Columbia River CROSSING

Meeting Agenda

MEETING TITLE: Task Force Meeting

DATE: Wednesday, March 22, 4-8:00 p.m.

INVITEES: Task Force Members

LOCATION: WSDOT SW Region Headquarters
11018 NE 51st Circle, Vancouver, Washington

Note: Please turn off all cell phones during the meeting as they can disrupt the audio and recording equipment. Thank you.

TIME	AGENDA ITEM	LEAD STAFF	ACTION
4:00 – 4:10	February 1 meeting minutes		Approval
4:10 – 4:20	Project Sponsors Council and InterCEP Actions on Evaluation Framework		Briefing and Discussion
4:10 – 6:00	Component Screening Background and Context		Briefing and Discussion
6:00 – 6:15	Dinner Break		
6:15 – 7:20	Step A Screening Staff Report		Briefing and Discussion
6:15 – 7:40	Communications Report – Upcoming Outreach Efforts		Briefing
7:40 – 7:55	Public Comment		
7:55 – 8:00	Next Meeting – April 26		Topics will include Step B screening, initial packaging of components, and results of April open houses

C-TRAN Route to the Task Force meeting from Portland:
From Downtown Portland (SW Salmon and 6th Avenue) take **C-Tran Bus #105** (I-5 Express) to Downtown Vancouver (7th Street Transit Center) take Bus #32 (Evergreen/Andresen) eastbound to the Vancouver Mall Transit Center. Transfer to Bus #80 (Van Mall/Fisher's) eastbound to 49th and 112th Avenue. WSDOT SW Regional Headquarters is 2 blocks north of this bus stop.

C-TRAN Route to the Task Force meeting from Vancouver:
From Downtown Vancouver (7th Street Transit Center) take Bus #32 (Evergreen/Andresen) eastbound to the Vancouver Mall Transit Center. Other bus routes to the Vancouver Mall Transit Center are 47,72,76, and 78. From the VM Transit Center, transfer to Bus #80 (Van Mall/Fisher's) eastbound to 49th and 112th Avenue. WSDOT SW Regional Headquarters is 2 blocks north of this bus stop.

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Columbia River CROSSING

Meeting Summary

MEETING: Columbia River Crossing Task Force

MEETING DATE: February 1, 2006, 4–6:30 p.m.

LOCATION: OAME - 4134 North Vancouver, Portland, Oregon

Members Present:

Rich Brown, Bank of America
Rex Burkholder, Metro
Bob Byrd, Identity Clark County
Lora Caine, Friends of Clark County
Serena Cruz, Multnomah County
Hal Dengerink, Washington State University Vancouver (Task Force Co-chair)
Dave Frei, Arnada Neighborhood Association
Jill Fuglister, Coalition for a Livable Future
Jerry Grossnickle, Columbia River Tugboat Association
Brad Halverson, Overlook Neighborhood Association
Fred Hansen, TriMet
Henry Hewitt, Stoel Rives (Task Force Co-chair)
John Hoefs for Lynne Griffith, C-TRAN
Monica Isbell, Portland Business Alliance
Susie Lahsene for Bill Wyatt, Port of Portland
Dean Lookingbill, Regional Transportation Council
Ed Lynch, Vancouver National Historic Reserve Trust
Dick Malin, Central Park Neighborhood Association
Steve Petersen, Portland Business Alliance
Bob Russel, Oregon Trucking Association
Jonathan Schlueter, Westside Economic Alliance
Steve Stuart, Clark County
Jeri Sundvall-Williams, Environmental Justice Action Group
Walter Valenta, Bridgeton Neighborhood Association
Scot Walstra, Greater Vancouver Chamber of Commerce
Tom Zelenka, Oregon Freight Advisory Committee

Absent Members:

Sam Adams, City of Portland
Charles Becker, City of Gresham
Dr. Wayne Branch, Clark College
Elliot Eki, Oregon/Idaho AAA
Lynne Griffith, C-TRAN
Brett Hinsley, Columbia Pacific Building Trades
Eric Holmes, City of Battle Ground
Mark McCloud, Greater Vancouver Chamber of Commerce
Larry Paulson, Port of Vancouver, USA
Bart Phillips, Columbia River Economic Development Council
Royce Pollard, City of Vancouver
Janet Ray, Washington AAA
Art Schaff, Washington State Trucking Association
Karen Schmidt, Washington Freight Mobility Strategic Investment Board
Bill Wyatt, Port of Portland

Project Team Members Present:

Ron Anderson
Mike Baker
Katy Brooks
Rob DeGraff
Doug Ficco
Jay Lyman
David Parisi
Kris Strickler

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Opening Remarks

Co-chair Henry Hewitt announced that the next Columbia River Crossing (CRC) Task Force meeting will be held on March 22, 2006, from 4–8:00 p.m.; dinner will be provided. Task Force members will discuss component screening results in detail and the public outreach plan.

- **Action** - No action required.

Meeting Minutes

- **Action** – The January 4, 2006, meeting minutes were adopted with no discussion.

Public Comments

Comment received from six citizens: Lenny Anderson, Paul Edgar, Travis Huennekens, Tom Mielke, Sharon Nasset, and Michael Powell. Written comments are included in Appendix A. Summaries of verbal comments follow.

- Paul Edgar provided Task Force members with a possible Preliminary Evaluation/Screening Criteria list. He stated that the rail bridge should be replaced with a west side bypass and combination bridge.
- Tom Mielke, former Washington State Representative, stated that he does not want Task Force members to make the same mistakes other states have made when they start looking at replacing the I-5 bridge. He emphasized the need to look at all solutions, including the western corridor and I-205. He also stated that the rail bridge should be replaced with a swing bridge.
- Michael Powell, owner of Powell's Books, stated that his company moves a lot of books and freight by truck. Traffic congestion results in increased costs for his business. Congestion also discourages businesses from opening in North Portland. He emphasized that traffic is a current problem and needs to be solved soon.
- Sharon Nasset noticed that 11 percent of traffic traveling to Washington County gets off Interstate 5 in North Portland. The truck traffic causes health issues. She stated that, while trips to Swan Island make up 22 percent of traffic traveling across the I-5 bridge, that traffic is not part of the maps. She suggested that this traffic be put back on I-5. She asked why so much money is being spent on the Task Force per month. She also stated that the project should include expanded areas in the 2040 plan.
- Travis Huennekens expressed his concern regarding the west side bypass not being a part of the study. He cited a recent article in which Doug Ficco stated there would be no money for a west side bypass and requested that the article be entered as part of the record.

Note: The full text of public comments is available in the meeting transcript posted on the project Web site.[1]

Evaluation Framework

Mike Baker introduced the Evaluation Criteria, which included input from the January 4, 2006, Task Force meeting and additional feedback. Henry noted that the Evaluation Criteria are the factors by which alternatives will be measured.

Note: Task Force questions and comments are in *italics,* staff responses are in (parentheses), and passed amendments are in **bold**.

[1] www.columbiarivercrossing.org

Criterion 1: Community Livability and Human Resources

- Why is "enhance" not first in criterion 1.6 like it is in criterion 1.7?
  - (The Washington State Historic Preservation Office maintains that archaeological resources cannot be enhanced or improved.)
- Development opportunities resulting from the project may not be consistent with comprehensive and neighborhood plans and zoning as noted in criterion 1.8.
- Asked if criterion 1.8's purpose is to address wider issues. Regional plans should be added to the references to local and neighborhood plans.
  - (Criterion 9.1 may duplicate that language.)
- Suggested that language in criterion 1.8 needs to be consistent with goals and aspirations.
- Expressed the need to account for all regional plans.
- Criterion 1.6 dealing with historic, prehistoric, and cultural resources should be revised to include the word "enhance".
  - (Suggested Task Force members reconsider and compromise on the language of criterion 1.6.)
- **1.6 Avoid or minimize adverse impacts, or where practicable, preserve historic and prehistoric resources.**
- **1.8 Support development/redevelopment opportunities consistent with local comprehensive and regional plans.**
- **1.10 Avoid or minimize adverse impacts, or where practicable, enhance cultural resources.**

Criterion 2: Mobility, Reliability, Accessibility, Congestion Reduction, and Efficiency

- Asked if these measures will address the reliability of transportation.
  - (Yes, reliability will be addressed in the performance measures.)
- No changes.

Criterion 3: Modal Choice

- No changes.

Criterion 4: Safety

- *Requested clarification of the meaning of "safety" in criterion 4.3.*
  - (Staff will measure the degree to which a new crossing improves or impairs safety.)
- *Prefers "enhance safety" for criterion 4.3 rather than "maintain."*
  - (An alternative that "enhances" safety will score higher.)
- *Asked why "enhance" and "maintain" are not used in other measures addressing bike and pedestrian safety and freight.*
  - (Staff will present their approach to scoring at a later meeting.)
- No changes.

Criterion 5: Regional Economy, Freight Mobility

- *Expressed concern over access to port facilities and requested language that parallels criterion 5.5.*
- **5.6 Enhance or maintain access to port, freight, and industrial facilities.**

Criterion 6: Stewardship of Natural Resources

- *Requested that staff explain changes to criterion 6.6.*
  - (The criterion lacked clarity. "Transportation system" gives the criterion more freedom and flexibility.)
- *Asked if there will be an energy study on different modes of transportation that addresses the relative efficiency of each.*
  - (All modes, except marine, will be studied. Studies will focus on fossil fuels and efficiency.)
- No changes.

Criterion 7: Distribution of Benefits and Impacts

- *Requested that Task Force members consider using less negative language such as "avoid" and "minimize" when addressing human impacts.*
- *If an alternative exhibits a high degree of adverse impacts, it will receive a low grade.*
- *Suggested environmental justice training for Task Force members.*
- *Agreed with training because it is an opportunity for the Environmental Justice Working Group to get involved.*
- *Requested staff present an environmental justice training plan at the next meeting.*
  - (For March 22 meeting, staff to provide a plan for environmental justice training for the Task Force, and a schedule for when that would occur, prior to the evaluation of alternatives later this year.)
- **7.1 Avoid or minimize disproportionate adverse impacts on, and where practicable, improve conditions for low income and minority populations.**

Criterion 8: Cost Effectiveness and Financial Resources

- *Energy consumption needs to be addressed in this criterion.*
- *Requested that criterion 8.1 mirror 6.6.*
- *Asked how cost effectiveness is determined.*
  - (Cost effectiveness is determined by the actual cost and cost per user.)
- *Asked how Task Force members will evaluate the cost of alternatives.*
- (Responded that members review the costs against the evaluation criteria.)
- *Asked if there will be a feasibility analysis.*
  - (8.2 addresses feasibility analysis.)
- *Inquired as to whether the evaluation criteria address Federal Transit Administration questions regarding criteria language.*
  - (Yes, comments have made the criteria clearer. Staff is working with federal agencies.)

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- **8.1 Ensure transportation system construction cost effectiveness.**
- **8.3 Ensure transportation system maintenance and operation cost effectiveness.**
- **8.4 Minimize the cost of construction.**

Criterion 9: Bi-State Cooperation

- **Title changed to "Growth Management/Land Use."**

Criterion 10: Constructability

- *Suggested deleting criterion 10.3 because the project will address bottlenecks.*
- *Intent of criterion 10.3 was not to preclude future expansion and provide flexibility.*
- *Suggested "enhance" instead of "expansion."*
- *Concerned with vehicle capacity—if we create capacity we will increase demand.*
- *Intention of criterion 10.3 was to ensure capacity for light rail in the future.*
- **10.3 Provide flexibility to accommodate future transportation system improvements.**
- **Action** - The Evaluation Framework was adopted with amendments.

Component Presentation

Consultant Team Project Manager Jay Lyman presented the transportation component list. His presentation is available on the project Web site.2 The component list consists of the full range of ideas generated to address identified needs of the CRC project. The creation of the component list is the first step in the screening process. Components originated from recommendations in the 2002 I-5 Transportation and Trade Partnership Final Strategic Plan. Components also originated from suggestions from the public and agencies during the National Environmental Policy Act (NEPA) scoping process for this project. Jay's presentation served as an introduction to the screening process which will be discussed in detail at the March 22, 2006, Task Force meeting. Co-chair Hal Dengerink asked Task Force members if there was anything Jay did not list in his presentation.

- *Asked if rapid transit is ideal for the short distances in the bridge influence area.*
  - (Rapid transit would look like an Express Bus. An example would be a bus traveling non-stop to riders' ultimate destinations.)
- *Asked if there is a preferred height for a fixed bridge.*
  - (A low-elevation bridge would have a consistent elevation across the river. Ninety percent of marine traffic could pass under, 10 percent could not. A mid-elevation bridge would allow all marine traffic to pass under. A high-elevation bridge would be as high as the Glenn Jackson Bridge, which is substantially higher than any boats that currently use the river.)
- *Asked when the U.S. Coast Guard would give staff a height for the fixed bridge.*
  - (The U.S. Coast Guard will give staff a height range in spring 2006. They will provide staff with a specific height right before the record of decision. Staff is meeting with river users that need a high clearance to discuss a fixed bridge.)
- *Supported a river crossing option that would benefit components by moving the rail bridge opening south. Moving the opening would eliminate the majority of the lifts. Not looking at this alternative would be unrealistic.*

[2] www.columbiarivercrossing.org

- (Cost of moving the rail bridge is costly at $42 million. If an alternative does not maintain marine safety it will not be considered.)

- *Asked if staff is aware of Federal Aviation Administration's requirements.*
  - (Pearson Airport's requirements for take off and landing are critical for this project. Elevation will be discussed at the March 22, 2006, Task Force meeting.)
- *Concerned that none of the options address freight movement by rail and the rail bridge.*
- **Add freight rail to the component list.**
- *Asked how long members have to add to the component list. Also asked how staff is going to the public with the component list to receive more ideas.*
  - (Since the project is a NEPA EIS, ideas must be acknowledged throughout the process. After the March 22, 2006, Task Force meeting, staff will attend neighborhood meetings. Staff will hold community meetings in May 2006.)

Next Meeting Date/Location

Wednesday, March 22, 2006, 4:00–8:00 p.m.
WSDOT SW Region Headquarters, Room 102
11018 NE 51st Circle
Vancouver, Washington

Tentative Agenda

Discussion of component screening results, alternatives and packages, and public outreach plan.

Columbia River CROSSING

Memorandum

March 15, 2006

TO: Task Force

FROM: Hal Dengerink and Henry Hewitt

SUBJECT: Evaluation Framework

COPY: Doug Ficco, Rob DeGraff

Task Force members:

At our February 1 meeting, we reviewed, edited, and adopted the Evaluation Framework. Subsequent to our meeting, the CRC Project Sponsors Council met to review progress to date, including the Evaluation Framework. The council, which is comprised of elected officials and senior staff representing the eight sponsor agencies (WSDOT, ODOT, TriMet, C-TRAN, Metro, RTC, Vancouver, Portland), made three changes to the criteria at the recommendation of senior project staff. The changes addressed two areas of concern: 1) the criteria dealing with cultural resources was inconsistent with federal law, which does not allow for the enhancement of cultural resources, and 2) repeating criteria in two separate locations created the risk of a legal challenge about unfairly weighting some criteria over others.

Following the Project Sponsors Council meeting, the project's Interstate Collaborative Environmental Process (InterCEP) group also met to consider the Evaluation Framework. The InterCEP members include representatives from key national and state agencies responsible for protecting the region's air, water, wildlife and cultural resources. This committee must formally concur on project decisions affecting their areas of concern at major project milestones. In addition, the committee provides advice and consultation regarding the NEPA process. At their meeting they recommended minor text changes to four of the criteria, solely for the purposes of clarification.

The PSC-adopted changes and InterCEP recommendations are summarized in the table on the following pages. For your reference, the complete screening criteria list, as amended by the PSC and InterCEP, is attached, as is a letter from the Washington State Department of Archaeology and Historic Preservation, which describe the agency concerns about the cultural resource criteria.

We have reviewed the changes with project staff, and believe that they improve the criteria, and that they do not substantively change the way that the criteria will be used. Moreover, the changes will be helpful in working collaboratively with the large number of regulatory and sponsor agencies affected by this project, as well as in avoiding potential future challenges to our process. Our plan is to move forward with the revised criteria without further action by the Task Force, unless members raise significant concerns.

CRITERION	TASK FORCE RECOMMENDATION	PROJECT SPONSORS COUNCIL CHANGE	InterCEP CHANGE	NOTES
1.6	Avoid or minimize adverse impacts, or where practicable, preserve historic and prehistoric resources.	Combine 1.6 and 1.7 to read: Avoid or minimize adverse impacts, and where practicable, preserve historic and prehistoric, and cultural resources.	.	1.6 and 1.7 were originally combined. The Task Force split them to focus on the potential for enhancing cultural resources. However, the Washington State Department of Archaeology and Historic Preservation has noted that federal law does not allow for the enhancement of cultural resources (see attached letter). Therefore, the criteria were recombined and the focus shifted to preservation, rather than enhancement.
1.7	Avoid or minimize adverse impacts, or where practicable, enhance cultural resources.			
1.8	Support development/ redevelopment opportunities consistent with local comprehensive plans and regional plans, including jurisdiction-approved neighborhood plans.	Support development/ redevelopment opportunities consistent with local comprehensive plans, including jurisdiction-approved neighborhood plans.	Support local comprehensive plans and jurisdiction-approved neighborhood plans, including development and redevelopment opportunities consistent with these plans	The Task Force suggested modifying Criterion 1.8 to additionally reference support of "regional plans." However, Criterion 9.1 already refers exclusively to support of regional plans. Measuring the same thing in two separate criteria creates a risk of a legal challenge to the process. The PSC chose to keep the evaluation of regional plans solely as part of 9.1, to avoid duplication. The PSC also felt that keeping Criteria 1.8 and 9.1 separate and distinct would strengthen the focus on each level of plans. InterCEP felt that the PSC text should indicate that project alternatives should support all elements of local comprehensive plans, not just those relating to development/re-development.
5.2	Reduce travel times and reduce delay for vehicle-moved freight on I-5 through the bridge influence area.	Reduce travel times and reduce delay for vehicle-moved freight in the I-5 corridor.		This is simply an administrative change to avoid potential duplication with the new criterion proposed by the Task Force, Criterion 5.6, which reads "Enhance or maintain access to port, freight, and industrial facilities." To avoid duplication with Criterion 5.1, staff identified minor revisions to the performance measures associated with Criterion 5.1 (not shown), as well as the proposed text changes to Criterion 5.2 so that it can be more readily distinguished from 5.1.

CRITERION	TASK FORCE RECOMMENDATION	PROJECT SPONSORS COUNCIL CHANGE	InterCEP CHANGE	NOTES
6.1	Avoid, then minimize adverse impacts to, and where practicable enhance, threatened or endangered fish or wildlife habitat.		Avoid, then minimize adverse impacts to, and where practicable enhance, threatened or endangered fish **and** wildlife **and their** habitat.	In both of these criteria, InterCEP proposed a clarification that the criteria would measure impacts to fish and wildlife and their habitat (changing "or" to "and"); and adding the words "and their" in front of habitat.
6.2	Avoid, then minimize adverse impacts to, and where practicable enhance, other fish or wildlife habitat.		Avoid, then minimize adverse impacts to, and where practicable enhance, other fish **and** wildlife **and their** habitat.	
6.4	Avoid, then minimize adverse impacts to, and where practicable enhance, wetlands.		Avoid, then minimize adverse impacts to, and where practicable enhance **and/or restore**, wetlands.	InterCEP added the words "and/or restore"

Columbia River CROSSING

DRAFT 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 V*ision 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.

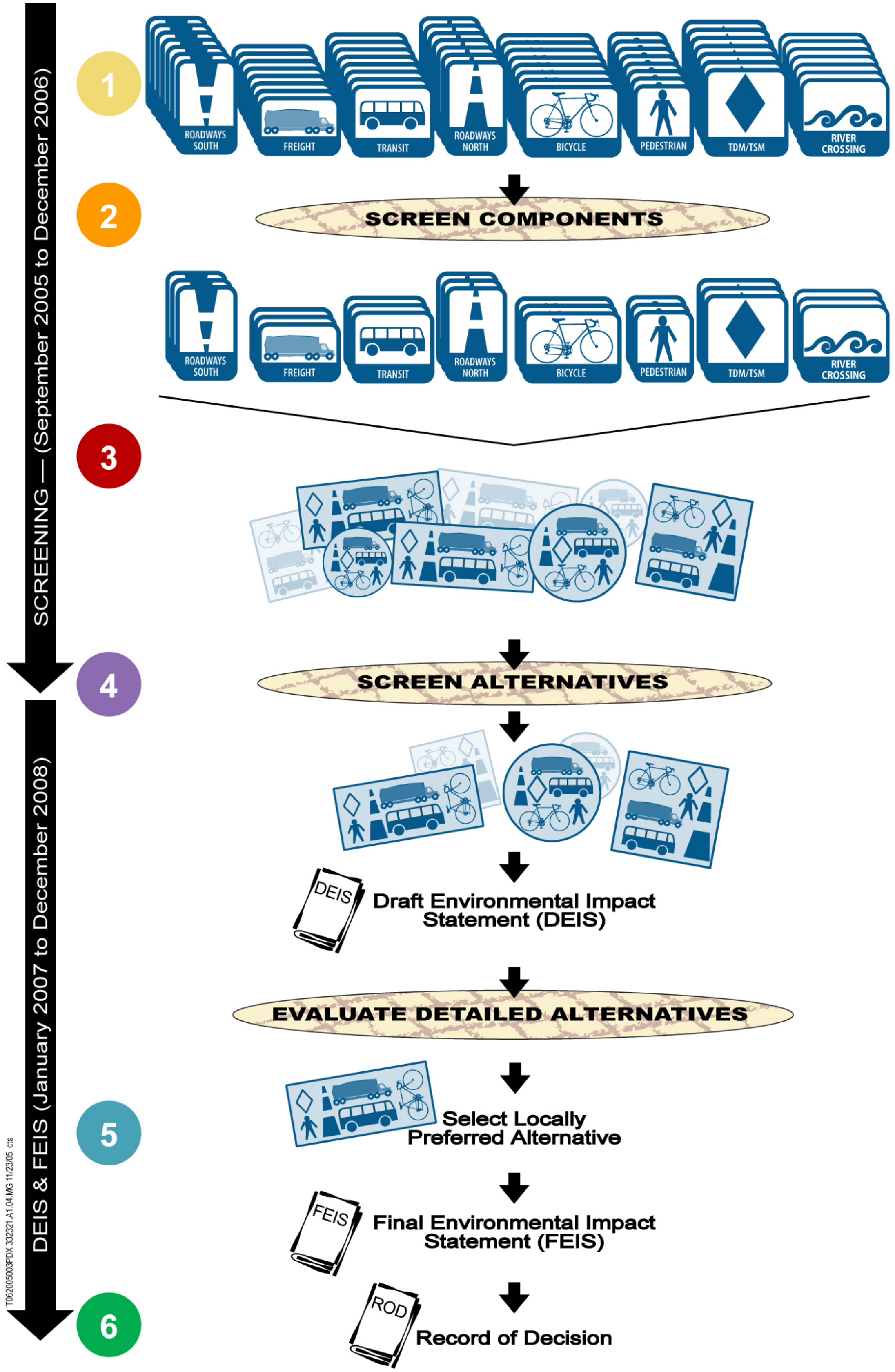
Criteria- Principles reflecting the CRC Task force adopted *Vision and Values Statements* by which components and alternative packages will be considered.

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 (3-14-06)

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.

DRAFT COMPONENTS STEP A SCREENING REPORT

March 22, 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

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

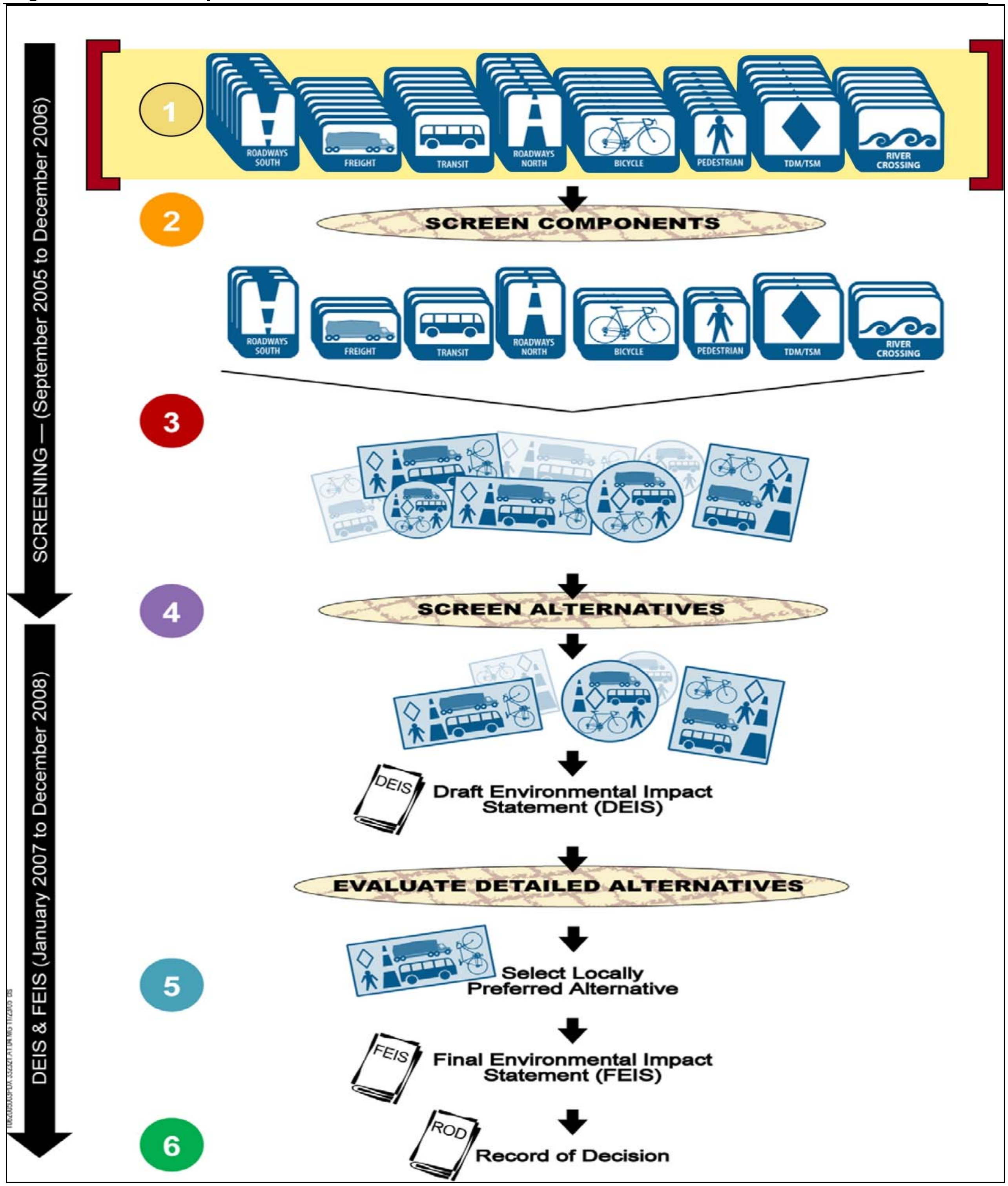
Question: Does the Component	Transit Components	River Crossing Components
1. Increase vehicular capacity or decrease vehicular demand within the bridge influence area?	♦	♦
2. Improve transit performance within the bridge influence area?	♦	♦
3. Improve freight mobility within the bridge influence area?		♦
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.

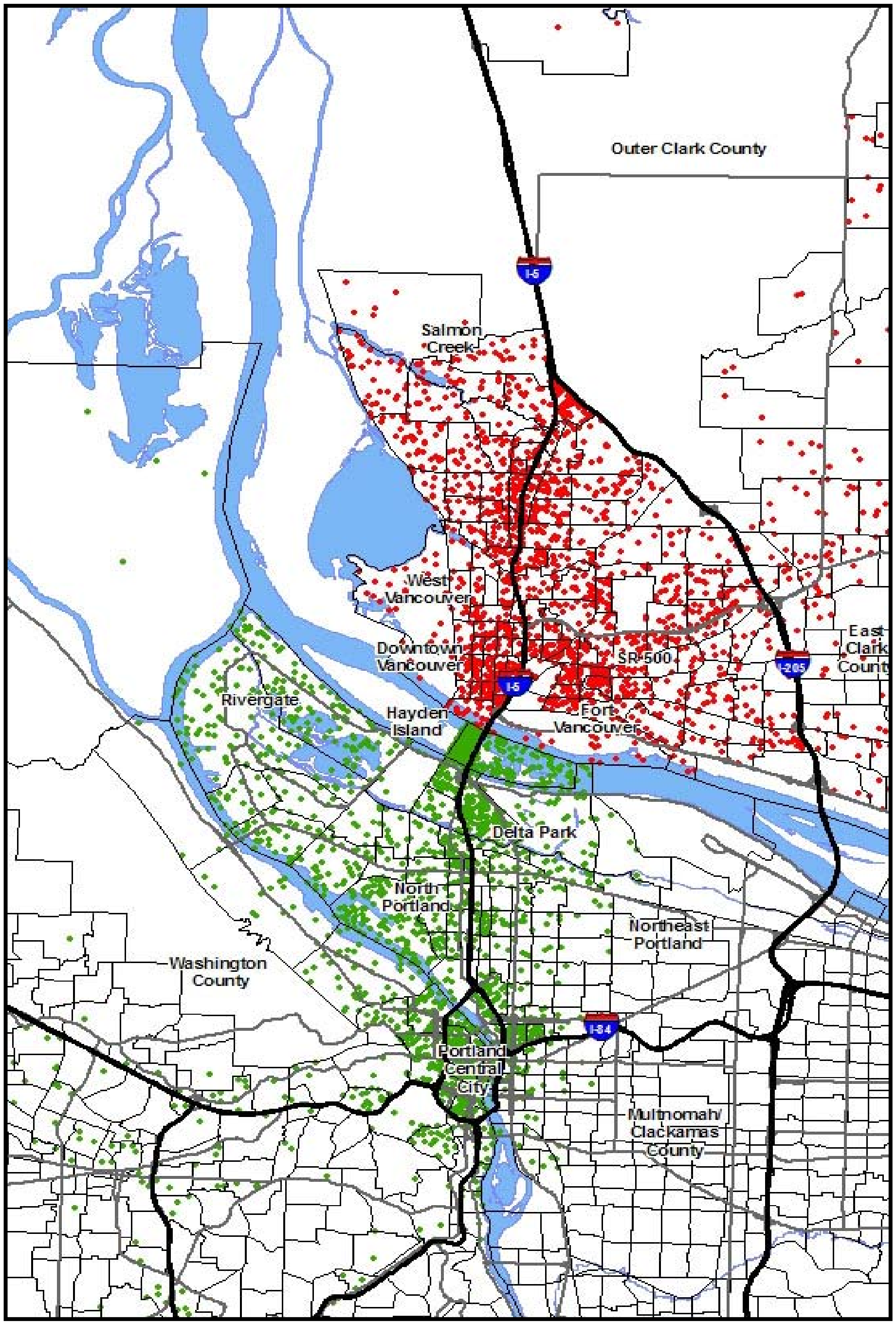
Travel demand across I-5 Interstate Bridge has steadily increased over the years. Recent traffic counts indicate that over 130,000 vehicles per day cross the bridge. By the year 2020, about 175,000 vehicles are estimated to use the crossing each day.

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)

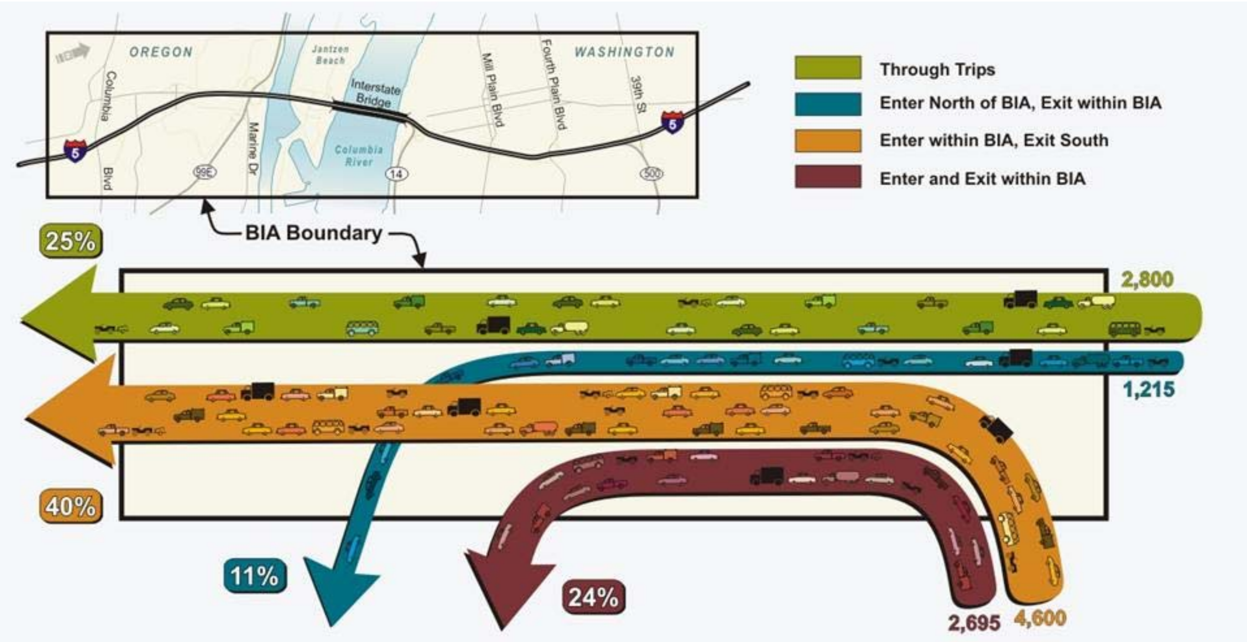
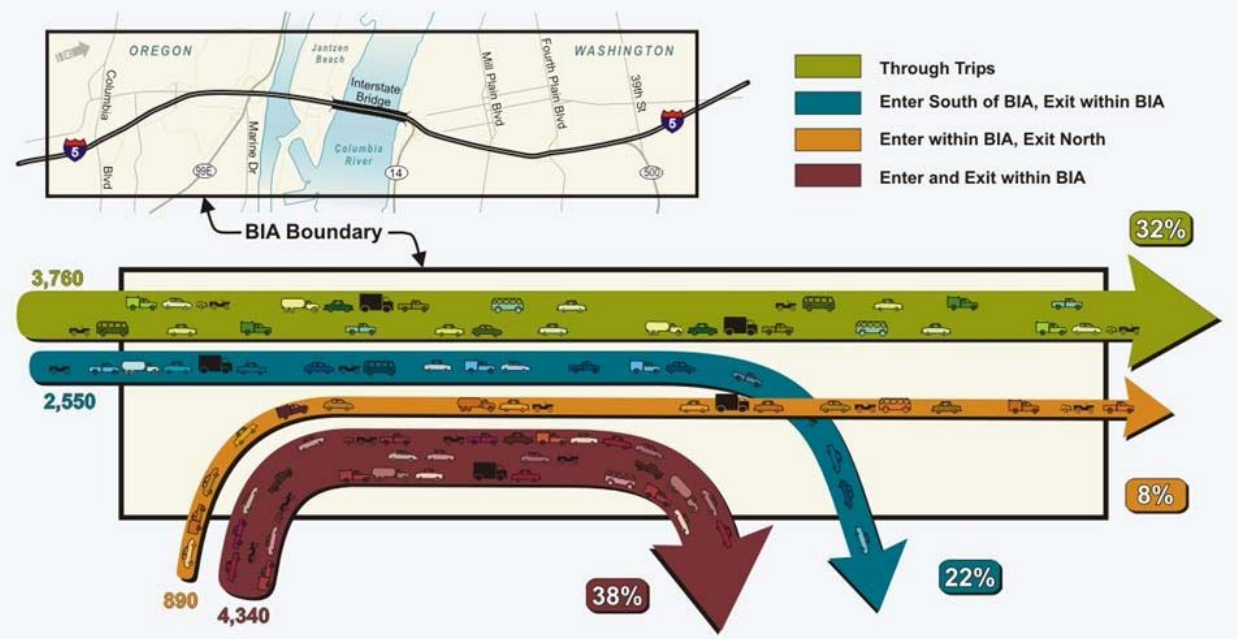


Figure 3-3. Northbound I-5 Vehicle-Trip Patterns in the Bridge Influence Area, for Trips Across the Interstate Bridge (2005)



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)

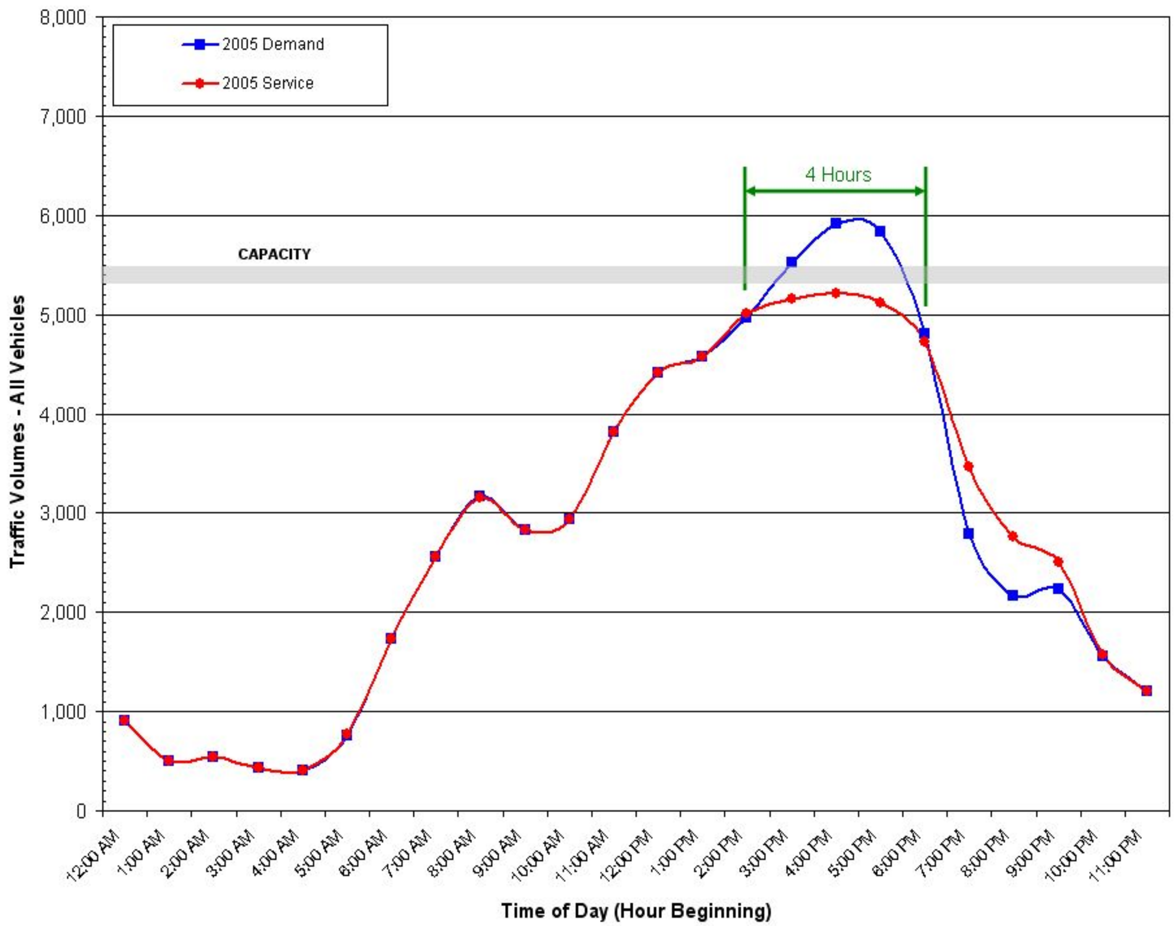
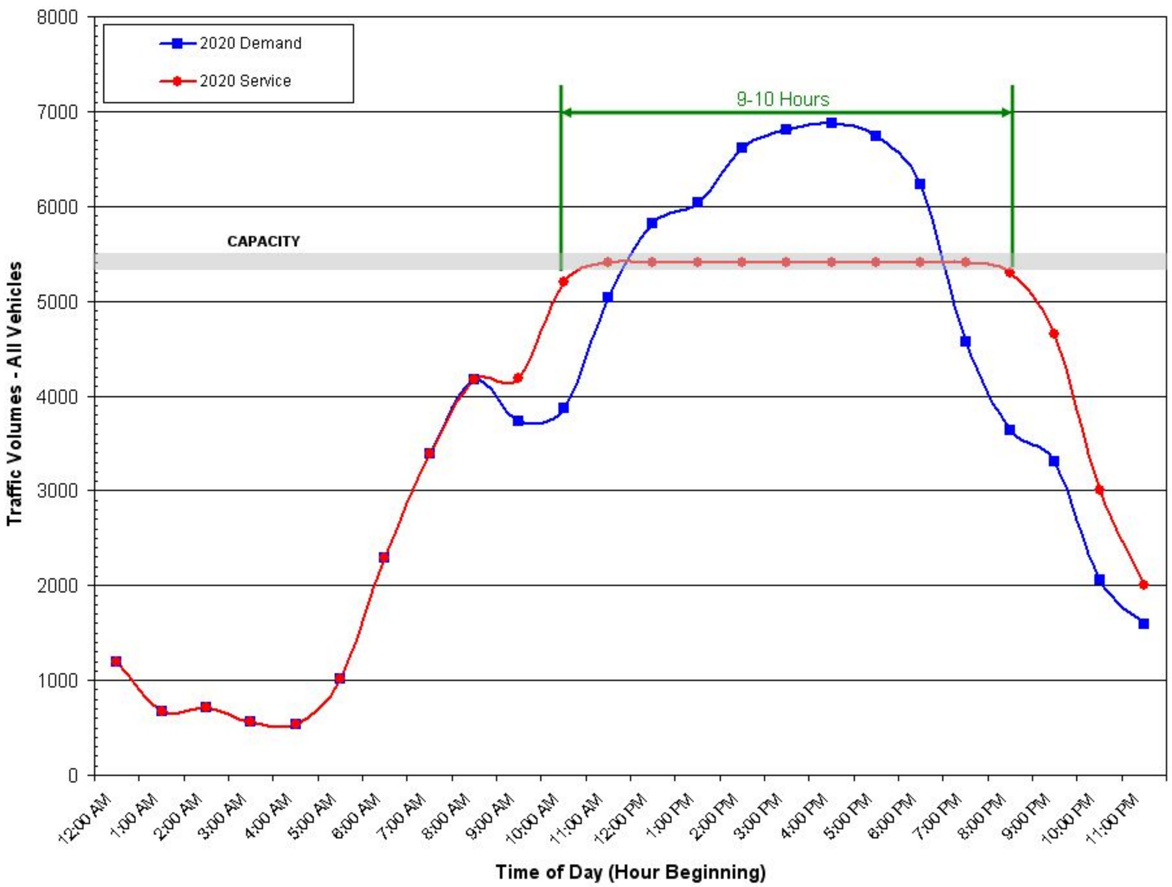


***Figure 3-5** shows an estimate of future hour-by-hour traffic levels along northbound I-5 at the Interstate Bridge. This assumes no highway capacity improvements are made within the Bridge Influence Area, no other corridor improvements are provided, and traffic demands increase to predicted 2020 levels. 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.

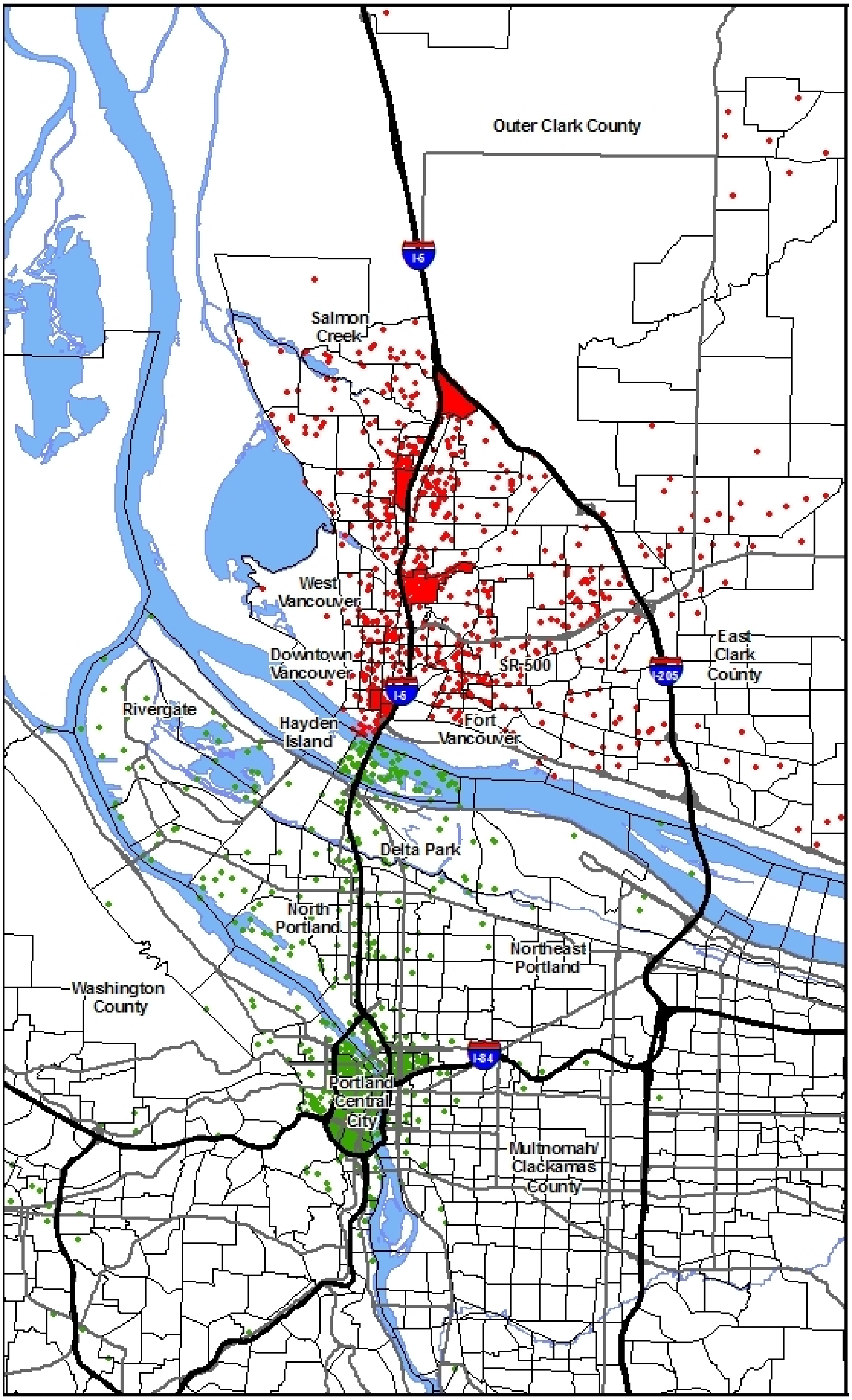
Commuter buses also experience congestion and incident-related delays. Commuter buses traveling southbound (i.e. in the peak direction) during the morning peak period have travel times between 45 percent and 115 percent longer than buses traveling northbound. Commuter buses traveling northbound during 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.*

---

[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.

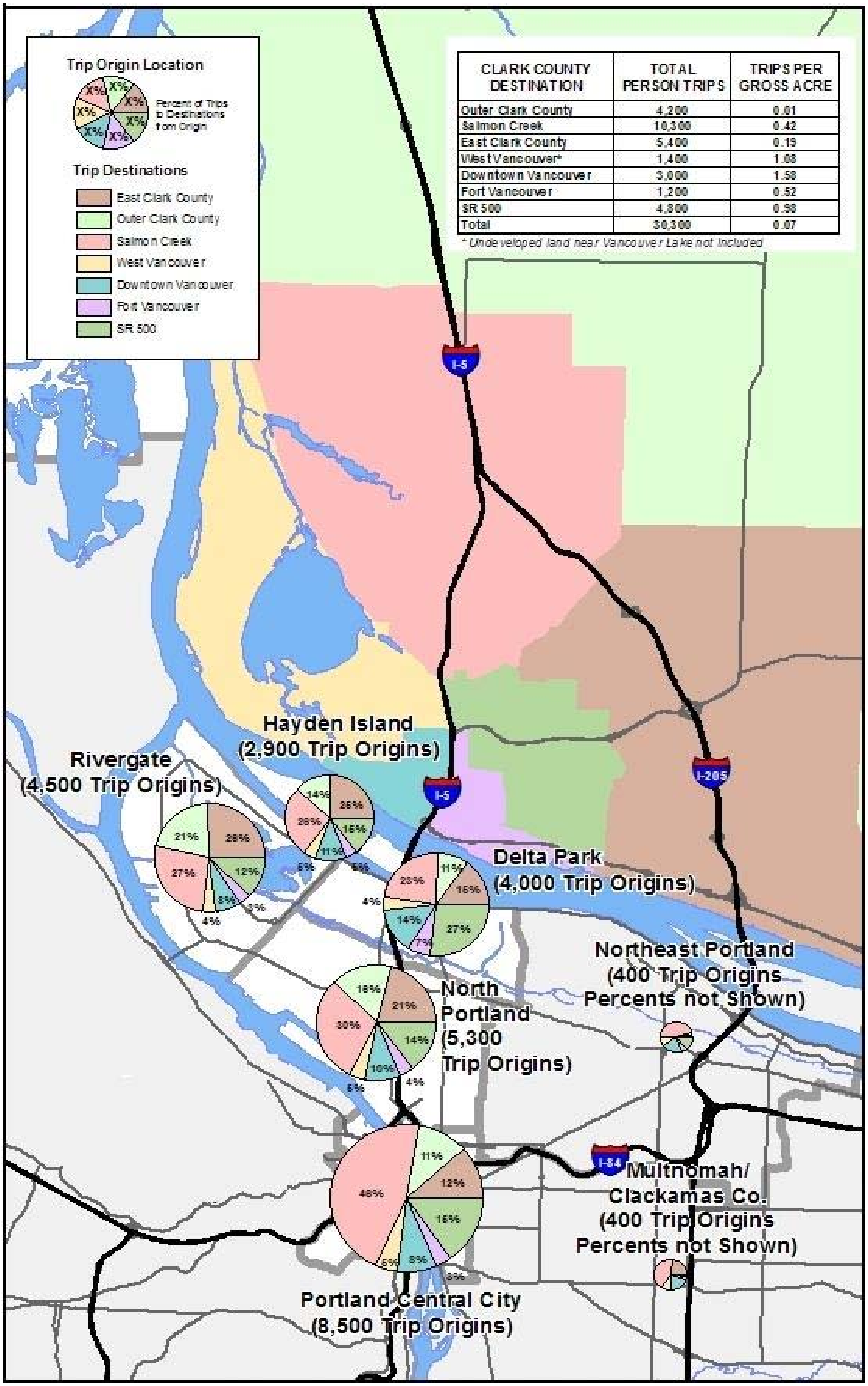
4. The Portland Central City, which includes downtown Portland, the Lloyd District, and Central Eastside Industrial District, will be the largest generator of person trips to Clark County (approximately 8,500 person trips). The Salmon Creek district will be the primary destination for these trips (3,900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

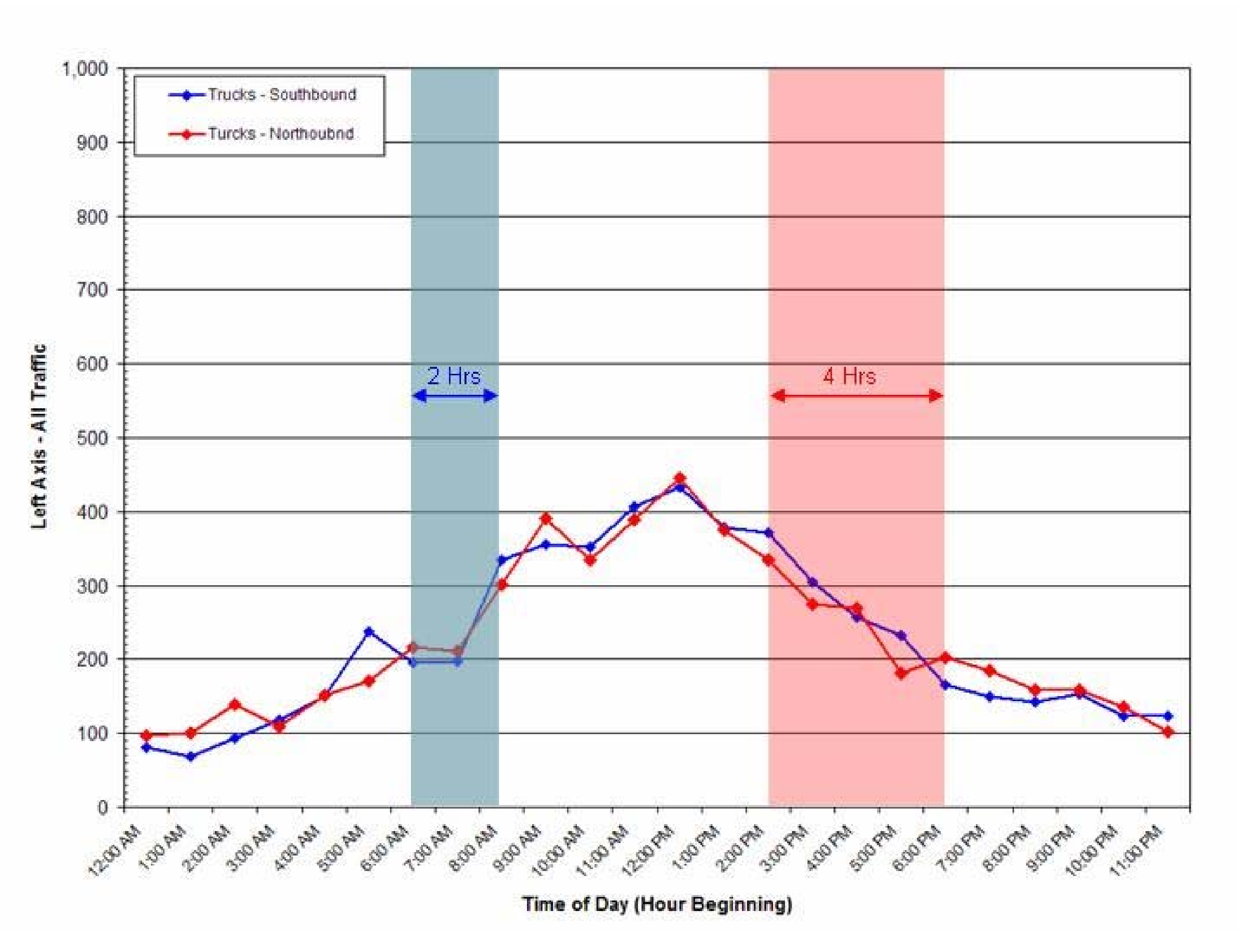
I-5 is the primary freight corridor for goods moving into and out of the Vancouver-Portland region and the Pacific Northwest. Access to significant industrial and commercial districts, including the Ports of Vancouver and Portland, and connections to marine, rail and air freight facilities, is adversely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

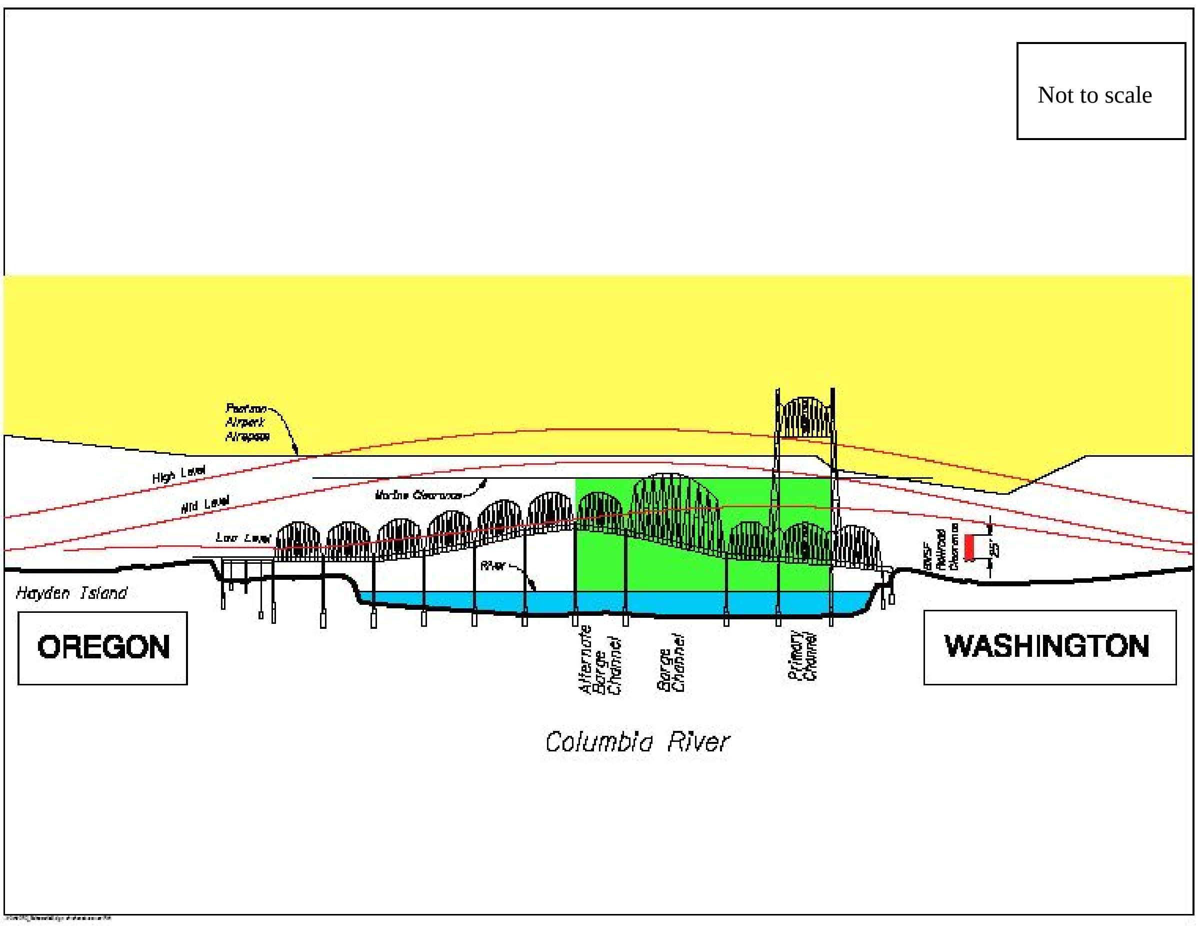
3.4 Question 4: Does the Component Improve Safety and Decrease Vulnerability to Incidents Within the Bridge Influence Area?

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).

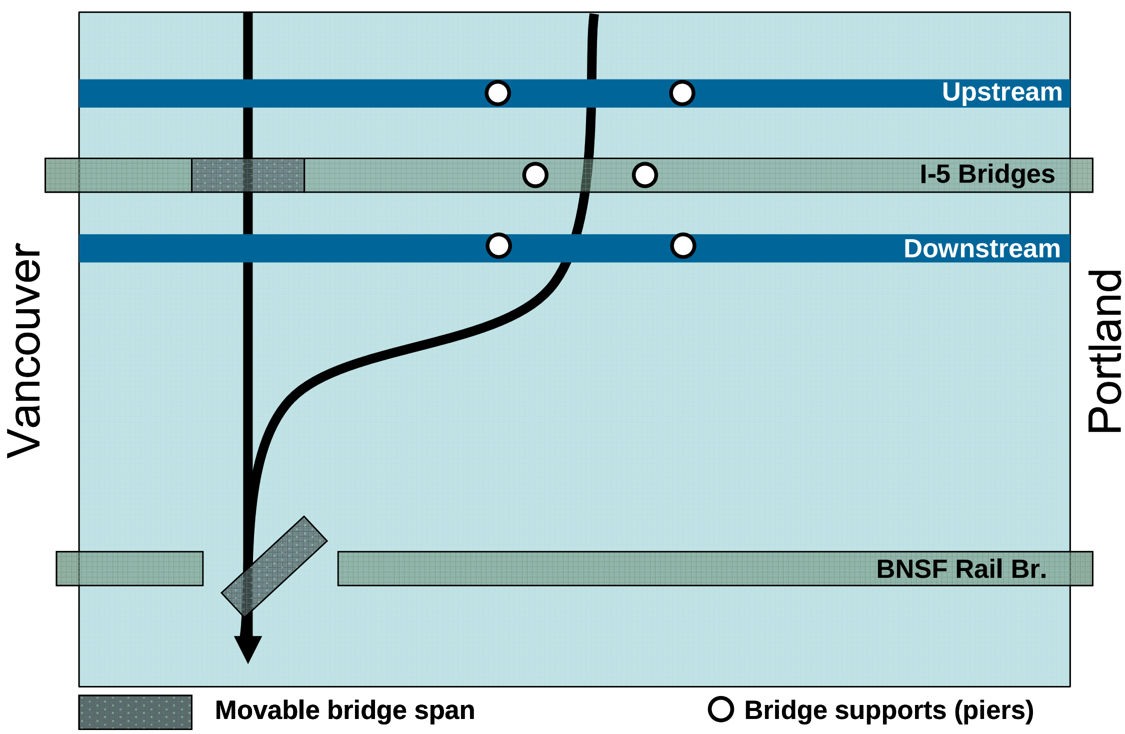
To understand the characteristics of existing river traffic, a boat survey was completed in 2005 identifying the existing vessel traffic using the river upstream of I-5. The survey found that most vessels using the river do not require a bridge opening to pass beneath I-5 except during higher water levels 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)

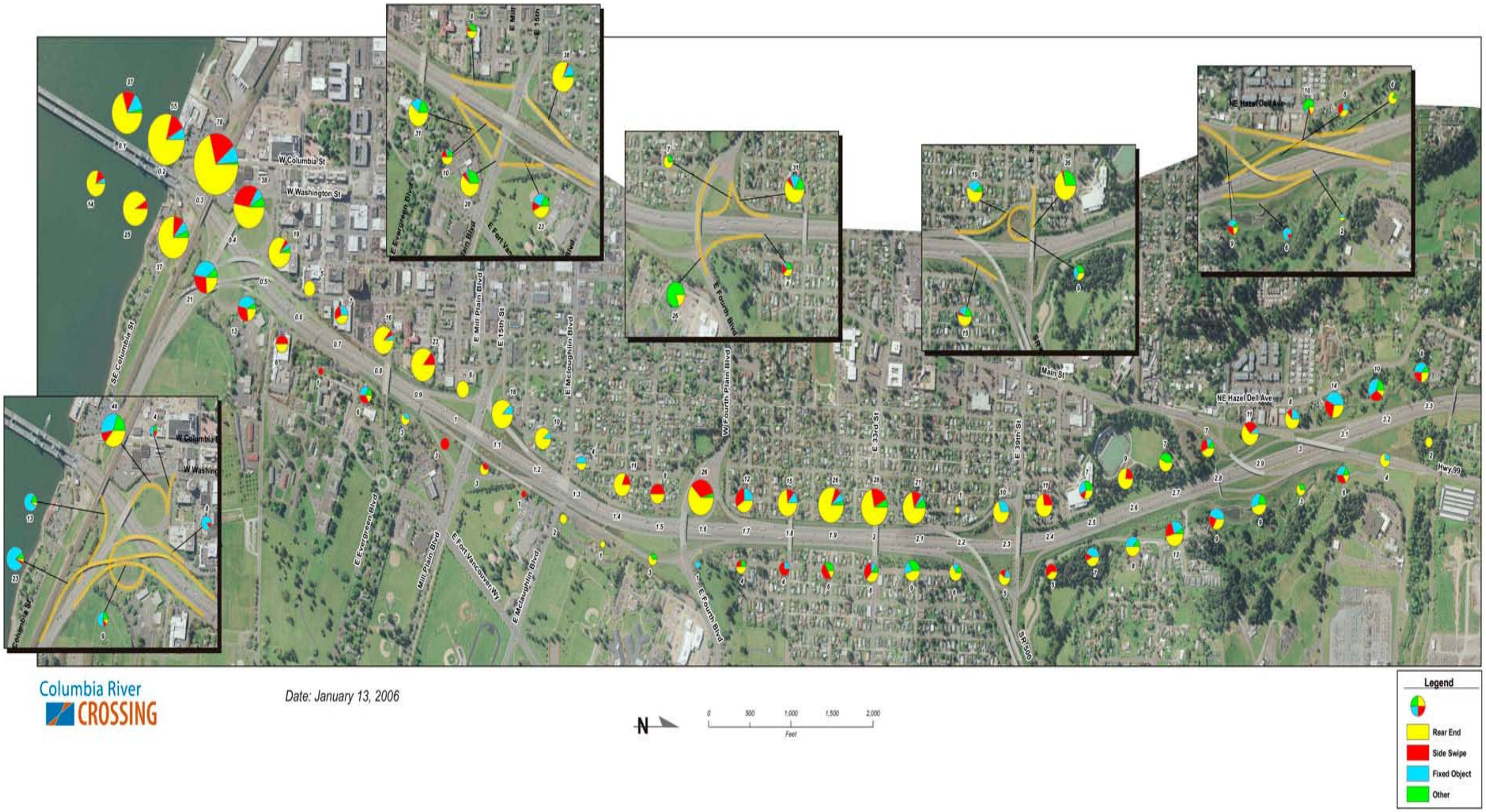
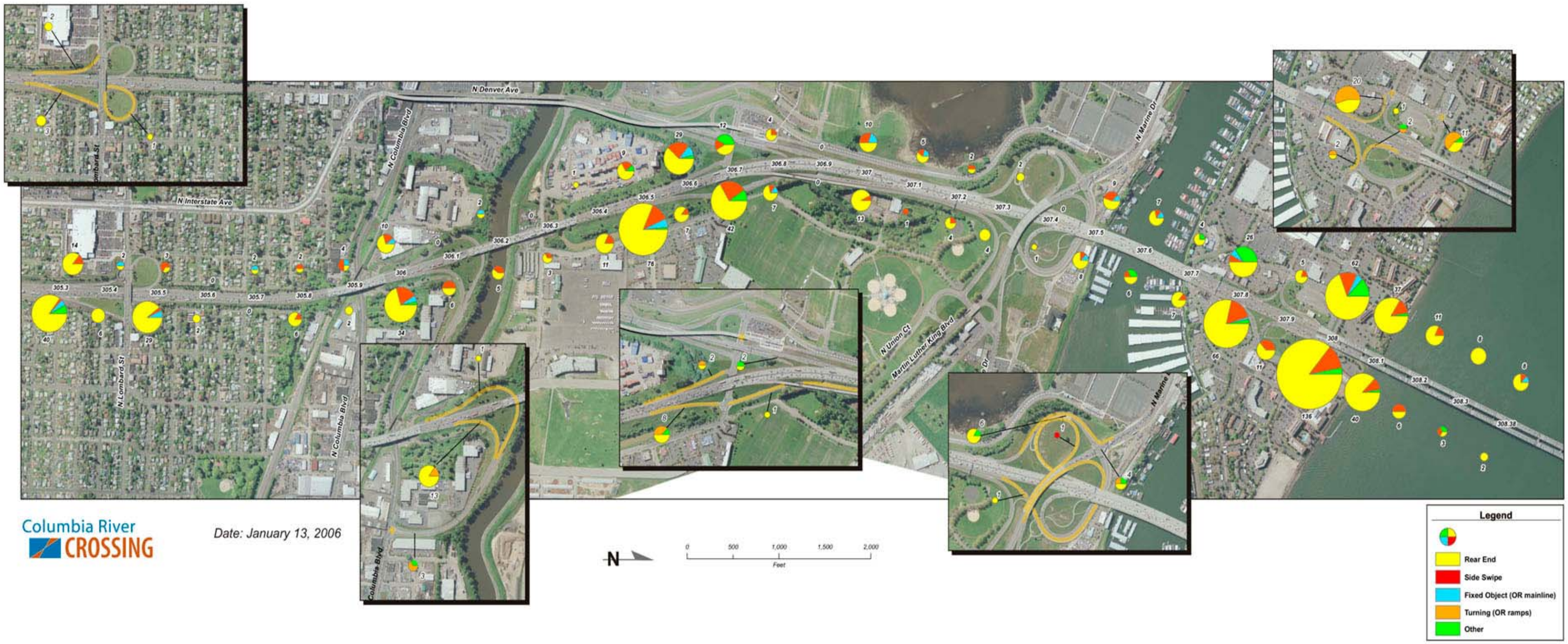


Figure 3-12. Crash History by Crash Type for Mainline Highway and Ramps–January 2000–December 2004 (Oregon)



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)

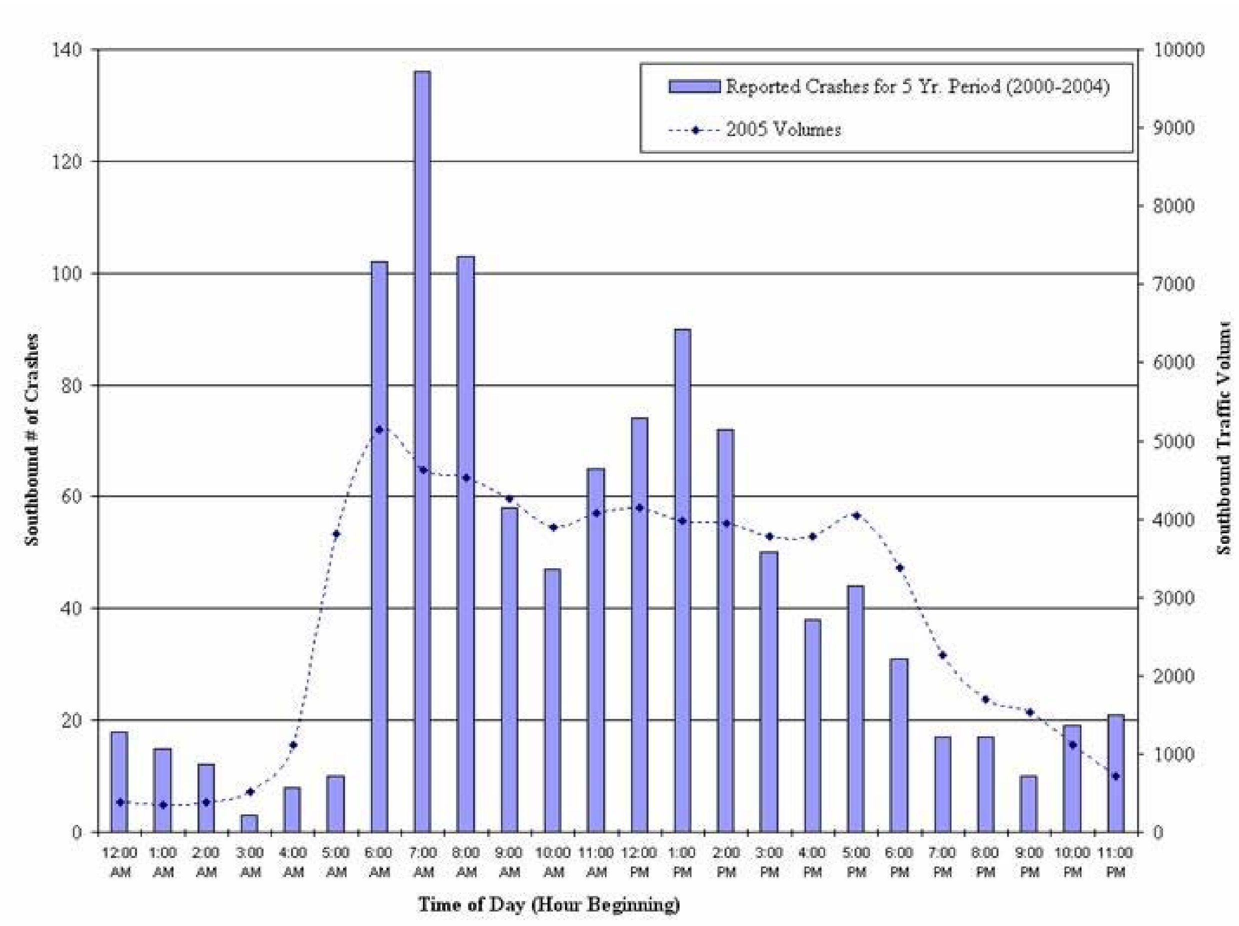
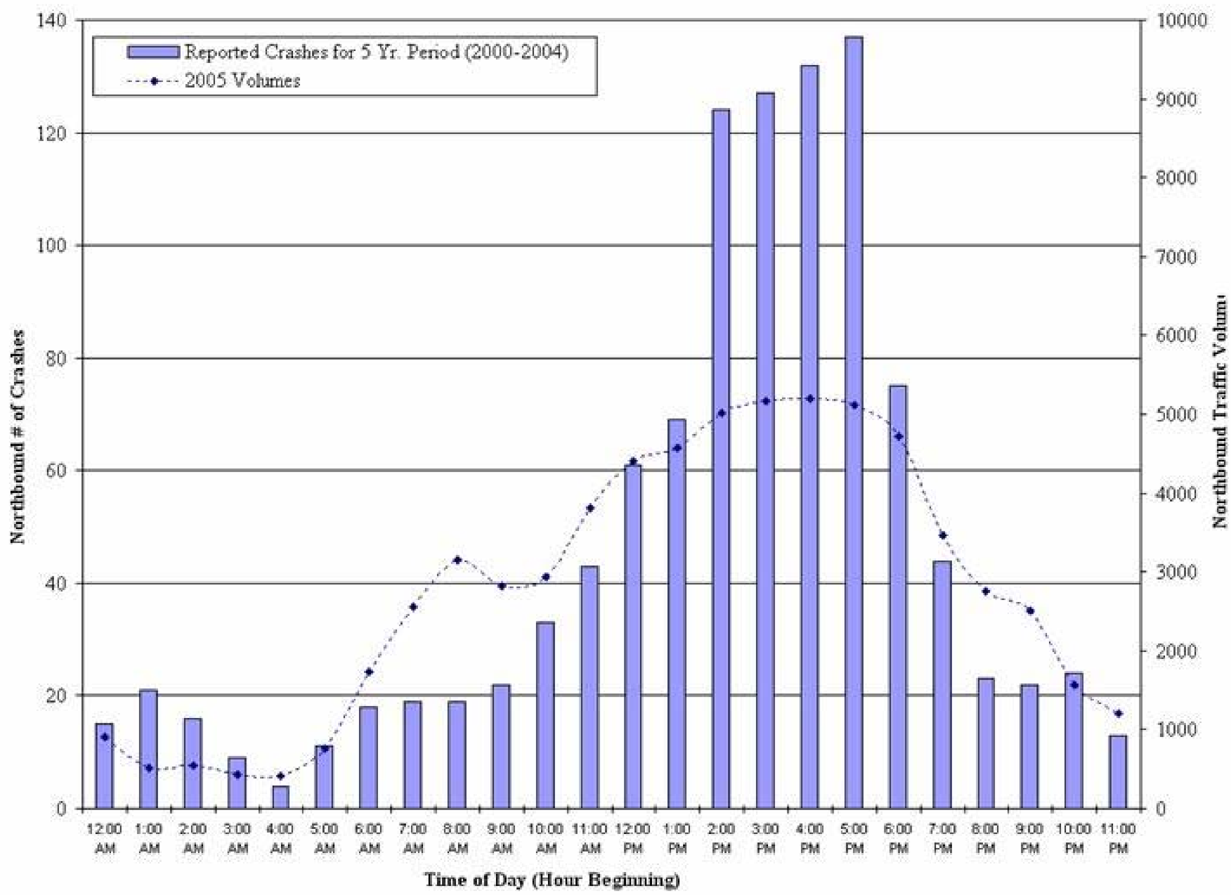


Figure 3-14. Northbound I-5 Crashes by Time of Day from Lombard Street to Hwy 99/Main Street (2000-2004)



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.

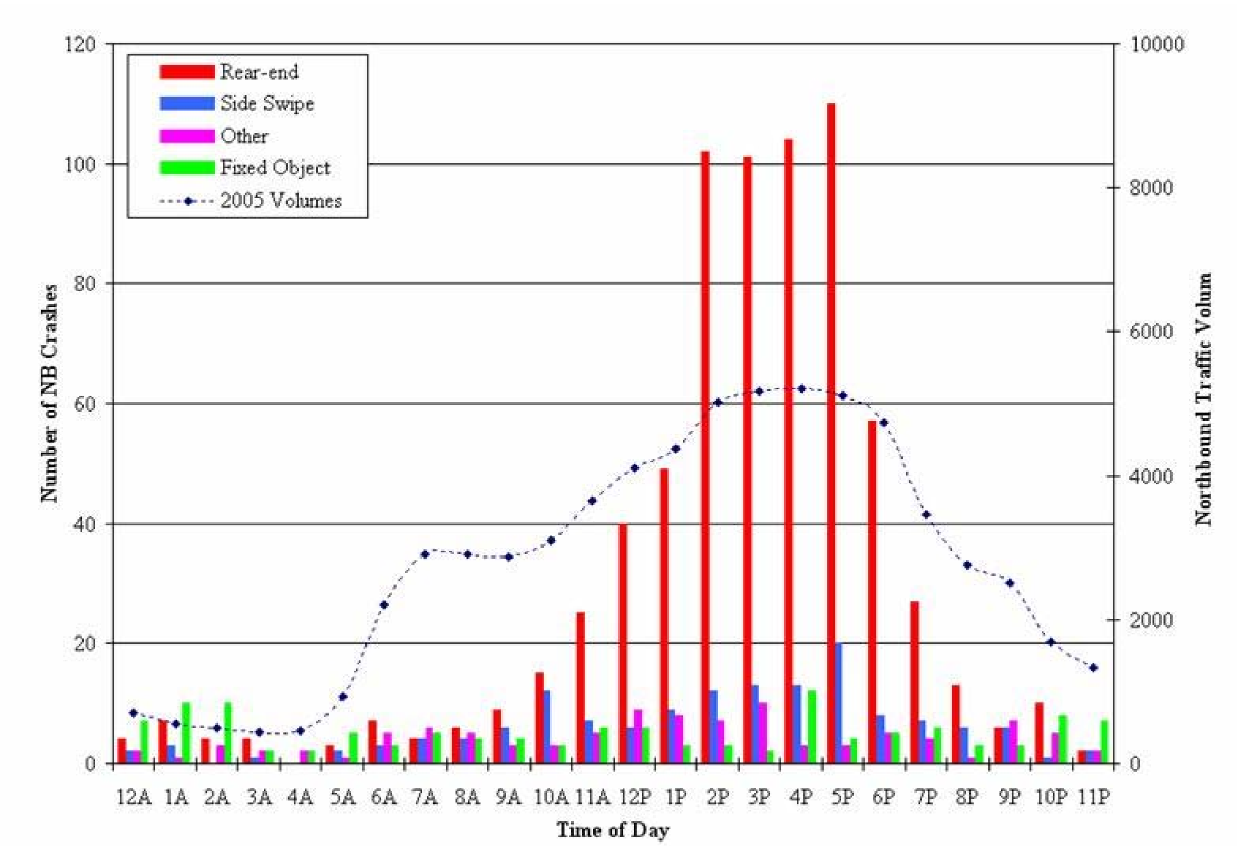
As shown in **Figure 3-13**, during periods when traffic is uncongested along southbound I-5, the number of reported collisions is generally proportional to prevailing traffic volumes (except during late night periods when the number of fixed-object and alcohol-related collisions increase). However,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



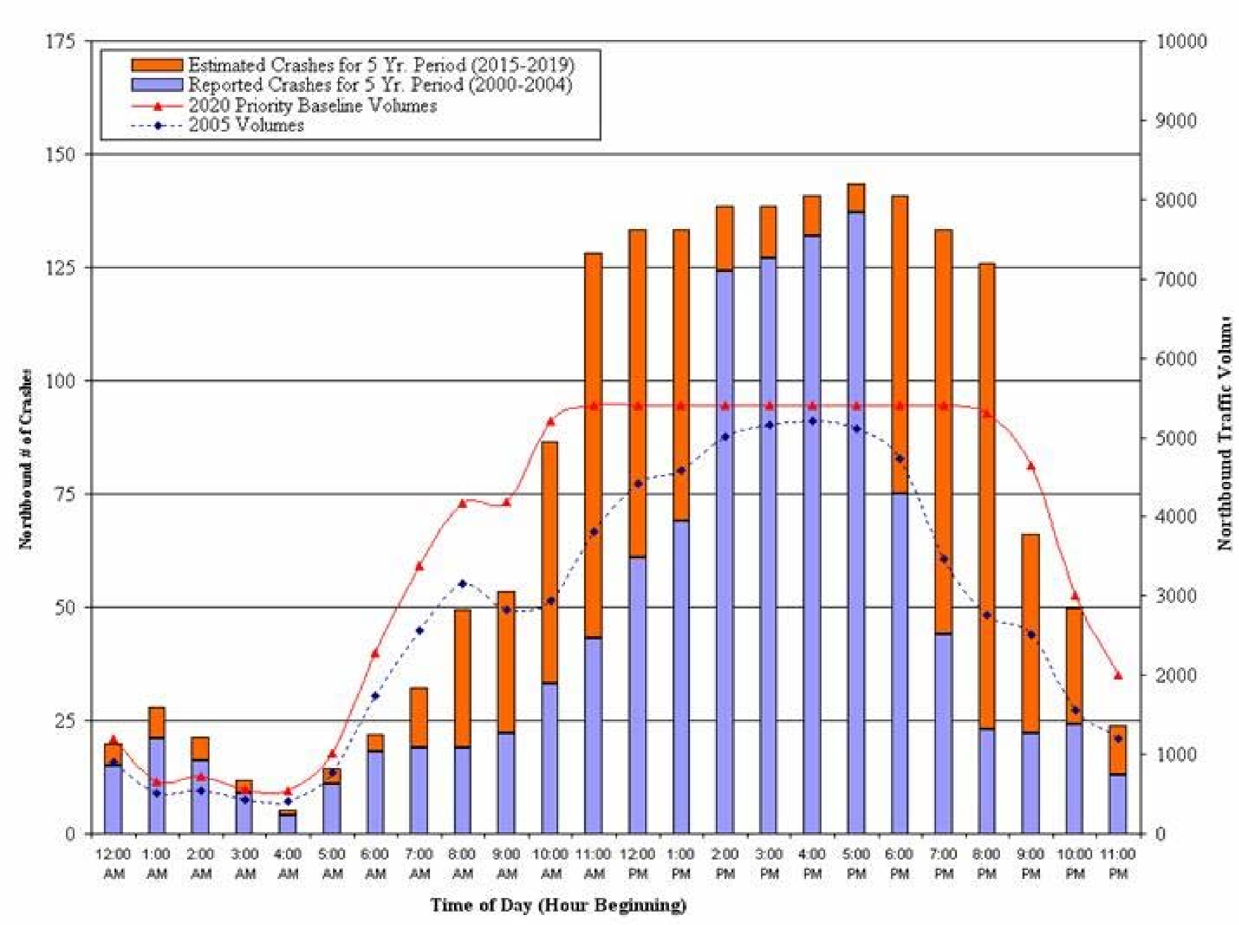
3.4.10 Attributes of Components Satisfying Question #4 for Vehicular Traffic

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?

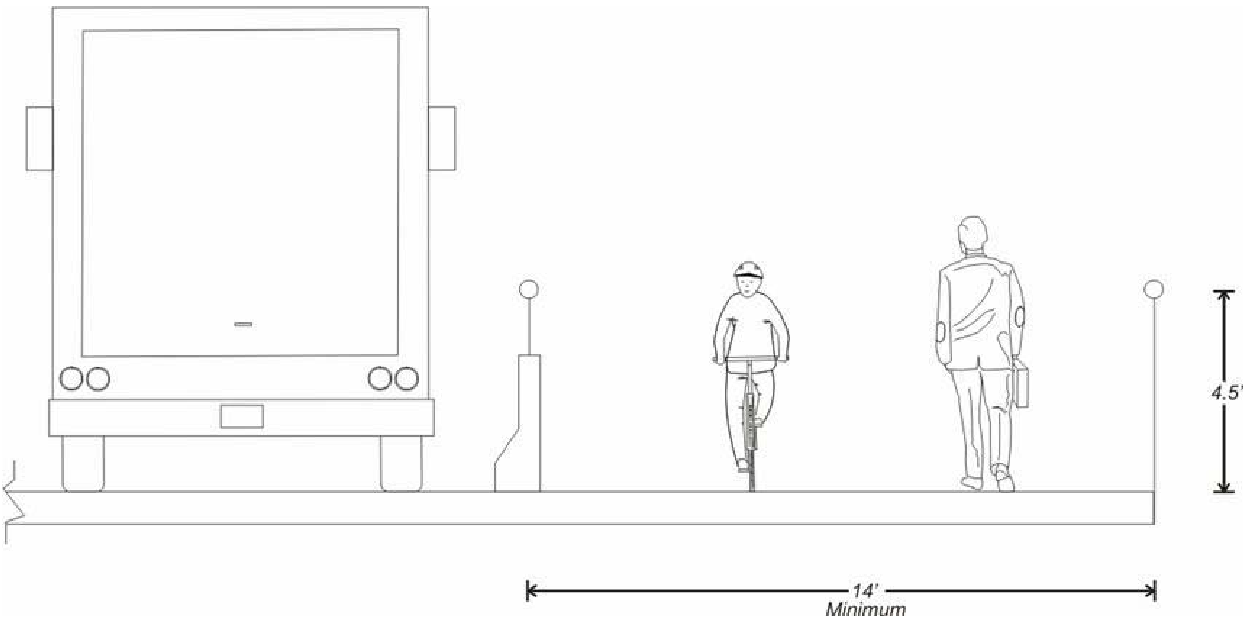
3.5.1 Bicycle and Pedestrian Mobility

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)

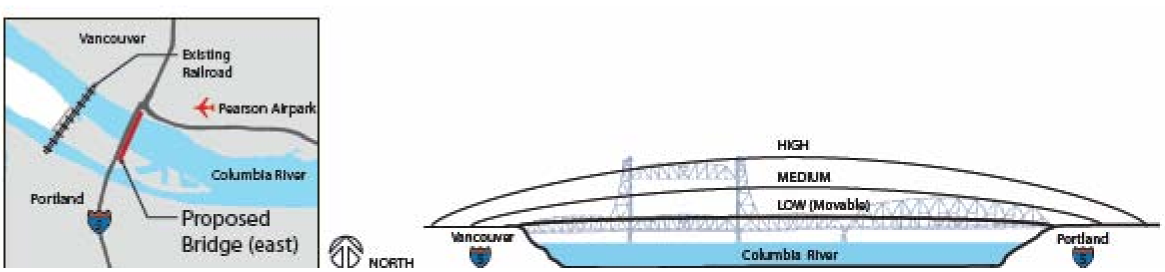
Descriptions:

<u>RC-1 Replacement Bridge Downstream/Low Level/Movable</u>: 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

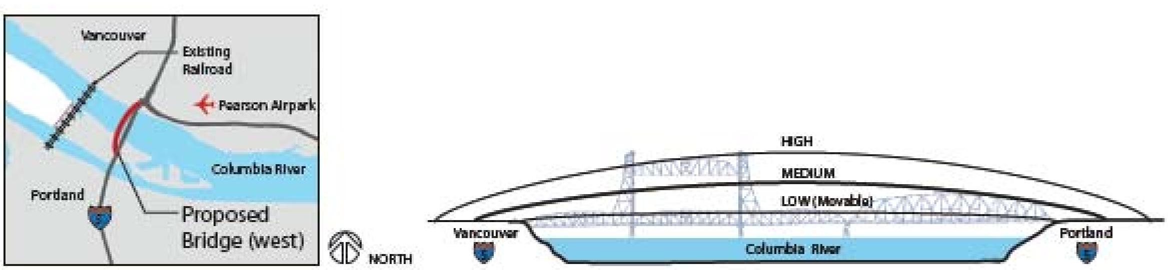
RC-2 Replacement Bridge Upstream/Low Level/Movable: This crossing represents a bridge that would be located immediately east (upstream) of the existing I-5 bridges. The existing I-5 bridges would be removed. The proposed replacement bridge is a low level bridge that would provide approximately 65 feet 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



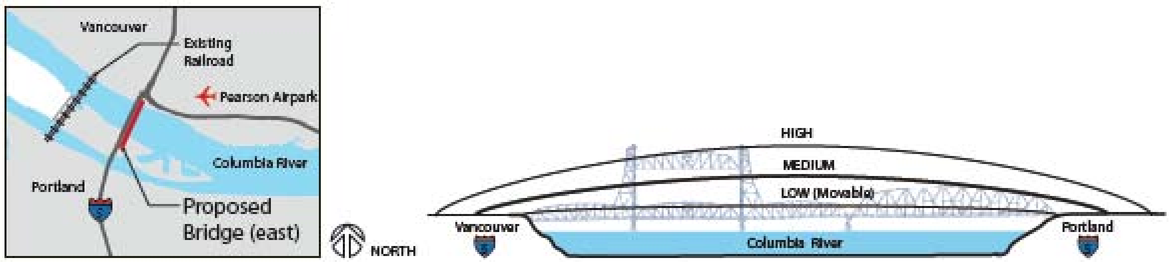
RC-3 Replacement Bridge Downstream/Mid Level: This crossing represents a bridge that would be located immediately west (downstream) of the existing I-5 bridges. The existing I-5 bridges would be removed. The proposed replacement bridge is a mid level bridge that would provide approximately 110 feet of 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:

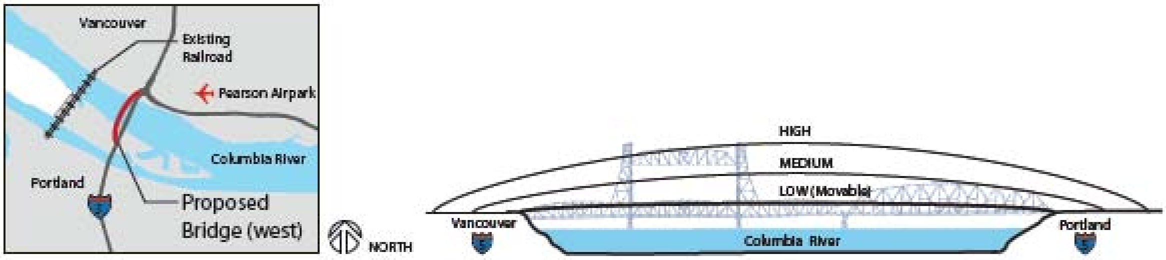
1. They would increase vehicular capacity in the Bridge Influence Area by providing approximately ten lanes of capacity for vehicular traffic.
2. The bridge configurations could also be used to carry transit, and thus could allow for an increase in transit capacity.
3. Freight mobility would be improved 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:

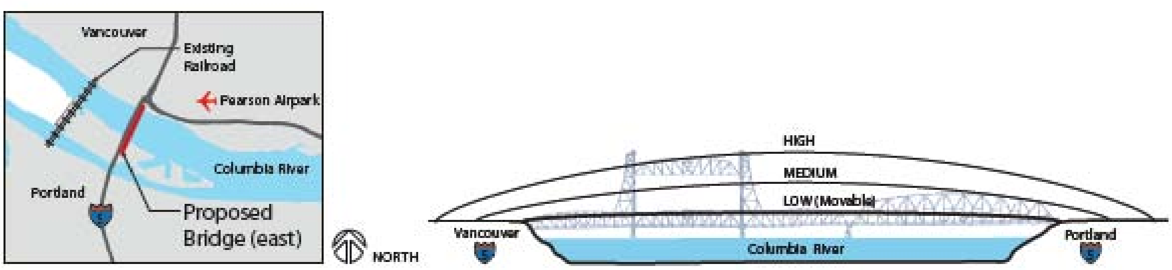
RC-7 Supplemental Bridge Downstream/Low Level/Movable: This crossing represents a new bridge that would be located immediately west (downstream) of the existing I-5 bridges. Either one or both of the existing I-5 bridges would remain in place as they are today. The proposed bridge is a low level bridge 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



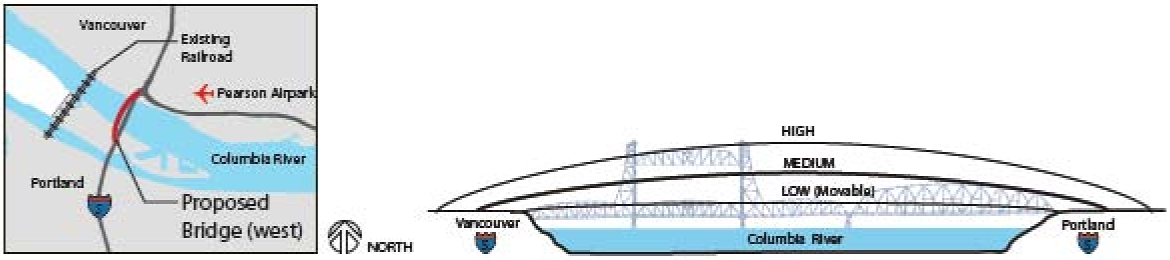
RC-8 Supplemental Bridge Upstream/Low Level/Movable: This crossing represents a new bridge that would be located immediately east (upstream) of the existing I-5 bridges. Either one or both of the existing I-5 bridges would remain in place as they are today. The proposed bridge is a low level bridge that 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.

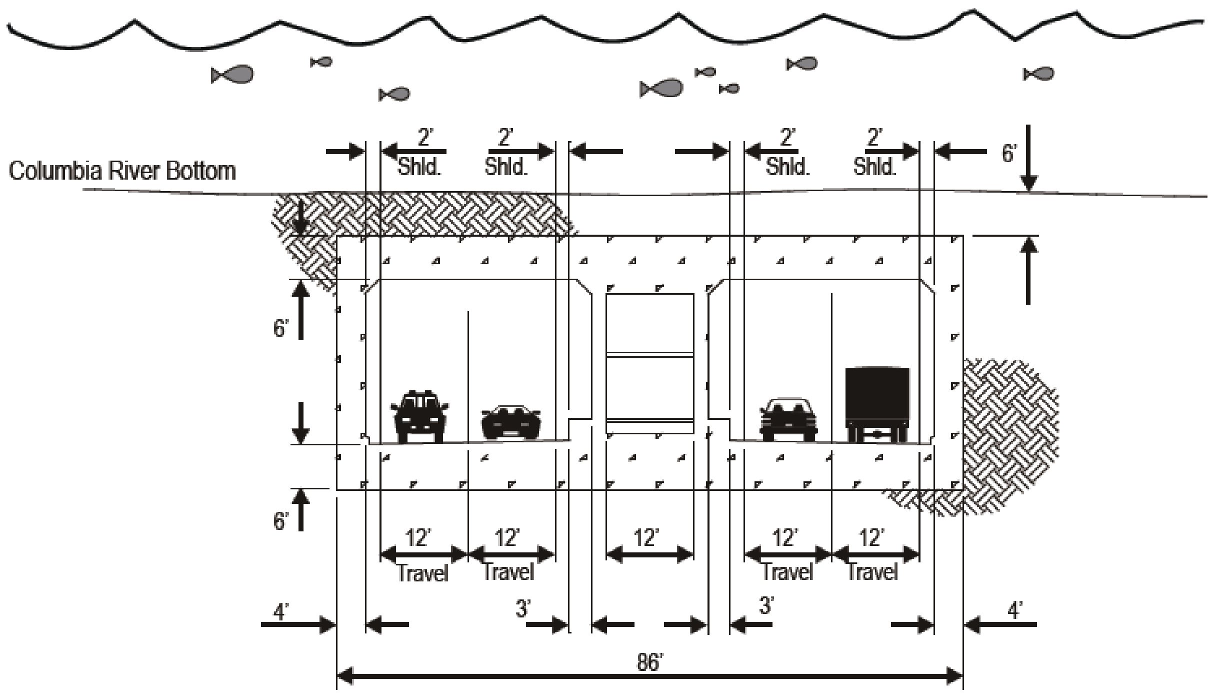
5.2.3 RC-13 Tunnel to Supplement I-5

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

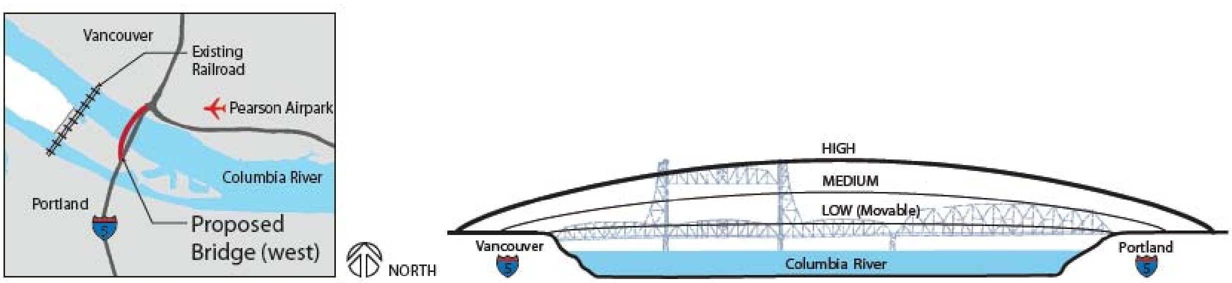
- The component does not address I-5 bicycle and pedestrian deficiencies

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

Descriptions:

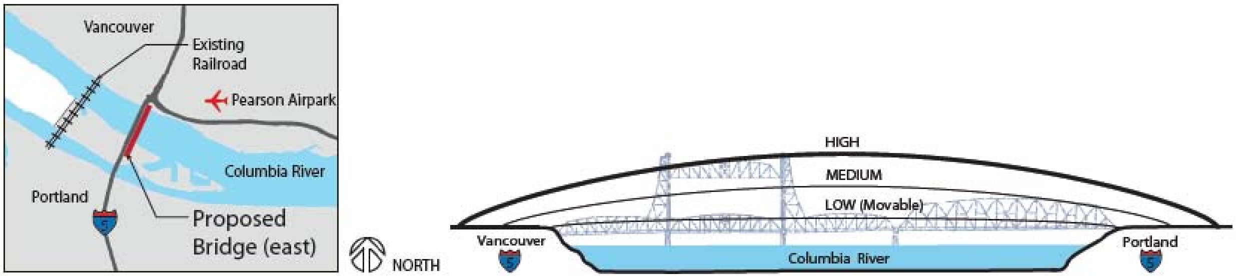
RC-5 Replacement Bridge Downstream/High Level: This crossing represents a bridge that would be located immediately west (downstream) of the existing I-5 bridges. The existing I-5 bridges would be removed. The proposed replacement bridge is a high level bridge that would provide approximately 130 feet 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



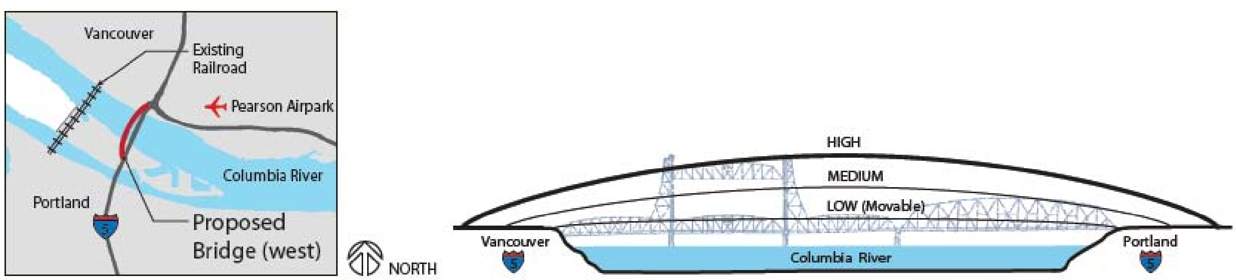
RC-6 Replacement Bridge Upstream/High Level: This crossing represents a bridge that would be located immediately east (upstream) of the existing I-5 bridges. The existing I-5 bridges would be removed. The proposed replacement bridge is a high level bridge that would provide approximately 130 feet of 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



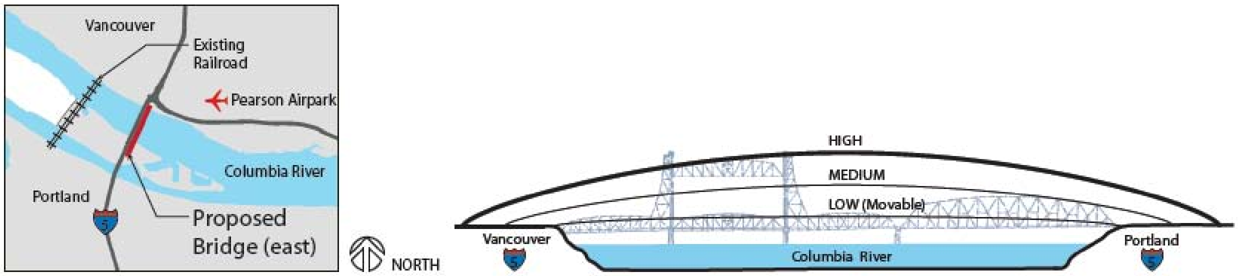
RC-11 Supplemental Bridge Downstream/High Level: This crossing represents a new bridge that would be located immediately west (downstream) of the existing I-5 bridges. Either one or both of the existing I-5 bridges would remain in place as they are today. The proposed bridge is a high level bridge that 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:

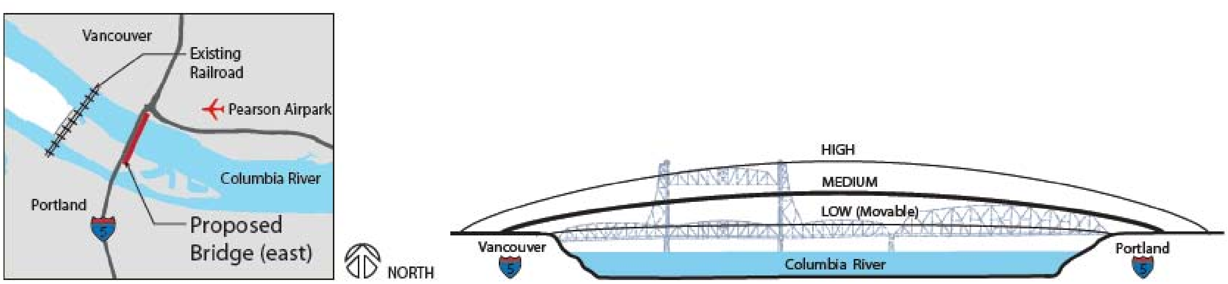
All of these components fail Question #4 relating to airspace safety. These high level bridges significantly encroach into Pearson Airpark airspace, and depending on the bridge type, may also encroach into PDX airspace. The FAA has confirmed that these high level structures would not be favorably received.

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:

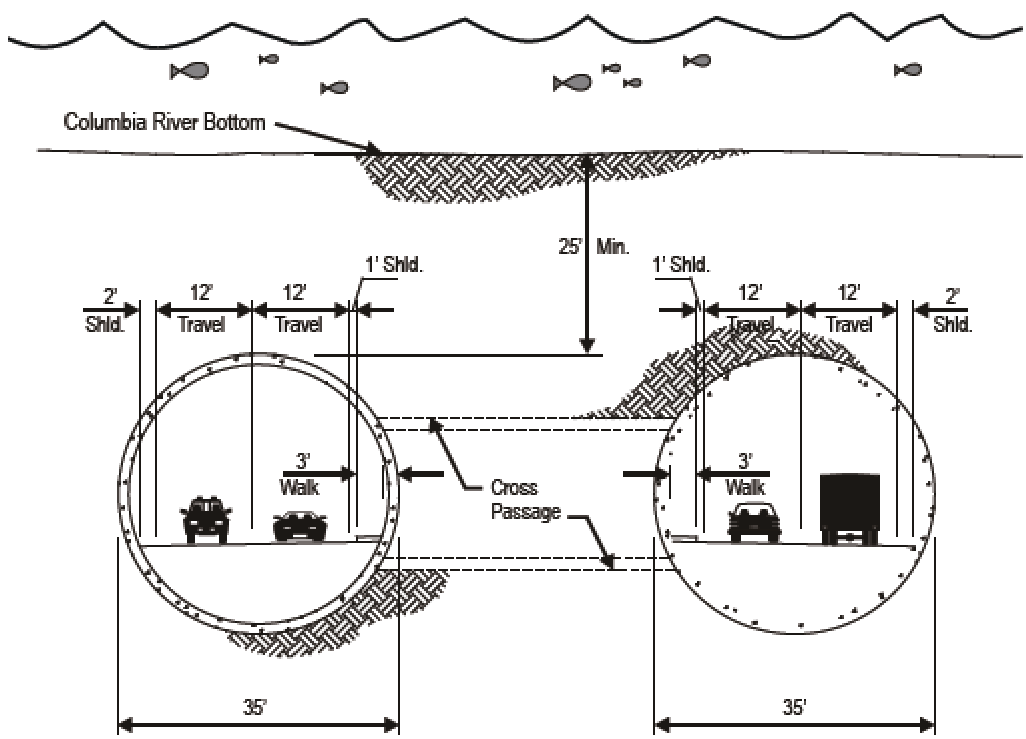
This component fails Question #4 related to safety. This component retains the existing I-5 bridges, and therefore the opening for the supplemental bridge would need to line up with the existing lift span opening. This places the high point of the new bridge on the north side of the Columbia River channel. 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)

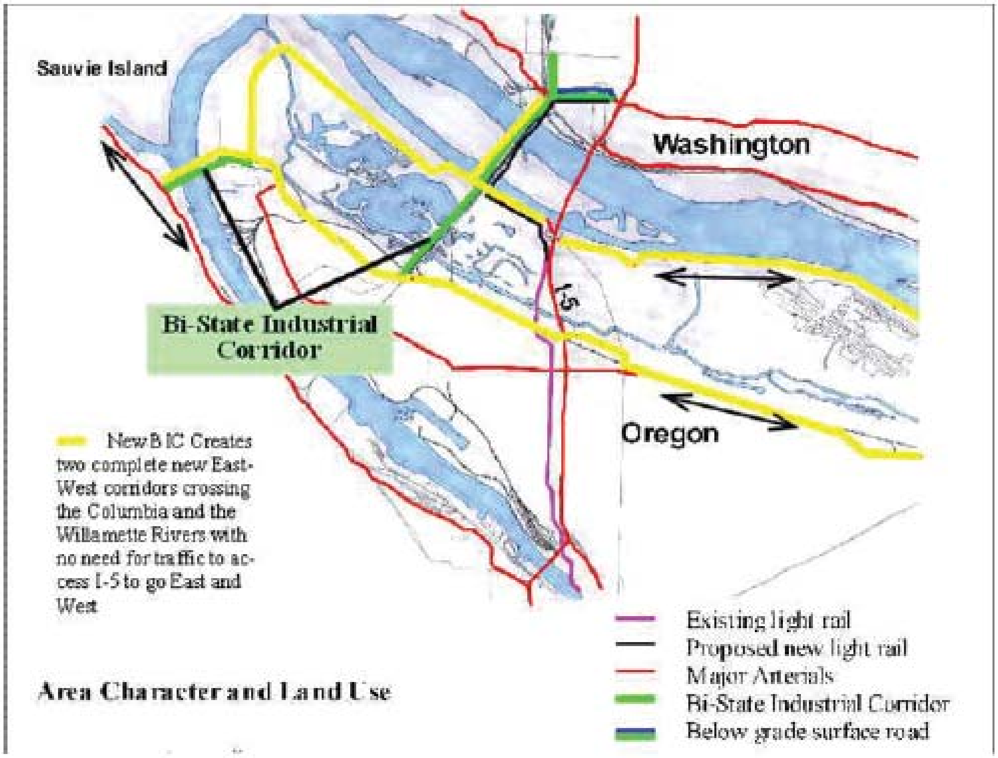
Most of these new corridor components were suggested during the NEPA scoping process and are conceptual in nature. Project staff has not developed detailed alignments or engineering designs for these components. That said, enough is known about their general location and intended function to substantiate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

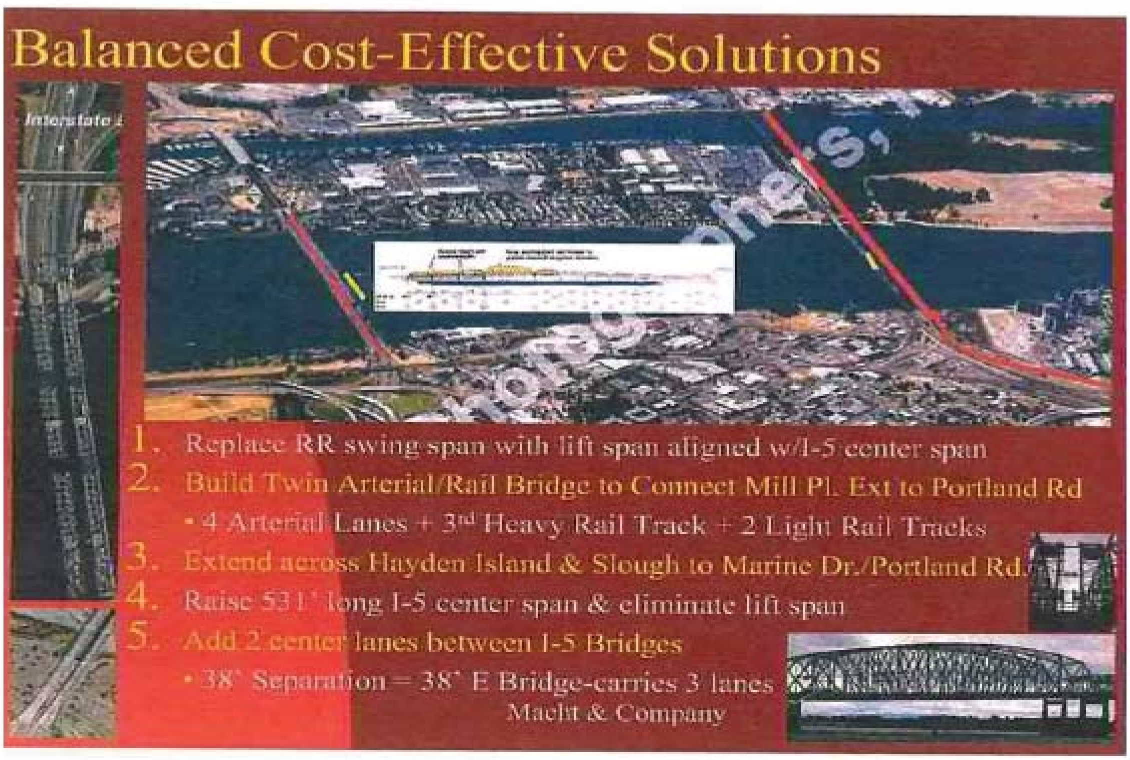
- This component fails Question #2. It would not improve transit service to the identified I-5 corridor transit markets, nor does it improve the performance of the existing transit system within the Bridge Influence Area.
- This component fails Question #4. Year 2020 I-5 peak traffic demands are projected 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



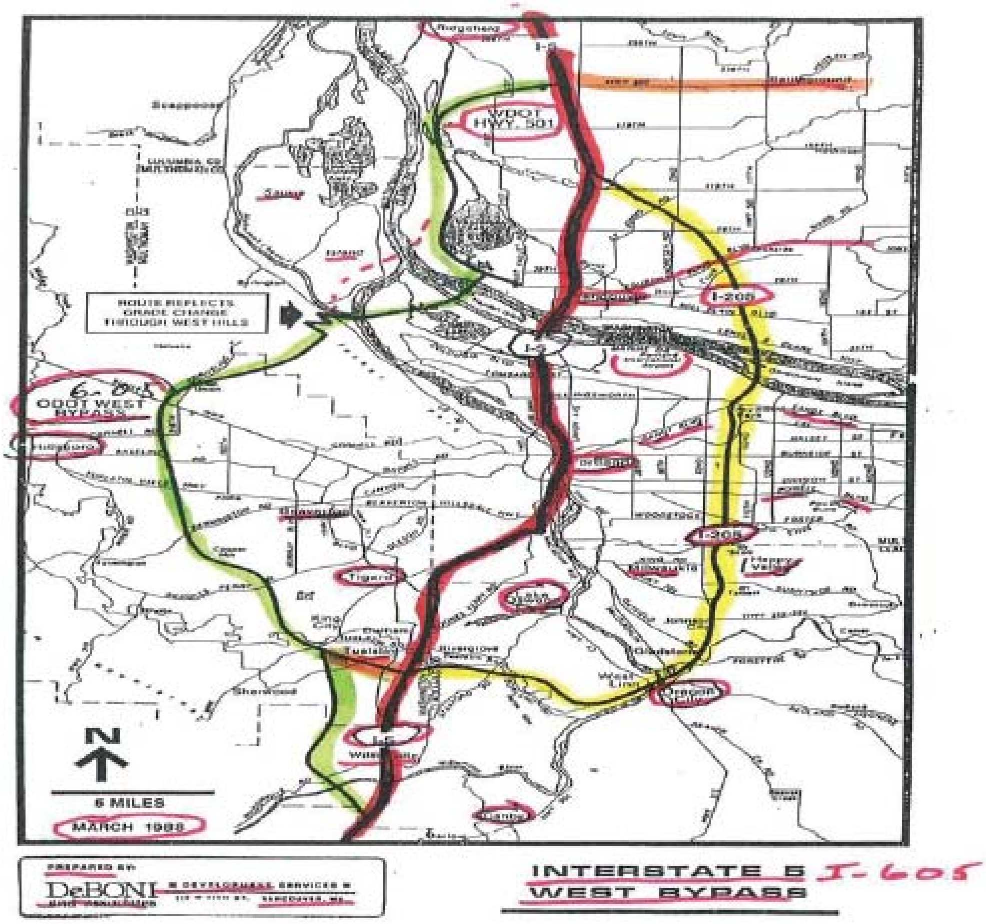
Rationale for Not Advancing:

- 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).

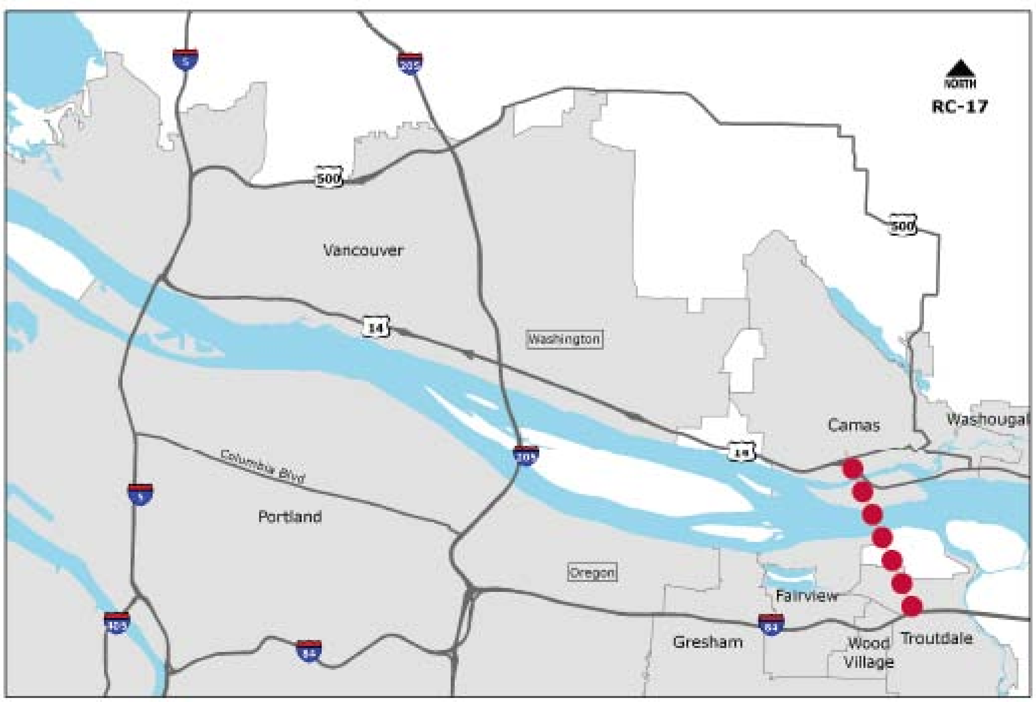
- This component fails Question #4. Year 2020 I-5 peak traffic demands are projected to increase about 20 percent over 2005 conditions and without added capacity and re-design of the Bridge Influence Area to meet standards, collisions are expected to increase approximately 45 percent over 2005 conditions.
- 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.

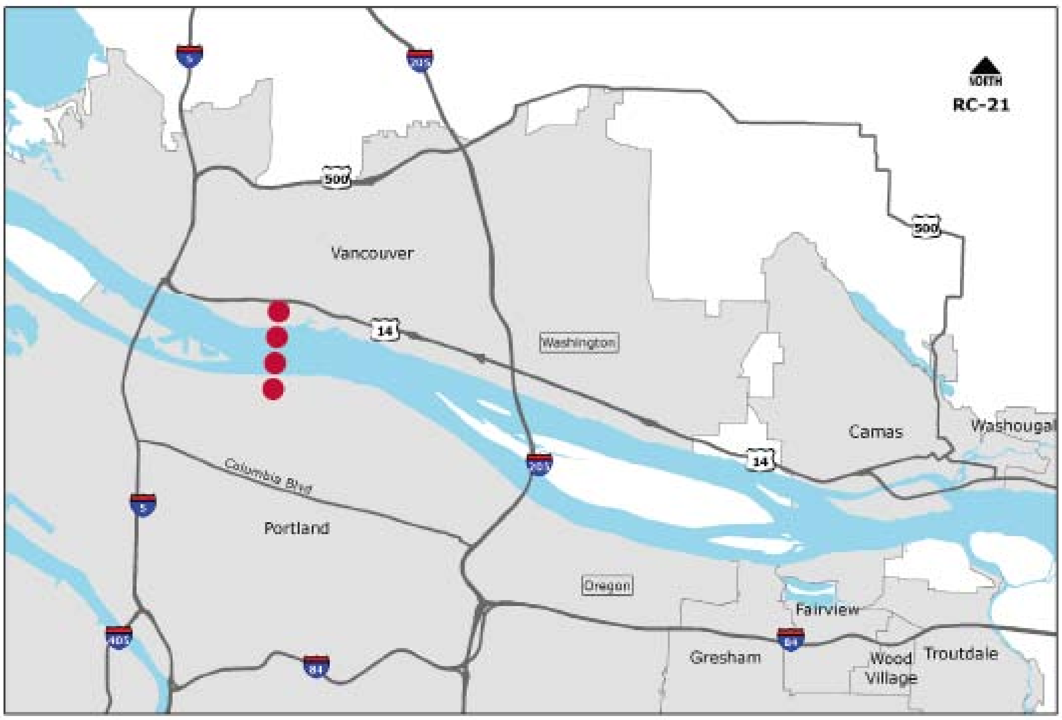
- This component fails Question #6. River crossing components that locate new structures outside of the I-5 corridor are not assumed to upgrade the existing I-5 bridges, and therefore the seismic risk of the I-5 bridges would not be reduced.

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.

Paul Edgar

From: Paul Edgar [pauloedgar@qwest.net]
Sent: Tuesday, March 21, 2006 9:53 AM
To: Henry Hewitt; Harold A. Dengerink, Ph.D.; Rob DeGraff
Cc: Rep. Deb Wallace; Rex Burkholder; Sam Adams; Marc Boldt
Subject: I am going to speak to this at tomorrows CRC Task Force Meeting (Please print this and have it in the packets for the members)

Paul,

Thank you for your efforts to bring a regional perspective and a sense of accountability to the congestion problems in the Portland area. I agree with nearly everything you are trying to accomplish and I appreciate your efforts to "keep the pressure" on the leaders of the Region. In my opinion, we are on the same side...and we want the same things for Portland / Vancouver. If we differ at all, it's in the matters of scope and timing. Let me explain:

Scope: I think our goal should be, not to fix one corridor between Portland and Vancouver, but to fix them all. I don't want to just widen I-205, or build a new Columbia River Crossing at I-5 or to build a new third bridge connecting the Ports and better serving the western communities...I want all three, and, looking to the twenty year future, the metropolitan area will need all three. So what we are trying to do is to pursue a strategy that will give us the best chance of getting all three.

Timing: The question is...How to do this, and in what order??? Should we try for the easier (and less expensive) widening of I-205 first? Maybe, but if so, that might reduce the perceived need for an improved I-5 corridor? Should we try for the third bridge first to improve the connection between the Ports with a new "freight" corridor? Maybe, but that might be seen as a substitute for widening I-205 and for improving the I-5 corridor.

So, what we seem to be settling on is trying to get the most difficult project (the I-5 corridor) underway first. If we can get that project started (and funded) and prove to the public and the legislature our ability to make a positive difference at the I-5 crossing...then, it is not such a great leap to build public support for the other two, and ...there is no question that both other projects can still stand on their own as necessary and cost effective. The fear is, if we do I-205 or the third bridge between the Ports first, than these projects will be used by some as an excuse to not support the I-5 improvements and we will further delay the replacement of these critical bridges.

I hope that you can accept (or at least not object to) this strategy. In fact, my real hope is that you will use your considerable influence to support and help us find a way to build all three of these needed projects.

Thank you again for your active support of improved transportation in the Portland / Vancouver area.

David O. Cox
Division Administrator
FHWA - Oregon Division
503-399-5749

From: Paul Edgar, **Subject:** Economic Development Research Group Study

After printing out and reading the full text of the "The Cost of Congestion to the Economy of the Portland Region" by the Economic Development Research Group at first I thought to myself "that it was about time that this information was made available" but then the real light came on. Why not let this group independently setup the criteria to evaluate; the solutions on the table now and in the future like the Columbia River Crossing (CRC) Project proposal so that a comparison could be made to it; like the widening of I-205 to 4-lanes in conjunction with the building of a freight specific Port-to-Port, Westside arterial like outlined in the Bi-State Industrial Corridor (BIC) proposal as a public/private partnership. The BIC proposal also includes replacing the Heavy Rail Bridge crossing the Columbia River with the ability to include on it a MAX/Light Rail Loop that would provide the infrastructure to connect into Vancouver.

David Evans and Associates is doing the pre-EIS efforts for this I-5 CRC project and they have had the blinders put on them to virtually only design, engineer and sell this one project. The current process, instructions and players pre-ordain an action without identifying if this is the best use of all recourses and dollars that can be invested into transportation in our region. It precludes any region/system wide solutions from evaluation. How can we have and achieve an effective public process and ROI with the current plan and instructions? Many people believe that we will not even be able to achieve an effective EIS with the current charter/RFP that exists for the CRC Task Force and project teams.

The comparative cost of these alternate projects to the public should be approximately about that same or a little less when it comes to widening of I-205 because so much of the bridges and overpass infrastructure already exists. All of the Right-of-Way necessary to accomplish this widening of I-205 to 4-lanes is currently owned. The (BIC) Port-to-Port Westside arterial could be accomplished/built in an earlier time frame with-in a public private partnership. The funding for BIC would come from the combinations of contributions from the Ports (Portland and Vancouver), Heavy Rail Entities (UP and BNSF), Tri-Met, PDC, ODOT, WSDOT, FED's, Metro, Multnomah County, Clark County, City of Portland, City of Vancouver, River Commerce Groups, Tolls and other public and private investors. The big issue is the comparative benefits to the economy of the Portland/Vancouver region.

The benefit and cost analysis should depict what the net results are of any recommendation in the Portland/Vancouver Region as transportation entities try to implement recommendations to satisfy "The Cost of Congestion to the Economy of the Portland (Vancouver) Region". Right now in front of us is a major train going down the track call the Columbia River Crossing Task Force that can obligate much of the next 20-years of transportation, transit, highway and road investments dollars in this region. This task force is tightly looking at only the replacement of the Interstate Bridges and very little more. It does not at this time even take steps to look at real economic and congestion relieving alternatives that may have the possibility of costing less and bringing in more benefits as suggested as needed by the "Economic Development Research Group". If the CRC Task Force is not given instruction to open their charter and tasks to include and identify all options to the east and west of the I-5 corridor it is wrong. A result would that we will be doing a significant disservice to all stakeholders. We must identify and evaluate all transportation options and investments to ensure that the cost of congestion to our region is eliminated or substantially reduced.

Immediate steps must be taken by all parties to thrust the lack of "Freight Mobility" caused by congestion to the front of our area's priority list. We cannot continue to invest into feel good projects that suck up the majority of the transportation investment dollars that have little Return on Investment. We must change the mind-set of the public as to what is considered as politically correct. If the economic engine doses not spin, we will not have the needed family wage jobs and investments that create them. A major issue for all of the public servants is that we will not have the taxes/revenue come in that are needed to pay for the public services and public investments. This is a chicken or egg priority decision as to what comes first. I do not want to be Chicken Little but if we do not stop and/or change the direction of the CRC Task Force Train and transportation planning NO-ONE will have the dollars available to make reasonable decisions and investments to help solve this serious congestion problem and its subsequent cost that was identified in this report.

I want what this report suggests and that is that we can get a 2-dollar return for every 1-dollar invested. The current regional transportation plans do not currently provide this type of returns on our transportation investments. Something has to change.

Thanks, Paul O. Edgar

Description of the BI-State Industrial Corridor

for Placement in the Official Records of

Columbia River Crossing

includes

Description of the Northwest Passage

and

Description of the West Arterial

March 22, 2006

Sharon Nasset

Director, Economic Transportation Alliance

Phone: (503)283-9585

Email: sharonnasset@aol.com

BI-State Industrial Corridor (BIC)

1. From highway 30, 124th to Oil Time Road in Oregon connects with existing arterials Marine Dr., N. Lombard St., Columbia Blvd. and North Portland Rd. to Vancouver Washington along the east side of the BNSF north alignment to perhaps Ridgefield Washington.
2. BIC is a freeway corridor and would have nine or more complete ramps as entrance and exit access with NO stop lights.
3. A complete ramp is north and south access (18 or more). This would be in addition to and with no change of Fruit Valley Rd. There are several existing arterials in Vancouver that currently connect with the BNSF rail line.
   *Due to grade issues the trenching of Mill Plain has been removed.

Columbia River Bridge (BIC)

1. A high span bridge with 2 levels and no lift span.
   The Lower Level Consistingonsisting of 8 lanes with 4 in each direction. Truck friendly lanes thirteen feet wide with emergency lanes in the center and on the sides. This level is to be built to accommodate high wide and needs to remain at about a 2 percent grade.
   The Top lLevel Four lanes with 2 general purpose lanes in each direction general and an emergency lane on the side.
   Three lanes transit only, 1 as a future reversible lane and 2 lanes for transit. Two lane width for sidewalk, bike and viewing.

2. New rail tracks lift span bridge with 4 tracks(1or 2 extra heavy for high speed and large loads.) Commuter rail to be established with the new additional capacity.

3. Remodel of the existing BNSF from a swing to a lift span, adding a second lift to line up with the current I-5 bridge.
   North Portland Road
   North Portland Road to be upgraded to 4 lanes each in North/South direction. The upgrade from Marine Dr. to Columbia Blvd. As North Portland Rd. borders both Smith and Bybee lakes, this would provide both access and create a pedestrian friendly promenade.

Willamette River Bridge (BIC)

1. A one level bridge with no lift span consisting of 5 lanes, 4 general purpose truck friendly lanes, thirteen feet wide with emergency lanes in the center and on the side.

2. To be built to accommodate high wide, it needs to remain at about a low percent (2%-3%) grade.
3. One center lane to be used as a future reversible lane.

4. Two lane width right of way for bicycle and pedestrian traffic on east side of bridge.

5. New lift span bridge with 4 sets of heavy rail tracks, one or more set being for high speed or every heavy rail.

Northwest Passage Description

1. The Northwest Passage includes three bridges. First over the Columbia River, second the Columbia Slough, and third the Willamette River.

2. From Mill Plain in Vancouver (I-5) follows the BNSF line and uses as a viaduct "The Cut"
to Highway 30. This is 7 lanes, one center lane for emergency and emergency lanes on the curb side. (center lane reversible making 3-3 or 3-4 lane combination)

3. The NW Passage **does not include a lift span bridge** over the Columbia River and uses on and off ramps **not stop lights** on the express way.

4. An access road to Swan Island makes a second road out, that does not access I-5, and connects with the major industrial area on one continuous corridor.

5. The NW Passage also adds heavy rail capacity of 4 new train tracks and a for freight and commuter rail.

6. Accommodation is made for bicycle and pedestrian traffic.

West Arterial Description

1. A four-lane **lift span bridge** with two northbound and two southbound lanes.

2. **Includes 5 to 7 stop lights** which bring the traffic to a full stop.

3. No addition of heavy rail or commuter rail in comparison summaries

4. No additional lanes for bike and pedestrians.

*The NW Passage was not modeled by the BI-State I-5 Trade & Transportation Partnership.

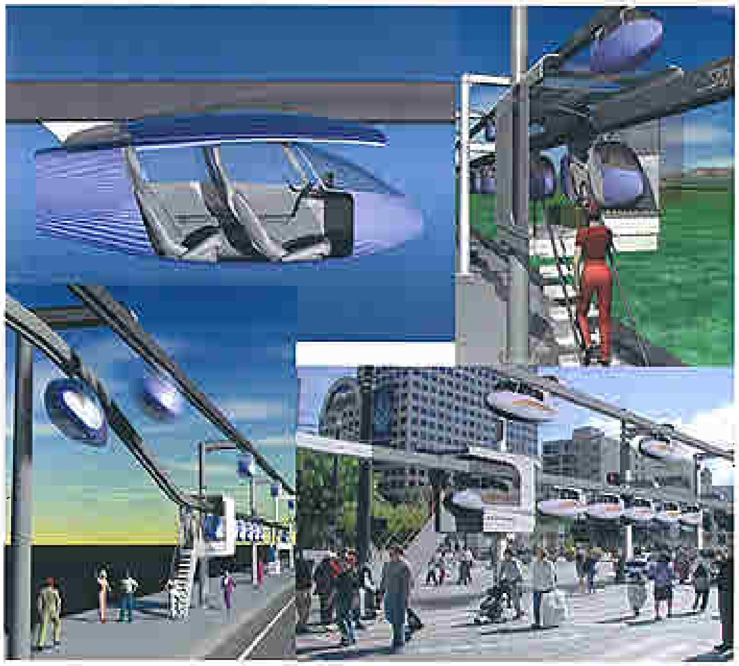
*The Western Arterial was a verion of NW Passage.

Columbia River Crossing SkyTran™ Proposal

By Ben Wilson
ben.wilson@accelero.info

What is SkyTran?

- Transportation system developed by UniModal™.
- Uses a network of elevated guideways.
- Small, computer-controlled, magnetically-levitated vehicles.
- Transit is point-to-point, non-stop.
- On-demand vehicles waiting at every boarding portal.



Key Features:

- Speed: Vehicles travel up to 100 mph.
- Cost: The lowest cost transportation mode to install and operate. 1/10th the cost of light rail.
- Capacity: One guideway has the same capacity as a 3-lane freeway.
- Energy & Pollution : Vehicles use clean electricity and get the equivalent of 200 miles per gallon.
- Maintenance: Magnetic levitation eliminates wheels, thus greatly reducing maintenance costs.
- Environment: Noiseless, visually unobtrusive lightweight vehicles and guideways blend into the city.
- Safety: Elevated guideways eliminate surface traffic collisions. Driverless, automated vehicles use computers, sensors and radar collision avoidance systems to merge and navigate.

Advantages Over Roads

- Congestion-free reliability
- Faster transit
- Cleaner energy
- No parking required
- Minimal land use required
- Significantly lower cost to build
- Significantly lower cost to operate

SkyTran for the Columbia River

- SkyTran can provide an effective extension to the MAX into Vancouver.
- SkyTran guideway can be attached to the existing bridge.
- SkyTran addresses the issue of commuter traffic, which is the primary cause of congestion.

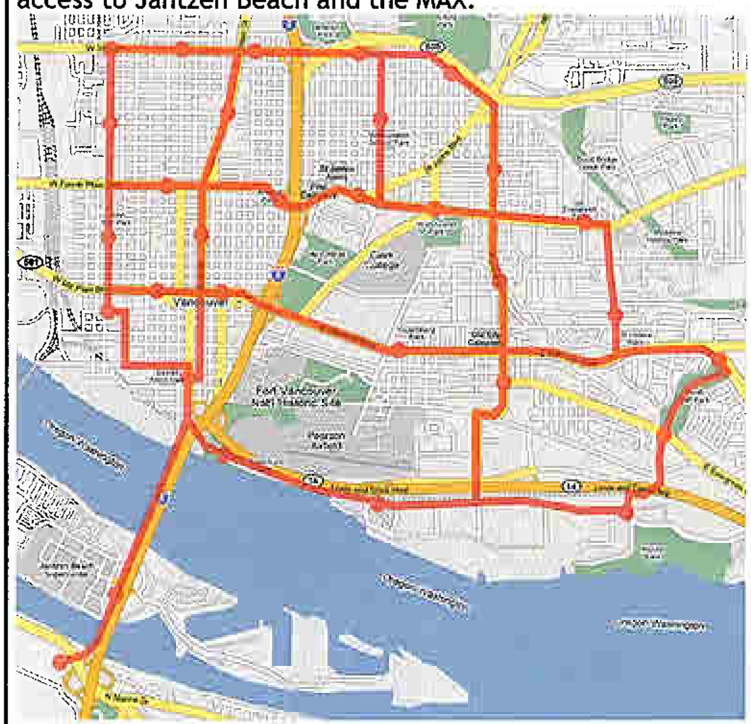
Phase 1

SkyTran link between 7th Street Transit Center and Expo Center MAX Station, with stop in Jantzen Beach

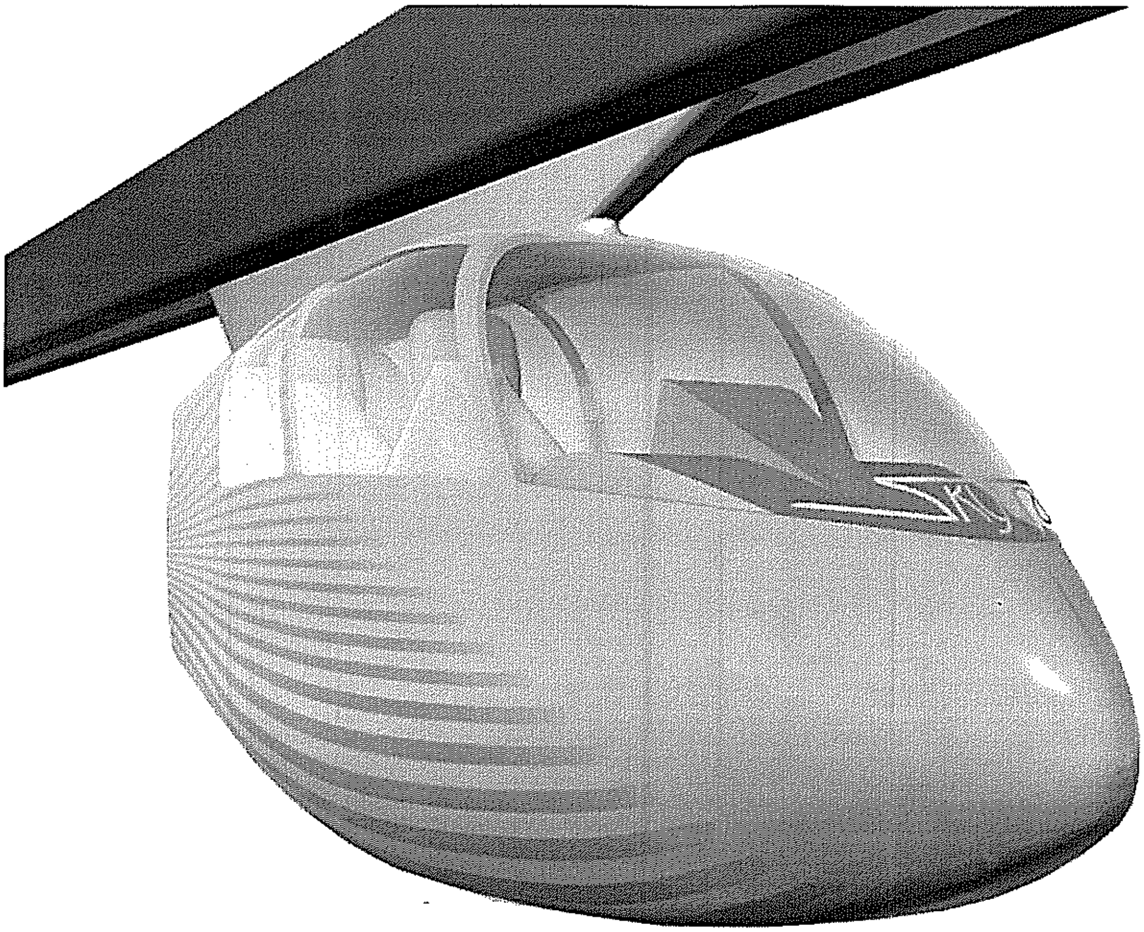
- 2-minute travel time from Vancouver to Expo Center.
- Estimated cost for research, development and installation: $90 million.
- Project Duration: 4 years.

Phase 2

SkyTran feeders covering SW Vancouver, providing direct access to Jantzen Beach and the MAX.



- Estimated cost: $100 million.
- SkyTran expects to be able to fund phase 2 privately – no tax money required.
- All that is required is permission to build along public right of way.



Faster, Safer...Smarter.

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Transport Solutions for People, Products and Data

SkyTran™ Personal Maglev Transporter™

On UniModal's SkyTran™ you travel the city using a network of elevated guideways on which small, computer controlled, magnetically levitated vehicles provide you with point-to-point, non-stop, on-demand transit service.

THE SKYTRAN EXPERIENCE

You board a 2 passenger vehicle from one of many small, conveniently located stops throughout the city. After entering your destination, you experience a mild acceleration as your vehicle leaves the offline stop and merges onto the main guideway joining the elevated network of vehicles moving 100 mph to their specific destinations without any stoppage or interruption.

SkyTran behaves like an automatic car...but faster. There's no traffic lights, no traffic jams, and it works with greater capacity, safety, energy efficiency and far better economy.

KEY ADVANTAGES...

Speed: Vehicles travel 100 mph in the city and 150 mph between cities.

Cost: The lowest cost transportation mode to install and operate. 10 times less than light rail.

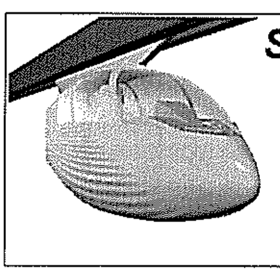
Capacity: One guideway has the same capacity as a 3 lane freeway.

Energy & Pollution : Vehicles use clean electricity and get the equivalent of 200 miles per gallon.

Maintenance: Magnetic levitation eliminates wheels, thus greatly reducing maintenance costs.

Environment: Noiseless, visually unobtrusive lightweight vehicles and guideways blend into the city.

Safety: Elevated guideways eliminate surface traffic collisions. Driverless, automated vehicles use computers, sensors and radar collision avoidance systems to merge and navigate.



SkyTran™ delivers public transit users the convenience of a car without the need for government subsidies to build and operate the system.

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Background

From Gridlock To Personal Freedom

Problem: The public overwhelmingly rejects light rail, monorails, buses, and car pool lanes as a solution to automobile gridlock.

Analysis: Despite the reality of gridlock, the perceived convenience of cars outweighs the inflexibility that light rail, buses, and car pool lanes impose on personal transit.

Solution: A transportation option that allows personal point-to-point non-stop convenience like cars but at higher speeds and volumes and with less energy and pollution.

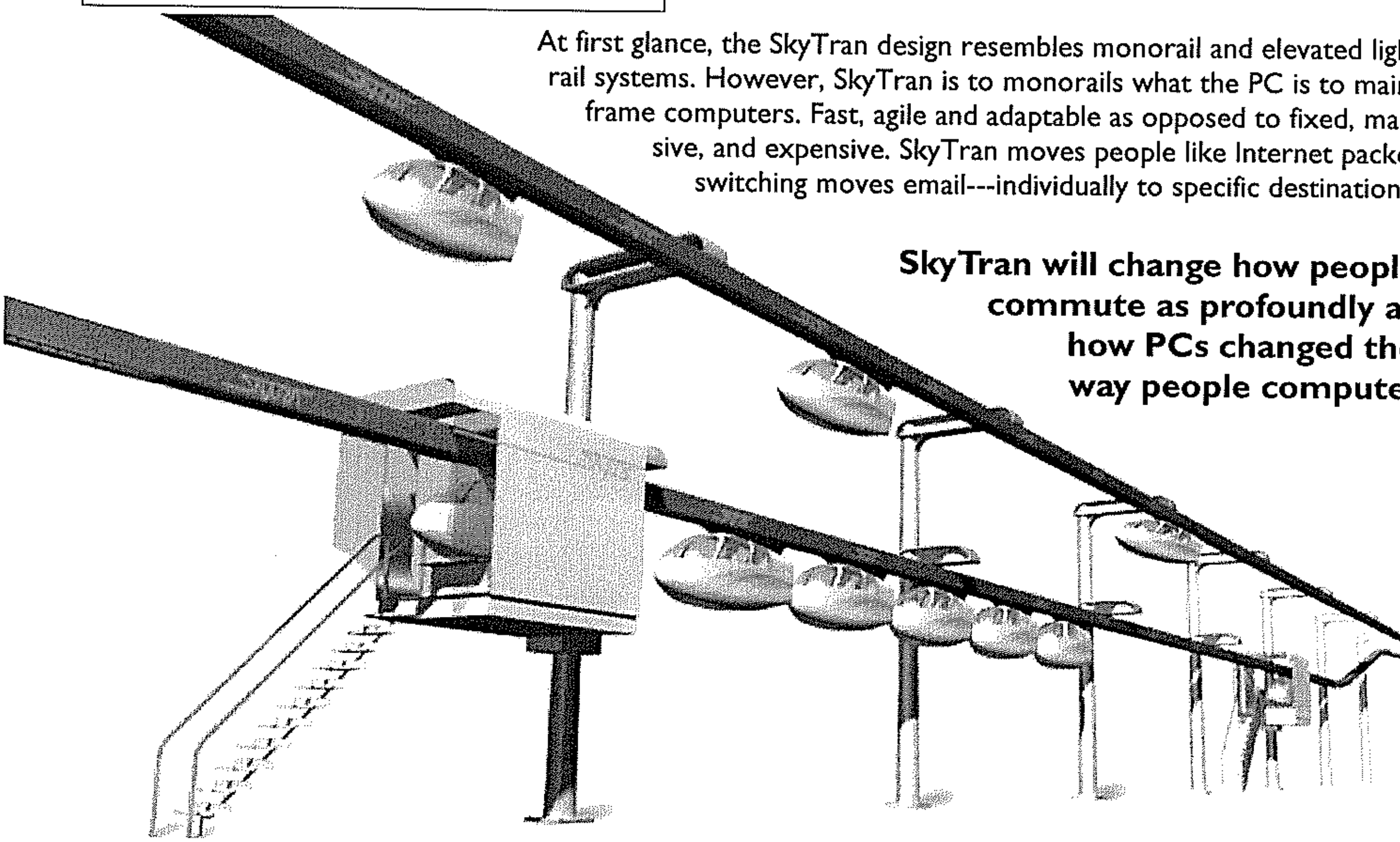
Q: Is the problem too many cars?

A: No. The real problem is how to quickly move small human payloads everywhere. Time to rethink using two ton machines to move 170 pound people.

The SkyTran Solution. SkyTran's unique design integrates key technical advances in engineering, automation, and propulsion and transforms them into a 21st century transportation solution that eliminates traffic gridlock and congestion.

At first glance, the SkyTran design resembles monorail and elevated light rail systems. However, SkyTran is to monorails what the PC is to mainframe computers. Fast, agile and adaptable as opposed to fixed, massive, and expensive. SkyTran moves people like Internet packet switching moves email---individually to specific destinations.

SkyTran will change how people commute as profoundly as how PCs changed the way people compute.



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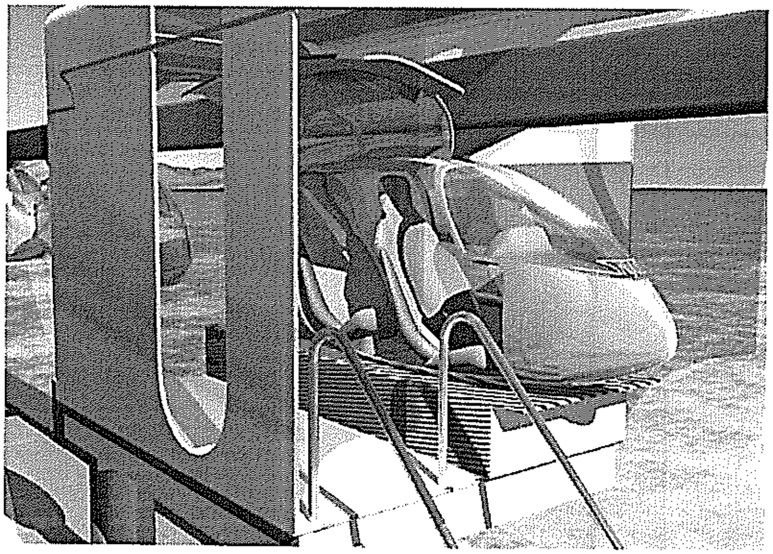
SkyTran Features

Safety, Convenience & Speed



Easy & Convenient. SkyTran is on-demand. There's no waiting, fixed routes or timetables. It's just like using your automobile. You board a waiting vehicle at the head of a queue at one of many city-wide off-line stops. The destination is either selected via display menu or voice activation. Payment is by credit card or a RFID device similar to a Mobil SpeedPass. Each vehicle has air conditioning, audio entertainment and vehicle-to-vehicle communication.

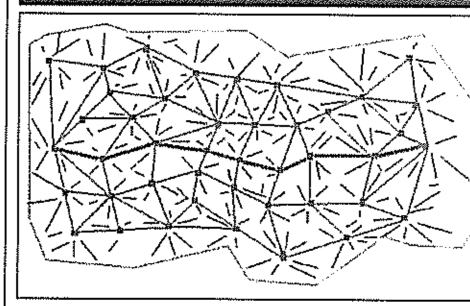
Fully Automated. Before departure occurs sensors determine the dynamic position of all oncoming SkyTran vehicles on the high speed guideway. At a precise calculated moment the off-line vehicle accelerates and merges safely with mainline traffic. A high reliability, high-speed, non-mechanical switch provides the transition onto the non-stop guideway. Once on-line you don't stop until you reach your destination. Then, the vehicle is switched off-line again. The rider exits and the vehicle joins the queue awaiting another rider to enter the vehicle, input a destination, and depart. In a fully developed system you are never more than a quarter mile from a stop to get on or off.

Fast: SkyTran utilizes line capacity more efficiently than light rail by moving the vehicles in a continuous stream. Every part of the line is continuously utilized network as opposed to light rail, where each line segment is utilized only for a few seconds when the train passes over it and then repeatedly sits idle at each station. When compared to the highway infrastructure, a SkyTran guideway has the same capacity as three lanes of freeway traffic.

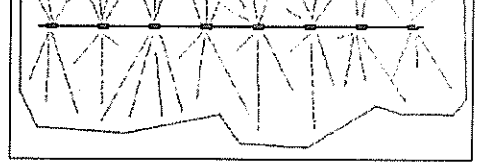
Energy Efficient : Gliding on no-contact, friction-free maglev bearings, the light plastic composite two-passenger vehicles add to energy efficiency by reducing wind resistance and drag through their aerodynamic design. This attention to vehicle shape and size allows for their suspension on narrow, lightweight, visually unobtrusive aerial guideways supported by standard utility poles with a very small right-of-way footprint.

Safe: There are no intersections where pedestrians or surface vehicles can collide with SkyTran because the system is elevated and the vehicles themselves run in only one direction eliminating the threat of vehicle collisions. The guideway's patented design "captures" the maglev-motor assembly in such a way that makes vehicle derailments impossible. Computer controlled collision-avoidance radar and guideway sensors update thousands of times per second to maintain proper position and speed with other vehicles.

SKYTRAN 3D NETWORK



SkyTran is laid out across a city in an elevated 3-D network configuration (above). You can get from any one point in the city to any another by a variety of different routes. And getting to any stop is only a short walk. In contrast, typical light rail design (below) serves an extremely limited number of stops, leaving most of the city without service.



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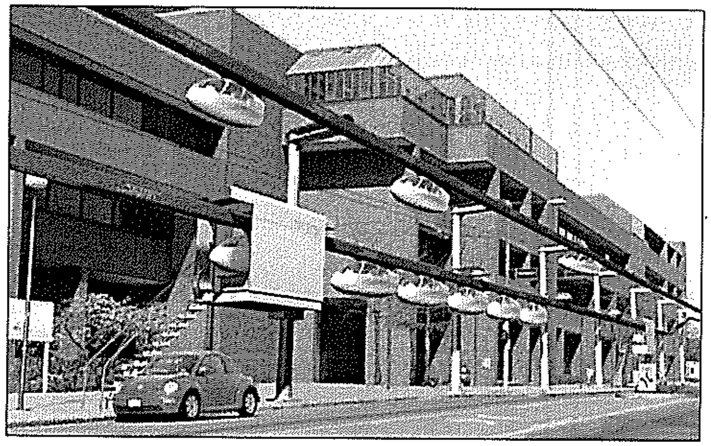
Design Philosophy

Mass Transit Transformed Into Personal Transit

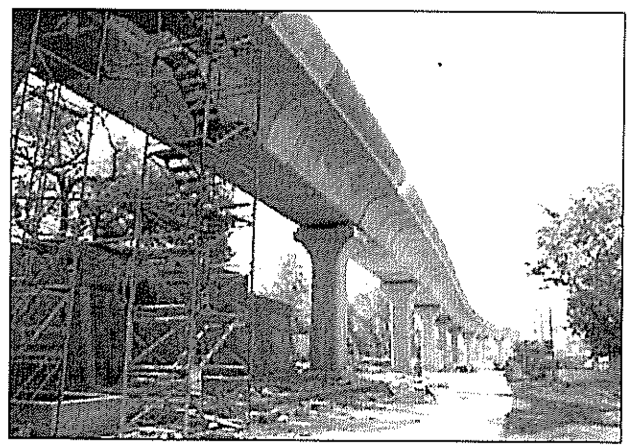


SkyTran uses off-the-shelf parts and civil engineering principles already proven in monorail and light rail systems. The paradigm shift is in how we design mass transit with those parts and principles. Instead of defining the *mass* as a few large groups of people moving in extremely heavy vehicles with multiple stops to a small number of destinations, SkyTran moves many tiny clusters of people (1 or 2) non-stop anywhere in a large network of destinations in an extremely light vehicle.

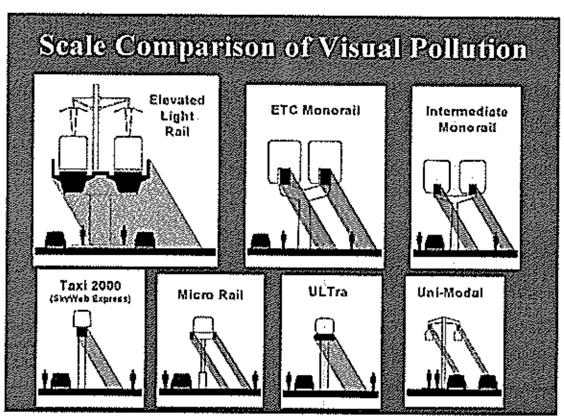
In contrast to a monorail's expensive, massive and visually intrusive support columns and trusses, the SkyTran design is so lightweight and agile that it can be suspended over residential sidewalks, attached to building exteriors, and even routed directly to gates at airport terminals or through shopping malls.

David vs. Goliath

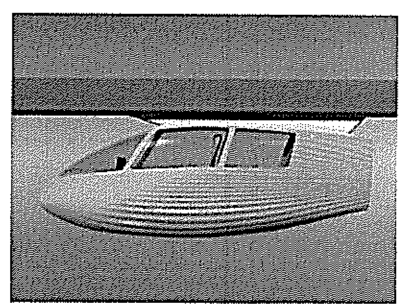
SKYTRAN: Lightweight, inexpensive, quick to install, and blends seamlessly into the urban landscape. Requires minimal right-of-ways.



LIGHT RAIL: Heavy concrete work, extremely expensive, difficult to install, and visually unappealing. Requires extensive right-of-ways.



Light vs. Shadow



Compared to other elevated forms of transit, the Unimodal design casts the smallest shadow on the urban landscape. Note the dramatic difference between the three current monorail and light rail designs and Unimodal. Even among other personal transit designs, Unimodal's SkyTran is the least visual obtrusive. The key is a philosophy that incorporates aerodynamic and lightweight design as its guiding principle.

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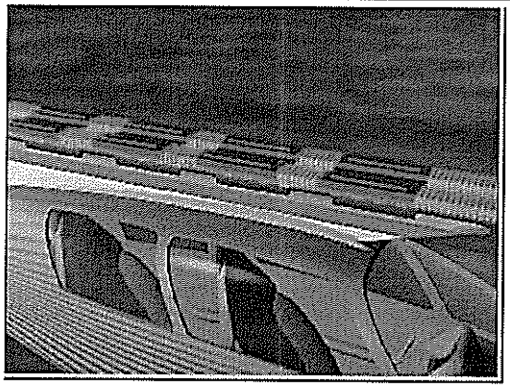
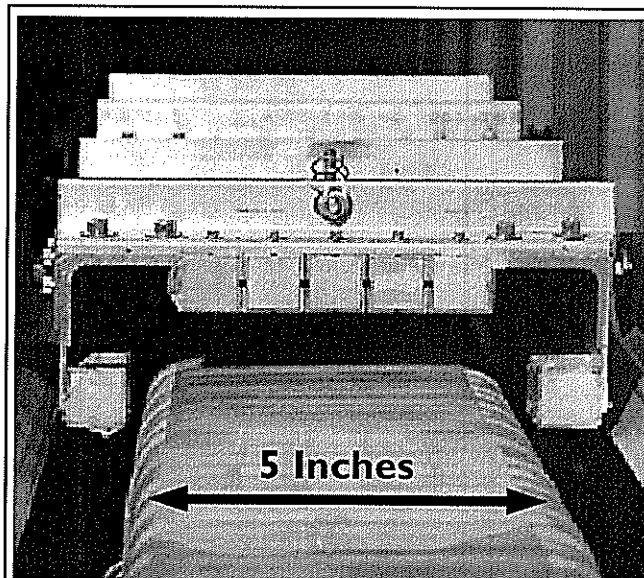
Maglev Technology

The "Wheel" of the 21st Century



SkyTran's PRT vehicle design is the first ever proposed that eliminates the use of wheels and mechanical rotary bearings. This revolutionary approach is possible by incorporating magnetic levitation (maglev) as a non-contact, no-friction bearing system that slashes costly maintenance because there are no moving parts to fail. Propelled by a linear motor, the vehicle requires no active electrical input for the magnets to levitate down the guideway at speeds of up to 150 mph. Energy efficiency is equivalent to a 200 mpg auto.

SkyTran uses a revolutionary maglev technology that stably rides an induced magnetic wave without requiring active electrical input to levitate. Unlike conventional active electrical input systems like the German Transrapid and Japanese HSST technologies, SkyTran's breakthrough approach allows for the design of elegant and compact linear motor/magnetic bearing suspension devices without the complex feedback systems and auxillary power supplies required by conventional maglev.



This photograph of an actual test of the first generation proprietary maglev technology used in SkyTran successfully demonstrated sustained, stable levitation and the feasibility of the compact bearing and guideway concept.

The magnetic bearings being developed for use in SkyTran use high performance permanent magnet materials combined with embedded conductive elements to provide an unprecedented combination of performance, safety, durability and economy. This approach is passively stable both laterally and vertically by improving upon the basic principle of electrodynamic suspension, producing lift from forward motion but also producing lateral centering forces to keep vehicles stable and on track without active control or unwanted vertical planar components that would hinder merging or diverging. And while in motion the vehicles are rigidly and precisely fixed in the vertical dimension by powerful repulsive magnetic forces and can carry wide ranging loads without requiring adjustment. These features allow the design of guideways that employ passive and fail-safe merge/diverge high speed switching operated solely by solid state devices on the vehicles—a technical achievement impossible to implement with conventional maglev designs. These proprietary switching methods are key to SkyTran's vehicle design. This arrangement allows for reduced guideway structural requirements and allows the safe use of under hanging vehicles which bank naturally in response to turning forces, providing greatly improved passenger comfort, higher cornering speeds, switching speeds and reduced torsion on guideway support structure.

In the event of a catastrophic power loss, vehicles continue to levitate while gliding gently down to a low speed before settling onto the track surface unlike conventional maglev designs. The complete lack of moving parts in both guideways and vehicles along with non-contact, friction-free vehicle motion ensures the highest level of reliability with extremely low maintenance requirements. Tightly integrated propulsion is by either linear synchronous or linear induction motors, or both depending on the application. High force and power capabilities enable rapid acceleration and steep grade climbing. Regenerative braking capability like that used in hybrid automotive vehicles improves overall system efficiency.

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SkyTran In Review

Specifications & Benefits

CONVENIENCE: SkyTran is on-demand—no fixed routes or timetables. It's just like your automobile. Vehicles are waiting for you whenever you need one and they take you straight to your destination without wasting time stopping at each and every station. A passenger keys in a desired destination address into a terminal at the originating portal.

EASE OF USE: No need to drive, vehicles are automatic. More affordable and safer than driving, much faster than auto, bus or light-rail.

VEHICLE CAPACITY: SkyTran vehicles can accommodate up to 2 people or 1 person with a luggage capacity equal to airline travel. Vehicle designs can accommodate special ADA needs.

SYSTEM CAPACITY: A single guideway is equivalent to 3 lanes of freeway traffic running at peak capacity. Anytime maximum capacity for a single guideway is 14,400 passengers per hour. SkyTran carries passengers in a continuous stream on a non-stop mainline unlike light rail which carries passengers in bursts where everyone stops at every station on the route. A stopping SkyTran vehicle does not cause other vehicles to stop, the vehicle branches off from the mainline and decelerates at an off-line line stop where passengers disembark.

SPEED: 100 miles per hour cruise speed non-stop in a city, 150 miles per hour non-stop between cities.

SAFETY: Elevated guideways insure there is no possibility of collisions with cars, trucks, pedestrians, children, animals or road debris. SkyTran vehicles move on a single guideway going only one direction—there is no risk of head-on collisions. Computers and sensors monitor vehicle spacing and speed for collision avoidance and each vehicle is enabled with safe high-g emergency braking. Compared to auto travel, there are no intersections where accidents can occur (75% of auto accidents happen at intersections), no dangerous passing or arbitrary lane changing. SkyTran is all-weather and unlike cars cannot slide out of control in rain, ice or snow. SkyTran can safely stop 10 times faster than a car. Derailments are impossible as the motor/maglev vehicle assembly is physically "captured" by the guideway.

COST: Under $10 million per installed mile including vehicles.

ENERGY EFFICIENCY: Each electric powered vehicle gets the equivalent of 200 miles per gallon. This is achieved by using no-contact, no-friction magnetic levitation bearings, a light weight, aerodynamic vehicle profile and regenerative braking technologies.

MAINTENANCE: A SkyTran vehicle has a mechanically simple, solid state design. Maglev means there's one moving part—the vehicle hovering down the guideway. There are no wheels, bearings, hydraulics, pistons, valves, tires, or linkages to fail resulting in very low maintenance.

ENVIRONMENTAL IMPACT: SkyTran has minimal environmental impact. Because there are no wheels, the vehicles travel almost silently and without vibration. Compared to an equivalent capacity three lane highway or a lower capacity light rail system, SkyTran has minimum visual impact .

LAND USE: Of all transportation options, SkyTran has the least intrusive right-of-way requirements. No expensive, destructive right-of-way acquisitions required, just easements on existing sidewalks. The installation footprint is only as large as the size necessary for the placement of standard utility poles that support the guideway.

INSTALLATION: No heavy digging, disruption or relocation of utilities and roads for installation. SkyTran's lightweight design enables installation on sidewalks, attachment to buildings, routing through shopping mall interiors even direct access to gates at airports.

ACCESSIBILITY: A mature 3-D network of SkyTran stops in a city would enable easy access to the system requiring a short walk. Stops are spaced approximately 1/8 to 1/4 mile apart. SkyTran has no large "stations" like those used with light rail. SkyTran is accessed by way of small portals or "stops" like a bus stop, that are conveniently sited through neighborhoods, cities and regions. The system can be accessed inside office buildings, hotels, malls, schools and airports.

PERSONAL CHOICE: SkyTran passengers always have the option to veto a particular vehicle due to sanitation or other issues.

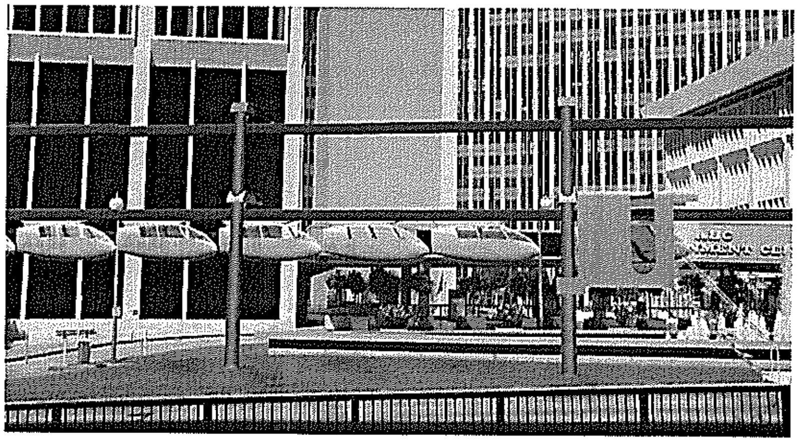
SECURITY: The whole idea of SkyTran is to empower the passenger to have the personal freedom to select time of departure and destination. You never have to share your vehicle with anyone. Should problems arise, the system is programmed to divert a vehicle for immediate emergency intervention. SkyTran provides privacy, safety and personal freedom.

COMFORT: Vehicles are air conditioned and have entertainment and vehicle-to-vehicle communication options. In normal operations vehicles never accelerate/ decelerate at more than ½ g —well within human body comfort zone.

unimodal

Transport Solutions for People, Products and Data

Unimodal, Inc.



UniModal is incorporated in the state of Montana whose principal stockholder is inventor, Douglas Malewicki.

UniModal owns key enabling technologies of the Skytran system. Mr. Malewicki is also the president and chief scientist at AeroVisons Inc., a company dedicated to the development, promotion and commercialization of aerospace related products. Some of his transportation accomplishments are: Guinness World record setting California Commuter vehicle that achieved 157 mpg at freeway speeds, and the world's fastest electric car, the White Lighting, clocked at 248 mph. Additional transportation firsts include the F-18 Jet Bike, an afterburning, jet powered motorcycle, the RB-2000 Personal Rocket Belt and Evel Knievel's canyon jumping, rocket powered X-1 Skycycle.

Mr. Malewicki's Aerovision is a qualified DARPA (Defense Advanced Research Project Agency, a US Defense agency) technology contractor. He recently worked on development of morphing wing UAV aircraft with DARPA. Mr. Malewicki has his Master's degree from Stanford University in Aeronautics and Astronautics. He also served as Senior Technical Specialist in Advanced Composites Manufacturing for Northrop on the B-2 project.

During his long and successful career working for key government and business organizations, Mr. Malewicki has specialized in low-cost design innovation, aerodynamics, engineering structural analysis, automation consulting, and vehicle performance analysis. He has authored numerous technical papers, books, and articles, including a cover feature story for *Scientific American*. He is often called upon by leading scientists for his insight and work as well as by the media for commentary on cutting-edge thinking and technology.

Unimodal, Inc.
1113 East Broadway, Suite 100,
Missoula, MT 57801
USA
Phone: +1-949-559-7113
www.unimodal.com

STATE OF WASHINGTON

DEPARTMENT OF ARCHAEOLOGY & HISTORIC PRESERVATION

1063 S. Capitol Way, Suite 106 • Olympia, Washington 98501
Mailing address: PO Box 48343 • Olympia, Washington 98504-8343
(360) 586-3065 • Fax Number (360) 586-3067 • Website: www.dahp.wa.gov

DATE: February 9, 2006

TO: Heather Gundersen

FROM: Russell Holter

CC: Transportation Archaeologists: Lucie Tisdale (OR-SHPO); Matthew Sterner (WA-SHPO)

RE: Columbia River Crossing

It has recently come to my attention that language changes to the Screening and Evaluation framework were recommended by the CRC Taskforce. The current language states that Cultural Resources will be evaluated based upon "Avoiding or Minimizing adverse impacts to historic, prehistoric and cultural resources." It has been suggested that this language be changed to "Avoid or minimize adverse impacts, or where practicable, enhance cultural resources." As you know, I have been resistant to any changes in this language. There are several reasons for this resistance, which I shall outline for you.

1. Language contained in Federal law does not allow for the enhancement of cultural resources. It is not found in Section 106 of the National Historic Preservation Act nor is this term used in connection with Section 4(f).
2. The CRC Taskforce appears to be using this term arbitrarily only for the sake of being consistent with other environmental resource language. Though screening project alternatives for their ability to enhance natural environmental resources may be a legitimate and worthy goal, I contend that you cannot enhance cultural resource sites; they can only be diminished in integrity or destroyed. The other alternative is to record the site but that constitutes mitigation and mitigation cannot be a driver for selecting project alternatives. The preservation and protection of cultural resources is the only language that would be appropriate in adding to the Screening and Evaluation Framework.
3. The term 'enhance' is insufficiently defined. Interested and affected tribes will take note of this new terminology and will undoubtedly take steps to affect immediate changes. Native American graves, belowground cultural resources, and Traditional Cultural Properties cannot, and will not, be enhanced by the presence of this project.
4. The term 'enhance' leaves open to interpretation as to how the term could be used in relation to the built environment too. The only appropriate enhancements to National Register eligible properties, districts, and landmarks are found in the Secretary of the Interior's Standards for Historic Preservation. These standards should only be defined in terms of mitigation and are thus not appropriate as a means of screening and evaluating project alternatives.

Your prompt attention and consideration of this matter is greatly appreciated.