Columbia River CROSSING

DRAFT COMPONENTS STEP B SCREENING REPORT

June 9, 2006

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ACRONYMS

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

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1. Overview of Evaluation Process

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

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

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

1.1 Step B Screening Findings and Conclusion

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

1.2 What's Inside

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

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

2. Step B Methods

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

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

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

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

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

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

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3. Step B Evaluation of Transit Components

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

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

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

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

3.1 Key Findings

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

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

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

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

    a. Express Buses in General Purpose Lanes = 40 minutes

    b. Express Buses in Managed Lanes = 35 minutes

   c. BRT-Full = 25 minutes

   d. Light Rail = 25 minutes

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

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

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

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

   c. BRT-Full = 10,500 riders

   d. Light Rail = 12,500 riders

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

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

3.1.2 Modal Choice

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

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

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

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

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

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

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

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

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

3.1.3 Regional Economy, Freight Mobility

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

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4. Step B Evaluation of River Crossing Components

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

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

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

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

4.1 Key Findings

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

4.1.1 Community Livability and Human Resources

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

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

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

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

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

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

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

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

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

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

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

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

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

4.1.3 Modal Choice

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

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

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

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

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

4.1.4 Safety

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

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

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

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

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

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

4.1.5 Regional Economy, Freight Mobility

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

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

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

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

4.1.6 Stewardship of Natural Resources

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

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

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

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

4.1.7 Distribution of Benefits and Impacts

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

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

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5. Staff Recommendations

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

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

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

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

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

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6. Next Steps – Alternatives Packaging

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

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

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

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

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

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

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7. Appendix – Detailed Step B Screening Methods

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

Table A-1. I-5 Columbia River Crossing - Draft Evaluation Framework				
Step B: Component Screening Measures and Proposed Approach – January 17, 2006				
Component Screening Measure		**Question**	**Information Sources and Methods**	**Considerations or Caveats**
Number	**Description**			
Community Livability and Human Resources				
1.1	Magnitude of residential properties within approximate noise impact contour	How many residential properties will fall within the 66 dBA (WA) or 65 dBA (OR) residential noise impact contour?	This will use 2020 traffic model runs; peak hour and peak truck hour traffic information with vehicle splits from traffic consultant. Contours from this data will be overlaid upon taxlot data in GIS format from Metro RLIS and Clark County	Analysis will be based on a 2-dimensional analysis and preliminary alignments and will not be as accurate as 3-dimensional modeling with preliminary design information. It will allow a general comparison of alternatives.
1.4	Magnitude of residential properties crossed by component's conceptual footprint	How many residential units fall within the design area footprint?	Tax lot data and land use information in GIS format from Metro RLIS and Clark County. Building permit data from cities of Portland and Vancouver will supply the number residential units for each parcel.	Must account for multi-family uses.
1.5	Magnitude of commercial/industrial properties crossed by component's conceptual footprint	How many commercial or industrial properties fall within the design area footprint?	Tax lot data and land use information in GIS format from Metro RLIS and Clark County. Field surveys will verify the number of business impacted. Acres and number of businesses will be averaged to produce one value.	May also consider the number of jobs for each commercial or industrial property. Note: Another impact, equally significant as a "hit" may be the loss of accessibility. We're assuming that information necessary to screen for this won't be available until further in the alternatives development process.

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

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

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

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

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

5.2	Potential (on a qualitative scale) for component to reduce daily delay for trucks in the I-5 corridor	Can a component reduce delay for trucks?	2021 traffic model runs and estimates.	
5.3	5.3 Potential (on a qualitative scale) for component to avert extension of "no bridge lift" periods tied to I-5 congestion	Enhance or maintain efficiency of marine navigation	• Conceptual plan and profile	• Crossings that keep the existing bridge were rates as 1 because it maintains the lift period. • A crossing received a rating of 3 if it was a low level. The proposed moveable span is 65 feet at the primary channel and today it is 25 clear in closed position. We are improving the vertical clearance. Also at the alternate channel we are improving the vertical clearance. • A crossing received a rating of 5 if it was a Mid Level
5.4	5.4 Potential (on a qualitative scale) for component to increase freight vehicle throughput across the Columbia River via I-5	How many freight vehicles can a component serve?	2020 traffic model runs and estimates.	
5.6	5.6 Range of travel times (on a qualitative scale) between up to five origin/destination pairs of typical freight centers within the bridge influence area (e.g., between Port of Vancouver and Columbia Blvd. interchange)	What travel times, between key freight activity locations, does a component provide?	2020 traffic model runs and estimates.	

Stewardship of Natural Resources				
6.1	Magnitude of direct impact on designated ESA critical habitat and other threatened or endangered species habitat	What is the total acreage of critical and native habitat for T&E species within the design area footprint?	StreamNet data (from Pacific Northwest's fish and wildlife agencies and tribes) for designated Critical habitat (http://www.streamnet.org/). Johnson & O'Neil and WDFW priority habitat species and critical areas.	Will use area (acreage) and type of direct impacts to specific habitats, i.e., streams, riparian area, critical habitat, native habitats.
6.2	Magnitude of direct impact on other fish and wildlife habitat	What is the total acreage of fish and wildlife habitat within the design area footprint? What is the range of different habitat types within the design area footprint?	Metro Goal 5 Inventory. Clark County Critical Areas Ordinance data. Will assume that SOI species are present in suitable habitat. Critical and native habitat areas will be included in this criterion as well.	Will use area (acreage) and type of direct impacts to specific habitats (i.e., streams, riparian area). We will need agreement on list of species of interest (SOI) and ways to account for their habitats
6.3	Magnitude of direct impact on rare, threatened, or endangered plant species	What is the total acreage of plant habitat within the design area footprint?	Likelihood of plant presence will be based on presence of suitable habitat for rare plants. Data gathered for the PBR will provide suitable habitat. Acreage of suitable habitat will be measured.	
6.4	Magnitude and significance of direct impact on wetlands	What is the total acreage of wetlands within the design area footprint? What is the range of different wetland types within the design area footprint?	Spatial data on wetland determinations conducted for PBR. Will also use information from Metro Goal 5 and Clark County Critical Areas Ordinance. Vanport wetlands will be weighted more heavily than other wetlands.	Will still need input from regulatory agencies on significance of wetland areas that may be impacted.

6.5	Magnitude of net increase in impervious surface area	How much (square feet or acres) of additional impervious surface would be introduced by this alternative?	Use footprint data supplied by design team.	Water quality treatment options cannot be evaluated at this point.
6.7	Magnitude of direct impact to waterways	What are the removal/fill impacts to waterways?	GIS data from Metro, Clark County, City of Portland and City of Vancouver will provide surface area of water bodies. Area of in-water structure (piers) will be measured.	GIS data from local governments may be very coarse, particularly for smaller waterbodies (i.e. Burnt Bridge Creek).
Distribution of Benefits and Impacts				
7.1	Magnitude of potential residential property acquisitions in blocks or block groups with high share of low income or minority populations (compared to impacts in other blocks or block groups)	How many properties may be acquired for the design option? Do potential acquisitions cluster in areas considered high-minority or low income?	GIS parcel data and census data at the block group level. Number of units displaced within census blocs with a greater proportion of minority or low-income populations than the Portland/Vancouver MSA.	We do not know whether properties likely affected are owned my minority or low-income residents. Minority and low income populations are not uniformly distributed across census areas.