Third Draft of Strategies Report

Portland/Vancouver I-5 Trade Corridor
Freight Feasibility and Needs Assessment

Development of Alternative Strategies Report

- DRAFT-

Prepared for

Oregon Department of Transportation
Washington Department of Transportation

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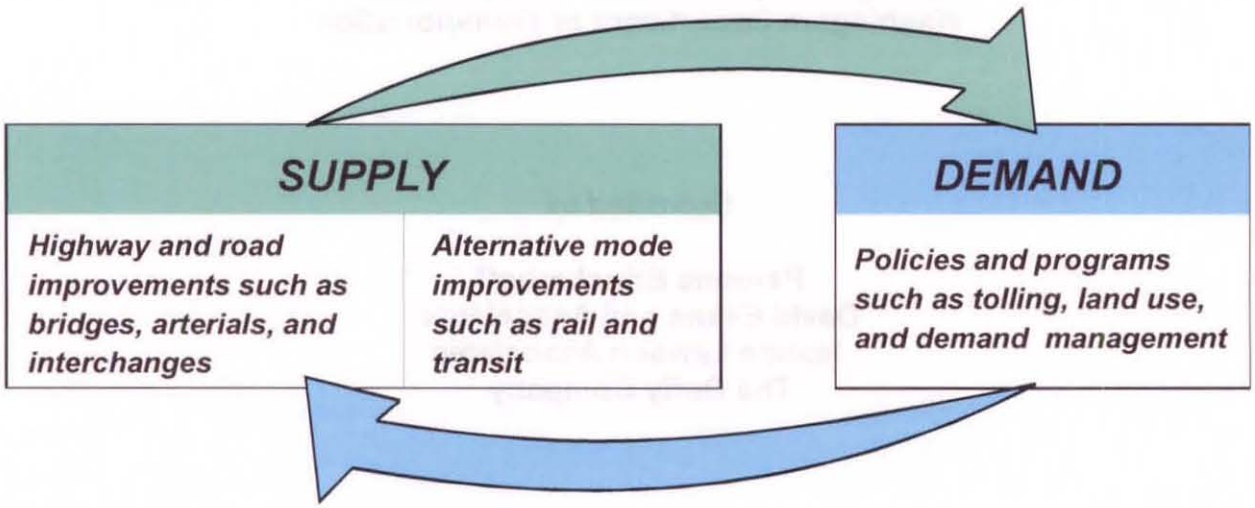
1.0 Introduction

This report gives a general description of eight (two pending) transportation strategies developed jointly by the technical advisory team and the Leadership Committee. The purpose of developing multiple transportation strategies is directly related to the Policy Committee's charge to the Leadership Committee. The five questions raised in the charge are:

1. To what extent do inadequacies in the I-5 Trade Corridor constitute a major impediment to the competitiveness and economic development of the Portland/Vancouver region, the states of Washington and Oregon, and the nation?
2. What are the costs of inaction?
3. Are there efficient transportation improvement strategies that regional decision-makers should consider for the Corridor? If so, what are their costs and benefits?
4. If improvement strategies are recommended, how should/can these improvements be funded?
5. How should ODOT/WSDOT and regional governments proceed in implementing the committee's recommendations?

2.0 Strategies Overview

To answer these questions, the technical advisory team worked with the Leadership Committee to develop multiple strategies and describe generally their respective benefits, costs, and constraints (detailed benefits, costs, and constraints are described in the Evaluation of Strategies Report). Through an iterative process, a range of strategies representing different levels of investment was refined. The resulting strategies described in this report include supply (capacity) and/or demand (policies and programs) components.



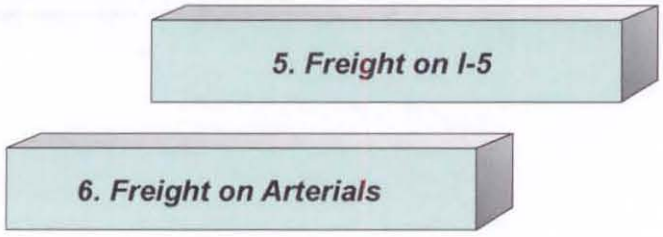
2.1 Supply-Side Strategies

On the supply side, the Leadership Committee identified two broad sets of strategies. The first set is comprised of general capacity components (i.e. projects). These strategies would provide additional capacity for all vehicles, as well as additional transit capacity. The assumption is that by improving travel conditions for all roadway users – and commuters in particular – problems related to freight movement can be addressed as well. General capacity strategies are cumulative, meaning higher-ordered strategies build upon rather than replace previously described strategies, as shown below.

General Capacity Strategies:

A second set of supply-side strategies has been developed that focus specifically on facilitating freight movement. As shown in the following illustration, these strategies are mutually exclusive. Some of these strategies may also include (build upon) the general capacity strategies, which are described in the "Strategy Descriptions" section of this report.

Freight-Specific Strategies:



2.2 Demand-Side Strategies

Demand-side strategies attempt to affect travel behavior to make more efficient use of existing or new transportation facilities. Demand strategies can be implemented independently or in combination with supply-side strategies, and can include financial incentives, disincentives and/or policy tools to change travel demand. Examples of demand strategies include:

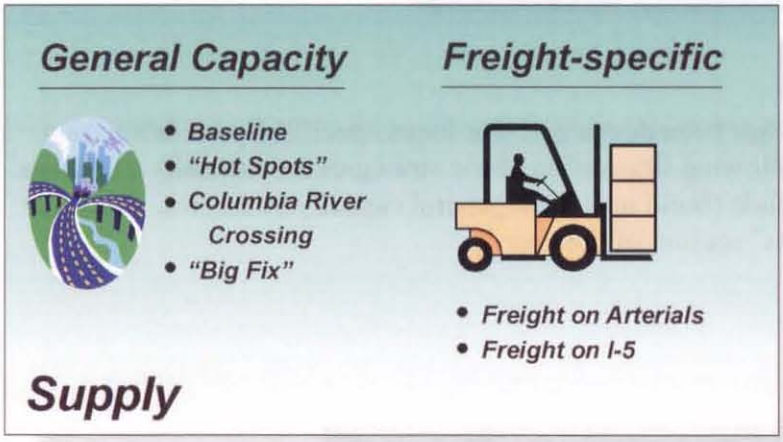
- Policies affecting business location decisions
- Transportation pricing components (e.g. parking pricing, discounted transit passes)
- Taxation revisions
- Time-of-day travel restrictions

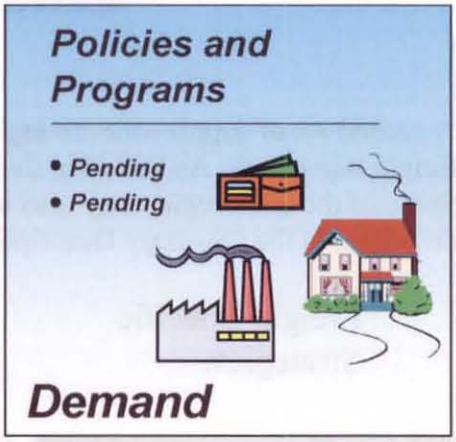
2.3 Summary of Strategies

(This section and probably the previous demand section to change once we know more about the demand management strategy, transit strategy, how they might be combined, etc.)

To conclude, the strategies described in this report can be organized as shown below.

Three Groups of Strategies:



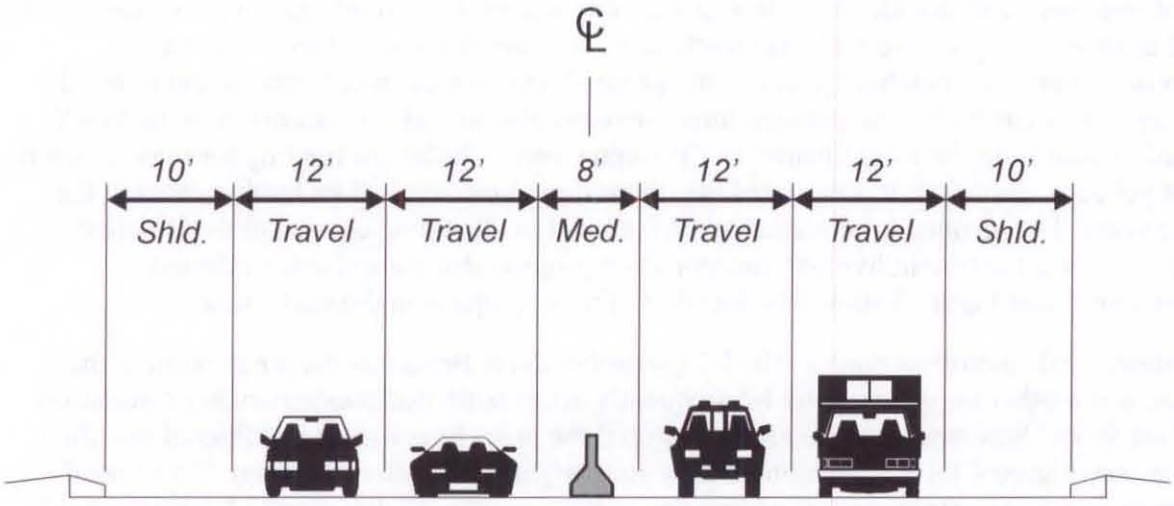


3.0 Strategy Descriptions

3.1 Baseline Strategy

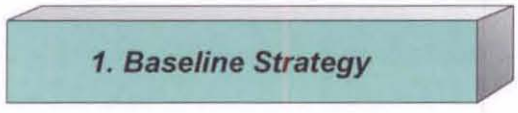
The Baseline Strategy is the bare-bones approach because it considers only the existing transportation system plus about 20 construction projects in the study area that are already funded or highly likely to be funded. These projects primarily consist of intersection improvements and street extensions and widenings near Port facilities and in freight corridors adjacent to I-5. Under this scenario, the existing capacity of I-5 would not be enhanced except for the widening to three lanes in each direction of the section from Main Street (in Vancouver) to 99th Street. Figure 1 shows a typical two-lane section of I-5 where traffic bottlenecks currently occur (e.g. Delta Park to Lombard Street).

Figure 1



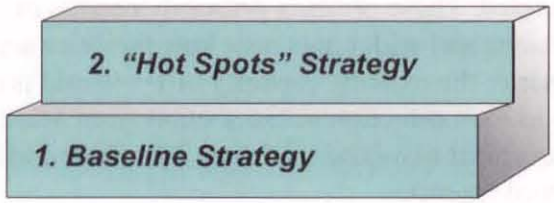
Baseline Strategy
I-5 Bottleneck Lane Configuration

The Baseline Strategy provides a baseline for comparison to other strategies. Similar to a no-build condition, this strategy portrays the future cost of inaction in the corridor. Table 1 lists the individual transportation projects (components) that comprise this strategy, and Figure 2 shows the location of these projects in the study area.



3.2 "Hot Spots" Strategy

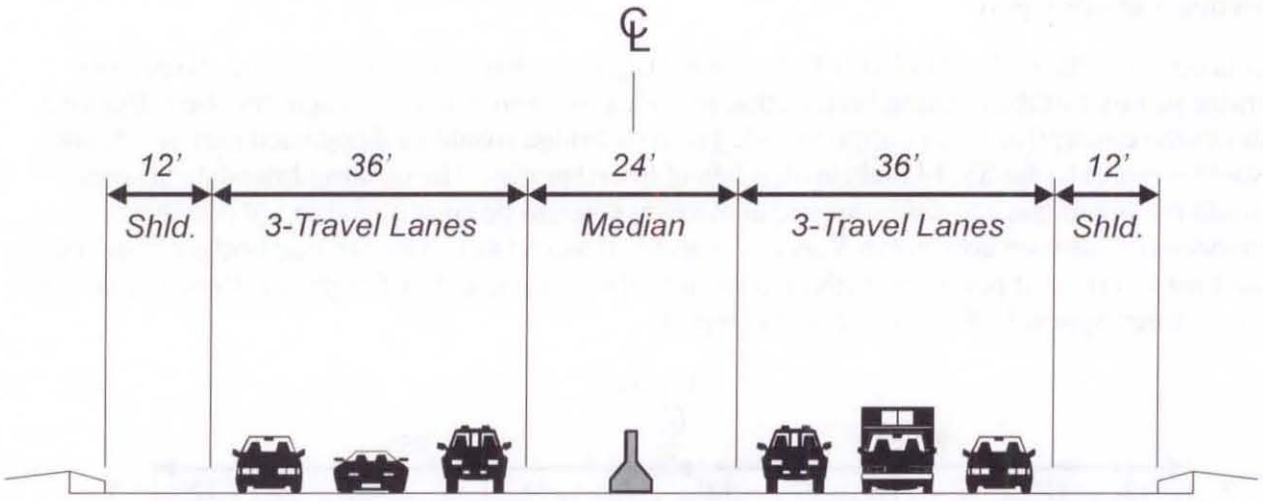
The "Hot Spots" Strategy includes identified planned improvements in the study area and selected bottleneck improvements in the I-5 Corridor. Consistent with the building block approach to strategy building, it also includes the Baseline Strategy components.



More than 40 transportation improvements are planned, but not funded, in the study area. These planned improvements are identified in regional, city and port transportation improvement plans, as well as other sources. The projects largely consist of arterial and collector street and intersection improvements, but include some planned interchange modifications and railroad grade-separations as well. The planned improvements also include an extension of the MAX light rail system from the Rose Quarter to the Expo Center. Although funding for these projects has not yet been identified, it is assumed that these improvements will be implemented in the next 20 years. The planned improvements are included in all strategies, except the Baseline Strategy. Table 2 lists the individual transportation projects that comprise the planned improvements, and Figure 3 shows the location of these projects in the study area.

In addition, while motorists think of the I-5 Columbia River Bridge as the pinch point in the corridor, a few other segments along I-5 frequently act as bottlenecks experiencing congestion. The "Hot Spots" Strategy focuses specifically on these areas by providing additional mainline capacity (see Figure 4 for the location of these road segments in the study area). "Hot Spots" bottleneck improvements consist of adding one travel lane in each direction to I-5 between 99th and 134th Streets (Figure 4 - #1), between Lombard Street and Delta Park (#3), and between I-84 and the Greeley Avenue ramps (#4). Finally, this strategy would add new collector-distributor lanes between SR 14 and Mill Plain in Vancouver (#2). Conceptual plans of the new Vancouver collector-distributor lanes are included in Section 5.6 of this report.

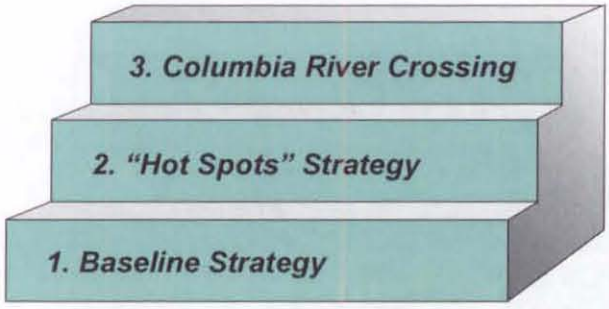
Figure 3



"Hot Spots" Strategy
I-5 with Additional Mainline Capacity at Bottlenecks

3.3 Columbia River Crossing Strategy

This strategy adds increased bridge capacity over the Columbia River to the components included in the previous strategies. The number of additional travel lanes across the river would be consistent with the mainline capacity improvements in the "Hot Spots" Strategy.

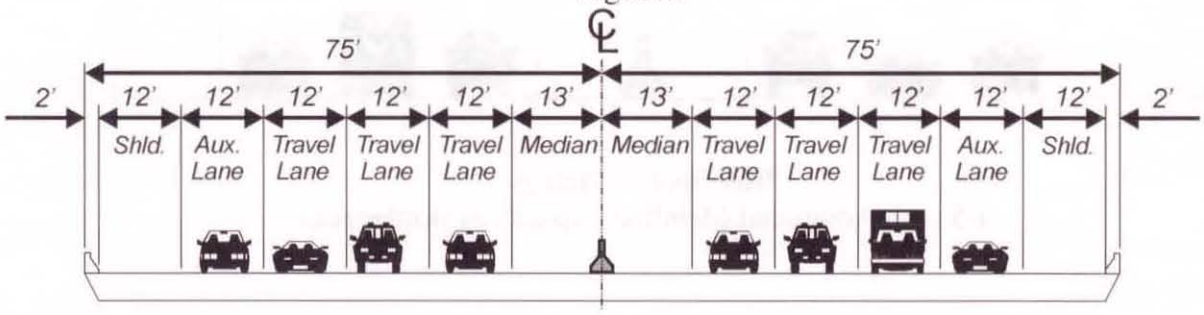


A number of different transportation facilities could be constructed to provide additional capacity, including widening existing bridges, constructing new bridges, or constructing a tunnel under the river.

While each option presents its own opportunities and constraints, a new high-level, fixed-span bridge option is currently being used to represent the level of capacity for this strategy at this early stage in the planning process. If the Columbia River Crossing Strategy emerges as a promising solution during the evaluation phase of the study, all crossing options will be revisited in more detail. Enhanced descriptions and preliminary drawings of all crossing options appear in Section 5 of this report.

Conceptually, the Columbia River Crossing Strategy consists of a new high-level, fixed-span bridge just east of the existing bridges that provides four travel lanes in each direction (Figure 5 shows the conceptual lane configuration). The new bridge would be designated part of I-5, and would connect to the SR 14 and Hayden Island interchanges. The existing Interstate bridges would remain in place and new approach roadways would be constructed to provide direct connections between downtown Vancouver and Hayden Island. The existing bridges could be used for a variety of purposes, including local traffic, transit, and/or freight. Conceptual plans of this strategy appear in Section 5.2 of this report.

Figure 5



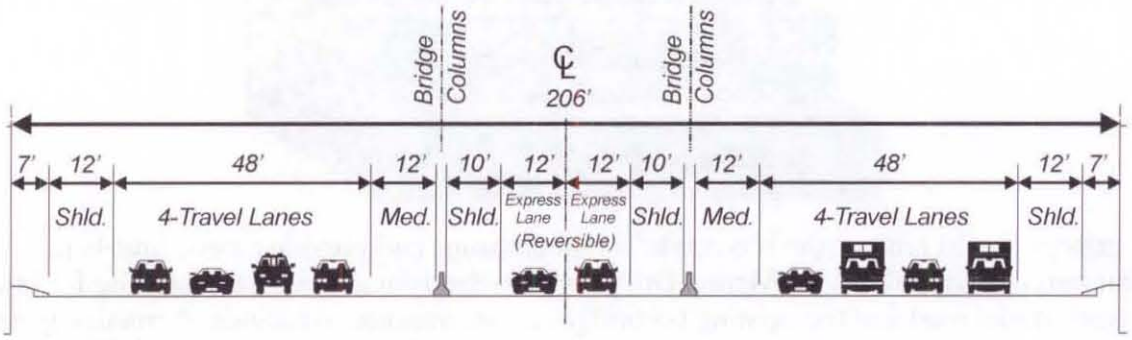
Columbia River Crossing Strategy
Conceptual Bridge with 8 Travel Lanes

3.4 "Big Fix" Strategy

The "Big Fix" Strategy includes all components in the previously described strategies, plus additional capacity along I-5 for separated express travel lanes as well as added capacity for mixed-flow vehicles.

Future travel demand is expected to be greatest in the southbound direction in the morning peak commute period, and in the northbound direction in the afternoon peak period. Therefore two reversible express lanes would operate in the southbound direction during the morning and in the northbound direction during the evening, similar to the system in Seattle. The reversible express lanes would extend from the I-405 interchange in Portland to just north of the 99th Street interchange in Vancouver. The express lanes would be added to the new fixed-span bridge across the Columbia River (as described in the Columbia River Crossing Strategy), resulting in a total of 10 lanes on the bridge.

Figure 6



"Big Fix" Strategy
Columbia River Crossing with Express Lanes

Access to and from the express lanes would be limited to ensure their operational effectiveness. Specifically, access to the express lanes would be provided to and from I-5 north of 99th Street, to and from SR 500, to and from Columbia Boulevard, and to and from both I-405 and I-5 near their interchange. SR 500 and Columbia Boulevard would only connect to and from the southbound express lanes.

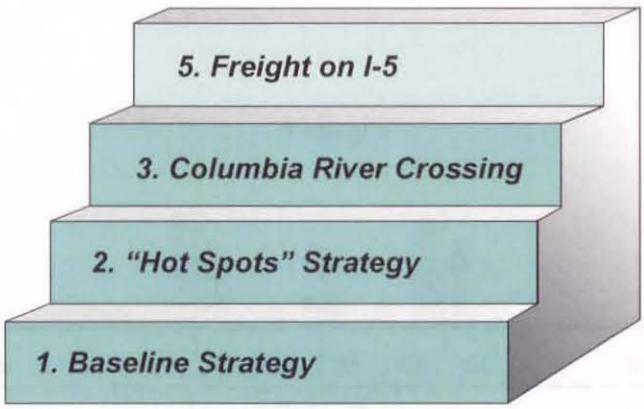
Based on estimates of future travel demand and the concept of travel lane balance, mixed-flow travel lanes would be added in some segments of the corridor, in addition to the express lanes:

- A fourth travel lane in each direction between 99th Street and the I-205 interchange
- A fourth travel lane in the southbound direction between Mill Plain Boulevard and the Columbia River Bridge
- A fourth travel lane in each direction between the Columbia River Bridge and Marine Drive

Finally, the "Big Fix" Strategy includes the extension of the MAX light rail system from the Expo Center (see the "Hot Spots" Strategy) to Clark College in Vancouver. The light rail line would use the existing western Interstate Bridge over the Columbia River, while the existing eastern bridge would be used for two-way traffic between downtown Vancouver and Hayden Island. Figure 7 shows the location of these improvements in the study area.

3.5 Freight on I-5 Strategy

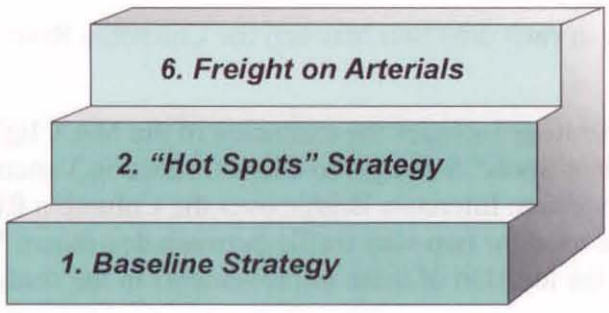
This strategy includes all the components in the Baseline Strategy, the "Hot Spots" Strategy and the Columbia River Crossing Strategy. It builds on these strategies and improves truck access between Marine Drive and I-5 to and from the north.



This strategy would remove the Hayden Island interchange and provide a new, four-lane, general-purpose arterial linking Marine Drive and Hayden Island west of the existing I-5 bridges. This new arterial road and the existing I-5 bridges could continue to provide alternative general-purpose freeway access to Hayden Island from Oregon and downtown Vancouver. This strategy would also provide direct truck-only ramps to the new I-5 bridge from Marine Drive (east and westbound), bypassing the general-purpose ramps. Finally, a new truck-only ramp would be built to connect the new southbound bridge lanes to Marine Drive (east and westbound), as would new ramps connecting Columbia Boulevard to and from I-5 northbound. Currently, Columbia Boulevard only connects to and from the southbound lanes on I-5. Conceptual plans of this strategy appear in Section 5.7 of this report.

3.6 Freight on Arterials Strategy

This strategy builds upon all components in the Baseline and "Hot Spots" Strategies. It provides additional lanes for truck traffic in the study area; a new four-lane arterial would connect the Mill Plain Extension with Columbia Boulevard west of the existing BN rail bridge over the Columbia River.

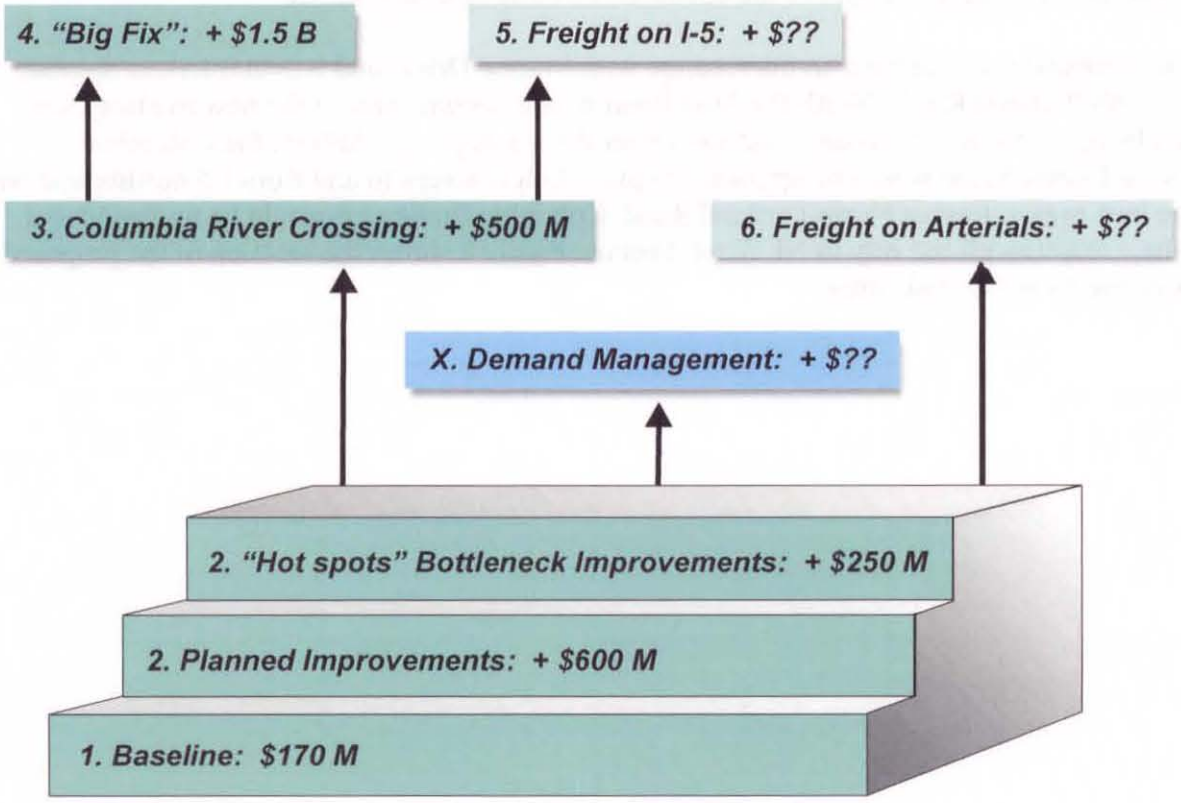


The new arterial could be a high-level, fixed-span bridge, or a lower-level, movable span bridge, and would include a new arterial interchange at Hayden Island. The new arterial interchange would serve traffic to the east (Jantzen Beach) and to the west (West Hayden Island). Freight and commercial traffic would be allowed to travel the entire length of the new arterial without paying a toll. However, general-purpose traffic not entering or exiting at the Hayden Island interchange would pay a toll. The I-5/Hayden Island interchange would be removed under this alternative, with access to the island provided via the new arterial. This would eliminate the weaving problems caused by the close proximity of the Marine Drive and Hayden Island interchanges, and thereby improve the operation of I-5 for through traffic.

The new roadway would have an interchange with Marine Drive, and would intersect at-grade with North Portland Road. North Portland Road would become part of the new roadway and would be upgraded to a four-lane roadway under this strategy. In addition, the Columbia Boulevard interchange would be upgraded to provide full access to and from I-5 northbound with single lane ramps. East of North Portland Road, Columbia Boulevard would be upgraded to a five-lane roadway all the way to NE 82nd Avenue. Figure 8 shows the location of the proposed improvements in the study area.

4.0 Estimated Costs

The following diagram shows estimated capital costs for each of the strategies. Costs are conceptual estimates and are primarily intended to show the different investment options this early in the planning process. These costs will be refined further during subsequent phases of the study.



5.0 Facility Options

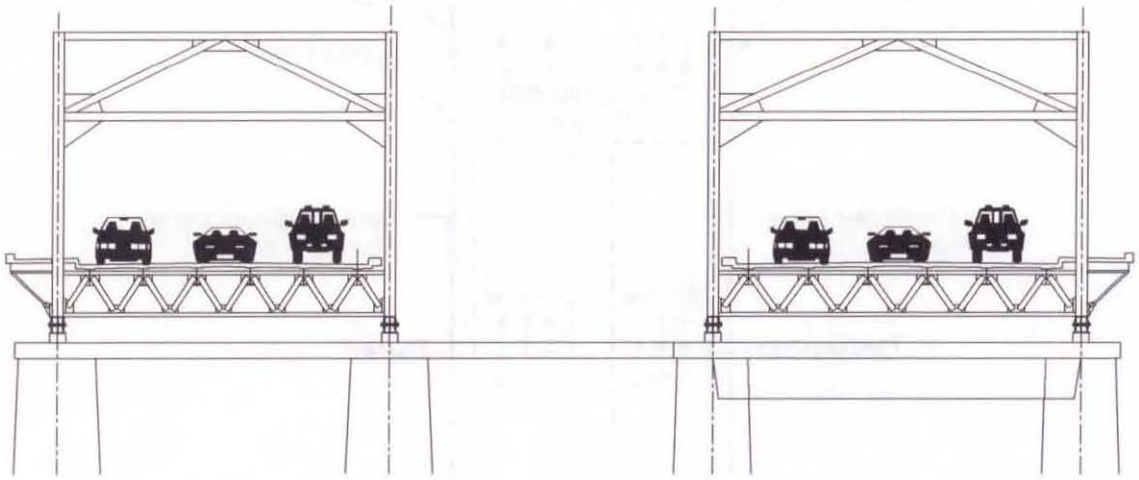
A number of components of strategies were developed in more detail to depict their operational functions, to use in calculating conceptual costs and to understand their broad impacts. This section describes these facility options.

5.1 Widen Existing I-5 Bridges

The Widen Existing I-5 Bridges Option is one way to increase capacity for the Columbia River Crossing Strategy. It could upgrade the existing I-5 structures by constructing cantilever lanes outside the existing bridge superstructures, and would provide one additional travel lane in each direction for a total of eight lanes (see Figures 9, 10, and 11). The new outside lanes would be

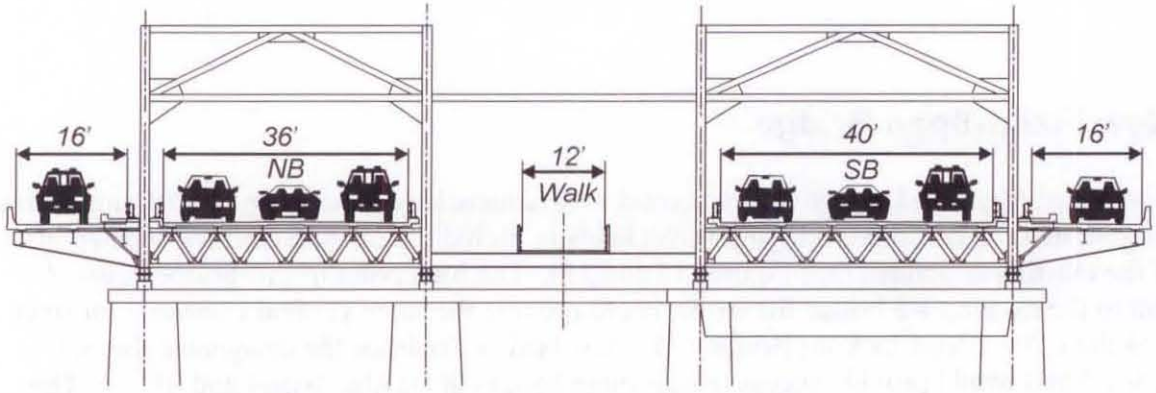
separated from existing lanes by the existing bridge trusses, restricting lane changes. This option may require replacement of the existing lift spans and mechanisms, and relatively minor interchange modifications.

Figure 9



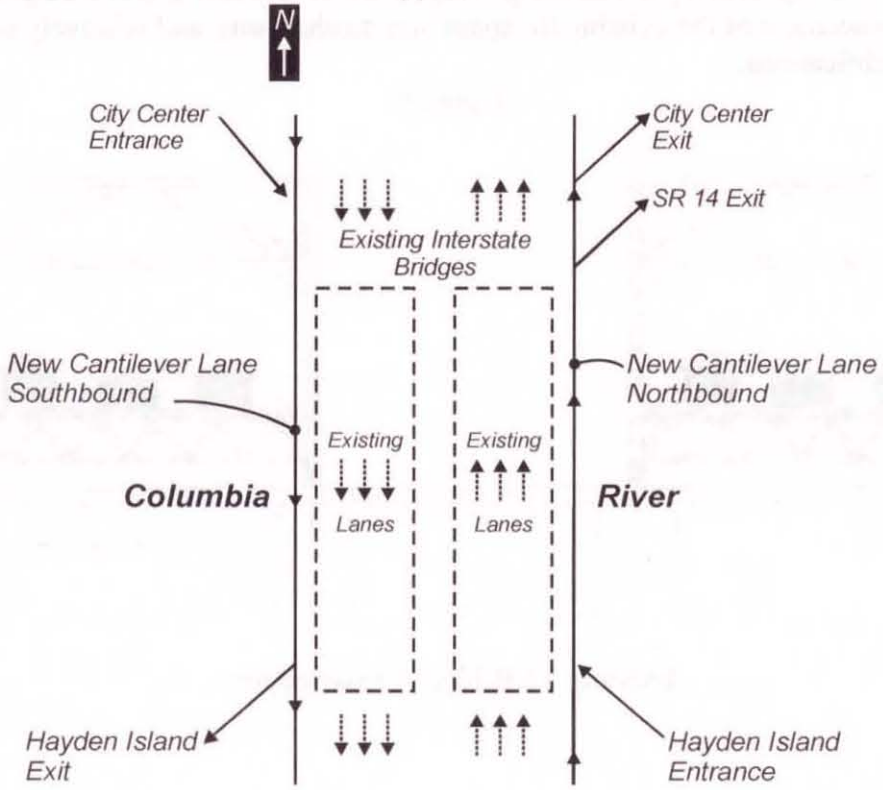
Existing I-5 Bridges Cross-section

Figure 10



Existing I-5 Bridges with Additional Lanes

Figure 11

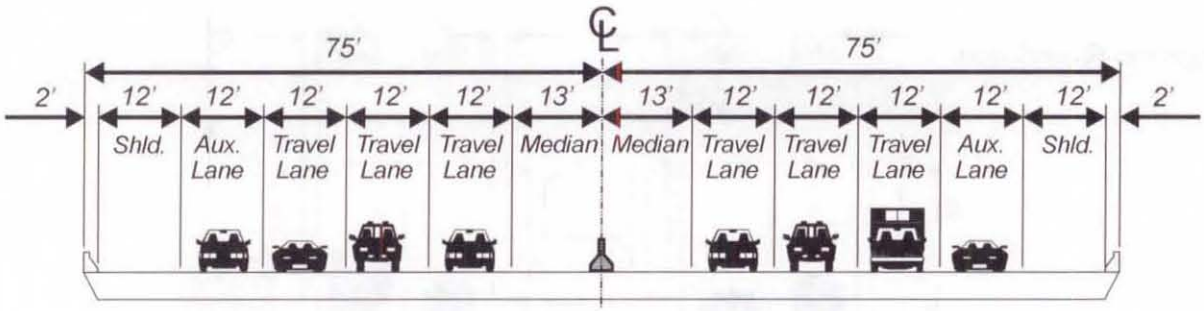


Widen I-5 Bridges Option New Lane Configuration

5.2 New Fixed-Span Bridge

The New Fixed-Span Bridge Option is a second way to increase capacity for the Columbia River Crossing Strategy. It could provide four travel lanes in each direction and could be located just east of the existing structures (see Figures 12 and 13). The high point of this bridge, located adjacent to the existing I-5 bridge lift spans, could provide the same vertical clearance for river traffic as the I-205 Glenn Jackson Bridge. The new bridge would be the designated through route for I-5 and would provide access to new interchanges at Hayden Island and SR 14. The existing I-5 bridge structures could remain in service for local traffic between downtown Vancouver and Hayden Island.

Figure 12

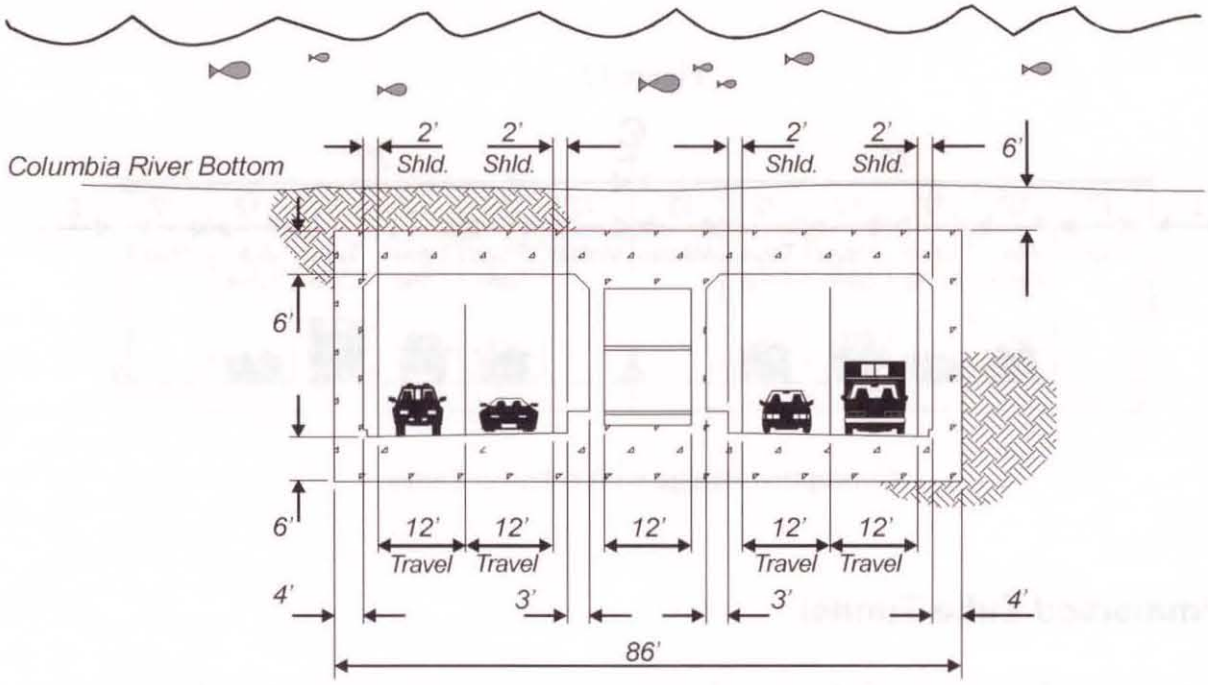


Conceptual Bridge with 8 Travel Lanes

5.3 Immersed Tube Tunnel

The Immersed Tube Tunnel Option could consist of twin, precast concrete tunnels lowered in sections into a dredged trench in the river bottom, then backfilled with rock (see Figures 14 and 15). This tunnel would connect to the existing I-5 south of Hayden Island and north of the Vancouver City Center ramps. It would require modified interchanges at Mill Plain Boulevard and Marine Drive. Access to Hayden Island and SR 14 northbound would be via the existing I-5 bridges. This option currently has two travel lanes in each direction, although a wider roadway could be accommodated in a larger tunnel cross section.

Figure 14

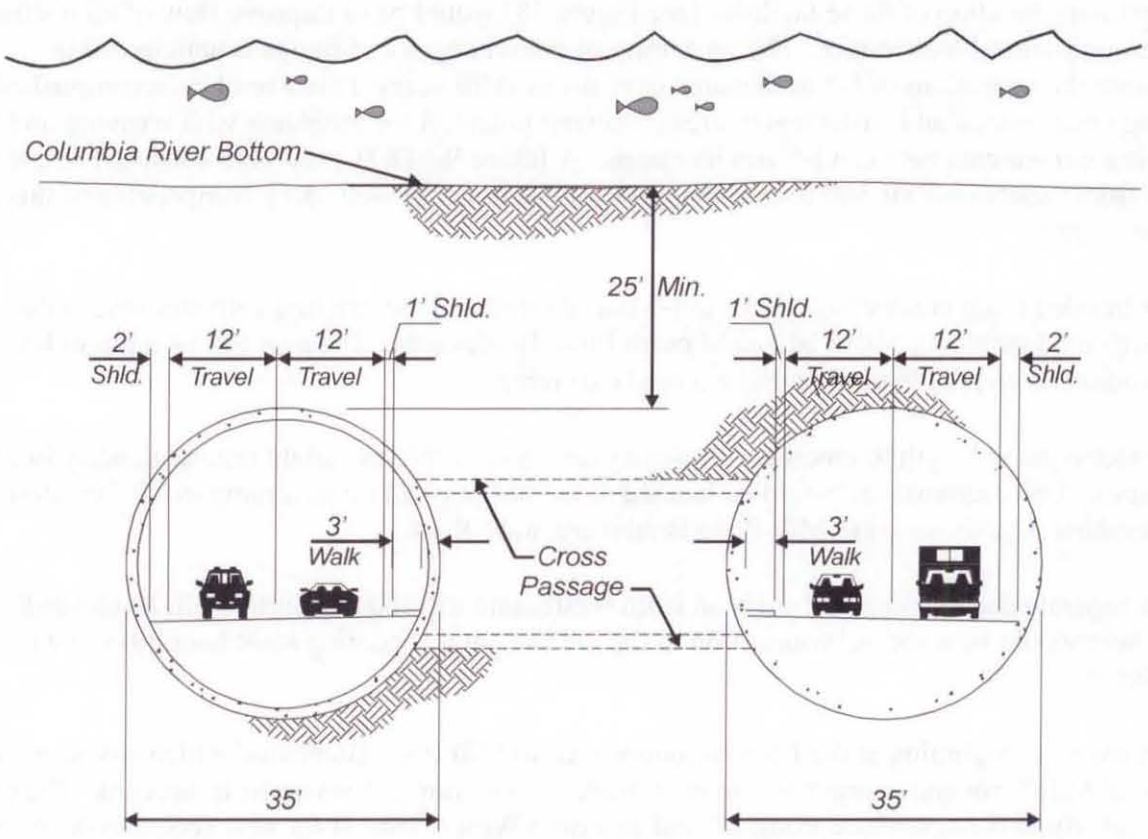


Immersed Tube Tunnel Lane Configuration

5.4 Bored Tunnel

The Bored Tunnel Option could consist of twin 40-foot diameter tunnels bored a minimum of 20 feet below the river bottom, requiring no construction work in the river (see Figures 16 and 17). The depth of these tunnels under the Columbia would result in a longer facility before the tunnel could connect into the existing I-5 facility. At-grade connections with I-5 would be near Victory Drive to the south and SR-500 to the north. The existing SR 14 and Hayden Island interchanges could be left intact, with the existing I-5 bridges and roadway providing access between Marine Drive and Fourth Plain Boulevard. Maximum grades of 3.3 percent would eliminate the need for truck climbing lanes. Current tunnel boring technology probably would limit the width of the roadway to two lanes in each direction.

Figure 16



Bored Tunnel Lane Configuration

5.5 Columbia River Crossing Options – Estimated Construction Costs

Table 3 lists the estimated construction costs for the Columbia River Crossing options. These costs are conceptual estimates and are primarily intended to show costs of different investment options this early in the planning process. These costs will be refined further during subsequent phases of the study. The conceptual cost for the new fixed-span bridge has been used for analysis of the Columbia River Crossing Strategy described in Section 3.3 of this report.

Table 3

Option	Length (feet)	New Lanes	Estimated Cost
Widen Existing I-5 Bridges	3,500	2	$350 million
New Fixed-Span Bridge	5,200	8	$500 million
Immersed Tube Tunnel	9,100	4	pending
Bored Tunnel	18,500	4	$2 billion

5.6 Vancouver Collectors/Distributors

The primary function of these facilities (see Figure 18) would be to improve flow of all traffic on I-5 through central Vancouver. The proximity of interchanges and ramps is anticipated to constrain the operations of I-5 in this area over the next 20 years. This would be accomplished by adding lanes, ramps and structures in areas showing potential for problems with weaving and merging movements between I-5 and its ramps. A future WSDOT project to construct a new ramp from westbound SR 500 to northbound I-5 is included as well. Key components of this option include:

- A braided ramp connecting SR 14 to I-5 northbound and the existing collector/distributor (c/d) road servicing Mill Plain and Fourth Plain Boulevards. The new SR 14 ramp to I-5 would "fly over" the northbound c/d road exit ramp.

- Extensions in length to emergency re-entry ramps for vehicles caught unintentionally in exit lanes. These extensions would be located at the northbound I-5 exit ramp to SR 500, and the southbound exit ramps to Mill Plain Boulevard and SR 14.

- A separate access ramp and c/d road from westbound SR 500 to Fourth Plain Boulevard. There would be a second connection to the c/d road at the existing southbound I-5 exit to 39th Street.

- A c/d road beginning at the I-5 southbound exit to Mill Plain Boulevard which would pass over Mill Plain and connect to a new at-grade intersection at Evergreen Boulevard. The c/d road would then continue along I-5 and exit onto West 6th Street for new access to downtown Vancouver.

5.7 Freight on I-5 Facilities

The primary function of these facilities would be to improve truck access between Marine Drive and I-5 to and from the north. These facilities would be based on the Columbia River Crossing Strategy (i.e. a new fixed-span bridge, see Section 5.2) with the following additions/changes:

- At the Marine Drive interchange, two new northbound on-ramps for truck use only could be added. From the west, a ramp for eastbound-to-northbound trucks could exit Marine Drive at the Expo Center entrance and then fly over Marine Drive and I-5 to connect directly to the I-5 northbound lanes. At Marine Drive east of I-5, a new westbound-to-northbound truck only ramp would diverge from Marine Drive at North Vancouver Way. The ramp would pass over the loop ramps in the northeast quad of the interchange and connect with the eastbound-to-northbound truck ramp.

- The Hayden Island interchange could be removed from the system (no freeway ramps to and from Hayden Island) to eliminate the weaving problems caused by the close proximity of Marine Drive and Hayden Island. Access to Hayden Island from Vancouver would be by

using the existing bridges as shown in the Columbia River Crossing Strategy. Access from the Portland side could be provided by a new four-lane bridge from Marine Drive (opposite the Expo Center entrance) to North Jantzen Street about 1,500 feet west of I-5. It would be open for all vehicles.

- To accommodate trucks moving from southbound I-5 to Marine Drive, a new southbound truck-only exit ramp would be added. The ramp would diverge from the freeway on Hayden Island, then connect with the north end of a new local service bridge at the intersection with North Jantzen Street.