

MEETING TITLE: Task Force Meeting

DATE: January 23, 4:00 - 6:30 pm

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

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

| TIME | AGENDA ITEM | ACTION |
|-------------|--|-----------------------------|
| 4:00 – 4:15 | Welcome & Announcements Project Update | |
| 4:15 – 4:20 | November 29 Meeting Summary | Approval |
| 4:20 – 4:40 | Public Comment | Receive public comment |
| 4:40 – 4:55 | Progress Report on Open Houses and Outreach Activities | Presentation and Discussion |
| 4:55 – 5:45 | Staff Recommendation Discussion – Questions and Clarifications | Discussion |
| 5:45 – 6:25 | Economic Importance of the I-5 Corridor | Presentation and Discussion |
| 6:25 – 6:30 | Wrap Up and Next Steps | |
| | Next Meeting: February 27, 2007, 4:00 – 8:00 p.m. Oregon Department of Transportation 123 NW Flanders St., Portland | |

BUS DIRECTIONS from PORTLAND:

From Downtown Portland (SW Salmon and 6th Avenue) take C-Tran Bus #105 (I-5 Express) or TriMet Bus #6 (MLK Jr. Blvd) to Downtown Vancouver (7th Street Transit Center). Then follow directions below from Vancouver.

BUS DIRECTIONS from VANCOUVER:

From Downtown Vancouver (7th Street Transit Center) take C-TRAN Bus #4 (Fourth Plain) eastbound to the Vancouver Mall Transit Center. Other buses to Vancouver Mall are #32, 72, 76, and 78. From the VM Transit Center, transfer to Bus #80 (Van Mall/Fisher's) eastbound to 49th and 112th Avenue. WSDOT SW Regional Headquarters is 2 blocks north of this bus stop.

Meeting: Columbia River Crossing Task Force
Date: November 29, 2006
Location: WSDOT SW Region Headquarters,
 11018 NE 51st Circle, Vancouver, Washington

Members Present:

| Last Name | First Name | Organization | Alternate Attending |
|-------------|------------|---------------------------------------|---------------------|
| Adams | Sam | City of Portland | |
| Armbruster | Grant | Portland Business Alliance | |
| Burkholder | Rex | Metro | |
| Byrd | Bob | Identity Clark County | |
| Caine | Lora | Friends of Clark County | |
| Cruz Walsh | Serena | Multnomah County | |
| Dengerink | Hal | Wash. State University- Vancouver | |
| Eki | Elliott | Oregon/Idaho AAA | |
| Frei | Dave | Amada Neighborhood Association | |
| Fuglister | Jill | Coalition for a Livable Future | Scott Chapman |
| Grossnickle | Jerry | Columbia River Towboat Association | |
| Halverson | Brad | Overlook Neighborhood Association | |
| Hansen | Fred | TriMet | Neil McFarlane |
| Hewitt | Henry | Stoel Rives, LLP | |
| Isbell | Monica | Starboard Alliance Company, LLC | |
| Knight | Bob | Clark College | |
| Lookingbill | Dean | Regional Transportation Council | |
| Lynch | Ed | Vancouver Chamber of Commerce | |
| Malin | Dick | Central Park Neighborhood Assn. | |
| Morris | Betty Sue | C-TRAN | Scott Patterson |
| Osborn | Dennis | City of Battleground | Adrienne Dedona |
| Paulson | Larry | Port of Vancouver | |
| Pollard | Royce | City of Vancouver | |
| Schlueter | Jonathan | Westside Economic Alliance | |
| Strahan | Elson | Vancouver National Historic Reserve | |
| Stuart | Steve | Clark County | |
| Tischer | Dave | Columbia Pacific Building Trades | |
| Valenta | Walter | Bridgeton Neighborhood Association | |
| Walstra | Scot | Greater Vancouver Chamber of Commerce | |
| Wyatt | Bill | Port of Portland | Susie Lahsene |
| Zelenka | Tom | Schnitzer Group | |

Number of guests present: 34

Project Staff Present:

Ron Anderson
 Mike Baker
 Danielle Cogan
 Doug Ficco
 Frank Green
 Heather Gundersen
 Barbara Hart
 Bob Hart
 Jeff Heilman
 Leslie Howell
 Ryan LeProwse
 Jay Lyman
 John Osborn
 David Parisi
 Ed Pickering
 Anne Pressentin
 Lynn Rust
 Lynette Shaw
 Gregg Snyder
 Audri Streif
 Rex Wong
 Patti Oeth
 Tonja Gleason

Members Absent:

| | | |
|-------------------|---------|--|
| Becker | Charles | City of Gresham |
| Brown | Rich | Bank of America |
| Hinsley | Brett | Columbia Pacific Building Trades |
| Phillips | Bart | Columbia River Economic Development Council |
| Pursley | Larry | Washington Trucking Association |
| Ray | Janet | Washington AAA |
| Russel | Bob | Oregon Trucking Association |
| Schmidt | Karen | Washington Freight Mobility Strategic Investment Board |
| Sundvall-Williams | Jeri | Environmental Justice Action Group |
| Wyatt | Bill | Port of Portland |

1. Welcome & Announcements

- **Welcome to new members**
 - **Bob Knight**, the interim president of Clark College is joining us.
 - **Elson Strahan** is replacing Ed Lynch as the representative for the Historic Reserve Trust.
- **Member Changes**
 - **Jeri Sundvall-Williams** is changing jobs but is not leaving us and will continue to represent the Environmental Justice Action Group.
 - **Ed Lynch** is now representing the Greater Vancouver Chamber of Commerce in a position that has been vacant.

2. Public Comment

Ginger Metcalf, Identity Clark County. Invited Task Force members to Dec. 12 Tolling Forum and made flyer available. (**Appendix**)

Barbara Nelson, board member, Jantzen Beach Moorage Inc., floating home community. Spoke against downstream alternatives that would be built where floating homes currently are and instead encouraged consideration of upstream alternatives where rental floating homes and commercial development are located. Pointed out some of the alternatives destroyed the moorage community in four or five places. Strongly emphasized how tight-knit the moorage community is and the amount of investment it has put into the area, including new walkways and other improvements. Task force members were also encouraged to consider keeping the existing bridge as a secondary access route to connect Hayden Island to Portland (assuming the I-5 traffic is on a new bridge). Task Force members were also invited to visit the moorage for the Christmas Ships Dec. 8 -15 or any other time in order to see the community personally.

Sharon Nasset – Questioned the legitimacy of the process used to narrow down options at the March meeting on the grounds that only 19 Task Force members were present and that there were several errors in the document that was given out about the screening process. Recounted event five months prior in which CRC staff invited her to go over the issues she was concerned about—specifically that many things that were marked as “fail” should have been “pass.” Referred to a document she handed over to staff three months prior which outlined information she identified as inaccurate and incorrect, and mentioned that the staff said they would do something about it. Asserted that staff has not studied the information provided and that this is not in keeping with NEPA protocol. Provided list of CRC’s evaluations of a new corridor crossing (**Appendix**), and included criticism of several of those listed. Reiterated that there was no reason not to study a third crossing option and argued such an option would not require removing any homes or businesses.

Joe Cordon, CEO of SW Washington Medical Center. Explained the three hospital, bi-state trauma system for the region and SW Washington Medical Center’s position as the busiest emergency department in the states of Washington and Oregon. Demonstrated that the hospitals’ ability to effectively manage high trauma volumes through transport of critical patients to other centers is being very adversely impacted by the current state of congestion on I-5 between Portland and Vancouver. Also mentioned similar adverse impacts on neonatal care. Stated that he was not advocating for any option, just that there be a quick decision so this problem can be addressed.

Jim Karlock – Referred to October meeting between C-TRAN Board of Directors and CRC project staff in which he heard someone from the project mention that an alternative needed to be selected before cost was discussed. Commented that it seemed backwards in terms of business sense and a possible way to slip in a high cost option without anyone noticing until it is too late. Commented that

the project should follow a suggestion that came up in the same meeting to start with express bus, then move to Bus Rapid Transit, and then Light Rail when ridership dictates it.

Jim Howell- Referenced a memo distributed by AORTA (**Appendix**) that argues for the inclusion of an alternative that retains the existing bridges in the EIS phase of the CRC project. Advocated for the viability, with some modifications, of the bridge proposal submitted by AORTA in February 2004. Described some aspects of the proposal, mentioned its relative low-cost and low-impact design, and maintained that staff had not yet seriously considered it.

Ron Swearin – Transportation committee member of the Sellwood-Moreland Improvement League and participant in the United Nations World Urban Forum. Stated that it is not likely the American economy will be able to continue to support large infrastructure projects in the future. Advocated for a problem solving approach that looked at all the region’s transportation problems and needs as a whole and not just those facing this stretch of I-5 and the creation of the fewest number of solutions to the greatest number of problems. Mentioned that a Western route might be that kind of solution.

3. Meeting Summary Approval

- **Action:** Approved – Draft summary of October 25, 2006 meeting

Barbara Hart – A meeting on the performance measures took place as a follow up to the October Task Force meeting. A summary will be available soon.

4. Overview of Analysis Results

Presentation by David Parisi

Major Trends and Traffic Performance

Discussion

NOTE: *Task Force questions and comments are in italics,*
Staff responses are in plain text

--Hal Dengerink- *You said five through lanes – you meant three through lanes with auxiliary lanes?*

Dave Parisi- Yes.

--Henry Hewitt – *If the problems to the south of the I-405 loop are dealt with, do these graphs showing the difference between North and South bound I-5 travel times change?*

Dave Parisi – Yes.

--Dave Frei – *How do we save 16 minutes of travel time savings across the region from saving four minutes in the Bridge Influence Area?*

David Parisi – There is such a large amount of queuing going on now, we would improve conditions outside the BIA as well as within it.

--Lora Caine – *Were you assuming high capacity transit on this modeling?*

David Parisi – Yes. The same vehicular demand is seen on each high capacity alternative, both of which come up as running pretty full.

Presentation by Ron Anderson

River Crossing Recommendations

Discussion

--Brad Halverson – What is the cost for seismic upgrades? Would it be half for keeping one bridge?

Ron Anderson – \$125 million to do a minimal upgrade, \$265 million to do a full upgrade. The cheaper upgrade would mean the bridges would shake and not be usable, but would probably not fall down during a 500 year event. If you only leave one bridge, the price would be less, but not half as much because the foundations are tied together.

--Commissioner Sam Adams – Has any thought been given to leaving a portion of the bridge up on the Oregon side for tourism purposes – far away from river navigation?

Ron Anderson – We talked about something that could help preserve the historical value. It could be a pedestrian attraction or lookout that would retain historic context. We are not that far on a decision yet.

--Commissioner Serena Cruz – Could you go into more detail about the unrestricted bridge lifts? Why would there be greater right-of-way issues if you left the bridges there?

Ron Anderson – Austin Pratt, the Coast Guard regional commander out of Seattle, has said that because of the complexity of having three structures and the impact of the new bridge pier locations on the navigation channels, they would strongly recommend unrestricted bridge lifts.

Jay Lyman – We are also under the operating premise that any degradation to marine safety would result in a “no” at the end of this process from the Coast Guard. Adding piers in the channel may affect that decision.

--Commissioner Serena Cruz – If the piers are aligned, what would be the greater safety impact?

Ron Anderson – It looks like the new bridges would need to have five piers for the sake of navigation and height clearance. We are trying to design with a 600 ft clearance between piers, and we can't make that line up with the nine piers on the existing bridge. Even if we made the new bridge with nine piers, navigation would still be impacted because it would create a longer channel for ships to get through.

Jay Lyman – We can't get all three barge channels to remain clear in the supplemental design.

--Commissioner Serena Cruz – Why would there be greater right-of-way issues if you left the bridges there?

Ron Anderson – If we take out the existing bridges it creates new area for redevelopment immediately on Hayden Island. On the Vancouver side, arterial connections for the supplemental bridge option would also require takings.

--Jonathan Schlueter -Is the current \$3 million operation and maintenance cost that was shown for the twin structures combined?

Ron Anderson – Yes, they have a centralized lift operation.

--Jonathan Schlueter - Once they are no longer highways, we lose federal support money for that operating and maintenance burden? Who owns it then?

Ron Anderson – That is correct that we lose the money. Who owns it becomes an issue.

--Jerry Grossnickle – It would be possible to have a supplemental bridge, leave the green bridges intact, and not have the Coast Guard rule them as not acceptable if the railroad bridge was modified. If there is any degradation to the way it is now, the tug and barge industry would ask for a Truman–Hobbes proceeding. If we had additional piers, we would ask to use lifts at all times.

--Brad Halverson – If we spend the \$40 million to fix the railroad bridge that may take care of issues of lifts with the Coast Guard on the I-5 bridges.

Presentation by Gregg Snyder

Transit Recommendations

Discussion

--Scot Walstra – You mentioned that the Light Rail has the least operating costs. Do you have the costs in a per-rider-mile figure or something that would be meaningful in terms of actual ridership?

Gregg Snyder – We have prepared preliminary work on it, but feel that information is better presented in DEIS.

--Neil McFarlane - I do have some of the numbers on the current MAX cost. MAX is \$1.28/passenger whereas it is \$2.00 – \$2.50/passenger for a bus system for TriMet, which has pretty efficient bus operation.

Phone Call from Governor Gregoire

Governor Gregoire – The Task Force has made tremendous progress and I and others want to recognize you for all the time and energy you have put in. Thank you to Hal and Henry and the hard work of WSDOT and ODOT – the staff and the consultants who have brought us thus far. When this took off in 2005, I began sessions with Governor Kulongoski about a plan for economic development between Multnomah and Clark County as partners in global competition. We recognized that one of the barriers to make that partnership more viable is what you are working on now. This project is very important to the future of both states. We have to of course address the congestion problem, but also fundamentally address the freight mobility problem that is part of both states' economic development plans. I respect that you are going to be getting into the tough, decision making part now. Transportation has a way of being very emotional and includes a lot of difficult choices and decisions. I am very appreciative of your willingness to do this and I think it is absolutely in good hands. I am there to support you as you make these difficult decisions. Please stay the course, move ahead, and make the tough choices. Governor Kulongoski and I with our respective delegations will need to be working to make this a reality. Thank you for what you are doing and I am sure that if Governor Kulognoski was here, he would join me in saying thanks.

Continuation of discussion

--Sam Adams – If you were to add capital costs, how does the cost per rider for light rail change?

--Neil McFarlane – We are getting 40 years out of a light rail vehicle versus 15 out of buses. Need to think out not just the initial capital cost but the on-going lifecycle cost which is a burden to the transit districts overall. Light rail allows us to carry a large number of people at a low cost for a long period of time.

--Hal Dengerink – Isn't there a point at which the capital amortizes out?

--Neil McFarlane – Absolutely but I don't have the general formula. As the Federal Transportation Administration looks at the different alternatives for funding, it will look very hard at that cost effectiveness equation. To understand it we need to get to the next level of detail and put this on equal footing with BRT.

--Brad Halverson – Once you widen Delta Park, there is no managed lane?

Gregg Snyder – We assume we would match the three south bound lanes south of the Victory Blvd. interchange. There would not be a managed southbound lane south of Victory Blvd.

--Brad Halverson – In reference to your "lessons learned" slide on transit reliability, all four of those are just about even in regards to importance. I hope they aren't played off of each other.

Gregg Snyder – We recognize that, and it's clear riders want reliable, fast, frequent service.

--Brad Halverson – Is that three to four trains being backed up during the 17 minute delay from bridge lifts?

Gregg Snyder – Our alternatives tested high capacity modes at a standard service of every 5 minutes. If a bridge lift occurred, that would mean three to four vehicles stacked up.

5. DEIS Alternatives

Presentation by Mike Baker

Discussion

--Hal Dengerink– The staff is recommending that these three options go forward for further study and not proceed with some of the others. We have to see if we are comfortable with it. Not a point of no return as there is a lot of other detail we still need. Not a decision to proceed no matter what, at this point.

--Lora Caine – In NEPA, is there a low cost option study requirement like there is for no action?

Jay Lyman – The only requirement is that we look at no-action and alternatives that are feasibly capable of addressing the purpose and need of the project. Our recommendation is that the minimum threshold required to address the purpose and need are a new bridge for the I-5 crossing itself and an investment in high capacity transit coupled with the other things we have talked about.

--Hal Dengerink– *That does not mean that cost is irrelevant. Cost becomes an important criteria.*

- **Motion:** to accept the staff recommendation the project team has presented tonight and put it forward to the public for comment - Rex Burkholder
- **Motion Second:** Walter Valenta

--Rex Burkholder – *I would like to speak to the motion. We have a decision coming up in February. It would behoove us to put this out on the street and hear back. Some people are getting tired of the process and want to have a decision now. However I, like other government representatives here, can't vote yes on anything adopting a position without working with my council. I would agree to have this committee put this out on the street and have some more public comment. Part of this is recognizing that a huge amount of analysis that's been done and saying that we will probably come to a similar decision as this in February.*

--Hal Dengerink – *Along with that we would ask staff to ramp up its detailed analysis of these alternatives.*

--Ed Lynch- *Is work from this point on limited to within these three alternatives?*

--Henry Hewitt – *That is the outcome we are aspiring to at this meeting or the next. We are still being informed by further analysis, public input, and from groups such as JPACT.*

--Walter Valenta – *It is important that we are really clear on when we are deciding on decisions like this. We need to follow the process to the letter. That means notice of when the decision in front of us will be brought back to the group, a clear time on when we are going to decide, and a way for the public to comment in a meaningful matter beforehand. We want to have strong consensus on this. I would like some clarity on when exactly is the official time to accept this recommendation.*

--Hal Dengerink – *We said we would make this decision in February. We are narrowing the current activities of the staff by accepting this report, not necessarily approving it.*

--Commissioner Sam Adams– *Can we fast track some of the staff analysis by approving this motion?*

--Hal Dengerink– *Approving the motion would do that.*

Jay Lyman –*The motion would put us in the mode of working full tilt on refining these alternatives.*

Doug Ficco – *This will also give us a jump on our public involvement.*

--Commissioner Sam Adams – *Could you note my question about the reuse of the bridge as a pier?*

--Brad Halverson – *At what point do we have the discussion on uses of the old bridges, like bike and pedestrians? I don't think it's been proven that they have to come down.*

--Hal Dengerink – *Replacing the bridges does not say that we will take down all of the other two. The issue of what happens with these bridges is not yet determined.*

Jay – *The proposal we put in front of the group is that the existing bridges be taken out. Sam's suggestion is not inconsistent if only a part stays. The Coast Guard has said though that if they aren't being used for transportation, they would recommend that the existing bridges would come out.*

--Hal Dengerink – *When do we address the fact that it is a historical monument?*

Jay – *We are working closely with the Federal Highway and Federal Transit Administration attorneys and we expect to have an informal opinion from them by February.*

--Hal Dengerink – *We have a motion on the floor to accept the recommendation, proceed for public comment, that we will go back to our constituencies with this, staff will proceed with the analysis as outlined for the DEIS, but our formal consideration and approval would not occur until February.*

- **Action:** Approved - motion to accept staff recommendation as presented tonight and put it forward to the public for comment.

--Hal Dengerink – Commissioner Adams and Mayor Pollard have a motion. (**Appendix**)

--Mayor Royce Pollard – The architecture of the bridge – its aesthetics and its impact - is very important to the future of our communities. We ask that this body create an Urban Design working group similar to the Environmental Justice group. The board can direct how it is organized, but we would like to be involved. The work and progress of the body would report back to this group.

--John Osborn – We recognize that this is important. It has been the intention of the project team to establish a working group for this when we got closer to knowing what it is we were going to build and are now at that point. We support Mayor Pollard and Commissioner Adams as being chairs for that group. We can begin working with you on membership needs. We do have some initial guidelines of what we think might be a good process, and certainly appreciate your input.

--Hal Dengerink – Does this require formal action?

--Tom Zelenka - I don't disagree with the basic tenet of what they are proposing. I don't understand the letter suggestion that they have the lead role. This is a bi-state issue and concerns more than just the two cities. What we are saying – would the two cities take over running that aspect of the review?

--Commissioner Sam Adams– The decision making on the overall project is very similar to the decision making on what it looks like and how it functions. The system is built so that no one can run away with any aspect of the project. My concern is that folks that were elected to positions and were appointed to this committee are given a space to deal with the way this thing looks. I am comforted that the staff has planned ahead but am still nervous that the design is considered a luxury. Discussions in a contemporaneous timeline help avoid that.

--Hal Dengerink – We do have criteria for this in our original evaluation criteria.

--Commissioner Sam Adams – The other reason to get going is that this bridge is going to have some very difficult constraints on design.

--Dean Lookingbill – I agree with Walter that this is an important issue that we work on as a group. We should take a formal position and vote to have this move forward.

--Hal Dengerink- We have already included it formally in criteria and have committed to it.

--Dean Lookingbill – I was looking for something to structure the process. That is what this group is about.

--Henry Hewitt – We should accept this letter and ask staff and others to come back to us with a proposal for creating an aesthetics committee and then approve that.

--Mayor Royce Pollard – I agree with that. We have bestowed a special recognition for the Environmental Justice Group and are looking for that with this group.

6. Upcoming Public Outreach Events and Opportunities

Presentation by Danielle Cogan – (Skipped due to weather concerns)

Barbara Hart – The Communications Summary is in your binder along with a schedule. We can send more information in lieu of the Dec. meeting. Consider taking part in these events so you can hear directly what people are thinking.

7. Overview of Budget and Schedule

Presentation by Doug Ficco – (Skipped due to weather concerns)

Doug Ficco – Look at what we have given you and let me know if you have questions. You are free to call me anytime.

8. Next Meeting

December 13th, 2006 meeting (Cancelled)

Next meeting: Tuesday, January 23, 2007, WSDOT SW Region Headquarters

DRAFT



Is Tolling In Our Future?

Exploring Tolling Options in the Bi-State Region

Sponsored By
The Cascadia Center/Discovery Institute

Hosted by Identity Clark County and the Portland Business Alliance

Tuesday, December 12, 2006

12:30 p.m. - 5:30 p.m.

EB Hamilton Hall at
Vancouver's Historic Reserve
Vancouver, WA

Discovery Institute's Cascadia Center is pleased to co-sponsor with Microsoft another forum as part of our Transportation and Technology Series - this time in Vancouver, WA. The forum is hosted by Identity Clark County and the Portland Business Alliance.

Local and national tolling experts will join a panel of local leaders on national and worldwide tolling trends and practices and explore the future of tolling in the Northwest. Featured speakers include:

Kamran Khan, Wilbur Smith, Chicago
Jack Opiola, Booz Allen Hamilton, London
Kary Witt, Golden Gate Bridge Authority, San Francisco
Harold Worrall, Former Director Orlando-Orange County Expressway, Florida
Don Forbes, HNTB, Salt Lake City
Fred Cummings, TransLink, Golden Ears Bridge Project, Vancouver, BC

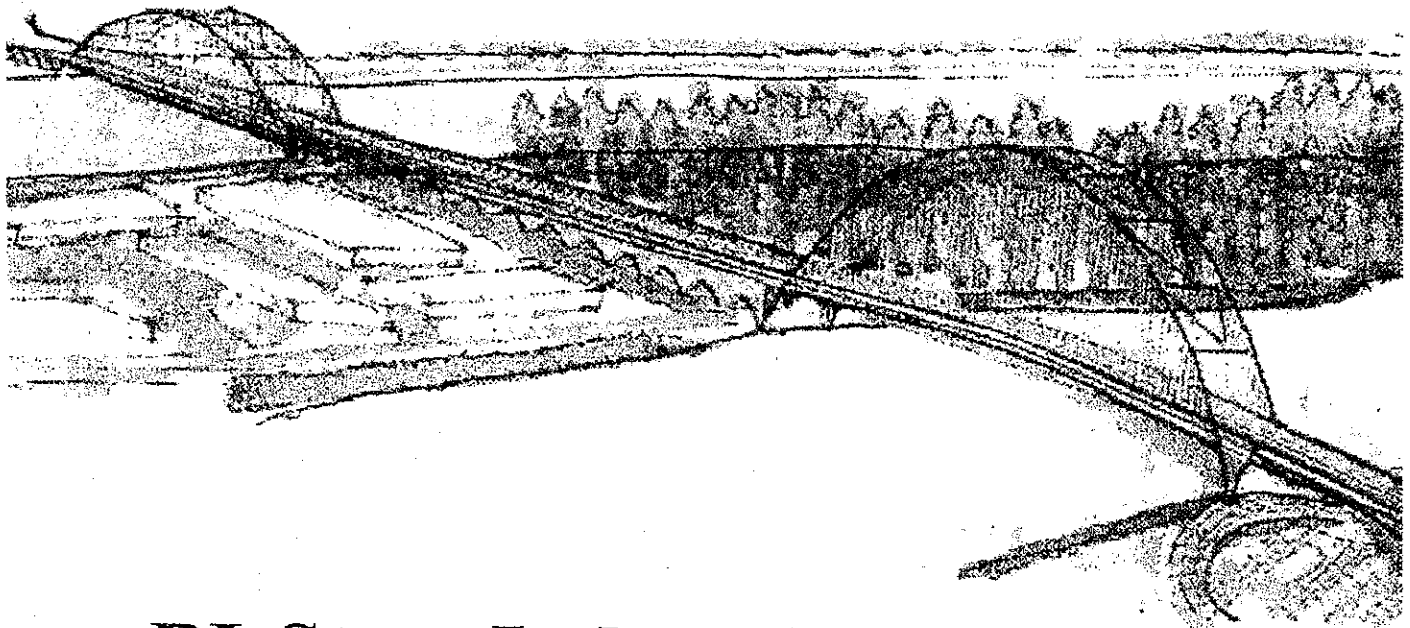
The event will be held from 12:30 to 5:30 p.m. on Tuesday, December 12, 2006 at the EB Hamilton Hall at Vancouver's Historic Reserve, 605 Barnes Road, Vancouver, WA.

The forum is free and open to the public. A no-host reception will follow.

To register, please contact Kathy Davis at 360.695.4116 or email kathy@identityclarkcounty.org.

Space is limited - RSVP now!

For more details on the forum, visit www.cascadiaproject.org

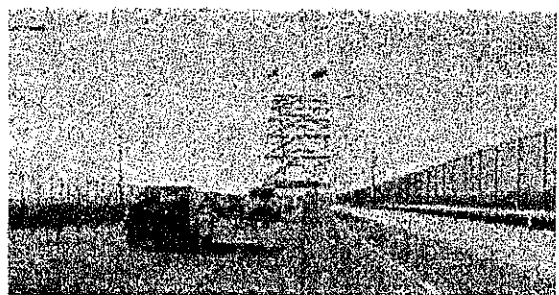
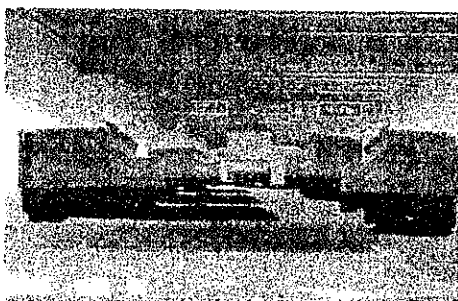


BI-State Industrial Corridor Reduces Congestion

Reduce Congestion on I-5 and connect our 20th century industrial areas with a 21st century transportation system. The proposed arterial would attract traffic off I-5 to a new BI-State Industrial Corridor. The "BIC" (BI-State Industrial Corridor) expressway built next to the BNSF railroad tracks uses mostly vacant and under utilized land. "BIC" will connect all of the major regional industrial areas on one continuous corridor. The current lack of direct access to I-5 from regional industrial areas cost businesses millions of dollars every year. The transportation infrastructure deficiencies cause congestion, pollution, and keeps businesses from locating or expanding in the Portland Metropolitan Area. The corridor's North end starts at Mill Plain and I-5 in Vancouver, has a Multi-modal (Train, truck, vehicle, light rail, bike and pedestrian) bridge from Vancouver to Jantzen Beach and Marine Dr. in Oregon. The corridor upgrades North Portland Rd. continuing to Columbia Blvd. Corridor. At the South end of the corridor is the North Willamette Bridge to HWY 30. The North Willamette Bridge can be reached by using Marine Dr. Corridor or Columbia Blvd. Corridor. "BIC" completes North, South, East and West existing transportation corridors and arterials.

BI-State Industrial Corridor

- *Third bridge between Vancouver and Portland
- *Port to Port connection
- *Truck friendly direct access into regional industrial areas from I-5
- *Reduced congestion on I-5 and in neighborhoods
- *Light rail connection to Jantzen Beach and Downtown Vancouver.
- *Bike and Pedestrian connection to Jantzen Beach, Vancouver and the 40-mile loop.
- *No demolition of Jantzen Beach business district or residential area.
- *Lessens air pollution and removes truck traffic from St. Johns, Kenton and Vancouver Neighborhoods.



Key Highlights

Road

- *Port to Port connection
- *Truck friendly direct access into regional industrial areas from I-5.
- *Direct access from the NW industrial area, to Rivergate, Port of Portland and Vancouver's industrial area.
- *Direct access to Marine Dr. Corridor, Columbia Corridor, St. Helen's HWY. and Mill Plain extension.
- *Upgrading North Portland road to four lanes.
- *Provides Columbia Corridor with a north I-5 freeway entrance.
- *Provides I-5 with an exit from the north to the Columbia Corridor.

Rail

- *A new heavy rail bridge across the Columbia River removes inadequacies in the current system.
- *A new heavy rail bridge increases capacity for freight, commuter, and speedy(?) train.

Transit

- *New bus routes into industrial areas, retail, and entertainment centers.
- *Light rail connection to Jantzen Beach and downtown Vancouver.
- *Commuter rail

Local connection

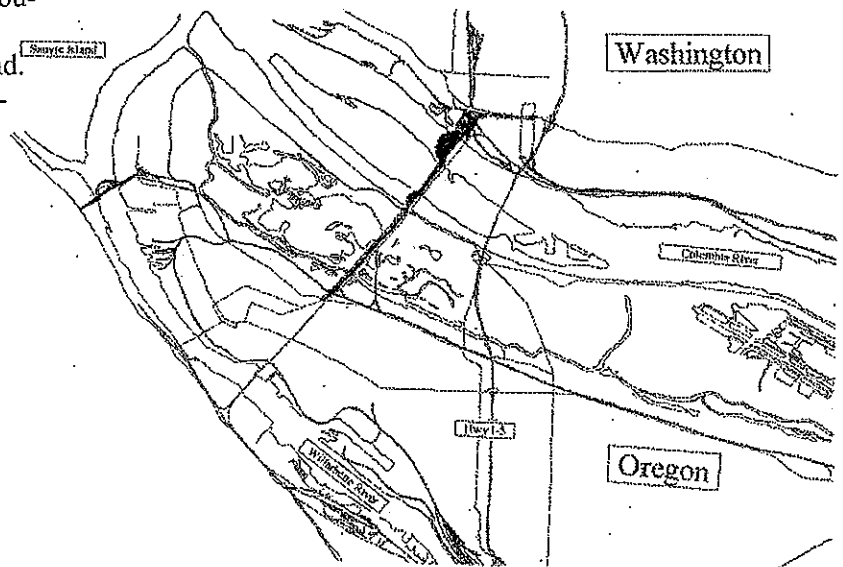
- *Access to downtown Vancouver
- *A second bridge to Jantzen Beach.
- *Bike access from Vancouver to Jantzen Beach, Portland and the 40-mile loop.
- *Pedestrian access from Vancouver to Jantzen Beach, Portland and the 40-mile loop.

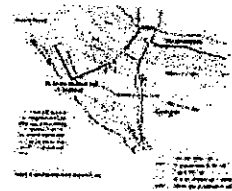
Environment

- *Removes truck traffic from St. Johns, Kenton and Vancouver Neighborhoods.
- *Removes street level traffic from Vancouver's Mill Plain Extension
- *Lessens air pollution in St. John's, Kenton, Vancouver and I-5 Neighborhoods.
- *Built next to, not through, Jantzen Beach wet land.
- *No demolition of Jantzen Beach business' or residential areas.
- *No encroachment to Historic Fort Vancouver.
- *No construction or flaggers on I-5

Several studies have pointed out the damaging economic effects of congestion and pollution in the Portland Metropolitan Area. Transportation deficiencies affect the economy of our state and several nearby states. New businesses are not locating here, existing business are not expanding, and some are leaving. Thirty years ago, studies found that a new bridge needed to be built to the North peninsula industrial area to maintain the economic viability of the area. Not only has that bridge not been built but it isn't even in the planning stage. Oregon is losing a billion dollars or more annually from transportation congestion. It does not have the funding to build a transportation system to meet the needs of existing businesses, let alone build a stronger economy. The state of Oregon has decided to allow the creation of private-public partnerships to fund needed transport system improvements. With businesses losing more in congestion costs than the cost to correct the problems, private-public partnerships are a win-win process for the state of Oregon and for businesses

The Economic Transportation Alliance is proposing to raise funds to study, design and build the BI-State Industrial Corridor. This corridor includes multi-modal three tiered bridges with heavy rail on the bottom, truck friendly lanes on the second level and vehicle, light rail, bike and pedestrian lanes plus look outs on the top. The bridges across the Columbia and Willamette Rivers will join the region's major industrial areas on one continual corridor, using existing corridors and arterial connected by new statically placed bridges.





RC-14: New Corridor Crossing Near BNSF Rail Crossing

Staff Recommendation: Not Advance

| Step A Question | Pass/Fail | Reasons |
|-----------------|-----------------------------|--|
| Q1. Traffic | See note below ¹ | Assuming construction of a new multi-lane tunnel under Mill Plain Blvd. and construction of high capacity interchange ramps between I-5 and Mill Plain Blvd., provides new Columbia River crossing that would serve up to 30,000 daily vehicles with most of these vehicles diverted from I-5. Some I-205 traffic shifts to I-5. By 2020, I-5 traffic demands still increase by at least 15% (by over 20,000 vehicles) over 2005 levels, resulting in 6-7 hours of afternoon/evening peak period congestion. |
| Q2. Transit | Fail | Does not improve transit service to identified I-5 corridor transit markets, nor does it improve the performance of the existing transit system within the I-5 Bridge Influence Area. Provides transit service along new corridor located approximately one mile west of I-5 to potential non-I-5 travel markets, but is out of direction for I-5 origins and destinations. |
| Q3. Freight | Pass | Results in 6-7 hours of afternoon/evening peak period congestion on I-5, however provides alternative route linking freight activity centers west of I-5. |
| Q4. Safety | Fail | Provides new Columbia River crossing located approximately one mile west of I-5 built to current safety standards, but does not address existing non-standard design features within the I-5 Bridge Influence Area. Traffic demands on I-5 within the Bridge Influence Area would increase by at least 15% by 2020 over 2005 conditions, resulting in 6-7 hours of afternoon/evening peak period congestion. <u>Without added I-5 capacity and re-design of the Bridge Influence Area to meet standards, collisions would be expected to increase approximately 40 percent over 2005 conditions.</u> |
| Q5. Bike/Ped | Fail | Provides new Columbia River crossing with modern bike/ped pathway(s). With a location approximately one mile west of I-5, it is out of direction for users with trip origins and destinations within the I-5 Bridge Influence Area. |
| Q6. Seismic | Fail | Provides new Columbia River crossing built to current seismic standards, but does not upgrade the existing I-5 bridges serving Interstate traffic and therefore the seismic risk of the I-5 bridges would not be reduced. |

¹ May provide some potential benefit in congestion management relative to 2030 No Build conditions.

Note: A variation of this component was introduced at the 3-22-06 Task Force meeting. Staff evaluated the revised component and believes it fails for similar reasons as summarized above.





CITY OF

PORTLAND, OREGON

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November 29, 2006

Hal Dengerink, Co-Chair
Henry Hewitt, Co-Chair
Columbia River Crossing Task Force
700 Washington St., Suite 300
Vancouver, WA 98660

Subject: **Design Review Process for Columbia River Project**

Dear Co-Chairs Dengerink and Hewitt,

As Task Force members representing the two municipal jurisdictions on each side of the Columbia River along the Interstate 5 corridor, Mayor Pollard and I would appreciate your consideration and support of the Task Force to accelerate the urban design and aesthetics effort for the Columbia River Project. It is important and timely to immediately begin a concerted effort to address urban design and bridge architecture issues of the project.

It is our understanding that a draft work plan for "Architectural Guidelines and Aesthetic Assessment Framework" is being prepared to address vital project issues such as urban design and aesthetics. We are hopeful that this work would also include investigation of the development implications of upstream vs. downstream bridge locations, bridgehead area design impacts, multi-modal accessibility and user experience.

The urban design and bridge architecture aspects of the bridge present tremendous challenges and opportunities for Hayden Island and Downtown Vancouver livability and economic vitality.

For these reasons we suggest that the Task Force representatives from the two cities perform the lead role in a process in coordination with the CRC staff to investigate and prepare recommendations regarding bridge architecture and urban design.

We recommend that an Urban Design Working Group be established, in similar fashion to the Environmental Justice Working Group, to provide stakeholder involvement in this process. The work and outcomes of this process will be reported to the CRC Task Force.

We look forward to your consideration of this proposal.

Sincerely,

Sam Adams, Commissioner
City of Portland

Royce Pollard, Mayor
City of Vancouver

cc: Doug Ficco, Washington Department of Transportation
John Osborn, Oregon Department of Transportation



PORTLAND FREIGHT COMMITTEE

November 29, 2006

Hal Dengerink, Co-Chair
Henry Hewitt, Co-Chair
Columbia River Crossing Task Force
700 Washington St., Suite 300
Vancouver, WA 98660

Dear Co-Chairs Dengerink and Hewitt:

The purpose of this letter is to support the recommendations submitted by the Columbia River Crossing (CRC) Freight Working Group (FWG).

The Portland Freight Committee (PFC) is an advisory group to the Portland City Council. Its membership includes 30 private sector representatives of freight service providers, shippers, trade associations and businesses directly related to multi-modal freight activities. Our roster is attached.

The PFC views the CRC as the most important transportation project presently under consideration in this region. I-5 is the only continuous north/south interstate highway on the West Coast, providing a commerce link for the United States, Canada and Mexico.

The two-bridge crossing, which served 30,000 vehicles per day in the 1960's, now carries more than 125,000 automobiles, buses and trucks each weekday. While many of these trips are regionally oriented, it is estimated that 70 to 80 percent of the trips using the I-5 crossing actually enter and/or exit I-5 within the 5-mile long I-5 Bridge Influence Area.

The increased demand mentioned above, combined with short merge lanes, lack of safety shoulders, and frequent bridge lifts has resulted in stop-and-go traffic conditions for hours on end. This is unacceptable for an essential trade corridor and it is unacceptable for local businesses and residents who rely on this road for their daily lives.

We urge the CRC Task Force adopt the FWG recommendations to:


- Eliminate F-1 Freight Managed Lanes from further consideration.
- Continue to consider F-2 (Freight Bypass Lanes) and F-5 (Freight Direct Access Ramps) as project components.
- Add F-6 to ensure safety for truck operations.

These recommendations were prepared by experts in their field and with the expectation that, if adopted, will result in a better project for all CRC stakeholders and users of the system.

Thank you for your consideration.

Sincerely,

Ann L. Gardner

A handwritten signature in cursive script that reads "Ann L. Gardner". The signature is written in black ink and is positioned below the typed name.

PFC Chairperson

What We're Hearing

The themes heard are a snapshot from this eight week period and do not represent a scientific survey. They are meant to provide Task Force members with a flavor of the comments the project is receiving. A more comprehensive summary of public comments received will be provided in advance of the February Task Force meeting in preparation for making a final recommendation on the choice of DEIS alternatives.

Comments were received from these sources:

Emails - 68

Short comment forms - 8

Meeting summaries - 14

River crossing generated about 46 comments with seven expressing support for a replacement I-5 bridge, one supporting a supplemental I-5 bridge, and two supporting a supplemental arterial bridge. One comment suggested retaining the existing bridges for tourism purposes. Many commentors advocated for river crossing components that have already been dismissed, especially a tunnel and a western bypass.

Transit generated about 42 comments with a greater number in support of light rail than other modes. Comments opposed to light rail included a mix of support for BRT or for "the most efficient option between BRT and LRT." There were also comments supporting transit options already dismissed, such as monorail and commuter rail.

Further transit comments included questions about what agency would operate a light rail system in Clark County, the impacts of closing Vancouver's 7th Street Transit Center, expansion of express bus service from Salmon Creek, the feasibility of a passenger rail corridor across the BNSF rail bridge.

Other comments included several questions about the right-of-way impacts of highway and transit alignments, highway design, cost/tolling, freight mobility, bike/pedestrian access, number of lanes, neighborhood impacts, and the historic nature of the existing bridge.

Others commented on the project's importance to economic growth, expressed disapproval of the current HOV lane on I-5 northbound in Oregon, and included a few statements on the need for more lanes than the existing bridges have.

Where We've Been

In the past four weeks, CRC staff has been to the following events. The number of people engaged is in parentheses.

Neighborhoods

Washington:

- Rosemere neighborhood group (13)
- Shumway Neighborhood Assn. (25)
- Neighborhood Associations Council of Clark County (16)
- Esther Short Neighborhood (47)
- Arnada Neighborhood Assn. (25)

Oregon:

- Hayden Island Neighborhood Network (67)
- East Columbia Neigh. Assn. (8)

Other

- Division / Clinton Business Assn. (13)
- Kiwanis Club, Cascade Park, Vancouver (22)
- SW Washington Regional Transportation Council board (25)
- Metro Council (7)

- Kiwanis, Downtown Portland (25)
- Portland Planning Commission (8 – visited twice)
- Portland Transport Blog meeting (13)
- Cowlitz County elected officials briefing (RPACT) (20)
- Coalition for a Livable Future, CRC Forum (65)
- Jantzen Beach SuperCenter employees meet and greet (30 – visited twice)

The Totals

437 people reached in this eight week period.

4,186 people reached since March 1, 2006.

What else is happening?

Polling Results

CRC released the results of a public opinion phone survey conducted between Nov. 27 and Dec. 4. The poll surveyed 400 likely voters from Clark County and 400 from the tri-county Portland area. Questions touched on a variety of issues including congestion, transit choices, and tolling. Key findings include:

- People believe there are good reasons to take action to improve I-5;
- There is strong support for transit and highway improvements to address congestion on both sides of the river;
- People want a comprehensive and long term solution; and
- Opinions about tolling are mixed.

Outreach Leading up to Task Force's February Decision

The project team will continue to visit neighborhood and community groups to discuss the staff recommendation and gather feedback. From Nov. 20 to Jan. 14, staff have attended 19 events and are scheduled to attend an additional 21 events leading up to Task Force's decision meeting. Public

comments will be shared with the Task Force in advance of their February 27th meeting.

Community and Environmental Justice Group (CEJG)

On January 13, CEJG members and CRC staff went on a bus tour of neighborhoods in the Bridge Influence Area. Group members led the tour of their communities to build understanding of areas potentially affected by the project.

Media Coverage

- The Portland Tribune – Dec. 4: Coverage of presentation to Metro on the Staff Recommendation.
- The Portland Tribune – Dec. 7: Story on the case made for tolling at Metro Council hearing.
- The Columbian – Dec. 14: Article on the results of CRC poll.
- The Oregonian – Dec. 14: Article on the results of CRC poll.
- The Oregonian – Dec. 15: Continued coverage of the CRC poll.
- The Columbian – Dec. 15: Opinion piece on Native American ancestral remains and the siting of a new bridge.
- The Columbian - Dec. 15: Editorial on light rail and the CRC poll.
- The Columbian – Dec. 16: Column about CRC media.
- The Portland Tribune – Dec. 22: Report on CRC public opinion survey results.
- The Portland Tribune – Dec. 26: Editorial in favor of tolling for CRC.
- The Columbian – Jan. 7: Editorial in support of CRC project and staff recommendation.
- Daily Journal of Commerce – Jan. 11: Potential effects of the CRC project on downtown Vancouver.

Outreach Materials

- The CRC **monthly email update** was sent to over 2,250 subscribers in December and again in January with a reminder about open houses.
- A CRC **traveling informational display** visited the Battle Ground City Building.
- Promotional flyers for the **January open houses** were produced and inserted into the January issues of Vancouver neighborhood newsletters.
- The fourth edition of CRC's **newsletter** *BridgeNews* is now available in four languages. More than 10,000 copies were mailed to the CRC mailing list.
- A variety of materials were created and distributed as a build up to CRC's January **open houses**. These include display ads, posters, and flyers. A total of 44,680 postcards were mailed to project area ZIP codes 98660, 97217, 98661 and 98663.
- A **storefront kiosk** of CRC information materials is planned to appear in the coming weeks at the Jantzen Beach SuperCenter indoor mall.

February 27th, 4:00 pm
Oregon Department of Transportation
123 NW Flanders Street
Portland

Submitting Public Comments

CRC encourages written comments to be submitted to the project office in these ways:

Email: feedback@columbiarivercrossing.org

Mail: 700 Washington St., Suite 300
Vancouver, WA 98660

Fax: 360.737.0294

If comments are received by **February 16th**, they will be included in a report submitted to the Task Force one week prior to their Feb. 27th decision meeting.

The public may also comment in person at the February Task Force meeting:

Public Outreach and Agency Meetings (Washington)
 Focus on Staff Recommendation



| AGENCIES | DATE | TIME | PLACE | ADDRESS |
|---|----------|----------------|--|---|
| SW Washington Regional Transportation Council (RTC) board | 12/5/06 | 4pm | RTC | 1300 Franklin St., Vancouver |
| RPACT (Regional Policy Advisory Committee on Transportation), Cowlitz-Wahkiakum Counties | 12/20/06 | 4pm | County Administration Building | 207 N 4 th Ave., Kelso |
| SW Washington Regional Transportation Council (RTC) board | 1/2/07 | 4pm | RTC | 1300 Franklin St., Vancouver |
| C-TRAN board of directors | 1/9/07 | 5:15pm | | |
| City Center Redevelopment Authority | 1/18/07 | 12pm | Vancouver City Hall | 210 E 13 th St. |
| WSDOT Open House, Cowlitz County | 1/18/07 | 4pm to 7pm | Cowlitz PUD room | 961 12 th Ave., Longview |
| Task Force meeting, Columbia River Crossing | 1/23/07 | 4pm | WSDOT SW Regional building | 11018 NE 51 st Circle, Vancouver |
| SW Washington Regional Transportation Council (RTC) board | 2/6/07 | 4pm | RTC | 1300 Franklin St., Vancouver |
| WSDOT 2007 Design/Construction training sessions | 2/8/07 | 1:30pm, 2:45pm | To Be Determined | |
| C-TRAN board of directors | 2/13/07 | 5:15pm | | |
| Federal Highway Administration - Western Federal Lands Division | 2/14/07 | 10:30am | Federal Highway Administration Office | 610 E. 5 th St., Vancouver |
| WSDOT SR 520 Open House | 2/22/07 | 4pm to 7pm | Battle Ground High School | 300 W Main St., Battle Ground |
| NEIGHBORHOOD & COMMUNITY GROUPS | | | | |
| Kiwanis Club of Cascade Park | 11/30/06 | 7:30am | IHOP | 2900 SE 164 th Ave. |
| Shumway Neighborhood Association | 1/4/07 | 7pm | Vancouver School of Arts and Academics | 3101 Main St. |
| Esther Short Neighborhood Association for downtown Vancouver (including Heart District Business Association, nearby residents of condominiums and apartments) | 1/11/07 | 6:30pm to 8pm | Indoors farmer market by Esther Short Park | 505 W. 8 th St. |

| | | | | |
|---|------------------|-------------------|---|---|
| Arnada Neighborhood Association | 1/11/07 | 7pm | Vancouver Housing Authority | 2500 Main St. |
| <i>Cancelled due to inclement weather, will be rescheduled</i> Neighborhood Traffic Safety Alliance (NTSA) | 1/16/07 | 7pm | Glenwood Place Senior Living | 5500 NE 82 nd Ave, Vancouver |
| <i>Cancelled due to inclement weather. Rescheduled Clark County location pending.</i> CRC Open House, Battle Ground | 1/17/07 | 5:30pm to 7:30pm | Battle Ground Police Department Training Room | 507 SW 1 st St., Battle Ground |
| <i>Cancelled due to inclement weather, will be rescheduled</i> Rotary Club, Vancouver | 1/17/07 | 12pm | Red Lion Hotel at the Quay | 100 Columbia St. |
| CRC Open House, Vancouver | 1/20/07 | 9:30am to 12:30pm | Lincoln Elementary School | 4200 NW Daniels St. |
| Rose Village Neighborhood Association | 1/23/07 | 7pm | Memorial Lutheran Church, | 2700 E 28 th St. |
| Lions Club, Vancouver | 2/1/07 | 6:30pm | Bill's Chicken and Steak House | 2200 St. John's Blvd. |
| Shumway Neighborhood Association | 2/1/07 | 7pm | Vancouver School of Arts and Academics | 3101 Main St. |
| Neighborhood Associations Council of Clark County (NACCC) | 2/12/07 | 7pm | Clark County Public Works Maintenance Center | 4700 NE 78th, Vancouver |
| Retired Public Employees of Clark County | 2/15/07 | 2 pm | Luepke Senior Center | 1009 E. McLoughlin, Vancouver |
| Lincoln Neighborhood Association (<i>pending</i>) | 2/19/07 | | | |
| Kiwanis Club, Boulevard Chapter | 2/20/07 | 7am | Elmer's Restaraunt | 40 St. and Anderson |
| Carter Park Neighborhood Association (<i>pending</i>) | To Be Determined | | | |
| West Minnehaha Neighborhood Association (<i>pending</i>) | To Be Determined | | | |

Public Outreach and Agency Meetings (Oregon)
Focus on Staff Recommendation



| AGENCIES | DATE | TIME | PLACE | ADDRESS |
|--|----------|------------------|--|------------------------------------|
| Metro Council (work session) | 12/5/06 | 2pm | Metro | 600 NE Grand Ave. |
| Portland Planning Commission | 12/12/06 | 2pm | City of Portland 1900 Building | 1900 SW 4 th Ave. |
| Portland Planning Commission | 1/9/07 | 12:30pm | City of Portland 1900 Building | 1900 SW 4 th Ave. |
| NEIGHBORHOOD & COMMUNITY GROUPS | | | | |
| Kiwanis, Downtown Portland | 12/6/06 | 12pm | Benson Hotel | 309 SW Broadway |
| Hayden Island Neigh. Network (HINooN) | 12/12/06 | 7pm | Former Hayden Island Yacht Club | 12050 N Jantzen Dr. |
| Jantzen Beach SuperCenter Meet and Greet | 12/14/06 | 9am | Jantzen Beach Supercenter | 1405 Jantzen Beach Ctr |
| Portland Transport Blog | 12/14/06 | 6pm | Wynne's Bar | 2002 SE Division St. |
| Coalition for a Livable Future – Community Forum | 1/4/07 | 6:30pm | New Columbia Community Education Room | 4625 N Trenton St. |
| East Columbia Neighborhood Association | 1/9/07 | 7pm | East Columbia Bible Church | 420 NE Marine Dr. |
| Jantzen Beach SuperCenter employees meet and greet | 1/11/07 | 9am | Jantzen Beach Supercenter | 1405 Jantzen Beach Ctr |
| Bridgeton Neighborhood Association | 1/17/07 | 7pm | PAM at Columbia School | 716 NE Marine Dr (at NE Bridgeton) |
| African-American Alliance Community Unity Breakfast (rescheduled from Jan. 18) | 1/25/07 | 7:30am | Irvington Village ALF | 420 NE Mason St. |
| CRC Open House, Portland | 1/25/07 | 4:30pm to 7:30pm | Oregon Association of Minority Entrepreneurs | 4134 N Vancouver Ave. |
| CRC Open House, Hayden Island | 1/30/07 | 6:30pm to 8:30pm | Former Hayden Island Yacht Club | 12050 N Jantzen Dr. |

| | | | | |
|---|---------|--------|----------------------------------|------------------------------------|
| Piedmont Neighborhood Association | 1/31/07 | 7:30pm | Holy Redeemer School, Clare Hall | 127 N. Portland Blvd. |
| Hayden Island Neigh. Network (HINooN) | 2/8/07 | 7pm | Former Hayden Island Yacht Club | 12050 N Jantzen Dr. |
| Kenton Neighborhood Association | 2/14/07 | 6:30pm | Kenton Firehouse | 2209 N. Schofield |
| Bridgeton Neighborhood Association <i>(rescheduled from 1/17/2007)</i> | 2/21/07 | 7pm | PAM at Columbia School | 716 NE Marine Dr (at NE Bridgeton) |



The Cost of Congestion to the Economy of the Portland Region

Prepared for:



Prepared by:



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EXECUTIVE SUMMARY

The Cost of Congestion to the Economy of the Portland Region

Prepared for: Portland Business Alliance, Metro, Port of Portland and Oregon Department of Transportation

Prepared by: Economic Development Research Group, Inc., Boston, MA
December 2005

Conclusion

The region's economy is transportation-dependent. Despite Portland's excellent rail, marine, highway and air connections to national and international destinations, projected growth in freight and general traffic cannot be accommodated on the current system. Increasing congestion -- even with currently planned improvements -- will significantly impact the region's ability to maintain and grow business, as well as our quality of life.

Action is needed to remain competitive with other regions that are planning large investments in their transportation infrastructure. This report finds that:

- Being a trade hub, Portland's competitiveness is largely dependent on efficient transportation, and congestion threatens the region's economic vitality.
- Businesses are reporting that traffic congestion is already costing them money.
- Failure to invest adequately in transportation improvements will result in a potential loss valued at of *\$844 million annually by 2025 – that's \$782 per household -- and 6,500 jobs.* It equates to 118,000 hours of vehicle travel per day – that's 28 hours of travel time per household annually;
- Additional Regional investment in transportation would generate a benefit of at least \$2 for each dollar spent.

Background

As a first step to addressing the Portland region's rising congestion problem, public and private sector partners commissioned a study to provide base-line information about the relationship between investments in transportation and the economy.

This report does not recommend a level of funding for transportation improvements, nor does it endorse a specific package of improvements. Instead, it is intended as a

springboard for discussions about planning for and investing in the Portland metropolitan region's transportation system.

Congestion and the Economy

1. The region's economy is transportation-dependent, especially on its roads and highways, for the movement of freight.

In comparison with other U.S. metropolitan areas of similar size, Portland's competitiveness is largely dependent on the region's role as a gateway and distribution center for domestic inland and international markets. Some other metropolitan areas have larger bases of research, venture capital, and higher education or are surrounded by greater population centers that enable their economies to be competitive even with more congested highway conditions.

- **"Traded" industries, which bring new money into the region and enable the rest of the economy to prosper, require an efficient transportation system.**

Portland's economy depends on industries that could locate elsewhere, but have been attracted to the area because of its advantageous trading position. Those industries include computer equipment, wood products, metal products, tourism, publishing, wholesale distribution activities and gateway port activities.

Because traded industries depend on the movement of freight, reasonably good transportation access must be maintained if those industries are to remain and grow in the Portland area in the years to come.

- **All modes -- roads, transit, air, marine, and freight rail -- are important to an efficient transportation system, but few alternatives exist to a smoothly functioning road and highway system for on-the-clock business travel.**

Portland is located at the confluence of two navigable rivers and is served by two intercontinental rail lines and an international airport. However, these modes commonly require a road system to get to and from a terminal or parking lot. While alternatives such as rail and bus transit help alleviate congestion for many commuters, these transit services do not meet the specialized needs of business travel for delivery of freight and other services. As many business-related trips are subject to schedule requirements, businesses become "prisoners of congestion," significantly increasing their cost of doing business.

- **In addition to road congestion, there are limitations with rail, air, and**

marine service and connections, which are critical to business needs as well.

2. Congestion is already impacting large and small businesses and hurting their competitiveness.

Interviews with local business leaders reveal how traffic congestion is affecting their operations. Many businesses have already made schedule changes to avoid peak afternoon traffic conditions. However, businesses have expressed a growing concern that the relatively few windows of time when congestion is not a problem are shrinking.

Businesses reported the following impacts of congestion:

- Costs for additional drivers and trucks due to longer travel times;
- Costly “rescue drivers” to avoid missed deliveries due to unexpected delays;
- Loss of productivity due to missed deliveries;
- Shift changes to allow earlier production cut off;
- Reduced market areas;
- Increased inventories;
- Costs for additional crews and decentralized operations to serve the same market area.

Specific examples of how businesses are being harmed by congestion:

- Intel has moved their last shipment departure time up two hours for outbound shipments through PDX because of increased p.m. peak congestion. A missed flight affects production across the globe and can result in costly operational changes.
- Sysco Foods opened a new regional distribution center in Spokane to better serve their market area, because it was taking too long to serve its market from the Portland area; others are following suit.
- Providence Health Systems reported medical deliveries, which have to be rapid and frequent, are getting very difficult on the west side, with routine runs requiring more than four hours. As a result, Providence is planning a relocation of warehousing and support operations at a cost (independent of construction) from \$1-1.5 million in 2006/7.
- OrePac has increased inventories by 7% to 8% to mitigate for congestion delays, which represents a lost opportunity for other investment.
- Other businesses have managed to restructure their operations to deal with congestion, but many have reached the point at which operational changes are resulting in real costs. As an example, PGE estimates that it spends approximately \$500,000 a year for additional travel time for maintenance crews.

As congestion continues to worsen, businesses in this region will be at a competitive

disadvantage. Businesses that serve local needs either absorb the added costs and reduce their profits, or pass these costs on to the region's consumers through higher prices. Trade-oriented businesses, however, can respond by moving their operations, and the jobs they provide, to locations outside the region.

Failure to address the negative impacts of congestion is likely to result in the loss of jobs as existing businesses expand elsewhere or relocate and the region attracts fewer new businesses. This also has a ripple effect on other businesses and suppliers throughout the region and the state.

Overall Impacts of Congestion on the Economy

Transportation forecasting models show that currently planned transportation investments will not keep up with traffic growth, resulting in severe congestion delays.

This will affect how well the region can compete for new jobs and cost each household an additional 50 hours of lost time annually by 2025. Simply put, congestion reduces the advantage of location, which is particularly troubling for the Portland metropolitan region because its traded industries are dependent on transportation.

The study compares a Planned Investments Scenario, anticipated to be funded over the next twenty years, to an Improved System Scenario, which would double transportation investment over the next 20 years. The Improved System Scenario would result in significantly less congestion growth during morning and afternoon peaks, key times for businesses. It would also save 28 hours of travel time per household annually by 2025.

- **Economic benefit: The total value of benefit from such an investment is \$844 million annually by 2025. It also supports 6,500 additional permanent jobs as of 2025, as well as 2,000-3,000 construction jobs annually.**

This total combines the value-added income generated in the region and the value of time savings to individuals. Under a higher investment scenario, businesses are able to convert travel time savings into additional sales, resulting in \$426 million a year of value-added benefit and 6,500 jobs. The benefit to businesses would also be complemented by significant time savings and higher quality of life for residents, valued at \$418 million a year. This scenario, while not eliminating congestion, will improve reliability, which is also critical to business travel.

- **Return on Investment: Under an Improved System Scenario, each dollar**

invested returns at least \$2 in value.

Some significant costs are incurred in the early years of the study period, and benefits continue to phase in over a longer time period. Looking at both the cost stream and the benefit stream in terms of their net present value, the analysis shows a potential benefit/cost ratio of about \$2 to every dollar invested.

Next Steps

The stakes are high for the economy and quality of life in the Portland metropolitan region, representing thousands of jobs and billions of dollars.

Many other regions, including Chicago, Atlanta, LA, Houston, Seattle and Vancouver BC, have undertaken similar studies and are taking action to address congestion. Examples from around the country illustrate the range of policies and programs that can be adopted to mitigate future congestion growth. More importantly, these examples demonstrate the need for the Portland metropolitan region to act now to reduce the impacts of congestion and preserve our continued economic competitiveness.

This study is intended to provide useful information to the public, the business community and government decision-makers as they work to formulate transportation policy, projects and funding decisions. The study should be used as a springboard for future discussions about planning for and investing in the Portland metropolitan region's transportation system.

This report also outlined a number of potential tools, such as road and transit capacity enhancement, system management, and pricing strategies that are being considered in other cities, and should also be considered here as we look at solutions. Local business and government leaders should immediately have a discussion about the impacts of congestion and solutions in order to protect and enhance the local economy and quality of life.

ACKNOWLEDGEMENTS

This study was conducted by Economic Development Research Group, Inc., for the Portland Business Alliance, Metro, the Port of Portland and Oregon Department of Transportation. Also contributing to the public funding for this study was Clackamas County, Multnomah County, Washington County, TriMet, the Cities of Portland, Beaverton, Wilsonville and Gresham. Further support came from private businesses including: Intel, Qwest, Ross Island Sand & Gravel, Providence, Platt Electric, Portland General Electric, NW Natural, Portland State University, PacifiCorp, Gunderson, Inc., David Evans & Associates, Portland Spirit, Schnitzer Investment Corp., City Center Parking and Oregon Transfer.

The study was overseen by a Steering Committee comprised of Greg Peden and Marion Haynes of the Portland Business Alliance; Richard Brandman and Bridget Wieghart of Metro; Susie Lahsene of the Port of Portland; Steve Clark of the Portland Tribune; and Matt Garrett of Oregon DOT.

The consultant team conducting this study and writing this report consisted of Glen Weisbrod, Stephen Fitzroy, Lisa Petraglia, Anjali Mahendra and Brett Piercy. The study built on transportation models and forecasts developed by Metro's Travel research and Modeling Services staff, especially Bill Stein. Bridget Wieghart played a critical role in coordinating the analysis process. The consultant team and steering committee are also grateful to the many individuals and businesses who were interviewed and provided data for this report.

All findings and conclusions in this report are those of the study authors and are not necessarily the positions of the study sponsors. Any errors in this report are the responsibility of the consultant team.

1

INTRODUCTION

1.1 Motivation: Economic Competitiveness

As the Portland region moves further into the 21st century, it becomes important to understand the need for transportation facilities to keep up with changes occurring in the region's population and business base. The stakes can be high. Failure to provide sufficient transportation capacity and functionality could potentially increase traffic congestion delays enough to reduce the quality of life for area residents and reduce the competitiveness of the region for business. Since most residents in the region depend on household income generated by good local jobs, the financial well-being of area residents is directly tied to the ability of the region to maintain its position as a competitive location for business investment, expansion and attraction.

To examine these issues, the Portland Business Alliance sponsored this study working in close cooperation with Metro and the Port of Portland.

This report examines the costs of traffic congestion to business currently located in the Portland metro area, forecasts for future changes in traffic congestion, and the impact that transportation infrastructure improvements can have on business productivity, competitiveness and growth. The report seeks to address two questions:

The Stakes Can Be High
Failure to provide for future transportation needs can reduce the future quality of life for area residents and reduce the competitiveness of the region for business.

- How do transportation infrastructure improvements, or lack of improvements, affect the costs and ability of businesses now located in the region to compete locally and globally?
- How do transportation infrastructure improvements, or lack of improvements, affect the competitiveness of the Portland metropolitan region for recruiting and retaining industries targeted by regional economic development efforts?

By addressing these questions, this report seeks to provide a context for better understanding the business case for the next generation of public investments in transportation system upgrades, and the economic risks associated with failure to address congestion growth.

1.2 Study Focus: Traffic Congestion

At the outset, it should be clear that transportation involves a wide variety of modes, including walk, bicycle, bus, train, car, truck, motorcycle, air and marine travel.

These modes serve a broad range of purposes, including health and recreation, shopping and personal business, commuting, freight deliveries and business trips. All modes and purposes are important to consider in broad-based transportation planning. However, from the perspective of maintaining a vibrant and competitive regional economy, it is appropriate to focus in on the most directly applicable and critical issues affecting business activity. This leads to two key observations:

- *Traffic congestion is related to highway system demand and capacity.* Many means of motorized travel -- buses, streetcars, cars, trucks and motorcycles -- depend on the region's system of roads and highways. So when traffic is gridlocked, the movement of buses as well as cars and trucks is slowed or stalled. Even travel on modes with their own right-of-way -- such as trains, airplanes and ships -- commonly require some travel on the road system for access to a terminal. All of these modes are important to consider insofar as they are all affected by highway traffic congestion.



- *Not all of the modes are substitutes.* Public transit can substitute for cars for some commuting trips, depending on the origins and destinations. However, for freight deliveries to homes and businesses, there is necessarily a reliance on trucks using the highway system. For businesses relying on materials from outside suppliers or delivering products to outside customers, there is also need to maintain good truck access to or through airports, marine ports, intermodal rail facilities and cross-state highway routes. Also, business-related trips for sales and service delivery typically require cars or light trucks since they cannot rely on fixed route services for their dispersed travel.



Congestion Effects are Broad
Traffic congestion affects bus service, as well as ground access for air, sea and rail transportation.

The bottom line is that many forms of business-related travel are dependent on the ability of the region's highway system to move vehicles. This report examines the nature of business dependence on the highway system, and the degree of vulnerability to current and future growth in traffic congestion levels. It goes into

particular depth to show how congestion affects the many facets of goods movement because that element of business impact is often less well understood by the general public. However, this additional focus on freight is not intended in any way to minimize the ways in which traffic congestion also affects passenger movements, which are also covered.

1.3 Organization of the Report

The report is organized into five chapters:

- Chapter 1 has defined the objective and focus of this study.
- Chapter 2 examines how Portland's regional economy is particularly dependent on transportation for serving broad markets, and thus vulnerable to congestion.
- Chapter 3 uses business interviews to lay out the many facets of impact that congestion has on local business costs, operations and growth strategies.
- Chapter 4 uses transportation models to show the magnitude of current congestion and expected future travel conditions under alternative future scenarios.
- Chapter 5 uses economic models to show the implications of congestion growth for the region's economic future.
- Chapter 6 summarizes the ways in which other regions are also recognizing the economic development consequences of congestion and implementing actions to address it.

2

TRANSPORTATION ROLE IN THE REGIONAL ECONOMY

The geography, location and past development of Portland have made the area an international air and sea gateway, as well as a regional rail and highway hub, with important roles in wholesale distribution that depend on transportation connections.

The economy of the Portland metropolitan area today still depends on a set of primary industries that have been attracted to the area because of its location advantages. They include computer/electronic products, wholesale distribution services, forestry/wood/paper products, publishing and recreation. These primary or “traded” industries serve markets well beyond the region, a factor that makes their future existence and growth dependent on performance of the area’s transportation system for delivery of products and services.

As a result of these factors, core industries in the area economy are particularly vulnerable to changes in transportation conditions. Reasonably good transportation access conditions will have to be maintained if those industries are to remain and grow in the Portland area in the years to come.

2.1 Primary (Traded) Industries

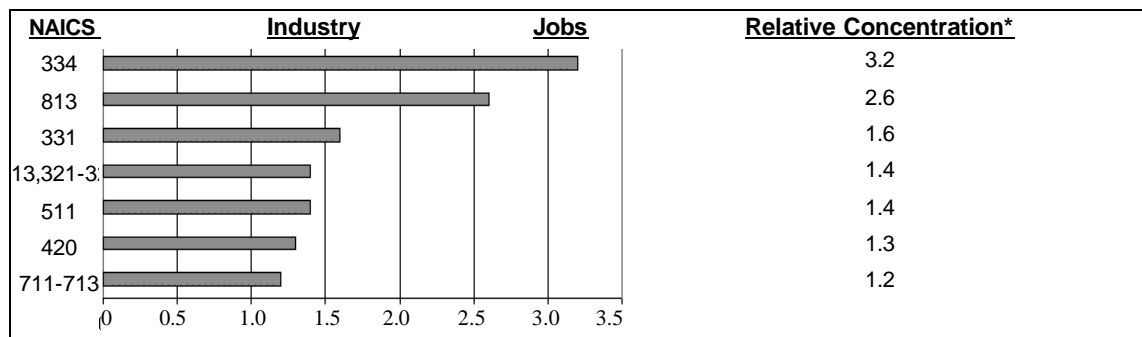
Core Industries. The foundation of Portland’s economy is its *primary industries*, also known as *traded industries*. These are the manufacturing, transportation/port distribution, and service activities that are located in Portland but serve broader regional, national and global customer markets. In service of these broader markets they bring money into the regional economy by selling their products and services elsewhere nationally and internationally. They could locate elsewhere but choose to grow in the Portland area because of the area’s attractiveness and competitiveness for their operations. They are the foundation of the regional economy, as the money they draw into the region is subsequently re-spent on local “population-serving” industries.

Traditionally, the Portland area’s key traded industries have been computer/electronic products, wholesale/distribution services, forestry/wood/paper products, publishing and recreation. Table 2-1 shows how many of these industries play a particularly strong role in the Portland area economy, compared to national averages.

Reliance on Traded Industries. Industries that serve broader customer markets (beyond the Portland area) show up as having higher than normal concentrations of

employment in the area. The industry with the highest relative concentration locally is computer and electronic products; Portland is a major exporter of these products to the rest of the world. The area’s metal product, wood/paper and publishing industries also compete for business with other regions of the US and the world. Furthermore, the area’s seaport, airport and some of the wholesale distribution facilities serve international gateway and national product distribution functions that compete with other cities in North America. As ports of entry, they provide opportunities for higher value added and traded industries to locate in the area, though such industries are also sensitive to congestion.

Table 2-1. Traded Industries with a High Concentration in the Portland Area



*Relative concentration is measured as the Location Quotient, which reflects the industry’s share of local jobs relative to its share of national jobs.

Source: EDR-LEAP database, compiled by IMPLAN from US Dept of Commerce Regional Economic Indicators Service (REIS), includes self-employed and contract labor in addition to wage and salary employment.

The vitality of the area’s economy depends substantially on its traded industries. Many other major sources of jobs – government, education, health care, construction, retailing, personal and business services – actually account for a larger number of total jobs, but they are serving needs of the local population and thus ultimately depend on the traded industries for their continued vitality.



Change Over Time. The nature of the region’s traded industries has been evolving over time. Forecasts by the Oregon Employment Department indicate expectations of significant growth between 2002 and 2012 in the high technology industry cluster (growing by more than 15%) and recreation (growing by more than 17%), although losses are expected in the lumber/wood/paper and metals industries. Altogether, the mix of goods and services will be changing, but the importance of traded industries depending on access to outside markets will remain.

2.2 Transportation-Related Industries

Role for International Gateway and Inter-Regional Distribution. In every metropolitan area, the transportation system plays a critical role in serving local needs for commuting, shopping, personal, recreation trips, and local delivery. However, the

Transportation Reliance
Geography and history have made Portland an air and sea gateway, as well as a regional rail and highway hub.

economy of the Portland Area and its associated transportation system has additional features that do not exist in many other places. In particular, the area's marine port, airport and highway facilities make the area a major trade gateway for movement of people and goods into and out of the US, facilitating important east-west international trade with Asia, and north-south trade with Canada and Mexico. Domestically, Portland is an important link in the west coast corridor trade between the state of Washington and the large markets of California. Key facilities serving long distance travel also create greater demand for ground transportation within the region. These include the following:

- The Port of Portland is recognized as the shortest marine route from the US to Asian markets. The largest sea imports by value are motor vehicles, iron and steel, office machines, petroleum, apparel and footwear. Sea exports include cereals, chemicals, fertilizers, vegetables and fruits, paper and ores. While most bulk cargo travels by train, intermodal containers comprise the key cargo carried by trucks, helping to facilitate just-in-time delivery of manufactured products. The Port's marine terminals handle over 2.5 million tons of intermodal containers.
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- Portland International Airport is particularly important for products that are high in value and low in weight, which covers the high-technology industries that are currently among the fastest growing sectors in the region. The largest air imports by value are office and computer equipment, electronic machinery, scientific instruments and telecom equipment. Air exports include transport equipment, chemical materials, vegetables and fruit, in addition to high-tech machinery, instruments and electronic equipment. Essentially all arriving or departing air cargo relies on truck for ground connections.
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- Inter-Regional Highways intersect to make the Portland region a hub for long-distance movements. The I-5 corridor is the major north-south spine for movement along the entire west coast from Mexico to Canada. The I-84 corridor is a major east-west spine for movement from Portland through the Cascades to the central and eastern parts of the US. Trucks account for a disproportionately high percentage of total vehicles on both highways. (Trucks account for 5% of all vehicles in the region, but 10% on I-5 to the north, 15% on I-5 to the south and 22% on I-84 to the east of the city.)

Wholesale Trade. While all metropolitan areas need some wholesale activity to support their population-serving retail activities, the Portland area has attracted a wholesale distribution industry that serves broader North American markets. The

Regional Wholesale

Wholesaling in the Portland region accounts for a 30% larger share of total jobs and a 42% larger share of total business output than the national average.

metropolitan area has approximately 60,000 jobs in wholesaling. The Portland area's wholesale sector has a 30% higher share of total regional employment and a 42% higher share of total regional business output than the national average for this industry. Primary reasons for this high concentration of wholesale activity are the presence of an international sea port and airport, a navigable river system connecting the seaport to the inland areas of Oregon and Washington, and domestic rail/highway connections to the rest of the US and Canada. Together, these factors make Portland an important gateway and distribution center for North America.

Trucking, Warehousing and Other Transportation Services. The distribution and logistics industry handles a large share of regional economic activity. It is supported by infrastructure that has developed around it, particularly trucking services, export packing, and maintenance and repair operations. A high level of truck services accompanies distribution operations because truck is the dominant mode of transportation used for the distribution of apparel, food, beverages, paper products, general commodities and miscellaneous bulk articles. The goods movement provided by the distribution industry maintains Portland's advantages as a trade hub. The metropolitan area has approximately 12,000 jobs in trucking, 16,000 in warehousing and package delivery services and 18,000 jobs in other elements of transportation including air and rail transportation and related freight logistics and support services.

Typically, larger distribution centers are located at the ports of entry. From these larger centers, goods from marine containers are loaded into smaller domestic containers for shipment to inland regional distribution centers. The majority of these shipments are handled by truck and hence the availability of trucking services is critical. In addition, truck distribution is the key link for moving goods between the manufacturing sector, warehouses and markets in the retail trade sector.

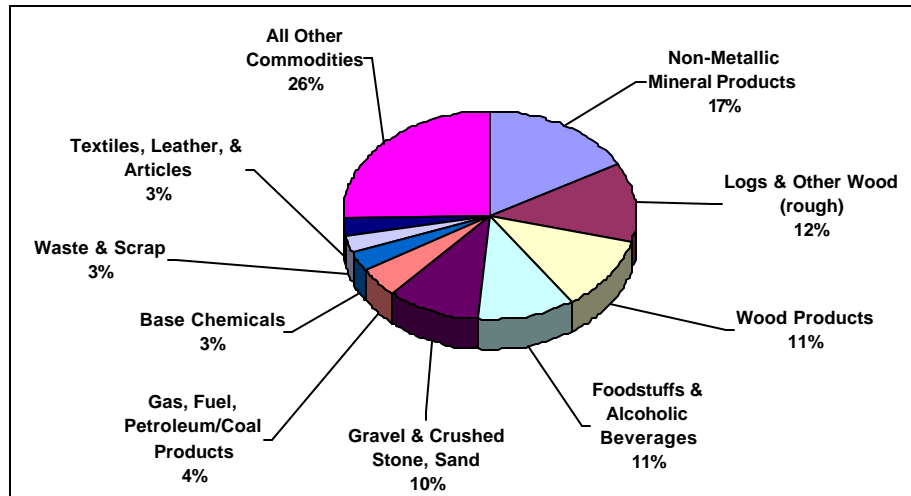


Commodities Moved by Truck. The total value of all commodities shipped to, from and through the Portland area in 1997 was estimated to be \$363 billion, according to the latest published Commodity Flow Survey. That survey showed that trucking carried the largest value of goods shipped in the area, at a value of \$278 billion or 79% of total value. Nine commodity categories comprise about three-quarters of the total freight tonnage carried by truck in the region. Figure 2-1 shows the distribution of tonnage for these key commodities carried by truck. This also indicates the shares of freight that are directly affected by highway congestion.

Freight Growth

Over \$363 billion of commodities move annually through the Portland metro area, with over \$278 billion moving by truck.

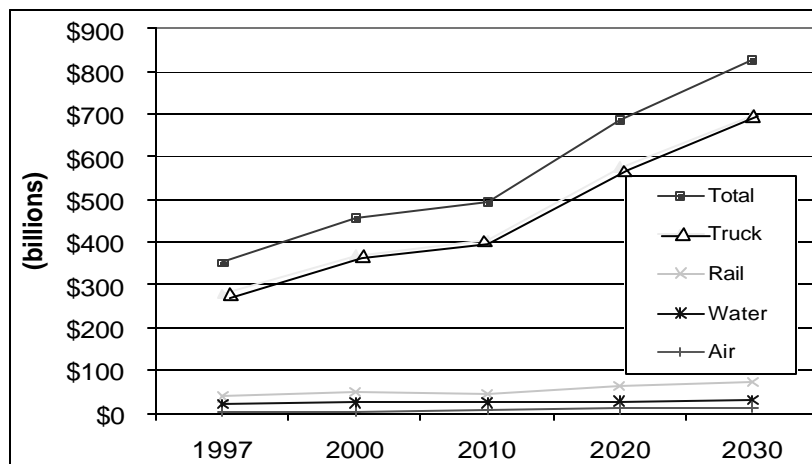
Figure 2-1. Mix of Freight Directly Affected by Congestion
 (Percent of Total Tons Carried by Truck within the Portland Region, 1997)



Source: Commodity Flow Forecast Update and Lower Columbia River Cargo Forecast (p.10)

Projections of the region’s economy and future freight flows indicate that freight tonnage in the Portland region is predicted to more than double between 2000 and 2030.¹ This is faster than the forecast for regional population growth. They also show that the truck share of total tonnage is expected to grow from 64% today to 73% in 2030. The reliance on trucking is even greater when viewed in terms of dollar value of freight rather than tonnage. Figure 2-2 shows that trucks are expected to account for 84% of commodity movement by value by 2030.

Figure 2-2 Forecast Value of Commodity Shipments by Transport Mode
 (billions of US dollars, for the Portland-Vancouver region)



Source: Commodity Flow Forecast Update and Lower Columbia River Cargo Forecast²

¹ Regional Freight Data Collection Project, 2005

² DRI-WEFA and BST Associates. 2002. Prepared for the Port of Portland, Metro, Oregon Department of Transportation, Port of Vancouver and the Regional transportation Council, p. 49

A 2003 study of the distribution industry surveyed businesses across the region and found that many firms identified the ease of access to highways as key advantages of the Portland region.³ However, increasing congestion and bottlenecks were identified to be among the key disadvantages that are affecting business expansion.

Jobs in the Economy. Together, wholesaling, transportation and related distribution and logistics companies account for nearly one in 12 jobs, or approximately 106,000 jobs out of the region’s total of approximately 1,290,000 jobs in all industries.

However, this vastly understates the actual role of transportation-related jobs, because

Jobs

Transportation, wholesale, and related distribution activities together account for over 132,000 jobs in the region.

it does not count the driver and mechanic jobs associated with truck and car fleets that are owned and operated by manufacturers, retailers and service businesses. Counting these additional transportation jobs increases the total by approximately 25%, meaning that over 132,000 area jobs (over 1 in 10) are actually providing transportation-related services.⁴

Of course, these figures still do not count those jobs in key traded industries that are transportation dependent, nor jobs in other local businesses would not be present if not for the core activity of the region’s transportation and traded industries.

2.3 Conclusions

A significant part of the Portland area economy is based on the city’s location as a gateway port for marine and air movement, and intersection of major cross-continent highway and rail routes. Those facilities have supported the growth of Portland’s core of “traded industries” – businesses that produce goods and services for customer markets extending beyond the metropolitan area. These traded industries depend critically on access routes to/from the various port and terminal facilities, as well as general truck movement to, from and through the metropolitan area. For these reason, they are particularly vulnerable to worsening highway congestion. Since they are not merely serving the local area market, they can also have the option of relocating the site of their operations outside of the Portland area if transportation conditions compromise the future competitiveness of locating in this area.

Other businesses are classified as part of the “local-serving industries.” They serve local customers and cannot just move away, but they too absorb cost of increasing congestion and can pass them on to local customers in the form of higher prices.

³ Distribution Study by Martin Associates, 2003

⁴ Transportation Satellite Accounts, US Dept of Commerce and Bureau of Transportation Statistics.

3

BUSINESS PERSPECTIVES

From a business standpoint, a major issue for regional competitiveness will be the ability of vehicles to move within and beyond the boundaries of the metropolitan area quickly and easily at key times of the day. The expense associated with congestion delays raises costs of doing business and adversely affects long-term competitiveness for attracting and retaining many industries. However, there are even broader effects on business operations. If the time required to move through and out of the region continues to increase, then there will be further decreases in the ability of some manufacturers as well as transportation and logistics oriented businesses to serve markets outside of the metropolitan area. As this happens, new jobs in transportation, logistics and manufacturing that are serving markets outside of the Portland region will tend to migrate out of the region.

Business perspectives presented in this chapter describe why investments in transportation that reduce congestion are fundamental to preserving the region's ability to compete in national and global markets. Business interviews indicate how congestion – especially in the afternoon – is already a problem. Examples show how business inventories, warehousing decisions, production processes, staff deployment and scheduling are all affected by increasing congestion. Most major businesses have already made changes to their schedules to mitigate peak afternoon traffic conditions. However, there is a growing concern that the relatively uncongested windows of time in which transportation delivery and logistics functions are currently operating may shrink to a level that will make future adjustments more costly and difficult to achieve.

As congestion becomes a day-long condition, businesses can adjust by further changing their deployment of staff, inventory management and delivery areas. However, such changes affect costs and revenues for both local-serving and trade-oriented businesses. Local-serving businesses either absorb added costs and reduce their profits or pass these costs on to people in the region. Trade-oriented businesses though, can and do move their operations to locations outside the region.

3.1 Business Interviews

Interview Process. Interviews with key members of the business community were conducted between April and June, 2005. These interviews were designed to provide background information about operational decision-making and to elicit information and perspectives on transportation issues faced by key businesses in the Portland region. Interviews focused on businesses with a working knowledge of and involvement in transportation issues in the Portland region. They each offered

important insights into how the current state of the transportation system in the region influences business decision-making. Some of these businesses have been operating in the Portland region for over 100 years, and others are relatively recent arrivals to the region. Their efforts to adapt to increasing congestion and to implement innovative ways to solve transportation and logistics problems by constantly refining their business practices has enabled them to sustain their operations in the Portland region and to survive in an increasingly competitive business environment.

The interviews focused on relationships between traffic congestion and the cost, productivity, and efficiency of business activities. The interview format was designed to develop insight into the ways in which each type of business is dealing with congestion, the ways in which congestion affects their operations, and the cost implications of continuing to deal with growing congestion. While many of the details cannot be reported due to the competitive nature of these businesses and the proprietary nature of some of their innovations in management and logistics support, we are able to report the broad outlines of actions taken to-date and to highlight some of the points of view that have been expressed about the concerns of major businesses relative to their future operations in the Portland Metropolitan Area.

Economic Sectors Covered. Sixteen in-depth interviews were completed. The interviewed businesses were grouped into four sectors:

- Major Regional Employers – Providence Health Systems, PGE
- Retail/Wholesale & Distribution – Fisher Farms, Columbia Sportswear, Powell’s Books, OrePac, Fred Meyer
- Manufacturing – Blount, Gunderson, Boeing, Intel, Schnitzer Steel
- Transportation & Warehousing – SYSCO, Oregon Transfer, USF Reddaway, George S. Bush Logistics.

These businesses ranged in size from just over 50 to just under 15,500 employees, representing a total of 38,200 full time, part time and seasonal employees. The share of these 38,000 employees included in each business sector is shown in Figure 3-1.

Rather than attempt to design a statistically representative sample of all businesses in the Portland Metropolitan area, the interviews focused on key businesses with transportation-intensive operations. Nevertheless, when viewed in terms of their association with current industrial classifications, these businesses represent or approximately 27.4% of all employees in the selected industry sectors within the Portland Metropolitan Area (see Table 3.1) In some industry groups, such as utilities, apparel manufacturing and computers and electronic parts companies, interviewed businesses covered a very large proportion of the region’s labor force employed in these areas. In other transportation-intensive businesses, such as transportation, warehousing and package delivery, transportation equipment, and machinery manufacturing, our interviewees employed between 5% and 23% of the region’s labor force. In all, the interviewed businesses included 10% of the region’s employment in the eleven industrial groups that are most transportation-dependent.

Figure 3-1. Share of Full Time, Part Time and Seasonal Employees included in Each Business Sector for Interviewed Businesses

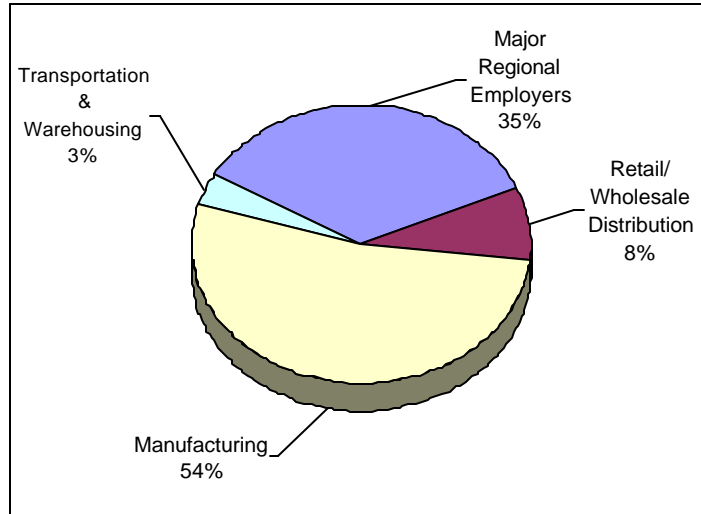


Table 3-1. Breakdown of Employment by NAICS and Business Sector for Portland Metropolitan and Interviewee Employment

| | Portland Employment (2002) | | Businesses Interviewed (2005) | |
|--|----------------------------|--------------------------|-------------------------------|---------------------------|
| | # of Jobs | % of Regional Employment | # of Jobs | % Employment Within NAICS |
| Crop Production | 15,043 | 1.20% | 170 | 1.1% |
| Utilities | 2,668 | 0.20% | 2,687 | 100.7% |
| Apparel Manufacturing | 1,113 | 0.10% | 550 | 49.4% |
| Wood Products | 5,560 | 0.40% | 150 | 2.7% |
| Primary Metal Manufacturing | 6,308 | 0.50% | 130 | 2.1% |
| Machinery Manufacturing | 8,864 | 0.70% | 1,000 | 11.3% |
| Computer & Electronic Products | 36,087 | 2.80% | 15,500 | 43.0% |
| Transportation Equipment | 9,818 | 0.80% | 2,250 | 22.9% |
| Retail Trade | 124,514 | 9.60% | 450 | 0.4% |
| Transportation, Warehousing & Package Delivery | 30,454 | 2.40% | 2,390 | 5.1% |
| Health Care & Social Services | 113,088 | 8.80% | 10,000 | 8.8% |
| TOTAL | 353,517 | 27.4% | 35,330 | 10.0% |

These businesses employed almost 600 drivers and required 1,890 trailers, 516 tractors and a number of other off-road vehicles in their daily operations. Because we chose businesses that were transportation-oriented, in that they either operated for-hire transportation services or provided substantial in-house logistical support for internal operations, they were responsible for a large number of vehicles and related transportation equipment, and employed a large number of drivers and operators (see Table 3-2).

Table 3-2. Transportation Equipment and Drivers Employed by Interviewees

| | Fleet | | | | | |
|---------------------------------|------------|------------|-----------|--------------|----------|--------------------|
| | Trucks | Drivers | Vans | Trailers | Vessels | Other ¹ |
| Major Regional Employers | 57 | 5 | 2 | - | - | 5 |
| Retail/Wholesale & Distribution | 129 | 251 | 19 | 926 | - | - |
| Manufacturing | 19 | 16 | 3 | 3 | 1 | - |
| Transportation & Warehousing | 311 | 318 | 14 | 960 | - | 55 |
| Total | 516 | 590 | 38 | 1,889 | 1 | 60 |

¹ Includes fork lifts and other warehouse vehicles

3.2 Issues Identified in the Interviews

(A) Cross-Cutting Issues. The logistical requirements and complexities faced by businesses in the Portland region vary significantly. Hence, the need to examine each of the four sectors identified in the previous section. However, there are a few cross-cutting issues that emerged frequently in discussions with representatives of each of the four business sectors. These issues have important implications for the business climate and economic future of the region precisely because they bear directly on either the cost of doing business or the ability to expand business operations to meet the demands of the Portland region. The most significant cross-cutting issues are:

- **Closing “Window of Opportunity” in the Morning Peak Period.** Businesses have adjusted to the long-term effects of evening congestion by shifting operations to the early morning hours. This has proven effective for a variety of reasons and across a number of sectors. However, as morning travel demand continues to grow, available highway capacity is shrinking sufficiently to affect the operations of most of the businesses that have become dependent on efficiencies of operating in this time period. As there is no other feasible time period in which to operate, the effects of a saturated morning peak will result in a much more serious impact on business operations than the effective elimination of the evening peak hours.
- **Increased Costs of Inventory Management and Control.** Most of the efficiencies in supply chain management over the past decade have been attributable to advances in inventory control and management of materials, components, and finished goods in the supply chain. Tight inventory controls and accurate accounting for inventory flows are a factor in both achieving profit margins and, arguably, in the ability of the national and regional economies in many parts of the US to weather the business cycle. The effects of congestion are eroding the significant progress that has been made in inventory management and control by re-introducing uncertainty in shipping and receiving attributable to the over-the-road and “last mile” portion of the supply chain system. The result can be a fallback to looser scheduling, lower targets and additional inventory to allow for uncertainty in delivery times.

- **Delivery Costs** – Beyond the changes in warehousing and inventory management, congestion has remaining effects on the cost of deploying crews for delivery of products and services. These effects can include labor and fuel costs due to longer truck operating hours, fewer deliveries or completed jobs per crew trip, and/or greater reliance on additional truck and van trips when current driver time limits are reached.
- **Localized Effects of Land Use and New Development** - Warehousing was traditionally located in former “edge” areas of the region. Several firms that located in these relatively low-density, open spaces – even as recently as 7 to 10 years ago – are now facing congested roadways and difficulty with access to major arterials (turning movements from gates, ramp congestion). This was especially notable in the Hwy 224/212 corridor and at manufacturing sites along waterfront areas. Expansion is limited both by new and proposed non-commercial land uses and by significantly higher land costs. Using existing facilities with greater intensity is limited to the utilization of existing space in transportation and warehousing operations (e.g., most trailers in use have increased from the 28’ to 40’ range to 53’).

Retailers and distributors located in and serving urban centers cite increasing difficulty with both deliveries and parking operations as residential activity and traffic congestion increases. Early deliveries of merchandise made necessary by afternoon congestion (as noted above) means that complaints from nearby residential areas (e.g., noise, lack of on-street loading areas) have also increased. Increased mixed uses, such as residential development near active port areas, have produced road congestion that is becoming more noticeable to businesses and manufacturing firms operating in these areas.

The effects of these cross-cutting issues are highlighted specifically as they affect various business sectors in the following discussion. The “last mile” phenomenon refers to the fact that most shipments, whether by air, water or rail, involve some over-land movement on the highway system. Therefore, even for relatively short moves – such as from the airport to a manufacturing plant somewhere in the region, or from a terminal operated by the Port to a local warehouse – some part of the region’s highway system is used.

(b) Highway-Related Issues. Although there are a host of unique and special problems faced by each of the interviewed businesses, several issues were identified in many of the discussions conducted for this project. The four most representative issues include the following:

- **Cross-Region Movement** - Most interviewees identified major problems with east-west movements that involve Hwy 26 and Hwy 217. Increased congestion on Hwys 224/212 is most significant for firms located along this roadway. I-5 and I-205 are key congested north-south facilities, with the Wilsonville area and I-5 in the I-84 interchange most frequently cited as major choke points.

- **Evening Congestion-Shortened Operating Time** - All interviewed businesses irrespective of sector have restricted operations after 3PM in the face of congestion (except for Providence Health Systems, which has moved deliveries to the west side until after 6:30PM). This has pushed starting times into the early morning hours for businesses involved in transportation and distribution, with individual characteristics depending on the kinds of services offered (common carriers start earliest).
- **Interchange and Ramp Congestion** - Lack of capacity (or more accurately, growth in traffic that exceeds existing capacity) is one of the most recognized issues for all businesses in the region and is most apparent on arterials leading to the interstate system and ramps connecting these arterials to the interstates.
- **Externalized Effects of Start Times** - Most employers require employees to bear the costs of shifting start times to earlier hours. However, many employees are constrained in their ability to use transit because service cannot be economically offered early in the morning or late in the evenings – typically when early morning and swing shifts begin and end. As warehousing and transportation (driver) employees are dispersed around the region, and because route assignments often change throughout the year, the consistency of reporting times and return times for drivers has seriously reduced the feasibility of car and van-pools for workers in the logistics and transportation industry, as well as the adoption of other traditional TDM strategies.

(c) Non-Highway Issues. Many firms intensively involved in the freight and logistics business depend on non-highway modes of transportation to support their businesses. Regional competitiveness is often significantly influenced by these modes. Although the firms interviewed for this study identified a range of issues and concerns that are highlighted in the business sector summaries, there are three cross-cutting areas that were each mentioned by several interviewees. They are:

- **Poor Class I Rail Service/Reliability** - Service by Class I operators has become noticeably less reliable in the past 3 to 4 years. Shippers with regular rail deliveries report that there is at least one “no-show” every two weeks. This affects trans-loading services and potential for efficiencies offered by carriers who want to make trans-loading a more integrated part of their operations. Missed schedules by Class I railroads increases both labor costs (unloading crews) and inventory costs (to compensate for the expectation of future delivery problems) of firms offering services that depend on meeting tight delivery schedules.
- **Reduction of Ocean Shipping Choices** - Loss of ocean shipping firms has resulted in increased truck operations – primarily from the Port of Tacoma, with

Rail Service and Trucking
Poor rail service can mean more trucks are needed to support goods movement within a region. It can also mean increased operating costs and reduced productivity as missed trans-loading schedules cost both the time of the trucking and unloading crews and require trucking firms to reschedule their operations. These costs are not immediately recoverable.

smaller movements from San Francisco and Los Angeles. A relatively new short-line (rail) now operates between Tacoma and Portland, but this is not an efficient alternative for all shippers – especially those without direct access to rail yards operated by these short-lines. Therefore, there has been a significant increase in container movements by truck into the region from the north.

Air Cargo Efficiency Requires Sustainable Traffic

A large proportion of air cargo is moved via overnight truck from San Francisco Airport to the Portland Metropolitan area. Lift capacity is the issue at PDX, especially for manufactured goods. Some manufacturers receive as much as 60% of all air freight through SFO.

- **Air Cargo Capacity** - Capacity to handle air cargo at Portland International Airport is an issue for many businesses involved with low volume or high value cargoes. The issue of capacity is also complicated by access time – especially for those businesses located on the west side of Portland. Many businesses rely in inbound shipments from Asia for materials and components involved in manufacturing. Increasingly, these inbound air shipments move through either Seattle-Tacoma or San

Francisco and are trucked to Portland. Outbound shipments also move through these airports because of shipper or capacity issues. Air cargo routing decisions are subject to a complex calculus of cost and capacity, of which congestion in Portland is only one variable. In addition, more outbound shipments of low volume/high value products, such as electronic components, are moving through Hillsboro airport.

3.3 Major Regional Employers

Two major regional employers were interviewed for this study – Providence Health Systems (PHS) and Portland General Electric (PGE). Although these are very different businesses, they have common characteristics in terms of their need to provide services region-wide and the way that their service delivery points and employees are distributed throughout the region. Both organizations have a limited number of highly-concentrated employment centers and a much larger number of smaller, more widely distributed service centers (PGE has one central load management center located in downtown Portland and nine crew dispatch centers) and clinics (PHS has four hospitals – including the Newberg – and 29 clinics located throughout the region.) They each require rapid responses and cannot tolerate delays/missed deliveries. Both organizations must maintain extensive logistics support functions that can respond to emergencies as well as routine and predictable demands. And the effective management of costs supporting mission-critical supplies and institutional capacity are critical to the success of each organization.

Common Congestion Issues for Regional Employers

Major employers with high levels of “Mission-Critical” service and logistics support operations cannot tolerate missed deliveries or delays.

Congestion has affected the ability to deliver services and support for both of these major regional employers. The increasing effects of congestion that have developed in the past 5 to 8 years have been especially challenging. But because the ways that

***Two Reactions to
Afternoon Congestion***

- *PGE starts shifts earlier*
- *PHS schedules evening hospital deliveries*

they provide service to the community are so different, they have adapted to the effects congestion in very different ways. Also, the differences in discipline imposed by a competitive market in the case of PHS compared to the discipline imposed through the regulatory environment in the case of PGE has led to

important differences in how each organization has responded to the effects of congestion. In both cases, operational efficiency and cost minimization have been driving forces in decision-making and in responding the effects of congestion.

Utility Issues - Portland General Electric. PGE must maintain an extensive system of electric generation, transmission, distribution and customer service. The operational effects of congestion are most apparent in the distribution and customer service side of the company's operations. Over the past ten years, PGE has consolidated its customer service functions and moved into toll-free telephone and internet-based customer service. These decisions have been influenced more by the costs of personnel and facility maintenance than by congestion, although the previous trend toward opening more customer service centers was due, in part, to the difficulty customers were having getting to a limited number of customer service centers. Today, the effects of congestion are influencing PGE's ability to respond to emergency situations and to dispatch maintenance/repair crews. Congestion has also influenced routine services such as meter reading and interoffice conferencing.

PGE is tied to performance benchmarks set by Public Utility Commission (PUC). Rate increases are measured against improvements in responding to outage frequency and duration. Response times are a critical element in meeting these performance standards. There is no provision for the effects of congestion on response benchmarks, so PGE must make provisions to meet or exceed various measures of customer service and system reliability in spite of congestion effects.

PGE has modified its maintenance and emergency repair services in response to various cost pressures and the difficulty of responding in congested time periods. Sites that were developed at the edge of the region 20 years ago have become difficult to access or expand. As a result PGE has consolidated line support centers at three locations (Hillsboro, Beaverton and Wilsonville) and operates smaller yards and crew centers located at 5 other locations. These sites provide flexibility and are less costly to close as land use and traffic pressures mount (see text box). PGE expects to continue responding to changes in land use patterns and the effects of congestion at service center and yard locations as conditions change.

Dispatching emergency crews from yards has proven to be both expensive and inefficient, as getting crew members to the yard and then moving emergency-ready equipment out of the yard can involve extensive delays at peak hours. One method

used by PGE to improve emergency response time involved development of “Eagle Crews”. Twenty-five of these one-person crews are pre-positioned and ready to respond to emergency situations. In addition to providing first-response emergency services, they can call in support and equipment from appropriate yards and service centers throughout the PGE system. When not responding to emergencies, these crews provide routine support and maintenance for PGE distribution system components and other customer services.

Other routine maintenance tasks have proven to be less amenable to innovative management and operational changes. Two of the most relevant with respect to congestion effects are tree/line maintenance and increased costs for in-roadway construction. Tree and line maintenance were traditionally done by in-house crews. Increasing travel times from staging areas increased the down-time and travel costs to work sites.

Line Maintenance Costs Increase with More Congestion

PGE estimates that the travel time penalties for contract trimming and line crews has increased by between 20 and 30 minutes in the past 7 years. This adds between \$30 and \$50 per day to the costs for each of the 36 crews currently employed year-round.

Seasonality of this maintenance work as well as increased “overhead” due to travel time increases led to more contracting out. Currently PGE has 36 contract crews working during peak seasons. Equipment staging and storage/parking in urbanizing areas has become more of a problem. Contract crews routinely must travel 5 to 6 miles from staging and storage areas compared to 1 to 2 miles just five years ago. This increases driving time and reduces on-site work time, thus reducing productivity.

Traffic Management Costs

PGE’s traffic management costs for in-road construction have risen from 4% of the maintenance budget in 1990 to 10% of the maintenance budget in 2003.

Roadway congestion has also significantly increased the costs of in-street maintenance and repairs. As the volume of traffic has increased, temporary construction signage has been replaced by 1- and 2-person flagging teams. Repair work is also being done more frequently and for longer periods of time in older urban areas as equipment wears out and

higher capacity replacement transformers and distribution lines are required to serve increasingly concentrated loads.

Increased congestion has affected personnel movement within PGE. With offices in Salem and Oregon City as well as Gresham and Portland, travel between offices for meetings and project-related team conferences has been adversely affected by congestion. This has increased the on-the-clock travel time for senior managers as well as project and departmental staff. Another example of both the impact of congestion and creative ways to accommodate the effects of congestion involves meter reading. PGE estimates that their meter readers traveled over 1,200,000 vehicle miles per year. The increased mileage and the wear and tear on vehicles, coupled with higher operating costs and slower speeds was reducing the productivity of even their most experienced meter readers. By consolidating meter reading functions in selected locations and by providing mountain bikes for many of the

readers assigned to moderate and high density areas, PGE has reduced vehicle miles by 12% and increased the efficiency of meter reading services.

Health Care Industry - Providence Health Systems. PHS logistics and warehousing services supports one west-side hospital and two east-side hospitals as well as their Newburg Hospital. They also provide medical supplies to 29 clinic operations. They use common carriers for deliveries to other affiliated hospitals in coastal and southern Oregon. Most warehouse and distribution costs are associated with hospital support for the four facilities in the Portland region.

PHS has centralized warehouse operations because direct deliveries to hospitals and clinics from manufacturers and suppliers were too unreliable. (This arrangement also saves money on bulk orders direct from manufacturers.) Their ability to purchase in bulk and provide warehousing, distribution and support to their hospitals and clinics is one of the most important ways that they can cut costs and achieve an economic return on scale for multi-hospital, multi-clinic operations. The ability to keep supply costs low is an important part of the strategic planning for hospital expansion within existing PHS facilities and is a factor in future acquisition and support for other health care facilities in the Northwest.

Until the early 1990s, most deliveries scheduled from the PHS warehouse were within the 9AM to 3 PM time periods for both hospitals and clinics. Today, deliveries to nearby hospitals (Providence Portland Medical Center, and to a lesser extent, Providence Milwaukie Hospital) are made in the mornings or late evening hours, and deliveries to clinics are restricted to morning and early afternoon. These changes evolved due to the growing unpredictability of deliveries to hospital receiving areas due to local roadway congestion and the costs involved in staffing hospital loading areas while waiting for deliveries that may be delayed. Also, cost-cutting and tighter staffing schedules required better efficiency in allocating hospital support staff.

Increasing Congestion Influences Clinic Deliveries
Deliveries to clinics require drivers to unload and store supplies. With 12 of the 29 clinics located on the West Side, traffic delays and congestion can create significant schedule delays and missed deliveries.

Warehouse operations are centralized in one facility located in the Northeast of Portland just off I-84. Inbound warehouse deliveries are cut off at 10AM (most are in by 7:30AM) to allow for sorting and racking. PHS also supports cross-docking for special orders in this time-frame. Cross-docking is critical to keeping supply costs low as manufacturers and distributors can provide significant discounts on bulk

orders. Although most bulk orders are destined for one specific hospital, they are received at the central warehouse because manufacturers/providers cannot reliably meet clinic/service center delivery time windows that are often later in the day. These larger orders can be cross-docked at the central warehouse, combined with other stocks destined for each hospital and loaded for delivery in the evening run.

Peak Hour/West Side Congestion Problem for PHS
Congestion in the evening peaks and congestion delay on the West Side are the biggest logistical problems and the most costly problems to solve.

Deliveries to St. Vincent Medical Center, located on the West Side are *dispatched* at 6:30PM and timed to coincide with hospital swing shifts. Timing is important because all deliveries must be unloaded, inventoried, stored and secured for potential immediate use. The time required to accomplish these tasks can be substantial for a full truckload, thereby requiring several hospital staff. Order fulfillment is a critical issue, too. Missing items or mis-filled orders, though rare, must be identified and corrected by early the following day. Separate van crews deliver emergency or mis-filled orders throughout the day. PHS has also added a specialist for suture and specialty supplies. These materials are delivered in a dedicated van.

Medical Support Requires Rapid & Frequent Deliveries
Larger hospitals, like St. Vincent's in the NW, require at least three deliveries per day, with the largest in the evening.

Deliveries to the West Side and to the Newberg Hospital have become very difficult, with routine runs often requiring over 4 hours – the equivalent to half of a regular person shift. These lengthy delivery runs have required more efficiency in logistics management and PHS recently (since 1999) moved to more complex route planning to support backhauls. Backhaul efficiency is of growing importance because PHS generates significant amounts of recycled materials (surgical and non-surgical), plastics and paper. The increasing volumes and loading/unloading times needed to support backhaul operations impose even more constraints on operations. Congestion during backhaul operations is becoming a growing problem because it limits loading times for the evening delivery cycle.

PHS is planning a relocation of warehousing and support operations that will be designed to address both expansion of the number of hospitals served within the region and accommodate new service functions, including reagent centralization, refrigerated supplies and possibly nuclear medical support. These new facilities will require access to a major interstate highway and will require careful examination of routing and scheduling. They expect that relocation costs (independent of construction) will range from \$1 to \$1.5m in 2006/07. Warehousing capacity is expected to increase by 60% – to 75,000 square feet.

PHS is primarily a customer service business. As such, it requires that all patients have direct physical access to their facilities. Congestion is a factor in customer/patient access and the costs to accommodate both in-patient and out-patient clinical visits is an important consideration in many decisions made by PHS staff and management. PHS has significant visitor/patient requirements (2,500 per day at hospitals alone!) Most access to PHS's major hospitals is via personal auto or taxi because illness, physical limitations and lack of familiarity (coupled with stress of visits) limits the appeal and practical use of transit.

PHS looks at the availability of transit when locating clinics and out-patient facilities. However, the use of transit by non-employees is relatively low. PHS also operates an inter-facility shuttle and promotes transit usage (see text box, above.) Although

participation by employees is high during the day shifts, swing and night shift employee participation drops off. Patient use of transit is quite low.

3.4 Retail/Wholesale and Distribution

***Key Findings for
Retail/Wholesale & Distribution***

- *Regional Distribution Centers Moving Out Of Metro Region*
- *Shift Support Functions to Earlier Start Times*
- *Growth Constrained by Physical and Logistical Capacity*
- *Adding Smaller And More Numerous Delivery Vehicles*
- *Increased Inventory*

The retail/wholesale and distribution sector was represented by interviews with five businesses: Fisher Farms, Columbia Sportswear, Powell's Books, OrePac, and Fred Meyer. These firms represent a wide range of retail- and wholesale-oriented businesses, each of which includes substantial distribution and logistics support. Some firms, like Columbia Sportswear and OrePac are also involved in significant manufacturing operations and require logistics support for these operations, too.

Consequences of Congestion for Retail/Wholesale & Distribution. Reactions of interviewees to the effects of congestion and other constraints on their operations in the region are manifest in many ways. However, there are a few important ways that businesses are responding to congestion that have implications for both the competitiveness and the long-term economic trends in the Portland Metropolitan area.

- **Regional Distribution Centers Moving Outside of Metro Region.** The ability to serve both Metropolitan area and non-Metropolitan retail stores and other customers is affected by congestion inside the region. Every one of the businesses reported increased difficulty serving retail outlets outside of metro region. Increased travel times that result from congestion effectively shrink the distribution radius of existing operations, making both existing service and expansion into new regional markets more difficult. The biggest factor in providing logistics support outside of the metropolitan area has to do with the fact that congestion limits the outbound (morning) and especially the afternoon return times. Afternoon returns, which often include backhauls, can create an overtime/over-hours situation for the drivers involved, thereby increasing costs and reducing productivity for both the vehicles and the drivers. This further cuts into the cost-effectiveness of distribution operations because efficient backhaul management is one aspect of logistics management that traditionally provides competitive advantages to these firms. As a consequence, many new retail and distribution centers are being located outside of the region. Some

***Serving Growing Markets from
Portland Is Becoming More
Difficult***

Continued growth requires more efficient and expanding service to large markets in the Mid-West and East. Some firms (Columbia) have opened facilities as far away as Kentucky. Others, (Fisher Farms) serving customers 1,000 miles away find local congestion a major factor in extending market area.

companies have even begun locating distribution centers as far away as the mid-western states.

Distribution Centers Generate Significant Traffic

Over 6,000 truckloads per week (inbound + outbound) are required just to operate the Fred Meyer Distribution Warehouses on Highway 212.

Even local-serving distribution operations have become more susceptible to increased congestion. This is because many distribution warehouses that were located on the periphery of the metropolitan area 10 years ago are now in or near major population growth areas. These developing and more intensely used residential and commercial

areas are generating more traffic, which in turn affects access to major highways and access to interstate facilities. Originally, because Portland offered a central location in the Pacific Northwest, many of these distribution centers were established to serve retail locations outside of the Portland region – including eastern Oregon, western Washington State and Northern California. Increased time to travel within the region has affected the ability of regional distribution centers to serve out-of-state retail operations.

- **Shift Support Functions to Earlier Start Times.** Retail operations depend on high volume sales, especially because margins for competitive retailing operations are constantly being reduced. The primary factors driving higher throughput are the need to offer a greater range of products and providing continuous availability of retail stocks in the face of uncertain delivery/delay. Timing of deliveries is critical because it is related to stocking time – the ability to get products on shelves, or from loading docks to in-store storage.

Congestion has significantly reduced, and in many cases eliminated afternoon stock/merchandise deliveries. Early morning deliveries are now required to support stocking in the morning or during swing shifts. This creates problems in mixed residential areas with noise. Most retailers and produce consignees are reluctant to allow “drop shipments”, especially of perishables or high-value retail merchandize. Thus, swing shifts are becoming more common as they are required to load shipments for following day. Some distribution warehouse/loading operations begin these swing shifts at 2:00AM, especially if they distribute beyond the metropolitan area.

If deliveries are made too early or too late in the day, extra in-store shifts are required. Some retailers must also accommodate “push” shipments from manufacturers where, due to improved logistics and manufacturing efficiencies, order fulfillment is now in matter of days, not weeks.

Retailers Dictate Deliveries

Home Depot cut back their 24/7 operating hours. Now, suppliers must deliver at pre-specified times during the day. As major retailers consolidate, they exert more pricing power and a greater ability to dictate delivery times based on their internal stocking schedules and staffing levels.

- **Growth Constrained by Physical and Logistical Capacity.** Future growth for many retailers in the region is being constrained by both physical expansion and

logistics capacity. Most retailers have set goals for growth at 5% to 10% annually to maintain profit margins and market share. This requires more productivity from their fixed assets (space, labor and vehicles). The addition of larger product inventory and more volume also contribute to this need for greater capacity. Some downtown retailers also feel challenged by parking restrictions and difficulty operating parking facilities.

- Add Smaller and More Numerous Delivery Vehicles.** Increasing congestion means that it is not possible to make equivalent number of deliveries within a shift or delivery run compared to only a few years ago. Coupled with growth in number of products/deliveries and the proliferation in the number of stores needed to serve a growing population (also a function of increased intensity of activity attributable to mixed use development) the ability to provide adequate inventory requires more drivers/vehicles. The reduction in driver productivity increases costs to distributors, and it adds more trucks and delivery vans to the mix of vehicles already on the region’s highways. Many firms have also added smaller and more numerous delivery vehicles to deal with congestion and to provide both

Vans and Outsourcing Loads
Missed orders and delays mean lost customers. When larger trucks are held up or delayed, distributors dispatch small delivery vans or hire common carriers to fill missed or delayed shipments. While this keeps customers happy, it adds to costs and increases congestion on the region’s roadways. Outsourcing can add 35% to delivery costs.

flexibility and rapid delivery of urgent or missed orders. Large vehicle drivers often make multiple deliveries from a single pull-over/stop (which can lead to local congestion and parking tickets). Often, congestion in and around delivery locations means that the larger consolidated loads for multiple deliveries are more likely to be delayed, especially toward the end of the run.

- Increased Inventory.** Most retailers and distributors are faced with a rapidly growing inventory. In addition to having to move more of a particular item, they are also stocking a larger number and greater diversity of items. Increases in volume and mix of products mean space constraints have become critical factors in their ability to serve customers and retail outlets. Inventory management and distribution efficiency are the most important factors in achieving the levels of productivity needed to remain competitive. Limited space inside existing warehouses and lack of expansion space encourage just-in-time inventory systems, which are highly dependent on reliable deliveries.

Reliable delivery schedules allow for efficient “just-in-time” processing, but delays effectively undo those opportunities for business efficiency. As a result, businesses with chronic delivery problems have had to increase inventories by as much as 5% to 8% compared to 5 years ago. Some of that is due to road congestion and some to railroad delays.

Increased Congestion Requires Increased Inventory
OrePac Estimates that the effects of congestion in the past 3 to 4 years have forced them to increase inventory by

3.5 Manufacturing Industry

Key Findings for Manufacturing Businesses

- *Earlier Start Times for Shift Workers*
- *More Conflicts with Non-Commercial Traffic*
- *Earlier Scheduled Deliveries/Shipments*
- *Increased Inventory*
- *Affects Production Elsewhere*

Five manufacturing firms participated in the interviews. These firms included: Blount, Gunderson, Boeing, Intel, and Schnitzer Steel. Although they represent a wide range of manufacturing operations, they all face common congestion-related costs. Some of these issues reflect those already noted in the logistics support part of the retail/distribution sector. However, some of the consequences of congestion noted by manufacturers are slightly different.

- **Earlier Start Times for Shift Workers.** Earlier start times for shift workers are becoming standard as manufacturing output is more constrained by the ability to move finished materials to consignees. Early start times and staggered shifts mean that alternatives to auto commuting have to address very early start times and the effects on second-shift start/end times. In areas where transportation, warehousing and manufacturing are concentrated, and where transit or paratransit⁵ services are available, there should be a careful assessment of the ways in which new shift patterns can be addressed. Many manufacturing businesses in the Portland region have relatively high retention rates. Although there is a variety of reasons for this phenomenon, the effect is that these long-term workers tend to notice changes in commuting delays because they can compare their commuting experiences over a relatively long period of time.

Congestion Issue for Workers
Manufacturing workers in Portland are reportedly more likely to complain about congestion because they have seen their commute times lengthen and their commute options as shift-workers are limited.

- **More Conflicts with Non-Commercial Traffic.** Maintaining or improving productivity for transportation and manufacturing firms requires both earlier starts for drivers and late-shifts associated warehousing operations. Congestion in increasingly more populated areas, especially congestion attributable to

The Productivity Problem

Schnitzer Steel supplies its McMinnville plant using scrap metal arriving by truck and rail, as well as barge, which is off-loaded to a marine slip on its site in the Portland Harbor. Maintaining production in McMinnville requires that 40 trucks make 3 round-trips (turns) per day. When congestion increases the time “per turn” either extra trucks or later runs have to be scheduled. Costs go up and productivity goes down.

development of new residential and mixed use activity near traditional manufacturing areas, new residential development near the Portland waterfront, and increases in the numbers of people living close to or in downtown area, are producing many more “conflicts” with heavy industrial traffic. This increases the time it takes to move large loads and

⁵ This can include public or employer sponsored carpool, van, and/or shuttle services.

routine shipments, and it adds to the difficulty of maintaining traditional routes and fixed delivery schedules. For manufacturing businesses with regular, high-volume movements between sites, congestion and reduced capacity on critical bridge crossings and city streets has significantly increased the time needed to move intermediate products, partial assemblies and raw materials. In many cases, especially where older manufacturing sites are located along waterways or in older industrial areas, introduction of new, mixed use development has combined with traffic congestion to compound delays in routine shipment patterns.

- Earlier Scheduled Deliveries/Shipments.** Most firms are involved in on-going review of routings and have developed methods for “on-the-fly” rerouting or regular adjustment of departure times, loading and preparation of loads for delivery and other measures. However, some firms – particularly those with large, heavy loads moving between established manufacturing operations, do not have the flexibility to make these adjustments. Slower turn-around between plants requires either adding more vehicles to sustain production, adding shifts, or cutbacks in production schedules.

“Last Call” for Outbound Shipments

Intel has moved their last shipment departure time from 5:30PM to 3:30PM for outbound shipments through PDX in response to increased congestion. A missed flight means loss of inventory and production at the receiving location.

- Increased Inventory.** Throughout the 1990s, reductions in inventories increased efficiencies in the manufacturing and transportation sectors. These efficiencies are beginning to erode due to roadway congestion (highways) and reduced levels of service (primarily attributable to poor service from Class I railroads and a reduction in ocean shipping services). Increased variation in delivery times attributable to congestion, more missed deliveries, and other uncertainties related to maintaining services tied to rail deliveries and maintenance of delivery routes has contributed to keeping more inventory on-hand – both in distribution warehouses and in manufacturing operations.

- Effects on Production Elsewhere.** Many manufacturers operate multiple production facilities throughout the US and in many foreign countries. The location of production on the part of most manufacturing companies is a complex decision that is based on a unique combination of factors such as labor, materials and markets. However, transportation has historically played a role in these

Delays in Portland Affect Global Production

If Intel experiences delays or missed shipments, it can shut down a production line as far away as Costa Rica, China or the Philippines. These shutdowns can produce a ripple effect on world-wide production and testing operations. They may also have to pay inventory surcharges for various “non-chip” components, and other penalties tied to production delays.

decisions. Almost all of the businesses interviewed and several of the retailers who are involved in manufacturing operate globally – with manufacturing on every continent and many regions of the globe (including Africa and the mid-East). However the predominant location of production is in the US and Canada, with Latin American

operations following close behind. This means that for manufacturers, congestion and the ability of the transportation infrastructure in the Portland region to support efficient production processes is an important factor in their decisions about where to locate new product lines, how and where to position various aspects of the intermediate and final production, and where they may best serve growing or emerging markets for their products.

3.6 Transportation and Warehousing

Four firms involved in transportation, logistics support and warehousing operations participated in the interviews. These companies included SYSCO, Oregon Transfer, USF Reddaway, and George S. Bush Logistics.

As with other business sectors, several common themes and concerns emerged. However, these issues affect the transportation and warehousing sector differently than the previously discussed business sectors.

One of the most important points that emerged from these interviews is that most of the efficiencies and obvious adjustments to congestion by transportation and warehousing businesses have now been incorporated into their operations. In the future, congestion is likely to begin cutting more deeply into their productivity and operating costs. Key aspects of these effects include the following:

Key Issues for Transportation & Warehousing Industries

- *Warehousing Practices*
- *Delivery/Shipment Patterns*
- *Shift Starts and Relief Drivers*
- *Impaired Cross-Docking Operations*
- *Less Backhaul Efficiency*
- *Increased Stem Times*
- *Reduced Out-of-Region Capacity*

- **Warehousing Practices.** While costs for drivers and equipment have increased as a share of overall expenditures in transportation/ warehousing operations, warehousing operations have become more efficient (using scanners, reducing labor per unit moved, and applying advanced methods for inventory control and management). Although warehousing efficiency has compensated for congestion effects in the past several years, these efficiencies have approached their practical limits and future congestion is more likely to add to non-fuel costs and reduce productivity industry-wide.
- **Delivery/Shipment Patterns.** Shifting early morning dispatches to the 4 AM to 6 AM time slots requires even earlier start times for loading and support personnel (2 AM to 3 AM). Dispatch times are limited by the ability to prepare and load trailers from the time they arrive in the afternoon to the time that they are scheduled to depart in the early morning. The ability of warehouse operations to assemble loads and stage them for loading in the evening shifts, reposition trailers based on available dock/door capacity, and stage trailers for departure is constrained by available time between drop off and whenever trailers with backhaul materials are ready. Increasing the number of trailers on-site is limited

by available space and adds costs for redundant equipment. Very early dispatch times also are limited by the ability of businesses to receive goods in early morning hours (e.g., stores in urban areas or manufacturing operations).

Transportation and warehousing operations have adjusted scheduling so that most vehicles return to the warehouses or distribution centers by the early afternoon. Most consignees have been able to accommodate these early shipping deadlines into their operations. However, if afternoon congestion trends continue, with the implicit shortening of the window for final outbound shipments, manufacturing and transportation operations will be hard-pressed to maintain current levels of productivity and current final outbound shipment schedules.

- **Shift Starts and Relief Drivers.** In the case of the transportation and warehousing industries, first shift start times for drivers have been moved to very early in the day – often 4 M to 6 AM. This is because afternoon congestion has

Delays Can Drive Up Costs If Hours-of-Service are Exceeded

The total cost per hour for a driver is between \$35 and \$55. Sending out a “rescue driver” can double or triple the hourly costs. Rescue driver dispatch usually occurs during periods of heavy congestion. So, costs for these operations can become very expensive.

become a problem for firms with scheduled deliveries or routes, and most firms want to avoid overtime pay or violating state/federal regulations on truck driving hours (typically 11 hours per day within Oregon). Some firms have begun to rely on “rescue drivers” to avoid those situations.

- **Impaired Cross-Docking Operations.** Efficiency and feasibility of cross-docking operations are tied to the ability of originators to deliver inbound loads within window of time needed to reposition loads for outbound customers – typically very early in the morning. Late inbound delivery creates storage and loading problems. As the communications and inventory control infrastructure required to support cross-docking operations becomes more widespread and more

critical to improving efficiency and lowering costs of transportation and logistics, delivery reliability will become an even greater issue in the successful adoption of cross-docking in warehouse and logistics management. To the extent that this practice becomes more integrated into transportation and warehousing operations, consideration will be given to locating new facilities in places where congestion is less of a factor in the variability of scheduled delivery times.

Delivery Productivity is Key to Efficiency

USF Reddaway depends on each driver making 15 to 20 deliveries per 8-hour shift. Increases in stem times and/or delays along the route of even ½ hour can mean missing 2 or more deliveries – even if there are no more congestion-related delays for the rest of the run.

- **Less Backhaul Efficiency.** Backhaul efficiencies are important to many transportation and logistics operations as the ability to support efficient backhauls reduces the number of vehicles, number of operators and time required for normal operations by these firms. Backhaul opportunities and efficiencies are more

significantly impacted by afternoon congestion than outbound shipments. Thus, the vulnerability of backhauls to afternoon congestion is also greater. Many firms that developed sophisticated routing and logistics management practices integrating backhaul management into their processes have more recently noted increased overtime and the need for “rescue drivers” to conform to the new “hours of operation” requirements.

- **Increased “Stem Times”** The time it takes to get from the warehouse to the first stop/delivery (stem time) has increased by about 50% in the past 5 to 8 years. This means that there are more vehicles on the road (to maintain and grow distribution and trucking markets) and routes are changed more often. Also, east-west movements are much more difficult than they have been in the past and have required constant adjustments in scheduling drivers and deliveries.
- **Reduced Out-of-Region Capacity.** Increased stem times and greater travel times required to move through the region have made it more difficult to serve areas outside of the immediate Portland metro area from facilities located inside the metro region. As with the ability of retail/wholesale firms to support out-of-region businesses, this factor is also a noticeable and more significant drag on the region’s transportation/warehousing operations where growth outside of the immediate metro region has to be served.

New Warehouses Serve Markets Formerly Covered from Portland

SYSCO has recently opened a Spokane warehouse to serve eastern Washington and the Tri-Cities, as well as places in Oregon such as Pendleton and Milton-Freewater.

Several interviewees have opened new operations outside the region (especially in areas of Oregon and Washington north and east of the Portland Metropolitan area) to serve growth in markets in Washington State (especially southern and eastern Washington), and markets east of Portland. Service to Southern Oregon and Northern California seem less affected (to-date) by congestion. However, operations in the Wilsonville area are seeing

significant afternoon delays. Transportation and warehousing operations have begun to site new centers closer to customers in the western states rather than try to serve these markets from the Portland area. There are many factors contributing to these decisions, but the top three are lack of adequate expansion for major new facilities, lengthening times in moving out of the region, and lack of alternatives to truck transportation (e.g., especially Class I rail and Short-lines).

3.7 Conclusions

Interviews conducted for this project provide important insights into the complex and interrelated effects of congestion that challenge businesses in the Portland region. Congestion – especially in the afternoon – is already a problem. Most businesses

have made accommodations to address peak afternoon traffic conditions. However, there is a growing concern that the relatively uncongested windows of time in which transportation and logistics functions are currently operating may shrink to a level that will make future accommodation costly and difficult to achieve.

Area businesses have found some ways to “work around” problems created by congestion in the transportation systems and continue to deliver efficient and cost-effective service and support within their business sectors. Most often, this involves reorganizing their operations around times when congestion in the region is at its lowest ebb (very early morning hours.) However, managing around the severe afternoon peaks presently characteristic of the transportation system is becoming increasingly difficult because the only alternative – the morning peak hours – are beginning to become congested as well. In many parts of the region, especially where localized early morning congestion on major highways and ramps leading to interstate facilities are reaching capacity, even these attempts to alter operations are facing severe challenges. What is striking in the discussions undertaken for this project is the sense that the operational windows of relatively uncongested highway conditions in the early morning hours and the ability of businesses across the board to work within this window are rapidly being reached.

Operating in a more intensely developed region is also of some concern. As mixed land uses become more prevalent (e.g., along waterfront and in urban areas) and as residential infill and new centers are developed in formerly less heavily populated areas within the urban growth boundary (e.g., residential areas on Sunrise Highway) more pressure is placed on local streets and highways, arterials, and ramp access to the interstate system. Issues range from improved management and design (allowing adequate space for trucks to make left turns, providing adequate lane widths, creating gaps in traffic for turning movements), to added capacity (providing multiple ramp lanes, increasing the number of lanes on arterials and major highways,) to consideration of major new facilities to improve connectivity between parts of the region (providing more capacity for east-west movement).

In Chapter 2, a distinction was made between “local-serving industries” and “traded industries.” The “*local-serving industries*,” including the electric utility and hospital suppliers profiled here, have to absorb their additional costs of congestion and then pass them on to their customers in the form of higher rates. Ultimately, residents of the region are likely to end up paying many or most of these costs.

The “*traded industries*,” including the manufacturers and wholesale/ distribution activities profiled here, do have a location choice. If the costs of congestion reduce the competitiveness of locating in the Portland area, they can select other locations for siting their facilities. From a business standpoint, a major issue for regional competitiveness is the ability to move within and beyond the boundaries of the metropolitan area quickly and easily at key times of the day.

Portland is uniquely positioned to competitively serve Northern California, southern

and eastern Washington, and other inter-mountain states. It has historically provided logistical support to the Seattle-Tacoma metropolitan region, and it remains the major gateway for bulk commodities transported through the Columbia River rail/barge system. However, if the time required to move through and out of the region continues to increase, then there will be decreases in the ability of manufacturers and transportation and logistics oriented businesses to serve markets outside of the metropolitan area. As this happens, new jobs in transportation, logistics and manufacturing that are serving growing markets outside of the Portland region will tend to migrate outside of the region.

4

TRAVEL CONDITIONS

Prior chapters have shown the many ways in which the Portland area’s business activity and economic base are vulnerable to traffic congestion. The next logical step is to assess how traffic conditions are expected to change in the future, and the relative impact of additional investment to reduce future congestion growth.

Two scenarios are offered for the period from now to the year 2025: (a) a Base Case, referred to as the *Planned Investments Scenario*, that maintains current spending levels to fund modest transportation system improvements, and (b) an illustrative alternative, referred to as the *Improved System Scenario*, that requires additional funding to better meet future transportation needs.

Transportation forecasting models show that the *Planned Investment Scenario* will not keep up with traffic growth, resulting in severe congestion delays. Under this scenario, slower speeds and increasing bottlenecks will add 212,000 more hours of vehicle travel time delay per day than would occur under today’s conditions. That represents over 55 million vehicle-hours of additional travel time incurred annually, which is an average of 50 hours of time lost annually per household by the year 2025. These are substantial numbers and the increases in congestion will especially hit truck traffic and have a particularly strong impact on the region’s business base.

While the *Improved System Scenario* will not fully solve the congestion problem, it will provide substantial savings by avoiding more than half of that delay. Most importantly, it will disproportionately relieve congestion growth during the morning and afternoon peaks. This will allow businesses to deliver more efficient and cost-effective services during those times. This congestion reduction will allow “local-serving industries,” such as the electric utility and hospital suppliers, to avoid having to pass on their additional costs of congestion to their customers. It will also make the region more competitive as a place for manufacturers and wholesale/distribution businesses to remain and grow.

4.1 Profile of Current Travel Congestion

Region-wide Conditions. Table 4-1 shows a metropolitan-wide summary profile of current car and truck traffic, based on year 2000 conditions. It reveals that:

- Afternoon peak period accounts for roughly 18% of total daily trips. Since morning peak accounts for a similar proportion, the peak commuting periods together account for around 36% of total daily trips.

- Truck trips average triple the mileage of car trips, reflecting both long-distance shipping and the multiple delivery nature of many truck trips.
- At a regional level, the average speed is lower in the peak period than the daily average, though the difference appears modest. However, these statistics reflect averages for all travel distributed over all streets and roads in the region, and thus do not show the fact that some key travel corridors experience congestion and much more substantial slowdowns during peak periods.

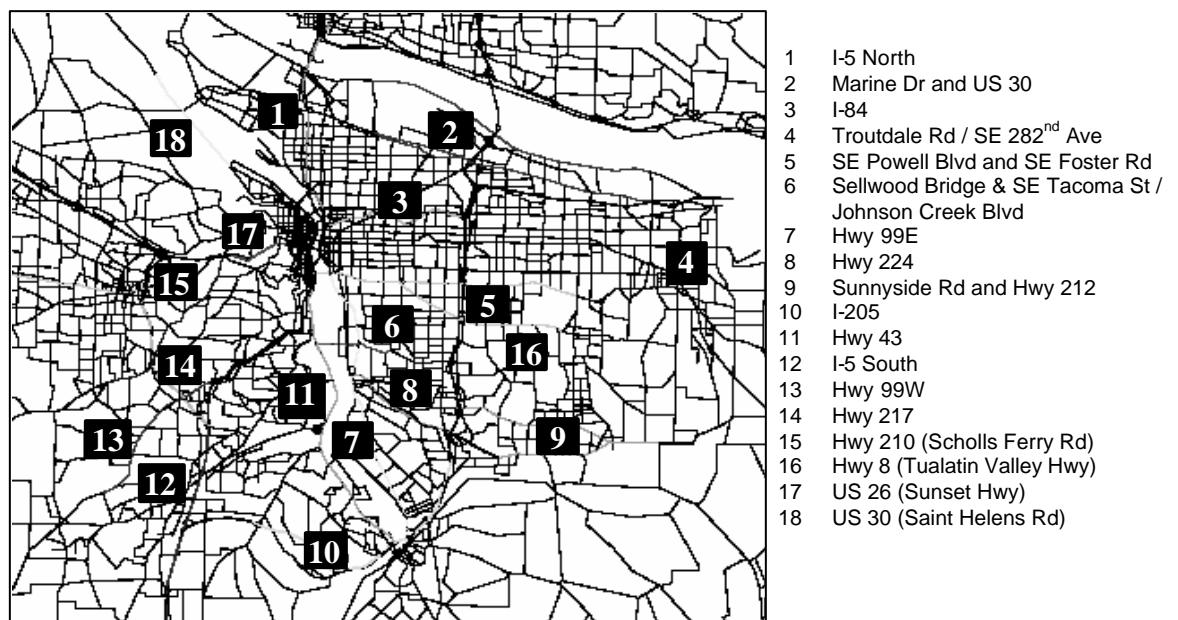
Table 4-1. Current Road Traffic Summary (average weekday)
-- Year 2000 “Current Conditions”

| | PM Peak | Daily Total | Cars | Trucks |
|-------------------------|-----------|-------------|------------|-----------|
| Vehicle Trips | 1,024,623 | 5,741,846 | 5,655,592 | 86,253 |
| Vehicle-Miles of Travel | 6,735,165 | 36,440,729 | 34,775,204 | 1,665,525 |
| Vehicle-Hours of Travel | 230,901 | 1,183,558 | 1,141,223 | 42,335 |
| Average Miles per Trip | 6.57 | 6.35 | 6.15 | 19.31 |
| Average Miles per Hour | 29.17 | 30.79 | 30.47 | 39.34 |

All numbers are per weekday. Source: calculations by EDR Group based on data from Metro

Specific Corridors. There are many key travel corridors throughout the Portland region that are particularly important for commuting flows, for business deliveries, and for longer distance traffic. There are also many key traffic intersections and interchanges that represent bottlenecks restricting those flows. The business interviews cited in Chapter 3 identified specific locations of congestion concern, and analysis by staff of Metro identified additional areas of high congestion delay. The result was a list of 18 congested highway links, shown in Figure 4-1.

Figure 4-1. Location of Identified Areas of Traffic Congestion



While these are not the only locations of traffic congestion in the Portland metropolitan area, they are notable for the geographic spread of their locations, as shown in the map. Together, they account for over 12,600 vehicle-hours of delays every weekday afternoon. While afternoon peak periods tend to have slightly worse traffic congestion than the more spread-out morning peaks, nevertheless these figures indicate that morning and afternoon peak period congestion at these 18 locations altogether total over 5 million vehicle-hours of delay annually. Details of the extent of delay at each of these high congestion areas are provided in the Appendix.

4.2 Future Base Case: Planned Investments Scenario

Definition of Base Case. To assess the need for additional capital investment, it is necessary to define a *base case* representing “normally expected” levels of capital investment and then an *alternative case* representing more aggressive investment in transportation capacity and services for the period from 2000 to 2025. To maximize credibility of the analysis, it is important that these cases be defined in ways that are deemed both realistic and prudent (erring on the side of caution in assessing needs for further spending).

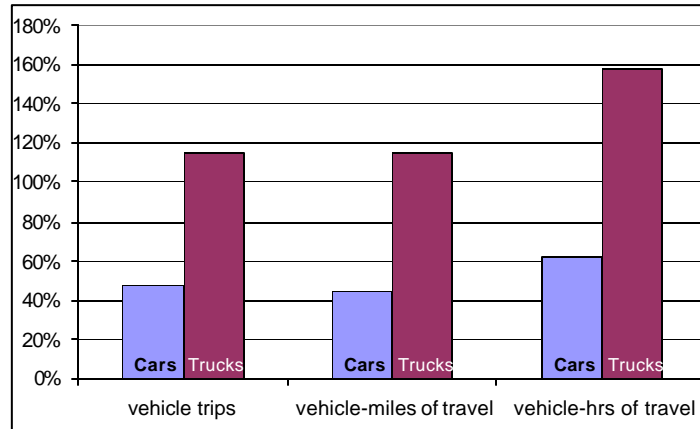
This study has defined the base case as implementation of all transportation capital investments currently planned for the next twenty years – a package costing an estimated \$4.2 billion in today’s dollars, although that cost would be spread over the period of twenty years. This is referred to as the “*Planned Investments Scenario*.” Since full funding to support this scenario has not yet been secured, this could be considered an optimistic assumption. The result of using this definition for the base case is that it will make the incremental benefit of further capital investment (in a more improved transportation system) appear to be smaller than if a more pessimistic base case was adopted. However, this approach will help prevent arguments that the study has intentionally assumed a “worst case scenario” for the base case in order to maximize the apparent benefit of additional transportation investment.

Truck Traffic
Forecasts for 2025 show truck trips growing at more than double the rate of car trips.

Forecast Regional Changes. Figure 4-2 and Table 4-2 show the baseline projection for road traffic. They show the number of car trips growing 48% over the 2000 - 2025 time period, closely matching Metro’s mid-level projections for regional population growth. However, the projections show truck trips growing a 116% -- well over double the growth rate for cars. Trips lengths are not expected to change much, so that total vehicle-miles of travel reflect these same increases. However, average vehicle speeds are projected to drop significantly, causing total vehicle-hours of travel to increase at a much higher level, rising 63% for car trips and 157% for truck trips.

Figure 4-2. Planned Investments Scenario: Growth in Trips, Vehicle-Miles and Travel Times, 2000 – 2025

Source: calculations by EDR Group based on data from Metro



In other words, the Metro travel models are forecasting that speeds will slow significantly as traffic becomes increasingly congested, and travel times will increase accordingly. The projected difference is over 212,000 hours of additional vehicle travel time per day in 2025 (compared to what would be the case if year 2000 speeds still applied to all trips in 2025). That represents over 55 million hours of additional travel time incurred annually – representing an average of 50 hours of time lost annually per household. These are substantial numbers and the increases in congestion will especially hit truck traffic and thus have a particularly strong impact on the region’s business base.

Base Case Traffic Congestion
Forecasts for 2025 show 212,000 hours of additional vehicle travel time per day due to higher traffic volumes.

Table 4-2. Projection of Road Traffic (average weekday) -- Current Conditions and 2025 Planned Investments Scenario

| | PM Peak | Daily Total | Cars | Trucks |
|-----------------------------------|------------|-------------|------------|-----------|
| Vehicle Trips | | | | |
| 2000 “Current Conditions” | 1,024,623 | 5,742,615 | 5,655,592 | 86,253 |
| 2025 Planned Investments Scenario | 1,550,878 | 8,544,485 | 8,356,715 | 186,826 |
| Percent Change | 51.4% | 48.8% | 47.8% | 116.6% |
| Vehicle-Miles of Travel | | | | |
| 2000 “Current Conditions” | 6,735,165 | 36,520,585 | 34,775,204 | 1,665,525 |
| 2025 Planned Investments Scenario | 10,086,695 | 53,987,090 | 50,279,629 | 3,603,366 |
| Percent Change | 49.8% | 47.8% | 44.6% | 116.4% |
| Vehicle-Hours of Travel | | | | |
| 2000 “Current Conditions” | 230,901 | 1,188,588 | 1,141,223 | 42,335 |
| 2025 Planned Investments Scenario | 423,827 | 1,980,852 | 1,865,176 | 109,104 |
| Percent Change | 83.6% | 66.7% | 63.4% | 157.7% |
| Average Miles per Trip | | | | |
| 2000 “Current Conditions” | 6.6 | 6.4 | 6.1 | 19.3 |
| 2025 Planned Investments Scenario | 6.5 | 6.3 | 6.0 | 19.3 |
| Percent Change | -1.1% | -0.6% | -2.1% | -0.1% |
| Average Miles per Hour | | | | |
| 2000 “Current Conditions” | 29.2 | 30.7 | 30.5 | 39.3 |
| 2025 Planned Investments Scenario | 23.8 | 27.3 | 27.0 | 33.0 |
| Percent Change | -18.4% | -11.3% | -11.5% | -16.1% |

All numbers are per weekday. Source: calculations by EDR Group based on data from Metro

Public Transit Shares. Table 4-3 shows the projected future mode split under the Base Case Scenario (for motorized modes only) and its change from year 2000 conditions. It indicates that the region-wide transit share of all person-trips is expected to increase over the period from the year 2000 to 2025, for all classes of trips. This result can be attributed to a combination of factors -- the substantial increases in delay for car travel, planned changes in capacity for transit to accommodate additional demand, and assumed changes in land use development patterns over time.

Table 4-3. Projection of Public Transit Share by Trip Purpose -- Current Conditions and 2025 Planned Investments Scenario (avg. weekday, motorized modes only)

| Trip Purpose | Year 2000 | Year 2025 |
|---------------------|----------------------|--------------------------------|
| | "Current Conditions" | "Planned Investments Scenario" |
| On-the-clock | 1.5% | 2.1% |
| Commuter | 9.2% | 12.8% |
| Personal/Recreation | 2.0% | 3.7% |
| Total | 3.9% | 6.1% |

Source: calculations by EDR Group based on data from Metro

Public Transit
The Base Case has public transit shares increasing substantially, especially for commute trips. However, on-the-clock business trips generally require trucks and delivery vehicles and remain "prisoners of congestion."

In interpreting these numbers, it is also important to note that the regional transit share for commuting trips is over double that of the average for all trips. In fact, the current transit share for commuting trips is even higher in those corridors where there is strong transit service, exceeding 30% for commuting trips along the I-84 and west side corridors. These figures confirm that public transit can be an important means of serving work commuting travel and some personal travel. However, transit services do not meet the specialized needs of "on-the-clock" business travel for delivery of freight or delivery of installation/repair services (usually requiring trucks), and they limited application in serving some of the more spatially diverse and time sensitive requirements for business sales and service calls. As many business-related trips are subject to schedule requirements, they become "prisoners of congestion."

Additional Effects on Regional Travel Conditions. The changes in travel conditions shown earlier are based on forecasts of *average* travel times and speeds. However, it is well known that congestion not only slows traffic speeds, but it also increases *variability* in travel times. When congestion becomes severe (i.e., traffic levels exceed 90% of road design capacity), the frequency of incident-related delays increases dramatically. Under those conditions, any minor accident, flat tire or engine stall can lead to traffic backups and long-lasting slowdowns. This increases the unpredictability of travel times on affected routes. When such traffic incidents occur, the time delays are often double or triple the average delay due to congestion alone. As occurrences become more common, travelers and businesses adjust their

schedules to allow for this uncertainty. The result is further time built into commuter and business delivery schedules.

To account for this factor, transportation researchers have developed the concept of a “variability penalty factor” that is added to average time delay estimates. That factor varies depending on the extent of severe congestion along major travel corridors. This penalty factor is projected to nearly double over the next twenty years, going from an 18% add-on under year 2000 conditions to a 34% add-on under the 2025 Planned Investments Scenario. (Further documentation is provided in the Appendix.)

In addition to affecting travel times in the region, congestion also affects *market access*. As travel speeds slow, the delivery market that a business can serve within any given time period shrinks. So too does the labor market from which a business can draw for its workers. So when regional average speeds slow by 11% (from 30 mph today to 27 mph as forecast for the 2025 Planned Investments Scenario), these market areas shrink accordingly. As congestion also increases schedule uncertainty, the result is yet further shrinkage in job, shopping and delivery market access in addition to the previously cited effects on travelers.

4.3 Capital Investment (Improved System) Scenario

Definition of Illustrative Alternative Scenario. To assess the relative benefit of additional capital investment in regional transportation capacity, it is necessary to define an “alternative case” representing greater investment from now to the year 2025 than the base case of normally expected investment. The purpose of this comparison is to show the potential economic benefit associated with additional investment in an improved transportation system, and the potential cost of failing to do so. To maximize the credibility and usefulness of this analysis, it is important that both the proposed investment scenario (referred to as the Improved System Scenario) and the base case (referred to as the Planned Investments Scenario) be deemed realistic and achievable.

The intent at this point in time is to provide an illustrative example of the magnitude of potential benefits associated with an increase in capital spending, and not to justify any package of specific projects or programs. Yet it is technically impossible to calculate the changes in travel conditions without assuming some mix of projects. Accordingly the authors of this study, working in consultation with Metro and the Portland Business Alliance, decided to use the mix of projects in the current regional plan known as the “2025 Preferred Alternative” as the illustrative *Improved System Scenario* for this report.

The Improved System Scenario represents a \$10.4 billion investment in transportation capital improvements over the period from now to 2025, which will provide increased roadway and transit capacity to help meet future growth needs. It represents an

additional \$6.2 billion above the \$4.2 billion Planned Investments Scenario, which is anticipated to be affordable given traditional funding streams. (All values are in today's dollars.) This scenario of increased capital investment includes a package of many types of transportation capital investments, shown in the box below:

Elements of the Improved System Scenario

- *Rail and road expansions* to maintain access and connections for national and international rail, air and marine freight to reach its destination with limited delay.
- *Major highway expansions* to maintain regional mobility and enhance access to intermodal industrial areas and facilities where goods move from one transportation mode to another.
- *Arterial street expansions* to maintain access to regional highways and to maintain circulation and access between the central city, regional centers and town centers.
- *Increase in transit service* -- including longer hours, increased light rail transit to the central city and regional centers, commuter rail and streetcar service in downtown Portland, plus new bus routes to serving employment areas.
- *New street connections to regional highways* to slow increases in traffic congestion and provide direct alternate routes and, within regional and town centers, to improve access by all modes of travel.
- *Road management strategies* such as ramp metering, signal timing and access management, and transit strategies such bus-only lanes and signal preemption to increase traffic flow and reduce congestion delay.

There are two important notes about this Improved System Scenario:

- First, the level of capital investment assumed by this scenario is deemed to be challenging but possible to finance over two decades with some combination of local, state and federal funds, private financing and/or user fees. Its scale will reduce but not eliminate future increases in traffic congestion.
- Second, the impacts of this scenario were calculated assuming a currently-envisioned package of road and transit system investments, which allowed the study team to calculate the size of region-wide impacts from investing in a regional congestion reduction strategy. However, this does not replace the need for careful evaluation of individual project investments in the future, nor does it preclude the possibility of formulating and later adopting a revised combination of projects or programs to achieve a similar economic impact.

Forecast Regional Changes. Metro's traffic forecasting models show that the Improved System Scenario substantially improves region-wide traffic flow, as shown in Table 4-4. First, there is an 0.7% reduction in total vehicle-miles of travel (VMT). While this percentage appears modest, it represents a savings of over 400,000 vehicle-miles of vehicular traffic *each weekday*. This savings is attributable to two factors: (a) more availability of transit, particularly for commuting trips, and (b)

more capacity on some road routes, reducing the need for diversion of that traffic to longer routes in avoid known bottlenecks.

Even more dramatic are the improvements in travel speeds and savings in travel times. Average travel speeds are projected to improve nearly 5.7% for cars and 4.5% for trucks. As excess travel mileage is also reduced, the net savings in total vehicle hours of travel is even greater: 6.3% for cars and 5.3% for trucks. The overall line impact is dramatic, reflecting a savings of over 118,000 hours of travel delay each weekday. Over the course of a year, that totals over 30 million vehicle-hours of time saved under the *Improved System Scenario* that would be time lost under the *Planned Investments Scenario*. By 2025, the annual savings will represent an average of 27.8 hours for every household in the Portland metro area.

Reduced Congestion with Additional Investment
Forecasts for 2025 show that the Improved System Scenario would save over 118,000 hours of vehicle travel time per day that would otherwise be lost under the Planned Investments Scenario.

Table 4-4. Improved System Scenario: Impact on Future Road Traffic
--Difference of Improved System Scenario to Planned Investments Scenario, avg. weekday

| | PM Peak | Daily Total | Cars | Trucks |
|-----------------------------------|------------|-------------|------------|-----------|
| Vehicle Trips | | | | |
| 2000 "Current Conditions" | 1,024,623 | 5,742,615 | 5,655,592 | 86,253 |
| 2025 Planned Investments Scenario | 1,550,878 | 8,544,485 | 8,356,715 | 186,826 |
| 2025 Improved System Scenario | 1,505,052 | 8,312,630 | 8,124,215 | 186,826 |
| Percent Change | -3.0% | -2.7% | -2.8% | 0.0% |
| Vehicle-Miles of Travel | | | | |
| 2000 "Current Conditions" | 6,735,165 | 36,520,585 | 34,775,204 | 1,665,525 |
| 2025 Planned Investments Scenario | 10,086,695 | 53,987,090 | 50,279,629 | 3,603,366 |
| 2025 Improved System Scenario | 9,974,664 | 53,584,815 | 49,837,481 | 3,563,402 |
| Percent Change | -1.1% | -0.7% | -0.9% | -1.1% |
| Vehicle-Hours of Travel | | | | |
| 2000 "Current Conditions" | 230,901 | 1,188,588 | 1,141,223 | 42,335 |
| 2025 Planned Investments Scenario | 423,827 | 1,980,852 | 1,865,176 | 109,104 |
| 2025 Improved System Scenario | 387,597 | 1,862,024 | 1,748,300 | 103,284 |
| Percent Change | -8.5% | -6.0% | -6.3% | -5.3% |
| Average Miles per Trip | | | | |
| 2000 "Current Conditions" | 6.6 | 6.4 | 6.1 | 19.3 |
| 2025 Planned Investments Scenario | 6.5 | 6.3 | 6.0 | 19.3 |
| 2025 Improved System Scenario | 6.6 | 6.4 | 6.1 | 19.1 |
| Percent Change | 1.9% | 2.0% | 2.0% | -1.1% |
| Average Miles per Hour | | | | |
| 2000 "Current Conditions" | 29.2 | 30.7 | 30.5 | 39.3 |
| 2025 Planned Investments Scenario | 23.8 | 27.3 | 27.0 | 33.0 |
| 2025 Improved System Scenario | 25.7 | 28.8 | 28.5 | 34.5 |
| Percent Change | 8.1% | 5.6% | 5.7% | 4.5% |

All numbers are per weekday. Source: calculations by EDR Group based on data from Metro

Public Transit Shares. The changes in transit reliance are shown in Table 4-5. The Improved System Scenario increases the public transit share of trips to more than double the year 2000 levels. However, it is clear that the most significant shift is for

commuting to work, which is the class of trips most easily shifted (since users have predictable origins, destinations and times of travel).

Table 4-5. Improved System Scenario: Change in Public Transit Share
-- Difference of Improved System Scenario to Planned Investments Scenario
(avg. weekday, motorized modes only)

| Trip Purpose | 2000 | 2025 Base Case | 2025 Improved System Scenario |
|-------------------------|-------------|-----------------------|--------------------------------------|
| On-the-Clock | 1.5% | 2.1% | 2.3% |
| Commute to Work | 9.2% | 12.8% | 16.6% |
| Personal - Recreation | 2.0% | 3.7% | 4.6% |
| Total: All Trips | 3.9% | 6.1% | 7.7% |

All figures are per day. Source: calculations by EDR Group based on data from Metro

Additional Effects on Regional Travel Conditions. The figures shown in Table 4-4 understate the full benefits of the Improved System Scenario because they only reflect forecasts of differences in *average* travel times and speeds. In fact, the avoidance of severe congestion (that would otherwise occur under the Planned Investments Scenario) will also reduce the *variability* in travel times. There will still be a “travel time variability penalty factor” but the Improved System Scenario will reduce growth in that factor to half of what would otherwise occur.

In addition, the increased speeds possible under the Improved System Scenario will also maintain *market access* closer to current conditions, instead of allowing it to degrade as much as predicted under the Planned Investments Scenario.

4.4 Conclusions

Transportation forecasting models show that the base case *Planned Investment Scenario* will not keep up with traffic growth, resulting in severe congestion delays. Under this scenario, slower speeds and increasing bottlenecks will add over 55 million vehicle-hours of travel time occurring annually. Dividing over the expected 2025 population base yields an average of 50 hours of time lost annually per household. These are very substantial numbers and the increases in congestion will especially hit commuter and truck traffic, directly affecting some business operations.

While the *Improved System Scenario* will not fully solve the congestion problem, it will provide substantial savings by avoiding more than half of that delay. Most importantly, it will disproportionately relieve congestion growth during the morning and afternoon peaks. This will allow businesses to deliver more efficient and cost-effective services during those times. This congestion reduction will allow “local-serving industries,” such as the electric utility and hospital suppliers, to avoid having to pass on their additional costs of congestion to their customers. It will also make the region more competitive as a place for manufacturers and wholesale/distribution

businesses to remain and grow.

5

ECONOMIC IMPACTS

Earlier chapters showed that Portland area’s business activity and economic base are particularly vulnerable to traffic congestion, and that planned transportation system investments will be insufficient to avoid the development of severe congestion delays in the next twenty years, potentially causing significant loss of time and access for residents and businesses.

This chapter calculates the economic stakes involved in transportation capital investment for the Portland area, by comparing economic impacts of an Improved System Scenario against those of implementing only a Planned Improvements Scenario. It considers impacts on business delivery and operating costs, household expenses, and access for product delivery markets and labor markets. Altogether, it shows that the stakes involved for the development and maintenance of Portland’s area economy are indeed substantial.

The analysis shows that the benefit of implementing an Improved System Scenario, or the loss associated with not implementing it, will grow each year. The regional impact (counting both income generated and the value of personal time) can exceed \$844 million/year by 2025. Over 6,500 jobs can be at stake. A benefit-cost comparison shows that net present value of benefits can exceed the costs by a factor of at least 2 to one. The cumulative benefit is expected to exceed the cost by more than \$3.6 billion dollars. These results show that the potential benefit of implementing an Improved System Scenario is large, as is the potential loss associated with failure to do so.

These findings do not endorse any specific transportation policies or projects, but they do show the importance of taking action and the magnitude of potential stakes. They indicate a need for further discussion among residents, businesses and

5.1 Types of Economic Impacts and Benefit Measures

Types of Economic Impacts. While there are many facets of impact associated with traffic congestion under alternative future scenarios, they can be organized into two broad groups which are discussed in Sections 5.2 and 5.3:

- (1) Travel cost impacts – including travel time, schedule variability and travel distance impacts, which in turn also affect traveler fuel use, safety, cost of living and business operating expenses. (Section 5.2)

- (2) Access impacts – effects beyond the cost of travel, that affect the nature of freight delivery markets, logistics, labor markets and the business productivity of operating in alternative locations. (Section 5.3)

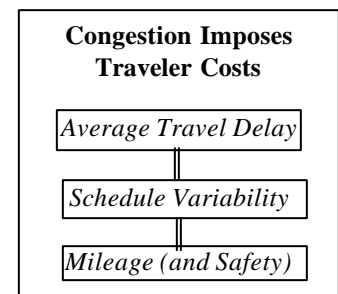
Types of Benefit Measures. The different types of economic impacts can be used to generate three benefit measures. They are discussed in Section 5.4.

- (1) Traveler Benefit – This measure puts a dollar value on benefits to travelers. It includes savings in business costs, household expenses and personal time savings. This is the traditional measure of transportation system efficiency.
- (2) Benefit to the Economy – This measure counts growth of the regional economy due to changes in household living costs, business operating cost, productivity and competitiveness. However, it does not count the value of personal time, since that does not directly affect the flow of dollars.
- (3) Society Benefit – This measure combines the income-generating value of benefits to the economy together with the value of non-money traveler benefits such as personal time savings. It avoids double-counting to provide the most comprehensive measure of overall impact.

5.2 Traveler Savings from Congestion Reduction

Concept of Congestion Cost. The *traveler cost of congestion* is the dollar value of the additional travel, travel cost and accidents that congestion causes for travelers. The key components of this economic cost are:

- Cost of Time Delay. High levels of congestion forecast for the Planned Investments Scenario lead to increasing travel time delays. These bring along costs for excess engine idling time, driver and passenger time, and truck freight delivery (loading dock and inventory staff) time.
- Cost of Travel Time Variability. When congestion becomes severe, the frequency of incident-related delays increases dramatically. This increases the unpredictability of travel times on affected routes, and causes businesses to adjust their delivery schedules to allow for this uncertainty. The result is a further time cost built into delivery schedules.
- Cost of Excess Mileage to Avoid Congestion Bottlenecks. High congestion delays and gridlock cause some drivers to use longer routes to avoid the congestion backups. Each additional vehicle-mile of travel due to congestion effects leads to a cost associated with additional vehicle fuel use and accidents.



These travel-related costs are calculated on the basis of average daily and average peak period travel speeds and distances. As such they understate the full problem for businesses, since they do not reflect the extent to which some firms discourage their workers from travel on certain corridors and at times of day because of congestion. The result –trucks shifting to alternative routes and earlier or later delivery times, was already reported and confirmed in the business interviews. Such shifts in business operation are absorbed as higher operating costs for those affected businesses, which are in addition to the delays indicated by the table.

Traveler Savings from Implementing the Improved System Scenario. The total annual traveler savings associated with the Improved System Scenario is valued at \$789 million/year as of the year 2025. The value of this benefit grows over time, so it is smaller in years before 2025 and greater for years after 2025.

Traveler Savings
The travel time and travel expense savings from implementing the Improved System Scenario is \$789 million per year as of the year 2025. This is just one element of the total cost of congestion.

This benefit measure includes the dollar value of all congestion-related travel time, travel expense and travel safety impacts that can be avoided by implementing that scenario in place of the Planned Investments Scenario. These traveler impacts in turn affect business costs, household expenses and personal time savings.

This is the traditional measure of transportation system efficiency. However, it is important to note that this measure does not discriminate between real money cost savings and personal time savings that do not affect the flow of money in the economy. It also does not discriminate between benefits for people and businesses residing in the Portland area and benefits for those that are just passing through the area. A breakdown of these savings is shown in Table 5-1, and these benefits are explained in the text that follows.

Table 5-1. Traveler Time and Cost Savings from Implementing the Improved System Scenario instead of the Planned Investments Scenario (annual benefit, year 2025)

| Category of Impact | Total Annual Benefit | Annual Benefit / Households |
|--|----------------------|-----------------------------|
| (a) Savings in Business-Related Travel Time | \$356 million | \$323 |
| (b) Savings in Business-Related Travel Expense | \$ 9 million | \$ 8 |
| (c) Savings in Personal Time Savings | \$418 million | \$380 |
| (d) Savings in Personal Travel Expense | \$ 6 million | \$ 5 |
| (e) Total Traveler Savings | \$789 million | \$716 |

** includes savings in average travel time plus avoidance of scheduling to allow for travel time unreliability.*

Source: Calculations by EDR Group; see Appendix for further explanation.

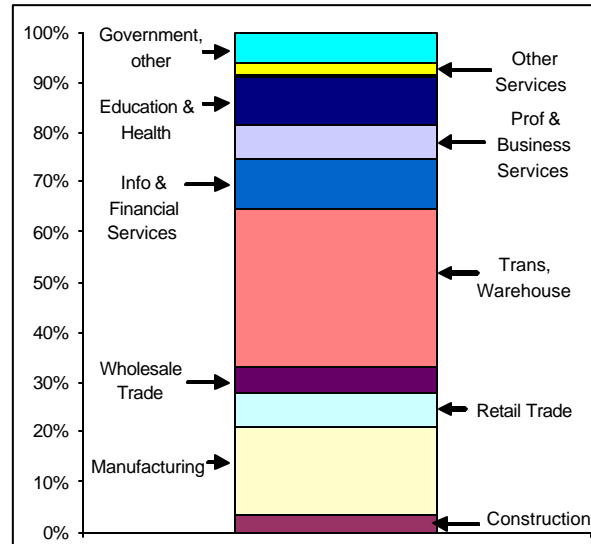
Note: All values are in constant year 2005 dollars

- (1) Business Time Cost Savings (\$356 million) – Businesses save incurring the excess time costs that would otherwise occur under congested conditions. The benefits include reduced driver or traveler time spent en route, as well as reduced scheduling costs related to delivery time uncertainty.
- (2) Business Operating Cost Savings (\$9 million) – Businesses save incurring the excess expenses that would otherwise occur under congested conditions. The benefits include lower vehicle operating expenses and lower accident costs.
- (3) Household Personal Time Savings (\$418 million) – Households receive a benefit from congestion reduction in the form of time savings for personal travel (that is not business related). The value of this time savings is considered by transportation planners and economists to be as quite real for purposes of benefit-cost analysis. However, this value does not directly bring dollars in anyone’s pocket, so it does not directly affect flow of money in the economy.
- (4) Household Personal Expense Savings (\$6 million) – Households save incurring the higher cost of living that would otherwise occur under congested conditions. The benefits include lower vehicle operating expenses (fuel, etc.) and accident costs due to fewer vehicle-miles of personal travel. This avoided cost represents additional disposable income. It is relatively small in this case because most of the household benefit is a time savings rather than a driving distance savings.

Local Share of Benefit. The traveler savings discussed above are the savings occurring for traffic moving within the Portland metropolitan area. An analysis of the origin and destination patterns of trips in the region shows that 89% of that benefit goes to persons residing and businesses located within the metropolitan area. In other words, \$328 million of the total \$365 million of business travel cost savings from the Improved System Scenario affects the Portland metropolitan area’s economy.

Types of Businesses Benefiting from Cost Savings. The \$328 million of local business travel cost savings associated with implementing the Improved System Scenario is distributed among sectors of the economy. Figure 5-1 shows that the cost savings are greatest for the region’s trucking, warehousing, manufacturing and trade sectors. Those are the industries that rely most on truck freight shipment. Also affected are office activities, as higher commuting costs in congested areas have been shown to affect costs of worker compensation.

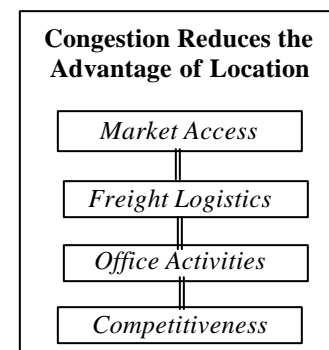
Figure 5-1. Distribution of Direct Business Cost Savings Among Industries



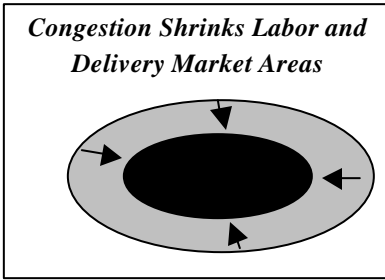
Unmeasured Additional Business Benefits. Finally, in evaluating benefits of implementing the Improved System Scenario, it is important to note that there are additional types of benefits that are not counted in the current calculations. One type of unmeasured benefit pertains to the special needs of morning business deliveries. Many business deliveries are made early in the morning. The business interviews indicated a distinct possibility that failure to slow the growth of morning peak period congestion could make current morning truck delivery “time windows” no longer viable for trucking/freight transportation in the future. If these “windows” were to close, there would be no other time for shippers to schedule deliveries unless it is in the very late or very early hours – which will bring their own set of financial costs for business and environmental impacts for residents. Issues such as this cannot be fully quantified, but do represent a benefit of implementing the Improved System Scenario, which is over and above the dollar value of business travel cost savings.

5.3 Market Access and Competitiveness Impacts

Market Access Effect on Logistics. Beyond the impact on costs for existing travel (covered in Section 5.2), congestion can have an additional impact of on regional competitiveness for business attraction and expansion. Quite simply, congestion reduces the advantage of location. For example, as average travel speeds slow and travel time variability increases, the *delivery market* that a business can reliably serve within any given time period shrinks. So too does the *labor market* from which a business can draw for its workers.



Facing a loss of market access due to congestion, those businesses that depend on delivery of goods and services can respond in several ways. They can adjust their warehousing and logistics processes to stock more inventory, provide distribution from a larger number of locations, deploy more delivery vehicles and drivers, or reduce guarantees for delivery times. All of these adjustments still involve increased costs or reduced revenue that are beyond the direct change in travel time and expense. However, there are thresholds



beyond which any particular type of business activity can no longer survive. If the delivery market shrinkage, delivery reliability loss or cost increase for serving outside markets becomes sufficiently large, then businesses become more likely to move some or all of their activities out of the Portland region.

Examples offered in the Chapter 2 business interviews show how these effects on business location are already starting to occur for some manufacturing, service and wholesale distribution firms. Of course, there are ways to minimize such losses. Improvement in both transit services and highway travel speeds, as projected for the Improved System Scenario, help minimize the labor market access shrinkage. However, only highway system improvements can help maintain truck delivery market access.

Market Access Requirements of Office Activities. A significant portion of the economy does not depend on the delivery of goods and services via truck, but instead operates through electronic, telephone, mail and courier services. This includes headquarters operations and major back office functions of financial institutions, insurance companies and some business services (such as data processing). It also includes regional and national headquarters offices of retail chains and distribution companies. However, these major office activities still require access; they typically locate where there is broad labor force access for both executives and clerical staff (including both public transit and highway access) and often also good access to a major airport for regional or national travel by executives and sales force employees. For regional activities, road access for sales and service travel is also important.

As congestion increases under Planned Investments Scenario conditions, it will reduce the future attractiveness of the Portland region for attracting and retaining these office activities. However, improvements in both transit services and highway systems, as projected for the Improved System Scenario, would help to maintain worker access and thus enhance the ability of the region to attract and expand its base of office activities.

Access Effects on Economic Competitiveness. The long-run impact of congestion on regional economic development cannot be viewed in isolation. It must be viewed in terms of how it affects overall regional competitiveness for business site location decisions, which affects attraction, retention and expansion for regional and national

firms that serve markets beyond the Portland region. In this respect, the effect of congestion on business site location and investment decisions can be deceiving. Even when the term “congestion” is not stated as a business site selection criterion, it ends up affecting a variety of other site selection factors, as shown in the box that follows:

Congestion Effects on Location Competitiveness for Business Attraction

- At the point when a business site selector is screening competing urban areas, congestion can affect the availability of a workforce with required skills, especially for firms seeking more specialized and larger workforces at a single location.
- Congestion can also affect accessibility to transportation routes and terminals, and transportation shipping costs, especially for firms with heavy freight shipping requirements and broad scale delivery markets.
- Within a region, congested areas can have higher wage rates to compensate for the more difficult worker commute.
- At the point of screening specific sites, congestion can affect land costs, and it will clearly affect travel times for truck access to suppliers, customers, ports and intermodal terminals.
- When congestion becomes a sufficiently sized problem at a region-wide scale, then it also becomes a quality of life issue that influences where people choose to live and how much they pay for housing, as well as accessibility to cultural and recreational assets and leisure time available.

Competitiveness Differences Among Cities. The relative impact of congestion in any region is affected by the area’s transportation dependence and its other (non-highway related) strengths and weaknesses. For instance, San Jose and Boston have high living costs and traffic congestion, but they have economic bases that rate very high in terms of educational institutions, technology R & D and venture capital. Los Angeles and New York have even higher levels of congestion but they each have unique economic bases focusing on specialty tourism, entertainment and financial services, as well as international connections.

The report on *Economic Development Strategy for the City of Portland* (Portland Development Commission, 2002) provided detailed comparison of Portland’s advantages and disadvantages for a broad set of population and business location factors, compared to eleven other metropolitan areas. Additional comparisons were developed as part of this study, using a geographic information system to further evaluate the Portland region’s market access and costs relative to those same cities.⁶ These various comparisons show a consistent set of findings:

⁶ Austin, Denver, Las Vegas, Minneapolis -St. Paul, Phoenix, Sacramento, Salt Lake City, San Diego, San Jose and Seattle.

Relative Advantages & Disadvantages of the Portland Area for Business Attraction

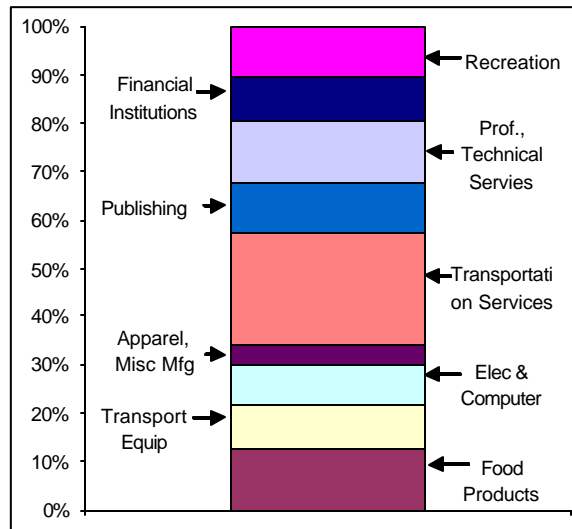
- The region's labor costs, worker skills and non-labor costs are mixed but generally in the middle of the range of other cities, neither advantageous nor an absolute obstacle.
- The region's research and funding base is not particularly strong. It ranks relatively low in R & D, research institutions, universities and venture capital industries, which are relatively low in sensitivity to traffic congestion.
- The region is relatively strong in transportation-reliant manufacturing industries as well as transportation-related wholesaling, trucking, rail and air freight.
- The region's location away from most other major markets has made its transportation connections to outside areas particularly important. This includes international air and marine ports and the road connections to them.
- The region has a pattern of land use and development that makes vacant land for industrial development relatively scarce. This increases the importance of preserving good access to/from available sites.

In summary, the Portland region tends to lack the types of institutions and location advantages that reduce transportation dependency. Many of the region's core industries and relative strengths are, in fact, reliant on transportation connections.

Improved System Scenario: Business Attraction Impact. A business competitiveness and targeting model was used with a “geographic information system” to calculate how the future congestion scenarios would affect size of the population base within commuting range, and the business base within delivery range of Portland.⁷ The system also calculated how these scenarios would affect access to the airport, marine port and intermodal rail facilities. The model estimated how changes in these various elements of access would affect productivity for various industries and hence the region's competitiveness for attracting and expanding them. The analysis showed that the Improved System Scenario would retain greater regional economic competitiveness than the Planned Investments Scenario. Figure 5-2 shows a breakdown of affected businesses, which are largely those dependent either on access to skilled labor or delivery access to broader national markets. The scale of affected employment and business output is discussed next, in Section 5.4.

⁷ Transportation Economic Development Impact System; see Appendix for further information

Figure 5-2. Portland Area Industries Most Affected by Market Access Changes



5.4 Overall Economic Impact

Economic Analysis System. The Transportation Economic Development Impact System (TREDIS) is a framework for evaluating regional economic impacts of transportation scenarios, encompassing traveler impacts (as discussed in Section 5.2) as well as market access effects (as discussed in Section 5.3). It also includes impacts for both freight and passenger travel, and for both public transit and road transport modes. These effects can be summarized in terms of three categories:

- **Economic Impact of Travel/Time Cost Changes** – Business travel time and expense changes affect local cost of doing business, while household expense savings affect local cost of living. Changes in these cost savings end up shifting local spending patterns and prices, affecting local business activity and investment, and thus employment for some industries. The economic analysis system also recognizes that not all of these changes are absorbed in the local economy; some are passed on to customers outside of the region.
- **Economic Impact of Travel Access Changes** – Changes in access times also lead to effective changes in labor market and product delivery market areas, as well as access to intermodal transportation connections. These access changes end up shifting productivity and thus regional competitiveness for attracting various manufacturing, service and office industries.
- **Economic Value of Personal Time Changes** – Changes in travel time for personal (non-business) trips have a value to society. However, they do not directly affect the flow of dollars in the economy, so their value is counted separately from the calculation of impact on the regional economy.

The methodology for calculating these impacts is described in the Appendix.

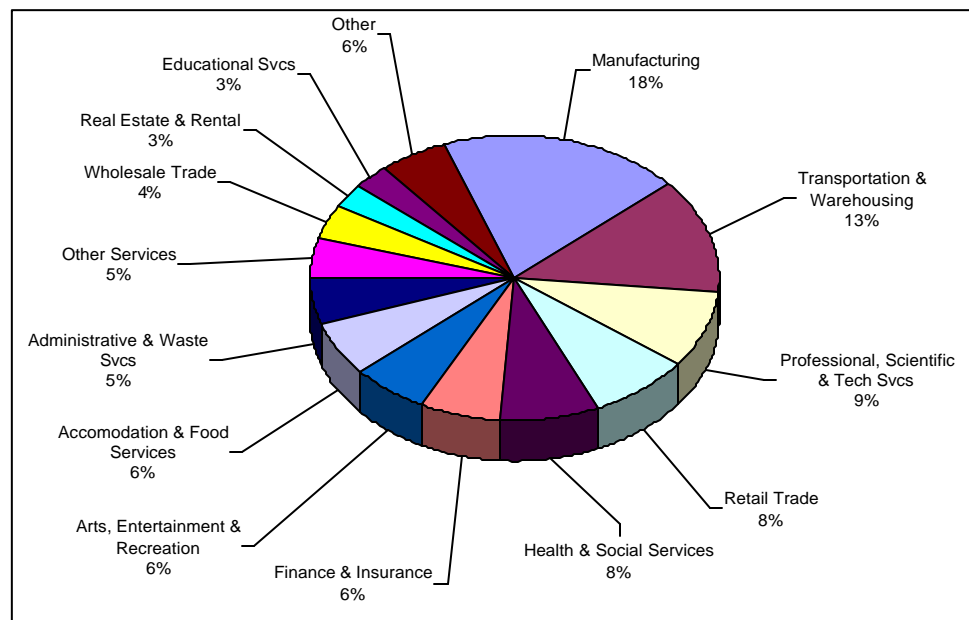
Findings on Regional Economic Impacts. The findings on economic impacts are presented in Table 5-2 on the next page. This table shows the economic benefit of implementing an *Improved System* instead of just allowing the *Planned Investments* scenario to occur. Alternatively, it can be interpreted as the loss that would occur if the region fails to implement an improved system and instead only implements currently planned investments.

As transportation forecasts are for congestion to continue growing, and since the Improved System Scenario would be implemented over twenty years, the benefits of implementing this scenario will also grow larger over time. All numbers shown here reflect annual impacts as of the target year 2025. Benefits for earlier years will be smaller and benefits for later years will be even larger.

Metro Area Economy - Part I of Table 5-2 shows impacts on the regional economy, which can be measured in terms of either total Business Sales (\$848 million/year) or as the portion of those business sales that is additional income produced in the region (referred to as Gross Regional Product or Value Added, totaling \$426 million/year). In any case, an estimated 6,500 continuing jobs are at stake.

The impacts shown here reflect net change in the regional economy attributable to travel-related cost changes (from Section 5.2) and additional market access changes affecting business productivity and competitiveness (from Section 5.3), plus additional impacts on other industries that are affected by business supplier orders and worker spending. The overall impacts are distributed widely across the region’s economy, as shown in Figure 5-3.

Figure 5-3. Distribution of Employment Impacts on the Regional Economy of the Portland Metropolitan Area



source: economic model analysis by EDR Group

**Table 5-2. Economic Impacts of Implementing the Improved System Scenario instead of the Planned Investments Scenario
(Annual Impact as of 2025)**

| <i>Part I -- Impact on the Metropolitan Area Economy</i> | <i>Annual Impact (2025)</i> |
|--|-----------------------------|
| (A) Total Growth of Business Output ^[1] | \$848 million |
| (B) Portion of Business Output (A) that is Value Added (i.e., additional personal + corporate income generated) ^[2] | \$426 million |
| (C) Total Jobs supported by the Additional Value Added | 6,500 jobs |

| <i>Part II - Total Benefit to the Region</i> | <i>Annual Impact (2025)*</i> |
|--|------------------------------|
| Additional Income Generated in the Economy (<i>from B above</i>) | \$426 million |
| + Additional Value of Personal Time (<i>from Table 5-1-C</i>) | \$418 million |
| + <u>Additional Value of Air Quality Improvement</u> | <i>not measured</i> |
| = Total Benefit to the Region | \$844 million |

* All values are as of the target year 2025, but are expressed in constant 2005 dollars

[1] Output is the total business revenue or sales volume.

[2] Value Added is the output minus the cost of materials. It thus represents the total of income paid to workers and net corporate income that is either reinvested in the firm or distributed to its owners. It also represents the change in Gross Domestic Product (GDP) of the region.

Total Benefit to the Region - Part II of Table 5-2 shows the total economic value of benefit to the region, which is the sum of the impacts on income produced in the economy *plus* the value of non-money impacts that do not directly affect the flow of dollars in the economy (such as time saved on personal and shopping trips). Congestion changes also have air quality impacts that represent additional benefits, though their value has not been calculated for this study. If they were added, the total benefit of implementing an Improved System scenario (or the loss from failing to implement it) would be even larger.

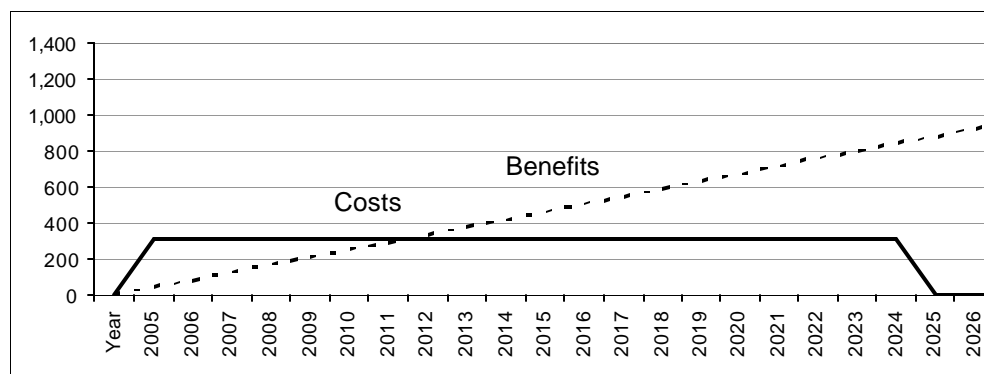
The impact for the Portland regional economy is estimated to be approximately **\$844 million per year** as of the year 2025, as shown at the bottom of Table 5-2.

Benefit- Cost Analysis. The full impact of implementing an Improved System Scenario instead of the Planned Investments Scenario is a stream of additional benefits and additional costs occurring over time. Benefit-cost analysis portrays those streams of benefits and costs and then discounts future year impacts to adjust for the time value of later year impacts. In that way, the present value of all benefit and cost streams can be examined in a consistent format.

Benefit and Cost Streams. Expressed in constant year 2005 dollars, the additional cost of implementing an Improved System is estimated to be \$6.2 billion, which would be distributed over a twenty year period (averaging \$310 million/year). The

additional benefits to the region will grow annually as additional transportation investments are made, reaching the benefit level of \$844 million (as shown by the bottom line in Table 5-2) by the year 2025, and then continue to grow annually for another ten years or until the early projects come to the end of their useful life. Figure 5-4 shows the relative size of benefits and costs over time, before any discounting is done. It shows that there are additional costs of an Improved System in the early years, but that the benefits grow larger than those costs after a few years.

Figure 5-4. Comparison of Benefits and Costs of Implementing the Improved System Scenario instead of the Planned Investments Scenario
(non-discounted, annual cost in millions of constant 2005 dollars)



Net Present Value. The benefits and costs do not all occur at the same time. Since there are costs incurred in the early years, and benefits phase in over a longer time period, it is necessary to represent both the cost stream and the benefit stream in terms of their “net present value.” This involves reducing future year costs and benefits by a discount rate that reflects the time value of money. While there is no firm agreement on discount rates, most states use a discount rate in the range of 5% to 7%. These discount rates represent the time value of money *over and above the rate of inflation*. Benefit-cost analysis involves comparing the discounted present value of all benefits and costs.

Table 5-3 shows the present value of all benefits and costs after adjusting for the time value of money beyond just inflation, assuming a standard 5% discount rate. The results shown here indicate that implementing the Improved System Scenario instead of the Planned Investments Scenario provides very large net benefits – over \$3.6 billion greater than the present value of capital costs. Altogether, the benefit/cost ratio is roughly two, indicating that there is a public benefit of two dollars for each one dollar of capital investment in transportation system enhancement.

Table 5-3. Benefit-Cost Analysis of Implementing the Alternative Case Instead of the Planned Investments Scenario

| | Discount Rate | Net Present Value (NPV*) |
|---------------------------------|---------------|--------------------------|
| NPV Benefit ^[1] | 5% | \$7,431,132,000 |
| NPV Cost ^[2] | 5% | \$3,778,518,000 |
| NPV Benefit – Cost | 5% | \$3,652,614,000 |
| NPV Benefit / Cost Ratio | 5% | 2.0 |

* Expressed in constant 2005 dollars, and further discounted to reflect their “present value”

[1] Discounted net present value of the stream of annual benefits to the region, as defined in Part II of Table 5-2, and illustrated in Figure 5-4.

[2] Discounted net present value of the stream of added costs distributed over twenty years, as illustrated in Figure 5-4. The total is less than \$6.2 billion because costs in future years are discounted to their present value.

Conclusion. Future congestion growth can have substantial impacts on jobs, income and business sales in the regional economy. The calculations provided here indicate that the economic payback can clearly justify a more aggressive approach to transportation capital investment in the region over the next twenty years.

More to the point, the results here indicate that potential stakes for the economy and residents of the Portland area are very large – representing thousands of jobs and hundreds of millions of dollars every year. These stakes can be seen as the benefit of implementing an improved system. However, they can also be seen as the potential loss associated with failing to increase transportation investment and instead just relying on currently planned improvements.

The margin of the difference between benefit and cost figures is also striking. The numbers are sufficiently large so that assumptions about what constitutes an Improved System Scenario could be changed within a wide range and yet the present value of total benefits could still exceed the value of total costs by billions of dollars.

These findings point to the importance of further dialogue among residents,

Return on Investment

The economic benefits of a more aggressive transportation system improvement program are large, exceeding \$844 million annually by the year 2025. The net present value of future benefits over thirty years exceeds costs by over \$3.6 billion dollars, and the economic return on investment for the Portland region is in the range of 2 to one.

businesses and government agencies to refine future plans for transportation investment in the region. It is quite possible that future plans could lead to even more effective results than the illustrative Improved System Scenario defined for this study.

6

CASE STUDIES

Citizens, business leaders and planners in a number of urban areas around North America have become concerned about the potential for severe congestion in the future and the possibility of significant economic consequences if the issue is not appropriately addressed. Business and civic leaders in other urban areas have also been studying the problem of rising congestion and are now taking action to address it. Those cases reinforce the value of this study as a starting basis for additional public discussion.

Examples from around North America also illustrate the range of policies and programs that can be adopted to minimize future congestion. They include capital investments to increase the capacity of highway and transit systems, transportation system management and prioritization strategies to enhance the efficiency of existing facilities, and pricing schemes that shift demand so that traffic most needing a facility can still move effectively while other traffic is shifted to alternative times, facilities or services. These examples provide a potentially useful basis for developing local action plans for the future.

This chapter highlights two types of examples that are relevant to the Portland region:

- Examples where a regional economic impact study was conducted to assess the regional economic consequences of congestion and alternative scenarios (Section 6.1).
- Examples of different types of solutions that have been adopted, or being considered for adoption, to address congestion in various metropolitan areas (Section 6.2).

These examples are described in summary fashion in this report; further details are provided in the Appendix.

6.1 Regional Economic Impact Studies

Selection of Case Studies. There are eight efforts in other cities that roughly parallel the Portland case in that they included studies of the economic costs of looming urban traffic congestion, and the economic benefits of taking action to address the problem. They are: (1) Vancouver BC, (2) Chicago, IL, (3) Atlanta, GA, (4) Milwaukee, WI, (5) Houston, TX (6) Los Angeles, CA, (7) Seattle, WA and (8) Toronto, ON. Major similarities and differences among these studies are described in the text that follows,

and key findings are summarized in Table 6-1 which then follows. More detailed descriptions of these case studies are also included in the Appendix to this report.

Comparison of Study Processes and Outcomes. The various studies of congestion and economic development implications have some key similarities and differences in terms of sponsorship, analysis methods, defined scenarios and recommended actions:

- **Sponsor** – Like Portland, several of the other case studies also involved private business organizations as sponsors or co-sponsors working together with government planning agencies (Vancouver BC, Chicago, Milwaukee). However, others were funded and conducted solely by government agencies (Atlanta, Houston, Los Angeles).
- **Traffic and Economic Analysis Methods.** Like Portland, all of the case studies included traffic modeling to establish the severity of expected future congestion, along with some form of economic model to calculate the cost to business and implications for economic competitiveness.
- **Planned Investments Scenario and Improved System Scenarios** – Like Portland, most of the case studies involved comparison between an explicitly defined Planned Investments Scenario that assumed financially constrained conditions and a proposed package of improvements that would require additional financing (Atlanta, Chicago, Vancouver). However, a few merely compared future conditions to existing conditions to calculate the change in congestion costs (Houston, Milwaukee).
- **Recommended Actions** – All of the case studies led to findings that additional capital investment in transportation system capacity was needed, and they subsequently led to action plans to raise funds and seek approval for some specific capacity expansion projects. However, the case studies varied in the mix of recommended solutions. Some included rail and/or bus transit investment as part of the solution for business delivery problems (Atlanta, Los Angeles, Vancouver BC, Toronto), some recommended tolls and other user fees to help raise funds and facilitate traffic flow (Chicago) and others focused only on investment to expand highway capacity (Milwaukee, Houston).

Comparison of Study Findings and Recommendations. Table 5-1 summarizes each of the case studies in terms of findings and recommendations. Additional information can be found in the Appendix on the organizations involved, issues addressed, study scope, and links to web resources for further information for each case.

Table 5-1. Studies of the Regional Economic Impact of Congestion

| Name / Location / Sponsor | Findings | Recommendations |
|---|---|--|
| <p>Economic Impact Analysis of Investment in a Major Commercial Transportation System for the Greater Vancouver Region</p> <p><i>Vancouver, BC, Canada</i></p> | <ul style="list-style-type: none"> • Cost of congestion expected to exceed \$800 million by 2021 • AM peak-hour regional road traffic projected to grow by 39% in terms of trips and 54% in terms of vehicle hours • 7,000 -16,000 jobs and \$500 million to \$1 billion could be lost due to inadequate infrastructure investment | <ul style="list-style-type: none"> • Implementation of a broad series of highway, arterial road, light rail, freight rail, bridge and tunnel projects to minimize future congestion costs and increase economic competitiveness. |
| <p>Chicago Metropolis Freight Plan: “Assessing the Economic Impacts of Congestion Reduction Alternatives”</p> <p><i>Chicago, IL</i></p> | <ul style="list-style-type: none"> • Current cost of congestion estimated at more than \$4 billion/year • Metroplan recommendations would have a positive impact on business sales of nearly \$4 billion | <ul style="list-style-type: none"> • Expand highway capacity • Implement user fees on highways • Develop a more formal system of truck routes • Modernize public transit to increase attractiveness • Better use of existing rail infrastructure |
| <p>Mobility 2030, Regional Transportation Plan of the Atlanta Regional Commission (2004)</p> <p><i>Atlanta, GA</i></p> | <p><i>Chapter 5 - Case Studies</i></p> <ul style="list-style-type: none"> • % of freight currently moves via truck • transportation system must accommodate more than 2.5 million people and 1.3 million by 2030 • percent of freeways/arterials with more than 2 lanes of daily delay will increase from 39% to 50% | <ul style="list-style-type: none"> • Improve access to intermodal facilities • Expand freeway and cross-regional arterial road system • Implement HOV lanes • Expand public transit system • “Smart Corridors” with ITS for better monitoring and control |
| <p>The Economic Benefits of Transportation Investments, 2003</p> <p><i>Milwaukee, WI</i></p> | <p><i>Chapter 5 - Case Studies</i></p> <ul style="list-style-type: none"> • highway construction has not kept up with regional travel demand • cost of congestion in the Milwaukee metro area estimated at \$390 million in 2000. • congestion currently affects 17% of the state’s critical roadways, growing to more than a third by 2020. | <ul style="list-style-type: none"> • \$22 billion investment in the regional highway system. |

Continued next page

Table 5-1 (cont.) . Studies of the Regional Economic Impact of Congestion – continued

| Name / Location / Sponsor | Findings | Recommendations |
|---|---|--|
| <p>Texas’ Future: A Look at the Next 25 Years of Roadway Supply, Demand Cost and Benefit, 2003</p> <p><i>Houston, Dallas, San Antonio and Austin, TX</i></p> | <ul style="list-style-type: none"> • Cost of congestion estimated at \$46 billion over the last decade • Will require \$38.5 billion more than current investments over the next 25 years just to maintain existing congestion levels • \$78.2 billion is needed to meet regional congestion reduction goals | <ul style="list-style-type: none"> • Highway and freeway expansion in each of the four metro areas |
| <p>Long Range Transportation Plan for Los Angeles County, 2001</p> <p><i>Los Angeles, CA</i></p> | <ul style="list-style-type: none"> • Improvement scenarios would cost \$13-15 billion through 2020 • Increase in personal income would exceed investments by \$8 billion during the period. | <ul style="list-style-type: none"> • Expand rail transit system in conjunction with freeway system |
| <p>FAST – Freight Action Strategy for Everett-Seattle-Tacoma, 2004</p> <p><i>Seattle, WA</i></p> | <ul style="list-style-type: none"> • Puget Sound ports have lost 11.9% of market share since 1998 • Losing competitiveness relative to Vancouver, Canada | <ul style="list-style-type: none"> • A multi-phase program to improve efficiency and reliability of freight transit through grade separations, truck access routes and ITS |
| <p>Ontario Strategic Transportation Directions (2002) and Central Ontario Freight Plan (2004)</p> <p><i>Ontario, Canada</i></p> | <p><i>Chapter 5 - Case Studies</i></p> <ul style="list-style-type: none"> • Central Ontario plays a critical role in the North American economy • Increasing congestion is threatening to undermine the efficient movement of goods through the region • The cost-competitiveness of Central Ontario as a business location is becoming threatened | <ul style="list-style-type: none"> • Establish private-public partnerships including a regional goods movement coordinating body • Improve the transportation planning, funding and decision-making process by including it in the regional economic development and land use strategy • Implement a regional truck route system • Improve incident (accident) management and investigation • Improve transit to reduce SOV use |

6.2 Congestion Management Projects

Congestion is an indication that demand is approaching or exceeding the design capacity of transportation infrastructure. As the number of vehicles entering a highway approaches the physical capacity of the facility, traffic speeds slow to a crawl and overall vehicular throughput of the facility declines. There are three basic approaches for addressing this problem: (a) increase capacity of highway and transit infrastructure, (b) improve management of infrastructure use to increase throughput, and (c) impose pricing systems that shifts demand so that traffic most needing the facility can move effectively while other traffic is shifted to other times of day, or other facilities or services.

Any or all of these elements can be relevant for the Portland region in the future. The nature of these approaches are summarized here. While the approach of expanding road and rail system capacity is well known, some of the approaches for traffic management and pricing are new and experimental. Examples of these newer approaches are described in further detail in the Appendix.

(a) Investment in Capacity Expansion of Highway and Transit Infrastructure

Infrastructure Capacity Expansion. The traditional approach to address future congestion is to invest in additional transportation system capacity to meet the projected increase in traffic demand for access to and within air and marine ports, intermodal rail, industrial parks and town centers. This includes:

- *Highway system expansion.* Major highway widening as well as construction of new, reliever routes to maintain regional mobility for freight and passenger movement.
- *Arterial street expansion.* Widening arterial streets and bridges to improve access to the regional highway system and maintain circulation and access for freight and passenger movement.
- *New intersection connections.* New interchanges and intersections designed with special turn lanes and signals to reduce turning delays and facilitate alternate routes using arterial roads for freight and passenger movement..
- *Expanded transit service.* Increase in light rail transit facilities and services, commuter rail and streetcar services, expansion of transit service hours, and implementation of new bus routes serving employment areas.

Mode Choice Options. Besides just increasing capacity to meet projected demand, there are some opportunities to reduce congestion by encouraging alternative modes of transportation. Specifically, expansion of transit services and freight rail services can help to divert a portion of travel demand away from reliance on cars and trucks

on the highway system, although not all classes of passenger and goods movement will find those options to be viable alternatives. A current study of the National Cooperative Highway Research program is entitled, *Rail Freight Options for Relieving Highway Congestion*⁸ and that study is examining cases where expansion of railroad capacity could help address congestion. The study is not yet complete, but is focusing on identifying the circumstances in which this option is truly viable.

All of the regional case studies presented in Table 6-1 included the traditional approach of expanding the capacity of highway and arterial road systems, including new bridges, tunnels, overpasses, ramps and intersection connections. In addition, several of those case studies (Atlanta, Los Angeles, Vancouver BC and Toronto) included expansion of rail transit and bus services as a way to further relieve highway congestion and thus facilitate truck movements that require use of the highway system. The Alternative Case (2025PF) Scenario considered for the Portland area also included expansion of highway, arterial road and transit system capacity.

(b) Infrastructure Management.

Transportation System Management. In addition to direct construction of additional capacity, many of the previously discussed cases also include “transportation system management” policies and programs to improve the functionality of existing facilities. These include:

- **Freeway performance** enhancement strategies such as “Smart Corridors” involving ramp metering, signal timing and access management controls for on-ramps as well as incident detection for main routes;
- **Intersection performance** enhancement strategies such as additional turning lanes and turning signals, and
- **Transit performance** enhancement strategies such as bus-only lanes and signal preemption for buses and streetcars.

Designated Freight Corridors. The concept of “rationalizing” the region’s transportation system refers to actions that optimize the placement and use of facilities and services. Usually this means allocating space and assigning priority for various types of vehicles (cars, buses, trucks, bicycles) and various types of trip purposes (commuting, freight movement, etc.) on relevant roads and corridors.

One form of rationalization is the development of **transit priority routes** where buses and streetcars are assigned special lanes and/or special priority for passing through signalized intersections or road crossings.

Another form of rationalization is the development of **freight priority routes** which

⁸ Reebie Associates and Economic Development Research Group for NCHRP, 2005.

are typically arterial streets where signs, road width, intersection geometrics, ramps and vehicle parking areas are all designed to facilitate truck movement. Designation of such routes and their design features can maximize the effectiveness of truck movement on those corridors while minimizing negative impacts on neighborhoods. In some cases, this may also include the development of grade separated truck and/or rail routes for access to ports or other intermodal freight terminals.

Examples of freight priority routes span a range from clarifying truck routes along existing arterial streets to the development of truck priority and truck-only routes. Examples of this wide range of priority routes (described in the Appendix) are:

- Regional Truck Route System for Chicago
- Puget Sound FAST Corridor – Port Access Routes
- Alameda Corridor – freight-only grade-separated route to port
- Washington - Wenas Corridor Truck Routing.
- World Trade Bridge Route - Laredo, TX.

(c) Highway Pricing Policies

Pricing (tolls) can be implemented to achieve a number of goals – from raising revenues to managing the volume of traffic on priced (tolled) and unpriced (free) lanes and highway facilities. Pricing can also be used to achieve a more optimal mix of vehicles through special HOV (High Occupancy Vehicle) reserved lanes and HOT (High Occupancy Toll) lanes that can be used by any vehicle. Both approaches can help to expand “usable capacity” by improving the operations of existing highways. There are three classes of pricing policies: pricing on existing roads, pricing on new lanes and cordon tolls.

Pricing on Existing Roads - Most of these projects involve the conversion of existing HOV (high occupancy vehicle) lanes to HOT (high occupancy toll) lanes. Examples (described in further detail in the Appendix) are:

- California - HOT lanes on I-15 in San Diego
- Texas - HOT Lanes on Two Radial Corridors in Houston (I-10) and US 290)
- Minnesota - HOT Lanes on I-394 in Minneapolis
- Colorado - HOT lanes on I-25/US 36 in Denver
- California - Alameda County
- Other Projects Under Study: I-680 SMART Carpool Lanes in Alameda County, CA; HOT lanes on I-95 in Miami-Dade County, FL ;and HOT Lanes on I-75 in Atlanta, GA.

Pricing on New Lanes – These are projects in which new highway lanes are built specifically as HOT lanes. This allows them to have fully private funding. Examples (described in further detail in the Appendix) are:

- California - Express Lanes on State Route 91 in Orange County.
- Other Projects under Study: California - HOT lanes in Median of Route 1 in Santa Cruz County, CA; Express Toll Lanes on C-470 in Denver, CO; Express Lanes on I-4 in Orlando, FL; HOT Lanes on I-40 in Raleigh/Piedmont, NC; Managed Lanes on I-35 in San Antonio, TX; and HOT Lanes on State Route 167 in the Puget Sound Region, WA.

Use of Toll Roads – Unlike the preceding examples of tolls on only some lanes, these projects provide for time-of-day pricing and special truck pricing policies on toll roads. These policies can serve to encourage off-peak truck movements. Examples (described in further detail in the Appendix) are:

- Florida - Variable tolls for Heavy Vehicles in Lee County.
- New York and New Jersey -- Variable Tolls.
- California - Peak pricing on San Joaquin Hills Toll Road in Orange County
- Other Projects under Study: Variable tolls with open road tolling in Broward County, FL; Pricing options on Florida Turnpike in Miami-Dade County, FL; Illinois Tollway Value Pricing Study in Chicago area; Northern Ohio Freight Efficiency Study; Express Bus/HOT Lane in the Lincoln Tunnel, NY-NJ; Variable tolls on the Northwest Tollway in the Chicago area; and Variable tolls on the Pennsylvania Turnpike in Philadelphia

Cordon Tolls – The most extreme form of road pricing is the development of a “cordon” line around the most heavily congested part of an urban area, with a system of daily charges put on vehicles that enter the area. Typically, persons living inside the cordon area and government vehicles are excluded from the tolls. Examples (described in further detail in the Appendix) are:

- London Commercial District Pricing
- Singapore Cordon Pricing
- Other Project under Study: Cordon pricing in Lee County, FL; Tolls on East River and Harlem bridges in New York City.

6.3 Conclusions from the Case Studies

The Portland region is far from alone among metropolitan areas in facing increasing traffic congestion. Other metropolitan areas have also faced concern about the transportation and economic development consequences of rising traffic congestion, and have taken action to address them. The experience of these other areas fall into five key categories:

- 1) **Process.** Portland is following a general process that has been successfully implemented in other regions, in which business representatives have joined

to work together with local governments to examine the nature of congestion problems, stakes for economic competitiveness, and options for addressing them.

- 2) **Study.** This study addresses issues of economic competitiveness in similar ways as other regions, which have found that such findings can be of critical importance in establishing the business case and economic need for taking action to invest in future transportation projects and program to reduce future congestion growth.
- 3) **Range of Actions.** Essentially all of the regional plans have identified the need for expanding effective transportation system capacity through infrastructure investment. Most support an integrated package of arterial road, highway and transit infrastructure projects. Technologies and policies to optimize use of these resources are also important and should be implemented to the extent possible, but they are not a full substitute for expansion of infrastructure capacity.
- 4) **Focus on Freight.** Increasing development of regional, national and international markets are raising the importance of freight movement, and urban areas across the US are responding by adding projects and policies designed specifically to improve freight flow.
- 5) **Pricing.** There is great interest at the current time in experimental programs using electronic systems to charge tolls that vary by time of day, type of vehicle and sometimes level of congestion. In theory, such projects can meet a variety of differing goals: (a) to help reduce overall traffic volumes by encouraging use of high occupancy vehicles, (b) to facilitate faster truck movements during off-peak times along designated routes levels, and/or (c) to raise revenues that help pay for infrastructure investments. Care must be taken in viewing these projects, because they generally do not address all three of these goals.



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The Local and Regional Economic Impacts of the Port of Vancouver Marine Terminals and Non-Maritime Real Estate Tenants

Prepared for:



July 12, 2006

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**Summary of the Economic Impacts Created by
The Port of Vancouver Marine Terminals and Real Estate Tenants**

The Port of Vancouver, located on the Columbia River consists of four marine terminals and 13 berths, and is home to the largest grain export elevator on the West Coast of the United States. These marine terminals handle automobiles, forest products, steel, grain, dry bulk cargoes and liquid bulk products, and provide the catalyst for economic activity throughout the region. In addition to the marine terminals owned by the Port of Vancouver, the Port also is home to an extensive and diverse range of non-maritime tenants. These tenants include industrial and manufacturing facilities, warehouse and distribution operations, commercial real estate tenants and agricultural tenants. These tenants are also key contributors to the local and regional economy.

Because of this perceived economic contribution of the Port to the local and regional economy, the Port of Vancouver retained the services of Martin Associates to quantify the economic impact of the Port of Vancouver seaport and non-maritime real estate operations. This current study is an update of a similar study conducted by Martin Associates in 2000. In the previous study, as well as in this current study, separate studies were conducted for the two lines of business, and have been presented under separate cover. The combined impacts of the maritime and real estate activities are presented in the balance of this summary. It is to be emphasized that the economic impacts estimated for maritime activity at the Vancouver Harbor included impacts created by both the Port-owned terminals, as well as privately owned marine terminals located in the Vancouver Port District. However, in 2005, the private terminal, Vanalco, that had previously been considered in the harbor-wide impacts of 2000 was no longer in business. Therefore, the impacts identified in the separate marine impact report actually reflect the impacts generated by the cargo and vessel activity at the Port of Vancouver's owned and leased marine terminals.

The impact analysis is based on a telephone survey of 275 marine and real estate tenants and firms providing services to the marine terminals and represents a 100% sample of the Port's tenants as well as the maritime community serving the Vancouver marine terminals. Local responding models were also developed to estimate the impact of local purchases by both individuals directly employed by Port tenants and vessel and cargo activity at the Port's marine terminals. Also quantified was the economic impact of the marine terminals on shippers and consignees using the marine terminals.

Economic activity due to the movement of marine cargo and vessel activity, or by non-maritime real estate tenants of the Port of Vancouver, contributes to the local and regional economy by providing employment and income to individuals, taxes to state, county and local governments and revenue to local and national firms engaged in producing goods and services. Exhibit E-1 illustrates the flow of economic activity from the maritime activity and real estate tenant activity at the Port of Vancouver.

Exhibit E-1
Flow of Economic Activity Throughout the Local Economy

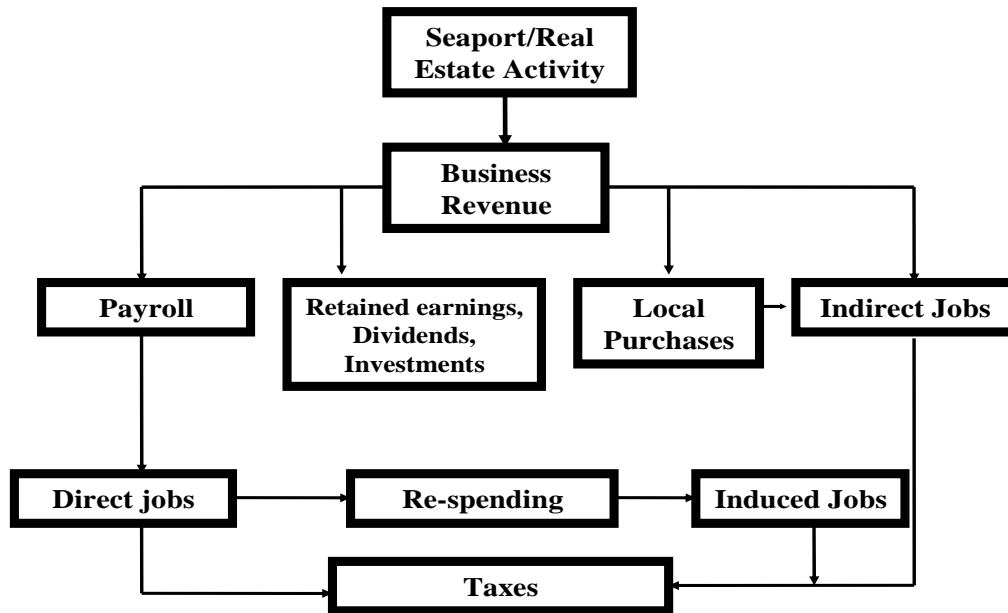


Exhibit I-1 illustrates the flows of economic impacts generated by a seaport and non-maritime real estate activity throughout the region's economy. As this figure shows, economic activity by a seaport activity or by a firm or industry located on Port of Vancouver real estate initially creates business revenue. This revenue is in turn used for several purposes:

- To hire employees to produce the goods and provide the services;
- To pay stockholders dividends, retire debt, and invest;
- To buy goods from other firms, creating indirect jobs;
- To pay taxes.

As can be seen from Exhibit E-1, the flow of economic impacts throughout an economy creates four separate and non-additive types of impacts. These are:

- Employment impact;
- Personal earnings impact;
- Business revenue impact;
- Tax impact.

Direct jobs are those jobs held by employees of a particular firm, and are measured in terms of full-time equivalent workers. These are the number of jobs reported by a firm as paid employees. These direct employees are estimated directly from the survey of 275 Port of Vancouver marine and non-maritime tenants, as well as service providers.

Those directly employed by firms in a given industry receive wages and salaries. A portion of the wages and salaries is saved; another portion is used to pay personal taxes, while a final portion is used to purchase goods and services. A percentage of these purchases are made in the Vancouver metropolitan area, while some consumption purchases are made outside the area. These consumption purchases, in turn, generate additional jobs in those firms supplying the goods and services. The **induced jobs** measured in this study are only those generated in the Vancouver metropolitan area, which includes:

- The cities of Vancouver and Portland;
- Clark County, Multnomah County (OR), Skamania County, Cowlitz County, Washington County (OR), and Clackamas County.

Jobs, which are created due to the purchases by firms, not individuals, are classified as **indirect jobs**. These jobs are estimated based on the local purchases made by the Port's real estate tenants and firms directly dependent upon seaport activity.

The **income impact** consists of the level of wage and salary earnings associated with the jobs created by the real estate tenants, and is adjusted to reflect respending throughout the economy. The personal income impact is, for the most part, based on salary and annual earnings data provided from the survey conducted by Martin Associates. As described above, individuals directly employed by a firm use a portion of their income to purchase goods and services. A portion of these purchases is made from firms located in the Vancouver area, while another portion is used for out-of-region purchases. Respensing of income within a geographical region is measured by an income multiplier. The size of the multiplier varies by region depending on the proportion of in-region goods and services purchased by individuals. The higher this percentage, the lower the income leakage out-of-region.¹

The **revenue impact** is the measure of direct business revenue received by seaport tenants and service providers and the gross sales generated by the non-maritime tenants

¹ It is to be noted that different income multipliers are used to estimate the induced job impacts and the respending and consumption impacts for seaport activity and real estate activity. The income multipliers, as estimated for Martin Associates by the U.S. Bureau of Economic Analysis for the Vancouver regional economy, reflect the level of salary associated with each industry group, as well as the leakages of income from the Vancouver economy for the specific industry sector. Because of the higher direct wages and salaries associated with seaport activity, the direct income multiplier used to measure the impacts of the seaport activity is higher than the direct income multiplier associated with the non-maritime real estate tenants.

of the Port of Vancouver. It is to be emphasized that this revenue impact is not necessarily money that remains within the Vancouver local economy. Only those portions of the revenue paid out in wages and salaries to those directly employed, used by the dependent firms and real estate tenants for local purchases of goods and services, and that portion of revenue paid in taxes to the local and county governments, can be defensibly identified as remaining in the local economy.

The *state, county and local tax revenues* generated by economic maritime activity at the Port's marine terminals and by the activity of the non-maritime real estate tenants of the Port of Vancouver comprise the tax impact.

In addition the direct, induced and indirect impacts, the seaport activity also supports activity with regional exporters and importers using the Port of Vancouver's marine terminals. These impacts are classified as *influenced user impacts* in that the exporters and importers using the marine terminals can and do use other ports for the shipment and receipt of cargo. The influenced impacts measure the impact, or influence, of the Port's marine terminals at a given point in time, and if the Port's terminals were no longer used, these influenced users would use other ports to export and import cargo. Unlike the direct, induced, and indirect impacts, the influenced impacts would not necessarily be dislocated from the economy – instead, the impacts would no longer be influenced by the Port of Vancouver, but by another port.

Table E-1 summarizes the economic impacts of the Port of Vancouver.

Table E-1
Summary of the Economic Impacts of the
Port of Vancouver

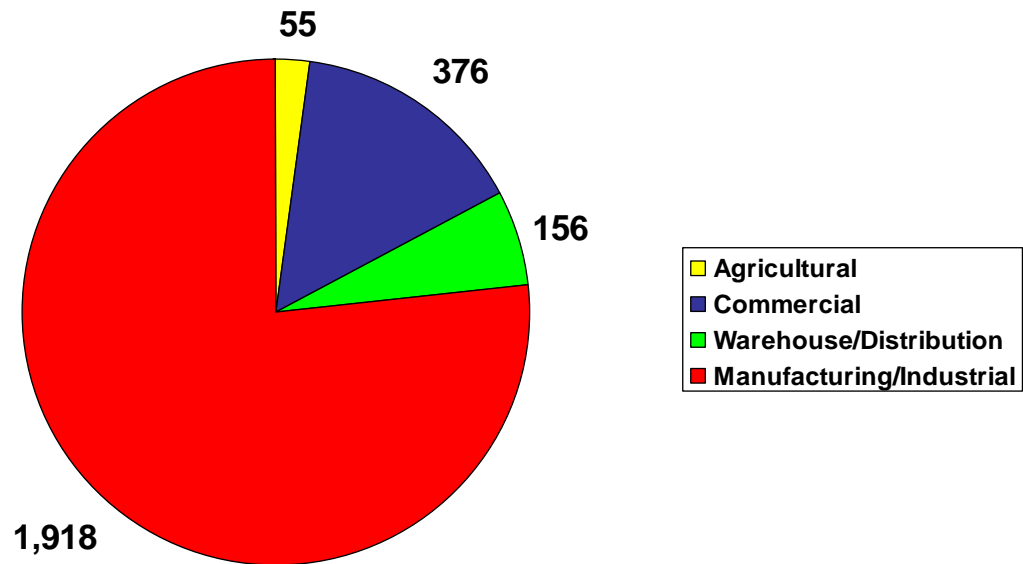
| | Non-Maritime Real Estate | Port of Vancouver Marine Terminals | Total Impacts Port of Vancouver |
|--|-----------------------------|---------------------------------------|------------------------------------|
| Jobs | | | |
| Direct | 1,084 | 1,185 | 2,268 |
| Induced | 591 | 1,640 | 2,231 |
| Indirect | 830 | 583 | 1,413 |
| Influenced Jobs | <u>NA</u> | <u>9,668</u> | <u>9,668</u> |
| Total | 2,505 | 13,075 | 15,580 |
| Personal Income (Thousands) | | | |
| Direct | \$33,329 | \$65,423 | \$98,751 |
| Induced and Consumption | \$43,660 | \$197,040 | \$240,700 |
| Indirect | \$25,003 | \$22,613 | \$47,616 |
| Influenced Income | <u>NA</u> | <u>\$376,506</u> | <u>\$376,506</u> |
| Total | \$101,992 | \$661,581 | \$763,573 |
| Economic Activity (Thousands) | | | |
| Direct Business Revenue | \$720,821 | \$219,077 | \$939,899 |
| Influenced Output | <u>NA</u> | <u>\$658,046</u> | <u>\$658,046</u> |
| Total | \$720,821 | \$877,123 | \$1,597,944 |
| Local Purchases (Thousands) | | | |
| | \$53,104 | \$42,947 | \$96,051 |
| State and Local Taxes (Thousands) | | | |
| Direct, Induced and Indirect Taxes | \$11,117 | \$30,460 | \$41,577 |
| Influenced Taxes | <u>NA</u> | <u>\$40,229</u> | <u>\$40,229</u> |
| Total | \$11,117 | \$70,689 | \$81,807 |

The Port of Vancouver maritime and real estate tenant activity supported 15,580 total jobs in the local economy.

- 2,268 jobs are directly created by marine cargo activity and by the Port's non-maritime real estate tenants. The real estate tenants are responsible for 1,084 direct jobs, while the cargo and vessel activity creates 1,185 direct jobs. Of the 1,084 direct jobs generated by the non-maritime tenant real estate tenants, the
- As the result of local purchases by the 2,268 directly employed workers, an additional 2,231 induced jobs are supported in the local economy to provide goods and services to those directly employed.
- 1,413 indirect jobs are also supported in the local economy as the result of the local purchases of goods and services by the firms directly dependent upon the cargo and vessel activity at the Port's marine terminals, as well as by the real estate tenants.
- Nearly 40% of the directly employed reside in Vancouver, while another 36% reside in Clark County. About 12% of those directly employed live in Multnomah County.

- The activity at the marine terminals supported impacts with shippers/consignees shipping and receiving cargo via the Port of Vancouver marine terminals. These user impacts are considered influenced impacts, in that these impacts are not dependent upon the marine activity at the Port, and these users could and often do use other ports to ship and receive cargo. However, at a given point in time, these impacts represent the influence of the maritime activity at the Port of Vancouver. In 2005, the 4.4 million tons of cargo supported 9,668 jobs with port users. While the influenced firms and the jobs associated with these shippers/consignees, would not likely cease operations if the Port's marine terminals were unavailable for use, these firms would suffer a transportation cost penalty and suffer some degree of economic loss.
- With respect to the non-maritime real estate tenants, the majority of the 2,505 direct, induced and indirect job holders are generated by the industrial/manufacturing sector, as shown in Exhibit E-2.

Exhibit E-2
Distribution of Direct, Induced and Indirect Jobs by Non-Maritime Real Estate Tenant Sector



In 2005, the 4.4 million short tons of cargo handled at the Port's marine terminals and the revenue generated by the non-maritime tenants supported a total regional economic value of \$1.6 billion.

- The businesses providing services at the Port of Vancouver marine terminals and the non-maritime real estate tenants received \$939.9 million of revenue,

excluding the value of the cargo moving over the Port's marine terminals. The remaining \$658.1 million represents the value of the output to the Washington/Oregon region that is created due to the cargo moving via the Port of Vancouver marine terminals. This includes the value added at each stage of producing an export cargo, as well as the value added at each stage of production for the firms using imported raw materials and intermediate products that flow via the marine terminals in the Vancouver Harbor and are consumed by industries within the region.

- The local businesses made \$96.1 million of purchases from the local economy, supporting the 1,413 indirect jobs.
- The Port of Vancouver generated \$387.1 million of wages and salaries and consumption activity in the local economy.
 - The 2,268 direct employees earned \$98.8 million in wages and salaries, for an average salary of about \$43,541 per port-generated direct job. The direct average salary generated by seaport activity is significantly higher than that generated by the non-maritime real estate activity. Maritime activity generated an average salary of \$55,209, while the non-maritime real estate activity generated an average wage of \$30,746 per direct employee.
 - When the respending effect of this direct income is considered, an additional \$240.7 million of income and regional consumption activity is created.
 - The indirect job holders received \$47.6 million of wages and salaries.
- The 9,668 jobs with the influenced shippers/consignees using the Port's marine terminals received \$376.5 million of wages and salaries.
- A total of \$81.8 million of state and local tax revenue was supported by the activity at the Port of Vancouver.
 - The Port of Vancouver's marine cargo activity and the economic activity created by its non-maritime tenants generated a total \$41.6 million of state and local taxes. The state and local government entities of the State of Washington received about 80%, or \$33.8 million, of these tax revenues.
 - The activity with the influenced users of the marine terminals supported an additional \$40.2 million in state and local tax revenue.

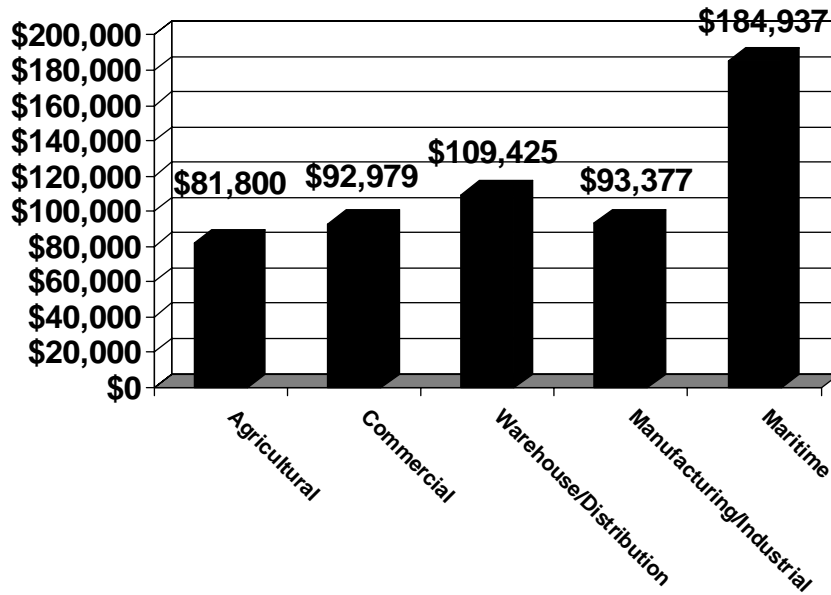
Between 2000 and 2005, the direct impacts of the Port of Vancouver increased by nearly 100 jobs, \$18.2 million of personal wage and salary income, and local

businesses received an additional \$145.9 million of direct business revenue. Direct jobs generated by the Port's maritime activity grew by 258 jobs over the period, despite the closing of one of the Port's key maritime tenants, Vanaclo. Direct jobs with the non-maritime real estate tenants fell by 162 jobs over the same period.

Maritime jobs have nearly twice the economic value to the local community than do jobs generated in other lines of business operated by the Port.

When comparing the local economic value of a direct job to the local community, the direct income, re-spending impact, and indirect income impact was divided by the direct jobs generated in each business line in which the Port operates – maritime sector, and the non-maritime real estate sectors of agriculture, commercial real estate, warehousing and distribution and manufacturing/industrial sectors. Exhibit E-3 demonstrates the economic value of each direct job to the local community. As this exhibit shows that for each direct job created by maritime activity, the local economy receives nearly \$185,000 of total economic activity. This economic value is significantly greater than the value generated by the direct jobs in the non-maritime real estate sector.

Exhibit E-3
Total Local Economic Impact per Direct Job



In conclusion, it is to be emphasized that this study is designed to provide a framework that the Port of Vancouver can use in formulating and guiding the future development of Port-owned marine terminals and industrial and commercial real estate property in order to maximize the Port of Vancouver's economic contribution to the local and regional economy.

Regional Economic Effects

Columbia River Crossing Choke Points

presented to

Columbia River Crossing Task Force

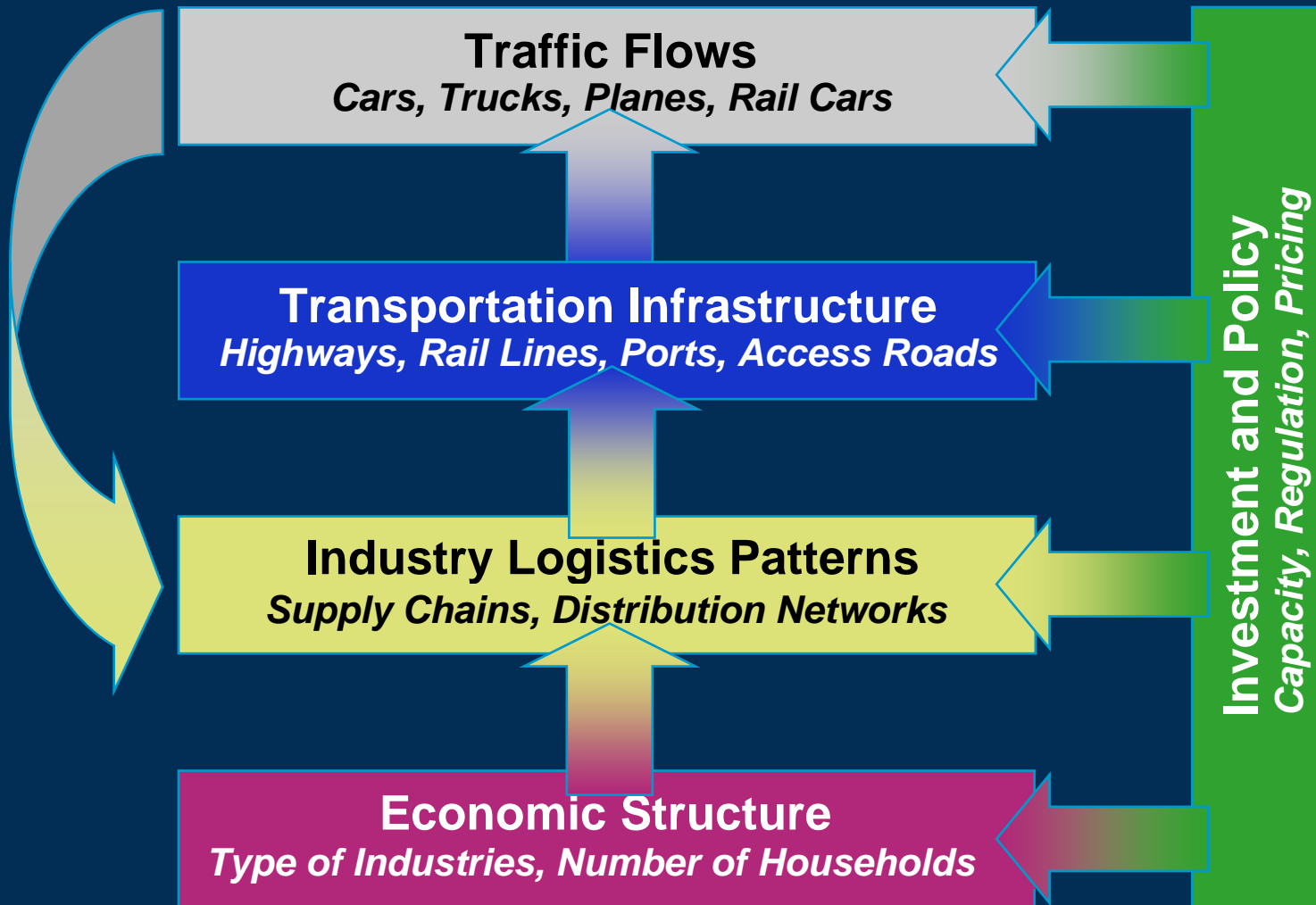
presented by

**Christopher Wornum
Cambridge Systematics, Inc.**

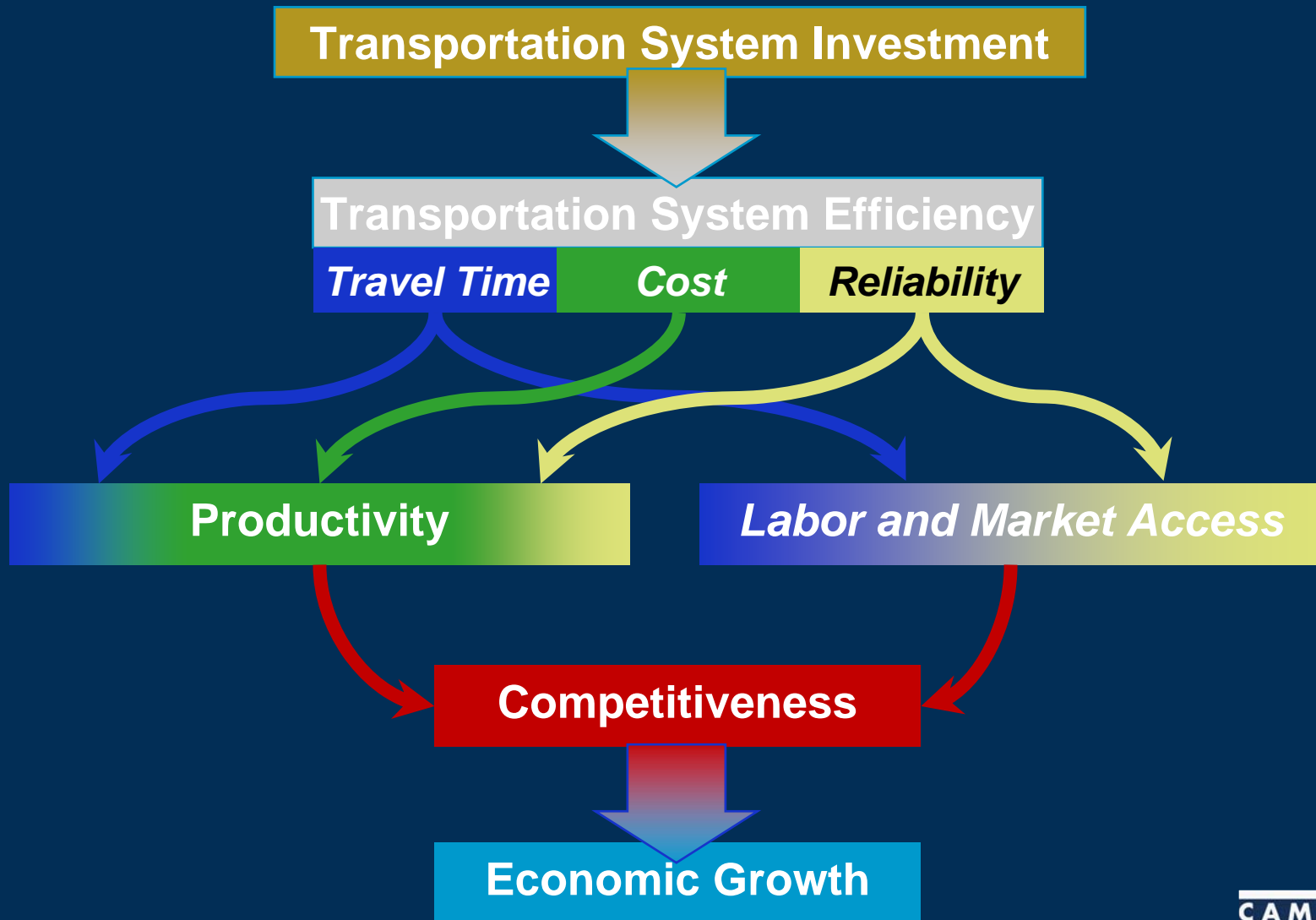
January 23, 2007

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Understanding Economic Effects of Transportation

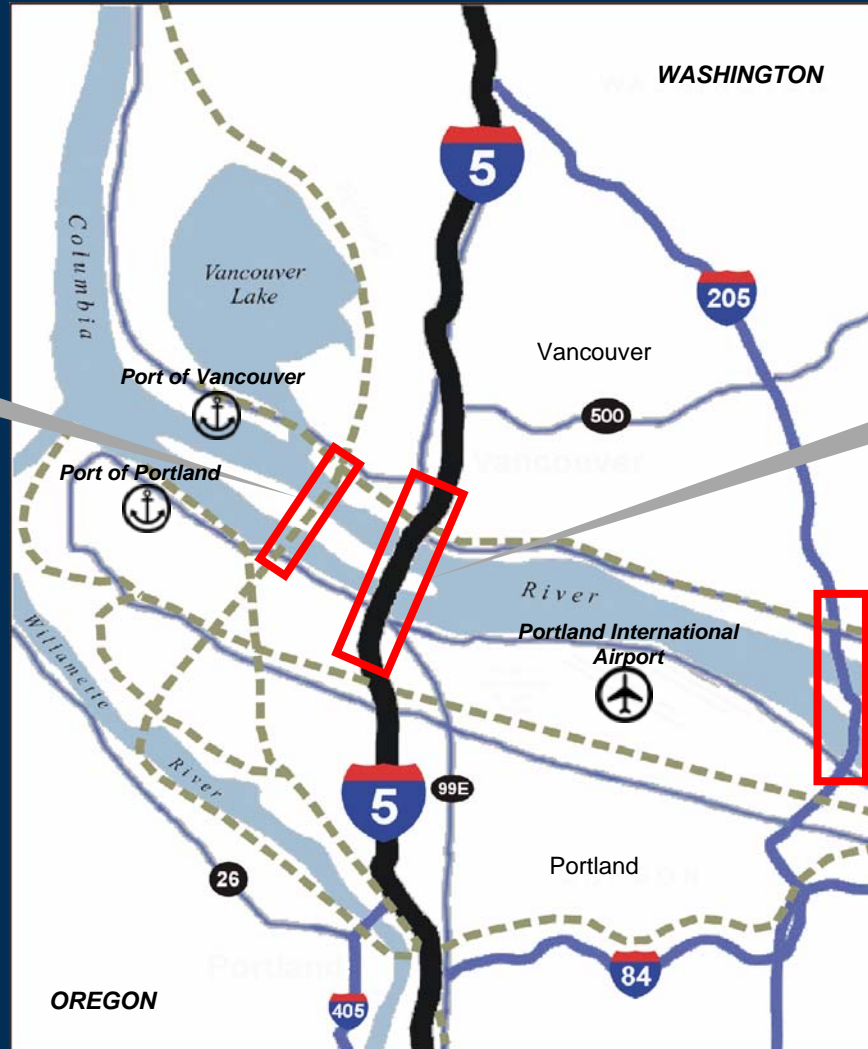


Economic Effects of Transportation



Columbia River Crossings at Portland-Vancouver

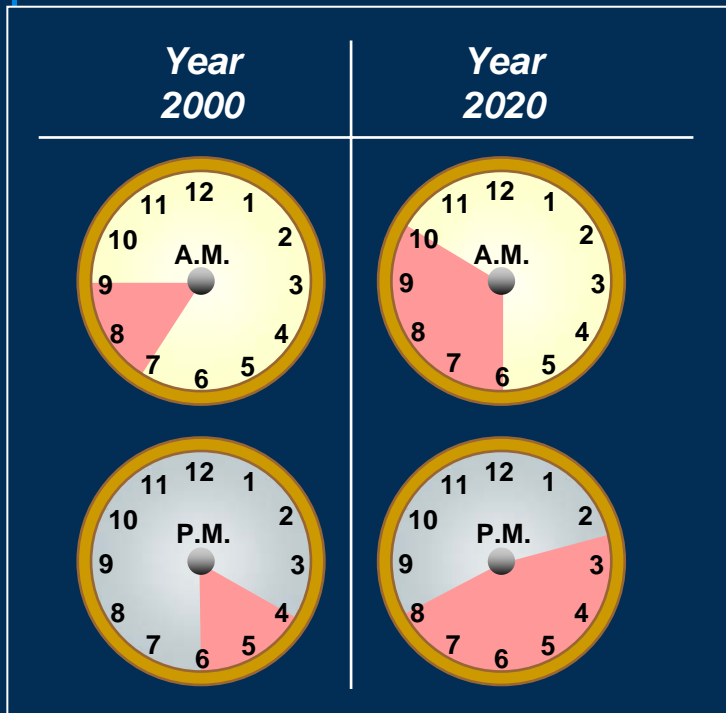
BNSF Rail Bridge



I-5 Bridge

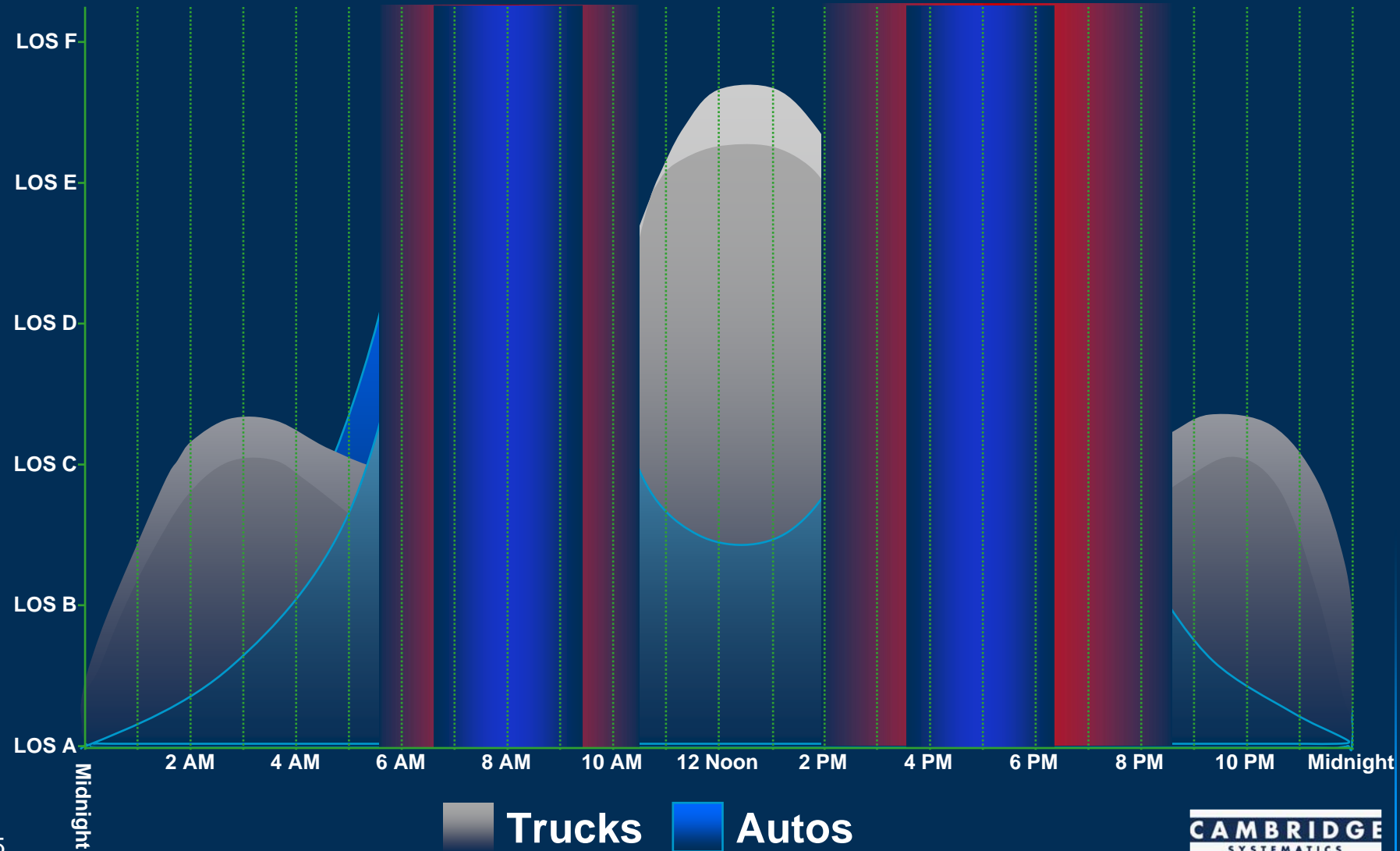
I-205 Bridge

Duration of Morning & Evening Peak-Period Traffic I-5/Columbia River Bridge & Approaches in 2000 and 2020



Duration of Morning & Evening Peak-Period Traffic I-5/Columbia River Bridge & Approaches in 2000 and 2020

Level of Service

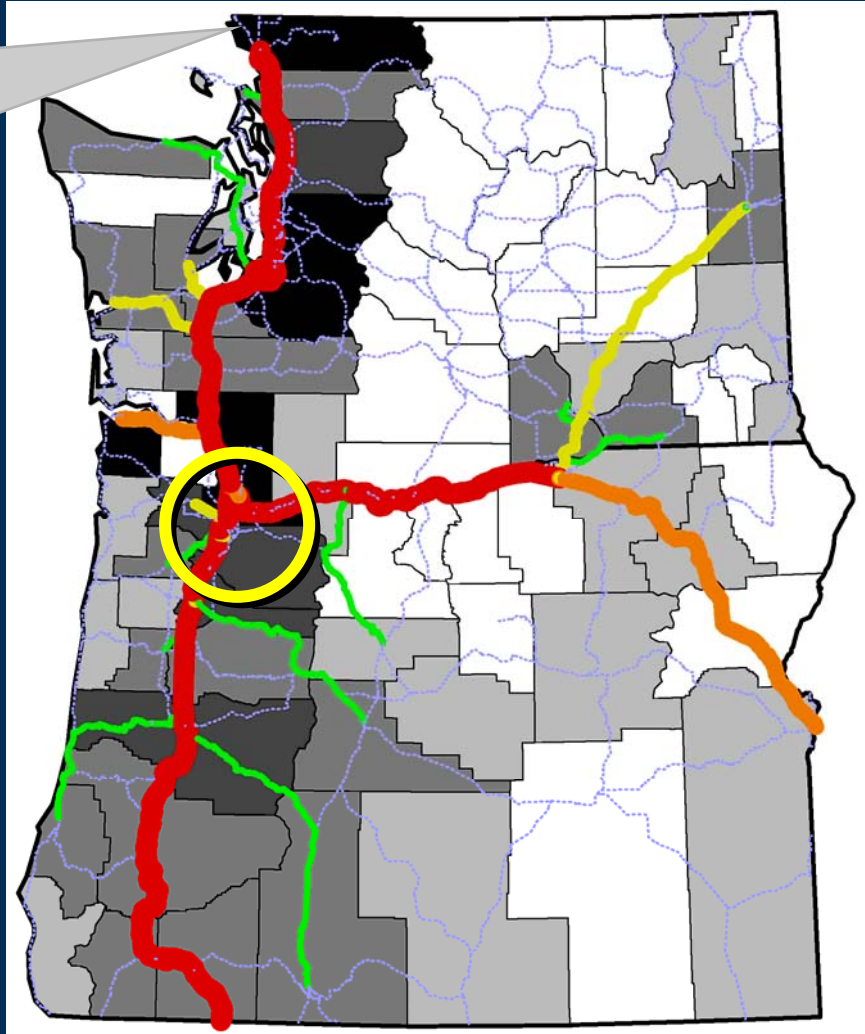


Freight Impacts

- **Congestion will spread into the midday period, which is the peak-travel period for trucks**
- **Reliability – the ability to hit delivery windows predictably – will decrease**
- **Annual vehicle hours of delay on truck routes in the I-5 corridor will increase by 93 percent from 13,400 hours in 2000 to 25,800 hours by 2020**
- **Congested lane-miles on truck routes will increase by 58 percent,**
- **The cost of truck delay will increase by 140 percent to nearly \$34 million**

Origins & Destinations for Truck Freight Crossing I-5 & I-205 Bridges at Portland-Vancouver with Tonnage on Routes Used to Access Bridge

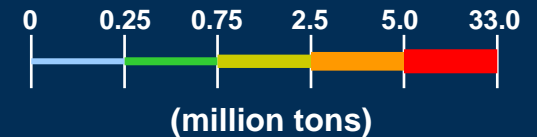
Note:
Commodities shipped to or from British Columbia are assigned to Whatcom County



Origins and Destinations of Truck Freight Crossing I-5 and I-205 Columbia River Bridges, 1998, All Commodities

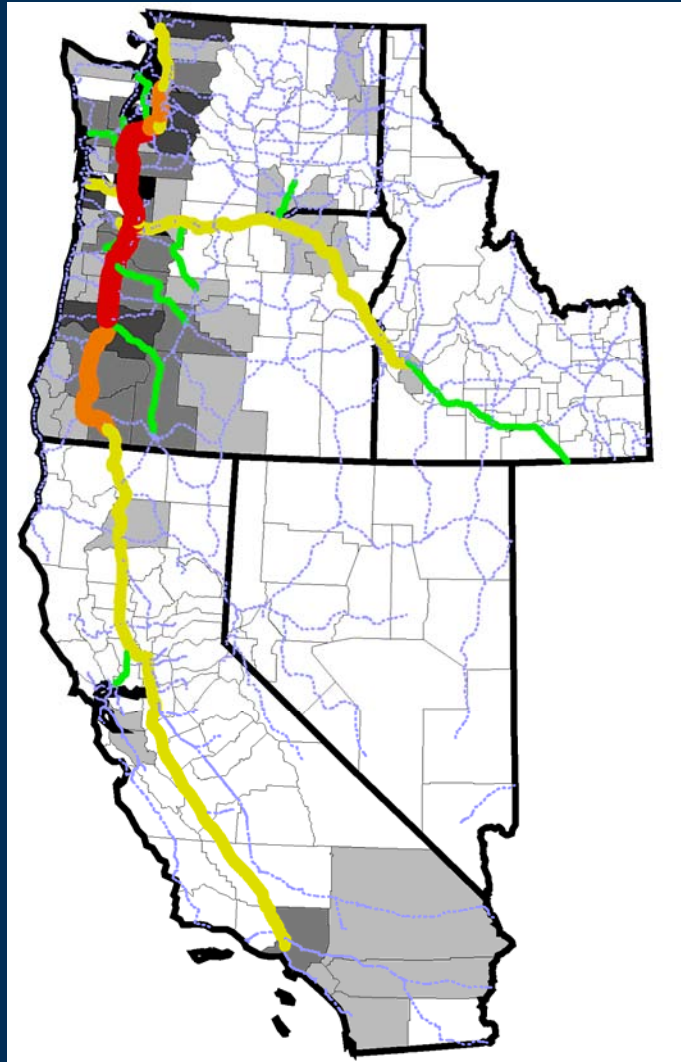


Volume of Truck Freight on Routes Used to Access I-5 and I-205 Columbia River Bridges, 1998, All Commodities



Source: Cambridge Systematics based on
Reebie Associates TRANSEARCH data, 1998

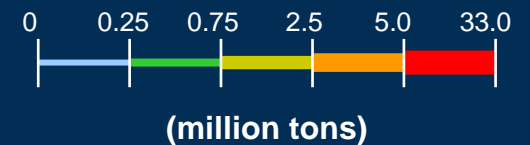
Wood & Paper Products Origins & Destinations Crossing the I-5 and I-205 Bridges at Portland-Vancouver With Tonnage of Freight on Routes Used to Access Bridge



Origins and Destinations of
Lumber, Wood, and Paper
Products Crossing I-5 and I-205
Columbia River Bridges, 1998

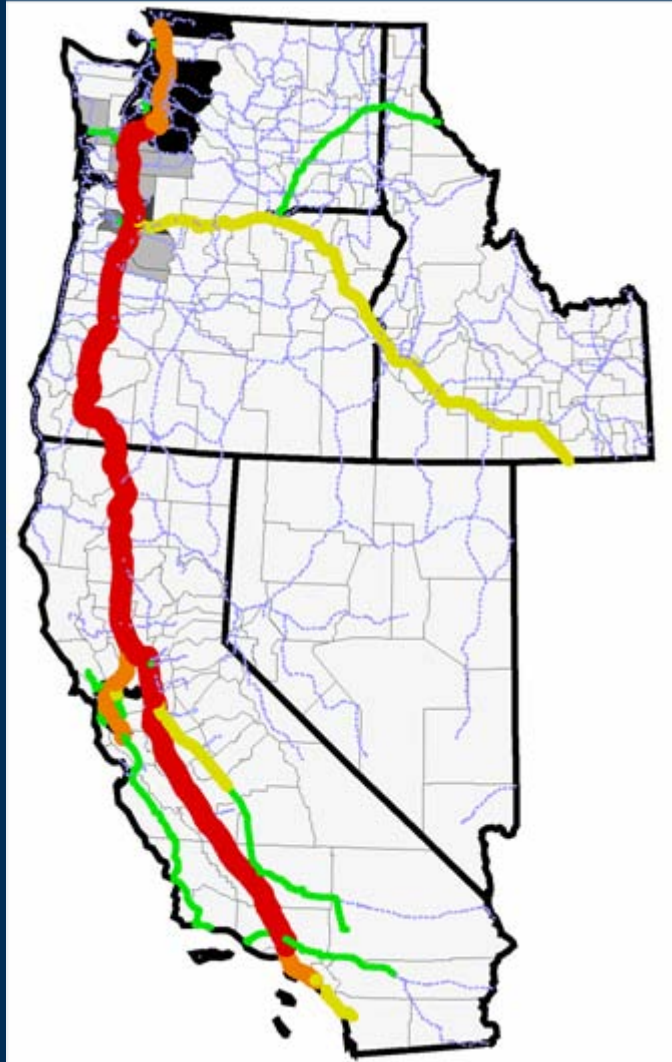


Volume of Lumber, Wood, and Paper
Products on Routes Used to Access I-5
and I-205 Columbia River Bridges, 1998



Source: Cambridge Systematics based on
Reebie Associates TRANSEARCH data, 1998

High-Tech Manufacturing Origins & Destinations Crossing the I-5 & I-205 Bridges at Portland-Vancouver With Value of Freight on Routes Used to Access Bridge



Origins and Destinations of High-Tech Manufacturing Products Crossing I-5 and I-205 Columbia River Bridges, 1998

0 0.01 0.03 0.1 0.2 0.2+



(billions of dollars)

Value of High-Tech Manufacturing Products on Routes Used to Access I-5 and I-205 Columbia River Bridges, 1998

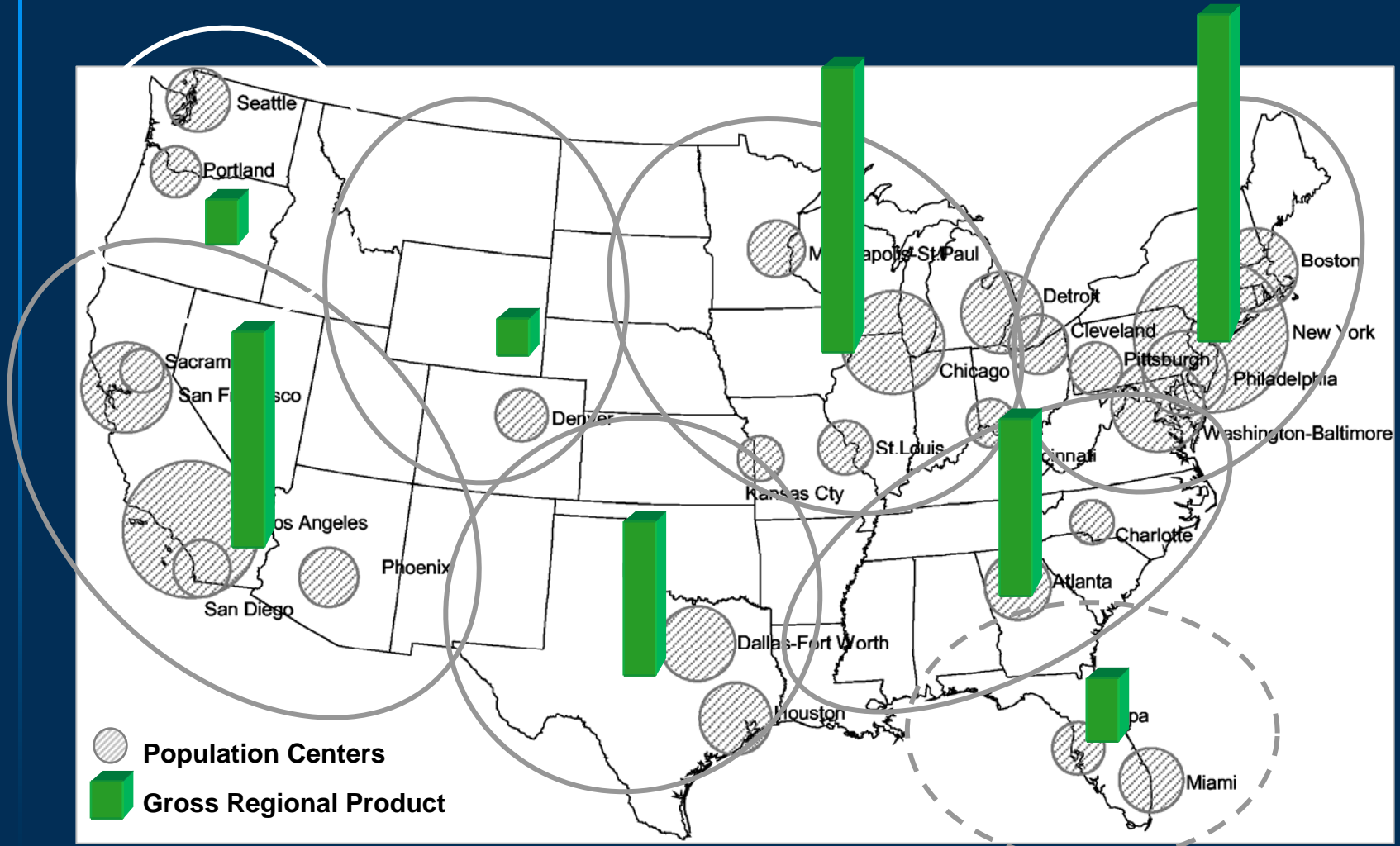
\$0.0 \$0.01 \$0.08 \$0.2 \$1.0 \$1.0+



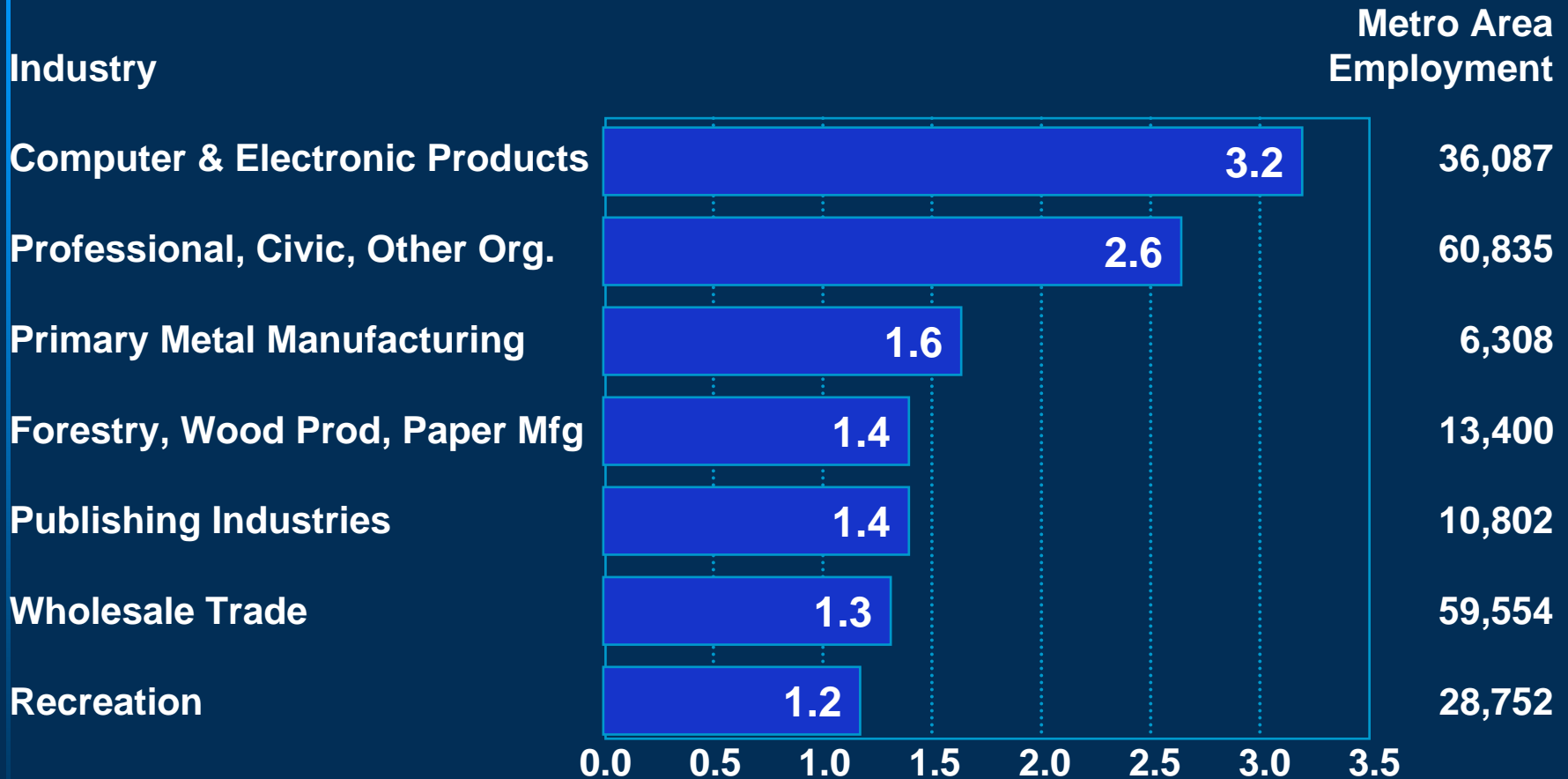
(billions of dollars)

Source: Cambridge Systematics based on
Reebie Associates TRANSEARCH data, 1998

Gross Regional Products of Eight U.S. Trade Blocs With Major Population Centers



Transportation-Intensive Industries Employment Concentration of Traded Industries in the Portland Area



* *Relative concentration is measured as the Location Quotient, which reflects the industry's share of local jobs relative to its share of national jobs.*

Non-Transportation Advantages & Disadvantages for Business Attraction

- **The region's labor costs, worker skills and non-labor costs are mixed but generally in the middle of the range of other cities, neither advantageous nor an absolute obstacle.**
- **The region's research and funding base is not particularly strong. It ranks relatively low in R & D, research institutions, universities and venture capital industries, which are relatively low in sensitivity to traffic congestion.**

Transportation Advantages & Disadvantages for Business Attraction

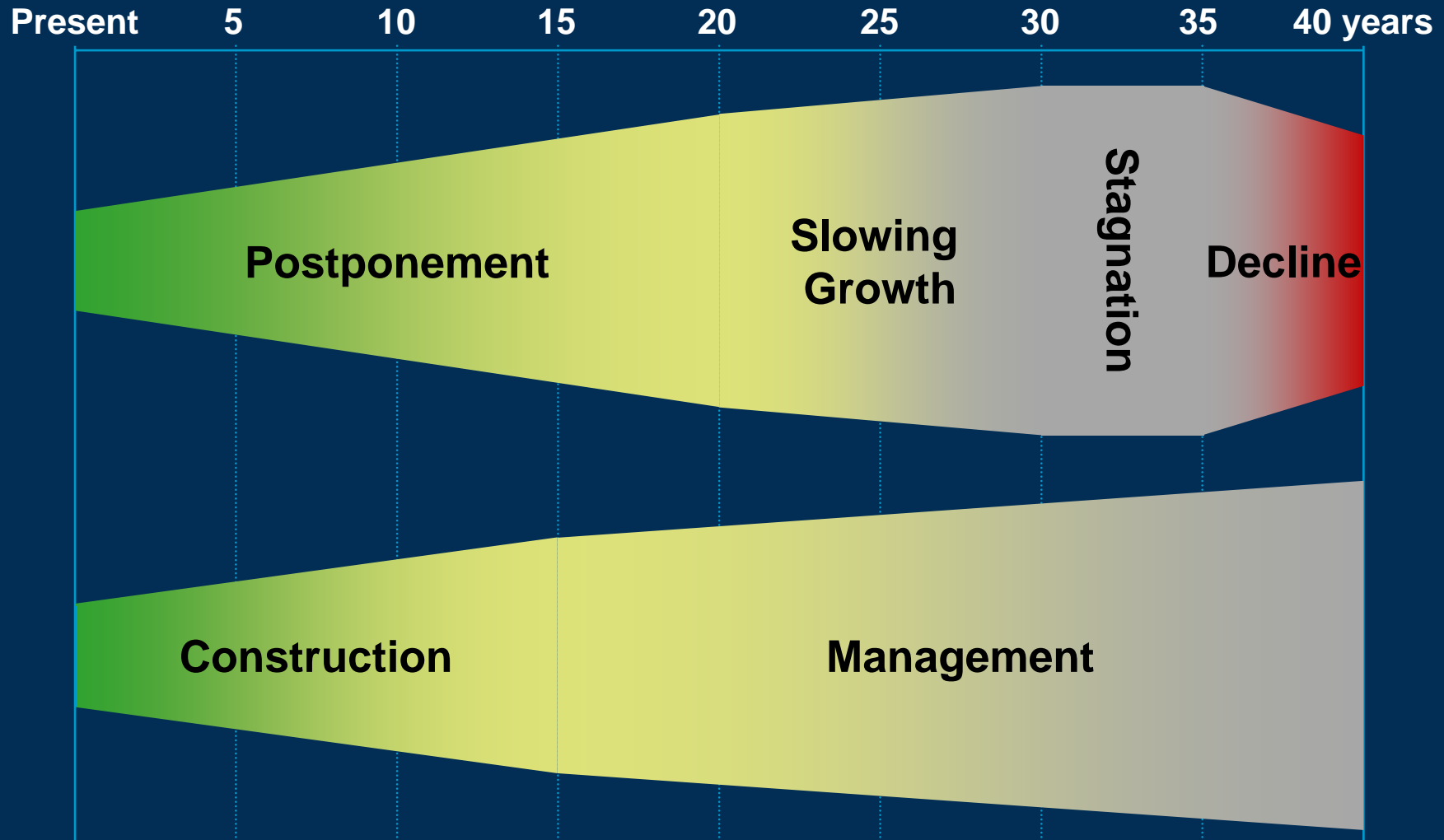
- **The region's location away from most other major markets has made its transportation connections to outside areas including international air and marine ports and the road connections to them.**
- **The region has a pattern of land use and development that makes vacant land for industrial development relatively scarce. This increases the importance of preserving good access to/from available sites.**
- **The region is relatively strong in transportation-reliant manufacturing industries as well as transportation related wholesaling, trucking, rail and air freight.**

The Outlook

- **Region is seeing diminishing returns from the transportation initiatives of earlier decades**
- **Capacity and congestion problems today are eroding the productivity of the transportation system**
- **Congestion at the crossings has a real and immediate cost the Portland-Vancouver residents and businesses**
- **It has a less visible, but equally real, cost to residents and businesses beyond the metropolitan area**

What the Future Holds

Residents & Businesses Have a Choice of Two Futures





Questions & Answers

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PORT OF VANCOUVER, USA
Post Office Box 1180
Vancouver, WA 98666-1180

November 21, 2006

To Members: Project Sponsors Council
Columbia River Crossing Project Team

From: Arch Miller, Commissioner Port of Vancouver

The Port of Vancouver, USA concurs with the recommendations of the Columbia River Crossing Project Team to advance two Build Alternatives for further evaluation into the Draft Environmental Impact Statement (DEIS).

On October 31, 2006 several Port, City, RTC, County, and C-Tran members met with the Project Team to review the proposed alignments of the Columbia River Crossing. The Port of Vancouver, USA recommends and supports several "project components", as follows:

SR 500 – 39th Street: To facilitate improved freight access to I-5 the Port supports a reconfigured SR500 alignment which allows access without stopping. Nearly all the alignments provide for improved access to SR500.

The Port also supports maintaining or improving access between I-5 and 39th Street. Some of the current alignment components provide for either no or only southbound access from 39th Street. With the potential future capacity constraints on either Fourth Plain or Mill Plain Boulevards, the Port needs to maintain all possible routes to I-5. With the addition of a grade separated crossing at the BNSF mainline, 39th Street could provide needed access under extreme conditions.

Fourth Plain Boulevard: Preliminary alignments show it is possible to add a wrap around access from Fourth Plain eastbound to I-5 northbound. This would provide for freer access movement of freight without stopping. With the potential of future congestion on Mill Plain Boulevard (see below) and growth at the Port, it is even more important to encourage the CRC team to look into additional improvements to the Fourth Plain/I-5 access.

Mill Plain Boulevard: Several of the alignments show a "single-point" urban interchange (SPUI) AT THE Mill Plain and I-5 interchange. These improvements provide for two traffic lanes onto and off of I-5. This interchange is similar to the current interchange at I-5 and 99th Street.

Mill Plain Boulevard (Continued):

Current Light Rail and Bus Rapid Transit alignments carry this service through downtown Vancouver and across Mill Plain Boulevard. Although these alignments are preliminary, they potentially can cause congestion and delays along Mill Plain. This, coupled with potential increases in traffic due to waterfront and other City projects, causes some concern regarding future capacity on Mill Plain for the Port.

SR-14: There are several alternatives to the terminus of SR-14. Many of these appear to be acceptable to the Port. The Port support's a SR-14 terminus which terminates with at least a few lanes at Columbia Street near the Red Lion Inn at the Quay. This supports the City's vision of greater access to downtown and the waterfront.

Supplemental Bridge Options: The Port will not support any alternative that results in retaining the existing bridges and building of a supplemental bridge. These alternatives result in substantial taking of the Port's Terminal 1 property and/or taking of property from the Historic Reserve, and commercial property on Hayden Island. Secondly, these alternatives force Marine Drive and Hayden Island traffic through downtown Vancouver.

Cc: Larry Paulson, Executive Director – Port of Vancouver
Nancy Baker, Commissioner – Port of Vancouver
Brian Wolfe, Commissioner – Port of Vancouver

**Portland and Vancouver
International and Domestic
Trade Capacity Analysis**

2006

METRO

Oregon Department of Transportation

Portland Development Commission

Port of Portland

Port of Vancouver

Portland/Vancouver International and Domestic Trade Capacity Analysis

Executive Summary

Introduction

The rapidly growing Asian economies will have significant impact on the demand for trade access into and out of the United States. The Portland/Vancouver region is one of four primary international trade gateways on the US West Coast (Southern California, Bay Area, Columbia River, and Puget Sound). Many of the trade facilities (marine terminals and air cargo facilities) are already operating near or at capacity. At the same time, the ability of the highway and rail system to handle the additional freight volume and the supply of industrial land to accommodate support services is strained. It is likely that there will be implications for the Portland/Vancouver region.

The region is currently beginning a large-scale planning process called the “New Look”, assessing growth patterns through 2035. They are creating a regional freight plan as a part of the overall regional transportation plan, also under development this year. To better inform Port business planning and provide input into the regional planning processes, a consortium of agencies has commissioned the study of trade patterns affecting the Portland/ Vancouver region. The information from the analyses will provide input into the planning efforts.

Purpose

Determine the impact of increased international and domestic trade on the region’s supply of and demand for trade support infrastructure (i.e., surface transportation and industrial land). Provide regional decision makers with technical information to support decisions regarding the management of the region’s land supply and the identification transportation priorities, particularly as it relates to international and domestic trade.

Scope

Task 1. Quantify overall growth rate for the region’s freight volumes to 2035.

Task 2. Assess global market dynamics that may affect trade volumes through Portland/Vancouver gateways.

Task 3. Identify challenges and opportunities trade volume growth presents to Portland/Vancouver region.

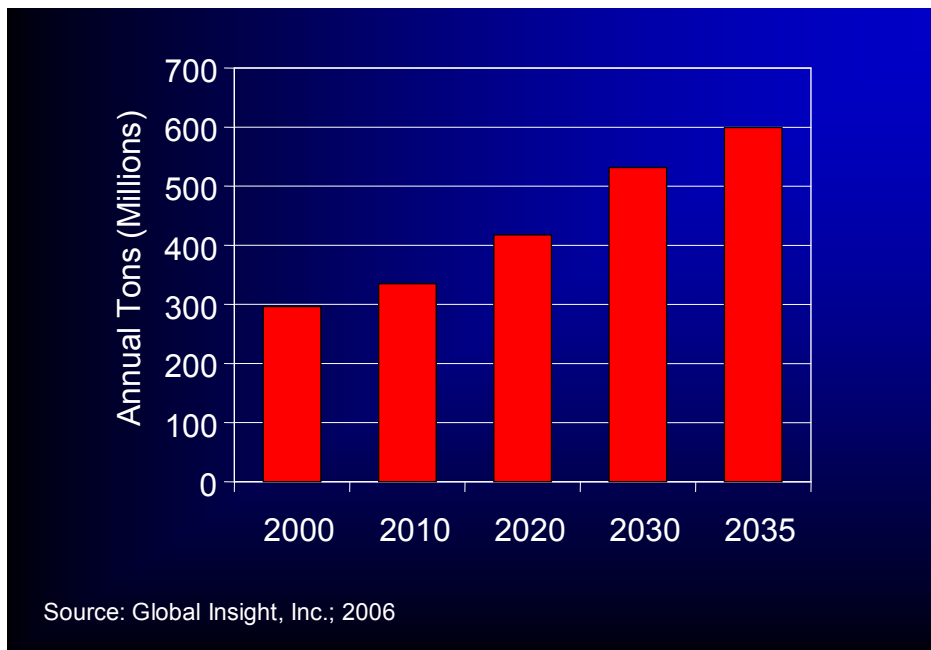
Task 4. Assess of adequacy of land supply and transportation infrastructure to meet forecasted trade volume.

Task 5. Validate results by review of national expert on trade, transportation, and related land use issues.

Key Findings

Trade Growth

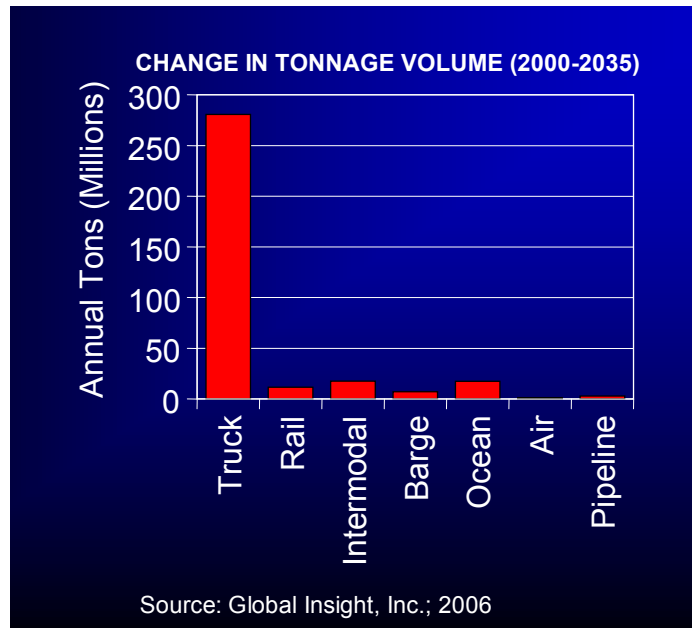
The study forecasts a doubling of trade volume by 2035 in the Portland region, consistent with the last forecast in 1997. The project growth in trade, at approximately 2% per year, is also consistent with the region's projected population growth over the same time period.



Growth is likely to alternate between periods of slow to moderate growth and rapid growth, because our relatively small market size is more impacted by external forces in the national and international economies than in larger domestic markets.

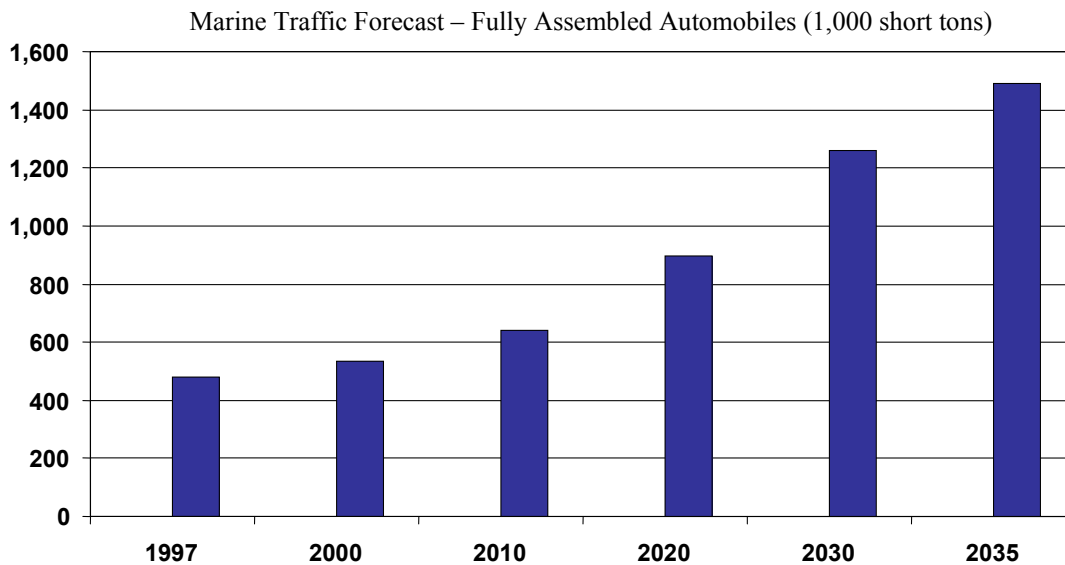
Trade growth is also influenced by a market area that extends well beyond the metropolitan region. Because Portland is at the nexus of an excellent transportation network, it serves as a gateway to domestic and international markets for businesses located throughout Oregon, Southwest Washington, Idaho and even further east. As business and population grow in the market area, trade volumes will increase, which in turn will stimulate more growth.

By mode, trucking will continue to be the dominant mode of freight transport, as shown in the table below. The dominance of trucking is related to its flexibility and integration with all other modes of freight movement. In addition, the study suggests there will be an increasing shift in the commodity mix to high value goods requiring high frequency, smaller shipments that will promote greater truck use.



Maritime Trade

The current forecast projects an increase of 67% more tons of marine cargo by 2035 with substantial increases projected for autos, bulks and containerized freight. As the graph below shows, auto volumes are forecast to triple by 2035 and bulk minerals are forecast to double by 2035. Containerized freight is the wildcard in this scenario.



These opportunities are dependent, however, on the availability of adequate infrastructure, including the Columbia River navigation channel, the Columbia-Snake River barge system, the rail and road networks and the availability of marine industrial land.

The navigation channel of the Columbia River, currently being deepened to 43 feet, is predicted to be adequate to handle a substantial portion of today’s larger cargo ship fleet.

The Columbia-Snake River barge system, unique to marine trade on the US west coast, currently provides the lowest cost and most energy efficient mode to transport agricultural and other commodities from as far up-river as Lewiston, Idaho. The study warns that if barging is eliminated, the railroads may not carry displaced barge volumes, given their shift from short haul to long haul operations and increasing demands on mainline capacity.

The road system provides key access to markets for certain types of marine cargo such as containers and regional market autos. The rail system provides a key linkage to bring all types of marine cargo to and from market including containers, autos, bulks and break-bulks. Both of these systems need to be enhanced in order to meet the volumes forecast.

Marine Industrial land is a scarce commodity in the region, due to very specific location and size requirements and competition from other general industrial and non-industrial land uses. Land currently designated for marine industrial use has a long lead time to bring it into productive use due to permitting processes, making it difficult to respond to market demands in a timely fashion.

The Rail System

Portland benefits from good rail service relative to other West Coast ports from two of the major Class I railroads (Union Pacific and BNSF Railways) and several short line railroads.

However, Class I railroads are facing local, regional and national capacity and congestion issues. As a result, Class I railroads are changing their business model to focus on long haul unit trains (intermodal containers and bulk commodities) to maximize revenues & minimize costs. Consequently, they have placed less focus on serving individual local boxcar (carload) shippers.

As the Class I railroads focus less on local carload business, short line railroads may be able to assume more of this important role for local shippers. However, providing national market access for carload shippers will still require system capacity and the cooperation of the Class I railroads. In addition, the short lines are likely to need additional land for new facilities in order to perform this transloading function.

Air Cargo

Local and regional businesses depend on air cargo to provide national and international market access for high value and time sensitive products, such as computer components, specialized equipment and instruments, apparel and footwear and perishable foodstuffs.

While air transport may account for a relatively small share of these companies' total traffic weight, air cargo access is a critical competitive factor in driving their location and expansion decisions.

However, good air cargo service is only as good as the local road access to the airport. Efficient ground access also expands the areas where industries can locate and be close to a cargo airport and where airports can compete in the regional hinterland. Investment in the road network will be critical in maintaining access in the future.

Land for Logistics

Moving from a just in-time to just-in case logistics business model suggests expansion to regional distribution hubs serving both the Portland and Seattle markets, created by a push for redundancy and flexibility to withstand shocks to the supply chain.

Logistics companies interested in regional warehouse/distribution sites primarily require access to the I-5 corridor in order to provide the flexibility described above.

In addition, each of the modes has their own specialized land need with very specific requirements related to shape, size and access to transportation facilities. Preserving land for this purpose is challenging given competition from general industrial and non-industrial (such as residential) land uses.

Jobs in Logistics

Logistics provides living wage jobs and a career path for workers without a college education. Traditionally, manufacturing provided the career path for workers fitting this profile. As that sector has declined and is projected to decline relative to other sectors of the economy, the logistics sector is increasingly able to provide career opportunities for blue collar workers.

| Sectors with Few Training Barriers to Beginning Employment | |
|---|--------------------|
| | Mean Annual Income |
| Mining | \$90,491 |
| Manufacturing | \$48,397 |
| Logistics | \$47,411 |
| Construction | \$42,714 |
| Gaming | \$29,785 |
| Retail Trade | \$28,108 |
| Hotel/Motel | \$24,108 |
| Agriculture | \$23,474 |

Blue Collar

SOURCE: Economics and Politics, 2006

RND



GLOBAL INSIGHT

Portland/Vancouver International and Domestic Trade Capacity Analysis

Task 1

PORT OF PORTLAND

by:

Global Insight, Inc.

1850 M Street, NW, Suite 1100
Washington DC 20036

Paul Bingham

July 28, 2006

THE POWER OF PERSPECTIVE

OVERVIEW

Global Insight, Inc. was tasked with providing a validation of the 2002 commodity flow forecast for the Portland/Vancouver Regions. Global Insight also was asked to provide an assessment of trade and economic dynamics for the Portland/Vancouver international and domestic trade capacity analysis. Global Insight has conducted this work as two tasks, of which this is the report on the first task, validation of the commodity flow forecast. This effort has broadly validated the earlier forecasts with total growth still being expected to see a doubling of commodity volume between 1997 and 2030. The composition of the share of modal growth and commodity share exhibits some differences from before, though the relative growth of the various modes is much the same with those modes carrying high value goods, air, truck and rail intermodal growing faster than modes that carry primarily slower growing bulk commodities such as pipeline and barge.

METHODOLOGY AND APPROACH

The work of the commodity flow forecast validation was to review the growth rate assumptions used in the commodity flow forecast completed in 2002. Using the 1997 baseline from that forecast, Global Insight has validated that forecast. There were two specific subtasks associated with this. The first was to assess the overall growth rate for freight volumes. The forecast completed in 2002 was that freight volumes for the Portland/Vancouver region will double between 1997 and 2030. The question addressed here is whether this continues to be the case or have developments accelerated or decelerated from the earlier projection? The second task was to examine the growth rates for each of the 41 individual commodity categories and update the forecasts for these commodities using current Global Insight trade and freight demand models and underlying macroeconomic and industry forecasts. This was done and the results and findings are documented in this report.

The new forecasts, as were the forecasts completed in 2002, were developed in the context of national models both driven by forecasts at the macroeconomic, regional, producing sector, and purchasing sector levels.

The commodity flow forecasts project the demand for freight flows for 2010, 2020, 2030, and 2035 for domestic and international freight flows, by origin, destination, and commodity category. The forecast was developed using industry sector classified activity, which were then mapped to the study's SCTG commodity categories. The general methodology involved taking the base year values for 1997, and growing these values based on appropriate growth rates. The results represent the demand for transportation of desired goods either as shipments or purchases of a commodity in a particular region of the country. The shipments growth rate was determined based on the growth rate in output in a particular region of the country and commodity group, from Global Insight's Business Demographic Model (BDM). The purchases growth rate was determined based

on Global Insight's Business Transactions Matrix (BTM), which measures the purchases of a product made in one industry by industries in all other industry sectors, as well as the retail sector, in a particular region of the country. Finally, the forecasts of commodity shipments were controlled to purchases by commodity group and region.

FINDINGS AND CONCLUSIONS

The analysis and new projections have validated the 2002 forecasts by the newly estimated freight volumes also expecting to double from 1997 to 2030. In the new projections out to 2035, total freight tonnage for the Portland/Vancouver region increases at a compound average annual growth rate of 2.2%. Comparing the forecast completed in 2002 to the new validation, the new projection is for slightly faster growth over the 1997 to 2030 period, with a compound average annual growth rate of 2.18% compared with the 2.12% rate in the forecast completed in 2002. By 2030, the difference in total tonnage, for the entire metro area (including both the Oregon and Washington portions of the metro area) is 9.96 million tons additional compared with the forecast completed in 2002. The growth rates for the individual mode total freight volumes are shown in Table 1.1, below. The compound average annual growth rates have been calculated for the period 1997 to 2030 for comparison with the forecast completed in 2002 which extended only to 2030.

**Table 1.1 Total Portland/Vancouver Freight Tonnage 1997-2035
(1000s of Short Tons)**

| Period | Truck | Rail | Intermodal | Barge | Ocean | Air | Pipeline | Total |
|-----------------------|--------------|--------------|--------------|--------------|--------------|-------------|--------------|--------------|
| 1997 | 166,574 | 14,636 | 11,778 | 14,082 | 25,265 | 313 | 28,131 | 260,779 |
| 2000 | 197,236 | 17,316 | 15,634 | 15,065 | 28,406 | 449 | 22,236 | 296,342 |
| 2010 | 224,526 | 20,137 | 17,222 | 15,068 | 33,025 | 521 | 24,448 | 334,947 |
| 2020 | 294,356 | 21,661 | 21,267 | 17,126 | 36,527 | 754 | 25,760 | 417,451 |
| 2030 | 390,498 | 24,082 | 26,809 | 19,783 | 40,344 | 1,257 | 28,810 | 531,582 |
| 2035 | 447,157 | 26,243 | 29,318 | 21,280 | 42,629 | 1,658 | 31,055 | 599,340 |
| CAGR % (1997-2030) | 2.62% | 1.52% | 2.52% | 1.04% | 1.43% | 4.3% | 0.72% | 2.18% |

Note: CAGR is Compound Average annual Growth Rate (percent)

Source: Global Insight, Inc.

The difference between the forecasts completed in 2002 and the validation projections are more substantial when compared at an individual modal basis. The most significant difference is in rail carload traffic, which is now projected to grow at a compound average annual rate of 1.6% rather than the 2.7% rate of the forecast completed in 2002. The difference in growth rates results in almost 11 million fewer tons being shipped in rail carload traffic in the metro region by 2030, reflecting significantly slower rail carload growth in base chemicals, gas, fuel, petroleum products, milled grain and bakery products, foodstuffs, alcoholic beverages, and other categories. Some of this is from loss of mode share to rail intermodal or truck, but some, such as basic chemicals, is due to lower overall growth in tonnage volume projected for that commodity category. Intermodal rail is forecast to grow slightly faster by 2030 than in the forecast completed

in 2002, now carrying more tonnage than carload rail through the region by the year 2030. There is some reduction in growth forecast for the petroleum products moved by pipeline by 2030, somewhat offset by a shift to more by truck and inbound ocean transport. Air cargo and barge volumes are also now expected to see slightly faster growth in tonnage by 2030 than in the forecast completed in 2002. Barge will capture some agriculture tonnage lost by rail carload as well as handle a greater volume of gravel and stone by 2030 than forecast before. The largest increase in 2030 tonnage compared with the forecast completed in 2002 is for truck, but is off a very large base so that the increase in compound average annual growth from 1997 to 2030 is just 0.085%. The differences in total tonnage by mode between the forecast completed in 2002 and the validated forecast are summarized in Table 2.

Table 1.2 Differences in Total Portland/Vancouver 2030 Freight Tonnage Validated Forecast vs. Forecast Completed in 2002 (1000s of Short Tons)

| Difference in Validated - Original Forecast, 2035 | Truck | Rail | Intermodal | Barge | Ocean | Air | Pipeline | Total |
|---|--------|---------|------------|-------|-------|-------|----------|-------|
| Tonnage (1000s) | 10,526 | -10,912 | 2,645 | 4,282 | 5,578 | 196 | -2,352 | 9,964 |
| CAGR % (1997-2030) | 0.085 | -1.156 | 0.322 | 0.744 | 0.456 | 0.535 | -0.238 | 0.059 |

Note: CAGR % here is the difference in the Compound Average Annual percentage growth rates.
 Source: Global Insight, Inc.

Looking at the growth in the Standard Classification of Transported Goods categories used in the forecasts, gas, fuel and petroleum products remains the category with the greatest total Portland / Vancouver commodity tonnage. The majority of this product category tonnage is inbound to the region, especially via the Olympic pipeline from Puget Sound. There is also significant movement inbound via the ocean. Outbound movements by barge and truck, as well as substantial metro area distribution by truck make up most of the rest of this category tonnage. The next largest tonnage commodity category in the region is the non-metallic mineral products category that includes cement, concrete, glass and ceramic products primarily used in construction. These are mostly very heavy unit-weight commodities that travel relatively short distances by truck. This category has the greatest internal tonnage movement of any category, almost all by truck. Foodstuffs and alcoholic beverages is the third largest category, a catch all category including a wide variety of grocery food products and beverages. This is another category with substantial internal movements as well as inbound and outbound shipments, almost all by truck. Cereal grains, gravel & crushed stone, logs and wood products are the next largest tonnage categories. The validated 2030 total tonnage forecast by commodity category and by mode, the last year that can be compared with the forecast completed in 2002, is in Table 1.3 below.

**Table 1.3 Total Portland/Vancouver 2030 Freight Tonnage
Validated Forecast by Commodity Category and Mode (1000s of Short Tons)**

| YEAR 2030 (1000s of short tons) | | TOTAL | | | | | | | Totals |
|---------------------------------|---|------------------|-----------------|-----------------|-----------------|-----------------|----------------|-----------------|------------------|
| SCTG | Description | Truck | Rail | Intermodal | Barge | Ocean | Air | Pipeline | |
| 1 | Live animals and live fish | 340.8 | 20.0 | - | - | 6.9 | 0.1 | - | 367.8 |
| 2 | Cereal grains | 4,828.8 | 9,240.5 | - | 8,607.5 | 16,322.2 | - | - | 38,999.0 |
| 3 | Agricultural products, except live animals, cereal grains and forage products | 5,243.0 | 148.2 | 75.3 | 25.3 | 307.5 | 25.5 | - | 5,824.8 |
| 4 | Animal feed and feed ingredients, cereal, straw, and eggs and other products of animal origin, n.e.c. | 1,168.7 | 22.0 | 7.9 | 21.1 | 674.8 | 0.2 | - | 1,894.8 |
| 5 | Meat, fish, seafood, and preparations | 1,483.1 | 11.2 | 74.0 | - | 54.8 | 9.2 | - | 1,632.3 |
| 6 | Milled grain products and preparations and bakery products | 11,777.8 | 797.9 | 93.1 | 8.1 | 130.8 | 0.0 | - | 12,807.8 |
| 7.8 | Foodstuffs and alcoholic beverages | 46,388.0 | 2,265.1 | 260.1 | - | 246.2 | 16.4 | - | 49,175.8 |
| 9 | Tobacco products | 441.7 | 1.9 | - | - | 0.1 | - | - | 443.8 |
| 10 | Monumental or building stone | 222.6 | 415.6 | - | - | - | - | - | 638.2 |
| 11 | Natural sands | - | - | - | - | - | - | - | - |
| 12 | Gravel and crushed stone | 25,131.1 | - | - | 5,407.1 | 10.7 | - | - | 30,548.9 |
| 13 | Nonmetallic minerals, n.e.c. | 2,068.3 | - | - | 1.2 | 2,669.7 | - | - | 4,739.2 |
| 14 | Metallic ores | 0.1 | 414.9 | - | - | 1,391.7 | - | - | 1,806.6 |
| 15 | Coal | 9.8 | - | - | - | - | - | - | 9.8 |
| 16 | Crude Petroleum Oil and Oil from Bituminous Materials | 0.5 | - | - | 94.6 | 436.8 | - | - | 531.9 |
| 17.18.19 | Gas, fuel, petroleum/coal products | 29,163.5 | 923.6 | - | 4,268.2 | 6,508.4 | 0.9 | 28,810.0 | 69,674.6 |
| 20 | Base chemical | 13,526.4 | 4,334.7 | 679.6 | 27.8 | 3,508.8 | 17.1 | - | 22,094.5 |
| 21 | Pharmaceutical products | 1,233.0 | - | - | - | - | 5.6 | - | 1,238.5 |
| 22 | Fertilizer and fertilizer materials | 466.6 | 2,173.2 | - | 103.9 | 2,279.9 | - | - | 5,023.5 |
| 23 | Chemical products and preparations, n.e.c. | 6,754.9 | - | - | - | 130.2 | 19.8 | - | 6,904.9 |
| 24 | Plastics and rubber | 4,111.3 | 98.2 | 11.2 | - | 320.3 | 11.1 | - | 4,552.1 |
| 25 | Logs and other wood in the rough | 33,484.0 | - | - | 24.8 | 85.4 | - | - | 33,594.2 |
| 26 | Wood products | 33,280.9 | 72.6 | 6,012.4 | 106.1 | 221.0 | 13.1 | - | 39,706.0 |
| 27 | Pulp, newsprint, paper, and paperboard | 7,222.6 | 66.5 | 3,914.3 | 50.5 | 48.8 | 7.1 | - | 11,309.8 |
| 28 | Paper or paperboard articles | 5,801.0 | - | - | 102.7 | 39.1 | 8.4 | - | 5,951.2 |
| 29 | Printed products | 1,668.6 | 34.1 | 2.3 | - | - | 17.0 | - | 1,722.0 |
| 30 | Textiles, leather, and articles | 5,030.6 | 20.3 | 1.2 | - | 48.2 | 17.7 | - | 5,118.0 |
| 31 | Nonmetallic mineral products | 65,026.4 | 342.4 | 438.5 | - | 1,593.1 | 5.2 | - | 67,405.6 |
| 32 | Base metal in primary or semifinished forms and in finished basic shapes | 7,819.8 | 1,048.1 | 484.0 | - | 709.7 | 0.5 | - | 10,062.0 |
| 33 | Articles of base metal | 10,417.8 | 0.4 | 67.7 | 60.2 | 287.4 | 9.6 | - | 10,843.2 |
| 34 | Machinery | 3,031.2 | 182.7 | 44.6 | - | 78.4 | 276.8 | - | 3,613.8 |
| 35 | Electronic and other electrical equipment and components, and office equipment | 2,584.1 | 47.0 | - | - | 381.8 | 259.6 | - | 3,272.4 |
| 36 | Vehicles | 12,275.6 | 494.3 | 692.0 | - | 1,257.9 | 29.0 | - | 14,748.8 |
| 37 | Transportation equipment, n.e.c. | 3,604.4 | - | - | - | - | 0.6 | - | 3,605.0 |
| 38 | Precision instruments and apparatus | 1,325.8 | - | - | - | - | 99.1 | - | 1,424.9 |
| 39 | Furniture, mattresses and mattress supports, lamps, lighting fittings, and illuminated signs | 2,141.6 | 71.2 | 5.4 | - | 58.3 | 4.0 | - | 2,280.5 |
| 40 | Miscellaneous manufactured products | 6,517.5 | 3.7 | 270.3 | - | 272.1 | 16.6 | - | 7,080.2 |
| 41 | Waste and scrap | 16,298.5 | 433.6 | 426.6 | 76.5 | 243.0 | 0.1 | - | 17,478.4 |
| 43 | Mixed freight | 17,590.9 | - | 12,825.9 | - | 19.5 | 87.1 | - | 30,523.4 |
| 44 | Mail and Express Traffic | 367.8 | 397.9 | - | - | - | 299.8 | - | 1,065.5 |
| 60 | Empty Containers, etc | 648.6 | - | 422.6 | 797.2 | - | - | - | 1,868.4 |
| Totals | | 390,497.6 | 24,081.7 | 26,809.3 | 19,783.0 | 40,343.7 | 1,257.1 | 28,810.0 | 531,582.3 |

Source: Global Insight, Inc.

Comparing the results of the forecast completed in 2002 with the validated forecast shows the changes in outlook are not uniform. The logs and wood products categories are projected to grow slower than before, due to more difficulties in producing in the U.S. and more competition from foreign producers with more open access to the U.S. market (including Canada.) In the other direction, mixed freight, often consolidated shipments used by retailers and third party logistics firms is forecast to increase more than in the forecast completed in 2002, as changes in logistics practices have accelerated, partly as a reflection of national consolidation in the retail sector, and partly as a reflection of the increase in use of intermodal rail service. The forecast tonnage volume for gas, fuel and petroleum products is also projected to grow faster, with the growth in truck and ocean volume coming at the expense of slower growth in rail and pipeline. The differences in the two forecasts in 2010, 2020 and 2030 are in Table 1.4 below.

Difference: Validated Minus Original (1000s of short tons)

| SCTG | Description | 2010 | 2020 | 2030 |
|---------------|---|----------------|-------------------|----------------|
| 1 | Live animals and live fish | 41.4 | 65.0 | 88.5 |
| 2 | Cereal grains | 3,337.5 | 2,977.0 | 4,470.0 |
| 3 | Agricultural products, except live animals, cereal grains and forage products | 448.6 | 678.7 | 1,730.3 |
| 4 | Animal feed and feed ingredients, cereal, straw, and eggs and other products of animal origin, n.e.c. | (162.3) | (248.0) | (199.2) |
| 5 | Meat, fish, seafood, and preparations | 73.0 | (174.1) | (248.9) |
| 6 | Milled grain products and preparations and bakery products | 119.7 | (2,665.5) | (3,367.2) |
| 7.8 | Foodstuffs and alcoholic beverages | 1,759.9 | (8,495.8) | (10,816.3) |
| 9 | Tobacco products | 72.4 | 87.6 | 47.3 |
| 10 | Monumental or building stone | 36.8 | 66.8 | 113.7 |
| 11 | Natural sands | - | - | - |
| 12 | Gravel and crushed stone | (6,833.7) | (5,638.8) | 3,551.3 |
| 13 | Nonmetallic minerals, n.e.c. | 936.6 | 1,790.8 | 3,046.4 |
| 14 | Metallic ores | 349.5 | 473.5 | 525.1 |
| 15 | Coal | 1.8 | 2.9 | 8.0 |
| 16 | Crude Petroleum Oil and Oil from Bituminous Materials | (44.8) | (75.1) | (115.0) |
| 17.18.19 | Gas, fuel, petroleum/coal products | (1,515.1) | 3,391.5 | 13,156.0 |
| 20 | Base chemical | 763.4 | (1,854.0) | (2,643.9) |
| 21 | Pharmaceutical products | 72.4 | 322.3 | 876.2 |
| 22 | Fertilizer and fertilizer materials | 292.0 | (37.6) | (290.1) |
| 23 | Chemical products and preparations, n.e.c. | 357.6 | 1,098.3 | 3,333.3 |
| 24 | Plastics and rubber | 359.8 | 376.6 | 862.1 |
| 25 | Logs and other wood in the rough | (3,946.7) | (10,652.8) | (14,512.0) |
| 26 | Wood products | (4,151.5) | (11,789.8) | (16,825.5) |
| 27 | Pulp, newsprint, paper, and paperboard | 130.7 | (797.3) | (1,524.2) |
| 28 | Paper or paperboard articles | 86.1 | (261.4) | (77.5) |
| 29 | Printed products | (26.4) | (715.9) | (1,181.5) |
| 30 | Textiles, leather, and articles | (261.6) | (1,544.8) | (2,523.7) |
| 31 | Nonmetallic mineral products | (995.1) | (10,671.4) | (14,123.7) |
| 32 | Base metal in primary or semifinished forms and in finished basic shapes | 1,243.3 | 1,334.5 | 2,655.2 |
| 33 | Articles of base metal | 1,080.9 | 1,213.0 | 2,778.9 |
| 34 | Machinery | (358.6) | (860.1) | (397.0) |
| 35 | Electronic and other electrical equipment and components, and office equipment | (341.7) | (800.7) | (398.6) |
| 36 | Vehicles | 714.9 | 2,405.4 | 7,385.4 |
| 37 | Transportation equipment, n.e.c. | 285.8 | 471.6 | 1,744.7 |
| 38 | Precision instruments and apparatus | (26.6) | (178.3) | 144.1 |
| 39 | Furniture, mattresses and mattress supports, lamps, lighting fittings, and illuminated signs | 108.4 | 127.4 | 385.7 |
| 40 | Miscellaneous manufactured products | 200.7 | 741.5 | 3,290.4 |
| 41 | Waste and scrap | 1,732.2 | 2,667.1 | 7,194.2 |
| 43 | Mixed freight | 8,048.7 | 12,502.1 | 22,315.6 |
| 44 | Mail and Express Traffic | 63.4 | (471.9) | (737.5) |
| 60 | Empty Containers, etc | 129.9 | 106.4 | 243.3 |
| Totals | | 4,183.4 | (25,033.3) | 9,963.8 |

Source: Global Insight, Inc.

ASSUMPTIONS USED TO VALIDATE THE FORECASTS

As a summary of the assumptions in the economic and trade forecasts used to validate the commodity flow forecast, we present the following comparison of forecasts completed in 2002 and the new validation of those forecasts prepared in 2006.

Table 1.4 Comparison of Underlying Economic and Trade Assumptions Behind Forecast Prepared in 2002 and Validation Forecast Completed in 2006

| Assumption | Forecast Completed in 2002 | Validation Completed in 2006 |
|------------------------------|--|---|
| 1. U.S. GDP | Rebound in 2002 with GDP growth increasing to 4.5% by 2004 then slowing to 3.6% in 2005 and staying above 3% annually over longer term. | Growth in rebound peaked at 4.2% in 2004 now slowing to 2.6% by 2007 before increasing back to over 3% over the long term. Not much change long-term |
| 2. U.S. Interest Rates | Federal Reserve will continue to focus on inflation fighting as #1 goal by raising interest rates through 2005, and then adjust rates for steady low inflation. | Much the same except rate hikes in short-run continue into 2006. No change in long term anti-inflation policy assumptions, so the CPI averages near 2.4% long-term. |
| 3. Fiscal Policy | Federal government runs a long-term deficit, especially as entitlement programs grow and tax increases are minimized. State and local spending limited by ability to increase tax revenues. | Mostly the same: growth of real federal spending averages 1.8% per year; real growth in federal transfers average 5.8% per year. Average growth in state and local purchases is 1.5% per year. |
| 4. Energy Prices | Crude oil prices expected to rise gradually from \$20/bbl to near \$30/bbl by 2010 and continue moderate real growth thereafter. Coal, natural gas and other energy prices also see moderate growth. Limited conservation / alternative fuels adoption within U.S. | Crude oil falls from near \$80/bbl in 2006 (after quick run up in last few years) to \$50/bbl by 2010 and then moderate long term increases from that level to \$79/bbl by 2030. Other energy prices higher as well. Accelerated adoption of alternative fuels and energy conservation steps. |
| 5. Commodity Prices | Non-energy commodity prices expected to show moderate inflation over the long-term as demand and investment for production expected to track fairly closely, moderated by business cycle demand and productivity growth. | Non-energy commodity prices increased through rapid demand increases, especially from China, as world in recovery. Longer-term price increases still expected to moderate as production expands following recent price increases. |
| 6. U.S. Dollar Exchange Rate | Dollar to fall gradually over long-term starting in 2002 against most trade partners. U.S. export competitiveness improves starting in 2002. | Dollar fell against Euro but held value against some Asian currencies until 2005. China appreciates its currency slowly against the dollar. U.S. export competitiveness improves after 2005. |

Table 1.4 Comparison of Underlying Economic and Trade Assumptions Behind Forecast Prepared in 2002 and Validation Forecast Completed in 2006 (Continued)

| | | |
|------------------------------------|---|---|
| 7. Japanese economy | Recession and deflation keep Japan growing slowly through 2004-2005, then growth increases to near 2% growth in GDP annually over medium term before falling again with shrinking population and workforce after 2010 | Much the same except growth recovered about one year faster and will slow again sooner. No change to declining demographic outlook. Goods trade with China continues to increase. |
| 8. China's Economy | Rapid growth in exports and internal development assumed, including more trade with U.S. Chinese infrastructure spending and employment growth expected to decelerate by 2007 following WTO entry. Average 8% GDP growth 2002- 2007. | Chinese Export growth, foreign investment, Chinese government infrastructure spending and new job creation all at higher rates than previously forecast through 2007. Long term trade growth rate slows with maturation of China export markets, after 2010. Average 9% GDP growth 2002-2007. |
| 9. Other Asian Economies | Strong GDP growth, driven by export trade and much of it linked to development in China, with strong growth in intra-Asia trade. Assumed other Asia grows an average of over 4% per year over the long-term, India at 5.5% growth sustained into the long-term.. | Similar, though Korea and Taiwanese trade growth has moved quickly up the value chain ahead of lower cost manufacturing moved to China. Commodity price boom helps some Asian country exporters. India remains protectionist for many goods manufacturing industries while booming in service sector development, averaging 6.5% growth. |
| 10. U.S. Population and Work Force | Long-term, population projections use the U.S. Census Bureau's latest projections, which are based on specific Census Bureau assumptions about immigration, fertility, and mortality rates. Retirements of the baby-boomers and the aging of the population affects the availability of labor and consumption patterns, including such results as slower growth of the housing stock. | Mostly the same, though with updated projections from the U.S. Census Bureau. Retirement ages are not increasing despite policy to encourage it to do so. Availability of labor includes continuation of recent immigration and migration patterns and no change to law or enforcement that restricts immigrant labor availability. The U.S. population will average 0.8% growth per year through 2030. |

Table 1.4 Comparison of Underlying Economic and Trade Assumptions Behind Forecast Prepared in 2002 and Validation Forecast Completed in 2006 (Continued)

| | | |
|--------------------------------------|---|--|
| 11. Oregon Employment | After decline to -1.5% in 2002, the average annual 1997-2030 growth in employment was forecast between 1.1% and 1.4%, but with slower growth in the last 20 years of the forecast period to 2030 of 0.2% to 0.3%. | After strong recovery through 2005, growth in employment is forecast to average 1.1% over the study period, though growth slows to an average of 0.8% between 2010 and 2030. Higher growth in services drives employment. |
| 12. Oregon Gross State Product | Real Gross State Product was forecast at 2.5% to 3.0% out to the 2030 study horizon with weaker growth in services in the early years after the 2001 recession. | Real Gross State Product is now forecast at 3.2% over the comparable period due to stronger growth in the services sectors and manufacturing in the state. |
| 13. Portland / Vancouver Employment | Metro area employment growth forecast to be 0.6% in 2003–2010, with few sectors reaching 1.0% growth due to aftermath of 2001 recession. | Metro area employment growth rebounded faster than forecast in 2003-2005, with near term 2005-2007 employment growth now projected to be 2.2%, longer term growth |
| 14. Portland / Vancouver Real Output | Real output in the metro area was forecast between 2.7% to 3.0% over the forecast horizon, 2010-2030, following the 2004-2010 rebound from the 2001 recession. | About the same though short term performance has been better, averaging 5.6% over 2005-2007, increasing the long-term average growth towards the top end of the earlier range. |
| 15. Industry Sector Growth | Service sectors will be the source of short-term and long-term economic growth. Specialty manufacturing will remain though increased outsourcing of commodity goods production is the long-term forecast. | Mostly the same, though some capital goods manufacturing has rebounded faster than projected out of the 2001 recession. Services lead growth while resource sectors such as wood products now slow more due to restricted output and freer trade. Retailing industry consolidation faster than in previous forecast. |



GLOBAL INSIGHT

Portland/Vancouver International and Domestic Trade Capacity Analysis

Task 2 Assessment of Trade and Economic Dynamics

PORT OF PORTLAND

by:

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September 22, 2006

THE POWER OF PERSPECTIVE

OVERVIEW

For the Portland/Vancouver International and Domestic Trade Capacity Analysis, Global Insight, Inc. was tasked with providing a validation of the 2002 commodity flow forecast for the Portland/Vancouver Regions and an assessment of trade and economic dynamics. Global Insight has conducted this work as two tasks, of which this is the report on the second task, the assessment of trade and economic dynamics. The commodity forecasts completed in 2002 and the validation effort are both dependent on a large number of assumptions about the underlying dynamics of the economy and trade over the forecast horizon. This report discusses the key factors that might influence the forecast.

TRADE AND ECONOMIC DYNAMICS

The demand for commodity transportation depends on many factors that determine the demand for and supply of goods and the geography of their production and consumption. These factors are usually quantified as economic and demographic indicators, though the changes in these indicators can be in turn be influenced by sociological, geopolitical and environmental developments that can more difficult to quantify (or predict). This discussion will focus on the developments we observe in industry and the economy that affect commodity shipments in the Portland / Vancouver region. Among these developments are those in the areas of the purchasing patterns of consumers, the sourcing patterns of businesses, industry logistics practices, and macroeconomic developments within the United States and abroad.

POPULATION

There are many important characteristics of the population that influence future commodity flow activity. The demographics of the population are expected to show a continued increase in average age, with low birth rates and increasing life expectancy leading to an ever-smaller proportion of the total population of working age, and an increase in the elderly population. This is a population that is expected to shift their consumption increasingly towards services (e.g. healthcare) compared with spending on goods for consumption as a proportion of their total income. This trend is already at work in the economy and how this will affect future commodity transportation demand is somewhat complex, because the composition of goods purchased is changing as well. It is likely that the future population will be spending a greater percentage of their income on high value goods such as pharmaceuticals and a smaller percentage of their income on higher cubic volume goods such as furniture. Longer lives mean more years of consumption however, so the bottom line impact is an increase in demand. Obviously anything that would slow population growth or reduce the population in the region would have the opposite effect, reducing total transportation demand, though it is difficult to imagine what might cause population trends to reverse in the region. In the validated commodity forecasts the demographic influence on purchasing patterns is captured from consumer purchases of goods and services by category. The underlying shift in

population is modeled as seven individual age cohorts as well as labor force size and labor force participation by age group. Regional geographic shifts in population are captured through net migration and work force estimates at the state and metropolitan area level for the United States.

WORKFORCE AND MIGRATION

Related to the population are the characteristics of the workforce, and the influences of migration and immigration. Reflecting the aging of the population, the workforce will see slower growth than the population as a whole, with the average age of employees increasing. Employers will have incentive to invest in more technology and equipment for production that remains in the country, increasing labor productivity through advances in automation. This continues to put pressure on workers to obtain more education. If the challenge from availability of the skilled labor workforce becomes severe enough, it may promote the movement of even more manufacturing off-shore. At the national level, manufacturing employment trends of the past decade are forecast to continue with long-term absolute declines in manufacturing jobs through the end of the forecast period. How this will turn out for the Portland/Vancouver region is not yet clear, as further net migration from other parts of the country is quite possible, as the quality of life available in the region proves attractive to those living in more crowded and expensive parts of the country. Immigration, legal or not, is another factor affecting the workforce, though the outlook for this in the region is unclear, given the uncertainty with respect to federal immigration policy and enforcement. In the Portland / Vancouver region, some of the affects of immigration are indirect through their greater influence on other regions of the country. This forecast assumes no significant affect from potential changes in immigration law or enforcement from the practices of the last decade which means that that workforce availability is not significantly changed from recent historical trends by immigration.

U.S. REGIONAL GROWTH

Differences in regional growth in the country can also have an effect on goods transportation demand in the Portland / Vancouver region. The more rapid growth in the southern and western regions of the country is likely to continue though the more recent pattern in the West has been a shift towards faster growth in the 'Mountain'¹ states than along the West Coast itself. The upper Midwest and the Northeastern portions of the country are expected to continue to be slower growing, which has implications for growth in demand for freight transportation serving those regions. The influence of these geographic shifts are captured through the faster relative growth in goods demand from the faster growing regions drawing more strongly on source supply regions and gateways than the slower growing regions. While the Portland / Vancouver region has an international gateway function for both the near-hinterland of the Mountain states and more distant population centers of the Mid-West and Eastern regions, it will be closer hinterland that will be the stronger market. This has implications for relative modal

¹ The 'Mountain' states are generally considered to be Idaho, Montana, Wyoming, Colorado, Utah, and Nevada.

demand, such as more truck demand to serve the closer hinterland where rail has less of an advantage due to the shorter distances.

TRADE PARTNER GROWTH

Difference in growth among the country's trading partners will also affect goods transportation demand in the Portland / Vancouver region. After the strong growth in U.S. trade with Japan during the 1970s-1980s, commodity trade with Japan has become increasingly less important to the region. The shift that first followed growth in trade with Japan was a shift towards faster growth in trade with the 'newly industrialized economies' of Asia, including Hong Kong, South Korea, Taiwan and Singapore. In the last ten years, trade with these economies has been overtaken by trade with China, which will soon overtake even Mexico to become the country's second largest trade partner after Canada. The continued rapid growth in China, and more moderate growth in the rest of Asia (and slow growth in Japan) has transformed the composition of U.S. trade with Asia trade as well as the composition of all U.S. trade. With the exception of large energy commodity imports into the U.S. from other regions of the world, Pacific Rim trade has justifiably commanded the greatest attention from trade specialists. While there is real political risk associated with the ability of China to continue to grow at near double-digit rates on a sustained basis, it is likely that Asian trade will continue to be the center of attention for both U.S. importers and exporters over the long-term. This forecast is for continued growth in trade with China, exceeding the volume of any other trade partner throughout the forecast period. By the end of the long-term forecast period, Vietnam trade with through the Pacific Northwest, including Portland / Vancouver, is forecast to grow at a faster annual rate than trade with China, but off a much smaller base of traffic. Japan suffers from continued slow trade growth with the Pacific Northwest throughout the forecast period yet remains the number two Asian trade partner for the region, while losing 2/3 of its market share, in percentage terms to China.

INTERNATIONAL GATEWAYS

Critical to sustained growth in trade are the gateways through which these goods move in and out of the country. Though far from the largest, the Portland / Vancouver region is one of these international gateways, and importantly serves primarily the fast-growing U.S. - Asian trade. How this growth in trade will impact the region depends in part on how desirable this region is in comparison with other international gateways. Therefore, among the factors affecting demand for commodity transportation through the Portland / Vancouver region are the conditions of the alternative international trade gateways serving the country.

This is an important factor in the future international commodity demand in the region because there are signs of strains in the system of international trade gateways. In the last four years, the West Coast has seen a U.S. West Coast-wide port shut down in 2002, severe containerized cargo congestion in Southern California in 2004 and a port-trucker strike in Vancouver, BC in 2005. Since 2001, the airline industry has suffered with poor

financial performance that has resulted in a restructuring of routes, services and aircraft fleets which has affected the air cargo service network, including the U.S. – Asia routes.

While these recent events captured headlines and attracted attention to the performance and capacity of international gateways serving the West Coast, more fundamental issues such as the environmental and long-term congestion impacts of port activity have become increasingly the focus of the communities and states of which the ports are a part. Congestion and port traffic-related environmental impacts are especially acute in the Los Angeles metropolitan area which consequently faces steep costs to mitigate the environmental impacts of even existing traffic volume. Key international air cargo gateway airports such as Los Angeles International and Seattle-Tacoma also face limitations on growth.

Consequently it is possible that there will be more serious congestion at these gateways ahead, because the pace of investment has not been keeping up with the growth in traffic volume. This could change if the government takes steps to promote expansion of transportation infrastructure capacity again. There are some moves at the state and federal level to tackle infrastructure needs, but the competition for government budgets makes fully funding transportation needs with public dollars unlikely. With more private investment in transportation infrastructure, such as the recent moves elsewhere in the country to privatize toll roads, it is possible that the total investment in capacity could accelerate, though this isn't seen in the public port or airport sector yet. With respect to congestion in Southern California or elsewhere outside the Portland / Vancouver region, this represents an upside risk to the Portland / Vancouver forecast. However the ability of the Portland / Vancouver region to benefit from external-region congestion could most likely happen in conjunction with a concerted effort to attract the business from the other regions. Even capturing only a small share of the "excess" demand for congested gateway regions could be a sizable increase for Portland / Vancouver and help advance initiatives for improved services locally, such as improved rail service.

In the port and airport sector, there has also been a substantial diversion of resources towards security and environmental considerations and away from capacity-building. While these other issues are of critical importance, the consequences have been to stretch available resources for capacity-building even further. Obviously much of the infrastructure investment needed is not within the harbors, port terminals or airports themselves but in the inland system needed to make the physical gateway facilities function, and neither the road or rail system capacity are being expanded as fast as cargo has been increasing, or is expected to increase, either. Therefore the existing patterns of international gateway traffic may shift away from the current concentration at key hub gateways. This may be an opportunity for more rapid growth in the use of the gateway facilities in the Portland / Vancouver region.

The pressures on the existing system are already producing changes that can help alleviate future congestion. There are several developments that may significantly add new port capacity, at least. One potential contribution to adding capacity is the development of new port gateways in new locations (e.g. Prince Rupert in British

Columbia, Punta Colonet in Baja California, Jasper County in South Carolina) to serve the U.S. market. These port proposals seem to be attracting private investment capital that can add North American capacity without facing the obstacles that further major expansion of existing container ports face. The hinterland to be served by these proposed ports overlaps with that served by Portland / Vancouver only in the upper Mid-west, and it is not certain that each of these will be developed as proposed.

Another contribution towards alleviating congestion is the continued evolution of port operating practices and employment of technology. The expansion of operating hours, reductions in "free time", adoption of chassis pools, use of virtual container yards, the addition of more cranes and more labor, can all help extract higher throughput from existing port terminal space. Technology may also help add capacity to the aviation system through more efficient use of available airspace and expanded all-weather operations. Over the long-term what is unknown is whether there can be a new revolutionary technology, like the ocean container was 50 years ago, that can further transform goods transport.

For the near-term, the pressures from trade growth are substantial and require shorter-term solutions. One important solution, as we've seen in the Asian response to rapid trade growth, is the expansion of use of currently under-utilized facilities. Direct ocean and air cargo services to cities not previously served directly have been added as the volumes of trade have grown large enough to justify it. Some signs exist that this is already happening on the West Coast with the recent increase in the number of container services calling at the Port of Portland. Due to the increases in costs deriving from the congestion at the largest existing ports, importers and exporters with cargo to and from inland points may divert cargo to ports like Portland / Vancouver. And while this practice may affect ports around the coasts of North America, the ports along the West Coast still will have the advantage of the shorter distance for most Asian trade compared with sailing down through the Panama Canal or east through the Suez Canal². This practice also becomes more likely over time as the long-term growth in traffic becomes large enough for vessels operators to offer more regular vessel service at ports. The distance upriver from the ocean and the Columbia River channel depth still limit the ability of Port/and Vancouver to compete for all larger-port discretionary (non-local) cargo, because many of the new large container ships can not call Portland when fully loaded. Similar developments exist in the air cargo business, especially as aviation agreements open up more opportunities for new city-pair services on the transpacific routes.

The commodity flow forecasts are relatively unconstrained demand forecasts that assume necessary investments and policies will be available to provide total system capacity for the expected demand, as has happened in the past. These forecasts have not been limited by infrastructure constraints specific to any particular geographic region or transportation

² Container vessels of any size can use the Suez Canal today, which means the greater economies of scale possible with larger ships can at least partially offset the longer sailing distance and time. Most East coast ports also have channel dimension limitations that constrain loaded vessel size as well, reducing the advantage of the Suez Route. The Panama Canal is still limited to 'Panamax' size vessels today.

mode. This means that aggregate capacity of international gateways serving the region is assumed to be provided, at a price, and consequently demand at these levels will not be reduced by inadequate total international gateway capacity.

ENERGY

Since the commodity forecasts completed in 2002 were made, the world energy markets have seen significant changes in prices and market dynamics. Oil prices and natural gas prices have increased due to the influence of world politics, natural disasters such as hurricanes Katrina and Rita, and the growth of demand from Asia, increasing substantially faster than forecast earlier. There has also been an additional price pressure from the entry of financial firms such as hedge funds into the energy commodity markets. Consequently, it is expected that energy prices will continue to be volatile over the long-term, as many of the world's key producing regions remain in political turmoil and the U.S. remains dependent on imported energy. Higher energy prices add pressure on shippers that currently use more energy-intensive modes of transport (air and truck) which may benefit the modal competitiveness of those modes that are relatively less energy-intensive such as maritime and rail transport. The potential for modal diversion from energy prices alone is somewhat limited, however, to those goods whose value and time sensitivity makes use of slower modes of transport a possibility. Much more common will be increased efforts for efficiency in use of the existing modes of transport, through marginal reductions in shipments made without full capacity utilization, that up until now were made in order to keep to a schedule. There may also be some further consolidation of shipments to gain further economy-of-scale efficiencies. As the airlines have done in recent years, equipment will increasingly be "right-sized" to match market volume demanded to the capacity used to carry it. Accelerated investments in information technology to optimize use of equipment will also be a consequence of living with higher energy prices. Substantially higher energy costs would affect the economy more broadly over the long-term, "crowding-out" consumption of other products and encouraging greater substitution of other factors of production for energy and energy-intensive service inputs such as transport. Nevertheless, given the fundamentals of supply response (with a lag) resulting from the recent high energy prices, real energy prices are forecast to fall back from recent high levels, though not back down to the levels of the 1990s. A substantially higher energy cost scenario and the consequences for trade and transportation are a lower probability than the likelihood of the more moderate future energy price condition. There is also a chance that energy prices could fall further than expected, with further reductions in pressures for industry practices to change.

INDUSTRY LOGISTICS AND PERFORMANCE

Examining the validated commodity flow forecast estimates, Global Insight has identified several changes in patterns of industry logistics and the economic performance of certain industries that have contributed to the observed differences between the validated forecasts and the forecasts completed in 2002.

LOGISTICS

The pace of adoption of higher-technology logistics practices throughout industry has accelerated in recent years. Some of this is due to the acceleration in off-shore manufacturing which has lengthened supply chains and required advanced communications systems to manage more complex supplier relationships. More generally across industry, businesses have accelerated implementation of advanced logistics practices to minimize warehousing and shorten the time it takes to bring goods to market. The result has been a faster shift towards more frequent, smaller shipments, with a focus on increasing the 'velocity' of product shipments. Benefits from the shift include less unsold merchandise and a supply chain that can be global yet responsive to changes in the marketplace. Coordinated shipments from multiple suppliers include practices where traditional physical warehouses are replaced with electronic databases of production and shipment information. Centralized warehousing is used less and less and only adopted when the volume of goods and the economics of value-added services performed at these facilities make it efficient for shippers. This does not mean that production is localized or that distribution-related industries no longer require physical space. On the contrary, domestic markets are shifting to be international, and regional markets are shifting to being national markets. There are now retail import shipments that are moving directly to the store from overseas through the international gateways without moving through a distribution center. There is also a move to spread distribution geographically around the country to serve regional instead of national distribution needs, thereby minimizing risk from potential gateway bottlenecks and improving flexibility, at least where total shipment volume can still take advantage of economies of scale on multiple routes. Another logistics practice that is increasing in use is the shift of some new value-added services to distribution centers rather than at factories, including such functions as product labeling, tagging, sequencing, and/or consolidation.

The consequences of the faster adoption of advanced logistics is more rapid growth in truck shipments and slower growth in carload rail, the rail service that is not the intermodal rail movement of containers or truck trailers. Railroads are focusing on two business lines that have the greatest potential for them to earn profits: long-distance movements of complete trains filled with intermodal containers and 'unit' trains of bulk commodities such as grain or coal that are moved very long distances. Railroads are most efficient when they haul long distances without having to stop, so with limited capacity on their networks, that is where their primary focus will remain.

In a significantly higher-energy price world, the use of advanced logistics practices would shift back towards relatively higher inventories and greater consolidation of freight transport into fewer, denser shipments for those commodities whose transportation costs are, or become, a significant share of the total delivered cost. Such a situation would benefit maritime and rail transport compared with truck and air transport at the margins where the service requirements / cost trade-off between modes is competitive.

INDUSTRY PERFORMANCE

The outlook for several individual industries has changed since the commodity flow forecasts completed in 2002 as well, resulting in higher or lower projected commodity shipments in the validated forecasts. Among the commodity categories with the greatest differences in outlook are logs and other wood in the rough, wood products, foodstuffs (e.g. oils, fats, dairy, sugar, processed foods, juices, etc.) and alcoholic beverages, non-metallic mineral products (e.g. clay, building stone, bricks, articles of cement/concrete, glass, gypsum wallboard, asphalt products, etc.), motor vehicles, and "mixed" freight. The reasons for the differences are primarily due to changes in these industries affecting the quantity produced (and shipped) and/or the geography of sourcing and/or consumption. Upside and downside risks remain in the outlooks for most industries due to competitiveness factors at work within each sector, and affecting their freight demand.

For example, Global Insight is projecting slower growth than previously for the logging and lumber industry in Oregon and Washington, which results in a reduction in the compound average annual growth rate (1997 to 2030) for the logs and other wood in the rough and wood products category tonnage volume. This is a reduction from 2.6%-2.9% in the forecast completed in 2002 to 1.5%-1.8% in the validated forecast. The forecast is still for growth in this category, but at a slower rate due to greater long-term environmental constraints on this industry as well as increased production and competitiveness of foreign (and substitute product) producers.

The compound average annual growth rate for tonnage forecast for the non-metallic minerals category is also less in the validated forecast (3.1%) than in the forecast completed in 2002 (2.5%). This primarily is a result of a less robust forecast for long-term construction activity with most of this tonnage moved internally in the region by truck.

The tonnage volume of the foodstuffs and alcoholic beverages category remains as one of the top three categories in terms of total tons shipped in 2030, however the rate of growth is now lower. The compound average annual growth rate (1997 to 2030) is reduced from 3.5% in the forecast completed in 2002 to 2.9% in the validated forecast. This moderate reduction in growth rate reflects some of the broader trends in this industry to have products serve a national market, which comes at the expense of facilities, such as distribution centers and warehouses, within the Portland / Vancouver region.

Looking forward, this could well begin to change, as high prices of oil and natural gas have sent ripples throughout the chemicals sector in North America, and critical raw materials costs (ethane, propane, and naphtha) have escalated in tandem with the rise in oil and gas prices. The prospects for a return to low 1990s energy price levels seems remote at the present time despite the long-term forecasts for a decline in real energy prices from recent levels. Even moderated energy prices still present a challenge to the future of the chemical industry in North America as the underlying fundamentals of feed stock supply and foreign competition will continue to work against the domestic chemicals industry.

There will continue to be a variety of industry-sector specific factors that will affect the potential demand and supply conditions that determine freight volumes in the region. Consequently we can expect further dynamic change to affect freight volumes at an industry-specific level over the long-term, which warrants the continued attention of planners as conditions change. For freight planning, continuous change will compel updating these projections again in the future.

FINDINGS AND CONCLUSIONS

There are many developments that will have influence on the path of commodity flow growth eventually seen in the Portland / Vancouver region. These factors may accelerate the demand compared with the validated forecast levels or work to dampen expected growth. These factors can affect the geographic distribution, the modal distribution, and the overall level of Portland / Vancouver commodity flows such that any of these dimensions of freight transportation in the region may turn out to be higher or lower than projected. Some of these factors, such as global geopolitics, are beyond the ability of the region to influence. Other factors, such as highway network capacity and the preservation of land for transportation/logistics industry use are well within the capacity of the region to influence positively over the long-term. Developments in trade and the economy outside the region are likely to provide opportunity for Portland / Vancouver to take advantage of its location as a key international gateway in attracting desirable services into the region. However competitive threats and external economic challenges will remain meaning proactive decision-making in the region will be required to meet the challenges and benefit from the opportunities that exist.



**TRADE CAPACITY STUDY
GROWTH OPPORTUNITIES AND CHALLENGES
ASSESSMENT
RELATED TO MARITIME TRADE**

For:

PORT OF PORTLAND

METRO

OREGON DEPARTMENT OF TRANSPORTATION

PORT OF VANCOUVER

REGIONAL TRANSPORTATION COUNCIL

PORTLAND DEVELOPMENT COMMISSION

Submitted by:

BST Associates

August, 2006

**Trade Capacity Study
Growth Opportunities Assessment
Related to Maritime Trade
Task 3 – Marine and Barge Modes
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EXECUTIVE SUMMARY

BST Associates was retained by the Port of Portland to:

- Evaluate market opportunities for maritime trade based upon the updated forecasts by Global Insight,
- Assess the required level of service to meet these opportunities, and,
- Describe the infrastructure requirements to capitalize on these opportunities.

The report is presented in three sections. The first section presents a summary of findings and conclusions while the second section evaluates the opportunities for marine cargo and the third section evaluates the opportunities for the Columbia-Snake River barge system.

FINDINGS & CONCLUSIONS

Cargo Opportunities

The updated cargo forecast for both marine and barge cargo is significantly higher than the previous forecast. In the year 2030, there is expected to be 5.5 million more tons of marine cargo and 4.2 million more tons of barged cargo than under the previous forecast.

Most cargo handling groups (fully assembled autos, grain, dry bulks and liquid bulks) are expected to be higher under the forecast update. General cargo (breakbulk and containers) is expected to be at the same level as the previous forecast in 2030. However, Global Insight notes that there is a need for additional gateway ports to handle container volumes and that there appears to be an opportunity for the Portland-Vancouver region to serve this function.

Infrastructure and Service Requirements

In order to meet these potential opportunities, the Ports and their partners will need to continue to improve the transportation systems that serve these shippers and carriers.

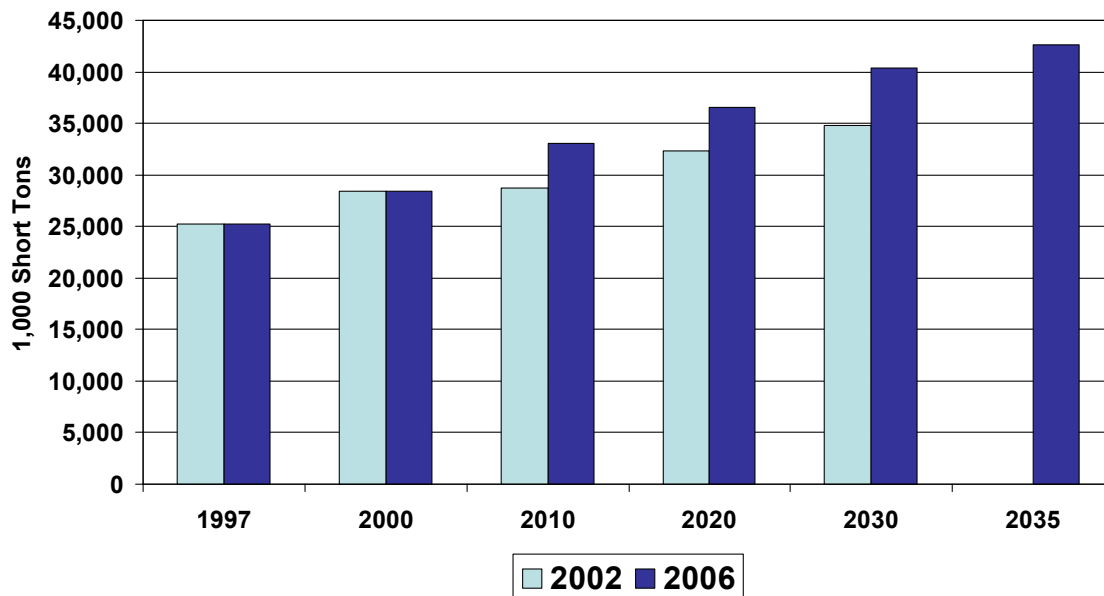
The following improvements are required:

- The continued deepening of the Columbia River Channel is very important to meet shipper's needs. In addition, funds need to be available to maintain and repair the channel system including the jetties, the channel, anchorages and port terminal berths.
- The Ports have recently prepared plans to upgrade and expand marine terminals to meet market conditions. These projects may be adequate to meet the updated baseline forecasts. However, there are additional opportunities beyond the baseline forecasts. This may require the Ports to acquire and develop additional land for terminal development.
- Inland transportation systems also need to be enhanced to meet expected cargo volumes. Truck and rail improvements are addressed in other companion reports.
- Barge transportation is also very important to shippers and upriver communities from the Columbia River into the Lower Snake River. It is important that these systems are properly dredged and improvements undertaken to lock systems and upriver ports as needed.

MARINE CARGO SYSTEMS

A comparison of the unconstrained marine forecasts for all inbound and outbound cargoes that were prepared in 2002 and 2006 are presented in Figure 1. As can be seen, the 2006 cargo forecast anticipates more opportunities for growth, with approximately 5.5 million short tons more cargo than the previous forecast by the year 2030. Inbound and outbound cargoes could contribute approximately 4 million and 1.5 million additional tons respectively.

Figure 1 – Marine Traffic Forecast – Inbound & Outbound (1,000 short tons)



Virtually all of the marine trade moving through the Portland-Vancouver region is with international trading partners, most of whom are located along the Pacific Rim.

MARINE CARGO HANDLING MODE

In order to fully appreciate the trade opportunities and potential infrastructure challenges, it is necessary to evaluate specific cargo handling groups.

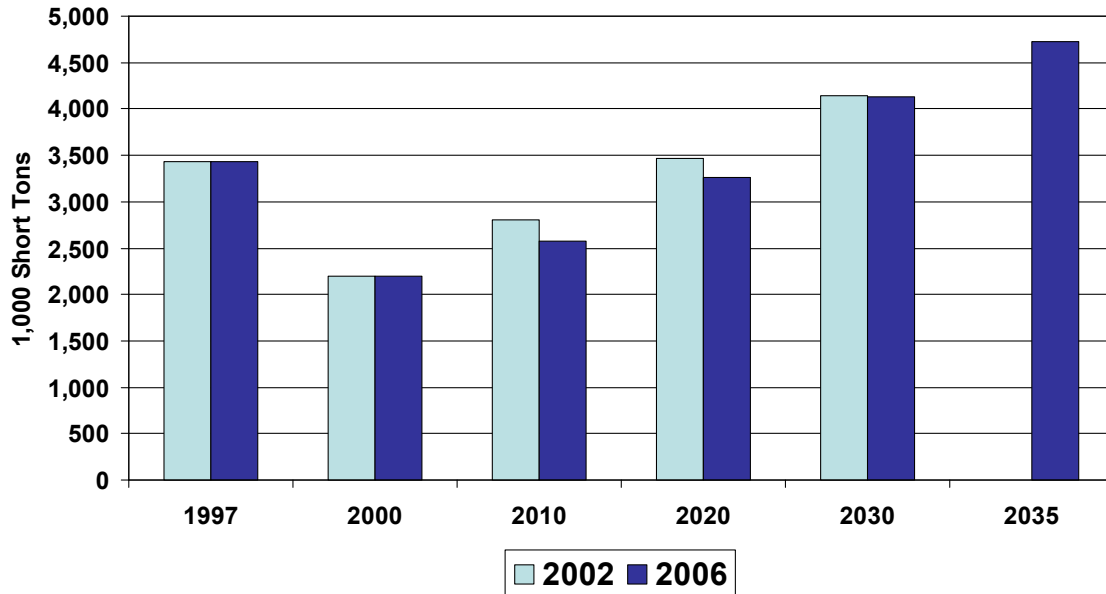
General Cargo

The unconstrained forecast is based upon the standard classification of transported goods (SCTG). As a result, it is difficult to identify the precise split between breakbulk and containerized commodities¹. We have aggregated those commodities that are considered general cargo in a single group. The forecast assumes lower growth in the general cargo category in 2006 than in 2002 through 2010 and 2020 but the forecasts reach parity in 2030. Upon investigation of specific SCTG categories, the biggest difference between the 2002

¹ This is particularly true for swing commodities such as lumber, pulp, metals and like products that may move in breakbulk or container form.

and 2006 forecasts are in two commodities (agricultural products and animal feeds²), in which lower growth is now expected. However, offsetting these downward trends, the 2006 forecast expects much more rapid growth in inbound container volumes than expected in 2002.

Figure 2 – Marine Traffic Forecast – General Cargo (1,000 short tons)



The important factors for attracting breakbulk and container traffic are assessed in this section, focusing on navigational requirements, marine terminals and inland transportation systems.

Breakbulk Cargo

In the Portland-Vancouver area, breakbulk cargo is primarily composed of forest products (pulp and lumber among other products) and metal products (primarily steel and aluminum products) as well as project cargo (turbines for wind power projects, domestic and overseas construction projects et al). Some of these products originate or terminate at local firms but some also move forward to inland destinations by barge and/or rail. As declining production has occurred in some local firms (particularly at pulp and lumber mills and aluminum smelters et al), it has created an opportunity for imports of these products.

Breakbulk vessels are generally Panamax or Handymax types, which are able to navigate the Columbia River channel without constraint.

The regional competition for breakbulk cargo is very intense, particularly for gateway traffic. Success in attracting these cargoes requires provision of cost effective and efficient general purpose terminals as well as efficient rail and barge connections.

Both Ports have efficient terminal facilities available at the present time. In addition, both Ports have entered into effective operating agreements that help attract and retain the cargo.

² Animal feeds may move in either a bulk (beet pulp pellets) or container form (hay cubes and baled hay et al).

The Port of Portland entered into an agreement with Oregon Steel to bring steel products into T6 in an area very close to the mill, which minimized transportation costs. The Port of Vancouver has entered into an agreement with its stevedore to operate the general cargo terminal. Additional breakbulk terminals are not likely to be needed through the study period.

Efficient inland connections for gateway traffic are also required to support breakbulk operations.

Rail service is critical for steel coils and other products moving from the Ports to manufacturing centers located in the Midwest and elsewhere. This requires cost effective access to the rail system by small and large volume shippers. The performance of the rail system is addressed in another section of this report.

Barge service has been used to transport imported wind turbines from the Ports upriver to the construction site. As an example, turbines and other products were barged from the Ports to the Stateline Wind Energy Center located in Walla Walla. Other similar projects are expected to occur in the future. Because these projects could not occur without it, these projects underscore the need for full barge access to Columbia-Snake River system. The performance of the barge system is addressed in greater detail in a later section.

Containers

The region's local container market consists of an area including the state of Oregon, southern Idaho, and the barge system serving southeast Washington and northern Idaho. Products in this market area can either move via Columbia River ports (primarily the Port of Portland) or container ports in Puget Sound (primarily Seattle and Tacoma). The region's share of the local market depends on a number of factors, including the number of containers moving to and from each country/region, the relative frequency of service provided by ocean carriers and relative inland transport costs, among other factors.

The 2006 forecast update extends baseline conditions, in which the region would continue to experience modest growth in container volumes. However, container volumes on the US West Coast are expected to continue to grow rapidly throughout the study period. A direct result will likely be the absorption of container terminal space in the existing major gateways, increased costs of service and congestion on the mainline rail systems. A search for new gateways is currently underway and the Portland-Vancouver region could potentially play a greater role serving this need but there are challenges to meeting this opportunity.

Container vessels are getting larger and deeper. As shown in Table 1, the fully laden draft of Panamax and Post-Panamax vessels up to 6,000 TEUs can be accommodated in the improved Columbia River channel with minimal underkeel clearance. However, as vessel size increases beyond this point, the vessel would have to call the Portland-Vancouver region with a partial load. It should be noted that import containers are relatively light and the vessels do not typically achieve their design draft.

A recent study by the Port of Long Beach finds that "The projected fleet calling San Pedro Bay ports reflects a continuing growth in average ship size from approximately 3,700 TEUs in 2004 to 5,800 TEUs by year 2020. Fully 22 new weekly services are expected with

vessels ranging in size from 8,000-12,000 TEUs³.” Throughout the study period, there will be vessels calling on the West Coast that can utilize the improved Columbia River channel.

Table 1 – Container Vessel Dimensions

| Type | TEUs | Length | Draft | Beam |
|-------------------------|--------|--------|-------|------|
| Existing Vessels | | | | |
| Panamax | 3,000 | 722 | 39 | 106 |
| Panamax | 4,000 | 919 | 37 | 106 |
| Post-Panamax | 4,500 | 961 | 40 | 106 |
| Post-Panamax | 5,000 | 919 | 41 | 131 |
| Post-Panamax | 6,000 | 1,001 | 41 | 141 |
| Post-Panamax | 8,000 | 1,099 | 45 | 141 |
| Future Vessels | | | | |
| Suezmax | 12,000 | 1,312 | 48 | 172 |
| Post-Suezmax | 18,000 | 1,542 | 52 | 197 |

Source: Propulsion Trends in Container Vessels, Man B&W A/S

More significantly, the major US West Coast port gateways are nearing capacity. As this occurs, ports and terminal operators are focusing on maximizing terminal velocity. There are several programs underway that attempt to improve productivity, including:

- Smoothing of the peak seasonal volumes,
- Shifting from wheeled to grounded operations,
- Increase in use of night gates,
- Increase in the use of off-dock transfer areas, and
- Financial incentives to improve throughput, among others.

These efforts will improve throughput but they will also likely increase terminal-related costs. These trends are forcing shippers and carriers to identify new gateways. The Portland-Vancouver region has available waterfront industrial land. In addition, the Columbia Gorge route is less congested than other west coast corridors. This issue is addressed in more detail in another section.

The opportunities for achieving growth in container throughput beyond the baseline forecast appear guardedly optimistic.

Fully Assembled Automobiles

The Portland-Vancouver region has established itself as one of the leading US gateways for automobile traffic. The 2006 forecast calls for much more rapid growth in automobile traffic than the 2002 forecast. In 2030, there are expected to be 615,000 tons (approximately 410,000 additional units) more than previously forecast. This level of growth would double the throughput of automobiles through the region.

³ Source: Forecast of Container Vessel Specifications and Port Calls Within San Pedro Bay Final Report, Mercator Group, February 22, 2005, Page 3.

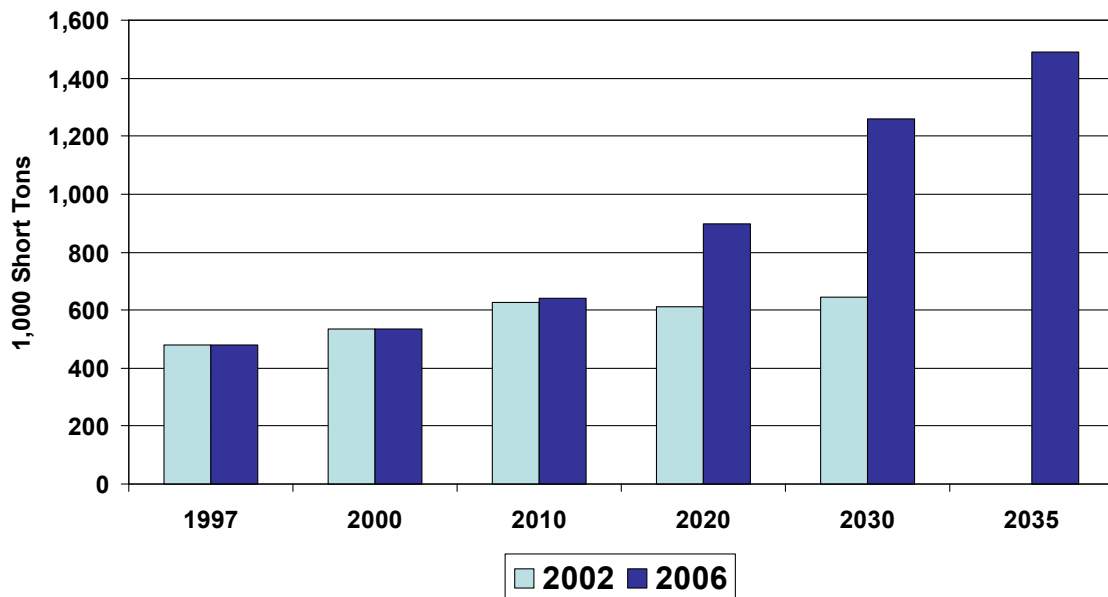
In addition to carrying autos, these ships also occasionally carry project cargo.

Auto carriers are increasing in size but are not expected to have any vessel draft limitations given the Columbia River channel improvements.

The infrastructure challenges for meeting the forecast opportunities are terminal development and inland transportation. Portland and Vancouver both have existing terminals for autos. New terminals are required to serve the additional expected volumes and should be in place prior to 2020.

Approximately 75% of the auto imports are transported by rail to inland destinations. The cumulative impact of this additional carload volume would need to be accommodated.

Figure 3 – Marine Traffic Forecast – Fully Assembled Automobiles (1,000 short tons)



Grain Exports

The Portland-Vancouver region is a major gateway for grain exports, primarily serving wheat exporters as well as other commodities (barley, corn, soybeans, sorghum et al). The 2006 forecast anticipates between 1 and 2 million additional tons of grain more than the 2002 forecast during the forecast period⁴.

By leaving at the right time and speed, grain shippers have been able to take advantage of tidal conditions and achieve vessel loadings exceeding 40 feet. The channel deepening (to 43 feet) will make deeper draft loading more accessible for these shippers.

Some of the grain elevators in the region are old and less efficient. There are plans to improve and expand the elevator system in the region. With these improvements, existing facilities should be able to accommodate the forecasted volumes.

⁴ In addition to grain exports, the Port of Vancouver has recently entered into plans to develop an ethanol terminal, which will increase receipts of grain by rail.

Grain arrives at the elevators by barge (around 40-45%) and rail (around 55-60%).

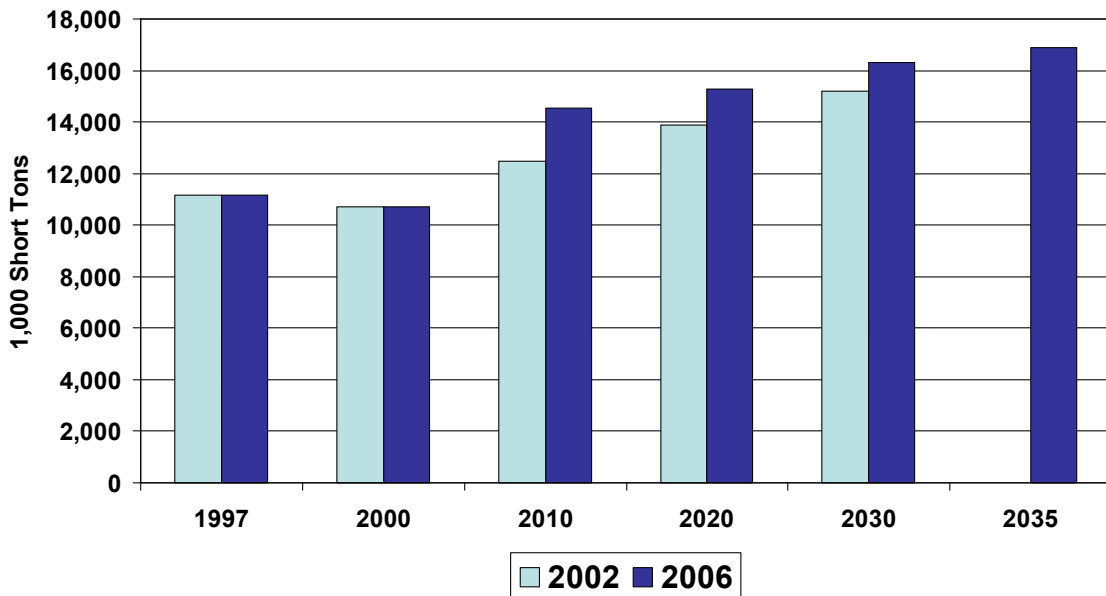
Of the barged grain, more than half arrives from elevators located along the Lower Snake River and the remainder comes from elevators located along the Columbia River.

Continued access to the barge system is required to meet the forecast volumes.

Grain moving by rail comes from areas that are more distant from the river system, stretching from Washington, Oregon and Idaho into Montana, North and South Dakota and beyond. The railroads have initiated pricing systems that provide an incentive for rapid loading and unloading of unit trains of grain. This has required improvements to the elevators in the Portland-Vancouver region to accommodate the unit trains. These improvements have largely occurred or are underway.

However, as the mainline rail system begins to reach capacity, the railroads have begun to focus more on transcontinental traffic. This could negatively impact short haul grain shipments. The conventional wisdom is that if the barge system is compromised, the displaced volumes would shift to rail. However, there continues to be uncertainty about whether the railroads would accommodate this traffic.

Figure 4 – Marine Traffic Forecast – Grain Exports (1,000 short tons)



Dry Bulks

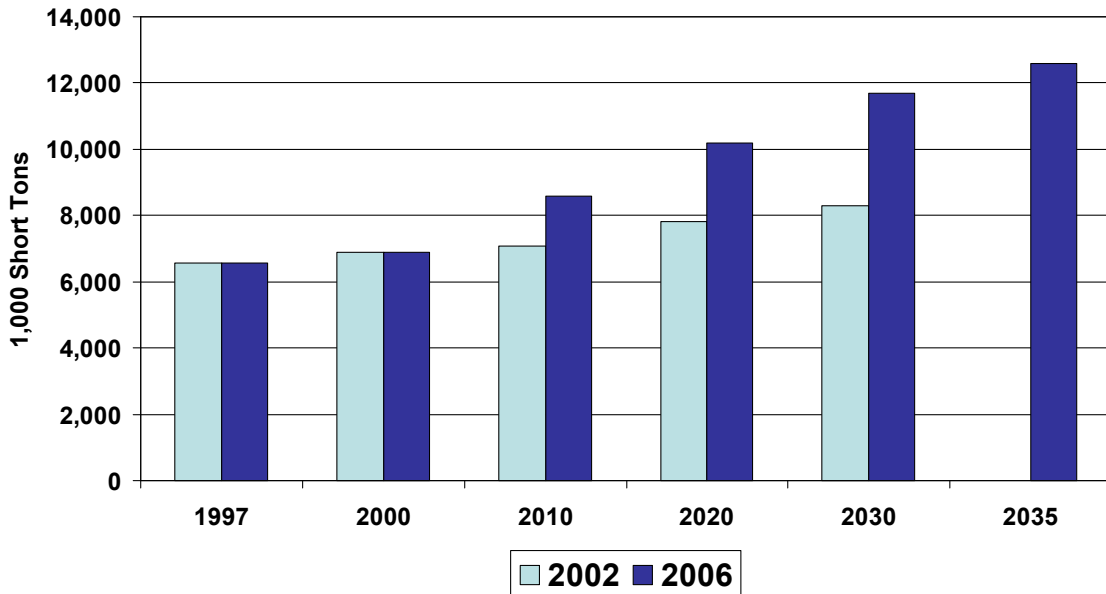
The Portland-Vancouver region is also a major gateway for dry bulk imports and exports, including exports of potash, soda ash, bentonite clay and ores and imports of ores, fertilizer, minerals and mineral products (cement and limestone) among other products. The 2006 forecast anticipates more than 3 million additional tons of dry bulks than projected in the 2002 forecast in the year 2030.

Dry bulk commodities are typically moved in Panamax or Handymax vessels. Given improvements to the channel, these vessels are not expected to experience constraints.

The increased volumes will likely require additional terminal capacity. The Ports are currently planning expanding existing facilities and possible building new terminals as market conditions warrant.

Virtually all of the outbound dry bulks arrive at the Port by rail in units trains. The ability of the rail system to accommodate these flows will require numerous improvements, which are covered in the rail section of this report.

Figure 5 – Marine Traffic Forecast – Dry Bulks (1,000 short tons)



Liquid Bulks

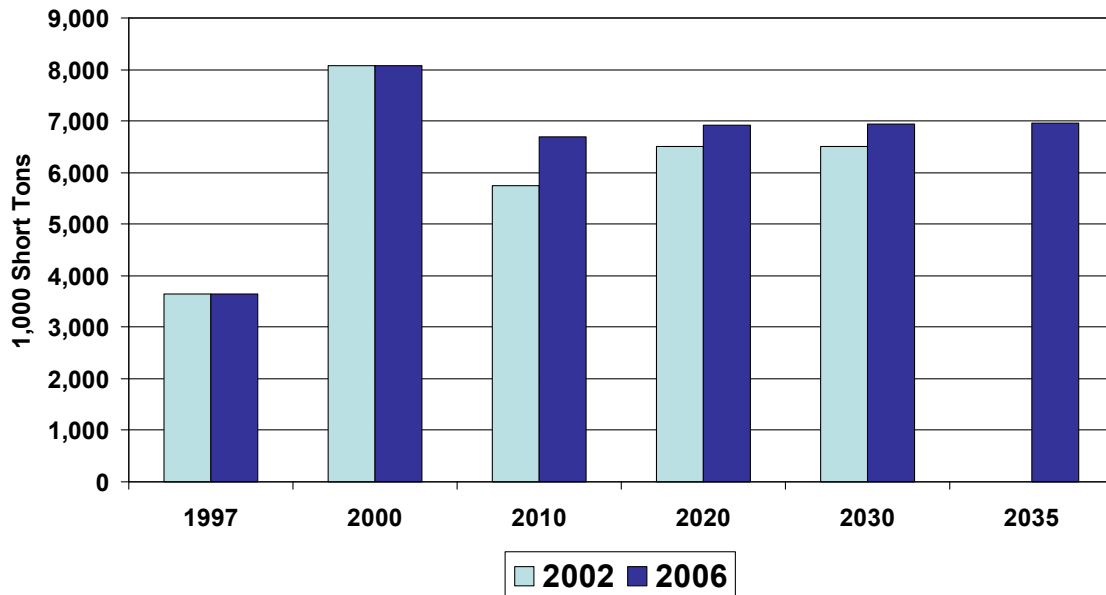
Liquid bulks flowing through the region include:

- Petroleum products for local consumption as well as barged volumes to upriver communities along the Columbia and Lower Snake Rivers,
- Crude oil used for asphalt plants supporting the local construction market and
- Chemicals used by local industry.

The 2006 forecast is slightly higher than the 2002 forecast. The forecast anticipates that more of the petroleum products will arrive in the region by truck and pipeline than by ocean vessels.

Vessels carrying these products are typically parcel tankers or barges and do not have draft constraints in the channel. The products flow through private terminals that are expected to be able to accommodate the anticipated flow of the product. Most of the product is consumed locally and is transported by truck. However, a portion of the petroleum products moves upriver by barge. Continued access to the barge system is required to meet these needs.

Figure 6 – Marine Traffic Forecast – Liquid Bulks (1,000 short tons)



BARGE CARGO SYSTEMS

The Columbia/Snake River waterway is an extension of the Columbia River navigation channel, which allows for commercial navigation between the Pacific Ocean and Lewiston, Idaho. Most of the commodities moved via barge move to the deep-water ports on the lower Columbia River.

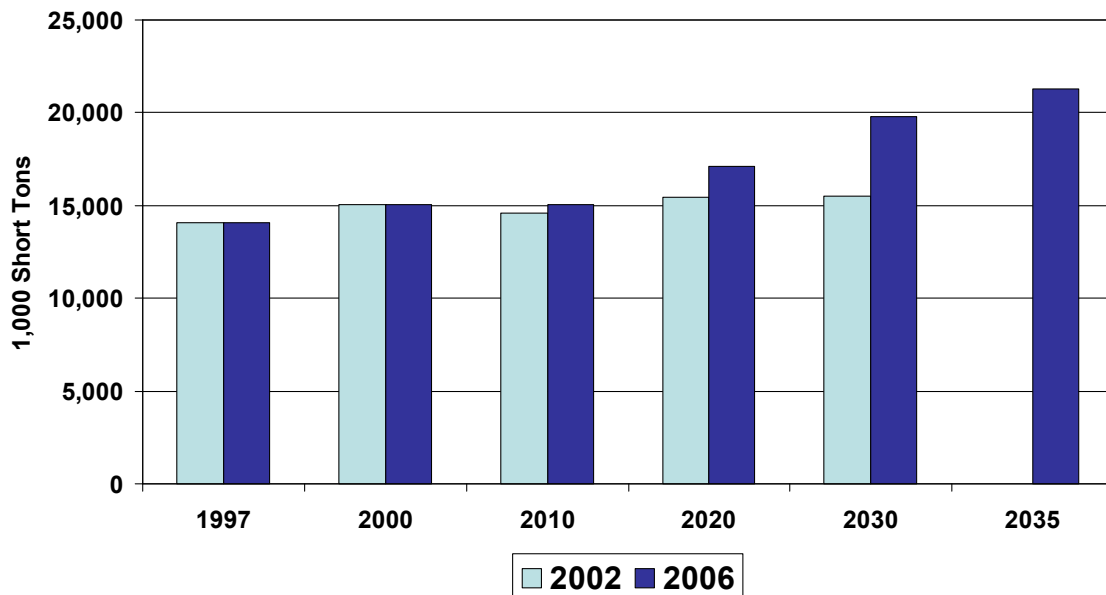
The 2006 forecast projects that significantly more cargo will be transported by barge (more than 4.2 million tons in 2030).

Downbound cargo is largely comprised of grain as well as containerized products (animal feeds, peas and lentils, and forest products) and forest products (wood chips and logs) among others. Upriver cargoes mainly include upriver shipments of petroleum products, fertilizer and returning empty containers. In addition, there are shipments and receipts of gravel and other construction materials.

Most of the increased growth is expected to come from grain shipments and to a lesser extent from construction materials (particularly aggregates).

Existing barge terminals are generally capable of handling these projected volumes. In addition, the barge system has been sized to meet the additional volumes

Figure 7 - Barge Traffic Forecast – Inbound, Outbound & Internal (1,000 short tons)



Most of the constraints on the barge system result from efforts to breach the Lower Snake River dams and to delay or eliminate improvements such as dredging the channels or improving the lock systems.

The barge system functions effectively for shippers from both economic and transportation perspectives, meaning that system capacity is available at a competitive cost for all system components, including: access roads, river elevators, navigation channel capacity, barge availability/capacity and down river elevator capacity for unloading barges. However, the need for improved dredging is required in the navigation channels and at the entrance to some terminals. Annual dredging in the Lower Snake river is expected to cost approximately \$4 to \$6 million every three years. Lock maintenance is expected to cost approximately \$1.5 million per year in the mid-Columbia and \$1.9 million per year in the Lower Snake river⁵.

In the near future, improvements will also be required for the lock systems to improve fish flows and replace aging systems. In the near term (within five years), this will include:

- Mid Columbia River navigation lock repair & retrofit – approximately \$33,300,000 and
- Snake River navigation locks repair & retrofit – approximately \$18,100,000.

In the longer run (10+ years), there is a need to replace the BNSF rail bridge navigation lift span in order to make barge transit more efficient. This is expected to cost approximately \$56.5 million.

⁵ Source: Pacific Northwest Waterways Association.

If barging were no longer available, wheat would necessarily move to another, more expensive mode of transport, which would affect the selling price of the grain, because barge is the lowest-cost means of transporting downriver. Given the intense competition in the world wheat market even a small increase in the price of Pacific Northwest wheat could have a substantial negative effect on exports. In addition, as noted previously, the railroads have shifted their focus from short haul to long haul operations. As a consequence, it is unclear whether the displaced barge volumes could move to rail.

**Portland/Vancouver
International and Domestic Trade Capacity Analysis**

Task 3

Growth Opportunities and Challenges Assessment

Outlook on Rail

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August 23, 2006

Freight Demand

The United States economy will grow at an average compound annual growth rate between 2.6 percent and 3 percent between now and 2035. At these rates, the tonnage of freight moved in the U.S. will double by the end of the period. However, rail's share of total tonnage is forecast to drop because of the continuing structural shift in the economy toward industries and trade that generate toward lighter, higher-value freight shipments. Nevertheless, rail tonnage will increase 60 percent and rail ton-miles by 70 percent.

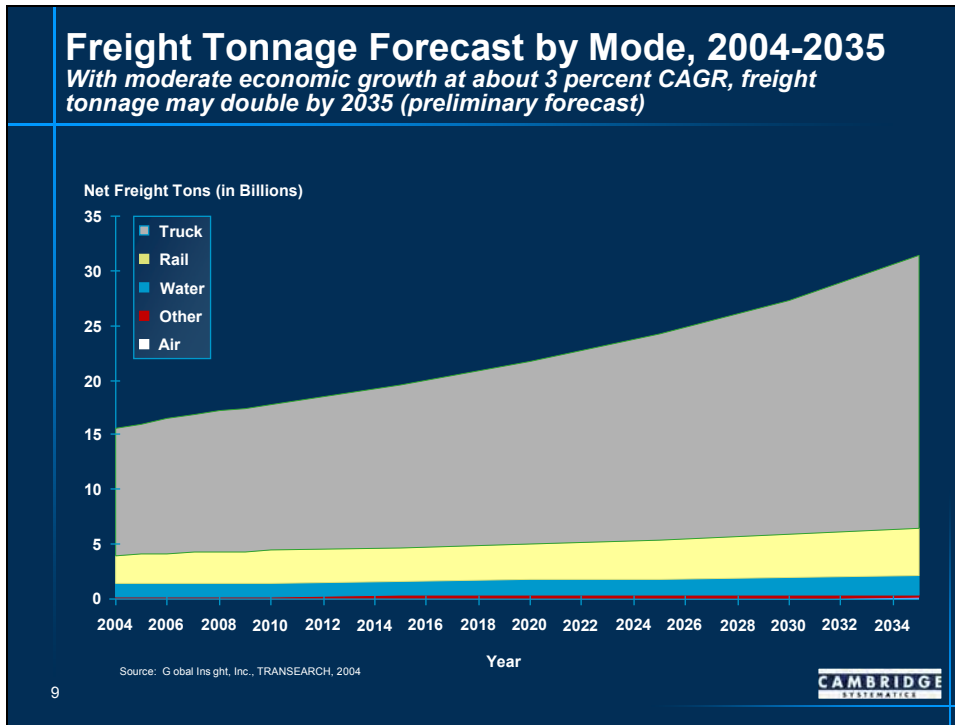


Figure 1

The Pacific Northwest (Washington and Oregon) will grow faster than the national average. The gross regional product is expected to grow at an average compound annual growth rate of about 3.5 percent. This means that the PNW will see a doubling or more of freight demand. As with the national forecasts, rail's share of total freight tonnage is expected to decline, with trucking absorbing more of the growth in freight demand in the PNW. However, just to handle its share, rail will need to carry about two-thirds more tonnage through the PNW than it does today.

In the Portland/Vancouver region, total freight tonnage is expected to grow from about 300 million tons today to 600 million tons in 2035. As in the nation and the PNW, demand for rail will grow more slowly than for truck, but rail will carry about 50 percent more tonnage than it does today. The Portland/Vancouver region generates about 35 million tons for rail today; this will grow to over 56 million tons by 2035.

We expect to see 1.52 percent growth in rail carload tonnage coupled with the 2.52 percent growth in intermodal traffic tonnage (see Task 1). The growth in carload tonnage from 19,000 tons to 26,000 tons translates into an additional six to eight trains per day. The growth in intermodal tonnage from 16.5 million to 30 million tons also translates to an additional six to eight trains per day (TPD). Accounting for empty returns, the Portland/Vancouver region will need to accommodate between 24 and 32 additional TPD to handle the rail share of freight demand by 2035. Splitting this growth between the two Class I carriers suggests that the BNSF and UPRR each must handle 12 to 16 additional trains per day. Additional rail infrastructure will be required in the Portland/Vancouver area to keep up with this growth.

Railroad Business Practices

Nationally as well as in the PNW and the Portland/Vancouver region, the railroads are straining to meet the growing freight demand. The rail industry today is stable, productive, and competitive with enough business and profit to operate. But despite the recent increase in prices and revenue, the industry is not yet attracting capital fast enough to replenish its infrastructure quickly nor keep pace with demand and public expectations. The rail industry spends three to five times as much on infrastructure as other major industries. As a consequence, both lenders and railroads tend to be very cautious about over-investing in infrastructure. The mismatch between demand and rail supply has led to increasing rail congestion and deteriorating service levels in many rail corridors.

The Class I railroads are responding by increasing “velocity” to gain greater throughput capacity and shifting further toward “wholesale” railroading, looking for economies of scale by focusing on long-distance, high-volume, “hook-’n-haul” operations. Specific strategies include the following.

Railroads are using pricing to turn aside lower-profit carload freight in favor of intermodal and coal traffic, which can be handled cost-effectively and profitably in bulk unit trains. In some markets and corridors, international intermodal traffic is squeezing out industrial-carload traffic, and even domestic-intermodal traffic. Shippers, who are used to being price setters, and now price takers. This is painful change for all shippers, especially captive shippers, who are being forced to rethink their supply chains and markets. This shift is having a noticeable effect in the PNW and the Portland/Vancouver region. The Ports of Seattle and Tacoma are major gateways for intermodal traffic moving to and from the Pacific Rim. The strong growth in intermodal traffic is slowly eroding the railroads’ capacity to serve local Oregon and Washington State industrial and agricultural carload traffic.

The railroads are rerouting traffic. As oil prices have increased, the demand for coal from the Powder River Basin has surged. The Class I railroads have been under strong pressure from electric utilities and politicians to ensure the reliable rail service. The high volume of coal trains moving east out of the Powder River Basin (PRB) has made it virtually impossible to route time-sensitive intermodal trains moving from PNW ports to central and southeast gateways such as Kansas City and Memphis through the near

continuous flow of slow-moving coal trains. Adjusting to this, BNSF has shifted all intermodal traffic destined to locations south of Chicago to the Ports of Los Angeles and Long Beach. All intermodal traffic landing at PNW ports must now move through Chicago. Because of continuing delays in implementing much needed physical plant and infrastructure improvements in the Chicago area rail network, many trains routed through Chicago are penalized up to one to two days as this traffic attempts to move through Chicago. The UPRR faces a similar problem. The UPRR's only east-west corridor connecting the PNW with Midwest and Eastern destinations passes directly through the 120-140 TPD central-Nebraska coal corridor. To avoid conflict with the coal trains, UPRR now routes their time-sensitive intermodal traffic over their Sunset Corridor, bypassing the large volume of coal trains of the Central Corridor. These routing changes make it more difficult for the Ports of Seattle, Tacoma, Portland, and Vancouver to compete with the Ports of Los Angeles and Long Beach for intermodal traffic destined for central and south-central U.S. and East Coast markets.

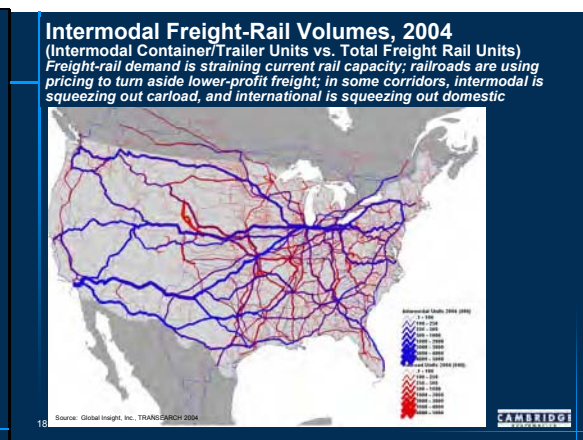


Figure 2:

Figure 3:

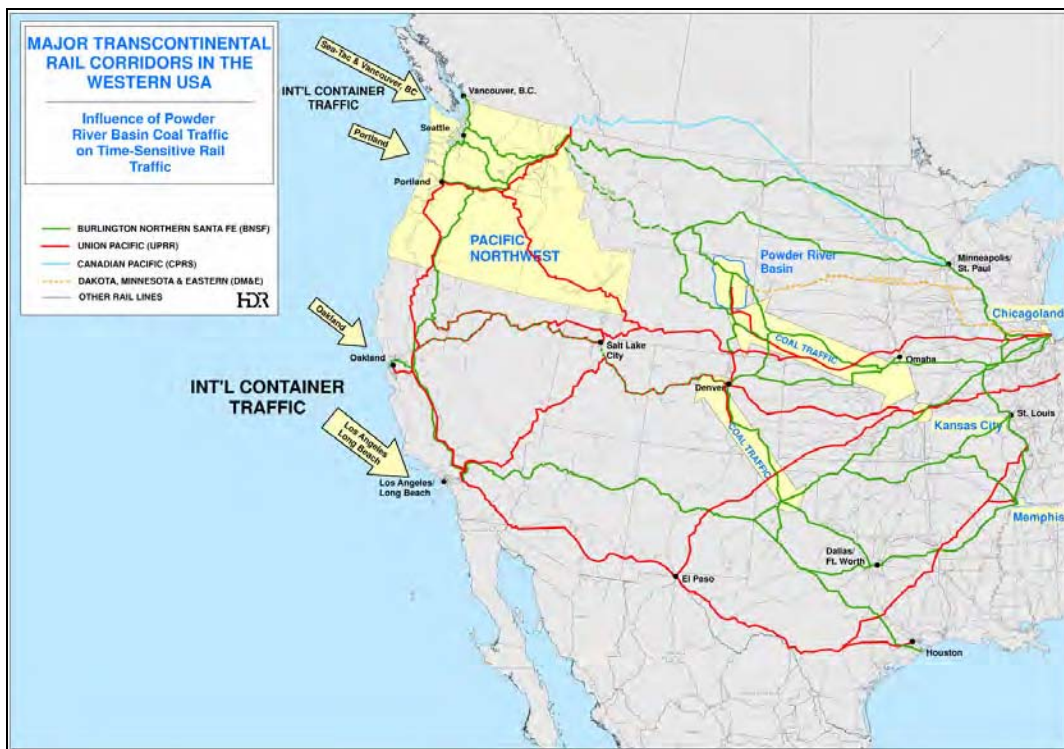


Figure 4: High Volume of Powder Rive Basin (PRB) Coal Traffic on Key UPRR and BNSF could discourage their agreeing to time-sensitive, guaranteed delivery intermodal service.



Figure 5: Recent depiction of BNSF's revamping of their PNW Intermodal Traffic Flow. Note that the Time-Sensitive Service Lanes all avoid BNSF's primary PRB Coal Routes.

The railroads are using longer trains. For example, the BNSF has mandated that all their international intermodal shipments will be handled in 40-foot well cars and all their intermodal trains will be 8,000 feet in length. These changes will allow the BNSF to increase the amount of freight that can be handled over its mainlines without increasing the number of trains. However, the longer trains cannot be handled without lengthening sidings to permit trains to meet and pass; and without providing the corresponding yard capacity to assemble and hold the longer trains. Adding sidings and expanding terminals is a major challenge in a densely developed area such as the Portland/Vancouver region.

Railroads are encouraging the rationalization of the carload network and the development of consolidation terminals for carload and domestic intermodal shipments. To provide rail service that is cost competitive with trucking—at least for long-haul movement of heavy or bulky commodities—the Class I railroads have restructured themselves as wholesale carriers. They specialize in moving large quantities over great distances where economies of scale (such as gained by the use of unit coal, grain, and intermodal trains) can be used to keep the cost of individual shipments down. To do this, the railroads have focused on mainline, “hook-‘n-haul” service, relying on short lines and truckers to collect and distribute traffic to individual shippers. And to feed these mainline, “hook-‘n-haul” services, the Class I railroads are pushing shippers, short lines, and truckers to consolidate shipments in ever larger terminals and “industrial villages.” They are accelerating the process by declining to stop trains on the mainline to pick up and put out small lots of carload and intermodal traffic (e.g., 2, 5, 10 cars at a time). These small “work events” cost the railroads more in mainline delays than they generate in revenue. Should a potential shipper insist on locating their facility adjacent to a Class 1 mainline, the railroads are countering with the stipulation that all work events necessary to serve the facility must be on siding tracks clear of the mainline and that trains must enter and leave these siding tracks at relatively high speeds (in the 30 MPH range). In the Portland/Vancouver region, this will likely play out as pressure to relocate and consolidate small local terminals and provide trackage rights to short lines so they can access these new consolidation terminals. There will be a tendency to locate these terminals further outside the urban area because of the high cost of urban land and because railroading is a heavy, 24/7 industry. Development of consolidation terminals will benefit the Portland/Vancouver region by sustaining rail service and therefore industries and jobs, but rebound to the public sector in the form of higher highway and bridge maintenance costs to accommodate increased and longer-distance truck traffic to and from the rail centers.

Union Pacific and BNSF differ in the markets that service. The two figures below indicate these differences.

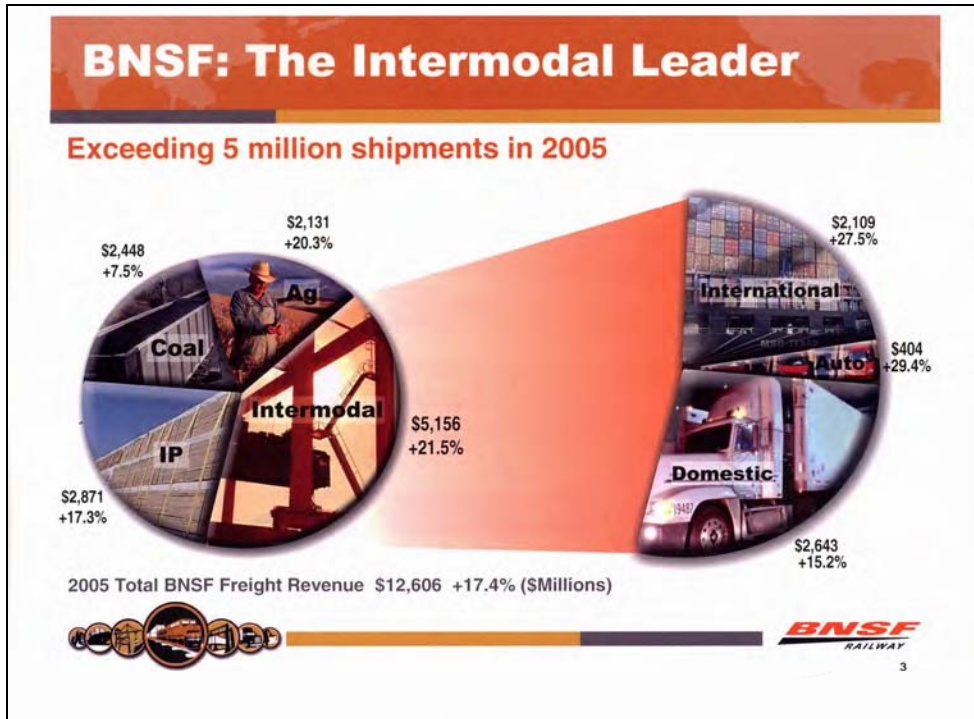


Figure 6: Depiction of BNSF's 2005 Market Distribution

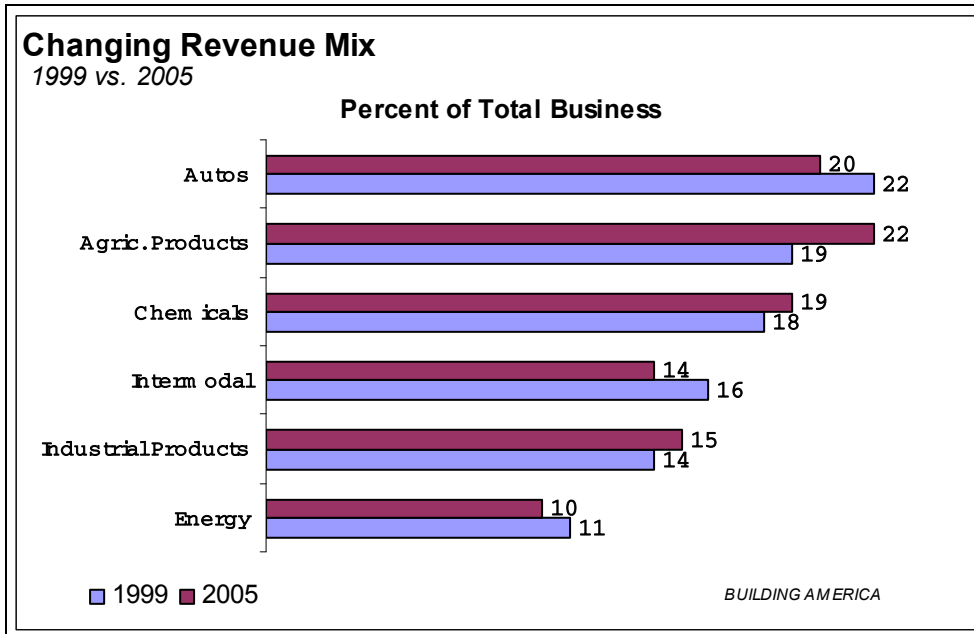


Figure 7: Union Pacific's 2005 Market Distribution including trends from 1999

Rail Capacity Issues

The Portland/Vancouver region has a number of capacity and service constraints that must be addressed to accommodate the growth in rail demand and deal with the changing business models of the Class I and short line railroads. The constraints center around the Portland/Vancouver Triangle, the I-5 Corridor between Portland/Vancouver and Seattle, and the East-West Corridors (Stevens, Stampede, and Gorge lines)

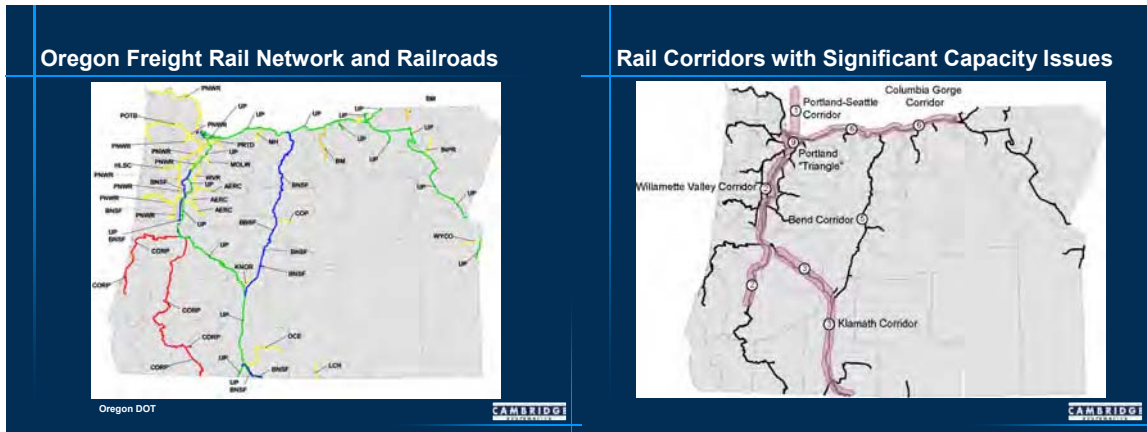


Figure 8

Figure 9

Portland/Vancouver Triangle

The Portland Triangle is the complex of rail lines, switches, sidings, yards, and terminals – including the BNSF rail bridge crossing the Columbia River – that serves freight- and passenger-rail traffic moving into, out of, and through the Portland-Vancouver metropolitan area. The Triangle is the linchpin of the Oregon and the Pacific Northwest rail systems. It serves north-south and east-west through-traffic, freight trains moving to and from Portland and Vancouver’s marine terminals, the railroads’ four major freight yards, and the state’s largest collection of industrial shippers. Portland’s juxtaposition at the west end of the Columbia River Gorge allows rail shippers direct access to the only water-level route through the Cascades. Rail traffic must travel through the Triangle because the two-track rail bridge across the Columbia is the only rail crossing in the region. The next major rail crossing of the Columbia River is 92 miles upstream near The Dalles, Oregon.

Following their merger with Southern Pacific, UPRR greatly altered the flow of freight rail traffic in and around Portland area. Due to restrictions near East Portland (near and underneath the intersection of I-5 and I-84), all freight moving between the Willamette Valley (primarily forest products) and California (freight of all kinds) and eastern destinations (such as Hinkle, Salt Lake City, the Midwest and the East Coast) must pass through Albina Yard, turn the corner at Penn. Junction and proceed east on the Kenton Mainline. This is due to the fact that an eastbound connection at East Portland does not

currently exist. This infrastructure improvement would greatly ease congestion in the Portland area by routing the Hinkle-Eugene and Hinkle Roseville, California trains away from the congested Kenton Mainline corridor.

UPRR trains passing through the Portland Triangle enroute to Kalama, Longview, Centralia, Tacoma and Seattle must also pass through the Kenton Mainline. These trains stop on the Kenton Main to change crews. This procedure takes 20 to 30 minutes and, because the Kenton Main is primarily a single track railroad, no other train can move. Changing crews affects the movement of trains as described in the paragraph above as well as hampers UPRR trains moving south on the BNSF Mainline through Vancouver which must oftentimes wait for the Hinkle-Eugene and/or the Hinkle Roseville trains plus the trains that are changing crews to move out of the way before these trains can be advanced. In this manner, congestion south of the Columbia in Oregon has a great impact on BNSF's ability to move passenger and freight trains north of the river in Washington. Double tracking the Kenton Main as well as improving the velocity through the North Portland Interlocker (controlled by BNSF) would greatly help the throughput and the capacity of the Portland Triangle.

Union Pacific operates two intermodal yards in the Portland area, one yard is in Albina and one in Brooklyn. While their plans are not finalized, they intend to consolidate these two yards into one using Brooklyn Yard as UPRR's only intermodal yard in the Portland area. This modification, which will likely occur when the existing load-limited MLK Blvd viaduct is replaced, will free up much needed space in Albina Yard for manifest traffic.

Union Pacific was disappointed with their inability to sequester *ConnectOregon* funds for projects that would free up capacity in the Portland Triangle. They also attempted to secure project funds to improve their mainline capacity on the Portland to Eugene segment of their network, a corridor that is badly over-capacity. In late 2004, UPRR invested \$10M into a new mainline through Albina Yard in hopes of improving system velocity through Albina Yard. They have \$4.7M remaining to construct a second mainline through Eugene, a project that is estimated to cost in the neighborhood of \$6-6.5M.

I-5 North-South Corridor

The Portland/Vancouver-Seattle corridor serves freight-rail traffic moving north from Portland to Seattle and traffic moving south from Seattle, Tacoma and British Columbia to Portland, California and the Midwest.

BNSF is moving more and more of their intermodal business south from the Ports of Seattle and Tacoma along the I-5 corridor to Vancouver, east to Pasco, northeasterly to Spokane, and then east on the BNSF mainline to Chicago and East Coast markets. The reverse movement of these intermodal trains is also occurring along this route through the Gorge. To accommodate this shift in freight rail traffic flow, BNSF is expanding capacity on their Fallbridge and Pasco Subdivisions (the segment between Vancouver and Pasco) by lengthening the siding at Lyle. This modification of their train movements has been precipitated by the following events:

- BNSF’s Mainline between Seattle to Everett then east over Stevens Pass to Wenatchee and Spokane is “at capacity” due to the physical restrictions imposed by the ventilations operations of the 7.78-mile long Cascade Tunnel. Approximately 24-28 trains per day (TPD) are moving through this tunnel daily; the tunnel’s rated capacity is 28-30 TPD.
- The BNSF Stampede Pass mainline between Auburn and Pasco cannot accommodate high-cube, double-stack equipment because there is insufficient clearance in the two-mile long Stampede Tunnel. Consequently, BNSF cannot use this corridor to handle any of their intermodal traffic growth.
- BNSF, under the auspices of Sound Transit, has been adding capacity to the segment between Seattle and Tacoma by constructing a third and fourth mainline. When this project is completed, the construction to add capacity between Seattle and Everett will begin. The additional trains generated by both the Port of Seattle and the Port of Tacoma have been routed south through Vancouver then east through the Columbia Gorge to avoid this construction interference and because there isn’t sufficient capacity through Stevens Pass.

The combination of the UPRR’s inability to move through the Portland Triangle coupled with the influx of BNSF intermodal business has created a tremendous bottleneck along the I-5 corridor between Vancouver and Kelso, WA. What commonly occurs is that the UPRR trains depart Portland with very little time left to work and consequently tie up on the BNSF Mainline in the vicinity of Longview. In part this occurs because both UPRR and BNSF freight trains stop daily on the BNSF mainline between Vancouver and Kelso at Woodland, Kalama, Kalama Export, and Longview, picking up and setting out cars to serve the major industries at these locations. Into this congestion are injected the ten scheduled passenger trains operated daily by Amtrak and WSDOT’s passenger rail program.

BNSF has been working with WSDOT to develop capacity projects in the Vancouver area (Vancouver Bypass and the West Vancouver Rail Access Project) and the Kelso to Martin’s Bluff Third Mainline (see Figures 10 & 11 below). However, these projects have cost higher than expected and have not yet been funded.

According to UPRR, in terms of volume, they move as much business north and south as BNSF moves east and west from PNW locations. This volume of train movement is reaching capacity on UPRR’s North/South corridors including: (1) their corridor north of Portland where they operate on a trackage rights basis on the BNSF Mainline between Portland and Tacoma and (2) their corridor south of Portland (between Portland and Eugene) that is often at capacity. Indeed, the on-time percentage of the six daily passenger trains is roughly in the 37-39 percent range. This low on-time percentage is indicative of the congested experienced by both passenger and freight trains.

East-West Corridors (Stevens, Stampede, and Columbia Gorge Lines)

The Columbia Gorge corridor is the major east-west corridor connecting the Portland, Oregon, and the Pacific Northwest with the national rail system. UPRR owns and

operates the rail line through the Gorge on the south (Oregon) side of the Columbia River. BNSF owns and operates a parallel rail line through the Gorge on the north (Washington State) side of the Columbia.

The Gorge corridor is the preferred route for heavy and transcontinental trains. Although the BNSF and the UPRR lines are single tracked for much of the route, the corridor rail lines run at river-grade through the Cascade Mountains. By contrast, the BNSF's more northerly routes, which run directly east from Seattle, must climb over the Cascades. The BNSF's Steven's Pass line travels through a nearly eight-mile long, single-track tunnel at the height of the pass. The number of trains using the tunnel is limited to allow for venting of exhaust gases from the tunnel. The parallel Stampede Pass line located roughly 70-90 miles south of the Stevens Pass route also must negotiate a two-mile long, single track tunnel and is not cleared for double-stack container trains.

Union Pacific's East/West Mainline between Portland and Hinkle is reaching capacity. This is due to the fact that UPRR's strategic alliance with CP Rail is reaching their expected goals. Approximately 12 trains daily now operate between Eastport, Idaho (the location in northern Idaho where UPRR interchanges with CP Rail) and Hinkle. Add these 12 trains to the 20-24 trains per day that move between Hinkle and Idaho over the Blue Mountains indicates that 32-36 trains are now moving between Portland and Hinkle. While not at capacity, there are days when capacity is exceeded and then all trains are delayed. *ConnectOregon* awarded UPRR \$3.7M to construct additional tracks in Hinkle adjacent to their mainline. These tracks will serve as "near port storage capacity" tracks for the Port of Portland.

The BNSF mainline through the Gorge is also approaching capacity. It handles approximately 35 trains per day (TPD). With the increased level of intermodal traffic, BNSF is now operating 35 and occasionally 40 TPD over this route. Extending sidings will help, but with sustained growth forecasted for the PNW, BNSF must consider opening up Stampede Pass for intermodal traffic as well as planning for expansion to add capacity in the Gorge.

BNSF's north/south route through Oregon connects with their Gorge route at Wishram. As a result of the Union Pacific/Southern Pacific merger, BNSF obtained a continuous route between the PNW and the Pacific Southwest. Rail traffic blossomed and BNSF now operates 12 TPD through this corridor, its rated capacity. BNSF has considered several siding expansions as well as clearing several tunnels on this route that passes through Bend to improve their capacity on their north/south corridor.

Shortline Serving the Portland Triangle

Portland & Western Railroad (PNWR) provides shortline service to the Portland area via two connections. From the south, PNWR delivers carload business to the UPRR at Brooklyn Yard over their rail connection that crosses over the Willamette River at Lake Oswego. This same railroad delivers BNSF cars to their interchange yard located at the west end of Willbridge (Willamette River Bridge located near the St. John's Bridge). Discussions are underway for the PNWR, working with the Central Oregon & Pacific Railroad, to deliver

trainload business directly from the Rogue Valley and other Oregon locations. Union Pacific has apparently approved “intrastate” shipments that would move to Portland area destinations on this PNWR/CORP routing such as the Rogue Valley. This movement is a combination of UPRR and BNSF franchise arrangements. Normally, whenever one railroad handles the business of another carrier, a reciprocal switching fee is assessed. This move would duplicate the current inter-railroad move of logs from Rainier and forest products manufacturing sites in Southern Oregon. Also underway is the implementation of a passenger commuter rail service between Beaverton and Wilsonville on the PNWR. This project is being managed by TriMet which is seeking a Full-Funding Grant Agreement in October, 2006 from the FTA. The proposed service would operate three morning and three evening bi-directional passenger trains in what will be the first suburb to suburb commuter service in the country.

In other developments that may ultimately impact the Port of Portland is the Portland & Western’s assuming of the handling of BNSF’s 663/664 freight train service between Vancouver, WA and Albany, OR. This movement will allow PNWR trains crews to operate BNSF trains between Brooklyn Yard over the Steel Bridge to the Lake Yard area then into Vancouver.

Both BNSF and UPRR are in the process of handing over the traditional yard switching assignments over to shortlines. This conversion is occurring in Tacoma with UPRR and BNSF having Tacoma Rail handle the switching assignments in Fife and Main Yards respectively. Still in the talking stages is the allocation of switching in the Centralia area to the Puget Sound and Pacific RR. Also, both railroads are considering third party switching in the Portland area and UPRR is considering having a Eugene-area shortline handle all switching assignments in the Eugene area.

One of the primary reasons for implementing these third party switching arrangements is to free up experienced personnel to protect their mainline train schedules. Both railroads are finding it difficult to hire qualified employees. They routinely interview over 100 candidates only to offer employment to 3-5 individuals. Many times, several of these new hires quit once the realization of 24/7 all weather, all hours, mandatory drug testing, on-call life style faces them. Consequently both BNSF and UPRR are resorting to somewhat draconian measures to obtain qualified personnel to operate their trains.

Mitigation Efforts to Relieve Rail Congestion

Portland Triangle Area

Rail congestion in the Portland/Vancouver Triangle negatively impacts the flow of rail traffic in the I-5 north/south as well as the East/West rail corridors. Many of the service failures highlighted above could be rectified if investment in the rail infrastructure within the Portland Triangle could be developed. Until such time as these bottlenecks are mitigated or eliminated, then the rail velocity through the North/South I-5 corridor will continued to be compromised affecting reliable deliveries to rail-served customers as well as the on-time performance Amtrak’s and WSDOT’s passenger rail program. Figure 10

displays many of the projects identified during the I-5 Rail Feasibility Analysis conducted in 2002. Some of these projects have been completed with the community and the railroad the recipient of the intended results. Other projects are desperately needed as discussed above. BNSF failed to see the benefits to their railroad of improving the speed of UPRR trains entering and leaving their mainline at North Portland Jct. (Project No. 3 in Figure 10). Therefore they choose not to contribute their portion (roughly \$800K) of the 20% match for the *ConnectOregon* grant that would have provided approximately \$10M to improve the diverging speed through this interlocker. Unfortunately, southbound UPRR trains oftentimes do not have sufficient time to crossover from the BNSF mainline in Vancouver to the UPRR tracks at North Portland Jct. When this occurs, the BNSF train dispatcher holds the UPRR trains on the mainline until such time the UPRR train can be advanced. During the I-5 feasibility analysis, it was determined that this wait can exceed 4-5 hours!

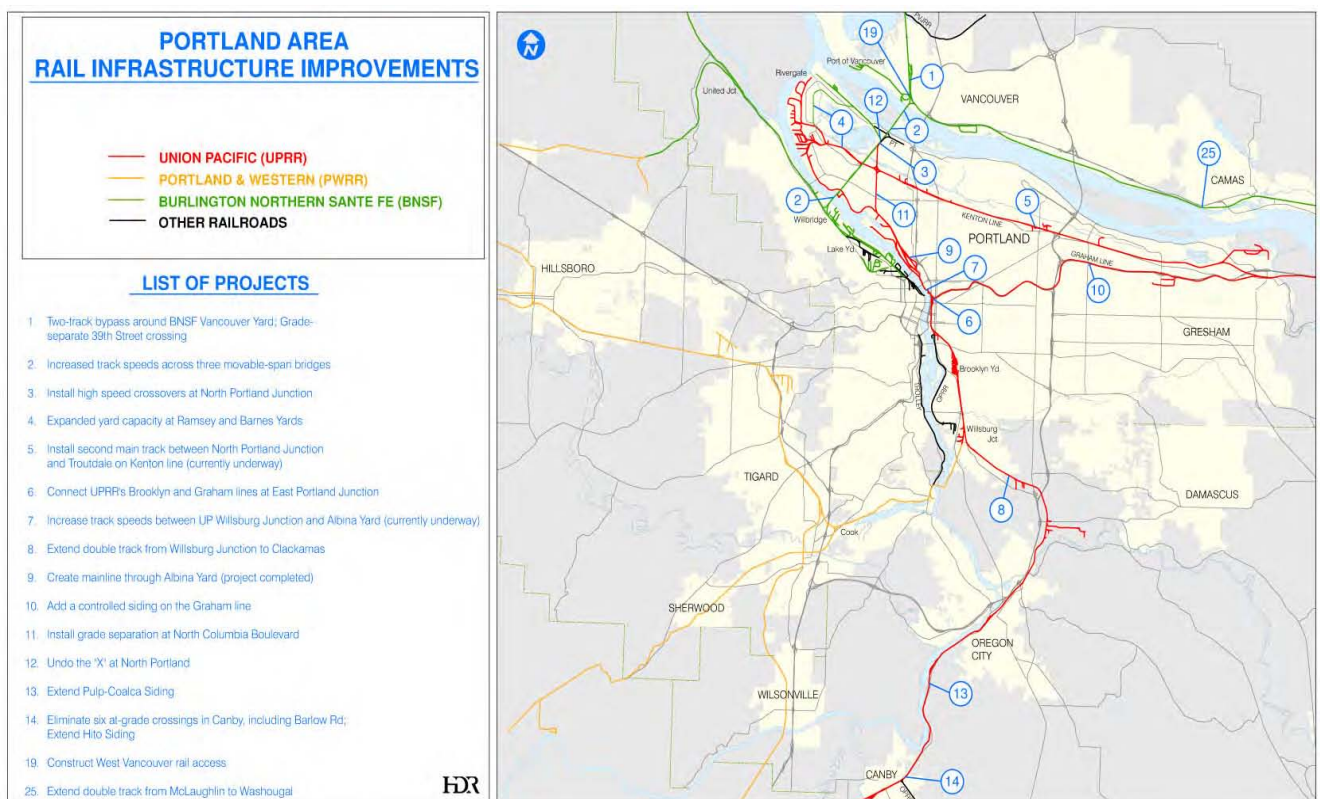


Figure 10: Portland/Vancouver Area Projects that, if implemented, would greatly improve rail velocity and reliability for both passenger and freight trains.

Greater Portland Area Including I-5 North/South & East/West Solutions

By implementing the projects described in Figure 10 would reduce train delay for all classes of trains, there are projects just outside the immediate Portland/Vancouver area that would also be required once congestion in the Portland Triangle is reduced. These projects range from those critically now (Martins Bluff to Kalama and through Longview Jct. Projects No.

22 & No. 23 in Figure 11) to those that the planning effort should be initiated as soon as possible due to long lead time will be long (Double tracking through Albany, Project No. 18 or the Directional Running Scenario Project No. 28 in Figure 11).

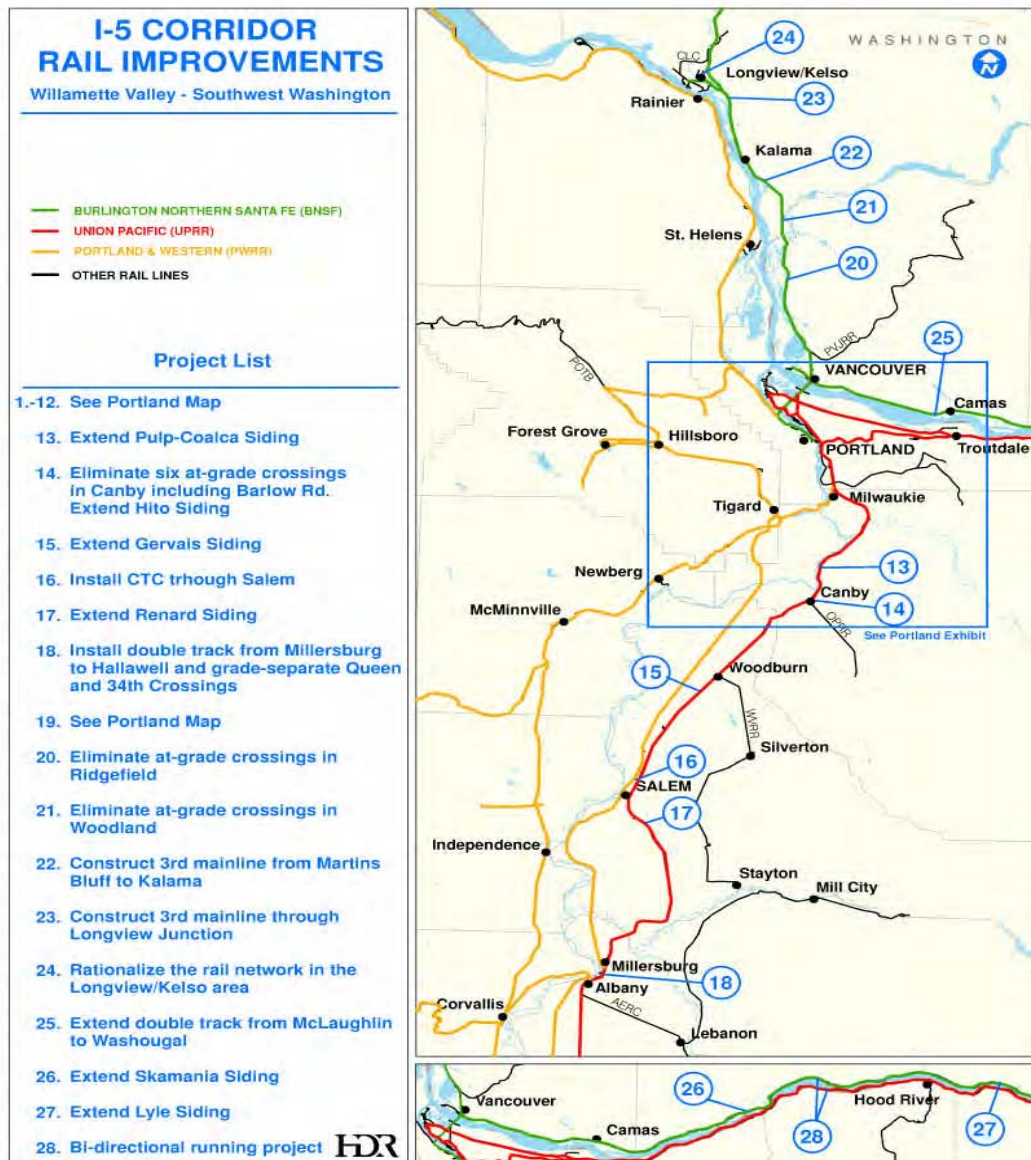


Figure 11: A list of Potential Rail Capacity Projects just outside the Portland/Vancouver Area that will be required once congestion in the Portland Triangle is reduced.

Co-Production

Co-Production is the term that indicates segments of trackage whereby BNSF and UPRR allow each other to operate their trains on each other's track. The terms of these agreements are spelled out fairly rigidly so that a shipper who might see a UPRR train operating on a BNSF track might be tempted to contact UPRR to obtain a more favorable rate than the

shipper might have with BNSF. Usually, these co-production agreements strictly prohibit this from occurring. There are many locations throughout their respective systems where both BNSF and UPRR determine that it would be mutually advantageous for them to share their tracks with each other. While their “gameboard” is large, they try to isolate these potential co-production segments to fairly discrete locations where it is clear that if BNSF receives the right to say operate from Reservation to Black River Jct on the Union Pacific, then in return, UPRR would obtain the right to operate from Lake Yard to Vancouver on BNSF’s mainline. In this manner, they can determine that the exchange is “equal” and that one railroad doesn’t benefit more than the other.

Co-Production on a grand scale could greatly increase east/west capacity through the Gorge. If BNSF and UPRR were to operate all their eastbound trains on UPRR trackage east from Portland through the Gorge and both railroads were to operate all their westbound trains on the BNSF mainline north of the Columbia, then the carrying capacity of these corridors would immediately double. This concept (Project No. 28 in Figure 11) is diagrammed in Figure 12.

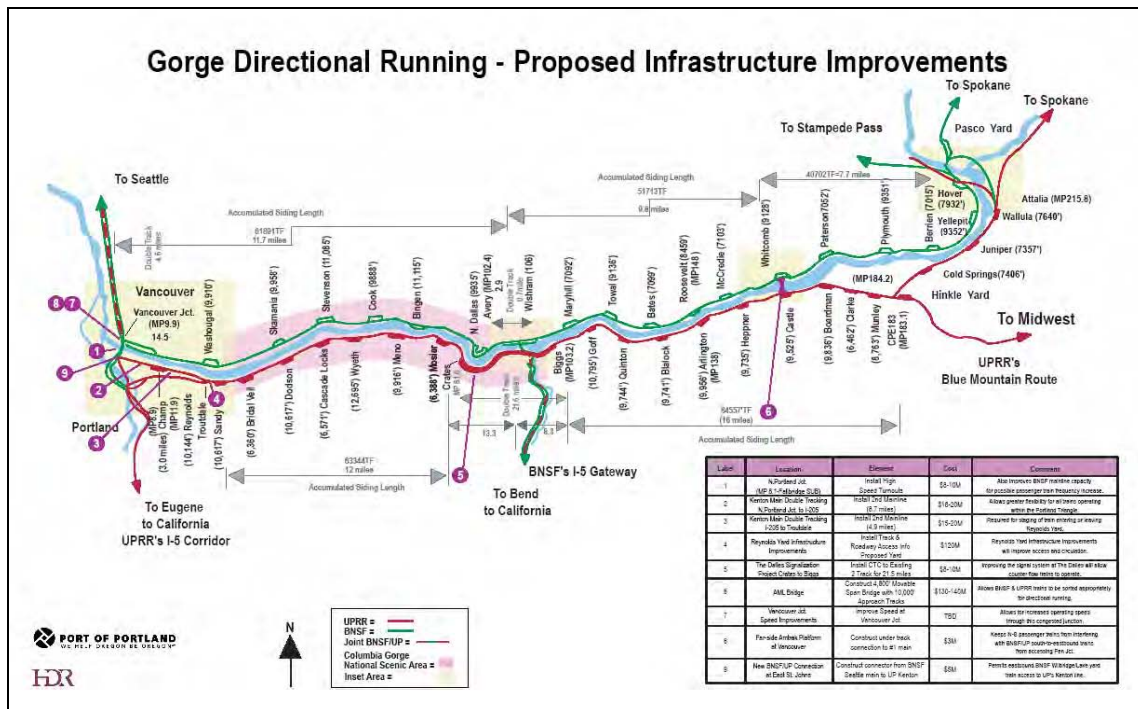


Figure 12: Proposal to Implement Directional Running through the Columbia River Gorge.

UPRR has implemented directional running between the San Antonio area and the St. Louis/Memphis region. BNSF has been granted trackage rights on these paired tracks. Both CP Rail and CN operate together in a co-production agreement between Vancouver BC and Kamloops through the environmentally fragile Thompson River Canyon.

Implications for Portland/Vancouver Freight

Bulk Port Traffic

Congestion in the Portland/Vancouver Triangle impacts almost all of the region's major marine-terminal customers: grain and bulk mineral exporters; lumber, paper, wood, and processed food manufacturers looking to expand their export markets; automobile and wholesale merchandise importers bringing goods in from the Pacific Rim for distribution to the Midwest, etc. Over time, congestion at the core of the Portland rail network will erode the marine terminals' major asset – the perception among shippers, brokers, and carriers that freight transportation through the Portland/Vancouver gateway is relatively less congested and more manageable than other West Coast port cities. The short-term outlook for rail service along the Gorge corridor is good, but long-term service levels are less certain. Much of the Portland marine terminals' business in grain and mineral bulk exports, as well as their business in automobile and containerized merchandise imports, are at risk if east-west rail service along the Gorge corridor is not reliable.

Rail Infrastructure that permits the unrestricted flow of bulk-commodity unit trains includes long storage tracks in the 7000-8000' range that are ideally located near their ultimate terminal for disposition. These storage tracks allow these trains to be "chambered" close enough to the terminal that they can be delivered to the terminal for unloading when it's convenient for the shipper. Also needed are the loop tracks or long working tracks that allow for the positioning of the loads to be unloaded at a dumper pit and then for the empties to be shuttled to a location where they can ultimately be reassembled, air-tested and readied for departure when road locomotives are deployed for the movement back east. Ideally, in today's realm of 110-car unit trains composed of 62' covered hoppers, the working tracks plus trackage through the dumper pit area equates to a narrow parcel of land roughly 3 miles in length without any at-grade road crossings. Both BNSF and UPRR discourage the design of industrial loop track any tighter than 9 degree 30 minute curves. With a radius of 606 feet, this criterion results in a loop track requiring a parcel of land roughly 1.0 mile long and over a quarter mile wide.

Within the Portland Triangle, industrial sites meeting these criteria are few and far between. Loop track arrangements are possible in the Terminal 4 area but these may exceed the minimum curve restriction criteria. Terminal 4 can accommodate relatively long staging or working tracks but much shorter than the nearly 7,000' required to prevent these trains from being doubled or tripled over into multiple tracks. The Port of Vancouver may have parcels of land still able to meet the bulk train infrastructure criteria. Bulk train layouts have been incorporated in the Hayden Island rail planning effort. Except for the proposed mainline trackage over the Slough Bridge, the proposed improvements in the Ramsey Yard and South Rivergate area will be too short to serve to hold a bulk unit train intact (in one unbroken train). However, these tracks will easily accommodate the staging of a bulk unit train by doubling over into the requisite number of track. The addition of a third loop track at Portland Bulk Terminal's facility at Terminal 5 will allow this shipper to handle the

expected volume. UPRR's new 10,000' siding at Hemlock and the recently completed double siding at Champ on the Kenton Main will allow trains to be temporarily stored for disposition at the Port. The Vancouver Bypass will allow BNSF's bulk unit trains enroute to Kalama and Tacoma to be routed through Vancouver without impacting the mainline as the crews are changed on these trains or if these trains are temporarily held for staging. The Port of Vancouver's West Rail Access will allow unimpeded flow of bulk trains to and from BNSF's East/West corridor directly into the Port area without impacting the already congested North/South corridor. This infrastructure improvement will greatly improve rail capacity within the Portland/Vancouver area. Ethanol facilities are currently being contemplated for the Port Westward area near Clatskanie which would necessitate a through-train move from BNSF's east/west corridor over the Columbia River Bridge and Willbridge enroute to the PNWR's Astoria line. Other than taking up mainline capacity, this move shouldn't require any facilities in the Portland/Vancouver area unless surge capacity is needed.

Industrial Carload Traffic

The loss of rail service in the Willamette Valley corridor and related shortages of specialized railcars and containers, which has shifted much of Oregon's local industrial, food products, and chemical traffic from rail to truck over the last decades. Although the volume of international intermodal traffic and the railroads' need to maximize throughput on the mainlines threatens to squeeze out industrial carload traffic, carload traffic is still a major source of revenue for the Class I railroads, especially for the UPRR. The major challenge for the Portland/Vancouver region will be balance the railroads' demand for more railroad-efficient consolidation centers with business and industry's need for tailored door-to-door services and the region's urban growth and land use program.

Rail Infrastructure devoted to Industrial Carload traffic includes, for UPRR, a limited area at Brooklyn Yard, a major classification yard at Albina Yard and at Barnes Yard. BNSF uses Vancouver Yard and both railroads use the Portland Terminal facility at Lake Yard to handle carload business. Both railroads are requiring additional trackage in order to accommodate continued growth in handling carload shipments. The proposed Ramsey Yard is ideal for handling industrial carload business. The proposed improvements at South Rivergate will greatly alleviate the congestion there as well. UPRR's yard at Eugene is over-capacity and inadequate to handle the surging industrial carload business in Southern Oregon. While this facility isn't within the Portland Triangle, the fact that Eugene is inadequately-sized does affect train flow in the Portland as well as the Hinkle area.

Intermodal Traffic

Portland/Vancouver's remaining container import and export business depends in part on the frequency of national rail service passing through Portland and on the Portland/Vancouver region's historic role as a major distribution center. Because the Portland/Vancouver marine terminals are eight hours steaming time up river from the ocean, Portland is less attractive than Seattle-Tacoma as a port-of-call for the major containership lines and mega-containerships; nevertheless, Portland maintains a business in container traffic because steamship operators, shippers, and brokers understand that Portland has excellent rail

service. This enables Portland to capture container that might otherwise go Seattle and Tacoma. But to accommodate and grow intermodal traffic, the Portland/Vancouver region must generate enough intermodal traffic and provide sufficient yard space to assemble and store the 8,000 foot trains that the railroads will favor under their “hook-‘n-haul” strategy.

Rail Infrastructure devoted to Intermodal traffic was discussed earlier in this report. The addition of a third lead track in Terminal 6 will allow both BNSF and UPRR to work simultaneously.

Conclusion

Congestion in the Portland/Vancouver Triangle impacts the flow of nearly all rail traffic in the Pacific Northwest. Indeed, only the two dozen or more trains that navigate daily over Stevens and Stampede Passes escape being delayed within the Portland Triangle. It will continue to be important for both Class 1 railroads along with the region’s shortlines to work together with themselves and with the appropriate public agency to obtain the funds necessary to minimize rail congestion. Upcoming legislation introduced by Senator Trent Lott would provide a 25% tax credit for new trackage installed by the Class 1’s. Shortlines currently have this type of incentive already in place. *ConnectOregon* was able to assist in only one limited area (Ramsey Yard). The upcoming SAFETEA-LU is reportedly to have a strong emphasis on freight mobility.

The Portland/Vancouver region requires the focus of both BNSF and UPRR working with both ODOT and WSDOT as well as the Port of Portland and the Port of Vancouver to address improving the region’s rail infrastructure in order to remain fluid to handle the expected growth.



Portland/Vancouver International and Domestic Trade Capacity Analysis

Task 3

Growth Opportunities and Challenges Assessment for Air Cargo Market

PORT OF PORTLAND

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Alexandria, Virginia
August 2006

OVERVIEW

This report examines the opportunities and challenges associated with expanding the air cargo system for the Portland/Vancouver region. A description is provided of air cargo systems in general and the existing activity, infrastructure and services at Portland International Airport (PDX). The Task 1 forecast is examined relative to the expected capabilities of the infrastructure, as well as factors that will affect actual demand and service levels in the future. Finally, opportunities and challenges for expansion of air and supporting services, local/regional air cargo demand and the supporting infrastructure are examined.

MARKET BACKGROUND

AIR CARGO BACKGROUND

The transportation of freight and mail by air represents a vital element of regional trade and distribution networks. In recent years, increased demand for fast and time-definite transportation by manufacturers, merchants and consumers has combined with the development of advanced air services to greatly increase the importance of air transport. Air transport is the fastest, most reliable option for shipping commodities between markets, although typically at a higher cost relative to surface transportation (ocean, rail and truck). Accordingly, air cargo shipments are relatively small, light, and of high value. Examples of the types of goods that tend to travel by air include pharmaceuticals, electronics, auto parts, fashions, and high-value perishables. While relatively insignificant in terms of weight volumes, air transport is responsible for more than 40% of the world's trade value. Despite the effects of recession and terrorist attacks, world air cargo traffic averaged 6% annual growth from 1993 to 2003, and both Boeing and Airbus project similar growth over the next twenty years at about 1% more per year than air passenger traffic.

For the most part, air cargo moves on a multi-modal door-to-door basis involving a combination of air transport, ground transport and transfer/handling activities. Air carriers provide the air transport segment of air shipments, and may also provide ground handling or pickup/delivery services. Air carriers are primarily categorized as either "direct airport-to-airport" carriers who are mostly responsible for the air portion of the trip, or "integrated" carriers who maintain single entity responsibility for shipments on a door-to-door basis (including most if not all of the functions of the cargo service providers listed below). Unlike other modes, passenger services account for a significant amount of cargo capacity, particularly for mail and international traffic. While handling cargo, these services are geared towards passenger markets.

Other key participants in the air cargo service market include:

- **airports** provide facilities and support services to air carriers and air cargo shippers, both at origin/destination points and intermediate hub or gateway transfer points
- **freight forwarders and customs brokers** provide ground and other handling services that connect shipments to airport-to-airport services as an agent for the shipper or consignee
- **trucking firms** transfer shipments to/from both the origin and destination airports, often combining a local pickup or delivery with a linehaul transfer between a gateway and local airport
- **specialized services** may be provided independently of forwarders/brokers and integrated carriers including warehousing and airport **ground handlers**. An increasingly important type of service provider is the **third-party logistics (3PL)** or distribution firm that may provide little or no direct transportation, but rather acts as the shippers' or consignees' agent in handling overall distribution systems.

The air cargo service ("supply") sector is designed to accommodate the need for fast and reliable transportation by shippers and consignees ranging from delivery of an online gift purchase to a household, to the transport of donor organs to hospitals, and to managed distribution of manufacturing components and finished product between suppliers, factories and retail outlets.

The use of air services is determined by a shipper or consignee in consideration of trade-offs between service and price relative to the type of shipment. Air cargo demand markets are characterized by:

- **origin/destination** - most air shipments do not originate or terminate at an airport, but are determined by industrial and demographic location patterns. The origin and destination of a shipment determine the range and cost of routing and service options available
- **commodity** - commodity type affects both the desirability of, and requirements for, air shipment. Key characteristics include size, perishability, value, weight, and physical dimensions.
- **desired transit time** - for the most part, the level of air cargo service desired is determined by the shipment's physical characteristics, although other conditions may dictate use of air services (e.g., emergency need for a low-value part)
- **shipment size** - for the most part, air shipments are small and typically must be consolidated into pallets or containers for handling to and from the aircraft. Larger sized shipments may require special handling or aircraft types, but they can also move at a lower cost

- **shipment volume** - while air cargo services are available in some form for almost all conceivable origin-destinations, the volume of traffic for a particular origin or destination dictates the variety and scope of services available.

While there are thousands of distinct commodities that move in trade markets, air cargo traffic can be categorized as follows:

- **Mail** - shipments collected and distributed through national postal systems and shipped to foreign points via airline contracts including intra-government mail (e.g. diplomatic pouches, military mail)
- **Express Freight** - air shipment of envelopes and small packages via the express services of integrated carriers
- **General Freight** - air shipment of mostly larger commodities and packages using more traditional airport-to-airport services (including those provided by integrated carriers). This is also known as "heavy freight".

In 2003, the Boeing Company estimated that mail traffic accounted for 4% of world airline cargo traffic (measured in revenue tonne-kilometres for domestic and international markets combined) with freight accounting for 96%. Express services accounted for 11% of international traffic in 2003, up from 4.1% in 1992, indicating the continued expansion of the integrated carriers' world networks. In contrast, US express carriers account for 60% of the US domestic market.

The dominance of the integrated carriers in the U.S. domestic market results in a significant distinction between the domestic and international service sectors. The integrated carriers provide direct air service between their hubs and most U.S. airports, based on the need to meet overnight express schedules. The remaining domestic traffic moves on passenger flights (as determined by passenger flow patterns) and all-cargo flights on high volume cargo routes. While the integrated carriers collect and distribute international traffic via their U.S. and worldwide networks, international air traffic is more highly dependent on both widebody passenger and freighter flights with the latter geared towards connecting hub networks in the U.S., Asia, Europe and other world regions. The result is that most domestic air cargo is handled via local airports, while international traffic tends to gravitate to major gateways with some increasing diversion to emerging secondary gateways.

The interaction between air cargo demand and supply patterns results in the flow of air commodities via various routings, service types and carriers. Traffic patterns reflect the underlying demand for shipping between various geographic regions, the type of commodities involved, and the way individual providers tailor their services to meet demand.

PORTLAND/VANCOUVER AIR CARGO MARKET

Like all regional economies, the Portland/Vancouver market is highly dependent on air cargo to support industrial and consumer activity. Local manufacturers ship in supplies, components and emergency parts, while shipping out finished products to domestic and international markets. Wholesale, retail and distribution firms use air services to provide the most efficient delivery to their customers, while consumers increasingly use direct air shipment to shop worldwide for products once limited to local store inventories.

The local air cargo infrastructure is critical to attracting and retaining high tech and similar industrial activity that is increasingly dependent on air transport to compete in speed-dependent manufacturing and distribution markets. A region's airports are critical connectors to worldwide air distribution networks and their efficiency and capabilities are essential to attracting and maintaining economic development.

The service market (or "hinterland") for an air cargo airport can extend 500 miles and even further for the top international gateways (e.g., LAX) that have a high share of available cargo flights to overseas points. Except for the major gateways and integrated hub airports, the typical regional airport serves a local metropolitan market and regional market defined by the location, size and capabilities of competing gateways. Optimally, an air shipper would prefer to directly deliver an outbound shipment to the airplane and have the consignee pick it up at the flight's destination airport. In reality, most air shipments require some ground transport and some transfer at an intermediate hub or gateway airport. Shippers seek to minimize ground linkages, but any cost and time savings using a local airport must be compared to cost and service advantages at the major gateways, particularly the breadth of direct air services typically not available at a "secondary" gateway.

Portland International Airport (PDX) is the primary service airport for the Portland/Vancouver region, providing direct air services to domestic and international origin/destinations, as well as connecting to the hubs and gateways of the major integrated and other cargo carriers. Due to the broad availability of direct integrated and passenger flights to local airports, the domestic cargo market for PDX would be primarily the local metropolitan area (other than some feeder hub activity as described below). In the international sector, PDX's "primary" market hinterland can be defined as points within 100 miles of the airport (a "local" truckhaul) that are closer to PDX than to Seattle's airport. A broader "regional" hinterland encompassing the 5 states of Oregon, Washington, Idaho, Montana and Wyoming can also be competitively served via PDX services. While air shipments can (and do) originate and terminate beyond this hinterland (particularly in international markets), significant penetration of markets beyond 500 miles is mostly limited to the primary gateways (LAX or SFO for the trans-Pacific, JFK for trans-Atlantic, and MIA for Latin America).

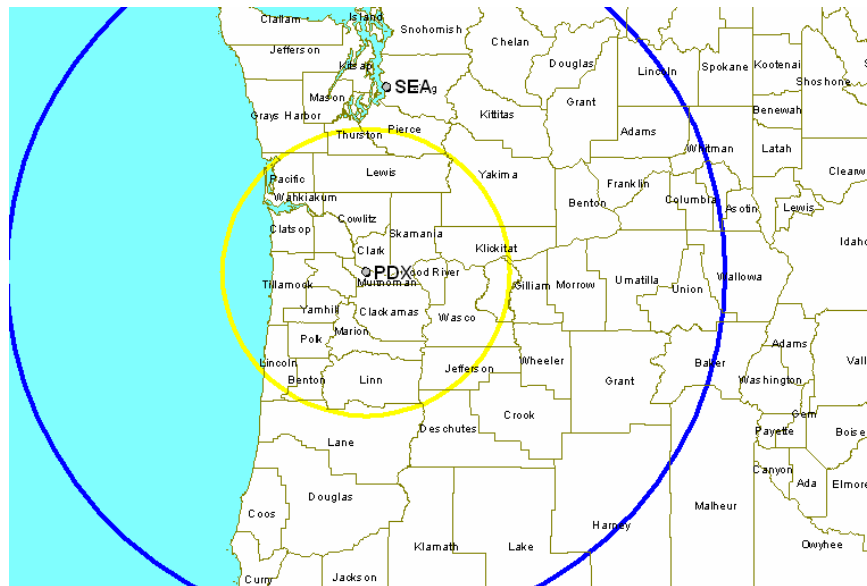


Figure 1

PDX's 50- and 100-mile Market Hinterlands

In 2005, the airport handled 276,000 tons of air freight and 12,000 tons of air mail. Domestic traffic accounted for 92% of the air freight with 86% of that total moving on integrated carrier flights with domestic passenger flights handling 9% and freighter flights handling 5%. For domestic integrated traffic, PDX is the service airport for the local market and also serves as a regional air hub connecting the integrated hubs with smaller Oregon communities using feeder flights. The three integrated carriers (FedEx, UPS and DHL/ABX) handled 217,000 on nearly 15,000 freighter flights in 2005 with 11% of the traffic transferred between the small feeder flights and the primary hub flights. Domestic freight and mail also moves on passenger flights to and from major travel destinations and some freighter flights operated in support of large forwarder traffic routes. Other than the feeder traffic, the majority of the domestic traffic can be assumed to originate or terminate within the “primary” market hinterland.

At present, PDX has limited direct service to international points including passenger flights to Japan and Germany, and all-cargo service to China. Up to May 2006, PDX also had direct freighter service to South Korea. The carriers serving these routes not only handle traffic for the destination country, but also distribute cargo to and from the entire region via their flight networks.¹ Total international traffic amounted to 23,000 tons in 2005 with 55% of that moving on the freighter services to China and Korea.

PDX's international services draw traffic from a wider hinterland including the entire state of Oregon and southern Washington. PDX's international services compete with

¹ Both Lufthansa and Korean Air operate major distribution hubs at Frankfurt and Seoul respectively in order to serve “beyond” markets throughout the entire region. Air China is less dependent on beyond traffic due to the geographical size and high volumes of the China market.

Seattle and Vancouver, BC services for traffic originating or terminating in the 5-state Northwest region although both airports have more direct service to the key Asia market. LAX is the dominant West Coast gateway airport for international traffic, particularly to and from Asia. San Francisco is the next largest gateway, while a significant amount of U.S.-Asia traffic is routed via Anchorage due to stage length limitations and increased freighter-based transit cargo.

The State of Oregon accounted for 82,000 tons of international air trade in 2005 with 51% of that estimated to be imported.² The total value of air trade originating or terminating in Oregon is estimated at \$10 billion or an average of \$61 per pound. Oregon is ranked 18th in air trade value compared to other states and 25th in terms of air trade weight. East Asia accounts for 67% of Oregon's trade value and 48% of trade weight with Europe accounting for 24% of air value and 36% of air weight. The effects of 9/11 and a downturn in high tech trade resulted in a 14% decline in the state's air trade value between 2000 and 2005, although air trade weight increased 16%.

The broader 5-state regional hinterland accounted for 253,000 tons of air trade worth nearly \$29 billion in 2005. The region was responsible for 5% of total U.S. air trade value and 4% of trade weight. The region's air trade is slightly more weighted towards inbound trade than the State of Oregon. East Asia accounts for 60% of the region's trade value and 46% of trade weight with Europe accounting for about one-third of both. While the local market is smaller than that of Seattle's, it is estimated that the PDX local 50-mile market accounted for 28% of 2005 export weight from the 5-state region with other Oregon points accounting for an additional 11% of the market. Between 2000 and 2005, regional air trade value declined 6% while air trade weight increased 16%.

PDX's Customs District³ handled over 25,000 tons of international air trade in 2005, equivalent to 10% of the regional origin/destination trade and 31% of Oregon's air trade. The relative size of PDX's international air trade is shown by comparison with competing gateways. PDX's total air weight is 24% of Seattle's total in 2005, 7% of San Francisco's, and 3% of Los Angeles. This provides an indication of PDX's relative disadvantage in terms of direct flight availability as traffic flows closely correlates with flight capacity. The primary competing gateway at LAX was ranked just third in terms of Customs air weight behind New York/New Jersey (JFK and EWR) and Chicago and just before Miami. Portland's District is roughly equivalent in weight volumes to Charlotte, NC, Great Falls, MT and Buffalo, NY. The fact that Washington air trade weight is just 70% higher than that of Oregon (and some of that originates/terminates closer to PDX than Seattle) compared to traffic volumes that are four times higher shows that local origin/destination traffic levels is not the sole determinant for air cargo and flight routings.

² These statistics are derived from U.S. Bureau of Census trade statistics using the State of Exports series for outbound traffic and an allocation of Customs District statistics for inbound trade.

³ PDX is the primary airport in the Columbia-Snake River Customs District and should account for almost all of its air trade. Census statistics differ from the airport's international cargo traffic totals probably due to differences in the timing of reporting and the exclusion of small and in-transit shipments from Census totals.

Despite its relatively small volume of international air trade, PDX has benefited from the long-term growth of air trade in general with air value increasing 344% between 1990 and 2005 and air weight increasing 218%. This growth includes declines from 2000 to 2005 in air value of 21% and in air weight of 6%. PDX's air trade growth substantially exceeded that of both Seattle and San Francisco from 1990 to 2005 (in both value and weight terms), although Seattle did not experience the same decline from 2000 to 2005 as Portland (while San Francisco's decline was less).

The amount of leakage from PDX's market hinterland can be demonstrated by the flow of regional air exports by airport. In 2005, PDX accounted for 33% of Oregon's exports to all world markets (excluding Canada⁴) compared to 26% for Seattle, 8% for Memphis (based on FedEx's hub routings), 7% for LAX, and 7% for SFO. PDX's one-third share is an increase over 1995's share of 18% and 2000's share of 33%, during which periods Seattle's share declined. As might be expected based on its services relative to competing gateway, PDX's share of the Asia market (43%) is higher than its world average with a below average share to Europe (23%) compared to Seattle's 33% share. To indicate both the benefit of direct air service and the power of large gateways, PDX accounts for just 2% of Oregon's air export weight to Latin America, while Miami accounts for 54% followed by LAX with 19%.

The limited reach of current PDX international cargo services is indicated by the heavy reliance on local traffic. Oregon's air exports accounted for 76% of PDX total air export weight (excluding Canada) with most of the rest originating in Washington (15%). PDX accounted for just 4% of Washington's total air export weight and similar shares of the other states in the regional hinterland (that are relatively small origin markets in any case). The only states outside the regional hinterland that accounted for any significant traffic for PDX were California (5% of PDX's total weight) and New York (1%), both of which were probably based on interline connections by air rather than truck.

These patterns differ depending on the overseas market with PDX's penetration of the local and regional hinterland markets significantly higher for regions with direct service. Export markets for which PDX accounts for above average shares of Oregon air export weight include China (69%), France (56%), Japan (52%) and Hong Kong (43%). The ability (and in some cases the desirability) to serve beyond markets is shown by high shares for both France and Hong Kong, as well as average or below average shares for direct service markets Germany (33%) and South Korea (26%). PDX accounts for high shares of Washington- and Idaho-origin traffic for all of the direct service markets (15% and 25% respectively for South Korea and 12% and 23% for Germany). This pattern, indicates that shippers are willing to accept a longer trip on the U.S. side as a trade-off for direct air service on the foreign side (and vice versa for good beyond services).

⁴ In analyzing routing statistics, U.S.-Canada trade is eliminated as it is handled similarly to the U.S. domestic market, i.e., mostly via integrated carrier networks.

AIR CARGO FORECAST

The Task 1 air cargo forecast corresponds to the total air cargo traffic projected to be routed via PDX and incorporates status quo assumptions concerning service and routing patterns and does not address the effect of infrastructure capacity or efficiency. The forecast predicts total air cargo via PDX will increase from a 1997 baseline of 313,000 tons (derived from PDX statistics) to 521,000 tons in 2010 and 1.3 million tons in 2030. The relevant annual growth rates are 4.0% from 1997 to 2010, 3.8% from 2010 to 2020, and 5.2% from 2020 to 2030 or 4.3% annual growth for the entire period. Inbound traffic is projected to increase slightly faster than outbound traffic, but it projected to remain equal split in each direction.

Based on the current high dependence on domestic air cargo, this forecast is reasonable when compared to industry forecasts. Boeing projects 20-year annual growth from 2003 levels will be 4.2% for the U.S. domestic market, 5.2% for U.S.-Europe, and 7.2-7.3% for U.S. Asia. A weighted average of these growth rates (based on 2005 traffic levels) would be 4.2% annual growth.

The issue of whether the forecasts will be achieved is addressed in the sections below.

CURRENT AND FUTURE STATUS OF AIR CARGO INFRASTRUCTURE

PDX's air cargo system includes both on- and off-airport facilities, equipment and infrastructure, as well as the ground transport access that connects those facilities and the local air cargo industry with local and regional markets. This section briefly describes the existing and planned air cargo system serving the Portland/Vancouver region.

The physical elements of an air cargo system support the transport and handling activities of door-to-door "air" cargo shipments. A typical inbound shipment involves the following elements to reach final origin/destination:

AIRSPACE AND AIRFIELD

PDX has 2 parallel runways and supporting taxiways that are capable of handling all current freighter and passenger aircraft under all conditions. PDX, as well as many other airports, is not currently capable of handling the Airbus A380 for routine traffic. The 2000 Master Plan projected that runway capacity would be adequate through 2020, at which point, a third runway is planned for construction. An airport flight handling capacity is also affected by the efficiency and capacity of the local air traffic control system inclusive of local airspace. (Airports are also obviously affected by regional, national and international airspace issues but those apply systemwide and would not be specific to PDX.) In 2005, PDX had the 5th lowest average departure delay per flight

among the 35 OEP airports. In terms of capacity, there are no problems anticipated regarding the airspace.

A key issue related to air cargo is the heavy reliance on nighttime flights by the integrated carriers. The typical integrated network relies on evening flights from service airports to hub airports where traffic is sorted back to flights returning to the same airports. The hub sort typically occurs in the middle of the night and the returning flights arrive in the early morning in order to meet early morning express delivery guarantees. The ability to continue to operate existing and future night flights is essential to retaining direct integrated carrier service at PDX and maintaining the top level of service essential for local manufacturers and consumers. Local express service levels would be hurt if integrated carrier flights were forced to another airport, necessitating higher costs, earlier cutoff times, and later delivery times. In addition to affecting the overnight delivery systems for local residents, reduced express levels would harm businesses that depend on overnight delivery to ship critical parts and products, as well as the potential to attract logistics/distribution facilities.

The operation of the statewide feeder flights for FedEx and UPS at PDX also is dependent on night flights that link the primary hub flights with small communities throughout the state. These communities currently enjoy comparable levels of express service to Portland and other major metropolitan areas solely based on the ability to operate these flights as trucking times fall outside the integrated carriers' sort schedules. PDX has actively worked to balance the continued operation of these flights with community noise concerns.

The relatively small proportion of flights that are cargo-related (7% of 2005 total flights excluding all North American passenger flights handling cargo) make it unlikely that any additional air cargo growth would severely impact either airspace or runway/taxiway congestion or efficiency. The relatively uncongested nature of the airport could increasingly become a competitive advantage as competing gateways reach their capacities.

AIRCRAFT HANDLING AND CARGO TRANSFER EQUIPMENT

Air cargo is handled to and from the aircraft using loading equipment that transfers pallets, containers, and even loose shipments to ground transfer equipment. Passenger aircraft are typically handled directly at the passenger transfer point which may require a longer on-airport transfer to reach the cargo area. Freighter aircraft are parked close to the cargo terminals in the designated cargo area. The handling of non-integrated aircraft is typically conducted by a third party operator, particularly in smaller airports where an airline may have just a few cargo flights per day.

Smaller freighter and passenger aircraft don't require any specialized equipment, while large freighters generally use a special loading device (e.g., front loaders). The relatively low usage of special loading devices at small gateways often is a competitive disadvantage relative to the major gateways. In the case of PDX, the future attraction of

international freighter flights will require assurance that adequate and cost-competitive loading equipment will be available.

The current cargo area totals 50 acres and is divided between the original cargo terminal area and the south cargo area where the integrated carriers and some of the direct carriers operate. Future plans also anticipate further consolidation and expansion of the cargo areas. The Master Plan estimates the cargo area could be expanded to 138 acres or even more with a third runway. The size and efficiency of the cargo area is not anticipated to have any effect on meeting or exceeding the cargo forecast.

ON-AIRPORT AND OFF-AIRPORT CARGO TERMINALS

Most air cargo shipments move in a palletized or containerized form, but the small average shipment requires “building” and “breaking down” unit load devices for transfer to and from the aircraft. These types of activities are typically conducted in airport terminals, although large forwarders and some integrated carriers use off-airport sites. At PDX, most of the ULD activity is conducted at the airline’s cargo terminal or at a similar facility operated by a cargo handling agent. PDX currently has 12 cargo facilities totalling 661,000 sf including 3 facilities owned by the port. There is currently available space on-airport for leasing, particularly at the older cargo terminal on the north side. The availability of and lack of congestion for on-airport cargo facilities should be asset in achieving or exceeding forecast growth.

In addition to cargo handling facilities, PDX also has facilities where Customs and other inspection activities can be conducted. Because of lower volumes, PDX’s Customs operations are considered efficient and may be a competitive advantage. Related facilities typically only become an issue when needed terminal space has to be diverted for government use.

Most of the forwarders and custom brokers have off-airport sites where final distribution (or initial acceptance) of shipments are conducted, often in concert with ocean and truck traffic. Because most of these operators handled multiple modes, these facilities may be located some distance from the airport at a centralized location. Most of the large air forwarders are located in local office parks where rental costs are less than on-airport facilities. The cost of warehouse space in PDX is considered low relative to competing airports and may be an advantage in attracting new carriers, forwarders, or air-dependent distribution activities. The availability and suitability of off-airport space would not appear to be issue in the future.

AIRPORT ACCESS

As noted above, most air cargo is transferred by truck between airport and off-airport facilities. Most of the general air traffic uses smaller trucks that shuttle traffic back and forth to the airport prior to flight departure or after flight arrival. Integrated carriers that sort local traffic on-airport may operate larger equipment, while off-airport sorts may transfer cargo using tugs. Airports that attract cargo from a large hinterland may

also have direct airport-to-airport long distance trucks. Large shippers may operate their own equipment or use regional or local trucking firms.

In any case, the ability to efficiently transfer cargo between the airport and either local or long-distance points is essential to the overall efficiency of air cargo services. At the high rates charged for air cargo (relative to other modes), shippers expects the fastest and most reliable transit times possible, and any advantage of a direct flight can easily be dissipated by ground delays having nothing to do with the airport.

The critical elements of the ground access system are:

- Airport Gate - Being a secure area, all ground equipment transferring air cargo must use a airport gate. PDX has several gates used for cargo operations and it does not appear to be an issue, and, in fact, may be an advantage as competing gateways typically have greater congestion. A key issue presently is the impact of new cargo security regulations that will require most personnel involved in airport ground trucking operations must have the same clearances as on-airport employees. In one case, a cargo airline will be moving their gate to better segregate off- and on-airport truck operations and avoid the cost of credentialing all of their truckers.
- Local Roads - While air cargo may travel long distances by road, most general air cargo (i.e., non-integrated) involves a short-haul transfer between the airport and a local facility, typically moving under a tight schedule. While these local truck transfers do not generate significant traffic relative to passenger-related traffic and non-airport local traffic, congestion caused by those other uses may have a significant impact on the efficiency of air cargo services. For example, increased rush-hour congestion may require a off-airport forwarder to cutoff shipments earlier to make a flight. An earlier local cutoff will translate into earlier departures from origin areas, possibly adding a day to the ultimate delivery time and making a service non-competitive.⁵ The efficiency of local road access also determines the range where manufacturers and other cargo shippers can locate and still be “close” to the airport. Local road congestion can severely affect the ability to attract and retain air-dependent industries that require such access.
- Highway Access - The importance of local access also pertains to the longer-distance access necessary to connect the airport with final origins and destinations. Air cargo service is regarded as a door-to-door product, as best exemplified by the integrated carriers. The size of regional market hinterlands available for specific cargo services depends on the time and cost efficiency of truck transfer to various points, particularly quick access to interstate highways. PDX and its adjacent cargo facilities has excellent interstate access, and therefore

⁵ Air cargo shippers optimally seek to ship out at the end of business day and time a start-of-the-day arrival at destination. Relatively short delays that affect that window can be significant in terms of routing and even modal decisions.

maintaining good access could be a significant selling point in attracting carriers and forwarders, as well as the ability for PDX to be the gateway for emerging high-tech centers in the region (e.g., Boise).

Additional items relating infrastructure to the opportunities and challenges of future air cargo growth are discussed below.

KEY FACTORS AFFECTING FUTURE EXPANSION AND EFFICIENCY OF AIR CARGO SYSTEM

The future level of air cargo activity at PDX ultimately depends on future changes to traffic patterns, air cargo service levels, and the availability and efficiency of air cargo infrastructure. The following describes the various demand and supply factors that might affect long-range airport activity.

LOCAL AND REGIONAL DEMAND

Task 2 discussed general demand market factors that would affect regional traffic levels by mode including population and employment changes, shifts in the local industrial profile or that of trade partners. The Task 1 forecasts assumed that these general patterns would apply across modes including air. Due to the interaction of industrial location/growth patterns and the efficiency of trade and transportation systems, each mode will be affected differently by general demand shifts.

Like other modes, future air cargo traffic growth will depend on general economic trends. Population growth will determine the level of consumer products shipped by air, as will relative income growth as many luxury items or discretionary shipments (e.g., overnight lobsters from Maine or high fashion items) tend to be shipped by air. To the extent there is general growth in the demand for products produced in the area, air shipments should rise somewhat similar to other modal shipments by local industries.

In regard to air cargo, an important demand consideration relative to future airport growth is the growth or re-location patterns of air-dependent industries and how that may be affected by current location patterns rather than the future trade and transport environment in the region. While consumer-based shipments by air vary in type similar to surface modes (e.g., air-shipped products available on-line are comparable to what can be found at Target or Wal-mart), the industrial-based shipments tend to be concentrated in certain industries and commodity types, particularly for a local or regional economy. The Portland area ships high tech products such as integrated circuits and computer products, footwear-related commodities, specialized equipments and the parts used to product and support those products. The regional economy produces many of the same air cargo items (particularly computer products) while also produces seafood and other perishables (e.g., cherries) that require air shipment.

Industries make location and expansion decisions based on a variety of factors including labor and other costs and availability of skilled labor and space. Accordingly, future

growth in particular air cargo movements will vary significantly based on other factors that drive those decisions. For example, the decline in PDX's air cargo traffic in recent years is highly related to the decline of the high tech sector in the late 1990s, mostly if not entirely unrelated to the airport used for many of that sector's shipments. The rise or fall of existing or future high tech and other "air-dependent" industries will greatly determine air traffic volumes at the airport, particularly as the location of these time-sensitive shippers drive the service sector. As described above, air transport accounts for a high share of U.S. overseas trade value and an increase or decrease in the efficiency of local air cargo systems could have a significant effect on local production and employment.

A similar set of factors affect the markets that local and regional shippers ship to or from. Recent growth in international trade at PDX and other West Coast airports has been significantly driven by the explosion in U.S.-Asia trade relative to other world regions. Any growth or shift in the overseas markets that trade with the PDX regional market will affect future air cargo growth, again mostly unrelated to the air cargo system. As with local industries, the air-related markets overseas may be highly concentrated in certain sectors and subject to large pattern shifts (e.g., the rise and fall of circuit manufacturing in general and the constant shift of facilities between countries).

General industrial demand patterns relate to the production and consumption of commodities and products, but the rising importance of logistics in both manufacturing and final product distribution has created "intermediate demand" for air and other cargo transportation. Particularly for high tech and high value products, the distribution process (including distribution of components to manufacturing sites) has become increasingly as important as the production process. The trend towards regional distribution centers to service large geographical areas has created new air cargo for some airports (e.g., LAX) based on not on local demand, but the efficiency of transferring cargo to satisfy other regions' demands. Traditionally, Portland has been an origin/destination market rather than a transfer point for other markets. Its small size relative to Seattle's market has tended to concentrate regional distribution there. The extent that Portland is able to attract and expand local distribution and logistics activities for non-local demand could therefore affect airport traffic significantly.

AIR CARGO SERVICE MARKET

The air cargo service sector responds to underlying demand patterns in the context of available technology, air system capacity, the market structure of industry participants, and other factors such as route restrictions. Some of the service factors that will influence future growth include:

- Unlike other modes, air cargo flight capacity is significantly affected by passenger demand and service patterns, particularly in the international market. In simple terms, passenger flights are scheduled to satisfy traveller demand, creating some excess belly capacity that is sold based on market conditions determined by both the total availability of passenger lift and the availability of

- all-cargo services. Future shifts and growth in passenger service will drive cargo routing patterns, as will fleet changes that may reduce cargo capacity (e.g., reduction in wide-body Transcon flights) or increase it (e.g., Airbus A380).
- The most important development in worldwide air cargo transportation has been the evolution of the integrated carriers from small package overnight delivery companies serving a single region to multi-modal value-added transportation companies operating worldwide networks. As mentioned above, the emergence of the U.S. integrated carriers resulted in a significant decline in the need for general all-cargo freighters for the U.S. domestic market, and a similar effect could be seen in U.S. international markets. The future changes to the integrated carriers participation in air cargo and related markets will greatly affect routing patterns, particularly for their hub and gateway airports.
 - General all-cargo freighter service typically provides flight capacity on routes where passenger flights can not satisfy demand either in terms of capacity or capabilities (e.g., oversized shipments). In fact, many passenger airlines operate their own freighters for just that purpose. While limited in the U.S. domestic market, non-integrated freighters continue to have a strong role in the international market, but the future will depend on both the passenger and integrated carrier sectors. While traditionally operated on an airport-to-airport basis, it is possible that the general all-cargo airline may assume some of “integrated” traits and develop full-scale distribution networks that can compete with the integrated carriers.
 - The pattern of air cargo routings is affected by the range and payload characteristics of both passenger and freighter aircraft and future fleet trends will affect future patterns. For example, many U.S.-Asia freighter flights are required to make a technical stop in Alaska, increasing traffic and flight activity at Anchorage and West Coast airports not requiring a tech stop. Most international freighters are wide bodies leading to more concentration in the large gateways that can both handle the aircraft and feed enough cargo to fill it. Two trends for future aircraft will have counteracting effects on air cargo. The introduction of the Airbus 380 freighter and passenger aircraft (including both FedEx and UPS) will limit the markets that can handle the aircraft or support its enormous capacity, probably to the advantage of the top gateways or hubs. On the hand, the introduction of longer range middle-sized aircraft into international markets may increase the use of less congested secondary gateways whose markets are suited to their capacity.
 - A related factor is the level of future fuel prices that will not only affect operating costs, but will drive many fleet decisions. Fuel price increases disproportionately affect air relative to other modes increasing rates and causing mode shifts. This is partially the reason for the recent shift of U.S. express shipments from air transport to LTL ground networks (often operated by the integrated carriers). High consuming aircraft may not be efficient to operate, thereby reducing (or shifting) capacity.
 - Air cargo routing patterns are not driven entirely by cost and time factors, but also depend on structural factors for the airline and forwarder industries. The concentration of air cargo at just a few international gateways is partially caused by airlines wanting to use common airports for their passenger and freighter

flights and by airline partnerships. Most forwarders operate under “gateway” systems whereby local offices have incentives to route their freight to a limited number of airports where the local office can consolidate and negotiate low rates. Forwarders have a major influence on routing decisions, particularly when shippers do not fully understand the air cargo market. While having some economies of scale advantages, this system shifts routing decisions from shippers and local forwarders to corporate offices, often to the detriment of emerging international airports.

- International regulation has also affect cargo routing with many U.S. markets controlled by bilateral agreements that limit carrier entry and routes. This has also tended to concentrate services at a limited number of gateways, both in strict terms and in terms of making it more difficult to choose a secondary gateway with valuable route authority. The trend towards “Open Skies” agreements that would eliminate these limits may reduce this as a factor. One possible long-term possibility is that the elimination of all route restrictions could allow foreign carriers to serve U.S. domestic and international markets not involving their home market. This may increase the attractiveness of secondary gateways.
- Increased post-9/11 security has affected the air cargo market significantly including the restriction of cargo handling on passenger flights, and cost impacts from increased screening and security review. In the future, increased cargo screening could decrease the competitiveness of air vs. other modes, both in terms of cost and time. Security changes could also affect air routing patterns. A requirement to use specialized screening equipment would tend to further concentrate traffic at a few airports that can afford to efficiently operate that equipment. On the other hand, the ability to conduct security activities at less congested secondary gateways might be an advantage.
- On the environmental side, the key issues are noise and emissions. The direct effect of local noise concerns over integrated cargo flights were discussed above, but noise and emissions restrictions could affect the cost of operating all-cargo fleets, many of which are heavily populated with the older aircraft targeted by the regulations.

OPPORTUNITIES AND CHALLENGES

The sections above describe the underlying factors affecting the future growth of air cargo at PDX. In simple terms, future traffic levels will depend on:

- Growth and shifts in local and regional demand
- Attraction and expansion of throughput and transfer activity
- Changes to the size and scope of the service market hinterland relative to competing gateway airports
- Attraction and expansion of direct air and related services relative to shifts in underlying structure
- Airport infrastructure capacity and capabilities relative to changing requirements.

These factors can be interrelated. For example, the size of the local origin/destination market will determine whether airlines choose to serve it with direct flights or via truck service to larger markets. On the other hand, the attraction, retention and expansion of air-dependent industries depend on the available air services compared to other industrial locations. Pure transfer activity (e.g., hub sorting) may be attracted to large O/D markets based on economies of scale or may go to smaller less congested airports. Finally, the ability to handle air cargo traffic depends on having adequate and suitable infrastructure, the development of which depends on attracting sufficient air services to cover costs and may be driven by factors unrelated to the airport (e.g., local roads).

Assuming the objective is to develop the PDX air cargo system to best serve local and regional shippers, future opportunities and challenges relate to enhancing and leveraging market advantages while minimizing or mitigating any disadvantages. The following describes these opportunities and challenges.

AIR CARGO SERVICE DEVELOPMENT

In general terms, PDX faces the same opportunities and challenges on the service side as most airports trying to expand air cargo activity. The advantages relate to having underutilized infrastructure and less congestion and delays than the major gateways, while the disadvantages relate to not having enough base activity to build on.

One general advantage of the PDX market is the relatively high concentration of large air shippers who would most benefit from enhanced air services. Despite being mostly served via other gateways, these shippers have located in the Portland/Vancouver area. The challenge is to identify the benefits of direct air service to these shippers and have those benefits understood by the shippers and then translated into routing decisions and ultimately airline service patterns. These benefits should be analyzed on a door-to-door basis, rather than airport-to-airport, to take advantage of Portland excellent ground and intermodal systems. The availability of large important air shippers could be utilized to promote PDX, but any new direct service would have to translate into lower costs or better service for the shipper and increased market share for the airline. One challenge will be mobilizing shipper support as it is unlikely that shippers and their forwarders would be willing to make hard commitments to use a new service as has been done in the passenger market.

A major challenge in the international market is that routing decisions for import shipments are typically made overseas where PDX is not known as a cargo gateway (and LAX may be thought to be the only gateway). Those routing decisions may be being made without an understanding or consideration of the benefits of direct PDX services, particularly if those benefits pertain to the local PDX consignee. The airport and its partner could work to enhance PDX's overseas profile as a cargo airport and try to get large local consignees to influence routings.

The major opportunities and challenges exist for the international market, as the domestic market is mostly controlled by the integrated carriers who can adapt their networks to

meet future needs. The long-term service goal for the international market is to develop a mix of direct services to all significant world markets including Asia, Europe and Latin America. In addition to shipping via multiple modes, most air shippers deal with a full range of world markets. In terms of attracting air-dependent industries, good service to just one region limits the scope of industries that can be attracted.

The typical international gateway “builds” using a combination of passenger-based lift and freighter capacity. While optimally shippers would like direct freighter flights to a variety of major cargo airports, emerging gateways must build one service at a time. Ultimately, service expansion results from airlines deciding where to put the “next” flight and it is often difficult for them to choose a new gateway as opposed to adding capacity to a proven market. Cargo activity via passenger flights can be a building block to future services, offsetting this incentive. A well-supported passenger flights (in terms of cargo) can lead to freighter services, particularly by carriers that operate both types of aircraft. The airport could support existing passenger-based services as a building block for future services and also to benefit local shippers using the services.

Whether a passenger or freighter service, “building block” services should optimally involve quality airlines with strong overseas networks. While the introduction of marginal or irregular services may increase traffic in the short-term, it does not create conditions that allow development of long-term capabilities, particularly airline-forwarder-shipper relationships that drive so many routing decisions. Direct service to a strong airline’s network hub overseas (e.g., Frankfurt for Lufthansa or Hong Kong for Cathay) provides semi-direct service to a wide range of markets, satisfying shippers’ needs.

In terms of short-term opportunities, the importance of Asian markets and the recent loss of direct freighter service to South Korea provides an opportunity to replace that service with that of one of several strong Asian carriers. Direct European service is provided with a passenger service to Germany and that service should be supported with future expansion as the market dictates. Most local and regional traffic to and from Latin America currently moves via Miami and Los Angeles using long-haul trucks and interline connections. While relatively small compared to Asia and Europe, Latin America is a growing market and adequate air access could be a critical factor in attracting some industries. Short-term enhancements to the Miami and Los Angeles gateways (e.g., scheduled truck or direct freighter service) could assist in attracting direct service in the future.

Another possible opportunity is the attraction of international gateway service by an integrated carrier. As described above, these U.S. and European carriers are expanding the worldwide networks in order to serve inter-regional markets (e.g., U.S.-Asia) as efficiently as their base intra-regional markets. The original inter-regional links were between the carriers’ regional hubs (e.g., Memphis, Subic Bay and Paris for FedEx) where shipments are distributed to and from the intra-regional networks. Increasingly, the carriers are seeking to bypass their primary hubs using coastal gateway airports where international traffic is sorted typically to serve a single region (e.g., FedEx’s Newark

gateway for the U.S. Northeast). As existing gateways become congested and regional markets grow, these carriers will add additional gateways possibly at PDX. One challenge is that because these carriers conduct both air and forwarding activities, freight forwarders are reluctant to use their flights for competitive reasons. This is particularly true for smaller markets (such as Portland) where forwarders have long-term shipper relationships they are protective of.

In the domestic market, the opportunities and challenges depend mostly on identifying and satisfying the needs of the integrated carriers who currently handle 86% of the market with 9% of the market moving on flights dictated by the passenger market. Future growth will mirror general industrial and population trends in the local market and these carriers need the ability to expand their multi-modal systems to meet demand. Some of these requirements may include:

- Expansion of on-airport sort facilities
- Efficient access to off-airport facilities
- Continued operation of night and feeder flights
- Improved integration with ground operations

To the extent these carrier needs can be met, the market will continue to expand. In some cases, operating restrictions or high costs at primary airports have driven these operations to secondary airports (e.g., Boeing Field in Seattle). While in some cases this may be desirable (e.g., to relax congestion), any impediments to providing the best level of express services will directly affect local shippers and residents. The integrated carriers need to continue to have the ability to operate nighttime flights and have efficient ground access to local and regional markets. One possible challenge could be if a new integrated carrier needs to be accommodated, although that is obviously also an opportunity for enhanced competition and services.

Similar to attracting international gateway activity, there is also the future opportunity to attract a regional domestic sort hub for one of the integrated carriers. Overlaying the primary hub system, these carriers operate regional hubs where intra-regional traffic can be sorted more efficiently than at the national hub. As markets growth, new regional hubs will be established and PDX could possibly attract one. The most likely opportunity would be for carriers that don't currently have a regional sort hub for the Pacific Northwest (e.g., DHL or even a new competitor). The challenge would be to find additional cargo space to handle the flights and handling activity, but the opportunity lies in having more space than some other airports.

There may also be opportunities for expansion of general domestic all-cargo services, particularly if cargo activity is reduced or eliminated on passenger planes due to security concerns. This may include the opportunity to develop domestic links to international gateway airports (e.g., Miami, Anchorage).

A final area of service development involves the support services provides by forwarders, brokers, handling agents, truckers and others. The efficiency of this locally-based

network must complement that of the air services in order to enhance the ultimate door-to-door service paid for by shippers. A major challenge is the location of most of these activities off-airport. Any planning or support of the PDX air cargo system should include these operations and consider the importance of ground access to overall efficiency. In terms of attracting new direct air services, the airport should work to assure that airlines would have access to competitive handling and trucking services and suitable handling equipment, often a challenge at developing gateways.

LOCAL AND REGIONAL DEMAND MARKET DEVELOPMENT

The relationship between air cargo systems and economic development goes both ways. Efficient air cargo services can attract air-dependent industries to an area, (or more likely allow them to locate away from large congested airports). These industries are typically growing high tech businesses that are highly desirable for local communities based on their high wage levels and trade volumes. On the other hand, growth in local businesses that ship by air can attract new air services.

On the demand side, the greatest opportunities and challenges relate to developing efficient air transport linkages in order to attract, retain and expand local and regional businesses dependent on air cargo. These businesses include manufacturing of high tech products such as integrated circuits, computer components, and specialized equipment and instruments, as well as the major apparel and footwear manufacturers in the area. The opportunity exists to leverage the high concentration of these high volume air shippers to expand air services and thereby make the area more attractive for more of these businesses. One challenge is to maintain good access to the airport and to expand the region where industrial sites can be “near airport” using efficient local road access. As discussed above, the air cargo system cannot be limited to just on-airport activities.

Another challenge is to provide competitive air access during the period when the PDX gateway is developing. The “target” shippers may require efficient access to markets with no direct service (e.g., Latin America), and a business may be driven to another site by lack of service.

One advantage of the PDX market is the excellent combination of air, ocean and ground systems. This provides an opportunity to target multi-modal industries that would most benefit from this quality. The challenge is to assure that multi-modal and intermodal access meets shippers’ needs. Good access to developing industrial areas (e.g., Southern Oregon and Boise) is also an opportunity to extend market reach. The attraction of distribution and logistics activities unrelated to local consumption and production also is an opportunity to increase the size of the local market, but there is the same challenge to meet the high level of transportation needs and to compete against larger markets (e.g., Seattle). A critical area for the future will be to continue to work with local and regional modal and development agencies to coordinate these efforts.

AIR CARGO INFRASTRUCTURE DEVELOPMENT

The opportunities and challenges faced directly by the airport involve maintaining the competitiveness and capabilities of the air cargo infrastructure. PDX has the capacity to expand air cargo activity, but must leverage its lack of congestion and expandability to offset the disadvantage of having a relatively smaller local market than competing gateways. This is a particular challenge when development costs for specialized facilities and equipment necessary to attract new services much initially be spread over low traffic levels. It is important that existing advantages be maintained including the easy access to cargo areas at airport, good local road and highway access, and efficient Customs clearance.

A major challenge will be to balance the air users' needs that might conflict with the interests of the local community (e.g., night flights). For air cargo in particular, it is important to associate the growth and prosperity of the air cargo sector with the interests of local businesses and residents (e.g., overnight gift delivery or emergency organ transplants) while emphasizing the large economic impact of air-related trade and transport

As with any infrastructure planning, the challenge is to match the availability and capabilities of facilities and infrastructure to future user needs for relatively volatile markets. The opportunity for a new carrier service may occur tomorrow, but require facilities with long development lead times. For example, the Airbus 380 will require airfield modifications to handle its size. It is unknown whether this capability will be required (particularly for air cargo operations at PDX), but if it is a critical factor in attracting new services, those modifications may take a long time to implement.

In conclusion, the PDX air cargo infrastructure can be suitably modified to handle the baseline traffic forecast as well as any additional growth resulting from new demand and service stimulation.

FINDINGS AND CONCLUSIONS

The Portland/Vancouver air cargo market is relatively small when compared to competing airports in Seattle, San Francisco and Los Angeles, both in terms of traffic demand and direct air services. PDX fulfills the standard role of a service airport for domestic air cargo, mostly using the services of the integrated carriers to support traffic for the local metropolitan area. PDX's integrated carriers also serve the wider Oregon market with feeder flights to smaller communities. PDX has a limited number of direct international cargo flights with much of the local market trucked to other gateways. The existing services do draw cargo from throughout the 5-state service hinterland, and additional services could expect to do the same, as well as retaining a high share of local traffic.

The status quo (Task 1) forecast for air cargo via PDX predicts an increase of total traffic to 521,000 tons in 2010 and 1.3 million tons in 2030 based on average annual growth of

4.3% from 1993 to 2030. This long-term growth is comparable to that predicted by industry forecasts, although declining traffic since the base year will require strong short-term growth to meet the 2010 estimate.

In general, PDX air cargo infrastructure is capable of handling predicted status quo growth through 2030 under current development plans. In fact, air cargo areas and facilities are underutilized and could handle substantial growth in both the short- and long-term. The airspace and airfield are relatively uncongested and could be expanded to handle both passenger and cargo activities. A key concern is that the integrated carriers who handle 86% of the U.S. domestic traffic at PDX are dependent on nighttime flights and any noise-related restrictions could hinder or divert this activity.

The airport has full capabilities for transferring, processing and storing air cargo at both on- and off-airport facilities with no concerns about future congestion based on a development plan to expand and consolidate the on-airport cargo area and expected availability of nearby industrial land. As with many smaller cargo airports, the current market size limits the availability of specialized facilities and equipment, although they could be developed if needed.

The door-to-door intermodal nature of air cargo transportation make ground access issues of high priority including airport gate access, local road access (to shippers and off-airport handling sites), and regional highway access. Good access increases the quality of the air services which is highly dependent on transit time and reliability and which is essential for high-valued air commodities. Efficient ground access also expands the areas where industries can locate and be “close” to a cargo airports and where airports can compete in the regional hinterland. PDX has good road access at the airport and excellent interstate connections to regional markets. While currently an advantage, the future quality of ground access is mostly unrelated to the airport itself but will have a major impact of future efficiency of the air cargo system.

The future level of air cargo activity at PDX will depend on a number of factors related to future changes to traffic patterns, air cargo service levels, and the availability and efficiency of air cargo infrastructure. Local air cargo growth will depend on changes to the underlying industrial structure, which is turn is partially affected by the availability of air cargo services. It will also depend on industrial shifts for overseas markets. The current local market is highly dependent on large shippers who might relocate or expand based entirely on non-transport factors. While air transport may account for a relatively small share of these companies’ traffic weight, air cargo access is a critical competitive factor in driving location and expansion decisions.

The air cargo service sector reflects the underlying market demand, but also is defined by technology and air cargo industry practices and structure. For domestic cargo, most is handled by the integrated carriers who design their networks in order to provide a wide range of service levels over the entire U.S. As the service airport for these carriers’ local market, PDX’s traffic growth is dependent on any changes to those networks. The international market is still dominated by traditional passenger and freighter operators,

although the integrated carriers are increasing their market share and power. While market size and economics mostly determine routing patterns for international air cargo, certain structural elements (e.g., forwarders' gateway systems and bilateral agreements) have tended to concentrate traffic at a limited number of primary gateways. New aircraft types, rising fuel prices and noise/emission regulations could significantly shift routing patterns.

The future opportunities and challenges for PDX in terms of air cargo relate to satisfying the needs of integrated carriers in the domestic market and attracting expanded international services in competition with entrenched gateway airports. Opportunities can be seized and challenges met by developing the air cargo service sector, attracting and expanding local and regional demand, and coordinating infrastructure development to match future needs of both the shipper and service provider.

In terms of service development, the key advantages are an underutilized infrastructure and less congestion and delays than the major gateways, while the disadvantages relate to trying to build services from a low base in an industry that has traditionally favored concentration at major gateways. The local market includes several highly prominent worldwide shippers of air cargo that would benefit from direct air services and could be mobilized to attract new airlines. The challenge is that many routing decisions are made overseas where PDX is not well-known for air cargo, and current routing and flight decisions are driven to gateway consolidation. In general, the short-term opportunity is to incrementally add services that ultimately lead to the long-range goal of competitive worldwide air access for local shippers. In that regard, a direct service by an established Asian carrier with a strong Asian network system will maximize the probability of success while providing multi-market access through a single hub flight. The current passenger-based service to Europe should be strongly supported with the intention of adding freighter or more passenger capacity when the market dictates. Air access to Latin America could be very important in the future, but the service development plan for that market probably needs to start with better air and truck access to existing gateways (Miami and LAX), prior to establishing direct flights. There may also be an opportunity to attract international gateway service by an integrated carrier.

In the domestic market, the opportunities and challenges are primarily dependent on the integrated carriers who currently handle 86% of the market. These carriers will continue to expand their networks to meet demand changes and at PDX might require expanded on-airport sort facilities, more efficient access to off-airport facilities and ground networks, and the continued operation of night and feeder flights. The opportunity is to continue expansion to the benefit of the airport and local shippers, while the challenge is mostly to balance these carrier needs with community interests. It is also possible that PDX could be selected as a regional sort hub for an integrated carrier due to the availability of on-airport space, but it will depend on regional traffic growth and congestion at existing hubs.

There may also be opportunities to expand non-integrated freighter flights in the domestic markets, possibly to an underserved international gateway such as Miami or in support of

new all-cargo services. In addition to air services, there may also be opportunities to expand and enhance the support services such as forwarding and cargo handling. While expansion in these services will follow increases in market size and direct air services, the challenge will be to provide competitive support services as the direct air services build.

There are also opportunities and challenges related to local and regional demand. The primary opportunity is to use efficient air and multi-modal cargo systems to attract new industries that in turn attract new cargo services. For this to be accomplished, current access and efficiency advantages relative to other airports must be maintained with future needs to access developing industrial areas considered. The primary challenge will be to maintain efficient international air access via PDX during the period when direct services are building – air-dependent industries can be diverted as well as attracted. A similar challenge is to leverage the local high-profile air shippers to assist in developing new services and supporting continued infrastructure improvements.

While the air cargo infrastructure is expected to be capable of expanding to meet both status quo and stimulated growth, the infrastructure must adapt to meet changing market conditions, to take advantage of opportunities, and to address any problems in a timely manner. In this regard, long-range planning requirements are a challenge for a highly volatile market and one that is dependent on other sectors of the economy (e.g., local roads). New technology and the ability to invest in new facilities and equipment prior to service development may also be challenges.

In conclusion, the PDX air cargo market can be expected to grow under general economic trends, but there are significant opportunities to expand the airport's role as an international gateway or domestic transfer point. The challenge will be to utilize PDX's advantage in available space, access and lack of congestion to offset and divert existing routing patterns, possibly requiring infrastructure improvements. Improved air cargo access could stimulate new demand, but the opposite is also possible.

**PORTLAND/VANCOUVER INTERNATIONAL
AND DOMESTIC TRADE CAPACITY
ANALYSIS**

SUPPORT INFRASTRUCTURE NEEDS REPORT

[Task 4]

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Sponsors

Port of Portland
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Port of Vancouver

Report Overview

This report addresses the objective of the Task 4 work scope for the Portland/Vancouver International and Domestic Trade Capacity Analysis, which is to define the 20 year industrial land supply and transportation system needed to adequately support anticipated growth in domestic and international trade for the greater Portland/Vancouver market area.

To accomplish this objective the report is divided into 3 sections:

- I. Summarization of findings from relevant studies and plans.
- II. Summarization of findings from the forecasts and assessments developed in Tasks 1, 2 and 3.
- III. Major conclusions concerning the ability of the existing industrial land supply process to meet the needs of traded sector businesses and identification of key road and rail corridors and improvements and other key policy initiatives to support the future freight needs.

Section 1

SUMMARY OF EXISTING ECONOMIC AND TRANSPORTATION INFORMATION RELEVANT TO FREIGHT MOVEMENT

I. Overview

This first section of the report summarizes the key findings, conclusions and recommendations from 28 studies and policy documents which the sponsors considered to be most relevant to this analysis. The documents are listed in the Appendix, with their reference numbers cited in parentheses at the end of each summary. Summary information is grouped into categories in order to synthesize similar types of findings and conclusions into one place.

II. Transportation

A. Overall Network

The following findings are extracted from the major transportation studies and plans produced for the region over the past few years:

1. The Oregon Commodity Flow Forecast of 2005 showed an 81% increase in total tonnage to, from and through the state by 2030. Trucking will have the greatest absolute tonnage increase to over 630 million tons per year, followed by rail, with air tonnage growing fastest but representing only a small percentage (less than 1%) of the total. The fastest growing commodity is projected to be electrical equipment at 4.9 % annual average growth over the time period. A significant amount of this traffic is not originating in or destined for the region, growing to 122 million tons by 2030. Truck through traffic is forecast to grow faster than other modes, accounting for about two thirds of the total.(20)
2. Metro's Regional Transportation Plan (2004) projects that, with no new improvements to the transportation system by 2020, there would be an increase in freeway miles experiencing congestion from about 15% to almost 37%, an increase from 6% to almost 25% in arterial miles of congestion, and a 734% increase in vehicle hours of delay. In the same time period the average number of weekday truck trips would be expected to increase by 32%, travel times by 30% and hours of delay by 840%. The corridors with the biggest increase in travel times would be Highway 217, I-5 north to Vancouver and I-205 from Oregon City to PDX.(14)
3. The 2005 regional Cost of Congestion Study concludes that, in addition to specific highway improvements, other key improvements for the transportation

system include: designating freight corridors and freight priority routes; highway pricing policies; and an integrated system package that also includes transit, technological and traffic management improvements.(1)

4. The 2002 Commodity Flow Forecast projected that freight movement tonnage to, from and through the Portland/Vancouver region would double by 2030, with by far the biggest share of that continuing to be by truck (81%), with air tonnage growing fastest. That Forecast also projected that pass-through freight traffic in the region will continue to be significant. The pass through traffic takes up capacity from local industry and automobiles, but also provides support for both public and private improvements to the transportation infrastructure.(4)
5. The City of Portland Freight Master Plan has 3 themes: Mobility, Livability and Healthy Economy. There are a number of actions and on-going activities under each category. Under Mobility are activities such as designating freight classifications for city streets, optimizing signal timing for freight movement in certain corridors, and reducing at-grade rail crossing problems. Livability actions include establishing “good neighbor agreements” to address truck/neighborhood issues, implementing the Design Guidelines for Trucks, and updating loading regulations. Under Healthy Economy are actions such as collaborating with agency partners on public investment strategies. The Plan also prioritizes freight improvement projects by priority tiers and by policy, operational and public benefit metrics.(10)
6. The Portland/Vancouver I-5 Trade Corridor Freight Feasibility and Needs Assessment of 2000 demonstrated that this corridor is critical to the regional, state and national economies. It represents a chokepoint in the rail and road systems and without attention will become much worse in the future. Without improvements it threatens the economic promise of the region, and is key to supporting the region’s quality of life. The Assessment concluded that doing only the currently planned projects in the corridor will not address the problems, which require new, multi-faceted freight and passenger capacity across the river. It recommended that the region’s decision-makers pursue a phased approach to address these problems, bringing new resources to bear, including more federal money, tolls and private sources where appropriate.(18)
7. The 2003 study of I-5 Transportation Choke Points concluded that, since the regional economy is much more freight dependent than the national average and the I-5 road/rail corridor represents a large choke point on the freight movement system, congestion on the I-5 Columbia River crossings (road and rail) is a strategic issue for the Portland/Vancouver region and the PNW. Peak period congestion will spread from 4 hours in 2003 to almost 10 hours in 2020 if no significant improvements are made, increasing the cost of delay to trucks by 140%, from \$14 million annually to \$34 million. Rail congestion within the region adds about 40 minutes of delay to every train move. This cost will become an even greater drag on the regional economy as the region grows and the demand

for travel increases. As part of this study the I-5 Trade and Transportation Partnership identified improvements that will:

- Minimize the spread of congested periods, preserving the midday period for truck freight movements;
 - Reduce delays for trucks on I-5 generally;
 - Maintain or enhance access to ports and industrial areas; and
 - Accommodate more freight rail and high speed passenger rail while maintaining or enhancing rail system performance.(17)
8. The 2005 Washington Transportation Plan Update identified a 94% increase in truck trips on I-5 in Washington between 1993 and 2003, and a freight volume projected increase of 80% by 2020. Washington's largest waterborne export is food, primarily grain, 85% of which is shipped to Asia via the Columbia River ports. There are serious impediments to these freight movements with federal restrictions on Columbia River dredging and lock maintenance, and rail congestion at the Port of Vancouver rail yard. The most common form of distributing goods is by small truck from large distribution centers to stores and businesses. The number and frequency of these deliveries are increasing as high land costs put a premium on reducing storage space. Most observers see no alternative to moving goods over Washington's major highway system, especially I-5.(25)
9. Recommendations from the Washington Transportation Plan Update (2005):
- Analyze a public/private truck-toll highway parallel to I-5 from Central Puget Sound to the Oregon border.
 - Support east-west mainline rail capacity improvements, particularly Columbia River Gorge sidings and the Vancouver rail yard bypass.
 - Implement a strategic dredging and lock maintenance program for the Columbia-Snake Rivers barge system.
 - Create an ongoing, appropriate level of funding for regional economic development freight projects.
 - Replace the I-5 Columbia River bridge.
 - Create fuel pipeline capacity and distribution alternatives to meet long term demand.(25)

B. Road

Specific roadway system findings include the following:

1. Portland's 2006 Freight Master Plan concludes that their roads will experience a doubling in the number of truck trips between 2000 and 2020, while overall congestion continues as well. The locations that will experience the greatest increases in travel delay for freight movement are the roads approaching PDX and the surrounding industrial area, the US 30 industrial corridor, and all of the region's freeways. It also identified several major infrastructure barriers for freight movement, such as: weight restricted bridges; low clearance bridges; at-

grade rail crossings; and restrictions on the Columbia River rail and freeway lift spans.(10)

2. The Portland Harbor Industrial Lands Study identified strong support among harbor businesses for roadway improvements for freight and employee commutes, and for improved transit.(22)
3. The Washington State Freight and Goods Transportation Update of 2005 lists I-5, SR 14, SR 500, SR 501 and SR 503 as Strategic Freight Corridors.(23)

C. Rail

Observations concerning the rail system can be divided into 3 sets of findings. Following are findings from the 2004 study of Freight Rail and the Oregon Economy:

1. The railroad industry nationally does not have the resources to replenish its infrastructure or grow rapidly. They are very capital intensive, reinvesting 18% of their revenue back into capital improvements (5 times the industrial average). They are not currently earning their cost of capital, and may not be able to keep pace with economic growth. If this continues, then shippers will be forced to shift freight to trucks, which will mean more congested highways, higher road maintenance and improvement expenses, higher costs for shippers, slower economic growth, less competitive industries and possibly fewer jobs.(2)
2. There are current or emerging capacity problems in 5 rail corridors that serve key Oregon industries: Portland/Seattle; Willamette Valley; Klamath/West coast I-5; Columbia Gorge; and the Portland Triangle. The most pressing congestion and capacity problems are in the Portland Triangle, which is the interchange between Oregon's north-south and east-west corridors in central Portland. It is the area roughly bounded by the Vancouver Rail Yard on the north, Troutdale on the east and the Clackamas industrial area on the south. (Delay in this area is twice that in Chicago, the nation's busiest rail center.) As freight rail increases significantly over the next 20 years, the Portland/Seattle and Klamath/I-5 corridors will also experience significant capacity problems as will the Columbia Gorge in the longer term.(2)
3. The public sector has two broad policy choices: remain with a market-driven evolution of the freight rail system, or opt for a policy-driven expansion of capacity. The first leads to the problems identified above. The second means increasing state involvement and investment in rail. It also carries the risk that, even with public dollars, the railroads will not be able to deliver the needed services that will retain and attract shippers in a difficult business environment.(2)
4. Especially if the public sector opts for partnership with the railroads, the following initiatives should be considered: link public rail initiatives to economic development goals; clarify public roles and responsibilities by convening a PNW

freight advisory committee; improve public rail planning, analytical and decision-making capabilities to identify major capacity constraints and improvements; and leverage public resources for these improvements.(2)

The following findings come from the 2003 I-5 Rail Capacity Study:

5. Several incremental improvements to the inner Portland and Vancouver rail system can significantly improve the capacity of the I-5 rail corridor for the next 5-10 years. Without these, the reliability of rail service in this area will decline and costs to shippers may increase. In 10-20 years additional improvements will be needed to accommodate growth.(6)
6. The economics of freight movement result in freight rail not being as competitive with trucks at distances of less than 500 miles, depending on commodity.(6)

The last two findings relate to the rail situation in Washington and come from the Statewide Rail Capacity and System Needs Study:

7. The Washington state rail network is at or near capacity due to inadequate infrastructure and inefficient operating practices. Freight demand is growing, much of it driven by shippers and receivers outside the state, and the Class I railroads are not keeping pace with the demand. Their business model is changing, now emphasizing throughput capacity and consolidation facilities to enable profitable “hook and haul” services, accompanied by pricing to discourage lower-profit traffic such as carload and domestic intermodal services. This will lead to some of their (especially low volume) stakeholders losing out, and increased highway costs from additional truck traffic. Short line rail companies will be handling an increasing share of local service, although many are not positioned well in the current business climate. International trade growth will continue to dominate rail traffic and make rail connections to ports critical to their competitiveness.(27)
8. The Study identified a number of potential policy options and improvement strategies, including:
 - Financial incentives and assistance for operational improvements to enhance throughput and mainline capacity, selective investment in port access and terminal capacity, new intermodal terminals and transload centers, and short line systems providing access to industrial customers.
 - Permitting assistance for strategic projects.
 - Development of regional freight rail districts for support of short line services.
 - Cost effective means of improving passenger mobility, including better coordination of operations, investments to eliminate bottlenecks, and separating passenger from freight rail service.

III. Land

A. General (planning, demographics, etc.)

The 2004 Metro Regional Transportation Plan forecast regional population growth of 51% by 2020, to about 2.3 million people, with approximately 2/3rds being new residents. Employment is expected to grow by 70% to about 1.6 million jobs, with the highest growth in retail employment. Substantial growth is also projected in the trade and transportation dependent sectors, accounting for about half of the region's total employment by 2020.(14)

The 2005 Metropolitan Transportation Plan for Clark County determined that the County's population grew 80% between 1980 and 2000, and employment grew 124%. Projections are for significant growth to continue, with population growing by 72% to almost 600,000 by 2030, with jobs growing over 100% to about 240,000. Transportation improvements are required to keep pace with land development by the Growth Management Act. A major County goal is to reduce dependence on the auto.(12)

The Portland Harbor Area has about 940 firms employing over 39,000 people in 2000, of which about half were in manufacturing and one third in distribution. Metals and equipment manufacturing are the biggest industrial clusters, and are highly interdependent. Portland's share of the nation's manufacturing base continues to grow even as manufacturing represents a smaller component of the nation's total employment base. Marine cargo tonnage handled in Portland harbor grew by 253% since 1960, about 2.3% per year, with continued growth forecast through 2030. Rail is the primary inland mode for ocean cargo, handling about 51%, with 26% hauled by barge and 22% by truck. The harbor area is a regional job engine, with each of the 34,300 industrial jobs supporting an additional 1.9, accounting for about 1 in 8 jobs in the region. The total annual payroll for those jobs is approximately \$3.5 billion. Since the harbor is the region's primary port and distribution hub it provides a specialized function to the region's shippers which is estimated to save them about \$68 million per year.(21)

B. Industrial (overall)

1. When it was published in 2001, the Regional Industrial Land Study (RILS) concluded that:
 - Large industrial parcels are in short supply in the Portland/Vancouver region and there is a need for public help to fix this problem, including transportation access improvements, land assembly, and permit streamlining, among others.
 - The most critical factors in identifying viable industrial land are location (access to freeways, major arterials, and rail and air facilities, proximity to labor, etc.), and the characteristics of the land (slope, size, water and sewer availability, etc.).
 - Potential industrial policy strategies to address these issues include: Creating a regional economic development strategy; preserving strategic land for industrial

development; linking public investments to the economic development strategy; and a series of land-related and infrastructure policies that address those specific issues.(5)

2. In 2002 CREDC concluded in its Economic Development Strategy that Clark County should:
 - Maintain the current industrial land inventory by guarding against conversion to non-industrial uses.
 - Increase the industrial land supply to provide large (over 75 acres) sites and master planned, mixed use development (?) on industrial land.
 - Designate additional industrial land in growth nodes to accommodate industrial clusters.
 - Establish urban land banks in areas that have the capability to support development of industrial clusters, and use public sector mechanisms to consolidate parcels.
 - Create a special high tech/knowledge-based industrial corridor along I-5 between Salmon Creek and LaCenter.
 - Continually update development codes to reflect emerging markets, for instance allowing more non-retail office uses in industrial zones.(7)
3. The Report to Clark County on the Current Industrial Land Inventory (2000) noted that Clark Co. had 807 acres of “prime” industrial land, those with few building restrictions. However, the only two over 80 acres were for lease only, and there were only two more over 40 acres. The rest were small and scattered. There were 1717 acres of secondary industrial land, with some significant constraints such as lack of infrastructure. There were 3428 acres of tertiary industrial land, those with severe restraints such as wetlands or steep slopes. The report also commented that Clark Co. should designate sufficient buildable (primary) industrial land (3000 acres) to meets its need, including several larger parcels and enforce a no-net-loss of industrial land policy.(8)
4. Portland’s 2006 Freight Master Plan determined that the City’s industrial land supply has 3 major limitations to being readily developable: lack of good access; environmental and ownership constraints; and expensive redevelopment of previously developed industrial land.(10)
5. The 2003 Portland Harbor Industrial Lands Study laid the foundation for extensive planning for this area. Following are highlights of the 2 parts of that Study:
 - The Study covered a 5532 acre area of mostly industrial land, representing about one third of the City’s supply. This area is Oregon’s freight transportation hub, connecting the region’s main seaport with 2 trans-continental railroads, Columbia/Snake Rivers barge routes and 2 interstate highways. River-dependent uses occupy about 1700 acres (72%) of the developed riverfront property. 735 acres of the total were classified as

undeveloped, with over half of that in Rivergate. Most of this area is protected by industrial sanctuary zoning, with relatively little converting to other uses. River-dependent uses have also been stable or growing, at an annual average of about 21 acres per year since 1960. Existing freight transportation investment is a significant locational advantage for the harbor area as both a freight hub for distribution industries and as a marine and rail access location for manufacturers that require those facilities. In combination with the adjacent Columbia Corridor, the harbor area is the center of Oregon's freight distribution industry and is well positioned to maintain that position with continued growth as a West Coast distribution hub. The harbor is also the location for the region's largest heavy industrial district, and many of the industries located there are also highly interdependent.(21)

- Business activity in the Portland Harbor is expected to remain stable, with limited job growth and minimal need for added industrial land. The major local issues affecting harbor industries are: the uncertainty caused by the Superfund designation; maintaining competitive multi-modal transportation for riverfront businesses; regional congestion; non-industrial encroachment; permitting; and public policy/community support for all businesses.(22)
- There is general consensus among industries to continue the industrial sanctuary prohibitions against residential uses, though not for commercial uses. There is a desire to allow some corporate office, support retail, information technology and flex space uses.(22)

C. Distribution

The Portland Harbor Industrial Land Study also noted that distribution firms that serve the local market will continue to value a harbor area location, though regional and national firms do not necessarily need that location.(22)

D. Manufacturing

In this sector the Study noted that mid - larger manufacturer land needs in the harbor area will be modest, with most growth in smaller firms. Chemicals, electronics, printing, publishing, and especially metals and transportation equipment have significant inter-linkages in the harbor area and may have a need for other support businesses in the area.(22)

E. Riverside Land

The Study also noted that river-dependent industry needs multi-modal access, including 20+ foot barge depth and 40 foot depth for larger vessels, and that only auto import businesses are projected to need much new riverfront land. Reserving land for potential

riverfront users, even if demand is not readily apparent today, is an expressed interest by many harbor area firms and associations.(22)

IV. Land Supply Factors for Industrial Land

The most complete studies of site suitability factors for industrial uses is the Metro work documented in their memo titled “Industrial Land Location and Siting Factors”, dated June 9, 2003. That work was supplemented by a memo titled “Formation of new Industrial Neighborhoods” dated October 24, 2004. Both of these studies relied on extensive discussions with industrial siting experts, and followed the lead of the Regional Industrial Land Study, which was published in 2001. This long term study involved extensive participation by all those with an interest in industrial land, including industrial operations, real estate and development businesses.

A. Location and Siting Criteria

Metro developed location and siting criteria for 3 types of industrial land need: distribution, general industrial and tech-flex uses, and these are summarized below.

1. Distribution Uses

Different parts of the distribution industry serve different customers, and as a result there are somewhat different locational considerations for each. However, access to transportation facilities is key to all. Businesses that need access to marine or air facilities place a premium on being close to those transportation facilities. Local distributors place a premium on a location central to the region, while distributors with a much wider customer base (the PNW for instance) will prefer outlying, less congested locations. All parts of the distribution industry (except for those few that deal exclusively with rail or barge services to carry bulk products) rely on good truck service. If new land is needed for most distribution businesses there are several criteria that need to be met:

- Interstate freeway access (primarily I-5 or I-205 and to some extent I-84), within 3-5 miles of an interchange (depending on the intervening conditions) via an arterial street, with no conflicting land uses (e.g. residential, schools and high traffic generating commercial uses) between the freeway and the site;
- Less than 5% slope across the useable portion of the site; and
- A minimum amount of land area to accommodate a number of uses, not just a single small use.

2. General Industrial

This category includes light to heavy manufacturing, and can encompass a wide range of related activities such as research and development and office functions. The most important criteria that apply to this category are:

- Freeway access within 3 miles via an arterial street;
- Ability to divide property into individual sites between 1 and 5 acres and 10 and 20 acres;
- Stable soils and slopes no greater than 3% for manufacturing sites over 20 acres; and
- Stable soils and slopes no greater than 10% for individual 1-5 acre sites.

3. Tech-flex

These sites can tolerate more topographical variation than the other 2 categories, generally utilizing multiple, smaller buildings to accommodate such uses as light assembly, product storage, research and office activities. The most important criteria for these sites are:

- Net parcel size greater than 10 acres;
- Availability of specialized utilities such as specialty gases, triple redundant power, abundant water, dedicated fire and emergency response services;
- Stable soils, with limited rolling topography and overall no more than 5% slope.

4. Common Factors

There are a few common characteristics which are important to all industrial uses:

- Relatively flat slopes;
- Freeway access, especially for distribution uses, but also manufacturing and high tech industries for people movement, in particular to PDX (45 minute maximum mid-day travel time);
- Close proximity to other similar uses for access to suppliers and customers, and to their workforce.

5. Findings Concerning The Criteria

The substantial history of this region in examining how to provide land for industry has produced a good catalog of criteria to be used in determining what type of land should be made available for industrial activities. The above criteria have been analyzed and refined by private and public sector experts in this field. However, there are refinements that can be made to make them more complete, and these will be explored in Section 3 of this report.

B. Metro's Industrial Land UGB Expansion Process

The current status of the region's industrial land supply has been set since the 2005 decision by LCDC to accept Metro's adjustments to the expansion of the UGB in 2004. Combined with the existing industrial land in Clark County, this constitutes the scope of

the supply of industrial land in the 4 county region. Metro's decision-making process to arrive at this land supply is described below.

In order to amend the region's UGB in 2004 and 2005 to accommodate the need for additional industrial land, Metro staff used a methodology that had evolved over a number of years, starting with the RILS effort back in the mid-1990s. In 2002 the general demand for vacant industrial demand, from the Employment Urban Growth Report (Employment UGR), was determined to be 4285 acres. The 2002 UGB expansion added 533 net acres of "employment" land, 818 net acres of "industrial" land and 1499 net acres of Regionally Significant Industrial Area (RSIA) land. The latter was to be set aside largely for "traded sector" uses, which are essentially equivalent to those industries defined in this report as the most transportation dependent – distribution uses and many manufacturing businesses.

For the next UGB expansion decision in 2004, Metro determined that there were efficiencies which could be factored into the land demand equation since traditional land use categories are less applicable because of the tendency to mix commercial uses into industrial areas. By specifically limiting the amount of retail and office use in RSIA's the industrial land need was reduced by 1400 acres. Factoring that in, the 2004 20 year industrial land need was determined to be 1968 acres. When combined with a commercial land surplus of 393 acres, the net amount of land to be added to the UGB was set at 1575 acres. The Employment UGR also identified that 70% of the new acreage should be for distribution uses, 13% for general industrial and 17% for tech-flex uses. Lot size needs were also determined for each sector.

The process then turned to the land availability side of the equation and utilized a number of factors to determine areas to consider for UGB expansion. The location and site criteria discussed in A. above were a major element, as were factors relating to the aggregation potential of adjacent parcels, and the guidelines provided by Statewide Planning Goals 2 and 14 and Metro's own policies from the Regional Framework Plan. Through this process the lands under consideration were reduced considerably from 59,263 acres remaining from the 2002 UGB expansion to approximately 29,000 acres, divided into distinct study areas around the region.

Primarily applying the location, siting and aggregation factors, and recognizing the fact that approximately 1377 acres (70% of 1968 acres) needed to accommodate distribution uses, the majority of the recommended lands for final consideration by the Metro Council were within 2 miles of I-5, I-205 or I-84. Some consideration was also given to the need for local distribution sites in other areas as well.

Metro Council added 1956 total acres in their 2004 decision, which meant 1157 net acres after reductions for stream corridors, slopes, etc., and a shortfall in comparison to the identified need. In 2005 they took further action to modify the 2004 decision to address that shortfall and an LCDC requirement to factor in street needs and further reductions in demand for industrial land due to a higher redevelopment and infill rate for

commercial development. They also added another site, for a new total net acreage of 1207 acres, which met the new identified need number.

The 2005 decision was based in part on a rationalization for meeting the 70% number for distribution uses. The analysis included documentation and confirmation for much of the basis for including industrial land that would meet the distribution need. For instance it validated the need for close connections to the interstate freeways. It also described the need for more local distribution facilities to serve different parts of the region. The conclusion was that when combining the pre-2002 vacant acres of industrial land within close proximity of Port facilities and the freeways with the new land brought into the UGB in 2002 and 2004 in Tualatin and Damascus, approximately 77.6% of the total amount of the Metro area's vacant industrial land is available for distribution uses.

Findings Concerning the UGB Expansion Process

The above process has produced a significant UGB expansion for industrial land within the Metro part of the overall region, meeting general industrial and tech/flex needs. A major question remains, however. Since the distribution sector is the largest and has the most diverse needs, will the added land meet all of those needs? There is evidence that the current industrial land supply does not meet the need for regional distribution facilities, as opposed to local distribution facilities. It is also clear that rail/truck intermodal and transload facility land needs, as well as aviation and marine facility needs, were not directly addressed as part of the process.

V. Economic Impact

This part of the report summarizes the economic impact information developed for several different agencies. The first 4 points are from the 2005 report on the Cost of Congestion to the Economy of the Portland Region.

1. The region's economy is based on "traded industries", which are those core or primary businesses such as manufacturing, transportation/port distribution, and service activities located in the Portland/Vancouver region that serve broader regional (PNW), national and international markets. The core industries with the highest concentration locally relative to national averages (computer/electronics, metal products, wood/paper, publishing, etc.) all bring money into the Portland/Vancouver region by selling their products and services elsewhere.(1)
2. Since these core businesses serve markets well beyond the region, they are particularly dependent on the area's transportation system for delivery of products and services, and are vulnerable to changes in the transportation system's performance. Reasonably good transportation access needs to be maintained in order for these industries to remain and grow in the Portland/Vancouver region.(1)

3. All modes are important but few alternatives exist for a smoothly functioning roadway system for on-the-clock business travel. The roadway system is the linkage among all other forms of transportation, and among the land uses critical to business. Roadway congestion significantly increases the cost of doing business for those activities that are transportation dependent.(1)
4. The costs of congestion to the regional economy are estimated by comparing a “Planned Investment Scenario” with an “Improved System Scenario” for 2025. The value of the latter improvements to the economy compared to the former are: 28 hours of travel time savings per household; \$844 million annually; 6500 additional permanent jobs and 2-3000 construction jobs annually. The return on investment under the Improved System Scenario is \$2 for every dollar invested.(1)

The report on Economic Impacts of the Portland International Airport informed point 5.

5. PDX had the following economic impacts in 2003:
 - Almost 9,000 direct jobs, over 5,000 induced jobs to support purchases of goods and services by the direct employees and over 3300 indirect jobs due to over \$200 million in purchases by firms directly dependent on the airport. Over \$750 million of income and personal expenditures were generated as a result of those jobs.
 - Approximately \$3.2 billion of business sales were generated by airport activity, including \$785 million in air cargo activity.
 - The federal government received over \$200 million in airport-specific taxes, and state and local governments received \$72 million in revenue from airport activity.
 - Over 57,000 direct, induced and indirect jobs were supported by visitors arriving via PDX, who spent about \$2.4 billion on area businesses, and over \$100 million in state and local taxes.(26)
 - Over 230 million pounds of air freight passed through PDX, supporting about 70,000 jobs with firms producing that cargo.
 - (Most of these numbers reflect a decline during the recent recession, which has now been reversed.)(26)

The report on the Impacts of the Value Added Distribution Industry in the Portland Area is summarized in point 6.

6. In 2003 there were 17,000+ direct, induced and indirect jobs in the Portland/Vancouver area value added regional distribution industry. This industry produced \$800 million in personal income, \$2.8 billion in business revenue, and \$87 million in state and local taxes. The average wage for these businesses is over \$46,000 annually as opposed to an average of \$37,000 for all industries.(3)

The 2006 report on the Economic Impacts of the Port of Vancouver is summarized in point 7.

7. The Port of Vancouver is responsible for almost 2300 direct jobs, over 2200 induced jobs and more than 1400 indirect jobs, plus almost 9700 jobs with related shippers, resulting in \$1.6 billion of total economic activity and \$82 million in state and local taxes. Most of that impact is from maritime activities, with the balance from industrial real estate activities.(28)

VI. Implications for the Region's Land Use and Transportation Systems

When considered together, the above findings have the following implications for the region's land use and transportation systems.

1. The region's economy is based on traded sector businesses – those core businesses such as manufacturing (electronics, metal products, etc), distribution and service activities that serve a non-local market. These industries bring money into the region and support the rest of the economy. They are particularly dependent on the area's transportation network since they all use some aspect of the network to move freight and/or people to destinations outside the region. Reasonably good access to, and mobility on, the transportation network needs to be maintained in order for these industries to remain and grow.
2. All modes are important, but the roadway system links all of the others, and links land uses critical to business. Roadway congestion significantly increases the cost of doing business for those activities that are transportation dependent.
3. One of the primary transportation-dependent "traded industries" is the value-added regional distribution industry, which represents \$2.8 billion in business revenue in the region, with higher than average wages. This industry is primarily dependent on trucking but touches all modes of transportation.
4. Over the next 30 years trucking within the region is projected to double its freight tonnage, have the greatest absolute tonnage increase, and the largest share (81%). Metro has projected that, with no significant improvements to the transportation network in the next 15 years, there would be very significant increases in congestion on the area's freeways and arterials, particularly those corridors that are heavily used by trucks – I-5 between downtown Portland and Vancouver, I-205 between PDX and Oregon City, Highway 217, and the streets approaching PDX and surrounding industrial area, and Hwy. 30 through the Portland harbor industrial area.
5. The I-5 road and rail corridor is critical not only to this region, but also to the national economy. The Columbia River freeway and rail bridges are chokepoints on this corridor. If no major improvements are made within the next 15 years, peak period freeway congestion will grow from 4 to 10 hours a day, increasing

the cost of delay to trucks by 140%. On the rail system, increasing congestion in Vancouver Yard and on the Columbia River Bridge will add about 40 minutes of delay to an already poor situation. This is a strategic issue for the Portland/Vancouver region and the PNW. Without new, multi-faceted freight and people capacity improvements across the river, the region's economic future and its quality of life will be seriously compromised. The region's decision-makers need to pursue a phased approach to address these problems, and bring new resources to bear, including tolls, more federal money and private sources. Improvements identified would: minimize congested periods, especially during prime truck operating times; maintain good access to the ports and industrial areas; and accommodate more freight and passenger rail traffic while enhancing performance.

6. Pass through freight traffic (road and rail) in the region will grow faster than regional traffic. While this takes away capacity from local users, it also provides national support for enhanced regional transportation systems.
7. The most pressing rail congestion problems are in the Portland Triangle, the interchange area for the major north-south and east-west lines serving the PNW. Delays in this area will worsen as freight rail volumes increase significantly over the next 20 years. A series of incremental improvements over the next 5 – 10 years in this area will improve capacity for the whole regional system. Increasingly significant capacity problems will also develop in the I-5 corridor (Vancouver – Seattle and Portland – Klamath Falls) and the Columbia Gorge over the next 20 years, and will need to be addressed as well to accommodate forecast growth.
8. As the new business model for the Class I Railroads evolves, there will be increasing pressure on local, state, and federal governments to become involved in freight rail infrastructure improvements. This will require governments to develop strategies to ensure that they receive good value for their financial participation in improving how freight rail operates. It will be important to link this participation to public economic development goals and possibly a more substantive stake in the rail industry (e.g. ownership of ROW ?) to ensure the public receives good long term value for the investment.
9. Trade and transportation-dependent industries will account for about half of regional employment by 2020. Manufacturing businesses are unlikely to experience much growth, and will mainly be concerned with maintaining and enhancing the protections and flexibility they need from the land use system in order to stay competitive. What additional land needs they have can be accommodated through modest increases in industrial land. The large land need is for distribution/logistics industries, primarily in locations close to I-5, I-205 and to some extent I-84. In addition to large sites for truck distribution facilities there may be specialized site needs for rail “consolidation” facilities.

10. The primary concerns for the public sector are to provide adequate land for the distribution/logistics sector in the right locations, and to enable them to expand without making the costs too high for their continued competitiveness in the world market. Protecting industry from conflicts with other uses, particularly housing, is also a major concern, as are environmental issues such as the uncertainty surrounding the Superfund area in the Portland Harbor.

Section 2

KEY FINDINGS AND IMPLICATIONS

| Key Findings | Implications |
|--|--|
| AIR | |
| Annual growth - 4-5% | |
| Speed, certainty and service quality are key factors. It is door-to-door service - ground transportation is critical | On-airport facilities planned for air cargo are adequate for foreseeable needs. Off-airport roadway system must be free of major congestion to enable good cargo movement to and from the airport. |
| Integrated carriers 86% of PDX market. Meet overnight delivery needs of region. Air feeder service to PNW is major factor. Needs to operate at night | |
| Secondary gateway for international service - 70+% of regional cargo diverted to other airports. PDX could pull cargo from 500 miles; primary market within 100 miles. | |
| Underutilized infrastructure capacity and space. Low delay factor. | |
| Much of cargo handling off-airport - gate access and local streets are critical. Congestion from cars on regional and local system can have affect on cargo moves. | |
| Portland can use multi-modal and distribution capabilities to attract cargo | |
| Getting direct service to major international destinations is critical to enhancing air cargo and giving manufacturers the connections they want. | Continue efforts to attract international air cargo service. |
| WATER | |
| Projected growth in general cargo (container and break bulk), but only back to 1997 levels by 2020 | |
| <u>Containers:</u> | |
| Other west coast ports reaching capacity, unlikely to expand due to congestion, environmental and community issues; operators looking for other ports | |
| Portland/Vancouver has available waterfront land for container expansion. | |
| Columbia Gorge rail corridor currently less congested for container land shipments. | |
| <u>Autos:</u> | |

| | |
|---|--|
| Doubling throughput of autos in the region by 2030 | Autos: Need to double amount of marine terminal land devoted to autos by 2030. |
| 75% of current auto shipments by rail to inland destinations - expected to continue. | Rail connections from the marine terminals to and through the Columbia River Gorge will need to be improved to keep pace with demand for eastbound auto shipments. |
| Unit train business from marine terminals. | |
| <u>Grains:</u> | |
| Continued slow growth in grain shipments | |
| 43 foot channel will allow larger vessels | |
| Shipments arrive by barge (40-45%) and rail (55-60%) now | |
| Barge system threatened by environmental issues. If unable to handle short haul grain traffic in PNW, uncertain whether rail will be able to pick up the slack as RRs move to focus on long haul service. | Truck not viable alternative if barge and rail combination is compromised. Need to ensure both barge and rail systems continue to make improvements to the Columbia River corridor to keep pace with demand for westbound shipments. |
| <u>Dry Bulks:</u> | |
| Strong growth projected for dry bulks, both inbound and outbound | |
| Ports are planning expansion of terminal capacity. | |
| Virtually all cargo uses rail. | (same as grain and autos) |
| <u>Liquid Bulks:</u> | |
| No growth projected; handled by truck and pipeline. | |
| <u>Barge System:</u> | |
| Growth projected after 2010, mostly in grain. | |
| Barge system provides an effective way to move bulk and container cargo, from both a financial and transportation perspective. | If the barge system is compromised there may be no cost effective alternative for grain products to move from PNW farms to overseas markets, especially if rail is unwilling to accommodate this cargo. |
| Significant system constraints: dams threatened by ESA and other environmental issues; 2 locks need major improvements within 5 years, and all have ongoing maintenance and repair needs; Vancouver rail bridge lift span needs replacement in 10 years; ongoing Columbia and Willamette channel maintenance dredging needed, as well as dock dredging. | The barge and rail systems work effectively as alternatives for one another within the PNW. If the barge system is compromised and rail is not significantly improved there is a very real danger that there will be significant loss of cargo movement capability in the Columbia River corridor. |

| RAIL | |
|---|---|
| Both BNSF and UP have changed to "wholesale" business model - focus on long haul, longer trains; priced smaller customers to encourage short haul by others to central terminal facilities for makeup into full trains for "hook and haul" service; increase profits by increasing volume through the system. Big impact on local, small shippers and businesses that have relied on "retail" service. Operating costs (including labor) are a major impetus for this change. | To accommodate the new operating dynamic, there will be pressure to relocate and consolidate small, local rail facilities to larger facilities outside urban areas. Public sector impacts: higher road and bridge costs for longer truck routes to and from the new rail centers; pressure to use farm land for new facilities. Short line RRs will be increasingly important to handle the local needs of rail customers to access the central large rail terminals. |
| Industries in US not generating as much heavy cargo, which means rail shipments will not grow as fast as they have in the past, although rail volumes in the region will still grow by 50% by 2035. Means roughly 24 - 32 more trains per day in and out of the region, which exceeds the capacity of the system. | |
| RRs not able to attract capital as fast as infrastructure and equipment is needed; very conservative on taking on new debt that cannot be easily liquidated (tracks, rolling stock, etc.); they spend about 18% of revenue on infrastructure compared to 4-5% for typical industry. | |
| Major impediment to increasing rail service to southeast and south central US is huge volumes of coal being shipped through mountain states - runs constantly, RRs will not disrupt those politically sensitive and profitable train movements for service from PNW. Affects all eastbound movements, which now all go through the bottleneck in Chicago. RRs shifting eastbound container traffic to southern California to avoid this conflict. | There appears to be a need to reconsider the exclusive reliance on the private sector to solve a looming national rail service crisis. This is especially important given the very probable need to rely even more heavily on rail freight shipments as the price of fuel sends the cost of truck shipments continually higher. Should the public sector take over responsibility for funding rail infrastructure and leave the RRs to operate the freight services (same as on the road system)? |
| The Portland Triangle is the most critical rail bottleneck in the region. Virtually all rail movements have to pass through this complex of tracks and bridges that is severely limited by single tracks on key segments and the lack of a critical south to east connection in central Portland. | Congestion in the Portland triangle impacts all of the region's major marine terminal customers and eventually will erode the perception of the region as a relatively less congested gateway. Prioritize improvements to the Portland Triangle. |

| | |
|---|---|
| <p>The I-5 north-south corridor is also heavily congested, especially between Vancouver and Kelso, Wa. UP's line to Eugene is also frequently at capacity.</p> | <p>Funding for a series of bypass and siding improvements in this corridor will be critical soon.</p> |
| <p>The Columbia Gorge is the major east-west corridor connecting the PNW with the national rail system, but operates largely on single tracks north and south of the river. Congestion in this corridor is growing and will soon cause major service disruptions.</p> | <p>While the short term outlook for bulk, auto and container train usage of the Columbia Gorge is good, the long term is less certain if it is not reliable as volumes grow. Lengthening sidings, and eventually double tracking both sides of the Gorge, will be needed improvements in the longer term.</p> |
| <p>Portland & Western RR provides short line service to the Portland area, and discussions are underway to broaden its service to the Rogue Valley and other Oregon locations.</p> | <p>Short line RRs will need to be encouraged and reinforced in order to provide the necessary access to nationwide rail services for PNW customers</p> |

Section 3

MAJOR CONCLUSIONS - TRANSPORTATION SYSTEMS AND INDUSTRIAL LAND

I. Overview

This section of the report takes the implications compiled in the previous two sections, summarizes them, and then draws conclusions that will inform and help analyze the ability of the existing regional transportation systems and industrial land supply to meet the requirements of international and domestic trade.

II. Summary of Implications from Previous Sections

The following points summarize the key implications listed in the previous two sections:

- The region's economy is based on traded sector businesses, and they are particularly dependent on the transportation network to move freight and people to and from destinations outside the region.
- All modes of transportation are important for freight movement but the roadway system links them all together, and links the land uses critical to those businesses.
- Trucking is projected to double its freight tonnage over the next 30 years. Congestion on the primary truck routes will limit the ability of traded sector businesses to support a prosperous economy.
- The I-5 road and rail corridor is critical not only to the prosperity of this region, but to the national economy. The Columbia River freeway bridge and the rail chokepoints in the "Portland Triangle" need to be the focal points for long term improvements to these surface transportation modes. Other freeway and arterial roadway congestion problems as well as railway system limitations in the Columbia Gorge are also major concerns.
- There is a dramatic change going on in the rail industry which is affecting the ability of the Class I railroads to make the improvements necessary to provide the full range of services needed by regional freight customers. The public sector will need to play an increasingly important role in funding rail improvements.
- Good road access to PDX is critical to the movement of time sensitive freight between this region and outside markets.
- PDX has an adequate land supply to handle the need for direct airside freight movement facilities in the foreseeable future. The need for additional off-airport distribution facilities to handle the projected strong growth in air cargo is a subset of the more general distribution industry addressed below.
- The combination of Port of Portland and Port of Vancouver vacant and re-developable riverfront property will be adequate to handle the need for marine cargo facilities for the near-term future. However, for the longer term,

environmental and financial issues could make it difficult to implement current plans for development of riverfront lands which are very important to the continued growth of marine transportation facilities. Under current projections a good portion of the land need will be for auto handling facilities.

- The Columbia River barge system is a key freight service for much of the PNW, providing an important low cost transportation alternative that keeps traffic off the roadway and rail systems.
- While the manufacturing sector is strong in the region, it is also not projected to experience much growth in its future land needs. All indicators point toward manufacturers consolidating their market positions and diversifying products and services to stay competitive. The main land need appears to be to accommodate relatively small spin-off and support businesses.
- By far the largest amount of industrial land need is to accommodate the fast growing distribution/logistics industry. The biggest issue is providing sites that meet the location, size and other characteristics this industry needs. The primary unmet need appears to be for regional distributors and specialized needs such as transload and intermodal facilities.
- Protecting industrial uses from conflicting uses and allowing them to expand where needed without extraordinary costs or controversy are major factors for all segments of the industry.

Key Regional Road and Rail Corridors for Freight Movement

The rail and road corridors discussed in this sub-section have been identified as the most critical to meet the future freight movement needs of transportation-dependent industries in the Portland/Vancouver region. It provides a catalog of the road and rail facility needs to keep the region's traded sector businesses competitive in the world market.

Rail System Conclusions

Over the past 4 years there have been several studies of the rail system in the region, including broader studies of the entire PNW area. They are consistent in identifying improvements to the same three "corridors" as the most important for freight movement. The biggest bottleneck is in the Portland Triangle, and given its strategic location as the part of the system where the major east-west and north-south corridors come together, it has the highest priority for improvements. The I-5 and Columbia Gorge rail corridors have important improvement needs, but can wait a few years. In any case, the full benefit of those improvements will only be felt after the central Portland improvements are made. Below is the list of the improvements recommended for those three areas over the next 20 years.

The Portland Triangle

This area extends on the east side from near Troutdale where the Kenton and Graham lines merge, to the Vancouver Rail Yard on the north and the Clackamas industrial area on the south along the old SP line. It also includes the rail lines and yards throughout the North Portland Peninsula. The I-5 Rail Capacity Study identified a series of “incremental” improvements that need to be made as soon as possible in order to untangle the very congested system of tracks and rail operations that now make up this area. The City of Portland Freight Master Plan lists the same projects as part of its rail recommendations, although those outside the City are not listed. The Port of Portland 2006 Transportation Improvement Plan also lists these same projects. The following improvements should be completed within the next 2 - 7 years. (Note that these projects were all identified as being needed in 5 – 10 years several years ago, which should put the emphasis on being completed within a shorter timeframe than 10 years.)

- A two main track bypass around the Vancouver Yard.
- Revised crossovers and higher turnout speeds at North Portland Junction and improved track conditions on the Columbia and Willamette River bridges.
- A second main track and track improvements on the Kenton Line between N. Portland Junction and approximately 82nd Ave.
- Expanded capacity and longer tracks at Ramsey and Barnes yards.
- A direct east-south connection between UP’s Brooklyn and Graham lines at E. Portland Junction and an added siding on the Graham line at Rockwood.
- A new track in one key location and upgraded existing track and signals from Albina Yard through the E. Portland Junction south to Clackamas.

Total cost of these improvements has been identified as approximately \$180 million (2003 dollars). In the 10 – 20 year timeframe a grade separation at the N. Portland Junction would be required to separate the UP and BNSF mainlines which cross at that point. (See IV. below for additional policy and regional public/private partnership initiatives for funding these improvements.)

I-5 North and South Corridors

Within the next 5-15 years the congestion on the rail lines from Portland south and from Vancouver north along the I-5 corridor will dictate the need for capacity improvements. These largely consist of either double tracking or sidings, signalization upgrades and grade separation at key locations between Clackamas and Eugene and between Vancouver and Tacoma. The north part of the corridor is at or near capacity today and should receive a high priority for rail funding in the early part of that timeframe.

Columbia River Gorge Corridor

This corridor functions fairly well today, but at current growth projections will become increasingly congested within 10 years, and over capacity in the 10 – 20 year timeframe. The primary need will be for an increased number of sidings, and eventually either double tracking on both the north and south sides of the river, or an operating agreement between BNSF and UP to run trains eastbound on one side and westbound on the other.

Special Facilities

As the train yards in the region become increasingly congested and functionally obsolete it will become increasingly important to determine the types of facilities needed for consolidation yards and efficient rail/truck intermodal or transload operations, and the approximate locations where they would be needed on the rail system. A study of this issue needs to be initiated soon to determine the long term feasibility of these facilities in the region.

Road System Conclusions

The road system studies that have specifically analyzed freight movement in the region in the past few years have identified a number of problem areas for trucks. The consensus is that the I-5 corridor between I-84 and downtown Vancouver is the highest priority. Also on the freeway system, the I-205 corridor between PDX and Oregon City and Highway 217 has bottlenecks that will need to be addressed within the next 10 years. On the arterial street system the key improvements will be to address congested intersections in the Columbia Blvd. corridor around PDX, and access to certain parts of the Portland Harbor in north and northwest Portland.

I-5 Corridor between I-84 and Vancouver.

The key freight mobility improvement on the road system is the complex of projects which will address the bottlenecks on this section of I-5. The widening of the freeway between Lombard and the Expo Center to 3 lanes in both directions is funded and will begin soon. Interchange improvements for I-5 and Columbia Blvd. are also on the region's priority list for funding in the near future. Other major elements of the overall solution to this set of problems are being determined through the I-5 Columbia River Crossing Project, which is in the project identification phase. The I-84/I-5 interchange has undergone a series of studies over the years without providing a solution to this important bottleneck, and will need significant attention to identify a solution.

2. I-205 and Hwy. 217

Other key regional facilities for truck movement include the section of I-205 from the Columbia River to Oregon City. Truck capacity improvements have not been fully identified at this point but include northbound on-ramp and southbound off-ramp projects

at the Airport Way interchange and capacity improvements to handle increasing truck traffic near the Clackamas industrial area. Hwy. 217 is a major bottleneck for truck movements. General capacity enhancement projects on this corridor will help relieve this problem. (See Metro RTP 2004.)

3. Arterial Improvements

The two major industrial areas in the City of Portland each have a series of truck access improvements delineated to address specific problems. In the Columbia corridor industrial area, particularly around PDX, there are intersection and street widening improvements already funded and prioritized for funding at the regional, and city levels. In the Portland harbor area there are also several projects already funded and several more intersection and traffic improvement projects prioritized for funding that will improve truck flow in the region. (See City of Portland Freight Master Plan)

Transportation Policy Initiatives

There are a number of non-infrastructure issues that have been identified in looking at the existing studies and plan documents and in reviewing the implications of the Task 3 work. This sub-section identifies potential initiatives that should be undertaken to address these issues, grouping them under the headings for each freight movement mode.

A. Rail Conclusions

The major rail issues can be essentially summarized as follows:

The changing business model for Class I railroads to a “hook and haul” emphasis.

The apparent need for public funding for rail infrastructure to ensure adequate service to regional freight shippers.

These two issues are intertwined. A set of policy initiatives has been suggested to address them, and they are summarized here.

1. Clearly link the region’s economic competitiveness enhancement strategies to local and state freight movement policies. It is key to achieving long term economic stability that local and regional decisionmakers understand that linkage and act on it when making decisions. This implies that both overall economic strategies and specific freight policies have been well conceived and that all responsible parties have accepted them.

To accomplish this, the public’s roles and responsibilities in this arena need to be clarified. One suggested mechanism to accomplish this task is to convene a PNW Freight Advisory Committee that would include railroads and rail shippers in addition to public representatives. This committee would have to work closely with local and state interests to achieve consensus on how the public and private sectors will interact, including a frank discussion of what the public sector can expect for its participation in funding improvements to the rail system. This also implies strengthening the analytical capabilities and decisionmaking processes at the state, metropolitan and local levels with regard to rail issues.

Ultimately, there are a series of decisions that will need to be made, most of them about spending public money. The above policies and strategies need to give clear guidance concerning the types of incentives that should be provided for: operational and capacity improvements; the type of selective investments that need to be made in short haul and branch line systems, and for port access and terminal capacity to meet throughput needs; and assistance with new intermodal and transload facilities. There are a number of financial resources that can be leveraged to accomplish much of this agenda, and these need to be thoroughly explored and advocated for at all governmental levels as part of this regional effort. Finally, there are permitting and other non-funding issues that will need to be considered, especially for new rail facilities, and these need to be addressed as part of a coordinated public/private effort to support freight movement in the region.

B. Marine Conclusions

There are several distinct issues which should be addressed with regard to waterborne freight transportation, and these can be summarized as follows:

- Increasing the region's container traffic in support of regional economic goals.
- Ensuring that the land planned for the growth of marine freight, particularly for new automobile movements in the foreseeable future, is able to be brought on line as needed.
- Ensuring that the Columbia/Snake Rivers barge system can continue to provide competitive freight service in the future.

The following points should be considered in attempting to address these issues:

- The region's economy would benefit from the enhanced connectivity with the world economy through increased regional container shipping opportunities. Local and regional businesses, in particular those basic industries that support the rest of the economy, need cost effective connections to markets around the world in order to stay competitive. The most effective way to ensure the necessary connections are there in the future is to have a cooperative regional approach to this issue.
- The container issue has been addressed over the years by the Port of Portland as an integral part of their marine strategy. Finding the right set of incentives and ways to communicate the region's advantages have been major elements of that strategy, and these need to be continuing elements of a regionally supported marine strategy. Having the unified support of other regional economic development interests will enhance the effectiveness of these measures. But in order to achieve a more effective regional strategy implies that the two ports and the other entities involved in achieving regional economic goals agree on all elements of that strategy.
- At the present time there is ample land available for the various marine industrial and transportation functions to meet the region's needs. In the future, as current vacant and underutilized marine properties are used up, there will be a need to prepare more riverfront land for marine development. Funding for such facilities is always challenging given their high cost. But the

biggest challenge may be in the realm of environmental permitting. The way to overcome this challenge is to have a unified regional strategy that makes an overwhelming case for the need for such facilities. This also points toward strong regional consensus to influence the decisionmaking process.

- The barge system faces similar challenges. The dams and locks that make up the systems infrastructure need to be maintained and enhanced, but the other issue facing them is environmental. The endangered salmon runs present the region with a conundrum: how to balance the legitimate concerns on both sides of this issue. A clear understanding of the tradeoffs and implications of losing the dams as a functioning part of the freight transportation network is imperative for making decisions about the future of the rivers. Once again, a strong regional process that provides clear direction to the decisionmaking process is a necessity.

C. Air Conclusions

The economic issue for air cargo is tied directly to the regional objective of aligning air service to the needs of local and regional businesses that rely on air connections with the rest of the world. In order to meet their shipping requirements, the region will have to form a strategy that satisfies the needs of the integrated carriers in the domestic air freight market, and attract expanded international service. The strategy should consider the following points:

- Current cargo routing patterns through major gateway airports and Portland's relatively small cargo base present challenges to be overcome in carrying out this strategy.
- The strategy should actively maintain Portland's current advantages in infrastructure and available space while building demand for better service with local and regional shippers and the businesses that they serve.
- Specific elements of the strategy include developing the air cargo service sector, attracting and expanding local and regional demand for air freight services, and coordinating the infrastructure development to match the future needs of both the shippers and the service providers.

D. Road Conclusions

The biggest challenge on the roadway system is achieving agreement on the importance of freight movement, particularly in the funding arena where the various modes are in direct competition with one another. The region has successfully integrated truck movement into the list of improvement project priorities. Following are points to consider in creating a strategy to address freight road funding needs:

- The main issue is the overall adequacy of funding for improvements. This issue is much bigger than this region. It is a nationwide problem, and needs a nationwide solution. The Portland/Vancouver region should continue to exert pressure on the federal government to fully fund the legitimate infrastructure needs of the country. Basic measures of economic prosperity, such as

productivity indicators, clearly show the great power that transportation improvements have on the nation's long term prosperity.

- In this era of higher energy costs, it is imperative that the overall transportation network be balanced.
- An intelligent allocation of resources will lead to enhanced truck movement capacity by encouraging less single occupancy driving and fewer and shorter auto trips.

V. Assessment of the Ability of the Industrial Land Supply to Support Trade

The implications from Tasks 1, 2 and 3 and previous studies summarized in II. above indicate that the need for transportation-dependent industrial land is potentially problematic. Metro has taken great pains over the past decade to address this need, and has largely succeeded. Clark County is also aware of this issue and has provided a significant amount of appropriate industrial land. However, there are several areas of inquiry that need to be examined further in order to understand whether the region can do more to provide enough land for this purpose. These can be grouped into several different categories: technical, private market, political and regulatory issues.

1. Technical issues –

While the locational and siting criteria discussed in Section I. are good, there is clearly a need to address the differentiation of distinct uses within the overall distribution category. This category could include at least three sub-categories: local distribution, regional distribution and more specialized distribution uses such as rail transload facilities, and aviation and marine facilities. While local distribution needs seem to be well addressed in the recent Metro UGB decisions on industrial land, there is a significant question as to whether regional distribution needs have been met, and specialized needs were not addressed at all in those decisions.

2. Political issues-

The inability to completely anticipate the locational requirements of all parts of the distribution industry has made the application of the criteria through the political process difficult. There has been room for political judgment to enter into how to apply the locational and siting criteria and determine the large blocks of land that will best meet industry's needs. Without more specific information about the requirements of the sub-categories within distribution, the inevitable result is that there will be controversy about whether the land brought into the UGB is really as well suited for the intended uses as it should be.

The political challenge does not end with Metro, however, because acceptance of local responsibility can also be a problem. Local jurisdictions must implement the regional decision to make industrial land available to the businesses that will use it. There have been several instances of local jurisdiction dissatisfaction with designating

land in their urban service area for distribution uses and, since this is by far the largest need, this can be an enormous obstacle in the path of eventually placing land in the hands of the end user.

Another major challenge is how to address the full distribution market geographically. Metro only has a portion of the responsibility for the full market area, which includes Clark County and parts of Columbia and Yamhill Counties, and for some uses could extend as far south as Salem. These other counties supply industrial land for regional distribution uses as well. All parts of the land supply need to be considered together when determining how the need for these uses will be met in the Portland/Vancouver region.

3. Private market issues –

The availability of land for industrial purposes is something that is difficult for the public decision-making process to take into account. For instance, private land owners are not always willing to sell when the industrial land market wants to buy. More generally, existing parcels are rarely the right size or shape to accommodate large industrial users. Metro has studied the potential ways that various sizes of property ownerships could be aggregated to assemble larger parcels to create industrial parks that make sense in the context of their physical surroundings. While there appears to be great merit in their analysis, it does not, and maybe cannot, anticipate all of the variables present in the array of land ownership situations present in the region.

There is also an acceptance issue in the real estate development community that plays a role in the viability of the decision Metro and local jurisdictions (including Clark County) have to make about adding certain property to the industrial land inventory and not others. However, this is part of the inevitable political maneuvering that takes place any time the public sector takes responsibility for tough decisions. As long as the decision has clear and consistent criteria and the process is perceived as fair, this issue should not be a major problem.

4. Regulatory issues-

Regulation of industrial land (newly added or existing) can also present problems in enabling the full and appropriate use of the region's industrial land supply. In addition to the familiar environmental concerns, there are a host of "compatibility" concerns that zoning and other development regulations attempt to deal with, often with only marginal success. For instance, at the regional level, Metro has designated Regionally Significant Industrial Areas (RSIAs) to help preserve property needed to meet the distribution land needs of the next 20 years. While in theory most interested parties agreed with this, when it came time place the RSIA designations on the regional map, the scope of the regulations to be enacted for those properties made it difficult for many local jurisdictions and even industrial advocates to agree with the end result. At the local level, traditional zoning codes have always strictly divided industrial uses from others, but in the past twenty years there has been a blurring of the distinctions among some types of industrial and commercial uses. Many firms engage in a mixture of the two that defies conventional zoning, and therefore makes it difficult to figure out how to regulate the placement of industrial uses. Industrial users themselves oftentimes find that they are

conflicted by this issue as well as the public planners who have to implement the regulations.

VI. Land Supply Process Conclusions

To address all of these issues, the following points should be considered:

Industrial land demand and supply should be addressed at the regional market level

- Both the demand for, and the supply of, industrial land, especially for the spectrum of distribution uses, should be determined at the level of the full market region. This includes the three Metro Counties, Clark County, and parts of Columbia and Yamhill Counties.
- At the minimum this would mean including the full market area in the analytical framework to determine where land with the proper characteristics is located.
- The decision-making process for determining where additional industrial land should be located is more difficult given the jurisdictional issues involved. However, establishing voluntary cooperative agreements among the parties involved would be a start, and could achieve a much better outcome than what currently occurs.

The location and siting criteria for Distribution uses should be refined

- The distribution category that Metro uses should be broken down into as many sub-categories as are required to adequately address the regional need to meet the full range of distribution and related transportation-dependent industrial uses.
- Local and regional distribution and specialized uses such as rail transload and intermodal facilities need to be included in this expanded category, along with marine and airside accessible industrial land needs.
- The land requirements for each of these sub-categories should be determined within the full market region, then allocated across the full region using the expanded location and siting criteria.

The regulatory processes governing the development of industrial land should be carefully reviewed and adjusted to ensure an adequate industrial land supply

- Local jurisdictions should be required to allow the full range of industrial uses within their general and/or heavy industrial zoning categories in order not to exclude distribution uses.
- While local zoning codes might allow a mix of residential, commercial and even light industrial uses throughout a jurisdiction, the potential impacts and conflicts inherent with most true industrial uses dictate

that they be provided for separately, with supporting retail services and accompanying office uses the only other uses allowed.

- Federal, state and local processes that regulate the re-development of existing industrial land should be re-examined to ensure that brownfield sites can be as easily developed for industrial use (where appropriate) as for other, higher value uses.
- Federal, state, regional and local regulations that govern the conversion of environmentally sensitive land should give priority to trade sector business uses, such as marine terminals and air cargo facilities that have severe locational limitations.

Support Infrastructure Needs Report

Appendix

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PEER REVIEW AND OBSERVATIONS

Portland/Vancouver International Trade Capacity Analysis

The Port of Portland and its partners recently completed an international trade capacity analysis for the Portland/Vancouver region. The purpose of this report is to provide a peer review and observations of the results and findings from the trade capacity analysis. There are five specific observations as follows.

CONSERVATIVE GROWTH FORECASTS

Observation: The international trade growth forecasts produced by Global Insight Inc. suggest that annual trade volumes will double from a level of 300,000 annual tons in the year 2000 to a level of 600,000 annual tons by the year 2035, a compounded average annual growth rate of 1.9%. By comparison, the historical growth rate for the domestic economy ranges at 2-3% annually, and the recent growth in real output for the Portland/Vancouver region was at 5-6% annually. In light of the fact that the international sectors are growing faster than the domestic sectors, demonstrated by the growth rates used by other West Coast ports, specifically 5% for international trade forecasts, it is our observation that the forecasts for the Portland/Vancouver International Trade Capacity Analysis are conservative.

Strategic Opportunity: In the context of the overall Asian trade phenomenon, the region is viewed as an alternative on the West Coast to accommodate some of the growth in Asian imports, specifically containerized traffic.

CHANGING RAIL BUSINESS MODEL

Observation: The Class I railroads are shifting their business focus to the sectors that increase their opportunity for “hook ‘n haul” traffic, specifically traffic with significant and concentrated volumes to generate unit trains at a single load center. Transcontinental international intermodal container traffic and coal traffic are examples of such sectors. As a result they are “de-marketing” the traditional business lines that generate incremental carload and boxcar shipments from a dispersed market area. The implications for the Portland/Vancouver region include land use for larger staging facilities to build long unit trains, deteriorating transportation capacity along key corridors that service the transcontinental intermodal and coal unit trains, and declining market access for smaller markets which are increasingly ignored.

Strategic Opportunity: Growing a successful base load of intermodal traffic in the region is important from an environmental standpoint as well as from a local economic development standpoint. The greatest strategic opportunity for growing intermodal traffic in the region is to emphasize the growth in international container traffic through the port.

DISTRIBUTION GATEWAYS

Observation: Companies are expanding from a four corner mega distribution center philosophy to

encompass smaller sub-regional distribution centers in the secondary markets such as the Portland/Vancouver region. Moreover, warehouse/distribution, logistics and transportation land uses are shifting south from Seattle towards Portland/Vancouver and vice versa, indicating that the greater Portland/Seattle market is increasingly being viewed as a single trading/ distribution market.

Strategic Opportunity: The allocation of sufficient land for the use of warehouse/distribution, logistics and transportation, specifically within the context of the growth boundary framework, is critical to sustaining a well balanced economic structure for the region. The logistics sector plays an important role in providing employment opportunities and upward social and economic mobility for blue collar employees, especially with a declining traditional industrial job base.

WATERFRONT LAND

Observation: The international trade forecasts suggest that preparing waterfront land is important to sustaining the region's transportation capacity. For example, the region is forecasted to grow as an important gateway for automotive imports, requiring twice as much space as it currently has committed for imports from the sector.

Strategic Opportunity: In order to support this niche market, as well as the other international trade sectors, additional waterfront land with good truck and relaxes is needed.

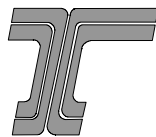
ROAD ACCESS FOR AIR CARGO

Observation: While the region has sufficient airside land capacity for air cargo, the road access for air cargo is increasingly congested. The scheduled and time sensitive nature of the air cargo sector requires reliable and timely access to air cargo facilities. The industries dependent on the air transportation of freight will be at a disadvantage if ready access to the airport is not available. The implication of deteriorating air cargo service is a decline in the region's competitiveness to attract and keep sectors that typically pay higher than average salaries and benefits.

Strategic Opportunity: Invest in additional highway capacity among key corridors that serve the airport.

Regional Economic Effects of the I-5 Corridor/Columbia River Crossing Transportation Choke Points

prepared for
Oregon Department of Transportation



prepared by
Cambridge Systematics, Inc.

in association with
David Evans and Associates, Inc.

April 2003

final report

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■ Executive Summary

Portland, Oregon and Vancouver, Washington, along with the rest of Oregon and Washington, share a common transportation choke point—the Interstate 5 (I-5) Corridor highway and rail bridges that connect the two cities across the Columbia River. The crossings are of strategic importance to the freight transportation in the Portland-Vancouver area and the Pacific Northwest, but their ability to effectively support freight movement and the regional economy is threatened by growing congestion.

The duration of peak-period congestion at the I-5/Columbia River highway bridge will double from four hours today to nearly 10 hours in 2020. The congestion will spread into the midday period, which is the peak travel time for trucks. This will increase the cost of delay to trucks by 140 percent—from \$14 million in 2000 to \$34 million in 2020. The rail network within the Portland-Vancouver area is equally congested. Congestion adds about 40 minutes to every train move, twice the delay in Chicago, the nation’s largest rail hub.

Congestion at the Columbia River crossings is not just a local problem, it is a Pacific Northwest problem. The region’s economy is built on transportation-intensive industries. Agriculture, construction, transportation equipment and utilities, wholesale and retail trade, and manufacturing make up 54 percent of the Oregon-Washington economy, but only 49 percent of the national economy. As a consequence, the Oregon-Washington economy is more dependent on transportation and spends more proportionally on transportation than the nation as a whole. The Oregon-Washington economy spends 3.35 percent of its gross regional product on freight transportation, 6.7 percent more than the national average of 3.14 percent.

The region has an efficient transportation system today, which gives the region’s businesses a competitive edge in reaching national and global markets. But if the region loses reliable and cost-effective access to its businesses, farms, ports, airports, and trade partners, the regional economy loses.

Efficient transportation is important because the Oregon-Washington economy is small compared to the other economic regions of the United States—the region’s \$350 billion economy ranks seventh among the eight national multi-state trade blocs. Reliable transportation is essential to Pacific Northwest businesses moving and selling products to the larger California and Eastern markets. But much of this freight traffic funnels through the congested Portland-Vancouver crossings.

Efficient transportation also is important because the economy of the Pacific Northwest is very dependent on global trade. Oregon and Washington export \$45 billion of products each year. As a percentage of the region’s economy, this is about twice the national average. Much of this freight traffic also funnels through the Portland-Vancouver crossings.

This study examined the impact of congestion at the I-5/Columbia River crossings on key Oregon-Washington industries, including:

- Lumber, wood, and paper products industry; transportation equipment industry; and farm and food products industry – traditional pillars of the Pacific Northwest economy;
- High-technology industry – a key emerging industry, critical to the region’s future growth; and
- Distribution and warehousing industry – the sector that supplies manufacturers, retailers, and the service sector.

The study found that congestion at the I-5/Columbia River crossings was affecting business and industry across the region by increasing shipping and production costs, shrinking labor markets, and reducing the competitiveness of these industries in regional, national, and global markets.

The cost of congestion at the I-5/Columbia River crossings will become an even greater drag on the economy in the future as the region grows and the demand for travel increases. The Portland-Vancouver area and the Pacific Northwest can expect freight volumes to grow at rates faster than the national average – between 1998 and 2020 import-export freight tonnage is forecast to grow 123 percent and domestic freight tonnage 76 percent. The region must provide the capacity to handle this growth effectively or risk weakening its economy and quality of life.

The I-5 Transportation and Trade Partnership, a consortium of state and local transportation planning organizations, elected officials, and stakeholders from the Portland-Vancouver area, has identified transportation improvements needed to relieve highway and rail congestion at the I-5/Columbia River crossings. These improvements will:

- Establish a transportation system that handles the projected 2020 travel demand with improved performance, reliability, predictability, and safety relative to today;
- Minimize the spread of peak-period congestion, preserving the midday period for truck freight movement within and through the Portland-Vancouver area;
- Reduce delays to trucks operating along I-5;
- Maintain or enhance existing accessibility to key port and industrial areas; and
- Accommodate more freight-rail and high-speed passenger-rail service while maintaining or enhancing current rail system performance.

The study recommends that Oregon and Washington make a coordinated effort to act promptly to decide on a course of action and identify sources of funding for the recommended Columbia River crossing improvements in the I-5 transportation corridor. The improvements will benefit Portland-Vancouver and the Pacific Northwest.

■ Introduction

A Shared Transportation Choke Point

Portland, Oregon and Vancouver, Washington, along with the rest of Oregon and Washington, share a common transportation choke point—the Interstate 5 (I-5) Corridor highway and rail bridges that connect the two cities across the Columbia River. The crossings have become a choke point because they no longer have the capacity to handle the volume of automobile, truck, and rail traffic crossing the Columbia River.

The crossings are of strategic importance to freight transportation in the Portland-Vancouver area and the Pacific Northwest. But their ability to effectively serve freight movement and the regional economy is threatened by growing congestion. The I-5/Columbia River bridge operates at capacity for four hours each day. By 2020 it will operate at capacity for almost 10 hours each day. The parallel I-205/Glenn Jackson bridge will be equally congested by 2020. As the Glenn Jackson bridge reaches capacity it will discourage diversion of I-5 traffic resulting in increased peak-period spreading within the I-5 corridor. With increasing congestion will come more accidents and breakdowns, adding further delays and making travel times less predictable. The cost of congestion delay and accidents is high today and will be even higher tomorrow.

A Shared Economy

The cost of this congestion is paid by Portland-Vancouver commuters and businesses and by all businesses across Oregon and Washington that move freight through the area. Businesses see these costs as increased shipping and production costs, shrinking and more expensive labor markets, and reduced competitiveness in regional, national, and global markets.

The economy of the Pacific Northwest is very dependent on trade, and much of the freight traffic upon which the regional economy depends funnels through the Portland-Vancouver crossings. Congestion is eroding the reliability of freight transportation in the Pacific Northwest, reducing the region's quality of life and threatening the economic well being of business and industry. Congestion will become an even greater drag on the economy in the future as the region grows and the demand for travel increases.

A Regional Partnership

The I-5 Transportation and Trade Partnership, a consortium of state and local transportation planning organizations, elected officials, and stakeholders from the Portland-Vancouver area, has identified transportation improvements needed to relieve highway

and rail congestion at the I-5 Corridor/Columbia River crossings.¹ The key recommendations and their anticipated benefits are:

- **Highway**

- Widen I-5 to a maximum of three through lanes in each direction from the Fremont Bridge in Portland to the I-205 junction north of Vancouver;
- Add a new supplemental or replacement bridge across the Columbia River with up to two auxiliary or arterial lanes in each direction and provision for two light-rail tracks; and
- Add auxiliary lanes between interchanges on I-5 and modify the interchanges to increase safety and capacity and discourage the use of I-5 for local trips.

- **Transit**

- Construct a light-rail loop connecting the existing transit lines in Portland with the communities across the Columbia River in Clark County, Washington; and
- Initiate premium, peak-hour express bus services in the I-5 and I-205 corridors, consistent with existing regional transportation plans.

- **Rail**

- Expand yard capacity and construct bypass tracks so that local trains do not block through trains;
- Increase track speeds in the Portland-Vancouver area by improving track conditions and repairing or replacing junctions;
- Add a second track to single-track sections, permitting simultaneous bi-directional movement of trains; and
- Add sidings to congested sections to allow for temporary storage of trains and locomotives that are waiting to enter terminals and yards and now block other freight and passenger trains.

“Yes, there are real constraints, but we can no longer put our head in the sand. We must think creatively and we must act now.”
Keith Thomson, Port of Portland

- **Transportation System Benefits**

- Establish a transportation system that handles the projected 2020 travel demand with improved performance, reliability, predictability, and safety relative to today;
- Minimize the spread of peak-period congestion, preserving the midday period for truck freight movement within and through the Portland-Vancouver area;
- Reduce delays to trucks operating along I-5;
- Maintain or enhance existing accessibility to key port and industrial areas; and
- Accommodate more freight-rail and high-speed passenger-rail service while maintaining or enhancing current rail system performance.

¹ For additional details, see I-5 Trade and Transportation Partnership, *Final Strategic Plan*, June 2002 at www.i-5partnership.com.

A Regional Economic Study

Congestion at the Columbia River crossings is not just a local problem, it is a Pacific Northwest problem. Congestion at the I-5 Corridor/Columbia River crossings affects businesses and communities across the entire region. Making the necessary improvements, reducing congestion, and improving the transportation system will require a partnership across Oregon and Washington as well as neighboring states and provinces.

This report expands the I-5 Partnership's prior studies. It investigates the regional economic impacts of the I-5 Corridor/Columbia River crossing transportation choke points. It first reviews the local economic effects, then examines the regional economic effects of congestion at the Portland-Vancouver crossings. It looks at the economy of Oregon and Washington as a whole, then develops case studies of the regional economic impacts on five freight-intensive industries:

"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 the area."

Wesley Hickey, Tidewater Barge Lines

- Lumber, wood, and paper products industry; transportation equipment industry; and farm and food products industry – traditional pillars of the Pacific Northwest economy;
- High-technology industry – a key emerging industry, critical to the region's future growth; and
- Distribution and warehousing industry – the sector that supplies manufacturers, retailers, and the service sector.

■ Local Economic Effects

The Columbia River Highway and Rail Crossings Are Transportation Choke Points for Portland-Vancouver

The Columbia River highway and rail crossings connect the communities of Portland and Vancouver for work, recreation, shopping, and entertainment. They provide critical freight connections to the area’s two major ports for deep-water shipping and up-river barging, link its two transcontinental rail lines, and connect much of the region’s industrial land.

The crossings are transportation choke points because the Portland-Vancouver area has only two highway bridges and one rail bridge over the Columbia River. Figure 1 shows the location of the I-5 and I-205 Columbia River highway bridges and the Burlington Northern Santa Fe’s (BNSF) rail bridge crossing the Columbia River. Figure 2 is an aerial photograph of the I-5/Columbia River highway bridge. The area has fewer crossings than river cities of similar size across the United States. Table 1 compares the number of highway and rail crossings serving the Portland-Vancouver area with the number of crossings serving other river cities. With limited bridge capacity, few alternative routes, and growing travel demand, the Portland-Vancouver crossings have become major traffic bottlenecks. See Figure 3, a photograph of peak-travel period traffic on I-5 southbound, approaching the I-5/Columbia River bridge.

Table 1. Comparison of River Crossings in Selected U.S. Metropolitan Areas of Similar Size

| Metro Area | Population | Body of Water | Highway Crossings | Rail Crossings |
|---------------------------|---------------------|------------------------------|--------------------------|-----------------------|
| Norfolk | 1.57 million | Hampton Roads/Chesapeake Bay | 4 | 0 |
| Cincinnati | 1.65 million | Ohio River | 7 | 2 |
| Kansas City | 1.78 million | Missouri River | 10 | 3 |
| Portland-Vancouver | 1.92 million | Columbia River | 2 | 1 |
| Pittsburgh | 2.36 million | Three Rivers | >30 | 3 |
| St. Louis | 2.60 million | Mississippi River | 8 | 2 |

Figure 1. Map of Columbia River Crossings in Portland-Vancouver Area

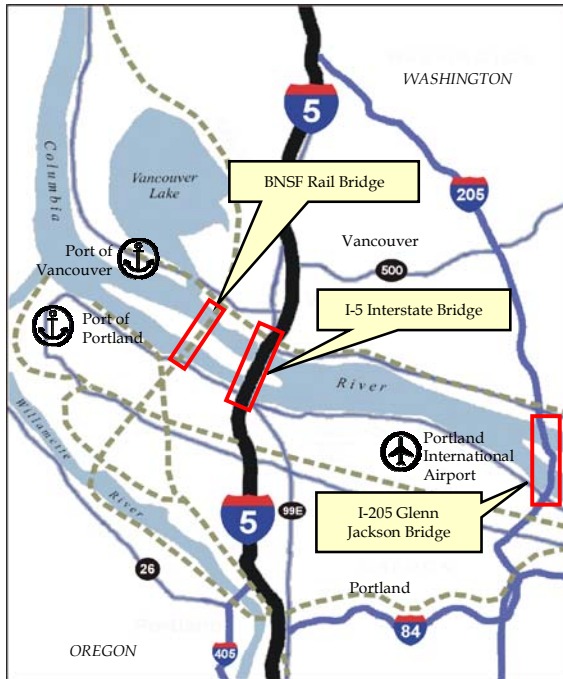


Figure 2. I-5/Columbia River Bridge



Figure 3. Peak-Travel Period Traffic on I-5 Southbound Approaching the I-5/Columbia River Bridge



The I-5/Columbia River Highway Crossing Is Severely Congested

Interstate 5, with its bridge crossing the Columbia River, is the backbone of the Portland-Vancouver area transportation system. On an average day more than 125,000 vehicles, including 10,000 trucks, cross the I-5/Columbia River bridge.²

“The bridge crossing is the worst bottleneck between Los Angeles and Seattle.”

Vancouver economic development official,
Regional Economic Effects Study interviews

Today the Portland-Vancouver metropolitan area population is about 1.9 million. By 2020, the population is expected to increase to 2.4 million. As the region grows, traffic volume on the bridge is expected to grow proportionally to 180,000 vehicles per day, an increase of 44 percent. Vehicle travel times between downtown Portland and north Vancouver will increase 22 percent, from 38 minutes in 2000 to 44 minutes in 2020.

The I-5/Columbia River highway crossing operates at capacity for two hours during the morning peak-travel period and another two hours during the evening peak-travel period. Unless capacity is added, no additional vehicle trips can be squeezed into those hours. Additional trips will be made

“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, Urban League

earlier or later, more than doubling the duration of the peak-travel periods by 2020. The morning congestion period will spread from two to four hours, and the evening congestion period will expand from two hours to over five and one-half hours. The quiet mid-day period will largely disappear. Instead of a total of four hours of congested travel along the I-5/Columbia River crossing corridor, Portland-Vancouver drivers can anticipate almost 10 hours of congested travel a day by 2020. Figure 4 compares the duration of the morning and evening peak periods in 2000 and 2020 if crossing capacity is not increased.

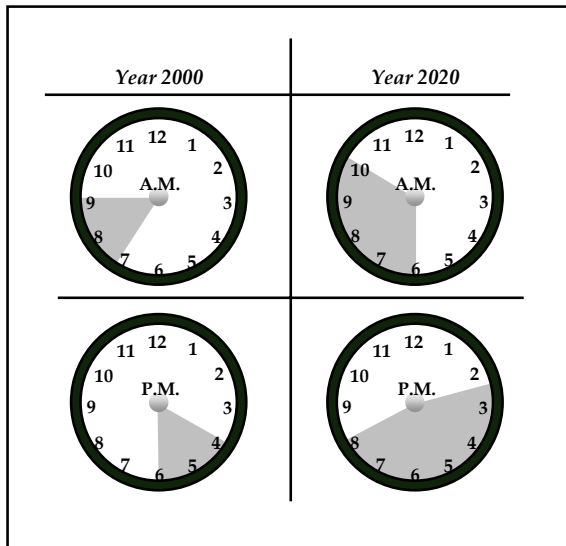
The congestion is caused by limited vehicle through-put capacity on the bridge itself and by the complex traffic patterns on the Oregon and Washington sides of the river:

- The six traffic lanes on the I-5/Columbia River bridge are inadequate for the volume of traffic crossing the river during peak-travel periods;
- Close interchange spacing north and south of bridge does not allow for adequate merging and weaving sections, effectively reducing the capacity available for through traffic;

² Oregon Department of Transportation. 2001 *Transportation Volume Tables*.

Figure 4. Duration of Morning and Evening Peak-Period Traffic on the I-5/Columbia River

Bridge and Approaches in 2000 and 2020



- Short entrance and exit ramps force trucks to accelerate and decelerate on the freeway, further slowing traffic; and
- The bridge’s low-level lift span, one of the last remaining on the national Interstate highway system, opens for 10 minutes for barge traffic 20 to 30 times per month in off-peak periods, closing the highway and bringing traffic to a halt for periods of 30 minutes.

The eight-lane Glenn Jackson bridge, which carries I-205 across the Columbia River six miles up river of the I-5/Columbia River

bridge, provides an alternate route to the I-5/Columbia River crossing. But the Glenn Jackson bridge, which carries 132,000 vehicles, including 7,800 trucks, across the river each day, also operates near capacity. Growing congestion, due in part to diverted traffic from I-5, is diminishing travel reliability and predictability on I-205 and the Glenn Jackson bridge. As the Glenn Jackson bridge reaches capacity it will discourage diversion of I-5 traffic resulting in increased peak-period spreading within the I-5 corridor. The next closest Columbia River highway crossing is the two-lane bridge between Rainier, Oregon, and Longview, Washington, 53 miles downstream; it provides little relief to the metropolitan area.

With few alternative routes, congestion on I-5 spills onto other roadways in the Portland-Vancouver area. Some drivers heading to the I-5/Columbia River bridge use the arterial roadways paralleling I-5 rather than grind through the traffic on the I-5 approaches to the bridge. During the peak-travel periods, this diverted traffic fills the local north-south streets and jams the interchanges near the bridge, blocking the east-west arterial streets as well.

Freight traffic is disproportionately affected by this congestion:

- Congestion is spreading into the midday period, which is the peak-travel period for trucks. Most truck deliveries are made in the mid-morning after businesses open, and most pick-ups are made in the mid-afternoon before businesses close. Congestion spilling over from the morning and evening commuter peaks into the midday will entangle truck operations, increasing trucking costs, and making pick-up-and-delivery times less reliable;

- Trucks enter and leave the highway at the closely spaced interchanges north and south of the bridge to access the ports, intermodal rail yards, industrial areas, and commercial areas near the Columbia and Willamette Rivers, but the interchanges and ramps cannot safely and efficiently handle the large volumes of truck traffic;
- Bridge openings are limited to off-peak hours to reduce delays for commuters, but bridge lifts during midday and off-peak hours coincide with the heaviest volumes of trucks on I-5. A 10-minute bridge lift during the midday creates a traffic queue that takes 25 to 30 minutes to dissipate. By 2020 it will take 30 to 35 minutes for the northbound queue to clear and 50 to 60 minutes for the southbound queue to clear;
- Traffic congestion increases truck travel times to and from the Ports of Portland and Vancouver, and to and from the BNSF and Union Pacific intermodal rail terminals; and
- Congestion delays trucks moving among the manufacturing plants, warehouses, and distribution centers in the Columbia Corridor on the Portland side of the river and along SR 14 on the Vancouver side of the river.

When an incident on I-5 reduces capacity or temporarily closes the highway during peak-travel periods, the high volume of traffic using the I-5/Columbia River highway crossing and the lack of alternate routes results in gridlock across the Portland-Vancouver area. This happens almost daily.

The Portland-Vancouver Rail Network and the Columbia River Rail Crossing Also Are Severely Congested

The two-track BNSF rail bridge, adjacent to the I-5/Columbia River bridge, is the only rail crossing connecting Portland and Vancouver. The rail bridge carries 63 freight trains and 10 Amtrak passenger trains across the river each day.³ The next major rail crossing of the Columbia River is 92 miles upstream near The Dalles, Oregon.

Figure 5 shows the Portland-Vancouver rail network. On the Vancouver side of the river, rail lines run north to Seattle and east along the north side of Columbia River Gorge toward the Midwest. On the Portland side of the river, rail lines run west to the port terminals, south to California, and east along the south side of the Columbia River Gorge toward the Midwest and the Gulf.

³ I-5 Trade and Transportation Partnership. *Final Strategic Plan*, June 2002.

Figure 5. Portland-Vancouver Rail “Triangle”



The primary cause of congestion in the rail system is inadequate capacity within the overall Portland-Vancouver terminal and junction “triangle.” On each side of the Columbia River, trains crossing the bridge compete for track space with local and long-distance trains moving to rail yards and terminals. Single tracks connect most junctions, and yard capacity is inadequate for the volume of rail traffic traveling to and from rail yards and port terminals in Portland and Vancouver. Local operations—the movement of locomotives and cars between yards and the movement of trains into and out of port and railroad terminals—must share track time and space with long-distance, through trains, including intermodal trains traveling from Seattle and Tacoma to the Midwest and California through the Portland-Vancouver area.

When measured in terms of delay per train, rail congestion in the Portland-Vancouver area is about twice that of Chicago, the nation’s largest rail hub. An analysis of the Portland-Vancouver rail system found that over a typical 96-hour (four-day) period the terminal area handled 600 freight and passenger trains. The average speed of those trains

through the Portland-Vancouver network was 12.3 mph and they accrued 402 hours of delay (about 41 minutes of delay per train). By comparison, over the same period the Chicago rail network handled about 3,500 freight and passenger trains. The average speed was 12.5 mph, and the trains accrued 813 hours of delay. With less than one-fifth the number of trains as Chicago, the Portland-Vancouver rail network experiences nearly half the delay hours of Chicago.

These rail delays affect freight service across the Pacific Northwest, limit opportunities for growth at the ports of Portland, Vancouver, Kalama, Longview, and other Columbia River ports, and make it difficult to expand intercity passenger service along the Seattle-Portland-Eugene corridor.

To relieve rail congestion and provide new capacity, the railroads must invest heavily in new yard capacity, sidings, bypass tracks, switches, and dispatching systems within the Portland-Vancouver rail triangle. And within 10 to 20 years, the railroads also may need to look at investing in an expanded rail bridge across the Columbia River or a rail bypass of the Portland-Vancouver area for through trains.

This will be a challenge for the railroads. The railroad industry today is stable, productive, and competitive, with enough business and profit to operate, but it does not have the resources to replenish its infrastructure quickly or grow rapidly. Most of the benefits of railroad reorganization and productivity over the last 20 years have accrued to shippers and the economy in the form of rate cuts, rather than to the railroads and their investors. The industry's rate of return on investment has improved from about four percent in 1980 to about eight percent in 2000; however, it is still below the cost of capital, which is about 10 percent.

This is a problem for the railroad industry because it is extraordinarily capital-intensive. Railroads spend about five times more to maintain rail lines and equipment than the average United States manufacturing industry spends on plant and equipment. Wary of the gap between the railroads' capital needs and their income, investors have backed away from railroad stocks. This has reduced the amount of money available to invest in the freight-rail system, forcing the railroads either to borrow money to maintain and expand infrastructure or defer maintenance and improvements. The possibility that the railroads may not grow apace with the economy and might shed freight to trucks, adding to already congested highways, has prompted some states to think about investing to correct rail choke points such as the Portland-Vancouver triangle.⁴

⁴ American Association of State Highway and Transportation Officials, *Freight-Rail Bottom Line Report*, Washington, DC, January 2003. For additional detail see http://transportation.org/committee/freight/doc/rail_bottomline.pdf.

Transportation Congestion Has Significant Costs for the Portland-Vancouver Area

The Portland-Vancouver metropolitan area as a whole suffered an estimated 34.4 million road-traveler hours of delay in 2000. This is equivalent to 47 hours per road-traveler per year or an entire weekend stuck in traffic. The economic cost to Portland-Vancouver area road-travelers was estimated at \$670 million per year, or about \$910 per road-traveler.⁵

Congestion at the Columbia River crossings accounted for a portion of this delay and congestion at the crossings will grow over the next 20 years. If no significant capacity is added to the I-5/Columbia River crossing, total vehicle hours of delay during the peak periods will increase 74 percent from 31,000 hours per day in 2000 to 54,000 hours per day in 2020.

“Businesses in the Puget Sound area are leaving, citing transportation issues. We will only know we’ve failed when companies stop moving to or expanding in the Portland region.”
Vancouver economic development official

Because the I-5/Columbia River crossing serves the industrial core of the region, trucks and the businesses they serve will see significant increases in congestion and delay costs:

- Annual vehicle hours of delay on truck routes in the I-5 corridor will increase by 93 percent from 13,400 hours in 2000 to 25,800 hours by 2020;
- Congested lane-miles on truck routes will increase by 58 percent; and
- The cost of truck delay will increase by 140 percent to nearly \$34 million.

Delays at the crossings affect a wide range of transportation users, including employees commuting to work, customers traveling to stores and business meetings, shippers meeting schedules, trucks picking up and delivering goods, and trains moving freight to and from ports and intermodal terminals. The costs of delay are passed on to businesses, either directly or indirectly, by:

⁵ Texas Transportation Institute, *2002 Urban Mobility Study*, Mobility Data for Portland-Vancouver, Oregon-Washington for 2000. For additional detail and comparative rankings with other major metropolitan areas see http://mobility.tamu.edu/ums/studymobility_data/tables/portland.pdf.

- **Increasing Production Costs** - Congestion leads to higher transportation costs for businesses due to delay, unreliable travel times, and increased logistics and inventory costs. Freight carriers must adjust schedules and routes, hire more drivers, and purchase additional vehicles to serve the same customers. Firms must accommodate larger inventories of parts, supplies, and products, causing inventory and operating costs to increase unless they can find savings elsewhere.
- **Shrinking Labor Pools** - Congestion effectively reduces the geographical area in which potential employees can afford to work (or are willing to work) by increasing the time and cost of commuting. As a region's quality of life deteriorates and the cost of living increases, the area also becomes less attractive to new workers. Business productivity declines as the number of workers with specialized skills decreases.
- **Reducing Access to Business Inputs and Markets** - Congestion shrinks business market areas and reduces the economies of scale that can be realized by operating in large urban areas near concentrations of similar firms or concentrations of competing suppliers.

"As moving goods becomes more difficult, it is the smaller businesses that will suffer most."
Phil Kalberer, Kalberer Food Service
Equipment

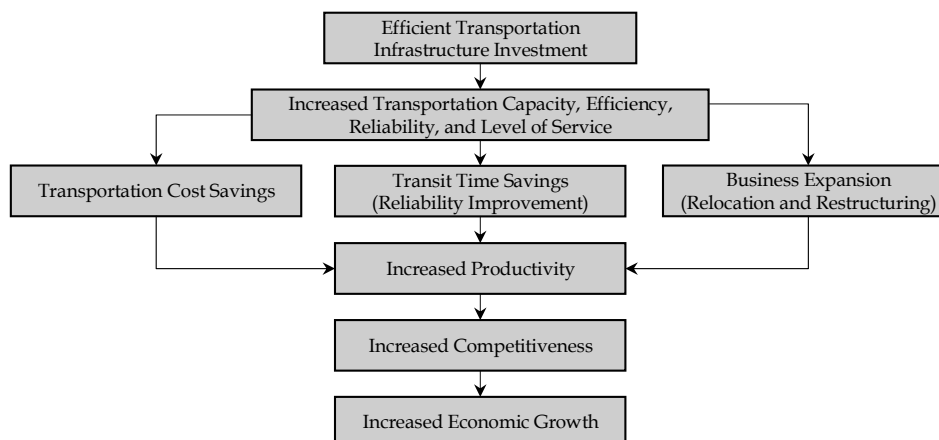
Congestion is one of the costs of doing business, but if it becomes severe, businesses may respond by moving away, going out of business, or adjusting to smaller market areas for workers, suppliers, and customers. All of these lead to a reduction in productivity, which in turn limits economic competitiveness and curtails economic expansion.

Economic Benefits of Investment in Transportation

The economic benefits of investment in transportation include:⁶

- For almost all industry sectors, transportation investments reduce the cost of producing a given level of output. The cost savings can be used by companies to increase profit, make new investments, or expand market share.
- Since lower production costs can lead to lower product prices and increased sales, transportation investments also generate an “output effect” that grows the economy. Expanding output can stimulate increases in employment.
- Investments in roadways accounted for about 15 percent of U.S. productivity growth between 1950 and 1991.
- Transportation investments allow manufacturers and retailers to maintain smaller inventories, resulting in significant business cost savings, but just-in-time operations depend on reliable transportation.
- Transportation investments reduce the per-mile cost of transporting goods, allowing production and distribution facilities to serve larger market areas. By serving larger markets, businesses can more efficiently use labor, equipment, and capital.
- Improvements in the freight transportation system allow businesses to draw supplies from a wider area, potentially yielding savings in material costs and improvements in quality.

Transportation and the Economy



The exhibit above shows how investments in transportation infrastructure can lead to growth in the Oregon-Washington economy. Freight transportation enhancements that reduce the costs of moving goods (and services) to and from local, regional, national, and international markets are critical to economic expansion. This is because the movement of goods is a “factor input” in the production of goods. (Other factor inputs include labor, materials and capital equipment.) Like labor and capital, transportation costs directly affect the price of goods and services and the profits of producers. Consequently, investments that reduce the cost of moving goods to and from markets (via improvements in reliability and reductions in transit times) can help to increase and sustain economic growth. The efficiency and reliability of the freight transportation system affects economic productivity, and productivity is a key determinant to overall economic performance.⁷

⁶ Federal Highway Administration, Office of Policy, 2003.

⁷ ICF Consulting and HLB Decision Economics, *Economic Effects of Transportation: The Freight Story*, for the Federal Highway Administration, January 2002.

■ Regional Economic Effects

The Crossings Are Transportation Choke Points for the Pacific Northwest

Congestion delays in the Portland-Vancouver area are not just a local problem. The economy of the Pacific Northwest is very dependent on trade, and much of the freight traffic upon which the regional economy depends funnels through the Portland-Vancouver crossings. Congestion at the Columbia River highway and rail crossings affects the entire Pacific Northwest.

The physical geography of the Pacific Northwest defines the regional transportation system and makes the crossings at Portland-Vancouver strategic regional choke points. Figure 6 shows the major landforms of Oregon and Washington and the major highways. Mountain ranges across the region have constrained development of most of the region's highways, rail lines, and large population centers to a narrow corridor running from Vancouver, British Columbia through the Portland-Vancouver area to Eugene, Oregon. Highway and rail routes connecting the region to the other major North American trade blocs to the east and south run through difficult mountain passes and the Columbia River Gorge.

The region has excellent deepwater ports with access to the West Coast and Pacific Rim, and the Columbia/Snake River system provides barge access to the agricultural areas in the eastern half of the region. The Columbia River is a major regional transportation artery, but the river also is major regional barrier. There are just nine highway bridges and two rail crossings between Umatilla, Oregon, where the river curves northward into Washington State, and the Pacific Ocean, a distance of 292 miles or a little less than the distance between Portland-Vancouver and Vancouver, British Columbia.

"Time is [of the] essence in a truck driving company. The slower we go, the less money we make."

Truck driver, Survey of Freight Industry
Opinions of I-5, Oregon DOT

Congestion at the I-5/Columbia River Highway Crossing Delays Truck Shipments Across Oregon and Washington

The I-5/Columbia River bridge at Portland-Vancouver is a critical link in the Pacific Northwest's regional highway network. Congestion at the I-5/Columbia River highway crossing and the parallel I-205 crossing affects truck traffic throughout Oregon and Washington, but especially within the I-5 corridor.

Figure 6. Landforms of the Pacific Northwest
With Interstate and Major Highways

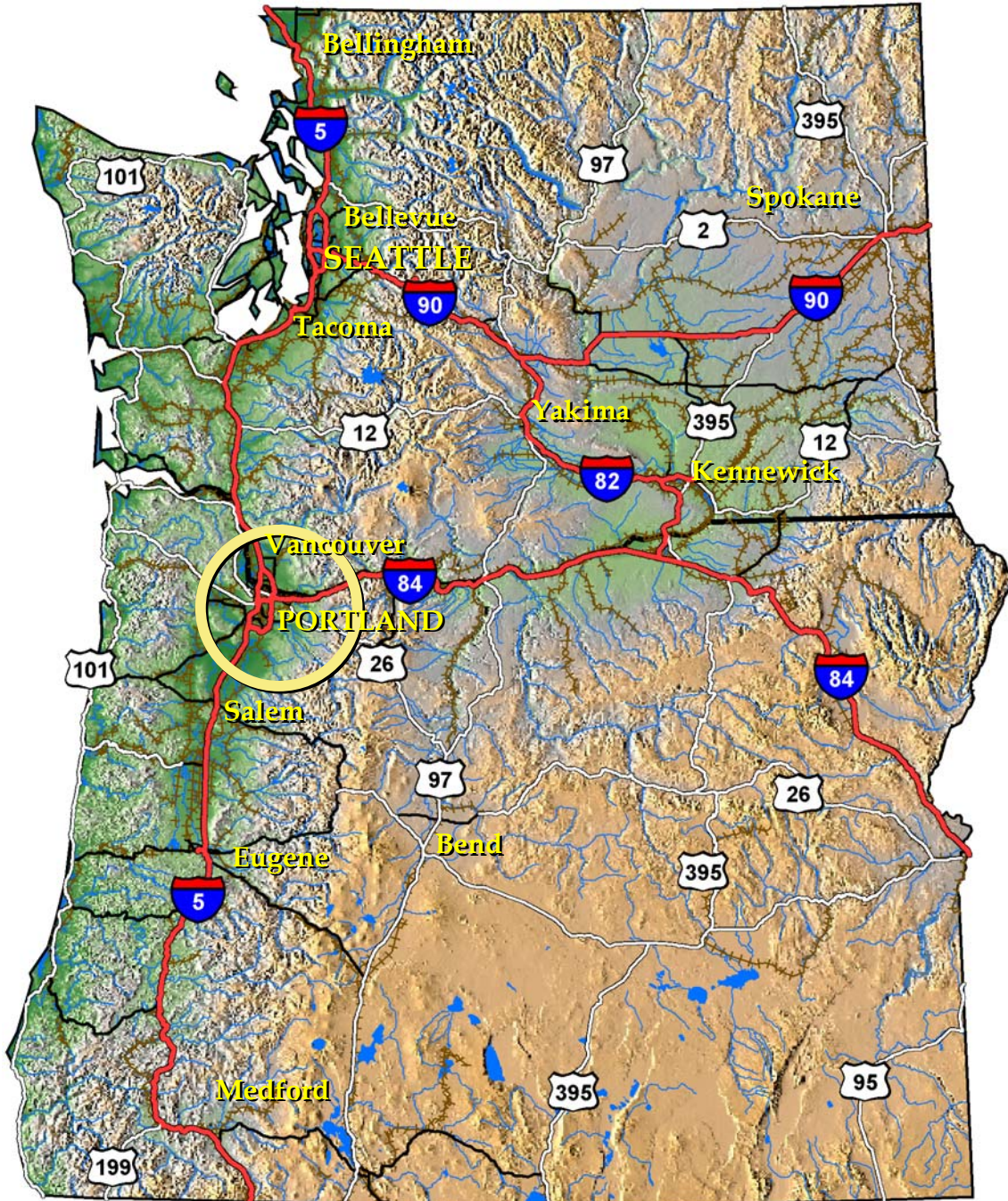


Figure 7 shows Oregon and Washington counties and highways affected by congestion at the I-5 and I-205/Columbia River highway crossings.⁸ The figure shows the counties (in gray scale) that ship or receive truck freight using the crossings; the darker gray the county, the more tonnage is shipped or received from that county. (Commodities shipped to and from British Columbia are assigned to Whatcom County.) The figure also shows the highways (in color) that trucks use to move to and from these counties; the wider and redder the bandwidth of the highway line, the greater the truck tonnage carried on the highway.

Congestion at the Rail Crossing Has a Major Impact on Rail Shippers

The rail junction at Portland-Vancouver is a critical link in the Pacific Northwest rail system. Congestion at the rail crossing also has a major impact on Oregon and Washington State rail shippers.

Figure 8 shows freight-rail tonnage on the major rail lines serving Oregon and Washington, including those passing through the Portland-Vancouver rail triangle.⁹ The wider and redder the bandwidth of the rail line, the greater the commodity tonnage carried on the rail line. (The figure shows commodity or net tonnage, not gross tonnage, which would include the weight of the locomotive and railcars.)

Figure 9 highlights Oregon and Washington counties and highways affected directly by rail congestion in the Portland-Vancouver triangle. The figure shows the counties (in gray scale) that ship or receive rail freight that moves into, out of, or through the congested Portland-Vancouver rail triangle; the darker gray the county, the more tonnage is shipped or received from that county. (Commodities shipped by rail to and from British Columbia are assigned to Whatcom County.)

"The rail system is our life blood. We have to be able to move our grain."

Grain shipper, commenting at an I-5
Partnership public meeting

Rail congestion at Portland-Vancouver has a major impact on Puget Sound shippers, Washington State's Columbia River ports, and the Portland-Vancouver area. The congestion affects shipments of grain, lumber, and minerals moving west by rail from Montana, Idaho, eastern Washington, and central and eastern Oregon for export through the ports. It also affects intermodal container shipments of merchandise moving east by rail from Seattle-Tacoma, wood products from western Washington moving south and east, and automobiles being carried inland from Portland.

⁸ Source: Cambridge Systematics, Inc., based on commodity flow and truck-routing data provided by Reebie Associates from their 1998 TRANSEARCH database.

⁹ Source: Cambridge Systematics, Inc., based on commodity flow and rail-routing data provided by Reebie Associates from their 1998 TRANSEARCH database.

Figure 7. Oregon-Washington Origins and Destinations for Truck Freight Crossing the I-5 and I-205 Bridges at Portland-Vancouver
With Tonnage of Freight on Truck Routes Used to Access Bridge

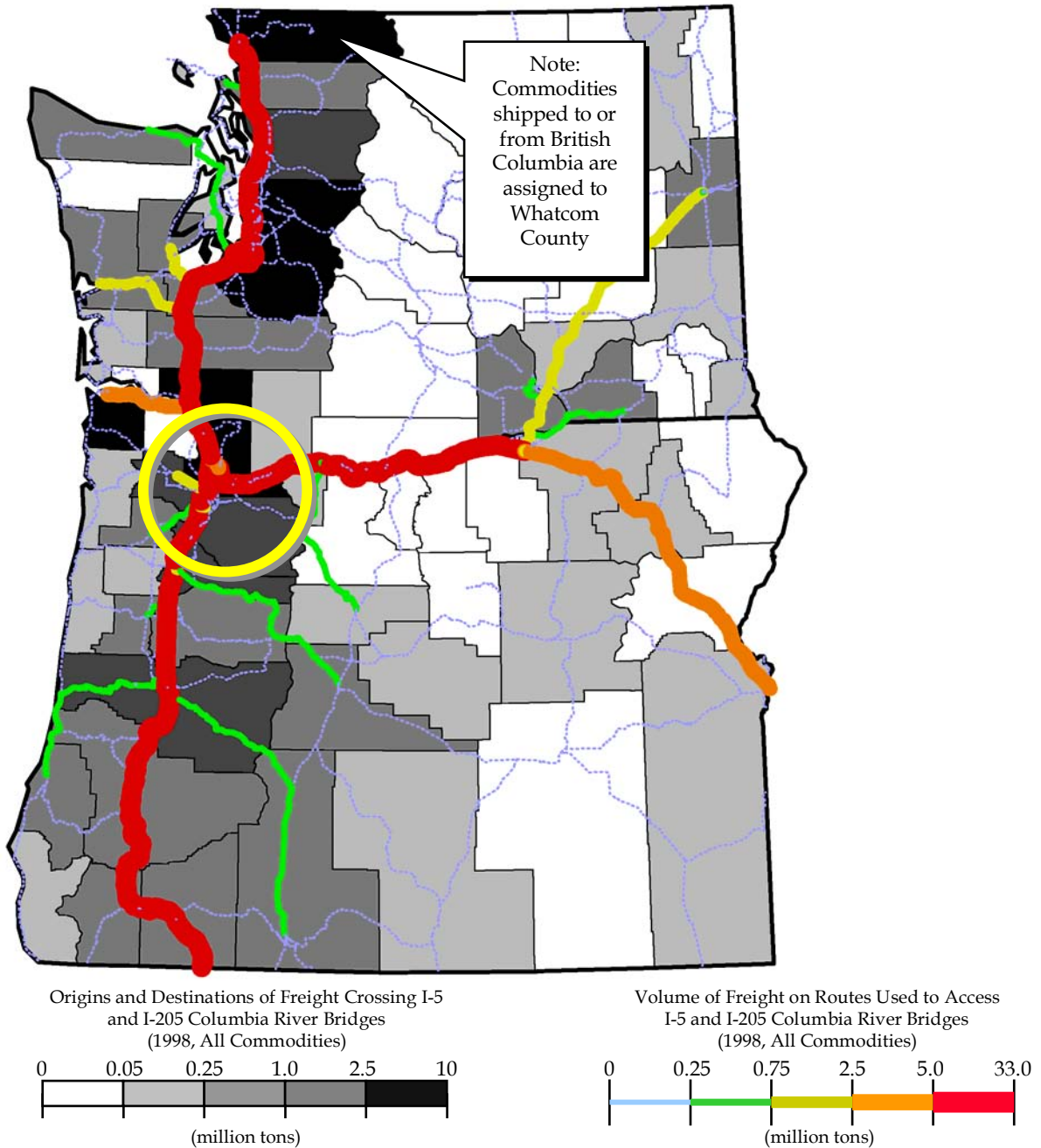


Figure 8. Volume of Freight on Pacific Northwest Rail Network

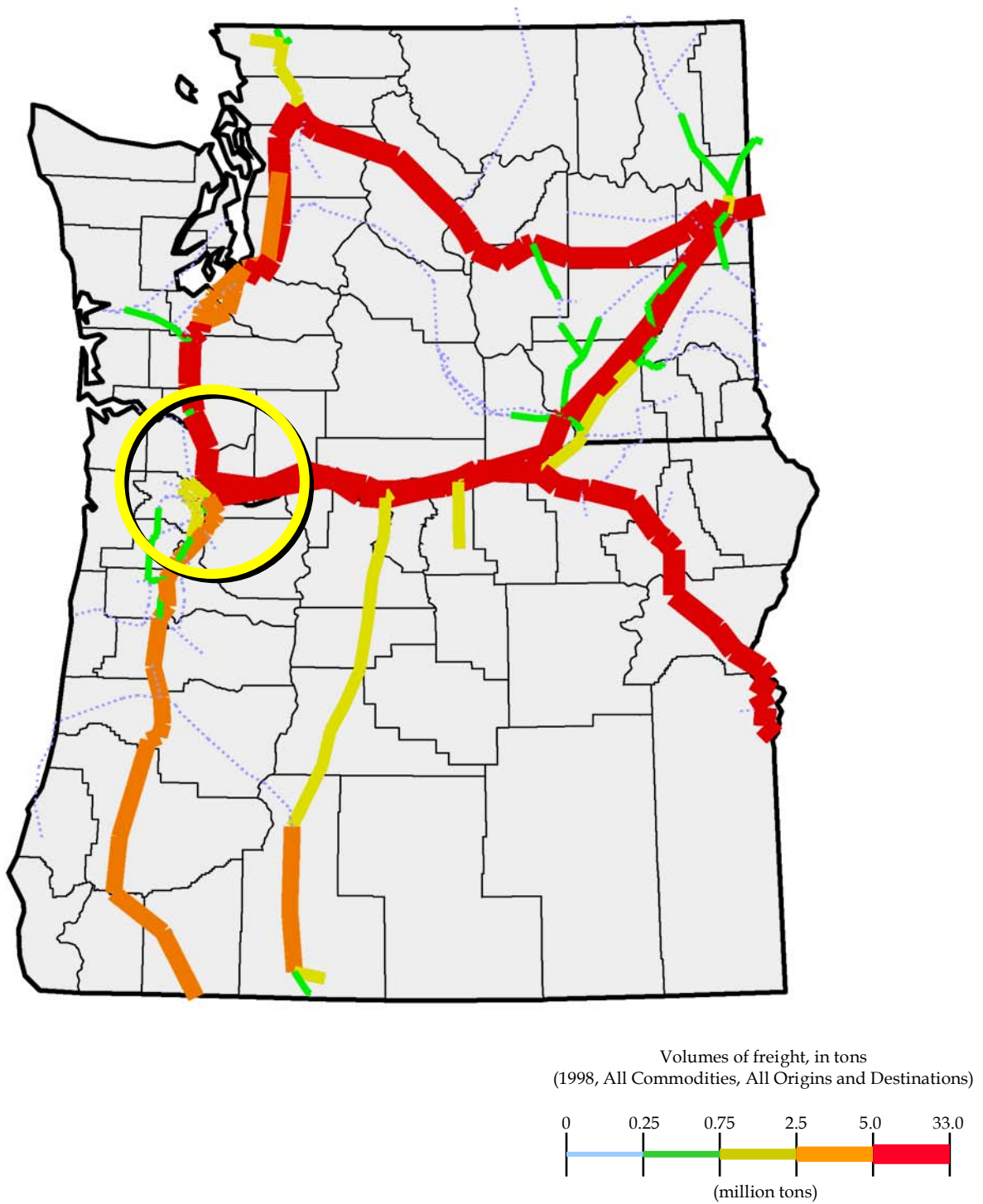
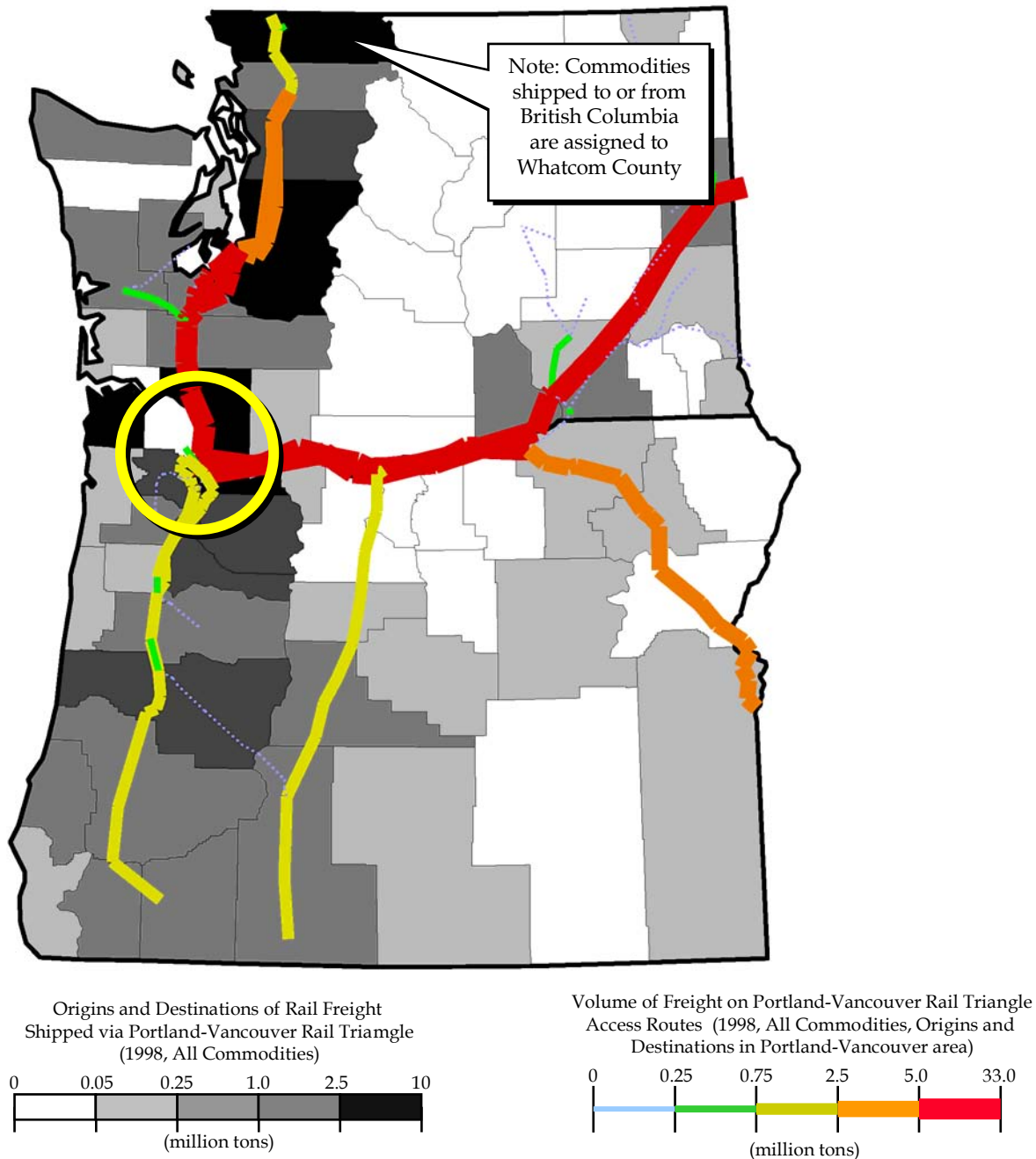


Figure 9. Oregon-Washington Origins and Destinations for Rail Freight Using the Portland-Vancouver Rail Triangle
With Tonnage of Freight on Rail Lines Used to Access Triangle



Congestion at the Crossings Impedes Oregon and Washington Trade with National Markets

The population and economy of Oregon and Washington are small compared to the other economic regions of the United States. Transportation is critical for Pacific Northwest businesses moving and selling products to the larger California and Eastern markets. Figure 10 shows the relative sizes of the national trade regions. The shaded circles show the relative population size of the major metropolitan areas, the ovals indicate the geographic scope of the multi-state trade regions, and the columns show the relative size of the regional economies measured as a share of national gross domestic product (GDP). (Florida, shown in the dotted-line oval, is usually counted as part of the Atlanta-Southeast trade region, but is emerging as a major, new, trade and distribution center for the Caribbean and Latin America.)

Figure 11 shows the flows of truck freight between the Oregon-Washington region and the rest of the United States; the wider the bandwidth of the highway line, the higher the tonnage of truck freight moving over that highway. The ovals delineate the multi-state trade regions. The small circle shows the location of the I-5 and I-205/Columbia River highway crossings. The density of truck freight on I-5 and I-84 shows the importance of these trade routes to Oregon and Washington businesses and the influence of congestion at the I-5/Columbia River highway crossings.

Congestion at the Crossings Weakens the Region's Competitiveness in Global Markets

The Pacific Northwest is very reliant on international trade. With exports worth \$45 billion per year, Oregon and Washington are more dependent on international trade than the United States as a whole. Figure 12 tracks the value of exports from Oregon and Washington as a percentage of gross regional product compared to the value of exports from the United States as a percentage of gross domestic product.

Good access to Pacific Northwest ports and airports—measured in travel time, cost, and reliability—gives the region's businesses a competitive edge in reaching global markets. However, the Portland-Vancouver area's preeminent position as an export region is being undermined by global competition and rising transportation costs.

Over half of the Pacific Northwest's export trade today is with Pacific Rim countries; much of it is trade in grain that moves through Portland-Vancouver and other Columbia River ports. Grain export sales are particularly sensitive to cost. Differences of a few cents a ton affect buyers' choices among global suppliers. Highway and rail congestion at the Portland-Vancouver crossings increases the cost and decreases the reliability of export shipments, weakening the competitive position of businesses selling to overseas markets.

**Figure 10. Gross Regional Products of Eight U.S. Trade Blocs
With Major Population Centers**



**Figure 11. National Freight Flows for Goods with Origins or Destinations
in Oregon or Washington**

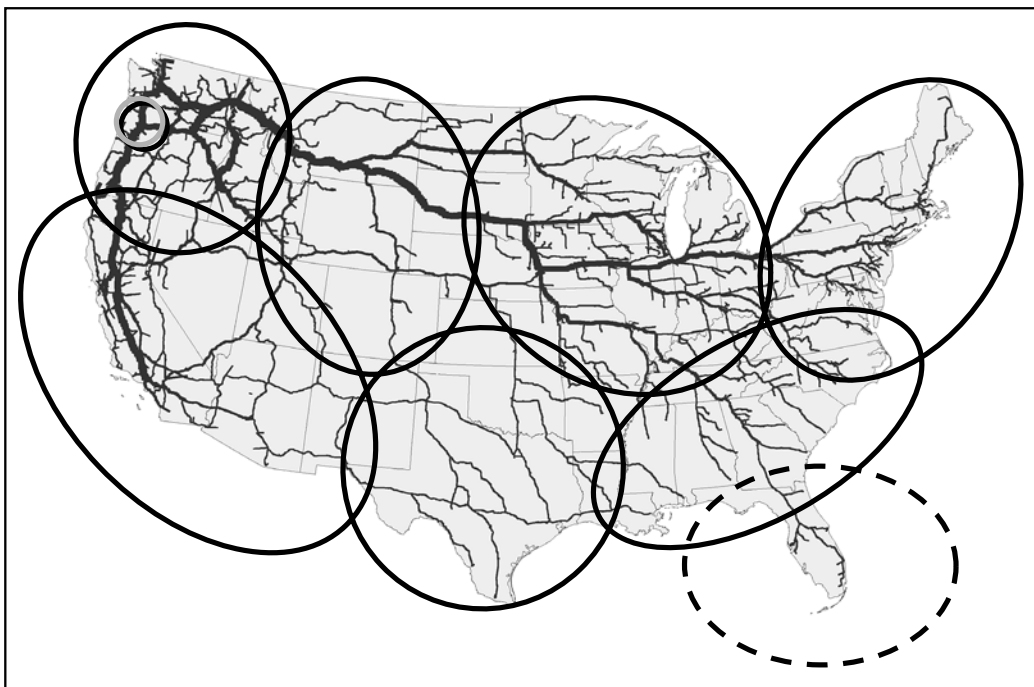
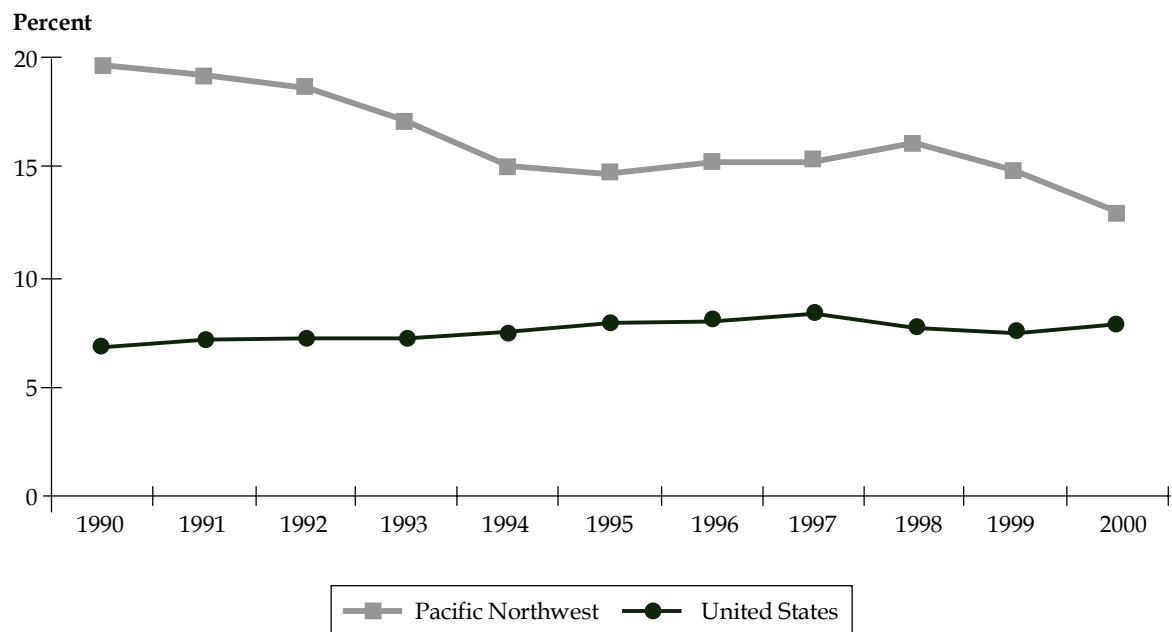


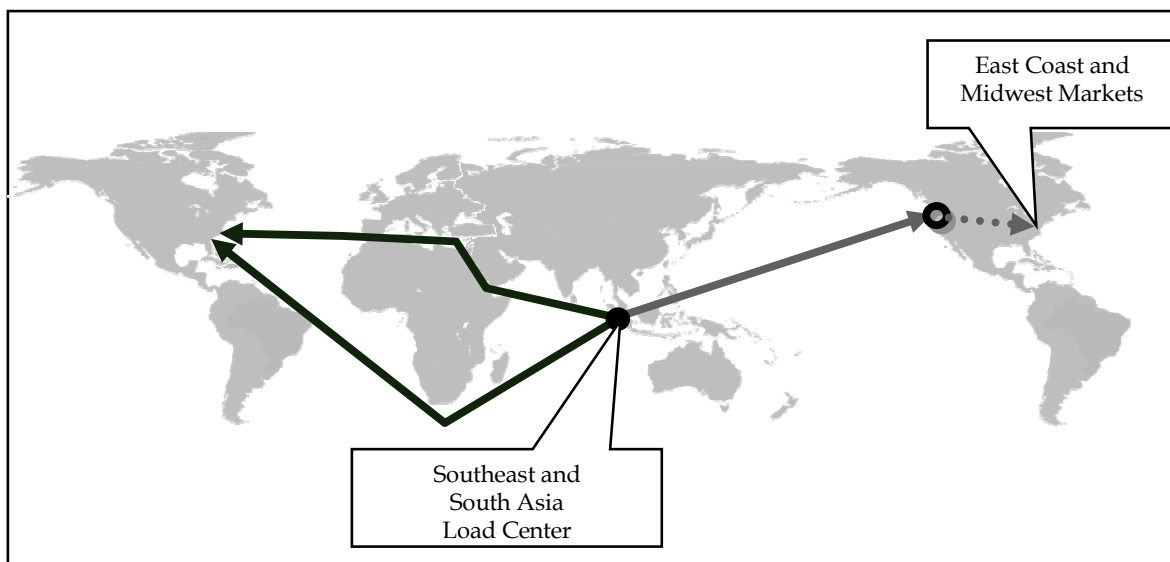
Figure 12. Oregon-Washington Exports as a Percentage of Oregon-Washington Gross Regional Product and U.S. Exports as a Percentage of U.S. Gross Domestic Product



The ports of Seattle and Tacoma have been major transshipment centers for imported merchandise moving from the Pacific Rim to Midwest and East Coast markets. About half of rail shipments originating from Seattle-Tacoma travel south through Portland-Vancouver, then eastward along one of the Columbia River Gorge rail lines.

The Pacific Northwest remains a major trading partner for Korea, Japan, China, and Taiwan. But the Pacific Northwest is no longer on the shortest, most cost-effective route from the growing, global load centers of South and Southeast Asia to the major United States Midwest and East Coast markets. As illustrated in the schematic diagram in Figure 13, when the cost of transporting goods by land across the United States is considered, shipping routes via the Cape of Good Hope or the Suez Canal and the Atlantic Ocean are now competitive with Pacific routes. The Pacific Northwest ports will be competing more and more with the ports in New York, New Jersey, and the Southeast United States as well as the ports of Los Angeles-Long Beach. For Oregon and Washington ports to maintain or increase their share of the global merchandise trade, access to and from its ports must be as reliable and cost-effective as possible.

Figure 13. Shipping Routes from Southeast and South Asia Load Centers to East Coast and Midwest Markets in U.S.



Regional Growth and Increasing Demand for Freight Transportation Will Magnify the Economic Impacts of the Crossing Choke Points

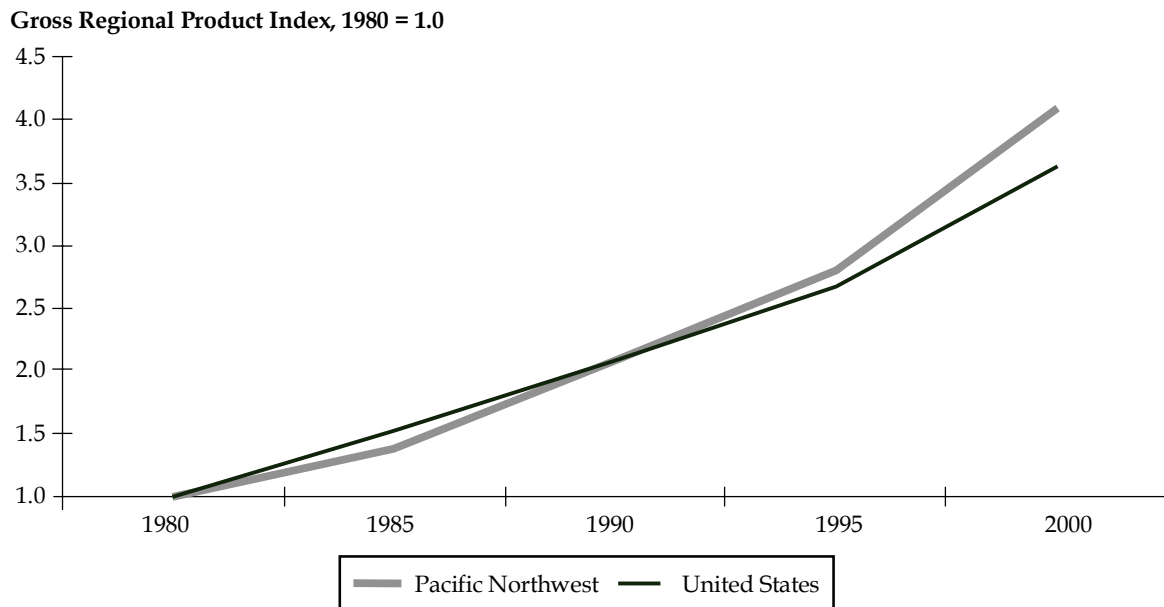
The region has significant potential for economic expansion. Regional economic growth has averaged 3.4 percent per year over the last 20 years, outpacing the United States average in the last decade. Figure 14 compares the growth of the Oregon-Washington economy to the United States average. Regional employment also has grown faster than the national average.

Despite a recent slowdown in the economy, the economy of the Pacific Northwest is forecast to match or exceed the national average over the next 20 years. With this growth will come increased demand for reliable and cost-effective freight transportation. At a moderate, national economic growth rate of 3.1 percent per year, import-export freight tonnage could double by 2020 and domestic freight tonnage could increase by about 70 percent.¹⁰

"Traffic on I-5 makes it difficult for us to do business in Washington. It takes too long to get there and back."
Portland freight shipper

¹⁰Federal Highway Administration, Freight Analysis Framework Project estimates, December 2002.

Figure 14. Growth in Oregon-Washington Gross Regional Product (GRP) and U.S. Gross Domestic Product (GDP)



This growth will strain the national freight transportation system. Over the last two decades, passenger and freight movements on the nation's transportation system have increased dramatically. Vehicle-miles-of-travel (VMT) by passenger cars and trucks grew by 72 percent while construction of new road-lane-miles grew by only one percent.¹¹ Over the same period, ton-miles-of-freight moving over the nation's railroads increased by 55 percent while rail system mileage actually declined because unused track was removed.¹²

The Portland-Vancouver area and the Pacific Northwest can expect growth in freight volumes to occur at rates faster than the national average, with import-export freight tonnage growing 123 percent between 1998 and 2020 and domestic freight tonnage increasing by 76 percent.¹³ If the forecast growth in freight is not accompanied by increases in capacity, worsening congestion will make supply chains less reliable, drive up the cost of labor and materials, and undermine the competitive position of Pacific Northwest businesses.

¹¹Federal Highway Administration, *Highway Statistics*.

¹²Eno Foundation.

¹³Federal Highway Administration, Freight Analysis Framework Project estimates, December 2002. For additional detail and comparative information for other regions see <http://www.ops.fhwa.dot.gov/freight/adfrmwrk/index.htm>.

■ Economic Effects by Industry

The Regional Economy Is Dependent on Safe, Reliable, and Cost-Effective Transportation

Transportation underpins the \$350 billion economy of Oregon and Washington and the region's 5.5 million jobs.¹⁴ Figure 15 shows the contribution of each major sector to the gross regional product (GRP) of the Oregon-Washington economy. Figure 16 shows the distribution of jobs by sector.

Businesses and employees in all sectors of the Oregon-Washington economy depend on safe, reliable, and cost-effective transportation. Figure 15 also shows the percentage of each sector's contribution to the GRP that is spent on transportation to support that sector. The expenditures range from a high of 7.7 percent in the agricultural sector, which moves heavy, high-bulk products, to a low of 0.6 percent in the finance-insurance-and-real-estate (FIRE) sector, which moves light, high-value products. Compared to other nations, these expenditures are low, reflecting the United States' immense and successful investment in high-quality and cost-efficient transportation systems.

However, the Oregon-Washington economy is more dependent on transportation and spends more proportionally on transportation than the nation as whole. Overall, the Oregon-Washington economy spends 3.35 percent of its GRP on transportation, 6.7 percent more than the national average of 3.14 percent.¹⁵ It is more dependent because five transportation-intensive sectors—agriculture, construction, transportation and utilities, wholesale and retail trade, and manufacturing—make up 54 percent of the Oregon-Washington economy, but only 49 percent of the national economy.

Transportation congestion and delay reduce the productivity and profitability of businesses in the transportation-intensive sectors. These businesses pass along some of the congestion and delay costs to businesses in the service, FIRE, and government sectors that depend on the transportation-intensive sectors. Congestion and delay costs have a multiplier effect that is felt throughout the region's economy. When the transportation-intensive sectors do well, the overall Oregon-Washington economy does well; when productivity in the transportation-intensive sectors drops, so does the health of the region's overall economy.

¹⁴Bureau of Economic Analysis.

¹⁵Bureau of Economic Analysis. Gross domestic product is reported in chained 1996 dollars. The percentage transportation expenditures by sector are based on the U.S. Transportation Satellite Accounts for 1996.

Figure 15. Oregon and Washington Gross Regional Product by Industry Sector

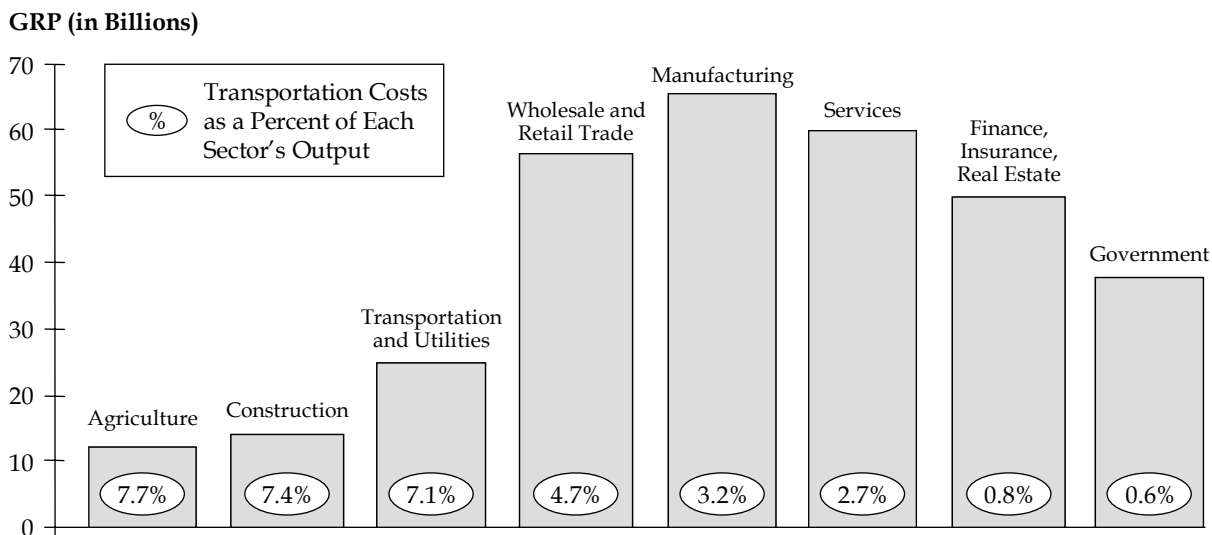
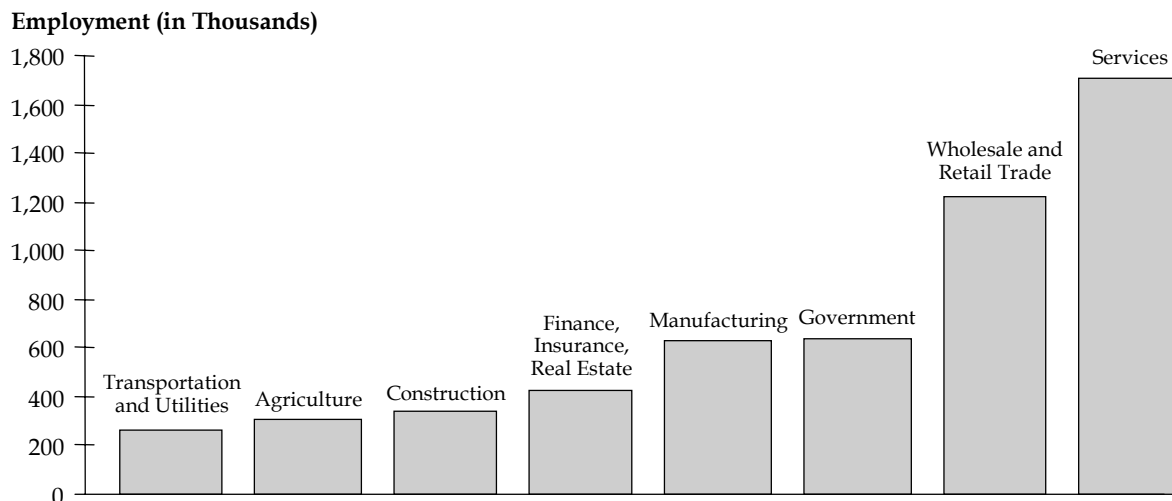


Figure 16. Oregon and Washington Employment by Industry Sector



Within the transportation-intensive sectors, five specific industries are especially sensitive to the Portland-Vancouver highway and rail choke points. These industries are:

- Lumber, wood, and paper products;
- Transportation equipment manufacturing and steel;
- Farm and food products;
- High-technology (electronics and scientific instruments); and
- Distribution and wholesale trade.

These freight-intensive industries account for 30 percent of the Oregon-Washington GRP and 20 percent of the states' employment.¹⁶ Table 2 provides a breakout of contribution of these industries to the GRP. Table 3 provides a breakout of employment by industry.¹⁷

Table 2. Contribution to Oregon and Washington Gross Regional Product of Five Freight-Intensive Industries

| GRP by Industry (in \$ Millions) | 1990 | 2000 |
|--|---------------|---------------|
| Lumber/Wood/Paper | 10,623 | 7,293 |
| Distribution/Wholesale Trade | 16,074 | 28,588 |
| Transportation Equipment/Steel | 10,937 | 9,829 |
| Farm and Food Products | 12,549 | 18,983 |
| High-Tech (Electronics and Scientific Instruments) | 2,537 | 34,332 |
| Total | 52,720 | 99,025 |
| Total as a Percentage of Oregon and Washington GRP | 26% | 31% |

¹⁶Bureau of Economic Analysis.

¹⁷American Electronics Association, *Cyberstates 2002*. The high-technology industry numbers shown in the tables cover the electronics industry and the scientific instruments industry, selected because these sectors correspond to the Standard Transportation Commodity Code industry classifications used in analyzing the movement of goods. The American Electronics Association (AEA) uses a broader definition of high-technology that includes high-tech services such as software development. The AEA's classification shows 225,200 high-tech employees in Oregon and Washington in 2001.

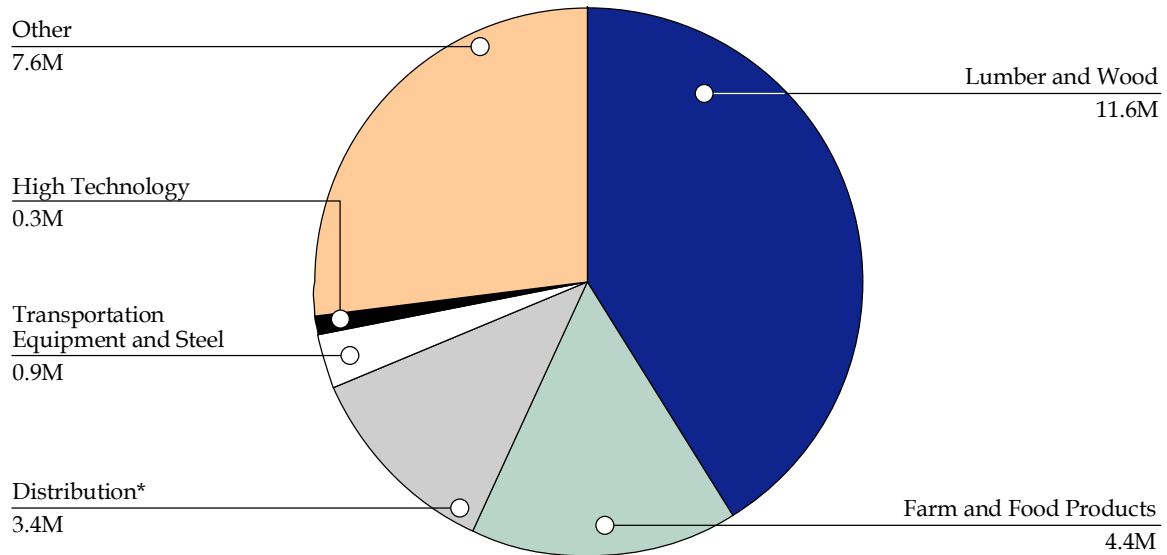
Table 3. Employment in Five Freight-Intensive Industries

| Employment by Industry | 1990 | 2000 |
|--|----------------|----------------|
| Lumber/Wood/Paper | 143,712 | 114,331 |
| Distribution/Wholesale Trade | 294,668 | 350,875 |
| Transportation Equipment/Steel | 169,254 | 144,846 |
| Farm and Food Products | 208,962 | 211,655 |
| High-Tech (Electronics and Scientific Instruments) | 56,246 | 85,333 |
| Total | 872,842 | 907,040 |
| Total as a Percentage of Oregon and Washington GRP | 24% | 20% |

These five industries account for approximately 70 percent of the commodity tonnage crossing the I-5 and I-205/Columbia River bridges by large truck¹⁸ and about 60 percent of the commodity tonnage moving through the Portland-Vancouver rail triangle. Figure 17 shows the distribution of commodity tonnage by industry for the I-5 and I-205/Columbia River bridges. Figure 18 shows the distribution of commodity tonnage by industry for the rail network. (These figures are commodity or net tonnage numbers; they are not gross tonnage numbers, which would include tonnage for truck tractors and trailers or locomotives and cars.)

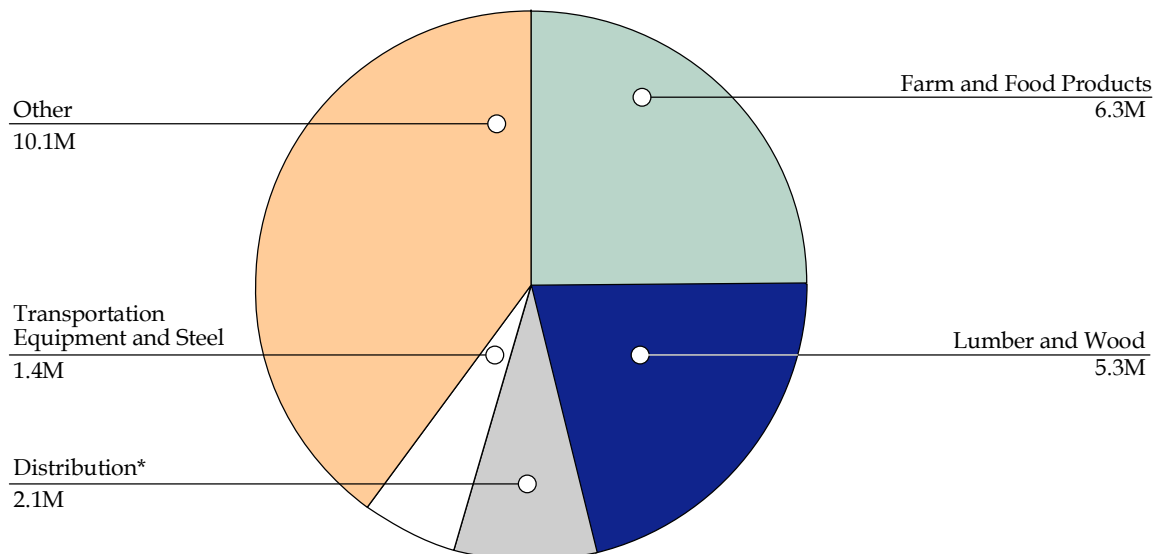
¹⁸The statistics capture primary and long-haul freight moves (e.g., supplier-to-manufacturer; manufacturer-to-distribution center; and most intermodal moves), but do not capture local distribution-to-retail moves and farm-to-processor moves. The long-haul freight moves are typically made in large over-the-road trucks (e.g., 18-wheel, tractor-semi-trailer trucks or heavy-duty three-axle trucks). The statistics do not capture moves made by smaller trucks and service vehicles. The total of all freight movement by truck will be higher than reported in the figures, but reliable data accounting for all truck moves are not readily available.

Figure 17. Distribution of Freight Tonnage Crossing the I-5 and I-205 /Columbia River Bridges by Industry



* Distribution (or "Miscellaneous Shipments") includes most intermodal shipments.

Figure 18. Distribution of Freight Tonnage Using the Portland-Vancouver Rail Triangle by Industry



* Distribution (or "Miscellaneous Shipments") includes most intermodal shipments.

The five freight-intensive industries represent the Pacific Northwest's:

- Traditional economic strengths—lumber, wood, and paper products; transportation equipment and steel; and farm and food products;
- Key emerging industries that are critical to the region's future growth—high-technology; and
- Goods-moving sectors that supply manufacturers, retailers, and service-sector offices—distribution and warehousing.

These industries place significant demands on the transportation system and are particularly vulnerable to the delays and decreased travel time reliability resulting from roadway and rail congestion in Portland and Vancouver.

The next sections of the report examine each of these five industries, providing an overview of key industry trends, a look at the importance of the Portland-Vancouver choke points to the industry's logistics, and a discussion of the economic effects of the choke points on the industry. Brief case studies of the experience of specific firms are provided for each industry. The industry profiles and case studies were built from interviews with company executives, industry association experts, and regional development economists.

Lumber, Wood, and Paper Products Industry

| | |
|---|---------------|
| Standard Industry Classification Codes: | 24 and 26 |
| Oregon and Washington Employment (2000): | 114,331 |
| Oregon and Washington Value of Production (2000): | \$7.3 billion |

Industry Trends

Lumber, wood, and paper are traditional pillars of the Pacific Northwest economy. While employment and output in this industry have been declining for years in the region, a shift toward more value-added processing has created new opportunities. This increasing specialization translates to less cost-sensitive export of bulky raw materials and more time-sensitive export of higher-value processed goods. For example, instead of exporting large volumes of logs, more wood is now transformed into high-value items such as structural architectural framings before being shipped to domestic markets or overseas.

Importance of Crossings to Industry

The Pacific Northwest has been a primary source of lumber and wood products for much of the United States market. Lumber and wood products were shipped from the Pacific Northwest to the major United States Midwest and East Coast markets. However, the supplier-market relationship has changed over time. Today, Oregon and Washington continue to be principal suppliers to the large Southern California market, but lumber- and wood-product manufacturers in the South Central states and Ontario now supply the Midwest market, and Southeastern United States and Eastern Canada suppliers serve the East Coast market. This has caused a major reorientation of the industry's shipping patterns—from predominantly west-to-east to predominantly north-to-south today.

Figure 19 presents a western United States picture of rail shipments of lumber, wood, and paper products that move through the Portland-Vancouver rail triangle. The figure shows the counties that ship or receive rail freight moving through the triangle; the darker gray the county, the more tonnage is shipped or received from that county. (Commodities shipped to and from British Columbia are assigned to Whatcom County.) The figure also shows freight-rail tonnage of lumber, wood, and paper products moving on the major rail lines; the wider and redder the bandwidth of the rail line, the greater the commodity tonnage carried on the rail line. (Figure 19 reports net commodities tonnages, not gross tonnages, which would include the weight of the locomotive and railcars.) Oregon and Washington lumber, wood, and paper products moving through the Portland-Vancouver area today is strongly oriented towards the Southern California and Texas markets.

Truck shipments of lumber, wood, and paper products that cross the I-5/Columbia River bridge are even more strongly oriented to the Southern California market. Figure 20 shows West Coast truck shipments of lumber, wood, and paper products that cross the I-5/Columbia River bridge. As in the rail figure, the gray scale indicates the total commodity tonnage shipped and received by county, and the highway bandwidth and color indicate the tonnage of commodities moving by truck along the highways.

Figure 19. Western United States Origins and Destinations for Lumber, Wood, and Paper Products Using the Portland-Vancouver Rail Triangle
With Tonnage of Freight on Rail Lines Used to Access Triangle

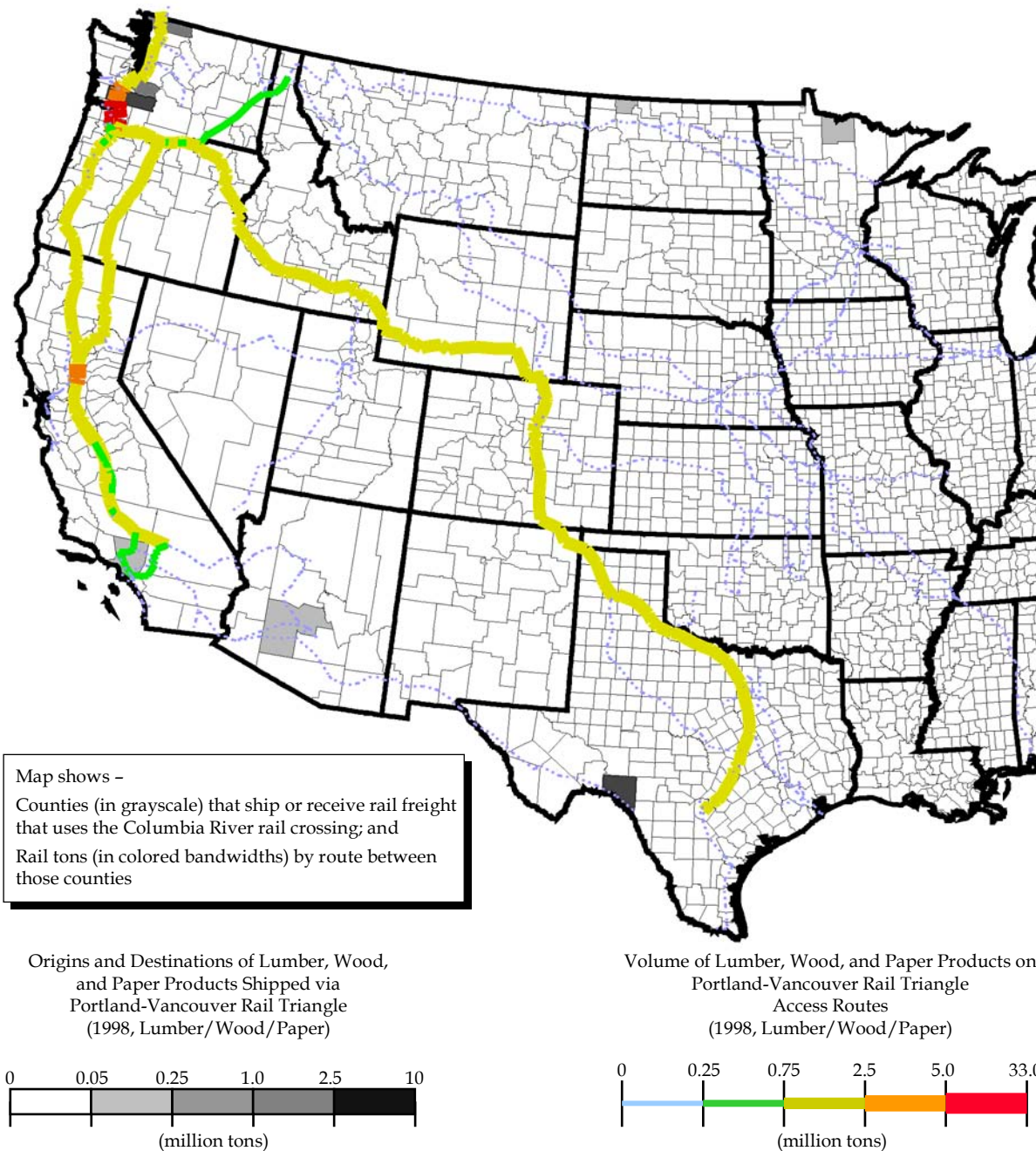


Figure 20. West Coast Origins and Destinations for Lumber, Wood, and Paper Products Crossing the I-5 and I-205 Bridges at Portland-Vancouver With Tonnage of Freight on Truck Routes Used to Access Bridge

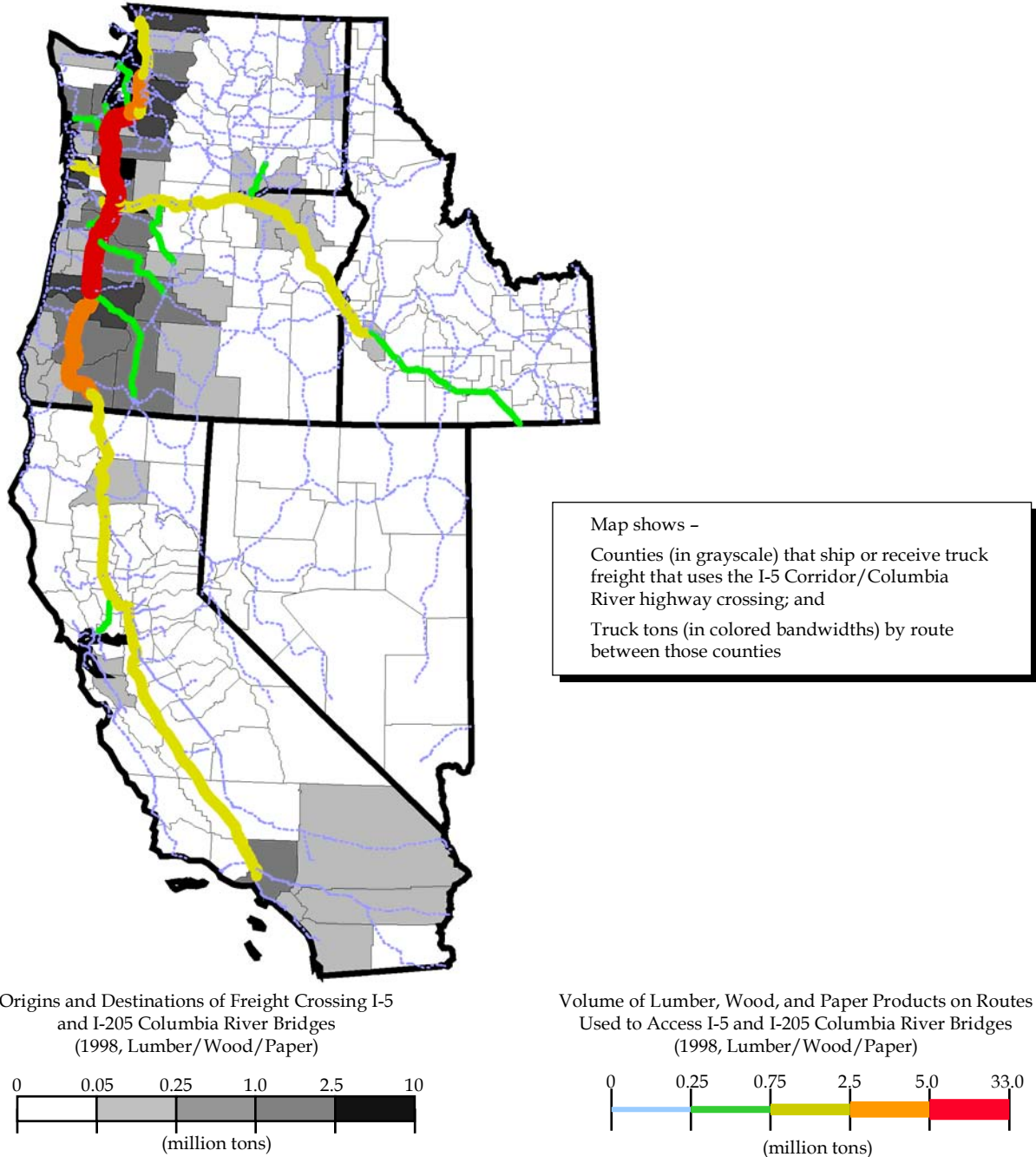


Figure 21 shows more detail of the rail movements of lumber, wood, and paper products through the Portland-Vancouver rail triangle.

Figure 21. Oregon-Washington Origins and Destinations for Lumber, Wood, and Paper Products Using the Portland-Vancouver Rail Triangle
With Tonnage of Freight on Rail Lines Used to Access Triangle

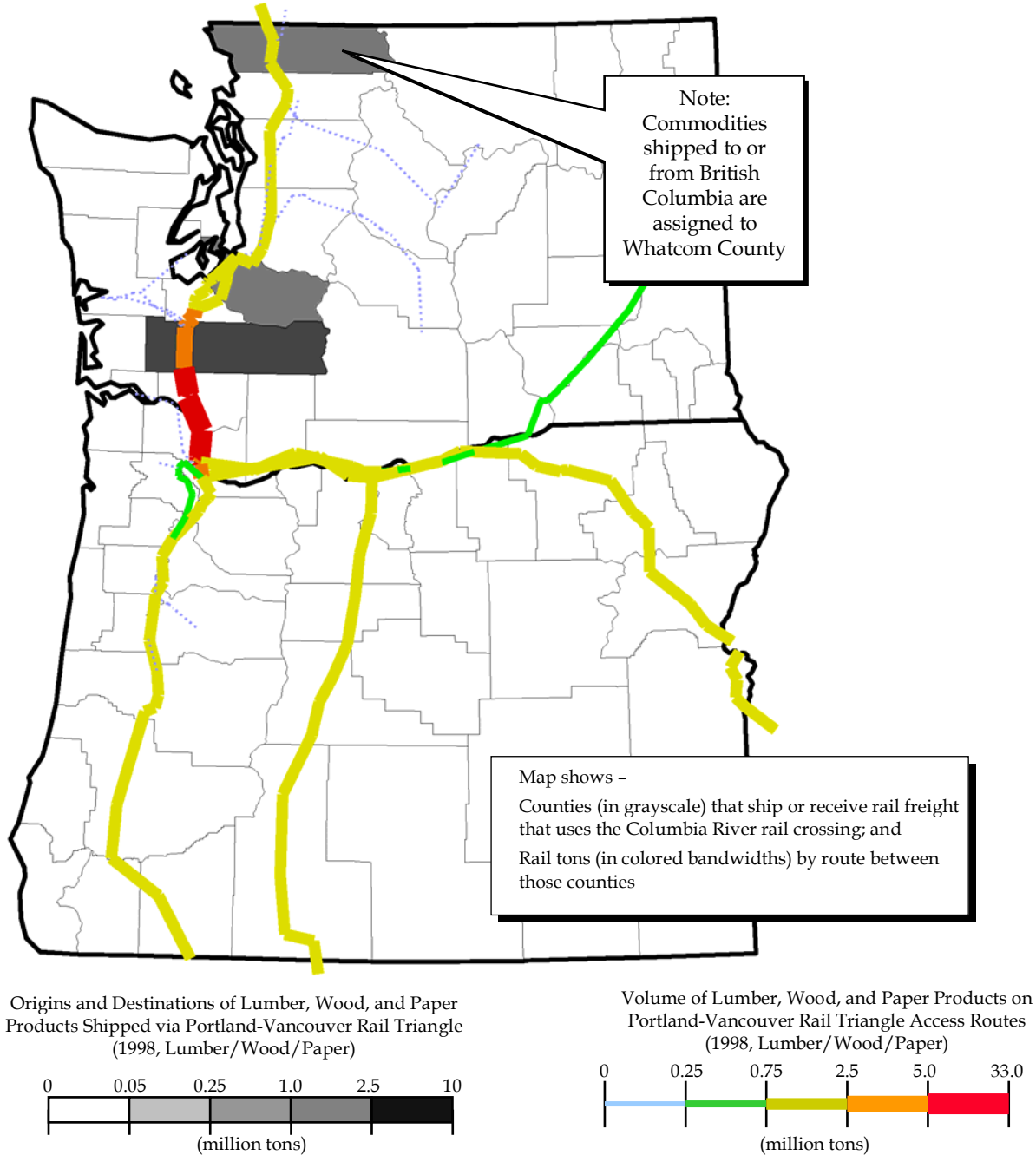


Figure 22 illustrates the pattern of truck movements of lumber, wood, and paper products within Oregon and Washington. It shows that every county in western Oregon and western Washington has a stake in reliable truck movement across the I-5/Columbia River bridge. Again, the figure shows just those truck shipments of lumber, wood, and paper products that cross the I-5/Columbia River bridge, but it includes inter-plant truck moves (described in the case study below) as well as truck moves for export and import. Although North American production accounts for most lumber-related traffic in the region, overseas wood imports are growing. Radiata pine logs from New Zealand arrive at the Port of Portland and then are transported by truck to provide feedstock for Pacific Northwest lumber mills, allowing the mills to be utilized more fully. To reach mills in southwestern Washington, lumber trucks must negotiate port-area congestion exacerbated by I-5 traffic and then cross either the I-5 or I-205 bridges.

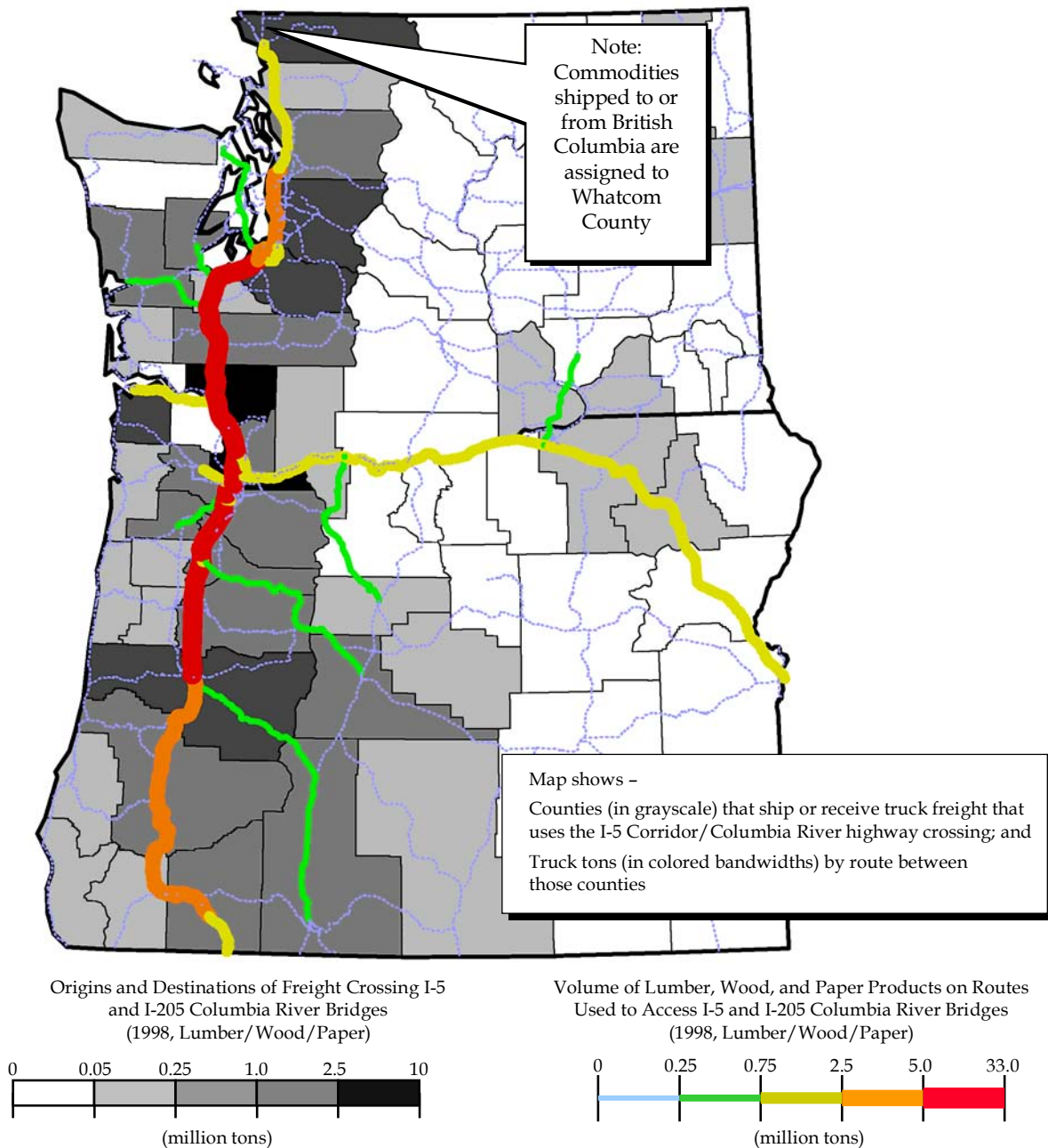
Effects of Choke Points on Industry

Highway and rail congestion at the Portland-Vancouver crossings affect the lumber, wood, and paper products industry by:

- Shrinking the supply areas that serve mills and reducing manufacturing plant efficiency by making it more costly to move logs, chips, and production materials between mills and manufacturers that are located outside the Portland-Vancouver area;
- Increasing the cost of reaching national markets by raising long-haul trucking and rail costs. Lumber and wood products transported by rail must negotiate congestion in the Portland-Vancouver terminal area before continuing on to more distant domestic markets, including Los Angeles and Dallas-Fort Worth. Congestion leads to longer transit times and deteriorating delivery reliability, making rail less competitive than trucking. However, trucking costs for heavy, bulky lumber and wood products are usually higher than rail costs, especially for long-distance trips. In the long term, increased shipping costs could cause Oregon-Washington businesses to lose market share and profitability.
- Increasing the cost of exports and imports. Exports generate jobs and income for Oregon and Washington, and imports increasingly help keep the region's mills running. Congestion that increases transit times and reduces delivery reliability also undermines the competitiveness of Oregon-Washington businesses in global markets. As trade volumes drop, ports lose economies of scale and may become less cost-efficient and less attractive to shippers.

On a national scale, the delays and costs encountered at the Portland-Vancouver crossings impact the nearly eight percent of United States lumber, wood, and paper production that emanates from Oregon and Washington.

Figure 22. Oregon-Washington Origins and Destinations for Lumber, Wood, and Paper Products Crossing the I-5 and I-205 Bridges at Portland-Vancouver With Tonnage of Freight on Truck Routes Used to Access Bridge



Lumber, Wood and Paper Products Case Study
Interstate Wood Products

Firm Location: Kelso, Washington.

Products: Hauling of wood chips from lumber mills to processing plants.

Background: Interstate Wood Products is a medium-sized trucking firm that specializes in hauling wood chips from lumber mills to processing plants where the chips are converted to pulp, paper, and board products.

Product Shipping Processes: The company is located 50 miles north of Portland and 125 miles south of Seattle. Serving west-central Washington and northern Oregon, the company uses specialized trucks to pick up scrap wood chips at lumber mills and deliver them to processing plants. The processing plants are capital intensive and require a steady stream of feedstock (wood chips) to keep them operational. Disruptions in production due to a lack of chips are costly.

Effects of I-5/Columbia River Crossing Congestion on Company: Interstate Wood Products has already been priced out of the Seattle market due to congestion. The company formerly linked mills and plants north and south of Seattle, but congestion made round-trip times long, unpredictable, and costly – four-hour round-trips through Seattle frequently extended to six and eight hours due to traffic jams. Now, due to congestion at the I-5/Columbia River and I-205 highway crossings, the company is encountering similar problems in linking clients north and south of Portland.

Impacts on Competitiveness: Congestion has reduced the service area for Interstate Wood Products. Already squeezed out of markets north of Seattle, the company now finds congestion threatening access to clients south of Portland. Fewer and smaller markets translate into less efficient use of the company's capital equipment, resulting in higher costs, possibly fewer jobs, and lower profitability. Poor reliability and increasing delays make the region's lumber, wood, and paper product producers less competitive as costs are either passed on to customers. If costs cannot be passed on due to competition with other regions, the Oregon and Washington companies must absorb the costs themselves, reducing profits and lowering long-term viability.

Farm and Food Products Industry

| | |
|---|-------------------|
| Standard Industry Classification Codes: | 01, 02, 07 and 20 |
| Oregon and Washington Employment (2000): | 211,655 |
| Oregon and Washington Value of Production (2000): | \$19.0 billion |

Industry Trends

The productivity of the Pacific Northwest agricultural industry is growing, with output expanding while overall employment remains steady. The region is a leading grower of grains; grass seed; a wide variety of fruits (including apples, pears, and raspberries), vegetables, and horticultural products (including azaleas and Christmas trees). The region also has a significant food products industry, producing processed items such as wine, pasta, and roasted coffee.

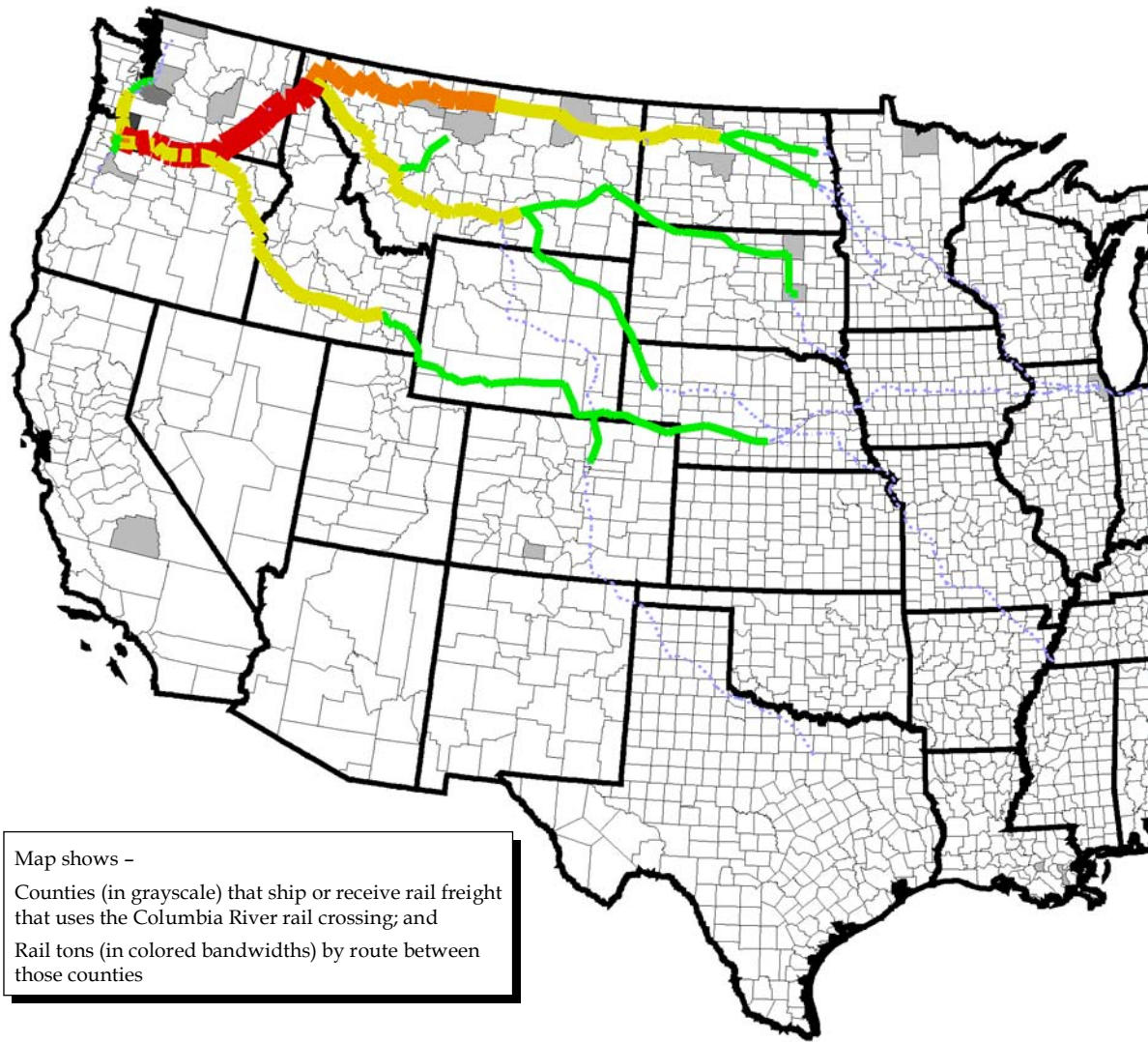
Importance of Portland-Vancouver Crossings to Industry

Washington, Oregon, Montana, Idaho, and portions of the Upper Midwest have some of the most productive agricultural regions in the country. Farm and food products businesses in these areas depend on the Columbia River ports, the Port of Seattle, and the Port of Tacoma to reach export markets.

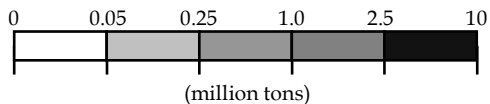
Rail links to the Port of Portland, the largest grain exporting port on the West Coast, are particularly important. Figure 23 shows the pattern of western United States rail shipments of farm and food products that move through the Portland-Vancouver rail triangle. The figure shows how farm and food export shipments from the entire northwestern tier of the country converge on the Port of Portland and other Columbia River ports. Figure 24 shows the pattern of rail shipments of farm and food products within Oregon and Washington. Rail service provides a vital link between eastern Washington agricultural producers who are exporting farm and food products and the ports of Portland-Vancouver and Seattle-Tacoma.

Rail congestion in Portland-Vancouver would be much worse if it were not for the large volumes—over 12 million tons annually—of grain and other products transported by barge to and from the Port of Portland. Barges can economically ship bulk commodities such as the grains grown in eastern Washington and Oregon that would otherwise be shipped almost entirely by rail or truck. Competition among the three modes generally keeps down the price of shipping farm and food products although competition varies by location. Figure 25 shows the tonnage and types of commodities moved by barge downriver (inbound) to the Portland-Vancouver ports and upriver (outbound) to eastern Washington and Oregon. Barge shipments within the metropolitan area are not included in this figure.

Figure 23. Western United States Origins and Destinations for Farm and Food Products Using the Portland-Vancouver Rail Triangle
With Tonnage of Freight on Rail Lines Used to Access Triangle



Origins and Destinations of Farm and Food Products Shipped via Portland-Vancouver Rail Triangle (1998, Farm and Food Products)



Volume of Farm and Food Products on Portland-Vancouver Rail Triangle Access Routes (1998, Farm and Food Products)

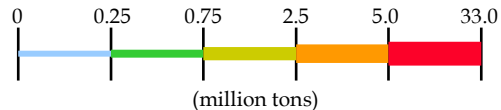


Figure 24. Oregon-Washington Origins and Destinations for Farm and Food Products Using the Portland-Vancouver Rail Triangle
With Tonnage of Freight on Rail Lines Used to Access Triangle

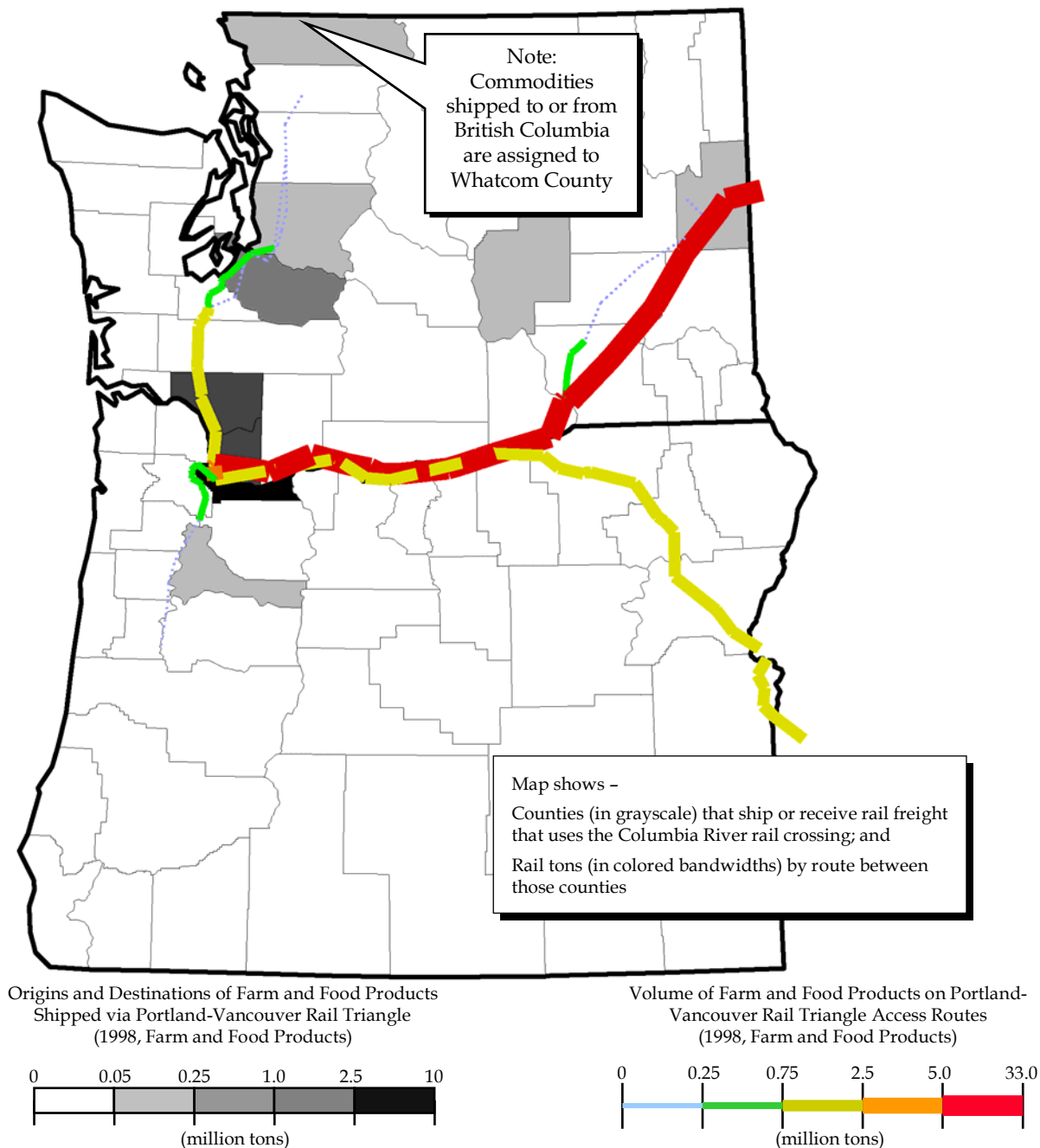
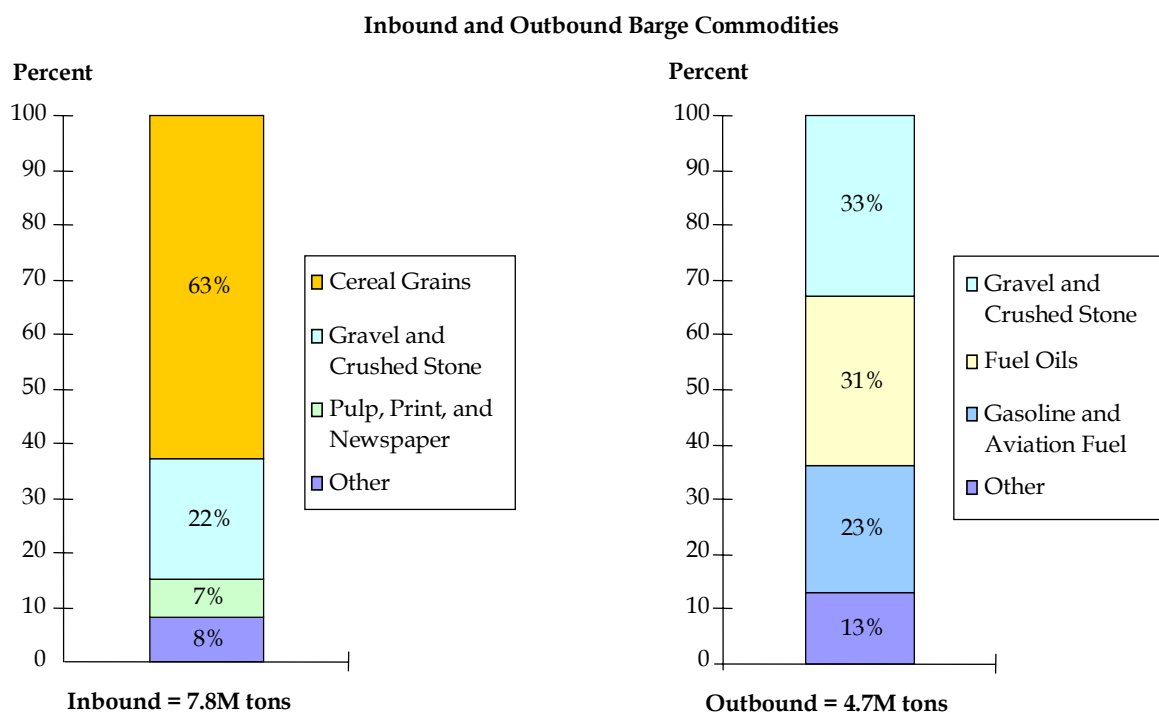


Figure 25. Port of Portland Barge Commodities
Inbound (Downriver) and Outbound (Upriver)



Source: Commodity Flow Database for the Portland Metropolitan Area, 1997.

Trucks, while not used intensively to ship bulk commodities such as grain over long distances, carry large volumes of food products over short distances. Trucks deliver higher value, processed foods to supermarkets and transport highly perishable, time-sensitive food products such as Washington oysters. Figure 26 shows the West Coast movement of farm and food products that cross the I-5/Columbia River bridge by truck. Over 3 million tons of food products are trucked across the I-5/Columbia River bridge annually, with many of these products destined for sale in California markets.

Figure 27 shows the more detailed pattern of truck movements of farm and food products within Oregon and Washington. The gray scale indicates the total commodity tonnage shipped and received by county, and the bandwidth and color of the lines indicate the tonnage of commodities moving by truck along the major highways. The figure makes clear that farm and food products businesses up and down the I-5 corridor, as well as those in central and eastern Oregon and Washington, move products across the I-5/Columbia River bridge.

Figure 26. West Coast Origins and Destinations for Farm and Food Products Crossing the I-5 and I-205 Bridges at Portland-Vancouver With Tonnage of Freight on Truck Routes Used to Access Bridge

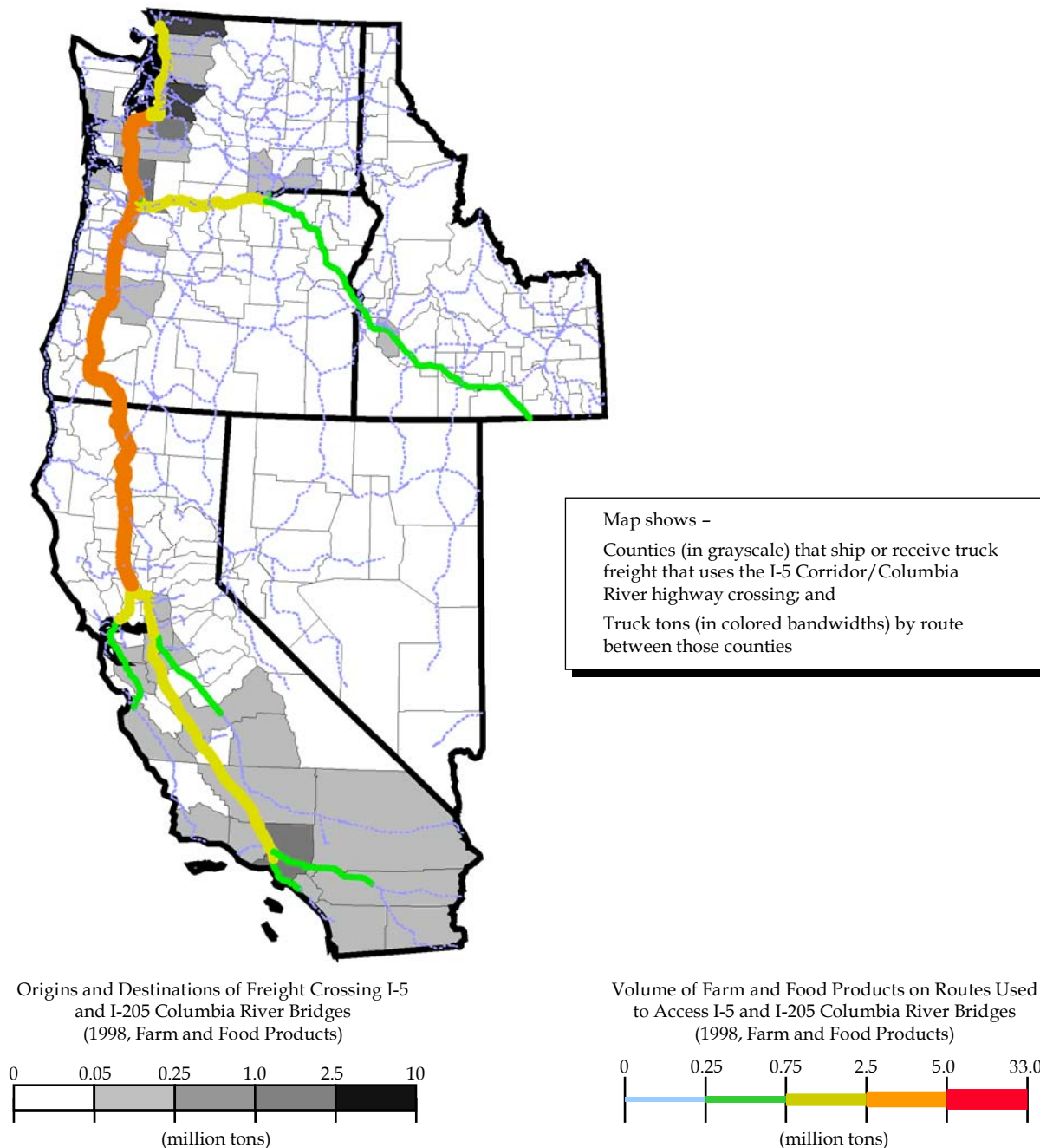
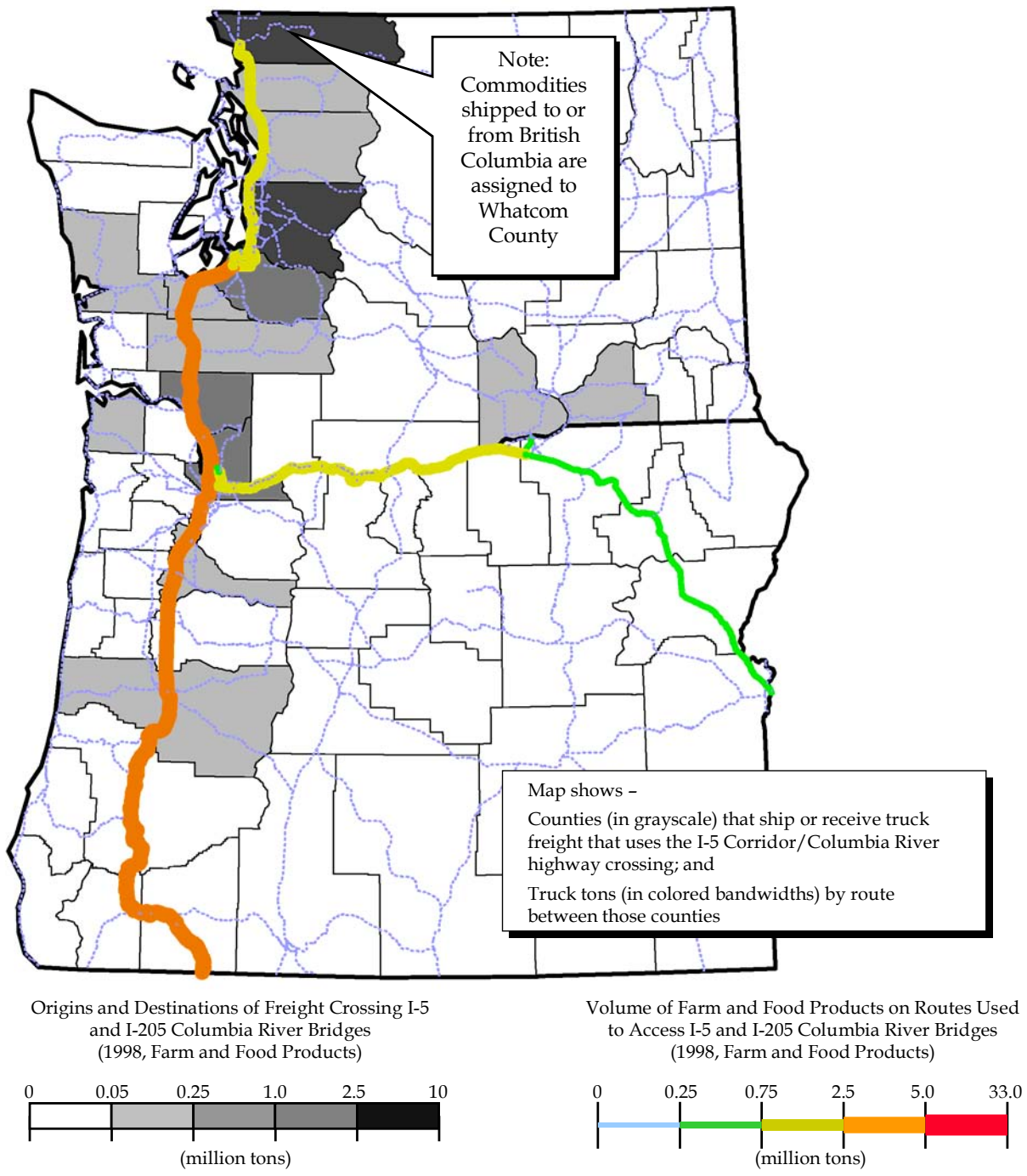


Figure 27. Oregon-Washington Origins and Destinations for Farm and Food Products Crossing the I-5 and I-205 Bridges at Portland-Vancouver With Tonnage of Freight on Truck Routes Used to Access Bridge



Effects of Portland-Vancouver Choke Points on Industry

Producers of farm and food products face challenges similar to those encountered by the region's lumber, wood, and paper products industry. Congestion raises the cost of inter-plant truck moves for value-added food processors. This sector is forecast to be a long-term growth industry for the region, but rising congestion costs risk dampening the potential for job and revenue growth.

More important for the Oregon-Washington economy, many of the agricultural goods produced in Oregon and Washington are global commodities. The Portland-Vancouver highway and rail choke points raise the cost of exports to worldwide markets where competition is measured in differences of cents to the ton. The railroads have introduced heavier, higher-capacity rail cars and longer trains to gain economies of scale and keep down the cost of transportation, especially for long-haul bulk wheat shipments. But, these improvements to one link of the logistics chain are exacerbating congestion in the Portland-Vancouver rail network, which threatens to increase the cost of all rail movements through the area. If shippers pass through the higher transportation costs in their pricing, Oregon-Washington producers risk losing market share to producers overseas or to competing ports in North America.

A large component of the Pacific Northwest farm and food products industry is wheat. The case study below details how wheat and other grains are dependent on a combination of barge and rail service to the Port of Portland. Given existing demands on the Portland-Vancouver rail infrastructure, a decline in barge service would exacerbate existing rail congestion issues.

Farm and Food Products Case Study **Eastern Washington and Oregon Wheat¹⁹**

Background: The eastern parts of Washington and Oregon are national leaders in wheat production. Overall, Washington ranks 3rd among the states in wheat production and Oregon ranks 13th. Portland and the Columbia River ports of Longview and Kalama are critical export gateways for Washington, Oregon, North Dakota, Montana, Idaho, South Dakota, Colorado, Minnesota, and Nebraska grains.

Wheat Production (in bushels) - Leading States, 2000

- | | |
|----------------------|-------------------|
| 1. Kansas | 6. South Dakota |
| 2. North Dakota | 7. Idaho |
| 3. WASHINGTON | 8. Minnesota |
| 4. Montana | 9. Colorado |
| 5. Oklahoma | 10. Texas |
| | 13. OREGON |

¹⁹United States Department of Agriculture, Statistics Service, 2000 data. County rankings fluctuate from year to year.

In 2000, six Oregon and Washington counties ranked among the top 10 wheat growing counties in the entire nation.

Wheat Production (in bushels) - Top Counties in the United States, 2000

- | | |
|----------------------------|---------------------------|
| 1. WHITMAN, Washington | 6. UMATILLA, Oregon |
| 2. LINCOLN, Washington | 7. GRANT, Washington |
| 3. WALLA WALLA, Washington | 8. Cavalier, North Dakota |
| 4. ADAMS, Washington | 9. Bingham, Idaho |
| 5. Polk, Minnesota | 10. Ward, North Dakota |

Product Shipping Processes: On an annual basis, about 133 million bushels of wheat grown in eastern Washington and Oregon are shipped by rail and barge to the Port of Portland for export to foreign markets. Barges account for 61 percent of this total, rail accounts for 36 percent of shipments, and other modes for 3 percent.

Effects of I-5/Columbia River Crossing Congestion: Farmers in Eastern Washington and Oregon depend on barge and rail service to ensure that grains reach the Columbia ports and critical export markets such as Japan. While barges can transport grains directly to deep-sea vessels, rail shipments must move through the congested Portland-Vancouver terminal area before entering the port. If the Columbia River system were to become non-navigable (e.g., because of breaching of dams or low water), farmers would lose the option to ship by barge and would have to rely on rail and truck. A complete shift from barge to rail would require that the Portland-Vancouver rail triangle accommodate an additional 1,100 65-car train sets per year. This would present an immense challenge given existing constraints.

Impacts on Competitiveness: The Pacific Northwest competes in world grain markets with growers from Australia, Canada, France, and Argentina. Pricing is market-driven. Oregon and Pacific Northwest farmers must be cost-competitive to secure orders and maintain profitability. Rail congestion and deteriorating reliability add to costs and threaten profitability by reducing margins. The Columbia River ports do not have the rail capacity to accommodate the increased rail shipments that would result from a total loss of barge traffic. Additional rail capacity in the Portland-Vancouver area would better insure Eastern Washington and Oregon farmers against any possible reduction in barge service.

Transportation Equipment and Steel Industry

| | |
|---|---------------|
| Standard Industry Classification Codes: | 33, 37 |
| Oregon and Washington Employment (2000): | 144,846 |
| Oregon and Washington Value of Production (2000): | \$9.8 billion |

Industry Trends

The Pacific Northwest is home to one of the greatest concentrations of transportation equipment manufacturers in the United States, including Boeing and Paccar in Seattle, and Freightliner and Gunderson in Portland. Suppliers that support the aerospace, truck, and railcar manufacturing industries, including aluminum and steel producers, are located throughout the region.

The transportation equipment industry tends to be very cyclical, rising with economic upturns and falling during recessions. After a decade of robust growth, Boeing, the region's largest employer in the transportation equipment industry, is confronting a sharp decline in jet aircraft orders. In contrast, a major railcar manufacturer, Gunderson, has recently noticed an increase in railcar orders despite the economic slowdown. Overall, production levels for transportation equipment in the Pacific Northwest are declining modestly while employment in the industry is falling more rapidly. As the United States economy recovers, orders for trucks and railcars produced in the region are expected to increase.²⁰ However, the timing of an improvement in Boeing's passenger aircraft sales is less certain because of strong competition and the current glut in the market created by record orders for new planes in the 1990s.

Importance of Portland-Vancouver Crossings to Industry

The transportation equipment sector requires reliable, low-cost access to suppliers and markets located throughout the Pacific Northwest to remain cost-competitive and viable. Parts and supplies are either destined for the Portland-Vancouver area or must transit the area to reach manufacturers in the Puget Sound region. For example, shipments carried by truck from the east or from ports in Washington use I-5 to access the railcar and truck plants in the North Portland industrial complex. The Boeing parts facility in Gresham, Oregon relies on the I-205 bridge to transport supplies to production facilities in the Seattle area, but congestion on that bridge is worsening as growth in the corridor adds new trips and the I-205 bridge draws overflow from I-5.

²⁰For example, Freightliner recently consolidated a Canadian production line into its Portland plant. This is a positive indicator for the future of the Portland plant.

Figure 28 shows the approximate distribution of transportation equipment shippers and receivers and the associated truck moves by value within Oregon and Washington. The figure also shows truck shipments of transportation equipment that cross the I-5/Columbia River bridge. The broad bandwidth of I-5 underscores the importance of the region's ports for import and export of transportation equipment products. The Port of Tacoma is the most important origin and destination for transportation equipment and metal products moved over the I-5/Columbia River bridge by truck. Commodities, including rolled steel, are imported through Tacoma for use by Portland area manufacturers.

Figure 29 shows the corresponding distribution of transportation equipment shippers and truck moves by tonnage (not value as in the prior figure) across the West Coast. Again, the figure shows just those truck shipments of transportation equipment that move across the I-5/Columbia River bridge. The figure reveals the strong interdependence of businesses along the I-5 corridor in Washington and Oregon as well as the strong links between the Oregon-Washington transportation equipment industry and the Southern California aerospace and transportation equipment industries.

The final figure in the series, Figure 30 shows the movement of transportation equipment between Oregon-Washington counties and the western United States. The figure shows counties of origin and destination for products moving through the Portland-Vancouver rail triangle, and the routes used by these products to access the triangle. Many of the transportation equipment industry's finished products are distributed by rail (or air, not captured in these diagrams), rather than by truck. Southern California, the Midwest, and the Port of Houston are primary destinations for transportation equipment passing through the Portland-Vancouver rail network; parts and supplies come from Chicago and east.

Effects of Portland-Vancouver Choke Points on Industry

The manufacturers of transportation equipment require a reliable stream of components and parts to produce aircraft, trucks, ships, and railcars in a timely and cost-effective manner. Congested rail and highway bottlenecks are making the region's transportation system less dependable and are triggering delays that affect the underlying competitiveness of Oregon's and Washington's substantial transportation equipment industry. With strong domestic and foreign competition, the region's transportation equipment industry must remain technically innovative and keep costs low to stay competitive. Growing congestion undermines these efforts.

Parts used in the manufacture of transportation equipment are delayed by congestion at the Portland rail yards. In addition, trucks have difficulty during the peak-travel periods accessing intermodal transfer facilities due to roadway congestion. Congestion in Portland-Vancouver reduces the dependability of deliveries and shipments, adding to business costs in the region.

The case study of Gunderson, below, demonstrates the importance of rail and trucking to maintain the supply streams that keep the company's North Portland production facility running. With its North Portland location, Gunderson is affected first-hand by rail capacity restrictions and congestion on the Columbia River bridges and I-5.

Figure 28. Oregon-Washington Origins and Destinations for Transportation Equipment and Steel Products Crossing the I-5 and I-205 Bridges at Portland-Vancouver With Value of Freight on Truck Routes Used to Access Bridge

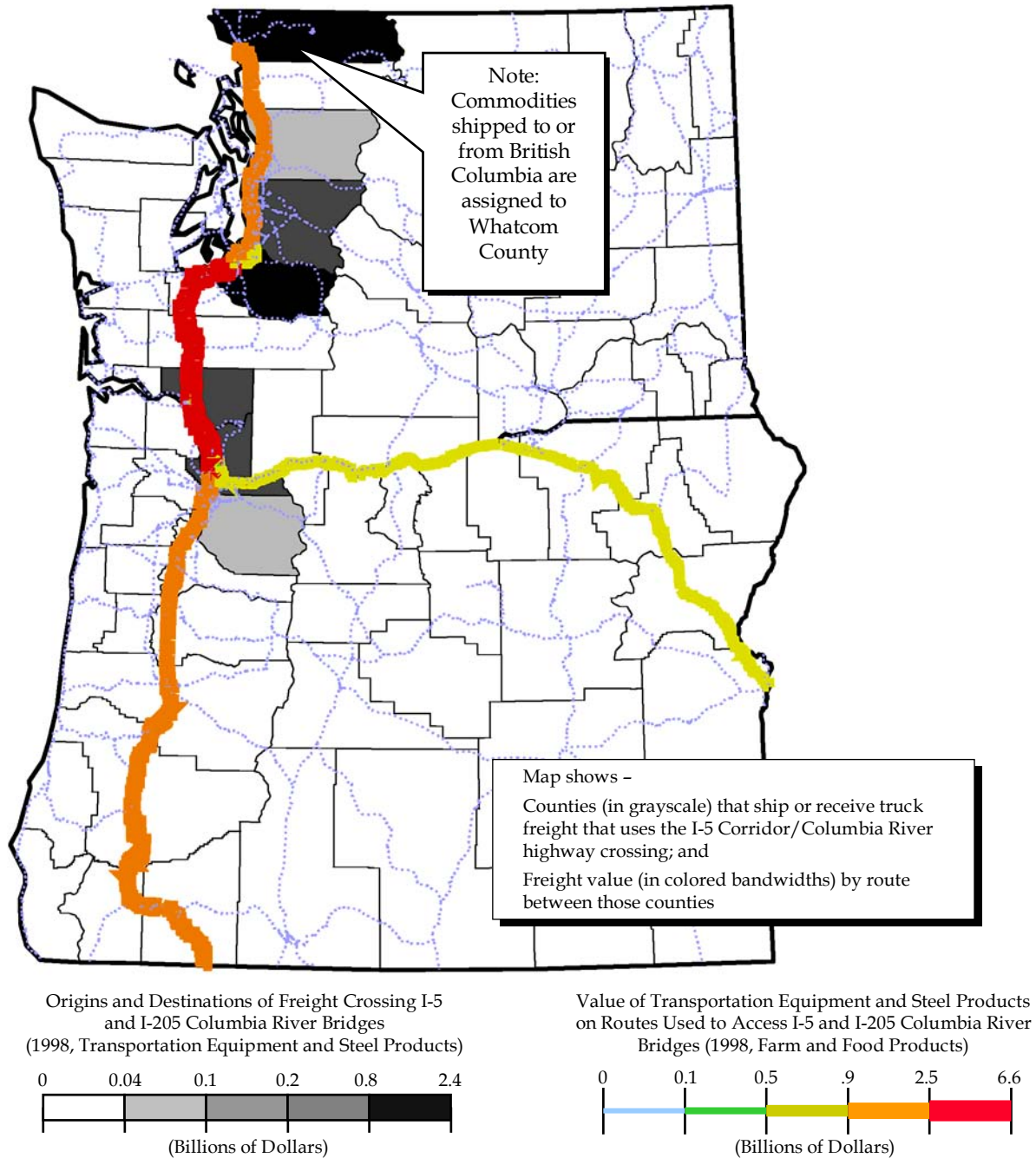


Figure 29. West Coast Origins and Destinations for Transportation Equipment and Steel Products Crossing the I-5 and I-205 Bridges at Portland-Vancouver With Tonnage of Freight on Truck Routes Used to Access Bridge

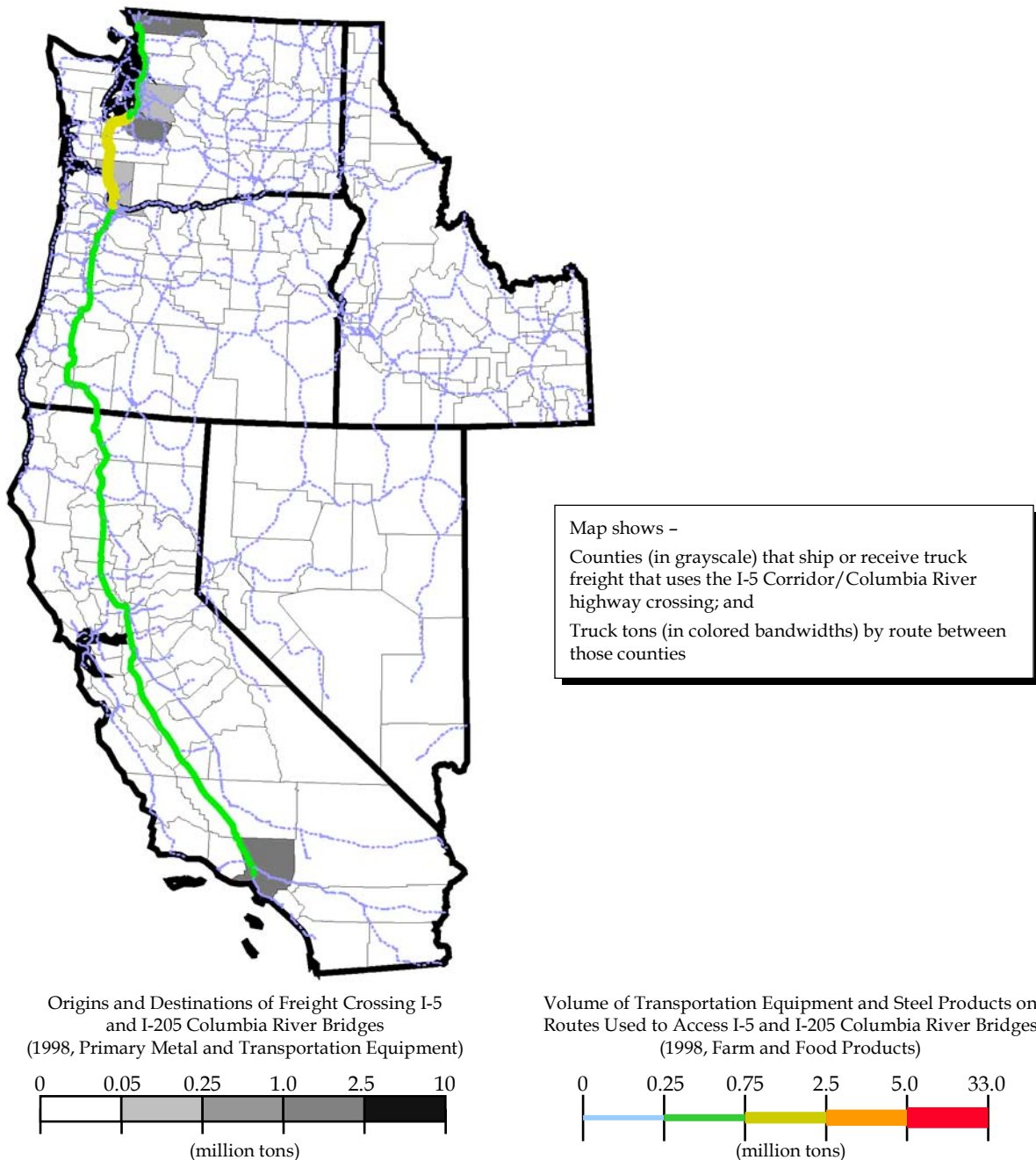
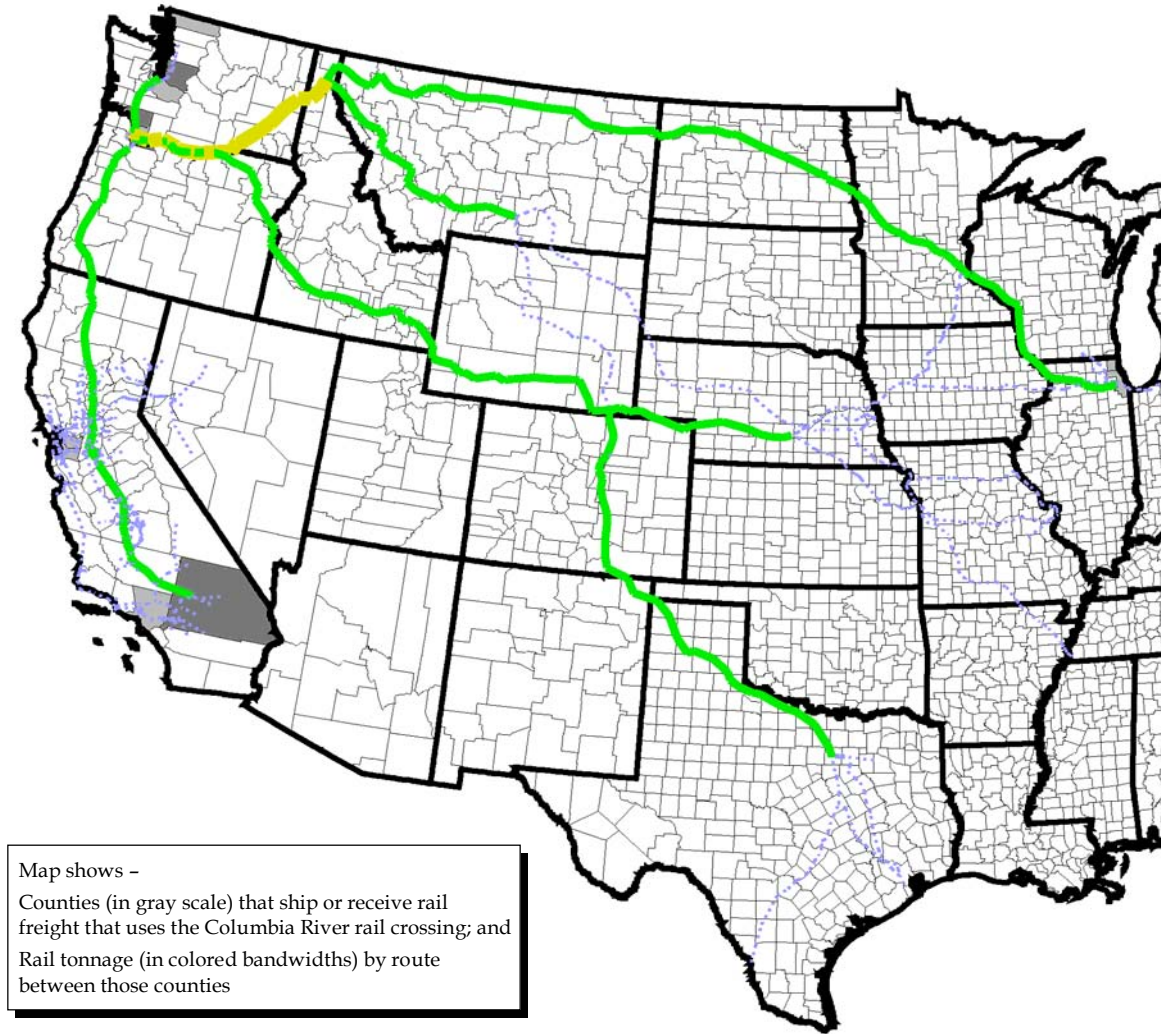
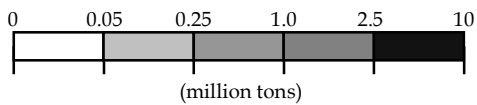


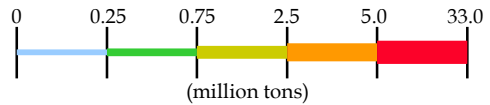
Figure 30. Western United States Origins and Destinations for Transportation Equipment and Steel Products Using the Portland-Vancouver Rail Triangle
With Tonnage of Freight on Rail Lines Used to Access Triangle



Origins and Destinations of Transportation Equipment and Steel Products Shipped via Portland-Vancouver Rail Triangle (1998, Transportation Equipment and Steel)



Volume of Transportation Equipment and Steel Products on Portland-Vancouver Rail Triangle Access Routes (1998, Transportation Equipment and Steel)



Transportation Equipment Case Study:
Gunderson, Inc.

Locations: Portland, Springfield, and Tri-Cities (Washington).

Products: Rail car manufacturing.

Background: Gunderson is a builder and refurbisher of freight cars and marine barges, employing about 1,300 people at its Portland, Springfield, and Tri-Cities locations. Innovations in its railcar designs have resulted in robust sales over the past several years. The company has produced more than 100,000 railcars since 1960.

Product Shipping Processes: Heavy castings and other material inputs for Gunderson's Portland manufacturing plant are imported by rail from Chicago and the East via the BNSF line on the north side of the Columbia River. Twenty containers per month arrive at the Port of Tacoma and are transported to Gunderson by rail or by truck. A local Oregon Steel plant supplies Gunderson by rail. Finished rail car products are shipped to customers from Gunderson's Portland facility.

Effects of I-5/Columbia River Crossing Congestion on Company: Inbound rail shipments (e.g., those from the East and the Port of Tacoma) must contend with rail congestion spilling out of the Portland-Vancouver rail triangle to reach the Gunderson facility. Most truck deliveries arrive from the east via I-84, but still are affected by I-5/Columbia River-related congestion at the Columbia Boulevard and North Portland interchanges and at the I-5 and I-84 interchange.

Impacts on Competitiveness: Rail and roadway congestion reduces the reliability and predictability of deliveries and shipments, raising business costs.

High-Technology Industry²¹

| | |
|---|----------------|
| Standard Industry Classification Codes: | 36, 38 |
| Oregon and Washington Employment (2000): | 85,333 |
| Oregon and Washington Value of Production (2000): | \$34.3 billion |

Industry Trends

A strength of the Pacific Northwest is that it is a “creative economy” – a region that cultivates innovation and successfully attracts well-educated people. These attributes helped guide a spectacular high-technology boom in the region during the 1990s. The growth was led by semiconductors and semiconductor research in the Portland-Vancouver area and software development in the Puget Sound region. By 2000, two high-technology-related industries – electronics and scientific instruments – accounted for over 11 percent of the entire Pacific Northwest’s economy, up from just over one percent in 1990.

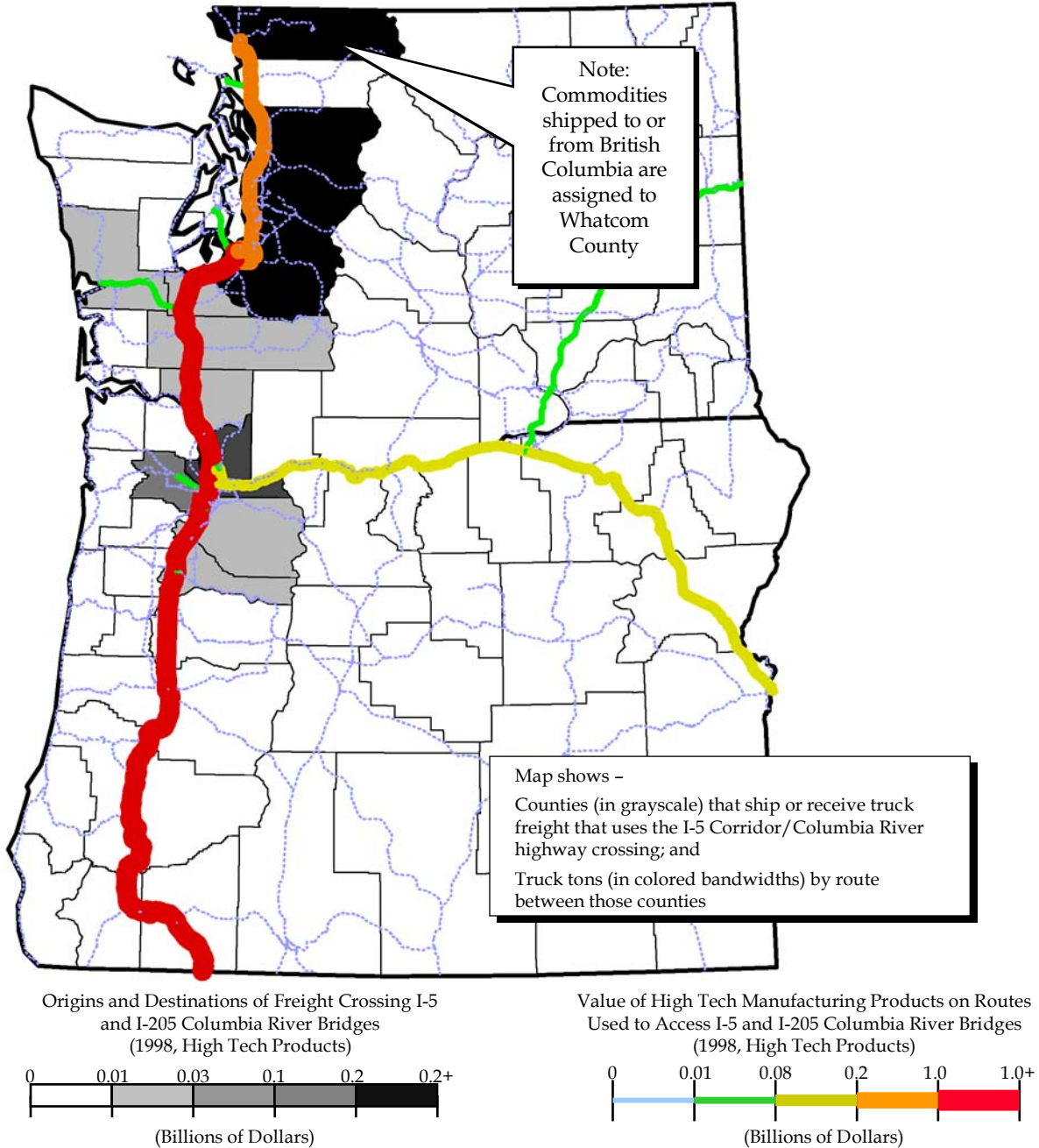
While growth in the high-technology sector in the Pacific Northwest has slowed due to a decline in worldwide demand and a shift in commodity production to overseas markets, the high-tech industry is expected to be a long-term growth engine for the region. The resumption in growth is expected to be led by a new generation of semiconductors, environmental technologies, software, flat panel and infrared displays, and biotechnology.

Importance of Portland-Vancouver Crossings to Industry

Due to their relatively high values and low weights, high-tech goods are generally shipped by truck or air. The value of high-tech goods that cross the I-5/Columbia River bridge exceeds \$1.5 billion per year. Figure 31 maps the distribution of high-tech manufacturing shippers and receivers and the associated truck moves by value within Oregon and Washington. Many of the counties that most intensively ship high-tech goods over the I-5/Columbia River bridge are in the Puget Sound area. The figure shows just those truck shipments of high-tech goods that move across the I-5/Columbia River bridge. The gray scale indicates the total commodity value shipped and received by each county, and the bandwidth and color of the lines indicate the value of commodities moving by truck along the major highways.

²¹The high-technology industry analyzed in this section covers the electronics industry and the scientific instruments industry, selected because these sectors correspond to the Standard Transportation Commodity Code industry classifications used for analyzing the movement of goods. The American Electronics Association uses a broader definition of high-technology that includes high-tech services such as software. The AEA’s classification shows 225,200 high-tech employees in Oregon and Washington in 2001.

Figure 31. Oregon-Washington Origins and Destinations for High-Tech Manufacturing Products Crossing the I-5 and I-205 Bridges at Portland-Vancouver (With Value of Freight on Truck Routes Used to Access Bridge)



The I-5 corridor connects suppliers and manufacturers, but also provides critical access to the region's international airports. In 2001, over \$850 million in Oregon exports, much of which was generated by the high-tech industry, was shipped overseas from the Seattle-Tacoma (Sea-Tac) International Airport gateway. Even more of Oregon's high-tech exports traveled via domestic flights from Portland International Airport to other major international air-cargo gateways. Due to the frequency of international flights and availability of cargo carriers at larger out-of-state airports, the value of Oregon exports departing from Sea-Tac, Los Angeles International Airport, and San Francisco International Airport exceeded those leaving from Portland International Airport. In 2001, the value of Oregon exports leaving the country through the Los Angeles International Airport gateway was \$1.2 billion, almost two times greater than the \$616 million of Oregon goods exported through the Portland International Airport. The reliable movement of high-tech goods by truck from Oregon manufacturers to Portland International Airport, Sea-Tac, and even the more distant gateway airports on I-5 is critical to the future success of the industry in the region.

Figure 32 shows the linkages between the Oregon-Washington high-tech industry and suppliers and markets in San Francisco and Los Angeles. As before, the figure shows just those truck shipments of high-tech goods that move across the I-5/Columbia River bridge. The gray scale indicates the total commodity value shipped and received by county, and the bandwidth and color of the lines indicate the value of commodities moving by truck along the major highways.

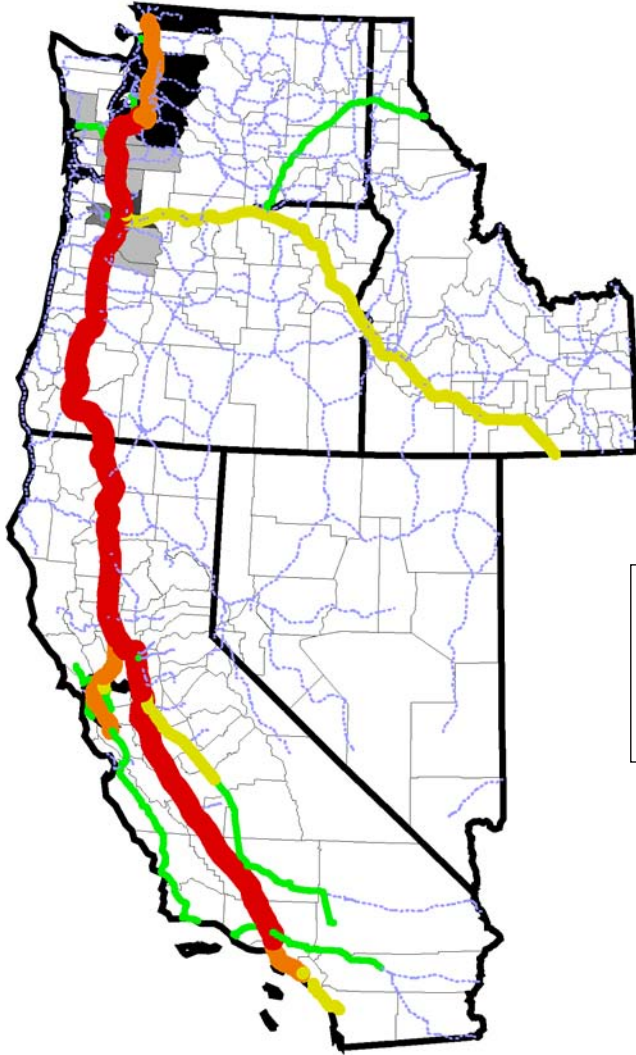
Effects of Portland-Vancouver Choke Points on Industry

High-tech companies are very dependent on air cargo. However, congestion makes it difficult to reliably reach the Portland International Airport from Washington County employment centers such as the Westside technology area. To ensure on-time deliveries, companies have resorted routinely to shipping finished products to the airport during off-peak, midday hours.

In an industry that pioneered low-inventory, just-in-time manufacturing, congestion is making logistics coordination between labor and parts more difficult. Companies are increasing night deliveries to avoid congestion. While this improves the reliability of deliveries, labor costs increase as staffing levels must be maintained during off hours.

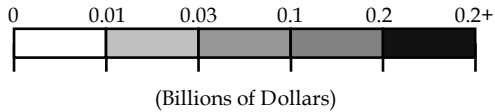
Congestion on the I-5/Columbia River bridge adds to business costs in the region by reducing the size and quality of the labor pool that can cost-effectively access places of employment. For example, commuters from relatively affordable residential areas in fast-growing Clark County, Washington face a long, costly, and unpredictable commute to jobs at Westside technology companies. I-5 congestion bifurcates the labor market into smaller subregional markets within the Portland-Vancouver area as workers seek jobs closer to their homes. To continue drawing from a large labor pool, employers must increase wages to maintain their attractiveness in the face of the longer commutes.

Figure 32. West Coast Origins and Destinations for High-Tech Manufacturing Products Crossing the I-5 and I-205 Bridges at Portland-Vancouver
With Value of Freight on Truck Routes Used to Access Bridge

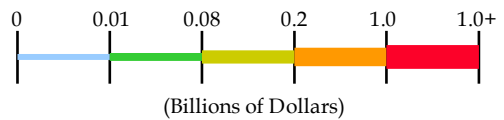


Map shows -
Counties (in grayscale) that ship or receive truck freight that uses the I-5 Corridor/Columbia River highway crossing; and
Truck tons (in colored bandwidths) by route between those counties

Origins and Destinations of Freight Crossing I-5 and I-205 Columbia River Bridges (1998, High Tech Products)



Value of High Tech Manufacturing Products on Routes Used to Access I-5 and I-205 Columbia River Bridges (1998, High Tech Products)



High-Technology Case Study
Intel

Location: Hillsboro, Oregon (and other locations in Oregon and Washington).

Products: Semiconductor research and semiconductor production.

Background: Intel is Oregon's largest private employer. In 2001, the company accounted for three percent of employment, 4.4 percent of payrolls (non-farm wages and salary), and six percent of total state output. At its Hillsboro facility, Intel produces extremely high-value semiconductors, the "brains" that enable computers to process information and accept commands. While lower-end "commodity" semiconductors are increasingly being produced overseas in Southeast Asia and Latin America, Intel researches and produces its most advanced products in the Portland area. These include a 300 millimeter chip, currently under development, that will allow computers in the future to operate at much higher speeds. Growth at Intel was a major contributor to the overall expansion of the Oregon economy during the 1990s.

Product Shipping Processes: Intel, with its high-value, low-weight production of semiconductors, is dependent on air cargo. Finished products are shipped by truck from Hillsboro to Portland International Airport (PDX). From PDX, air-freight carriers transport semiconductors to locations throughout the United States. Due to limited international service from Portland, semiconductors destined for overseas markets often transit through Los Angeles International, San Francisco International, or Seattle-Tacoma International Airport.

Effects of I-5/Columbia River Crossing Congestion on Company: Intel ships finished products to PDX early in the afternoon to ensure they arrive before the 5:30 p.m. scheduled departures of overnight express carriers. The early shipments are required because the travel times of trips in the North Portland area are unpredictable, due largely to I-5/Columbia River congestion. Incidents on I-5/Columbia River such as breakdowns, accidents, and the raising of the Columbia River Bridge cause motorists and trucks to use surrounding arterials to reach I-205 in order to avoid prolonged delays and resume their trips. These arterials—the same arterials used by Intel to reach the airport—become clogged with traffic. Intel ships early to avoid this congestion, which is worse during peak late afternoon periods, and to allow sufficient time should heavy congestion be encountered. Congestion also is pushing delivery trucks onto back roads to reach Intel and other technology companies, creating safety concerns, and has made just-in-time coordination between labor and parts deliveries more difficult. To increase reliability, companies increasingly use night deliveries.

Impacts on Competitiveness: While high-tech companies can ship goods to the airport reliably during early afternoon, off-peak-travel periods today, higher traffic volumes in the future will force "peak spreading," making early afternoon travel more congested. The growing congestion and accompanying increase in accidents and auto breakdowns will make shipping during the early afternoon less reliable and predictable. As reliability and predictability deteriorate, businesses must compensate by allowing more driver time for shipping or paying higher labor costs for night shipping and receiving. Both strategies add to business costs.

High-Technology Case Study:
Hewlett Packard

Location: Corvallis, Oregon (and other location in Washington State, Idaho, and British Columbia).

Products: Inkjet printers.

Background: Corvallis, located between Salem and Eugene, is home to a Hewlett Packard design and fabrication facility that employs about 4,000 people. This facility produces advanced inkjet printers and is the second-largest employer in the community after Oregon State University.

Product Shipping Processes: Finished inkjet printers and cartridges are shipped by truck to airports in Portland, Seattle, and Vancouver (British Columbia). I-5/Columbia River and I-205 are the primary highways used to reach these airports.

Effects of I-5/Columbia River Crossing Congestion on Company: Congestion and delays at the I-5/Columbia River crossing increase the travel time between Corvallis and the airports and make it more difficult to predict travel time reliably. This increases the risk that trucks will miss delivery deadlines for domestic and international air cargo flights.

Impacts on Competitiveness: Congestion on I-5 disrupts the delivery of parts and finished goods, adding to business costs. As travel times between Corvallis and key regional airports becomes less predictable, Hewlett Packard must pay truck drivers for additional “buffer” travel time to ensure that they hit delivery window times consistently.

Distribution and Warehousing Industry

| | |
|---|----------------|
| Standard Industry Classification Codes: | 42, 50 |
| Oregon and Washington Employment (2000): | 350,875 |
| Oregon and Washington Value of Production (2000): | \$28.6 billion |

Industry Trends

Distribution is part of Portland-Vancouver's economic legacy. The area developed as the distribution center for the Pacific Northwest because of its unique geographic advantages. Portland-Vancouver, as well as nearby Longview and Kalama, Washington, have access to interior states via a navigable waterway and sea-level rail and highway routes, giving these ports an advantage over other West Coast ports. Water access, combined with its location in the major valley of a mountainous region and proximity to the Pacific Ocean, make the Portland-Vancouver area an ideal distribution hub. As the rail, water, and roadway network have developed around Portland-Vancouver, the distribution industry in the metropolitan area has grown, attracting distributors that today serve Oregon, Washington, Idaho, the western portions of Montana, and the northern parts of California.²² In recent decades the distribution and warehousing industry has expanded to accommodate a large influx of new residents into the region. As the Pacific Northwest continues to grow in population, the distribution industry is expected to expand commensurately.

The industry also has been greatly reshaped by the introduction of just-in-time manufacturing and retailing. Just-in-time (JIT) is a "pull" production system that involves scheduling inputs to minimize inventory. Within a pull system, production starts when a buyer has requested a product. Parts and components to build the product arrive at the assembly line only as they are needed. JIT has been adopted by companies worldwide as a way to minimize inventory costs, resulting in lower business expenses and higher profits. Retailers such as Wal-Mart use JIT to minimize merchandise inventories by monitoring sales and replenishing shelves as products are sold. Through JIT, companies lower the financial costs associated with carrying larger inventories and can use their real estate assets more intensively for productive purposes such as manufacturing or sales, rather than having to set aside large amounts of floor space for inventory. However, JIT depends critically on efficient transportation systems to ensure the frequent and reliable delivery of goods.

²²One measure of Portland-Vancouver's role as a distribution and transshipment center is the ratio of wholesale to retail sales. The City of Portland, in its Economic Development Strategy (Summer 2002) reported that in 1992 the Portland-Vancouver ports generated \$4.36 in wholesale trade for each \$1 in retail trade. The ratio was somewhat higher than Seattle-Tacoma's ratio of \$3.33, but both areas were significantly higher than the national average at \$1.71. The ratios will have changed in recent years, but the numbers indicate the importance of distribution to the regional economy.

Importance of Portland-Vancouver Crossings to Industry

On an annual basis, over 5 million tons of goods tied to the distribution and warehousing industry cross the I-5/Columbia River bridge by truck between Portland and Vancouver. These flows represent a wide range of shipments, including goods bound for retailers and manufacturers, containerized intermodal merchandise (most of which is classified into a “miscellaneous shipments category” that is included here as part of the “distribution” sector), and business supplies.²³

Figure 33 shows the origins, destinations, and flow patterns of distribution and warehouse goods moving across Oregon and Washington. The figure shows just those truck shipments of distribution and warehousing goods that cross the I-5/Columbia River bridge. The gray scale indicates the total commodity value shipped and received by county, and the bandwidth and color of the lines indicate the value of commodities moving by truck along the major highways. Within the Pacific Northwest, distributors in the most populous counties, including King County, Washington and Multnomah County, Oregon, are the most intensive users of the I-5/Columbia River crossing.

Figure 34 provides comparable information for the West Coast. Trucks crossing the I-5/Columbia River bridge are critical to maintaining the intraregional flow of goods between Oregon and Washington as well the movement of goods up and down the West Coast. Reflecting the importance of I-5 to distributors serving the entire West Coast, over 2 million tons of goods using the I-5/Columbia River bridge either originate in or are destined for California.

The Portland-Vancouver area also is the hub of intermodal rail moves that connect distributors and warehouse operators in the Pacific Northwest with the rest of the country. Figure 35 shows the span of distribution and warehousing freight moving through the Portland-Vancouver rail triangle. This freight activity centers on Seattle-Tacoma and Portland-Vancouver. The Puget Sound ports of Seattle and Tacoma, if combined, would rank as the third-busiest container port in the United States, behind Los Angeles-Long Beach and New York-Northern New Jersey.

²³Containers are included in this discussion because they typically carry merchandise (e.g., footwear, toys, apparel, household goods, etc.) that are bound for retailers, generally by way of warehouses and distribution centers. Containers constitute a large part of the overall volume of freight movements associated with the distribution and warehousing industry.

Figure 33. Oregon-Washington Origins and Destinations for Distribution and Warehouse Goods Crossing the I-5 and I-205 Bridges at Portland-Vancouver (With Tonnage of Freight on Truck Routes Used to Access Bridge)

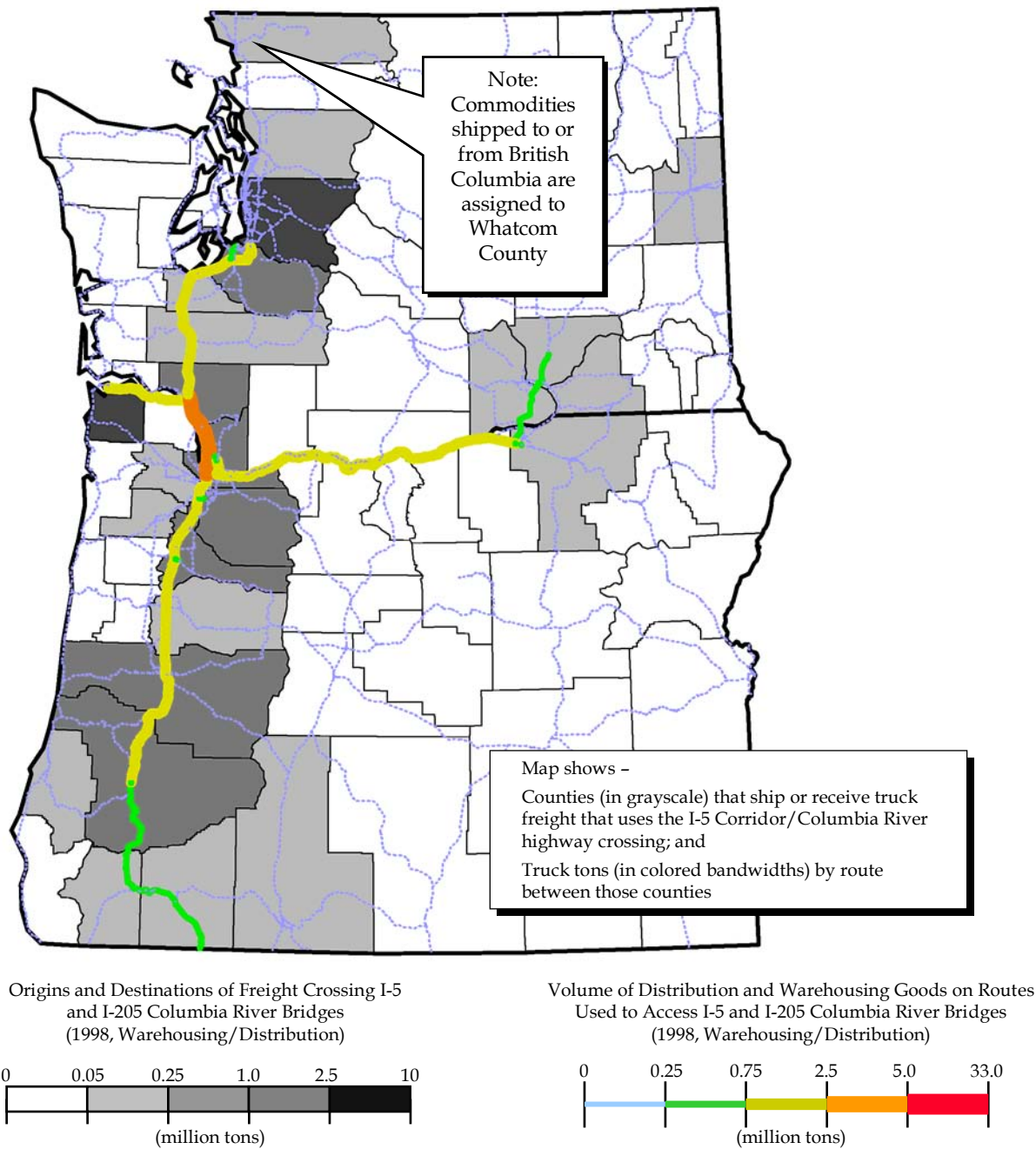


Figure 34. West Coast Origins and Destinations for Distribution and Warehouse Goods Crossing the I-5 and I-205 Bridges at Portland-Vancouver
With Tonnage of Freight on Truck Routes Used to Access Bridge

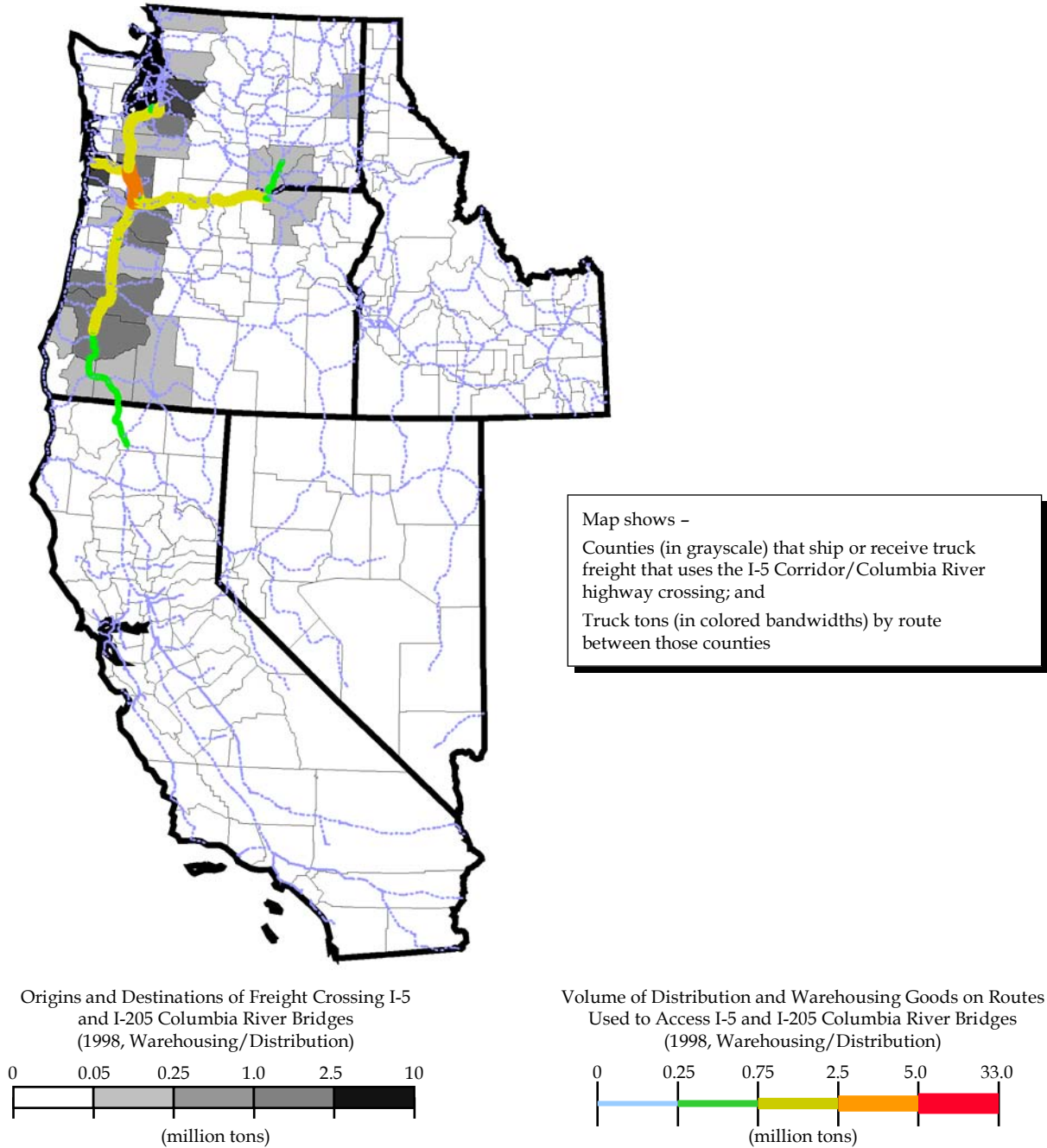
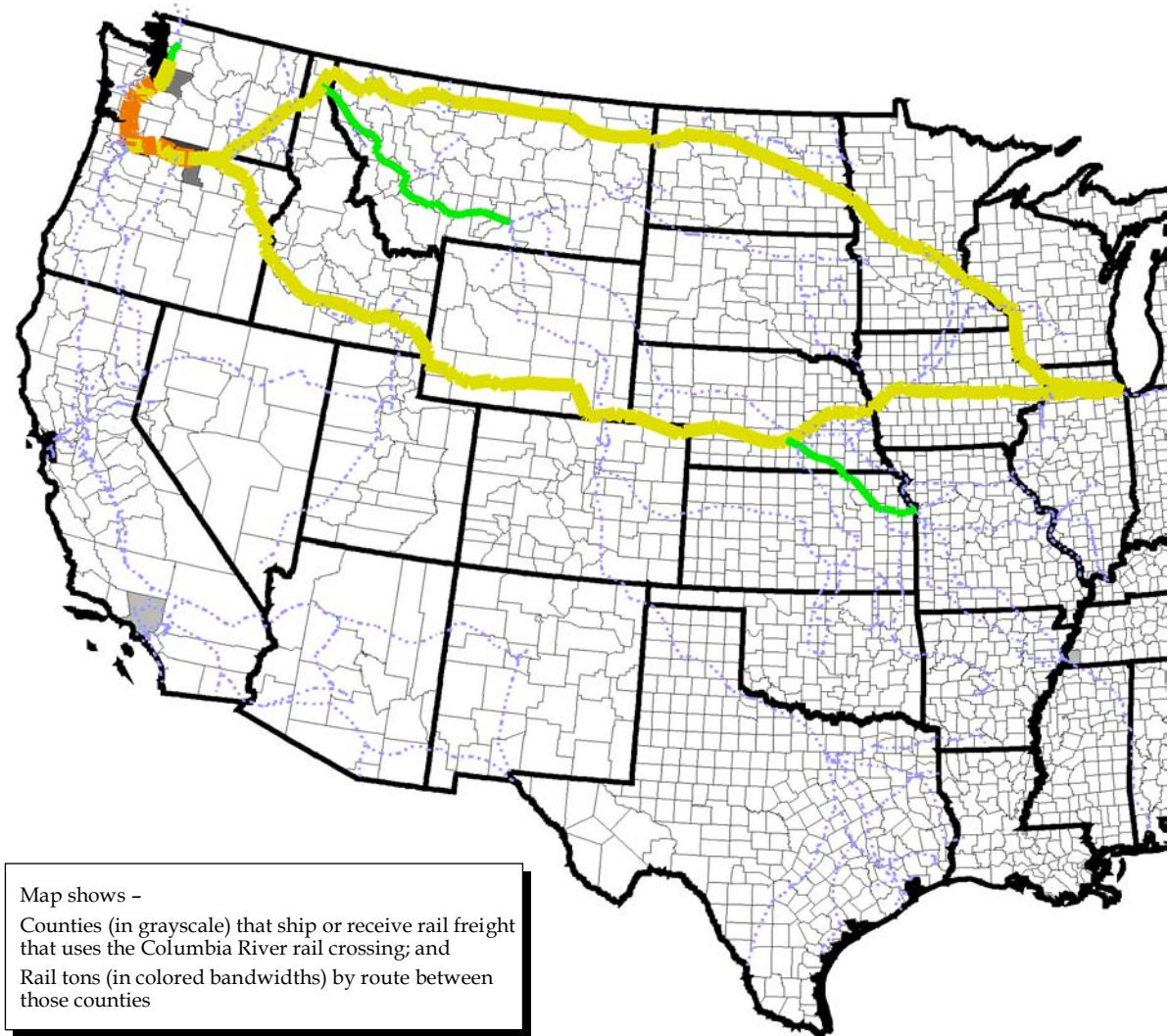
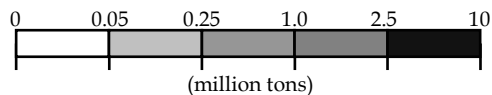


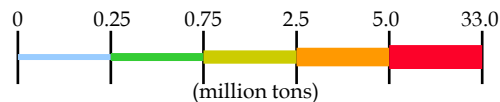
Figure 35. Western United States Origins and Destinations for Distribution and Warehouse Goods Using the Portland-Vancouver Rail Triangle
With Tonnage of Freight on Rail Lines Used to Access Triangle



Origins and Destinations of Distribution and Warehousing Goods Shipped via Portland-Vancouver Rail Triangle (1998, Warehousing/Distribution)



Volume of Distribution and Warehousing Products on Portland-Vancouver Rail Triangle Access Routes (1998, Warehousing/Distribution)



About half of the containers processed for import and export by ports in Seattle and Tacoma, as well as by the Port of Portland, transit the Portland-Vancouver rail triangle on their journeys to and from the Midwest and East Coast. This traffic is routed through Portland-Vancouver because the BNSF line on the north side of the Columbia River Gorge and the Union Pacific (UP) line on the south side have relatively flatter grades and are easier to navigate in bad weather than the more northerly routes out of Seattle, one of which goes through the high, single-track Stevens Pass tunnel, and the other through the winding Stampede Pass route. For that reason, the competitiveness of Puget Sound ports in attracting and retaining container traffic is affected directly by their ability to move goods reliably through Portland-Vancouver.

Effects of Portland-Vancouver Choke Points on Industry

The I-5 Corridor/Columbia River highway and rail choke points reduce the geographical reach of distributors by raising the costs of getting to markets. Although the distribution and warehousing industry has traditionally been Portland-centered, increasing congestion at the I-5 Corridor/Columbia River highway and rail crossings and spreading peak hours are leading to changes in the region's distribution system.

Congestion, combined with high prices for available industrial land in Portland-Vancouver, is pushing distributors to the periphery of the Portland-Vancouver area and to other parts of the Pacific Northwest. Distributors that serve markets outside Portland-Vancouver are finding it difficult to remain in the area as travel times within the region shrink the size of their service areas. In response, major distribution centers have been moving to the Pasco-Hermiston area to the east and companies that used to serve both the Puget Sound and Portland areas from a single location in Portland-Vancouver are opening additional facilities in Washington (e.g., Centralia) and elsewhere along the I-5 corridor.

While distribution and warehousing remain important in Portland, the lack of available land in Portland is directing new growth to Vancouver and surrounding Clark County, Washington. As the distribution and warehousing industry in Clark County expands, higher volumes of truck traffic will cross the I-5 and I-205/Columbia River bridges to supply the Portland market, contributing further to traffic delays and the cost of distribution and warehousing. These higher transportation expenses ultimately may be passed on to consumers and manufacturers in the form of higher prices or the reduced availability of goods.

Distribution Case Study
Les Schwab Tire Distribution Centers

Locations: Prineville, Portland, Boardman, and Ontario, Oregon; Redding, California.

Products: Tire sales and services.

Background: Les Schwab is one of the largest independent tire companies in the United States. The company has a retail sales network of 344 stores, including both company-owned and member dealer locations, located in Oregon, Washington, Idaho, Montana, northern California, Nevada, and Alaska. Annual sales are approximately \$1 billion.

Product Shipping Processes: The hub of Les Schwab operations is a 2 million-square-foot distribution center in Prineville, Oregon which handles over 4,600 containers annually. Tires are imported through the Ports of Seattle, Tacoma, and Portland and are shipped to the Prineville facility and other transfer facilities by truck and some by rail. The company serves regional markets through a network of transfer centers located in Portland, Boardman, Ontario (Oregon), and Redding. At any given time, Les Schwab stocks about one million tires in its stores and warehouses.

Effects of I-5/Columbia River Crossing Congestion on Company: Les Schwab serves both the Portland and Seattle markets from its Portland transfer center. Due to congestion in the I-5/Columbia River corridor, truck operations are scheduled during off-peak, midday, and evening time periods to avoid possible delays. Peak spreading in the I-5 corridor narrows the regions that each facility can serve in a timely manner by truck, reducing economies of scale and increasing delivery costs.

Impacts on Competitiveness: Increased business costs, especially if peak times spread and further limit the periods when trucks can cross the Columbia River without encountering delays.

■ Choices for the Future

Over the last half-century, the Pacific Northwest has made major investments in its highways, ports, and rail systems. However, the region is seeing diminishing returns from the transportation initiatives of earlier decades. Capacity and congestion problems today are eroding the productivity of the transportation system. Travel time and cost are increasing, service reliability is decreasing, and the ability of the system to recover from emergencies and disruption of service is severely taxed. The capacity and congestion problems are most apparent at the I-5 Corridor/Columbia River highway and rail crossings in the Portland-Vancouver area. The congestion at the crossings has a real and immediate cost to Portland and Vancouver residents and businesses. It has a less visible, but equally real, cost to the Oregon and Washington residents and businesses beyond the metropolitan area who depend on safe, reliable, and cost-effective access into and through the Portland-Vancouver area.

Oregon and Washington residents and businesses as well as Portland and Vancouver residents and businesses have a choice of two futures: a positive one in which the I-5 Corridor/Columbia River highway and rail crossings are improved and make a greater contribution to the economic well being of the entire Pacific Northwest; or a negative one in which the I-5 crossings are not improved, and the burden of congestion becomes more severe.

The region is weathering an economic recession, making it difficult to envision major new transportation investments. However, the region cannot afford to postpone action. Environmental studies, negotiation of funding agreements, stakeholder involvement activities, right-of-way acquisition, design, and construction of major transportation improvements can take five to 15 years to complete. Oregon and Washington must make a coordinated effort to act promptly to decide on a course of action and identify sources of funding for the recommended transportation improvements in the I-5 corridor.

Solving the problems of the I-5 Corridor/Columbia River crossings will require a willingness to plan and fund transportation improvements across boundaries—across the jurisdictional boundaries between states, across the interest boundaries of the public and private sectors, and across the financial boundaries among highway, rail, and port systems. These boundaries are surmountable because all parties to the I-5 Partnership must share the problem, the risks, and the benefits if they are to ensure the economic well being of the region.

January 16, 2007

TO: Columbia River Crossing Task Force Members
FROM: John Osborn, ODOT
Doug Ficco, WSDOT
SUBJECT: Letter from AORTA
COPY: n/a

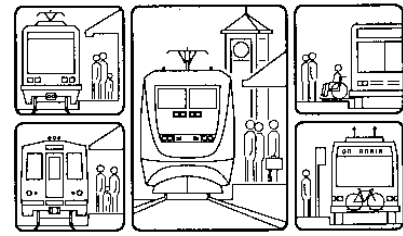
The attached materials for your review include a recent letter from Jim Howell of the Association of Oregon Rail and Transit Advocates. Included in his letter is a request that we provide the back-up information for our previously stated conclusions that his most recent proposal does not meet the project's Statement of Purpose and Need. A summary of our analyses, also attached, is being provided concurrently to Mr. Howell and to members of the Task Force.

The memorandum from CRC project staff includes a lot of detail. If you do not have time to read it thoroughly, please note that it strongly confirms the conclusions from our November 27, 2006 memorandum that Mr. Howell's proposal does not address the project's Statement of Purpose and Need in at least four key areas: 1) growing travel demand and congestion, 2) impaired freight movement, 3) safety and vulnerability to incidents, and 4) seismic vulnerability.

Association of Oregon Rail and Transit Advocates

AORTA • P. O. Box 2772 • Portland, Oregon 97208-2772

Also known as OreARP • Oregon Association of Railway Passengers



Memorandum

Date: Jan. 2, 2007
To: Columbia River Crossing Task Force
From: Jim Howell
Subject: Response to Nov. 27, 2006 Memorandum from staff

The Memorandum of November 27, 2006 to the Columbia River Task Force from Doug Ficco and John Osborn regarding Jim Howell's Proposal contains significant inaccuracies and omissions. In addition, the memo contains conclusions for which they provide no evidence. Last, but not least, going into the EIS with only two variants of the same high-cost freeway bridge proposal not only does a disservice to informed decision-making, but may not meet NEPA requirements for a range of alternatives.

The description of our proposed concept in the second paragraph indicated that the two-lane roadway extends south to Marine Drive. This is incorrect. We proposed in our revised version that it not connect to Marine Drive, but continue under Marine Drive to connect to Expo Road via a short road extension next to the Expo MAX Station. The last sentence in the fifth paragraph is also incorrect. We are not proposing the creation of "a new intersection just west of the interchange".

These obvious errors are a clear indication that the CRC staff failed to review our latest version with any diligence. Their review of our initial proposal was equally perfunctory.

Staff also failed to mention or, we suspect, analyze our proposed addition of a "truck only" bypass lane from Marine Drive and MLK Blvd. to I-5 north. We recommended that, unlike the general traffic lane, this lane should not be metered. This can be achieved by adding a ninth travel lane to the Portland Harbor Bridge by reassigning the lane currently used for bicycles and pedestrians. Bike and foot traffic would be relocated to the new bridge.

In addition, we recommended adding another lane to the SB off-ramp to Marine Drive and increasing the capacity of the Marine Drive Signal with additional turn lanes.

Our proposal **does** meet the project's Purpose and Needs.

It will significantly reduce vehicle travel demand and congestion. A new ten to twelve lane mega-bridge will do neither because it will induce more traffic, creating serious additional downstream congestion.

Our proposal extends light rail to Vancouver. It also replaces five congestion-causing ramps with two more efficient ones that will increase through capacity to match the rest of the

freeway. The light rail has far more capacity for commuters than I-5. What must occur to take advantage of this capacity is the development of an effective multi-destinational feeder bus system in Clark County and Portland's metro area. This type of feeder service has never been proposed or analyzed by any regional planning organization. An analysis of this option would have shown a significant difference in the outcome of the travel forecasting for this project. This type of system provides reduced travel time between many dispersed destinations, making public transit a more viable alternative for many more commuters.

Over time, the deployment of a truly multi-destinational transit system would also encourage the development of more compact and sustainable communities.

Travel forecasts are not always correct. The 1973 I-80 N Environmental Study for the proposed Mt. Hood Freeway stated that it would be carrying over 130,000 vehicles a day by 1990. The freeway was never built and, in 1982, TriMet established a grid bus system on the eastside that provided the essential feeder connections to the MAX Line when it opened in 1986, making it an instant success. Now, MAX carries more peak hour passengers than could be accommodated on an additional lane on I-84 and has the latent capacity of at least three more lanes in each direction.

Forecasting mistakes continue to be made, even with more sophisticated software and computers, because of similar wrong assumptions. If we have the wisdom to provide an effective bi-state transit system, the existing interstate bridges will never have to carry the currently projected 180,000 vehicles a day by 2020, just as the Mt. Hood Freeway never carried the 130,000 vehicles a day that were projected for 1990.

It will improve freight movement on I-5 by attracting commuter traffic to an effective public transit system. This leaves more space for trucks. In addition, the proposed ramp improvements mentioned above and in the original proposal improve truck access to and from I-5.

It will address many of the known safety issues associated with the river crossing and adjacent interchanges by removing the five substandard ramps and replacing them with two new ones. The staff memo states "...the proposed configuration of the freeway ramps on Hayden Island would exacerbate the congestion and safety problems for both the northbound and southbound weaving areas between Hayden Island and Marine Drive when compared with the existing ramp configuration." We strongly disagree with this statement and challenge staff to provide the engineering analysis of this configuration they used to arrive at this conclusion and submit it for an independent professional review. Furthermore, the staff should provide their analysis of the effect on safety and capacity of reducing the posted speed to 45 mph.

It will address the seismic vulnerability of the river crossing by providing new earthquake-resistant multi-modal bridges across the Columbia River and the Portland Harbor. The freeway bridges would not be changed or seismically upgraded but, in the event of a large earthquake, the local bridge with light rail would be a more effective river

crossing alternative. The freeway system in general would probably become dysfunctional because of its many vulnerable overpasses and bridges.

Furthermore, our proposal would replace the ancient, extremely vulnerable, railroad swing span with a new seismically stable lift span. Keeping the railroads in operation during a disaster is arguably more important to commerce than the freeway.

Although the memo did not mention bridge lifts, the prevailing assumption is that another bridge, with an opening span, as we have proposed, would be unacceptable because it would interfere with light rail operation.

Replacing the railroad bridge swing span with a lift span, aligned with the "hump" of the existing freeway bridges and the "hump" of a new multi-modal bridge, eliminates the need to open these bridges for all barge traffic at any time. The only time they would have to be opened is for the occasional high-mast sailboat or construction crane. Openings could be scheduled when light rail is not operating.

In addition, the visual impact of a high bridge over the railroad embankment in downtown Vancouver would be extreme. Views upriver to Mt. Hood would probably be blocked from the buildings in the redeveloping heart of Vancouver around Ester Short Park.

We posit that the Columbia River Crossing Task Force has a fiduciary responsibility to include, in the environmental impact phase of this project, an alternative with lower impacts and costs than replacement bridge alternatives alone. In addition, we question if having only two variants of the same new, high I-5 bridge proposal as the only build alternatives in the EIS will satisfy NEPA requirements. Whether the high capacity transit in the corridor is Light Rail or Bus Rapid Transit is a pretty minor issue, if both are built in the context of a parallel \$1-2 billion freeway bridge.

The maxim "we can't build our way out of congestion" is becoming an accepted principle, at least among planners and decisionmakers in this region. Yet the only proposal on the table at the moment is an attempt to address congestion by building increased freeway capacity, in direct contradiction to this principle. The Multi-modal Bridge provides a viable alternative more in keeping with this principle and should be carried forward in the EIS.

Attachments:

- 11-27-06 Memo to: Columbia River Crossing Task Force From: Doug Ficco and John Osborn
- 11-29-06 Memo To: Columbia river Crossing Task Force From: Jim Howell
- Multi-modal Bridge Option Site Plan. Jim Howell, 11-08-06

January 23, 2007

TO: Doug Ficco
John Osborn

FROM: CRC Project Staff

SUBJECT: Assessment of Jim Howell's Proposed Concept
(Association of Oregon Rail and Transit Advocates)

After meeting with Jim Howell on November 8, 2006, where Mr. Howell presented AORTA's most recent proposed concept, Columbia River Crossing project staff spent two weeks evaluating the proposal. Your memorandum to the Task Force, dated November 27, 2006, outlined the various reasons project staff found that the proposed concept would fail to meet the project's Statement of Purpose and Need.

This follow-up memorandum was prepared to provide even more detail on reasons CRC staff has concluded that AORTA's recent proposal would continue to fail to meet the project's Statement of Purpose and Need and why no further action on his concept is justified. This memorandum is organized by the project's adopted Statement of Purpose and Need:

- Growing travel demand and congestion
- Impaired freight movement
- Limited public transit operation, connectivity, and reliability
- Safety and vulnerability to incidents
- Substandard bicycle and pedestrian facilities
- Seismic vulnerability

The following information is attached to this memorandum for reference purposes:

- AORTA's proposed concept with annotations illustrating key deficiencies
- Our memorandum to the CRC Task Force dated November 27, 2006
- I-5 Columbia River Crossing Statement of Purpose and Need

As shown in the following pages, AORTA's most recent proposal, hereinafter simply referred to as "proposed concept", would fail to meet the project's Statement of Purpose and Need in several key areas.

Growing Travel Demand and Congestion

Mr. Howell postulates that his most recent proposed concept "will significantly reduce vehicle travel demand and congestion." This claim is partially based on his assumption that the region's travel demand model is highly inaccurate and substantially overestimates future traffic volumes.

The Portland-Vancouver regional model is one of the most sophisticated travel demand forecasting tools in the nation. It is calibrated to existing conditions and considers adopted land use projections and planned transportation improvements in predicting future travel forecasts. This model has been used successfully for years in the planning of regional transit and highway projects.

The travel demand model forecasts daily traffic volumes across the I-5 Bridge will increase from about 130,000 vehicles per day today to about 180,000 vehicles per day by the year 2030 if no investments are made in the I-5 Bridge Influence Area. Congestion levels at the bridge are predicted to increase from six hours today to more than 16 hours by 2030.

The proposed concept, primarily because it would provide an expanded light rail system, could reduce vehicle travel demand to some degree compared to a year 2030 No Build condition. However, because the proposed concept includes several highway features that would actually worsen traffic operations, it would be unable to significantly reduce traffic congestion (and therefore the proposed concept does not meet the project's Statement of Purpose and Need).

This conclusion was reached by testing how traffic would operate under the proposed concept using existing traffic volumes. In other words, if the proposed concept results in worsened conditions compared to today's operations simply based on existing traffic volumes, the proposed concept would function even worse under increased travel demands expected on I-5 over the next 25 years.

For example, it was determined that the proposed concept would result in the following traffic impacts to **northbound** travel during the **afternoon peak period**:

- The removal of the northbound on-ramp from Hayden Island would shift the location of I-5's afternoon peak period bottleneck from the I-5 Bridge approach to the vicinity of Interstate Avenue on-ramp. The duration of northbound congestion would remain similar to the current level of congestion.
- Downstream of the relocated northbound bottleneck, the additional lane from Marine Drive would serve more weaving vehicles between Marine Drive and Hayden Island. Travel speeds in the weaving area would not improve, however. Due to the added capacity, the weaving area's level of service would improve from level of service "E" to "D" conditions.
- Due to the elimination of the on-ramp from Hayden Island to northbound I-5, a significant volume of Hayden Island traffic would first travel south on I-5 to Marine Drive, and then travel from Marine Drive to northbound I-5. As a result, Marine Drive's northbound on-ramp volume would increase from about 1,160 to 1,500 vehicles per hour. This 29 percent increase would exacerbate the number of vehicles queued on the ramp and throughout the Marine Drive interchange complex. Even considering proposed concept's increased local intersection capacities, Marine Drive's signalized ramp terminal intersection's volume-to-capacity ratio would increase from 0.69 to 0.94.

Under existing conditions, **southbound** traffic operations are acceptable along I-5 during the **afternoon peak period**. Under the proposed concept, the following traffic impacts would result:

- Due to the elimination of the on-ramp from Hayden Island to northbound I-5, Hayden Island's southbound on-ramp volume would increase from about 560 to 850 vehicles per hour, a 52 percent increase.
- The proposed SR 14/Downtown Vancouver on-ramp extension bridge would serve about 1,020 vehicles per hour. These vehicles would merge with the 850 vehicles originating from Hayden Island. Thus, a total of about 1,870 vehicles per hour would merge into one lane prior to merging onto southbound I-5.
- A single-lane on-ramp that transitions to two lanes at a metered signal generally cannot serve more than 1,400 vehicles per hour. Overcapacity conditions would result in back-ups along both the SR 14/Downtown Vancouver on-ramp extension bridge and the Hayden Island on-ramp.
- Back-ups along the SR 14/Downtown Vancouver on-ramp extension bridge would impact local street operations in downtown Vancouver. Back-ups would also extend along westbound SR 14.
- Under the proposed concept, the Hayden Island ramp terminals would be moved north to North Hayden Island Drive. In addition, the arterial bridge would intersect with North Hayden Island Drive immediately to the west of the southbound on-ramp terminal. A number of closely spaced intersections would result, creating substandard conditions and affecting traffic capacity and local operations on Hayden Island. Thus significant vehicular queuing would result.

- The existing I-5 southbound weaving segment between Hayden Island and Marine Drive is already substandard. Under the proposed concept, the weaving segment would be reduced by approximately 300 feet.
- Due to the elimination of the on-ramp from Hayden Island to northbound I-5, the volume of vehicles weaving on southbound I-5 would increase from about 1,380 to 2,550 vehicles per hour, an 85 percent increase.
- The increased weaving volume under the proposed concept would introduce turbulence to southbound I-5. The weaving area's level of service would degrade from "D" to "E" conditions.
- Due to the constrained weaving conditions, resulting travel speeds along southbound I-5 would decrease by 10 to 15 mph compared to existing conditions.
- Also, due to the elimination of the on-ramp from Hayden Island to northbound I-5, traffic volumes to the southbound off-ramp to Marine Drive would increase from about 830 to 1,350 vehicles per hour. This 63 percent increase would extend vehicular queuing along the off-ramp, even considering the proposed concept's addition of a second lane along the ramp, as well as ramp terminal intersection improvements. Marine Drive's signalized ramp terminal intersection's volume-to-capacity ratio would increase from 0.69 to 0.94.

The proposed concept would result in the following traffic impacts to **southbound** travel during the **morning peak period**:

- Relocation of the SR 14/Downtown Vancouver on-ramp's merge from north of the Columbia River to a combined merge with Hayden Island south of the Columbia River creates a new southbound bottleneck at the proposed SR 14/Downtown Vancouver/Hayden Island merging area.
- The duration of southbound congestion would increase from two hours today to more than four hours as a result of the new bottleneck.
- The number of vehicles weaving on southbound I-5 between the Hayden Island on-ramp and the Marine Drive off-ramp would increase from about 1,550 to 2,290 vehicles per hour, a 48 percent increase. The weaving area's level of service would degrade from level of service "E" to level of service "F" conditions.
- Also, due to the elimination of the on-ramp from Hayden Island to northbound I-5, traffic volumes to the southbound off-ramp to Marine Drive would increase from about 1,180 to 1,280 vehicles per hour, an eight percent increase.

Compared to existing conditions, no substantial traffic operational changes would be expected for **northbound** travel during the **morning peak period** under the proposed concept.

It should be reiterated that the above results are based upon application of existing traffic volumes. The analysis proves that the proposed concept would result in overall worsened conditions compared to today's operations. The proposed concept would function even worse under increased travel demand over the next 25 years.

Therefore, the proposed concept does not meet the project's Statement of Purpose and Need related to growing travel demand and congestion.

Impaired Freight Movement

The proposed concept would provide a truck only ramp lane from Marine Drive to northbound I-5. This unmetered lane would improve mobility for trucks once they enter the on-ramp from the local street system. However, as discussed above, under the proposed concept the Marine Drive interchange complex would operate at higher congestion levels than are currently experienced, even with local intersection modifications he suggested. Overall truck mobility to and through the interchange complex would be substantially degraded compared to current conditions.

In addition, due to the general traffic impacts that would result from implementation of the proposed concept as described in the previous section, freight movements would continue to be significantly impaired.

Considering that freight volumes moved by truck to and from the area are expected to more than double over the next 25 years and that vehicle-hours of delay for trucks is estimated to increase by more than 90 percent, freight mobility would be even further affected under the proposed concept.

Therefore, the proposed concept does not meet the project's Statement of Purpose and Need related to impaired freight movement.

Limited Public Transit Operation, Connectivity and Reliability

The proposed concept would extend light rail from the Expo MAX Station to downtown Vancouver. Stations would be provided at Hayden Island and in downtown Vancouver. The light rail line would cross the Columbia River on a new arterial bridge that includes a lift span.

Provision of such a high capacity transit system, supplemented with an extensive feeder bus system as proposed, would provide increased public transportation opportunities over existing conditions.

To minimize the occurrence of bridge lifts, on both the I-5 Interstate Bridge as well as on a proposed multimodal bridge, the downstream railroad bridge swing span would be replaced with a lift span, aligned with the "hump" of Interstate Bridge and the new multi-modal bridge. According to Mr. Howell, the only time the lift spans of either bridge would have to be raised is when an occasional high-mast sailboat or construction crane traveled beneath the bridges and that such openings could be scheduled when light rail is not operating.

In that case, bridge openings would only be allowed very late at night or very early in the morning. If navigational traffic needed a bridge lift during other periods, however, it is likely that such lifts would cause severe disruption to light rail transit operations by delaying trains, randomly interrupting schedules, impairing corridor signal prioritization and impeding the operator's ability to coordinate signalization at the Steel Bridge in Portland. These effects would not just impact the extended MAX Yellow Line, but would have cascading impacts to other light rail lines and on traffic operations.

In addition, each bridge lift would delay passengers, including those making time-sensitive trips such as commuters. According to a recent system-wide survey, transit passengers view schedule reliability as one of the top public transit attributes.

Safety and Vulnerability to Incidents

A comprehensive analysis of crashes reported along I-5 and its ramps over a five-year period shows that there is a strong correlation between the presence of substandard design features and the frequency and type of collisions.

Under the proposed concept, three existing substandard features would be eliminated by the following actions:

- Elimination of Hayden Island's on-ramp to northbound I-5: This action would eliminate a substandard acceleration ramp length.
- Elimination of Hayden Island's off-ramp from southbound I-5: This action would eliminate a substandard deceleration ramp length.
- Relocation of SR 14's westbound on-ramp to southbound I-5: This action would eliminate a substandard acceleration ramp length.

The following 11 new or worsened substandard design and safety features would result under the proposed concept:

- Relocation of SR 14's westbound on-ramp to southbound I-5, with Hayden Island on-ramp:

- This action would reduce the existing substandard weaving length between Hayden Island and Marine Drive by approximately 300 feet.
- It would introduce a substandard length between the new Hayden Island and SR 14 merge point and the combined merge with southbound I-5. The proposed distance is 450 feet but the minimum standard for successive on-ramps is 800 feet.
- The SR 14/Downtown Vancouver connector ramp, proposed to provide one-lane, should be two lanes to meet design guidelines for its length.
- Modification of Marine Drive's off-ramp from southbound I-5:
 - This action would decrease the existing substandard deceleration distance by approximately 435 feet.
 - It would reduce the clear zone distance between the traveled way and the west abutment of the Marine Drive overpass.
- Modification of Marine Drive's on-ramp to northbound I-5:
 - This action would violate lane balance standards needed to provide continuity in traffic flow.
 - Maintains the existing substandard weaving length, but when additional lanes are added as proposed, design standards require extending the weaving length.
 - Results in substandard recovery distance beyond the proposed lane drop.
- Provision of new arterial roadway across the North Portland Harbor:
 - The roadway curves shown on the proposed concept would enable a 20 mph design speed, likely translating into a roadway with a 15 mph posted speed. This is inconsistent with arterial roadway standards.
- Provision of a new arterial roadway across the Columbia River:
 - The roadway curves proposed on the proposed concept would enable a 20 mph design speed, likely translating into a roadway with a 15 mph posted speed. This is inconsistent with arterial roadway standards.
 - The intersection of the arterial roadway with North Hayden Island Drive would be located about 250 feet west of the relocated ramp terminal to southbound I-5. This violates minimum design standards that require at least 1,320 feet between ramp terminals and adjacent intersections.

Since the proposed concept does not substantially address existing substandard features, but in fact introduces new substandard design elements, it is unlikely that the proposed concept design would improve safety over existing conditions. The crash rate for the I-5 Bridge Influence Area is currently over twice as high as the average rate experienced on similar urban freeways in the Northwest. Projections show that without eliminating most of the existing substandard features and providing additional mainline and ramp capacity in the Bridge Influence Area, the number of crashes would increase by approximately 70 percent by the year 2020.

The comprehensive crash analysis for I-5 showed that crashes generally occur in proportion to prevailing traffic volumes, except during periods of congestion. During congested periods, when traffic volumes are near or at capacity conditions and travel speeds are relatively low, the number of crashes increases substantially.

During the morning peak period, traffic congestion and vehicular crashes in the Bridge Influence Area are prevalent along southbound I-5's approach to the Interstate Bridge. The average prevailing travel speed during the three-hour peak period is 36 mph.

During the afternoon peak period, traffic congestion and vehicular crashes are prevalent along northbound I-5's approach to the Interstate Bridge. The average prevailing travel speed during the four-hour peak period is 19 mph.

The existing posted speed limit on I-5 in the vicinity of the Interstate Bridge is 50 mph.

A Federal Highway Administration study on the effects of raising and lowering speed limits on highways found that arbitrarily lowering speed limits has a minor effect on vehicle speeds. The study found that crashes at the study's 58 experimental sites where speed limits were lowered actually increased by 5.4 percent. According to the study, speed limit compliance decreases when speed limits are lowered.

Based on the above findings, the proposed concept's plan to reduce the posted speed of I-5 to 45 mph would likely have minimal benefits to safety.

For the above reasons, the proposed concept does not meet the project's Statement of Purpose and Need related to safety and vulnerability to incidents.

Substandard Bicycle and Pedestrian Facilities

According to the proposed concept, a continuous pedestrian and bicycle pathway would be provided between downtown Vancouver, Hayden Island, the Marine Drive Trail, and the Expo MAX station. CRC staff agrees that if carefully designed, the multi-use pathway and its connections could potentially meet the project's Statement of Purpose and Need.

Seismic Vulnerability

Recent studies indicate that the existing Interstate Bridges are vulnerable to failure in a significant seismic event and the cost for retrofitting the bridges to meet "no-collapse" or "serviceability" criteria range from \$125 million to \$265 million. These retrofit costs are high compared to available funding levels and therefore would be a low priority for implementation by either the Oregon Department of Transportation or the Washington Department of Transportation. Because of the age and condition of the existing bridges, replacement would be a better option than retrofitting the existing structures.

The proposed concept would not seismically retrofit the existing I-5 bridges, but would instead provide earthquake-resistant multimodal bridges across the Columbia River and North Portland Harbor. The bridges carrying I-5 traffic would continue to be vulnerable in the event of a significant seismic event.

Therefore, the proposed concept does not meet the project's Statement of Purpose and Need related to seismic vulnerability of the existing Interstate Bridges.

Attachments:

- AORTA's proposed concept with annotations illustrating key deficiencies
- Our memorandum to the CRC Task Force dated November 27, 2006
- I-5 Columbia River Crossing Statement of Purpose and Need

DP: bh

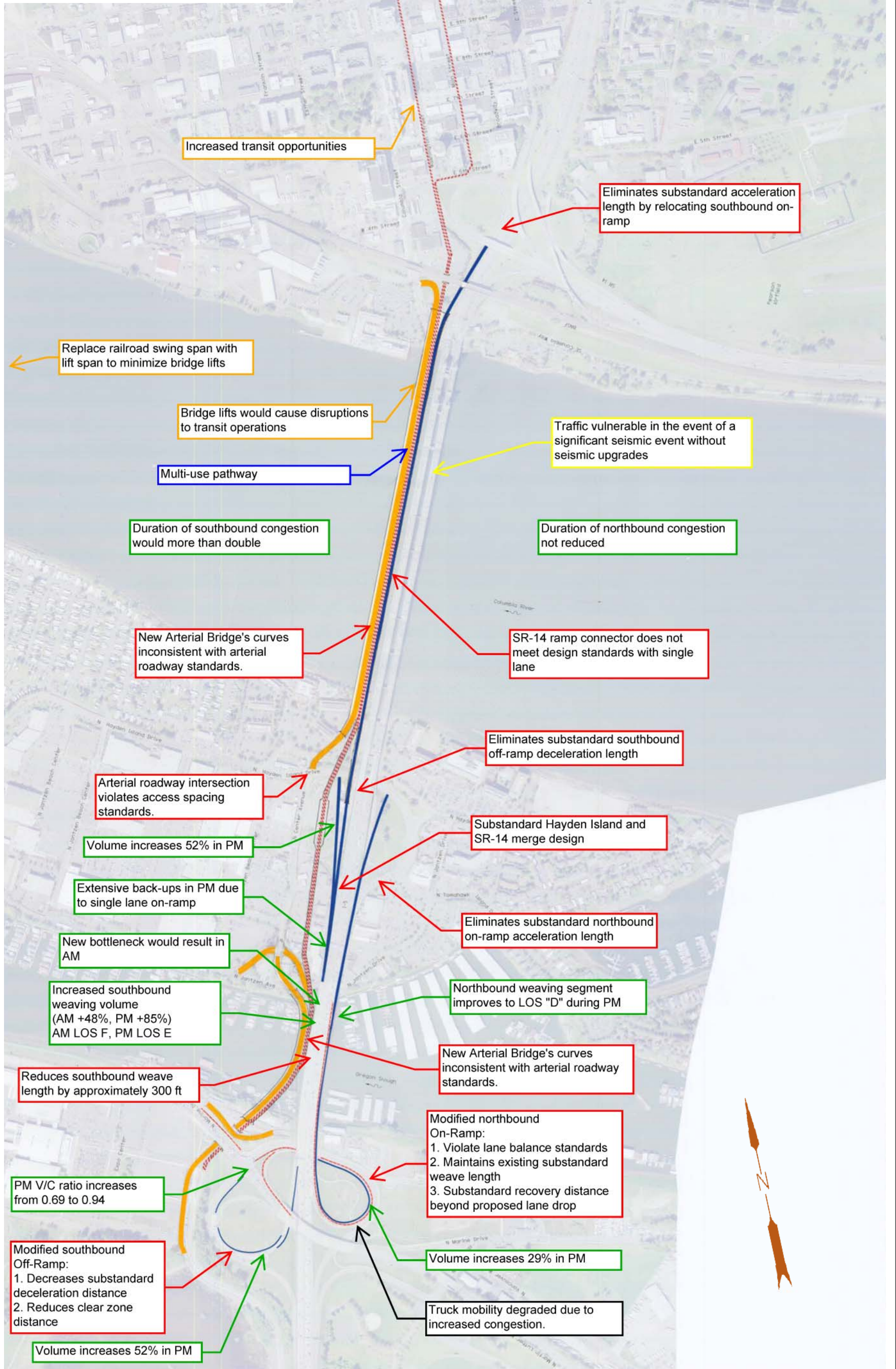
Cc: Project Controls

Assesment of AORTA's Proposed 11/08/2006 Concept

LEGEND:

- Growing travel demand and congestion
- Impaired freight movement
- Limited public transit operation, connectivity, and reliability
- Safety and vulnerability to incidents
- Substandard bicycle and pedestrian facilities
- Seismic vulnerability

*Background image provided by Jim Howell on 11/08/2006



November 27, 2006

TO: Columbia River Crossing Task Force

FROM: Doug Ficco
John Osborn

SUBJECT: Jim Howell Proposal

COPY:

Following up on the discussion at the October 25 Task Force meeting, we have taken another look at the river crossing component that was identified as RC-22 in our component screening process (see *Draft Components Step A Screening Report, March 22, 2006*). To be certain that we fully understood the author's intent, we invited Jim Howell to review his proposal with the project team as well as interested Task Force members.

A copy of the proposed concept is attached, including minor changes recently incorporated. In brief, the concept includes a new bridge just west of the existing bridges with two LRT tracks, a two-lane roadway linking Vancouver and Hayden Island (and extending south to Marine Drive), a new southbound on-ramp to I-5 from SR-14 that would bring the traffic onto the freeway on Hayden Island, and a bicycle/pedestrian pathway. The new bridge would be low-level and would include a lift span. Other elements of the concept would include an LRT loop through downtown Vancouver, and replacing the opening on the downstream railroad bridge with a new opening closer to the center of the river.

The concept is intended to provide a relatively low-cost crossing, and in that spirit includes some creative, although non-standard, elements (some of which would not meet federal and state design requirements). Although the concept has been updated since the earlier screening, the conclusions reached during the component screening phase are still relevant. The concept fails to meet the project Purpose and Need in several key respects. The concept does not:

- o significantly reduce travel demand or congestion;
- o improve freight movement on I-5; or
- o address many of the known safety issues associated with the river crossing and the adjacent interchanges.

Furthermore, with I-5 traffic remaining on the existing bridges, the seismic vulnerability of the river crossing would not be addressed.

Our review of the concept also included a more detailed analysis of traffic operations and a comparison of the concept to the No-Build Alternative and to Alternative 3—the arterial/LRT crossing carried forward as part of the initial 12 alternatives. The concept would not significantly improve the daily hours of congestion when compared to the No-Build or Arterial alternatives, and would not improve travel speeds crossing the river. Moreover, the proposed configuration of the freeway ramps on Hayden Island would exacerbate the congestion and safety problems for both the northbound and southbound weaving areas between Hayden Island and Marine Drive when compared to the existing ramp configurations. It would also add traffic volumes to the currently congested Marine Drive interchange while reducing its functional capacity by creating a new intersection just west of the interchange.

CRC staff recommends that the prior conclusions and actions by the Task Force (and others) should stand, and that no further action on this concept is warranted.

Nov. 23, 2006

What a Comprehensive Columbia Crossing package built around a new Multi-modal Bridge would do. (See attached illustration)

The Multi-Modal Bridge

- Would provide SR14 and downtown Vancouver an extended approach lane to a southbound I-5 on-ramp at Hayden Island.
- Would carry light rail
- Would accommodate local traffic with two arterial lanes.
- Would provide a safe bicycle and pedestrian crossing.
- Would provide clearance for safe barge movements without lifts.
- Would have either a vertical lift or bascule opening span aligned with the existing Green Bridges for the passage of an occasional tall vessel.
- Would have a low profile that would not interfere with air traffic.
- Would not be a visual eyesore in downtown Vancouver because it would not have to fly over the railroad embankment.
- Would be built to withstand a major seismic event.

The Freeway

- Would reduce traffic turbulence and improve safety on the freeway in the bridge area by eliminating five short dysfunctional ramps and replacing them with two long ramps on Hayden Island.
- Would increase freeway capacity by allowing the existing six lanes on the Green Bridges to function as through lanes.

- Would provide greater capacity and safety by reducing the posted speed limit in the entire influence area to 45 MPH.
- Would provide additional lanes in the Marine Drive Interchange.
- Would provide an exclusive unrestricted northbound queue-jump lane to I-5 for trucks coming from Marine Drive and MLK Blvd.
- Would provide Hayden Island direct access to I-5 south and access to I-5 north through an improved Hayden Island Interchange.
- Would greatly decrease the need to open the lift spans.
- Would retain the existing shoulders on the Green Bridges which is similar to those on the I-5 Marquam Bridge.
- Would retain the existing vertical grades which are similar to those on the I-5 Marquam Bridge. However the elimination of the SR14 and downtown on-ramp from the Washington side coupled with a slower posted freeway speed would greatly reduce traffic incidents in this area.
- Would provide a new bridge for local traffic and transit that would meet modern seismic standards. In the event of the "big one", I-5 through Portland and Vancouver would probably not be passable because many overpasses and other freeway structures would probably collapse.

Light Rail

- Would provide light rail (Yellow Line) access to Hayden Island and downtown Vancouver.
- Would provide the opportunity to integrate the Hayden Island station into a creative transit oriented development.
- Would provide frequent, high capacity, reliable and economical bi-state transit service that could seamlessly interface with the CTRAN bus system in downtown Vancouver.

- Would extend light rail only to downtown Vancouver but would not preclude the opportunity to extend it further into Clark County in the future.

Local Roads

- Would provide a two lane local road between Hayden Island and downtown Vancouver over the new Multi-modal Columbia River Bridge.
- Would connect Hayden Island Drive and N. Center Avenue on Hayden Island to Columbia Street in downtown Vancouver.
- Would provide Hayden Island with a local road connection south, over a new Portland Harbor Bridge that would carry two lanes of traffic, light rail, bikes and pedestrians.
- Would provide a logical connection to Denver Avenue via a Marine Drive underpass, a new road adjacent to the light rail station and Expo Road.
- Would allow access to Marine Drive via N. Force Avenue. A more direct access could be constructed through the Expo Center's parking lot.

The Railroad Bridge

- Would replace the old short unsafe swing-span on the Railroad Bridge with a longer and better-located lift span.
- Would reduce bridge opening time, thus increase rail capacity.
- Would be one of many infrastructure improvements in this rail corridor needed to provide more efficient freight and passenger service that ultimately would reduce traffic demand on I -5.

Navigation

- Would allow tug and barge tows to make a straight and safe maneuver under the “hump” to the new railroad bridge lift span during most river conditions.
- Would require highway bridge lifts only for the movement of an occasional tall vessel that could be scheduled during off peak hours.

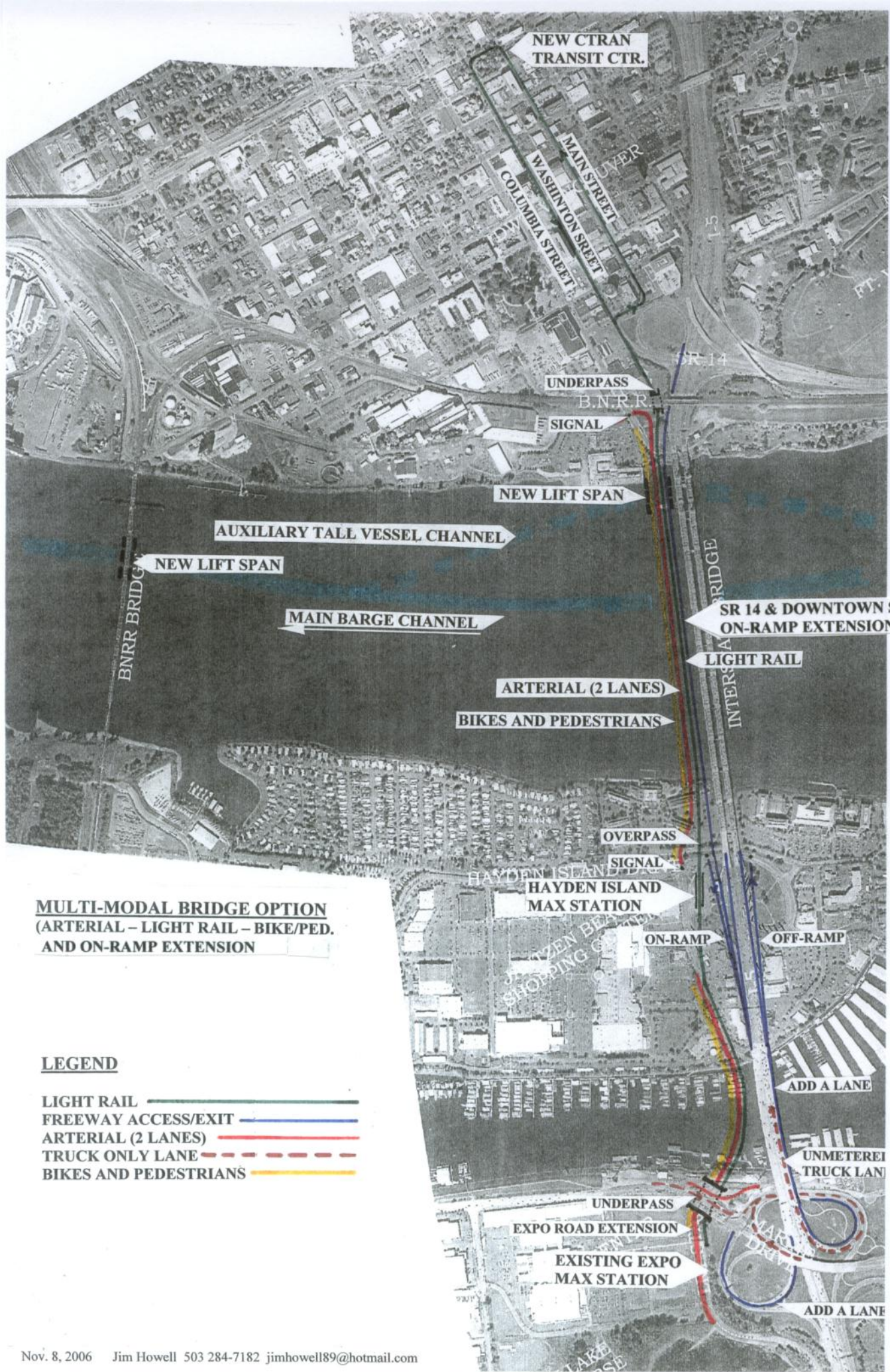
Bicycles and Pedestrians

- Would provide wide and safe bike and pedestrian lanes separated from vehicular traffic.
- Would replace the bike/ped. Lane on the existing Portland Harbor Freeway Bridge with one on the new Multi-modal Portland Harbor Bridge.
- Would provide an uninterrupted bicycle and pedestrian connection between downtown Vancouver, the Marine Drive Trail and the Expo MAX Station.

Costs

- Would cost a fraction of a new freeway bridge and approaches and includes practical solutions to transit, rail, navigation and local traffic.
- Would allow for multiple funding sources. (Federal, state and local highway, transit, railroad and navigational programs.)

Jim Howell
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Portland, OR 97213
503-284-7182
jimhowell89@hotmail.com



**MULTI-MODAL BRIDGE OPTION
(ARTERIAL - LIGHT RAIL - BIKE/PED.
AND ON-RAMP EXTENSION)**

LEGEND

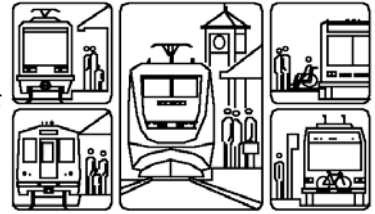
- LIGHT RAIL —————
- FREEWAY ACCESS/EXIT —————
- ARTERIAL (2 LANES) —————
- TRUCK ONLY LANE - - - - -
- BIKES AND PEDESTRIANS —————

Association of Oregon Rail and Transit Advocates

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Nov. 29, 2006

To: The Columbia River Crossing Task Force
From: Jim Howell, Director
Re: CRC Environmental Impact Study

An alternative that retains the existing bridges, in addition to the mandatory No Build Alternative, must be studied in the Environmental Impact phase of this project.

AORTA has shown how such an alternative can address all of the significant problems associated with the current infrastructure. Our first proposal made almost three years ago in February 2004 is still viable with some modifications.

Our simple and practical proposal has been summarily rejected by this project team without even the courtesy of taking the time to understand it, as was evidenced by the inaccurate statements made by the consultant at the last Task Force meeting.

Briefly, our proposal would:

1. Build a Multi-modal Bridge with a lift span, immediately downstream from the existing bridges, that would carry an extended on-ramp from SR-14 and downtown Vancouver separated from two local traffic lanes, bikes and pedestrians by two light rail tracks.
2. Remove five existing dysfunctional ramps in the bridge area and replace them with two long ones on Hayden Island.
3. Build a Portland Harbor Bridge for light rail, local traffic, bikes and pedestrians.
4. Provide a local road connection from the Portland Harbor Bridge to Expo Road, under Marine Drive and through the Expo Center parking lot next to the MAX Station.
5. Provide a new unrestricted truck-only northbound I-5 access lane from Marine Drive and MLK Blvd.



I-5 Columbia River Crossing Statement of Purpose and Need

Project Purpose

The purpose of the proposed action is to improve Interstate 5 corridor mobility by addressing present and future travel demand and mobility needs in the Columbia River crossing Bridge Influence Area (BIA). The BIA extends from approximately Columbia Boulevard in the south to SR 500 in the north. Relative to the No-build alternative, the proposed action is intended to achieve the following objectives: a) improve travel safety and traffic operations on the Interstate 5 crossing's bridges and associated interchanges; b) improve connectivity, reliability, travel times and operations of public transportation modal alternatives in the BIA; c) improve highway freight mobility and address interstate travel and commerce needs in the BIA; and d) improve the Interstate 5 river crossing's structural integrity.

Project Need

The specific needs to be addressed by the proposed action include:

- **Growing Travel Demand and Congestion:** Existing travel demand exceeds capacity in the I-5 Columbia River crossing and associated interchanges. This corridor experiences heavy congestion and delay lasting 2 to 5 hours during both the morning and afternoon peak travel periods and when traffic accidents, vehicle breakdowns, or bridge-lifts occur. Due to excess travel demand and congestion in the I-5 bridge corridor, many trips take the longer, alternative I-205 route across the river. Spillover traffic from I-5 onto parallel arterials such as Martin Luther King Boulevard, and Interstate Avenue increases local congestion. The two crossings currently carry over 260,000 trips across the Columbia River daily. Daily traffic demand over the I-5 crossing is projected to increase by 40 percent during the next 20 years, with stop-and-go conditions increasing to at least 10 to 12 hours each day if no improvements are made.
- **Impaired freight movement:** I-5 is part of the National Truck Network, and the most important freight freeway on the West Coast linking international, national and regional markets in Canada, Mexico and the Pacific Rim with destinations throughout the western United States. In the center of the project area, I-5 intersects with the Columbia River's deep water shipping and barging as well as two river-level, transcontinental rail lines. The I-5 crossing provides direct and important highway connection to the Port of Vancouver and Port of Portland facilities located on the Columbia River as well as the majority of the area's freight consolidation facilities and distribution terminals. Freight volumes moved by truck to and from the area are projected to more than double over the next 25 years. Vehicle-hours of delay on truck routes in the Portland-Vancouver area are projected to increase by more than

90 percent over the next 20 years. Growing demand and congestion will result in increasing delay, costs and uncertainty for all businesses that rely on this corridor for freight movement.

- **Limited public transportation operation, connectivity and reliability:** Due to limited public transportation options, a number of transportation markets are not well served. The key transit markets include trips between the Portland Central City and the City of Vancouver and Clark County, trips between North/Northeast Portland and the City of Vancouver and Clark County, and trips connecting the City of Vancouver and Clark County with the regional transit system in Oregon. Current congestion in the corridor adversely impacts public transportation service reliability and travel speed. Southbound bus travel times across the bridge are currently up to three times longer during parts of the am peak compared to off peak. Travel times for public transit using general purpose lanes on I-5 in the bridge influence area are expected to increase substantially by 2030.
- **Safety and Vulnerability to Incidents:** The I-5 river crossing and its approach-sections experience crash rates nearly 2.5 times higher than statewide averages for comparable facilities. Incident evaluations generally attribute these crashes to traffic congestion and weaving movements associated with closely spaced interchanges. Without breakdown lanes or shoulders, even minor traffic accidents or stalls cause severe delay or more serious accidents.
- **Substandard bicycle and pedestrian facilities:** The bike/pedestrian lanes on the I-5 Columbia River bridges are 6 to 8 feet wide, narrower than the 10-foot standard, and are located extremely close to traffic lanes thus impacting safety for pedestrians and bicyclists. Direct pedestrian and bicycle connectivity are poor in the BIA.
- **Seismic vulnerability:** The existing I-5 bridges are located in a seismically active zone. They do not meet current seismic standards and are vulnerable to failure in an earthquake.

P.O. Box 1995
Vancouver, WA 98668-1995



SCANNED
Date 1-22-07
Initial SP

www.cityofvancouver.us

January 19, 2007

Dr. Hal Dengerink, Co-Chair
Mr. Henry Hewitt, Co-Chair
Columbia River Task Force
700 Washington Street, Suite 300
Vancouver, WA 98660

RECEIVED

JAN 22 2007

Columbia River Crossing

Subject: City's position on the I-5 Interstate Bridge

Dear Dr. Dengerink and Mr. Hewitt:

The decision to improve mobility within the I-5 corridor as specifically defined within the Bridge Influence Area (BIA) will have a profound effect on America's Vancouver. There exist two primary areas of focus that deserve comment. I would like to address each in this correspondence. The first is the bridge recommendations currently proposed by the Columbia River Crossing staff, acted on by the CRC Task Force, and the second is the remaining improvements to that portion of I-5 north of the BIA needed to implement improvements to the corridor.

A great amount of time was exhausted developing the Purpose and Need for this project and moving it forward to adoption by the CRC Task Force. Thus, alternatives destined to advance into the EIS phase of this project should strive to meet these criteria, and in our opinion minimize its impact on and add to the quality of life in the City of Vancouver. Alternatives not meeting this test should be dropped from the process, thus allowing a full review and analysis of facts and issues on the remaining alternatives.

The city fully supports the recommendation of the CRC staff as proposed and adopted by the CRC Task Force at their November 29th, 2006 meeting. While much work is needed to further investigate actual bridge alignments, the decision to drop from further consideration additional study on retaining the existing I-5 bridges and inclusion of a supplemental bridge as a solution is highly appropriate. The reasons for this position follow.

- findings from the seismic investigations;
- significant impacts to a future transit operation on the existing I-5 bridges;
- the structural integrity of the existing I-5 bridges;
- I-5 bridges' ability to be consistent with the "Purpose and Need" of the project;
- and,
- most importantly its potential significant impact upon our downtown.

Royce E. Pollard • Mayor
Dan Tonkovich • Councilmember
Pat Jollota • Councilmember
Jeanne Harris • Councilmember



Tim Leavitt • Councilmember
Jeanne Stewart • Councilmember
Larry J. Smith • Councilmember
Pat McDonnell • City Manager

January 19, 2007

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The city rejects any further consideration of any proposal that would place unwarranted travel through our downtown. The City and many private investors are investing hundreds of millions of dollars to create a renaissance along the waterfront and to enhance its economic vitality. An arterial connection across the Columbia River would only serve as a by-pass to travel along I-5, with few trips destined within and to the downtown. This would consume valuable capacity and contribute to future safety problems. Downtown capacity must be preserved for future redevelopment and contribute to the accessibility of businesses and other recreational amenities.

Keeping the existing I-5 bridges and constructing an additional supplemental bridge requires determining the location for a "landing" of the new bridge. This "landing" would consume considerable waterfront land that would otherwise be used for economic development, thus reducing its precious limited supply. Additionally, connections to existing traffic corridors could create challenges and have negative impacts to circulation within our downtown.

A very significant transportation investment is being contemplated. Any investment made to the transportation system should include a transit component that will adequately serve the greater community for many, many years. Transit on the existing I-5 bridges would be subjected to ongoing bridge lifts, impacting transit operations and reliability. The United States Coast Guard has indicated that, if a supplemental bridge was constructed that was used for something other than interstate travel, bridge lifts would be deregulated. Thus, more frequent lifts should be expected. This would further jeopardize the reliability of the transit system. This is totally unacceptable.

The City of Vancouver has the opportunity to connect to and take advantage of an existing 44 mile system of efficient and reliable fixed rail transit system. Additionally, this system links to other systems within downtown Portland and beyond. It is acknowledged that this system by itself will not solve mobility needs through the corridor; however, it provides an effective alternative to the automobile which in turn and combined with other mobility improvements contributes to a more effective movement of people, freight and goods through the Portland/Vancouver region. Let us not forget that we are making a 50 to 100 year decision.

Maintenance of the existing I-5 Bridges would be of concern. If a new bridge of any kind was constructed and the existing bridges remained, the question of who would be ultimately responsible for operations and maintenance remains. The city has no interest in assuming any portion of this liability.

The alternatives for the alignment of the I-5 freeway north of the bridge landing and through the downtown must be carefully considered. Our strong preferences are:

- constructing a "cap" over the freeway beginning at the touch down point of the freeway to the north side of Evergreen;
- eliminating consideration of the high ramps potentially connecting I-5 and SR-14; and
- confining all improvements within the existing I-5 rights-of-way.

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We are in receipt of the letter from the Vancouver National Historic Reserve Trust, dated November 21, 2006, that declares the Trust's opposition to any alignment that would physically impact the Post Hospital building in any way. Please be advised that while the Reserve Trust functions as the city's management and development agent for city-owned properties within the Reserve, the Trust will not be the property owner nor a signer on the EIS. The city is the legal lessee and will be the owner of the affected property within the Reserve when the I-5 improvements are constructed. The Reserve Trust's letter does not represent the city's position.

We request that the CRC staff team and the Task Force give serious consideration to the above. The City of Vancouver remains completely committed to the process and will work collaboratively to assure that a final product will enhance our city while fulfilling the goals established by the purpose and need for the project, as defined.

Sincerely,

A handwritten signature in black ink, appearing to read "R.E. Pollard". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

ROYCE E. POLLARD
Mayor
America's Vancouver

cc: Vancouver City Council