The Embarcadero Experience: Can't We Just Tear it Down?

What would happen in Seattle if the Viaduct were torn down and not replaced?

San Francisco removed the Embarcadero Freeway after it was damaged in an earthquake.

The Alaskan Way Viaduct may seem similar to San Francisco's Embarcadero — both are aerial structures running along urban waterfronts. However, from a transportation and urban mobility perspective, the two are very different facilities.

The Embarcadero's primary function was simply to provide a connection between the regional freeway system and San Francisco's street grid. The Viaduct is a regional corridor that provides access both to and through downtown Seattle. The Viaduct accommodates a large number of trips that travel completely through downtown, for which there are no good alternate routes.

One lesson from the Embarcadero experience is that after it was closed, Embarcadero traffic shifted to more than a dozen parallel streets, and in some cases traffic volumes increased by more than 50%. However, compared to San Francisco, Seattle's street grid offers few parallel routes and has significantly less capacity to absorb displaced Viaduct trips.

Seattle and WSDOT have an opportunity to maintain the transportation corridor currently provided by the Viaduct by replacing it with either a Tunnel or rebuilding it. Replacing the central Viaduct segment with a Tunnel results in additional benefits, including many of the same urban design and revitalization benefits that San Francisco now enjoys without the Embarcadero. These additional benefits are described in a separate analysis, *Why Replace the Viaduct with a Tunnel.*

A Three-Part Economic Analysis of Project Benefits

This is the first of three economic benefit analyses that assess the comparative benefits and costs of each component of the Viaduct and Seawall replacement. The analysis finds:

- **Transportation Benefits.** The congestion and delay costs of not replacing the Viaduct's transportation capacity are greater than the costs of rebuilding it.
- **Tunnel Benefits.** The tunnel alternative will bring additional local and regional economic benefits that exceed the added investment for the tunnel.
- **Seawall Benefits.** The cost to the Northwest and national economies of a Seawall failure far exceed the cost to replace the Seawall.

Methodology for Estimating Congestion Costs

Congestion cost estimates were derived based on a traffic congestion and delay model that computes hours of travel delay in the Viaduct corridor and throughout the regional transportation system.

Hours of delay were converted to a dollar value using fractions of average wage rates for King, Kitsap, Pierce, and Snohomish counties: 50% of the average hourly wage rate for non-commercial trips and 120% of the wage rate for commercial trips were assumed. Wage rates were also assumed to increase at a rate of 1% above the annual inflation rate.

Projected future dollar values of benefits were discounted for comparison with costs based on a real (inflation-adjusted) discount rate of 3.5% per year.

For more information:

- Visit the website at: www.wsdot.wa.gov/projects/viaduct
- Call the Project Hotline (206) 269-4421
- Send an email to viaduct@wsdot.wa.gov

DECEMBER 2004

Why Invest in the Alaskan Way Viaduct:
It Costs Less to Replace the Viaduct Than to Lose It

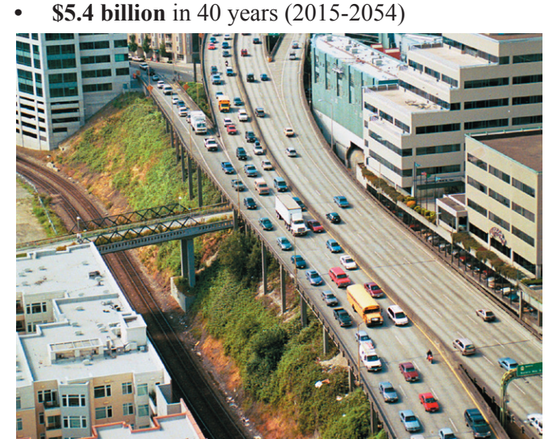
Congestion-Related Costs Exceed Viaduct Rebuild Costs

If the Alaskan Way Viaduct is not replaced, increased travel delay and traffic congestion will ripple across the Viaduct corridor and through the regional transportation network, spilling onto downtown streets, surrounding neighborhoods, and up and down I-5.

Even with major investments in transit and local arterials, the cost of this congestion is conservatively estimated at 10.4 million person-hours of delay and $190 million per year (see back page). Over time these congestion costs will become even more substantial, affecting our region's mobility, economic vitality and quality of life.

Assuming the Viaduct was not replaced, as of 2015, the cost of increased regional congestion would be:

- **$3.2 billion** in 20 years (2015-2034)
- **$4.4 billion** in 30 years (2015-2044)
- **$5.4 billion** in 40 years (2015-2054)



The preferred alternative includes a tunnel in the Central Waterfront section, though a lower cost option is also being carried forward. If construction begins in 2009, estimated cost ranges would be:

	Tunnel	Rebuild
Total Cost	**$3.4B - $4.1B**	**$2.7B - $3.1B**
Seawall Cost	**$700-800 million**	
Transportation Capacity Cost	**$2.7B - $3.1B**	**$2.0B - $2.3B**

The new facility will have a very long life — at least 75 years — and over its lifetime the benefits of avoided congestion and delay will increase substantially, compared to the cost of construction. Within 17 to 21 years, just avoiding the costs of congestion and delay will be worth more than the cost of the Tunnel Alternative. Additional benefits and costs avoided will continue to accrue over the facility's 75-year life. Under the Rebuild option, the replacement would pay for itself in 12 to 14 years, though the Rebuild has fewer amenity benefits than a tunnel.

The Viaduct is Critical to Regional Mobility

The Alaskan Way Viaduct and Seawall are at the end of their useful lives. The Viaduct carries 103,000 vehicles per day through downtown Seattle. The Viaduct is a crucial link in our region's transportation system, serving as a major commuter route; a freight corridor; a north-south highway through downtown Seattle; and a tie between in-city neighborhoods and downtown.

Washington State Department of Transportation

Federal Highway Administration

City of Seattle

What Contributes to Congestion Costs?

The Region Has Limited North-South Highway Capacity

The Puget Sound's major transportation system needs are for north-south movement, linking the major employment centers in Snohomish, King and Pierce Counties. Yet the region is challenged by geographic constraints and limited north-south highway capacity.

Between Everett and Tacoma there are only two north-south highways — I-5 and SR 99 — and only three in Central Puget Sound, including I-405. Exhibit 1 summarizes the increased delay expected for selected trips in normal conditions if the Viaduct were not available.

These delays affect travel on the corridor, downtown streets, and I-5. On bad traffic days, delays spill over to I-5, I-405 and other major corridors.

These estimates reflect only delays that come from overburdened roadways in usual traffic situations. In reality, user delay costs are still higher when planned sporting events and festivals, accidents and bad weather further congest our roadways.

Exhibit 1
2030 Afternoon Rush Hour Delay

Trips that Rely on Viaduct	Trip Times With Viaduct (minutes)	Additional Delay if Viaduct is Unavailable (minutes)
West Seattle to Ballard	26	+17
Ballard to South Duwamish	25	+12
Queen Anne to West Seattle	22	+12
Magnolia to SeaTac	32	+11
Trips on I-5		
University District to SeaTac	43	+7
Downtown Seattle to Everett	56	+3

Eight Blocks Separate the Viaduct from Interstate 5

Exhibit 2 shows the proximity of the Viaduct to I-5, and helps explain why removal of the Viaduct will have immediate traffic impacts on I-5. Without the Viaduct, displaced traffic will move to already congested city streets and I-5.

Exhibit 2
Proximity of Viaduct and I-5

Transit Investments Are A Key Part of the Analysis

The assessment of traffic congestion costs without the Viaduct assumes a high level of new transit investments and widespread use of all transit services. By 2030:

- Sound Transit's Link Light Rail system will connect Northgate to SeaTac Airport;
- The Monorail Green Line will be complete;
- Scarce supply of parking means parking costs will grow faster than inflation; and
- Three-quarters of downtown commuters will use transit (compared to about 43% today).

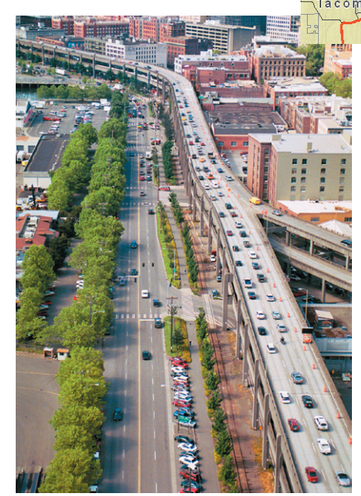
Congestion Has Environmental, Economic and Safety Costs

The Region's Highways are Interconnected and Problems Ripple Through the System

Exhibit 3 shows the limited highway system serving the region's 3.2 million people. By 2030, this population is forecasted to grow by 31% to 4.2 million people.

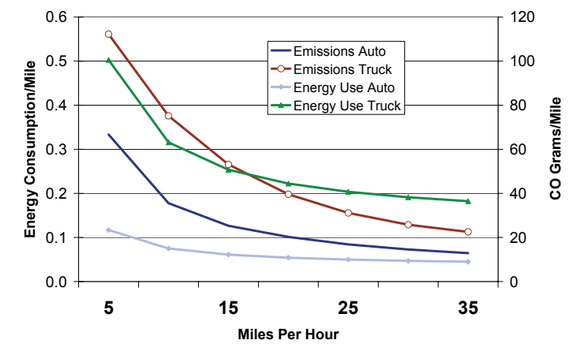
Removing the Viaduct's capacity from the region's limited network will exacerbate congestion and delay, especially when there is a traffic incident on I-5. If the Viaduct is not replaced, pollution will increase as will fuel and safety costs.

Exhibit 3
Regional Highway System is Interlinked



Vehicle emissions costs. As congestion grows and worsens, average travel speeds decrease. Idling and slow-moving cars and trucks produce more emissions per mile. This resulting increase in air pollution imposes health-related costs to people and degrades the environment. Exhibit 4 shows that energy consumption and polluting emissions increase as average speed decreases, particularly for trucks.

Exhibit 4
Relationship of Emissions to Average Speed



Fuel costs for vehicle operation. At slow speeds, cars and trucks consume more fuel per mile. Increased fuel costs to truckers translate into higher costs for freight shipments, and consequently higher costs of the goods being shipped.

Safety costs. Higher levels of congestion on I-5 and city streets could mean more frequent accidents, leading to unexpected congestion. Some transportation research has shown that shifting traffic off of crowded arterials to limited-access roadways can increase safety.

As with event-related congestion, it is challenging to place a value on these costs. Thus, only the impacts of "normal" congestion are valued here, resulting in a conservative estimate of the transportation value of the Viaduct's capacity.