehicles" can be propelled via various means, including through the use of different fuels or electric power. These vehicles must have seatbelts, windshields, turn signals, headlights, brake lights and other safety equipment. According to the National Highway Traffic Safety Administration, "low speed vehicles" are capable of speeds of up to 25 miles per hour and can be operated on streets with posted speed limits of 35 miles per hour or less. Since I-5 is posted for freeway speeds and since the bridge's multi-use pathway is narrow and permits only non-motorized vehicles, "low speed vehicles" are not allowed to use the I-5 bridge to cross the river.
6. The I-5 bridges across the Columbia River do not meet current seismic standards, leaving them vulnerable to failure in an earthquake.	Previous studies concluded that the existing structures could not be upgraded to fully meet seismic design standards without full bridge reconstruction.
7. The current configuration of I-5 within the I-5 Bridge Influence Area limits east-west connectivity across the highway for all users.	There are a limited number of overcrossings and undercrossings of I-5, particularly across I-5's approaches to the Columbia River bridge crossing, i.e., between downtown Vancouver to the west of I-5 and the numerous land uses to the east of I-5 and between Jantzen Beach and Hayden Island. Users wishing to travel across I-5 often must take circuitous routes.
Future Problems	**Details/Background**
8. As the Vancouver/ Portland metropolitan region grows, mobility and accessibility for automobile, freight, and transit will decline unless the disparity between demand and capacity in the I-5 Bridge Influence Area is addressed. The increasing disparity between demand and capacity will lead to longer delays, increased accident potential, and diminished quality of life and economic opportunity.	**Regional Growth** Consistent with regionally adopted comprehensive plans, the region's growth forecasts indicate that population, employment, and commercial trade will continue to grow, increasing regional travel demand. • Between 2005 and 2030, the population of the four-county Vancouver-Portland region is projected to increase by 44 percent, from 1.96 million to 2.82 million. • Regional trade is expected to almost double over the next 25 years to over 520 million tons. While currently 64 percent of the region's freight tonnage is hauled by truck, by 2030 it is projected that 73 percent will be carried by truck, many including container loads.

Increased Travel Demand
Daily traffic demand over the I-5 bridge is expected to increase by more than 40 percent in 20 years, from 125,000 vehicles in 2000 to 180,000 vehicles in 2020 (traffic is expected to further increase beyond 2020; new travel demand modeling is currently being conducted to predict 2030 levels). The projected increase in use of the bridge is constrained by the lack of capacity to accommodate more vehicles, resulting in an expansion of the peak period to accommodate the projected traffic increase. There will also be a potentially large and underserved transit market for trips between key regional locations traveling or connecting through the I-5 Bridge Influence Area.

Deteriorating Traffic Conditions
Unless improvements are made, traffic conditions in the I-5 Bridge Influence Area are predicted to worsen over the next 20 years:

- Traffic congestion and delay will increase, with stop-and-go conditions occurring in both directions for 10 to 12 hours on weekdays. Increased delays on weekends will also result.
- The current off-peak periods, which are generally uncongested and favored by freight carriers, will blend into adjacent peak period congestion, increasing freight delay throughout much of the day.
- Vehicle-hours of delay during the evening commute period will increase nearly 80 percent, from 18,000 hours to 32,000 hours each day. Vehicle-hours of delay on truck routes will increase by more than 90 percent, from 13,400 hours to 25,800 hours each day.
- Average travel times for buses traveling in general purpose lanes on I-5 between downtown Vancouver and downtown Portland are expected to almost double, from 27 minutes in 2000 to 55 minutes in 2020.
- With an extension in the duration of congestion, there may be pressure to increase the bridge lift closure periods, further hampering river navigation and increasing the likelihood of accidents between vessels and the bridge.
- As traffic demands increase, accident levels will likely rise within the Bridge Influence Area.

	Diminished Mobility and Accessibility • Slower highway speeds will reduce access to jobs, shopping, and recreational uses. • Regional truck freight is projected to increase by about 130 percent in the next 25 years; however, increasing delays between I-5 and freight centers will adversely affect freight distribution and access to ports and terminals, thereby shrinking market areas served by the Vancouver-Portland region. The current Regional Transportation Council Metropolitan Transportation Plan and the Metro Regional Transportation Plan recognize the need for additional capacity to improve the flow of people and freight in the I-5 Bridge Influence Area. Both plans include the I-5 Transportation and Trade Partnership Strategic Plan recommendations to increase mobility and accessibility in the I-5 Bridge Influence Area.

Columbia River CROSSING

I-5 Columbia River Crossing

Statement of Purpose and Need

Project Purpose

The purpose of the proposed action is to improve Interstate 5 corridor mobility by addressing present and future travel demand and mobility needs in the Columbia River crossing Bridge Influence Area (BIA). The BIA extends from approximately Columbia Boulevard in the south to SR 500 in the north. Relative to the No-build alternative, the proposed action is intended to achieve the following objectives: a) improve travel safety and traffic operations on the Interstate 5 crossing's bridges and associated interchanges; b) improve connectivity, reliability, travel times and operations of public transportation modal alternatives in the BIA; c) improve highway freight mobility and address interstate travel and commerce needs in the BIA; and d) improve the Interstate 5 river crossing's structural integrity.

Project Need

The specific needs to be addressed by the proposed action include:

- **Growing Travel Demand and Congestion:** Existing travel demand exceeds capacity in the I-5 Columbia River crossing and associated interchanges. This corridor experiences heavy congestion and delay lasting 2 to 5 hours during both the morning and afternoon peak travel periods and when traffic accidents, vehicle breakdowns, or bridge-lifts occur. Due to excess travel demand and congestion in the I-5 bridge corridor, many trips take the longer, alternative I-205 route across the river. Spillover traffic from I-5 onto parallel arterials such as Martin Luther King Boulevard. and Interstate Avenue increases local congestion. The two crossings currently carry over 260,000 trips across the Columbia River daily. Daily traffic demand over the I-5 crossing is projected to increase by 40 percent during the next 20 years, with stop-and-go conditions increasing to at least 10 to 12 hours each day if no improvements are made.

- **Impaired freight movement:** I-5 is part of the National Truck Network, and the most important freight freeway on the West Coast linking international, national and regional markets in Canada, Mexico and the Pacific Rim with destinations throughout the western United States. In the center of the project area, I-5 intersects with the Columbia River's deep water shipping and barging as well as two river-level, transcontinental rail lines. The I-5 crossing provides direct and important highway connection to the Port of Vancouver and Port of Portland facilities located on the Columbia River as well as the majority of the area's freight consolidation facilities and distribution terminals. Freight volumes moved by truck to and from the area are projected to more than double over the next 25 years. Vehicle-hours of delay on truck routes in the Portland-Vancouver area are projected to increase by more than

90 percent over the next 20 years. Growing demand and congestion will result in increasing delay, costs and uncertainty for all businesses that rely on this corridor for freight movement.

- **Limited public transportation operation, connectivity and reliability:** Due to limited public transportation options, a number of transportation markets are not well served. The key transit markets include trips between the Portland Central City and the City of Vancouver and Clark County, trips between North/Northeast Portland and the City of Vancouver and Clark County, and trips connecting the City of Vancouver and Clark County with the regional transit system in Oregon. Current congestion in the corridor adversely impacts public transportation service reliability and travel speed. Southbound bus travel times across the bridge are currently up to three times longer during parts of the am peak compared to off peak. Travel times for public transit using general purpose lanes on I-5 in the bridge influence area are expected to increase substantially by 2030.

- **Safety and Vulnerability to Incidents:** The I-5 river crossing and its approach-sections experience crash rates nearly 2.5 times higher than statewide averages for comparable facilities. Incident evaluations generally attribute these crashes to traffic congestion and weaving movements associated with closely spaced interchanges. Without breakdown lanes or shoulders, even minor traffic accidents or stalls cause severe delay or more serious accidents.

- **Substandard bicycle and pedestrian facilities:** The bike/pedestrian lanes on the I-5 Columbia River bridges are 6 to 8 feet wide, narrower than the 10-foot standard, and are located extremely close to traffic lanes thus impacting safety for pedestrians and bicyclists. Direct pedestrian and bicycle connectivity are poor in the BIA.

- **Seismic vulnerability:** The existing I-5 bridges are located in a seismically active zone. They do not meet current seismic standards and are vulnerable to failure in an earthquake.

Columbia River CROSSING

Screening and Evaluation Framework

This framework establishes a logical process for narrowing (or screening) the large number of transportation components that will be generated at the outset of the project. The framework also establishes criteria and related performance measures to:

- Measure the effectiveness of components and subsequent alternative packages in addressing the problems identified in the *Problem Definition*, and
- relate the degree to which community values as identified in the CRC Task Force's *Vision and Values Statement* are achieved.

The project will use the same criteria throughout the process. However, measures for gauging the performance of alternatives against the criteria will become successively more specific and may be modified as more detailed data becomes available.

Through successive screening, the most promising components are packaged into viable alternatives. These are then narrowed further to provide alternatives to be considered in the Draft Environmental Impact Statement (DEIS). Components and alternatives that do not pass from one screening level to the next will be dropped from further consideration. Ultimately, the evaluation criteria will be used to support selection of a preferred alternative.

Generation of Components

The I-5 Transportation and Trade Partnership *Final Strategic Plan* provided recommendations to shape transportation improvements on I-5 between Columbia Boulevard in Portland and State Route (SR) 500 in Vancouver, an area referred to as the "bridge influence area." However, many of the recommendations were not specific, leaving many ways to package and implement solutions. In addition, new ideas requiring further evaluation may surface through the National Environmental Policy Act (NEPA) scoping process.

Schedule

The project team will follow this screening schedule:

- Feb/April 2006 — Component screening and packaging of remaining components into alternatives to be evaluated further
- Late fall 2006 — Screening of alternatives and deciding which alternatives will be evaluated in the Draft Environmental Impact Statement (Draft EIS)
- Early 2008 — Selection of a preferred alternative

The evaluation framework is comprised of three elements, which are attached:

Contents

The following materials comprise the remainder of this framework:

- **Glossary of terms**
- **Overall Steps in the Screening and Evaluation Process**
- **Component Screening Step A**
- **Component Screening Step B**

(Criteria from Step B are also used during the alternative package screening and selection of a preferred alternative)

Glossary of Terms

Component- A specific idea proposed to address one or more of the identified needs in the I-5 bridge influence area. For example, each of several viable river crossing ideas is a separate component under the "river crossing" category.

Transportation Category- Components are organized and screened among eight (8) transportation categories based on the nature of the component. For example, all transit components (bus, light rail, other) are organized within the "transit" category and all river crossing components within the "river crossing" category. Due to their common reliance on highway and bridge facilities, bicycle, pedestrian, and freight components will be screened jointly with roadway and river crossing categories.

Screening- The process of assessing and narrowing the range of components and alternative packages relative to established screening criteria and documentation of the screening process and resulting outcomes. Screening represents the body of work completed in forming the range of alternatives to advance into the EIS. Component screening occurs within and not across transportation categories. Alternative packages are screened relative to one another.

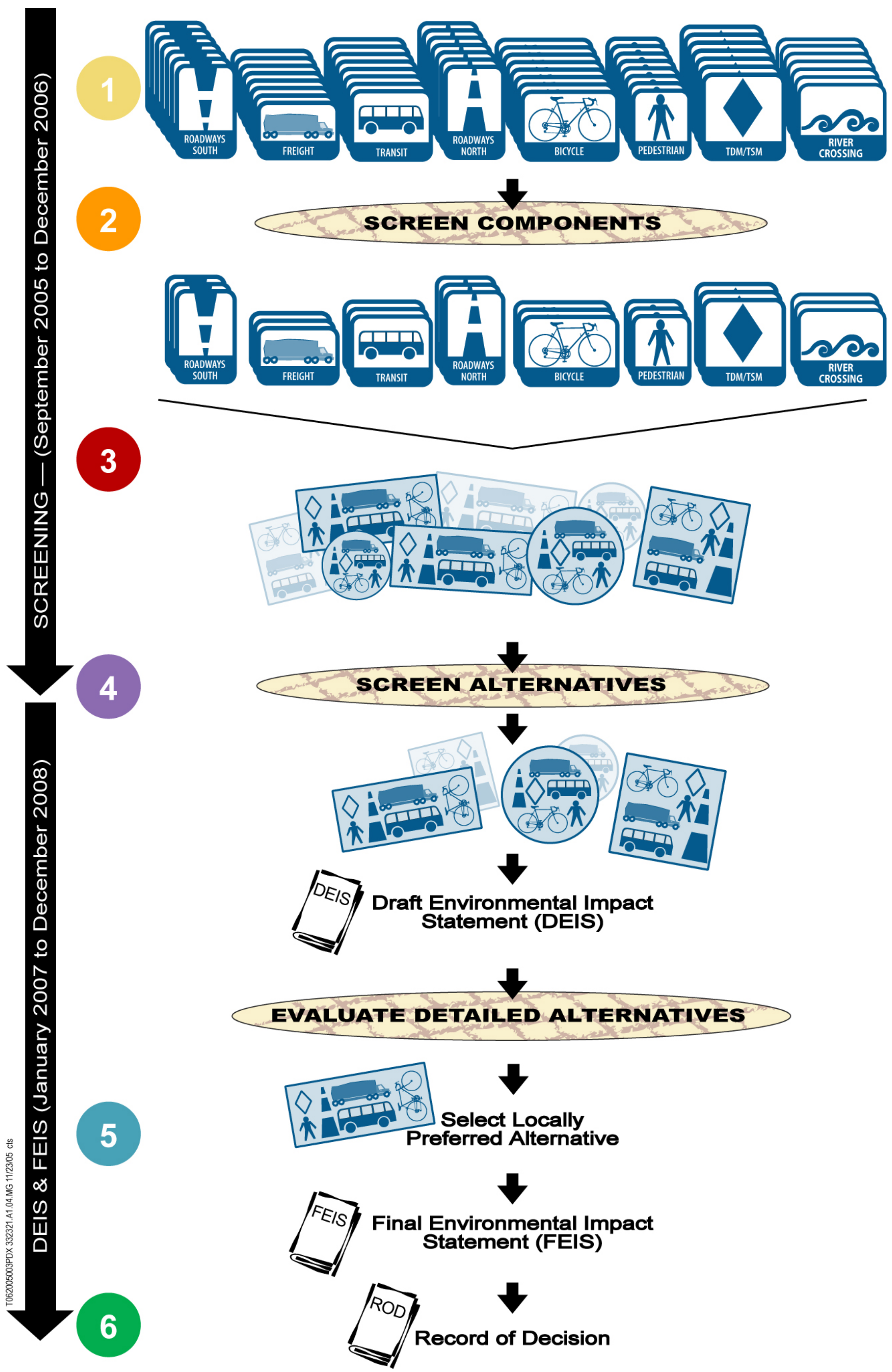
Criteria- Principles reflecting the CRC Task force adopted *Vision and Values Statements* by which components and alternative packages will be considered.

Performance Measure- Used to assess the degree to which the established criteria are satisfied. Measures are mostly qualitative during component screening given limited available data and become more quantitative during alternative package screening and selection of a preferred alternative as detailed data is generated.

Alternative- The end result of the screening process, each alternative is a carefully matched and fully formed assembly of components intended to address the project purpose and need and allow for comparison of performance relative to established evaluation criteria.

Evaluation- Different and distinct from screening, evaluation is the process of comparing and contrasting the adopted range of alternatives during the EIS, leading to selection of a preferred alternative. Performance measures at this stage are the most quantifiable.

Scoping Process- A process for early identification of potentially significant environmental issues and suggestions for potential improvements. This process begins with a project/process introduction to the environmental review agencies and the public, initiating coordination and involvement activities that will span the life of the project.



Steps in the Screening and Evaluation Process

1 Identify Transportation Components

To begin, a wide range of improvement ideas (or components) will be generated from two sources: (1) recommendations in the 2002 I-5 Transportation and Trade Partnership Final Strategic Plan; and (2) additional suggestions from the public and affected agencies received during the National Environmental Policy Act (NEPA) scoping process. The project team will organize these components into transportation categories to make the process of screening the components more clear: Roadways North, River Crossing, Roadways South, Freight, Transit, Bicycle/Pedestrian, and Transportation Demand Management (TDM)/Transportation System Management (TSM).

2 Screen Components

Component screening occurs using a two-step process (Steps A and B) for each component within the above categories to successively narrow the number of possible solutions. **Step A** is a pass/fail process in which transportation components are screened against questions derived from the *Problem Definition* (See attachment *Step A: Component Screening*). To determine if each component offers an improvement, they will be compared to the No Build condition. Components that pass in Step A will be evaluated further against **Step B** criteria that were developed to reflect values identified in the CRC Task Force's V*ision and Values Statement* (See attachment *Step B: Component Screening*). Project staff will rate each of the remaining components numerically on an established scale (for example 1-5) using data drawn mostly from previous studies. They will identify components that perform better than others in each category and recommend which components to advance for inclusion in alternative packages. Results will be presented in a Component Screening Report. Although many of the components may have benefits that extend beyond the bridge influence area, for this component screening, measures will focus on changes within the bridge influence area.

3 Assemble Alternative Packages

Project staff will assemble a representative set of alternative packages spanning the bridge influence area from the components that pass the first screening. Alternative packages will include components from each transportation category that blend together in a logical manner considering, for example, alignment and operational requirements. In some instances, one alternative package may sufficiently represent several other possible component combinations for analysis purposes. Assembling alternative packages allows project staff to model and analyze the integrated transportation system performance of I-5 within the bridge influence area, as well as other impacts and benefits, that cannot be assessed at the component level. Agreement on the range of alternatives to be considered is a major decision point in the project development process.

4 Narrow Range of Alternatives

Further screening will reduce the set of alternative packages to a reasonable range of Build Alternatives for comparison with the No-Build Alternative in the Draft Environmental Impact Statement (EIS). Performance measures will be modified to take advantage of new data available at this point in the project. Project staff will rate the performance of each alternative against these measures and will summarize results in an Alternatives Analysis Report. The most effective packages will advance into the Draft EIS either "as is" or after being modified based on screening results. Agreement on the alternatives to be evaluated in the Draft EIS is a major decision point in the project development process.

5 Select a Locally Preferred Alternative

Following preparation of the Draft EIS, project staff will again compare alternatives against the evaluation criteria using more detailed data compiled during preparation of the Draft EIS. This evaluation will be presented in a report to support selection of a preferred alternative. Agreement on the preferred alternative is a major decision point in the project development process.

6 Secure Federal Approval

The project team will document the locally preferred alternative in the Final EIS and submit it to the Federal Highway Administration and the Federal Transit Administration for approval. If all requirements have been met, these agencies will issue a Record of Decision to document final selection of the alternative to be built.

Step A: Pass/Fail Transportation Component Screening

Component:____________________________ **Screening Questions** Does the component achieve the following?	**Roadway North/ Freight/ Bicycle/ Pedestrian**	**River Crossing/ Freight/ Bicycle/ Pedestrian**	**Roadway South/ Freight/ Bicycle/ Pedestrian**	**Transit**	**TSM/ TDM**	**Pass**	**Fail**	**Not Applicable**	**Unknown**	**Reason(s) to Drop**
Increase vehicular capacity or decrease vehicular demand within the bridge influence area? For example, will the component provide additional travel lanes, remove a constraining bottleneck, or provide other modes of travel that can reduce the demand to travel by vehicle in the I-5 bridge influence area?	♦	♦	♦	♦	♦					
Improve transit performance within the bridge influence area? For example, will the component provide an exclusive high-capacity transitway, transit preferential lanes or other bus-specific improvements enough to improve transit capacity and performance in the bridge influence area?				♦	♦					
Improve freight mobility within the bridge influence area? For example, will the component provide truck freight priority or increase vehicular capacity or reduce vehicular demand enough to improve truck-hauled freight movements and reduce truck congestion in the bridge influence area? Will it improve or maintain access to existing freight facilities?	♦	♦	♦		♦					
Improve safety and decrease vulnerability to incidents within the bridge influence area? For example, will the component eliminate or minimize features that may be attributable to incidents within the bridge influence area such as a key bottleneck, closely spaced on and off ramps, or narrow shoulders?	♦	♦	♦	♦	♦					
Improve bicycle and pedestrian mobility within the bridge influence area? For example, will the component provide a continuous, connected and functional bicycle and pedestrian facility across the Columbia River?	♦	♦	♦							
Reduce seismic risk of the I-5 Columbia River crossing? For example, will the component seismically retrofit the existing Columbia River crossing and/or provide a new crossing that meets seismic standards?		♦								

Notes:

- Components will be screened only against the questions relevant to their categories (indicated by ♦)
- Components that fail the relevant questions will be screened out, and the only way components will be prevented from proceeding to Step B component screening is if they receive a "fail" rating.
- Bicycle, pedestrian, and freight components will be evaluated with the roadway and river crossing categories given their inter-relationship.
- All components will be compared to the No Build, which includes transportation improvements adopted in the regional transportation plans but no improvements at the Columbia River crossing.

Step B: Component Screening

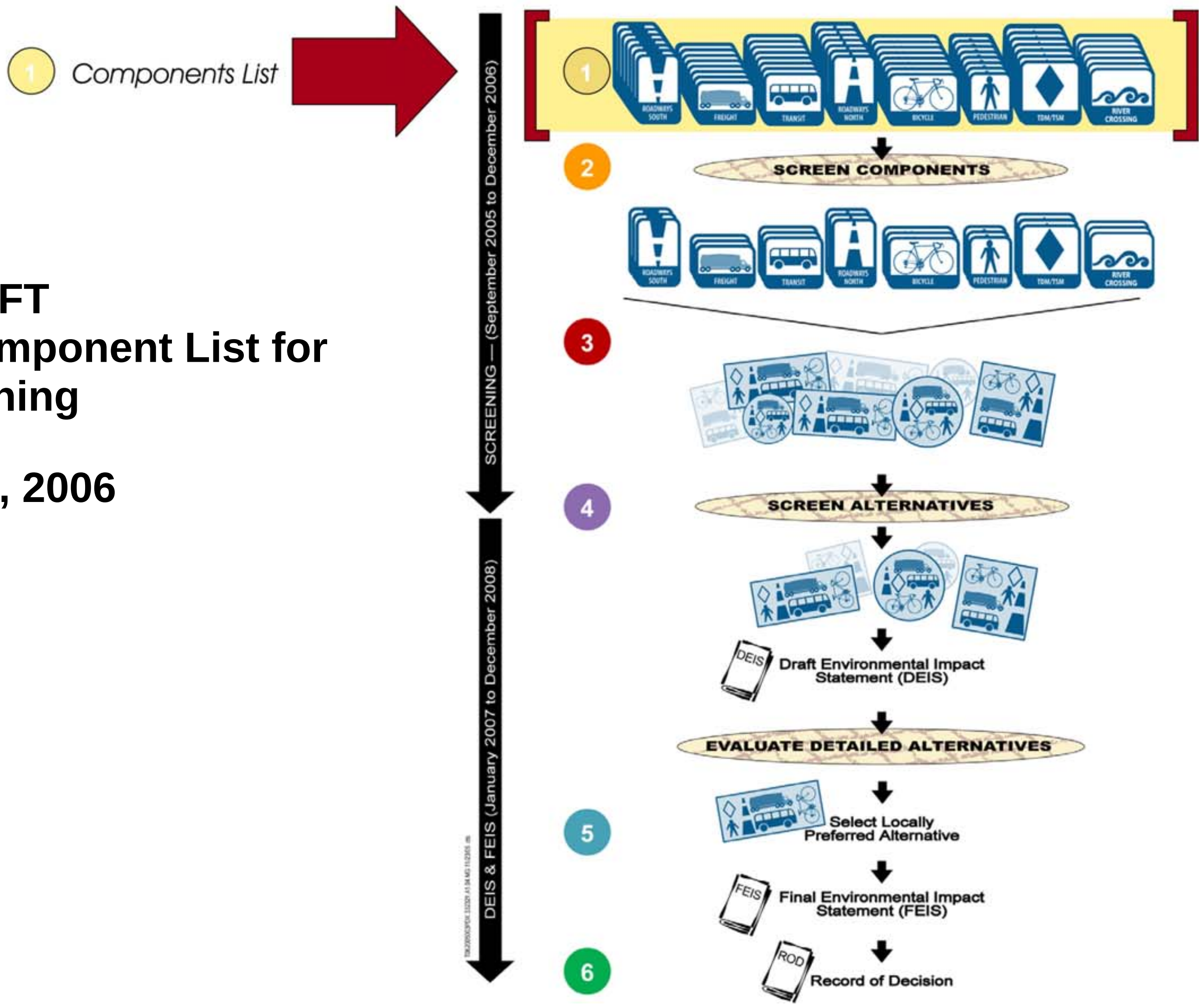
Criteria	Component Screening Performance Measures
1 Community Livability and Human Resources	
1.1 Avoid, then minimize adverse impacts to, and where practicable reduce, noise levels	1.1 Magnitude (on a qualitative scale) of residential properties within approximate noise impact contour
1.2 Avoid, then minimize adverse impacts to, and where practicable enhance, neighborhood cohesion	*1.2 Criteria 1.2 to be assessed during alternative package screening*
1.3 Avoid, then minimize adverse impacts to, and where practicable enhance, air quality	*1.3 Criteria 1.3 to be assessed during alternative package screening*
1.4 Avoid or minimize residential displacements	1.4 Magnitude (on a qualitative scale) of residential properties crossed by component's conceptual footprint
1.5 Avoid or minimize business displacements	1.5 Magnitude (on a qualitative scale) of commercial/industrial properties crossed by component's conceptual footprint
1.6 Avoid or minimize adverse impacts to, and where practicable, preserve historic, prehistoric, and cultural resources	1.6 Magnitude and significance (on a qualitative scale) of historic, prehistoric, and cultural resources crossed by component's conceptual footprint
1.7 Avoid, then minimize adverse impacts to, and where practicable enhance, public park and recreation resources	1.7 Magnitude and significance (on a qualitative scale) of public park and recreation resources crossed by component's conceptual footprint
1.8 Support local comprehensive plans and jurisdiction-approved neighborhood plans including development and redevelopment opportunities, consistent with these plans	*1.8 Criteria 1.8 to be assessed during alternative package screening*
1.9 Incorporate aesthetic values of the community in the project design	*1.9 Criteria 1.9 to be assessed during alternative package screening and/or alternative evaluation*
2 Mobility, Reliability, Accessibility, Congestion Reduction, and Efficiency	
2.1 Reduce travel times and delay in the I-5 corridor and within the bridge influence area for passenger vehicles	2.1 Potential (on a qualitative scale) for component to improve peak period passenger vehicle travel times and delay in the I-5 corridor and within the bridge influence area
2.2 Reduce travel times and delay in the I-5 corridor and within the bridge influence area for transit modes	2.2 Potential (on a qualitative scale) for component to reduce peak period travel time and delay for transit vehicles in the I-5 corridor and within the bridge influence area
2.3 Reduce the number of hours of daily highway congestion in the I-5 corridor and within the bridge influence area	2.3 Potential (on a qualitative scale) for component to reduce the number of hours of daily highway congestion in the I-5 corridor and within the bridge influence area
2.4 Enhance or maintain accessibility of jobs, housing, health care and education to travel markets served by the I-5 Columbia River crossing	*2.4 Criteria 2.4 to be assessed during alternative package screening and/or alternative evaluation*
2.5 Improve person throughput of I-5 Columbia River crossing	2.5 Potential (on a qualitative scale) for component to increase the level of persons crossing Columbia River via I-5 by mode
2.6 Improve vehicle throughput of I-5 Columbia River crossing	2.6 Potential (on a qualitative scale) for component to increase the level of vehicles by mode crossing Columbia River via I-5
3 Modal Choice	
3.1 Provide for multi-modal transportation choices in the I-5 corridor and within the bridge influence area	3.1 Potential (on a qualitative scale) for increasing transit capacity as a percentage of total daily capacity and peak period capacity across the I-5 Columbia River bridge
3.2 Improve transit service to target markets in the I-5 corridor and within the bridge influence area	3.2 Potential (on a qualitative scale) to improve transit service in the I-5 corridor to identified travel markets considering frequency, connectivity, span of hours, number of transfers, and travel time
3.3 Improve bike/pedestrian connectivity in the I-5 corridor and within the bridge influence area	3.3 Ability (on a qualitative scale) to improve connectivity of bicycle and pedestrian trips in the I-5 corridor and through the bridge influence area
3.4 Increase vehicle occupancy in the I-5 corridor and within the bridge influence area	3.4 Potential (on a qualitative scale) for component to increase vehicle occupancy in the I-5 corridor and within the bridge influence area
4 Safety	
4.1 Enhance vehicle/freight safety	4.1 Potential (on a qualitative scale) for component to improve vehicle/freight safety within the bridge influence area
4.2 Enhance bike/pedestrian facilities and safety	4.2 Quality (on a qualitative scale) of bicycle and pedestrian pathways provided within a component, considering design standards such as ADA compliance
4.3 Enhance or maintain marine safety	4.3 Quality (on a qualitative scale) of navigation channel geometrics to accommodate ship movements considering necessary tug and barge turning maneuvers and hazards of additional lift restrictions
4.4 Enhance or maintain aviation safety	4.4 Ability (on a qualitative scale) to accommodate FAA clearance zone for Pearson Airpark
4.5 Provide sustained life-line connectivity	4.5 Ability (on a qualitative scale) to accommodate life-line connections in the I-5 corridor across the Columbia River to be maintained in an earthquake
4.6 Enhance I-5 incident/emergency response access within the bridge influence area	4.6 Quality (on a qualitative scale) to accommodate incident/emergency service access to incidents on I-5 in the bridge influence area
5 Regional Economy; Freight Mobility	
5.1 Reduce travel times and reduce delay for vehicle-moved freight on I-5 *within* the bridge influence area	5.1 Potential (on a qualitative scale) for component to reduce daily delay for trucks on I-5 within the bridge influence area
5.2 Reduce travel times and reduce delay for vehicle-moved freight in the I-5 corridor	5.2 Potential (on a qualitative scale) for component to reduce daily delay for trucks in the I-5 corridor
5.3 Enhance or maintain efficiency of marine navigation	5.3 Potential (on a qualitative scale) for component to avert extension of "no bridge lift" periods tied to I-5 congestion
5.4 Improve freight truck throughput of the bridge influence area	5.4 Potential (on a qualitative scale) for component to increase freight vehicle throughput across the Columbia River via I-5
5.5 Avoid or minimize adverse impacts to the parallel freight rail corridor	*5.5 Criteria 5.5 to be assessed during alternative package screening and/or alternative evaluation*
5.6 Enhance or maintain access to port, freight, and industrial facilities	5.6 Range of travel times (on a qualitative scale) between up to five origin/destination pairs of typical freight centers within the bridge influence area (e.g., between Port of Vancouver and Columbia Blvd. interchange)
6 Stewardship of Natural Resources	
6.1 Avoid, then minimize adverse impacts to, and where practicable enhance, threatened or endangered fish and wildlife and their habitat	6.1 Magnitude (on a qualitative scale) of direct impact on designated critical habitat and other threatened or endangered species habitat
6.2 Avoid, then minimize adverse impacts to, and where practicable enhance, other fish and wildlife and their habitat	6.2 Magnitude (on a qualitative scale) of direct impact on other fish and wildlife habitat
6.3 Avoid, then minimize adverse impacts to, and where practicable enhance, rare, threatened, or endangered plant species	6.3 Magnitude (on a qualitative scale) of direct impact on rare, threatened, or endangered plant species
6.4 Avoid, then minimize adverse impacts to, and where practicable enhance and/or restore, wetlands	6.4 Magnitude and significance (on a qualitative scale) of direct impact on wetlands
6.5 Avoid, then minimize adverse impacts to, and where practicable enhance, water quality	6.5 Magnitude (on a qualitative scale) of net increase in impervious surface area
6.6 Minimize total energy consumption of construction and transportation system operations	*6.6 Criteria 6.6 to be assessed during alternative evaluation*
6.7 Avoid, then minimize adverse impacts to, and where practicable enhance, waterways	6.7 Magnitude and significance (on a qualitative scale) of direct impact on waterways
7 Distribution of Benefits and Impacts	
7.1 Avoid or minimize disproportionate adverse impacts on, and where practicable, improve conditions for low income and minority populations	7.1 Magnitude (on a qualitative scale) of potential residential property acquisitions in blocks or block groups with high share of low income or minority populations (compare to impacts in other blocks or block groups)
7.2 Provide for equitable distribution of benefits to low income and minority populations	7.2 Potential improvements (on a qualitative scale) to vehicle and transit travel times between representative low income or minority areas and selected destinations (including employment, education and commercial areas)
8 Cost Effectiveness and Financial Resources	
8.1 Minimize the cost of construction\	*8.1 Criteria 8.1 to be assessed during alternative package screening and/or alternative evaluation*
8.2 Ensure transportation system construction cost effectiveness	*8.2 Criteria 8.2 to be assessed during alternative package screening and/or alternative evaluation*
8.3 Ensure transportation system maintenance and operation cost effectiveness	*8.3 Criteria 8.3 to be assessed during alternative package screening and/or alternative evaluation*
8.4 Ensure a reliable funding plan for the project	*8.4 Criteria 8.4 to be assessed during alternative package screening and/or alternative evaluation*
9 Growth Management/Land Use	
9.1 Support adopted regional growth management and comprehensive plans	*9.1 Criteria 9.1 to be assessed during alternative package screening and/or alternative evaluation*
10 Constructability	
10.1 Maintain transportation operations during construction	*10.1 Criteria 10.1 to be assessed during alternative package screening and/or alternative evaluation*
10.2 Minimize adverse construction impacts	*10.2 Criteria 10.2 to be assessed during alternative package screening and/or alternative evaluation*
10.3 Provide flexibility to accommodate future transportation system improvements	*10.3 Criteria 10.3 to be assessed during alternative package screening and/or alternative evaluation*
10.4 Use construction practices and materials that minimize environmental impact	*10.4 Criteria 10.4 to be assessed during alternative package screening and/or alternative evaluation*

Notes: 1. Bicycle, pedestrian and freight components will be evaluated with the roadway and river crossing categories given their interrelationship. 2. These criteria will be used in alternative screening and the selection of a preferred alternative, but the performance measures will change.
3. Where noted, insufficient data will exist to report on certain criteria during component screening. Data will be available during subsequent analysis of alternative packages.

Columbia River CROSSING

DRAFT
Transportation Component List for Screening

March 3, 2006



This document presents the full range of ideas generated to address identified needs under the I-5 Columbia River Crossing (CRC) project. Ideas, referred to as ***"components"***, were generated from two sources: (1) recommendations in the 2002 I-5 Transportation and Trade Partnership Final Strategic Plan; and (2) additional suggestions from the public and affected agencies received during the National Environmental Policy Act (NEPA) scoping process for this project.

The cover page graphically illustrates the I-5 CRC project evaluation framework process and depicts generation of the component list as the first step in the screening process. ***Note- screening has not yet occurred. Screening results will be presented to the Task Force beginning with the March 22, 2006 meeting.***

TRANSIT

ID	Name	Description	Sample Images
TR-1	Express Bus in General Purpose (GP) lanes	Primarily peak period local and express bus services operating in existing or new I-5 general purpose traffic lanes.	
TR-2	Express Bus in Managed Lanes	Primarily peak period local and express bus services operating in new I-5 managed lanes.	
TR-3	Bus Rapid Transit (BRT)-Lite	An all-day Bus Rapid Transit (BRT) service that operates in exclusive, managed, or general purpose lanes, which may or may not have in-line stations and special vehicles.	
TR-4	Bus Rapid Transit (BRT)- Full	An all-day Bus Rapid Transit (BRT) service with an exclusive right-of-way, in-line stations, special vehicles, and a unique branded identity.	

TRANSIT

ID	Name	Description	Sample Images
TR-5	Light Rail Transit (LRT)	An extension of MAX across the Columbia River in an exclusive guideway.	
TR-6	Streetcar	A modern streetcar system with an exclusive/non-exclusive guideway that has the ability to operate on light rail tracks (e.g., with Interstate MAX).	
TR-7	High Speed Rail	A high speed rail service operating in a new exclusive guideway within the I-5 corridor.	
TR-8	Ferry Service	A ferry service connecting downtown Vancouver to Hayden Island and/or downtown Portland via the Willamette River.	

TRANSIT

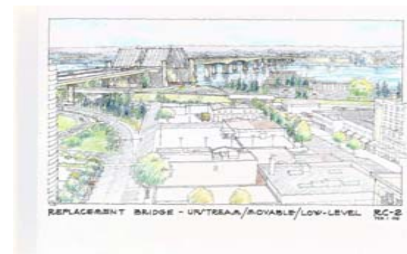
ID	Name	Description	Sample Images
TR-9	Monorail System	A monorail system operating in a new exclusive guideway within the I-5 corridor.	
TR-10	Magnetic Levitation (MagLev) Railway	A new monorail service connecting downtown Vancouver to either Hayden Island or downtown Portland.	
TR-11	Commuter Rail Transit	A commuter rail service operating along existing BNSF trackage.	
TR-12	Heavy Rail Transit	An urban heavy rail transit system operating in an exclusive guideway within the I-5 corridor.	

TRANSIT

ID	Name	Description	Sample Images
TR-13	Personal Rapid Transit	A personal rapid transit system operating in an exclusive guideway in the I-5 corridor.	
TR-14	People Mover/Automated Guideway Transit	A people mover or automated guideway transit system operating in a new exclusive guideway in the I-5 corridor.	

RIVER CROSSING

(All river crossing components will include bicycle and pedestrian pathway.)

ID	Name	Description	Sample Images
RC-1	Replacement Bridge-Downstream/Low-level/Movable	Replace both existing I-5 bridges with a new, low-level, movable-span bridge downstream (west) of the existing bridges.	
RC-2	Replacement Bridge-Upstream/Low-level/Movable	Replace both existing I-5 bridges with a new, low-level, movable-span bridge upstream (east) of the existing bridges.	
RC-3	Replacement Bridge-Downstream/Mid-level	Replace both existing I-5 bridges with a new, mid-level bridge downstream (west) of the existing bridges.	
RC-4	Replacement Bridge-Upstream/Mid-level	Replace both existing I-5 bridges with a new, mid-level bridge upstream (east) of the existing bridges.	

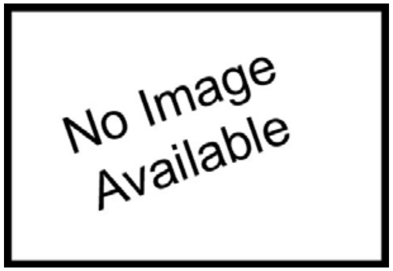
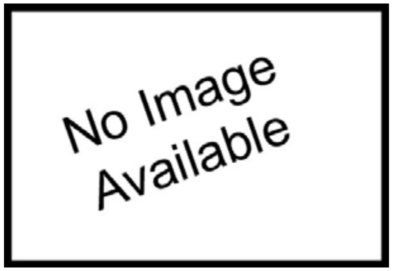
RIVER CROSSING

(All river crossing components will include bicycle and pedestrian pathway.)

ID	Name	Description	Sample Images
RC-5	Replacement Bridge-Downstream/High-level	Replace both existing I-5 bridges with a new, high-level bridge downstream (west) of the existing bridges.	No Image Available
RC-6	Replacement Bridge-Upstream/High-level	Replace both existing I-5 bridges with a new, high-level bridge upstream (east) of the existing bridges.	No Image Available
RC-7	Supplemental Bridge-Downstream/Low-level/Movable	Add a new, low-level, movable-span I-5 bridge downstream (west) of the existing bridges.	
RC-8	Supplemental Bridge-Upstream/Low-level/Movable	Add a new, low-level, movable-span I-5 bridge upstream (east) of the existing bridges.	

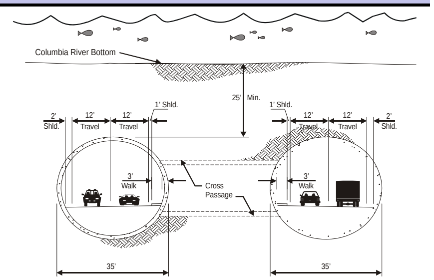
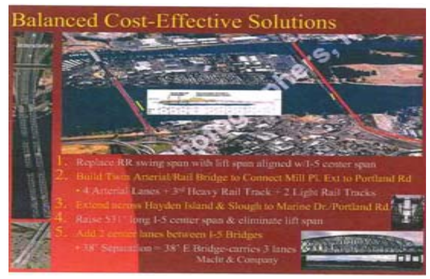
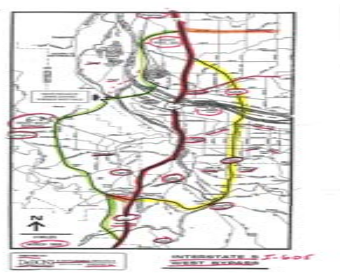
RIVER CROSSING

(All river crossing components will include bicycle and pedestrian pathway.)

ID	Name	Description	Sample Images
RC-9	Supplemental Bridge-Downstream/Mid-level	Add a new, mid-level I-5 bridge downstream (west) of the existing bridges.	
RC-10	Supplemental Bridge-Upstream/Mid-level	Add a new, mid-level I-5 bridge upstream (east) of the existing bridges.	
RC-11	Supplemental Bridge-Downstream/High-level	Add a new, high-level I-5 bridge downstream (west) of the existing bridges.	
RC-12	Supplemental Bridge-Upstream/High-level	Add a new, high-level I-5 bridge downstream (west) of the existing bridges.	

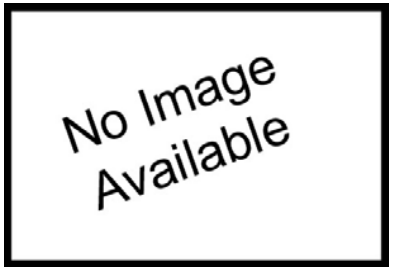
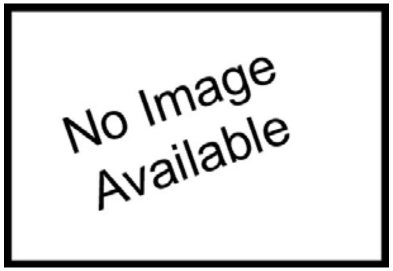
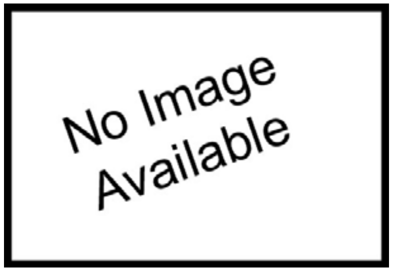
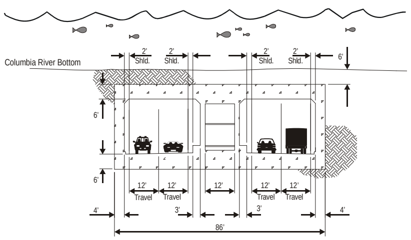
RIVER CROSSING

(All river crossing components will include bicycle and pedestrian pathway.)

ID	Name	Description	Sample Images
RC-13	Tunnel to supplement I-5	Supplement existing I-5 bridge(s) with a new tunnel crossing.	
RC-14	New Corridor Crossing	Create multi-modal, bi-state industrial corridor next to BNSF rail crossing west of existing I-5 Bridges.	
RC-15	New Corridor Crossing plus Widen Existing I-5 Bridges	Create multi-modal, bi-state arterial corridor next to BNSF rail crossing west of existing I-5 Bridges. Add two center lanes between existing I-5 bridges for additional vehicular capacity.	
RC-16	New Western Highway (I-605)	Add a new western bypass connecting Clark and Multnomah Counties.	

RIVER CROSSING

(All river crossing components will include bicycle and pedestrian pathway.)

ID	Name	Description	Sample Images
RC-17	New Eastern Columbia River Crossing	New bridge east of I-205 from Camas/East Clark County to Troutdale.	
RC-18	I-205 Improvements	Improvements in the I-205 corridor between Vancouver and Portland.	
RC-19	Arterial Crossing to Supplement I-5	Add new Columbia River crossing adjacent to existing I-5 bridges for arterial-use only, connecting downtown Vancouver to Hayden Island with potential connections to Marine Drive and Columbia Blvd.	
RC-20	Replacement Tunnel	Replace existing I-5 bridges with a new tunnel crossing.	

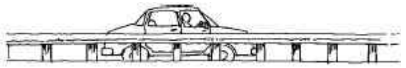
RIVER CROSSING

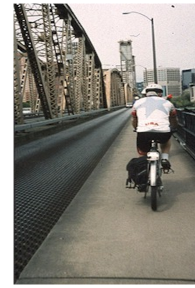
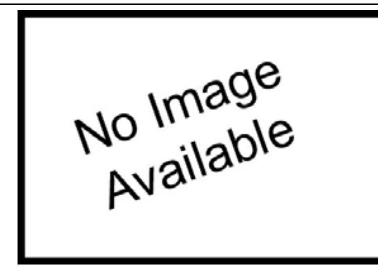
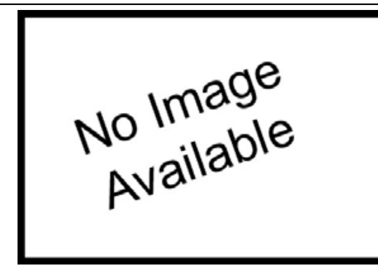
(All river crossing components will include bicycle and pedestrian pathway.)

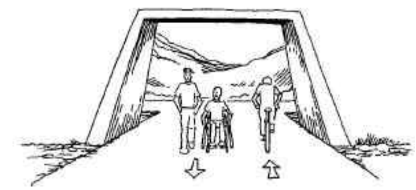
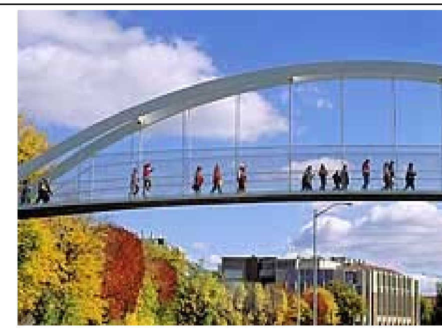
ID	Name	Description	Sample Images
RC-21	33rd Avenue Crossing	Add new crossing east of I-5, connecting Vancouver and Portland near the 33rd Avenue corridor in Portland.	No Image Available
RC-22	Non-Freeway Multi-Modal Columbia River Crossing	Add new multi-modal Columbia River crossing located west (downstream) of existing I-5 Bridges for vehicular, light rail, bicycle, and pedestrian use. Reconfigure Hayden Island and SR-14 access to I-5 via new crossing and other existing interchanges.	
RC-23	Arterial Crossing with I-5 Improvements	Add new Columbia River crossing for arterial use connecting downtown Vancouver to Hayden Island with potential connections to Marine Drive and Columbia Blvd, in conjunction with I-5 improvements in the Bridge Influence Area.	

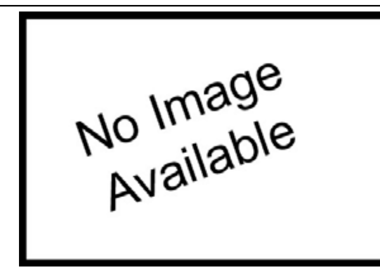
PEDESTRIAN

ID	Name	Description	Sample Images
P-1	Enhance Existing Pathway	Widen the existing narrow pathways on the existing bridges so that they meet multi-use pathway design standards. See B-1.	
P-2	New I-5 Bridge and Pathway	As part of a new bridge across the Columbia River, provide a multi-use pathway that meets design standards. See B-2.	No Image Available
P-3	New I-5 Pathway-Only Bridge	Construct a new bridge across the Columbia River that provides a multi-use pathway only. See B-3.	No Image Available
P-4	Enhanced Vancouver Connectivity	Improve pedestrian connections over and under I-5 in downtown Vancouver.	

PEDESTRIAN			
ID	**Name**	**Description**	**Sample Images**
P-5	Enhanced Hayden Island Connectivity	Improve pedestrian connections over or under I-5 on Hayden Island.	 
P-6	New North Portland Pathway	Construct a new multi-use bridge that connects Hayden Island/Jantzen Beach with Marine Drive. See B-6.	

BICYCLE			
ID	**Name**	**Description**	**Sample Images**
B-1	Enhance Existing Pathway	Widen the existing narrow pathways on the existing bridges so that they meet multi-use pathway design standards. See P-1.	 
B-2	New I-5 Bridge and Pathway	As part of a new bridge across the Columbia River, provide a multi-use pathway that meets design standards. See P-2.	
B-3	New I-5 Pathway-Only Bridge	Construct a new bridge across the Columbia River that provides a multi-use pathway only. See P-3.	
B-4	Enhanced Vancouver Connectivity	Improve bicycle connections over and under I-5 in downtown Vancouver.	

BICYCLE			
ID	**Name**	**Description**	**Sample Images**
B-5	Enhanced Hayden Is. Connectivity	Improve bicycle connections over or under I-5 on Hayden Island.	 
B-6	New North Portland Pathway	Construct a new multi-use bridge that connects Hayden Island/Jantzen Beach with Marin Drive. See P-6.	

FREIGHT			
ID	**Name**	**Description**	**Sample Images**
F-1	I-5 Mainline Freight-Only Lanes	Construct new through travel lanes on I-5 (within the Bridge Influence Area) that are dedicated to truck-freight only use during certain periods of the day, or all day long.	
F-2	Ramp Freight Bypass Lanes	Construct lanes at select I-5 on-ramps and off-ramps (within the Bridge Influence Area) that are dedicated for truck-freight use only.	
F-3	Truck Freight Restrictions	Prohibit truck-freight use of I-5 (within the Bridge Influence Area) during peak commuting periods.	
F-4	Allow Increased Freight Truck Size and Weight	Develop policy to enable use of larger/heavier trucks on I-5.	

FREIGHT			
ID	**Name**	**Description**	**Sample Images**
F-5	Freight Direct Access Ramps	Construct new ramps at select I-5 interchanges (within the Bridge Influence Area) that are dedicated to truck-freight use only.	No Image Available

ROADWAYS NORTH

Components will enhance bicycle-pedestrian connectivity

Roadway North solutions refer to connecting I-5 and associated ramps in Vancouver to any new Columbia River crossing. Roadway North components are dependent on the type and location of River Crossing and Transit components. During component screening, the project team will concurrently leverage the significant work that went into developing roadway concepts during the I-5 Partnership. The project team will advance these concepts by addressing outstanding design issues. We will be working with the Task Force, neighborhood groups, and other interested parties throughout the spring and summer to advance roadway concepts.

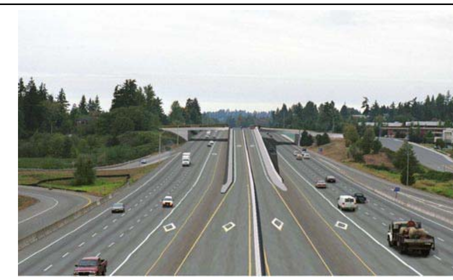
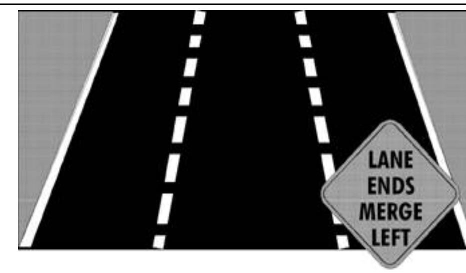
ROADWAYS SOUTH

Components will enhance bicycle-pedestrian connectivity

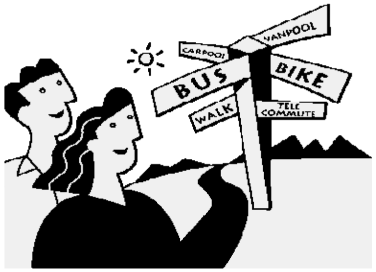
Roadway South solutions refer to connecting I-5 and associated ramps in Portland to any new Columbia River crossing. Roadway South components are dependent on the type and location of River Crossing and Transit components. During component screening, the project team will concurrently leverage the significant work that went into developing roadway concepts during the I-5 Partnership. The project team will advance these concepts by addressing outstanding design issues. We will be working with the Task Force, neighborhood groups, and other interested parties throughout the spring and summer to advance roadway concepts.

TRANSPORTATION DEMAND/SYSTEM MANAGEMENT (TDM/TSM)

ID	Name	Description	Sample Images
TM-1	Create Northern I-5 Managed Lane through Restriping	Restripe existing I-5 right-of-way to designate one highway lane per direction for managed lane use separate of general purpose (GP) lanes north of the bridge influence area between SR 500 and 134th/139th Street interchange.	
TM-2	Create Northern I-5 Transit-Only Lane through Restriping	Restripe existing I-5 right-of-way to designate one highway lane per direction for transit-only use separate of general purpose (GP) lanes north of the bridge influence area between SR 500 and 134th/139th Street interchange.	
TM-3	Create I-5 Managed Lane within the Bridge Influence Area	Utilize new capacity in the Bridge Influence Area for managed lane use separate of general purpose (GP) lanes within the bridge influence area between SR 500 and Victory Blvd.	
TM-4	Create I-5 Transit-Only Lane within the Bridge Influence Area	Utilize new capacity in the Bridge Influence Area for transit-only use separate of general purpose (GP) lanes within the bridge influence area between SR 500 and Victory Blvd.	

TRANSPORTATION DEMAND/SYSTEM MANAGEMENT (TDM/TSM)			
ID	**Name**	**Description**	**Sample Images**
TM-5	Reversible Express Managed Lane	Utilize new capacity in the Bridge Influence Area for a Reversible Express Managed Lane.	
TM-6	Direct Access Ramps	Provide interchange direct connection between I-5 Managed Lane(s) and other facilities for transit and/or other users within the I-5 corridor.	
TM-7	Preferential Managed Lane Merge(s)	Give priority to Managed Lanes at general purpose lane merge points within the Bridge Influence Area.	
TM-8	Ramp Queue Jump Lanes	Provide a bypass lane at select I-5 on-ramps within the Bridge Influence Area to allow one or more user groups (HOV, bus, freight, other) preferential access to the highway.	

TRANSPORTATION DEMAND/SYSTEM MANAGEMENT (TDM/TSM)

ID	Name	Description	Sample Images
TM-9	Increased Bus Service	Increased bus service within the I-5 corridor.	
TM-10	Enhanced Park-and-Ride Capacity	Expand existing Park-and-Ride lots and/or build new Park-and-Ride capacity.	
TM-11	Enhance ITS Technology and Management Systems	Enhance comprehensive Intelligent Transportation System (e.g., incident management; expanded detection capabilities, traffic signal coordination, message signing, etc.) within the I-5 corridor.	
TM-12	Improve the Package of Employer and Governmental TDM Policy Measures	Examples of policies and practicies include subsidized transit passes, rideshare matching, parking supply and pricing, etc.	

TRANSPORTATION DEMAND/SYSTEM MANAGEMENT (TDM/TSM)

ID	Name	Description	Sample Images
TM-13	Reduce Passenger Travel Time on Interstate MAX	Reduce travel times for passengers using Interstate MAX.	
TM-14	Transit Priority Signal System	Provide preferential signal priority for transit within the I-5 corridor.	
TM-15	Congestion Pricing on I-5	Congestion pricing of I-5 with any tolling scenario.	
TM-16	Highway On-Ramp Metering	Meter I-5 on-ramps within the I-5 corridor.	

TRANSPORTATION DEMAND/SYSTEM MANAGEMENT (TDM/TSM)

ID	Name	Description	Sample Images
TM-17	Arterial Managed Lanes	Build new arterial lanes for transit and/or managed lane use, and improve access to I-5 on- and off-ramps within the I-5 Bridge Influence Area.	
TM-18	Ramp Terminal Improvements	Improve capacity at ramp terminal intersections.	

Columbia River
CROSSING

DRAFT COMPONENTS STEP A SCREENING REPORT

March 22, 2006

Columbia River CROSSING

DRAFT COMPONENTS STEP A SCREENING REPORT

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Columbia River CROSSING

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ACRONYMS

AA	Alternatives Analysis
ADA	Americans with Disabilities Act
AGT	Automated Guideway Transit
BNSF	Burlington Northern Santa Fe Railroad
BRT	Bus Rapid Transit
CRC	Columbia River Crossing
CRD	Columbia River Datum
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HOV	High Occupancy Vehicle
I-5	Interstate 5
LRT	Light Rail Transit
NEPA	National Environmental Policy Act
ODOT	Oregon Department of Transportation
PDX	Portland International Airport
PRT	Personal Rapid Transit
RTC	Regional Transportation Council
RC	River Crossing
SOV	Single Occupant Vehicle
TR	Transit
TSM/TDM	Traffic System Management/Traffic Demand Management
WSDOT	Washington State Department of Transportation

1. Overview of Evaluation Process

In 1998, in response to evidence of growing congestion in the Portland-Vancouver I-5 corridor, leaders in the region came together to study the problem and potential solutions. This effort continues today as the Columbia River Crossing (CRC) Project Team works to identify and refine appropriate solutions to improve mobility and livability in the I-5 corridor. This current effort builds upon previous studies and will narrow potential transportation solutions to those that best meet the Purpose and Need Statement and Vision and Values Statement identified for the corridor.

The screening and evaluation of potential transportation improvements is part of the I-5 CRC Alternatives Analysis (AA) and the Environmental Impact Statement process. There are several steps to screening and evaluation. This *Components Step A Screening Report* describes how a broad range of potential transportation improvements (also known as “components”) was initially evaluated and screened, and presents the results of that screening. Those components that passed this initial screening will undergo a second round (Step B) of evaluation and screening. Components advanced from the second round will then be packaged into multi-modal alternatives. These alternatives will then be further evaluated and screened, resulting in a short list of the most promising alternatives that will be advanced into the I-5 CRC Draft Environmental Impact Statement (DEIS). The AA and DEIS will be published in late 2007, and will provide analysis and findings to help the public and agencies to understand the consequences, characteristics and other considerations associated with these alternatives. This will also help inform recommendations and decisions regarding a preferred alternative.

1.1 What is a Component?

A “component” is a potential transportation improvement proposed to address one or more of the identified needs in the Bridge Influence Area, which is the section of I-5 from SR 500 in Vancouver to approximately Columbia Blvd. in Portland. An example of a component is a newly constructed highway bridge, or light rail transit. For analysis purposes, all of the transportation components were grouped into eight categories relating to distinct transportation modes or strategies. These categories are:

1. Transit (buses, light rail, other)
2. River Crossings (different bridge or tunnel configurations and locations)
3. Roadways North (treatments to I-5 and other roadways north of the Columbia River, including interchanges)
4. Roadways South (treatments to I-5 and other roadways south of the Columbia River, including interchanges)
5. Freight (rail and truck facility improvements)
6. Transportation System/Demand Management (TSM/TDM—options to reduce auto travel during congested periods, strategies to optimize transportation facility operations)

7. Bicycles (bike lanes, bridge crossings, separate paths and routes)
8. Pedestrians (sidewalks, bridge crossings, separate paths and routes)

Some components are defined with respect to location, application, or operating characteristics (e.g., high bridge west of the existing I-5 bridges), whereas others are defined more generally and thus could be implemented in a wide range of locations or with different features (e.g., Highway On-Ramp Metering). Each component is also unique. Thus, each of several different bridge ideas, for example, is a separate component.

The final list of transportation components to be assessed was developed from two primary sources: 1) recommendations in the 2002 I-5 Transportation and Trade Partnership Final Strategic Plan, and 2) suggestions from the public and affected agencies received during the current National Environmental Policy Act (NEPA) scoping process.

Section 2 of this report describes the component screening process in more detail.

2. Evaluation Steps and Step A Measures

In February 2006, the CRC Task Force adopted a six-step evaluation framework that defines a formal process for screening the large number of transportation components and subsequently, a limited set of multi-modal alternative packages. In general, the framework establishes screening criteria and performance measures to evaluate the effectiveness of the transportation components in addressing:

- The project Purpose and Need,
- Problems identified in the project's Problem Definition, and
- Values identified in the Task Force's Vision and Values Statement.

Component screening is the first stage in the complete evaluation framework (see **Figure 2-1** at the end of this section) and is itself a two-step process.

In Step A, transportation components were screened against up to six pass/fail questions derived directly from the Problem Definition. To determine if each component offers an improvement, they were compared to the No Build condition, which includes transportation improvements adopted in the regional transportation plans, but no additional improvements at the Columbia River crossing.

In Step A, only the transit and river crossing components were screened. Components in the Pedestrian, Bike, Freight, Roadways, and TSM/TDM categories were not evaluated because their performance would critically depend upon how they were integrated with promising transit and/or river crossing improvements. As mentioned earlier, components in these categories (e.g., Ramp Queue Jump Lanes) could be implemented in a wide variety of ways. These components will be paired with complementary transit and river crossing components during alternatives packaging. **Table 2-1** shows the six Step A questions and what questions pertain to the transit and river crossing components.

Table 2-1. Component Categories and Relevant Step A Questions

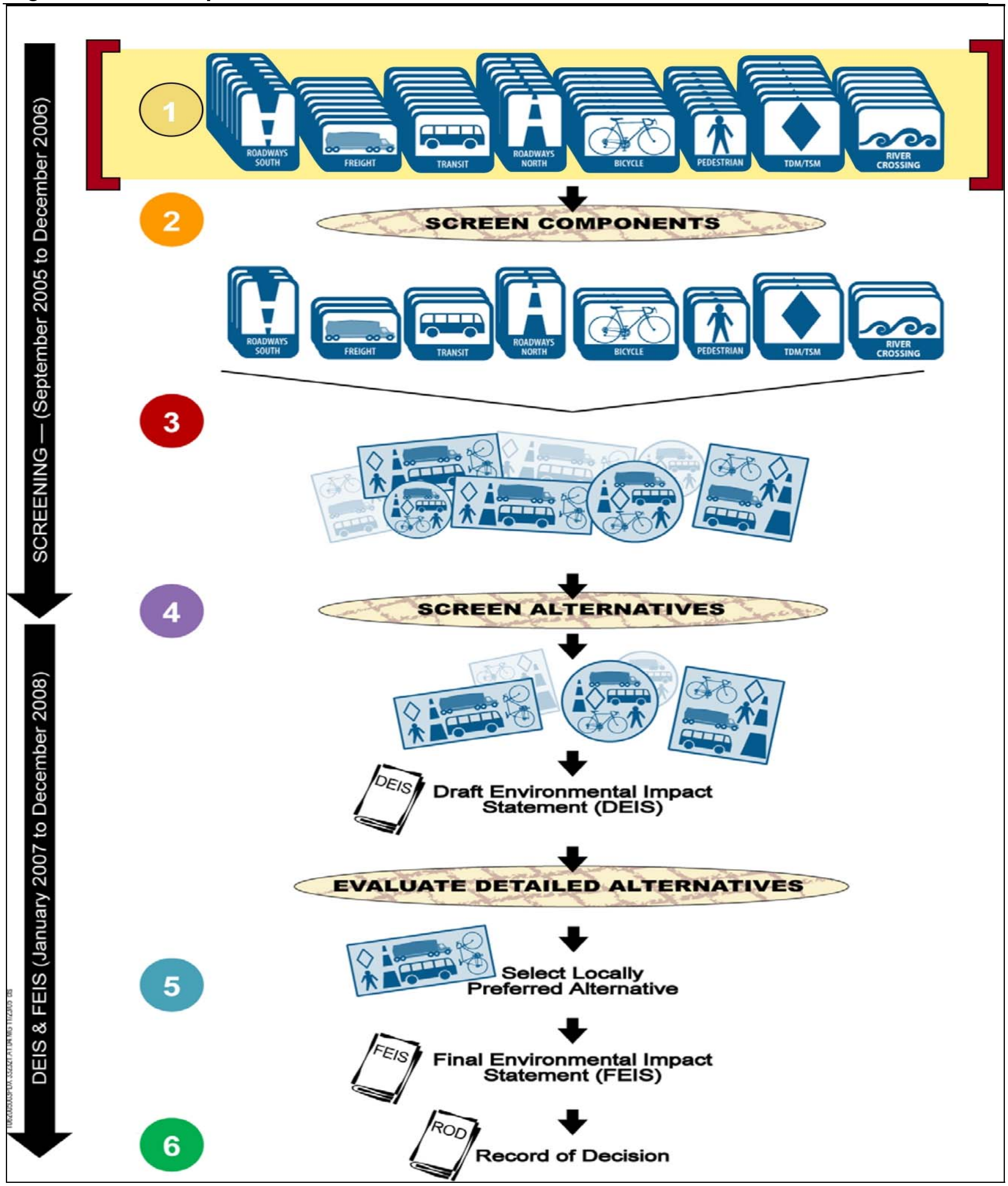
Question: Does the Component	Transit Components	River Crossing Components
1. Increase vehicular capacity or decrease vehicular demand within the bridge influence area?	♦	♦
2. Improve transit performance within the bridge influence area?	♦	♦
3. Improve freight mobility within the bridge influence area?		♦
4. Improve safety and decrease vulnerability to incidents within the bridge influence area?	♦	♦
5. Improve bicycle and pedestrian mobility within the bridge influence area?		♦
6. Reduce seismic risk of the I-5 Columbia River crossing?		♦

Note: Components were only screened against questions indicated by ♦

Importantly, each transit and river crossing component was screened independently during Step A screening. No consideration was given to how the component performs relative to other components in the same category, or how it could potentially be paired with components in other categories. In Step A, a component is eliminated from further consideration if it fails (characterized as a fatal flaw) any of the questions that pertain to that component.

After Step A, the remaining components will go through a second round of screening where consideration is given to how the component performs relative to other components in the same category. The Next Steps section at the end of this report briefly describes the Step B screening process.

Figure 2-1. Six Step Evaluation Framework



3. Step A Context and Considerations

This section describes the transportation deficiencies and issues that project staff considered and assessed in developing answers to the Step A questions.

Note to reader - *key points appear in italicized text.*

3.1 Question 1: Does the Component Increase Vehicular Capacity or Decrease Vehicular Demand Within the Bridge Influence Area?

3.1.1 Travel Markets Using the I-5 Bridge Influence Area

Interstate 5 (I-5) is one of two major highways in the Vancouver-Portland area that provide interstate connectivity and mobility. I-5 directly connects the central cities of Vancouver and Portland. Interstate 205 (I-205), the other major highway, is a 37-mile-long freeway that extends from its connection with I-5 at Salmon Creek to its terminus at I-5 near Tualatin. It provides a more suburban access and bypass function and serves travel demand between east Clark County, east Multnomah County, and Clackamas County.

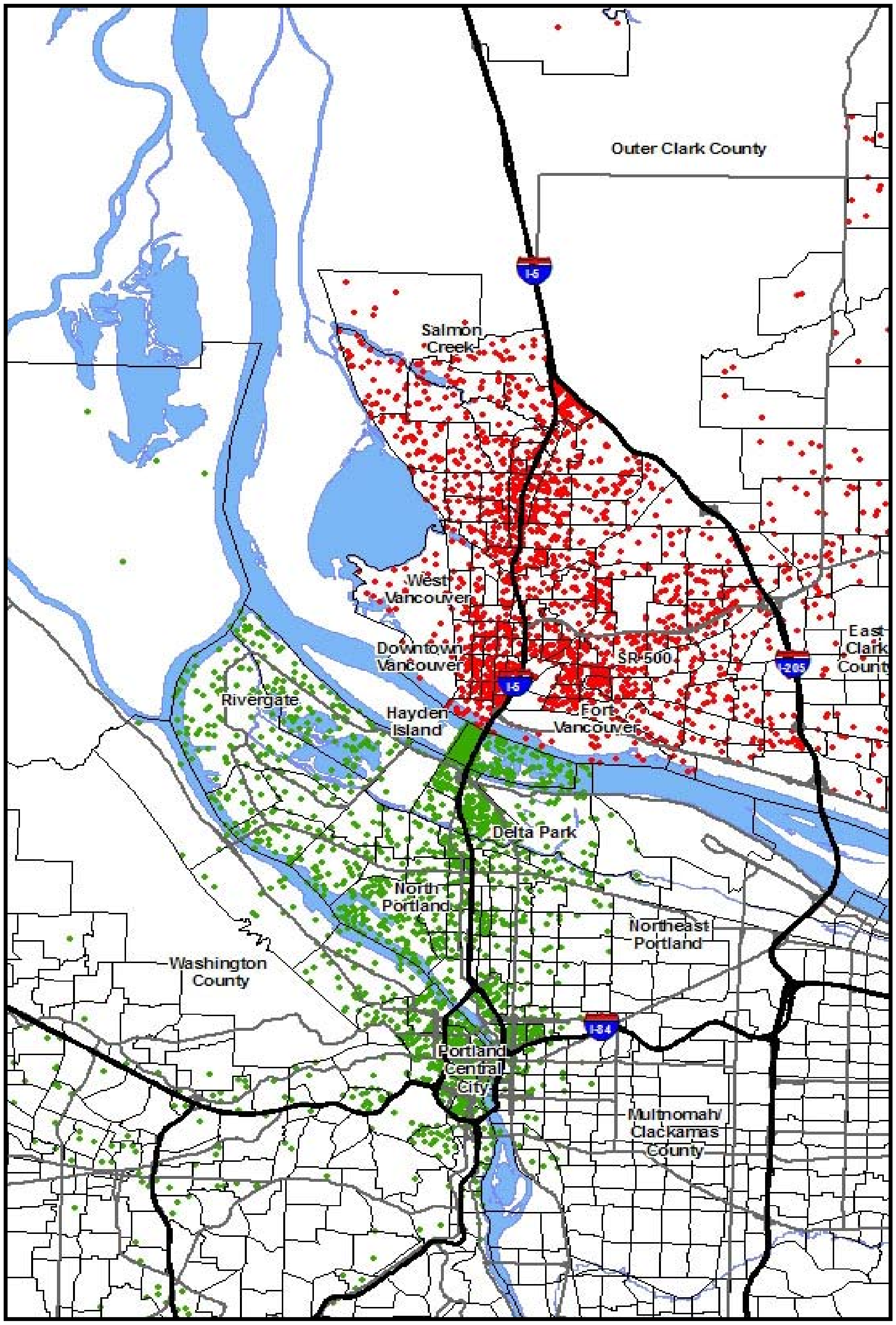
Travel demand across I-5 Interstate Bridge has steadily increased over the years. Recent traffic counts indicate that over 130,000 vehicles per day cross the bridge. By the year 2020, about 175,000 vehicles are estimated to use the crossing each day.

Current and future land uses on both sides of the Columbia River play a significant role in attracting traffic to the I-5 corridor. As an example, **Figure 3-1** shows the origins and destinations for person-trips expected to use I-5 Interstate Bridge in the year 2020. This figure highlights the locations of trips originating south of the Columbia River and the destinations of trips north of the Columbia River during a four-hour afternoon/evening commute period.

It is evident that most trips using the I-5 Interstate Bridge, today and into the future, have origins and/or destinations within or near the I-5 corridor itself, making the I-5 crossing the most direct means to accommodate these trips.

An analysis of potential transit markets and transit's role in reducing vehicular demand is discussed in section 3.2.3, which pertains to Question #2.

Figure 3-1. OR Origins and WA Destinations in PM Peak Period (2020)



3.1.2 Origin and Destination Travel Patterns Within the I-5 Bridge Influence Area

Surveys of vehicle license plates were conducted at the I-5 on- and off-ramps within the Bridge Influence Area in October 2005. The surveys were conducted using video cameras to determine origin and destination patterns of traffic traveling within the Bridge Influence Area. License plate information was collected for vehicles traveling in the peak directions (i.e., southbound during a two-hour morning peak period and northbound during a two-hour afternoon/evening peak period). Almost 30,000 license plates were recorded and a database was created to match vehicles entering and exiting the I-5 ramps, and identify vehicles that remained on the I-5 mainline (i.e. trips that travel through the Bridge Influence Area).

Figure 3-2 and **Figure 3-3** graphically depict the results of the Bridge Influence Area origins and destinations for trips traveling southbound and northbound, respectively, across the Interstate Bridge.

Figure 3-2. Southbound I-5 Vehicle-Trip Patterns in the Bridge Influence Area, for Trips Across the Interstate Bridge (2005)

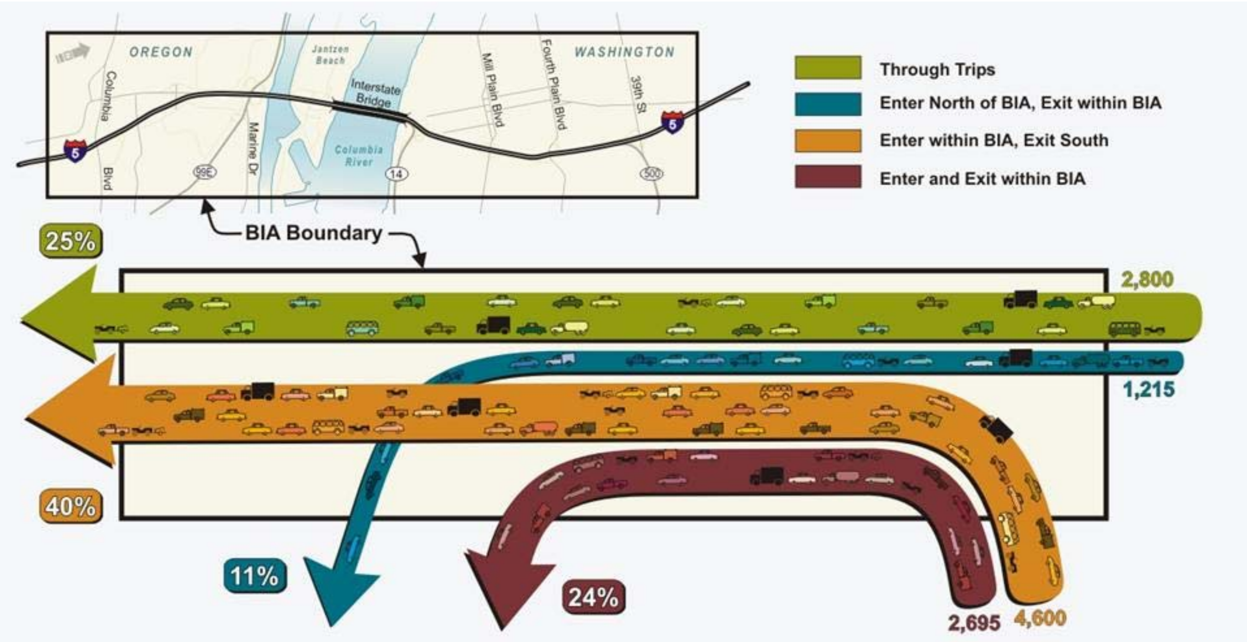
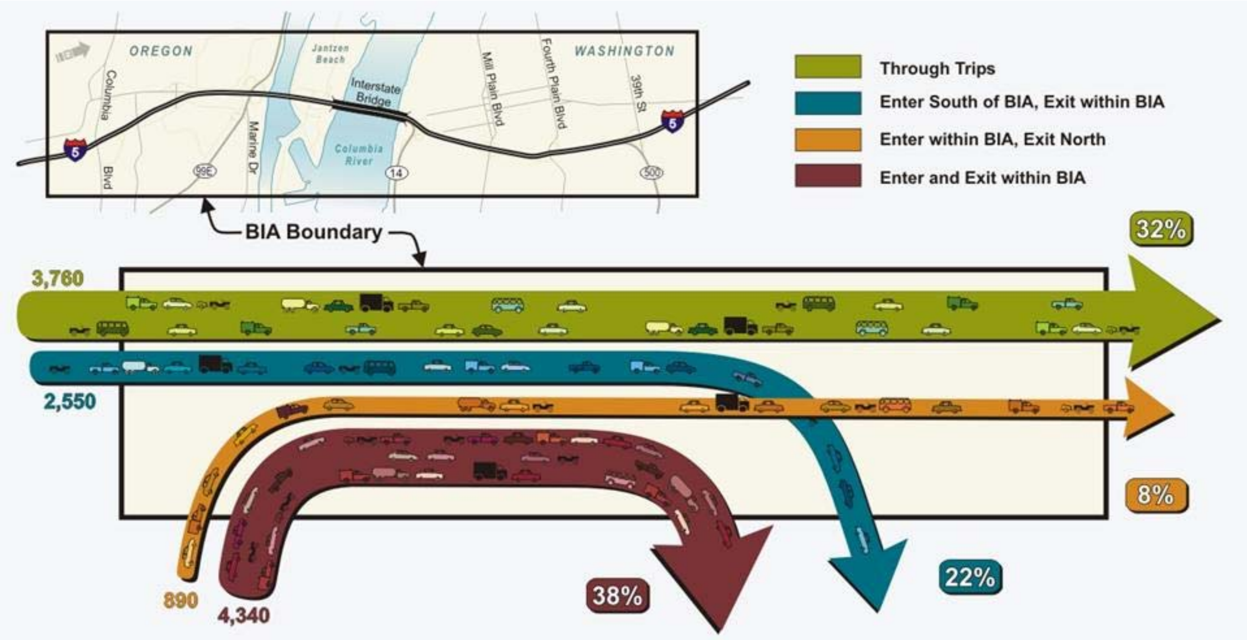


Figure 3-3. Northbound I-5 Vehicle-Trip Patterns in the Bridge Influence Area, for Trips Across the Interstate Bridge (2005)



According to the surveys, of all morning peak period southbound traffic traveling on I-5 across the Interstate Bridge and within the Bridge Influence Area:

- Twenty-five percent of traffic travels through the Bridge Influence Area along I-5 from north of SR 500 to south of Columbia Boulevard,
- Fifty-one percent of traffic enters the Bridge Influence Area from I-5 north of SR 500 and exits at an off-ramp within the Bridge Influence Area, or enters the Bridge Influence Area via an on-ramp and exits the Bridge Influence Area via I-5 south of Columbia Boulevard, and
- Twenty-four percent of traffic enters and exits the Bridge Influence Area via on- and off-ramps within the Bridge Influence Area.

Of all afternoon/evening peak period northbound traffic traveling on I-5 across the Interstate Bridge and within the Bridge Influence Area:

- Thirty-two percent of traffic travels through the Bridge Influence Area along I-5 from south of Columbia Boulevard to north of SR 500,
- Thirty percent of traffic enters the Bridge Influence Area from I-5 south of Columbia Boulevard and exits at an off-ramp within the Bridge Influence Area, or enters the Bridge Influence Area via an on-ramp and exits the Bridge Influence Area via I-5 north of SR 500, and
- Thirty-eight percent of traffic enters and exits the Bridge Influence Area via on- and off-ramps within the Bridge Influence Area.

The comprehensive origin-destination survey found that 68 percent to 75 percent of all peak period and peak direction traffic traveling on I-5 across the Interstate Bridge and within the

Bridge Influence Area enter and/or exit I-5 via a ramp within the Bridge Influence Area. In other words, a substantial amount of traffic on this segment of I-5 directly accesses arterial roadways within the Bridge Influence Area.

In fact, 24 percent to 38 percent of the traffic traveling on the I-5 bridge uses both an on-ramp and an off-ramp within the Bridge Influence Area.

3.1.3 Traffic Demands and Capacities, and Duration of Congestion

Traffic counts were conducted in October 2005 on an hour-by-hour basis along I-5 at all of its ramps between the Pioneer Street interchange in Ridgefield, Washington to just south of the I-84 interchange in Portland, Oregon. At the same times, observations were conducted on vehicular queuing along the freeway and at on-ramps to compare the observed traffic counts with actual traffic demands.

Figure 3-4 illustrates 2005 traffic demands and the actual traffic served along northbound I-5 at the Interstate Bridge over the course of a typical weekday. As shown in the curve labeled "demand," the actual traffic demand currently exceeds the bridge's traffic-carrying capacity during part of the day. This results in fewer vehicles being served, as shown in the curve labeled "service," and congestion for about 4 hours with some trips being made later in the evening.

Figure 3-4. Northbound I-5 at Interstate Bridge Traffic Volume Profile (2005)

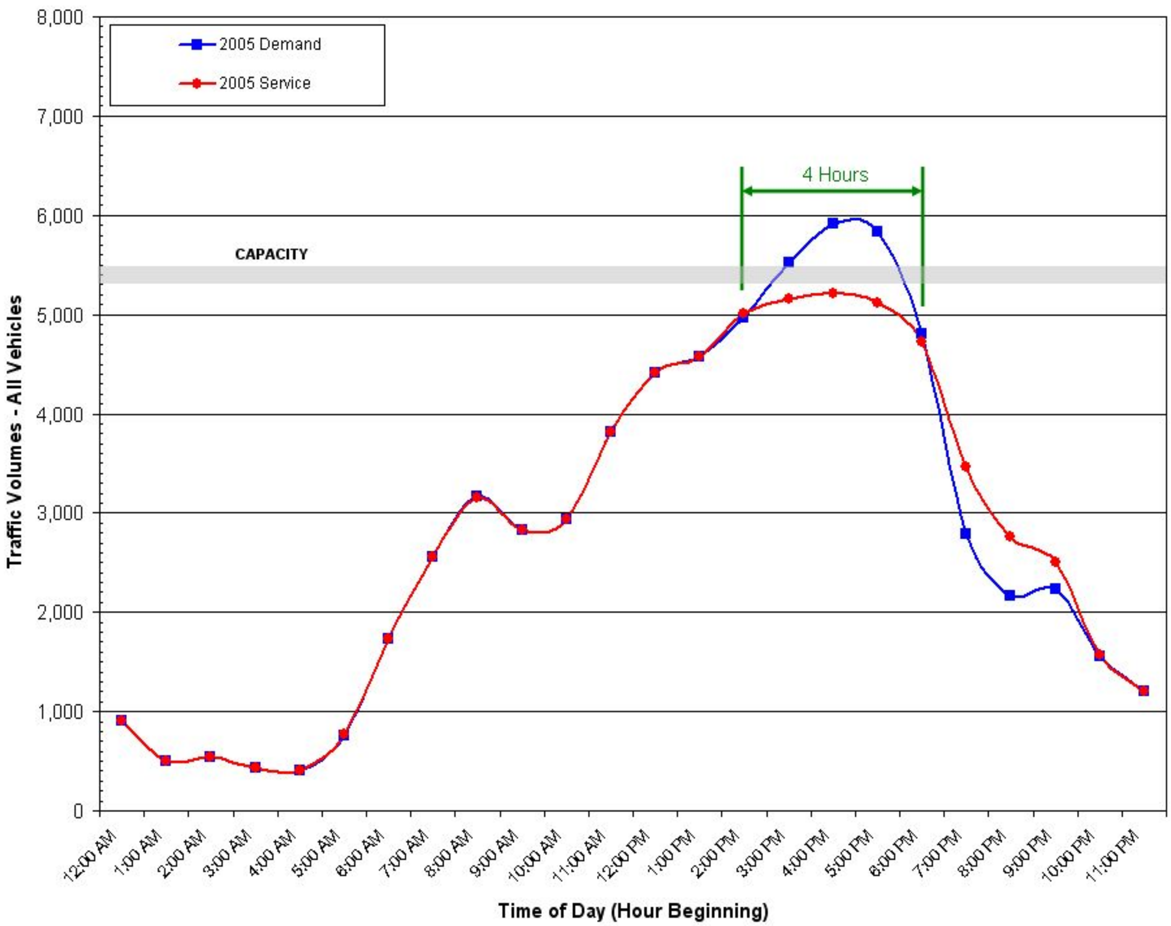
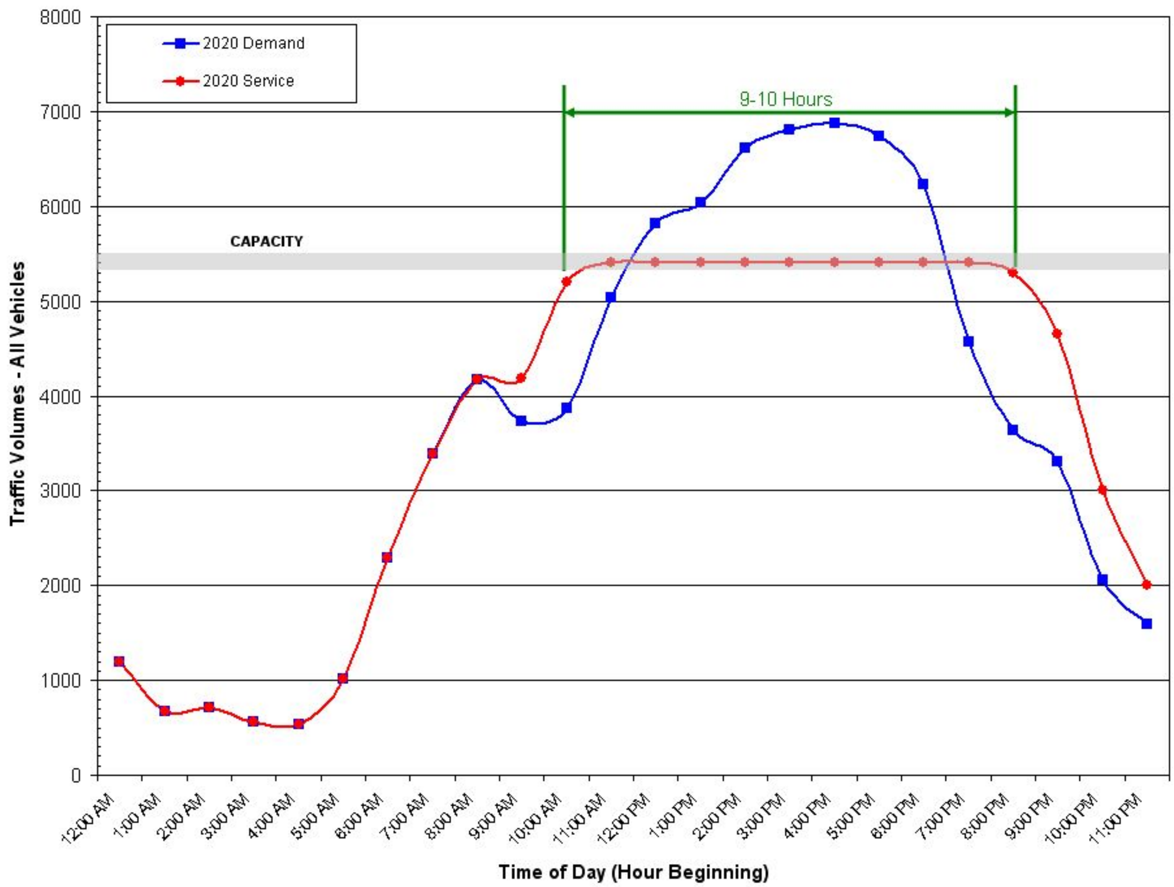


***Figure 3-5** shows an estimate of future hour-by-hour traffic levels along northbound I-5 at the Interstate Bridge. This assumes no highway capacity improvements are made within the Bridge Influence Area, no other corridor improvements are provided, and traffic demands increase to predicted 2020 levels. As shown in Figure 3-5, by the year 2020 the duration of northbound congestion would be expected to increase to 9 to 10 hours from 4 hours under 2005 conditions. Similarly, the duration of southbound congestion would be expected to double over 2005 conditions by the year 2020.*

Figure 3-5. Northbound I-5 at Interstate Bridge Traffic Volume Profile (2020)



3.1.4 Attributes of Components Satisfying Question #1

It is evident that most existing vehicle-trips using I-5 within the Bridge Influence Area have a trip origin and/or trip destination along or near the I-5 corridor within the metropolitan region.

The Bridge Influence Area, which includes eight interchanges with key arterial roadways and highways, is expected to continue to serve high travel demands due to existing and expected land uses served by these roadways and highways.

Due to the projected travel demands along I-5 and within the Bridge Influence Area, as long as no highway capacity improvements are made or other corridor improvements are provided, the duration of congestion along I-5 will significantly increase, creating congested conditions throughout much of the weekday and on weekends.

In order for a component to satisfy Question #1, the component must either:

- *Maintain future traffic demands such that they can be accommodated on I-5 within the Bridge Influence Area at acceptable congestion levels, or*
- *Increase the traffic-carrying capacity of I-5 within the Bridge Influence Area to accommodate forecast traffic levels at acceptable congestion levels.*

An analysis of potential transit markets and transit's role in reducing vehicular demand is discussed in the next section.

3.2 Question 2: Does the Component Improve Transit Performance Within the Bridge Influence Area?

3.2.1 Current Transit Problems

Bi-state transit service in the I-5 corridor currently includes one local bus route between downtown Portland and downtown Vancouver, and commuter-oriented peak period express routes from Clark County park-and-rides and transit centers to downtown Portland. Transit connections between Clark County and North and Northeast Portland are limited. Bi-state transit service in the I-5 corridor is constrained by limited roadway capacity and is subject to the same congestion as other vehicles, negatively affecting transit operations (i.e., travel speed) and reliability (i.e., delays caused by accidents and congestion).

Between 1998 and 2005, local bus travel times between the Vancouver Transit Center and Hayden Island increased 50 percent during the peak period. Local buses crossing the I-5 bridge in the southbound direction currently take up to three times longer during parts of the morning peak period compared to off peak periods. On average, local bus travel times are between 10 percent and 60 percent longer when traveling in the peak period direction.

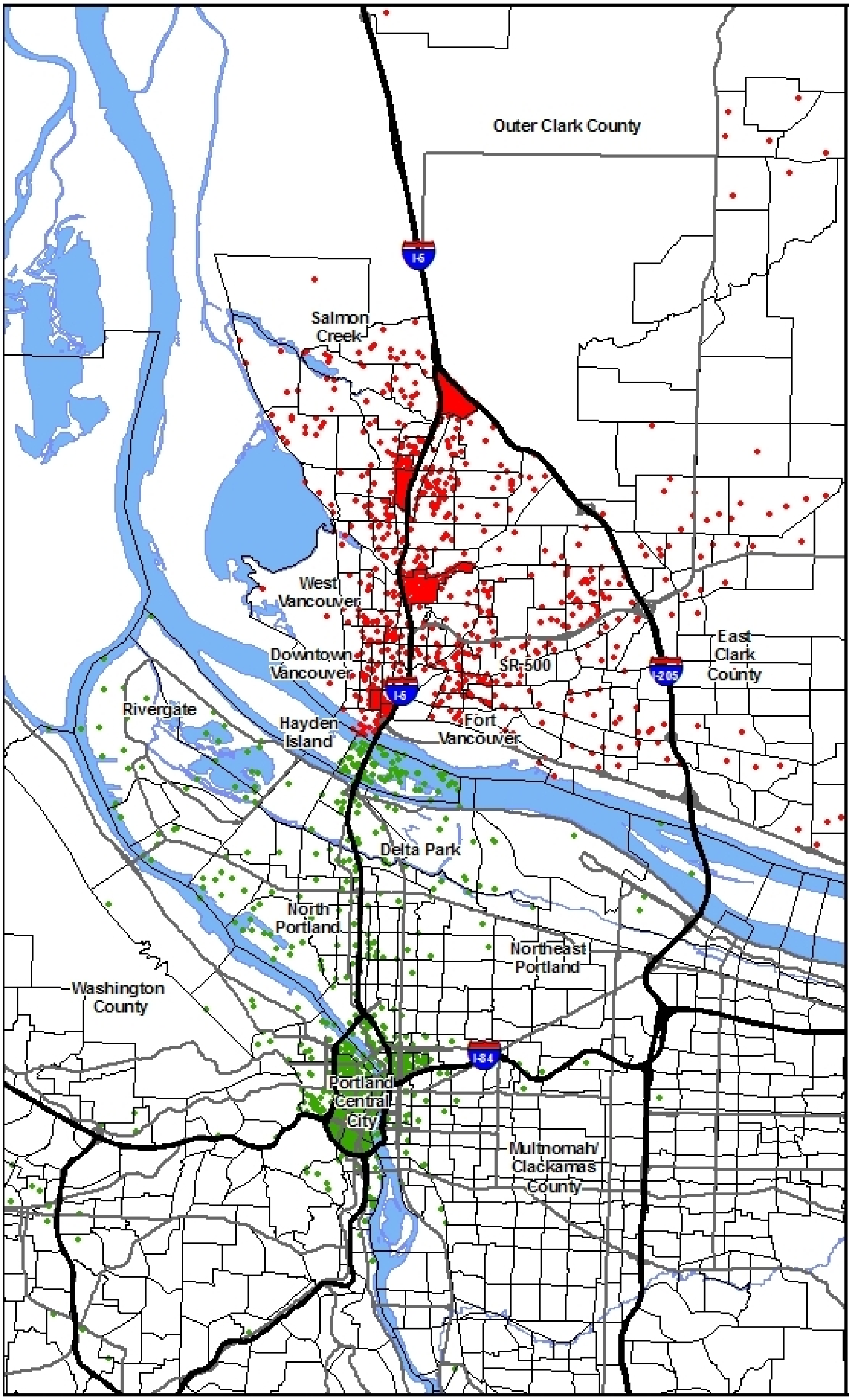
Commuter buses also experience congestion and incident-related delays. Commuter buses traveling southbound (i.e. in the peak direction) during the morning peak period have travel times between 45 percent and 115 percent longer than buses traveling northbound. Commuter buses traveling northbound during the afternoon peak period have the advantage of using the northbound High Occupancy Vehicle (HOV) lane, however, these buses still experience travel times between 35 percent and 60 percent longer than commuter buses traveling southbound.

3.2.2 2020 Origins and Destinations of Transit Riders

The current transit problems within the I-5 corridor impact transit riders from both Tri-Met and C-TRAN. In order to determine whether a transit component would improve transit performance within the Bridge Influence Area, the existing and future market for public transit services should be well understood.

Figure 3-6 shows the projected origins and destinations of transit riders in the year 2020 under no-build conditions, as determined by work completed by the I-5 Partnership Study. With little exception, the majority of transit riders have origins and destinations tightly clustered around the I-5 corridor. Particularly evident is the significance of downtown Portland as an important origin point for the typical PM transit trip, and the significance of transit destinations immediately adjacent to I-5 in Clark County.

Figure 3-6. Year 2020: OR Origins and WA Destinations in PM Peak Period – Transit Only



It is expected that the transit riders of the future will have origins and destinations within and/or near the I-5 corridor itself, making I-5 the most direct means of accommodating future transit trips.

3.2.3 Projected Transit Problems

Transit travel times from downtown Portland to downtown Vancouver in the afternoon peak period are projected to double by the year 2020 if no improvements are made to the I-5 bridge or bi-state transit service. In the year 2000, this transit trip took an average of 27 minutes to complete, and in 2020 it is expected to take 55 minutes. A major cause of the increased travel times is expected growth in trips (by all modes) that use the I-5 bridge.

Previous analysis also highlighted the importance of operating transit in exclusive or semi-exclusive lanes or guideways. *In the I-5 Partnership study, the only alternatives that reduced I-5 corridor transit travel times between 2000 and 2020 were alternatives that either a) included light rail operating in exclusive right-of-way or b) included buses operating in HOV (i.e., managed) lanes.*

3.2.4 2020 Transit Market Analysis

Current transit riders comprise only a segment of the future market, as future transit services should also appeal to current SOV and HOV drivers who have similar origin and destination points. **Figure 3-1**, shown previously, depicts the specific origins and destinations for all modes in the year 2020 PM peak period. As illustrated in the figure, the future travel market for all modes is highly complimentary and shares the same geography as the future transit riders.

To better understand the projected growth in I-5 bridge demand, and which markets transit services should serve in the future, a more detailed analysis of 2020 person trips during the afternoon peak period was completed[1]. Person trips are defined as the sum of one-way, afternoon, 4-hour peak period trips made by all persons for all purposes in single occupancy vehicles (SOV), HOV, and transit. Potential transit markets are defined as geographic concentrations of person trips, from either Oregon or Washington, that use I-5 to travel between the states. Year 2020 data developed for the I-5 Partnership Study was analyzed, and assumes that no I-5 bridge improvements would be built. **Figure 3-7** shows the results of this analysis.

For trips expected to use the I-5 bridge during the afternoon 4-hour peak travel period in 2020:

1. Sixty-six percent of all person trips will be traveling northbound on I-5 from the Portland metropolitan area to Clark County. The remaining 34 percent will be traveling southbound from Clark County to the Portland metropolitan area.

2. *Over 80 percent of all northbound person trips will originate in five "I-5 corridor" districts: Hayden Island, Delta Park, Rivergate, North Portland, and Portland Central City. These five districts will account for approximately 25,200 trips in the 4-hour PM peak travel period.*

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[1] 2020 morning peak period trips were not analyzed as this travel model is not as thoroughly calibrated as the afternoon peak period model, due to incomplete freight and transit data.

3. In comparison, trips from the west of this corridor (e.g., Washington County, West Portland) and to the east (generally east of NE 33rd Avenue) will collectively account for less than 20 percent of the northbound afternoon trips that cross the I-5 bridge.

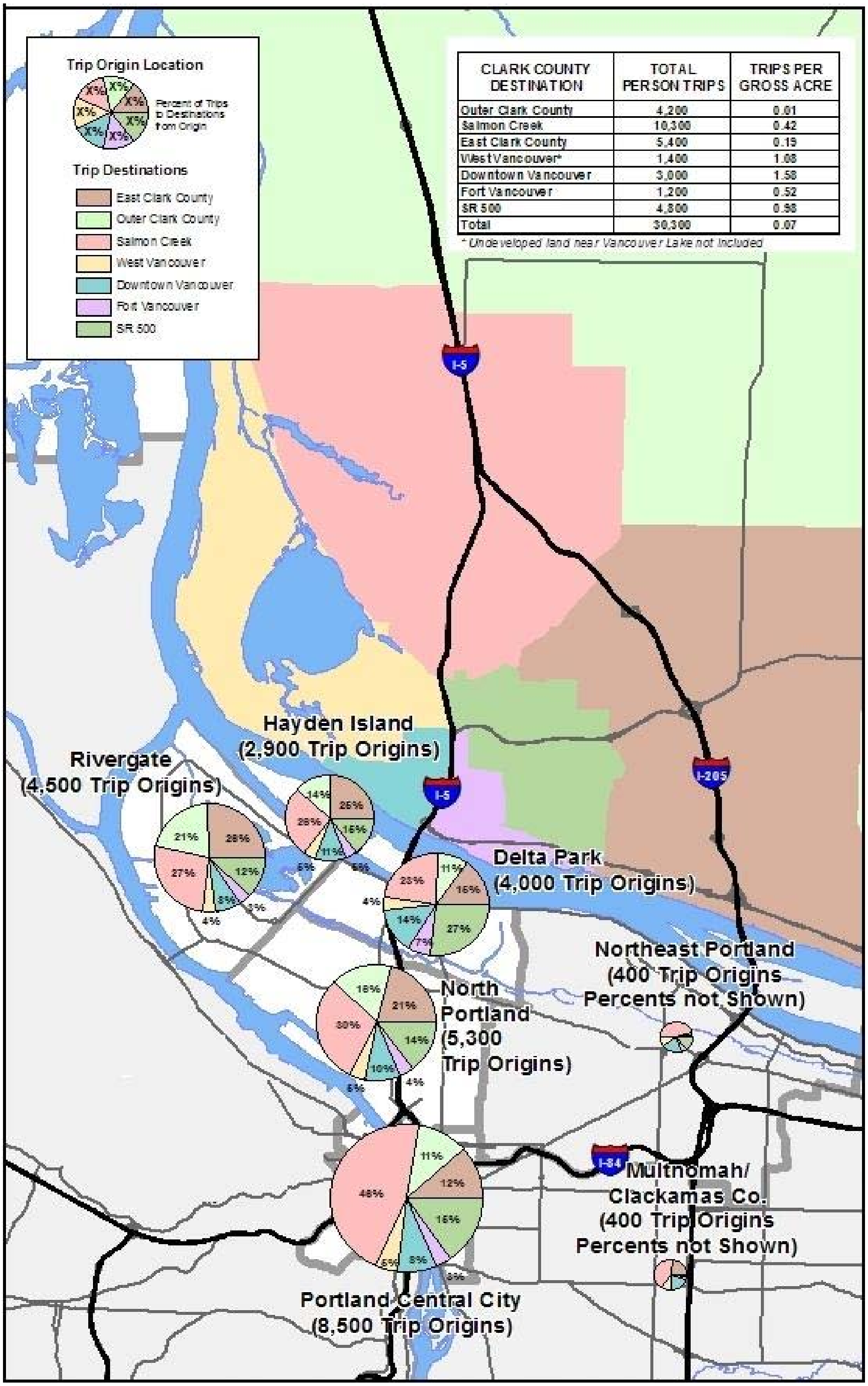
4. The Portland Central City, which includes downtown Portland, the Lloyd District, and Central Eastside Industrial District, will be the largest generator of person trips to Clark County (approximately 8,500 person trips). The Salmon Creek district will be the primary destination for these trips (3,900 trips).

5. North Portland will be the next largest trip producer to Clark County (5,300 trips), followed by Rivergate with 4,500 trips, Delta Park with 4,000 trips, and Hayden Island with 2,900 trips.

6. The Bridge Influence Area will be a significant trip origin for trips to Clark County. Of the 30,264 total person trips from the Portland metropolitan area to Clark County, approximately 6,900 (23 percent) of the trips will originate in either Hayden Island or Delta Park. Both of these districts are within the Bridge Influence Area.

7. The Salmon Creek district will be the primary destination for seven of the eight Portland sub-markets. Roughly one-third of all northbound trips that will use the I-5 bridge during the afternoon peak period will be bound for the Salmon Creek district.

Figure 3-7. 2020 Person-Trips to Clark County Using I-5 Bridge in 4-HR PM Peak Period



CLARK COUNTY DESTINATION	TOTAL PERSON TRIPS	TRIPS PER GROSS ACRE
Outer Clark County	4,200	0.01
Salmon Creek	10,300	0.42
East Clark County	5,400	0.19
West Vancouver*	1,400	1.08
Downtown Vancouver	3,000	1.58
Fort Vancouver	1,200	0.52
SR 500	4,800	0.98
Total	30,300	0.07

* Undeveloped land near Vancouver Lake not included

3.2.5 Attributes of Components Satisfying Question #2

Transit and river crossing components that serve multiple I-5 corridor travel markets will attract greater transit ridership. Conversely, components that serve fewer markets due to out-of-direction alignments, unique transit operating characteristics and/or station spacing that would not match projected ridership patterns will attract less transit ridership, and have less of an impact on vehicular demand.

Transit components that operate in an exclusive or managed right-of-way will improve transit travel times and reliability because the risk of delay and accidents would decrease. Alternatively, adding significant new general purpose capacity could also reduce congestion levels, and improve transit travel times and reliability if congestion were sufficiently reduced. Conversely, components that subject transit to the same congested and unpredictable traffic conditions as SOVs do not improve transit operations.

In order for a component to satisfy Question #2, the component must:

- *Be able to serve a significant portion of the I-5 corridor transit markets, and*
- *Provide an exclusive or managed transit right-of-way to improve operations and reliability, or*
- *Provide enough highway capacity to reduce general congestion levels significantly, thereby improving transit performance.*

3.3 Question 3: Does the Component Improve Freight Mobility Within the Bridge Influence Area?

3.3.1 Freight Mobility

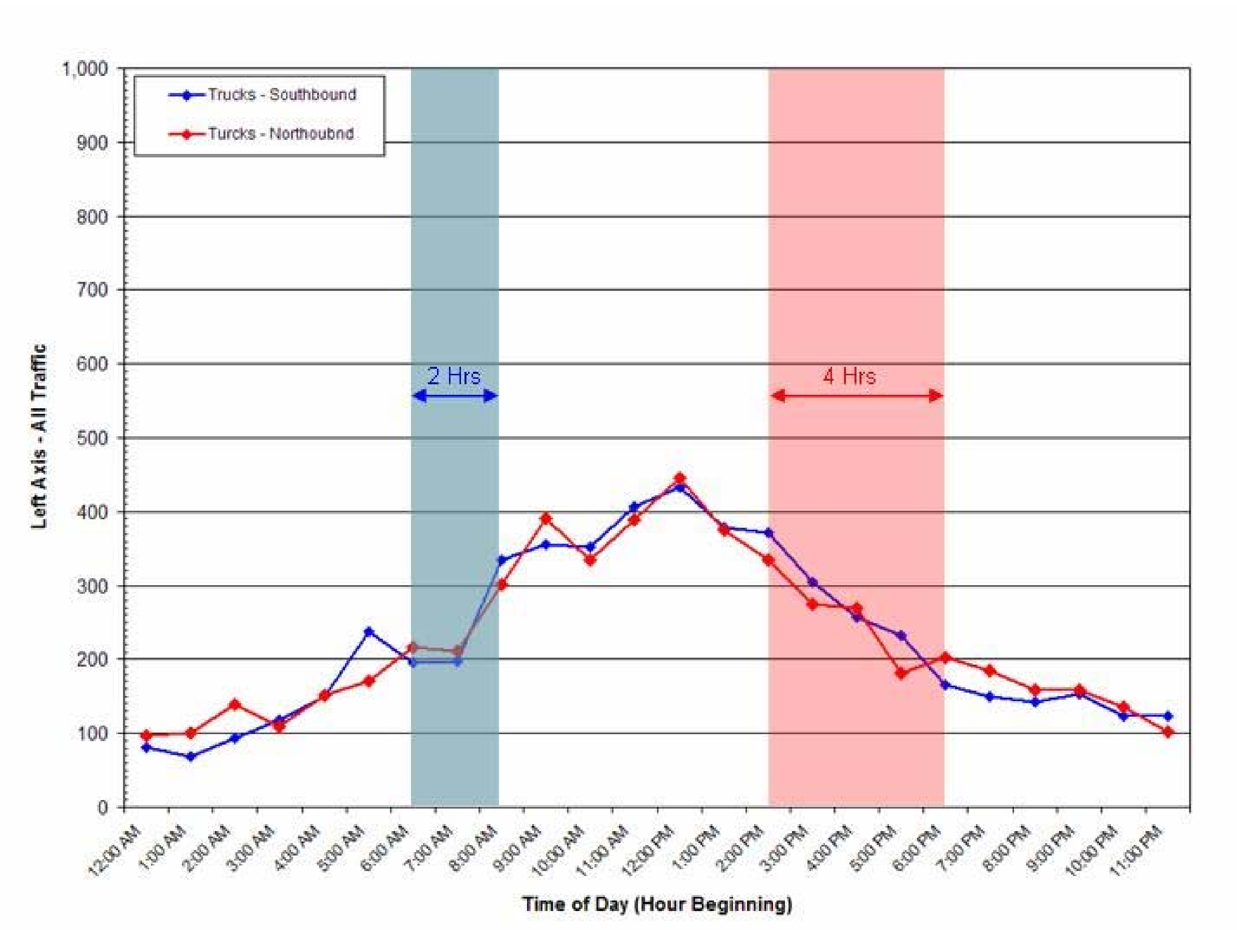
I-5 is the primary freight corridor for goods moving into and out of the Vancouver-Portland region and the Pacific Northwest. Access to significant industrial and commercial districts, including the Ports of Vancouver and Portland, and connections to marine, rail and air freight facilities, is adversely affected by congestion in the Bridge Influence Area.

Sixty-seven percent of all freight in the region travels by truck, and this is expected to grow to 73 percent by 2030. The increasing use of trucks is a reflection of the growing, diversifying and more demanding regional economy, which is leading to shipping practices becoming more tailored to the region’s needs. There will continue to be a significant movement of bulk commodities in the region – which rely on non-truck modes – but their growth will occur at a slower rate than the smaller shipments of higher value products such as machinery, electronic components, prepared meat and seafood products, and mail and express traffic (principally moved by truck), which will represent a larger segment of the region’s future economy. A corresponding phenomenon is that smaller shipments (under 1,000 pounds) have been, and will continue to be, the highest area of freight traffic growth.

Recent forecasts indicate that truck traffic in the region will double, and the logistics requirements for freight delivery time will become increasingly "just-in-time" – placing even more pressure on travel time reliability.

Traffic congestion is increasingly spreading into the off-peak periods (including weekends) used by freight carriers, as shown in ***Figure 3-8.*** *Declining freight carrier access slows delivery times and increases shipping costs, diminishing the attractiveness of I-5 and the uses served by I-5, and negatively affecting the region's economy.*

Figure 3-8. Northbound and Southbound I-5 Truck Volumes (2005)



3.3.2 Attributes of Components Satisfying Question #3

In order for a component to satisfy Question #3, the component must either:

- *Maintain future traffic demands such that they can be accommodated on I-5 within the Bridge Influence Area at acceptable congestion levels so freight is not further affected, or*
- *Increase the traffic-carrying capacity of I-5 within the Bridge Influence Area to accommodate forecast traffic levels at acceptable congestion levels, thereby improving freight mobility.*

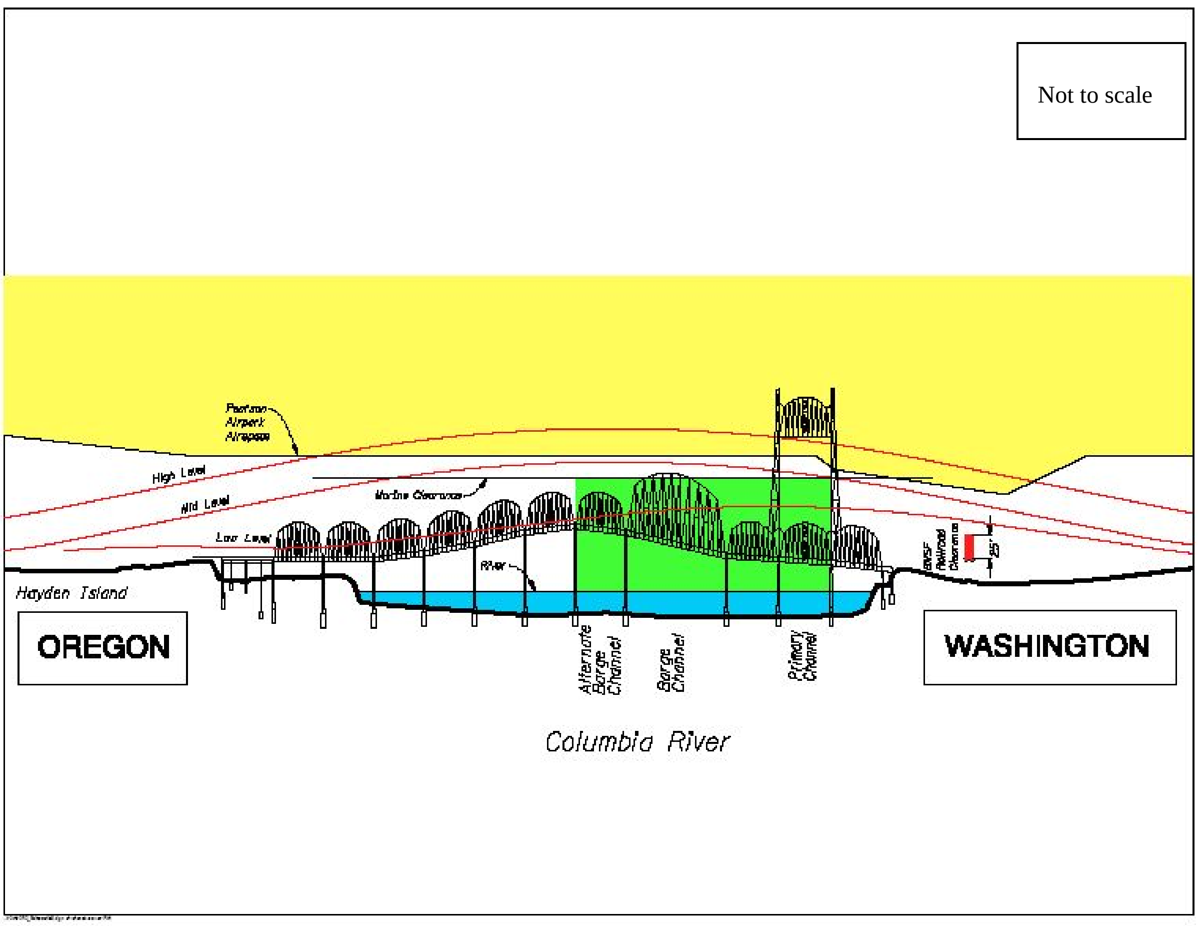
3.4 Question 4: Does the Component Improve Safety and Decrease Vulnerability to Incidents Within the Bridge Influence Area?

3.4.1 Safety and Incidents Related to Aviation

Two airports have influence on the airspace in the vicinity of the I-5 river crossing. Historic Pearson Airpark is located about one-half mile immediately east of I-5, while Portland International Airport (PDX) is located about three miles to the east of the project. For both airports, airspace requirements defined by the FAA must be considered to assess their impact on the vertical locations of the river crossing components (e.g. bridge towers).

The Pearson Airpark airspace has the most significant influence on the project because of its proximity to the existing I-5 bridge. FAA requirements state that airspace needs to be clear of obstructions for the safe operation of aircraft. This airspace was superimposed on an aerial map and the components were evaluated for penetration into the airspace. It should be noted that the existing I-5 bridge lift towers penetrate the Pearson Airpark airspace surface. ***Figure 3-9*** *shows how various bridge levels would relate to the Pearson Airpark airspace.*

Figure 3-9. Relationship of Bridge Levels to Pearson Airpark Airspace



PDX has two runways with approaches/departures bearing over the existing I-5 bridge. Currently PDX is proposing an expansion that would extend the north runway both to the west and to the east. As it exists, the north runway approaches/departs directly over the end of Pearson Airpark and the south runway tracks down the south shore of the Columbia River. In general, most potential river crossings do not encroach into the PDX airspace, with the exception of a high-level type structure.

3.4.2 Attributes of Components Satisfying Question #4 for Aviation

River crossings that are proposed upstream (east) of the existing bridge are closer to Pearson Airpark and thus must meet more restrictive standards to avoid impacting airspace requirements. Regarding the vertical location of a new bridge, a high or mid level bridge is also more likely to impact airspace requirements than a low level bridge (these different bridge heights are described further in the next section).

In order for a component to satisfy Question #4, the component:

- *Must not create a significant new encroachment into the Pearson Airpark airspace, and*
- *Must not encroach into the PDX airspace.*

3.4.3 Safety and Incidents Related to Marine Navigation

Columbia River navigation clearances are controlled by the U.S. Coast Guard. This agency, which is the permitting authority for new bridge crossings, will base the permitting decision largely on whether marine navigation safety is improved or degraded by the project. The ability of a vessel to safely travel through the bridge area will be determined by the location of any new bridge piers. While this must be considered for all the bridge components, it is especially critical for any options that would retain the existing bridges while adding a new bridge. The Coast Guard has expressed a preference to reduce the number of obstacles to navigation in the river, which could only be achieved by construction of a replacement bridge. However, it may be possible to permit a supplemental bridge if it can be demonstrated that the placement of the piers for the new bridge will not further impede marine traffic.

Vertical clearances under a new bridge (and the existing bridges, if they are retained) will be another critical factor that the Coast Guard will consider in its permitting decision. Clearance requirements are dictated by the vessels that will pass under the bridge(s).

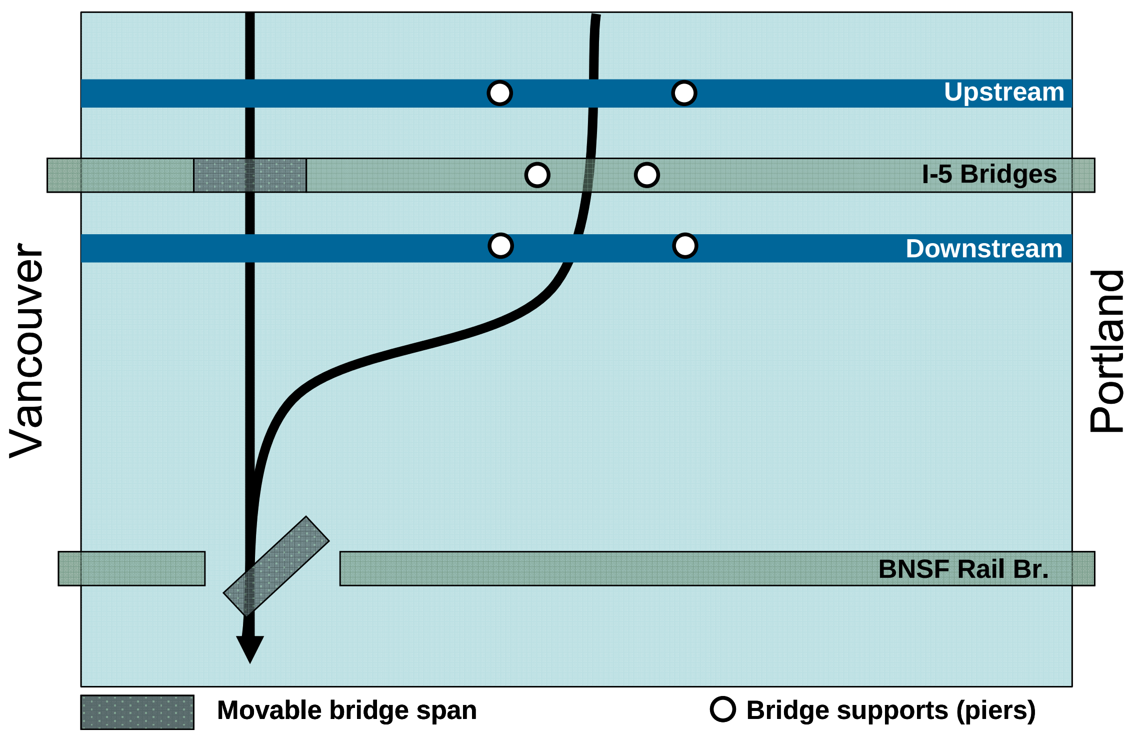
To understand the characteristics of existing river traffic, a boat survey was completed in 2005 identifying the existing vessel traffic using the river upstream of I-5. The survey found that most vessels using the river do not require a bridge opening to pass beneath I-5 except during higher water levels on the river. Additionally, the survey concluded that a clearance height of approximately 65 feet would accommodate all but six of the vessels identified in the survey, and a clearance height of approximately 110 feet would accommodate all known vessels using the river upstream of I-5.

Varying elevations and alignments of the river crossing options were evaluated as they relate to impacts on vessel navigation. Clearances defined as Low, Medium and High provide different clearance zones that would provide varying vessel passage percentages with the goal of minimizing or eliminating bridge openings. The river crossings were laid out using a clearance height of approximately 65 feet for a low level bridge, and approximately 110 feet of clearance for a mid-level bridge. These clearances should be provided over at least one of the existing navigational channels[2]. A high-level bridge would have a clearance of approximately 130 feet and would match the clearance of the existing I-205 bridge.

3.4.4 Attributes of Components Satisfying Question #4 for Marine Navigation

The horizontal location of a new bridge, either by itself or in tandem with the existing bridge, would affect vessel navigation operation and safety. Components that keep the existing bridges make it more difficult for navigational operations on the river. This is because vessels traveling on the river will need to navigate through another set of piers. In addition, the operators of river barges have stated that it is very difficult to navigate through the large channel opening of the I-5 bridge and then make an "S" curve to access the opening of the Burlington Northern Santa Fe Railroad (BNSF) Railroad bridge downstream. Components that keep the existing bridges and that are located closer to the downstream railroad bridge have the greatest potential to create navigational problems on the river. ***Figure 3-10*** *shows the relationship of new upstream and downstream bridge locations as they might affect marine navigation.*

Figure 3-10. Marine Navigation Considerations



[2] Bridge elevations and clearances may be evaluated and discussed further with the Coast Guard throughout the project as more data is collected.

In order for a component to satisfy Question #4, the component:

- *Must maintain or improve navigational safety in the vicinity of the I-5 corridor crossings.*

3.4.5 Number of Vehicular Collisions and Collision Rates

An extensive review of motor vehicle collisions reported within and slightly beyond the Bridge Influence Area was conducted to assess collision frequencies, types and severities; and to assess collision relationships to existing non-standard highway geometrics, bridge span lifts, and time of day.

Collision data was obtained from both the Washington and the Oregon departments of transportation for the 5-year period from January 1, 2000 to December 31, 2004 (collision data for the calendar year 2005 was not available at the time of this analysis).

During the 5-year period, 2,204 collisions were reported on mainline I-5 and its ramps. There is no data available for collisions that were not reported.

There was an average rate of 1.21 reported collisions per day.

The standard transportation engineering method of reporting collision rates is in collisions per million vehicle-miles traveled. The average collision rate for “urban city interstate freeways” in Oregon is 0.60 collisions per million vehicle-miles traveled. The Washington State Department of Transportation does not calculate the average collision rate for urbanized interstate freeways within the state.

The collision rate experienced on I-5, within the Oregon segment of the Bridge Influence Area, was 1.34 collisions per million vehicle-miles traveled. This is 2.26 times greater than the average rate experienced on similar facilities in Oregon. The collision rate experienced within the Washington segment was 1.23 collisions per million vehicle-miles traveled.

3.4.6 Vehicular Collisions by Type and Severity

The number, type and severity of collisions reported during the 5-year period were compiled and plotted by direction (northbound and southbound) in 0.1-mile increments on maps of I-5.

Four collision types were reported: rear-end, side-swipe, fixed object, and other. Three severity types were reported: property damage only, injury, and fatality.

Figure 3-11 shows the number and type of collisions reported within Bridge Influence Area in Washington. **Figure 3-12** shows the number and type of collisions reported within Bridge Influence Area in Oregon.

Figure 3-11. Crash History by Crash Type for Mainline Highway and Ramps–January 2000-December 2004 (Washington)

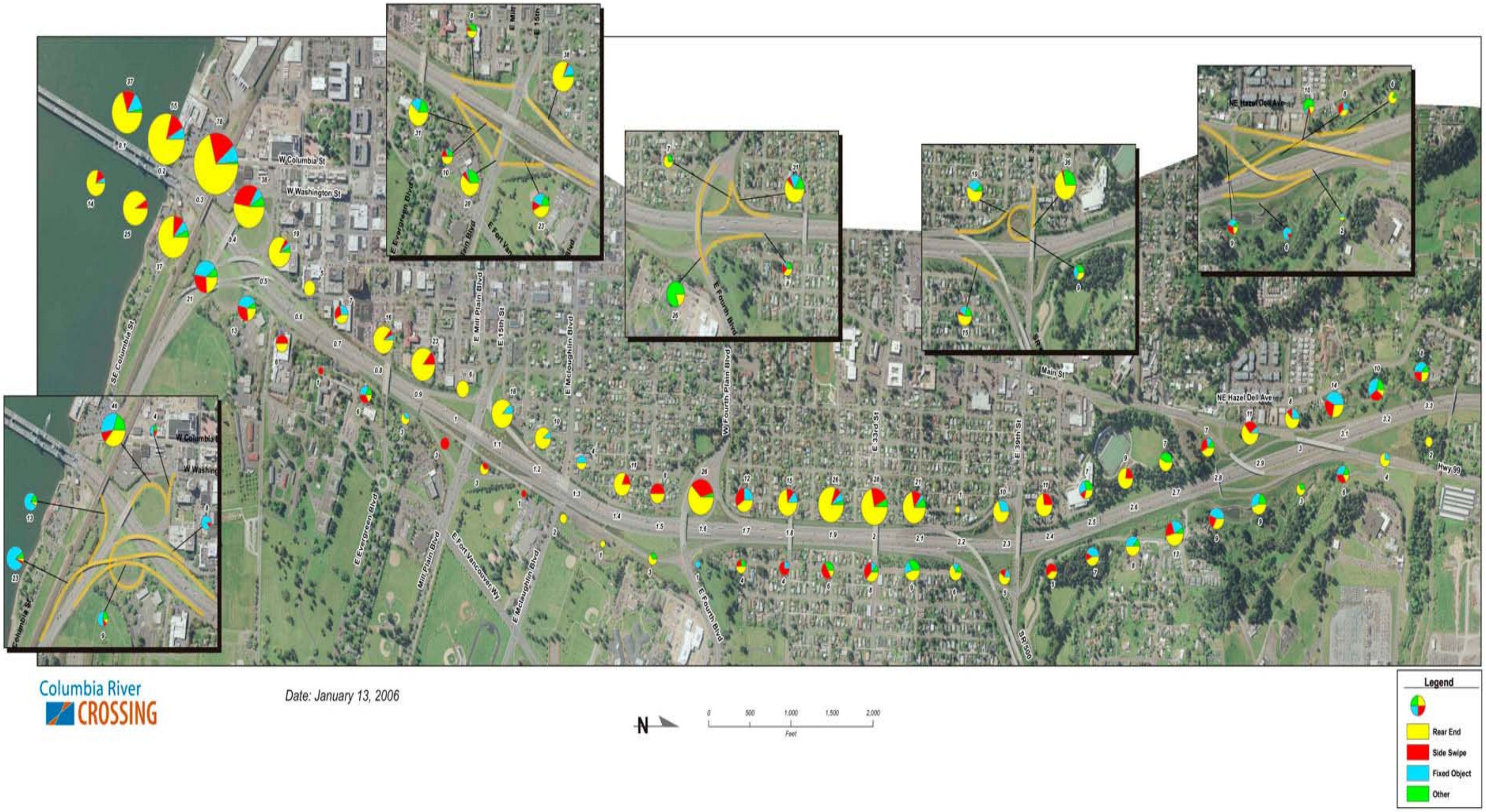
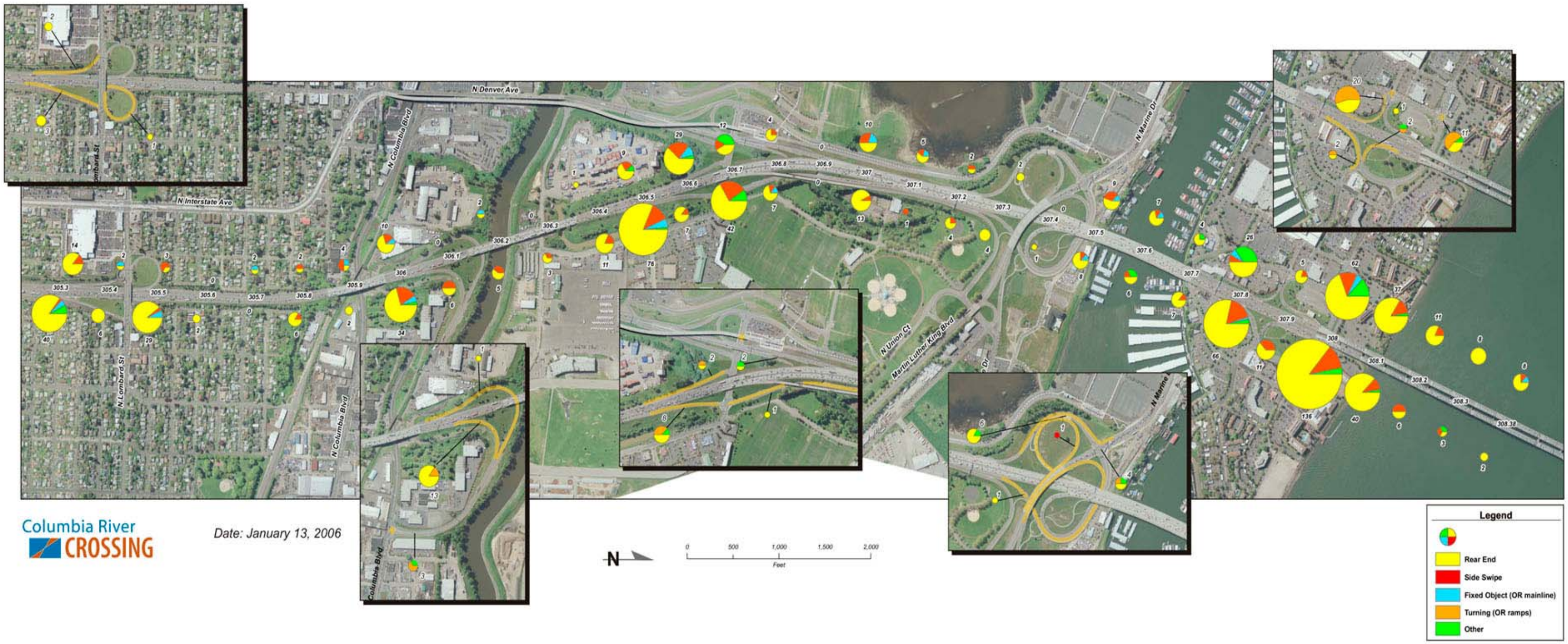


Figure 3-12. Crash History by Crash Type for Mainline Highway and Ramps–January 2000–December 2004 (Oregon)



A substantial portion of the reported collisions occurred near the approaches to the Interstate Bridge. Other notable collision locations included southbound I-5 at SR 14, at SR 500 and between Mill Plain Boulevard and SR 14 in Washington. In the northbound direction, high collision locations were at Hayden Island Drive, at Victory Boulevard, and at Lombard Street in Oregon.

For the period analyzed, the total number of southbound collisions that occurred in Washington was about twice that reported in the northbound direction. Sixty-nine percent of these collisions were rear-ends and 18 percent were side-swipes.

The total number of northbound collisions that occurred in Oregon was about twice that reported in the southbound direction. Eighty percent of these collisions were rear-ends and 14 percent were side-swipes.

3.4.7 Relationship of Vehicular Collisions to Highway Geometrics

A review was conducted to determine geometric elements of I-5 that do not meet current design standards. While I-5 within the Bridge Influence Area was originally constructed to generally meet design standards applicable at the time, design standards have evolved over the years, reflecting continued research in areas such as vehicle operating characteristics, driver expectations, traffic volumes, and physical highway elements.

The Federal Highway Administration (FHWA) has designated 12 geometric controlling criteria that have a primary importance for safety. These criteria are: design speed, grades, lane width, stopping sight distance, shoulder width, cross-slopes, bridge width, superelevation, horizontal alignment, horizontal clearance, vertical alignment, and vertical clearance.

The Washington and Oregon departments of transportation have developed geometric design standards related to each of the above controlling criteria. Their current design standards were compared to I-5 existing geometrics within the Bridge Influence Area. Particular emphasis was placed on the following elements, each related to one or more of the above criteria:

- Ramp-to-highway acceleration lane length
- Highway-to-ramp deceleration lane length
- Highway weaving area lane length
- Highway horizontal alignment
- Highway vertical alignment
- Highway shoulder width

It is evident that non-standard geometric features exist throughout the Bridge Influence Area, including short ramp merges/acceleration lanes, short ramp diverges/deceleration lanes, short weaving areas, vertical curves (crest and sag curves) limiting sight distance, and narrow shoulders.

The greatest concentration of existing non-standard geometric features is located along the Interstate Bridge and along its approaches. Within this area, there are multiple existing non-standard features.

Many ramps within the extent of the Bridge Influence Area do not provide standard acceleration or deceleration lane lengths and some weaving areas are also non-standard. Non-standard shoulder widths are prevalent in many areas of the Bridge Influence Area.

Based upon a comparison of the non-standard geometric features and reported collisions, there is a strong correlation between the presence of non-standard design features and the frequency and type of collisions.

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 collisions along northbound I-5, particularly at Hayden Island Drive, Downtown Vancouver Exit, and at SR 14. Along southbound I-5, non-standard acceleration and deceleration lanes contribute to a high number of rear-end and side-swipe collisions at Fourth Plain Boulevard, SR 14, Hayden Island Drive, and at Victory Boulevard.

Existing non-standard weaving areas contribute to a high number of rear-end and side-swipe collisions along I-5, primarily in the southbound direction 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.

The distance between the on- and off-ramps next to the Interstate Bridge and the bridge itself are substantially below standard; the bridge's vertical alignment results in non-standard crest and vertical curves (resulting in limited sight distance); and the bridge's shoulders are well below standard. All of these elements contribute to the high number of reported collisions near or at the Interstate Bridge.

3.4.8 Vehicular Collisions During Bridge Lifts and Traffic Stops

The I-5 northbound and southbound bridges include lift spans. Lifting of the spans or stopping of traffic for maintenance (even when the span is not lifted) is allowed on weekdays between 9 a.m. and 2:30 p.m. and overnight between 6 p.m. and 6:30 a.m., and is allowed any time during weekends.

An analysis was conducted to determine if the potential for a collision increases during bridge lifts and/or traffic stops. Logs obtained from ODOT's Maintenance Unit, which maintains and operates the bridge, include information on bridge lift/traffic stop dates, times and duration.

Using the 5-year collision database, a comparison was made between collisions that were reported to have occurred within a one-hour window of logged bridge lifts/traffic stops on weekdays between 9 a.m. and 2:30 p.m. The analysis only considered collisions that would involve vehicles approaching the bridge (i.e., northbound traffic approaching the bridge and southbound traffic approaching the bridge) as bridge lifts/traffic stops directly impact approaching traffic and may not have an effect on departing traffic.

Based on the analysis, it was determined that there is at least a 3 times higher likelihood of a northbound collision when a bridge lift/traffic stop occurs than when it does not. There is over a 4 times higher likelihood of a southbound collision when bridge lift/traffic stop occurs than when it does not.

It was also shown that collisions occurring during bridge lifts/traffic stops generally result in a higher amount of rear-end collisions and greater injury frequency than those collisions that occur during non-lift/non-stop periods.

3.4.9 Vehicular Collisions by Time of Day

The number and type of collisions reported in the Bridge Influence Area during the 5-year period were sorted on an hour-by-hour basis and by direction. **Figure 3-13** shows the number of collisions, by hour, that were reported along southbound I-5. **Figure 3-14** shows the number of collisions, by hour, that were reported along northbound I-5.

Figure 3-13. Southbound I-5 Crashes by Time of Day from Hwy 99/Main Street to Lombard Street (2000-2004)

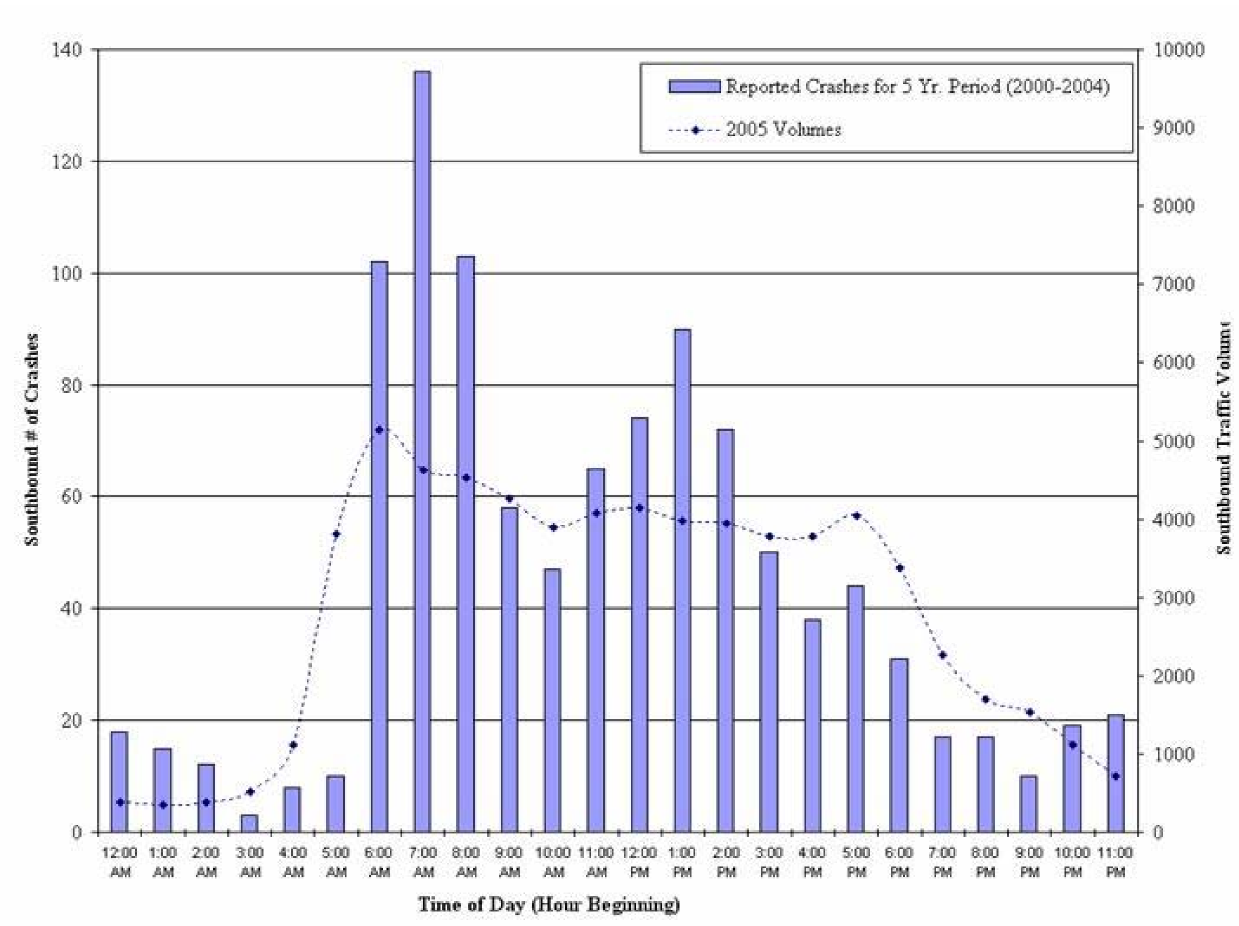
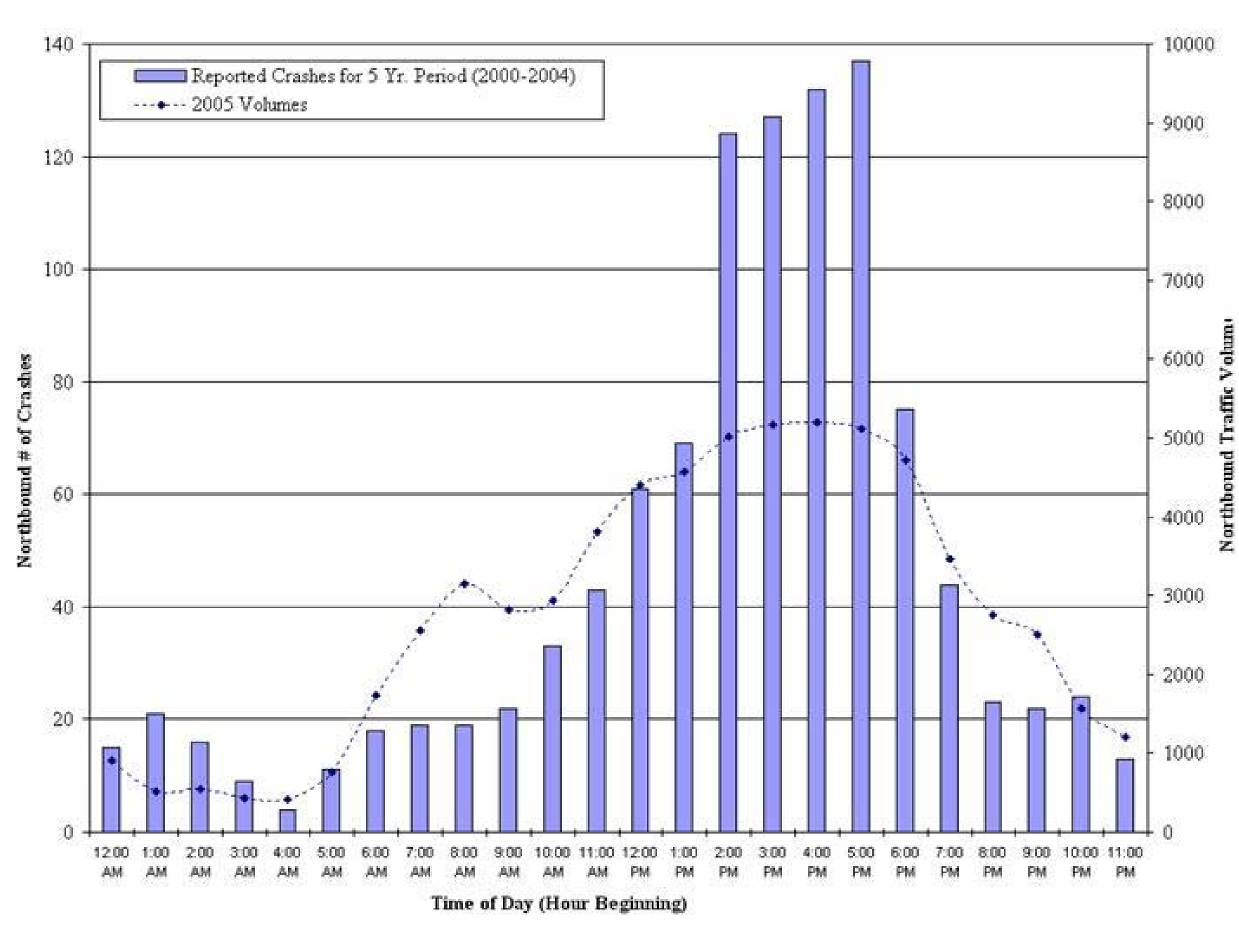


Figure 3-14. Northbound I-5 Crashes by Time of Day from Lombard Street to Hwy 99/Main Street (2000-2004)



Curves depicting existing traffic counts on the Interstate Bridge were added to **Figure 3-13** **Figure 3-14** to determine if a correlation exists between collision frequency and traffic volumes.

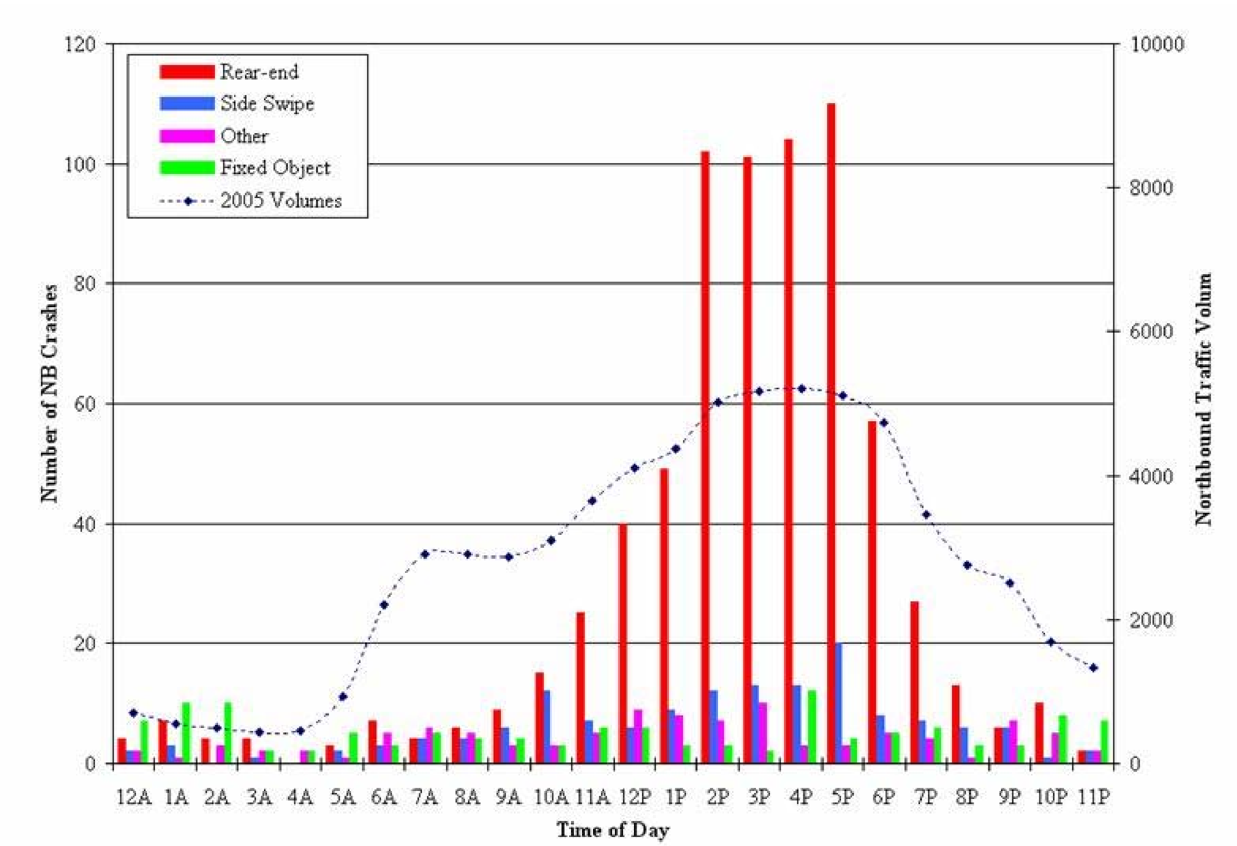
As shown in **Figure 3-13**, during periods when traffic is uncongested along southbound I-5, the number of reported collisions is generally proportional to prevailing traffic volumes (except during late night periods when the number of fixed-object and alcohol-related collisions increase). However, during periods when traffic volumes approach near-congestion or operate at congested levels, collisions increase significantly.

Figure 3-14 confirms the same results for northbound I-5. During periods approaching or at congestion, the frequency of collisions is substantially higher than during uncongested periods.

The frequency of collisions is generally proportional to prevailing traffic volumes, except during near or at-capacity conditions, when the frequency of collisions is about twice the proportion of congested traffic levels.

Figure 3-15 compares reported northbound I-5 collision types to time-of-day and to existing traffic volumes. During near or at-congested periods, the number of rear-end collisions increases substantially. As noted previously, rear-end collisions are the most prevalent along the Bridge Influence Area, and the higher proportion that results during congestion periods could be attributed to existing non-standard design features as well as vehicular queuing during peak conditions.

Figure 3-15. Northbound I-5 Crashes by Type and Time of Day from Lombard Street to Main Street/Hwy 99 (2000-2004)



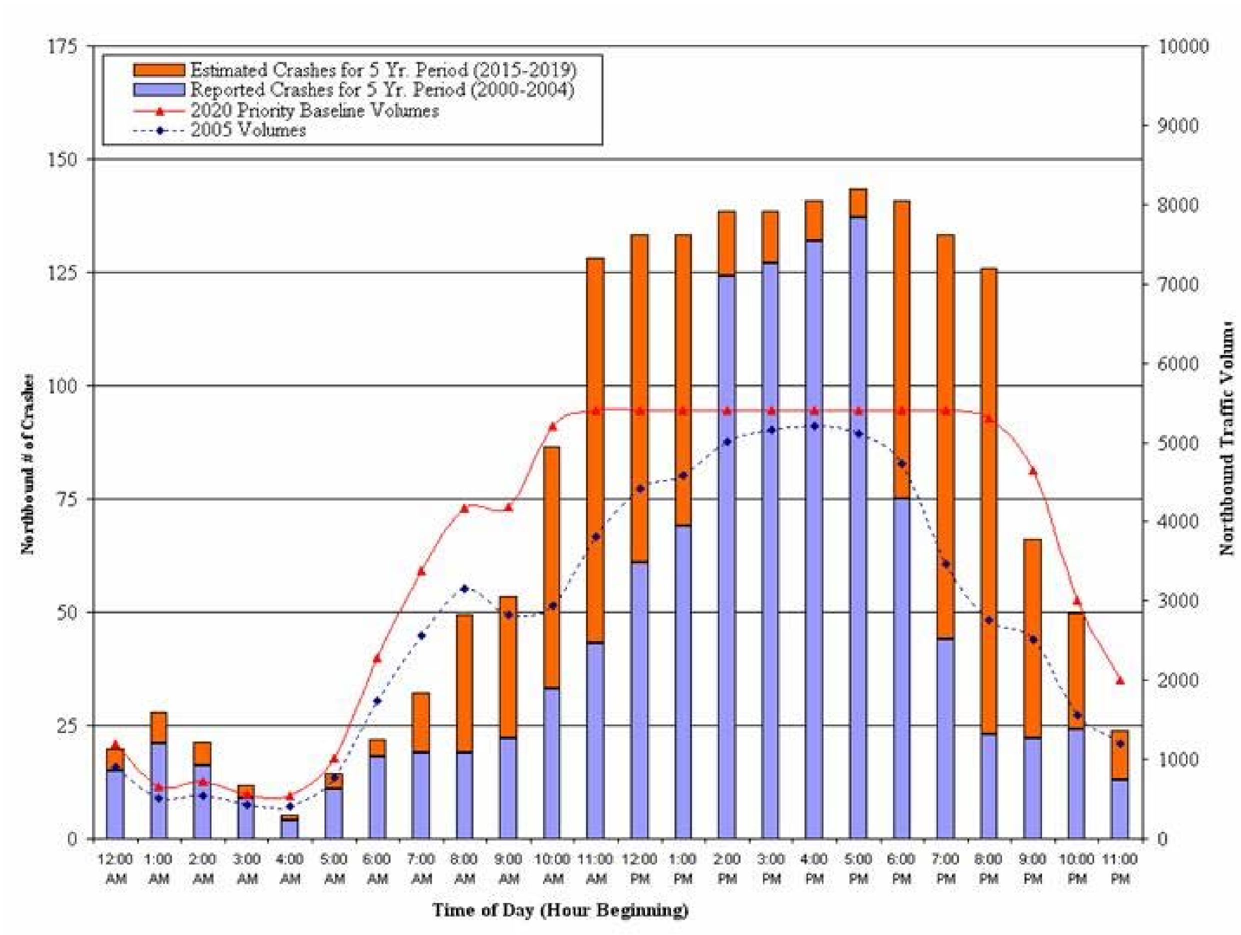
3.4.10 Attributes of Components Satisfying Question #4 for Vehicular Traffic

It is evident that the existence of non-standard geometric design features, the presence and duration of congested traffic conditions, and the occurrence of bridge lifts/traffic stops all contribute to the high number of vehicular collisions and the high collision rate in the Bridge Influence Area.

As long as the existing non-standard design features remain, the numbers of collisions are likely to substantially increase as traffic demands rise and the duration of congestion extends to more hours of the day.

Figure 3-16 shows predicted future collisions along northbound I-5 assuming no improvements are made within the Bridge Influence Area (i.e., existing non-standard geometric features remain and no traffic capacity is added) and traffic demands increase to predicted 2020 levels. As shown in **Figure 3-16**, by 2020 the duration of northbound congestion would be expected to increase to 9 hours from 4 hours under 2005 conditions. It is predicted that the increase in traffic levels and extension of congestion would increase the potential for collisions by 70 percent over existing conditions. Similar results would be expected in the southbound direction of I-5 within the Bridge Influence Area.

Figure 3-16. Northbound I-5 Crashes and Traffic Volumes at Interstate Bridge



In addition, as long as the existing non-standard features remain, traffic levels increase, and bridge lifts/traffic stops continue at their current rate or increase in the future to further maintain the bridge, the number of collisions are likely to substantially increase.

In order for a component to satisfy Question #4, the component must either:

- *Reduce future I-5 traffic demands compared to today's levels (this scenario would not require that existing non-standard geometric features be improved), or*
- *Redesign I-5 within the Bridge Influence Area to meet current design and safety standards.*

3.5 Question 5: Does the Component Improve Bicycle and Pedestrian Mobility Within the Bridge Influence Area?

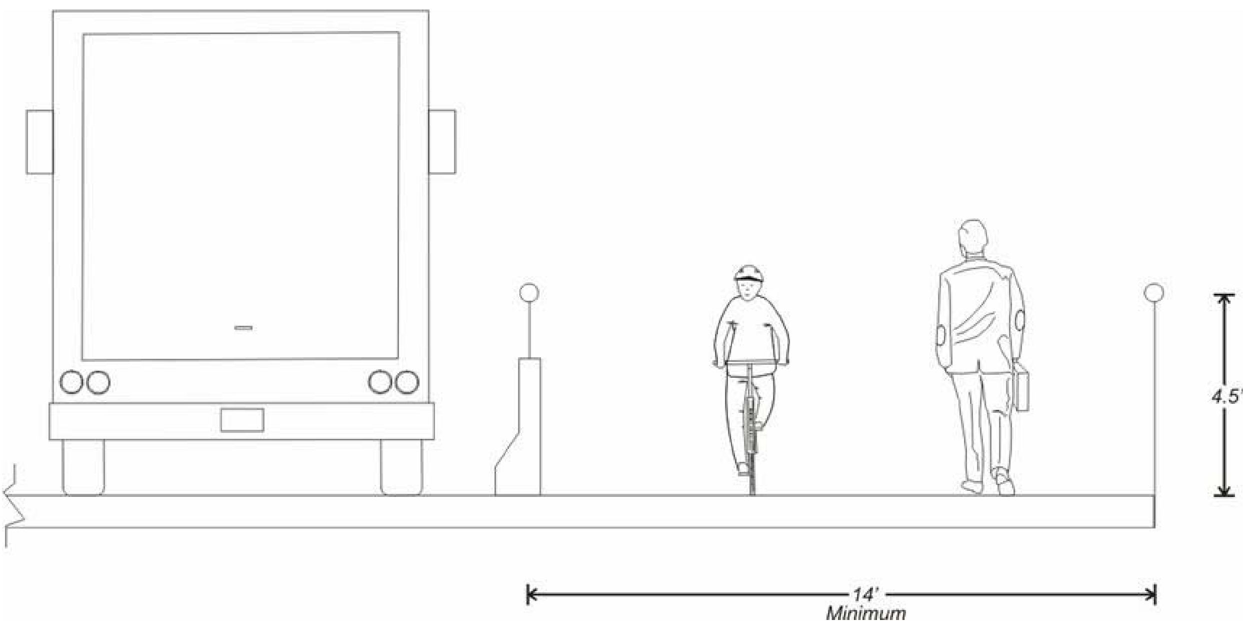
3.5.1 Bicycle and Pedestrian Mobility

Several elements of the existing bicycle and pedestrian network within the Bridge Influence Area do not enable safe and efficient mobility for bicyclists, pedestrians and disabled persons.

For example, although sidewalks are present on the Interstate Bridge (there is one on the west side of the southbound bridge and one on the east side of the northbound bridge), the sidewalks do not meet the minimum standards for shared use. The existing sidewalks vary in width from 3 to 6 feet and the minimum standard width for a shared pathway is 14 feet (per Washington State Department of Transportation (WSDOT) and Oregon Department of Transportation (ODOT)), as shown in ***Figure 3-17*** *and* ***Figure 3-18****. Provision of standard width pathways enable safe passage for bicyclists, pedestrians and disabled persons traveling in the same direction and in opposite directions.*

Figure 3-17. Photograph of Existing Non-Standard Multi-Use Pathway

Figure 3-18. Minimum Standard Multi-Use Pathway on a Bridge Structure



In addition, the existing sidewalks are located within 1 foot of the traffic lanes on the bridge, creating uncomfortable conditions for sidewalk users, and the existing railings separating users from traffic do not meet current design and safety standards.

Most of the connecting approaches to the Interstate Bridge sidewalks also do not meet multi-modal design, or Americans with Disabilities Act (ADA), standards.

Many of the connecting walkways and bikeways within the Bridge Influence Area, including along and adjacent to roadways in downtown Vancouver, on Hayden Island and near Marine Drive, do not enable safe and convenient bicycle, pedestrian and disabled person mobility for person trips approaching the river crossing. The routing is circuitous, confusing and consists of many impediments.

3.5.2 Attributes of Components Satisfying Question #5

In order for a component to satisfy Question #5, the component must either:

- *Improve the existing sidewalks across the Interstate Bridge, as well as other key bicycle, pedestrian and disabled person connections, to meet or exceed current shared use design standards, as well as provisions in accordance with the ADA, or*
- *Provide, as an element of a new river crossing, a new shared use pathway designed to meet or exceed applicable standards, to serve bicyclists, pedestrians and disabled persons.*

- *In addition, the component must improve bicycle, pedestrian and disabled person connections within the Bridge Influence Area to provide more direct routing and reduce or eliminate route impediments.*

3.6 Question 6: Does the Component Reduce Seismic Risk of the Columbia River Crossing?

3.6.1 Seismic Deficiencies

Both the Washington and Oregon departments of transportation acknowledge that the existing I-5 bridges do not meet today's seismic design standards and would be vulnerable in a major seismic event. A 1995 analysis of the lift span portion of the bridges revealed that items such as the timber piling in the foundations and steel braces in the lift span towers were insufficient to resist potential seismic forces.

3.6.2 Attributes of Components Satisfying Question #6

WSDOT and ODOT have agreed that all new structures that comprise the I-5 river crossing should be designed to the latest nationally accepted bridge design specifications. The existing I-5 bridges, if left in service and paired with a supplemental I-5 bridge, would also be seismically retrofitted if this is determined to be feasible in the design phase of this project. Meeting these specifications will reduce the risk of collapse during a seismic event, as they incorporate industry best practices for structure design and state-of-the-art design analysis procedures (based on national research and actual lessons learned from seismic events such as the Loma Prieta and Northridge earthquakes in California).

In order for a component to satisfy Question #6, the component must:

- *Provide a new river crossing within the Bridge Influence Area that is designed to the latest nationally accepted bridge design specifications, and/or*
- *Seismically retrofit the existing I-5 bridges if they are to remain in service, recognizing that the feasibility of a retrofit has not yet been determined.*

3.7 Other Considerations

In addition to the aforementioned issues, project staff was asked to consider and note factors that would likely jeopardize the overall feasibility of a component. Factors that could negatively impact a component's feasibility include: fundamental constructability problems, transit system integration problems, untested technology or facility designs, and consistency with currently adopted regional and statewide plans.

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4. Step A Evaluation of Transit Components

This section describes the results of the Step A evaluation of transit components. Each of the 14 transit components (TR-1 through TR-14) was screened against two of the six questions in Step A. These questions are, does the component:

Q1. Increase vehicular capacity or decrease vehicular demand within the Bridge Influence Area?, and

Q2. Improve transit performance within the Bridge Influence Area?

The transit components were also expected to be screened against Question #4, which is, does the component:

Q4. Improve safety and decrease vulnerability to incidents within the Bridge Influence Area?

To satisfy Question #4, a transit component would need to attract ridership sufficient to improve general traffic conditions for all vehicles (see Section 3.4.10). Answering this question, however, depends on knowing *with a fair degree of accuracy* how much future traffic volumes would be reduced by the transit component, and if the transit component would be complemented by new river crossing highway capacity. As promising components have not yet been combined, and detailed traffic modeling has not been completed, it is not yet possible to answer this question for the transit components. Therefore, all of the transit components received a rating of “unknown” for Question #4. In comparison, Question #1, asks *more generally* if a component is likely to reduce vehicle demand, and thus is possible to answer.

In summary, six components are recommended to pass through Step A and advance to the Step B screening, while eight components are recommended to fail the Step A screening. **Table 4-1** shows how the transit components rate on each relevant Step A question.

Table 4-1. Transit Components Step A Results

COMPONENTS		COMPONENT SCREENING RESULTS						
ID	NAME	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Overall
TR-1	Express Bus in General Purpose (GP) lanes	P	P	NA	U	NA	NA	P
TR-2	Express Bus in Managed Lanes	P	P	NA	U	NA	NA	P
TR-3	Bus Rapid Transit (BRT)-Lite	P	P	NA	U	NA	NA	P
TR-4	Bus Rapid Transit (BRT)- Full	P	P	NA	U	NA	NA	P
TR-5	Light Rail Transit (LRT)	P	P	NA	U	NA	NA	P
TR-6	Streetcar	P	P	NA	U	NA	NA	P
TR-7	High Speed Rail	F	F	NA	U	NA	NA	F
TR-8	Ferry Service	F	F	NA	U	NA	NA	F
TR-9	Monorail System	P	F	NA	U	NA	NA	F
TR-10	Magnetic Levitation Railway	F	F	NA	U	NA	NA	F
TR-11	Commuter Rail in BNSF Trackage	P	F	NA	U	NA	NA	F
TR-12	Heavy Rail	P	F	NA	U	NA	NA	F
TR-13	Personal Rapid Transit	F	F	NA	U	NA	NA	F
TR-14	People Mover/Automated Guideway Transit (AGT)	P	F	NA	U	NA	NA	F

P = Pass F = Fail NA = Not Applicable U = Unknown

4.1 Components that Pass Step A

This section describes the transit components that pass the Step A screening. Some of these transit components are currently used in the Portland-Vancouver region, and others appear to be promising options based on their typical operating characteristics. More details regarding these modes and their respective features, strengths, and weaknesses follow. The cost information included in this section is for informational purposes only; capital and operating costs are not criteria used in Step A screening.

4.1.1 TR-1 Express Buses in General Purpose Lanes

Description:

Express bus service has a limited number of stops and operates either from a collector area (such as a park-and-ride) directly to a specific destination or in a particular corridor with stops en route at major transfer points or activity centers. Express bus service is commonly used in many U.S. cities for longer-distance trips, and is currently used to provide bi-state transit service in the I-5 corridor (e.g., C-TRAN's route #134 from Salmon Creek to downtown Portland). The travel time and reliability of express bus service is directly affected by general congestion levels, since buses share traffic lanes with all other vehicles.

The capital costs of express bus service cannot be reduced to a cost-per-mile basis. Rather, capital costs for express bus service are based on the number of buses in service and the number of capital and passenger facilities constructed. **Figure 4-1** shows express buses operating in general purpose lanes.

Figure 4-1 Express Bus in General Purpose Lanes

Express buses operating in existing or new general purpose lanes passes the Step A questions because they could:

1. Increase transit capacity and reduce auto demand within the Bridge Influence Area.
2. Increase the speed of transit in the Bridge Influence Area, provided enough new general purpose capacity was added to reduce congestion levels. Transit reliability could also be improved if congestion were sufficiently reduced.

4.1.2 TR-2 Express Buses in Managed Lanes

Description:

This component is similar to TR-1, except that express buses benefit from improved travel times and reliability by operating in managed lanes that give preferential use to transit and/or reduce use by other modes (single-occupancy autos, trucks). Managed lanes can be High Occupancy Vehicle (HOV) lanes, bus-only lanes, and/or tolled lanes with reduced auto volumes.

The most common form of managed lanes are HOV lanes. HOV lanes are typically reserved for vehicles with two or more occupants and often serve buses, taxis, and carpools. HOV lanes are usually used in metropolitan areas ranging from one million to over 10 million people and can be developed through new construction, or conversion or modification of existing facilities. When utilized to their full potential, HOV lanes can often double the person-carrying capacity of the existing freeway lanes.

The capital costs of constructing a new HOV lane can range from $5 million to more than $20 million per lane mile, depending on location and specific engineering required by the site. Costs include right-of-way, engineering, and construction of the freeway and related facilities. **Figure 4-2** shows express buses operating in managed lanes.

Figure 4-2. Express Bus in Managed Lanes

Express buses in managed lanes passes the Step A questions because they could:

1. Decrease vehicular travel demand within the Bridge Influence Area by giving preference and a speed advantage to transit.

2. Improve transit performance by managing congestion and reducing the potential for accidents, thereby improving transit reliability.

4.1.3 TR-3 Bus Rapid Transit LITE

Description:

Bus rapid transit (BRT) is a strategy to reduce travel time for bus riders and improve bus efficiency in congested corridors. BRT “LITE” is an all-day bus service that can operate in exclusive, managed, or general purpose lanes, and which may or may not have in-line stations and special vehicles. BRT systems are more flexible than fixed guideway rail transit because a BRT bus can enter and leave a bus lane at specific points and can operate on regular city streets. BRT vehicles can thus provide a passenger collection function (e.g., pick up passengers close to their home) and can also provide fast “trunk line” service in managed or exclusive lanes.

BRT systems are being demonstrated in cities with population sizes ranging from 500,000 people to over 3 million people. Examples of BRT systems include Pittsburgh and nine demonstration projects supported and under development by the Federal Transit Administration.

The capital costs of constructing a new BRT system can range from $10 million to $30 million per mile, depending on the location and specific engineering required by the site. **Figure 4-3** shows a typical BRT LITE vehicle.

Figure 4-3. BRT LITE

BRT LITE passes the Step A questions because it could:

1. Decrease vehicle demand within the Bridge Influence Area by substantially increasing transit capacity and providing a travel time advantage to bus rapid transit vehicles.
2. Improve transit performance by managing congestion and thereby improving transit reliability.

4.1.4 TR-4 Bus Rapid Transit FULL

Description:

BRT FULL is conceptually similar to BRT LITE described previously, with the following operational enhancements. BRT FULL would:

- operate in exclusive right-of-way for a significant distance (BRT LITE may not)
- have in-line stations and special vehicles (BRT LITE may not)
- have distinct and unique brand identity, similar to most light rail systems

Figure 4-4 shows a BRT FULL vehicle operating in an exclusive right-of-way.

Figure 4-4. BRT FULL

BRT FULL passes the Step A questions because it could:

1. Decrease vehicle demand within the Bridge Influence Area by increasing transit capacity and providing a dedicated transit lane within the Bridge Influence Area that would be uncongested.
2. Improve transit reliability and travel speed by completely separating bus rapid transit vehicles from other traffic and giving them a substantial travel time savings.

4.1.5 TR-5 Light Rail Transit

Description:

Light rail transit (LRT) is more flexible than other rail systems, and can operate in shared vehicle lanes in city streets, in barrier-separated lanes on urban arterials, in freight railway corridors, or on its own exclusive track. It uses electrically powered rail cars, and has been implemented in many American cities. Cities with LRT typically range in population from one to three million people. On a per mile basis, LRT typically costs between $20 million and $80 million per mile. The cost of LRT typically depends on station geometrics, whether existing right-of-way is already owned by the constructing agency, and how much of the rail line is elevated, at-grade, or underground. **Figure 4-5** shows a typical 2-car light rail train.

Figure 4-5. Light Rail

LRT passes the Step A questions because it could:

1. Decrease vehicle demand within the Bridge Influence Area by increasing transit capacity and providing an exclusive guideway that would not be used by private automobiles. Its operating characteristics allow it to serve both short and long trips.
2. Improve transit travel time and reliability by completely separating LRT trains from other traffic.

4.1.6 TR-6 Streetcar

Description:

Streetcar transit is similar to LRT and can operate in shared vehicle lanes in city streets, in separated lanes on urban arterials, or on its own exclusive track. It uses electrically powered rail cars, and has been implemented in San Francisco, Portland, Tampa, Tacoma and other U.S. cities. Cities with streetcars typically range in population size from one to three million people, although some smaller cities have developed short streetcar segments as historical tourist attractions. On a per mile basis streetcar transit typically costs between $25 million to $50 million per mile. The cost of streetcar transit typically depends on station geometrics, whether existing right-of-way is already owned by the constructing agency, and how much of the rail line is elevated, at-grade, or underground. Compared to light rail, streetcar transit typically has the following differences:

- Streetcars have lower top operating speeds. Thus, streetcars are not typically used for long distance commuting, as other rail modes are better able to capitalize on long sections of track with no stops. Streetcar is typically an intra-urban mode with two to three block station spacing, whereas light rail is typically used as an inter-urban mode with half-mile or greater station spacing.

- Streetcars typically operate in general purpose traffic lanes while light rail typically operates in exclusive trackway, although this is not always the case.
- Streetcars usually have less passenger capacity than light rail vehicles. In Portland, each streetcar carries a maximum load (including standees) of 140 passengers, compared to 166 for a loaded LRT vehicle. LRT service is usually provided by two-vehicle trains, whereas streetcars usually operate as single trains to complete tight turns in urban areas and to minimize parking reductions.

Figure 4-6 shows a typical single-car streetcar.

Figure 4-6. Streetcar

Streetcars pass the Step A questions because they could:

1. Decrease vehicle demand within the Bridge Influence Area by increasing transit capacity and providing an exclusive guideway that would not be used by private automobiles.
2. Improve transit travel time and reliability by completely separating streetcars from other traffic. This critically assumes that it is possible to interline streetcar and LRT service on the same trackage (i.e. in the Interstate MAX corridor).

4.2 Components that Fail Step A

This section describes the transit components that do not pass the Step A screening. Each of these transit components has its optimal niche and in some cases has been implemented successfully in specific locations around the world. In the context of the CRC study area and the Portland-Vancouver region, however, they are not promising transit components. In general, these components would not interface well with the existing transit systems that are in place (i.e., they fail Question #2), and for them to be viable, the region would have to implement them on a scale far in excess of what the CRC project could adopt. Conversely, the segments of these transit modes that *could* be implemented as part of this project would not have sufficient "independent utility" to make the investment worthwhile.

More details regarding these modes and their respective features, strengths, and weaknesses follow. The cost information included in this section is for informational purposes only; capital and operating costs are not criteria used in the Step A screening.

4.2.1 TR-7 High Speed Rail

Description:

High speed rail is an inter-city transit service that operates primarily on a dedicated guideway or track not used by freight trains with typical train speeds over 150 miles per hour. Examples of high speed rail systems are found in Europe and Asia where trains routinely travel in excess of 170 mph. High speed rail systems are typically used to connect metropolitan areas ranging from 3 million to over 15 million people. Amtrak operates a form of inter-city high speed rail in the Northeast Corridor (Washington D.C. to New York and Boston), but its Acela service in the corridor typically has travel speeds below 125 miles per hour. A more local example is the Amtrak Cascades route in the Pacific Northwest connecting Eugene, Oregon and Vancouver, BC, although this service only travels at 79 mph - not fast enough to officially qualify as high speed rail. High speed rail requires special grade crossing restrictions. The capital costs of constructing a new high speed rail system can range from $50 million to more than $200 million per mile, depending on the location and specific engineering required by the site. **Figure 4-7** shows a high speed rail train.

Figure 4-7. High Speed Rail

Rationale for Not Advancing:

High speed rail fails Step A Questions #1 and #2. High speed rail is a proven technology but is designed primarily for long, inter-city or inter-state trips with few stops. High speed rail lines often compete with airlines for passengers traveling 200 miles to 300 miles and where travel times between airplanes and high speed rail are roughly equal. In a hypothetical application in the Pacific Northwest, such a system would likely only have one stop in Salem, one stop in Portland/Vancouver, and one stop in Seattle, for instance.

Given that the average bi-state trip within the region is about 15 miles, high speed rail could not advantageously serve many of the identified regional travel markets (e.g., downtown Vancouver, Hayden Island) because it could not achieve high travel speeds between stations that may be located only a few miles apart. A local high speed rail service would likely have very few stops or stations, and perhaps no stops within the Bridge Influence Area, and thus would not actually carry many passengers for local trips. Finally, in order to improve existing transit service in the Bridge Influence Area, it would have to be integrated with the existing bus and rail network, which is infeasible; the technology would require a completely grade separated right-of-way within the Bridge Influence Area and beyond. For these reasons, high speed rail is not an appropriate public transportation component for the Bridge Influence Area.

4.2.2 TR-8 Ferry Service

Description:

A ferry is a passenger-carrying marine vessel providing passage over a river, lake, or other body of water for passengers, vehicles, and/or freight. Ferries were especially important in the days before permanent bridges and tunnels were constructed across bodies of water. At first, most ferries were small boats or rafts, propelled by oars or poles and sometimes assisted by sails. A modern ferry system currently serves various points in the Puget Sound area in Washington, but provides service to only those points where a bridge or tunnel system does not exist. The average travel distance of a ferry route varies from between 10 miles and 500 miles. **Figure 4-8** shows a typical ferry service.

Figure 4-8. Ferry Service

Rationale for Not Advancing:

Ferry service fails Step A Questions #1 and #2. Ferries are most ideal for longer distance travel with no intermediate stops, because docking and de-boarding add significant travel time. The travel time for a ferry service connecting downtown Vancouver to downtown Portland, for example, would likely be slower than the slowest land-based transit bus, even in the congested I-5 corridor, since the service would have to travel many miles out of direction to access the Willamette River. The service would have little or no connectivity to smaller markets and connecting transit services, and likely would not even serve intermediate but significant transit markets such as North Portland. Due to slow travel times and few docking stations, the service would carry relatively few passengers.

In order to improve existing transit service in the Bridge Influence Area, it would have to be integrated with the existing bus and rail network, which is infeasible. The technology would require a new category of infrastructure, and siting the land-based facilities would be challenging, as would accessing the terminals with fixed-route transit. For these reasons, ferries are not an appropriate public transportation component for the Bridge Influence Area, although ferry service may be appropriate in other areas of the Vancouver-Portland region.

4.2.3 TR-9 Monorail System

Description:

Monorails are guided transit vehicles operating on or suspended from a single rail, beam, or tube. The monorail systems most familiar to Americans are located in downtown Seattle, Washington and at the Disneyworld and Disneyland theme parks in Orlando, Florida and Anaheim, California. Monorail cars themselves are rubber-tired and straddle a single, narrow, elevated beam that is approximately 25 feet above the ground. The cars are self-propelled by electric motors and are usually coupled together in trains of two to six cars. Because it straddles a single beam, monorail requires a much more complicated vehicle support system than rail vehicles. Thus, a monorail vehicle has 24 rubber tires as compared to a rail vehicle's eight steel wheels. The much higher resistance of rubber tires than steel wheels results in greater energy consumption and heat production. Moreover, monorails have less riding comfort and their interiors are less spacious than rail vehicles.

Historically, most monorail systems were built and operated as one-way loops. Modern monorail systems now incorporate new track switching technology that lets them operate like most modern rail systems. Several cities in the United States have considered monorails, namely Seattle, Washington (an extension of the existing system); Las Vegas, Nevada; Jacksonville, Florida; and others. Due to cost overruns, the Seattle monorail project was recently terminated.

The capital cost for constructing monorail systems is between $50 million and $200 million per mile, and most of this cost is for elevated guideway construction. **Figure 4-9** shows a typical monorail train.

Figure 4-9. Monorail

Rationale for Not Advancing:

Monorail service fails Step A Question #2. Monorail systems are most commonly used in specialty niche applications for very local circulation, and have never been used as a regional transit system in North America. Monorails typically have been built only for special purposes, such as amusement parks and airports, where elevated structures are not likely to be opposed by numerous private residences and businesses. Only a few cities, mostly in Japan, have built monorail as a general purpose transit line. In fact, there is no city with more than one monorail line anywhere in the world. It is generally accepted within the transit industry that light-rail and heavy-rail are more efficient and appropriate for high-quality urban mass transportation than monorails.

A monorail service could conceivably be designed to serve multiple destinations within the Bridge Influence Area and I-5 corridor, since the technology is not uniquely suited to long-distance or short-distance travel. In order to improve existing transit service in the Bridge Influence Area, however, it would have to be integrated with the existing bus and rail network, which is infeasible; the technology would require a completely grade separated right-of-way. For these reasons, monorail is not an appropriate public transportation component for the Bridge Influence Area.

4.2.4 TR-10 Magnetic Levitation Railway

Description:

A magnetic levitation (Maglev) railway is a high-technology rail system that operates on a specially-designed exclusive right-of-way and exceeds speeds of 200 miles per hour. The ideal trip distance for Maglev technology is between 50 and 500 miles. Maglev vehicles are propelled along a fixed guideway at high speeds by the attraction and repulsion of magnets on the rails and under the rail cars. Thus Maglev cannot share existing infrastructure and must be designed as a completely separate system. The capital costs of constructing a new Maglev railway are based on estimates of $100 million to more than $200 million per mile, depending on location and specific engineering required by the site. **Figure 4-10** shows a typical Maglev railway.

Figure 4-10. Maglev Railway

Rationale for Not Advancing:

Maglev fails Step A Questions #1 and #2. Given its travel speeds and acceleration characteristics, Maglev railways cannot adequately serve closely-spaced transit markets (e.g., downtown Vancouver and Hayden Island). Local Maglev rail service would likely have very few stops or stations, and perhaps no stops within the Bridge Influence Area, and thus would not serve the identified transit markets. In a hypothetical application, such a system would likely only have one stop in Salem, one stop in Portland/Vancouver, and one stop in Seattle, for instance.

To improve existing transit service in the Bridge Influence Area, it would have to be integrated with the existing bus and rail network, which is infeasible; the technology would require a completely grade separated right-of-way within the Bridge Influence Area and beyond.

Maglev railways are specifically designed for long distance trips. There are no operating Maglev railways in North America, and it is highly unlikely that the technology would be implemented without a prior federal, state, and local commitment. For these reasons, Maglev railways are not an appropriate public transportation component for the Bridge Influence Area.

4.2.5 TR-11 Commuter Rail Transit in BNSF Trackage

Description:

Commuter rail service is typically used for long distance travel between a central city, adjacent suburban areas, and other cities within a region. Commuter rail systems typically use diesel-powered locomotives and passenger rail cars and operate in existing railroad rights-of-way. Service is provided during morning and evening peak commuting periods. Large urban areas of North America, with population sizes ranging from two million to over 10 million people, use commuter rail for transporting people from outlying suburbs to the central city. On a per mile basis, commuter rail typically costs between $5 and $25 million per mile. Commuter rail is often less expensive than other rail modes because it typically operates on existing railroad rights-of-way and shares trackage with freight operations. Since commuter rail typically operates in freight rail corridors, there are usually extensive negotiations with the active railroad for the privilege of sharing the right-of-way and an annual trackage fee is paid. **Figure 4-11** shows a typical commuter rail train.

Figure 4-11. Commuter Rail Train

Rationale for Not Advancing:

Commuter rail operating on existing regional freight rail trackage fails Step A Question #2. To improve existing transit service in the Bridge Influence Area, it would have to be integrated with the existing bus and rail network, which is infeasible, as the technology would operate in a completely grade separated right-of-way.

In addition, during the I-5 Partnership Study, an in-depth study of commuter rail options determined that due to projected congestion in the existing freight rail system in the next 20 years, commuter rail could only be implemented on a separate passenger rail-only network; it could not be implemented on existing regional freight rail trackage. Some of the key findings from this study include:

- 63 freight trains and 10 Amtrak trains cross the Columbia River on the Burlington Northern Santa Fe (BNSF) bridge now; in 20 years this is projected to grow to 90 freight trains and up to 26 passenger trains.
- Existing train speeds are very slow (12 to 15 mph) and about half of normal operating speeds. The delay ratio (delay hours/train running hours) is 33 percent; 15 to 20 percent is considered to be normal. As the delay ratio grows, commuter rail service degrades until it is no longer viable.
- Slow speeds and train “bunching” are due to track constraints (which are constrained by the built urban environment), topography, and limited bridge crossings. In addition, the large number of local and yard trains needed to serve area industries would also congest the mainline.
- Due to mainline congestion and bunching, there is poor recoverability if breakdowns occur anywhere on the network.
- The narrow rail corridor through the region restricts improvement alternatives (e.g., passing tracks, parallel routes).

While new commuter rail service along regional freight rail trackage could conceivably serve some transit markets in the Bridge Influence Area (e.g., North Portland), it would provide poor, out-of-direction service to some key activity centers (e.g., downtown Portland). That said, it is not feasible to implement this service on the existing rail network.

4.2.6 TR-12 Heavy Rail Transit

Description:

Heavy rail is a moderate-speed, passenger rail service operating on fixed rails in exclusive rights-of-way from which all other vehicular/pedestrian traffic is excluded (also known as rapid rail; subway; or metro). Heavy rail generally uses longer train sets and has longer station spacing than light rail. Most heavy rail systems have at least part of their trackway underground. Heavy rail systems are used in large metropolitan areas ranging from three to over 15 million people. Examples include San Francisco's BART system and the subway systems of New York and Washington, D.C. The capital costs of constructing a new rapid rail system can range from $100 million to more than $200 million per mile, depending on the location and specific engineering required by the site.

Similar to light rail, heavy rail is a proven technology that serves regional trips. One of the main differences between heavy rail and light rail is that heavy rail typically requires a completely grade separated right-of-way while light rail can operate in mixed right-of-way environments. Another key difference is that light rail trains can serve between 5,000 to 12,000 people per hour in the peak direction, while heavy rail trains can accommodate between 15,000 to 60,000 people per hour in the peak direction. Heavy rail is typically considered to be a logical option when passenger demand far exceeds the person carrying capacity of either buses or light rail. The requirement of grade-separated right-of-way and the benefit of extra passenger carrying capacity are the main differences between heavy rail and light rail. **Figure 4-12** shows a heavy rail train.

Figure 4-12. BART Heavy Rail Train

Rationale for Not Advancing:

Heavy rail fails Step A Question #2. To improve existing transit service in the Bridge Influence Area, it would have to be integrated with the existing bus and rail network, which is infeasible, as the technology would operate in a completely grade separated right-of-way.

Regarding the identified transit markets, new heavy rail service could conceivably serve some of the significant transit markets in the Bridge Influence Area and beyond (e.g., downtown Vancouver, North Portland, downtown Portland). However, heavy rail becomes cost effective only when there are large peak hour passenger demands, such as those seen in the world's largest and most congested cities: New York, Washington D.C., London, Tokyo, etc. There are no heavy rail lines in the Portland-Vancouver metropolitan area, and no regional plans to consider heavy rail.

For these reasons, heavy rail is not an appropriate public transportation component for the Bridge Influence Area.

4.2.7 TR-13 Personal Rapid Transit

Description:

Personal rapid transit (PRT) is a theoretical concept that would have small rail cars carrying two to five passengers under computer control running over an elaborate system of elevated guideways. In short, passengers would board the rail car and program their destination into the computer. The computer controller would then route the rail car to its destination. Because PRT is still a theoretical concept, no PRT systems are operating in the U.S. The preliminary capital cost estimates of constructing a new PRT system range from $1 million to more than $200 million per mile, depending on the location and specific engineering required by the site. It is believed that the elevated guideways are small, light, and relatively easy to build, and that the majority of the capital cost is to develop the system controls and provide connectivity. However, there is no documented evidence that this is indeed the case. Similarly, the operating costs for this type of transit system remain unknown. **Figure 4-13** shows a conceptual PRT vehicle and elevated guideway.

Figure 4-13. PRT Vehicle and Guideway

Rationale for Not Advancing:

PRT fails Step A Questions #1 and #2. Capacity is one of the primary limitations of PRT, and incompatibility with the existing regional systems. Unless a very large number of vehicles were used, the system would not have enough capacity to serve the large trip demands in the Bridge Influence Area and to significant destinations like downtown Portland. Using such a large number of vehicles, however, would be impractical and inefficient compared to modes that use larger vehicles like buses and rail.

PRT's conceptual advantage critically depends on building a comprehensive regional system that serves virtually every place that patrons want to go. PRT within the Bridge Influence Area would not attract significant demand because it simply would not go to many of the final I-5 corridor and regional destinations that patrons want to go. How a PRT system would "grow" from a river crossing to a local, or even a regional network, is unclear.

To improve existing transit service in the Bridge Influence Area, it would have to be integrated with the existing bus and rail network, which is infeasible, as the technology would operate in a completely grade separated right-of-way. PRT remains a theoretical concept and not one appropriate for the Columbia River Crossing project.

4.2.8 TR-14 Automated Guideway Transit

Description:

Also commonly known as 'People-Movers' – automated guideway transit (AGT) is an automatically controlled (driverless) train operating over an exclusive guideway. Applications include short loop or shuttle operations (less than 5-miles in length) in airports, central business districts, or other high-activity centers. Urban AGTs are used in moderately sized urban areas of North America, such as Vancouver B.C., Detroit, and Miami. Because of AGT's need for grade-separation, its capital costs are significant, beginning at $50 million per mile for the elevated guideway alone, and climbing to over $100 million per mile in urban areas. The true cost of AGTs typically depends on the station geometrics and whether existing right-of-way is already owned by the constructing agency. **Figure 4-14** shows an AGT system.

Figure 4-14. People Mover/Automated Guideway Transit

Rationale for Not Advancing:

AGT fails Step A Question #2. To improve existing transit service in the Bridge Influence Area, it would have to be integrated with the existing bus and rail network, which is infeasible, as the technology would operate in a completely grade separated right-of-way.

AGT is a proven technology suitable for short-distance trips, and its limited application in North America has been to provide local circulator service. LRT and AGT share some of the same capacity and operating characteristics, but unlike LRT, AGT requires a completely grade separated right-of-way and either underground or aerial stations. For these reasons, AGT lines are not an appropriate public transportation component for the Bridge Influence Area.

5. Step A Evaluation of River Crossing Components

This section describes the results of the Step A evaluation of river crossing components. Each of the 23 river crossing components (RC-1 through RC-23) was screened against all six of the Step A questions. These questions are, does the component:

- Q1. Increase vehicular capacity or decrease vehicular demand within the Bridge Influence Area?
- Q2. Improve transit performance within the Bridge Influence Area?
- Q3. Improve freight mobility within the Bridge Influence Area?
- Q4. Improve safety and decrease vulnerability to incidents within the Bridge Influence Area?
- Q5. Improve bicycle and pedestrian mobility within the Bridge Influence Area?
- Q6. Reduce seismic risk of the I-5 Columbia River crossing?

In summary, nine components are recommended to pass through Step A and advance to the Step B screening, while 14 components are recommended to fail the Step A screening. **Table 5-1** shows how the river crossing components rate on each Step A question.

Table 5-1. River Crossing Components Step A Results

COMPONENTS		COMPONENT SCREENING RESULTS						
ID	NAME	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Overall
RC-1	Replacement Bridge-Downstream/Low-level/Movable	P	P	P	P	P	P	P
RC-2	Replacement Bridge-Upstream/Low-level/Movable	P	P	P	P	P	P	P
RC-3	Replacement Bridge-Downstream/Mid-level	P	P	P	P	P	P	P
RC-4	Replacement Bridge-Upstream/Mid-level	P	P	P	P	P	P	P
RC-5	Replacement Bridge-Downstream/High-level	P	P	P	F	P	P	F
RC-6	Replacement Bridge-Upstream/High-level	P	P	P	F	P	P	F
RC-7	Supplemental Bridge-Downstream/Low-level/Movable	P	P	P	U	P	U	P
RC-8	Supplemental Bridge-Upstream/Low-level/Movable	P	P	P	U	P	U	P
RC-9	Supplemental Bridge-Downstream/Mid-level	P	P	P	U	P	U	P
RC-10	Supplemental Bridge-Upstream/Mid-level	P	P	P	F	P	U	F
RC-11	Supplemental Bridge-Downstream/High-level	P	P	P	F	P	U	F
RC-12	Supplemental Bridge-Upstream/High-level	P	P	P	F	P	U	F
RC-13	Tunnel to supplement I-5	P	P	P	P	P	U	P
RC-14	New Corridor Crossing	P	F	P	F	F	F	F
RC-15	New Corridor Crossing plus Widen Existing I-5 Bridges	P	F	P	F	F	F	F
RC-16	New Western Highway (I-605)	F	F	F	F	F	F	F
RC-17	New Eastern Columbia River Crossing	F	F	F	F	F	F	F
RC-18	I-205 Improvements	F	F	F	F	F	F	F
RC-19	Arterial Crossing without I-5 Improvements	F	P	F	F	P	F	F
RC-20	Replacement Tunnel	F	F	F	P	F	P	F
RC-21	33rd Avenue Crossing	F	F	F	F	F	F	F
RC-22	Non-Freeway Multi-Modal Columbia River Crossing	F	P	F	F	P	F	F
RC-23	Arterial Crossing with I-5 Improvements	P	P	P	P	P	P	P

P = Pass
F = Fail
U= Unknown (insufficient information)

5.1 Evaluation Methods

River crossing components RC-1 through RC-12 were grouped into two major categories. The first category replaces the existing bridges with a new I-5 bridge. The second category retains one or both of the existing bridges and supplements them with a new I-5 bridge.

Using an aerial photograph base map, each crossing option was laid out in plan and profile views. Components with a new supplemental bridge assume that a single-deck, 10-lane bridge would be built. As components are later combined into alternative packages and future traffic volumes become available, different bridge types and lane configurations can be evaluated.

The Pearson Airpark airspace approach surface was overlaid on the designs in both plan and profile to identify airspace encroachments. In addition, water navigation routes were evaluated by noting the likely paths that marine vessels would take depending on the number and location of pier structures and span openings.

For river crossing components RC-13 through RC-23, staff reviewed relevant documents and drawings from the I-5 Partnership Study, as well as documents and drawings submitted by the public for components that have not been previously studied.

5.2 Components that Pass Step A

5.2.1 RC-1 Through RC-4 (Replacement Bridge Variations)

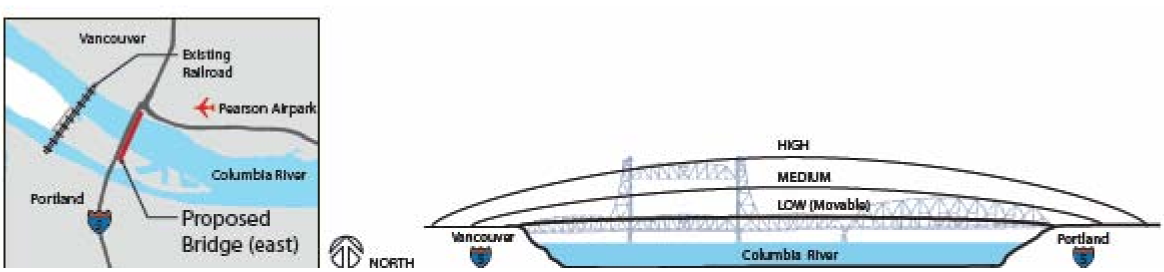
Descriptions:

RC-1 Replacement Bridge Downstream/Low Level/Movable: This crossing represents a bridge that would be located immediately west (downstream) of the existing I-5 bridges. The existing I-5 bridges would be removed. The proposed replacement bridge is a low level bridge that would provide approximately 65 feet of vertical clearance for traffic traveling down the Columbia River. Because this vertical channel clearance does not pass 100 percent of the marine traffic operating on the river, a portion or span of the bridge would need to be opened to allow traffic taller than 65 feet to pass through the channel. This is called a moveable span, of which the exact type has not been defined. Types of moveable spans could include, but are not necessarily limited to, a lift span, a swing span, or a draw bridge. **Figure 5-1** shows this component.

Figure 5-1. Replacement Bridge Downstream/Low Level/Movable

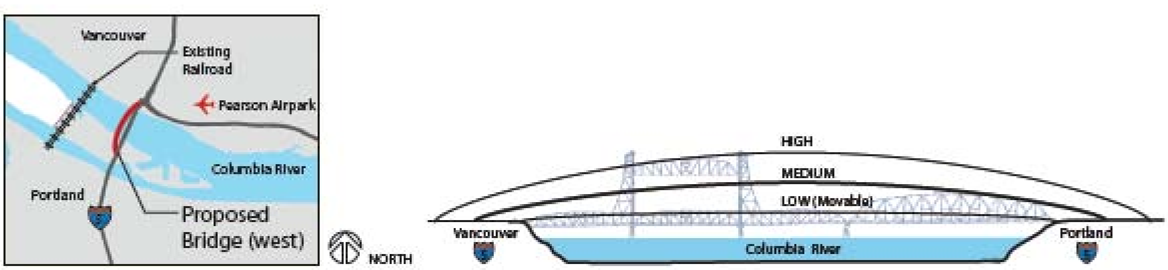
RC-2 Replacement Bridge Upstream/Low Level/Movable: This crossing represents a bridge that would be located immediately east (upstream) of the existing I-5 bridges. The existing I-5 bridges would be removed. The proposed replacement bridge is a low level bridge that would provide approximately 65 feet of vertical clearance for traffic traveling down the Columbia River. Because this vertical channel clearance does not pass 100 percent of the marine traffic operating on the river, a portion of the bridge would need to be opened to allow traffic taller than 65 feet to pass through the channel. This is called a moveable span, of which the exact type has not been defined. Types of moveable spans could include, but are not necessarily limited to, a lift span, a swing span, or a draw bridge. **Figure 5-2** shows this component.

Figure 5-2. Replacement Bridge Upstream/Low Level/Movable



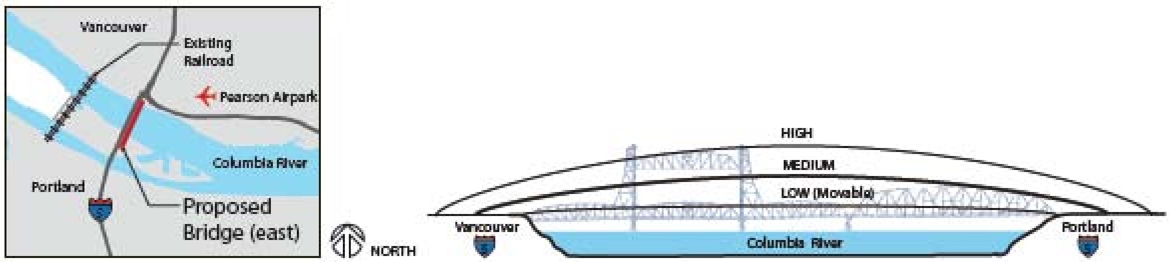
RC-3 Replacement Bridge Downstream/Mid Level: This crossing represents a bridge that would be located immediately west (downstream) of the existing I-5 bridges. The existing I-5 bridges would be removed. The proposed replacement bridge is a mid level bridge that would provide approximately 110 feet of vertical clearance for marine traffic traveling down the Columbia River. Because this vertical channel clearance would allow 100 percent of the traffic operating on the river to fit under the bridge, the entire bridge would be fixed and therefore no portion of the bridge would require any openings. **Figure 5-3** shows this component.

Figure 5-3. Replacement Bridge Downstream/Mid Level



RC -4 Replacement Bridge Upstream/Mid Level: This crossing represents a bridge that would be located immediately east (upstream) of the existing I-5 bridges. The existing I-5 bridges would be removed. The proposed replacement bridge is a mid level bridge that would provide approximately 110 feet of vertical clearance for marine traffic traveling down the Columbia River. Because this vertical channel clearance would allow 100 percent of the traffic operating on the river to fit under the bridge, the entire bridge would be fixed and therefore no portion of the bridge would require any openings. **Figure 5-4** shows this component.

Figure 5-4. Replacement Bridge Upstream/Mid Level



These components, which replace the existing I-5 bridges, pass the Step A questions because:

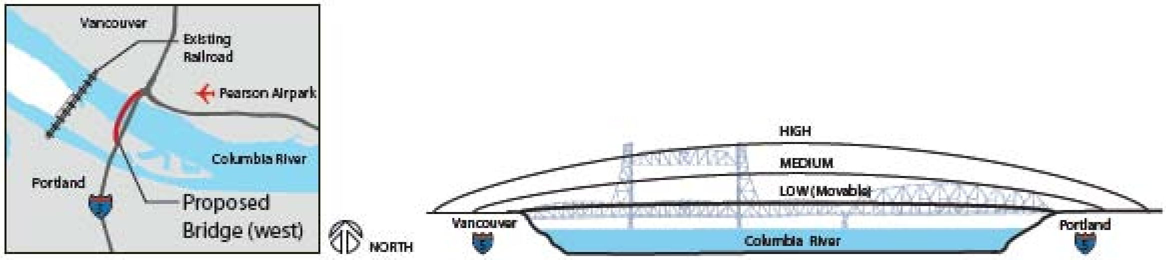
1. They would increase vehicular capacity in the Bridge Influence Area by providing approximately ten lanes of capacity for vehicular traffic.
2. The bridge configurations could also be used to carry transit, and thus could allow for an increase in transit capacity.
3. Freight mobility would be improved because of the increase in capacity and because the vertical alignment would be flatter and more conducive to truck movements.
4. All components that replace the existing bridges would be built to modern standards including full shoulders and a design speed of 70 mph, and they would not encroach into Pearson Airpark airspace.
5. All of these components would also allow for a separated bike/pedestrian lane designed to modern standards in each direction.
6. They would also reduce seismic vulnerability, as the new bridges would be brought up to current seismic standards.

5.2.2 RC-7 Through RC-9 (Supplemental Bridge Variations)

Descriptions:

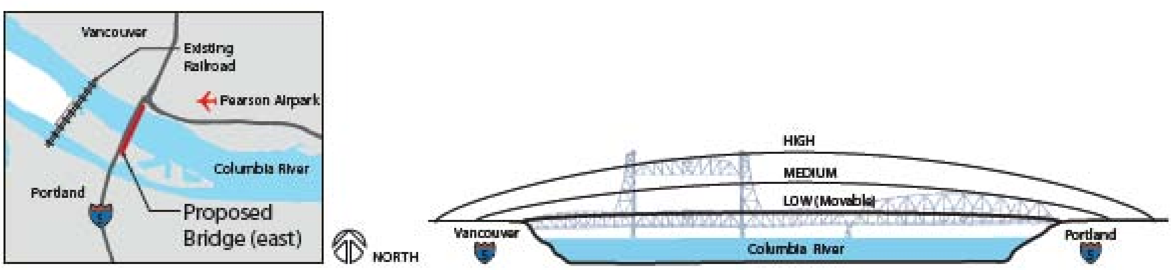
RC-7 Supplemental Bridge Downstream/Low Level/Movable: This crossing represents a new bridge that would be located immediately west (downstream) of the existing I-5 bridges. Either one or both of the existing I-5 bridges would remain in place as they are today. The proposed bridge is a low level bridge that would provide approximately 65 feet of vertical clearance for traffic traveling down the Columbia River. Because this vertical channel clearance does not pass 100 percent of the marine traffic operating on the river, a portion of the bridge would need to be opened to allow marine traffic taller than 65 feet to pass through the channel. This is called a moveable span, of which the exact type has not been defined. Types of moveable spans could include, but are not necessarily limited to, a lift span, a swing span, or a draw bridge type opening. The opening of the new bridge would have to line up with the lift span of the existing I-5 bridges. **Figure 5-5** shows this component.

Figure 5-5. Supplemental Bridge Downstream/Low Level/Movable



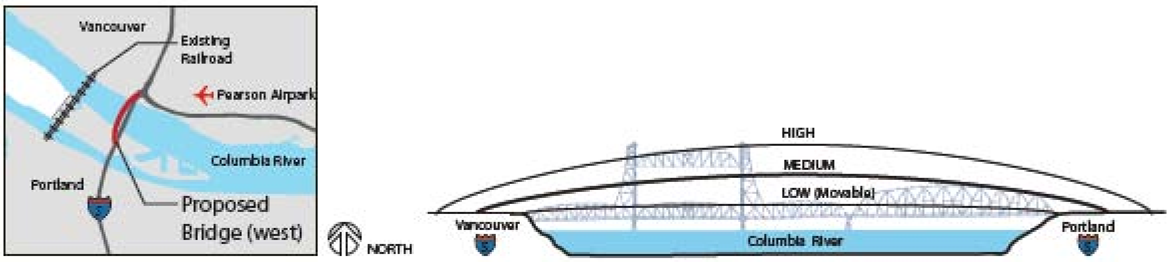
RC-8 Supplemental Bridge Upstream/Low Level/Movable: This crossing represents a new bridge that would be located immediately east (upstream) of the existing I-5 bridges. Either one or both of the existing I-5 bridges would remain in place as they are today. The proposed bridge is a low level bridge that would provide approximately 65 feet of vertical clearance for traffic traveling down the Columbia River. Because this vertical channel clearance does not pass 100 percent of the marine traffic operating on the river, a portion of the bridge would need to be opened to allow marine traffic taller than 65 feet to pass through the channel. This is called a moveable span, of which the exact type has not been defined. Types of moveable spans could include, but are not necessarily limited to, a lift span, a swing span, or a draw bridge. The opening of the new bridge would have to line up with the lift span of the existing I-5 bridges. Figure 5-6 shows this component.

Figure 5-6. Supplemental Bridge Upstream/Low Level/Movable



RC-9 Supplemental Bridge Downstream/Mid Level: This crossing represents a new bridge that would be located immediately west (downstream) of the existing I-5 bridges. Either one or both of the existing I-5 bridges would remain in place as they are today. The proposed bridge is a mid level bridge that would provide approximately 110 feet of vertical clearance for traffic traveling down the Columbia River. Because this vertical channel clearance would allow 100 percent of the marine traffic operating on the river to fit under the bridge, the entire bridged would be fixed and therefore no portion of the new bridge would require any openings. However, since the old bridge would remain in place and does not allow 100 percent of the marine traffic to pass through, the highest clearance in the new bridge would line up with the lift span of the existing bridges. **Figure 5-7** shows this component.

Figure 5-7. Supplemental Bridge Downstream/Mid Level



These components pass the Step A questions because:

1. They would increase vehicular capacity in the Bridge Influence Area by providing approximately ten lanes of capacity for traffic.
2. The bridge configurations could also be used to carry transit, and thus could allow for an increase in transit capacity.
3. Freight mobility would be improved because of the increase in capacity and because the vertical alignment would be flatter and more conducive to truck movements.
4. All components that replace the existing bridges would be built to modern standards including full shoulders and a design speed of 70 mph, and they would not encroach into Pearson Airpark airspace.
5. All of these components would also allow for a separated bike/pedestrian lane designed to modern standards in each direction.
6. Depending on the use of the existing I-5 bridges, they may need to be seismically upgraded to meet the new seismic criteria. It is not known at this point whether the existing bridges can be retrofitted to meet current seismic design standards.

Components RC-7 and RC-9, which add a new bridge immediately downstream of the existing I-5 bridge, would make it more difficult for tugs and barges to line up with the opening in the BNSF railroad bridge downstream. Further study is needed to determine whether these components can provide for safe passage of marine vessels. One potential improvement would be to straighten the path through the bridges by relocating the opening in the BNSF railroad span to the center of the Columbia River.

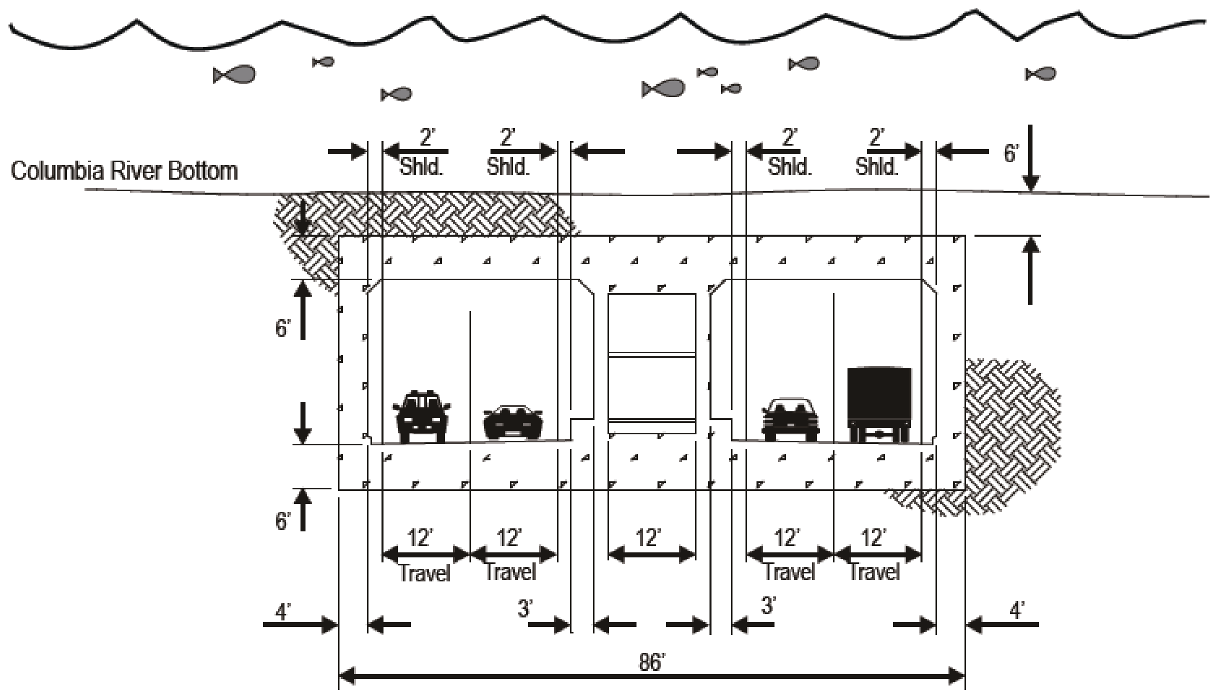
5.2.3 RC-13 Tunnel to Supplement I-5

Description:

This component would supplement the existing I-5 bridges with a multi-lane tunnel; the existing I-5 bridges would remain in place. The tunnel would surface approximately at Mill Plain Blvd. on the north and between Marine Drive and Victory Blvd. on the south, and would bypass

Marine Drive, Hayden Island and the SR 14 interchange. Connections to these interchanges would be provided via the existing I-5 bridges. **Figure 5-8** shows this component.

Figure 5-8. Tunnel to Supplement I-5



This component passes the Step A questions because:

1. This component would increase vehicular capacity in the Bridge Influence Area by providing additional traffic lanes.
2. These lanes could also be used to carry transit, and thus could allow for an increase in transit capacity.
3. Freight mobility would be improved because of the increase in capacity, and because the vertical alignment of the tunnel would be flatter and more conducive to truck movements. There would also be fewer on and off ramps, allowing traffic to flow more smoothly.
4. This component would improve vehicular safety by decreasing traffic volumes on the existing bridge, and would not compromise river navigation by adding more piers in the river.
5. For this component to improve bike and pedestrian mobility, the bike lane on the existing bridge would need to be upgraded.

6. Depending on the use of the existing bridges, they could need to be seismically upgraded to meet the new seismic criteria. It is not known at this point whether the existing bridges can be retrofitted to meet current seismic design standards.

5.2.4 RC-23 Arterial Crossing with I-5 Improvements

Description:

This component would supplement the existing I-5 bridges by adding a new Columbia River Crossing for arterial use connecting Vancouver to Hayden Island with potential connections at Marine Drive and Columbia Boulevard. Improvements to the existing I-5 bridges would be included. **Figure 5-9** shows this component.

Figure 5-9. Arterial Crossing with I-5 Improvements

This component would pass the Step A screening by assuming that the arterial crossing would be built in conjunction with a new I-5 crossing, and thus is similar to other components that increase capacity and therefore pass Step A.

5.3 Components that Fail Step A

This section describes the river crossing components that do not pass the Step A screening. The most common problems associated with these components include:

- Encroachment into Pearson Airpark airspace
- The location of the proposed crossing does not serve the transit and/or freight markets
- The component does not address existing I-5 safety or seismic deficiencies

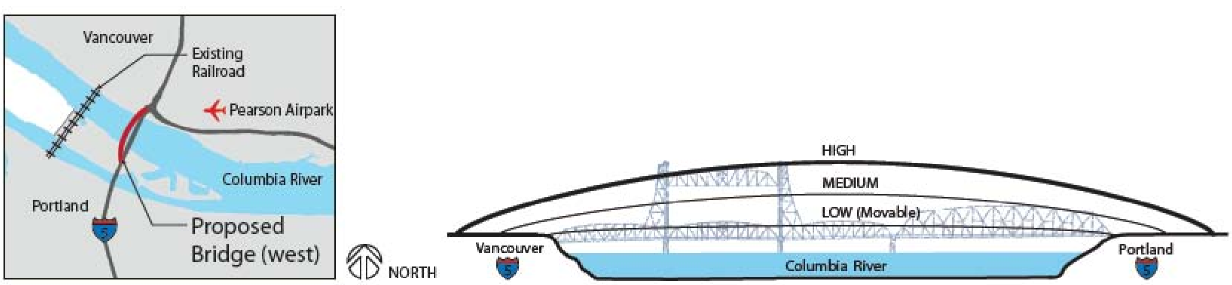
- The component does not address I-5 bicycle and pedestrian deficiencies

5.3.1 RC-5, RC-6, RC-11, and RC-12 (High Level Bridge Components)

Descriptions:

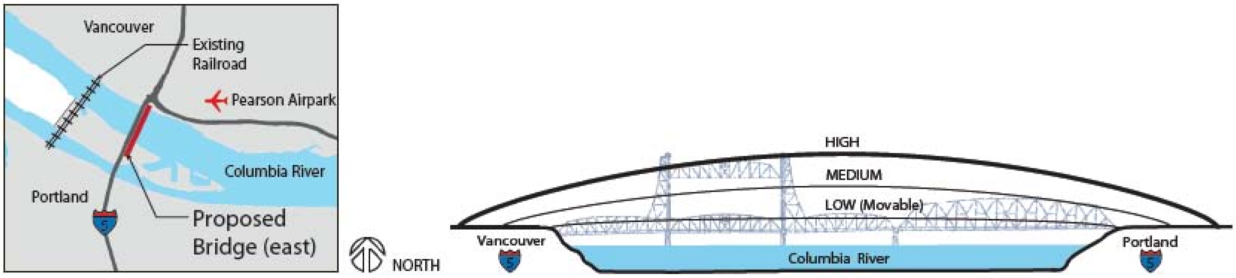
RC-5 Replacement Bridge Downstream/High Level: This crossing represents a bridge that would be located immediately west (downstream) of the existing I-5 bridges. The existing I-5 bridges would be removed. The proposed replacement bridge is a high level bridge that would provide approximately 130 feet of vertical clearance for marine traffic traveling down the Columbia River. This elevation was set based on the existing vertical clearance of the I-205 Columbia River Bridge. Because this vertical channel clearance would allow 100 percent of the marine traffic operating on the river to fit under the bridge, the entire bridge would be fixed and therefore no portion of the bridge would require any openings. **Figure 5-10** shows this component.

Figure 5-10. Replacement Bridge Downstream/High Level



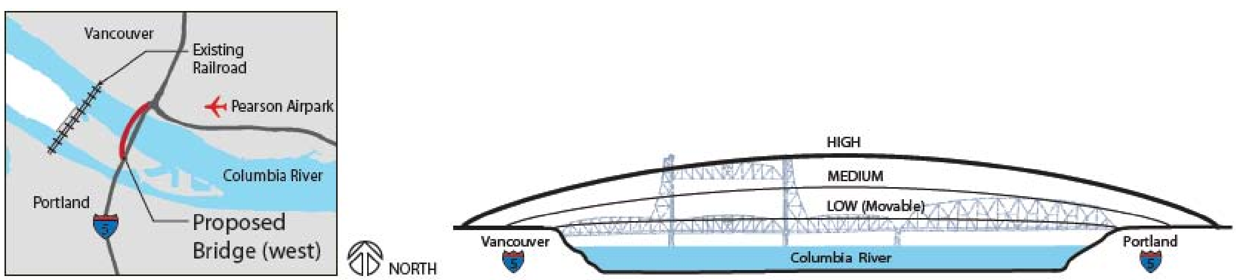
RC-6 Replacement Bridge Upstream/High Level: This crossing represents a bridge that would be located immediately east (upstream) of the existing I-5 bridges. The existing I-5 bridges would be removed. The proposed replacement bridge is a high level bridge that would provide approximately 130 feet of vertical clearance for marine traffic traveling down the Columbia River. This elevation was set based on the existing clearance of the I-205 Columbia River Bridge. Because this vertical channel clearance would allow 100 percent of the marine traffic operating on the river to fit under the bridge, the entire bridge would be fixed and therefore no portion of the bridge would require any openings. **Figure 5-11** shows this component.

Figure 5-11. Replacement Bridge Upstream/High Level



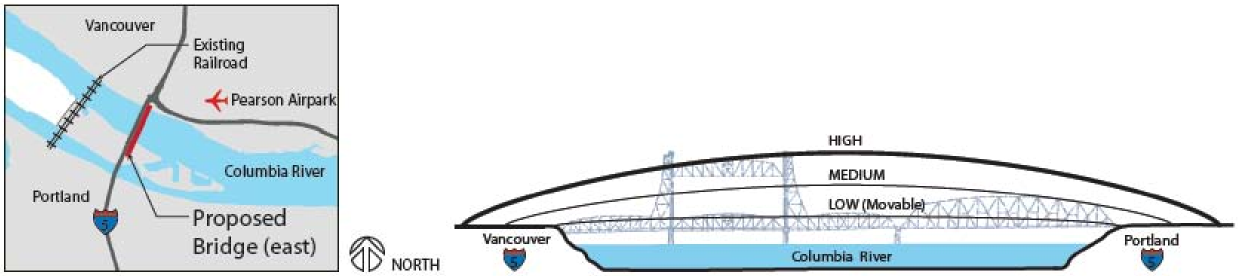
RC-11 Supplemental Bridge Downstream/High Level: This crossing represents a new bridge that would be located immediately west (downstream) of the existing I-5 bridges. Either one or both of the existing I-5 bridges would remain in place as they are today. The proposed bridge is a high level bridge that would provide approximately 130 feet of vertical clearance for marine traffic traveling down the Columbia River. This elevation was set based on the existing 129 foot of vertical clearance of the I-205 Columbia River Bridge. Because this vertical channel clearance would allow 100 percent of the marine traffic operating on the river to fit under the bridge, the entire bridge would be fixed and therefore no portion of the new bridge would require any openings. **Figure 5-12** shows this component.

Figure 5-12. Supplemental Bridge Downstream/High Level



RC-12 Supplemental Bridge Upstream/High Level: This crossing represents a new bridge that would be located immediately east (upstream) of the existing I-5 bridges. Either one or both of the existing I-5 bridges would remain in place as they are today. The proposed supplemental bridge is a high level bridge that would provide approximately 130 feet of vertical clearance for marine traffic traveling down the Columbia River. This elevation was set based on the existing clearance of the I-205 Columbia River Bridge. Because this vertical channel clearance would allow 100 percent of the marine traffic operating on the river to fit under the bridge, the entire bridge would be fixed and therefore no portion of the bridge would require any openings. **Figure 5-13** shows this component. shows this component.

Figure 5-13. Supplemental Bridge Upstream/High Level



Rationale for Not Advancing:

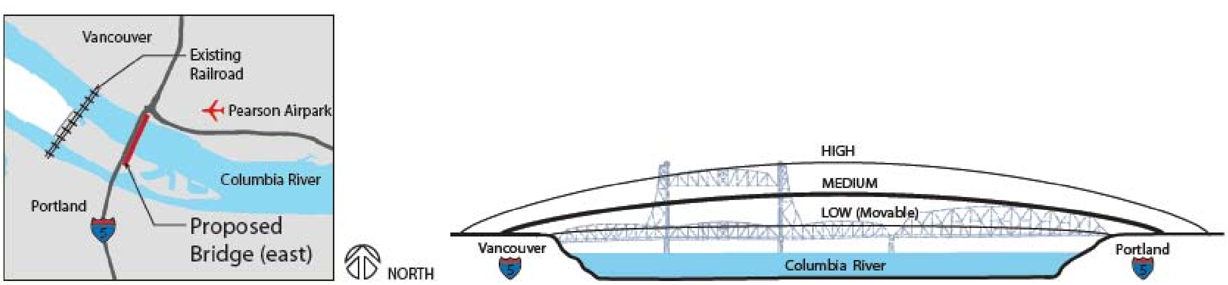
All of these components fail Question #4 relating to airspace safety. These high level bridges significantly encroach into Pearson Airpark airspace, and depending on the bridge type, may also encroach into PDX airspace. The FAA has confirmed that these high level structures would not be favorably received.

5.3.2 RC-10 Supplemental Bridge Upstream/Mid Level

Description:

This crossing represents a new bridge that would be located immediately east (upstream) of the existing I-5 bridges. Either one or both of the existing I-5 bridges would remain in place as they are today. The proposed bridge is a mid level bridge that would provide approximately 110 feet of vertical clearance for marine traffic traveling down the Columbia River. Because this vertical channel clearance would allow 100 percent of the boats operating on the river to fit under the bridge, the entire bridge would be fixed and therefore no portion of the new bridge would require any openings. However, since the old bridge will remain in place and does not allow 100 percent of the marine traffic to pass through, the highest clearance in the new bridge would line up with the current lift span of the existing bridge. **Figure 5-14** shows this component.

Figure 5-14. Supplemental Bridge Upstream/Mid Level



Rationale for Not Advancing:

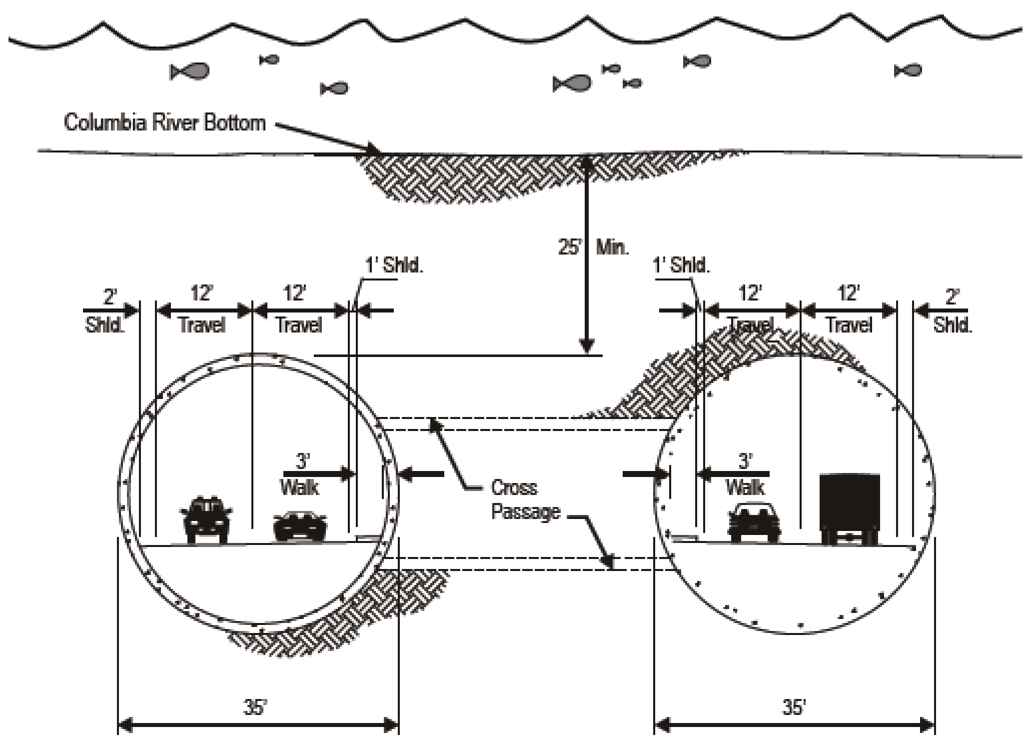
This component fails Question #4 related to safety. This component retains the existing I-5 bridges, and therefore the opening for the supplemental bridge would need to line up with the existing lift span opening. This places the high point of the new bridge on the north side of the Columbia River channel. In addition, the new bridge's upstream location places it closer to Pearson Airpark. Because of the upstream bridge and high point locations, this crossing encroaches into the Pearson Airpark airspace and therefore does not satisfy the Step A question related to safety.

5.3.3 RC-20 Replacement Tunnel

Description:

This component would replace the existing I-5 bridges with a new tunnel crossing. The tunnel would surface near SR 500 on the north and near Columbia Blvd. on the south, and would bypass most of the Bridge Influence Area. **Figure 5-15** shows this component.

Figure 5-15. Replacement Tunnel



Rationale for Not Advancing:

- This component fails Question #1 because it would not serve (i.e. increase vehicular capacity to) most of the Bridge Influence Area. It would also be difficult to construct enough tunnel traffic lanes to match the capacity that is needed; this would likely require two to four new bored tunnels. Activity centers in the Bridge Influence Area would instead have to be accessed by a complex system of frontage roads that would increase out-of-direction travel.

- This component fails Question #2. This component does not improve transit service to the identified I-5 corridor transit markets, nor does it improve the performance of the existing transit system within the Bridge Influence Area.
- This component fails Question #3 related to freight movement because connections to major state highways and freight centers within the Bridge Influence Area (e.g., Marine Drive, SR 14) would either be removed or would, at best, require significant out-of-direction travel.
- This component fails Question #5 because it would not include bike and pedestrian routes in the tunnel.

5.3.4 Components RC-14 through RC-19, RC-21, and RC-22 (New Corridor Components)

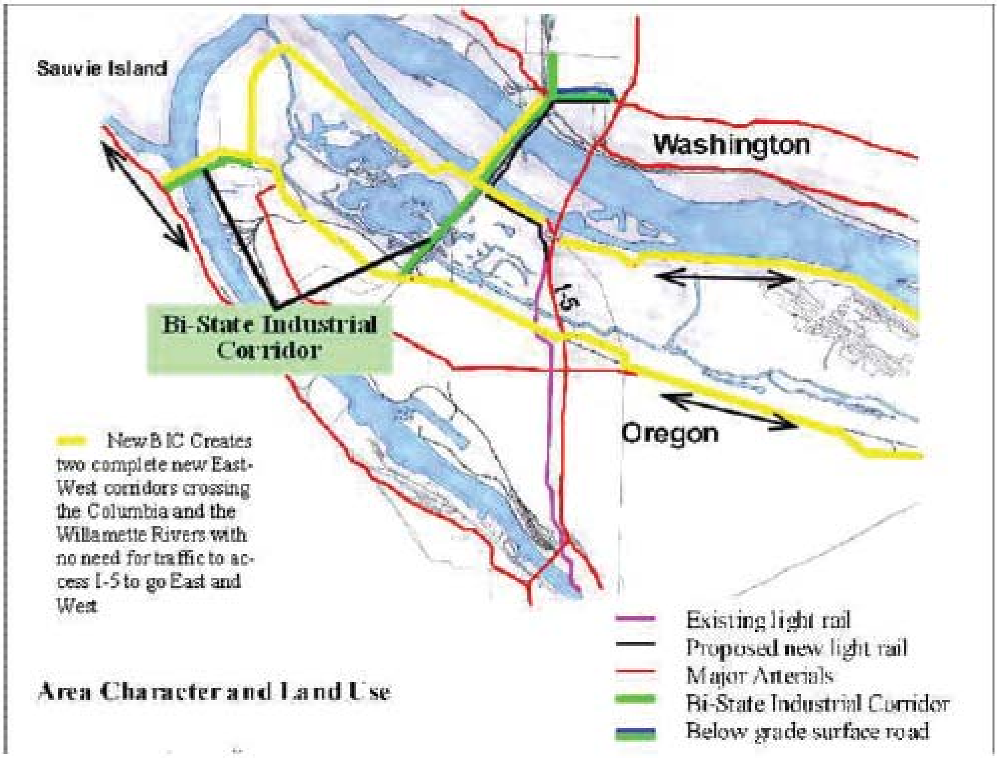
Most of these new corridor components were suggested during the NEPA scoping process and are conceptual in nature. Project staff has not developed detailed alignments or engineering designs for these components. That said, enough is known about their general location and intended function to substantiate the findings.

5.3.4.1 RC-14 New Corridor Crossing

Description:

This component creates a multi-modal bi-state industrial corridor next to the BNSF rail crossing west of the existing I-5 bridges. The north end would start near Mill Plain and Fourth Plain Boulevards in Vancouver and it would travel through Hayden Island connecting to Marine Drive near North Portland Road. This crossing would accommodate freight trains, trucks, autos, bus transit, bikes/pedestrians and potentially light rail. **Figure 5-16** shows this component. shows this component.

Figure 5-16. New Corridor Crossing



Rationale for Not Advancing:

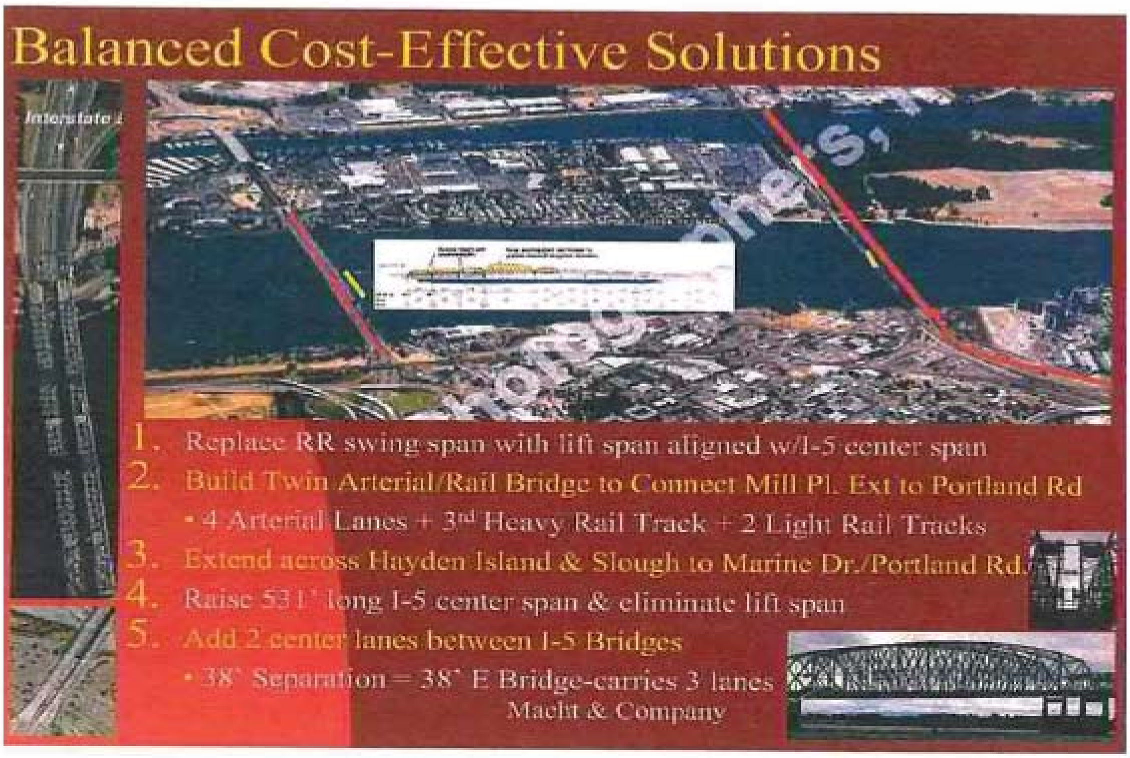
- This component fails Question #2. It would not improve transit service to the identified I-5 corridor transit markets, nor does it improve the performance of the existing transit system within the Bridge Influence Area.
- This component fails Question #4. Year 2020 I-5 peak traffic demands are projected to increase over 15 percent over 2005 conditions and without added capacity and re-design of the Bridge Influence Area to meet standards, collisions are expected to increase approximately 40 percent over 2005 conditions.
- This component fails Question #5. This component would not improve or provide a new multi-use pathway across the Columbia River in the I-5 corridor, nor does it improve bike/pedestrian connections.
- This component fails Question #6. River crossing components that locate new structures outside of the I-5 corridor are not assumed to upgrade the existing I-5 bridges and therefore the seismic risk of the I-5 bridges would not be reduced.

5.3.4.2 RC-15 New Corridor Crossing plus Widen Existing I-5 Bridges

Description:

Similar to RC-14, this component creates a multi-modal bi-state industrial corridor next to the BNSF rail crossing west of the existing I-5 bridges. The north end would start near Mill Plain and Fourth Plain Boulevards in Vancouver and it would travel through Hayden Island connecting to Marine Drive near North Portland Road. This crossing would accommodate freight trains, trucks, autos, bus transit, bikes/pedestrians and light rail. It would also raise 531 feet of the existing I- 5 bridge, decommission the lift span and add two center lanes between the existing I-5 bridges. **Figure 5-17** shows this component.

Figure 5-17. New Corridor Crossing plus Widen Existing I-5 Bridges



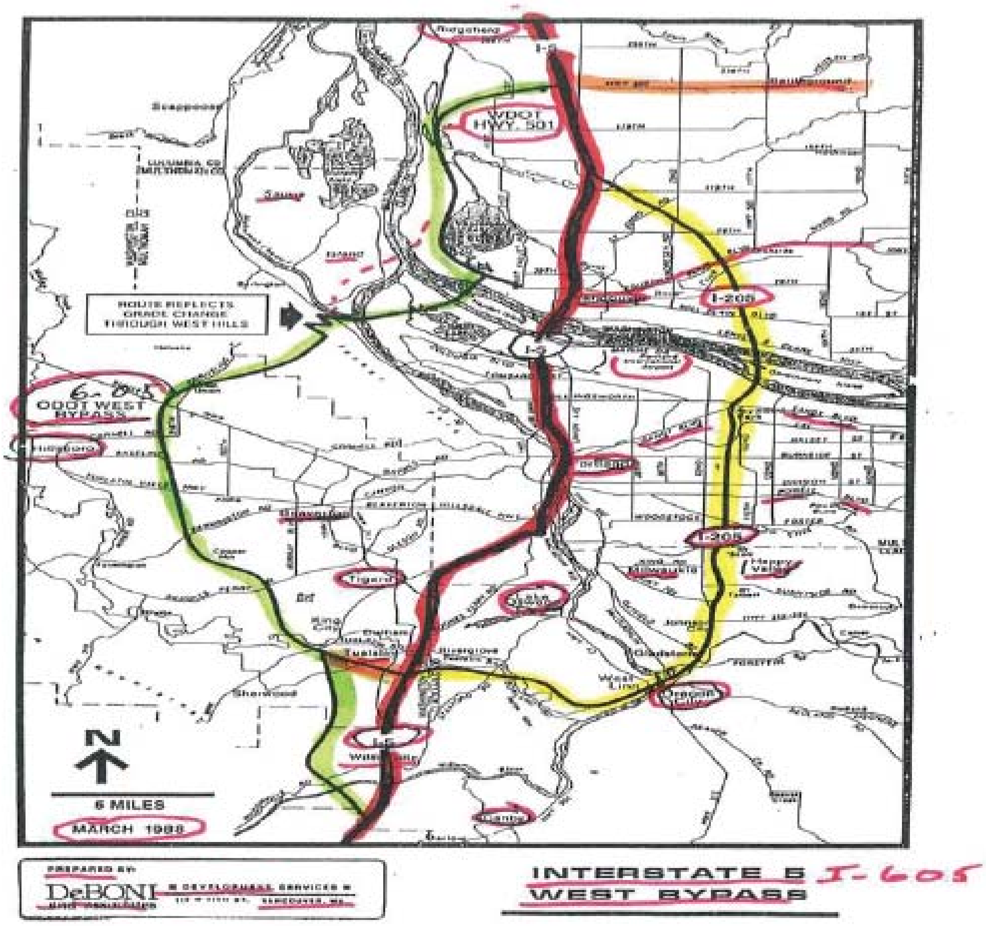
Rationale for Not Advancing:

- It is not feasible to widen the existing I-5 bridges to accommodate additional travel lanes.
- Without improvements to I-5, this component has similar findings as RC-14.

5.3.4.3 RC-16 New Western Highway (I-605)

Description:
This component creates a new western bypass connecting suburban Clark and Multnomah Counties. **Figure 5-18** shows this component.

Figure 5-18. New Western Highway (I-605)



Rationale for Not Advancing:

- This component fails Question #1. Year 2020 I-5 peak traffic demands are projected to increase about 20 percent over 2005 conditions and without added capacity in the Bridge Influence Area, significant traffic congestion will result (e.g., 7 to 8 hours during the midday-evening period).
- This component fails Question #2. This component would not improve transit service to the identified I-5 corridor transit markets, nor does it improve the performance of the existing transit system within the Bridge Influence Area.
- This component fails Question #3. Year 2020 I-5 peak traffic demands are projected to increase about 20 percent over 2005 conditions and without added capacity in Bridge

Influence Area, significant traffic congestion will result during key freight travel periods (e.g., 7 to 8 hours during the midday-evening period).

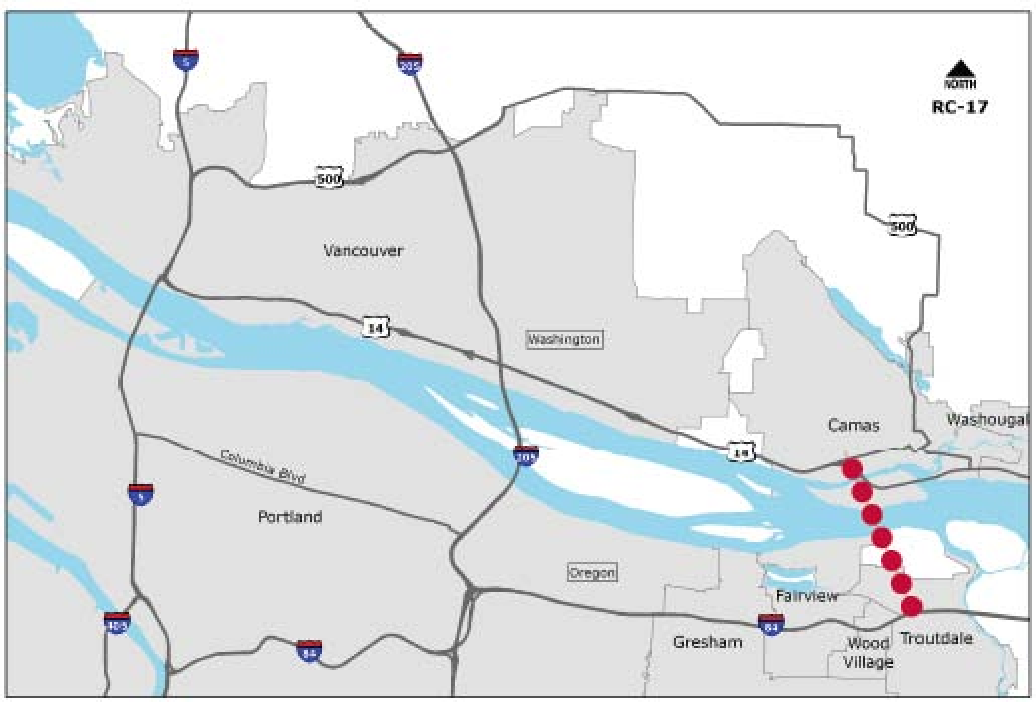
- This component fails Question #4. Year 2020 I-5 peak traffic demands are projected to increase about 20 percent over 2005 conditions and without added capacity and re-design of the Bridge Influence Area to meet standards, collisions are expected to increase approximately 45 percent over 2005 conditions.
- This component fails Question #5. This component would not improve or provide a new multi-use pathway across the Columbia River in the I-5 corridor, nor does it improve bike/pedestrian connections.
- This component fails Question #6. River crossing components that locate new structures outside of the I-5 corridor are not assumed to upgrade the existing I-5 bridges, and therefore the seismic risk of the I-5 bridges would not be reduced.

5.3.4.4 RC-17 New Eastern Columbia River Crossing

Description:

This component is a new bridge east of I-205 from Camas/East Clark County to Troutdale. One possible connection is from the 192nd Street exit on SR 14 in Vancouver to the Woodfield Village area near I-84 in Oregon. **Figure 5-19** shows this component.

Figure 5-19. New Eastern Columbia River Crossing



Rationale for Not Advancing:

- This component fails Question #1. Year 2020 I-5 peak traffic demands are projected to increase at least 30 percent over 2005 conditions and without added capacity in Bridge Influence Area, significant traffic congestion will result (e.g., at least 10 hours during the midday-evening period).
- This component fails Question #2. This component would not improve transit service to the identified I-5 corridor transit markets, nor does it improve the performance of the existing transit system within the Bridge Influence Area.
- This component fails Question #3. Year 2020 I-5 peak traffic demands are projected to increase at least 30 percent over 2005 conditions and without added capacity in Bridge Influence Area, significant traffic congestion will result during key freight travel periods (e.g., at least 10 hours during the midday-evening period).
- This component fails Question #4. Year 2020 I-5 peak traffic demands are projected to increase at least 30 percent over 2005 conditions and without added capacity and re-design of the Bridge Influence Area to meet standards, collisions are expected to increase at least 65 percent over 2005 conditions.
- This component fails Question #5. This component would not improve or provide a new multi-use pathway across the Columbia River in the I-5 corridor, nor does it improve bike/pedestrian connections.
- This component fails Question #6. River crossing components that locate new structures outside of the I-5 corridor are not assumed to upgrade the existing I-5 bridges, and therefore the seismic risk of the I-5 bridges would not be reduced.

5.3.4.5 RC-18 I-205 Improvements

Description:

Improvements in the I-205 corridor between Vancouver and Portland. **Figure 5-20** shows this component.

Figure 5-20. I-205 Improvements

Rationale for Not Advancing:

- This component fails Question #1. Year 2020 I-5 peak traffic demands are projected to increase 30 percent over 2005 conditions and without added capacity in Bridge Influence Area, significant traffic congestion will result (e.g., 9 to 10 hours during the midday-evening period).
- This component fails Question #2. This component would not improve transit service to the identified I-5 corridor transit markets, nor does it improve the performance of the existing transit system within the Bridge Influence Area.
- This component fails Question #3. Year 2020 I-5 peak traffic demands are projected to increase 30 percent over 2005 conditions and without added capacity in Bridge Influence Area, significant traffic congestion will result during key freight travel periods (e.g., 9 to 10 hours during the midday-evening period).
- This component fails Question #4. Year 2020 I-5 peak traffic demands are projected to increase 30 percent over 2005 conditions and without added capacity and re-design of the Bridge Influence Area to meet standards, collisions are expected to increase approximately 65 percent over 2005 conditions.
- This component fails Question #5. This component would not improve or provide a new multi-use pathway across the Columbia River in the I-5 corridor, nor does it improve bike/pedestrian connections.

- This component fails Question #6. River crossing components that locate new structures outside of the I-5 corridor are not assumed to upgrade the existing I-5 bridges, and therefore the seismic risk of the I-5 bridges would not be reduced.

5.3.4.6 RC-19 Arterial Crossing without I-5 Improvements

Description:

Adds new Columbia River crossing adjacent to the existing I-5 bridges for arterial-use only, connecting downtown Vancouver to Hayden Island with potential connections to Marine Drive and Columbia Boulevard. No improvements would be made to I-5. **Figure 5-21** shows this component.

Figure 5-21. Arterial Crossing to Supplement I-5

Rationale for Not Advancing:

- This component fails Question #1. Year 2020 I-5 peak traffic demands are projected to increase over 20 percent over 2005 conditions and without added capacity in Bridge Influence Area, significant traffic congestion will result (e.g., 7 to 8 hours during the midday-evening period).
- This component fails Question #3. Year 2020 I-5 peak traffic demands are projected to increase over 20 percent over 2005 conditions and without added capacity in Bridge Influence Area, significant traffic congestion will result during key freight travel periods (e.g., 7 to 8 hours during the midday-evening period).
- This component fails Question #4. Year 2020 I-5 peak traffic demands are projected to increase over 20 percent over 2005 conditions and without added capacity and re-design

of the Bridge Influence Area to meet standards, collisions are expected to increase at least 50 percent over 2005 conditions.

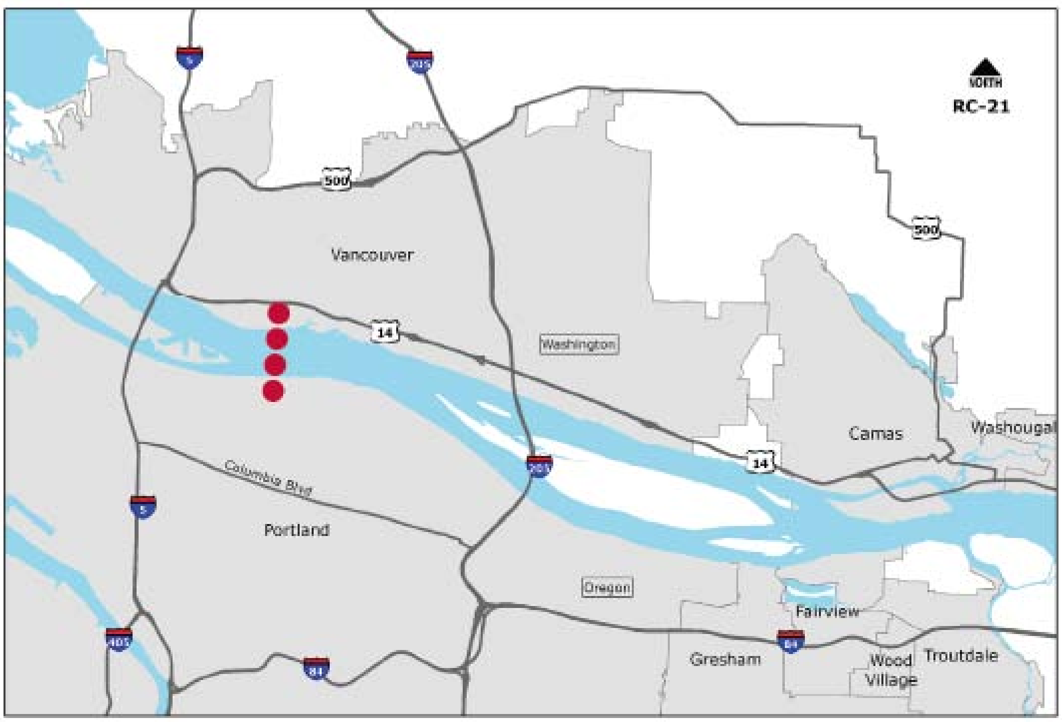
- This component fails Question #6. River crossing components that locate new structures outside of the I-5 corridor are not assumed to upgrade the existing I-5 bridges, and therefore the seismic risk of the I-5 bridges would not be reduced.

5.3.4.7 RC-21 33rd Avenue Crossing

Description:

Adds a new crossing east of I-5, connecting Vancouver and Portland near the 33rd Avenue corridor in Portland. **Figure 5-22** shows this component.

Figure 5-22. 33rd Avenue Crossing



Rationale for Not Advancing:

- This component fails Question #1. Year 2020 I-5 peak traffic demands are projected to increase about 25 percent over 2005 conditions and without added capacity in Bridge Influence Area, significant traffic congestion will result (e.g., 8 to 9 hours during the midday-evening period).
- This component fails Question #2. This component would not improve transit service to the identified I-5 corridor transit markets, nor does it improve the performance of the existing transit system within the Bridge Influence Area.
- This component fails Question #3. Year 2020 I-5 peak traffic demands are projected to increase about 25 percent over 2005 conditions and without added capacity in Bridge

Influence Area, significant traffic congestion will result during key freight travel periods (e.g., 8 to 9 hours during the midday-evening period).

- This component fails Question #4. Year 2020 I-5 peak traffic demands are projected to increase about 25 percent over 2005 conditions and without added capacity and re-design of the Bridge Influence Area to meet standards, collisions are expected to increase at least 60 percent over 2005 conditions.
- This component fails Question #5. This component would not improve or provide a new multi-use pathway across the Columbia River in the I-5 corridor, nor does it improve bike/pedestrian connections.
- This component fails Question #6. River crossing components that locate new structures outside of the I-5 corridor are not assumed to upgrade the existing I-5 bridges, and therefore the seismic risk of the I-5 bridges would not be reduced.

5.3.4.8 RC-22 Non-Freeway Multi-Modal Columbia River Crossing

Description:

This component would add a new multi-modal crossing downstream (west) of the existing I-5 bridges accommodating two to four lanes of local traffic, light rail, a southbound auxiliary lane, and bicycles/pedestrians. Interstate traffic would remain on the existing I-5 bridges, and the I-5/Hayden Island and I-5/SR 14 interchanges would be reconfigured to eliminate the on-ramps leading to the existing bridges. In addition, the bridges would be raised to meet clearance requirements for most vessels, and the lift spans would be decommissioned. **Figure 5-23** shows this component.

Figure 5-23. Non-Freeway Multi-Modal Columbia River Crossing

Rationale for Not Advancing:

- This component fails because it is not feasible to raise the existing I-5 bridges.
- This component fails Questions #1 and #3. It does not significantly increase vehicular capacity or reduce travel demand along I-5. It results in out-of-direction travel for commuters within the Bridge Influence Area.
- This component fails Question #4 by not addressing many of the known non-standard design features that contribute to vehicular collisions.
- This component fails Question #6. Under this component, the existing I-5 bridges would remain in use for interstate highway traffic. The component does not propose seismic upgrades to the existing bridges, and therefore the seismic risk of the I-5 bridges would not be reduced.

6. Next Steps

In the next phase of the Alternatives Analysis, transit and river crossing components that passed through the Step A screening will be evaluated further against Step B criteria summarized in the Project Evaluation Framework, which directly reflect the values adopted in the Task Force's Vision and Values Statement. For analysis purposes, the Step B criteria were grouped into 10 categories relating to distinct community values. These categories are:

1. Community Livability and Human Resources
2. Mobility, Reliability, Accessibility, Congestion Reduction, and Efficiency
3. Modal Choice
4. Safety
5. Regional Economy, Freight Mobility
6. Stewardship of Natural Resources
7. Distribution of Benefits and Impacts
8. Cost Effectiveness and Financial Resources
9. Growth Management/Land Use
10. Constructability

Within each of these categories, there are multiple criteria and associated performance measures. The full list of criteria will be included in the forthcoming Components Step B Screening Report.

In Step B, project staff will rate each of the remaining transit and river crossing components on an established scale (e.g., 1-5) using data drawn mostly from previous studies. Components will be scored based on their ability to satisfy the performance measures relative to other components in the same category. Staff will then identify the best performing or most effective components, and recommend components to advance for inclusion in alternative packages. The results will be presented in the Components Step B Screening Report.

As mentioned previously, components in the freight, roadways, pedestrian, bike, and TSM/TDM will not be evaluated in Step B, but rather will be paired with complementary transit and river crossing components during alternatives packaging.

Columbia River CROSSING

DRAFT STEP A COMPONENT FACT SHEETS

April 19, 2006

DRAFT COMPONENTS STEP A SCREENING REPORT

April 19, 2006

Columbia River CROSSING

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ACRONYMS

AA	Alternatives Analysis
ADA	Americans with Disabilities Act
AGT	Automated Guideway Transit
BNSF	Burlington Northern Santa Fe Railroad
BRT	Bus Rapid Transit
CRC	Columbia River Crossing
CRD	Columbia River Datum
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HOV	High Occupancy Vehicle
I-5	Interstate 5
LRT	Light Rail Transit
NEPA	National Environmental Policy Act
ODOT	Oregon Department of Transportation
PDX	Portland International Airport
PRT	Personal Rapid Transit
RTC	Regional Transportation Council
RC	River Crossing
SOV	Single Occupant Vehicle
TR	Transit
TSM/TDM	Traffic System Management/Traffic Demand Management
WSDOT	Washington State Department of Transportation

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1. What's Inside

On March 22, 2006, the project team presented a *Components Step A Screening Report* to members of the I-5 CRC Task Force. The report described how a broad range of potential transportation improvements (also known as "components") was initially evaluated and screened, and presented the results of that screening.

This companion *Component Step A Fact Sheets* provides fact sheets for each of the 14 Transit and 23 River Crossing components taken through Step A screening. It was prepared to address questions posed by the Task Force and to more fully document the rationale underlying staff's recommendations to advance or drop from further consideration certain Transit and River Crossing components.

As described in more detail below, the Step A screening process applies the six "pass/fail" questions derived from the project's *Problem Definition* as adopted by the Task Force in November 2005. A "fail" response to any of the relevant questions represents a "fatal flaw" that is inconsistent with the project Purpose and Need. Staff recommended dropping from further consideration all components receiving one or more "fail" responses. Only those components free of any "fail" responses were recommended for further consideration.

The fact sheets present the "pass/fail" responses and supporting information for each of the Transit and River Crossing components.

1.1 Step A Screening Overview

In February 2006, the CRC Task Force adopted a six-step evaluation framework that defines the process for screening the large number of transportation components and subsequently, a limited set of multi-modal alternative packages. In general, the framework establishes screening criteria and performance measures to evaluate the effectiveness of the transportation components in addressing:

- The project Purpose and Need,
- Problems identified in the project's Problem Definition, and
- Values identified in the Task Force's Vision and Values Statement.

Component screening is the first stage in the complete evaluation framework and is itself a two-step process.

In Step A, transportation components were screened against up to six pass/fail questions *derived directly from the Problem Definition*. To determine if each component offers an improvement, they were compared to the No Build condition, which includes transportation improvements adopted in the regional transportation plans, but no additional improvements at the Columbia River crossing.

In Step A only the transit and river crossing components were screened. Components in the Pedestrian, Bike, Freight, Roadways, and TSM/TDM categories were not evaluated because their performance would critically depend upon how they were integrated with promising transit and/or river crossing improvements. As mentioned earlier, components in these categories (e.g., Ramp Queue Jump Lanes) could be implemented in a wide variety of ways. These components will be paired with complementary transit and river crossing components during alternatives packaging. Table 1-1 shows the six Step A questions and what questions pertain to the transit and river crossing components.

Table 1-1. Component Categories and Relevant Step A Questions

Question: Does the Component	Transit Components	River Crossing Components
1. Increase vehicular capacity or decrease vehicular demand within the bridge influence area?	♦	♦
2. Improve transit performance within the bridge influence area?	♦	♦
3. Improve freight mobility within the bridge influence area?		♦
4. Improve safety and decrease vulnerability to incidents within the bridge influence area?	♦	♦
5. Improve bicycle and pedestrian mobility within the bridge influence area?		♦
6. Reduce seismic risk of the I-5 Columbia River crossing?		♦

Note: Components were only screened against questions indicated by ♦

2. Transit Component Fact Sheets

In summary, six transit components are recommended to pass through Step A component screening and advance for further consideration and screening, while eight components are recommended to be dropped from further consideration via Step A screening.

This section presents fact sheets for each of the 14 transit components (TR-1 through TR-14) taken through Step A screening. Each fact sheet provides reasoning behind staff's responses to the six "pass/fail" questions and ultimately the recommendation to either advance the component or drop it from further consideration for this project. Table 2-1 summarizes the transit component responses.

Table 2-1. Transit Components Step A Results

COMPONENTS		COMPONENT SCREENING RESULTS						
ID	NAME	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Overall
TR-1	Express Bus in General Purpose (GP) lanes	P	P	NA	U	NA	NA	P
TR-2	Express Bus in Managed Lanes	P	P	NA	U	NA	NA	P
TR-3	Bus Rapid Transit (BRT)-Lite	P	P	NA	U	NA	NA	P
TR-4	Bus Rapid Transit (BRT)- Full	P	P	NA	U	NA	NA	P
TR-5	Light Rail Transit (LRT)	P	P	NA	U	NA	NA	P
TR-6	Streetcar	P	P	NA	U	NA	NA	P
TR-7	High Speed Rail	F	F	NA	U	NA	NA	F
TR-8	Ferry Service	F	F	NA	U	NA	NA	F
TR-9	Monorail System	P	F	NA	U	NA	NA	F
TR-10	Magnetic Levitation Railway	F	F	NA	U	NA	NA	F
TR-11	Commuter Rail in BNSF Trackage	P	F	NA	U	NA	NA	F
TR-12	Heavy Rail	P	F	NA	U	NA	NA	F
TR-13	Personal Rapid Transit	F	F	NA	U	NA	NA	F
TR-14	People Mover/Automated Guideway Transit (AGT)	P	F	NA	U	NA	NA	F

P = Pass F = Fail NA = Not Applicable U = Unknown

Each transit component was screened against two of the six questions in Step A. These questions are, does the component:

Q1. Increase vehicular capacity or decrease vehicular demand within the Bridge Influence Area?, and

Q2. Improve transit performance within the Bridge Influence Area?

The transit components were also expected to be screened against Question #4, which is, does the component:

Q4. Improve safety and decrease vulnerability to incidents within the Bridge Influence Area?

To satisfy Question #4, a transit component would need to attract ridership sufficient to improve general traffic conditions for all vehicles (see Section 3.4.10). Answering this question, however, depends on knowing *with a fair degree of accuracy* how much future traffic volumes would be reduced by the transit component, and if the transit component would be complemented by new river crossing highway capacity. As promising components have not yet been combined, and detailed traffic modeling has not been completed, it is not yet possible to answer this question for the transit components. Therefore, all of the transit components received a rating of "unknown" for Question #4. In comparison, Question #1, asks *more generally* if a component is likely to reduce vehicle demand, and thus is possible to answer.

TRANSIT

TR-1: Express Bus in General Purpose Lanes

Staff Recommendation: Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Pass	Could increase vehicular capacity to serve transit and reduce auto demand within the Bridge Influence Area.
Q2. Transit	Pass	Could increase the speed of transit in the Bridge Influence Area, provided enough new general purpose capacity is added to reduce congestion levels. Transit reliability could also be improved if congestion were sufficiently reduced.
Q3. Freight	NA	
Q4. Safety	U	
Q5. Bike/Ped	NA	
Q6. Seismic	NA	

P = Pass F = Fail NA = Not Applicable U = Unknown

TRANSIT

TR-2: Express Bus in Managed Lanes

Staff Recommendation: Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Pass	Could decrease vehicular demand through shift to transit within the Bridge Influence Area by giving preference and a speed advantage to transit.
Q2. Transit	Pass	Could improve transit performance by managing congestion and reducing the potential for collisions, thereby improving transit reliability.
Q3. Freight	NA	
Q4. Safety	U	
Q5. Bike/Ped	NA	
Q6. Seismic	NA	

P = Pass F = Fail NA = Not Applicable U = Unknown

TRANSIT

TR-3: Bus Rapid Transit (BRT)- Lite

Staff Recommendation: Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Pass	Could decrease vehicular demand through shift to transit within the Bridge Influence Area by substantially increasing transit capacity and providing a travel preference and speed advantage to transit.
Q2. Transit	Pass	Could improve transit performance by managing congestion and thereby improving transit reliability.
Q3. Freight	NA	
Q4. Safety	U	
Q5. Bike/Ped	NA	
Q6. Seismic	NA	

P = Pass F = Fail NA = Not Applicable U = Unknown

TRANSIT

TR-4: Bus Rapid Transit (BRT) - Full

Staff Recommendation: Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Pass	Could decrease vehicular demand through shift to transit within the Bridge Influence Area by substantially increasing transit capacity and providing a dedicated transit lane that would relieve congestion and improve reliability for transit.
Q2. Transit	Pass	Could improve transit reliability and travel speed by completely separating bus rapid transit vehicles from other traffic and giving them a substantial travel time savings.
Q3. Freight	NA	
Q4. Safety	U	
Q5. Bike/Ped	NA	
Q6. Seismic	NA	

P = Pass F = Fail NA = Not Applicable U = Unknown

TRANSIT

TR-5: Light Rail Transit (LRT)

Staff Recommendation: Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Pass	Could decrease vehicular demand through shift to transit within the Bridge Influence Area by substantially increasing transit capacity and providing an exclusive guideway that would not be used by automobiles. Its operating characteristics allow it to serve both short and long distance trips.
Q2. Transit	Pass	Could improve transit travel time and reliability by completely separating LRT trains from automobile traffic.
Q3. Freight	NA	
Q4. Safety	U	
Q5. Bike/Ped	NA	
Q6. Seismic	NA	

P = Pass F = Fail NA = Not Applicable U = Unknown

TR-6: Streetcar

Staff Recommendation: Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Pass	Could decrease vehicular demand through shift to transit within the Bridge Influence Area by increasing transit capacity and providing an exclusive guideway that would not be used by automobiles.
Q2. Transit	Pass	Could improve transit travel time and reliability by completely separating streetcars from automobile traffic. This critically assumes that it is possible to interline streetcar and LRT- meaning they each use the same guideway (tracks) such as the Interstate MAX corridor. While a determination on this issue has not yet been made, the idea includes significant challenges affecting its viability.
Q3. Freight	NA	
Q4. Safety	U	
Q5. Bike/Ped	NA	
Q6. Seismic	NA	

P = Pass F = Fail NA = Not Applicable U = Unknown

TR-7: High Speed Rail

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Fail	Operating speeds of 175+ mph are most compatible with long distance inter-city and inter-state service with at most one transit station in the greater Portland/Vancouver metropolitan area. This one transit station would only serve transit trips arriving from or destined to locations outside the region, and thus would not attract the ridership necessary to notably reduce vehicular demand within the I-5 Bridge Influence Area.
Q2. Transit	Fail	It is not feasible to integrate this transit mode with the existing regional transit system while both 1) taking advantage of the operational features of high speed rail, and 2) providing service to identified transit markets within the I-5 Bridge Influence Area. Thus, it would not appreciably improve transit performance within the I-5 Bridge Influence Area.
Q3. Freight	NA	
Q4. Safety	U	
Q5. Bike/Ped	NA	
Q6. Seismic	NA	

P = Pass F = Fail NA = Not Applicable U = Unknown

TRANSIT

TR-8: Ferry Service

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Fail	Lacks the capacity and operational characteristics to generate significant ridership needed to appreciably reduce vehicular demand within the Bridge Influence Area. Provides for long, out of direction travel times with limited access to I-5 travel markets.
Q2. Transit	Fail	Ferry service is most appropriate for longer distance travel with no intermediate stops. Service to I-5 travel markets would require more stops than could be achieved with ferry service. The travel time for a ferry service connecting downtown Vancouver to downtown Portland, for example, would likely be slower than the slowest land-based transit bus, even in the congested I-5 corridor, since the service would have to travel many miles out of direction to access the Willamette River. The service would have little or no connectivity to smaller markets and connecting transit services, and likely would not even serve intermediate but significant transit markets such as North Portland. Due to slow travel times and few docking stations, the service would carry relatively few passengers. Users would incur a time delay associated with embarking and debarking a ferry that makes ferry service less attractive. Significant issues would exist with siting ferry terminals.
Q3. Freight	NA	
Q4. Safety	U	
Q5. Bike/Ped	NA	
Q6. Seismic	NA	

P = Pass F = Fail NA = Not Applicable U = Unknown

TRANSIT

TR-9: Monorail System

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Pass	Could decrease vehicular demand through shift to transit within the Bridge Influence Area by increasing transit capacity and providing an exclusive guideway that would not be used by automobiles.
Q2. Transit	Fail	A monorail service could conceivably be designed to serve multiple destinations within the Bridge Influence Area and I-5 corridor, since the technology is not uniquely suited to long-distance or short-distance travel. In order to improve existing transit service in the Bridge Influence Area, however, it would have to be integrated with the existing bus and rail network, which is infeasible; the technology would require a completely grade separated right-of-way. For these reasons, monorail is not an appropriate public transportation component for the Bridge Influence Area.
Q3. Freight	NA	
Q4. Safety	U	
Q5. Bike/Ped	NA	
Q6. Seismic	NA	

P = Pass F = Fail NA = Not Applicable U = Unknown

TRANSIT


German Trans Rapid Maglev

TR-10: Magnetic Levitation (MagLev) Railway

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Fail	Similar to high speed rail (TR-7), the high travel speeds (175+ mph) and acceleration characteristics associated with Maglev railways are most compatible with long distance inter-city and inter-state service with at most one transit station in the greater Portland/Vancouver metropolitan area. This one transit station would only serve transit trips arriving from or destined to locations outside the region, and thus would not attract the ridership necessary to notably reduce vehicular demand within the I-5 Bridge Influence Area.
Q2. Transit	Fail	It is not feasible to integrate this transit mode with the existing regional transit system while both, 1) taking advantage of the operational features of Maglev rail, and 2) providing service to identified transit markets within the I-5 Bridge Influence Area. Thus, it would not appreciably improve transit performance within the I-5 Bridge Influence Area.
Q3. Freight	NA	
Q4. Safety	U	
Q5. Bike/Ped	NA	
Q6. Seismic	NA	

P = Pass F = Fail NA = Not Applicable U = Unknown

TR-11: Commuter Rail Transit

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Pass	Could decrease vehicular demand within the Bridge Influence Area through a shift to transit.
Q2. Transit	Fail	To improve existing transit service in the Bridge Influence Area, it would have to be integrated with the existing bus and rail network, which is infeasible, as the technology would operate in a completely grade separated right-of-way. Additionally, the existing railroad right-of-way misses some key I-5 transit markets. In addition, during the I-5 Partnership Study, an in-depth study of commuter rail options determined that due to projected congestion in the existing freight rail system in the next 20 years, commuter rail could only be implemented on a separate passenger rail-only network; it could not be implemented on existing regional freight rail trackage.
Q3. Freight	NA	
Q4. Safety	U	
Q5. Bike/Ped	NA	
Q6. Seismic	NA	

P = Pass F = Fail NA = Not Applicable U = Unknown

TR-12: Heavy Rail Transit

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Pass	Could decrease vehicular demand within the Bridge Influence Area through a shift to transit.
Q2. Transit	Fail	To improve existing transit service in the Bridge Influence Area, it would have to be integrated with the existing bus and rail network, which is infeasible, as the technology would operate in a completely grade separated right-of-way. The Portland-Vancouver region is not projected to realize the population and density levels by 2030 on a par with the world's largest and most congested cities: New York, Washington D.C., London, Tokyo, etc. that can generate the necessary passenger demands that make an investment in heavy rail viable.
Q3. Freight	NA	
Q4. Safety	U	
Q5. Bike/Ped	NA	
Q6. Seismic	NA	

P = Pass F = Fail NA = Not Applicable U = Unknown

TR-13: Personal Rapid Transit (PRT)

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Fail	PRT's conceptual advantage critically depends on building a comprehensive regional system that serves virtually every place that patrons want to go. PRT within the Bridge Influence Area would not attract significant demand because it simply would not go to many of the final I-5 corridor and regional destinations that patrons want to go. How a PRT system would "grow" from a river crossing to a local, or even a regional network, is unclear. It's inconceivable that a PRT system within the Bridge Influence Area could attract the ridership necessary to appreciably reduce vehicular demand.
Q2. Transit	Fail	Capacity is one of the primary limitations of PRT, and incompatibility with the existing regional transit systems. Unless a very large number of vehicles were used, the system would not have enough capacity to serve the large trip demands in the Bridge Influence Area and to significant destinations like downtown Portland. Using such a large number of vehicles, however, would be impractical and inefficient.
Q3. Freight	NA	
Q4. Safety	U	
Q5. Bike/Ped	NA	
Q6. Seismic	NA	

P = Pass F = Fail NA = Not Applicable U = Unknown

Note: A variation of this component referred to as "SkyTran" was introduced at the 3-22-06 Task Force meeting. Staff believes the "SkyTran" idea is substantially similar to TR-13 and would fail Step A screening questions 1 and 2 for similar reasons as cited above.

TR-14: People Mover/Automated Guideway Transit

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Pass	Could decrease vehicular demand within the Bridge Influence Area through a shift to transit.
Q2. Transit	Fail	To improve existing transit service in the Bridge Influence Area, it would have to be integrated with the existing bus and rail network, which is infeasible, as the technology would operate in a completely grade separated right-of-way. AGT is a proven technology suitable for short-distance trips, and its limited application in North America has been to provide local circulator service (e.g. at airports). LRT and AGT share some of the same capacity and operating characteristics, but unlike LRT, AGT requires a completely grade separated right-of-way and either underground or aerial stations. For these reasons, AGT lines are not an appropriate public transportation component for the Bridge Influence Area.
Q3. Freight	NA	
Q4. Safety	U	
Q5. Bike/Ped	NA	
Q6. Seismic	NA	

P = Pass F = Fail NA = Not Applicable U = Unknown

TRANSIT

3. River Crossing Component Fact Sheets

In summary, nine (9) river crossing components are recommended to pass through Step A component screening and advance for further consideration and screening, while 14 components are recommended to be dropped from further consideration via Step A screening.

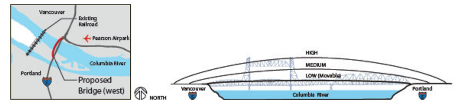
This section presents fact sheets for each of the 23 river crossing components (RC-1 through RC-23) taken through Step A screening. Fact sheets provide rationale for staff's responses to the six "pass/fail" questions and ultimately the recommendation to either advance the component or drop it from further consideration for this project. Table 3-1 summarizes the river crossing results. **Note-** Where components perform similarly across the six questions, they are grouped for reporting (e.g., RC 1-4, RC 5/6, RC 7-9).

Table 3-1. River Crossing Components Step A results

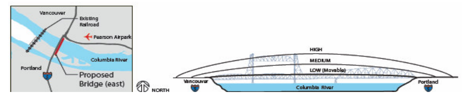
COMPONENTS		COMPONENT SCREENING RESULTS						
ID	NAME	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Overall
RC-1	Replacement Bridge-Downstream/Low-level/Movable	P	P	P	P	P	P	P
RC-2	Replacement Bridge-Upstream/Low-level/Movable	P	P	P	P	P	P	P
RC-3	Replacement Bridge-Downstream/Mid-level	P	P	P	P	P	P	P
RC-4	Replacement Bridge-Upstream/Mid-level	P	P	P	P	P	P	P
RC-5	Replacement Bridge-Downstream/High-level	P	P	P	F	P	P	F
RC-6	Replacement Bridge-Upstream/High-level	P	P	P	F	P	P	F
RC-7	Supplemental Bridge-Downstream/Low-level/Movable	P	P	P	U	P	U	P
RC-8	Supplemental Bridge-Upstream/Low-level/Movable	P	P	P	U	P	U	P
RC-9	Supplemental Bridge-Downstream/Mid-level	P	P	P	U	P	U	P
RC-10	Supplemental Bridge-Upstream/Mid-level	P	P	P	F	P	U	F
RC-11	Supplemental Bridge-Downstream/High-level	P	P	P	F	P	U	F
RC-12	Supplemental Bridge-Upstream/High-level	P	P	P	F	P	U	F
RC-13	Tunnel to supplement I-5	P	P	P	P	P	U	P
RC-14	New Corridor Crossing	Note1	F	P	F	F	F	F
RC-15	New Corridor Crossing plus Widen Existing I-5 Bridges	Note1	F	P	F	F	F	F
RC-16	New Western Highway (I-605)	Note1	F	F	F	F	F	F
RC-17	New Eastern Columbia River Crossing	F	F	F	F	F	F	F
RC-18	I-205 Improvements	F	F	F	F	F	F	F
RC-19	Arterial Crossing without I-5 Improvements	Note1	P	U	F	P	F	F
RC-20	Replacement Tunnel	F	F	F	P	F	P	F
RC-21	33rd Avenue Crossing	F	F	F	F	F	F	F
RC-22	Non-Freeway Multi-Modal Columbia River Crossing	Note1	P	U	F	P	F	F
RC-23	Arterial Crossing with I-5 Improvements	Note1	P	U	P	P	U	P

[1] May provide some potential benefit in congestion management relative to 2030 No Build conditions.
P = Pass F = Fail NA = Not Applicable U = Unknown New since 3-22-06 TF mtg

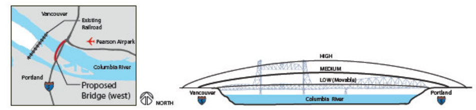
RC-1: Replacement Bridge Downstream/ Low Level/Moveable



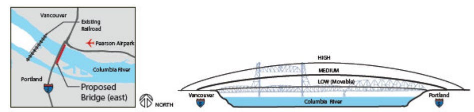
RC-2: Replacement Bridge Upstream/ Low Level/Moveable



RC-3: Replacement Bridge Downstream/Mid-level



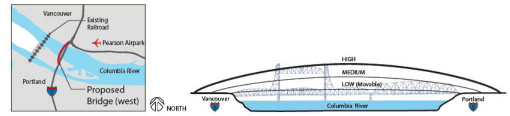
RC-4: Replacement Bridge Upstream/Mid-level



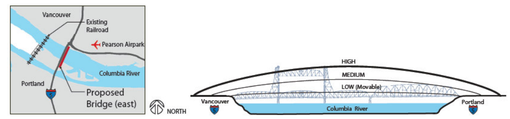
Staff Recommendation: Advance RC-1 through RC-4

Step A Question	**Pass/ Fail**	**Reasons:** ***RC-1 through RC-4 each:***
Q1. Traffic	Pass	Increases vehicular capacity along I-5 in the Bridge Influence Area by adding new travel lanes. Serves projected year 2020 traffic levels, which is expected to increase by at least 40% (over 50,000 daily vehicles) over 2005 levels, at similar or fewer hours of congestion compared to 2005 conditions (i.e., 4 hours during the afternoon/evening peak along I-5 within the Bridge Influence Area).
Q2. Transit	Pass	Provides increased travel capacity to accommodate transit within the I-5 Bridge Influence Area serving the identified travel markets.
Q3. Freight	Pass	Provides increased travel capacity for truck-hauled freight along I-5. Would be compatible with improvements to interchanges within the Bridge Influence Area that would support improved truck operations.
Q4. Safety	Pass	Provides I-5 crossing that addresses many non-standard design features and would be compatible with substantially upgrading I-5 within the Bridge Influence Area to current standards. Would not encroach into Pearson Airpark airspace and would satisfy U.S. Coast Guard navigational interests.
Q5. Bike/Ped	Pass	Provides new Columbia River crossing with modern bike/ped pathway(s).
Q6. Seismic	Pass	Provides new I-5 crossing built to current seismic standards.

RC-5: Replacement Bridge Downstream High Level



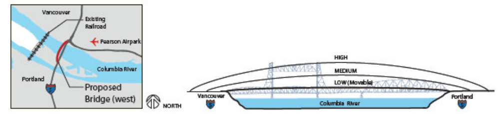
RC-6: Replacement Bridge Upstream High level



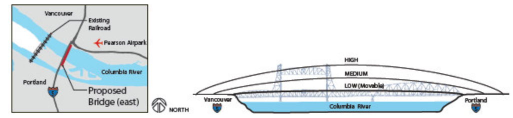
Staff Recommendation: Not Advance RC-5 and RC-6

Step A Question	Pass/ Fail	Reasons: ***RC-5 and RC-6 each:***
Q1. Traffic	Pass	Increases vehicular capacity along I-5 in the Bridge Influence Area by adding new travel lanes. Serves projected year 2020 traffic levels, which is expected to increase by at least 40% (over 50,000 daily vehicles) over 2005 levels, at similar or fewer hours of congestion compared to 2005 conditions (i.e., 4 hours during the afternoon/evening peak along I-5 within the Bridge Influence Area).
Q2. Transit	Pass	Provides increased travel capacity to accommodate transit within the I-5 Bridge Influence Area serving the identified travel markets.
Q3. Freight	Pass	Provides increased travel capacity for truck-hauled freight along I-5. Would be compatible with improvements to interchanges within the Bridge Influence Area that would support improved truck operations.
Q4. Safety	Fail	Provides I-5 crossing that, while addressing many non-standard design features and substantially upgrading I-5 within the Bridge Influence Area to current standards, would be built at a height that unacceptably encroaches into Pearson Airpark airspace- presenting a critical safety flaw.
Q5. Bike/Ped	Pass	Provides new Columbia River crossing with modern bike/ped pathway(s).
Q6. Seismic	Pass	Provides new I-5 crossing built to current seismic standards.

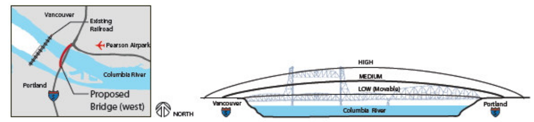
RC-7: Supplemental Bridge Downstream/Low Level/Moveable



RC-8: Supplemental Bridge Upstream Low Level/Moveable



RC-9: Supplemental Bridge Downstream Mid-level



Staff Recommendation: Advance RC-7 through RC-9

Step A Question	Pass/ Fail	Reasons: ***RC-7 through RC-9 each:***
Q1. Traffic	Pass	Increases vehicular capacity along I-5 in the Bridge Influence Area by adding new travel lanes. Serves projected year 2020 traffic levels, which is expected to increase by at least 40% (over 50,000 daily vehicles) over 2005 levels, at similar or fewer hours of congestion compared to 2005 conditions (i.e., 4 hours during the afternoon/evening peak along I-5 within the Bridge Influence Area).
Q2. Transit	Pass	Provides increased travel capacity to accommodate transit within the I-5 Bridge Influence Area serving the identified travel markets.
Q3. Freight	Pass	Provides increased travel capacity for truck-hauled freight along I-5. Would be compatible with improvements to interchanges within the Bridge Influence Area that would support improved truck operations.
Q4. Safety	Unknown	Provides I-5 crossing that addresses many non-standard design features and would be compatible with substantially upgrading I-5 within the Bridge Influence Area to current standards. Would not encroach into Pearson Airpark airspace. Presents challenges to align piers of new and existing bridges to maintain, and make no worse, existing marine navigation.
Q5. Bike/Ped	Pass	Provides new Columbia River crossing with modern bike/ped pathway(s).
Q6. Seismic	Unknown	Provides new I-5 crossing built to current seismic standards. However, depending on the use of the existing I-5 bridges, they may need to be seismically upgraded to meet the new seismic criteria. It is not known at this point whether the existing bridges can be retrofitted to meet current seismic design standards.

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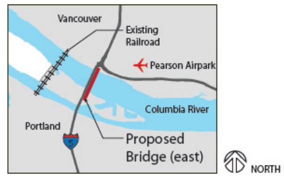
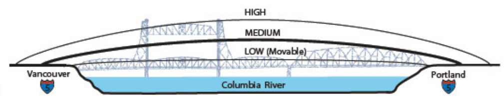
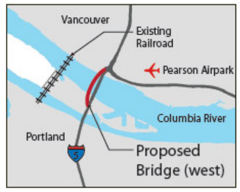


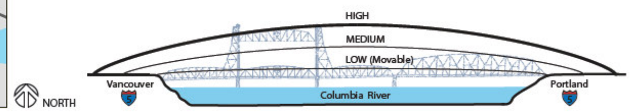


RC-10: Supplemental Bridge Upstream/Mid-level

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Pass	Increases vehicular capacity along I-5 in the Bridge Influence Area by adding new travel lanes. Serves projected year 2020 traffic levels, which is expected to increase by at least 40% (over 50,000 daily vehicles) over 2005 levels, at similar or fewer hours of congestion compared to 2005 conditions (i.e., 4 hours during the afternoon/evening peak along I-5 within the Bridge Influence Area).
Q2. Transit	Pass	Provides increased travel capacity to accommodate transit within the I-5 Bridge Influence Area serving the identified travel markets.
Q3. Freight	Pass	Provides increased travel capacity for truck-hauled freight along I-5. Would be compatible with improvements to interchanges within the Bridge Influence Area that would support improved truck operations.
Q4. Safety	Fail	Retains the existing I-5 bridges, and therefore the opening for the supplemental bridge would need to line up with the existing lift span opening. This places the high point of the new bridge on the north side of the Columbia River channel. In addition, the new bridge's upstream location places it closer to Pearson Airpark. Due to the upstream and high point locations for the new bridge, this crossing unacceptably encroaches into the Pearson Airpark airspace.
Q5. Bike/Ped	Pass	Provides new Columbia River crossing with modern bike/ped pathway(s).
Q6. Seismic	Unknown	Provides new I-5 crossing built to current seismic standards. However, depending on the use of the existing I-5 bridges, they may need to be seismically upgraded to meet the new seismic criteria. It is not known at this point whether the existing bridges can be retrofitted to meet current seismic design standards.

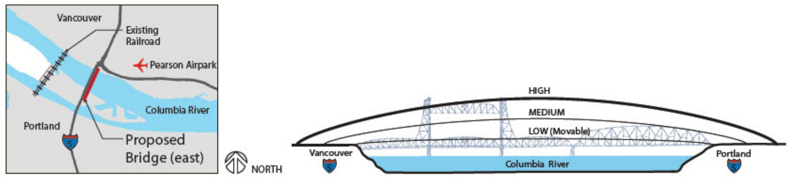




RC-11: Supplemental Bridge Downstream/High Level

Staff Recommendation: Not Advance

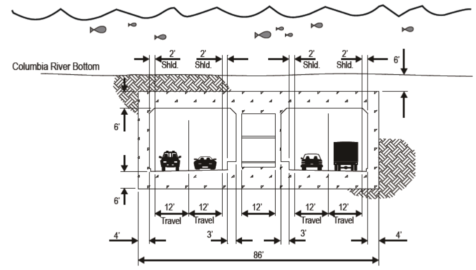
Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Pass	Increases vehicular capacity along I-5 in the Bridge Influence Area by adding new travel lanes. Serves projected year 2020 traffic levels, which is expected to increase by at least 40% (over 50,000 daily vehicles) over 2005 levels, at similar or fewer hours of congestion compared to 2005 conditions (i.e., 4 hours during the afternoon/evening peak along I-5 within the Bridge Influence Area).
Q2. Transit	Pass	Provides increased travel capacity to accommodate transit within the I-5 Bridge Influence Area serving the identified travel markets.
Q3. Freight	Pass	Provides increased travel capacity for truck-hauled freight along I-5. Would be compatible with improvements to interchanges within the Bridge Influence Area that would support improved truck operations.
Q4. Safety	Fail	Provides I-5 crossing that, while addressing many non-standard design features and substantially upgrading I-5 within the Bridge Influence Area to current standards, would be built at a height that unacceptably encroaches into Pearson Airpark airspace.
Q5. Bike/Ped	Pass	Provides new Columbia River crossing with modern bike/ped pathway(s).
Q6. Seismic	Unknown	Provides new I-5 crossing built to current seismic standards. However, depending on the use of the existing I-5 bridges, they may need to be seismically upgraded to meet the new seismic criteria. It is not known at this point whether the existing bridges can be retrofitted to meet current seismic design standards.



RC-12: Supplemental Bridge Upstream/High Level

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Pass	Increases vehicular capacity along I-5 in the Bridge Influence Area by adding new travel lanes. Serves projected year 2020 traffic levels, which is expected to increase by at least 40% (over 50,000 daily vehicles) over 2005 levels, at similar or fewer hours of congestion compared to 2005 conditions (i.e., 4 hours during the afternoon/evening peak along I-5 within the Bridge Influence Area).
Q2. Transit	Pass	Provides increased travel capacity to accommodate transit within the I-5 Bridge Influence Area serving the identified travel markets.
Q3. Freight	Pass	Provides increased travel capacity for truck-hauled freight along I-5. Would be compatible with improvements to interchanges within the Bridge Influence Area that would support improved truck operations.
Q4. Safety	Fail	Provides I-5 crossing that, while addressing many non-standard design features and substantially upgrading I-5 within the Bridge Influence Area to current standards, would be built at a height that unacceptably encroaches into Pearson Airpark airspace.
Q5. Bike/Ped	Pass	Provides new Columbia River crossing with modern bike/ped pathway(s).
Q6. Seismic	Unknown	Provides new I-5 crossing built to current seismic standards. However, depending on the use of the existing I-5 bridges, they may need to be seismically upgraded to meet the new seismic criteria. It is not known at this point whether the existing bridges can be retrofitted to meet current seismic design standards.



RC-13: Tunnel to Supplement I-5

Staff Recommendation: Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Pass	Increases vehicular capacity along I-5 in the Bridge Influence Area by adding new travel lanes. Serves an express function within the Bridge Influence Area with Vancouver access limited to the SR 500 interchange and points north and Portland access limited to Interstate Avenue and points south. Serves projected year 2020 traffic levels, expected to increase by at least 40% (by over 50,000 daily vehicles) over 2005 levels, at similar or fewer hours of congestion compared to 2005 conditions (i.e., 4 hours during the afternoon/evening peak along I-5 within the Bridge Influence Area).
Q2. Transit	Pass	Provides increased travel capacity to accommodate transit within the I-5 Bridge Influence Area serving the identified travel markets.
Q3. Freight	Pass	Provides increased travel capacity for truck-hauled freight along I-5 within the Bridge Influence Area.
Q4. Safety	Pass	Provides a new I-5 crossing that could substantially reduce traffic levels using the existing I-5 bridges, thereby reducing the potential for collisions within the Bridge Influence Area.
Q5. Bike/Ped	Pass	Provides new Columbia River crossing with modern bike/ped pathway(s).
Q6. Seismic	Unknown	Provides new I-5 crossing built to current seismic standards. However, depending on the use of the existing I-5 bridges, they may need to be seismically upgraded to meet the new seismic criteria. It is not known at this point whether the existing bridges can be retrofitted to meet current seismic design standards.

Summary of Arterial River Crossings (RC-14, 15, 19, 21, 22, & 23)

There are six river crossing components that contain variations of an arterial roadway crossing of the Columbia River. To a degree, these six components each have strengths and weaknesses and some clearly have fatal flaws. In order for an arterial river crossing concept to pass adopted Step A screening, it must:

- provide an acceptable level of congestion relief (Q1- Traffic);
- be proximate to the I-5 corridor to both meet transit performance criteria and improve bicycle and pedestrian mobility in the I-5 corridor (Q2- Transit & Q5: Bike/pedestrian);
- address critical non-standard safety/design features in the BIA and avoid airport airspace (Q4-Safety); and
- attempt to address the seismic vulnerability of the current facility (Q6-Seismic).

The CRC project team is waiting for significant freight data that will be generated by the Regional Freight Study now underway. In the interim, limited data is available to evaluate the performance of components related to freight (Q3- Freight). For the purposes of Step A screening, the project team has considered how concepts perform regarding congestion relief as the best current surrogate for assessing a concept's freight performance.

The following table summarizes CRC project staff's assessment of how these six arterial concepts perform relative to the Step A screening questions.

Summary of Step A Screening Recommendation for Arterial River Crossing Components

	Q1 Traffic	Q2 Transit	Q3 Freight	Q4 Safety	Q5 Bike/ped	Q6 Seismic	Overall
RC-14	Note[1]	F	P	F	F	F	F
RC-15	Note[1]	F	P	F	F	F	F
RC-19	Note[1]	P	U	F	P	F	F
RC-21	F	F	F	F	F	F	F
RC-22	Note[1]	P	U	F	P	F	F
RC-23	Note[1]	P	U	P	P	U	P

[1] May provide some potential benefit in congestion management relative to 2030 No Build conditions.

P = Pass F = Fail NA = Not Applicable U = Unknown New since 3-22-06 TF meting

Question #1: Traffic and Congestion Relief

The degree of predicted traffic congestion relief for all 23 river crossing concepts ranges from lessening or maintaining current levels of afternoon/evening congestion (i.e., 4 hours or less), to worst-case scenarios where the peak period spreads substantially into the midday and evening

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periods (i.e., 9 to 10 hours). All of the arterial river crossing components fall into a middle area between these extremes. Staff recommends that any arterial river crossing concept that results in:

- 8 or more hours of afternoon/evening congestion- component fails Question #1;
- 4 hrs or less of afternoon/evening congestion- component passes Question #1;
- 5 to 7 hours of afternoon/evening congestion- component is not eliminated from consideration based on this criterion because, while resulting in increased congestion and delay, it may result in other benefits.

RC-21, which would result in 8 to 9 hours of afternoon/evening congestion, fails Question #1 under this recommendation. The other five arterial river crossing components do not.

Question #2: Transit

In order for an arterial river crossing to improve transit service performance within the I-5 Bridge Influence Area and serve the key I-5 transit markets, it needs to be physically proximate to the current I-5 corridor. If it is not, it imposes unacceptable out of direction travel delays on transit, compromising the viability of serving key transit markets.

RC-19, RC-22 and RC-23 are all physically proximate to the current I-5 corridor and pass Question #2. RC-14, RC-15 and RC-21 are located one mile or more east or west of the current I-5 corridor and do not satisfy Question #2.

Question #3: Freight

As explained above, the project team has limited freight specific data against which to evaluate these arterial bridge components. Because all of these arterials but one (RC-21) provides marginal congestion relief (i.e., 6 to 7 hours), staff is proposing that only RC-21 fail for freight mobility reasons since it provides inadequate congestion relief (8-9 hours) along I-5 within the Bridge Influence Area. Concepts RC-19, RC-22 and RC-23 receive an “unknown” rating because it is not clear how they will tie into the regional arterial network and whether there would be freight mobility benefits as a result of those connections.

Because RC-14 and RC-15 provide direct connections to regionally significant freight destinations (the Ports of Portland and Vancouver and the regional freight resources adjacent to them), staff proposes they receive a “pass” on Question #3, in essence “giving them the benefit of the doubt” that these unique connections, coupled with their level of congestion relief, provide freight mobility benefits sufficient to meet the criteria of Question #3.

Question #4: Safety

In order for an arterial river crossing to improve safety within the I-5 Bridge Influence Area, it must do three things: 1) not significantly encroach into Pearson Airpark or Portland International Airport airspace, 2) maintain or improve navigational safety in the vicinity of the I-5 corridor crossings, and 3) reduce future I-5 traffic demands compared to today’s levels or redesign I-5 within the Bridge Influence Area to meet current design and safety standards to the greatest extent possible.

Only RC-21 creates an unacceptable encroachment into airport airspace and therefore should be eliminated from further consideration.

RC-14, RC-15, RC-19, and RC-22 do not make an investment in I-5 to substantially address existing non-standard design and safety features and therefore do not satisfy Question #4. As mentioned earlier, the congestion relief/demand reduction they provide falls in the marginal range.

Only RC-23 substantially addresses existing non-standard design and safety features within the I-5 Bridge Influence Area and therefore satisfies Question #4.

Question #5: Bicycle/Pedestrian Mobility

As with transit improvements, in order for an arterial river crossing to improve bicycle and pedestrian mobility within the I-5 Bridge Influence Area, its bicycle and pedestrian facilities need to be physically proximate to the current I-5 corridor and provide improved connections to the bicycle and pedestrian network.

RC-19, RC-22 and RC-23 are all physically proximate to the current I-5 corridor and could improve network connectivity, thereby satisfying Question #5. RC-14, RC-15 and RC-21 are located one mile or more east or west of the current I-5 corridor, imposing out of direction travel demands on cyclists and pedestrians seeking to move between points in the Bridge Influence Area and thus, do not satisfy Question #5.

Question #6: Seismic Vulnerability

In order for an arterial river crossing to reduce the seismic risk of the Columbia River Crossing, it must be designed to nationally accepted bridge standards and the existing I-5 bridges would need to be seismically retrofit. Note, however that it is not currently known whether the existing I-5 bridges can be retrofitted.

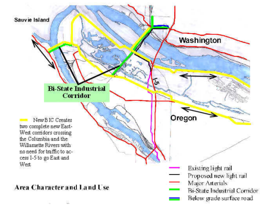
All arterial river crossing bridges would be designed to current seismic standards, however, only RC-23 proposes to seismically retrofit the existing I-5 bridges (if feasible), and therefore only RC-23 could potentially satisfy Question #6.

Summary

In summary, an arterial crossing can satisfy each of the six Step A screening questions so long as it provides:

- an acceptable level of congestion relief on I-5 to serve commuters and freight (Q1 & Q3);
- proximity to the I-5 corridor to both meet transit performance criteria and improve bike/pedestrian mobility in the I-5 corridor (Q2 & Q5);
- solutions to critical non-standard safety/design features in the BIA and avoids airport airspace (Q4);
- design upgrades to address the seismic vulnerability of the current facility (Q6).

Based on staff review of the six arterial components, RC-23 satisfies each of the Step A questions and is recommended to advance for further consideration during alternative packaging. Where appropriate, promising design features from the other five arterial components not recommended to advance could be integrated to further improve RC-23.



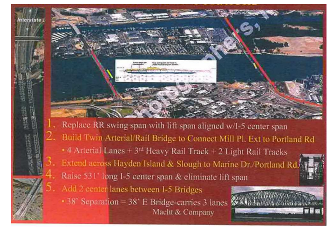
RC-14: New Corridor Crossing Near BNSF Rail Crossing

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	See note below[1]	Assuming construction of a new multi-lane tunnel under Mill Plain Blvd. and construction of high capacity interchange ramps between I-5 and Mill Plain Blvd., provides new Columbia River crossing that would serve up to 30,000 daily vehicles with most of these vehicles diverted from I-5. Some I-205 traffic shifts to I-5. By 2020, I-5 traffic demands still increase by at least 15% (by over 20,000 vehicles) over 2005 levels, resulting in 6-7 hours of afternoon/evening peak period congestion.
Q2. Transit	Fail	Does not improve transit service to identified I-5 corridor transit markets, nor does it improve the performance of the existing transit system within the I-5 Bridge Influence Area. Provides transit service along new corridor located approximately one mile west of I-5 to potential non-I-5 travel markets, but is out of direction for I-5 origins and destinations.
Q3. Freight	Pass	Results in 6-7 hours of afternoon/evening peak period congestion on I-5, however provides alternative route linking freight activity centers west of I-5.
Q4. Safety	Fail	Provides new Columbia River crossing located approximately one mile west of I-5 built to current safety standards, but does not address existing non-standard design features within the I-5 Bridge Influence Area. Traffic demands on I-5 within the Bridge Influence Area would increase by at least 15% by 2020 over 2005 conditions, resulting in 6-7 hours of afternoon/evening peak period congestion. Without added I-5 capacity and re-design of the Bridge Influence Area to meet standards, collisions would be expected to increase approximately 40 percent over 2005 conditions.
Q5. Bike/Ped	Fail	Provides new Columbia River crossing with modern bike/ped pathway(s). With a location approximately one mile west of I-5, it is out of direction for users with trip origins and destinations within the I-5 Bridge Influence Area.
Q6. Seismic	Fail	Provides new Columbia River crossing built to current seismic standards, but does not upgrade the existing I-5 bridges serving Interstate traffic and therefore the seismic risk of the I-5 bridges would not be reduced.

[1] May provide some potential benefit in congestion management relative to 2030 No Build conditions.

Note: A variation of this component was introduced at the 3-22-06 Task Force meeting. Staff evaluated the revised component and believes it fails for similar reasons as summarized above.



RC-15: New Corridor Crossing plus Widen Existing I-5 Bridges

Staff Recommendation: Not Advance

Note: It is not feasible to add two new travel lanes to I-5 between the existing bridges as this component calls for. This component is otherwise similar to RC-14 and would operate similarly.

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	See Note below[1]	Assuming construction of a new multi-lane tunnel under Mill Plain Blvd. and construction of high capacity interchange ramps between I-5 and Mill Plain Blvd., provides new Columbia River crossing that would serve up to 30,000 daily vehicles with most of these vehicles diverted from I-5. Some I-205 traffic shifts to I-5. By 2020, I-5 traffic demands still increase by at least 15% (by over 20,000 vehicles) over 2005 levels, resulting in 6-7 hours of afternoon/evening peak period congestion.
Q2. Transit	Fail	Does not improve transit service to identified I-5 corridor transit markets, nor does it improve the performance of the existing transit system within the I-5 Bridge Influence Area. Provides transit service along new corridor located approximately one mile west of I-5 to potential non-I-5 travel markets, but is out of direction for I-5 origins and destinations.
Q3. Freight	Pass	Results in 6-7 hours of afternoon/evening peak period congestion on I-5, however provides alternative route linking freight activity centers west of I-5.
Q4. Safety	Fail	Provides new Columbia River crossing located approximately one mile west of I-5 built to current safety standards, but does not address existing non-standard design features within the I-5 Bridge Influence Area. Traffic demands on I-5 within the Bridge Influence Area would increase by at least 15% by 2020 over 2005 conditions, resulting in 6-7 hours of afternoon/evening peak period congestion. Without added I-5 capacity and re-design of the Bridge Influence Area to meet standards, collisions would be expected to increase approximately 40 percent over 2005 conditions.
Q5. Bike/Ped	Fail	Provides new Columbia River crossing with modern bike/ped pathway(s). With a location approximately one mile west of I-5, it is out of direction for users with trip origins and destinations within the I-5 Bridge Influence Area.
Q6. Seismic	Fail	Provides new Columbia River crossing built to current seismic standards, but does not upgrade the existing I-5 bridges serving Interstate traffic and therefore the seismic risk of the I-5 bridges would not be reduced.

[1] May provide some potential benefit in congestion management relative to 2030 No Build conditions.

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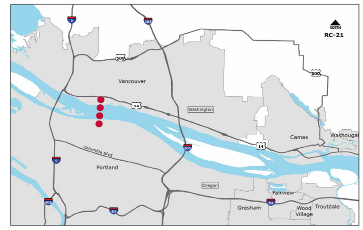
RC-19: Arterial Crossing without I-5 Improvements

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	See Note below[1]	Provides new Columbia River arterial crossing to supplement I-5. By 2020, I-5 traffic demands still increase by at least 15% (by over 20,000 vehicles) over 2005 levels, resulting in 6-7 hours of afternoon/evening peak period congestion.
Q2. Transit	Pass	Provides increased travel capacity to accommodate transit within the I-5 Bridge Influence Area serving the identified travel markets.
Q3. Freight	Unknown	Functionality for truck mobility would depend upon arterial roadway connections north and south of the Columbia River.
Q4. Safety	Fail	Provides new Columbia River crossing located immediately west of I-5 built to current safety standards, but does not address existing non-standard design features within the I-5 Bridge Influence Area. Traffic demands on I-5 within the Bridge Influence Area would increase by at least 15% by 2020 over 2005 conditions, resulting in 6-7 hours of afternoon/evening peak period congestion. Without added I-5 capacity and re-design of the Bridge Influence Area to meet standards, collisions would be expected to increase approximately 40 percent over 2005 conditions.
Q5. Bike/Ped	Pass	Provides new Columbia River crossing with modern bike/ped pathway(s).
Q6. Seismic	Fail	Provides new Columbia River crossing built to current seismic standards, but does not upgrade the existing I-5 bridges serving Interstate traffic and therefore the seismic risk of the I-5 bridges would not be reduced.

[1] May provide some potential benefit in congestion management relative to 2030 No Build conditions.



RC-21: 33rd Avenue Crossing

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Fail	Provides new Columbia River crossing to supplement I-5 and I-205 with traffic shifting from each facility to the new corridor. By 2020, I-5 traffic demands still increase by about 25% (over 30,000 vehicles) over 2005 levels, resulting in 8-9 hours of afternoon/evening peak period congestion.
Q2. Transit	Fail	Does not improve transit service to identified I-5 corridor transit markets, nor does it improve the performance of the existing transit system within the I-5 Bridge Influence Area. Provides transit service along new corridor located approximately 2-3 miles east of I-5 to potential non-I-5 travel markets, but is out of direction for I-5 origins and destinations.
Q3. Freight	Fail	Results in 8-9 hours of afternoon/evening peak period congestion on I-5.
Q4. Safety	Fail	Provides new Columbia River crossing located approximately 2-3 miles east of I-5 built to current safety standards, but does not address existing non-standard design features within the I-5 Bridge Influence Area. Traffic demands on I-5 within the Bridge Influence Area would increase by 25% by 2020 over 2005 conditions, resulting in 8-9 hours of afternoon/evening peak period congestion. Without added I-5 capacity and re-design of the Bridge Influence Area to meet standards, collisions would be expected to increase approximately 60% percent over 2005 conditions. In addition, bridge would unacceptably encroach into PDX Airport airspace.
Q5. Bike/Ped	Fail	Provides new Columbia River crossing with modern bike/ped pathway(s). With a location approximately 2-3 miles east of I-5, it is out of direction for users with trip origins and destinations within the I-5 Bridge Influence Area.
Q6. Seismic	Fail	Provides new Columbia River crossing built to current seismic standards, but does not upgrade the existing I-5 bridges serving Interstate traffic and therefore the seismic risk of the I-5 bridges would not be reduced.

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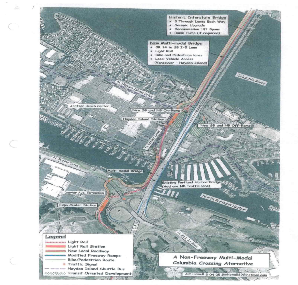


RC-22: Non-Freeway Multi-modal Columbia River Crossing

Staff Recommendation: Not Advance

Note: The proposed description for this component also included elevating the existing bridges and removing the lift spans. However, that part of the proposal was determined to not be feasible.

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	See Note below[1]	Provides new Columbia River arterial crossing to supplement I-5. By 2020, northbound I-5 traffic demands still increase by about 15% (by about 20,000 vehicles) over 2005 levels, resulting in 6-7 hours of afternoon/evening peak period congestion.
Q2. Transit	Pass	Provides increased travel capacity to accommodate transit within the I-5 Bridge Influence Area serving the identified travel markets.
Q3. Freight	Unknown	Functionality for truck mobility would depend upon arterial roadway connections north and south of the Columbia River.
Q4. Safety	Fail	Provides new Columbia River crossing located immediately west of I-5 built to current safety standards, but does not address existing non-standard design features within the I-5 Bridge Influence Area. Traffic demands on I-5 within the Bridge Influence Area would increase by about 15% by 2020 over 2005 conditions, resulting in 6-7 hours of afternoon/evening peak period congestion. Without added I-5 capacity and re-design of the Bridge Influence Area to meet standards, collisions would be expected to increase approximately 40% percent over 2005 conditions.
Q5. Bike/Ped	Pass	Provides new Columbia River crossing with modern bike/ped pathway(s).
Q6. Seismic	Fail	Provides new Columbia River crossing built to current seismic standards, but does not upgrade the existing I-5 bridges serving Interstate traffic and therefore the seismic risk of the I-5 bridges would not be reduced.

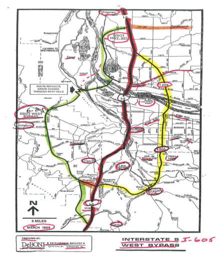
[1] May provide some potential benefit in congestion management relative to 2030 No Build conditions.

RC-23 Arterial Crossing with I-5 Improvements

Staff Recommendation: Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	See Note below[1]	Provides new Columbia River arterial crossing to supplement I-5. By 2020, I-5 traffic demands still increase by at least 15% (by over 20,000 vehicles) over 2005 levels, resulting in 6-7 hours of afternoon/evening peak period congestion.
Q2. Transit	Pass	Provides increased travel capacity to accommodate transit within the I-5 Bridge Influence Area serving the identified travel markets.
Q3. Freight	Unknown	Functionality for truck mobility would depend upon arterial roadway connections north and south of the Columbia River.
Q4. Safety	Pass	Provides new Columbia River crossing located immediately west of I-5 built to current safety standards. Provides safety improvements to I-5 within the Bridge Influence Area that significantly addresses critical existing non-standard design and safety features.
Q5. Bike/Ped	Pass	Provides new Columbia River crossing with modern bike/ped pathway(s).
Q6. Seismic	Unknown	Provides new Columbia River crossing built to current seismic standards for arterial roadway and upgrades the existing I-5 bridges serving Interstate traffic, if feasible.

[1] May provide some potential benefit in congestion management relative to 2030 No Build conditions.

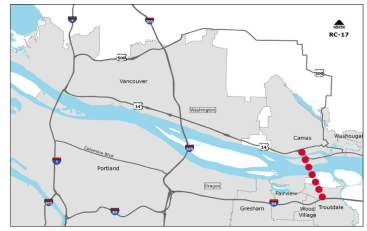


RC-16: New Western Highway

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	See Note below[1]	Provides new Columbia River crossing that would serve about 25,000 daily vehicles, with most of these vehicles diverted from I-5. Some I-205 traffic shifts to I-5. By 2020, I-5 traffic demands still increase by about 20% (25,000 vehicles) over 2005 levels, resulting in 7-8 hours of afternoon/evening peak period congestion.
Q2. Transit	Fail	Does not improve transit service to identified I-5 corridor transit markets, nor does it improve the performance of the existing transit system within the I-5 Bridge Influence Area. Provides transit service along new corridor located approximately 2-3 miles west of I-5 to potential non-I-5 travel markets, but is out of direction for I-5 origins and destinations.
Q3. Freight	Fail	Results in 7-8 hours of afternoon/evening peak period congestion on I-5.
Q4. Safety	Fail	Provides new Columbia River crossing located approximately 2-3 miles west of I-5 built to current safety standards, but does not address existing non-standard design features within the I-5 Bridge Influence Area. Traffic demands on I-5 within the Bridge Influence Area would increase by 20% by 2020 over 2005 conditions, resulting in 7-8 hours of afternoon/evening peak period congestion. Without added I-5 capacity and re-design of the Bridge Influence Area to meet standards, collisions would be expected to increase approximately 45% percent over 2005 conditions.
Q5. Bike/Ped	Fail	Provides new Columbia River crossing with modern bike/ped pathway(s). With a location approximately 2-3 miles west of I-5, it is out of direction for users with trip origins and destinations within the I-5 Bridge Influence Area.
Q6. Seismic	Fail	Provides new Columbia River crossing built to current seismic standards, but does not upgrade the existing I-5 bridges serving Interstate traffic and therefore the seismic risk of the I-5 bridges would not be reduced.

[1] May provide some potential benefit in congestion management relative to 2030 No Build conditions.

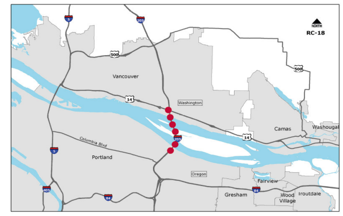


RC-17: New Eastern Columbia River Crossing

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Fail	Provides new Columbia River crossing to supplement I-205 corridor with most users shifting from I-205. By 2020, I-5 traffic demands still increase by at least 30% (over 40,000 vehicles) over 2005 levels, resulting in 9-10 hours of afternoon/evening peak period congestion.
Q2. Transit	Fail	Does not improve transit service to identified I-5 corridor transit markets, nor does it improve the performance of the existing transit system within the I-5 Bridge Influence Area. Provides transit service along new corridor located approximately 10-12 miles east of I-5 to potential non-I-5 travel markets, but is out of direction for I-5 origins and destinations.
Q3. Freight	Fail	Results in 9-10 hours of afternoon/evening peak period congestion on I-5.
Q4. Safety	Fail	Provides new Columbia River crossing located approximately 10-12 miles east of I-5 built to current safety standards, but does not address existing non-standard design features within the I-5 Bridge Influence Area. Traffic demands on I-5 within the Bridge Influence Area would increase by at least 30% by 2020 over 2005 conditions, resulting in 9-10 hours of afternoon/evening peak period congestion. Without added I-5 capacity and re-design of the Bridge Influence Area to meet standards, collisions would be expected to increase approximately 65 percent over 2005 conditions.
Q5. Bike/Ped	Fail	Provides new Columbia River crossing with modern bike/ped pathway(s). With a location approximately 10-12 miles east of I-5, it is out of direction for users with trip origins and destinations within the I-5 Bridge Influence Area.
Q6. Seismic	Fail	Provides new Columbia River crossing built to current seismic standards, but does not upgrade the existing I-5 bridges serving Interstate traffic and therefore the seismic risk of the I-5 bridges would not be reduced.

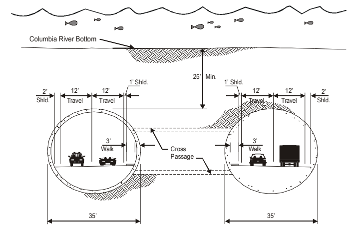
RIVER CROSSING



RC-18: I-205 Improvements

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Fail	Upgrades I-205 corridor by adding one lane per direction between I-5 to the north and I-84 to the south. By 2020, I-5 traffic demands still increase by about 30% (over 40,000 vehicles) over 2005 levels, resulting in 9-10 hours of afternoon/evening peak period congestion.
Q2. Transit	Fail	Does not improve transit service to identified I-5 corridor transit markets, nor does it improve the performance of the existing transit system within the I-5 Bridge Influence Area. May increase transit service along I-205 located approximately 7 miles east of I-5 to potential non-I-5 travel markets, but is out of direction for I-5 origins and destinations.
Q3. Freight	Fail	Results in 9-10 hours of afternoon/evening peak period congestion on I-5.
Q4. Safety	Fail	Provides improvements to existing I-205 corridor located approximately 7 miles east of I-5, but does not address existing non-standard design features within the I-5 Bridge Influence Area. Traffic demands on I-5 within the Bridge Influence Area would increase by 30% by 2020 over 2005 conditions, resulting in 9-10 hours of afternoon/evening peak period congestion. Without added I-5 capacity and re-design of the Bridge Influence Area to meet standards, collisions would be expected to increase approximately 65 percent over 2005 conditions.
Q5. Bike/Ped	Fail	Does not improve existing I-5 bike/ped pathways. May improve I-205 bike/ped pathway(s), but with a location approximately 7 miles east of I-5, it is out of direction for users with trip origins and destinations within the I-5 Bridge Influence Area.
Q6. Seismic	Fail	Does not upgrade the existing I-5 bridges serving Interstate traffic and therefore the seismic risk of the I-5 bridges would not be reduced.



RC-20: Replacement Tunnel

Staff Recommendation: Not Advance

Step A Question	Pass/ Fail	Reasons
Q1. Traffic	Fail	Increases vehicular capacity along I-5 in the Bridge Influence Area by adding new travel lanes. Capacity is underground and would require an elaborate frontage road network to serve SR 14, Vancouver City Center and Hayden Island- resulting in substantial out of direction travel for drivers. Tunnel would connect above ground to interchanges north of SR 14 and south of Hayden Island.
Q2. Transit	Fail	Tunnel alignment results in significant out-of-direction travel for transit to serve I-5 transit markets. Would require elaborate frontage road system to link I-5 activity centers.
Q3. Freight	Fail	Tunnel alignment results in significant out-of-direction travel for freight to serve I-5 freight activity centers. Would require elaborate frontage road system to link I-5 activity centers.
Q4. Safety	Pass	Provides new Columbia River crossing built to current safety standards.
Q5. Bike/Ped	Fail	Tunnel alignment creates significant out-of-direction travel for bike/ped users to reach I-5 activity centers with the Bridge Influence Area. Not desirable to serve bicyclists and pedestrians via a tunnel.
Q6. Seismic	Pass	Provides I-5 crossing built to current seismic standards.

Columbia River CROSSING

Memorandum

June 7, 2006

TO: Task Force

FROM: Doug Ficco, John Osborn

SUBJECT: Additional Component Screening

COPY:

Background

In the Step A screening process, the Task Force reviewed 14 transit components and 23 river crossing components for narrowing to those that will become part of the alternative packages for further evaluation. Seven transit components and nine river crossing components survived the initial Step A screening.

Several of these components, although they initially passed the Step A screening, are now being recommended for removal from further consideration. In addition, there are additional components that did not undergo Step A screening that are recommended for removal. The bases for removal of additional components are for the following reasons:

1. Based on further analysis and packaging of alternatives, it was evident that the component either should have failed Step A screening or performs so poorly against the Step A screening compared to other components that it should no longer be evaluated as part of an alternative package.
2. Special conditions exist that result in the likelihood that the component could not be implemented.

The CRC Project Team proposes the following components be considered by the Task Force for removal from further evaluation:

- RC-1, RC-2, RC-7, and RC-8 Movable Span Options
- RC-13 Supplemental Tunnel
- TR-6 Streetcar
- TR-11 Commuter Rail
- B/P-3 Bicycle/Pedestrian Path-Only Bridge
- F-3 Time of Day Freight Truck Restrictions
- F-4 Increase Truck Size

Attached are memoranda for each of the above components, including an analysis and recommendation for removal of the component from consideration as part of an alternative package.

Memorandum

June 7, 2006

TO: Doug Ficco, John Osborn

FROM: CRC Engineering Team

SUBJECT: Screening of RC-1, RC-2, RC-7, and RC-8 Moveable Span Components

Overview

In the process of developing the River Crossing (RC) components and packaging them with the Roadway components, it has become apparent that those RC components that include a low-level moveable span should be removed from further consideration and not be included in alternative packaging. Issues relating to bridge openings and high maintenance and operations costs that exist with the current bridges would be perpetuated with a new low-level moveable span. Although the number of lifts would likely be reduced when compared to the existing number of openings, they would still occur and therefore would still impede interstate traffic. Moveable spans are more costly in both initial cost and maintenance and operations when compared to a fixed span.

In addition, there do not appear to be any significant advantages to constructing a moveable span bridge. A moveable span would permit a lower profile for the bridge, and thus could potentially result in different (potentially fewer) landside impacts. However, engineering studies to date indicate that the areas of potential impact would be virtually the same for the low-level, moveable span options as compared to the fixed-span (non-moveable) mid-level bridge options.

Component Description

Currently there are four low-level moveable bridge RC components that passed Step A screening as described below. A low-level RC component is defined as a bridge that provides 80 feet of vertical design clearance at the base river stage. By comparison, the mid-level fixed-span bridge design concepts will provide about 95 feet of vertical design clearance at the base river stage. Because the 80-foot clearance does not pass 100 percent of the marine vessels operating on the river, a moveable span would be needed to pass tall vessels. The moveable span could be accomplished by the use of a lift span, swing span, or draw bridge.

- RC-1 Replacement Bridge Downstream/Low-Level/Moveable: This river crossing component represents a new bridge that would be located immediately west (downstream) of the existing I-5 bridges. The existing I-5 bridges would be removed.
- RC-2 Replacement Bridge Upstream/Low-Level/Moveable: This river crossing component represents a bridge that would be located immediately east (upstream) of the existing I-5 bridges. The existing I-5 bridges would be removed.
- RC-7 Supplemental Bridge Downstream/Low-Level/Moveable: This river crossing component represents a new bridge which would be located immediately west (downstream) of the existing I-5 bridges. Either one or both of the existing I-5 bridges would remain in place as they are today. Additionally, because the existing I-5 bridges have lift spans, the opening of the new bridge would have to line up with the lift spans on the existing bridges.

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- RC-8 Supplemental Bridge Upstream/Low-Level/Moveable: This river crossing component represents a new bridge which would be located immediately east (upstream) of the existing I-5 bridges. The only difference between RC-7 and RC-8 is that RC-8 is located upstream.

Analysis

A new fixed-span bridge can be expected to be less expensive to construct, maintain, and operate, and would provide improved traffic flow and safety compared to a moveable span bridge. The higher mid-level fixed-span bridge would allow for uninterrupted passage for both the users of the bridge and marine vessels passing underneath.

A moveable span is typically only considered when the vertical clearance requirements cannot practically be met, if there are height restrictions that prohibit a higher fixed span, or if a lower profile bridge results in fewer undesirable impacts to onshore or in-water resources. Our analyses to date indicate that none of those three circumstances apply to this crossing.

The analyses are summarized in accordance with the project Purpose and Need Statement as defined in the Step A screening questions adopted as part of the Screening and Evaluation Framework.

For this analysis, the low-level moveable span bridge components were contrasted to mid-level bridges in the same location. Although the moveable span bridge components do not fail any of the Step A screening questions, the need for accommodating marine traffic through bridge openings results in poor performance for five of the six Step A screening questions when compared to higher fixed-span components.

Q1. Does the component increase vehicular capacity or decrease vehicular demand within the Bridge Influence Area?

Moveable spans require continued I-5 closures during bridge openings or continued marine restrictions when the bridge must remain closed. Bridge openings have a negative impact on increasing vehicular capacity within the Bridge Influence Area.

Q2. Does the component improve transit performance within the Bridge Influence Area?

Bridge openings have a negative impact for maintaining speed and reliability for transit that uses I-5 within the Bridge Influence Area.

Q3. Does the component improve freight mobility within the Bridge Influence Area?

Bridge openings have a negative impact for maintaining speed and reliability for freight mobility within the Bridge Influence Area. Even though bridge openings may be restricted to off-peak periods, freight traffic also relies on off-peak periods for maximum efficiency.

Q4. Does the component improve safety and decrease vulnerability within the Bridge Influence Area?

Roadway

Analysis of crash data has shown that there is a direct correlation between bridge openings and a substantially higher accident incidence. Although the number of openings may potentially be reduced compared to the existing condition, a fixed span would still provide a safer highway. An analysis was conducted to determine if the potential for a collision increases during bridge lifts and/or traffic stops. Logs obtained from ODOT's Maintenance Unit, which maintains and operates the bridge, include information on bridge lift/traffic stop dates, times, and duration.

Using the 5-year collision database, a comparison was made between collisions that were reported to have occurred within a one-hour window of logged bridge lifts/traffic stops on weekdays between 9 a.m. and 2:30 p.m. The analysis only considered collisions that would involve vehicles approaching the bridge (i.e., northbound traffic approaching the bridge and southbound traffic approaching the bridge) as bridge lifts/traffic stops directly impact approaching traffic and may not have an effect on departing traffic.

Based on the analysis, it was determined that there is at least a three-times higher likelihood of a northbound collision when a bridge lift/traffic stop occurs than when it does not. There is over a four-times higher likelihood of a southbound collision when a bridge lift/traffic stop occurs than when it does not.

Some of these crashes may be a result of design deficiencies in the roadways north and south of the bridge, and would be eliminated if freeway improvements are constructed in conjunction with a new moveable span bridge. However, some of the crashes can be attributed to the queuing that occurs following each bridge lift, and those crashes would continue with a new moveable span bridge. By contrast, the problem can be eliminated entirely by the construction of a fixed-span bridge, thus eliminating bridge lifts.

Marine

The need for marine traffic to rely on bridge openings also increases risk to marine navigation. In meetings with barge operators, it was stated that one of the major concerns and frustrations with navigating through the Columbia River I-5 bridge channel is that of the captain's need to coordinate a lift clearance for the Interstate Bridge that is coincidental with the opening of the westerly downstream RR bridge. The required coordination between the I-5 and railroad bridges creates a potentially dangerous situation.

Aviation

Although a low-level moveable span initially appears to be a better option for aviation clearances, this is not necessarily the case. The moveable span could either be a swing span, a vertical lift, or a bascule-type span. The best case for aviation would be a swing span, but this may be impractical to construct given the potential width of the new bridge. For a vertical lift, the lift towers would encroach into Pearson's airspace. For a bascule-type span, there would be intermittent encroachments into Pearson's airspace during bridge openings. This would be the case for all four low-level moveable spans. In contrast, a fixed-span at a minimum would maintain the existing airspace encroachment condition with a supplemental bridge (one that kept the existing bridges), and with a replacement bridge it would actually serve to enhance the safety by eliminating the existing airspace encroachment.

<u>Q5. Does the component improve bicycle and pedestrian mobility within the Bridge Influence Area?</u>

A fixed span would provide better connectivity for bike and pedestrian facilities as it eliminates the potential for interrupted travel associated with low-level moveable bridges.

Other considerations

Although cost is not a Step A screening criteria, the construction cost for a moveable span is in the range of $100 million more than a fixed span with a higher vertical clearance. In addition, the maintenance cost for a moveable span versus a fixed span is much higher. The operations and maintenance for the moveable span is in the range of $400,000 more per year than a fixed span.

One of the potential concerns when comparing river crossing options is that the higher elevation options could potentially have more significant impacts at the onshore bridge approaches in Vancouver and on Hayden Island when compared to lower elevation, moveable span options. However, the design development of the low- and mid-level options has resulted in a relatively minor difference of elevation of about 15 feet at mid-span (as noted above, the low-level bridge would be at about 80 ft above the water, and the mid-level span would be at about a 95 ft. elevation). The difference in elevation would generally be progressively less as you move away from the river, resulting in relatively minor differences in elevation at the Vancouver and Hayden Island approaches.

As a result, the potential on-shore impacts can be viewed as approximately equivalent for the low- and mid-level options.

Conclusions and Recommendations

Moveable spans are warranted only when vertical clearance requirements cannot practically be met, if there are height restrictions that prohibit a higher fixed span, or if a lower profile bridge results in fewer undesirable impacts to onshore or in-water resources. In the case for the I-5 Columbia River Crossing, none of the three conditions are met. As demonstrated, the low-level moveable spans carry significant costs to mobility, safety, freight economy, and financial resources with no benefits over a fixed span. A higher mid-level fixed span can perform the same function as a low-level moveable span at lower cost and with no significant differences in impacts to the surrounding communities. For these reasons, RC-1, RC-2, RC-7, and RC-8 are not recommended for continued development.

Memorandum

June 7, 2006

TO: Doug Ficco and John Osborn

FROM: CRC Engineering Team

SUBJECT: Screening of RC-13 Supplemental I-5 Tunnel

Overview

In the process of developing the River Crossing (RC) components and packaging them with the Roadway components, it has become apparent that the RC-13 component which includes a supplemental I-5 tunnel crossing should be removed from consideration. Additional traffic analysis completed after the initial Step A screening indicates continued marginal performance in several of the criteria.

Additionally, since the existing I-5 bridges would still be needed to carry non-tunnel traffic (six lanes worth), continued safety issues remain related to the existing Interstate Bridge lift spans, alignments, vertical profiles, and shoulder widths. Also, although cost was not a specific Step A screening criteria, it is clear that RC-13 is likely to cost significantly more than any bridge River Crossing component without offering any significant performance benefit compared to the lower cost alternatives.

Other RC options would avoid some of the more severe environmental impacts associated with RC-13 tunnel construction. Development of tunnel designs has revealed unique and potentially severe impacts to aquatic habitat, archaeological and other historic resources, in addition to commercial property impacts adjacent to the portal areas on Hayden Island and downtown Vancouver.

Component Description

<u>RC-13 Tunnel to Supplement I-5</u>

This component would supplement the existing I-5 bridges with a multi-lane tunnel, with the existing I-5 bridges remaining in place. Several factors limit the possible alignment and design of a supplemental tunnel to a very narrow range of placement alternatives. In order to maintain the current bridges, match existing vertical grades of the land on each side of the River and meet freeway design standards, the tunnel would have to be configured as follows. On the Oregon side, the tunnel would surface and tie back into existing I-5 on the south end of Hayden Island. In Washington, the tunnel would connect north of SR 14 (just south of Mill Plain Boulevard). No connections would be available from the tunnel to the interchanges at Marine Drive (ramps from Marine Drive are too close to the south tunnel entrance), Hayden Island, SR 14, Mill Plain Boulevard, and SB 4th Plain Boulevard. Connections to these interchanges would be provided via existing I-5. Additionally, portions of I-5 where the tunnel resurfaces would require major reconstruction to tie back into the existing alignment.

Analysis

The analyses are summarized in accordance with the Step A criteria adopted as part of the Screening and Evaluation Framework. Also, it is worth noting that an upstream alignment was chosen for analysis so that river excavation volumes and impacts directly to downtown Vancouver could be minimized and/or avoided.

<u>Q1. Does the component increase vehicular capacity or decrease vehicular demand within the Bridge Influence Area?</u>

Although the tunnel will carry about 45 percent of the future I-5 traffic volume, the other 55 percent will continue to use the existing I-5 bridges. Since the lift span will still be in place, congestion and

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safety issues will still exist during lift periods. Also, in the areas where the tunnel surfaces and the realigned I-5 alignments tie back in, significant traffic turbulence is anticipated. Although not specifically analyzed, experience shows that merging 12 lanes into 6 is a challenging traffic scenario, with a high potential for driver confusion and numerous weaving movements.

Q3. Does the component increase freight mobility within the Bridge Influence Area?

Most of the existing interchanges within the Bridge Influence Area will not have access to the supplemental tunnel which will benefit through freight trips but restrict access to the new capacity provided by the tunnel. And, since the existing lift spans would remain in place, bridge openings will continue and be limited to off-peak hours. This would disproportionately impact freight movements, which tend to occur outside the peak periods.

Q4. Does the component improve safety and decrease vulnerability to incidents within the Bridge Influence Area?

Unless there is a complete reconstruction of the existing I-5 bridges to handle the 55 percent of traffic needing to use it, significant and continued safety concerns remain. These include seismic vulnerability, inadequate and unsafe shoulder and bike/pedestrian path widths, substandard vertical and horizontal alignments, and the remaining lift span still in place. If this reconstruction is envisioned to correct these deficiencies, than it is impractical to also build a parallel tunnel for cost reasons.

Other factors not included in Step A screening that are special conditions to consider for tunnel options:

Historic, Prehistoric, and Cultural Resources

RC-13 would likely result in severe impacts to significant archaeological and historic resources. The tunnel option would require cut-and-cover trenching up to 200 feet wide and up to 40 feet deep from the Washington shore of the Columbia River to about Evergreen Boulevard. This alignment is located in and around the Fort Vancouver Historic Preserve, which has known and undiscovered archaeological resources. Coordination to date with tribes, the National Park Service, and others suggests that there is a very high likelihood that numerous Indian burials occurred and are present in this area. Specific locations are unknown at this time. In addition, there are significant historic resources in the alignment of the proposed tunnel. Based on the existing available information and the current designs of river crossing components, the tunnel would result in the greatest amount of ground disturbance and would have the highest risk of resulting in the greatest potential impact to archaeological resources, in addition to impacts to known 4(f) resources.

Impacts to Threatened or Endangered Fish or Wildlife Habitat

This option would require dredging a trench approximately 200 feet wide and approximately 40 feet deep across the Columbia River. The in-water dredging would occur over multiple seasons and would produce over 1 million cubic yards (over 2 million for the entire tunnel) of dredge spoils. The impacts to water quality from a dredging project of this scale and duration could be significant. The potential impacts to threatened and endangered species is likely to be a significant concern to the National Marine Fisheries Service, greater than associated with the bridge options.

Cost of Construction

Although cost is not a consideration for this screening, on an order-of-magnitude comparison, the construction cost for a tunnel crossing could be in the range of twice that of a major bridge crossing. In addition, there would also be significant costs in rebuilding significant parts of I-5 in the portal areas so that the tunnel can resurface and tie back in to the existing alignment. In addition, much higher right-of-way costs on Hayden Island and downtown Vancouver would be necessary. Considering the uncertainty of project funding at this time, the magnitude of the higher costs could jeopardize funding.

Ongoing Maintenance and Operations Costs

The annual operations and maintenance costs for a tunnel of this length (5700 feet) would exceed $2 million, which is significantly more than for a major bridge crossing.

Conclusions and Recommendations

Although the tunnel provides some traffic operations benefit by splitting I-5 traffic, the tunnel option does not perform well against Step A screening criteria, especially compared to bridge options. In addition, the tunnel option would have potentially more severe impacts to some environmental resources without any unique and significant environmental advantages. It would also have greater right-of-way acquisition impacts, and overall much higher costs. For these reasons, RC-13 is not recommended for continued development.

Columbia River CROSSING

Memorandum

June 7, 2006

TO: Doug Ficco and John Osborn

FROM: CRC Transit Team

SUBJECT: Assessment of Operating Streetcars (TR-6) on Interstate MAX Tracks Recommendation to Eliminate Streetcars from Further Consideration

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Overview

This memorandum describes the results of a separate study to determine the feasibility of operating streetcars (transit component TR-6) on the Interstate MAX tracks within and south of the Bridge Influence Area.

During the February 2006 NEPA scoping process, a comment was received by the CRC project team to evaluate streetcars as a transit modal option within the Bridge Influence Area. The general concept suggested for the streetcar was a north-south alignment from downtown Vancouver to downtown Portland. The alignment would generally run from downtown Vancouver southbound over a new river crossing, through Hayden Island, and connect to the existing Interstate MAX tracks. The streetcar would then go southbound on the existing LRT tracks to downtown Portland.

Although the TR-6 Streetcar component passed Step A screening, subsequent analysis shows that interlining a streetcar system on the Interstate MAX right-of-way has safety, travel time, and capacity problems, and is technically infeasible. Prior to this analysis, it had been determined that streetcars operating on light rail tracks have the potential to 1) increase vehicular capacity or decrease vehicular demand within the Bridge Influence Area and 2) improve transit performance within the Bridge Influence Area. This finding was predicated on the ability of streetcars to operate on the Interstate MAX tracks all the way to downtown Portland, and thus serve all of the identified 2020 transit markets. On this assumption, streetcars were recommended to advance through the Step A and B screening processes.

The results of the subsequent analysis showed that streetcars could not use the existing Interstate MAX tracks, and thus would require all passengers to transfer to the Interstate MAX line. Since no other transit mode would require a transfer onto the Interstate MAX line, streetcars would have a distinct travel speed and travel time disadvantage vis-a-vis other transit modes and would have difficulty attracting enough passengers to decrease travel demand within the Bridge Influence Area. As a result, streetcars (TR-6) fail question #1 of Step A screening. The CRC Transit Team therefore recommends that streetcars (TR-6) be eliminated from future consideration.

Streetcar Description

Streetcar transit is similar to LRT and can operate in shared vehicle lanes in city streets, in separated lanes on urban arterials, or on its own exclusive track. It uses electrically powered rail cars, and has been implemented in San Francisco, Portland, Tampa, Tacoma, and other U.S. cities. Cities with streetcars typically range in population size from one to three million people, although some smaller cities have developed short streetcar segments as historic tourist attractions. On a per-mile basis, streetcar transit typically costs between $25 million to $50 million per mile. The cost of streetcar transit typically depends on station geometrics, whether existing right-of-way is already owned by the constructing agency, and how many utilities are relocated out of the streetcar's path. Compared to light rail, streetcar transit typically has the following major differences:

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Streetcars have significantly lower top operating speeds, primarily because they generally operate in shared right-of-way. Thus, streetcars are not typically used for long distance commuting, as other rail modes are better able to capitalize on long sections of track with no stops. Streetcar is typically an intra-urban mode with two- to three-block station spacing, whereas light rail is typically used as an inter-urban mode with half-mile or greater station spacing. The average vehicle speed of the Portland Streetcar is 6 MPH, while the Interstate MAX line operates at an average of 16 MPH.

Streetcars typically operate in general purpose traffic lanes, while light rail typically operates in its own exclusive right-of-way.

Figure 1: Typical Streetcar

Streetcars usually have less passenger capacity than light rail vehicles. In Portland, each streetcar carries a maximum load of 92 passengers, compared to 133 for a loaded LRT vehicle. LRT service is usually provided by two-vehicle trains (carrying up to 266 passengers), whereas streetcars usually operate as single trains to complete tight turns in urban areas and to minimize parking reductions.

Analysis of Interlining Streetcars and the Interstate MAX

Although light rail and streetcar are both rail modes that run on tracks with the same track gauge, they are designed to serve different purposes. The light rail system is designed to serve regional trips at relatively high speeds and high passenger capacities. The streetcar system is designed to serve local trips at relatively low speeds and moderate passenger capacities. Vehicle manufacturers such as Skoda-Inekon and Siemens design their LRT and streetcar vehicles differently to optimize vehicle performance in each environment. Manufacturers also have different vehicle specifications that make them incompatible with each other. Examples of this include:

1. LRT vehicles are designed to operate up to 55 mph. Portland's Skoda-Inekon streetcar can operate only up to 31 mph.
2. Streetcars do not have the same signal and communication equipment as light rail vehicles.
3. Streetcars lack a more crash-resistant body structure with anti-climbers at the proper height to prevent one train from telescoping into the body of the other train in a crash.
4. Streetcars are narrower than light rail trains and their platforms are a half-inch higher and more than four inches wider that light rail platforms.
5. Streetcars lack couplers and train-line connectors and cannot be run in two-car trains.
6. Streetcars have 1/3 the capacity of the typical two-car LRT train but about the same operating cost per mile.

While some vehicle specifications could be modified to address some of these concerns, the cost of building such a vehicle would be significant and would not significantly address safety, travel speed, and capacity issues.

Operating streetcars on light rail tracks would also introduce significant safety hazards that could not be avoided. Streetcar chassis are more fragile and less crash-resistant than light rail vehicles, and no streetcar design is currently equipped with anti-climbers. Thus, in a collision with a light rail vehicle, the light rail vehicle would ride over the chassis of the streetcar vehicle, owing to the different vehicle types. This is an unacceptable safety risk and a fatal flaw of interlined service.

Analysis of Requiring Transfers

The analysis above found that since streetcars do not have a viable connection to downtown Portland south of the Bridge Influence Area, all passengers would be required to transfer at the Exposition LRT Station to the Interstate MAX line to reach downtown Portland. Numerous technical studies conducted in the U.S. over the last three decades have concluded that requiring a transfer between transit vehicles decreases the number and frequency of passengers that would otherwise utilize the service.

All other transit modes considered as part of the CRC project would not require a transfer to the Interstate MAX line. For example, express buses and bus rapid transit modes from Clark County would not by necessity have to terminate their operations at the Interstate MAX line and require their passengers to transfer to reach downtown Portland. Express buses and bus rapid transit modes have the option to continue to downtown Portland either on I-5 in general purpose lanes or on the City of Portland's arterial street system. They do not by necessity require building a new transit right-of-way south of the bridge influence area. The express bus, bus rapid transit, and light rail transit modes all can provide a one-seat ride from downtown Vancouver to downtown Portland.

Requiring a transfer for all passengers within the bridge influence area significantly limits a streetcar's ability to improve transit travel time performance and serve the identified 2020 transit markets. As a result, streetcars would have difficulty attracting passengers and would not decrease travel demand within the Bridge Influence Area. Streetcars (TR-6) fail question #1 of Step A screening and the CRC Transit Team recommends that streetcars (TR-6) be eliminated from future consideration.

Conclusions and Recommendations

As a result of these findings, streetcars cannot operate on the Interstate MAX tracks and therefore fails Question #1 of Step A screening: "Does the component increase vehicle capacity or decrease travel demand within the Bridge Influence Area?" The findings indicate that without a connection to downtown Portland south of the Bridge Influence Area and requiring all passengers to transfer to the Interstate MAX line, streetcars would not serve the identified 2020 transit markets, would have difficulty attracting passengers, and would not decrease travel demand within the Bridge Influence Area. As a result, streetcars (TR-6) fail question #1 of Step A screening and the CRC Transit Team recommends that streetcars (TR-6) be eliminated from future consideration.

June 7, 2006

TO: Doug Ficco and John Osborn

FROM: CRC Transit Team

SUBJECT: **Screening of TR-11 Commuter Rail**

Overview

During NEPA scoping earlier this year, it was suggested that commuter rail operating on the existing Burlington Northern Sante Fe (BNSF) tracks could be a potential transit mode for the CRC project. This suggestion was evaluated in the Step A Screening process. The analysis concluded that, due to significant freight rail congestion, there is no excess rail capacity on the existing BNSF tracks. Commuter rail operating on the existing BNSF tracks is infeasible given this condition and would not improve transit performance within the bridge influence area. As a result, commuter rail failed question two of the Step A screening process and staff recommended that it not be advanced for further consideration.

At the May 17th CRC Task Force meeting the CRC Project team was asked to evaluate commuter rail under three operating conditions: 1) on the existing BNSF tracks; 2) on a new dual-track commuter rail alignment within the BNSF right-of-way; or, 3) on a new dual-track commuter rail alignment within the I-5 corridor. The analysis is summarized below for each of the three commuter rail operating conditions:

- **Commuter rail operating on the existing BNSF tracks is infeasible**. The project team reviewed its original Step A screening results and two previous commuter rail studies for the Portland/Vancouver area: the 1999 *RTC Commuter Rail Feasibility Study* and the 2003 *I-5 Transportation and Trade Partnership Rail Study*. These studies confirm that operating commuter rail on the existing BNSF tracks is infeasible because of insufficient capacity required to accommodate the frequency and timing of trains necessary for this type of service.
- **Commuter rail operating on a new dual-track alignment within the BNSF right-of-way is infeasible.** A new dual-track commuter rail alignment within the BNSF right-of-way to bypass the existing freight rail congestion would have significant environmental and cost impacts in comparison to the projected ridership. The CRC Transit Team has concluded that even under these assumptions a new commuter rail alignment would not serve the current and future 2030 transit markets. The BNSF right-of-way is west of the main transit markets, is dotted with freight rail crossings, threads its way through two large rail yards, and would have slower travel times due to out-of-direction travel. Based on this analysis, commuter rail operating on a new dual-track commuter rail alignment within the BNSF right-of-way is infeasible and would not improve transit performance within the bridge influence area.
- **Commuter rail operating on a new dual-track alignment within the I-5 corridor is infeasible.** A new analysis shows that building a new dual-track commuter rail alignment within the I-5 corridor would be a challenging and expensive undertaking. The analysis concludes that:
  - To serve the current and future 2030 transit markets a new 40-foot dual-track commuter rail right of way within the I-5 corridor would need to be assembled and constructed. The new right of way would need to be more than 15 miles long and connect Union Station in downtown Portland to Salmon Creek in Clark County.
  - The physical requirements of assembling and building a new 15 mile grade separated alignment within the already densely populated and urbanized I-5 corridor, could result in a large number of property acquisitions or easements, and would have significant environmental and cost impacts.

- Commuter rail requires vertical alignment grades less than 2%. The river crossing would need to be at a low level with a lift span to accommodate navigation needs, further impacting safety for river navigation.

Based on this analysis, commuter rail under its original and the two new operating conditions have been found to be infeasible and would fail question two of the Step A screening. Commuter rail is therefore recommended not to be advanced for further consideration as part of the Columbia River Crossing project. However, given that investments are anticipated to be needed in the future to serve projected growth In freight rail activity, as well as growth in inter-city passenger rail (i.e., Amtrak), it may be appropriate to re-consider the viability of commuter rail at the same time as when planning for other investments in the regional rail system.

Definition of Commuter Rail

Commuter rail train service is typically used for long distance travel between a central city, adjacent suburban areas, and other cities within a region. Commuter rail systems generally use diesel-powered locomotives with passenger rail cars and operate in existing railroad rights-of-way where excess rail capacity exists.

Figure 1: Typical Commuter Rail Train

Commuter rail service is typically provided during morning and evening peak commuting periods. Stations are located close to major activity centers and/or served by park-and-ride lots to assure maximum ridership.

Historically, commuter rail is often less expensive than other passenger rail modes because it operates on existing railroad rights-of-way where excess train capacity exists and shares tracks with freight operations. Since commuter rail typically operates in freight rail corridors, there are usually extensive negotiations with the active railroad for the privilege of sharing the right-of-way and an annual track fee is paid. **Figure 1** shows a typical commuter rail train.

Analysis

The analysis presented below describes how commuter rail under its original and the two new operating conditions were screened using the Step A process. The commuter rail options were screened against two of the six questions, which are:

Q1. Increase vehicular capacity or decrease vehicular demand within the Bridge Influence Area?

Q2. Improve transit performance within the Bridge Influence Area?

Commuter rail passed Question #1, but failed Question #2. Following is a more detailed analysis of the three operating conditions that were evaluated.

Operating Condition 1 – Commuter Rail operating on the Existing BNSF Tracks

During the Step A screening process transit component TR-11, Commuter Rail on Existing BNSF Tracks, was screened and failed question #2. To improve existing transit service in the Bridge Influence Area, commuter rail would have to be integrated with the existing bus and rail network, which is infeasible, as the technology would operate in a completely grade separated right-of-way well west of the current and future 2030 transit markets. In addition, while new commuter rail service along regional freight rail tracks could conceivably serve some transit markets in the Bridge Influence Area (e.g., North Portland), it would provide poor, out-of-direction service to some key activity centers (e.g., downtown Portland).

In 2003 there were 10 intercity Amtrak Cascades passenger trains that cross the BNSF Columbia River railroad bridge per day operating from Seattle to Portland. This compares to over 150 train movements made by BNSF and Union Pacific (UP) trains per day. In 20 years service plans anticipate 26 Amtrak Cascades passenger train crossings per day, effectively using any remaining rail capacity that exists, even without allowances for future growth in freight train activity.

The 1999 *RTC Commuter Rail Feasibility Study* evaluated new commuter rail service between Portland's Union Station and Vancouver's Amtrak Depot. From Vancouver two routes split off: one traveling north and east to Rye and one traveling east to Fisher's Landing. The need for three new stations was identified and three levels of peak-only service were selected: low, medium, and high. Under 2003 freight and intercity passenger rail conditions, the low and medium service alternatives were feasible with rail capacity improvements ranging from $36.6 million to $53.1 million (in 1998 dollars). By 2018, no commuter rail service alternatives could be mitigated to feasible delay levels.

The 2003 *I-5 Transportation and Trade Partnership Rail Study* found that there is insufficient capacity on the existing BNSF line to accommodate the frequency and timing of trains for commuter rail service. Nonetheless, the study evaluated a proposed commuter rail service on an improved freight rail system where 10 incremental projects were considered, at a cost of $170 million dollars (in 2002 dollars), to help relieve freight rail congestion. Assuming that the projects could be funded and constructed, the study still concluded that there was not enough rail capacity for a commuter rail operation. Interestingly, the study also found that even with the $170M in improvements, the average Amtrak Cascades passenger train speed would increase by only 2%.

Lastly, the 2003 *I-5 Transportation and Trade Partnership Rail Study* found that commuter rail service could only be instituted on a separated passenger rail-only network. In strongly worded policy statements it concluded that commuter rail operating on the existing tracks is an unacceptable outcome to the BNSF and the UP railroads. The previous work confirms that commuter rail operating on the existing BNSF tracks is infeasible and would not improve transit performance within the bridge influence area.

Operating Condition 2 – Commuter rail operating on a new dual-track alignment within the BNSF right-of-way

The second option for operating a commuter rail system within the Portland/Vancouver area is to add two new tracks within the BNSF right-of-way. A new track within the BNSF right-of-way would require a substantial capital investment in equipment and would require leasing the right-of-way from BNSF under a carefully crafted joint operating agreement.

The 1999 *RTC Commuter Rail Feasibility Study* found that a dedicated commuter rail alignment within the BNSF right-of-way was estimated to cost $450 to $750 million (in 1998 dollars), including property acquisition, environmental mitigation, main line reconfiguration and equipment. The *I-5 Transportation and Trade Partnership Study* estimated the cost of a separated passenger rail network within the BNSF right-of-way to be $1.5-1.7 billion dollars (in 2002 dollars), with uncertainty due to geologic and structural issues. The new tracks would require an acquisition of 35 residences, 7-12 industrial properties, and local street closures up and down the corridor. New tracks also increased the mainline footprint from 2 tracks to 4, filling in some wetlands along the way and triggering an unknown quantity of environmental restoration.

As noted in the previous section, the RTC Commuter Rail Feasibility Study found that, in 2003, the high commuter rail service alternative would require a dedicated alignment. In 2018 any level of commuter rail would need a dedicated alignment:

- **Dedicated Alignment Costs**: To increase capacity to make commuter rail feasible, the study considered a freight rail bypass above and below points of conflict with freight service between Vancouver and North Portland. Even under this scenario the dedicated alignment was estimated to cost $450 to $750 million (in 1998 dollars), including property acquisition, environmental mitigation, main line reconfiguration and equipment.

- **Operating Costs**: Approximate operating costs per train mile by service level were estimated as follows: Low - $90; Medium - $75; High - $55. This assumed a new agency would manage the commuter rail system. Cost recovery from fares and concessions would be less than 20% of operating costs; substantially less than most comparable services.
- **Columbia River BNSF Bridge**: Adding a third mainline to the Columbia River and Oregon Slough bridges would likely only push the chokepoints to where trains would merge into two tracks.

Both of the commuter rail studies concluded that commuter rail operating on a new dual-track alignment within the BNSF right of way is infeasible. Since freight rail capacity conditions have not significantly changed since the 1999 and 2002 studies, commuter rail operating on a new dual-track alignment within the BNSF right of way is infeasible and would not improve transit performance within the bridge influence area.

Operating Condition 3 – Commuter Rail on New Track within the I-5 Corridor

A third option for operating a commuter rail system to serve the transit market within the I-5 Corridor is to construct a new dual-track alignment along I-5. To construct a new track within the I-5 corridor would require a substantial commitment from both Washington and Oregon state legislatures and would surpass the Columbia River Crossing project in scope and magnitude. A successful commuter rail system would require a new 15 mile long corridor that is 40 feet wide, grade separated, with stations located every 4-5 miles. Such a system would serve the current and future 2030 transit market and provide frequent peak hour service of 30 minutes or less, and regular all day service.

Other significant findings are:

- To be consistent with City of Portland plans commuter rail service to downtown Portland would be required to go to Union Station. As such, a new dual track system to Union Station via the I-5 corridor would require two bridge crossings; one at the Columbia River and one at the Willamette River.
- A new dual-track commuter rail alignment within the I-5 corridor would need to serve the current and future 2030 transit markets, and would thus require building a new 40 foot grade separated right-of-way more than 15 miles long from Union Station in downtown Portland to Salmon Creek in Clark County.
- The physical requirements of assembling and building a new 15 mile long grade separated alignment within the already densely populated and urbanized I-5 corridor could result in a large number of property acquisitions or easements, and would have significant environmental impacts.
- Commuter rail would require an at-grade river crossing or one with a slope of 2% or less. All CRC river crossing options that had these lower slopes have been eliminated from further consideration due to unacceptable marine navigation impacts. A river crossing option that could feasibly carry commuter rail would likely result in a permanent negative impact to marine navigation.

A peer review was conducted as part of this analysis to determine how this potential commuter rail project would compare with other successful commuter rail projects around the U.S. The review included interviews with key project managers and research into four different commuter rail projects in Portland, Oregon; Nashville, Tennessee; Salt Lake City, Utah; and Seattle, Washington. Their feedback indicated that a commuter rail project built within the I-5 corridor, outside an existing rail corridor would be totally unique. These experts noted that other successful commuter rail projects have relied on three keys factors: utilizing excess rail capacity and resources, building stations that could attract thousands of passengers, and having a willing and helpful track owner.

A new commuter rail track within the I-5 corridor would also likely require other operational elements such as protected crossings, grade separated tracks; local street closures; compliance with safety regulations, regulations by the Federal Railroad Administration (FRA); compliance with existing railroad work rules and union agreements. A new track within the I-5 corridor would also require a substantial capital investment. Equipment capable of reaching speeds over 80 mph would be expensive and would require Class 1 railroad track with an in-cab signaling system.

Based on this analysis, assembling and building a new commuter rail railroad within the I-5 corridor is infeasible and would not improve transit performance within the bridge influence area.

Conclusions and Recommendations

The Step A screening process concluded, and the RTC and I-5 Transportation and Trade Partnership studies confirm, that commuter rail operating: 1) on the existing BNSF tracks; 2) on a new dual-track commuter rail alignment within the BNSF right-of-way; or, 3) on a new dual-track commuter rail alignment within the I-5 corridor fails question #2 of the Step A screening process because they are infeasible and would not improve transit performance within the Bridge Influence Area. Therefore, the CRC Transit Team recommends that commuter rail not be advanced for future consideration as part of the Columbia River Crossing project.

However, given that investments are anticipated to be needed in the future to serve projected growth In freight rail activity, as well as growth in inter-city passenger rail (i.e., Amtrak), it may be appropriate to re-consider the viability of commuter rail at the same time as when planning for other investments in the regional rail system.

Columbia River CROSSING

Memorandum

June 7, 2006

TO: Doug Ficco and John Osborn

FROM: CRC Transportation Planning Team

SUBJECT: Screening of B/P-3 Bicycle/Pedestrian Path-Only Bridge

Overview

In the process of integrating bicycle/pedestrian components into alternative packages, it has become apparent that the concept of a stand-alone bicycle/pedestrian bridge adjacent to I-5 and spanning the Columbia River should be removed from further consideration.

Component Description

Component B/P-3 is the construction of a new bridge across the Columbia River that would only provide a multi-use pathway for use by bicyclists and pedestrians. This new bridge, if constructed, would not be usable by other modes, including passenger vehicles, truck-freight, or transit.

Analysis

A stand-alone bicyclist and pedestrian bridge, without provision of added capacity on I-5 across the Columbia River for passenger vehicles, truck-freight, or transit, would not meet many of the project's Step A criteria as adopted as part of the Screening and Evaluation Framework.

All I-5 river crossing components, with the exception of tunnel options, would include a new or improved multi-use pathway as a part of their design. The proposed pathway for each of these components would meet or exceed current multi-use design standards. Thus, a stand-alone multi-use pathway would not be necessary.

For the river crossing tunnel options, a multi-use pathway would not be provided as a part of the tunnel, but could be provided on the existing Interstate Bridge under the Supplemental Tunnel component. For the Replacement Tunnel component, a stand-alone multi-use bicyclist and pedestrian bridge could provide a multi-modal connection, but such a structure may interfere with marine safety.

A stand-alone bicycle/pedestrian bridge was evaluated against some of the Step A criteria, as discussed below:

<u>Q1. Does the component increase vehicular capacity or decrease vehicular demand within the Bridge Influence Area?</u>

A stand-alone bicycle/pedestrian bridge, without providing added vehicular capacity or vehicular demand, will have little impact in reducing travel times and delay for passenger vehicles. There would be no discernable reduction in the number of hours of daily highway congestion in the I-5 corridor.

<u>Q2. Does the component increase transit performance within the Bridge Influence Area?</u>

A stand-alone bicycle/pedestrian bridge, without providing added transit capacity to I-5 within the Bridge Influence Area, would not reduce travel times and delay for transit modes.

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Q4. Does the component improve safety and decrease vulnerability to incidents within the Bridge Influence Area?

A stand-alone bicycle/pedestrian bridge, without improving key existing non-standard geometric and safety features on I-5 within the Bridge Influence Area, would not enhance vehicle or freight safety on I-5. A separate bridge will negatively impact navigation channel geometrics to accommodate ship movements considering necessary tug and barge turning maneuvers.

Q5. Does the component improve bicycle and pedestrian mobility within the Bridge Influence Area?

A stand-alone bicycle/pedestrian bridge across the Columbia River located in close proximity to touch-down existing facilities will perform well to improve bicycle and pedestrian mobility within the Bridge Influence Area.

Other Considerations

While cost is not part of the screening criteria at this time, it must be noted that a stand-alone bicycle/pedestrian bridge would be substantially more costly than integrating a bicycle/pedestrian path into a bridge constructed to also serve other purpose (e.g., highway or transit use). Also, the provision of a bicycle/pedestrian path on a multi-purpose structure would create fewer environmental impacts than would constructing a new highway/transit bridge and a separate bicycle/pedestrian bridge.

Conclusions and Recommendations

Component B/P-3, a stand-alone bicyclist and pedestrian bridge, would not meet many of the project's Step A criteria as adopted as part of the Screening and Evaluation Framework and is not recommended for continued development.

All I-5 river crossing components, with the exception of tunnel options, include a new or improved multi-use pathway as a part of their design. The proposed pathway for each of these components would meet or exceed current multi-use design standards. Thus, a stand-alone multi-use pathway would not be necessary.

For the river crossing tunnel options, a multi-use pathway would not be provided as a part of the tunnel, but could be provided on the existing Interstate Bridge under the Supplemental Tunnel component. For the Replacement Tunnel component, a stand-alone multi-use bicyclist and pedestrian bridge could provide a multi-modal connection, but such a structure may interfere with marine safety.

Columbia River CROSSING

Memorandum

June 7, 2006

TO: Doug Ficco and John Osborn

FROM: CRC Transportation Planning Team

SUBJECT: Screening of F-3 Time of Day Freight Truck Restrictions on I-5

Overview

Freight components were not included in the initial Step A screening that focused only on River Crossing and Transit components, because the list of components was short and it was not expected that screening would significantly reduce the options that needed to be analyzed. However, in the process of integrating freight components into alternative packages, it has become apparent that the concept prohibiting truck-freight use on I-5 during peak commuting periods within the I-5 Bridge Influence Area should be removed from further consideration. It does not meet Step A criteria for improving freight mobility within the Bridge Influence Area.

Component Description

Component F-3 proposes to prohibit truck-freight use of I-5 (within the Bridge Influence Area) during peak commuting periods.

Analysis

Prohibiting truck-freight use along I-5 within the Bridge Influence Area would not meet the project's Step A criteria as adopted as part of the Screening and Evaluation Framework.

Q3. Does the component improve freight mobility within the Bridge Influence Area?

Such a restriction would significantly impact freight mobility, affect freight access to key origins and destinations, and would divert vehicle-moved freight to other routes, including other highways and arterial roadways. The prohibition of truck-freight use on I-5 within the Bridge Influence Area during peak commuting periods would result in truck trips being diverted along other highways and arterial roadways, resulting in increased travel times and added delays for vehicle-moved freight in the I-5 corridor. Peak prohibition of truck-freight would also restrict access to port, freight, and industrial facilities, many of which are located within the Bridge Influence Area.

Other factors not included in Step A screening criteria that are special conditions to consider.

The restriction of truck traffic on I-5 would be contrary to federal and state policy.

The prohibition of truck-freight use on I-5 within the Bridge Influence Area during peak commuting periods would result in truck trips along other highways and arterial roadways, thereby likely increasing the magnitude of residential properties affected by increased noise levels and potentially diminished air quality.

Conclusions and Recommendations

Component F-3, the proposal to prohibit truck-freight use of I-5 (within the Bridge Influence Area) during peak commuting periods, would not meet the project's Step A criteria as adopted as part of the Screening and Evaluation Framework and is not recommended for continued development.

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Such a restriction would significantly hinder freight mobility, affect freight access to key origins and destinations, and would divert vehicle-moved freight to other routes, including other highways and arterial roadways.

Columbia River CROSSING

Memorandum

June 7, 2006

TO: Doug Ficco and John Osborn

FROM: CRC Transportation Planning Team

SUBJECT: Screening of F-4 Increased Freight Truck Size on I-5

Overview

In the initial process of considering the integration of freight components with river crossing components, it has become apparent that the concept of allowing increased freight truck size along the I-5 corridor, including within the Bridge Influence Area, should be removed from further consideration.

Component Description

Component F-4 proposes the use of increased freight truck size along the I-5 corridor, including within the Bridge Influence Area. Component F-4 proposes the development of a policy to enable use of larger trucks on I-5.

Analysis

Allowing the use of larger semi-trailers than are currently legally allowed on I-5 in both Washington and in Oregon is beyond the scope of the Columbia River Crossing project study and would require action by both states. Enabling larger truck use on I-5, or any other highways, could result in freight mobility, safety, traffic, operational, and environmental implications that affect more than just the project study area.

Conclusions and Recommendations

Component F-4, the proposal to allow the use of increased freight truck size along the I-5 corridor, including within the Bridge Influence Area, would require policy actions by both Washington and Oregon and could result in implications that affect more than just the Columbia River Crossing study area. It is therefore recommended that this component not be developed further for this study.

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Columbia River
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DRAFT COMPONENTS STEP B SCREENING REPORT

June 9, 2006

DRAFT COMPONENTS STEP B SCREENING REPORT

June 9, 2006

Columbia River CROSSING

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ACRONYMS

AA	Alternatives Analysis
ADA	Americans with Disabilities Act
AGT	Automated Guideway Transit
BNSF	Burlington Northern Santa Fe Railroad
BRT	Bus Rapid Transit
CRC	Columbia River Crossing
CRD	Columbia River Datum
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HOV	High Occupancy Vehicle
I-5	Interstate 5
LRT	Light Rail Transit
NEPA	National Environmental Policy Act
ODOT	Oregon Department of Transportation
PDX	Portland International Airport
PRT	Personal Rapid Transit
RTC	Regional Transportation Council
RC	River Crossing
SOV	Single Occupant Vehicle
TR	Transit
TSM/TDM	Traffic System Management/Traffic Demand Management
WSDOT	Washington State Department of Transportation

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1. Overview of Evaluation Process

In 1998, in response to evidence of growing congestion in the Portland-Vancouver I-5 corridor, leaders in the region came together to study the problem and potential solutions. This effort continues today as the Columbia River Crossing (CRC) Project Team works to identify and refine appropriate solutions to improve mobility and livability in the I-5 corridor. This current effort builds upon previous studies and will narrow potential transportation solutions to those that best meet the Purpose and Need Statement and Vision and Values Statement identified for the corridor.

The screening and evaluation of potential transportation improvements is part of the I-5 CRC Alternatives Analysis (AA) and the Environmental Impact Statement process. There are several steps to screening and evaluation. In Step A, a broad range of potential transportation improvements (also known as “components”) was initially screened against up to six pass/fail questions derived directly from the project’s Problem Definition. To determine if each component offers an improvement, it was compared to the No Build condition, which includes transportation improvements adopted in the regional transportation plans, but no additional improvements at the Columbia River crossing. In Step A, a component was eliminated from further consideration if it failed (characterized as a fatal flaw) any of the questions that pertain to that component. Through Step A screening, the initial list of 14 transit components was narrowed to seven (7) and the initial list of 23 river crossing components was narrowed to nine (9).

In Step A, only the transit and river crossing components were screened. Components in the Pedestrian, Bike, Freight, Roadways, and TSM/TDM categories were not evaluated because their performance would depend upon how they were integrated with promising transit and/or river crossing improvements. Components in these categories (e.g., Ramp Queue Jump Lanes) could be implemented in a wide variety of ways, and will be paired with complementary transit and river crossing components during alternatives packaging, described subsequently in this report. Readers should refer to the *Components Step A Screening Report* for more information regarding the Step A methods and findings.

1.1 Step B Screening Findings and Conclusion

While each of the seven transit and nine river crossing components that advanced through Step A screening has its respective strengths and weaknesses, the Step B screening found that there are relatively few dramatic differences between the remaining components, and that these differences are not large enough to warrant completely eliminating any additional river crossing or transit components from further consideration. The next sections of this report describe some of the key findings from the Step B screening, and also describe staff recommendations regarding how to proceed based on these findings.

1.2 What's Inside

This *Components Step B Screening Report* describes how the narrowed range of components was further evaluated and screened, and presents the results of that screening. Components advanced from this second round of screening will be packaged into multi-modal alternative packages. These alternative packages will then be further evaluated and screened using the same Step B performance measures and new data. Subsequently, a short-list of the most promising alternatives will be advanced into the I-5 CRC Draft Environmental Impact Statement (DEIS).

The AA and DEIS will be published in late 2007, and will provide analysis and findings to help the public and agencies to understand the consequences, characteristics and other considerations associated with these alternatives. This will also help inform recommendations and decisions regarding a preferred alternative.

2. Step B Methods

In Step B component screening, the transit and river crossing components that passed through the Step A screening process were evaluated further against Step B performance measures identified in the *Project Evaluation Framework*, which directly reflect the values adopted in the Task Force's *Vision and Values Statement*. As mentioned previously, components in the freight, roadways, pedestrian, bike, and TSM/TDM categories were not evaluated in Steps A and B, but rather will be paired with complementary transit and river crossing components during alternatives packaging.

For analysis purposes, the Step B measures were grouped into 10 categories relating to distinct community values. These categories are:

1. Community Livability and Human Resources
2. Mobility, Reliability, Accessibility, Congestion Reduction, and Efficiency
3. Modal Choice
4. Safety
5. Regional Economy, Freight Mobility
6. Stewardship of Natural Resources
7. Distribution of Benefits and Impacts
8. Cost Effectiveness and Financial Resources[1]
9. Growth Management/Land Use[1]
10. Constructability[1]

Measures in categories 8 through 10 (Costs, Growth Management, Constructability) were not considered in Step B screening of components, and instead will be assessed subsequently during alternatives package screening and/or alternative evaluation.

In Step B, project staff evaluated each of the remaining transit and river crossing components using data drawn from previous transportation and environmental studies, conceptual river crossing designs, and professional experience. The components were evaluated based on their ability to satisfy the performance measures *relative to other components in the same category*. The appendix describes in more detail the specific performance measures that staff addressed, and issues and data that staff considered.

[1] Criteria in these categories were not applied in Step B.

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3. Step B Evaluation of Transit Components

Six transit components passed Step A screening and were assessed using Step B screening on performance measures in three of the 10 community values categories. The three categories are:

2. Mobility, Reliability, Accessibility, Congestion Reduction, and Efficiency
3. Modal Choice
5. Regional Economy, Freight Mobility

Measures in the other categories (e.g., residential displacements, safety) were not addressed because the necessary information (e.g., detailed transit alignments) has not been developed yet. In Step B, the transit components were assessed based on their typical modal attributes and based on findings from previous I-5 studies. Readers should refer to the *Components Step A Screening Report* for descriptions of the transit components that were assessed in Step B:

- TR-1 Express Bus in General Purpose Lanes
- TR-2 Express Bus in Managed Lanes
- TR-3 BRT Lite
- TR-4 BRT Full
- TR-5 Light Rail
- TR-6 Streetcar

3.1 Key Findings

This section describes some of the key findings for the transit components. This information will be considered when the transit components are subsequently paired with river crossing and other components (e.g. TDM/TSM) to create logical and potentially effective alternatives packages.

Disclaimer: *The following results were produced during the I-5 Partnership Study and represent transit modal characteristics on a general scale. The CRC project team will re-evaluate the transit modes to better define and estimate the potential performance of each mode in the 2030 forecast year.*

3.1.1 Mobility, Reliability, Accessibility, Congestion Reduction, and Efficiency

1. Based on modeling completed for the I-5 Partnership, *transit travel times* would be faster for modes operating in their own right-of-way or exclusive lanes. Modeling completed for that study resulted in the following PM peak period transit travel times from downtown Portland to Downtown Vancouver in year 2020:

    a. Express Buses in General Purpose Lanes = 40 minutes

    b. Express Buses in Managed Lanes = 35 minutes

   c. BRT-Full = 25 minutes

   d. Light Rail = 25 minutes

   Streetcar service was not modeled in the I-5 Partnership Study, but based on streetcar's typical operating speeds, this same trip is estimated to take approximately 50 minutes.

2. Based on the year 2020 modeling, *transit ridership* would be highest for modes operating in their own right-of-way, and with higher carrying capacities (discussed in the next section). The modeling resulted in the following PM peak period transit ridership for all transit service crossing the Columbia River in both directions:

   a. Express Buses in General Purpose Lanes = 6,500 riders

   b. Express Buses in Managed Lanes = 9,000 riders

   c. BRT-Full = 10,500 riders

   d. Light Rail = 12,500 riders

   Streetcar service was not modeled in the I-5 Partnership Study, but based on streetcar's typical operating characteristics, ridership is estimated to be approximately 6,500 riders.

3. Transit modes that operate in exclusive rights-of-way and capture enough trips to reduce passenger vehicle demand in the I-5 corridor and within the Bridge Influence Area would result in the greatest *reduction in travel times and delay, reduce the number of hours of daily highway congestion, and improve vehicle throughput in the I-5 corridor and within the Bridge Influence Area*. Bus rapid transit-full and light rail transit would best meet these objectives, followed by express buses in managed lanes and bus rapid transit-lite.

3.1.2 Modal Choice

1. Based on typical transit vehicle types, seating capacities, and service frequencies, the following *transit carrying capacities* during a peak hour could be expected in the Bridge Influence Area:

   a. Express Buses in General Purpose Lanes = 3,000 to 10,000 passengers per day

   b. Express Buses in Managed Lanes = 4,000 to 15,000 passengers per day

   c. BRT-Full = 10,000 to 25,000 passengers per day

   d. Light Rail = 10,000 to 25,000 passengers per day

   e. Streetcar = 4,000 to 12,000 passengers per day

2. Regarding *service flexibility* and the *ability to serve the I-5 transit markets*, the bus-based components are potentially able to provide direct service to all of the I-5 markets because they can operate on virtually any roadway. In comparison, the rail-based components (light rail and streetcar) would directly serve only a few Clark County markets (e.g., downtown Vancouver), because the transit service cannot leave its dedicated right-of-

way, and the rail alignment terminus would be located within the narrowly defined Bridge Influence Area. However, they would provide access to much of the C-TRAN service area with a transfer. Transit support service can be designed to maximize its potential to capture transit market outside the I-5 Bridge Influence Area and broader I-5 corridor.

3. Transit modes that operate in exclusive rights-of-way and capture enough trips to reduce passenger vehicle demand in the I-5 corridor and within the Bridge Influence Area have the greatest potential to *increase vehicle occupancy in the I-5 corridor and within the Bridge Influence Area*. Bus rapid transit-full and light rail transit would likely best meet these objectives, followed by express buses in managed lanes and bus rapid transit-lite.

3.1.3 Regional Economy, Freight Mobility

1. Transit modes that operate in exclusive rights-of-way and capture enough trips to reduce passenger vehicle demand in the I-5 corridor and within the Bridge Influence Area would result in the greatest *reduction in travel times and delay for vehicle-moved freight, reduce the number of hours of congestion for vehicle-moved freight, and improve truck throughput in the I-5 corridor and within the Bridge Influence Area*. Bus rapid transit-full and light rail transit would best meet these objectives, followed by express buses in managed lanes and bus rapid transit-lite.

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4. Step B Evaluation of River Crossing Components

This section describes the results of the Step B evaluation of river crossing components. The nine river crossing components that passed Step A screening were assessed on performance measures in seven of the 10 community values categories under Step B component screening. These seven categories are:

1. Community Livability and Human Resources
2. Mobility, Reliability, Accessibility, Congestion Reduction, and Efficiency
3. Modal Choice
4. Safety
5. Regional Economy, Freight Mobility
6. Stewardship of Natural Resources
7. Distribution of Benefits and Impacts

Readers should refer to the *Components Step A Screening Report* for descriptions of the river crossing components that were assessed in Step B:

- RC-1 Replacement/Downstream/Low-Level/Moveable Bridge
- RC-2 Replacement/Upstream/Low-Level/Moveable Bridge
- RC-3 Replacement/Downstream/Mid-Level Bridge
- RC-4 Replacement/Upstream/Mid-Level Bridge
- RC-7 Supplemental/Downstream/Low-Level/Moveable Bridge
- RC-8 Supplemental/Upstream/Low-Level/Moveable Bridge
- RC-9 Supplemental/Downstream/Mid-Level Bridge
- RC-13 Tunnel to Supplement I-5
- RC-23 Arterial Supplemental Bridge

4.1 Key Findings

This section describes some of the key findings for the river crossing components. This information will be considered when the river crossing components are subsequently paired with transit and other components (e.g. TDM/TSM) to create logical and potentially effective alternatives packages.

4.1.1 Community Livability and Human Resources

1. The above-ground river crossing components would not have significantly different impacts regarding residential exposure to unacceptable traffic noise levels. In comparison, the tunnel option would subject fewer residences to traffic noise.

2. None of the river crossing components appears likely to result in significant residential displacements. As design advances, this may change.

3. Business displacement impacts would be roughly equivalent for all crossing options.

4. The above-ground river crossing components would not have significantly different impacts to known historic, archeological, and resource properties, although the impacted locations would differ. Resources that could be impacted include: Fort Vancouver, Old Apple Tree Park, Jantzen Beach, the Columbia River Bridges (historic structures), and/or the Downtown Vancouver District. In comparison, the tunnel option would preserve the historic bridges but could have greater impacts to archeological resources.

5. Similarly, the above-ground river crossing components would not have significantly different impacts to parks and recreation lands, although the impacted locations would differ. Resources that would be impacted include: Old Apple Tree Park, Waterfront Park, and/or Fort Vancouver.

4.1.2 Mobility, Reliability, Accessibility, Congestion Reduction, and Efficiency

The Step B analysis focused on the impacts the river crossing components would have on Light Rail Transit only, as Express Bus and Bus Rapid Transit service would be largely unaffected by the location or height of a replacement or supplemental highway bridge. (It should be noted, however, that *bus transit* would perform worse under RC-23 Arterial Supplemental Bridge, since buses would remain in the existing I-5 general purpose lanes, which have sub-standard designs.)

1. Transit throughput and delay is affected by bridge lifts. All of the replacement or supplemental highway bridges would be built high enough to allow all barges (comprising over 90% of river traffic) to pass under it. Therefore, bridge lifts would be infrequent (perhaps once a week) and would not be allowed during peak commuter periods.

2. Light rail operating on an existing I-5 bridge would be affected by relatively more bridge lifts throughout the day, even if a peak-period bridge lift moratorium remained in effect.

3. Light rail travel times on an existing I-5 bridge would be slower than on a new bridge due to steep grades with inadequate vertical curves, and would likely have tighter turns at the

ends of the bridge. For RC-23 Arterial Supplemental Bridge, light rail would probably operate on the new arterial bridge, and the grade and turn problems would be reduced.

4. If light rail were to operate on a supplemental highway bridge, it would be difficult, expensive, and impactful to integrate with RC-8 Supplemental/Upstream/Low Bridge. This connection would require the tracks to cross over the existing I-5 traffic lanes, resulting in a Hayden Island station elevated more than 40 feet in the air. In addition, the tracks could not go over the existing bridge superstructures and would have to go around the bridge ends, resulting in awkward geometry and very slow transit movements. RC-8 therefore assumed that light rail would operate on an existing I-5 bridge.

5. Assuming increased I-5 capacity is provided, all of the replacement and supplemental bridge components located within the I-5 corridor (RC-1 through RC-12, plus RC-23) would likely result in the *reduction in travel times and delay, reduce the number of hours of daily highway congestion, and improve vehicle throughput in the I-5 corridor and within the Bridge Influence Area.*

4.1.3 Modal Choice

1. Transit alignments that can go under the BNSF berm that parallels SR-14 (i.e. low-level bridges) will provide better connectivity and redevelopment opportunities at Vancouver's waterfront west of the I-5 Bridge, and low-level bridges would best provide for nearby LRT stations. However, they introduce delays to service due to bridge lifts with varying effects based on the height of the bridge.

2. Mid-level replacement bridges allow light rail to clear the BNSF berm and match street grades by 6th St.

3. The RC-9 Supplemental/Downstream/Mid-Level Bridge would be more than 20 feet higher than a Replacement Bridge at the BNSF berm (to provide higher clearance over the north shipping channel). The RC-9 alignment could not allow an LRT alternative to match downtown street grades until north of 6th Street. Local traffic and bus circulation would be significantly impacted, requiring the southern-most transit station to be located further north.

4. All of the replacement and supplemental bridge components located within the I-5 corridor (RC-1 through RC-12 and RC-23) would provide an improved multi-use pathway for pedestrians and bicyclists across the Columbia River, thereby substantially *improving bicyclist and pedestrian mobility and connectivity in the I-5 corridor and within the Bridge Influence Area*. None of the other components would improve bicyclist and pedestrian mobility, as none of them would provide a multi-use pathway.

5. Assuming that I-5 corridor improvements (e.g., RC-1 through RC-12, plus RC-23) would all be constructed with managed lanes, moderate levels of vehicular occupancy would be expected along I-5.

4.1.4 Safety

1. The existing bridges do not meet current design standards and have a design speed of only 35 mph. Replacement or supplemental low-level bridges would provide for better (i.e. standard) connections at SR-14 and Hayden Island. A lower profile would also have flatter grades on I-5 benefiting truck/freight operations. Mid-level crossings would have steeper grades on I-5 and may make connections to SR-14 and Hayden Island more difficult, but still within safety guidelines.

2. All potential crossings would improve bike and pedestrian connectivity by improving facilities on the existing bridges or including new facilities on new crossings (except for a tunnel).

3. A downstream alignment would hinder marine navigation by making it more difficult for river traffic to line up with the railroad bridge downstream, whereas an upstream alignment would be less restrictive[2]. A low-level bridge would limit the height of traffic that can pass under the bridge without a lift operation, whereas a mid-level bridge would allow most marine vessels (including all identified commercial marine traffic) to pass under. Any option that retains the existing I-5 bridges creates a significant challenge for marine traffic, which would have to navigate multiple sets of piers in the water.

4. Supplemental bridge components, which retain the existing I-5 bridges, would have the most encroachment into the Pearson Airpark airspace due to the existing tower heights. Potential downstream alignments are further away from Pearson Airpark, resulting in less encroachment into the airspace. Low level crossings also result in less encroachment. Conversely, upstream alignments or mid-level structures result in more encroachment into the airspace.

5. All new replacement or supplemental bridges (or tunnels) would be designed to withstand a seismic event. Retaining the existing I-5 bridges would require significant retrofits in order to withstand a seismic event.

6. All of the new highway crossings would greatly improve incident/emergency response as they would all provide full shoulder widths.

4.1.5 Regional Economy, Freight Mobility

1. Regarding marine traffic, keeping the existing I-5 bridges would maintain the "no lift" period. Building a replacement low-level bridge would shorten the "no lift” period because the new closed position would be higher than the current closed position. A replacement mid-level bridge would be a fixed bridge, and would eliminate the "no lift" period.

2. Assuming increased capacity for I-5 is provided, all of the replacement and supplemental bridge components located within the I-5 corridor (RC-1 through RC-12, plus RC-23) would result in the *reduction in travel times and delay for vehicle-moved freight, reduce*

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[2] Moving the span in the railroad bridge is a potential solution to address navigational problems.

the number of hours of congestion for vehicle-moved freight, and improve truck throughput in the I-5 corridor and within the Bridge Influence Area.

4.1.6 Stewardship of Natural Resources

1. The above-ground river crossing components do not have significantly differing impacts to fish and wildlife habitat and endangered species. The tunnel option, however, would have greater impacts due to the trenching needs for the tunnel. This would also likely have greater impact to sensitive archeological resources and upland historic resources.

2. None of the river crossing components appear likely to have adverse impacts to threatened or endangered plant species. However, plant surveys have not been completed to date.

3. The current design footprints show no impacts to known wetlands. Further investigation will occur in summer 2006.

4. Options that provide a supplemental bridge or tunnel would increase impervious surfaces and have potentially greater impacts on water quality compared to options that replace the existing I-5 bridge.

4.1.7 Distribution of Benefits and Impacts

1. The current design footprints show that all of the river crossing components would have a low likelihood for residential property acquisition and would have similar traffic noise impacts in residential areas. There is a small potential for disproportionate impacts to low income and minority populations associated with the river crossing components. This will be further evaluated when the river crossing components are packaged into complete alternatives for further study prior to the draft EIS.

2. Other impacts, such as travel time benefits, are likely to affect residents throughout the I-5 corridor (i.e. north and south of the Bridge Influence Area), and disproportionate impacts will be identified later in the project.

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5. Staff Recommendations

The Step A and Step B screening are the first steps in the complete project Screening and Evaluation Framework, which was developed before the full list of components was known (i.e. prior to the component scoping process). The intent of the Step B screening was to subject the components remaining after Step A to a more detailed set of criteria and scrutiny, so that only the most promising and potentially effective components would be advanced into alternatives packaging and modeling.

During the Step A screening a significant number of components (nearly half) were eliminated from further consideration. Thus, the number of components to be considered in Step B was fewer than originally envisioned, and the findings presented in this report show that the expected performance and impacts of the components do not differ significantly.

Project staff recommends that all the transit and river crossing components evaluated in this report remain viable components for alternative packaging, and that none be removed from further consideration based on this Step B screening. Key reasons for this recommendation are:

- The replacement bridge, supplemental bridge and tunnel components each have their respective strengths and weaknesses. This evaluation does not reveal any “fatal flaws” or conclusive “winners”. It is also possible that some differences in performance and impacts can be lessened pending further engineering, operations, and construction analysis.
- Transit components TR-1 Express Buses in General Purpose Lanes and TR-6 Streetcar are expected to perform worse than the other transit components. These components should be retained, however, for the following reasons:
  - TR-1 should be retained because this component will be part of at least one low-investment alternative that will be modeled (e.g., the No-Build and TSM/TDM alternatives). In addition, in the event that the project is not able to reach consensus regarding more promising transit options (e.g., transit in its own right-of-way, or in managed lanes), new general purpose capacity could still potentially improve transit operations compared to current conditions.
  - TR-6 should be retained pending further analysis by TriMet. TriMet is conducting a separate study to determine the feasibility of operating streetcars in the Interstate MAX right-of-way from Expo to Rose Quarter or downtown Portland. Issues that are being studied include:
    - Technology compatibility (streetcars are shorter and narrower than light rail vehicles, and have lower top operating speeds)
    - Transit operations (e.g. headways, signaling, additional trackage)
    - Safety (i.e. in a collision, how would different vehicle types fare?)

    The results of the TriMet analysis will be presented in a separate report.

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6. Next Steps – Alternatives Packaging

The alternative packaging step of the project will bring together for further development and evaluation all of the various components that passed through the Step A and B screening. The alternative packages that result will be considered in more detail over the next several months, and by late 2006, project staff will begin presenting the results of the analyses, including the application of the evaluation criteria, to compare and contrast each alternative package.

Ideas from each of the eight component categories will be combined to form project alternative packages. The principles used to form the alternatives include:

1. All components that pass Step A will be considered for inclusion in one or more alternatives.
2. Alternatives should be organized by theme – for example, what is (are) the key feature(s)?
3. Alternatives should represent a full range of potential transportation solutions, within the limits of the components that have passed Step A (those that have been determined to address the Purpose and Need).
4. Complementary components should be packaged together.
5. Alternatives should be structured to identify strengths and weaknesses of individual components.
6. Well-performing components may be re-packaged with other alternatives for the DEIS.

The packaged alternatives will be developed primarily to test individual components. Staff expects that the alternatives subsequently selected for consideration in the DEIS will include hybrids of the alternatives that are evaluated this spring and summer.

Under the National Environmental Policy Act (NEPA), one of the alternatives considered must be a no-build alternative. It will include only existing facilities and services, as well as projects in the adopted Metro and Southwest Washington regional transportation plans that can be reasonably anticipated for construction. Another alternative that will be considered will focus on transportation demand management (TDM) policies and techniques, without major capital investments in either roadways or high capacity transit (although this would include additional regular bus service to reduce auto demand).

Beyond these initial two alternatives, others will focus on a mix of investments in transit, roadway capacity, and components from each of the other groups (river crossing, freight, etc.). As an organizing principle, the alternatives will represent a range of investment scenarios, from those with a transit-intensive focus, to a more balanced transit/roadway approach, to a roadway capacity focus.

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7. Appendix – Detailed Step B Screening Methods

The following table (**Table A-1**) presents the methodology used by the project team in conducting Step B screening. The table summarizes the adopted Step B screening criteria and associated performance measures. It also summarizes information gathered to support screening and any considerations that affected screening.

Table A-1. I-5 Columbia River Crossing - Draft Evaluation Framework

Step B: Component Screening Measures and Proposed Approach – January 17, 2006

Component Screening Measure		Question	Information Sources and Methods	Considerations or Caveats
Number	**Description**			
Community Livability and Human Resources				
1.1	Magnitude of residential properties within approximate noise impact contour	How many residential properties will fall within the 66 dBA (WA) or 65 dBA (OR) residential noise impact contour?	This will use 2020 traffic model runs; peak hour and peak truck hour traffic information with vehicle splits from traffic consultant. Contours from this data will be overlaid upon taxlot data in GIS format from Metro RLIS and Clark County	Analysis will be based on a 2-dimensional analysis and preliminary alignments and will not be as accurate as 3-dimensional modeling with preliminary design information. It will allow a general comparison of alternatives.
1.4	Magnitude of residential properties crossed by component's conceptual footprint	How many residential units fall within the design area footprint?	Tax lot data and land use information in GIS format from Metro RLIS and Clark County. Building permit data from cities of Portland and Vancouver will supply the number residential units for each parcel.	Must account for multi-family uses.
1.5	Magnitude of commercial/industrial properties crossed by component's conceptual footprint	How many commercial or industrial properties fall within the design area footprint?	Tax lot data and land use information in GIS format from Metro RLIS and Clark County. Field surveys will verify the number of business impacted. Acres and number of businesses will be averaged to produce one value.	May also consider the number of jobs for each commercial or industrial property. Note: Another impact, equally significant as a "hit" may be the loss of accessibility. We're assuming that information necessary to screen for this won't be available until further in the alternatives development process.

1.6	Magnitude and significance of historic, archaeological and cultural (i.e., TCP) resource properties within conceptual footprint.	How many historic, archaeological, and cultural (i.e., TCP) properties fall within the design area footprint by the following categories? · National Register listed · Potentially eligible, as determined by historic resources tech team. · National Historic Site What it the total acreage of these properties?	Tax lot data from Metro RLIS and Clark County. Historic Resources information from Clark County and SHPO, review by tech team (historic). Area (acres) of impact to districts, and number of sites impacted will be measured. These will be averaged to produce one value.	Will require coordination with historic resources tech team to review questionable resources.
1.7	Magnitude and significance of public park and recreation resources crossed by component's conceptual footprint	How many 4(f) public parks fall within the design area footprint?	Tax lot data and public parks from Metro RLIS and Clark County Area of impact to 4(f) properties, area impact to districts, and number of 4(f) historic properties will be measured. These will be averaged to produce one value.	May require some data input from field maps and/or local jurisdiction maps on some parks in Oregon. Schools and 6(f) records should be included in this analysis.
Mobility, Reliability, Accessibility, Congestion Reduction, and Efficiency				
2.1	Potential (on a qualitative scale) for component to improve peak period passenger vehicle travel times and delay in the I-5 corridor and within the bridge influence area	Average general purpose travel times	2020 traffic model runs and estimates.	
2.2	Potential (on a qualitative scale) for component to reduce peak period travel time and delay for transit vehicles in the I-5 corridor and within the bridge influence area	• Average transit vehicle speeds by mode • River crossing profiles	• For river crossings, upstream bridges that add travel time and delay for transit vehicles accessing downtown Vancouver will be ranked lower over comparable downstream bridges • For TDM/TSM, components that increase transit vehicle speeds will rank higher than those that do not	• Vehicle speeds for various transit modes modeled in partnership work • Average transit vehicle delay in I-5 corridor was modeled in partnership work

			• This criteria is not applicable to bike, pedestrian, and freight components	
2.3	Potential (on a qualitative scale) for component to reduce the number of hours of daily highway congestion in the I-5 corridor and within the bridge influence area	How much will the component reduce the duration of congestion compared to No Build conditions?	2020 traffic model runs and estimates.	
2.5	Potential (on a qualitative scale) for component to increase the level of persons crossing Columbia River via I-5 by mode	• Average transit ridership by mode • River crossing profiles	• For river crossings, bridge options that provide a fixed (not-movable) span will be ranked higher over other bridge options with movable spans • For TDM/TSM, components that encourage multiple occupant vehicles (HOV, etc.) will rank higher than those that do not • This criteria is not applicable to bike, pedestrian, and freight components	• Average transit ridership, and transit revenue hours, modeled and reported in partnership work • Average transit industry ridership statistics can also be used
2.6	Potential (on a qualitative scale) for component to increase the level of vehicles by mode crossing Columbia River via I-5	How many vehicles can a component serve?	2020 traffic model runs and estimates.	
Modal Choice				
3.1	Potential (on a qualitative scale) for increasing transit capacity as a percentage of total daily capacity and peak period capacity across the I-5 Columbia River bridge	• Average transit carrying capacity by mode	• For river crossings, bridge options that provide for an at-grade transit alignment at the BNSF rail line will rank higher than those where the transit alignment is elevated over the BNSF rail line	• Criteria measures *capacity* and not *ridership*

		• River crossing profiles	• For TDM/TSM, components that contribute to transit carrying capacity will rank higher than those that do not	• Need to define transit capacity in terms of thousands per revenue hour
			• This criteria is not applicable to bike, pedestrian, and freight components	• Need to make some basic assumptions regarding headways and vehicle sizes
3.2	Potential (on a qualitative scale) to improve transit service in the I-5 corridor to identified travel markets considering frequency, connectivity, span of hours, number of transfers, and travel time	• Flexibility to serve identified travel markets	• For river crossings, bridge options that preclude future transit service to downtown Vancouver, Hayden Island, or the Lombard Street Transit Center will be ranked lower over other bridge options that allow for transit access (either directly or indirectly) to these locations	• Can the mode or component assist in serving the identified travel markets?
		• River crossing profiles	• For TDM/TSM, components that can augment or improve transit service in and to identified transit markets will rank higher than those that do not	• Is the mode flexible enough to serve all the identified markets simultaneously?
			• This criteria is not applicable to bike, pedestrian, and freight components	
3.3	Ability (on a qualitative scale) to improve connectivity of bicycle and pedestrian trips in the I-5 corridor and through the bridge influence area	Can a component provide a multi-use pathway in the I-5 corridor and improve connections?	Definition of component.	
3.4	Potential (on a qualitative scale) for component to increase vehicle occupancy in the I-5 corridor and within the bridge influence area	Can a component increase the number of non-SOV users?	2020 traffic model runs and estimates.	

Safety				
4.1	Enhance Vehicle/Freight Safety		· Conceptual plan and profile or other drawings provided by outside parties	· A lower, flatter I-5 profile provides better standard ramp connections on the interchanges on either side. Flatter grades also allow for better truck operation.
4.2	Enhance Bike/Ped Facilities and Safety		· Conceptual typical sections or other drawings provided by outside parties	· All new river crossings will enhance bike/ped facilities more than what exists today.
4.3	Enhance or Maintain Marine Safety		· Conceptual plan and profile · Clearance constraint for high level · Clearance constraint for low level · Clearance constraint for high level · Clearance constraint for low level	· Any RC that keeps the existing bridges will score low. Keeping the existing bridges adds one more set of piers that the operators need to navigate through. · If we keep existing bridge and locate new crossing, consideration to revising the RR bridge opening will be given as a mitigation

4.4	Enhance or Maintain Aviation		· Conceptual plan and profile · Pearson airspace constraints · PDX airspace constraints	· A low profile that is downstream is the best from the viewpoint of the Pearson Airpark. · The worst condition is if you keep the existing bridges; it penetrates about 55 feet into the existing approach slope.
4.5	Provide sustained life line connectivity		· None	· All crossings will greatly improve the ability to accommodate a design seismic event. · It is assumed that if a component keeps the existing bridges they will be retrofitted to approach the same standards as for the new crossing.
4.6	Enhance I-5 incident/emergency response access within the bridge influence area.		· Conceptual typical sections	· All crossings greatly improve incident/ emergency response as they will provide full shoulder widths, better sight distances and grades.
Regional Economy; Freight Mobility				
5.1	Potential (on a qualitative scale) for component to reduce daily delay for trucks on I-5 within the bridge influence area	Can a component reduce delay for trucks?	2020 traffic model runs and estimates.	

5.2	Potential (on a qualitative scale) for component to reduce daily delay for trucks in the I-5 corridor	Can a component reduce delay for trucks?	2021 traffic model runs and estimates.	
5.3	5.3 Potential (on a qualitative scale) for component to avert extension of "no bridge lift" periods tied to I-5 congestion	Enhance or maintain efficiency of marine navigation	• Conceptual plan and profile	• Crossings that keep the existing bridge were rates as 1 because it maintains the lift period. • A crossing received a rating of 3 if it was a low level. The proposed moveable span is 65 feet at the primary channel and today it is 25 clear in closed position. We are improving the vertical clearance. Also at the alternate channel we are improving the vertical clearance. • A crossing received a rating of 5 if it was a Mid Level
5.4	5.4 Potential (on a qualitative scale) for component to increase freight vehicle throughput across the Columbia River via I-5	How many freight vehicles can a component serve?	2020 traffic model runs and estimates.	
5.6	5.6 Range of travel times (on a qualitative scale) between up to five origin/destination pairs of typical freight centers within the bridge influence area (e.g., between Port of Vancouver and Columbia Blvd. interchange)	What travel times, between key freight activity locations, does a component provide?	2020 traffic model runs and estimates.	

Stewardship of Natural Resources				
6.1	Magnitude of direct impact on designated ESA critical habitat and other threatened or endangered species habitat	What is the total acreage of critical and native habitat for T&E species within the design area footprint?	StreamNet data (from Pacific Northwest's fish and wildlife agencies and tribes) for designated Critical habitat (http://www.streamnet.org/). Johnson & O'Neil and WDFW priority habitat species and critical areas.	Will use area (acreage) and type of direct impacts to specific habitats, i.e., streams, riparian area, critical habitat, native habitats.
6.2	Magnitude of direct impact on other fish and wildlife habitat	What is the total acreage of fish and wildlife habitat within the design area footprint? What is the range of different habitat types within the design area footprint?	Metro Goal 5 Inventory. Clark County Critical Areas Ordinance data. Will assume that SOI species are present in suitable habitat. Critical and native habitat areas will be included in this criterion as well.	Will use area (acreage) and type of direct impacts to specific habitats (i.e., streams, riparian area). We will need agreement on list of species of interest (SOI) and ways to account for their habitats
6.3	Magnitude of direct impact on rare, threatened, or endangered plant species	What is the total acreage of plant habitat within the design area footprint?	Likelihood of plant presence will be based on presence of suitable habitat for rare plants. Data gathered for the PBR will provide suitable habitat. Acreage of suitable habitat will be measured.	
6.4	Magnitude and significance of direct impact on wetlands	What is the total acreage of wetlands within the design area footprint? What is the range of different wetland types within the design area footprint?	Spatial data on wetland determinations conducted for PBR. Will also use information from Metro Goal 5 and Clark County Critical Areas Ordinance. Vanport wetlands will be weighted more heavily than other wetlands.	Will still need input from regulatory agencies on significance of wetland areas that may be impacted.

6.5	Magnitude of net increase in impervious surface area	How much (square feet or acres) of additional impervious surface would be introduced by this alternative?	Use footprint data supplied by design team.	Water quality treatment options cannot be evaluated at this point.
6.7	Magnitude of direct impact to waterways	What are the removal/fill impacts to waterways?	GIS data from Metro, Clark County, City of Portland and City of Vancouver will provide surface area of water bodies. Area of in-water structure (piers) will be measured.	GIS data from local governments may be very coarse, particularly for smaller waterbodies (i.e. Burnt Bridge Creek).
Distribution of Benefits and Impacts				
7.1	Magnitude of potential residential property acquisitions in blocks or block groups with high share of low income or minority populations (compared to impacts in other blocks or block groups)	How many properties may be acquired for the design option? Do potential acquisitions cluster in areas considered high-minority or low income?	GIS parcel data and census data at the block group level. Number of units displaced within census blocs with a greater proportion of minority or low-income populations than the Portland/Vancouver MSA.	We do not know whether properties likely affected are owned my minority or low-income residents. Minority and low income populations are not uniformly distributed across census areas.