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PROBLEM DEFINITION

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Introduction

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

Function and Role of the I-5 Bridge Influence Area

I-5 is the only continuous north/south interstate highway on the West Coast, providing a commerce link for the United States, Canada, and Mexico. In the Vancouver-Portland region, I-5 is one of two major highways that provide interstate connectivity and mobility. I-5 directly connects the central cities of Vancouver and Portland. Interstate 205 (I-205) provides a more suburban and bypass function and serves travel demand between east Clark County, east Multnomah County, and Clackamas County.

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

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

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

The I-5 BIA serves several broad travel markets:

- Through travel. These users travel from outside the Vancouver-Portland region to destinations that are also outside the region—for example, a freight or tourist trip from Seattle, Washington to Eugene, Oregon. These users represent about 7 percent of the total vehicle-trips crossing the river.
- Regional travel. Most of these users travel between Clark County and the Portland metropolitan area (Multnomah, Washington and Clackamas counties), or vice-versa, without stopping in the I-5 BIA. These trips account for about 47 percent of the total vehicle-trips crossing the river.

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

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

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

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

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Definition of the Problem

Current Problems	Details/Background
1. Travel demand exceeds capacity in the I-5 BIA, causing heavy congestion and delay during peak travel periods for automobile, transit, and freight traffic. This limits mobility within the region and impedes access to major activity centers.	Heavy traffic congestion has resulted from growth in regional population and employment and in interstate commerce over the last two decades. The existing I-5 bridge crossing provides 3 lanes of capacity in each direction, with a directional capacity of about 5,500 vehicles per hour. Travel demand currently exceeds that capacity during peak periods. As a result, stop-and-go traffic conditions last 2 to 5 hours in the mornings and afternoons. These conditions are aggravated by vehicle merges, traffic accidents, and vehicle breakdowns. Due to excess travel demand in the I-5 BIA, many travelers take longer, alternative routes such as I-205. In addition, spillover traffic from I-5 onto parallel arterial roadways increases local congestion. Although the lift span is used only in off-peak hours, it affects travel reliability and creates extensive traffic delays. The span is opened 20 to 30 times a month, with the greatest number of lifts occurring during the winter when water levels are at their highest. Each lift takes approximately 10 minutes, creating traffic delays for up to an hour.
2. Transit service between Vancouver and Portland is constrained by the limited capacity in the I-5 corridor and is subject to the same congestion as other vehicles, affecting transit reliability and operations.	The I-5 bridge is a critical bi-state transit link for transit patrons traveling between Vancouver and Portland. Bi-state transit service includes local fixed-route bus service between downtown Portland and downtown Vancouver (using the I-5 bridge), peak period express routes from Clark County park-and-rides and transit centers to downtown Portland on both I-5 and I-205, and I-205 shuttle service between Fisher's Landing Transit Center and the Parkrose Transit Center. Current congestion in the I-5 BIA has an adverse impact on transit travel speed and service reliability. Between 1998 and 2005, local bus travel times between the Vancouver Transit Center and Jantzen Beach increased 50 percent during the peak period. Local buses crossing the I-5 bridge in the southbound direction currently take more than three times longer during parts of the morning peak period compared to off peak periods. As a result, transit travel times between Vancouver and Portland have increased.

3. The access of truck-hauled freight to the Ports of Vancouver and Portland and to regionally significant industrial and commercial districts is impaired by congestion in the I-5 BIA.	I-5 is the primary commerce corridor serving the Vancouver-Portland region and the Northwestern United States. Access to the Ports of Vancouver and Portland and regionally significant industrial and commercial districts is adversely affected by congestion in the I-5 BIA, which is increasingly spreading into the off-peak periods (including weekends) used by freight carriers. Declining freight carrier access to these key locations slows delivery times and increases shipping costs, diminishing the attractiveness of the Ports and negatively affecting the region's economy.
4. The I-5 bridge crossing area and its approach sections experience crash rates up to 2.5 times higher than statewide averages for comparable urban freeways in Washington and Oregon, largely due to substandard design. Incident evaluations attribute crashes to congestion, closely spaced interchanges, short weave and merge sections, vertical grade changes in the bridge span, and narrow shoulders.	Nearly 300 reported crashes occur annually in the I-5 BIA, with many involving large tractor-trailer trucks. Crashes have resulted in substantial property damage and injury; some have resulted in fatalities. The causes are: Close Interchange Spacing The 5-mile BIA contains eight closely spaced interchanges. These interchanges provide access to several east-west highways and arterial roadways that serve a mix of interstate, regional, and local trip purposes. The average distance between the interchanges is 1/2 mile, as compared with a recommended minimum spacing of 1 mile between interchanges located in urban areas. Short Weave and Merge Sections Short weave sections for vehicles entering and exiting the freeway generate backups and delay due to difficulty in maneuvering, especially for large trucks. The proportion of trucks is high because this segment provides arterial street access to both ports. Outdated designs for entrance and exit ramps cause backups onto the mainline at exit ramps. Most of the entrance ramps do not provide enough space for vehicles to merge safely with through traffic. Vertical Grade Changes Vertical grade changes in the bridge span over the Columbia River create sight distance limitations that reduce speeds and create potential hazards to motorists. Narrow Highway Shoulder Width Several segments of the I-5 BIA, including the I-5 bridge, have narrow inside and outside shoulders in both travel directions. In several locations, shoulders are as little as 1-foot wide (10- to 12-foot wide shoulders are standard). The lack of shoulders positions many motorists undesirably close to physical barriers that border I-5. Many drivers respond with caution by slowing down to increase

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	separation from vehicles ahead and behind. Increased vehicle spacing reduces vehicle throughput and contributes to freeway congestion. In addition, the lack of safe areas for incident response, disabled vehicle pullout, and driver recovery also impairs the ability to manage highway operations and recover from events that interrupt traffic flow.
5. Bicycle and pedestrian facilities for crossing the Columbia River in the I-5 BIA are not designed to promote non-motorized access and connectivity across the river.	The width of the bicycle/pedestrian facility on the I-5 bridge is substandard (6 to 8 feet) and located extremely close to traffic. Separated multi-use paths should be at least 10 feet wide. Bicycle and pedestrian connections between North Marine Drive, Hayden Island, and Vancouver require out-of-direction travel. For example, no connection exists for pedestrians or bicyclists wanting to stay on the west side of the bridge between Hayden Island and North Marine Drive. In addition, many of the I-5 BIA's features are not in compliance with Americans with Disabilities Act design guidelines.
6. The I-5 bridges across the Columbia River do not meet current seismic standards, leaving them vulnerable to failure in an earthquake.	Previous studies concluded that the existing structures could not be upgraded to fully meet seismic design standards without full bridge reconstruction.
Future Problems	Details/Background
7. As the Vancouver/Portland metropolitan region grows, mobility and accessibility for automobile, vehicular freight, and transit will decline unless added capacity is provided in the I-5 BIA. An increasing disparity between demand and capacity will lead to longer delays, increased accident rates, and diminished quality of life and economic opportunity.	Regional Growth Consistent with regionally adopted comprehensive plans, the region's growth forecasts indicate that population, employment, and commercial trade will continue to grow, increasing regional travel demand. By 2020: • Vancouver-Portland regional population is projected to increase by nearly 40 percent, from 1.8 million to 2.5 million. • Regional trade is expected to increase by 50 percent, from nearly 300 million tons to nearly 450 million tons. A substantial portion of freight will be moved by truck. Increased Travel Demand Daily traffic demand over the I-5 bridge is expected to increase by more than 40 percent in 20 years, from 125,000 vehicles in 2000 to 180,000 vehicles in 2020. The projected increase in use of the bridge is constrained by the

	lack of capacity to accommodate more vehicles, resulting in an expansion of the peak period to accommodate the projected traffic increase. There will also be a potentially large and underserved transit market for trips between key regional locations traveling or connecting through the I-5 BIA. Deteriorating Traffic Conditions Unless improvements are made, traffic conditions in the I-5 BIA are predicted to worsen over the next 20 years: • Traffic congestion and delay will increase, with stop-and-go conditions occurring in both directions for 10 to 12 hours on weekdays. Increased delays on weekends will also result. • The current off-peak periods, which are generally uncongested and used by freight carriers, will blend into adjacent peak period congestion, increasing freight delay throughout much of the day. • Vehicle-hours of delay during the evening commute period will increase nearly 80 percent, from 18,000 hours to 32,000 hours each day. Vehicle-hours of delay on truck routes will increase by more than 90 percent, from 13,400 hours to 25,800 hours each day. • Travel times for buses traveling in general purpose lanes on I-5 between downtown Vancouver and downtown Portland are expected to almost double, from 27 minutes in 2000 to 55 minutes in 2020. These travel time increases will continue to erode mass transportation services as a viable mode choice and increase transit operation costs. • Safety will continue to deteriorate as a result of increased congestion. Diminished Mobility and Accessibility • Slower highway speeds will reduce access to jobs, shopping, and recreational uses. • Regional truck freight is projected to increase by about 230 percent in the next 30 years, however, increasing delays between I-5 and freight centers will adversely affect freight distribution and access to ports and terminals, thereby shrinking market areas served by the Vancouver-Portland region.
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	The current Regional Transportation Council Metropolitan Transportation Plan and the Metro Regional Transportation Plan recognize the need for additional capacity to improve the flow of people and freight in the I-5 BIA. Both plans include the I-5 Transportation and Trade Partnership Strategic Plan recommendations to increase mobility and accessibility in the I-5 BIA.
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