

**Part III: Costs Exceeds Benefits in Sound Transit’s
 Light Rail Expansion**

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Local elected officials in the central Puget Sound region are asking voters to approve a \$38 billion, 20-year Roads & Transit package in the November election. The plan combines spending \$24 billion for light rail and other regional transit projects and \$14 billion for highway expansion.ⁱ

The Puget Sound Regional Council (PSRC) required that Sound Transit prepare a benefit-cost analysis of the light rail portion of the Roads & Transit package.ⁱⁱ

Sound Transit compiled the costs and benefits of 50 new miles of light rail over the next 60 years. The costs are heaviest during construction and the benefits arrive years later when some of the new light rail opens for service in 2019. Sound Transit’s calculation yielded a total adjusted value of \$25.7 billion benefits and \$9.5 billion cost.ⁱⁱⁱ

However, the Sound Transit analysis includes many assumptions that are unrealistic. In preparing this policy note, we use Sound Transit’s methods of analysis, but correct five misleading assumptions to be more reasonable and responsible. These realistic changes reveal the public benefits of light rail expansion to be lower than the cost of building the project in the first place.

Under the corrected analysis, the adjusted value of benefits descends to \$9.5 billion while costs rise to \$10.0 billion.^{iv} The benefit-to-cost ratio becomes 0.9, meaning the benefits are not worth the costs. The following table shows Sound Transit’s results, compared to using assumptions that are more realistic.

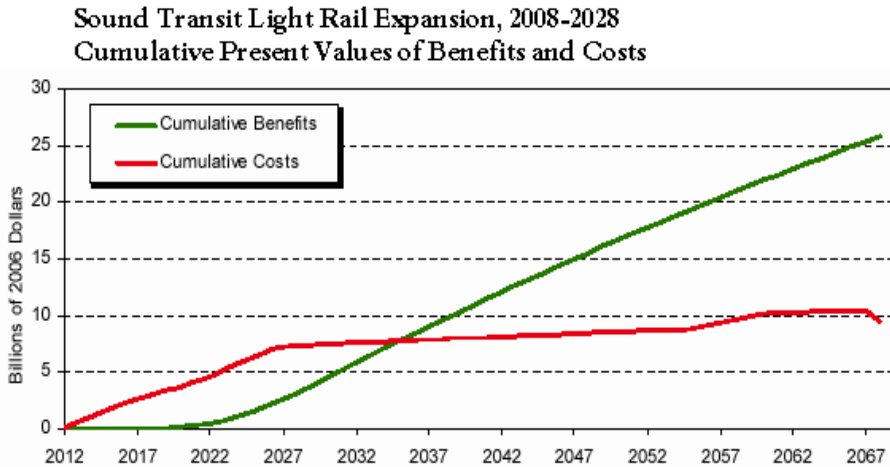
Effect of More Realistic Assumptions on Benefits and Cost of Light Rail

	Benefits	Cost	Benefit-Cost Ratio (B/C)
Sound Transit’s calculation ²	\$25.7 billion	\$9.5 billion	2.7
Sound Transit’s methods with five improved assumptions ³	\$9.5 billion	\$10.0 billion	0.9

A Quarter Century and Beyond to Realize Benefits

Regional transportation is in crisis. Problems are apparent every day, and are getting worse. Yet, Sound Transit's own analysis of light rail expansion shows an extraordinarily long time – about 26 years – for cumulative benefits to exceed costs. As shown in the graphic below, benefits finally rise above costs by about 2034, after more than a generation has passed.

Risk and uncertainty characterize investments that take a quarter century to pay off. Economic conditions change. Technology applications improve. Society likely evolves in unexpected ways.



Source: Sound Transit Benefit-Cost Analysis

Twenty-six years to achieve a return raises new questions about alternative investments that would work more quickly and cost far less. Alternatives do exist, such as increasing coverage, frequency and comfort of buses, and fixing roads to

let buses and other vehicles move faster. Incentives to use public transit could be expanded. Yet, Sound Transit compared spending billions on light rail to doing nothing.

Beyond this failure to evaluate alternatives, the assumptions behind Sound Transit's computation of light rail cost and benefits are problematic. With better assumptions, the return on investment takes even longer than a quarter century.

Transit Customer Time Savings

Sound Transit calculated its customers' benefits based on faster trips in 2030 with the new light rail. Many train passengers would otherwise be bus customers, and others would switch from driving. Sound Transit computed an average time saving of about 24 minutes per light rail trip.^v Comparison with recent promotional claims of time savings with light rail shows that this average is too high.^{vi}

Beyond 2030, Sound Transit's amount of overall claimed benefit depends on light rail ridership growing by 61% between 2030 and 2067.^{vii} This is not a realistic assumption. Over the past four decades, transit ridership has not grown consistently. It has shown little or no growth in some years.^{viii} Furthermore, Sound Transit assumes future growth would fill trains running at maximum frequency to full capacity.^{ix} Sound Transit's cost estimates ignore the additional expense of buying and running more trains to support this growth.

To correct the excess transit growth assumed by Sound Transit, we cap transit ridership growth in 2050 in our re-computation. By then the light rail system reaches a ridership plateau, because there is no allowance for investment in expanding beyond its 2030 capacity.

Highway User Time Savings

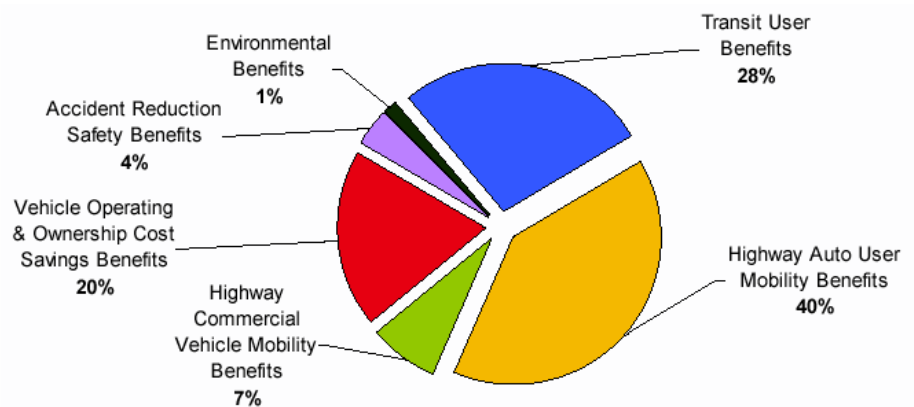
As shown on the pie chart, Sound Transit estimated that the time saving for drivers who do not ride on light rail is larger than the time savings for transit riders. This remarkable claim contradicts all earlier studies. Up until this analysis, Sound Transit officials have consistently said that light rail provides an alternative to congestion, but does not reduce congestion.^x

The regional time saving computed by Sound Transit of about 100,000 hours per day for drivers in 2030 is supposedly a result of faster traffic flows. However, drivers switching to light rail would remove less than one percent of cars from the road.^{xi}

Merging this result with recent studies conducted by Washington State Department of Transportation implies that light rail reduces traffic delay by 16%.^{xii} However, previous studies for Sound Transit's light rail found that a small reduction in traffic volume does not reduce travel delay from congestion.^{xiii}

We recalculate Sound Transit's result with the congestion benefits reduced by half. This assumption reflects that the majority of drivers in 2030 and beyond on today's congested roads would still be stuck in traffic following light rail implementation.

Sound Transit Analysis of Light Rail Expansion, 2008-2028
Cumulative Present Value of Benefits by Category



Source: Sound Transit Benefit-Cost Analysis

Two Problems on the Cost Side

Sound Transit assumes that light rail operations and maintenance costs (O&M) are going to grow at a real rate of 1.3% annually, equal to the assumed rate of ridership growth. This cost forecast has been challenged by Sound Transit's appointed Citizen Oversight Panel (COP), which noted that the agency's "O&M costs are unsustainable over time."^{xiv}

COP reviewed Sound Transit's performance, considered the experiences of other transit agencies, and urged that the agency raise its O&M cost projections by three to five percentage points. In response to this concern, we adjust the rate of growth of O&M in our revised analysis to 5%.

In addition, experts have pointed out that for every \$1 of public funds raised, taxes impose an additional 15 to 40 cents in social costs from foregone investment. Sound Transit did not include this cost. We recognize the social cost of this or any new taxation by increasing all tax-funded light rail costs by 25%.^{xv}

Discount Rate

Sound Transit's selection of a 3% discount rate represents the rate of return on investment that needs to be exceeded to realize transportation benefits. Choosing a low estimate like 3%

reflects negatively on a government agency's concern for the productivity of taxpayers' investments. The U.S. Government requires a 7% discount rate for analyzing cost-benefit of government investments – like public transit – that displace both private investment and consumption.^{xvi}

Because the funding of light rail both past and future includes significant Federal contributions, the discount rate should be at least 5%. The higher rate more closely conforms to Federal policy.

Conclusion

At \$38 billion over 20 years, the Roads & Transit measure is one of the largest tax-and-spend ballot measures in the history of U.S. local government. Cost versus the performance of spending billions in public funds should be very well understood and we commend the Puget Sound Regional Council for requiring Sound Transit to undertake this kind of examination.

Applying reasonable estimates of costs and benefits to Sound Transit's work reveals that light rail expansion does not come out ahead. With the five changes in the calculations described above, the net present value of costs exceeds benefits, and the benefit-to-cost ratio drops to 0.9, meaning the benefit to the public is not worth the costs involved.

Some may try to turn this result around by postulating mythical benefits of light rail expansion not covered in the analysis. For example, some politicians and citizens believe billions of dollars in prestige and glamour come to regions having a rail mass transit system.

With costs exceeding benefits, there is no business case for investing \$24 billion in expanded light rail. With reasonable and responsible assumptions, the point in time when cumulative benefits are worth the cost moves from 2034 – as calculated by Sound Transit – to beyond 2067, if ever.

The reconsideration of Sound Transit's work on benefits and costs illustrates that the proposed light rail investment is not a responsible investment in transportation improvement.

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ⁱ Dollar amounts here are in year-of-expenditure dollars.

ⁱⁱ The Sound Transit analysis is posted at <http://www.soundtransit.org/X5937.xml> (accessed 7-23-07)

ⁱⁱⁱ Each total was computed as the net present value of a stream of yearly future amounts in 2006 dollars discounted at 3% annually out to 2067.

^{iv} As described later, the discount rate is changed to 5%.

^v 24 minutes per trip comes from dividing 69 thousand daily hours saved on transit to 175,000 daily weekday transit trips in 2030 that use light rail for a portion of the trip, all as reported in the *Sound Transit 2 System Plan*.

^{vi} Forecast transit travel time savings are on p. C-7, Table 6, Appendix C of the *Sound Transit 2 System Plan*.

^{vii} Ridership growth of 61% derives from 1.7% annual ridership growth 2030-39, and 1.3% growth 2040-67.

^{viii} Fluctuations in regional transit ridership are documented in PSRC's newsletter *Puget Sound Trends*, March 2007.

^{ix} Data sheet "ST2 5e" that Sound Transit gave to the Expert Review Panel on April 6, 2007 indicates that a 61% ridership increase by 2067 would exceed the peak period capacity of the rail cars budgeted for ST2.

^x Sound Transit's board chairman emphasized that light rail will not ease congestion in an op-ed he wrote for the *Seattle Times*, December 26, 2000, "Light rail: There will never be a better time" by Dave Earling.

^{xi} The ST2 expansion plan forecasts 74,000 daily new transit trips in 2030. PSRC forecasts 11.5 million daily trips in 2030. The former is less than one percent of the latter.

^{xii} Details were obtained from the authors of the WSDOT modeling study of Roads & Transit performance measures briefed by Chris Picard to the Eastside Transportation Association monthly meeting on June 26, 2007

^{xiii} The Transportation Technical Report of the Environmental Impact Statement for Central Link Light Rail, 1999, describes its negligible impact on traffic congestion.

^{xiv} Letter of January 11, 2006 from COP Chairwoman Karen Miller to Sound Transit Chairman John Ladenburg.

^{xv} "Project Evaluation" by Kenneth Small, a chapter in *Transportation Policy and Economics* (Brookings, 1999) covers the social cost of taxation.

^{xvi} U.S. Office of Management and Budget, Circular A-94.