cities representing 95% of the State's population are planning under the GMA.

In Central Puget Sound, the regional transportation strategies set in the Vision 2020[6] focus on establishing a more balanced transportation system, shifting emphasis from highways and single-occupant vehicle travel to different travel options backed by the envisioned higher density development. But the desire to find housing at costs to match their budgets has caused many people to live further away from employment centers. Consequently, land use densities in many urban areas and corridors have remained at low levels that make it difficult for other travel options (bike, walk and transit) to be viable alternatives to today's patterns of automobile use. As shown in Figure 5, the increasing use of alternative travel options during the 1990s has not been enough to offset the increase in vehicle travel during the same time period.

What Can We Expect In The Future?

According to the State's Office of Financial Management, by the year 2025 Washington's population will increase from approximately 5.9 million to 7.9 million residents, and a growing economy will increase employment from 2.74 to 3.64 million jobs. The three major urban areas will incur 69% of the population growth and 79% of the employment growth. Table 1 shows the forecasted growth in the Central Puget Sound, Vancouver, and Spokane regions for the period between 2000 and 2025.

Table 1: Forecasted Regional Growth 2000 to 2025

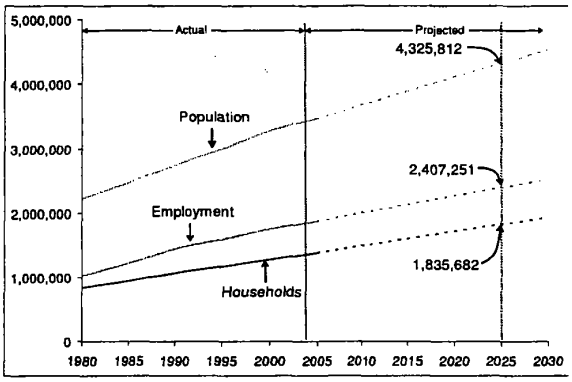
	Central Puget Sound		Vancouver		Spokane	
New Residents	+ 1,050,000	+32%	+ 146,000	+42%	+ 207,000	+47%
New Jobs	+ 660,000	+37%	+ 109,000	+69%	+ 98,000	+49%
New Vehicles	+ 928,000	+36%	+ 104,000	+42%	+ 146,000	+46%
New Work Trips[7]	+ 1,058,000	+47%	+ 209,000	+69%	+ 177,000	+51%

Source: State Sub County Forecasts, 2000 Census, and the regional forecasting models.

Central Puget Sound

In the 25 years from 2000 to 2025, the population in the four-county[8] Central Puget Sound region is expected to increase by 32%, with one million more people living in the region (Figure 6). During this same period, the region will attract almost 700,000 new jobs. The majority of the job growth is expected to occur in King County, while Snohomish and Pierce Counties will experience a faster pace of population growth.

Figure 6: Central Puget Sound Growth Forecasts

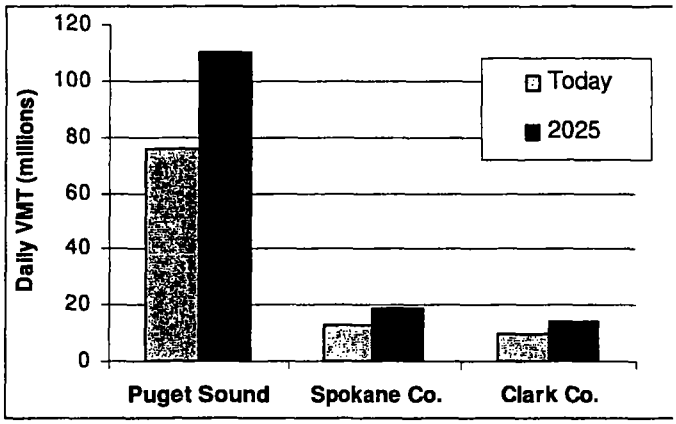


Source: PSRC, OFM and WSDOT Data Library

[6] VISION 2020 is the long-range growth management, economic and transportation strategy for the central Puget Sound region.
[7] Commute trips are one-way person-trips between home and work; total daily commute trips are approximately double the employment level.
[8] King, Pierce, Snohomish and Kitsap County are included in the Puget Sound study area.

According the computer models, travel patterns will also change within the regions, due in large part to the dynamics of population and employment growth and the availability of transportation capacity. In the Central Puget Sound region, although the number of trips will increase, the share of regional trips to, within, and from the City of Seattle will decrease from 22% today to around 18% in 2025. Conversely, trip making in other parts of the region will grow at a faster pace.

Figure 10: Comparison of Daily VMT in Major Urban Areas



Sources: SRTC, PSRC, RTC, OFM, WSDOT Data Library, and WSDOT Travel Delay Program.

In the Vancouver region, the expected population growth in outlying areas will funnel most of the travel growth to a handful of state highways. In addition, I-5 and I-205 are the only highways linking Vancouver and Portland. The demand for vehicle trips crossing the Columbia River bridges could increase by 50% over today's conditions.

In Spokane, growth in population in outlying areas, including Spokane Valley and Liberty Lake, will put higher travel demands on the I-90 corridor. Additionally, north-south arterials will see increased demand from growth in north Spokane County.

As travel demand grows, the imbalance between roadway demand and capacity will grow. The capacity built decades earlier in the major urban areas has been consumed. Without substantial new capacity, the projected population and job growth will put additional pressure on the already strained highway system in the State. The primary effects will be increased congestion, longer travel times, and reduced efficiency of the transportation system. These effects may lead to reduced productivity, higher costs for goods and services, and significant burdens of time lost to congestion in people's lives.

By 2025, without substantial new capacity or significant changes that affect how/ when we travel, users of Washington's transportation system will experience:

- *Increased delay*
- *Longer travel times*
- *Reduced efficiency*

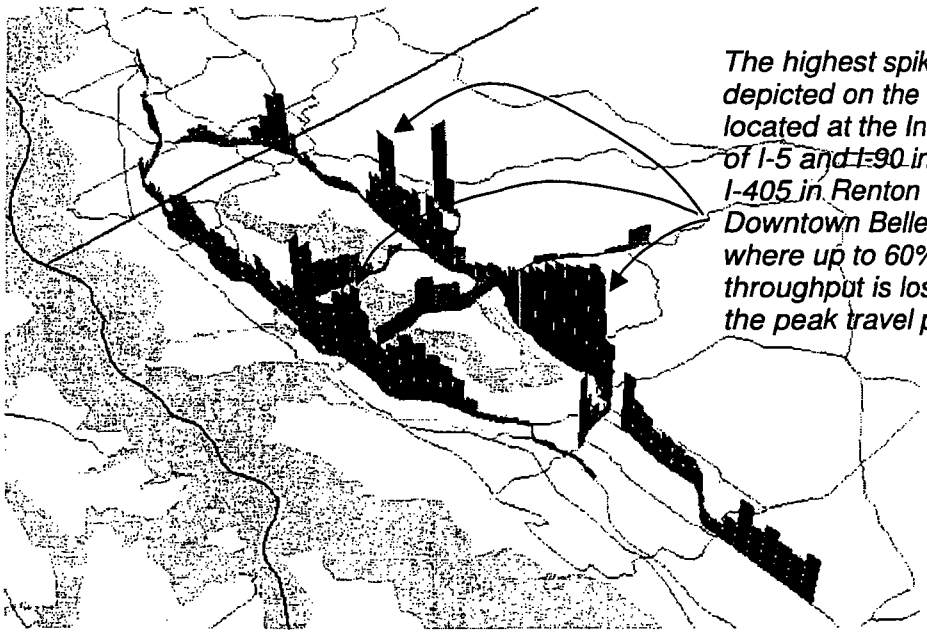
Increased Congestion

Travel delay and congestion duration are expected to continue to increase. In the Central Puget Sound region, the average delay per vehicle trip during the afternoon peak period is expected to nearly triple, with delay time loss increasing from five minutes to 14 minutes per trip. Combined with more travelers, this would result in quadrupling total daily delay for vehicles on the roadway system in 2025 (from 285,000 to 1.12 million hours per day). Substantial increases in delay time losses are also expected in the other two major urban areas: a 400% increase in daily delay is expected for the Vancouver area, and a more than 100% increase for the Spokane region.

In the Central Puget Sound region today, most major freeway corridors experience extended periods of congestion. On average, vehicle flows are impeded approximately five hours per day.

By 2025, congestion on freeways in the Central Puget Sound region is projected to last for more than ten hours each day on some freeways, a scenario in which the morning and afternoon peak periods would merge together. The throughput loss during these congested hours would be more dramatic than the loss experienced today.

Figure 11: Throughput Loss on Puget Sound Freeways When Congestion is at its Worst



The highest spikes depicted on the map are located at the Interchange of I-5 and I-90 in Seattle, I-405 in Renton and Downtown Bellevue where up to 60% of the throughput is lost during the peak travel period.

Confronting this Challenge – What Scenarios were considered?

There are several approaches to addressing roadway congestion: improving roadway operation to make capacity more available; expanding highways and transit systems; augmenting system investments to reshape transportation demand; and changing policy to value price roadways.

One approach that almost everyone agrees on is to improve the operations of roadways so that their inherent capacity is more effectively available. This includes a range of strategies from traffic light synchronization and ramp meters, to improved traveler information systems and faster clearance of disabled vehicles and crash scenes on the highways. These strategies are familiar in Washington State where many such approaches have been pioneered. More needs to be done and is being done. Estimates vary as to the proportion of highway congestion that is due to events and situations on the roadways that are unrelated or little related to the basic demand/capacity imbalance. Almost everyone agrees that demand/capacity imbalance is very large. This study, however, does not specifically model and address the transportation congestion improvements that can be gained from more emphasis in these areas.

Blended strategy: **Transit Emphasis** included a high investment in transit improvements, but a relatively lower investment in roadway improvements (about one third of the new capacity included in the Highway Focus Scenario).

Another blended strategy, **Transit Emphasis with Pricing**, included the same level of highway and transit improvements tested in the Transit Emphasis Scenario, with the addition of tolling all the heavily traveled corridors (freeways and expressways).

Finally, in order to create a common benchmark against which all strategies could be compared, **2025 Baseline Scenario** was created and modeled. This scenario included all the existing facilities plus funding secured projects (such as the Nickel projects and Light Rail to University of Washington). More detail on each of the scenario strategies follows:

Highway Focus, The Highway Focus Scenario tested an aggressive highway expansion program in each region. In the Central Puget Sound region, the Highway Focus Scenario's road investments would provide 1,230 more freeway and 730 more arterial lane miles than the 2025 Baseline Scenario. This represents a 16% increase in total lane miles (Table 2). Similar highway strategies were tested in Vancouver and Spokane.

Table 2: Lane Miles to be Added in the Highway Focus Scenarios*

Facility Type	Central Puget Sound			Vancouver**			Spokane		
	Miles Added	% Increase	% Change in Population	Miles Added	% Increase	% Change in Population	Miles Added	% Increase	% Change in Population
Freeways	1,230	52%	32%	100	45%	42%	137	60%	47%
Arterials	730	7%		186	25%		382	25%	
Total	1,960	16%		286	29%		518	30%	

* Lane miles compared with 2025 Baseline Scenario
** Data for Clark County only. Other lane miles added in Portland, Oregon.

Transit Focus:

A Transit Focus Scenario was developed in each region to test an aggressive expansion in transit infrastructure and service (Table 3). Transit service hours would increase by more than 100% in both the Central Puget Sound and Vancouver regions compared with the 2025 Baseline; the expansion of transit service hours was a more modest 38% in Spokane. The Central Puget Sound region High Capacity Transit (HCT) network expanded by 400%, while new HCT facilities were introduced in both Vancouver and Spokane.

Table 3: Transit Service and Facilities to be Added in Transit Focus Scenarios*

Service Addition	Central Puget Sound		Vancouver		Spokane	
	Units	% Increase	Units	% Increase	Units	% Increase
Transit Service Hours***	26,000 hours	104%	1,336 hours	149%	1,750 hours	38%
Miles of High Capacity Transit (HCT)	176 miles	490%	21 miles	No previous HCT	31 miles	No previous HCT

* Compared to the 2025 Baseline
** Data for Clark County only; other transit service added in Portland, Oregon
*** Average weekday bus equivalent revenue hours

delay to below today's levels. Figure 12 illustrates how delay was reduced in Spokane with the Highway Focus Scenario.

Large-scale highway expansion was found to be very expensive (see Table 5). In heavily traveled corridors, relatively less expensive right-of-way has been used and opportunities are limited for future highway expansion due to man-made and/or natural environmental constraints.

Figure 12: Daily Hours of Delay in the Highway Focus Scenario for Spokane

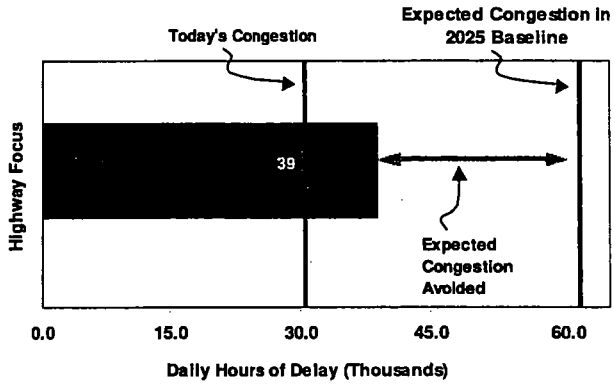


Table 5: Costs to Implement the Highway Focus Scenarios

Regions	Capital Cost* Range ($ Million)		Annual Operations and Maintenance Costs* ($ Million)
	Low End	High End	
Central Puget Sound	$ 79,100	$ 104,000	$ 150
Vancouver**	$ 3,100	$ 4,100	$ 10
Spokane	$ 6,800	$ 8,900	$ 25

* Costs in Year 2003 Dollars
**Implementation costs do not include Portland area improvements

While major system-level expansion of the highway system is effective in reducing delay, the predicted benefits may not be enough to offset the cost of building such a highway system[12].

Table 6: Benefits and Costs for the Highway Focus Scenarios

Regions	2025 Annual Benefits Range ($ Million)		Annualized Capital and 2025 O&M Costs Range ($ Million)	
	Low End	High End	Low End	High End
Central Puget Sound	$ 1,500	$2,200	$ 2,500	$ 3,700
Vancouver*	$ 54	$ 80	$ 77	$ 100

Notes: Benefits and costs are expressed in constant 2003 dollars including present value discounting;
Benefits and costs were evaluated for Vancouver only and do not include benefits and costs accrued/expended for the Portland area;
Spokane data not available

Can We Solve Congestion with Significant Transit Improvements?

Major transit expansion in the three urban areas would provide an alternative to congested roadways for people traveling to/from urban centers during peak periods. However, transit alone was not effective in reducing roadway delay. The lack of supportive land use densities

[12] The two primary reasons that the Highway Focus Scenario did not prove to be cost-beneficial are 1) improvements in densely developed areas (i.e., I-5 tunnel through downtown Seattle) are extremely expensive and 2) peripheral improvements generate increasingly fewer user benefits even though they are still very costly to construct. Certain components of this and other scenarios, especially strategically located/corridor-specific improvements, may prove to be cost-beneficial on their own.

Table 8: Benefits and Costs for the Transit Focus Scenarios

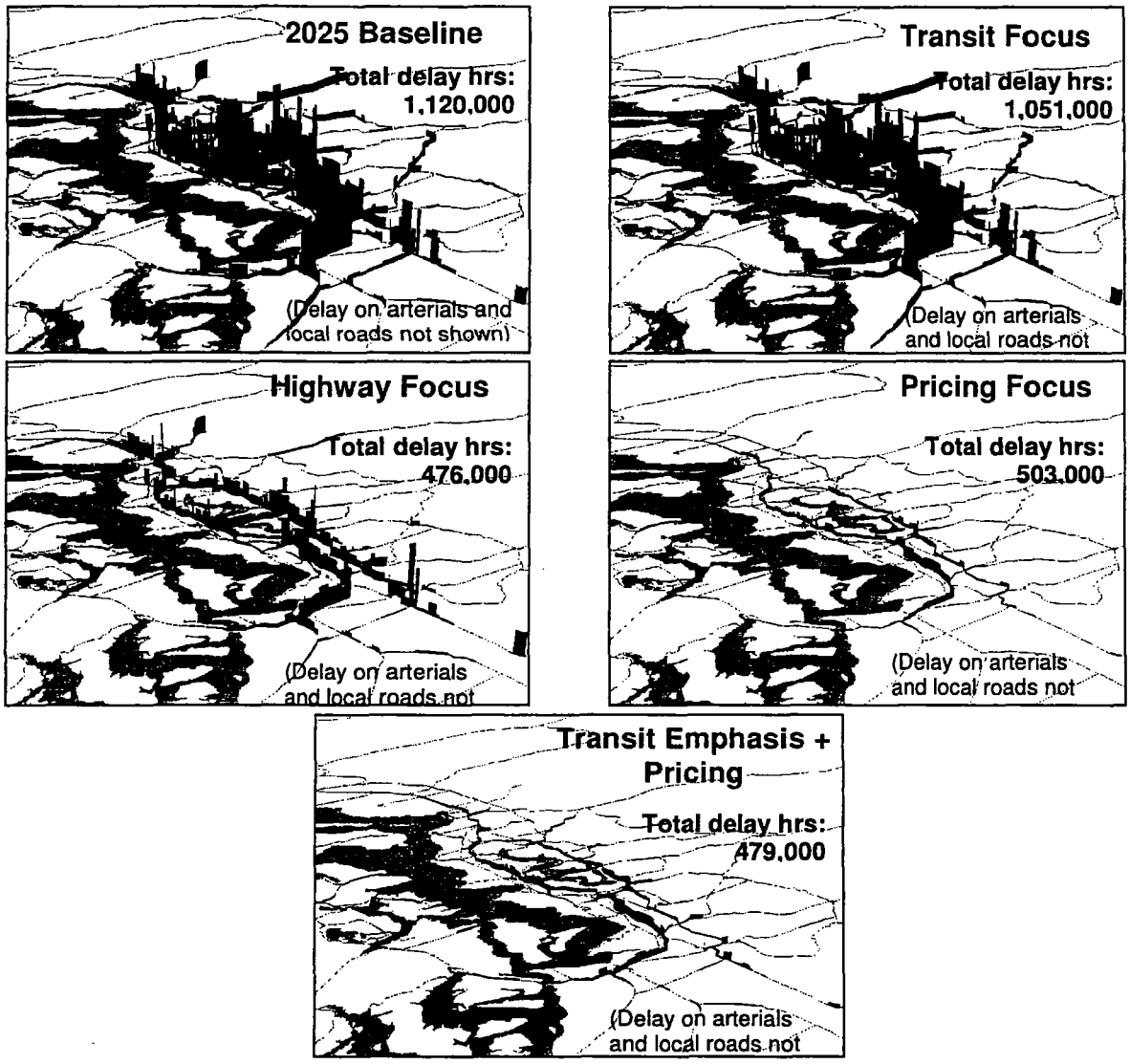
Regions	2025 Annual Benefits Range ($ Million)		Annualized Capital and O&M Costs Range ($ Million)	
	Low End	High End	Low End	High End
Central Puget Sound	$ 480	$ 730	$ 1,200	$ 1,500
Vancouver	$ 34	$ 52	$ 91	$ 108

Note: Benefits and costs are expressed in constant 2003 dollars inclusive of present value discounting; Spokane data not available.

Does Charging Roadway Tolls Reduce Congestion?

Each of the pricing strategies improved the efficiency of the transportation system as compared to the same conditions without pricing. Figure 14 illustrates this point.

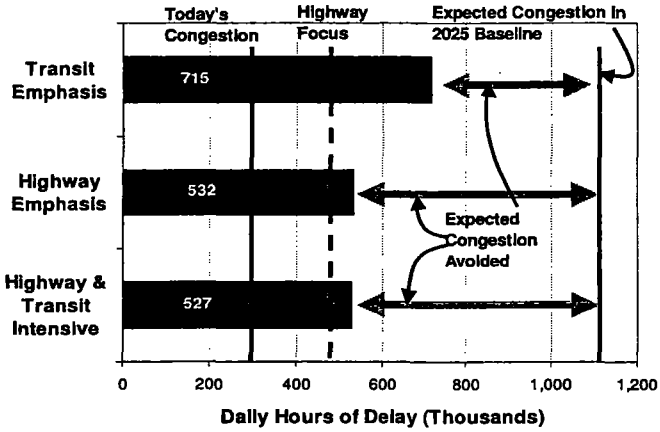
Figure 14: Delay per Mile per Day on Major State Highways in the Central Puget Sound Region



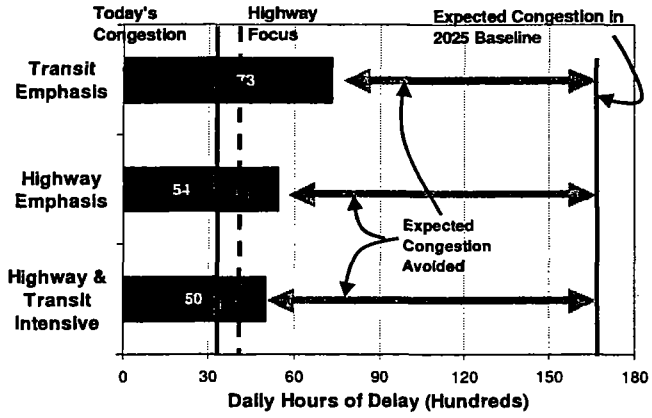
What if We Combined Investment Options?

Investing in a mix of roadway and transit produced similar levels of congestion reduction when compared to the Highway Focus Scenario (Figure 17). The mixed-mode solutions tend to be most effective in and around the urban cores where investment costs are high and congestion is persistent for much of the day.

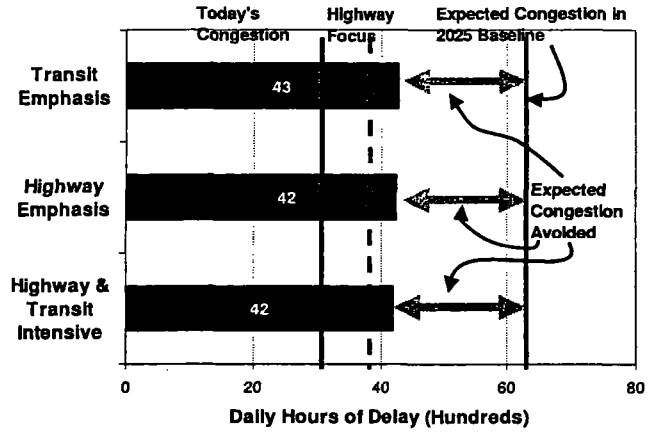
Figure 17: Delay Savings for Mixed-Mode Scenarios are Similar to the Highway Focus Scenario



Central Puget Sound



Vancouver



Spokane

How Can We Apply these Findings?
While the analyses are not intended to replicate or supplant ongoing planning processes, the broad range of the scenarios offers a perspective on how different modes work on their own and in combination. The congestion relief findings can be applied to help regional and corridor planning. The results may help in setting the range of regional transportation strategies to consider and screening the most effective modal options. At the corridor level, the metrics provide useful background data and insights into the effectiveness of transportation strategies. While not a substitute for detailed corridor planning and design, these results can help put corridor strategies into perspective with similar strategies elsewhere in the region.

What Can Be Done to Improve the Analysis?
While the methodology and assumptions used in this analysis apply the best available modeling tools, they have limitations. Topics that could be improved upon in future studies include the following:

The full range of effects of pricing on travel behavior. Pricing strategies were analyzed to the extent that they could be modeled within a region's travel forecasting process. These models do not fully capture the spectrum of potential pricing effects. Better analysis tools are needed to evaluate the impacts of pricing on roadway and transit use.

Effects of congestion strategies within specific highway and transit corridors. Most detailed evaluations of corridor strategies are best handled as part of focused corridor studies.

Effects on land use allocation and mix. Major transportation investments impact land use patterns. Further study is needed to determine how the regions' land use patterns could be affected by various transportation investment scenarios.

Refinement of benefit-cost methodology. The benefit-cost methodology should be refined to match refinements in the regional travel demand models to better address the effects of pricing and mode shift behavior. The methodology could also be expanded to a multi-year evaluation period by providing additional travel demand modeling for a second forecast horizon year beyond 2025.

Corridor effects of Transportation Demand Management strategies. Further testing of corridor-based TDM strategies would produce more accurate results than the system-wide factors applied in this study.

Detailed origin and destination traveler profiles. Additional analysis of travel patterns for personal travel and freight would assist in understanding the dynamics of the analysis result

Highway Congestion: What Is To Be Done?

Briefing for the Senate Transportation Committee

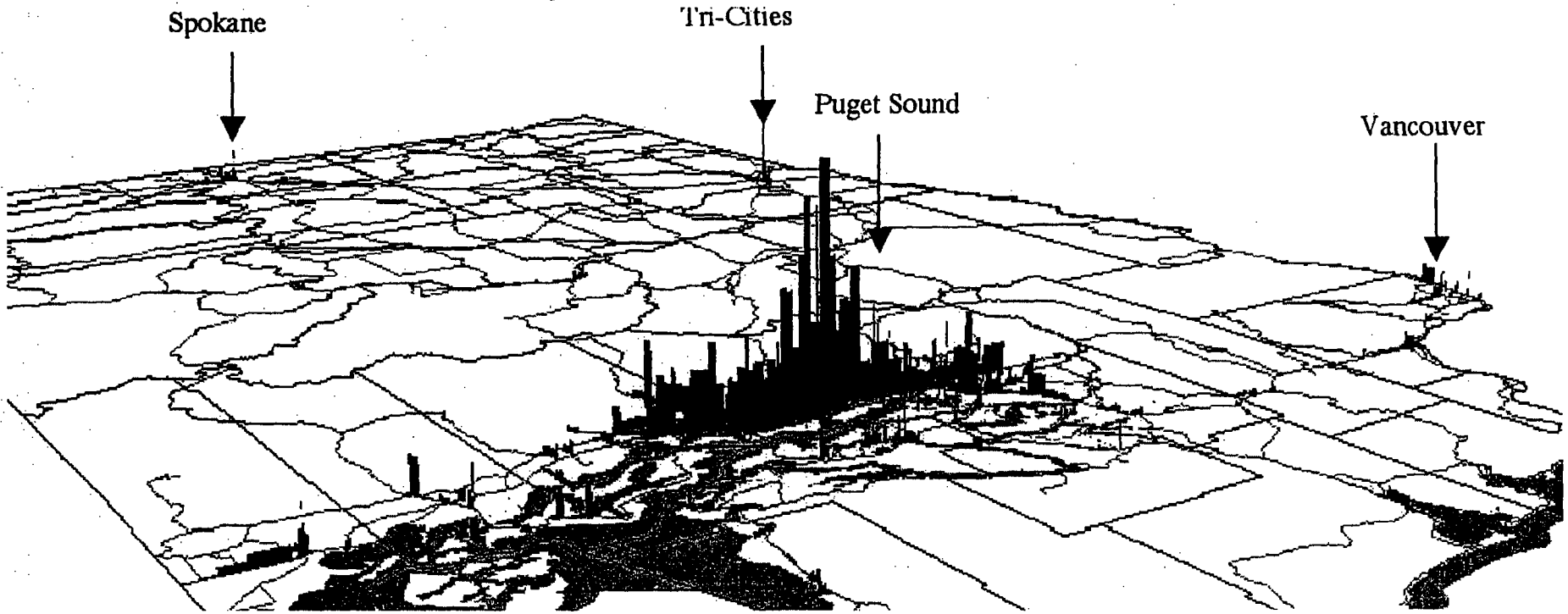
Douglas B. MacDonald
Secretary of Transportation

January 17, 2006

Washington State Department of Transportation

Highway Congestion - Delay - Aggravation - Cost - Risk

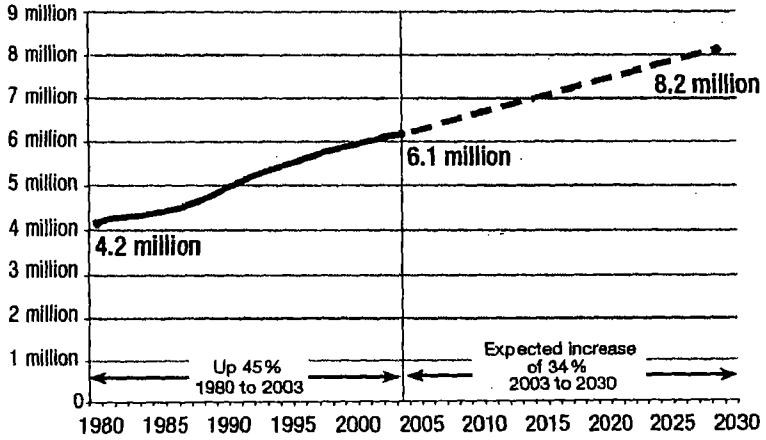
Annual hours of vehicle delay on state highway segments in urban areas



- 370,000 vehicle hours (520,000 person hours) daily delay (2004)
- Chiefly affecting urban areas and especially the Puget Sound region
- Lost productivity, economic inefficiency and personal opportunity costs
- Estimates: billions of dollars per year
- High accident rates accompany congestion and every accident in congestion makes congestion worse!

Highway congestion results from growth and prosperity creating a demand/capacity imbalance as a result of infrastructure under investment.

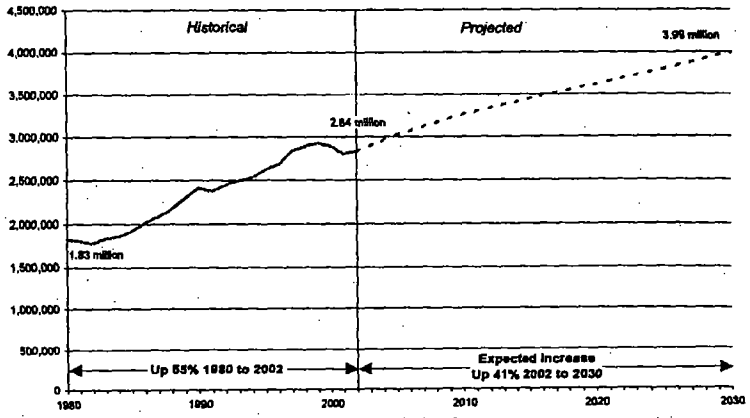
Population



Employment

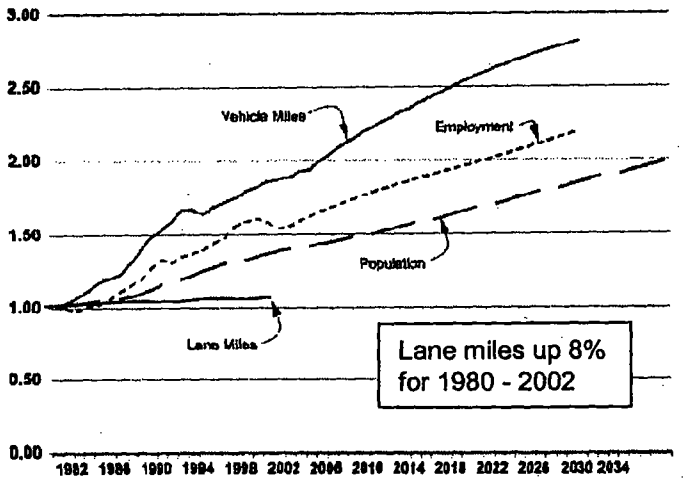
Historical and Projected Growth in Employment in Washington

1980 to 2030 (projected from 2003 to 2030)

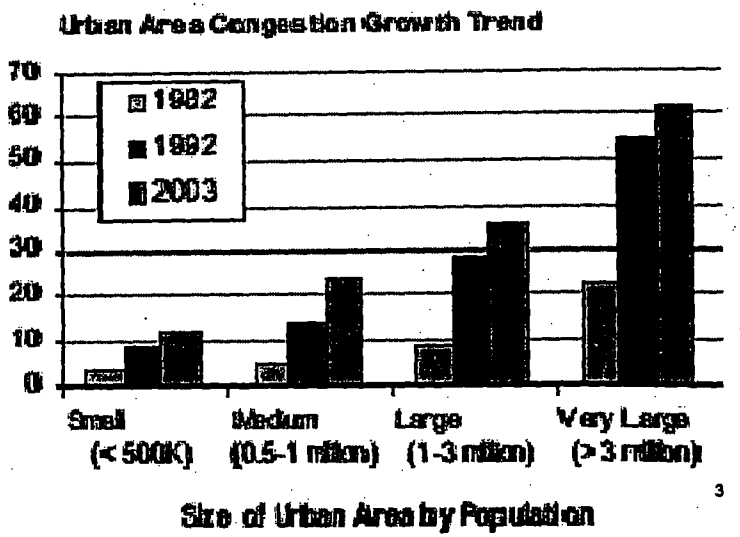


Source: Table 3-1, "2003 Long Term Economic and Labor Force Forecast for Washington" Washington State Office of Financial Management and Employment Security Division

Vehicle Miles Traveled



Growth in travel delay in 1982 to 2003

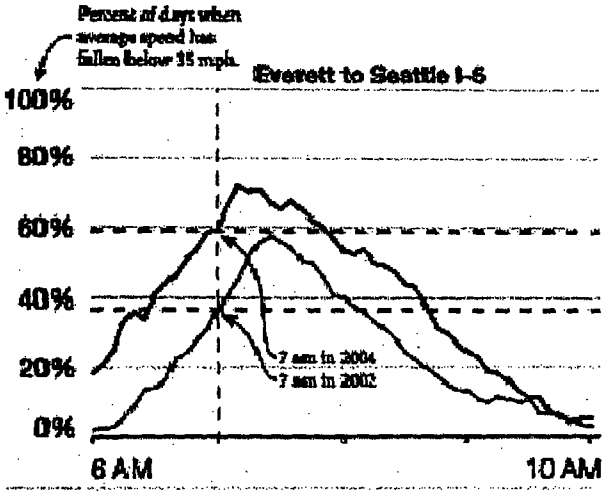


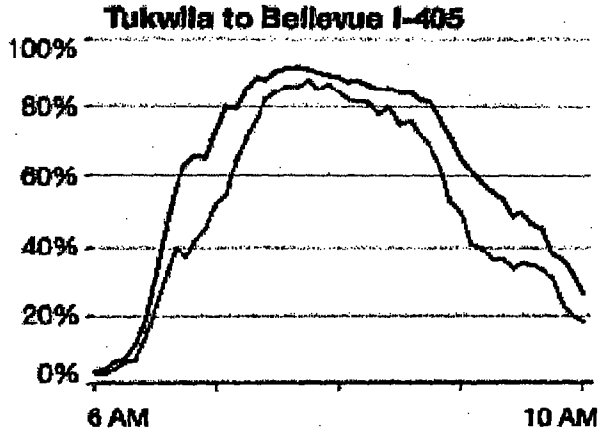
WSDOT and the University of Washington TRAC measure congestion changes on 20 key corridors

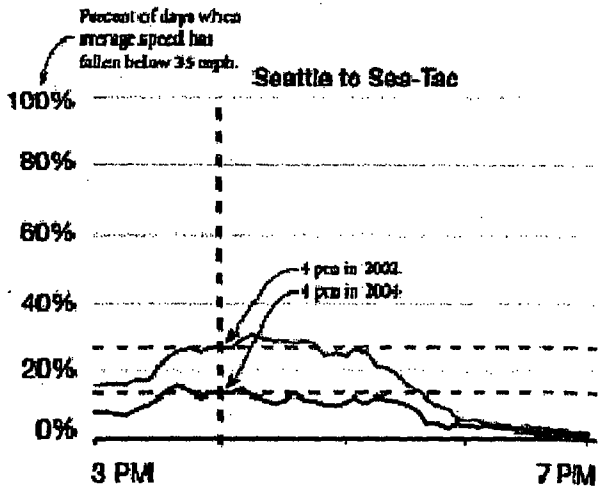
Gray Notebook congestion measurement report for 2004 (9/15/05)

Results for 2004 compared to 2002 as base year, for example:

	Peak Time	Length	2004 average travel time at peak *and change from 2002*	Volume In 2004	2004 % "slow days" *and change from 2002*	2004 "reliable" travel time and *change from 2002*
Tukwila to Bellevue (AM)	7:45 AM	13.5 mi.	36 min. *4 min. worse*	Down 1%	80% *Up from 73%*	52 min. *Down from 53 min.*
Everett to Seattle (AM)	7:20 AM	23.7 mi.	48 min. *4 min. worse*	Up 1%	52% *Up from 35%*	74 min. *Up from 66 min.*







What's coming could be much worse unless we continue to make progress on both system investment and management

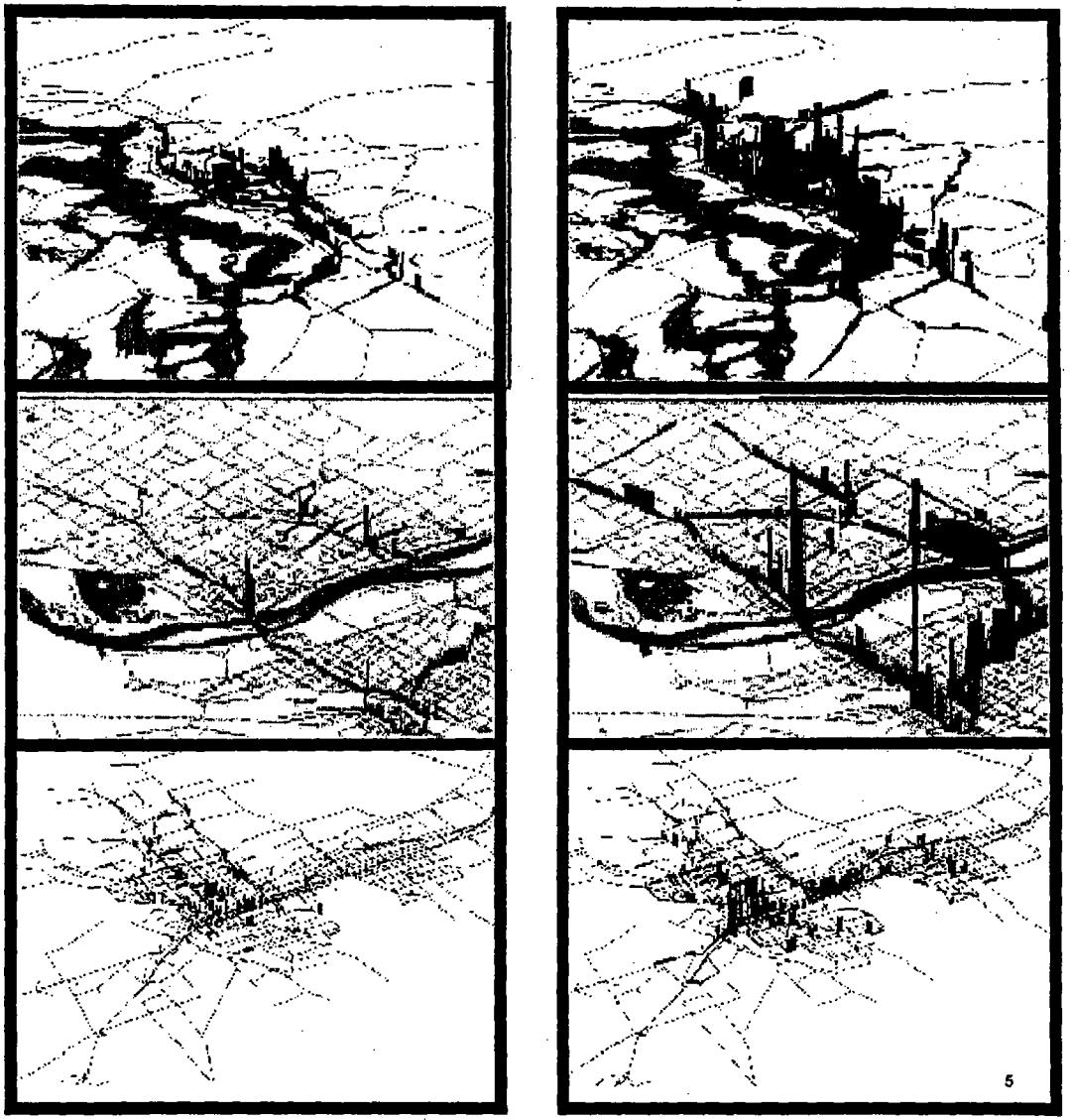
Vehicle delay today

Vehicle delay "2025 baseline"

Central Puget Sound

Vancouver/Portland

Spokane



To fight congestion, what are we committed to building?

- Highway projects to maintain and better use existing facilities — Alaskan Way Viaduct, SR 520 Bridge
- Highway projects to combat bottlenecks and chokepoints — I-405 improvements; I-5 48th to Pacific (Tacoma)
- Highway projects adding point-to-point capacity
  - Completing the central Puget Sound HOV lane system — I-5 Everett HOV, Tacoma Vicinity HOV, I-5 Fife HOV
  - Other point-to-point improvements — I-90 improvements in Spokane; SR 522, SR 202
- Transit facility investments to improve transit's appeal to current and future trip makers and build ridership — Link light rail from Seattle to SeaTac Airport, Regional express direct access ramps

2003 "Nickel" and 2005 "TPA" include 330 new general purpose lane miles and 85 new HOV lane miles.

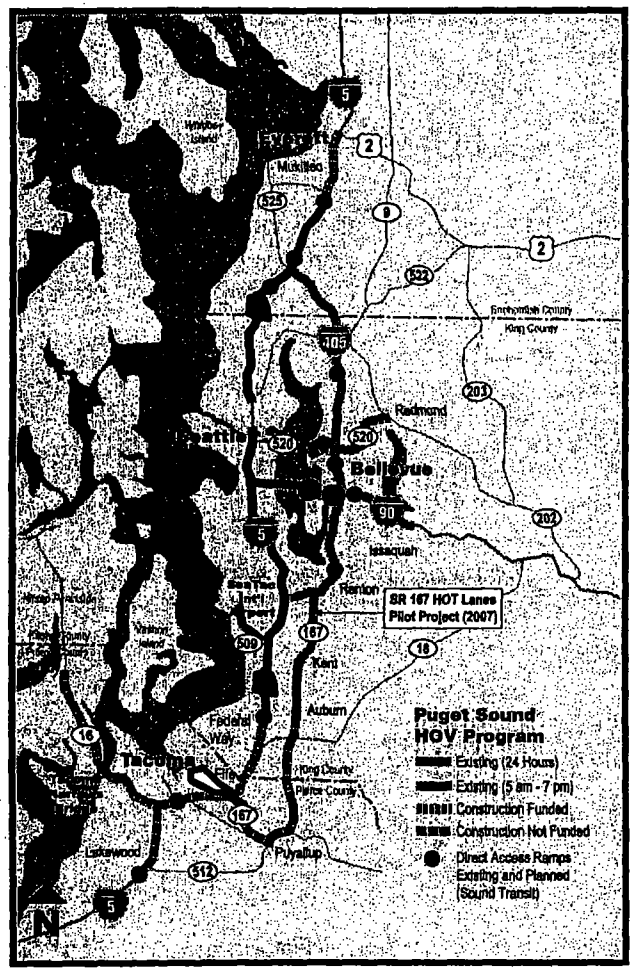
In the Puget Sound Region, we need more than just state investments to fight congestion

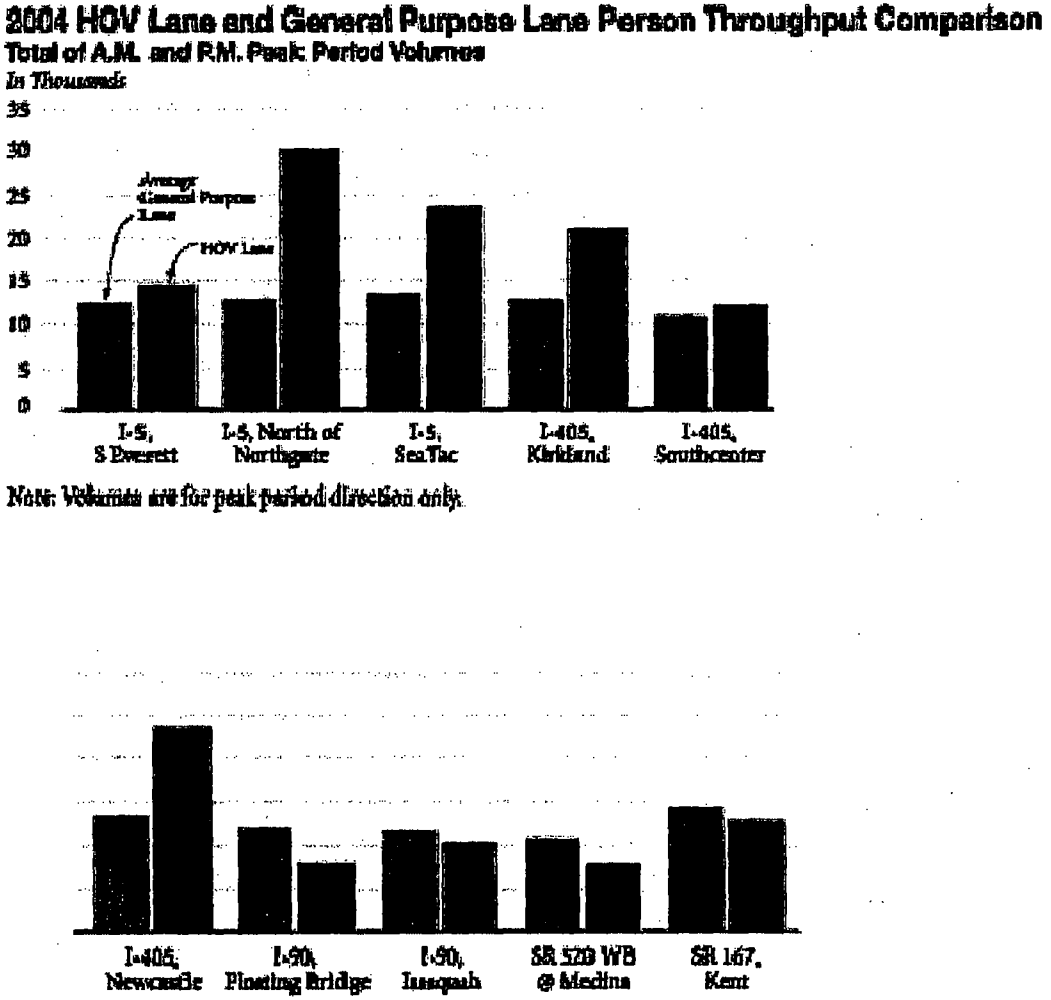
- Additional road investments requiring regional funding
  - SR 509/I-5 Corridor Completion
  - SR 167 Green River Valley HOV, Bottlenecks and Chokepoints
  - SR 167 Puyallup to Port of Tacoma Corridor Completion
  - I-405 – North Renton to Bellevue – Additional Lanes
  - SR 520 HOV Lanes
  - SR 9 Corridor Widening and Improvements
  - SR 162 Corridor Widening
  - SR 704 Cross-Base Highway

- Additional transit investments requiring regional and local funding
  - Light Rail Transit (LRT) Extension to Northgate
  - High Capacity Transit (HCT) Bellevue to Seattle
  - Expanded Regional Express Bus Service
  - Additional HOV Direct Access Ramps/Freeway-to-Freeway Connections

HOV lanes in the right places are highly efficient, enhance the speed and reliability of multi-passenger vehicles and ease congestion in adjacent general purpose lanes.

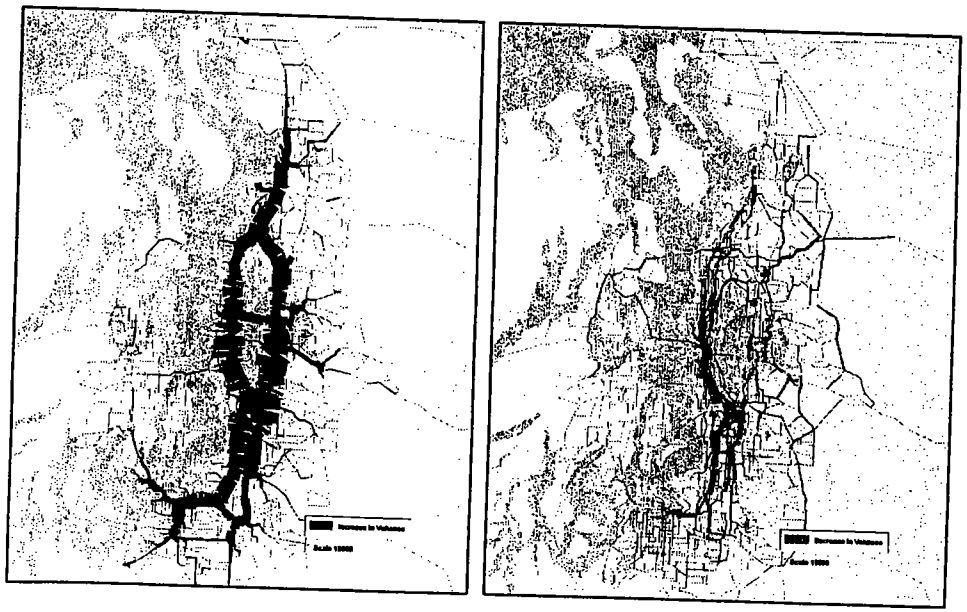
Central Puget Sound HOV lanes completed and to be completed



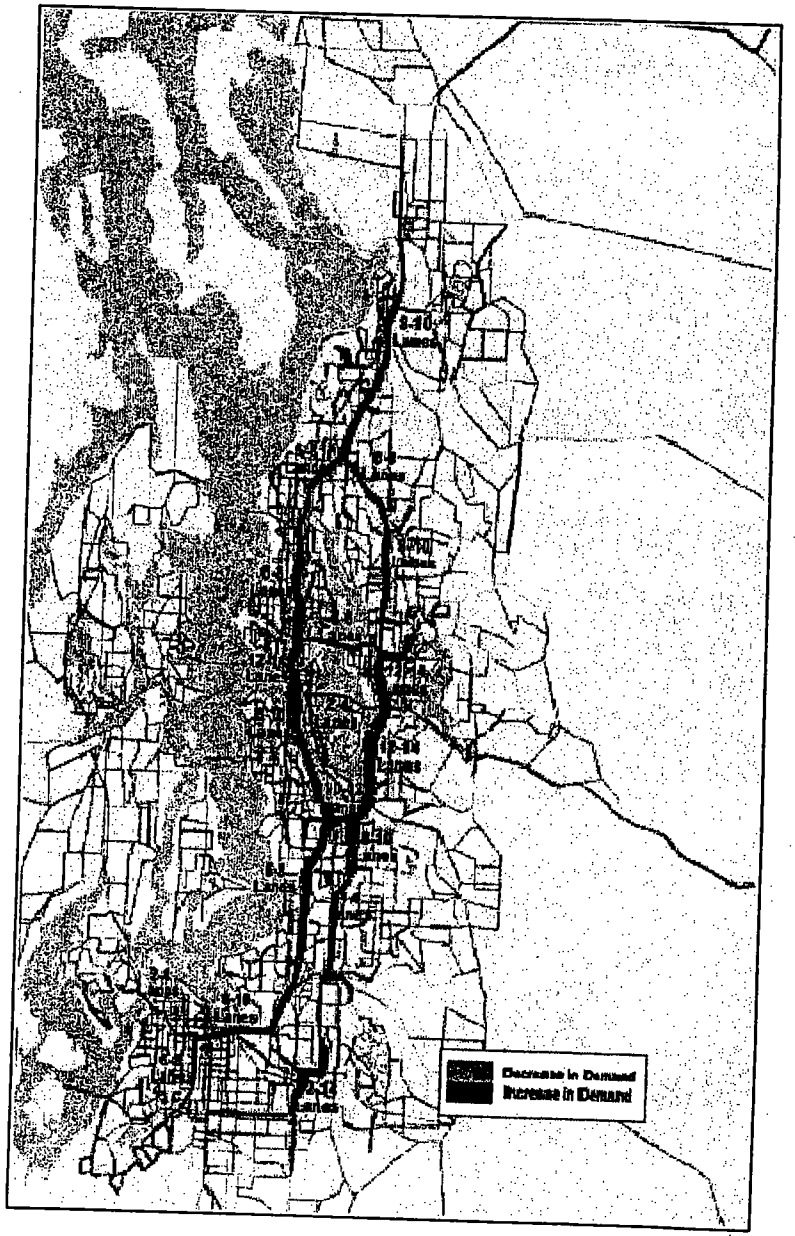


Building as the *only* solution for congestion relief turns out to present significant challenges and a very unrealistic transportation vision.

Changes in daily vehicle volumes in the unconstrained highway demand analysis



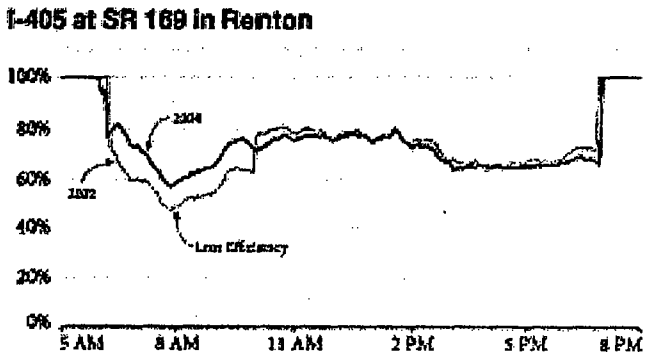
Additional lanes needed to meet unconstrained highway demand



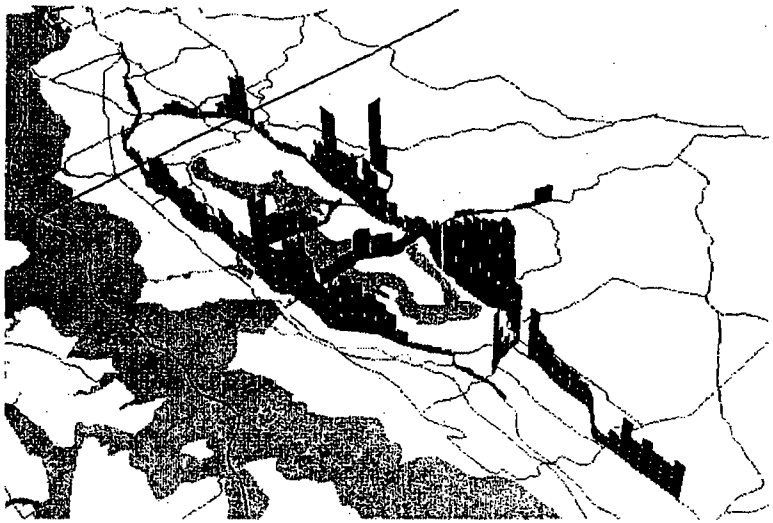
The crucial relationship between flow conditions and throughput

- When congestion builds, speeds drop, drivers bunch up and per lane throughput plummets. "The amazing shrinking freeway."
- At 45-50 mph optimal speed, highways typically see 2000 vehicles per lane per hour throughput. The highway is "productive.

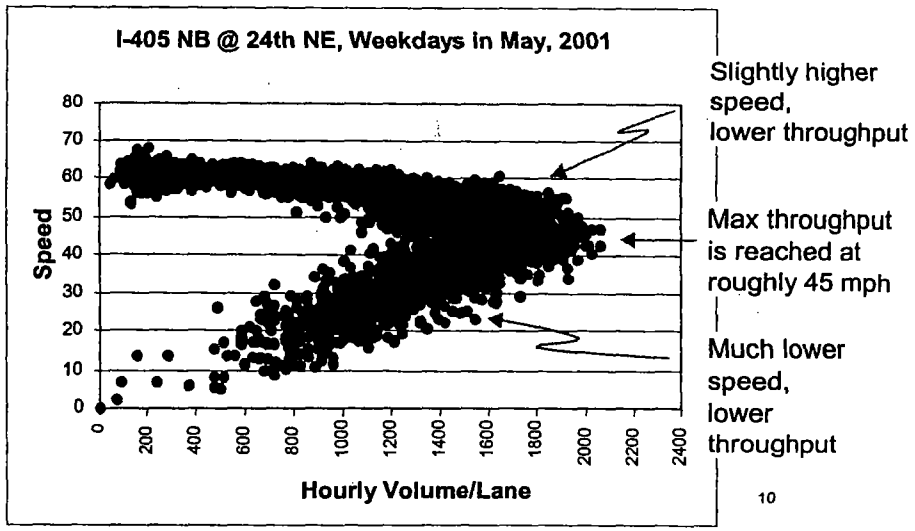
Here's how the productivity of a freeway is degraded by congestion



Here's the view of lost productivity for highways in central Puget Sound.



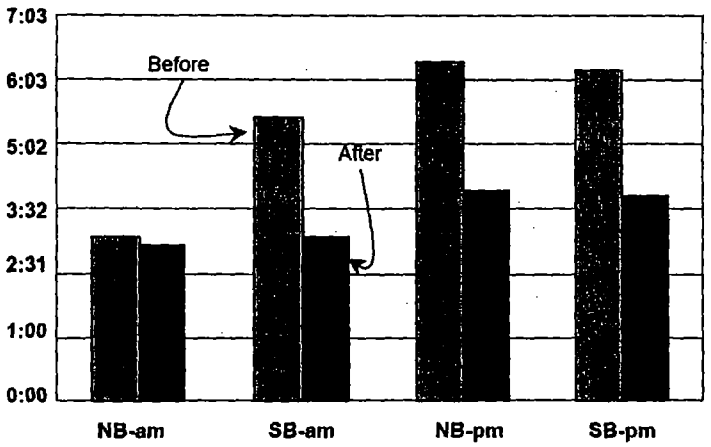
Here is the highway "sweet spot" graph.



We must also better manage highways and highway system operations to sucessfully fight congestion.

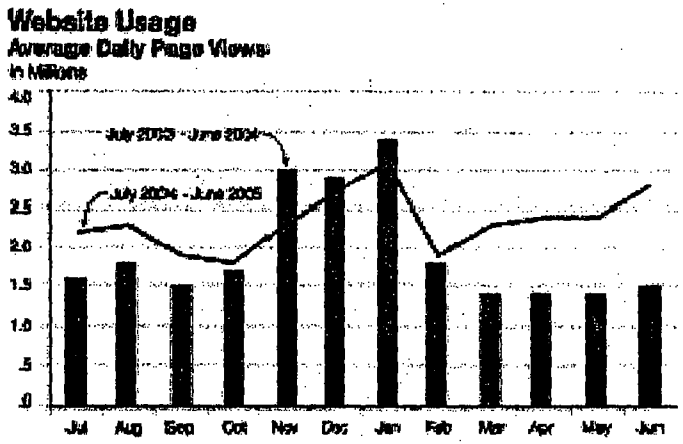
- Re-time and synchronize traffic signals
- Operate ramp meters to smooth traffic merges
- More progress on traveler information
- Incident response improvements

Traffic light re-timing probably has the best cost/benefit ratio of any dollar spent (min.sec)

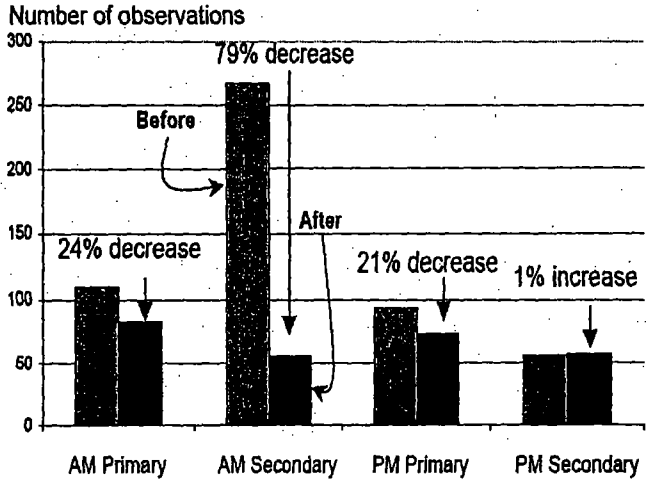


Before and after peak hour travel times

Study conducted by the City of Bothell on retiming traffic signals on SR 527 between 228th Street SE and SR 524.



Ramp meters improve traffic flow



Conflict results at S 212th St. to NB SR 167

Primary conflicts: when either the merging Behind or the adjacent mainline vehicle brake to avoid each other.

Secondary conflicts: mainline drivers behind a primary conflict that also must brake.

Fact: The traffic congestion you experience as intolerable is often caused by "incidents," not by inherent demand/capacity imbalance.

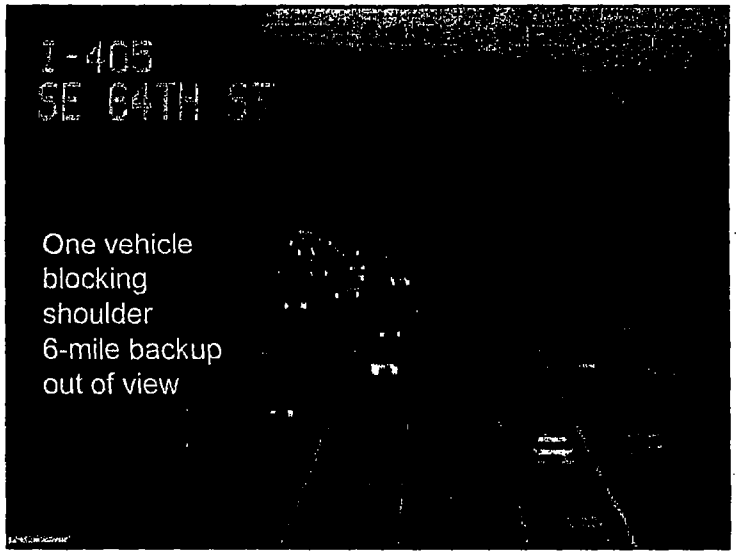
Accidents

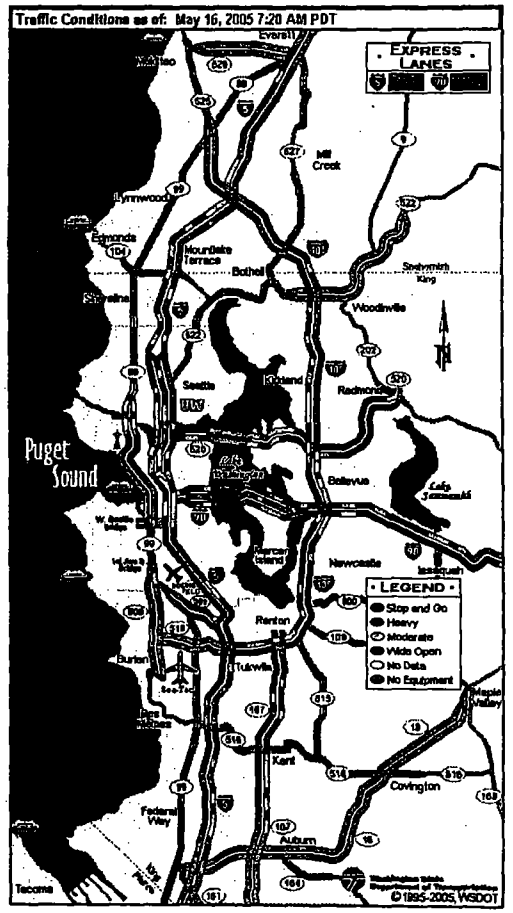
Disabled Vehicles

"Secondary" Accidents

Bad Weather

Construction/ Maintenance Zone





On a three-lane wide divided freeway:

- A car out of gas on the shoulder can reduce total throughput by 20%.
- A disabled car blocking one lane can reduce total throughput by 50%.
- An accident blocking two lanes can reduce total throughput by 85%

The bane of most travelers traffic experience: The intolerable backup that defeats their expectation of "reliable travel time."

In 2003, the total cost of traffic congestion in the greater Seattle area was over $1.2 billion. Savings due to traffic operations, including Incident response were estimated at $107 million*.

** Texas Transportation Institute 2005 Urban Mobility Study*

A short digression to fundamental questions too little discussed in the congestion arena:

- How will housing and job growth be distributed?
- How will energy supply affect the future of transportation demand and transportation systems?
- How will freight movement and freight logistics change?
- How will technology of highways and vehicles change?

Investing more and operating smarter will help address congestion but will not solve it. A more dramatic remedy "Value Pricing" will eventually be necessary.

- Free market economies use the law of supply and demand to assure the right level of goods and supplies at the right price.
- Where demand exceeds supply, price goes up, demand adjusts downward and supply adjusts upward. And the price constantly adjusts itself to make the market efficient.
- The time will come when the benefits of a market mechanism will have to be used to better match transportation demand and capacity.

How pricing will help

- Restores lost productivity. The price for using highways will fluctuate to keep the highways moving.
- Assures speed and reliability for multi-passenger vehicles-buses or vanpools.
- Encourages shifts in today's capacity-wasting transportation paradigm: everyone wants to drive on the same roads and the at the same time, after all, why wouldn't they? It's always "free".

Pricing for the value of consuming capacity of a HOT lane, or a freeway segment, or eventually the highway network

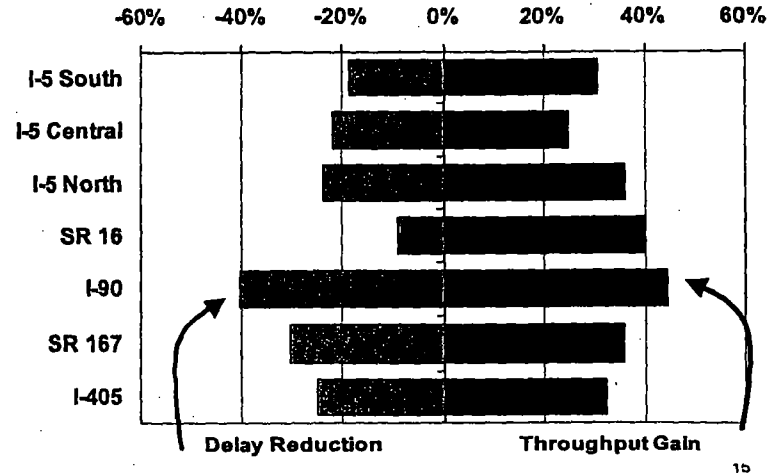
WSDOT's SR 167 HOT lane pilot project is a capacity management application of value pricing.

- The four-year pilot project will convert 9 miles of SR 167's HOV lanes to HOT lanes - likely to open in 2007 or 2008.
- The HOT lanes will maximize use of SR 167's existing capacity – with up to 13% increase in vehicles using the corridor and up to 56% increase in use of the HOV lanes when they become HOT lanes.
- Solo drivers will be charged a toll to use the HOT lanes. The price of the toll will be based on the congestion level in the lane and set to ensure speed and reliability in the HOT lane.
- Access to the HOT lanes by transit, car pools, van pools, and motorcycles will remain free.

HOT lane projects are sprouting up and around the country because its time to make the laws of market economics help solve the traffic congestion problem

- California
- Colorado
- Texas
- Washington
- Minnesota
- D.C. Beltway

Potential peak period percent delay reaction and efficiency gains with HOT lanes in the Central Puget Sound Region



Value pricing will come to pay economic dividends far in excess of the receipt of the tolling revenues.

- Revenues will be used to help finance transportation system investments and operations

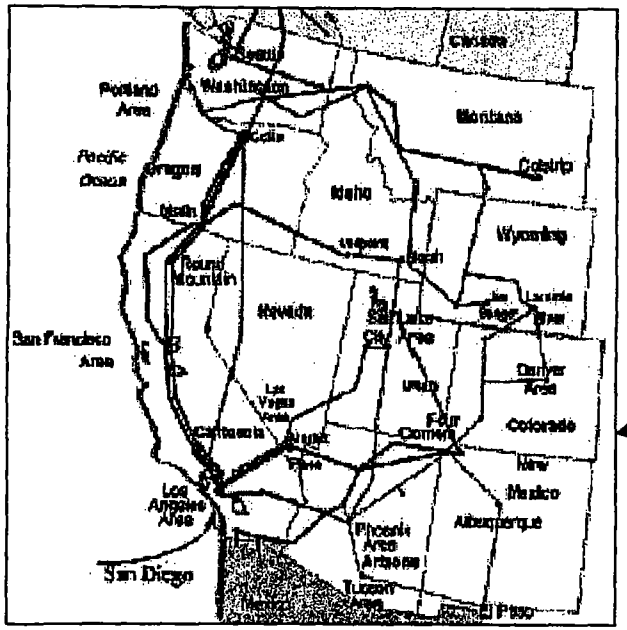
- Dollar investments already made in highways will recapture full value from making highways productive at full capacity once again

- Dollar value savings will be realized from cutting loss of time, money and fuel when people and goods are stuck in traffic

- Safety related savings will be realized from fewer fatalities, injuries and accidents on congested freeways

Value pricing also applies long-standing rule that price-induced conservation of capacity is generally cheaper than building new capacity

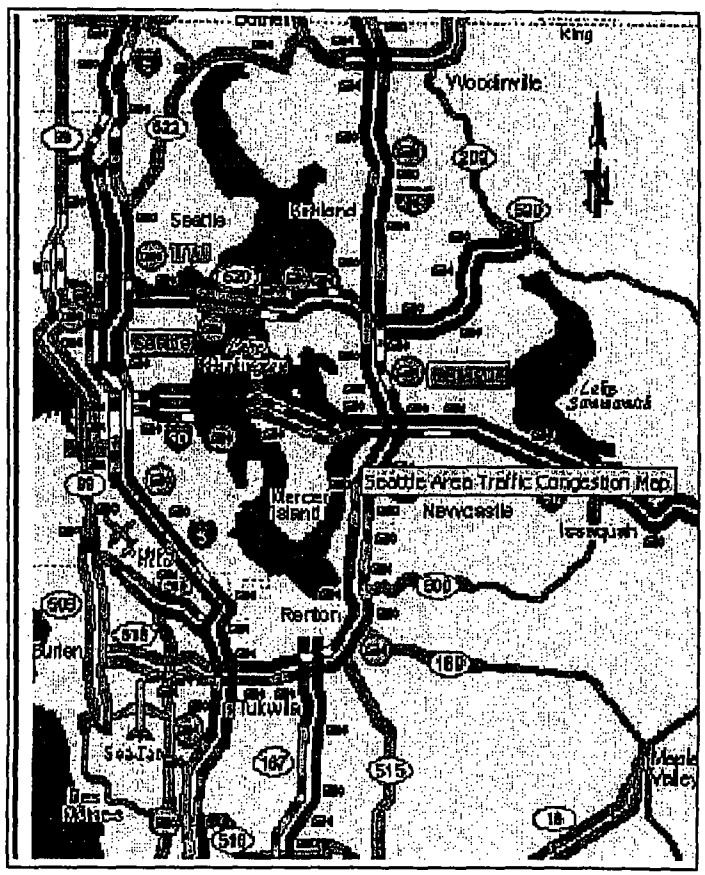
Traffic congestion is largely a "peaking" issue on a capacity constrained roadway "transmission" system. Just like time-of -day (or seasonal) electricity send-out peaking on the electric transmission grid. Charging a price to drivers varying as the cost of the demand burden they place on the system will shift demand away from the peaks.



Seattle City Light (Western Grid)

Traffic Grid

Electric Grid



The power company charges you extra for using electricity in peak times, e.g. so you will do the laundry at 8:00pm instead of at 5:00pm. Value pricing for highways will work on the same principle.

Action Strategies: Balanced - Broad-based - Short, Medium and Long Term

- Continuous improvement of highway management and efficiency
- On-going support for investments and programs to reduce the grip of automobile/highway dependency.
- Continued investment in existing transportation assets to extend their useful lives
- Effective delivery of investment projects now in the pipeline: chokepoint improvements *and* corridor expansion
- Continuing steps towards system planning and public acceptance for value pricing
- Good choice of additional highway and transit investments to get best value for dollar and integrate with tomorrow's transportation needs. Expanded rule for regional funding.

Washington State
Department of Transportation

ENDANGERED SPECIES • WETLANDS • AIR QUALITY • NOISE • HAZARDOUS MATERIALS • WATER QUALITY

ISH PASSAGE • CULTURAL RESOURCES • WATERSHEDS • ENVIRONMENTAL DOCUMENTATION • COMPLIANCE

August 2004

Environmental Challenges and Opportunities

"WSDOT is overseeing a statewide transportation improvement program that creates new opportunities for aligning our citizens' goals for the environment and our citizens' goals for transportation systems."

– Secretary Doug MacDonald

How are Transportation and the Environment related?

The interests of the environment are part of every aspect of WSDOT's work – from planning through construction and into maintenance of the transportation system. This brochure highlights our work in several environmental areas.

Connecting Habitat

Washington State contains dozens of diverse natural habitats. Over 650 different species of fish and wildlife need these habitats and their ecosystems.

Like people, fish and wildlife depend on the ability to move from place to place for foraging, breeding and raising young.

Constructing and operating facilities for transportation, especially roads, can have significant effects on many wildlife species. WSDOT projects have already responded to these concerns on some projects and the agency has recently proposed a broader policy framework that will:

- Identify where the fish and wildlife habitats are located
- Restore habitat connections where possible by:
  - Building features into planned new transportation projects
  - Constructing stand-alone retrofits where appropriate
  - Considering habitat connections in maintenance and operations practices
- Protect and enhance existing habitat near or on rights-of-way

Connecting Fish Habitat

Moose Creek Under SR 530 Near Darrington in Snohomish County

Before
Two corrugated steel culverts are too high and too steep to provide adequate fish passage.

After
New bottomless culvert replaces the two round steel culverts, eliminating the barrier.

So far, nearly 600 fish barriers on the state highway system have been identified for correction. Eighty-five have been fixed during the construction of a larger highway project, routine maintenance, or through the fish barrier retrofit program. Since 1991, more than 300 acres of stream habitat have been restored.

Protecting and Improving Water Quality

Land development can have a dramatic effect on the natural water cycle and its effect on land surfaces and water bodies. Throughout Washington, land that once was covered with forest and prairie has been replaced by buildings, parking areas, roads and farms. Covering topsoil with hard, impervious surfaces significantly increases surface and/or roadway runoff. Increased runoff can lead to flooding, water pollution, stream bank erosion, and aquatic habitat destruction.

WSDOT corrects and avoids problems created by stormwater runoff by applying physical, structural, and managerial practices that prevent or reduce runoff damage. Examples include retention ponds, biofiltration swales, and road sweeping. WSDOT, in conjunction with the Department of Ecology, is developing new Best Management Practices for highway corridors. Existing highway sections that have no stormwater treatment, or where treatment is substandard, will eventually be improved in conjunction with new highway improvements or as stand-alone retrofits, as funding permits.

Highway stormwater management systems include:

- Providing runoff treatment to meet water quality standards
- Recharging ground water
- Preventing instream erosion
- Controlling the rate and duration of storm flows from state right of way

There are many recent examples where significant water quality benefits have been secured in WSDOT projects and many other near-term opportunities in projects that currently await funding.

Greater Returns for Environmental Investments

WSDOT is working with others to improve the effectiveness of environmental investments through "watershed-based mitigation." This new approach involves looking at watershed needs and improvement opportunities beyond the immediate area of a project. By responding to project effects and mitigation

Mitigation Cost Study

WSDOT evaluated the costs associated with environmental mitigation on various projects to determine which elements contribute what costs to address environmental needs on roadway projects. This study is being used to develop new methods to improve the efficiency of meeting environmental needs on WSDOT projects.

See: www.wsdot.wa.gov/projects/mitigation/

opportunities on a watershed basis, project impacts can be transposed into mitigation opportunities that achieve highly favorable environmental returns for both water quality and species protection.

Improving Air Quality

Emissions associated with transportation – from cars, trucks, buses, cargo vessels, ferries and trains – are major sources of local air pollution and greenhouse gases. EPA studies link congested stop-and-go driving to sharp increases of carbon monoxide, dioxide, hydrocarbons and particulates.

WSDOT's efforts to minimize air pollution include fixing the bottlenecks that cause congestion and traffic backups. These projects also support public transit services and improve safety.

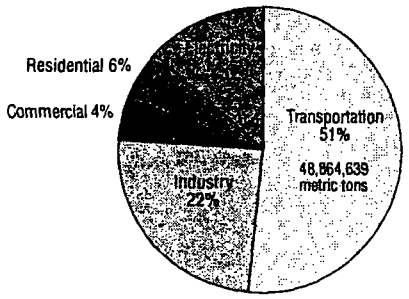
Washington State Ferries (WSF) recently announced that it is taking steps towards cleaner, healthier air by running all ferries on low sulfur diesel fuel, reducing particulate emissions by 30 percent fleet-wide. In addition, WSF is testing ultra-low sulfur diesel fuel and biodiesel made from renewable vegetable oils for emission reductions, performance and engine-wear. WSF is also cutting fuel consumption by revising routes and schedules and by upgrading to more fuel-efficient equipment.

WSDOT is a member of the state agency task force that is advising the West Coast Governors' Global Warming Initiative. This task force is exploring opportunities to constrain carbon dioxide emissions from motor vehicles, such as:

- increasing fuel efficiency,
- converting to less polluting technologies,
- holding down vehicle miles traveled.

One way that other states (such as California and Massachusetts) are moving toward these goals is by adopting Low Emission Vehicle Programs that target tailpipe emissions for steady declines, and force a higher percentage of advance technology vehicles to be sold in their states. See: www.wsdot.wa.gov/publications/folio/AirQuality.pdf

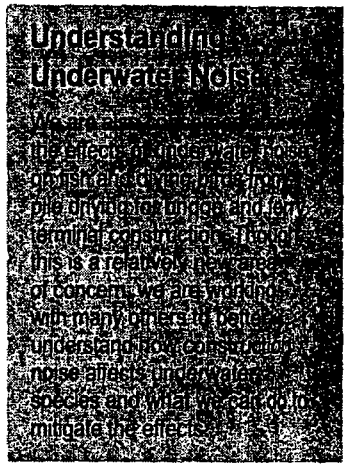
Sources of CO_2 in Washington



Source: Washington State University Energy Program.

Reducing Highway Noise

Traffic can create a lot of noise, sometimes at levels that are unacceptable for nearby neighborhoods. Though WSDOT cannot provide sound barriers everywhere we might like to, federal law and state policy requires that every project that adds through-lanes or significantly realigns roadways must receive noise evaluation. Outdoor noise impacts (66+ decibels) on locations like homes, schools, churches, day cares and hospitals trigger evaluation of whether noise mitigation (e.g., walls, earth berms) will be meaningful and cost-effective. The result is that WSDOT builds many noise barriers that generally halve residents' perception of traffic noise. From 1963 to 2000 we built approximately 65 miles of noise barriers throughout the state. From 2000 and into the future, we are building even more as a part of our construction projects in urban areas.



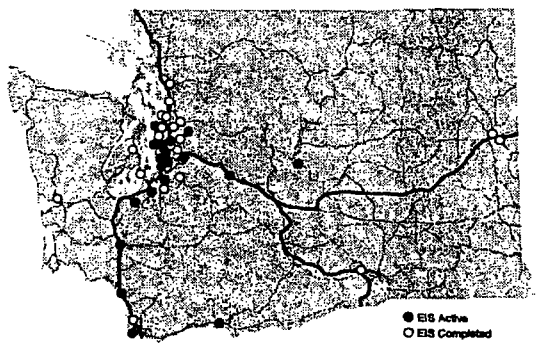
In addition to evaluating new noise impacts, WSDOT also plans for retrofitting existing highways with noise barriers. Before 1976 noise was not accounted for on highway projects. Seventy-two locations are currently on the priority list, subject to transportation funding. We try to address the highest priorities first (priority is based on location with the most number of homes at highest noise levels, for reasonable cost).

Improving Environmental Documentation

WSDOT and others analyze projects under the National Environmental Policy Act (NEPA) and its state counterpart, the State Environmental Policy Act (SEPA). Some projects lead to preparation of a NEPA Environmental Impact Statement (EIS). The essential features of a project are described and evaluated in the EIS documents. An EIS provides information on potential environmental considerations (not only on water and air quality or endangered species, but also on cultural resources and protected communities) and how those considerations might be addressed. Resource and regulatory agencies, tribes, other governmental entities and the general public are all involved in EIS development.

Following the intent of NEPA and SEPA, WSDOT's goal is to prepare environmental assessment documents that are accurate, informative, readable, and useful to decision makers, community members, legislators, regulators, and local government staff. By providing clear and concise environmental information, we elicit and invite thoughtful, constructive public and agency involvement in project planning and decision-making.

WSDOT Active and Completed EISs



Since 1989, WSDOT has completed 24 NEPA EISs. In addition, 19 EISs are in development (or active status) at this time.

Streamlining and Efficiencies

WSDOT participates in the Transportation Permit Efficiency and Accountability Committee (TPEAC). TPEAC is a product of the Environmental Permit Streamlining Act, originally authorized by the state legislature in 2001, to examine how the environmental permitting process for transportation projects can be improved. As part of TPEAC, we are involved in a range of efficiency improvements including:

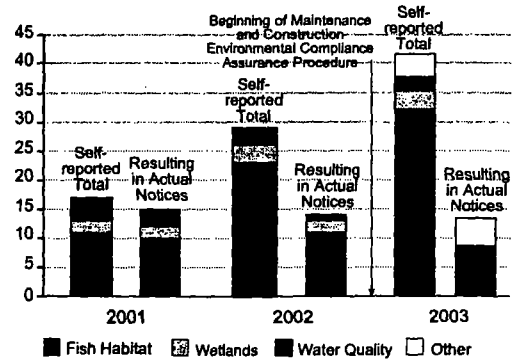
- Developing programmatic permits to simplify resource agency approvals for commonly performed activities
- Launching an information management initiative to improve the permit application process

Complying With Environmental Requirements

WSDOT works with Federal, State, and Local agencies to ensure our activities comply with requirements and conditions of environmental permits and laws. Self-evaluation and reporting is an important part of the compliance process. Works in progress include:

- Developing an Environmental Management System to monitor and track the agency's environmental performance
- Building a system that accurately tracks environmental commitments
- Developing tools to aid the agency in auditing and reporting
- Developing a compliance improvement strategy to address non-compliance issues
- Maintaining a reporting protocol for non-compliance events
- Producing an annual compliance report

Non-Compliance Events
2001-2003



WSDOT self-monitors for "non-compliance events" whether or not such events are taken up as formal "violations" by regulatory agencies or officials. The increase in recorded highway and ferry non-compliance events from 2001 to 2003 is partially explained by an increased emphasis on identifying and tracking non-compliance events. The resulting actual notices from regulatory agencies have remained relatively consistent during the same period.

For more information about WSDOT's Environmental Compliance Assurance Procedures, please see the *Gray Notebook* for the quarter ending March 31, 2003, page 18.

Source: WSDOT Environmental Services Office.

WSDOT's Environmental Performance is Online

For detailed information about the performance of WSDOT's environmental programs, see the *Gray Notebook* for 3rd quarter online at www.wsdot.wa.gov/accountability/grayportfolio.htm. Using the subject index, you can scroll to a specific topic and click on the title to read more information from the *Gray Notebook*.

Measuring Our Performance

Performance measures are important in assessing how well WSDOT is protecting the environment as we build and maintain transportation systems. WSDOT's quarterly performance report, the *Gray Notebook*, contains regular updates of the performance of environmental program areas, including those listed below. WSDOT is looking at additional areas to fully assess our activities.

- Correcting fish barriers
- Construction site erosion control and water quality protection
- Environmental permit compliance
- EIS processing times and concurrence approval rates
- Herbicide use
- Recycling and compost use
- Resource agency liaison program
- Wetland protection

Performance Highlight: Wetland Protection

WSDOT adheres to wetlands protection requirements under Section 404 of the Clean Water Act and numerous state and local environmental provisions. At the same time, WSDOT is working with many others to improve the effectiveness of wetlands protection and replacement requirements through opportunities for "watershed-based mitigation."

Each summer since 1997, WSDOT has worked with The Evergreen State College to sponsor the Wetland Ecology and Monitoring Techniques internship program. Interns receive college course credit to monitor wetland sites throughout the state for 11 weeks. These monitoring activities ensure that a viable wetland replaces the functions of the impacted area in accordance with regulatory standards and permit requirements.

- Twenty-one replacement wetland sites had targets (success standards) to be met in 2003. Five sites met all standards, 14 met some standards, and two met no standards. WSDOT staff biologists implement "course corrections" to achieve environmental commitments on unsuccessful sites.
- Of WSDOT's replacement wetland sites that have completed their monitoring periods since 1988, 49 out of 53 (267 acres) have been judged ecologically successful.

For more information
Megan White
whitem@wsdot.wa.gov
http://www.wsdot.wa.gov/environment/

Transportation, Sprawl and Growth Management: Key Challenges

When we talk to Washingtonians about the challenges facing our transportation systems in the next twenty years – as we are doing for the 2005 Update to the Washington Transportation Plan – we often hear about sprawl, quality of life, and the threats to natural ecosystems and salmon. The following discussion is meant to generate discussions regarding citizens' goals to constrain sprawl and the need to prioritize our efforts to address the demands on the state's transportation systems and services.

We at WSDOT appreciate the view that society's transportation practices – especially the automobile's dominance in our culture – present severe challenges to our environment, especially in relation to land use. A recent summary was presented by Northwest Environment Watch in its *Cascadia Scorecard: Seven Key Trends Shaping the Northwest* (2004):

> "The root of the problem is transportation: once scattered, people need far more of it, and they must do most of it by themselves. That makes private vehicles, ideally an accessory to life, into life's organizing principle. Sprawl entails expensive road infrastructure, all but guarantees the congestion of those roads, and then makes transit a more expensive – but less effective – alternative to that congestion. Sprawl locks northwesterners into an auto-dependent lifestyle, with the attendant burden on their pocketbooks, the world's oil fields, and the planet's atmosphere. It endangers health by putting people in harm's way (behind the wheel) nine hours a week and by tainting the air and water with toxic pollutants. It turns walking into recreation rather than transportation, which measurably expands waistlines.
>
> Sprawl also consumes farmland and open space with its massive roads and parking lots. More insidiously, it ruins lowland ecosystems by paving and developing just enough of some watersheds to render them uninhabitable for many aquatic species."

WSDOT knows that confronting this issue is central to creating forward-looking programs for transportation investment. There is no question that efficient transportation systems are essential to economic vitality. There is no question that individualized free market choices about housing, work and life styles are influencing transportation and land use with greater force than either independently influences the other. And there is no question that failure of transportation systems to meet needs that growing communities place upon them can trigger social and environmental costs – including poor land use outcomes.

Indeed, the inability to expand transportation capacity in the face of population and job growth is itself contributing to sprawl as jobs chase people into the suburbs and exurbs, leapfrogging away from denser locations because of clogged and congested transportation corridors serving denser core communities.

Transportation investment must be made in support of growth management strategies or growth management cannot succeed.

Our state's Growth Management Act (GMA) created a framework rooted in local government for reconciling the pressures from growth on the uses of land with the consequent demands for public infrastructure investment. In the decade since the GMA passed, we have seen improved consistency and public engagement in our local land use decisions as a direct result of the coordinated planning required by the law. Major elements of GMA are:

Critical areas. Every city and county in the state is required to designate critical areas – such as wetlands and fish and wildlife habitat – and resource lands – agricultural lands, forestlands, and mineral resource lands – and adopt development regulations to protect them. This fundamental first step in GMA provides cities and counties with the capability to protect critical lands from impacts as growth occurs.

Comprehensive plans. Fast-growing counties and the cities within them are required to create a comprehensive plan that includes elements of projected changes in land use and public facilities. Cities and counties have discretion in their comprehensive plans to make many choices about accommodating growth. Transportation is part of the infrastructure needed to support the land use element of the comprehensive plan. Regional transportation planning organizations certify the transportation chapter of local comprehensive plans.

Urban Growth Areas. Jurisdictions preparing comprehensive plans are also required to designate an Urban Growth Area within which future population growth and infill development is to be encouraged, and outside of which growth should occur only if it is rural in character. The purpose of an Urban Growth Area is to attract and funnel growth to certain core areas, increasing density there while maintaining the rural character of the land outside the Urban Growth Area.

Concurrency. The concept of concurrency exists to ensure that changes in land use are supportable by the necessary transportation infrastructure. Jurisdictions are required to adopt a concurrency regulation that prohibits development if it lowers level of service standards below those specified in the comprehensive plan, unless additional improvements or strategies are made to maintain the standard. The success of channeling growth into urban cores is dependent, in part, upon adequate transportation system capacity (in a variety of modes) to support that growth.

Transportation planning is a critical activity.

Growth management developed in our state out of citizen conviction that the condition of perpetual warfare between "pro"-growth and "anti"-growth forces would impoverish our landscapes, the environment, and the sound economic and social fabrics of our communities. Growth management presents many on-going challenges. One of those challenges is to make good choices for transportation investments. Good choices support mobility, responsibly align demand and capacity, and reinforce growth management plans. Bad choices, or no choices at all, strangle communities and deprive growth management of a crucial underpinning for success.

While there is room for debate in defining the "right areas" for growth to occur as well as the merits of different development patterns, transportation investment must be made in support of growth consistent with locally-adopted plans or else growth will have no reason not to occur outside boundaries adopted under GMA.

Without investment in transportation (and other infrastructure) facilities needed to support managed growth, many of which have been vetted through exhaustive reviews not only in the state transportation planning process but through local and regional decision-making (see, for example, the Puget Sound Regional Council's *Destination 2030*), sprawl and decreased development density are likely consequences. We believe transportation investments, including balanced investments in new capacity for all transportation modes, are essential to achieving success for the growth management strategies that have been adopted in this state. Our efforts to update the 20-year system plan will include a hard look at these issues.

Growth management is just one of the purposes transportation investment must serve.

Transportation investments to assure efficient and effective transportation corridors for moving people and goods between cities, across the nation, and to other countries is essential to the economic vitality of modern communities. We have to make transportation investments that maintain and improve intercity routes. Investments on crucial state-level corridors like I-5, I-90, and even U.S. 12 to Walla Walla are sensitive to many complicated and crucial issues. Confusing these transportation purposes and needs with the issues of "sprawl" does not assist the quality of the requisite investment decision-making.

Transportation systems must be more efficient.

How can we use every available tool to help alleviate the crisis of imbalance between demand and capacity on urban transportation systems that wastes time and fuel, exacerbates air emissions, exhausts the patience of citizens and drives up the costs of business?

Clearly, we need to invest in making our transportation systems more efficient. Inefficient transportation systems actually help promote sprawl and other negative environmental results. In an era of fierce fiscal constraints, immediate priorities for the update to the Washington Transportation Plan will likely include:

- Operational efficiency strategies such as ramp metering, incident response, and traveler information, which help to increase system throughput.
- Smaller scale investments to correct bottlenecks and chokepoints in existing corridors, restoring the needed capacity robbed by congestion (see sidebar).
- A commitment to investment that preserves and extends the useful life of transportation investments already in the public inventory in order to avoid worsening the demand/capacity imbalance by loss of current assets.
- Laying the foundation in every possible way for the introduction of pricing mechanisms that will encourage more efficient use of transportation assets.
- Working with cities and counties to connect and complete street networks that move people and goods more efficiently within urban and urbanized areas.

Why Congestion is Bad Social Economics

Physical bottlenecks are locations where the physical capacity is restricted with flows from upstream sections being funneled into smaller downstream segments. When we think of water being carried through a pipe, we say you can only put a certain amount of water through a pipe of a given size. That capacity stays constant no matter how much water backs up behind it – it always carries the same amount. But a roadway is actually very different from a water pipe: when excess flows from the "upstream" segment cause drivers to bunch and congestion to start forming, the roadway capacity actually shrinks. In fact it can shrink to carry only half of its original capacity.

This is one of the reasons the economic price of congestion is so high. Congestion robs part of the value of highway investment by causing the highway's capacity to be diminished below the capacity it is capable of conveying. Congestion, in other words, creates inefficiency by actually reducing the performance capacity of an existing infrastructure asset.

In addition to capacity reduction, other economic and environmental inefficiencies caused by congestion include the value of time lost by commuters and freight haulers sitting in traffic, wasted fuel, and excess emissions.

MAY 2004

WHAT ABOUT AIR QUALITY?

THOUGHTS FROM WSDOT ON AIR QUALITY CONCERNS AND TRANSPORTATION

Ve all hear a lot about ıir quality--

oth the local effects of pollution and the global roblems of greenhouse gases and climate hange. We at WSDOT want to provide you with ur perspective on some of the issues.

r emissions associated with transportation – from cars, trucks, buses, ırgo vessels, ferries and trains – are the state's largest source of cal air pollution and greenhouse gases. Compared to Washington ıme other areas of the country have overall higher emissions levels ır capita and a lower transportation sector share because they use ssil fuels for electric power generation to a much greater extent than ə do. This does not detract from the importance of what can and ust be done to better protect air and atmospheric quality.

ɛgulation of air emissions by EPA has led to huge air quality gains ross America since the 1970's. But some issues of concern have not t been addressed as effectively as they must. The transportation/ quality picture demonstrates two crucial and problematic trends.

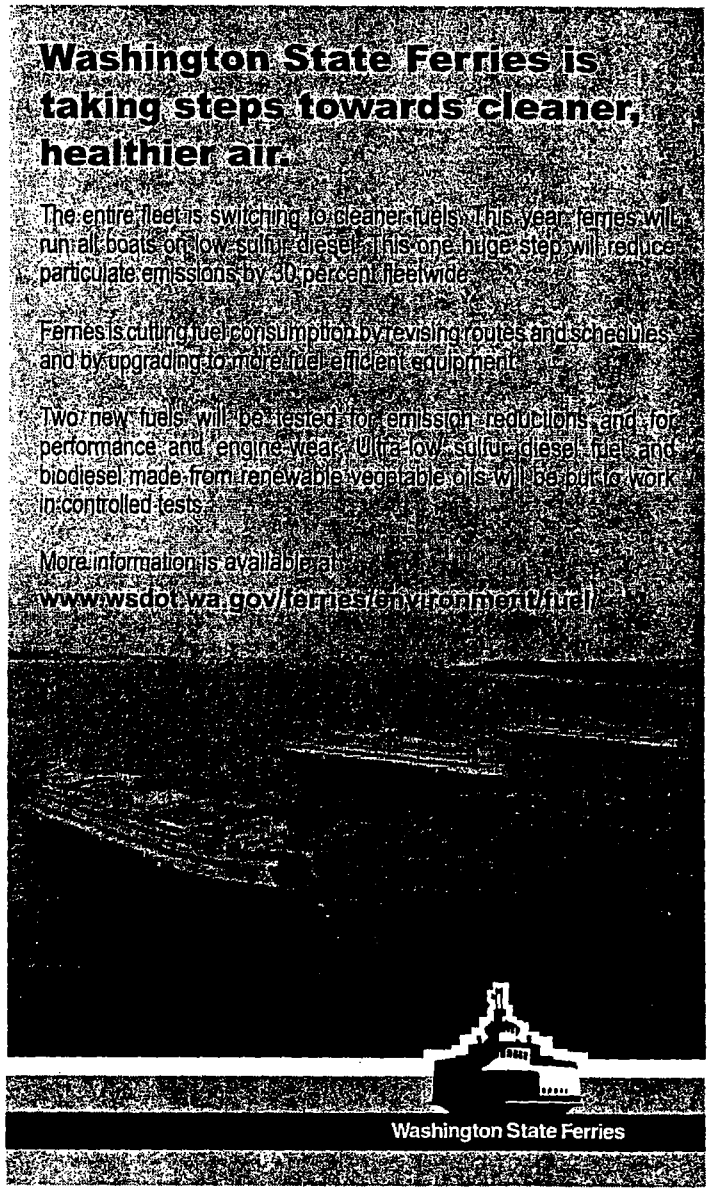
·uel efficiency for our cars and trucks has improved but little in recent years, even though technology offers breakthrough opportunities.

/ehicle miles traveled by every class of vehicle has been climbing in ·esponse to population and economic growth and changing habits ənd patterns of personal and freight mobility.

›gress on air quality issues must be built on greater efficiency in vehicles we use and appropriate constraints on the overall volume ɔur fossil-fueled transportation uses. These actions will be tied to gress in regulation, to progress in technology, and to progress in the ıices made about transportation by individuals and communities.

ployed as part of an integrated transportation program, large im- vements in the environment can be obtained from technology and ulation. These will buy time for longer term changes in transporta- demand and movement to sustainable transportation systems.

Washington State Department of Transportation

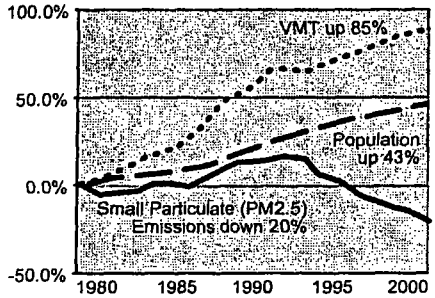


Diesel, $PM_{2.5}$ and the Protection of Public Health

Diesel exhaust is an important air quality issue. The chemistry of diesel combustion is complex. Among many candidate concerns, today's most prominent air quality issue associated with diesel is the very small particulate matter, smaller than 2.5 microns in size, resulting from diesel combustion. Diesel is not the only culprit in $PM_{2.5}$ generation. Other sources include agricultural burning, forest fires, construction activities and factory and utility smokestacks. But diesel is big.

$PM_{2.5}$ can be inhaled deeply into the lungs. Its long term and short-term health effects are matters of widespread concern in the public health community. Although there is broad debate about the precise conclusions to be drawn from research and investigations, the American Lung Association, believes that $PM_{2.5}$ is especially harmful to people with heart disease and respiratory problems. These concerns are in addition to long-standing suspicion that excessive exposure to diesel exhaust is implicated in other adverse health outcomes, including lung cancer.[1]

Change in Population, Vehicle Miles Traveled and Small Particulate Emissions (PM2.5) from 1980



Source: WSDOT

Even as research and evaluation continues on the health effects of diesel exhaust, there is broad consensus on the desirability on reducing diesel emissions especially to reduce $PM_{2.5}$ exposures. Steps already taken in the regulatory arena have had good effects here in Washington State, as seen in the accompanying graph.

$PM_{2.5}$ is going down because of federal emission regulation affecting engines and fuels

$PM_{2.5}$ emission leveled off in the late 1980s and then began declining since the early 1990s. That decline is tied mostly to federal regulatory changes in fuel and diesel engine performance standards for heavy-duty trucks. In 1988 new electronic exhaust and fuel efficiency equipment was required. In 1993 permissible sulfur content for all diesel fuel used for on-road driving was reduced from 5000 to 500 parts per million. Some further particulate emission reductions in 1994 were achieved with the urban bus program that helped to retrofit bus engines to meet new emissions standards. [2]

$PM_{2.5}$ will continue to be reduced as new regulatory standards take effect

Additional particulate reductions, especially for $PM_{2.5}$, are coming in the near future. Between 2004 and 2006 the permissible sulfur content in gasoline will decline from about 350 parts per million to 30 parts per million. EPA estimates that the change in gasoline sulfur levels will reduce annually about 4,300 premature deaths and 2,300 cases of bronchitis. In 2006 EPA will require sulfur levels in on-road diesel fuel to decline from 500 ppm to 15 ppm and in 2007 new heavy duty diesel engines will be required to include exhaust systems that will filter out over 90 percent of the soot and toxic chemicals that come out of the truck stack. This change is anticipated to reduce annually about 8,300 premature deaths and 360,000 asthma attacks, in addition to many other health benefits. Between 2008 and 2010 off-road construction equipment, marine vessels, and railroads will be required to use lower sulfur diesel, which will reduce another 12,000 premature deaths by the year 2030. As a package of controls that affect transportation, these will move the nation toward dramatic improvement in the air environment over the next five to six years.[3]

There are opportunities to do more!

Conversion of diesels used in transportation to low sulfur or ultra low sulfur at an even faster rate than required by regulation is a step that may be attractive to fleet operators and transit systems. Steps in this direction are being taken around the country. Washington State Ferries is taking such actions in 2004 at a cost of only about a penny per gallon more.

In long distance trucks, diesels are often left at idle for long periods of time to power truck electrical systems even while trucks are not on the road. A number of steps to reduce diesel idling are being taken and considered around the country. Washington State should join these initiatives.

The technology gains that enable the newest trucks to operate at such dramatically lower levels of emissions than older trucks should be extended. Older vehicles should be retired or retrofitted. Major gains in $PM_{2.5}$ emissions can occur by expediting the updating of the in-service vehicle fleet.

Cleaner Emissions, Better Fuel Efficiency

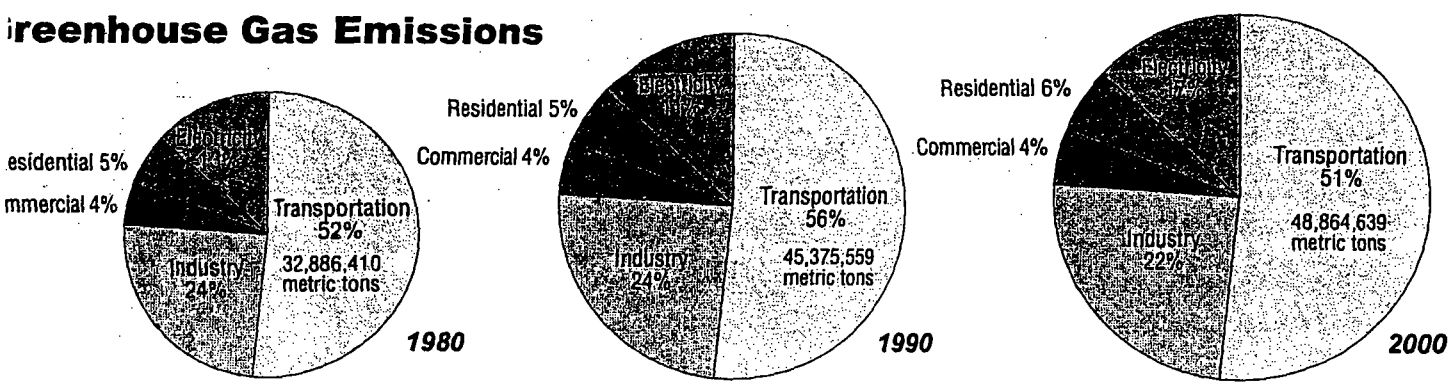
Washington State's average weekly fuel consumption per capita is about 8.4 gallons, or five percent below the national average but almost four times the rate in Germany[5]. Overall usage has not changed much over the last decade. Neither has efficiency. The average passenger car today gets about 21.9 miles to the gallon, compared to 20.2 a decade ago. Less efficient vans, SUV's and pick-ups (17.4 mpg on average) have become a much larger share of the vehicle fleet. Heavy trucks have actually seen average mileage decrease slightly in the past decade, and are now at 5.8 mpg. (Diesel engines are more efficient than gasoline engines per work unit and produce less CO_2 but more NOx and PM).

Get traffic moving: road-building solution to bottlenecks and chokepoints.

New roads that target bottlenecks and assist public transit, as part of an integrated plan to improve traffic congestion, ease pollution and improve safety, will help. Studies link congested stop-and-go driving to sharp increases in emissions of carbon monoxide, dioxide, hydrocarbons and particulates from heavy- and light- duty trucks, as well as from cars.[4] Cars and diesel trucks are much less fuel efficient and much worse pollution generators in congested stop-and-go driving than in free-flowing traffic at moderate speeds.

Reducing traffic bottlenecks and chokepoints so that vehicles spend less on-road time stuck in traffic, burning unnecessary gallons of fuel, would be a step ahead.

ireenhouse Gas Emissions



Carbon Dioxide ($C0_2$) Emissions in Washington State by Source
Source: Washington State University Energy Program

itter control of greenhouse gas emissions is at the very top of the obal environmental agenda. A century of sustained increases in carbon oxide from operating of internal combustion engines around the world s been a big factor in the greenhouse effect. Because Washingtonians y so little on fossil fuel for their electric power generation, per capita neration of carbon dioxide is less here than in many other states. But, h the "electricity" share of the pie so small in relation to other states, the ansportation" share is high.

e opportunities to constrain carbon dioxide emissions from motor nicles lie in:

creasing fuel efficiency
onverting to less polluting technologies
olding down vehicle miles traveled.

sically, we need to use less fuel, use fuel that is less carbon-intensive, l place a high value on fuel-efficiency in new vehicle technologies. One that other states (such as California and Massachusetts) are moving ard these goals is by adopting Low Emission Vehicle Programs that et tailpipe emissions for steady declines, and force a higher percentage dvance technology vehicles to be sold in their states.

w and Emerging Vehicle Technologies

nges in vehicle technologies play a big role in reducing CO_2 emissions ddressing fuel efficiency, economy and fuel source. The good news at there are options allowing us both to conserve and diversify our sources. Many technologies that improve fuel efficiency also reduce ust emissions.

id technology combines the extended range and readily available line or diesel fuel source of the internal combustion engine with the gy and environmental benefit of an electric vehicle. The introduction of hybrid cars now offers consumers a choice of dramatically more efficient automobiles. Hybrid buses are being tested in King County and elsewhere.

Cleaner gas cars are moving closer to the main stream of auto production. Ten automakers have "Partial Zero Emissions Vehicles", or PZEVs, lined up for sale in California. See details at *www.driveclean.ca.gov*

Alternative fuel cars, buses, and trucks are available as well. Fueled by biodiesel, methanol, natural gas, or propane, these vehicles produce fewer pollutants and greenhouse gases. They also help promote renewable energy sources and reduce our dependence on imported oil.

What about hydrogen? *Hydrogen fuel cell technology* is now gaining support as a step away from gasoline-dependent vehicles. One of the most common substances on earth, hydrogen is an energy carrier, not a source. It exists almost exclusively in combination with other substances. As a result, it must be extracted, a process that can itself require a considerable amount of energy. (In the case of hydrogen obtained from water, the energy consumed by electrolysis is actually greater than the energy produced by a fuel cell.) There is much debate about where the energy to fill hydrogen fuel cells should come from and what the true life cycle environmental costs will be of hydrogen vehicles (coal fired power plants or renewable energy sources like solar and wind).[6]

The movement to hydrogen technology may take decades and require substantial investments in fuel production and distribution. WSDOT has joined with California, Oregon and British Columbia to explore the possibilities of creating a "The Hydrogen Highways" along I-5 in time for the 2010 Olympics. In the meantime, major gains can be achieved with technology now ready to be used in our transportation system. Here lie real and immediate opportunities for achieving major reductions in emissions of greenhouse gases.

reenhouse Gases and Global Warming

ere is strong consensus among scientists that human alteration of the atmosphere -- increased emission of water vapor, bon dioxide and methane -- has stimulated the "greenhouse effect" that facilitates the passage through the atmosphere the sun's radiant energy while absorbing the earth's lower wave-length radiant energy, leading to warmer atmospheric nperatures.

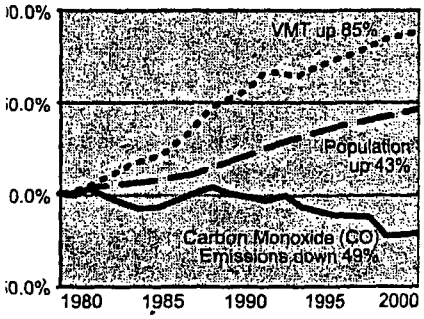
bal warming will be serious business in the Pacific Northwest. It's chief impact, according to experts at the University Washington, will be to shorten the duration of each spring/summer melt from mountain snowpack. This will alter regions hydrology in numerous ways with many highly disruptive consequences for the flora and fauna of the area, uding humankind.[7]

ɨtory of Progress

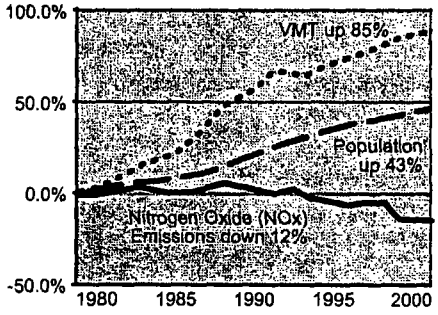
ı Washington State, the annual amounts of key pollutants focused on in the Clean Air Act regulatory cheme have dropped even as the state's citizens and businesses have registered large increases in riving. Transportation agencies like WSDOT also play a role in the scheme of regulation by evaluating roposed transportation projects to assure that emissions of regulated air pollutants will not lead to ɔcal areas of non-attainment of the applicable standards for public health protection.

he graphs below show overall air emissions experience in Washington State since 1980 for carbon ıonoxide, nitrogen oxides, and total hydrocarbon emissions.

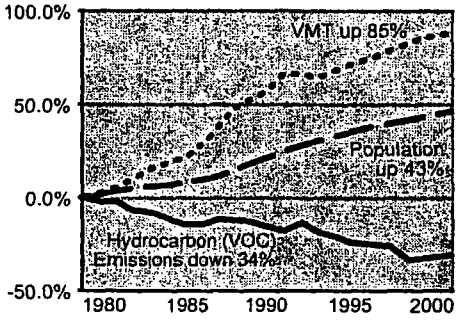
hange in Population, Vehicle iles Traveled and Carbon Monoxide missions (CO) from 1980



Change in Population, Vehicle Miles Traveled and Nitrogen Oxide Emissions (NOx) from 1980



Change in Population, Vehicle Miles Traveled and Hydrocarbon Emissions (VOC) from 1980



ɔurce: WSDOT

Vhat can we do today?

ideshare programs, transit, bicycle and pedestrian access are some the ways WSDOT works to reduce motor vehicle travel. Typically ansportation agencies apply incentives or disincentives that encourage ss driving. There is much work to be done in coordination with local ɔvernments and the legislature if we are to be successful in reducing MT. Meanwhile make sure your vehicle is well maintained and tires ɔperly inflated. A well maintained vehicle is hugely more environmentally endly and efficient than the same vehicle out-of-tune.

'SDOT is a member of the state agency task force that is advising the 'est Coast Governors' Global Warming Initiative. Multi-state workgroups ıve been formed to address the following topics:

Hybrid Vehicle Procurement: Combined purchasing of fuel-efficient vehicles and low-rolling resistance tires for motor pool fleets.

Ports & Highway Diesel Emissions: Reduce the use of diesel generators and engines by ships at port and trucks at rest areas and truck stops.

Renewable Energy: Remove barriers to and encourage the development of renewable electricity generation resources and technologies.

Energy Efficiency: Improve efficiency standards.

Measurement: Develop consistent and coordinated greenhouse gas emission inventories, protocols for standard reporting, and accounting methods for greenhouse gas emissions; and collaborate on improved scientific tools to more precisely measure the impact of climate change.

addition to the dozens of recommendation being considered, WSDOT l be suggesting that improved inspection and maintenance measures ould be considered to control emissions from existing on-road hicles.

For more information contact:

Mia Waters
Air Quality, Acoustics & Energy Programs Mgr.
Environmental Services
206/440-4541
watersy@wsdot.wa.gov

Washington State Department of Transportation

Notes and resources:

[1] Health Effects Institute, *Research on Diesel Exhaust and Other Particulates*, (2003)

[2] EPA, Regulatory Impact Analysis – Control of Emissions from New Motor Vehicles: Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements, p. 5. http://www.epa.gov/otaq/regs/ld-hwy/tier-2/frm/ria/r99023.pdf.
On-Road Diesel information source: http://yosemite.epa.gov/opa/admpress.nsf/b1ab9f485b098972852562e7004dc686/2298962181981d7585256e4d00690cdc?OpenDocument

[3] EPA, "Latest Findings and Trends on National Air Quality: 2002 Status and Trends," February 2004.

[4] Asif Faiz, Christopher Weaver and Mike Walsh, "Air Pollution from Motor Vehicles: Standards and Technologies for Controlling Emissions" The World Bank, 1996. Page 41.

[5] Northwest Environment Watch, *"Cascadia Scorecard: Seven Key Trends Shaping the Northwest"*, 2003 p. 31.

[6] Elizabeth Kolbert, "Car of Tomorrow" *The New Yorker*, August 11, 2003 v79 i22 p036.

[7] Hamlet, Alan, et al. "Effects of Climate Change on Water Resources in the Pacific Northwest: Impacts and Policy Implications." Climate Impacts Group and University of Washington, July 2003

Washington State Department of Transportation

Central Puget Sound Projects

The future of transportation in Western Washington

It's no mystery that the economic well-being of the Puget Sound region depends on safe and reliable transportation.

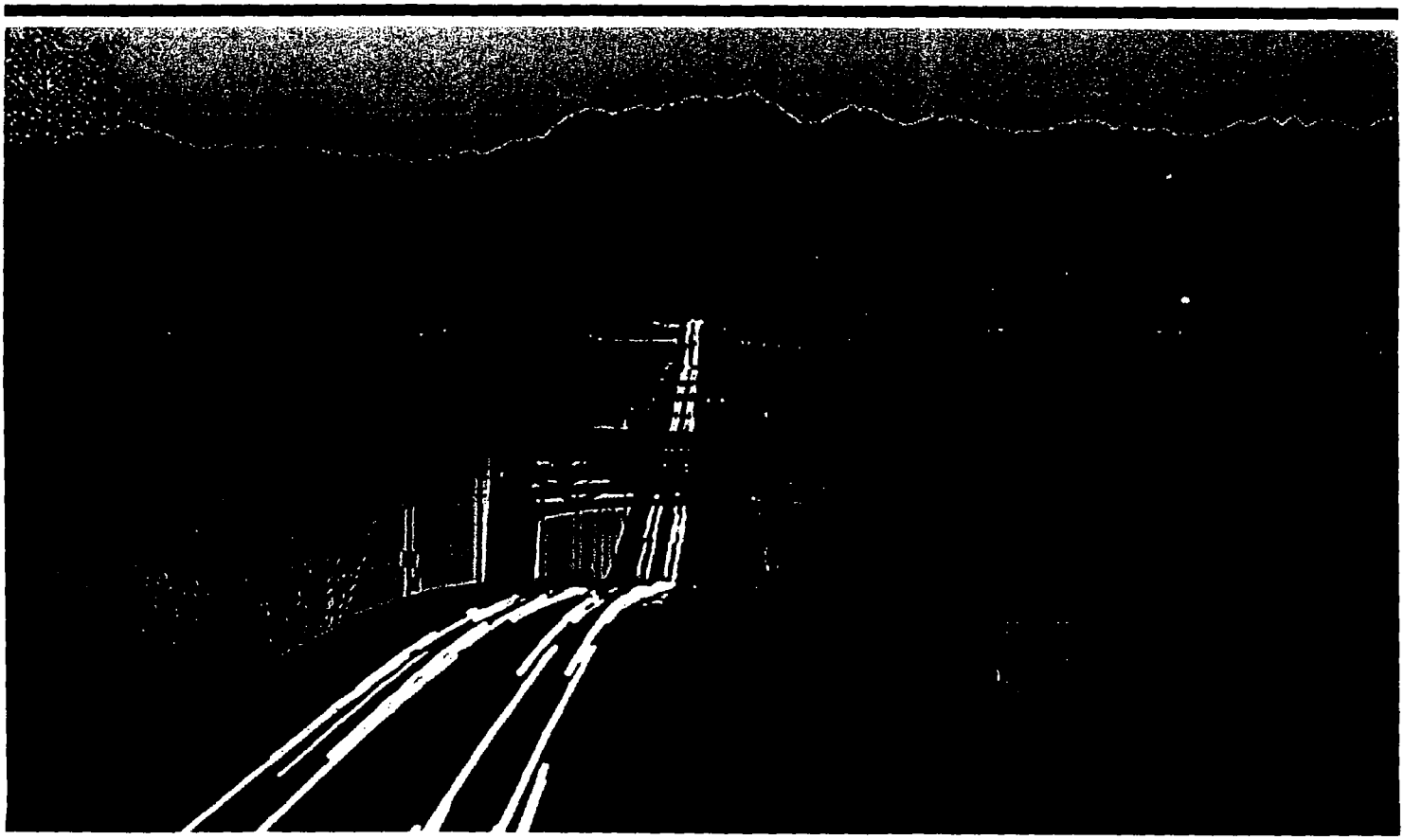
Despite temporary recessions, the growth trend that started in the 1980s continues today. Washington is now home to 2.8 million jobs. In 2020, our workforce will be 3.6 million strong — the great majority west of the Cascades. By 2030, we will be traveling a collective 80 billion miles per year.

To ensure that the Puget Sound region doesn't choke on its own growth, the Washington State Department of Transportation is working, project by project, dollar by dollar, to integrate key highway fixes and diversify travel methods in the 21st century.

It's true that construction on many of these fixes will cost billions, take several years to complete and inconvenience travelers during construction. But much bleaker is the picture of our region with an unusable SR 520 floating bridge, a fallen Alaskan Way Viaduct, and without new transit systems like Sound Transit's LINK Light Rail.

Transportation leaders of Washington have responded. They have developed a vision that will ensure our transportation systems are safe, reliable and will keep pace with our region's projected growth.

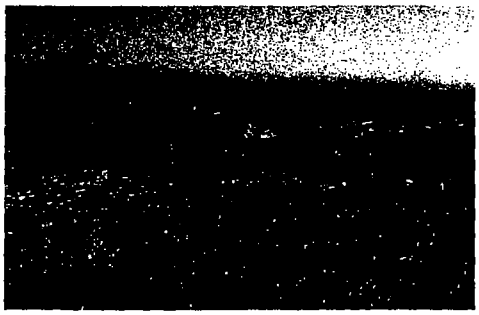
We're many steps closer than we were yesterday, with billions of new dollars raised by our 2005 state Legislature. We now look to regional and local sources for the remaining funds needed to turn the vision into reality — and we'll make every dollar count. ▶

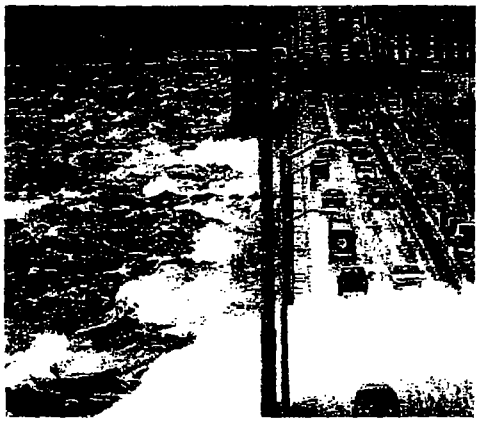


The challenges.

The forces of nature, population growth and time are challenges that we have no choice but to meet head on.

1.





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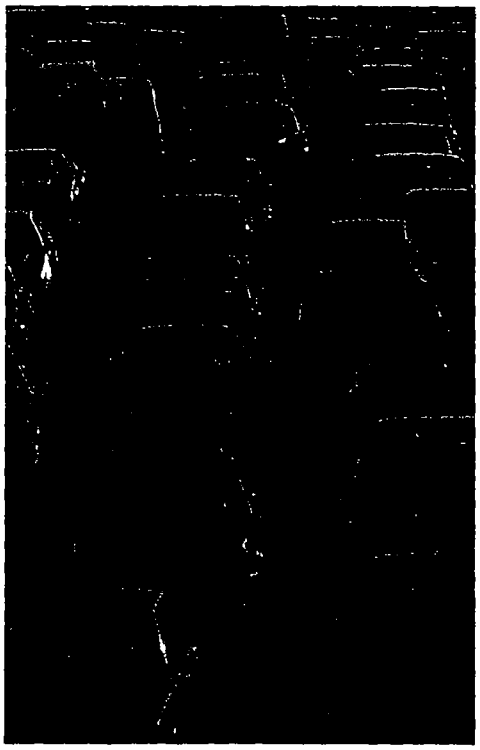

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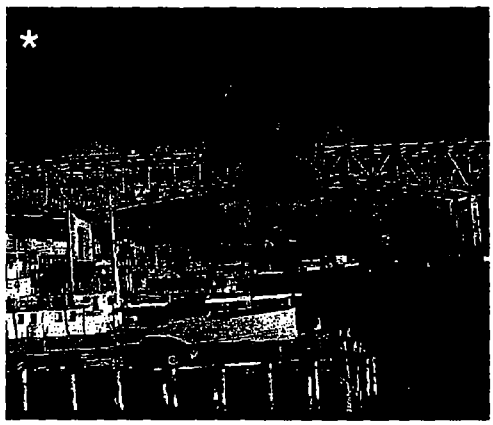
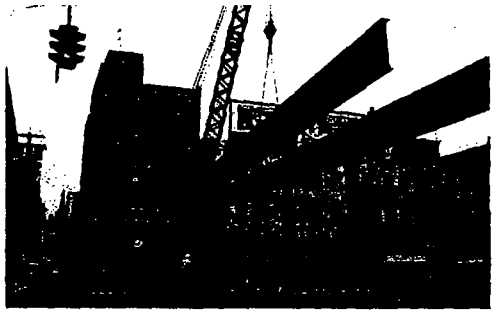




The elements
Divided by Lake Washington, the Seattle metropolitan area sprouted on a complex terrain between the Cascades and Puget Sound. While its natural beauty has attracted millions, its weather and geography are not as accommodating. Perched along hills, bodies of water and fault lines, our highways and bridges endure long periods of annual rain and windstorms, salty marine air and damaging earthquakes.

Growth and demand
Since 1980, Washington State's population grew 45% from 4.2 million to 6.1 million people. By 2020, 7.5 million will live here – more than half of us in or near the central Puget Sound. Just as the area's population has grown, so has the number of jobs, transportation demand and daily roadway wear-and-tear. Investment in the system has not kept pace with this demand.

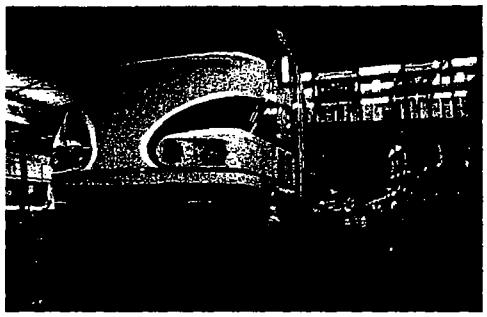
The infrastructure boom
After World War II, the U.S. economy was energized. Two decades of vast construction followed, resulting in our continental network of freeways, highways and bridges. I-5, I-405, I-90, the SR 99 Alaskan Way Viaduct, the SR 520 Bridge and SR 509 were all built in this period. The problem – in addition to having been built under outdated storm and seismic standards – is that today, they have simultaneously become obsolete.

*Courtesy of the Seattle Museum of History and Industry

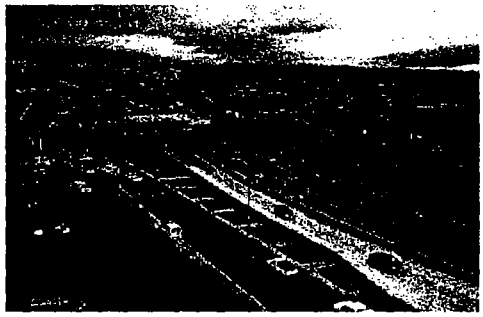
Projects underway.

Below are great examples of projects — some being built now, others already done — that are beginning to make a difference.

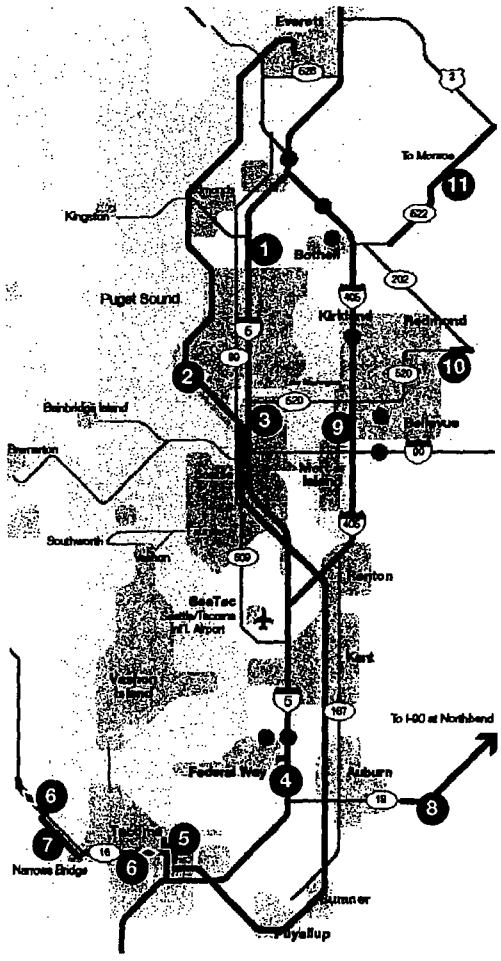
Tacoma Narrows Bridge. Ahead of schedule and under budget, a new suspension bridge is now being built parallel to and south of the existing Tacoma Narrows Bridge. It's scheduled to open to traffic as soon as 2007.



WSDOT's Amtrak *Cascades*
WSDOT's committment to improving intercity passenger rail made 2004 the tenth consecutive year of increased ridership on Amtrak *Cascades* — totalling nearly 400,000 passengers in Washington.



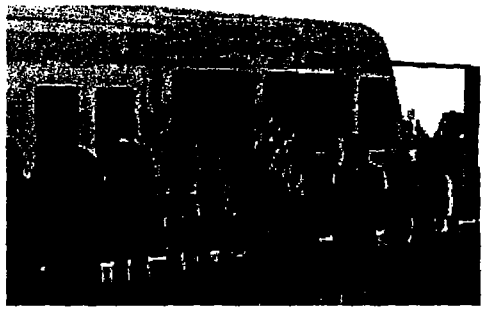
I-405, Access Downtown Bellevue. Work on this three-year, $139 million project was completed a year ahead of schedule and $25 million under budget. This was a package of projects designed to improve access to and from I-405 in Bellevue — and it has!



Project Type

- Roadway Improvements
- Transit/Rail Improvements
- Sound Transit/WSDOT Direct Access Interchange Projects
- HOV

1. I-5 Shoreline Auxiliary Lane Project
2. ST Sounder Commuter Rail
3. I-5 James-to-Olive Repaving Project
4. I-5 South 317th Street HOV Direct Access
5. ST Tacoma LINK Light Rail
6. SR 16 HOV Improvements Projects
7. Tacoma Narrows Bridge Project
8. SR 18 Corridor Improvement Project
9. I-405 Access Downtown Bellevue Project
10. SR 520 West Lake Sammamish Parkway to State Route 202 Project
11. SR 522 Corridor Widening Project



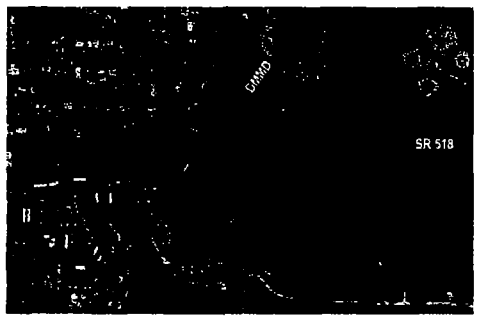
Sound Transit's Sounder Commuter Rail and Tacoma LINK Light Rail.
The Sounder now takes a weekly 18,000 riders off the roads and onto the tracks, with stations in Seattle, Edmonds, Everett, Tukwila, Kent, Auburn, Sumner, Puyallup, and Tacoma.

Washington's first light rail line, Tacoma LINK opened in 2003, and now serves thousands a week in downtown Tacoma.

On the boards.

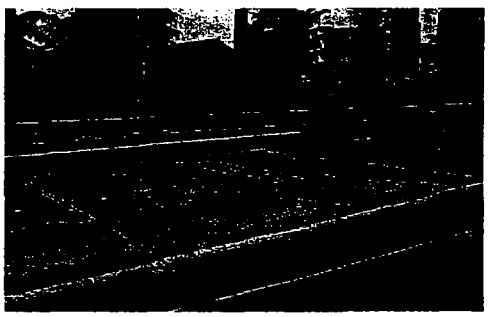
Looking past our most obvious needs, we still see lots of room for transportation improvement.

LINK to Sea-Tac Airport and North Seattle.
Plans to extend Sound Transit's LINK Light Rail line (now under construction) from downtown Seattle north to the University District, and from Tukwila south to the airport are now underway. The extension to Sea-Tac Airport is now funded and in design. Funding for the north LINK extension is still needed.



Fixing SR 518/Sea-Tac Interchanges.
This includes both safety and capacity upgrades to key SR 518 interchanges near the airport. It also prepares the corridor for the LINK Light Rail extension to Sea-Tac Airport.

Completing SR 509.
Design is done and when funding is secured, WSDOT will complete State Route 509
– extending it to meet I-5 south of the airport
– creating a crucial new link in our urban highway system.



I-5 Pavement Reconstruction.
The pavement on I-5 through most of the Seattle metro area is far past its original lifespan. Motorists driving I-5 can see and feel the pavement's poor condition. The plan is to replace all of the pavement on I-5 from Tukwila to Northgate in several stages.

Taking our plan in its entirety from the boards to the field will be a challenge that even our best engineers and planners can't tackle without support and funding from the citizens of Washington State.

To keep this great state thriving, the central Puget Sound needs to be kept moving. With our collective knowledge, investment and a little patience, we can take our plans from paper to roadway and reap the benefits.

The future of Washington just got better.

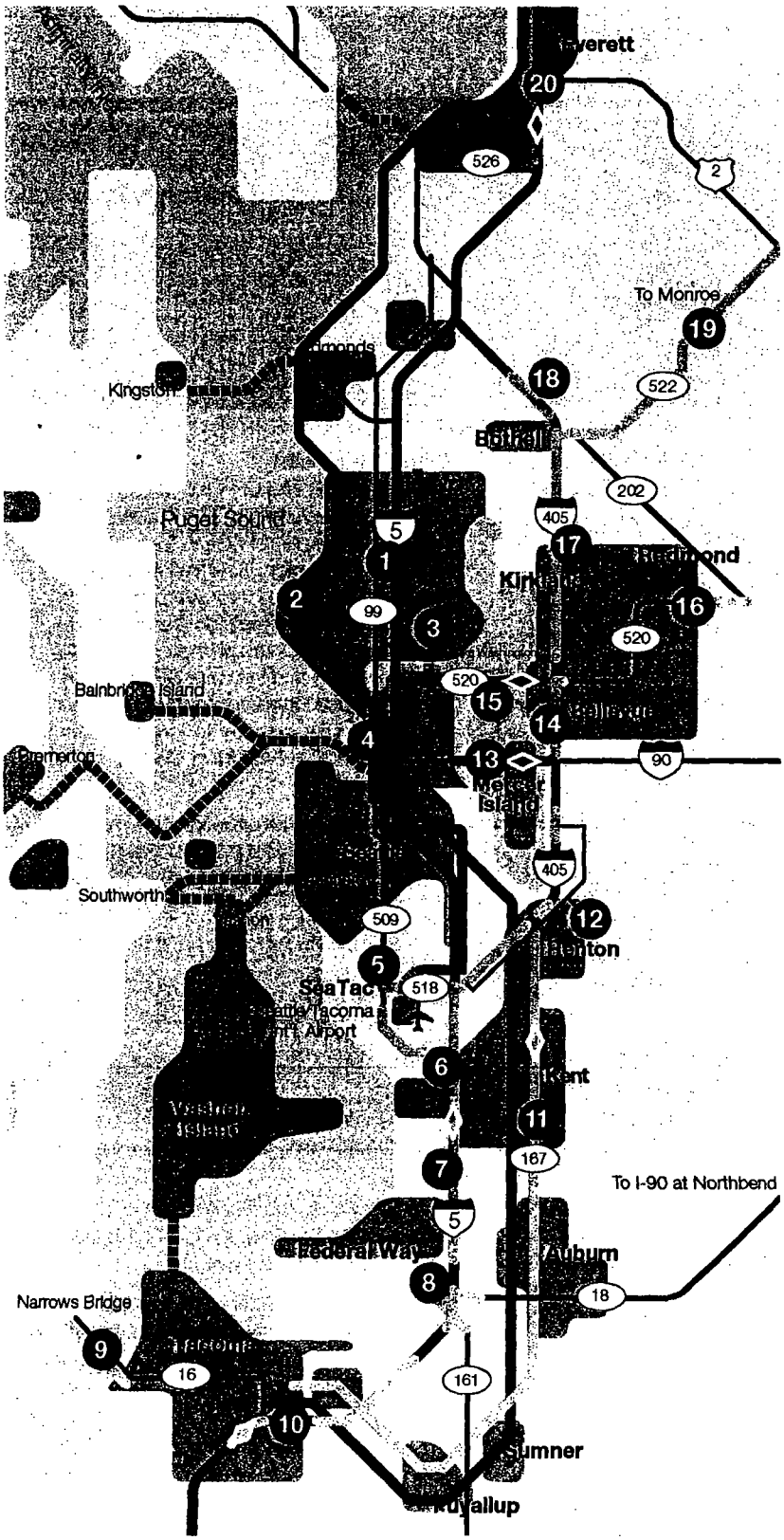
For more information, visit
www.wsdot.wa.gov
or write to
401 2nd Ave S, Ste 560
Seattle, WA 98104

MAKING EVERY DOLLAR COUNT.

2005 TRANSPORTATION PARTNERSHIPS PROJECTS

The plan.

Working together, these upcoming projects will fix or replace our most important arteries, expand our HOV and ferry systems, and introduce or expand new central Puget Sound high-capacity transit systems. ▶



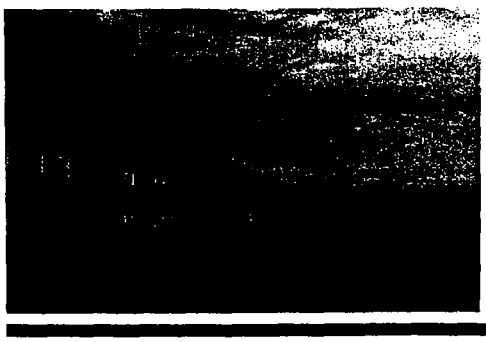
1. I-5 Pavement Reconstruction Projects
2. ST Sounder Commuter Rail (added trips)
3. ST LINK Light Rail Projects
4. Alaskan Way Viaduct Project
5. SR 518 Corridor Improvement Projects
6. SR 509/I-5 Freight and Congestion Relief Project
7. I-5 Pierce County-Tukwila HOV Projects
8. I-5/SR 161/SR 18 Triangle Project
9. Tacoma Narrows Bridge Project
10. I-5 Tacoma HOV Projects
11. SR 167 HOV, HOT Lane & Extension Projects
12. I-405 Renton Area Projects
13. I-90 Two-Way Transit and HOV Project
14. I-405 Bellevue Area Projects
15. SR 520 Bridge Replacement and HOV Project
16. SR 520-202 West Lake Sammamish HOV Project
17. I-405 Kirkland Area Projects
18. I-405 Bothell Area Projects
19. SR 522 Corridor Widening Project
20. I-5 Everett HOV Project

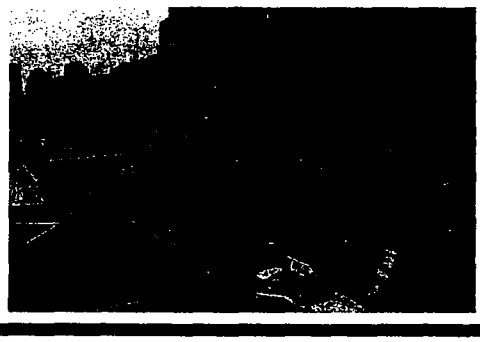
Project Type

- **Safety & Preservation**
- **Capacity & Congestion Relief**
- **Ferry Improvements**
- **Sound Transit Projects**
- **HOV**

By 2020,

we hope to be polishing off an assortment of projects, funded by 2003 and 2005 transportation packages, and integrating them into Puget Sound's growing system. WSDOT projects will fix or replace our worst infrastructure and expand the HOV and ferry systems. Agencies such as Sound Transit will diversify and strengthen our transportation system by introducing high-capacity transit to the region.





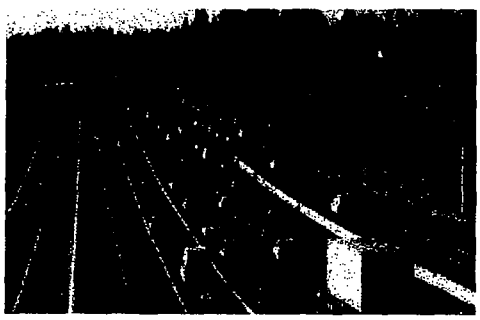
Safety & Preservation.
The needs to keep the traveling public safe, and to preserve the capacity we have are of utmost importance. 2005's state Legislative funding will begin paying for our top two safety and preservation needs: the Alaskan Way Viaduct and SR 520 Floating Bridge. Carrying a combined 200,000+ vehicles daily, today they are both old and at risk of failure.

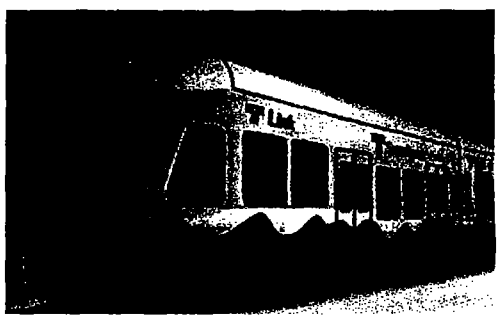
The new SR 520 floating bridge will be built to current storm and seismic standards, will have a bike/pedestrian path, full shoulders for safety, water treatment facilities, and pontoons to support high-capacity transit.

In a partnership project with the City of Seattle and the Federal Highway Administration, the viaduct could be replaced with a tunnel that maintains traffic capacity, is safe in earthquakes, and reconnects Seattle to Elliott Bay for the greater public.

Substantial regional and local funding is still needed to complete these projects.

Congestion Relief.
I-405, SR 522, and SR 18 are economic drivers for Washington. This series of roadway projects will expand I-405 in four traffic hotspots — Renton, Kirkland, Bellevue and Bothell — as well as improve public transit and environmental facilities (fish passages, water treatment) through the corridor. We will also widen and improve SR 522 from Paradise Lake Road out to SR 2, and will double SR 18's capacity to four lanes from Auburn to I-90 in East King County.





Ferries.
To address shortcomings in the Washington State Ferry system, ferry projects are working to reconstruct Seattle's ill-equipped Colman Ferry Terminal; maintain the existing ferry fleet; increase rider capacity; better facilitate different types of ridership (foot, bikes, vehicles) at terminals in Anacortes, Mukilteo and Edmonds; and purchase new vessels.

HOV.
HOV projects will expand the high-occupancy vehicle (HOV) lane system in the areas that need HOV lanes the most —I-5 in Everett between SR 526 and US 2, SR 167 in Renton and Kent, along I-90 across Lake Washington, along SR 520 between Seattle and Bellevue, and on SR 16 in Tacoma.

Transit.
WSDOT and Sound Transit are working to build a series of transit ramps on I-5, I-90 and I-405 to shorten bus travel times.

Sound Transit's Central LINK Light Rail project will add high-capacity transit to complement WSDOT's safety, HOV, ferry and congestion-relief projects.

WSDOT PROJECTS

"Washington's Future Just Got Better"

MAKING EVERY DOLLAR COUNT.

2005 Transportation Partnership Project Program

IT'S YOUR NICKEL. WATCH IT WORK.

2003 Legislative Funding Package

MOST REQUESTED

- Project of the Week
- SR 16 - Tacoma Narrows Bridge
- SR 99 - Alaskan Way Viaduct
- SR 104 - Hood Canal Bridge Replacement
- SR 520 - Bridge Replacement and HOV
- I-405 - Congestion Relief & Bus Rapid Transit Projects
- US 395 - North Spokane Corridor
- I-90 - Snoqualmie Pass East - Hyak to Keechelus Dam
- I-5 - Columbia River Crossing/Vancouver

PROJECT INFO.

- Project Management

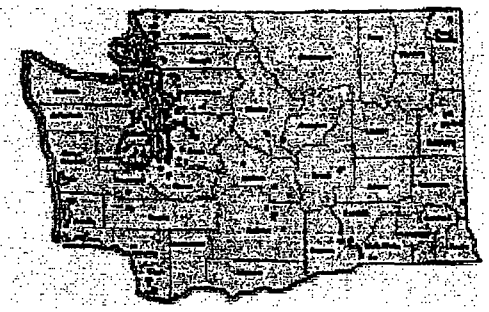
Highway, Ferry and Rail Construction and Improvement Projects

The list below provides links to many of WSDOT's major highway construction, ferry and rail projects. These project pages provide an overview of each of the major projects and specific details including local contact information.

Use these pages to:

- Stay informed on scope, schedule, and budget
- Find out about traffic impacts and public meetings
- Learn about WSDOT's environmental and tribal consultation practices
- Get in touch if you have questions or comments

Important and long-overview projects are in planning or under construction all over the state. Almost 300 projects are now underway and a number of projects have been completed since January 1, 2005.



Use this interactive map to find the WSDOT projects in your area or view the completed projects.

If you are looking for real-time traveler information you can visit us on the Web or call 511.

If you are planning a trip or a commute and would like to know which projects may impact your travel you may want to visit the local construction updates.

You can click on the column headings (County or Region) to sort the list or you car click on Title for an alphabetized list of WSDOT's major projects.

N - indicates project is funded in part by the 2003 Legislative Transportation Funding Package.

P - indicates project is funded in part by the 2005 Transportation Partnership Funding Package

Q - click to open the most recent Quarterly Project Report.

N	P	County	Region	Title
	P	Statewide		Cable Median Barriers
N		Snohomish	Northwest	Everett - East Everett Avenue Crossing
N		Skagit	Ferries	Ferry System - Anacortes Multimodal Terminal

IT'S YOUR NICKEL. WATCH IT WORK.

Funded in part by the 2003 Legislative Funding Package.

PROJECT INFO

- Project Home
- Project Area Map
- Proposed Design
- Existing Design
- Get Involved
- Olympic Region

QUARTERLY REPORT

- March 2006
- December 2005
- September 2005
- June 2005
- March 2005
- December 2004
- September 2004
- June 2004
- March 2004

I-5 - HOV Improvements - Port of Tacoma Rd to the King-Pierce County Line

Project Status

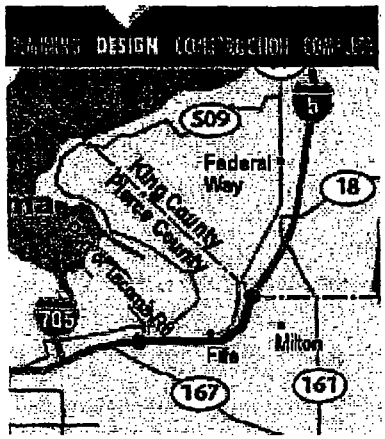
September 2006

WSDOT has partnered with the City of Federal Way to develop a project that will create and restore wetland and stream areas along West Hylebos Creek to mitigate for impacts due to the I-5 widening.

This will be a separate project constructed before the I-5 widening. Both WSDOT and Federal Way have hired a consultant, CH2M Hill, to design the project and develop plans for the mitigation site and a new bridge on S. 373rd Street to accommodate a stream relocation and improve fish and wildlife passage.

The design team is working closely with Washington Fish & Wildlife, the Puyallup Tribe, and Friends of the Hylebos Wetlands on the design of the stream restoration.

Read more about Spring Valley restoration project (pdf 98 kb).



View entire map. Project area is on I-5 and runs between the Port of Tacoma Road and the King/Pierce County line.

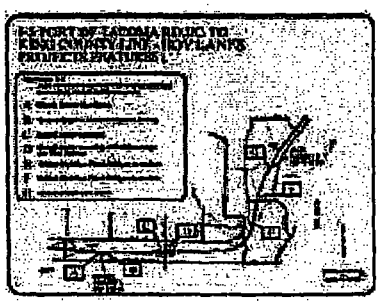
Why is WSDOT building HOV lanes?
This project is stage 13 of the Tacoma/Pierce County Core High Occupancy Vehicle (HOV) Program. This is one project in a series of highway projects that will provide operational improvements on I-5. Heavy traffic movements along I-5 in this vicinity create frequent congestion. HOV lanes assure that transit buses, vanpools and carpools can move as rapidly as possible even when traffic is congested in the adjoining general purpose lanes. This tends to increase ridership in multi-passenger vehicles and thereby helps ease demand in the general purpose lanes, making the highway system work more efficiently for everyone.

The End Result
The I-5 freeway will be widened toward the median to provide an additional lane in each direction for HOV vehicles from the Port of Tacoma Road interchange to the King/Pierce County line. There are six bridges that cross Wapato Creek and Hylebos Creek that will be widened. This project will also install a surveillance system (traffic cameras) to monitor traffic flows and connect to the existing information system (electronic signboards) to inform drivers of traffic delays and public announcements. In addition, metering signals will be installed on the northbound and southbound on-ramps at the 54th Avenue interchange. The on-ramps will also be widened to provide preferential HOV lanes to bypass the ramp metering signals.

Existing Design

Project Benefits

- **Congestion Relief.** This project will provide additional congestion relief to the I-5 corridor when connected to the HOV lanes constructed in the Tacoma/Pierce County Core High Occupancy Vehicle (HOV) Program.
- **Traffic Cameras.** Installs traffic cameras at strategic locations that will inform the motoring public of current traffic conditions via electronic signboards, local television stations and the internet.
- **HOV Lanes.** HOV lanes will be constructed which will reduce the number of vehicles on the road, thus producing less pollution.



Proposed Design

What is the project timeline?
The design work is currently underway. The right of way purchasing phase will began in the spring of 2005. Construction is scheduled to begin in 2009.

Public Involvement
Your thoughts and opinions are important to us. To date there have been many opportunities for the public to become informed and to inform us of their preferences and concerns, leading to completion of the Final Environmental Impact Statement in 2000, as well as influencing project designs since then.

Other recent public involvement was accomplished with the formation of advisory committees. These consist of local community members and their elected local and regional representatives working with WSDOT to come up with ideas to meet design challenges. We enjoy bringing our message and information to community groups, and if you like to request a presentation for your group or organization, please contact Gordon Roycroft, project manager.

Project Facts

- Creates 2.9 miles of HOV lanes for each northbound and southbound I-5.
- Provides traffic cameras for monitoring traffic flows.
- Six bridges will be widened to provide additional lanes.

Environmental Protection
WSDOT is committed to preserving the environment and makes every effort to assess and minimize environmental impacts from ou projects. A detailed analysis of the project's environmental impacts will be completed and an appropriate plan for mitigation of adverse impacts will be developed and documented as part of the Environmental Documentation and Environmental Permitting processes. Within project limits, I-5 crosses Wapato Creek and Hylebos Creek. WSDOT will use state-of-the-art roadway design to

minimize impacts to these important resources.
Please visit the WSDOT Environmental Services Web site for more information.

Increasing safety is one of our priorities
Ramp metering, guardrail upgrades and installations of additional traffic cameras are being done to provide a safer place to travel. Ramp metering at the Port of Tacoma interchange will provide gaps between merging vehicles thus reducing the hazards created b large numbers of vehicles attempting to merge in a "pack." Upgrades to guardrail and impact attenuators will also increase the safe on this section of highway. New traffic cameras will alert motorists of congestion and allow them to find alternate routes, thus helpin to decrease the number of rear-end collisions with slowed vehicles.

Will this project impact tribal resources?
At WSDOT we seek to address the concerns of the tribal nations using the process outlined in Section 106 of The National Historic Preservation Act and the WSDOT Tribal Consultation Policy adopted in 2003 by the Transportation Commission as part of the WSDOT Centennial Accord Plan.

The Puyallup Tribe of Indians has been a significant stakeholder in the development of the Tacoma/Pierce County Core HOV Program. The Puyallup Tribe has been involved in defining projects in Tacoma and Fife, providing direct input to minimize impacts t tribal lands.

For more information visit our WSDOT Tribal Liaison website.

Financial Information
This project is funded through the following sources:

- **2003 Gas Tax** (Nickel Funding) - **$33,623,000**
- **Existing Funds - $4,877,594**
- **Total Funding Available From All Sources - $38,500,594**

For project schedules and updates, please see the Quarterly Project Report.

Due to the state and national experience in cost escalation of construction materials and fuel, WSDOT is re-evaluating project cost estimates. These updated cost estimates will be incorporated into WSDOT's 2007-2009 Budget request to the Governor.

How can I get more information?
Contact:
Gordon Roycroft, HOV Project Manager
Tacoma/Pierce County HOV Office
PO Box 47376
Olympia, WA 98504-7376
Phone: (360) 709-8130
Email: roycrog@wsdot.wa.gov

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I-5 - HOV Improvements - Port of Tacoma Rd to the King-Pierce County Line

Quarterly Project Report Update for Quarter Ending March 2006

Project Title & Location	**Project Description**
I-5 HOV - Port of Tacoma Rd. I/C to King County Line	This project purchases right of way and constructs HOV lanes on I-5 from the Port of Tacoma Road to the Pierce/King County line. There are currently 8 lanes. There will be 10 lanes when the project is completed.
Contractor/Consultant Project not yet advertised or awarded	

Recent Progress

WSDOT has partnered with the City of Federal Way to develop a project that will create and restore wetland and stream areas along West Hylebos Creek to mitigate for impacts from the I-5 widening project. This will be a separate project constructed before the I-5 widening. Both WSDOT and Federal Way have hired a consultant, CH2M Hill, to design the project and develop plans for the mitigation site and to construct a new bridge on S. 373rd St. to accommodate a stream relocation and improve fish and wildlife passage.

Currently the wetland restoration project is in the design stage and work to finalize the design and develop plans is scheduled for this winter.

Design Construction Impacts

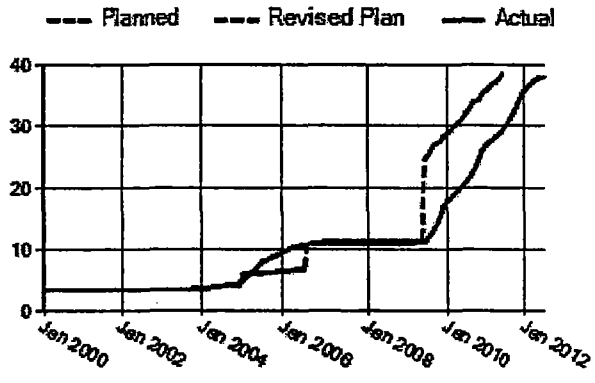
No issues at this time.

Environmental Impacts / Compliance	**Impacts to Traffic**
Work to construct the Spring Valley Restoration Project site could begin as early as Summer 2007.	Temporary impacts during construction could include narrow lanes along with nighttime lane closures and minor detours at the 54th Avenue Interchange.

Project Milestones	**Scheduled**	**Attained**	**Milestone Outlook**
Hydraulic and Storm water Redesign	August 2004	October 2004	The storm water and hydraulic design are complete.
Environmental Documentation Complete	October 2006		No issues at this time.
Right of Way acquisition complete	June 2005		Needed right of way for storm water treatment facilities; is in the appraisal stage and scheduled to be acquired soon.
Advertisement Date	January 2009		No issues at this time.
Open to traffic	October 2011		No issues at this time.

Project Cost Summary:	**Dollars in millions**	**Percent of Total**
Preliminary Engineering	$ 4.88	12.7%
Right-of-Way	$ 6.60	17.1%
Construction	$27.02	70.2%
Funded Project Costs	$38.50	100.0%
Nickel funds included in above costs	$33.62	87.3%
2005 Transportation Partnership Account		

Planned vs. Actual Expenditures
(Total Project Cost)

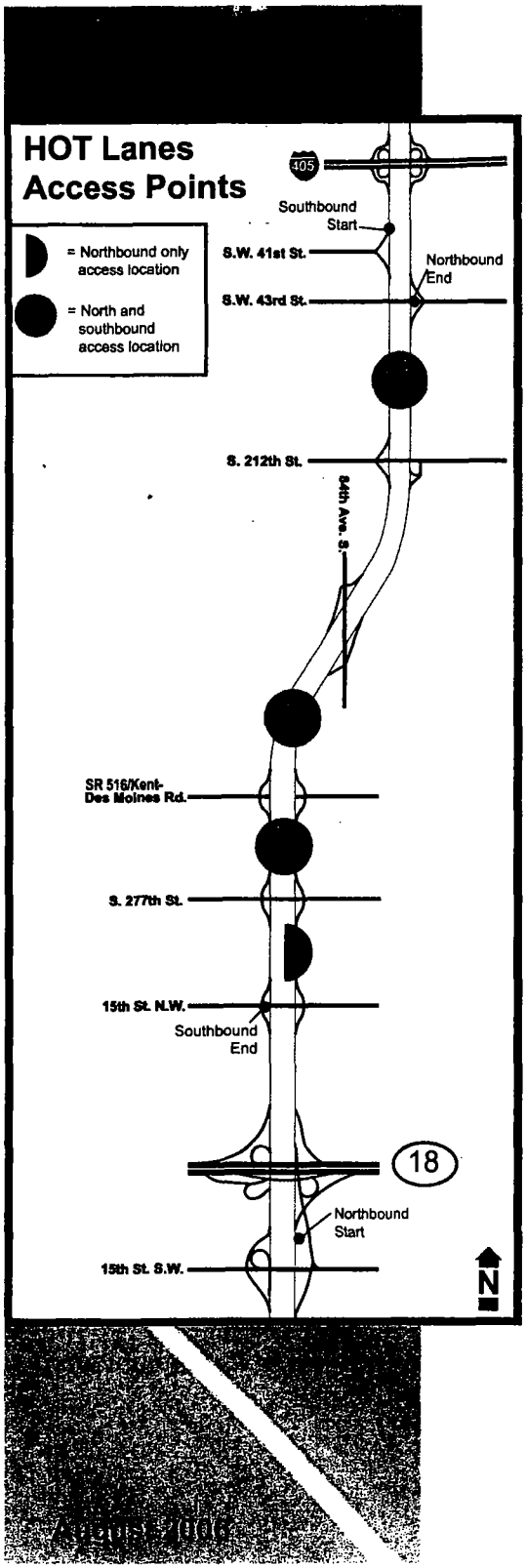


For more information, go to www.wsdot.wa.gov/projects

Gordon Roycroft, Project Development Engineer, (360) 570-6660, roycrog@wsdot.wa.gov

Washington State Department of Transportation

SR 167 HOT Lanes Pilot Project



Giving drivers a new way to get where they need to go...

High Occupancy Toll (HOT) lanes:

- Improve traffic flow.
- Allow more vehicles to move through the corridor.
- Maintain speed and travel time reliability for transit and carpools.
- Give solo drivers more choices.

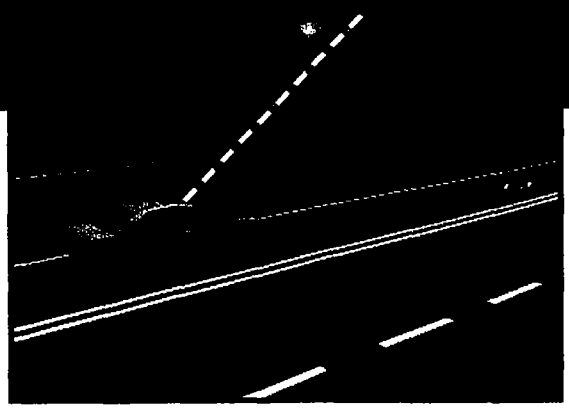
What are HOT lanes?

- HOT lanes are lanes that are open to vanpools, carpools, transit and toll-paying solo drivers.
- Solo drivers can use the lanes by paying a toll.
- Carpools will continue to use the HOT lanes toll-free.
- Tolls are adjusted to keep traffic flowing at 45 mph or faster even when regular lanes may be congested.

HOT lanes are coming to SR 167.

- HOT lanes are set to open in 2008.
- The SR 167 HOT lanes project will convert nine miles of the existing carpool lanes between Renton and Auburn to HOT lanes.
- Lanes will be re-striped to create a buffer and merging space between the HOT lanes and the adjacent general-purpose lane. This improves safety and driver comfort.
- Law enforcement and incident response teams will ensure proper use of the HOT lanes.
- Solo drivers will be allowed to access the HOT lanes as long as speeds are 45 mph or higher.
- Carpools and vanpools use the HOT lane toll-free and will still be given priority with added safety and trip reliability.

For up-to-date project information please visit our Web site:
www.wsdot.wa.gov/projects/SR167/HotLanes



Electronic readers and transponders mean no toll booths.

Automated toll collection maintains speeds and assists with enforcement.

- No tollbooths required! The automated toll collection system will include a vehicle-mounted transponder, over-roadway transponder readers and electronic toll rate signs.
- A flashing enforcement light at access points will signify when a vehicle drives through with an active transponder. If the light does not flash, Washington State Patrol will check to see if there are two or more people in the vehicle.

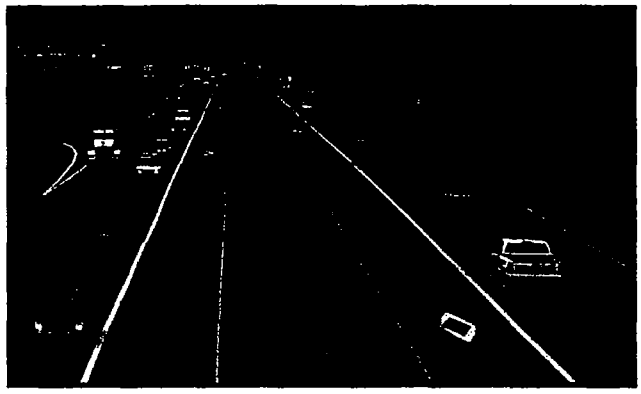
Tolls are set to keep traffic moving.

- Tolls for solo drivers are based on congestion. When the lanes open in 2008, the price will likely be between $1.50 and $2.00 per trip during peak hours or higher during times of heavy congestion.
- As more people enter the HOT lane, the toll goes up. A higher toll will result in fewer solo drivers entering the HOT lane and traffic will keep moving.
- WSDOT will monitor speeds to make sure traffic continues to move at least 45 mph, and likely up to 60 mph.

A toll transponder will be placed on a solo driver's front windshield.

SR 167 has space in its carpool lanes... *WSDOT is giving you a new reliable way to get where you need to go.*

An analysis of the SR 167 carpool lanes found that there is room to help alleviate some of the traffic in the regular lanes while maintaining trip reliability for carpoolers and vanpoolers.



Existing SR 167 facility with HOV lanes

Proposed SR 167 with HOV lanes converted to HOT lanes

HOT lanes save time for all commuters on SR 167.

Converting the carpool lanes to HOT lanes is expected to make better use of the road. More vehicles will be able to travel during the peak periods. Speed and trip reliability will be maintained for buses, carpools and vanpools in the HOT lanes.

- Opening year projections for morning commute, northbound:
  - Total number of vehicles traveling through the corridor increases up to 12%
  - Total number of vehicles traveling in the current carpool lane increases up to 20%

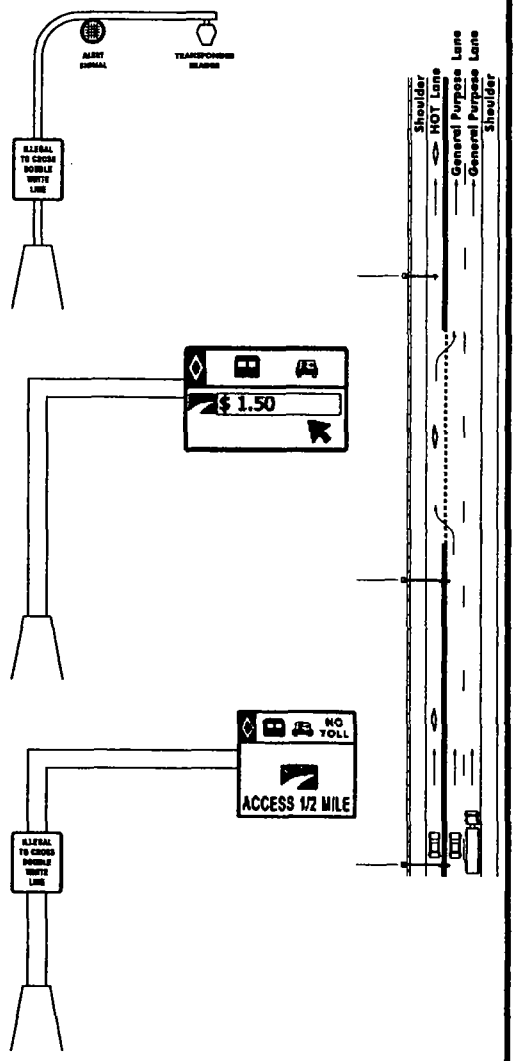
- Opening year projections for evening commute, southbound:
  - Total number of vehicles traveling through the corridor increases up to 13%
  - Total number of vehicles traveling in the current carpool lane increases up to 56%

Even with more vehicles on the highway, speeds in the regular lanes should stay the same or increase up to 10 mph because the traffic is spread out. Tolls help maintain speeds in the current carpool lanes.

Carpools will continue to use the HOT lane without paying a toll

How HOT Lanes Work

- An automatic reader will deduct tolls and alert enforcement patrols of violators.
- Dotted lines indicate access points and signs display the toll.
- Signs let you know when you can enter the lane.



For more infomation visit:
www.wsdot.wa.gov/projects/SR167/HotLanes

What do SR 167 users have to say about HOT lanes?

WSDOT has been out in the community talking to SR 167 commuters about HOT lanes.

We heard that the most important aspects of the HOT lanes are:

- Time savings
- Trip reliability
- Easier, less stressful driving

Most people said they would consider using the HOT lane if it would get them where they need to be on time.

A number of people had concerns about enforcement.

"I will use the HOT lane if I am running late; getting to a job site on time is worth more than the cost of a toll." ***-SR 167 Commuter***

ADA Information:
Individuals requiring reasonable accommodation of any type may contact Mike Sallis at sallism@wsdot.wa.gov or (206) 464-1230. Persons who are deaf or hard of hearing may call WA State Telecommunications Relay Service (TTY) at 711.

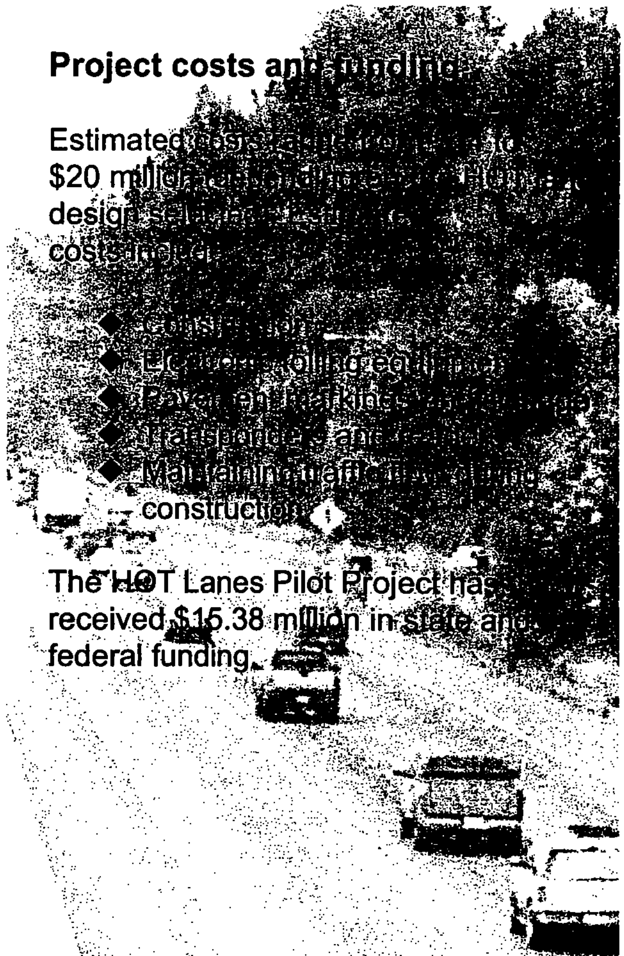
Title VI:
WSDOT assures full compliance with Title VI of the Civil Rights Act of 1964 by prohibiting discrimination based on race, color, national origin and sex in the provision of benefits and services. For language interpretation services, please contact Mike Sallis at (206) 464-1230. For information on WSDOT's Title VI Program, please contact the Title VI Coordinator at (360) 705-7098.

Project costs and funding

Estimated [illegible] $20 million [illegible] design [illegible] costs [illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible] construction

The HOT Lanes Pilot Project has [illegible] received $15.38 million in state and federal funding.



For more information:

Visit the project Web site:
www.wsdot.gov/projects/SR167/HOTLanes

Contact:
Patty Rubstello
WSDOT SR 167 HOT Lane
Project Manager
Phone: **(425) 450-2720**
Email: **SR167hotlanes@wsdot.wa.gov**

Washington State Department of Transportation

The Alaskan Way Viaduct & Seawall Replacement Project

07.06

Replacing the Viaduct and Seawall: The Facts

Several years of design and environmental review along with thousands of public comments have narrowed down a list of 76 concepts to two for replacing the viaduct, a cut-and-cover tunnel or a new elevated structure.

The Alaskan Way Viaduct carries about 110,000 vehicles each day.

Here is how they are similar:

Both Alternatives Maintain Transportation Capacity

Both have the same number of lanes and would carry up to 135,000 vehicles per day in the future. Regardless of which alternative is built, both assume transit ridership into downtown Seattle will double by 2030.

Both Alternatives are Safe

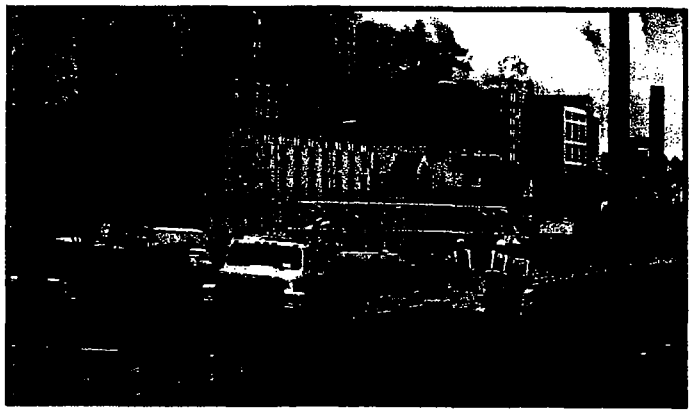
Either alternative would be built to meet modern safety and seismic standards. Both will have wider lanes and shoulders than the existing viaduct.

Contrary to what you may think, a tunnel is actually one of the safest places to be during an earthquake, because it moves with the earth. All of the tunnels in the Seattle area withstood the Nisqually Earthquake. The elevated structure will also be safe in the event of an earthquake.

The project team is using the best data available on global warming to design the tunnel and elevated structure to be safe in a tsunami and protected from rising water levels.

Both Alternatives Have Similar Construction Start Dates

Designing either alternative is a major undertaking, requiring a complex environmental and permitting process. No matter which alternative is built, utilities must be moved before construction can begin. Utilities are scheduled for relocation in 2008.



Routine repairs are needed to maintain safety on the aging viaduct. It is old, deteriorating, and must be replaced.

Comparing the Tunnel and Elevated Structure

Here is how they are similar:

Both Alternatives Have Similar Risks During Construction

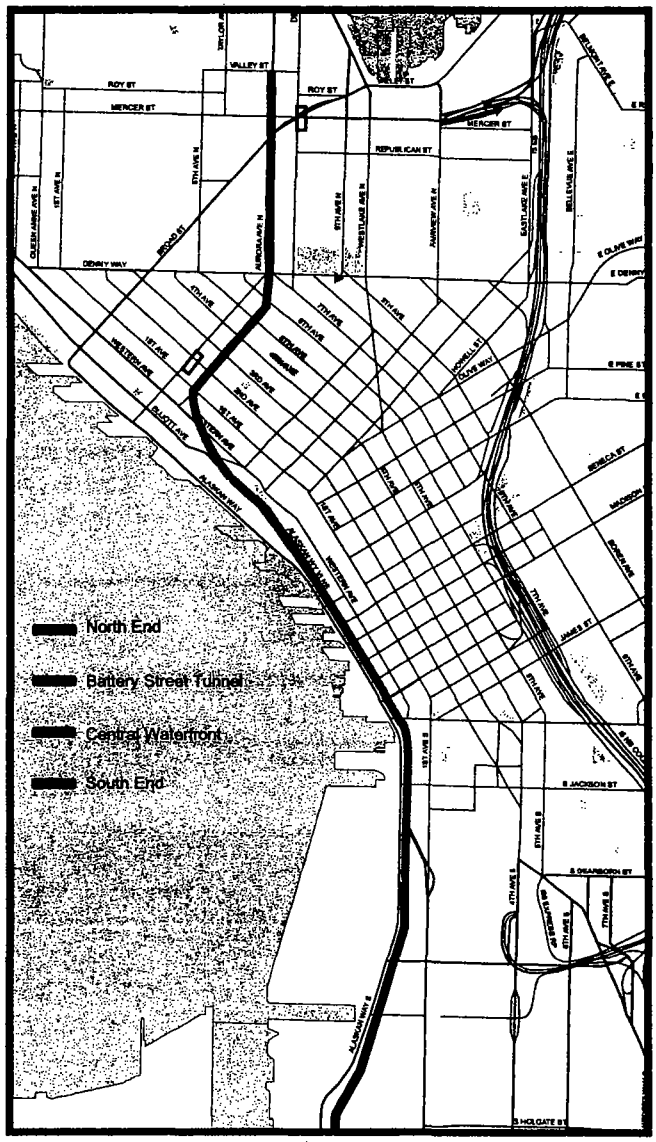
The viaduct runs through a dense urban area. Both alternatives must deal with the same unique constraints–very little room to work, poor soil that needs to be removed, and difficulties managing traffic. Because the seawall is failing and could cause subsequent failure of the viaduct, it must also be replaced.

Further, the two alternatives have an almost identical alignment. The south end between Holgate and King, the connection to the Battery Street Tunnel, and the improvements to Aurora Avenue are virtually the same.

Both Alternatives Will Disrupt Traffic During Construction

For either alternative, construction impacts will be significant. Some ramps will be closed for long periods of times, and at a minimum, one direction of traffic will be detoured to alternate routes for much of the construction period.

WSDOT, the City of Seattle, SR 99 users, and waterfront businesses and residents will need to come together to balance the trade-offs of construction. For either alternative, it is possible to close SR 99 completely, which means a shorter construction time and potential cost savings. However, this will have a significant impact on the 110,000 vehicles on the viaduct every day. It is also possible to try to keep at least one direction on SR 99 for most of construction (a minimum of three to four months of complete closures is required), however, it will take longer and likely cost more. Depending on the approach chosen, construction is expected to last seven to twelve years.



Only about one mile of each alternative along the central waterfront has a different alignment.

Here is how they are different:

Cost

The project team updates cost estimates with independent experts each year. The most current review occurred in December 2005. Costs are estimated at:

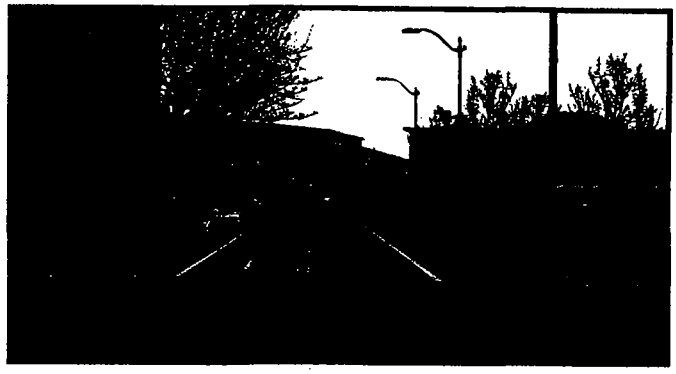
Tunnel:
$3.0 to $3.6 billion for the 'core' tunnel
$3.7 to $4.5 billion for the full tunnel

Elevated Structure:
$2.0 to $2.4 billion for the 'core' elevated structure
$2.7 to $3.1 billion for the full elevated structure

Economic Benefits

Tunnel: The tunnel is expected to pay for its additional cost within 25 years of completion. With new public open space along the waterfront, economists predict increased visitor spending and rising property values.

Elevated Structure: Because the waterfront will be the same as today, experts tell us there will be no change in the amount of tourists or property values.

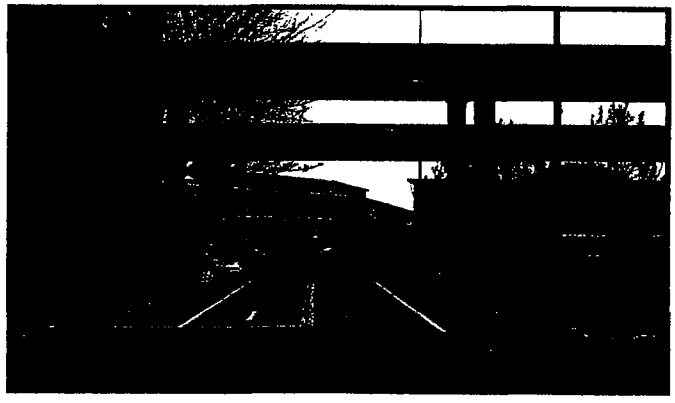


Alaskan Way at University Street with the Tunnel

Views and Waterfront Access

Tunnel: Pedestrians would gain views across Puget Sound, and enjoy easier access to the central waterfront area. Drivers in the tunnel would lose the view of Puget Sound, but would have some view before entering the Battery Street Tunnel.

Elevated Structure: The new structure would be wider and slightly higher with shoulders. Views of the water and from the eastern side of the structure will be slightly more obstructed than today due to a solid traffic barrier. The central waterfront sidewalk will be narrowed five feet to allow room for the Alaskan Way surface street near Colman Dock.



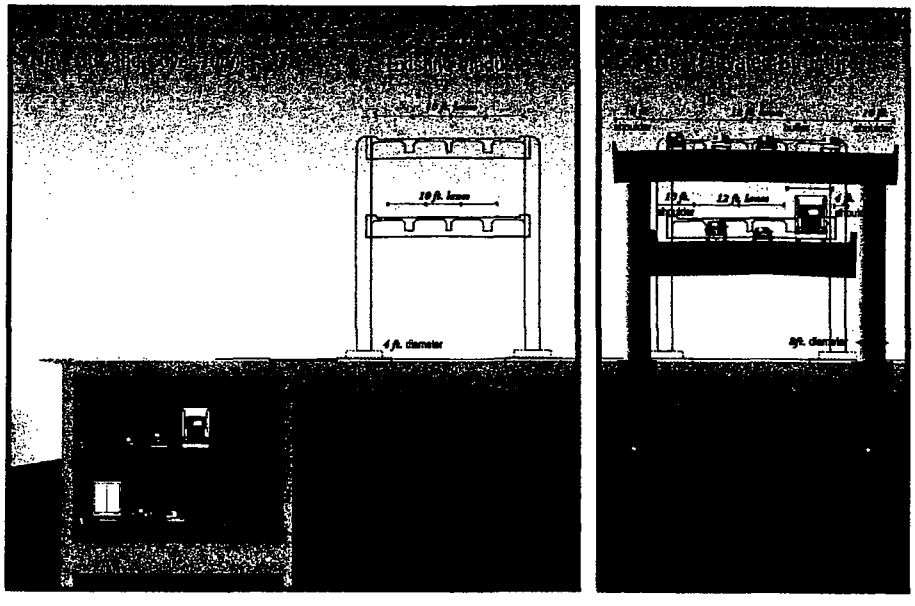
Alaskan Way at University Street with the Elevated Structure

Structure Size Compared to Today

For both alternatives, the south end of the corridor and north of the Battery Street Tunnel maintain a 'footprint' almost identical to the existing SR 99. Each alternative is being designed with wider lanes and shoulders to improve safety.

Tunnel: Since the tunnel will be underground, it will create new public open space along the central waterfront.

Elevated Structure: The new elevated structure would be wider than the current structure in the midtown area, where there is a fourth lane for an off-ramp, and double the width in the Pioneer Square area, where a transition is made to a side-by-side highway.



Alternatives shown at Madison Street with the existing viaduct shaded in the background. In this location, there is a fourth lane to accommodate the Seneca Street off-ramp for the Elevated Structure.

Project Timeline

Alternatives for environmental review selected

Final EIS

Begin construction

2001

Nisqually Earthquake shook Puget Sound

2002

2004

2002-2005

Begin design work

2006

- Cost estimates
- Supplemental Draft EIS
- Announce preferred construction approach

2007

2008

- Record of Decision
- Begin utility relocation

2010

Community Outreach

Your Role

Everyone will be affected by construction, but your insight can help make construction better. We need your ideas on how we can make it through the expected lane closures, noise and vibrations, and disruptions to businesses and residents.

Americans with Disabilities Act & Title VI information

Americans with Disabilities Act (ADA) Information: Materials can be provided in alternative formats: large print, Braille, cassette tape, or on computer disk for people with disabilities by contacting Molly Edmonds at (206) 267-3841 / EdmondM@wsdot.wa.gov. Persons who are deaf or hard of hearing may make a request for alternative formats through the Washington Relay Service at 7-1-1.

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