Portland/Vancouver I-5 Trade Corridor

Freight Feasibility and Needs Assessment

Final Report

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OREGON DEPARTMENT OF TRANSPORTATION

Washington State Department of Transportation

I-5 Trade Corridor Technical Staff

Freight Feasibility and Needs Assessment

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Executive Summary

Traffic congestion on Interstate 5 through the Portland, Oregon/Vancouver, Washington metropolitan area is a serious, growing problem that is affecting the region's economy. Referred to as the I-5 Trade Corridor, Interstate 5 is the most important freight freeway on the West Coast, linking markets in Canada, the United States, and Mexico. It is also the busiest commuter roadway in the region, linking the region's two largest cities, Portland and Vancouver.

The Oregon and Washington Departments of Transportation, in cooperation with regional policy-makers, initiated the Portland/Vancouver I-5 Trade Corridor Study in January 1999. The intent of the study is to examine transportation and economic consequences of investments in the I-5 Trade Corridor from the I-84 interchange in Oregon to the I-205 interchange in Washington.

As part of the study, the region's transportation policy-makers appointed fourteen business and civic leaders to a Leadership Committee and asked the committee to address five specific questions about the Portland/Vancouver I-5 Trade Corridor:

(1) What is the magnitude of the problem?

(2) What are the costs of inaction?

(3) What improvements are needed?

(4) How can the improvements be funded?

(5) What are the next steps?

A summary of the Leadership Committee's findings follows.

Question 1: What is the magnitude of the problem?

(1) The Portland/Vancouver I-5 Trade Corridor is critical to regional, state, and national economies.

(a) Interstate 5 is the only continuous interstate freeway on the West Coast between Canada and Mexico. It links international, national, and regional economies in Mexico, California, Oregon, Washington, Canada, and the Pacific Rim countries.

(b) The Portland/Vancouver I-5 Trade Corridor intersects the Columbia River, connecting the interstate highway system with deep-water shipping, up-river barging, and two water-level transcontinental rail lines. The convergence of transportation and port facilities in the Portland/Vancou-

We are at the brink of either keeping our economy strong or allowing the kind of disastrous gridlock that is going on in California and Seattle.

– Margaret Carter

ver I-5 Trade Corridor makes it a crossroads for both north-south and east-west trade, and an international gateway.

(c) The Portland/Vancouver I-5 Trade Corridor is home to the region's largest industrial areas, including the Ports of Portland and Vancouver, which together export the second largest volume of goods among West Coast ports. Over 40 percent of U.S. wheat exports move through the Columbia River system for transshipment to international markets through the marine terminals in the I-5 Trade Corridor.

(d) Portland/Vancouver is the number one origin and the number two destination for tonnage moved by commercial vehicles within the 17 western states. The I-5 Trade Corridor is the primary route for much of this freight movement.

(2) I-5 is a critical chokepoint; without attention, it will only become worse in the future.

(a) The I-5 Trade Corridor is currently the most congested segment of the regional freeway system.

(b) By 2020, congestion will grow significantly worse in the corridor.

(i) It will take about twice as long to commute from Downtown Portland to Downtown Vancouver.

(ii) Congestion will be a problem in the corridor for most of the day and well into the evening.

(iii) Back-ups on I-5 will cause back-ups on many regional freeways, including I-84, I-405, SR 14 and SR 500.

Question 2: What are the costs of inaction?

(1) Without improvements, future congestion in the I-5 corridor threatens the economic promise of the Portland/Vancouver region.

(a) Trade and freight movement on I-5 will be significantly more difficult as congestion moves into the mid-day period when the highest numbers of trucks are on the road.

(b) Traffic congestion will increase costs and uncertainty for businesses and will influence the willingness and ability of firms to continue to operate or expand at their current locations.

(c) The Portland/Vancouver region's ability to profit from the timely delivery of high-value or time-sensitive goods to national and international markets will be affected. Even a few pennies more in transportation costs can make the high volumes of wheat, wood, and scrap metal moving through the region non-competitive in the global market.

(d) The lack of accessibility in the I-5 Trade Corridor will adversely impact the ability to attract future jobs to areas such as the Columbia Corridor and central Vancouver.

(2) Maintaining mobility in the I-5 Trade Corridor is key to supporting quality of life in the Portland/Vancouver region.

(a) Regional land-use plans depend on movement between Portland and Vancouver. A significant portion of the labor market for Oregon jobs is located in Vancouver. Almost 50,000 Clark County residents are employed in Oregon and commute to work. Retaining access for commuters is important to support employment growth in Oregon.

(b) Increased spillover traffic from I-5 on parallel arterials, such as Martin Luther King, Jr. Boulevard and Interstate Avenue, will adversely impact neighborhoods and will diminish the opportunities for more neighborhood business development in these areas.

(c) Increased congestion on arterial roads through the industrial corridor leading to and from I-5 will dampen the region's ability to meet its job growth goals in the north Portland and Vancouver industrial areas.

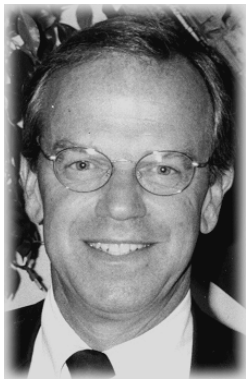
(d) Traffic avoiding congestion on I-5 is overloading I-205, which limits opportunities for continued growth in the I-205 corridor.

(e) Congestion at the Interstate Bridge threatens development in Downtown Vancouver. Such development is critical to increasing employment in Clark County and therefore reducing demand for commuting trips to Oregon.

Question 3: What improvements are needed?

(1) Doing only the currently planned projects in the corridor is unacceptable.

(a) Without additional transportation investments, congestion on I-5 and corridor arterials will greatly increase. This will dramatically affect access to important port and industrial property and to jobs and housing in the bi-state region.



The cure is not simply additional freeway capacity ... a concerted, integrated, and intermodal effort is required.

– Bill Hutchison

(2) The magnitude of the problem requires new freight and passenger capacity across the Columbia River.

(a) Addressing congestion in the corridor will require addressing the bottleneck created by the existing Interstate Bridge.

(3) The complexity of the problem requires that the new capacity be multi-faceted.

(a) It should include highway, transit, rail, and demand management, while also supporting the vitality of the river-based economy.

(4) The region should maximize the capacity of the existing system.

(a) This can be accomplished by encouraging demand and traffic management strategies, including transit, car-pooling, flex time, ramp metering, and incident response.

(5) The region's decision-makers should begin now to pursue a phased approach to addressing freight and passenger mobility in the I-5 Trade Corridor.

(a) The building blocks we recommend for further evaluation (not in order) should be:

(i) Improving bottlenecks and weaving problems on I-5 at:

(1) the Rose Quarter and Delta Park in Oregon

(2) downtown Vancouver and 99th to 134th in Washington

(ii) Providing new highway and transit capacity across the Columbia River and in the I-5 corridor.

(iii) Improving critical freight arterials in the corridor such as Marine Drive and Columbia Boulevard.

(iv) Improving the freight rail system in the corridor, in cooperation with private operators of the rail system.

(b) The cost of individual improvements ranges from a few million dollars to several hundred million. Together the cost of these elements could exceed $1 billion. While this is a significant cost, not addressing the identified problems will have significant impacts on the region's economy and quality of life.

(6) Even with the above improvements, there will be a capacity problem.

(a) It is important for the future economic health of the region to look at other solutions, including:

(i) Managing additional demand through peak-hour pricing of new capacity.

(ii) Instituting measures that would promote transportation-efficient development, including a better balance of housing and jobs on both sides of the river.

(iii) Providing for further, longer term highway express or HOV lane capacity in the corridor.

Question 4: How can the improvements be funded?

(1) Funding for major improvements in the I-5 Trade Corridor cannot be accomplished with existing resources.

(a) The transportation needs in the Portland/Vancouver region far exceed available funding.

(b) In the Portland metropolitan area, the Regional Transportation Plan identifies almost $7 billion in high priority needs over the next 20 years, yet only $1 billion in state, federal, regional, and local transportation revenue is available.

(c) In Clark County, the Metropolitan Transportation Plan identifies approximately $2 billion in needs over the next 20 years, yet only $500 million in state, federal, regional and local transportation revenue is available. Ballot measures in both states have and could reduce available transportation measures even further.

(2) The region should advocate strongly for federal participation in funding improvements in the corridor.

(a) The I-5 Trade Corridor is a critical link in this nation's freight movement network.

(b) There is a national interest in ensuring that goods can continue to move through the corridor in an efficient and effective manner.

(c) Therefore, the region should seek funding to the fullest extent possible from all appropriate federal highway, transit, and rail programs authorized by Congress.

(3) Assuming the current structure of public funding, tolling will be required to pay for a new Columbia River crossing and other corridor improvements.

(a) Improvements in the I-5 Trade Corridor are likely to be costly, particularly if a new crossing of the Columbia River is pursued.

(b) Funding for such bridges has historically been provided through tolls. This continues to be a viable means of financing such improvements.

(c) The region should consider tolls on other bi-state facilities if it is necessary to balance the traffic flow.

(4) Both states should make funding of infrastructure improvements in the corridor a priority.

(a) Trade activity in the corridor benefits all of Oregon and Washington. Both state legislatures need to recognize the importance of this corridor and consider allocation of transportation and general funds to fund improvements.

(5) Private financing should be sought where appropriate.

(a) There may be certain projects such as improvements to the freight rail system where funding should come primarily from the private sector.

(b) Further work will need to be done to identify specific freight rail needs in the corridor.

Question 5: What are the next steps?

(1) The Portland/Vancouver region needs to develop a Strategic Plan for improvements in the I-5 Trade Corridor.

  (a) The Leadership Committee has identified the need for a multi-faceted solution in the I-5 Trade Corridor, including demand management techniques and improvements to the highway, transit, and rail system.

  (b) The Strategic Plan should be developed with extensive citizen and resource agency participation in both states, and it needs to fully evaluate the environmental and social impacts of potential improvements.

  (c) The specific improvements in the corridor and their phasing will need to be identified and formally accepted into the Regional Transportation Plans in the Portland and Vancouver metropolitan areas.

  (d) The Strategic Plan must take into account and be coordinated with regional economic development, transportation, and other relevant plans.

(2) The Strategic Plan should address several areas, including:

  (a) Highway, transit, and rail improvements in the corridor.

  (b) Education and outreach about the critical nature of improvements in the corridor.

  (c) Demand management techniques for the corridor.

  (d) Local and regional land-use impacts of corridor improvements in each state.

  (e) Environmental effects of corridor improvements.

  (f) Public/private partnerships that may accelerate improvements in the corridor.

  (g) A finance plan for corridor improvements.

(3) The region's local, state, and federal officials must work together to advocate for improvements in the corridor.

  (a) The problem and the solutions we have identified will require cooperation at all levels of government in both states to ensure that the I-5 Trade Corridor, and the Columbia River Crossing issue in particular, is a priority for both states.

Summary of Findings

- Interstate 5 is the primary economic lifeline on the West Coast. The most economically significant segment of I-5 in the Portland/Vancouver region is in north Portland and Vancouver, where the freeway intersects with the Columbia River. Here, the interstate provides access to deep-water shipping, up-river barging, and two water-level transcontinental rail lines.

- Interstate 5 is currently the most congested segment of the regional freeway system in the Portland/Vancouver area. Without attention, future congestion in this important transportation corridor threatens the livability and economic promise of the Portland/Vancouver region.
- To maintain the economic competitiveness of the Portland/Vancouver region, and to maintain the high quality of life, this region needs to develop a Strategic Plan for managing demand in the I-5 Trade Corridor and making a balanced set of improvements in the corridor. To keep up with mobility needs in the corridor, there must be highway, transit, and freight and passenger rail improvements, along with demand management. No single strategy will solve the problems in the corridor. There is no silver bullet.
- Improvements in the corridor will be costly and most cannot be funded with existing transportation revenue. It is possible, however, to fund public improvements in the I-5 Trade Corridor with a combination of federal funds, tolling, and state funding from Oregon and Washington.

Figures

Tables

1 Introduction

Rush hour on I-5 in Vancouver, Washington

Traffic congestion on Interstate 5 through the Portland/Vancouver metropolitan area is a major problem. Rush hour now means hours of stop-and-go driving, and daily periods of congestion are steadily increasing. Accidents, even minor ones, can tie up traffic for hours. Congestion causes constant inconvenience for area residents and increases costs for the business community. To avoid congestion, many people reschedule trips, change routes, or select alternate destinations. All of these choices have economic impact.

Interstate 5 is the primary freight facility through the Portland/Vancouver metropolitan area with national and international significance. The rapid growth in international trade, especially in high-tech manufacturing, has increased the importance of access to and through the metropolitan area. Businesses are putting an increasing emphasis on the prompt delivery of products, and there is a growing trend to purchase goods and services directly from producers, leading to an increase in the number of small package shipments and the vehicle fleet required to distribute the packages. Surface transportation has become a principal means of delivering virtually all consumer goods, further taxing an already strained highway infrastructure. At the same time, resources for improving or even maintaining the infrastructure are diminishing.

This decision will be one of the most important for the region in the new millennium.

– Dick Pokornowski

This region is noted around the world for the quality of its planning. Several central locations, namely the Columbia Corridor, Downtown Portland, Downtown Vancouver, and the Portland International Airport, among others, have been designated as places where job growth would be especially beneficial to the community. In a competitive business environment, accessibility significantly affects the willingness of employers and employees to locate to and work at these sites.

The Portland/Vancouver metro area is an international hub for the movement of commodities by rail, barge, highway, and air. As an important port on the Pacific Rim, Portland/Vancouver competes for business with other North American ports. The freight rail that serves ports and key industries is also becoming congested.

As moving goods becomes more difficult, it is the smaller businesses that will suffer most.

– Phil Kalberer

Portland/Vancouver residents share a vision not only for a compact, livable metropolitan area but also for livable neighborhoods. People who live near I-5 rely on the jobs they find nearby — in the ports, warehouses, offices and factories. If these businesses lose sales, local residents lose jobs. At the same time, residents must live with the increasing intrusion and pollution of trucks on neighborhood streets, as I-5 congestion forces drivers to seek alternate routes.

Yes, there are real constraints, but we can no longer put our heads in the sand. We must think creatively and we must act now.
– Keith Thomson

Although it may be impossible to completely eliminate congestion on I-5 in the Portland/Vancouver metropolitan area, the problem must be addressed. In January of 1999, the I-5 Trade Corridor Study was initiated to examine how congestion impedes freight mobility.

This report represents the completion of the study's first task, to identify the magnitude of the congestion problem and explore concepts that could improve it. The concepts are presented as scenarios and are only a starting point in the study; they will be refined and others will be developed. Some of the scenarios give priority to the movement of goods while providing important benefits to residents of both Oregon and Washington. All of the scenarios support local and regional plans for livable neighborhoods, and vital, centrally located industrial and office employment centers, and help maintain the region's advantages in terms of attracting business and as a location for trade. Finally, the scenarios provide more choices for travel in the most important corridor of this busy, growing bi-state region.

1.1 The Process

In January 1999, the Oregon and Washington State Departments of Transportation, in cooperation with regional decision-makers, initiated the Portland/Vancouver I-5 Trade Corridor Study.

The regional decision-makers organized themselves into a Policy Committee to oversee the I-5 Trade Corridor Study. Policy Committee members are:

- **Henry Hewitt**, **Committee Chair**, *Chair, Oregon Transportation Commission*
- **Ed Barnes,** *Commissioner, Washington State Transportation Commission*
- **Mike Burton,** *Executive Officer, Metro*
- **Charlie Hales,** *Commissioner, City of Portland*
- **Fred Hansen,** *General Manager, Tri-Met*
- **Keith Parker,** *Executive Director, C-Tran*
- **Larry Paulson**, *Executive Director, Port of Vancouver*
- **Royce Pollard**, *Mayor, City of Vancouver*
- **Judie Stanton,** *Commissioner, Clark County Board of Commissioners*
- **Mike Thorne,** *Executive Director, Port of Portland*

The Policy Committee appointed a 14-member Leadership Committee to examine the specific problems in the I-5 Trade Corridor and to make recommendations to the Policy Committee. Leadership Committee members are:

- **Vern Ryles**, **Committee Chair,** *President, Poppers Supply*
- **Peter Bennett**, *Vice President, K-Line*
- **Mike Bletko**, *Vice President, Distribution and Trucking, Fred Meyer Stores, Inc.*

- **Margaret Carter,** *President, Urban League of Portland*
- **Anthony Ching,** *General Counsel/Secretary, Wafertech*
- **Wesley Hickey,** *President/CEO, Tidewater Barge Lines*
- **Bill Hutchison,** *Partner, Tooze, Duden, Creamer, Frank & Hutchison*
- **Phil Kalberer,** *General Manager, Kalberer Food Service Equipment*
- **Steve Madison,** *President, Cana Realty*
- **Bill Maris,** *CFO/Treasurer, Market Transport, Ltd.*
- **Ken Novack,** *President, Schnitzer Steel Industries/Schnitzer Investment Corp.*
- **Dick Pokornowski,** *Vancouver Citizen*
- **Carl Talton,** *Manager of Economic Development, Portland General Electric*
- **Keith Thomson,** *Commissioner, Port of Portland*

1.2 Leadership Committee Charge

The Policy Committee drafted a charge to the Leadership Committee to guide its examination of the I-5 Trade Corridor. Specifically, the Leadership Committee was asked to address these five questions:

(1) What is the magnitude of the problem? To what extent do congestion and access issues 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? Specifically, please address the congestion and access issues in the I-5 Trade Corridor as they pertain to:

(a) serving the needs of interstate commerce

(b) providing access to port and other trade-related facilities in north Portland and Vancouver

(c) providing access and internal circulation to the industrial enclaves in north Portland and Vancouver

(2) **What are the costs of inaction?**

(3) **What improvements are needed?** Are there efficient transportation improvement scenarios that regional decision-makers should consider for the corridor? If so, what are their costs and benefits?

(4) **How can the improvements be funded?** If improvement scenarios are recommended, how should/can these improvements be funded?

(5) **What are the next steps?** How should the Oregon Department of Transportation (ODOT)/Washington State Department of Transportation (WSDOT) and regional governments proceed in implementing the committee's recommendations?

The remaining sections of this report discuss the technical analysis used to answer the questions posed by the Policy Committee and present the Leadership Committee's find-

ings. Further information on these topics is available in several technical memoranda and reports. Source material for this report is cited in these documents, which are:

- "Development of Alternative Scenarios"
- "The Economic Benefits of Highway Improvements"
- "Economic Evaluation of Alternative Scenarios"
- "Factors Affecting Employment Growth in Southwest Washington"
- "Freight Rail Existing Conditions"
- "Transportation Assessment of Alternative Scenarios"
- "2020 Baseline Conditions"

These documents may be obtained from:

- **Dan Layden**, ODOT Region 1, 123 NW Flanders St., Portland, OR 97209 (503) 731-8565
- **Brian McMullen**, WSDOT, SW Region, 4200 Main St., Vancouver, WA 98668 (360) 905-2055

1.3 Study Area

Fig. 1 on page 5 is a map of the I-5 Trade Corridor Study area, which includes Interstate 5 and its vicinity from I-84 in Oregon to I-205 in Washington. The study corridor is important to the regional and national economy and includes many important community and economic assets:

- Interstate 5, the only continuous interstate highway on the West Coast between Canada and Mexico, linking the region with California, Canada and Mexico.
- The interchange of east-west and north-south mainline rail lines that connect the nation's agricultural heartland with major Pacific Rim ports. The east-west mainlines in particular are unique because they run at water level, making rail service on these rail lines among the most competitive in the United States.
- The Columbia River, second in trade volume only to the Mississippi River, linking the Pacific Rim and Portland/Vancouver to the nation's agricultural heartland. The Columbia River makes possible the deep-water ports of Portland and Vancouver, two major West Coast ports that connect this region with the Pacific Rim and the rest of world.
- The Rivergate, Columbia Corridor and Vancouver industrial areas, which provide high-wage jobs. The corridor includes Downtown Vancouver, the region's second largest city and neighborhoods in north-northeast Portland and Vancouver.

The convergence of transportation, port, industrial and community resources in this area makes it a unique crossroads for trade, industry and transportation, which are critical to the health of the economies of Oregon and Washington.

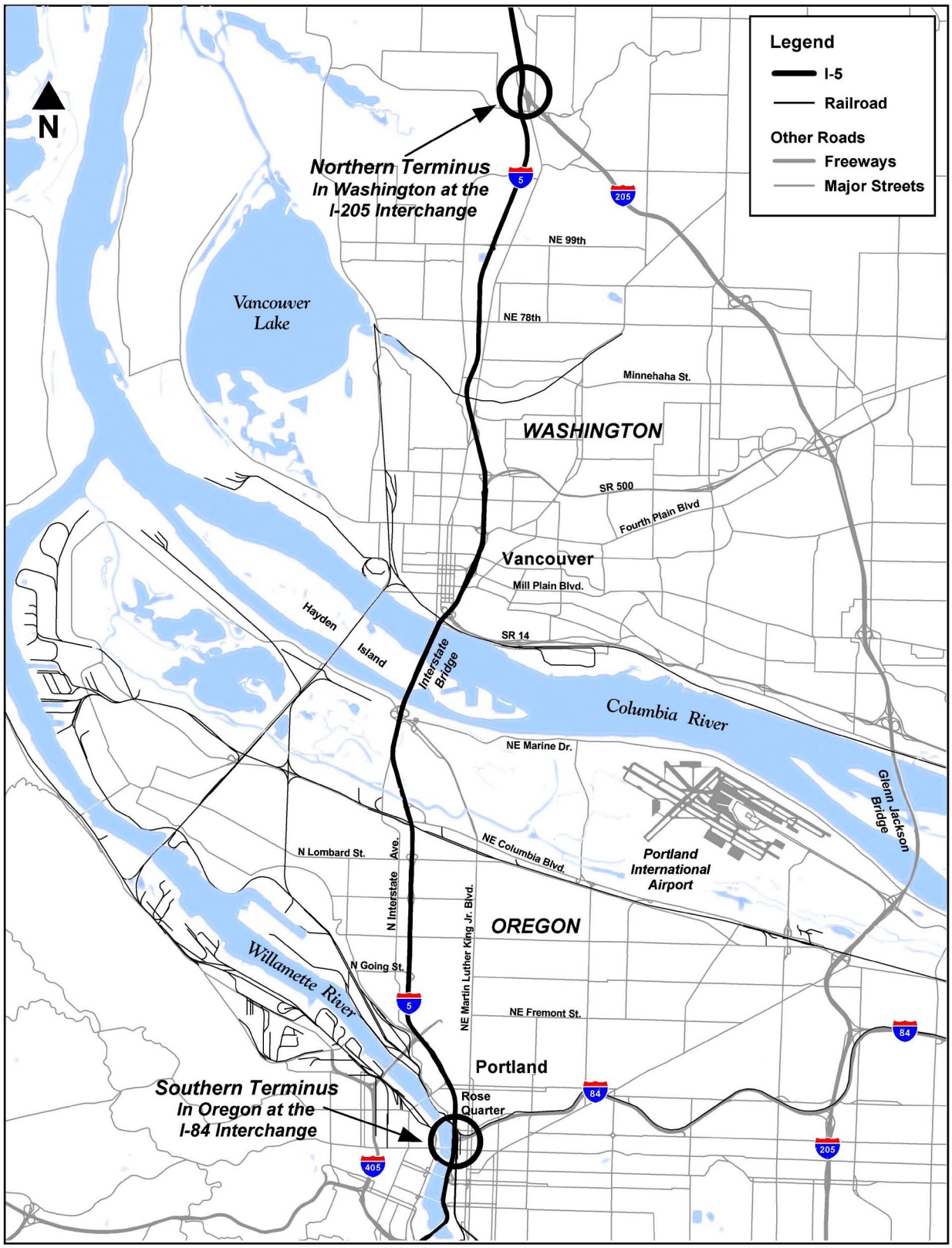


Fig. 1. *I-5 Trade Corridor Study Area.*

Many of the resources in this area have recently been addressed by public-sector efforts, including:

- A coalition of ports and cities is working with U.S. Army Corps of Engineers to deepen the Columbia River shipping channel.
- The City of Vancouver is developing a transportation and land-use plan for Downtown Vancouver.
- The City of Portland recently completed a transportation plan for the Columbia Corridor.
- The Port of Portland is planning a new, major deep-water terminal on Hayden Island.
- Tri-Met is planning a light rail line on Interstate Avenue.
- ODOT is operating an interim HOV lane on I-5 northbound.
- ODOT is working with the US Coast Guard, Senator Slade Gordon's office, WSDOT, and several citizen groups to develop a revised schedule of hours for lifts of the I-5 Interstate Bridges that facilities both highway and river traffic.

The Columbia River and Hayden Island

The I-5 Trade Corridor Study focuses on the highway and rail transportation systems in the corridor, and this report discusses the highway transportation system in detail.

1.4 Methodology

This report presents the conclusions of the Leadership Committee and the technical work used to develop the conclusions. This effort was meant to be a preliminary look at the corridor; there are many issues that have not yet been thoroughly examined.

The Leadership Committee examined the trade economy of the Portland/Vancouver region and the impacts of continuing congestion in the corridor and developed several scenarios for improvements in the corridor. The committee also assessed how the transportation system would function in the future and what its impact on the economy would be. The intent was to identify the magnitude of the problem and suggest the scope of improvements that would be necessary to address the problem.

There are many questions that will need to be addressed as the study moves forward, including:

- Land use: How congestion in the corridor will affect future land-use plans.
- Environment: Very few of the concepts in the scenarios were developed at a level of detail necessary to assess the environmental impacts of improvements. The next

phase of the study will include a more detailed assessment of air quality, water quality, noise and other environmental impacts.

- Public participation: The study focused on answering questions posed by a group of business and civic leaders. The second phase of this study will include an extensive process to identify the needs and concerns of the citizens of Vancouver and Portland.

2 Magnitude of the Problem

This chapter discusses the magnitude of the transportation problem in the I-5 Trade Corridor facing the region now and in the future, current bottleneck locations in the corridor, results of a technical analysis that assumed only minor improvements in the corridor, and freight rail bottlenecks in the corridor.

2.1 The Role of Interstate 5

I-5 is the only continuous highway between Mexico and Canada (U.S. NAFTA trading partners) on the West Coast and directly serves regional and state economies in Washington, Oregon and California. Within the Portland/Vancouver metropolitan area, I-5 is the north-south backbone of regional trade, intersecting two east-west transcontinental railroads, deep-water shipping and upriver barging, and providing primary access to the region's two ports and regional warehousing and distribution facilities. The Portland/Vancouver region's proximity to two interstate highways (I-5 and I-84) makes overnight truck delivery north into British Columbia, east to Idaho and western Montana, and south into the Bay Area possible. As a result, the Portland/Vancouver region serves as the Pacific Northwest domestic distribution location for many retailers and manufacturers, as well as the regional hub for most less-than-truckload carriers. For these and other reasons, Congress recognized I-5's national significance and economic importance in the Transportation Equity Act for the 21st Century (TEA-21) by designating it as a High Priority Corridor.

Afternoon truck traffic in the I-5 corridor

Domestically, trucks carry 75% of the goods that are shipped to or from other states. North and south truck movements in and out of the Portland/Vancouver region account for the majority of annual truck freight volumes. According to ODOT, $106 million of truck freight comes into the region each day, primarily from California, while $73 million leaves the region, going primarily to Washington. Canada is the primary destination for international exports by truck or rail, accounting for 17% of total exports leaving the region (most exports are bound for Pacific Rim countries). Trucks carry 100% of the goods for the local segment of international air-freight shipments.

I-5 plays a crucial role in local transportation because it provides the major access to port and industrial areas, with links to marine and rail freight terminals. I-5 is also one of only two river crossings linking Portland and Vancouver. As such, it is a vital corridor for commuting, shopping, access to services, and other local trips.

2.2 Current Conditions on Interstate 5

I-5 serves interstate, regional, and local traffic demand, with traffic volumes in the corridor ranging from over 140,000 vehicles per day near Going Street to nearly 58,000 vehicles per day just south of the north I-205 interchange endpoint of the corridor. On an average weekday, about 120,000 vehicles cross the Interstate Bridge. Traffic on I-5 has been growing at nearly 4% per year in Vancouver and Clark County, and at about 2% per year in the Portland portion of the corridor.

Throughout the corridor, morning and evening peak-period travel demand consumes between 60 and 100% of the highway's capacity. Peak-period travel demand routinely approaches or exceeds the available capacity at several locations, resulting in recurring periods of congestion and slow travel speeds.

The Interstate Bridge is one of the most significant bottlenecks in the corridor. While three lanes are provided in each direction, the capacity of the outside lane is significantly diminished by the heavy traffic volumes entering and exiting the highway on the Hayden Island and SR 14 on- and off-ramps. The capacity problem created by heavy ramp volumes is exacerbated because the short ramps do not permit vehicles to accelerate to highway speeds before merging, and the distance between the on- and off- ramps is insufficient to provide for merging and weaving movements.

In addition, the Interstate Bridge is a lift span and is required by the Coast Guard to open on demand for marine traffic (the Coast Guard requirement has been modified to minimize openings during morning and evening peak traffic periods). During periods of high water, lifts can be required several times a day, each time creating delays and queuing for vehicles on I-5.

Other major congestion points occur principally on sections of I-5 where only two through-lanes are provided in each direction, including I-5 near the Rose Quarter, the segment of I-5 between the Delta Park and Lombard interchanges, and from Main Street to I-205 (WSDOT has programmed adding a third lane in each direction from Main Street to 99th Street). The basic lane capacity of those segments is generally inadequate to meet existing and anticipated travel demand. In addition, congestion points occur where on- and off-ramps are closely spaced.

2.3 The Future of Travel Along Interstate 5

Travel demand along I-5 is expected to increase substantially over the next 20 years. At the Interstate Bridge, the corridor's main chokepoint, travel demand will increase by up to 35% over current conditions. Because of the increase in traffic, limited capacity across the bridge, and bottlenecks (Rose Quarter, Delta Park, Downtown Vancouver, and between 99th and 134th Streets in Vancouver), there will be long vehicle queues and prolonged congestion throughout the day.

Delays will be long, not only during typical morning and evening commute periods, but also between these periods when freight traffic is heavily dependent on the highway and connecting roadway system. Truck trips are expected to increase at a much greater rate than automobile trips in the corridor. In fact, mid-day and evening truck trips across Interstate Bridge are expected to increase by up to 60% over existing conditions. Therefore, freight mobility will be substantially impacted.

Due to extended periods of congestion along I-5, traffic demand will shift to adjacent corridors, including I-205. Without improvements to alleviate I-5 conditions, peak-period traffic levels will increase at the Glenn Jackson Bridge by 70% over existing volumes, resulting in over-capacity and congested conditions along this key route as well.

With all-day congestion expected throughout the I-5 corridor, the number of vehicle hours of delay (for all vehicles) will increase by over 220% during the evening peak period. Truck hours of delay are expected to increase even more — by 300%. Overall vehicle miles traveled (for all vehicles) will increase by about 35%. Truck miles traveled will increase by over 50% due to the anticipated increase in freight activity and diversion to less congested routes (**Fig. 2**).

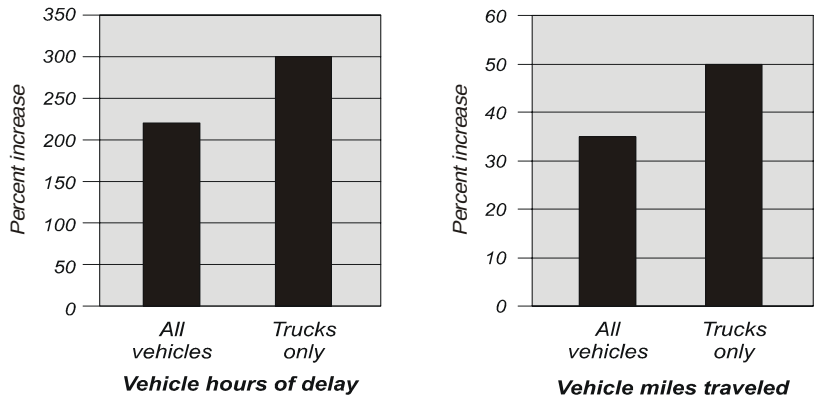


Fig. 2. *Estimated Percent Increases for the Year 2020 in Vehicle Hours of Delay (VHD) and Vehicle Miles Traveled (VMT), Compared to Existing Conditions.*

Increased traffic demand at several of I-5's on-ramps will create long vehicle queues, which may affect surface street operations. The most extensive queues and delays are expected at both southbound on-ramps (including 99th Street, Mill Plain Boulevard, Lombard Avenue and Weidler Street) and northbound on-ramps (including Denver/Delta Park, Marine Drive, Hayden Island, and Mill Plain Boulevard).

Nearly all of the arterial roadways serving I-5 are expected to show significant increases in traffic volumes. For example, over the next 20 years, traffic will more than double along segments of 134th Street, SR 14, Martin Luther King, Jr. Boulevard, and Lombard Street. The increased travel demand along the arterial street network will result in congestion and delays for all vehicles. For further information on this subject, see the technical memorandum, "2020 Baseline Conditions."

2.4 Freight Rail

The Leadership Committee discussed freight rail issues, including the results of a study conducted by Burlington Northern Santa Fe (BNSF) Railroad for the Southwest Washington Regional Transportation Council (RTC). The RTC study found that there will be a significant rail-capacity problem in the corridor in the future, which could limit potential industrial development in the corridor in a manner similar to the highway capacity problem. In addition, rail-capacity problems will create delays for goods shipped statewide and nationally. For further information on this subject, see the technical memorandum, "Freight Rail Existing Conditions."

2.5 Leadership Committee Findings

(1) The Portland/Vancouver I-5 Trade Corridor is critical to regional, state, and national economies.

  (a) Interstate 5 is the only continuous interstate highway on the West Coast between Mexico and Canada. It links international, national, and regional economies in Mexico, California, Oregon, Washington, Canada, and the Pacific Rim countries.

  (b) The Portland/Vancouver I-5 Trade Corridor intersects the Columbia River, connecting the interstate highway system with deep-water shipping, up-river barging, and two water-level transcontinental rail lines. The convergence of transportation and port facilities in the Portland/Vancouver I-5 Trade Corridor makes it a crossroads for both north-south and east-west trade, and an international gateway.

  (c) The Portland/Vancouver I-5 Trade Corridor is home to the region's largest industrial areas, including the Ports of Portland and Vancouver, which together export the second largest volume of goods among West Coast ports. Over 40% of U.S. wheat exports move through the Columbia River system for transshipment to international markets through the marine terminals in the I-5 Trade Corridor.

  (d) Portland/Vancouver is the number one origin and the number two destination for tonnage moved by commercial vehicles within the 17 western states. The I-5 Trade Corridor is the primary route for much of this freight movement.

(2) I-5 is a critical chokepoint; without attention, it will only become worse in the future.

  (a) The I-5 Trade Corridor is currently the most congested segment of the regional highway system.

  (b) By 2020, congestion will grow significantly worse in the corridor.

    (i) It will take about twice as long to commute from Downtown Portland to Downtown Vancouver.

    (ii) Congestion will be a problem in the corridor for most of the day and well into the evening.

    (iii) Back-ups on I-5 will cause back-ups on many regional highways, including I-84, I-405, SR 14 and SR 500.

3 The Cost of Inaction

This chapter documents what is potentially at stake for the regional economy if traffic congestion on I-5 further impedes the movement of people and goods in the corridor. More specifically, this section describes ways in which improvements in the performance of I-5 could improve movement of goods, creation and retention of jobs, leasing or development of real estate, and livability of neighborhoods in the vicinity of the corridor, in both Oregon and Washington.

3.1 The Portland/Vancouver Regional Economy

The Portland/Vancouver region has enjoyed a strong and growing economy over the past 10 years. During this period, growth in the manufacturing sector, especially in high-tech manufacturing, has dramatically shifted the regional economy from one dependent primarily on the natural resources sector to one that is more diverse and robust. The shift toward electronic and computer equipment manufacturing has brought an increase in wages. As a result, the average wage in the Portland/Vancouver region is currently higher than the national average.

Regional growth is evidenced by demographic indicators such as population, employment output, and wages. Employment has been growing consistently over the past eight years at an average rate of 3.3% per year. Regional population, which is linked to employment growth, has also increased with a net migration of 223,000 people to the region from 1990 to 1997. During this same period, regional output (i.e., sales) has increased 7.8% per year.

T-6 at the Port of Portland

Recent growth of the Portland/Vancouver regional economy has been led primarily by four major industries: electronics manufacturing (including plastics and chemicals), air transportation, construction, and business services (particularly computer-related services). Growth of the electronics industry has been particularly strong, with double-digit growth for the past 10 years. This compares to an average growth rate of about 1% per year for the U.S. electronics industry as a whole. **Table 1** compares the growth rates of these local industries with growth rates for the rest of the nation.

In light of the recent growth and other factors, several industrial "clusters" have emerged and are driving the regional economy (**Table 2**). Briefly, industrial clusters are groups of firms that share common markets, have similar technological needs, demand similar workforce skills, and have broad impact on regional and/or national economies.

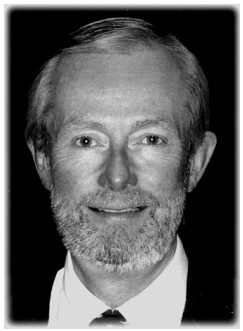
Table 1. *Average Annual Growth Rates (Earnings): Portland/Vancouver Region vs. U.S., 1985-1995.*

Industry	Portland regional growth rate (%)	U.S. growth rate (%)
Electronics and other electronic equipment	14.3	1.2
Transportation by air	14.9	6.2
Construction	10.7	4.1
Other transportation equipment	7.8	1.3
Agricultural services, forestry and other	12.7	8.0
Business services	11.2	7.0

Table 2. *Major Industrial Clusters in the Portland/Vancouver Regional Economy (1996 Data).*

Industry	Firms	Jobs	Average wage
Electronics/high tech	2,049	57,200	$49,000
Metals, machinery, transportation equipment	1,129	40,934	$37,500
Lumber and wood products	1,202	23,115	$39,600
Transportation/distribution[1]	NA	38,342	$34,900
Nursery products	801	8,780	$18,911
Specialty food/craft beverages	136	3,556	$30,458

[1]Number of jobs does not include durable and nondurable wholesaling. Average wage does include wholesaling.



Our regional ability to meet every other social, economic, and environmental challenge depends on economic strength, and our economic strength absolutely depends on efficient, multi-mode freight transport throughout the I-5 corridor.

– Bill Maris

Trade comprises a significant share of the regional economy. Freight movements into and out of the region have historically led to increased business and employment growth, with the result that today the Portland/Vancouver metropolitan area plays a leading role among regional distribution and transshipment centers for international commerce. While the ratio of wholesale to retail sales for the nation as a whole is 1.7:1, Portland's ratio is 2.5 times higher (4.4:1), giving Portland the highest value of wholesale trade per capita on the West Coast. Wholesale trade is therefore one of the primary drivers of the regional economy, although this sector is not listed as a cluster in **Table 2** due to the difficulty of separating wholesale and warehouse activities from their related primary industries.

The Portland/Vancouver region ranks thirteenth among all U.S. cities based on the value of exports. Exports make up the vast majority of the region's traded volume, exceeding the volume of imports by a factor of 15. While the volume of exports is still dominated by the natural resources sector (lumber, wood products, and agricultural products), the high-

tech sector now makes up the majority of the value of exported goods. Between 1989 and 1995, natural resource exports grew 30% (from $2.9 to $3.8 billion) while the high-tech sector grew 190% (from $1.7 to $4.9 billion). Because high-tech goods are valuable, light, and time-sensitive, they tend to be shipped by air freight rather than by sea. This has led to a dramatic increase in air-freight shipments, especially international shipments, which has created a greater demand for "just-in-time" (JIT) deliveries and access to the airport by high-tech businesses. Key industries in the high-tech sector include electrical and electronic equipment, industrial machines, and computers and instruments. The growing regional economy is increasingly dependent on an efficient transportation system.

3.2 Economic Benefits

This section discusses some of the ways investments that reduce travel times on the region's transportation system will benefit local businesses and the regional economy. Benefits are divided into business productivity, travel reliability, regional competitiveness, accessibility, trade, and livability.

3.2.1 Productivity

This section focuses on the impact of reduced travel times for businesses that rely on transportation services as part of the production process.

Reduced travel times affect business profitability directly by reducing transport costs. A percentage of these savings may in turn be passed on to passengers, consumers, and others in the form of lower prices. Travel time savings can also allow firms to reduce other logistical costs. Because total logistical costs are central to freight modal and route choices, inventory costs, production locations, and shipment frequency are all interconnected decisions manufacturers must make. Deregulation in the airline, trucking, and railroad industries has increased competition among carriers and given logistics managers greater opportunities to control costs and develop innovative services.

Increasing travel time is also a significant issue at the local level. Surveys of shippers (manufacturers and distributors), conducted for the I-5 Trade Corridor Study, revealed that businesses respond to increasing travel times and reduced reliability by:

- Moving operations closer to the airport or to key customers, thus incurring substantial relocation costs.
- Building satellite facilities and decentralizing services. This practice runs counter to a growing general business trend of centralizing facilities, with the result that costly overhead is duplicated.
- Increasing inventories and holding costs.
- Adding trucks, drivers and loaders to reduce stockpiling. In addition to increasing labor costs, this also places more trucks on the road, thus compounding problems re-

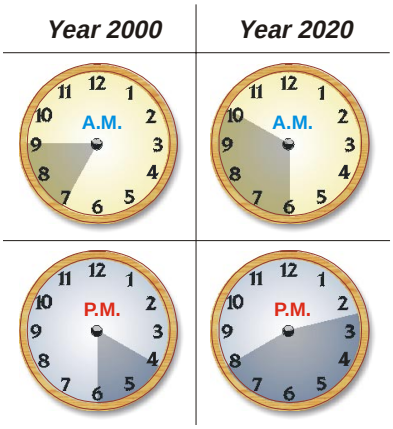
lated to congestion (trucks are increasingly carrying less than full truckloads of goods). While this strategy is usually used by firms engaged in JIT deliveries, many firms would prefer to consolidate loads.

- Consolidating freight and ship during evening hours. This might require the purchase of larger vehicles.
- Increasing hours of operation, typically earlier in the morning. This may inconvenience staff and/or increase labor costs due to longer working hours or adding staff.

The surveys found that local cartage carriers (truck companies) may respond by:

- Increasing reliance on dispatch services to warn of congestion problems.
- Using alternative routes, often through residential neighborhoods. (Because interstate highways have lower rates of traffic accidents and injuries than other roads, route diversions typically increase accident rates and ultimately truck insurance premiums and medical costs. Traffic accidents are also a major cause of reduced travel reliability.)
- Rescheduling pickups and deliveries before or after peaks, potentially increasing labor costs.
- Turning down or postponing loads at the risk of upsetting customers.
- Arriving late and incurring penalty fees. For companies that try to reduce inventory stockpiling, late shipments can cause expensive machinery to sit idle.
- Moving multiple trailers to a service area, which are then loaded or unloaded individually, to reduce returns to a main terminal. As relatively few streets and parking areas are designed to store idle trailers, this can result in unsafe traffic operations. Some areas (e.g., Downtown Portland) have no areas in which to store transfer trucks.
- Increasing shuttle runs by additional trucks to other trucks (particularly air-freight carriers) already in the field, compounding congestion.

The business community's ability to respond to increasing travel times and reduced reliability is limited by several factors. As traffic congestion spreads into off-peak commuting hours, for instance, firms find increasingly narrower windows of time within the normal business day in which to reschedule pickups and deliveries. Moreover, many of these deliveries cannot be shifted to times before or after normal business hours. Deliveries to Portland International Airport, for example, must be made by late afternoon in order for a shipment to make a next-day or two-day delivery, and many shippers and receivers work only from 6 am to 6 pm. State and federal regulations limit some types of heavy hauls to specific times of day and on particular facilities. Finally, it can be difficult to find workers willing to work a



Projected rush hour periods for the years 2000 and 2020 on I-5 in Portland/ Vancouver.

non-traditional schedule, and drivers doing so may incur additional accident costs because of driver fatigue.

Transportation improvements can lead to fundamental societal changes and flexibility (e.g., the ability to selectively adopt some logistical practices and discard others) that will facilitate gains in productivity and innovation. Transportation improvements will also ensure that existing businesses are able to operate in an increasingly competitive world. Not being able to deliver and receive goods promptly and at an optimal time of day has significant economic impact.

3.2.2 Competitiveness

Competitiveness is the ability of a region to retain and expand existing businesses and to attract new companies or industries. In this respect, transportation bottlenecks are important because many of today's industries are just as dependent on efficient transportation as other industries have historically been. One difference, however, is the fact that many companies are now based in the service economy and are flexible in terms of business location (in Portland/Vancouver, the service sector is the only sector larger than the trade sector). Many companies may now leave behind only empty office space, rather than immense capital facilities, when they choose new locations because of good airport, highway, and rail access. This increased locational flexibility is of critical importance for the Portland/Vancouver region, which is currently home to few company headquarters. Branch offices with relatively weak ties to the greater community are particularly likely to relocate or consolidate with headquarter operations to reduce costs.

Barge loading at T-6

Good transportation access is critical to a region's ability to attract business. Other factors important in attracting business are production costs (e.g., energy), availability of skilled labor, available land, business climate, labor costs, taxation, environmental regulation, and quality of life factors. However, transportation infrastructure may be "first among equals," in that there must first be an infrastructure that is sufficient to encourage other factors (e.g., labor and private capital) to enter a region.

According to business recruitment staff at Portland Development Commission, the Portland/Vancouver region currently enjoys several competitive advantages regarding business recruitment, including:

- An "average" cost structure with respect to taxes, wages, utilities costs, and land costs. While land in Portland is still relatively inexpensive compared to other West Coast water port cities (e.g., Los Angeles, San Francisco, Seattle), it can be more expensive than in other inland transportation hubs such as Denver, Phoenix, and Kansas City.

- A well-educated labor force.
- Telecommunications infrastructure. This factor is becoming increasingly important, and quantitative measures are only now emerging. In this case, Portland is considered to be "fully functional."
- Abundant natural resources (e.g., water).
- Low-cost power. The magnitude of this advantage may erode, however, due to energy deregulation, which is being aggressively pursued in California, for instance.
- Quality of life benefits for employees. While these are difficult to define and most cities claim to offer benefits in some form, Portland/Vancouver consistently ranks high regarding "livability" or quality of life factors. **Section 3.2.6** discusses livability issues in more detail.
- Industrial land-use planning. Firms like predictability and are able to occupy industrial sites knowing that their business use has been approved and that conflicts with neighbors are unlikely. Land-use approvals are often more difficult and time-consuming in other cities.

Regarding traffic congestion, most prospective firms note that current congestion levels in Portland are low compared to Seattle, Los Angeles, and San Francisco. In the long run, congestion levels in other cities are already so high that increased congestion in these places could cause some business activity to be driven elsewhere.

Prospective firms also note that Portland's linking of land-use and transportation planning gives it a long-term strategic advantage. While the business community does expect congestion to increase here (and everywhere else) from population and income growth, it also believes that the region's planning institutions are well equipped to mitigate these impacts and keep congestion at "tolerable" levels. In the future, Portland's competitive advantage may lie in maintaining a congestion level differential with other cities to attract firms that find deteriorating business conditions in those cities.

3.2.3 Trade

Trade is defined as the dollar value or volume of goods exported from or imported to the region, either to international (primarily Pacific Rim) markets or domestically to other West Coast states. The Port of Portland currently exports the second largest volume of goods among West Coast ports and is the nation's largest wheat shipping port. Oregon and Washington are each other's largest trading partners, with California the second largest trading partner for each state.

Trade sector activities create a demand for labor, which increases the number of "basic sector" jobs and introduces new income in the form of wages into the regional economy. Sixty percent (60%) of Oregon's workers have jobs that rely on transportation, and inter-

national trade supports one out of every four jobs in Washington, making the trade sector a primary driver of the Portland/Vancouver regional economy.

In 1996, over 165 million total tons of trade-related cargo moved in and around the Portland metropolitan area. This figure is projected to grow to 275 million tons in 2020, and to 330 million tons in 2030, for an average annual growth rate of 1.9%. This growth will be driven primarily by continued regional and national economic growth. In comparison, local employment is projected to grow by 1.5% annually, indicating that trade will become increasingly important to the local economy. Cargo volumes moving across docks or air terminals (e.g,, international goods) are projected to increase more than overall volumes. Ocean freight is projected to increase by 250% by 2030, while air cargo will grow by 300%.

At the local level, freight mobility is dependent largely upon trucks. In 1996, trucks carried 61% of total tonnage, comprised of 6 million tons of international goods, 22 million tons of local goods, and 75 million tons of goods moving into and out of the region. By 2020, the volume of international goods moved by truck is expected to increase to nearly 16 million tons, representing an increase of 160%. Notably, all air cargo moves to and from terminals at the airport by truck, and 25% of ocean tonnage moves to and from marine terminals by truck. In addition, trucks carry approximately 75% of domestic goods that are shipped to or from other states.

Top loading train

I-5 is an important link for all of these freight movements, with the result that local firms' share of domestic and international trade could be adversely affected by congestion due to higher transportation costs. Because much of the freight moving through the region is of low value, such as wheat, wood, and scrap metal, the Portland/Vancouver area is vulnerable to subtle market changes. Transportation costs are a large component of low-value products; therefore even a few dollars more in transportation costs can make some products non-competitive in the global market.

3.2.4 Reliability

Increased travel reliability allows firms to make smaller and more frequent deliveries, thereby reducing inventory and handling costs. This is significant since the costs of holding inventory are, for many industries, among the highest of doing business (between 30 and 70% of current assets). These costs are a prime motivator behind the growing trend for JIT delivery practices, which were initially adopted for high-value products (e.g., computers) but are now used for just about any type of product (e.g., hammers and birdseed). While in some cases JIT delivery may increase total transportation costs due to more fre-

quent shipments, total product costs typically decline through savings in production costs.

Traffic congestion is one of the leading causes of reduced travel reliability because congestion significantly increases traffic accidents. Data compiled by the Federal Highway Administration (FHWA) reveal that for all categories of accidents and injuries for both urban and rural areas, accident rates on interstate highways are two to three times lower than rates on other types of roads (highways, arterials, collectors, and local streets). Because truck drivers place a relatively high value on their time compared to commuters, truck drivers generally prefer to utilize highway facilities as much as possible because highways are designed to accommodate larger vehicles at higher speeds than other roadways and there is a reduced likelihood of delays caused by accidents.

Fig. 3 shows how accident rates increase with increasing levels of congestion (measured as the ratio of vehicles to capacity) on urban highways.

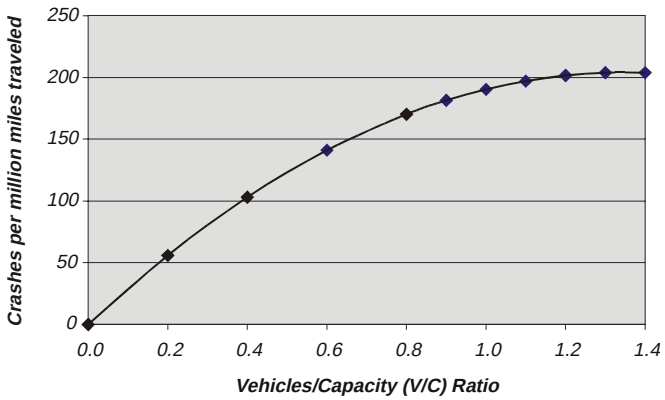


Fig. 3. *Relationship Between Congestion and Accident Rates on Urban Highways (Tedesco, S., V. Alexiadis, W. Loudon, R. Margiotta, and D. Skinner, "Development of a Model to Assess the Safety Impacts of Implementing IVHS User Services," Proceedings, IVHS America, 1994.*

At the local level, there are currently segments of I-5 where three traffic lanes merge into two lanes, with the result that congestion levels increase and bottlenecks occur regularly. These areas also have higher traffic accident rates and are located:

- between 99th and 134th Streets in Vancouver
- at the Interstate Bridge (three lanes but less capacity due to merging and weaving)
- between Lombard Street and Delta Park
- between I-84 and the Greeley Avenue ramps

In freight surveys conducted for this study, 43% of shippers (manufacturers) indicated that timeliness is very important to the production line, and 57% said it was very important to customers. Importantly, virtually all deliveries arrive at manufacturers by truck because there are almost no direct rail connections. In addition, 60% of manufacturers said they manage their inventory as JIT, and 30% say they manage according to customer orders. Due to travel-time variability, most shippers set schedules by adding a buffer to

average travel times. **Table 3** shows the percentage of inbound and outbound goods considered to be "time sensitive" by manufacturers and distributors.

Table 3. *Percentage of Shipments Considered Time Sensitive (DKS Associates et al., Freight Users/Shippers Logistics Interviews Interstate 5 Corridor Summary Report, Oregon Department of Transportation, Region 1, June 1999).*

	Inbound		Outbound	
Percentage of shipments (%)	Manufacturers (%)	Distributors (%)	Manufacturers (%)	Distributors (%)
>74	38	10	50	37
50 – 74	23	10	12	18
1 – 49	23	50	23	27
0	16	30	15	18

From a geographic perspective, one of the most problematic regional freight movements is currently from high-tech firms in Washington County (Oregon) to Portland International Airport for time-sensitive deliveries. Because commuter traffic in this corridor is also a major problem, it is possible that future regional growth in the high-tech sector is likely to be deflected to east Multnomah County and Clark County, which now enjoy relatively good access to the airport. From the perspective of this study, it is important to note that most of the developable industrial land in the region is currently in Clark County at locations that are critically dependent upon the smooth functioning of I-5 (e.g., the Port of Vancouver, Ridgefield).

3.2.5 Accessibility

Accessibility is defined by the U.S. Department of Transportation as "the relative ease by which the locations of activities, such as work, shopping, health care, and recreation, can be reached from another location." Transportation increases the value of goods by moving them to locations where they are worth more, and by allowing people to commute to places of employment where their time has higher value.

The construction of I-5 and later I-205 added significant transportation capacity to the region, which led to substantial residential and employment growth in Oregon and Washington because of increased access (via reduced travel times) to the rest of the region and beyond. On the employment side, this growth included the expansion of existing companies and the attraction of new businesses. More recently, the effects of these accessibility changes have been more pronounced in southwest Washington where the incremental change in transport infrastructure was greatest and there was a relative abundance of cheap, developable land on the urban fringe.

Over time, regional growth has occurred to a point where much of the initial increase in accessibility for residences and businesses has dissipated. Increasing congestion in the I-5 corridor in particular threatens to jeopardize the long-term integration of a bi-state re-

gional economy. If nothing is done to mitigate growing congestion, residences and businesses will face reduced choices as congestion reduces the ease of access to both a bi-state labor force and to bi-state employment opportunities.

To promote economic development generally, the Portland/Vancouver region has proactively developed centrally located industrial and office enclaves with good highway access. If these sites are no longer attractive to prospective businesses, few alternative sites will be available in the region and firms may have to go elsewhere. Congested conditions on I-5 may play a role in this process.

Port of Vancouver. The Port of Vancouver currently holds approximately 700 acres of developable industrially zoned land. Although a future tenant list has not been developed, the area is expected to serve 6,000 employees. About 300 acres of this land is expected to be marine terminal related, such as bulk, break bulk, and warehousing operations. The remaining acreage has rail and truck access and is expected to house heavy and light industry, preferably related to marine activities. The Port would also welcome campus-type developments (e.g., Nike, Intel); one high-tech tenant (MKA) already operates from Port properties. Because I-5 provides primary vehicular access via Mill Plain Boulevard and 26th Street, traffic congestion could negatively impact the development potential of these properties.

Downtown Vancouver. The City of Vancouver is currently in Phase I of implementing its downtown redevelopment plan, which covers eight city blocks. Phase I consists primarily of large office buildings and some mixed uses, while Phases II and III will provide supporting, primarily retail uses, for a total construction value of $600 million to $800 million. While construction of Phase I is financed and underway, leasing will not begin in earnest until 2000. In addition, programming of Phases II and III properties is pending and will be contingent upon the success of Phase I projects. Because all properties will rely on I-5 for primary regional access, congestion could impact the marketability of sites in this emerging regional center.

I-5 truck traffic

Columbia Corridor/Rivergate. The Columbia Corridor/Rivergate employment center is the location of a substantial portion of transportation-related employment. The area contains two marine terminal complexes (a third is being planned) and is home to the region's only international container terminal. Port of Portland properties have access to two national freight rail carriers, and over 90% of the corridor's reload facilities are located here. The region's major air-freight facility is also located here along with related land side cargo distribution facilities. This area contains a substantial amount of warehouse distribution space that supports retail and wholesale operations throughout the region and several truck freight companies that handle regional and interstate freight movement. The area is also the location of nearly 2,000 acres of vacant land that is planned for future industrial

development. Most of these properties rely on I-5 and I-205 for their primary regional vehicular access and would therefore be negatively impacted by growing congestion on these facilities.

3.2.6 Livability

Livability is a word that is often used to represent a host of factors that collectively describe a "good" place to live. The definition of livability varies from person to person and often includes concepts such as safe neighborhoods, access to jobs and recreation, clean environment, good schools, a strong economy, affordable housing, and moderate cost of living. In the Portland region, livability appears as a goal, explicitly and implicitly, in most local and regional planning documents.

In the context of this report, livability is important for its role in attracting and retaining a skilled labor force. Business location decision-makers increasingly rank quality of life and proximity to a highly skilled labor force high on the list of critical factors needed to attract firms. These two factors are highly correlated, as rising incomes are associated with an increased ability to locate in areas that have a high quality of life, or are "livable." Importantly, the Portland Development Commission and the Columbia River Economic Development Council, two regional agencies charged with business recruitment, have made the attraction of high-wage jobs an explicit goal.

A large percentage of congestion costs are passed on to employees who face increasingly longer and less reliable commutes, and have less time for leisure or other activities. In congested areas, these costs are substantial, and include:

- General aggravation and stress, reducing worker productivity.
- The inability of some workers to work a traditional 9 to 5 schedule. While some workers may prefer to work non-traditional hours to avoid congestion or for personal reasons, many workers prefer normal working hours to make personal schedules align with those of family (other workers, school-age children) and friends.
- Tardiness and work rescheduling.
- For workers traveling on the job, increased pressure to complete tasks within schedule.

If congestion becomes a chronic problem, residents may relocate to keep the amount of time allocated for travel at a stable level. Relocations may occur within the region or to other regions where reduced congestion and other factors combine to provide a better overall quality of life. Many labor economists have noted, for instance, that the recent migration of workers from southern California to Portland, Denver, Las Vegas, and Phoenix, can be largely explained by a downturn in the regional economy coupled with terrible traffic and environmental problems.

At the same time, every few years a new city or region becomes "hot" for business growth. While most entrenched companies may be less inclined to leave a region due to strong ties to other local businesses and existing customers, over time a pronounced ex-

odus of workers to other regions will lead newly emerging or expanding firms to those other regions as firms chase workers. This has probably happened to a certain extent in Portland with the emergence of the Silicon Forest, and with respect to the high-tech sector, is beginning to play out in other regions (e.g., the research triangle in North Carolina) as well. Thus, business dislocation may not be caused primarily by existing firms leaving an area but rather may be led by dislocated residential growth. In this light, traffic congestion creates considerable costs when measured by quality of life factors, the productivity of capital (e.g., excessive relocation costs), land-use impacts and environmental quality.

3.3 Social and Economic Impacts

The I-5 Trade Corridor functions within a planning environment in which public policy seeks to create both a vibrant urban form and a dynamic business environment. State and local policies and plans that were developed over the last 30 years overlap and compliment each other. I-5 Trade Corridor transportation projects will help the region meet many of these planning goals, some of which are described below. Following each goal is a brief statement of why it is important and how the goal can be met.

(1) **Accommodate the growth of the region within a compact urban form (reduce sprawl).** All local plans support the creation of a compact urban form that focuses growth in areas where there is already urban development and public facilities. The result is a more efficient use of existing public investment and infrastructure. I-5 improvement projects would support the continued development of employment centers in the I-5 Trade Corridor area by maintaining the accessibility of undeveloped sites.

(2) **Support continued development in designated mixed-use urban centers.** Continued development of mixed-use centers strengthens portions of the I-5 Trade Corridor such as Downtown Portland, the Lloyd Center District and Downtown Vancouver. In addition, new mixed-use centers are proposed along the future Interstate MAX light rail line and in existing transit corridors located both north and south of the Columbia River. I-5 Trade Corridor transportation projects in the corridor support the continued development of existing centers and the proposed redevelopment of mixed-use areas and meet the intent of this goal.

(3) **Help maintain current travel times between residential areas and employment centers to support access to jobs.** Many new jobs that are projected in the region are expected to locate within or near the I-5 Trade Corridor. I-5 Trade Corridor transportation projects help to maintain the level of accessibility for jobs and workers.

(4) **Create and maintain a regional transportation system for efficient movement of goods and for meeting the needs of the region's business and consumers.** The efficient distribution of goods by truck is necessary to meet the needs of both businesses and consumers in the region. Many truck freight companies are located in the I-5 Trade Corridor and must use I-5 for the delivery of goods to local businesses. The I-5

Trade Corridor transportation projects address a number of existing problems and improve truck freight movement both in and beyond the corridor.

(5) **Support access to inter-modal freight facilities in the corridor — truck/rail, marine/truck/rail and truck/air freight — for interregional and international trade.** Truck freight is a vital part of both the international and interregional trade systems. Truck freight is the primary method of delivering wholesale goods from Portland to its wholesale trade area, which covers much of Oregon and Washington. Truck freight also plays a major role in international trade. A substantial portion of the products being delivered to and shipped from marine and airfreight terminals move by truck.

3.4 Leadership Committee Findings

(1) Without improvements, future congestion in the I-5 corridor threatens the economic promise of the Portland/Vancouver region.

(a) Trade and freight movement on I-5 will be significantly more difficult as congestion moves into the mid-day period when the highest numbers of trucks are on the road.

(b) Traffic congestion will increase costs and uncertainty for businesses and will influence the willingness and ability of firms to continue to operate or expand at their current locations.

(c) The Portland/Vancouver region's ability to profit from the timely delivery of high-value or time-sensitive goods to national and international markets will be affected. Even a few pennies more in transportation costs can make the high volumes of wheat, wood, and scrap metal moving through the region non-competitive in the global market.

(d) The lack of accessibility in the I-5 Trade Corridor will adversely impact the ability to attract future jobs to areas such as the Columbia Corridor and central Vancouver.

(2) Maintaining mobility in the I-5 Trade Corridor is key to supporting quality of life in the Portland/Vancouver region.

(a) Regional land-use plans depend on movement between Portland and Vancouver. A significant portion of the labor market for Oregon jobs is located in Vancouver. Almost 50,000 Clark County residents are employed in Oregon and commute to work. Retaining access for commuters is important to support employment growth in Oregon.

(b) Increased spillover traffic from I-5 on parallel arterials such as Martin Luther King, Jr. Boulevard, and Interstate Avenue will adversely impact neighborhoods and will diminish the opportunities for more neighborhood business development in these areas.

(c) Increased congestion on arterial roads through the industrial corridor leading to and from I-5 will dampen the region's ability to meet its job growth goals in the north Portland and Vancouver industrial areas.

(d) Traffic avoiding congestion on I-5 is overloading I-205, which limits opportunities for continued growth in the I-205 corridor.

(e) Congestion at the Interstate Bridge threatens development in Downtown Vancouver. Such development is critical to increasing employment in Clark County and therefore reducing demand for commuting trips to Oregon.

4 Needed Improvements

4.1 Improvement Scenarios

To answer the Policy Committee charge, the Leadership Committee developed seven improvement scenarios. The scenarios were analyzed by the technical team to evaluate their respective transportation and economic impacts, costs, and constraints.

The scenarios collectively comprise a multi-modal approach to address congestion and facilitate freight movement in the I-5 corridor. Some scenarios focus on highway improvements while other scenarios emphasize improvements to freight arterials and/or transit improvements. Some scenarios include all of the elements (highway, freight, and transit).

Fig. 4 on page 27 gives an overview of the scenarios and illustrates how different transportation modes could build upon each other to reduce congestion in the I-5 corridor. The following sections describe these scenarios in more detail and how they build upon each other.

4.1.1 Highway Focus Scenarios

The Leadership Committee identified two broad sets of scenarios. The first set focuses on general highway components (i.e., projects). These scenarios would provide additional highway 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 will be addressed as well. Highway capacity scenarios are cumulative, meaning higher-ordered scenarios build upon, rather than replace, previously described scenarios (**Fig. 5**).

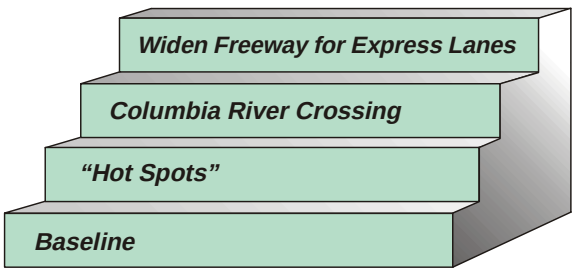


Fig. 5. *Highway Focus.*

The Baseline Scenario considers only the existing transportation system plus projects in the study area that are already funded or highly likely to be funded. The "Hot Spots" Scenario consists of relieving bottlenecks along I-5 by adding one travel lane in each direction where there are currently only two lanes, along with planned arterial improvements. The Columbia River Crossing Scenario provides a new freeway bridge across the Columbia River, leaving the existing Interstate bridges in place for local traffic, freight, or transit uses. The Widen Freeway for Express Lanes Scenario includes additional capacity along I-5 including separated express travel lanes.

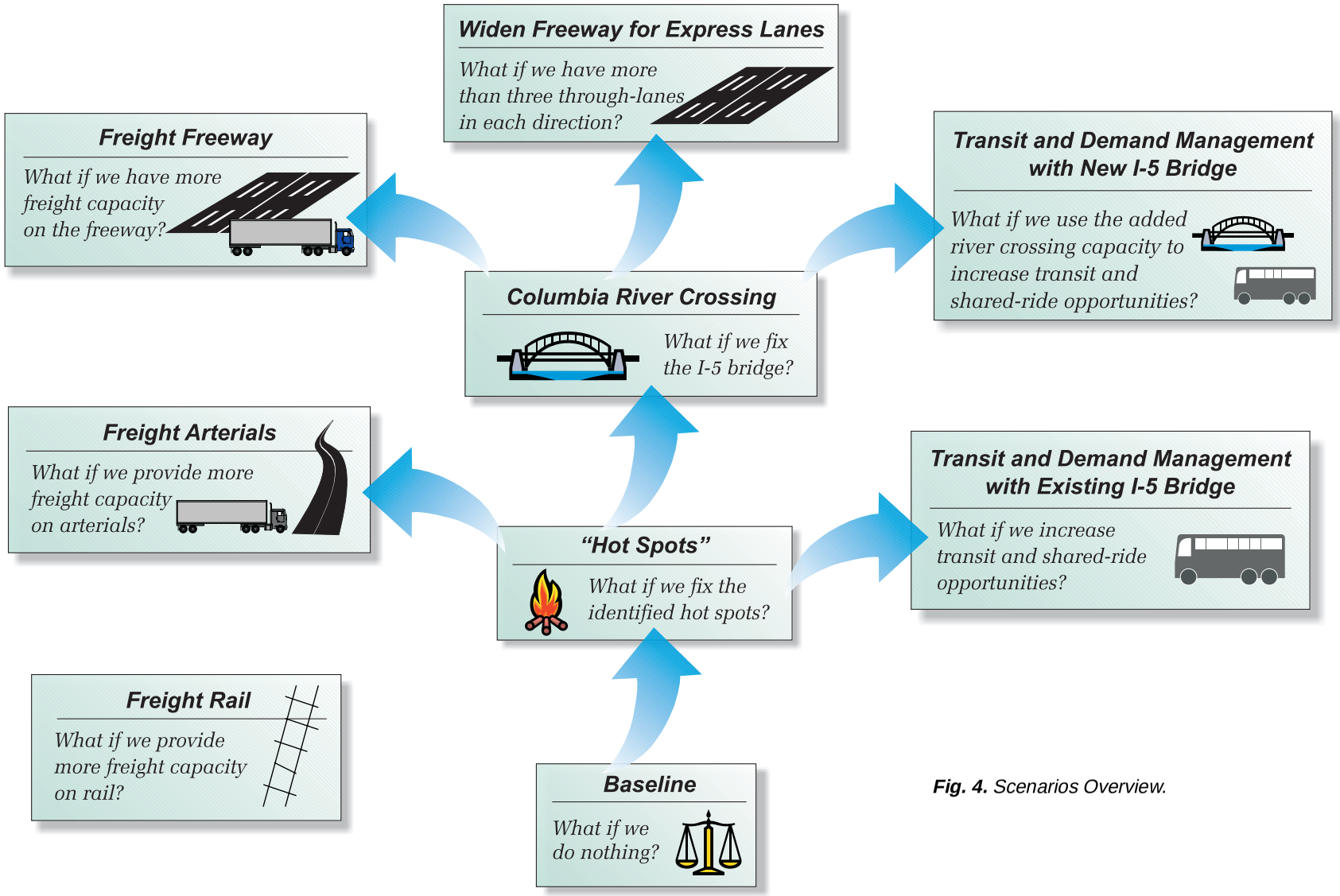


Fig. 4. *Scenarios Overview.*

4.1.2 Freight Focus Scenarios

A second set of scenarios that focuses specifically on facilitating freight movement was developed. As shown in **Fig. 6**, these scenarios do not build on each other. Some of these scenarios may include (build upon) the highway capacity scenarios.

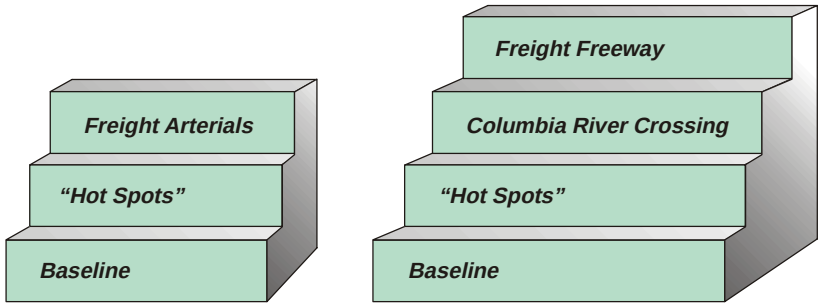


Fig. 6. *Freight Focus.*

The Freight Arterial Scenario features a new arterial roadway and bridge crossing the Columbia River across West Hayden Island, linking North Portland Road and Marine Drive to Mill Plain in Vancouver. A new interchange would be built at Hayden Island, enabling closure of the existing I-5 interchange. The new arterial roadway/bridge would be free for all freight and commercial traffic, but general purpose traffic not entering or exiting at Hayden Island would pay a toll.

The Freight Freeway Scenario adds facilities to improve truck access between Marine Drive and I-5 to and from the north. Under this scenario, the Hayden Island interchange would be removed and a new, four-lane, general-purpose arterial linking Marine Drive and Hayden Island would be built west of the existing Interstate bridges.

4.1.3 Transit and Demand Management Focus Scenarios

The Leadership Committee developed two scenarios that focus on improving transit and implementing policy changes to reduce demand in the corridor (**Fig. 7**).

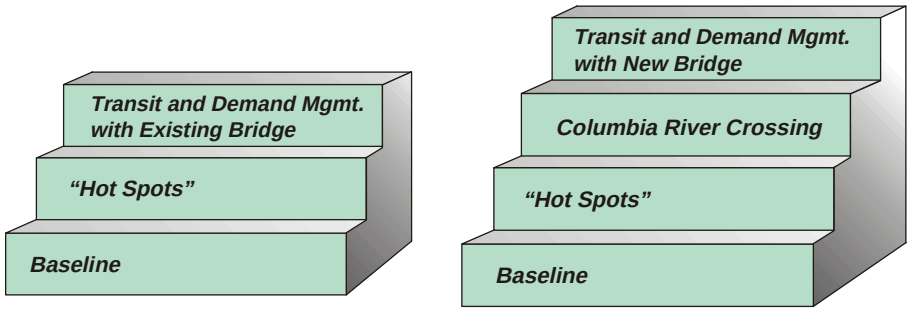


Fig. 7. *Transit and Demand Management with Existing Bridge and Transit and Demand Management with New Bridge Scenarios.*

The Transit and Demand Management with Existing Bridge Scenario was intended to test an aggressive transit scenario that did not include new highway capacity across the river. The scenario included a light rail system in Vancouver that would connect with the planned Interstate MAX light rail line in Oregon. The committee chose to use light rail in this scenario because it is difficult for transit to be competitive in a congested corridor without an exclusive right of way. Buses, even express buses, are delayed by the same congestion as passenger vehicles, and there is no time-travel savings.

The Transit and Demand Management with Existing Bridge Scenario included two demand management elements, an increase in the cost of parking at selected locations and a shift of 25,000 future jobs from Oregon to Washington. Both of these demand management elements could be challenging to implement. In the case of the job shift, the intention was to test the effectiveness of land-use and other policies to stimulate job growth in Washington. This is an aggressive assumption and would require significant changes in areas that public policy does not usually influence.

The second transit scenario was built on a Columbia River crossing and included a light rail system in Vancouver that would connect to the planned Interstate MAX light rail line in Oregon. This scenario also included the shift of 25,000 future jobs from Oregon to Washington. Due to increased capacity with a new Columbia River crossing, this scenario included a high occupancy vehicle (HOV) lane from 134th Street in Washington to Going Street in Oregon.

4.1.4 Freight Rail

The committee did not develop a detailed Freight Rail Scenario because of the difficulty of analyzing freight rail operations. However, the committee did identify several improvement scenarios that will be developed further in Task 2:

- expanded Columbia River crossing capacity
- rail sidings
- new rail connections
- modifying the existing rail bridge to reduce the number of openings of the Interstate Bridge

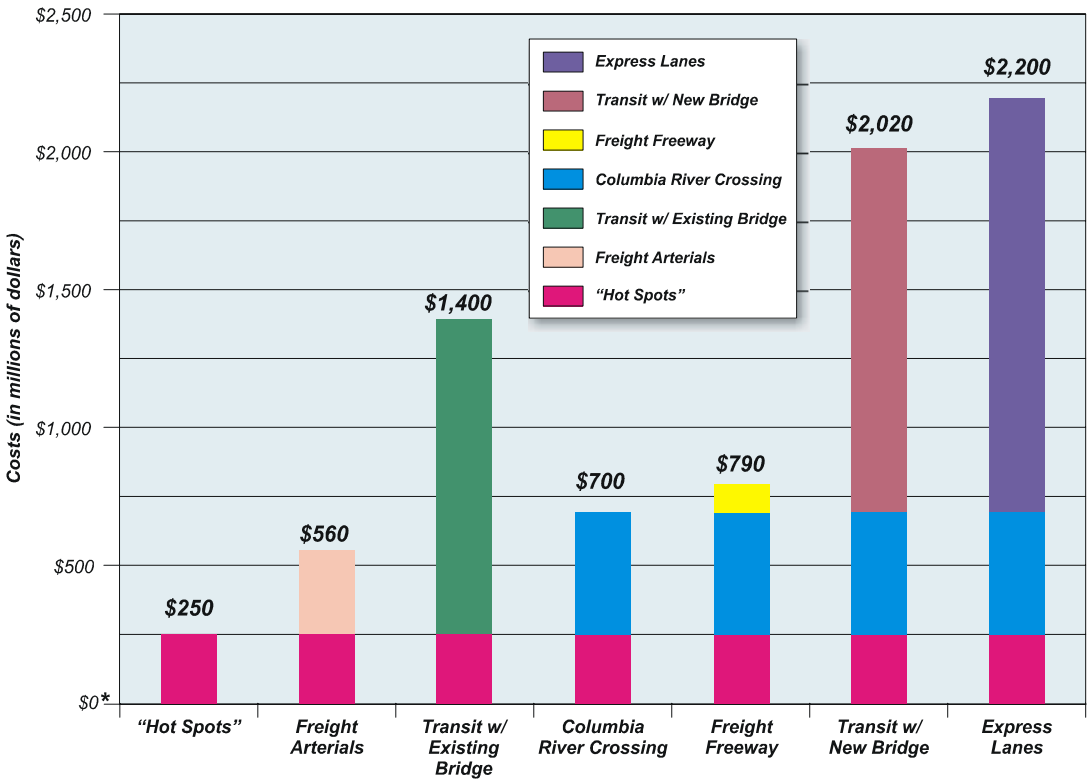
Further development of this scenario will require considerable involvement on the part of private rail operators. This scenario will be developed and analyzed further in Phase II.

4.1.5 Summary of Scenarios

The scenarios described in this report can be organized as shown in **Fig. 8**. The scenarios and their modal elements are described in **Fig. 9** on page 30a.

Fig. 8. *Three Groups of Scenarios.*

Fig. 10 shows estimated capital costs for each of the scenarios. Costs are conceptual estimates and are intended to show primarily the different investment options at this early stage of the planning process. These costs will be refined further during subsequent phases of the study.



**Costs do not include costs of the Baseline Scenario and Planned Improvements.*

Fig. 10. *Estimated Capital Costs for Each of the Scenarios.*

Some components of scenarios are projects under development by local transportation agencies and jurisdictions. For these projects, costs developed by the responsible agency were used. Costs for scenario components developed for this study were based on actual costs for recently completed similar projects. Since the concepts for these scenarios are at a very early stage of design, contingencies have been added to the estimates to account for unknowns. All costs are in 1999 dollars

4.2 Transportation Performance of Alternative Scenarios

The alternative scenarios were analyzed to compare their performance using five key measures. These measures reflect important goals for the community and are:

- **I-5 mainline operations, with emphasis on the Columbia River crossings:** I-5 operations give a sense of future congestion on Interstate 5. Traffic congestion on I-5 could affect the future growth of jobs and housing in Clark County, which will in turn affect jobs and housing growth in Oregon.
- **Impacts to travel demand on I-205:** As the other crossing of the Columbia River, the future of I-205 is inextricably linked with I-5. Traffic diverting from I-5 will increasingly cause traffic problems on I-205. This will affect the potential for growth in the I-205 corridor and compromise the region's major bypass route.
- **Arterial roadway operations:** Arterial streets provide the life-blood for communities and neighborhoods. Arterial street congestion can affect local business growth and lead to more traffic on neighborhood streets.
- **Transit ridership demand:** Since even the most extensive improvements will not be able to accommodate all travelers in cars, it is critical to increase transit ridership in this corridor.
- **System-wide measures such as vehicle miles traveled and hours of delay:** This region has established aggressive goals for reducing vehicle miles traveled. Hours of delay give a sense of how the regional transportation system will perform in the future.

The Leadership Committee used Metro's travel demand models to forecast year 2020 automobile and truck traffic demand and commodity flows for each of the scenarios. The models forecast weekday trips for three peak periods: morning, mid-day, and evening. The models projected the number of automobile trips, medium-sized truck trips, and heavy-sized truck trips on the roadway network. For further information on this topic, see the technical memorandum, "Transportation Assessment of Alternative Scenarios."

It should be noted that the models used for this analysis have two significant limitations. First, they use a fixed land-use forecast that is not able to account for changes in demand that would occur with changing land-use patterns, and second, they use a fixed forecast for commodities that does not account for large-scale changes in the regional economy. The models are intended to help with the comparison of scenarios, not to predict the fu-

ture. For further information on this topic, see the technical memorandum, "2020 Baseline Conditions."

4.2.1 I-5 Operations

Travel Demand. As shown in **Fig. 11**, year 2020 evening peak-hour travel demand at the Interstate Bridge would be fully served under only two scenarios: (1) Widen Freeway for Express Lanes and (2) Transit and Demand Management with New Bridge. For all of the other alternative scenarios, evening peak-period travel demand would not be completely served, resulting in congestion and queuing along I-5 for several hours each evening and requiring many motorists to travel before or after the two-hour period, thereby causing "peak spreading."

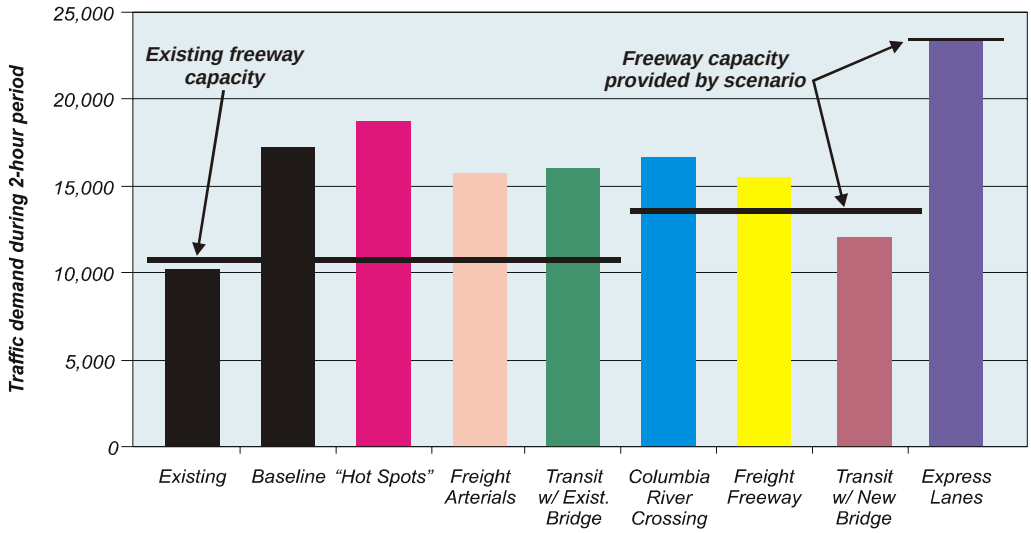
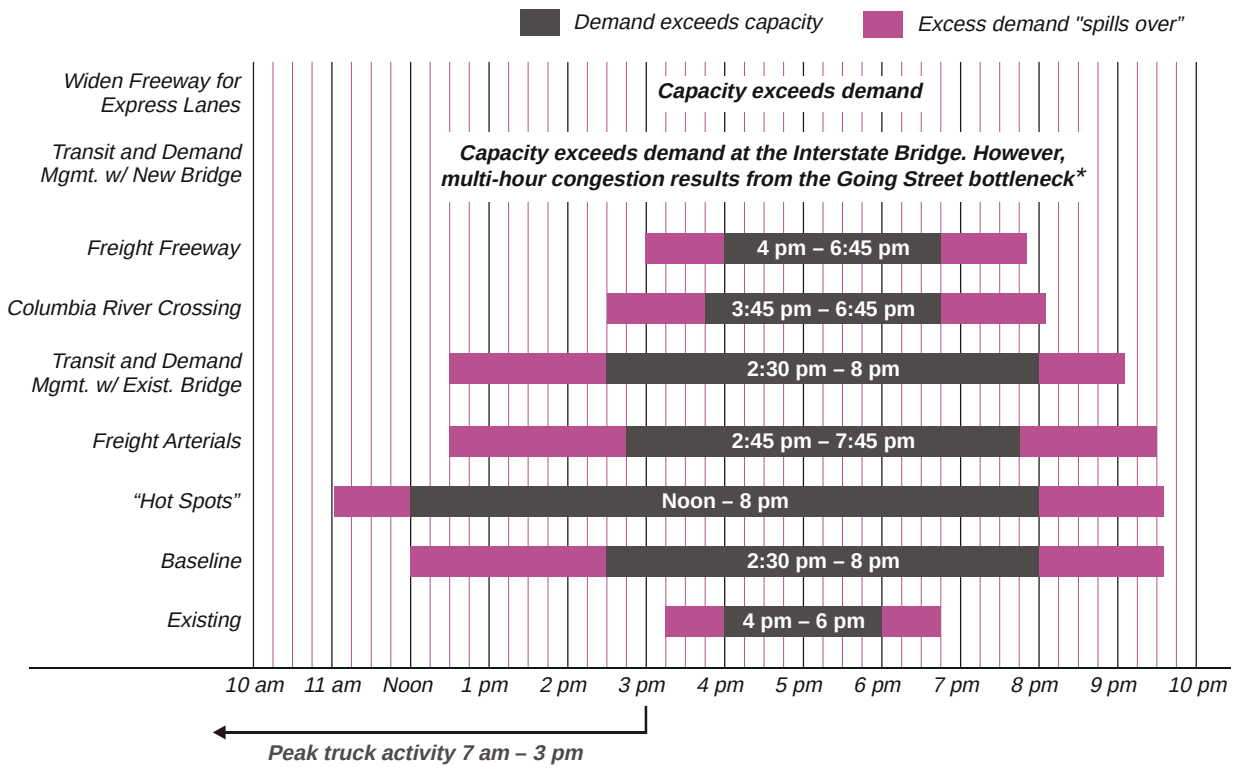


Fig. 11. *Projected Evening Peak-Period Vehicle Demands, I-5 at Columbia River, for Year 2020. Comparisons are based on Metro emme/2 results.*

Fig. 12 illustrates the concept of evening "peak spreading" at the Interstate Bridge for each alternative scenario. The black portion within each horizontal bar signifies the portion of time when northbound travel demand would theoretically exceed the bridge's available capacity. The red portion of each bar denotes the periods during which excess demand would "spill" (i.e., be served). Therefore, again theoretically, over-capacity conditions would occur throughout these periods, and in some cases for over ten hours. Of course, such extreme congestion is unlikely to actually occur because many motorists would find it intolerable and would take other actions to avoid the delays, e.g., decide to work and/or live elsewhere, commute by transit or telecommute, etc. Still, the extension of peak periods would significantly interfere with periods of high truck activity throughout the study area, as shown in **Fig. 12**.



*The "Going Street bottleneck" is caused by the reduction of one general-purpose lane to provide an HOV lane at Going Street. This problem will be analyzed in more detail in Task 2.

Fig. 12. *Projected Afternoon "Peak Spreading" at the Interstate Bridge for Year 2020.*

In 2020, almost 500 trucks per hour would travel northbound over the bridge during the evening peak period under the Baseline Scenario. However, almost 800 trucks per hour would travel northbound during the mid-day period (2 to 3 pm). Thus, as the peak period spreads, freight mobility becomes increasingly impacted.

Under the Baseline Scenario, afternoon queues for northbound traffic would extend from the Interstate Bridge over six miles south to beyond I-84. Substantial morning queuing would also occur, with the capacity constraints at the Interstate Bridge influencing traffic operations as far north as I-205. As shown in **Fig. 12**, the duration of the peak would be slightly lengthened under the "Hot Spots" Scenario. Improvements to I-5 through north Portland would attract more vehicles to the highway, but the "Hot Spots" Scenario does not include any changes in the capacity of the Interstate Bridge. As a result, congestion and queuing at the bridge could be expected to worsen.

Some relief from the projected queuing would be obtained by the Freight Arterials and the Transit and Demand Management with Existing Bridge Scenarios. Although neither scenario would add highway river crossing capacity, both would reduce the demand for travel on I-5. The Freight Arterials Scenario would shift about 6,000 vehicles in the peak period to the new bridge across the Columbia at West Hayden Island and move Hayden Island access to the arterial bridge. Both of those scenarios would improve highway operations directly. The Transit and Demand Management with Existing Bridge Scenario would

Morning southbound traffic in Vancouver

also reduce cross-river commuting by shifting a large number of future jobs to Clark County and by encouraging the use of transit for the remaining interstate trips.

The new bridge capacity included in the Columbia River Crossing and Freight Freeway Scenarios would reduce queuing caused by congestion at the Interstate Bridge by about 40% compared to the Baseline Scenario. However, the highway would still operate over capacity for about three hours every day, which could potentially impact traffic for up to six hours per day due to the anticipated "peak spreading."

Two of the scenarios would potentially fully address afternoon peak-period congestion. The Widen Freeway for Express Lanes Scenario, which includes reversible express lanes and light rail service to Clark County, is projected to provide sufficient capacity to meet travel demand in the corridor. The Transit and Demand Management with New Bridge Scenario would address travel demand both by providing more capacity (highway lanes and transit service) and encouraging job shifting to Clark County.

Highway Travel Times. The demand management and capacity enhancements in the corridor would also improve travel times on the highway. Today it takes almost 27 minutes to travel along I-5 between I-84 and I-205 during the evening peak period. As shown in **Fig. 13**, in the year 2020 under the Baseline Scenario, this travel time would increase to almost 45 minutes. All of the other scenarios would reduce travel times, with the Widen Freeway for Express Lanes Scenario actually decreasing the time to less than it is today (24 minutes). The "Hot Spots" and Freight Arterials Scenarios would have the second

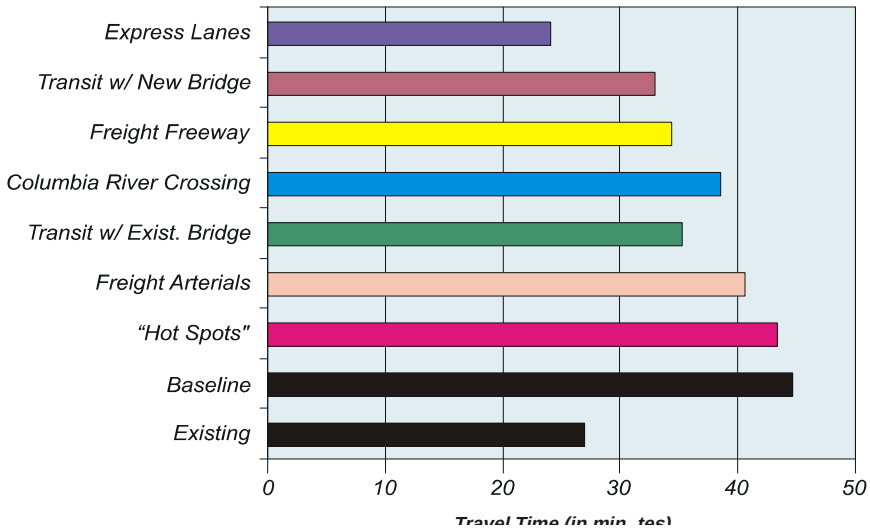


Fig. 13. *Projected Evening Peak-Period Travel Time, Northbound I-5: I-84 to I-205, for Year 2020. Comparisons are based on Metro emme/2 results.*

and third highest travel times, respectively. Similar travel time trends would occur between I-205 and I-84 during the morning peak period

4.2.2 I-205 Travel Demand

Each scenario would result in different travel demand along I-205. As illustrated in **Fig. 14**, under the Baseline and "Hot Spots" Scenarios, future northbound travel demand may not be served by the Glenn Jackson Bridge, resulting in congestion during the evening peak period along this interstate corridor. Travel demand associated with several other scenarios could also approach or exceed I-205's capacity. **Fig. 14** shows the effect that additional capacity in the I-5 corridor would have on travel demand in the I-205 corridor.

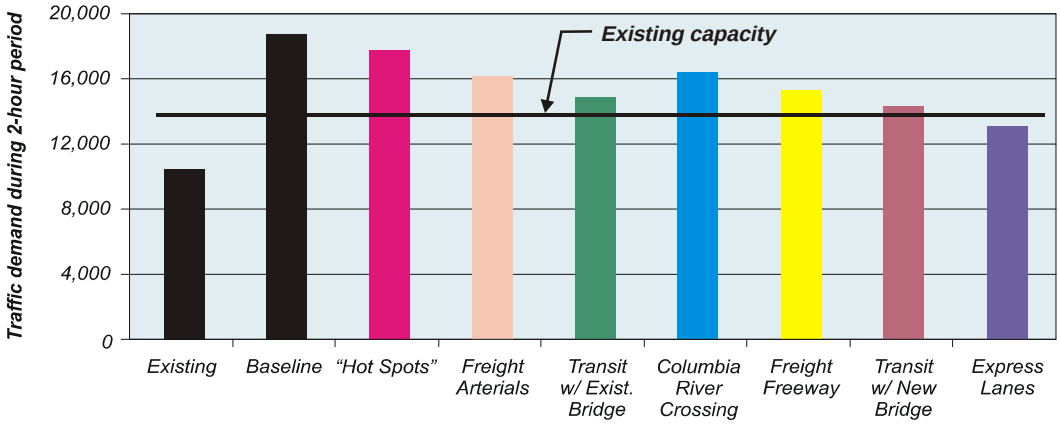


Fig. 14. *Projected Peak-Period Vehicle Demands, I-205 at Columbia River, for Year 2020. Comparisons are based on Metro emme/2 results.*

4.2.3 Arterial Operations

Compared to existing conditions, arterial roadway traffic volumes are projected to increase significantly under the Baseline Scenario. Within the study area, arterial traffic would more than double on segments of NE 134th Street, Martin Luther King, Jr. Boulevard, Marine Drive, and Lombard Street. Substantial increases would result along many other arterial roadways, too, as increased highway congestion would send long-distance trips to these roadways. Some of the key locations with significant increases in traffic would include Mill Plain Boulevard just to the west of I-5, Marine Drive west of I-5, and Denver Avenue at Columbia Boulevard.

Each of the other scenarios would impact arterial roadway volumes and traffic operations differently when contrasted to the Baseline Scenario. In general, the scenarios that provide increased capacity across the Columbia River would offer less disruptive conditions along major freight corridors; however, added capacity on I-5 would typically result in increased traffic volumes on arterials near major interchanges with the interstate.

In addition to the locations identified above that would show significant increases under the Baseline Scenario, the arterials most likely to experience major increases resulting from

Southbound on-ramp to I-5 at SR 14

capacity improvements on I-5 include Fourth Plain Boulevard west of I-5, Mill Plain east of I-5, and North Portland Road north of Columbia Boulevard. Reductions in arterial traffic volumes would typically be found on Marine Drive west of I-5, except for the Freight Arterials and Freight Freeway Scenarios, which would result in conditions similar to the Baseline Scenario on that segment of Marine Drive.

The two Transit and Demand Management Scenarios (with Existing Bridge and with New Bridge) would generally reduce most arterial roadway demand in Multnomah County, due primarily to the job shift to Clark County and the extensive expansion of light rail service. However, travel on Mill Plain and Fourth Plain Boulevards would increase somewhat, due to the increased commuting trips within Clark County.

4.2.4 Transit Ridership

Metro's travel demand models were used to compare projected peak-period transit ridership for each scenario across the Interstate Bridge and throughout the I-5 corridor. Transit ridership is the number of person-trips taken by bus and/or light rail. **Fig. 15** depicts the forecasted total peak-period transit ridership (peak morning two hours plus the peak evening two hours) for the scenarios.

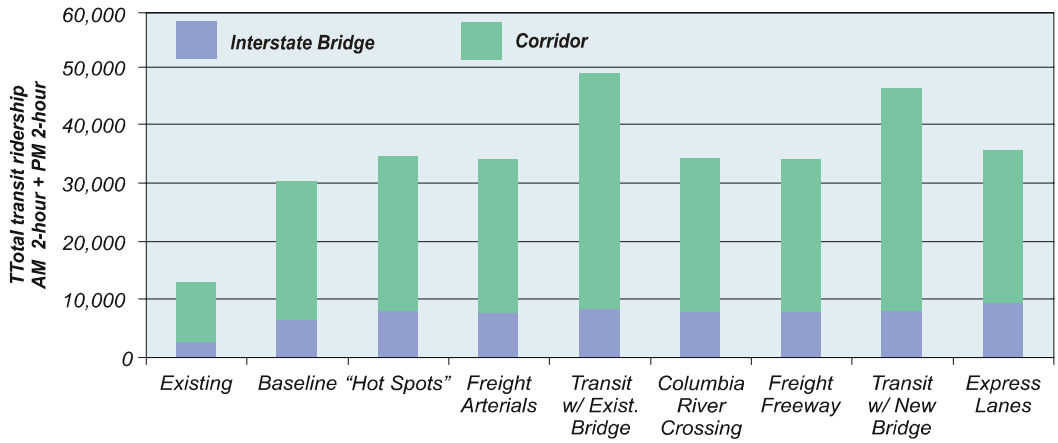


Fig. 15. *Projected Peak-Period Transit Ridership along I-5 and in the Corridor, for Year 2020. Comparisons are based on Metro emme/2 results.*

Under the Baseline Scenario, the number of peak-period (four hours) transit trips across the Interstate Bridge would increase from the current 2,700 to 6,500 by the year 2020, and throughout the corridor, from the current 13,000 to about 30,000 by the year 2020.

Under the "Hot Spots," Freight Arterials, Columbia River Crossing, and Freight Freeway Scenarios, over 34,000 peak-period transit trips would occur in the corridor, a 14% in-

MAX light rail

crease compared to the Baseline Scenario. The increase would be due primarily to the proposed MAX light rail extension from the Rose Quarter to the Expo Center and some additional congestion expected along I-5. About 7,900 peak-period transit trips are projected across the Interstate Bridge in 2020.

Although the Widen Freeway for Express Lanes Scenario would add substantial highway capacity, this scenario would result in higher transit ridership than the above scenarios due to the further extension of MAX light rail across the Columbia River to Clark College and the ability of express buses to travel faster within the express lanes. The scenario would result in almost 35,600 peak-period corridor transit trips, a 17% increase over the Baseline Scenario. Almost 9,300 peak-period transit trips would occur across the Interstate Bridge.

The Transit and Demand Management with Existing Bridge Scenario would result in the highest transit demand of all of the scenarios. This scenario would add extensive transit service in lieu of substantially increased highway capacity. It would extend the MAX light rail system beyond the Expo Center to 134th Street (via I-5) and to the Vancouver Mall (via SR 500), and add extensive feeder and local buses, as well as express buses. However, no substantial highway improvements beyond those in the "Hot Spots" Scenario would be included. The Transit and Demand Management with Existing Bridge Scenario would result in almost 49,000 peak-period corridor transit trips (a 61% increase over the Baseline Scenario) and 8,400 peak-period transit trips across the Interstate Bridge. Projected highway transit demand would be substantially lower if the employment shift from Multnomah County to Clark County is not assumed — that is, the job shift to Clark County would reduce the pool of potential transit riders in the corridor.

Finally, the Transit and Demand Management with New Bridge Scenario would result in the second highest transit demand of all the scenarios. This scenario would offer transit elements similar to the Transit and Demand Management with Existing Bridge Scenario but would add increased highway capacity and a new river crossing similar to that proposed in the Columbia River Crossing Scenario. Under the Transit and Demand Management with New Bridge Scenario, highway enhancements would decrease transit demand and result in nearly 46,200 peak-period corridor transit trips (a 52% increase over the Baseline Scenario), while over 8,100 peak-period transit trips would occur across the Interstate Bridge. Again, projected highway transit demand would be substantially lower if the employment shift from Multnomah County to Clark County is not assumed.

4.2.5 System-Wide Measures of Performance

This section discusses each scenario's performance from a system-wide perspective by looking at two measures of performance: (1) estimated vehicle hours of delay (VHD), which is the total number of hours of delay caused by congestion on the regional highway

network during peak periods, and (2) vehicle miles of travel (VMT), which is the total number of miles traveled by all vehicles on the roadway network during peak times.

VHD and VMT were determined for the scenarios during all three of the study peak periods using Metro's 2020 freight commodity travel demand models. Separate VHD and VMT estimates were developed for all vehicle classifications (including trucks) and for trucks only (medium and heavy trucks).

Projected evening peak-hour VHD for all scenarios is shown in **Fig. 16**. System-wide VHD is projected to grow at a much faster rate than the overall increase in VMT. As shown in **Fig. 16**, about 14,000 VHD could be expected in the corridor under the Baseline Scenario during the 2020 evening peak two-hour period, which is significantly higher than the existing (1999) condition of nearly 4,500 VHD and represents an increase of over 200%.

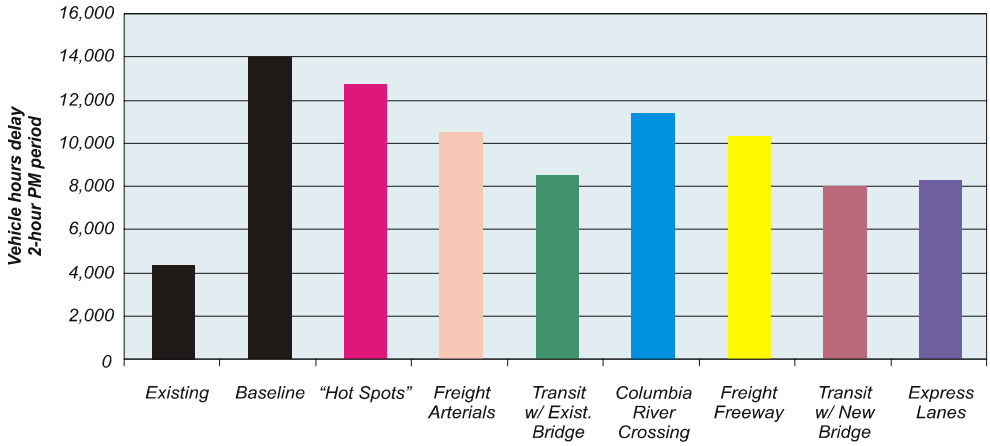


Fig. 16. *Projected Evening Peak-Period VHD in the I-5 Corridor for the Year 2020. Comparisons are based on Metro emme/2 results*

By comparison, VMT is expected to increase from today's 650,000 to 886,000 in 2020, a more than 35% increase (**Fig. 17**). The much greater proportional increase in VHD is symptomatic of an increasingly capacity-constrained transportation system.

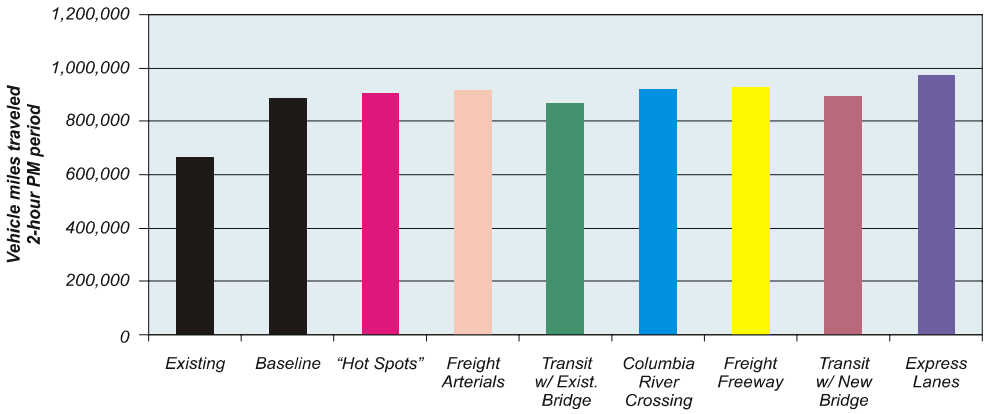


Fig. 17. *Projected Evening Peak-Period VMT in the I-5 Corridor for the Year 2020. Comparisons are based on Metro emme/2 results.*

Total VMT increases for all vehicles are projected to be highest during the evening peak period, both in the corridor and in the larger study area. Truck VHD is generally expected to increase at a substantially higher rate than all vehicle VHD for most of the alternative scenarios. Similarly, truck VMT is expected to increase at a faster pace than all vehicle VMT. These trends signify the projected increased number of freight trips and reliance upon the I-5 corridor by the year 2020.

To varying degrees, all scenarios would significantly reduce delay compared to the Baseline Scenario. Under the "Hot Spots" Scenario, 2020 evening peak-period VHD for all vehicles in the corridor would decrease by about 9% (6% decrease for trucks), due primarily to the removal of I-5's current bottlenecks. For the Freight Arterials Scenario, which builds on the "Hot Spots" Scenario by adding a parallel bridge and other arterial connections, peak-period VHD for all vehicles would decrease by 25% (33% for trucks).

The Columbia River Crossing Scenario would decrease peak-period VHD for all vehicles (and for trucks only) by 19% since substantial capacity would be added at the Interstate Bridge. The Freight Freeway Scenario would decrease VHD even more due to the interchange modifications at Columbia Boulevard and Marine Drive and the removal of the Hayden Island interchange. Peak-period VHD for all vehicles would decrease by 26% (33% for trucks).

The significant highway capacity obtained under the Widen Freeway for Express Lanes Scenario would reduce 2020 peak-period VHD for all vehicles in the corridor by 41% compared to the Baseline Scenario. The added capacity would reduce delays experienced by trucks by 48%, the greatest reduction of all of the alternative scenarios.

The Transit and Demand Management with Existing Bridge Scenario would result in almost the same VHD reductions as the Widen Freeway for Express Lanes Scenario. This Transit and Demand Management with Existing Bridge Scenario would reduce evening peak-period VHD by 39% for all vehicles (31% for trucks).

Finally, the Transit and Demand Management with New Bridge Scenario would result in the highest VHD reduction for all vehicles. It would reduce evening peak-period VHD by 43% in the corridor (38% for trucks). This substantial delay reduction would come from the added highway capacity and the reduced number of corridor vehicle-trips with an extended light rail system and long-distance commuting due to the job shift.

VMT would generally increase under each of the scenarios by as much as 4 to 5% for all vehicles, and 3 to 6% for trucks. A significant exception would be for the Transit and Demand Management with Existing Bridge Scenario, which is the only scenario that would reduce VMT (by 2%). The VMT reduction would result primarily from the shifting of jobs from Multnomah County to Clark County. Also, the additional highway capacity provided by the Widen Freeway for Express Lanes Scenario would allow more and longer trips, thereby increasing peak-period VMT by 10% for all vehicles.

4.3 Rail Scenario

Union Pacific Railroad

The committee met with the vice president of Burlington Northern and discussed the findings of a study conducted by the Southwest Washington Regional Transportation Council. The committee's brief analysis concluded:

- There is a potential rail-capacity problem in the corridor. The projected growth of passenger and freight rail in the corridor will eventually exceed the capacity of the Burlington Northern north-south mainline.
- Several sections of the rail line are not constructed for maximum capacity. These sections should be examined in more detail.
- The Columbia River rail bridge limits the capacity of the north-south mainline.

Due to a lack of staff resources, the committee was not able to address freight-rail congestion in depth. Phase II of this study will focus on freight-rail issues.

4.4 Economic and Social Benefits

Based on the transportation performance results discussed above, the alternative scenarios offer varying levels of potential economic benefits. This section describes some of the benefits and estimated costs of developing the scenarios (for a more detailed description of the estimated costs for developing specific projects in the scenarios, see the report, "Development of Alternative Scenarios"). The economic benefits were estimated by Cambridge Systematics using the REMI model (from Regional Economics Models, Inc.), which forecasts a wide range of regional economic indicators based on future traffic demand and commodity flows.

This section also presents a brief qualitative assessment of potential travel benefits in terms of their ability to achieve local and regional plans (**Section 3.3** describes the impacts of congestion on regional plans in more detail). Benefits are grouped under a number of broad objectives that are important to citizens of the region:

- supporting the regional economy and increasing trade
- reducing vehicle demand
- improving evening travel times
- supporting local and regional land-use plans
- considering capital costs
- evaluating capital cost effectiveness

Benefits related to these objectives are summarized in **Fig. 18** on page 40a (some are described in more detail in **Section 4.2** on transportation performance). **Fig. 18** was developed to allow a side-by-side comparison of the scenarios to help the Leadership Committee determine which elements should be advanced for further consideration. The objectives and the lessons learned from their applications are discussed below.

4.4.1 Supporting the Regional Economy and Increasing Trade

The performance of the I-5 corridor is important because of its critical role in the movement of goods. Improved travel times and safety for trucks and other vehicles used for business and trade enhance the Portland/Vancouver economy directly. Time spent delayed in traffic results in increased costs to businesses, while time saved results in increased profits, lower prices, and/or opportunities for increased sales.

The three scenarios that offer the greatest benefits to business as a result of saved travel time include an increase in capacity across the Columbia River and/or a reduction in vehicle trips due to demand management measures. These elements generate the greatest travel time and other economic benefits for businesses because these improvements make more efficient movement of goods in and out of the region possible.

The Transit and Demand Management with New Bridge Scenario would produce the greatest annual business savings due to travel time reductions and the largest increase in trade. The Widen Freeway for Express Lanes Scenario would produce the next greatest level of business savings followed by the Transit and Demand Management with Existing Bridge Scenario. In comparison, the "Hot Spots" Scenario would produce the least business savings and trade benefits.

4.4.2 Reducing Vehicle Demand

The Portland/Vancouver region is committed, as a matter of policy, to reduce its use and dependence on automobiles. Doing so will not only reduce congestion but also improve air quality and reduce impacts on residential neighborhoods. Potential reductions in vehicle use under the different scenarios are estimated using three indicators: the amount of transit ridership, the number of miles traveled daily in vehicles in the evening rush hour, and the amount of travel at mid-day (especially important to trucks, which often travel at mid-day to avoid congestion in the morning and evening commuting period).

Based on these indicators, the two scenarios that include balancing jobs on both sides of the Columbia River (the two Transit and Demand Management Scenarios) are especially effective. These scenarios reduce trips across the river, which generate congestion. However, implementing these scenarios could be very difficult. Unlike the other scenarios, balancing jobs requires affecting market conditions through public policy. The Transit and Demand Management with Existing Bridge Scenario actually reduces afternoon and mid-day miles of travel relative to the Baseline Scenario. The use of parking pricing on both the Oregon and Washington sides of the river, as well as the provision of additional transit service, further contribute to the reduction in vehicle demand in these scenarios. **Section 4.2** on transportation performance elaborates further

The Interstate Bridges

on the effects of the different scenarios on transit ridership and afternoon peak miles of travel.

4.4.3 Improving Evening Travel Times

The evening rush hour is typically the busiest hour of the travel day. By reducing travel times at this hour of the day, the local economy and the region's residents can realize significant economic benefits.

Based on three measures of travel delay (travel time, hours of delay for trucks, and hours of delay for cars), the Widen Freeway for Express Lanes Scenario offers the greatest travel time benefits during the evening rush hour for both trucks and commuters as a result of its increased highway capacity. Both of the Transit and Demand Management Scenarios also offer high levels of benefits in the form of reduced vehicle delay due primarily to increased transit ridership. **Section 4.2** on transportation performance results elaborates further on peak-hour travel times.

4.4.4 Supporting Local and Regional Plans

Local planning agencies have collaborated to produce noteworthy regional, local and neighborhood plans that focus on issues associated with livability and reduced reliance on automobiles. To consider the ways in which the I-5 scenarios would support local and regional plans, five locations were analyzed: (1) Downtown Vancouver, (2) the Columbia River industrial corridors, (3) north Portland neighborhoods, (4) Downtown Portland, and (5) the I-205 corridor.

The scenarios differed in benefits, with each producing benefits for different parts of the corridor, depending on, for example, whether the transportation benefits affect east-west or north-south travel. Scenarios that include a new bridge crossing of the Columbia River significantly reduce congestion in Downtown Vancouver. The exception to this is the Transit Demand Management with New Bridge Scenario, due to the conversion of one southbound general-purpose lane to an HOV lane south of the Columbia River. This scenario and the "Hot Spots" Scenario produce the greatest levels of congestion in Downtown Vancouver.

Travel times in industrial corridors do not vary substantially across the scenarios. The Freight Arterials Scenario, which provides a direct port-to-port connection and upgrades North Portland Road and Columbia Boulevard, offers the greatest reduction in travel time.

North Portland neighborhoods would realize the greatest reduction in cut-through traffic (–21%) under the Widen Freeway for Express Lanes Scenario, followed by the two Transit and Demand Management Scenarios. In comparison, the other scenarios do not appreciably reduce cut-through traffic; the "Hot Spots" Scenario, the next best performer, reduces local traffic by only approximately 5%.

The Widen Freeway for Express Lanes Scenario does the most to improve operations on the Glenn Jackson Bridge by bringing travel demand well below bridge capacity. The next best performing scenarios are the Transit and Demand Management with Existing Bridge and Transit and Demand Management with New Bridge. By causing a substantial gain in transit ridership, these scenarios free up some capacity in the I-5 corridor so that some travelers on I-205 can take more direct routes.

Quantitative estimates of queuing impacts on Downtown Portland (a measure of accessibility) are currently not available. The Widen Freeway for Express Lanes and Transit and Demand Management with Existing Bridge Scenarios, however, are likely to impact circulation on the downtown highway loop (I-5 and I-405) due to the express and HOV lane merge points at I-84 and Going Street. The other scenarios would not have this impact.

4.4.5 Considering Capital Costs

The transportation improvements considered during this phase of the study would have significant capital costs. New or improved interchanges, new bridge crossings, roadway widenings, and safety improvements vary in total cost. In addition, each of the scenarios combines different types of projects and travel modes, resulting in costs that vary from several hundred million dollars to over a billion dollars.

The "Hot Spots" Scenario is the least costly, since it does not include a new bridge or substantial capacity enhancements for any mode of travel. The most costly scenarios include a new Columbia River crossing and/or an extension of light rail into Clark County. The three most expensive scenarios, from most to least, are (1) Transit and Demand Management with New Bridge, (2) Widen Freeway for Express Lanes, and (3) Transit and Demand Management with Existing Bridge. Importantly, all costs are conceptual estimates that will be refined during the next phase of the study. The technical memorandum "Development of Alternative Scenarios" describes in more detail the individual projects that comprise the different scenarios and their associated costs.

4.4.6 Evaluating Cost Effectiveness

Cost effectiveness is a measure of how much each scenario benefits the region in comparison to the costs and is calculated by dividing total estimated benefits for each scenario by total construction costs. This analysis was conducted only to provide a preliminary comparison of the scenarios, and is not designed to determine project feasibility at this early stage in the planning process. This cost-effectiveness analysis considers only some of the more easily quantifiable costs and benefits. Certain benefits, such as those resulting from supporting local and regional plans (e.g., reduced neighborhood cut-through traffic, desired land-use changes), are difficult to measure in dollar terms and have not been estimated. This cost-effectiveness ratio considers only benefits due to reductions in traffic accidents, improvements in travel time for trucks and commuters, reduced vehicle operating costs, and increases in regional real disposable personal income. Similarly, the

C-Tran park and ride transit center

analysis does not include potential pollution (air, noise, and water) costs, short-term costs due to traffic disruption during project construction, potential impacts to environmental resources, and other costs. The only costs considered for this preliminary analysis are the aggregate long-term capital costs of construction of each scenario (it was not possible to perform a separate analysis for the individual projects comprising each scenario). Finally, all benefits and costs were analyzed using a 20-year planning horizon; some benefits and costs could have more lasting impacts. A more complete list of benefits and costs will be analyzed during the next phase of the study and cost effectiveness may be measured for the separate projects that comprise the scenarios. Until then, it is not possible to determine definitively which scenario performs best under this criterion.

The preliminary analysis indicates that of the seven scenarios, those that provide dedicated facilities to facilitate freight movement (the Freight Arterials Scenario and the Freight Freeway Scenario) performed especially well in terms of cost effectiveness. In addition, the "Hot Spots" Scenario proved especially cost-effective. Despite the relatively low benefits provided under this scenario, its low cost makes it the most cost effective of all the scenarios (this scenario is a building block in all the other scenarios as well). In comparison, the two Transit and Demand Management Scenarios, which offer high levels of benefits, are among the least cost effective due to the cost of building an extensive transit network in Clark County (the costs of these scenarios also do not include any potential costs needed to shift 25,000 future jobs to Vancouver). The next phase of the study will also consider scenarios with less expensive transit projects. Finally, the Widen Freeway for Express Lanes Scenario is the least cost-effective scenario due to the cost of widening the highway, although this scenario does provide substantial travel benefits.

4.5 Leadership Committee Findings

(1) Doing only the currently planned projects in the corridor is unacceptable.

   (a) Without additional transportation investments, congestion on I-5 and corridor arterials will greatly increase. This will dramatically affect access to important port and industrial property and access to jobs and housing in the bi-state region.

(2) The magnitude of the problem requires new freight and passenger capacity across the Columbia River.

   (a) Addressing congestion in the corridor will require addressing the bottleneck created by the existing Interstate Bridge.

(3) The complexity of the problem requires that the new capacity be multi-faceted.

(a) It should include highway, transit, rail, and demand management, while also supporting the vitality of the river-based economy.

(4) The region should maximize the capacity of the existing system.

(a) This can be accomplished by encouraging the Transit and Demand Management Scenarios, including transit, car-pooling, flex time, ramp metering, and incident response.

(5) The region's decision-makers should begin now to pursue a phased approach to addressing freight and passenger mobility in the I-5 Trade Corridor.

(a) The building blocks we recommend for further evaluation (not in order) should be:

(i) Improving bottlenecks and weaving problems on I-5 at:

(1) the Rose Quarter and Delta Park in Oregon

(2) Downtown Vancouver and 99^{th} to 134^{th} in Washington

(ii) Providing new highway and transit capacity across the Columbia River and in the I-5 corridor.

(iii) Improving critical freight arterials in the corridor such as Marine Drive and Columbia Boulevard.

(iv) Improving the freight rail system in the corridor, in cooperation with private operators of the rail system.

(b) The cost of individual improvements ranges from a few million dollars to several hundred million. Together the cost of these elements could exceed $1 billion. While this is a significant cost, not addressing the identified problems will have significant impacts on the region's economy and quality of life.

(6) Even with the above improvements, there will be a capacity problem.

(a) It is important for the future economic health of the region to look at other solutions, including:

(i) Managing additional demand through peak-hour pricing of new capacity.

(ii) Instituting measures that would promote transportation-efficient development, including a better balance of housing and jobs on both sides of the river.

(iii) Providing for further, longer term highway express or HOV lane capacity in the corridor.

5 Funding

As in many western states, Washington and Oregon's transportation needs far exceed available transportation revenues. Over the last 10 to 15 years, both Oregon and Washington have been blessed with a healthy and growing economy, which, combined with the livability of the Pacific Northwest area, have fueled unprecedented growth. The growth has created a demand and need for substantial improvements to the transportation system in order to maintain the mobility of freight and individuals. Unfortunately, the main sources of revenue supporting improvements to the transportation system (state gas taxes and vehicle registration fees) have not kept pace with inflation, let alone growing transportation needs. This problem is exacerbated by the need to maintain and preserve an aging transportation system.

5.1 Current Transportation Resources

Transportation in Oregon and Washington is generally funded by dedicated transportation user fees. In Oregon, of ODOT's $2 billion 1999-01 budget, 68% comes from state transportation revenue from gas taxes and vehicle registration fees, 31% from federal transportation funds, and 1% from state General Funds and lottery proceeds.

The Oregon State Highway Plan shows that investments totaling $29 billion should be made over the next 20 years to address highway needs. These investments would maintain and improve the condition of the state highway system and add highway capacity to address traffic congestion. The state and federal revenues that are projected to become available for state highways over the same period total $14 billion, leaving a $15 billion gap between needs and resources.

There is a proportionately larger gap at the regional level. While about $1 billion in state, federal and local revenues will become available over the next 20 years, high priority investments identified in the Regional Transportation Plan total almost $7 billion. A number of regionally significant projects outside the I-5 corridor cannot be financed today.

Like Oregon, Washington State's transportation system is funded through a system of transportation user fees. About 69% of WSDOT's 1999-01 budget comes from state transportation revenue with the balance coming from federal funds and other reimbursements. WSDOT does not receive any state General Funds or proceeds from the state lottery.

Both states are changing how transportation is taxed. Washington voters repealed the Motor Vehicle Excise Tax and replaced it with a $30 per year license fee (Initiative 695). WSDOT estimates that Initiative 695 will reduce transportation revenues by $4.2 billion over the next six years. Oregon voters will decide whether to replace Oregon's truck weight-mile tax with a diesel fuel tax and higher registration fees for heavy trucks. The replacements will not reduce support for Oregon's highways; the new tax system is designed to raise as much revenue as the weight-mile tax that it would replace.

The Washington Highway Plan finds the Washington state highway system in a similar financial condition. Prior to the passage of Initiative 695, needed investments outpaced revenues by about 2 to 1. The Metropolitan Transportation Plan for Clark County finds about $4 of needed investments for every dollar of projected revenue.

The transportation scenarios outlined in this report are estimated to cost from $250 million to $2 billion. None of the improvements beyond the Baseline Scenario is funded in existing regional transportation plans.

5.2 Financing Corridor Improvements

Given the limited transportation resources in both Oregon and Washington, it is unlikely that the major improvements that are needed in the I-5 Trade Corridor could be funded out of existing revenues. Despite this, there are several sources of financing that, when combined, could be used to fund improvements in the corridor.

5.3 Federal Assistance

The most likely source of federal funding for improvements in the I-5 Trade Corridor may be discretionary grants and Congressional earmarks. Most federal transportation money is allocated to the states by formula. The formula funds that come to both Oregon and Washington are generally dedicated to specific programs such as interstate maintenance, safety, and bridge rehabilitation. The federal funding that comes to the states and is uncommitted is distributed through each state's transportation capital plan and is generally distributed to projects throughout the two states. While it may be possible to fund some of the small- and medium-sized improvements needed in the corridor through the two states' regular capital plans, the scope of the improvements needed in the corridor and the competition for the funds makes this a relatively small source of funding.

Fremont Bridge

There are several federal discretionary programs authorized by Congress and administered by the U.S. Department of Transportation that could fund certain improvements in the corridor. These discretionary programs include the National Corridor Planning and Development (NCPD) Program, the Intelligent Transportation Systems Program, the Bridge Program, the Navigational Hazards Program, and the Section 3 Transit Program. The national competition for funding from each of these programs is intense. The federal discretionary bridge program provides an indicator of demand for funding. The program for federal fiscal 1999 was $109 million, including money allocated in 1998. FHWA received 66 applications totaling more than $1.1 billion. FHWA

funded 11 projects. These grants were in the range of $5 million to $11 million, with the largest ($30 million) going to strengthen the Golden Gate Bridge to withstand earthquakes.

In addition to the discretionary programs, when Congress reauthorizes the federal transportation act, now known as the Transportation Efficiency Act for the 21st Century (TEA-21), specific projects are often earmarked for funding. Some 1,850 highway projects were earmarked in TEA-21, accounting for $9.4 billion. The average amount earmarked for a highway project was about $5 million. TEA-21 also included approval for 108 major transit projects for federal funding and earmarked $2 billion for 51 projects, an average of $40 million per project (including $25 million for the South/North LRT project).

5.4 Tolling

Tolling is authorized by legislation in both Oregon and Washington and has historically been used to fund bridges and ferries. For example, a toll on the first Interstate Bridge financed construction of the second of the two Interstate Bridges between Portland and Vancouver. Currently, there are tolls on two bridges and one ferry across the Columbia River.

A toll on either the Interstate or Glenn Jackson bridges, or both, has the potential to raise a significant amount of new revenue. For instance, a $2 per car toll on I-5 is comparable in today's dollars to the toll that financed the Interstate Bridge construction in the 1950s. Such a toll could provide sufficient cash flow for bonds to finance construction of major projects in the transportation scenarios.

Federal policy supports tolling and market pricing of roads. TEA-21 authorizes tolls on interstate bridges to build replacement bridges or make other improvements and also on interstate highway segments as part of a pilot program.

State legislative review would be needed for specific proposals. Oregon statutes may need to be changed if a proposal uses toll revenues for a purpose beyond building a bridge. While toll projects are authorized in Washington, legislative approval of tollways is required from the state.

Highway user groups have opposed tolls in the past. The findings of the "Traffic Relief Options Study" (available from Metro) indicate that the public might be more accepting of tolls on new capacity-related facilities than they would be of tolls on existing roads and bridges.

5.5 Regional Taxes / Fees

While neither Oregon nor Washington has authorized region-wide transportation taxes in the four-county metro area, both states have authorized local taxes at the county and city level. The two local option transportation taxes/fees authorized in both states are gasoline taxes and auto registration fees. Multnomah County currently levies a three cent per gallon tax, and Washington County levies a one cent per gallon tax. Oregon has authorized a local option auto registration fee up to $15, subject to voter approval. Voters in the three Oregon metro counties rejected proposed fees in November 1996. Washington law authorizes a $15 local vehicle license fee. Washington's Initiative 695, which was recently passed, requires voter approval of all taxes and fees.

The tax structures are very different on either side of the river. Portland and Vancouver must work together to develop a consolidated approach to the solution.

– Anthony Ching

Table 4 shows how much money would be raised annually by local fees if they were approved region-wide.

Table 4. *Annual Estimated Revenue from Local Fees.*

Fee Type	Annual Estimated Revenue
$0.01 per gallon fuel tax	*$5 million to $7 million*
$1.00 per vehicle per year registration fee	*$1.4 million*

If local option taxes are used to finance the transportation scenarios, authorizing statutes may need to allow the revenue to be used outside the jurisdiction that imposes the fees.

5.6 General Revenues

General Funds comprise 36% of Oregon's $29.6 billion budget and 50% of Washington's $41 billion budget. Very little General Fund revenue in either state is allocated to transportation. Instead, both states have prioritized General Fund spending for services such as public education, human services, and public safety. Given the demand for General Funds, this prioritization is not likely to result in large amounts of new spending by either legislature on transportation projects, even in the I-5 Trade Corridor.

The region's ability to develop, finance, and implement a strategic multi-modal transportation plan for this corridor will be the key to maintaining the livability and economic vitality of our area.

– Wesley Hickey

5.7 Other Financing Mechanisms

The federal Transportation Infrastructure Finance and Innovation (TIFIA) is a federal credit program whose goal is to leverage

federal funds. TIFIA provides three forms of assistance: secured loans, loan guarantees, and standby lines of credit.

TIFIA may assist in structuring the financial aspects of projects in the transportation scenarios, provided a new source of revenue could be identified, but will not provide new resources.

Grant Anticipation Revenue Vehicles (GARVEE) is another form of federal credit that allows a state to issue bonds backed by the state's future federal highway apportionments. Like TIFIA, GARVEE bonds may assist in structuring the finances for projects but will not provide new resources.

5.8 Leadership Committee Findings

(1) Funding for major improvements in the I-5 Trade Corridor cannot be accomplished with existing resources.

  (a) The transportation needs in the Portland/Vancouver region far exceed available funding.

  (b) In the Portland metropolitan area, the Regional Transportation Plan identifies almost $7 billion in high priority needs over the next 20 years, yet only $1 billion in state, federal, regional, and local transportation revenue is available.

  (c) In Clark County, the Metropolitan Transportation Plan identifies approximately $2 billion in needs over the next 20 years, yet only $500 million in state, federal, regional and local transportation revenue is available. Ballot measures in both states have and could reduce available transportation measures even further.

(2) The region should advocate strongly for federal participation in funding improvements in the corridor.

  (a) The I-5 Trade Corridor is a critical link in this nation's freight movement network.

  (b) There is a national interest in ensuring that goods can continue to move through the corridor in an efficient and effective manner.

  (c) Therefore, the region should seek funding to the fullest extent possible from all appropriate federal highway, transit, and rail programs authorized by Congress.

(3) Assuming the current structure of public funding, tolling will be required to pay for a new Columbia River crossing and other corridor improvements.

  (a) Improvements in the I-5 Trade Corridor are likely to be costly, particularly if a new crossing of the Columbia River is pursued.

  (b) Funding for such bridges has historically been provided through tolls. This continues to be a viable means of financing such improvements.

(c) The region should consider tolls on other bi-state facilities if it is necessary to balance the traffic flow.

(4) Both states should make funding of infrastructure improvements in the corridor a priority.

(a) Trade activity in the corridor benefits all of Oregon and Washington. Both state legislatures need to recognize the importance of this corridor and consider allocation of transportation and general funds to fund improvements.

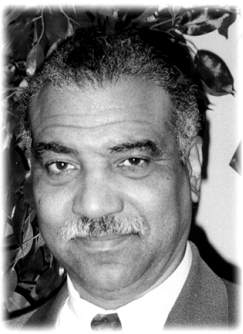
(5) Private financing should be sought where appropriate.

(a) There may be certain projects such as improvements to the freight rail system where funding should come primarily from the private sector.

(b) Further work will need to be done to identify specific freight rail needs in the corridor.

6 The Next Steps

This Freight Feasibility and Needs Assessment Study is the first step in a three-step process (**Fig. 19**). The goals of the process are to examine a range of potential options in the corridor, agree on a scenario for addressing the issues in the corridor, and prepare potential construction projects for environmental analysis and project development. This report concludes Task 1 of Phase I, which was to identify the magnitude of the problem and explore concepts for improving the corridor.



Our planning needs to continue to support a balance of jobs and housing — this transportation corridor is a critical piece of that puzzle.

– Carl Talton

Task 2 of the study will focus on developing a Strategic Plan to identify a long-range regional vision for improvements and management scenarios that will preserve the integrity of the corridor. Task 2 will include extensive public involvement on a range of issues including land-use and transportation impacts, environmental impacts, specific design of future improvements and possible funding scenarios. Task 2 is funded by a grant from the FHWA's Corridor and Border Infrastructure Planning Program.

Phase II of the project could involve project development and Environmental Impact Statements for specific improvements identified in Task 2. Phase II will be initiated after the completion of Task 2.

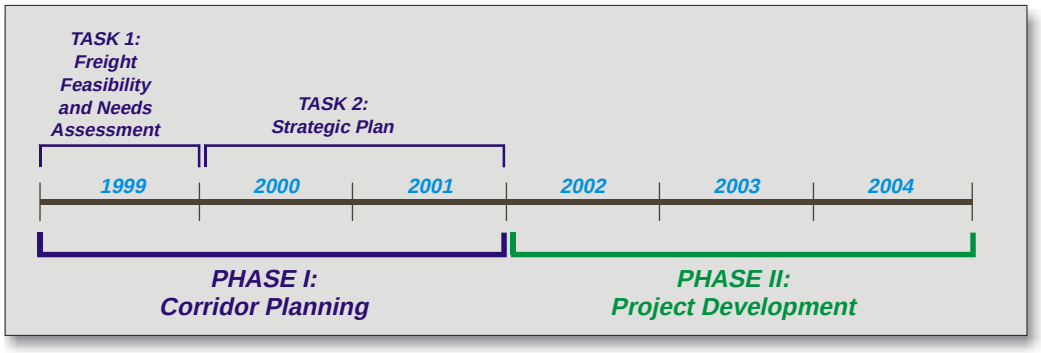


Fig. 19. *Process Timeline.*

6.1 Leadership Committee Findings

(1) The Portland/Vancouver region needs to develop a Strategic Plan for improvements in the I-5 Trade Corridor.

(a) The Leadership Committee has identified the need for a multi-faceted solution in the I-5 Trade Corridor including demand management techniques, and improvements to the highway, transit and rail system.

(b) The Strategic Plan should be developed with extensive citizen and resource agency participation in both states and needs to fully evaluate the environmental and social impacts of potential improvements.

(c) The specific improvements in the corridor and their phasing will need to be identified and formally accepted into the regional transportation plans in the Portland and Vancouver metropolitan areas.

(d) The Strategic Plan must take into account and be coordinated with regional economic development, transportation, and other relevant plans.

(2) The Strategic Plan should address several areas, including:

(a) Highway, transit and rail improvements in the corridor.

(b) Education and outreach about the critical nature of improvements in the corridor.

(c) Demand management techniques for the corridor.

(d) Local and regional land-use impacts of corridor improvements in each state.

(e) Environmental effects of corridor improvements.

(f) Public/private partnerships that may accelerate improvements in the corridor.

(g) A finance plan for corridor improvements.

(3) The region's local, state and federal officials must work together to advocate for improvements in the corridor.

(a) The problem and the solutions we have identified will require cooperation at all levels of government in both states to ensure that the I-5 Trade Corridor and the Columbia River crossing issue in particular is a priority for both states.

Appendix

Baseline Scenario and Planned Improvement Projects

Table A. *Transportation Projects Comprising the Baseline Scenario.*

Project	***Description***
Marine Drive improvements, Phase 1	*Widen Marine Drive between slough bridge and new bridge to five lanes*
South Rivergate overpass	*Separate rail and vehicular traffic at South Rivergate entrance*
Lower Albina RR crossing	*Auto crossing at Tillamook only; close six other street crossings*
Going Street overcrossing improvements	*Widen intersection and add additional eastbound lane on structure*
Airport Way widening	*Widen to six lanes adjacent to PIC (NE 82nd to I-205)*
47th Avenue roadway and intersection improvements	*Improvements (e.g., sidewalks, bike facilities) from Cornfoot to Columbia*
Airport Max	*Light rail extension from Gateway to PDX*
Marine Drive intersection improvements	*Modify three intersections in Bridgeton, near Marine Drive*
Broadway-Weidler, Phase 2 and Phase 3	*Main Street improvements from I-5 to NE 24th*
NE Alberta pedestrian improvements	*Streetscape improvements from MLK to NE 33rd*
Cascades/Airport Way interchange	*Construct a full interchange at Cascades (new road)*
Airport Way return/exit ramp improvements	*Improvements at entry/exit to terminals*
TEA-21 transit priority signal improvements	*MLK; Killingsworth; 82nd*
MLK@Columbia interim improvement	*Right turn westbound Columbia to MLK*
MLK Main Street improvements	*Phase 2 and Phase 3*
ODOT STP and RTC Metropolitan TIP	*Outside study area*
Expanded transit service	*Existing resources for service expansion*
NW 26th Street extension	*New road; Mill Plain to Port of Vancouver entrance*
Mill Plain extension	*Columbia Street to 26th Street extension; new road*
I-5 widening to three through-lanes	*Main Street to 99th*

Table B. *"Hot Spots" Planned Improvements.*

Project	Description
I-5/I-205 134th interchange	Interchange improvements, park-and-ride
Fruit Valley Road widening, from 34th Street to 78th Street	Roadway widening from 34th to 78th
SR500/St. John's Road intersection removal	Provide new urban style (single-point) interchange
SR500/42nd & Falk Road	Remove at-grade intersection and construct 42nd overpass
SR500/54th & Stapleton	Remove at-grade intersection and construct 54th overpass
4th Plain/Kyocera access	Improve intersection
6th Street RR overcrossing	Provide grade-separated crossing
T-4 Circulation overpass	Overpass between auto terminal landing and upper level
LRT Rose Quarter to Expo	Provide MAX extension along Interstate Avenue
North Lombard improvements	Improve roadway from Rivergate Blvd. to Slough bridge
Columbia Blvd./33rd intersection	Reconfigure interchange to better accommodate trucks
Alderwood Road widening	Widen roadway between 82nd and Cornfoot
Marine Drive improvements Phase 2	Road over rail between Nordstrom and Montgomery Ward; near T6
Columbia Blvd./Alderwood intersection	Widen and signalize intersection
Columbia Blvd./Lombard connector	Remove bridges and provide at-grade intersections with 82nd
Columbia Blvd./I-205 interchange	Provide capacity improvements to ramp intersections
I-205/Airport Way interchange	Modify to provide two-lane on-ramps and off-ramps
82nd/Airport Way overcrossing	Construct grade separated overcrossing
I-205 auxiliary lanes	Provide northbound auxiliary lane from I-84 to Columbia Boulevard
82nd/Alderwood improvement	Modify traffic signal and add right-turn lanes
Lombard: Rivergate-Ramsey	Widen Lombard 600 ft south of Rivergate to 1,320 ft north of Ramsey
Lombard: St. Johns-Columbia	Smooth curves on Lombard bridge and Columbia
Cornfoot Road extension: Alderwood-82nd	Extend roadway from Alderwood to 82nd Avenue
Argyle: MLK-14th Place	Extend Argyle westerly from 14th Place to MLK Jr. Blvd.
River Road extension	Extend River Road between Going Street and Albina RR crossing
11th-13th Avenue connection	Increase capacity of connection between Columbia and Lombard
Alderwood: 82nd-Clark	3-lane road extension
Cornfoot: 47th-Airtrans Way	Widen Cornfoot to three lanes from 47th to Airtrans Way
Marx Drive: 92nd-87th	Improve Marx Drive between 87th and 92nd
NE Marine Drive	Signalize 122nd intersection, reduce speed limit
Cornfoot Road intersection improvement	Provide channelization, construct new traffic signal at Airtrans
NE Columbia/Cornfoot Road connection	Construct two-lane slough crossing between 57th and 62nd
Alderwood Road/Cully realignment	Re-align Alderwood to line up with Cully at Columbia Boulevard
Marx Drive extension to Holman at NE 82nd	Extend roadway to 82nd Avenue
Ramsey Street extension	Extend street 350 ft to the east
Simmons Street extension	Extend street 750 ft south of Lombard
NRG Pacific Gateway Boulevard	New roadway from Marine Dr. to BNSF railroad
West Hayden Island Bridge	Construct vehicular bridge to West Hayden Island
Leadbetter Street extension	Extend Leadbetter to complete loop with Marine Drive
Transit and Demand Management Scenarios	TDM Scenarios to reduce vehicle trips
Intelligent Transportation Systems	Local and regional ITS applications