

7 COMPARATIVE EVALUATION OF ALTERNATIVES

7.1 INTRODUCTION

This chapter presents the comparative analysis of the four Level 2 build alternatives along with a discussion of the relative performance of the TSM/Baseline Alternative. The four build alternatives and a number of variations are described in detail in Chapter 4 and include the following:

- L1: I-5 Light Rail
- L2: SR 99 Mixed Profile Light Rail
- L3: SR 99 Elevated Light Rail
- B2: Multi-Corridor BRT

Chapter 4 also presents a detailed description of both the No Build and TSM/Baseline Alternatives. In addition to these alternatives, a number of other alternatives and variations were identified early in the AA process and were screened out through the initial evaluation steps as failing to satisfy the project's Purpose and Need. These alternatives, along with the reasons for dropping them, are discussed in Chapter 3.

Table 7-1 provides a summary of the Level 2 evaluation findings organized by category of the North Corridor Transit Project's Purpose and Need. The Purpose and Need, as described in Chapter 2, is summarized into six broad categories of evaluation measures that were applied to the alternatives. The six categories include those of local importance as well as FTA guidance on recommended factors to be considered in an AA. (See: Advance Notice of Proposed Rulemaking: Federal Transit Administration, 49 Code of Federal Regulations [CFR] Part 611 [Docket No. FTA-2010-0009], RIN 2132-AB02, Major Capital Investment Projects, dated June 3, 2010). The categories are:

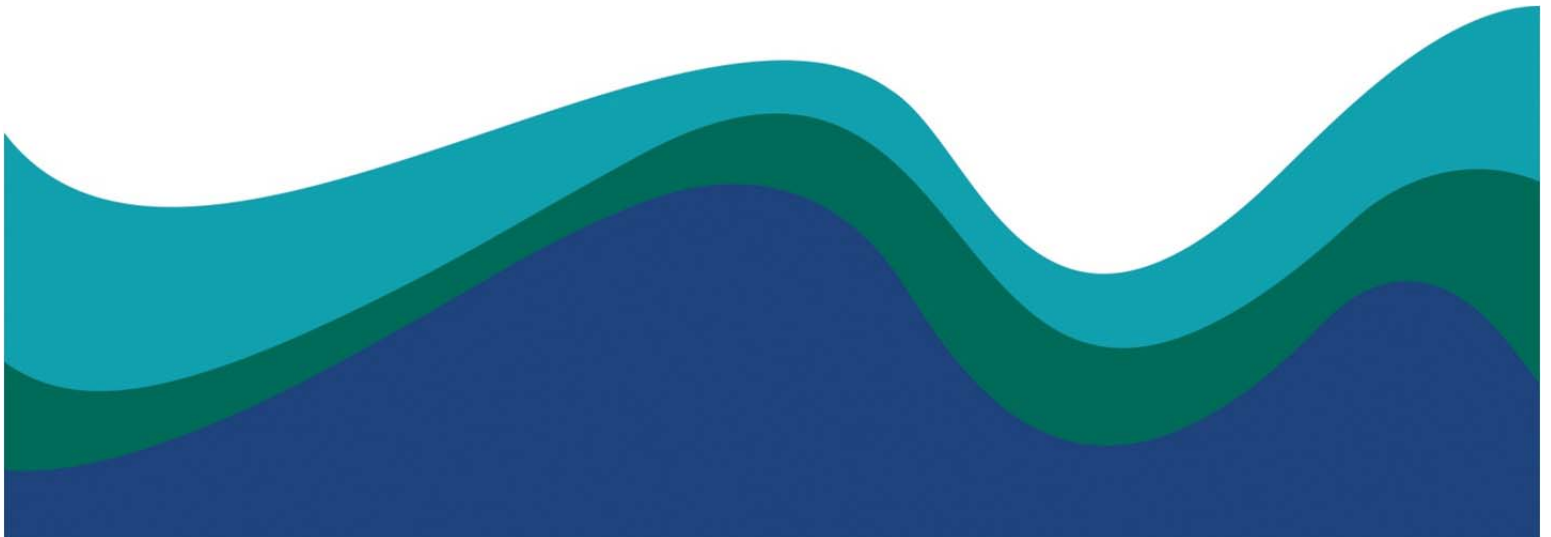


Table 7-1. Level 2 Alternatives Evaluation Summary

KEY TO RANKING



	TSM TSM/Baseline	L1 I-5 Light Rail	L2 SR 99 Mixed Profile Light Rail	L3 SR 99 Elevated Light Rail	B2 Multi-Corridor BRT
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Purpose and Need: Transportation Effectiveness in Meeting Mobility, Access and Capacity Needs

2030 Project Daily Riders	21,000 <i>Daily Riders</i>	52,000 <i>Daily Riders</i>	41,000 <i>Daily Riders</i>	48,000 <i>Daily Riders</i>	24,000 <i>Daily Riders</i>
2030 Annual New Riders	0.64 million <i>New Riders</i>	4.5 million <i>New Riders</i>	2.5 million <i>New Riders</i>	3.9 million <i>New Riders</i>	1.1 million <i>New Riders</i>
2030 Annual Hours of Travel Time Saved	0.59 million <i>Hours Saved</i>	4.6 million <i>Hours Saved</i>	2.4 million <i>Hours Saved</i>	3.8 million <i>Hours Saved</i>	1 million <i>Hours Saved</i>
2030 New Weekday Transit Trips to Regional Centers	1,500 <i>More Trips</i>	10,400 <i>More Trips</i>	5,300 <i>More Trips</i>	8,400 <i>More Trips</i>	2,500 <i>More Trips</i>
Capacity in passengers per hour per direction (pphpd)	1,680 <i>pphpd</i>	8,880 <i>pphpd</i>	4,440 <i>pphpd</i>	8,880 <i>pphpd</i>	3,600 <i>pphpd</i>
2030 Peak Hour Passenger Demand/Capacity	At capacity	72%	95%	62%	86%
2030 Peak Transit Travel Time: Lynnwood to Northgate	30 minutes	14 minutes	21 minutes	18 minutes	24 minutes
2030 Transit to Auto Travel Time Comparison (Peak Lynnwood to Northgate)	4 minutes <i>FASTER than Auto</i>	20 minutes <i>FASTER than Auto</i>	13 minutes <i>FASTER than Auto</i>	16 minutes <i>FASTER than Auto</i>	10 minutes <i>FASTER than Auto</i>
2030 Transit to Auto Travel Time Comparison (Peak Lynnwood to Downtown)	6 minutes <i>SLOWER than Auto</i>	10 minutes <i>FASTER than Auto</i>	3 minutes <i>FASTER than Auto</i>	6 minutes <i>FASTER than Auto</i>	Similar to Auto
Operations on Non-Exclusive Right-of-Way	23.8 miles	0 miles	0 miles	0 miles	25.8 miles
Signalized Intersections Traversed	30 <i>Intersections</i>	0 <i>Intersections</i>	5 <i>Intersections</i>	0 <i>Intersections</i>	50 <i>Intersections</i>
Number of Transfers to Reach Major Destinations	1 <i>Transfer</i>	0 <i>Transfers</i>	0 <i>Transfers</i>	0 <i>Transfers</i>	1 <i>Transfer</i>
2030 Reduction in Weekday VMT	16,900 <i>Fewer Miles</i>	191,500 <i>Fewer Miles</i>	85,200 <i>Fewer Miles</i>	160,700 <i>Fewer Miles</i>	33,100 <i>Fewer Miles</i>

Purpose and Need: Equitable Community Impacts and Benefits

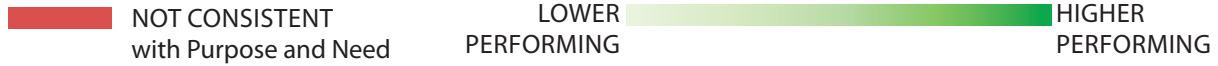
Impacts on Affected Communities	Low	Moderate	High	Moderate to High	Low
Transportation Benefits to Affected Communities	Low	High	Moderate	Moderate to High	Low

Purpose and Need: Supportive Land Use and Economic Development Effects

Access to Regional Growth Centers	Low	High	Moderate	Moderate to High	Low
Station Areas with High TOD Potential	Not Applicable	1 <i>of 4 Station Areas</i>	2 <i>of 5 Station Areas</i>	2 <i>of 5 Station Areas</i>	2 <i>of 10 Station Areas</i>

Table 7-1. Level 2 Alternatives Evaluation Summary (continued)

KEY TO RANKING



	TSM TSM/Baseline	L1 I-5 Light Rail	L2 SR 99 Mixed Profile Light Rail	L3 SR 99 Elevated Light Rail	B2 Multi-Corridor BRT
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Purpose and Need: Preservation of a Healthy Environment

At this level of concept development and analysis, measures do not account for possible impact avoidance and mitigation.

Ecosystem Effects	Low	Possible High Effects on Several Sensitive Areas	Possible High Effects on Several Sensitive Areas	Possible High Effects on Several Sensitive Areas	Possible Moderate Effects on Several Sensitive Areas
Water Resources Effects	Low	Moderate	Low to Moderate	Low to Moderate	Low
Potential Park or Historic Resources Effects, Including Section 4(f) Properties	Low	Low to Moderate	Low to Moderate	Low to Moderate	Low
Daily Reduction in Greenhouse Gas Emissions	Similar to No Build	235 tons	33 tons	223 tons	Similar to No Build
Visual Impacts	Low	Moderate, with Localized High	Moderate, with Localized High	Moderate, with Localized High	Low
Potential for Noise Impacts Requiring Mitigation	Low	Moderate to High	Moderate to High	Moderate to High	Low
New Transportation Right-of-Way Required	5 Acres 0 to 5 Parcels	22 Acres 140 to 170 Parcels	44 Acres 320 to 370 Parcels	40 Acres 240-270 Parcels	8 Acres 20-30 Parcels
Traffic Impacts	Minimal	Minor Corridor-wide Improvements	Minor Degradation at SR 99 Intersections	Minimal	Minimal
Pedestrian and Bicycle Travel	Minimal	Improvements Possible Over Time Near Stations	Improvements Possible Over Time Near Stations	Improvements Possible Over Time Near Stations	Minimal
Construction Effects on Transportation System	Low Impacts	Low to Moderate Impacts over Long Duration	High Impacts over Long Duration	Moderate Impacts over Long Duration	High Localized Impacts

Purpose and Need: Cost and Constructability

Capital Costs (Millions of Mid-2010 Dollars)	\$200 to \$230	\$1,420 to \$1,640	\$1,830 to \$2,100	\$2,010 to \$2,310	\$640 to \$730
2030 Net Annual Operations and Maintenance Costs (Millions of Mid-2010 Dollars)	\$17.6	\$11.0	\$10.4	\$14.6	\$33.6
Cost per Hour of 2030 User Benefits (Mid-2010 Dollars)	\$60 to \$64	\$25 to \$28	\$61 to \$69	\$42 to \$48	\$91 to \$99
Incremental Cost per 2030 New Passenger (Mid-2010 Dollars)	\$55 to \$59	\$25 to \$29	\$58 to \$67	\$41 to \$46	\$83 to \$90

Purpose and Need: Consistency with Sound Transit’s Long-Range Vision

Meets State Definition of HCT	No	Yes	Yes	Yes	No
Consistent with ST Long-Range System Plan	No	Yes	No	Yes	No

- Transportation effectiveness in meeting mobility, access, and capacity needs
- Equitable community impacts and benefits
- Supportive land use and economic development effects
- Preservation of a healthy environment
- Cost and constructability
- Consistency with Sound Transit's Long-Range Plan vision

The results of the detailed Level 2 alternatives evaluation are presented in Chapter 5. Chapter 7 includes a summary discussion of the comparative performance, by category, of the four build alternatives, followed by the resulting conclusions for each alternative. Finally, Chapter 8 contains a discussion of the next steps in the New Starts project development process leading to the preparation of a Draft EIS.

The findings summary in Table 7-1 for the build alternatives shows the performance of the alternatives compared to the No Build Alternative for each performance measure. The color shadings run from dark green to light green in tones that indicate the performance of the alternatives going from best-performing to worst-performing. Red shading indicates where an alternative fails to meet the project's Purpose and Need related to that specific measure.

The TSM/Baseline Alternative is shown in grey because this alternative is developed solely for the purposes of the FTA New Starts criteria comparisons. The sections that follow provide a comparative discussion of the most significant conclusions organized by the findings in each category of the project's Purpose and Need.

7.1.1 Transportation Effectiveness in Meeting Mobility, Access, and Capacity Needs

Thirteen criteria were used to assess the transportation performance of the alternatives using 2030 as the design year. The L1: I-5 Light Rail Alternative was the best performing on 8 of the 13 criteria and equal in performance to the next best-performing L3: SR 99 Elevated Light Rail Alternative on the other 5 measures. The L2: SR 99 Mixed Profile Light Rail Alternative was substantially lower on 11 of the 13 criteria compared to the other light rail alternatives. In addition, the L2: SR 99 Mixed Profile Light Rail Alternative is forecasted to be at 95 percent of capacity in 2030, while the fully grade separated light rail alternatives have substantial capacity to carry additional riders. The B2: Multi-Corridor BRT Alternative was generally the poorest performing of the build alternatives, generally ranking last on most measures. Findings by selected key category include:

- **Annual New Riders:** This measure counts travelers who previously did not ride transit but are attracted by the project's new facilities and services. Annual new riders would be highest for the L1: I-5 Light Rail Alternative, followed closely by the L3: SR 99 Elevated Light Rail Alternative. The L2: SR 99 Mixed Profile Light Rail Alternative would

have only half the new riders of the best-performing L1: I-5 Light Rail Alternative. The B2: Multi-Corridor BRT Alternative is last with under one-quarter of the new riders of the best-performing L1: I-5 Light Rail Alternative.

- **Annual Hours of Travel Time Saved:** Travel time savings over the entire transit system as a result of the project is the key measure of user benefit assessed in the analysis. The pattern of performance of the alternatives is very similar to the performance on the new riders measure. The L1: I-5 Light Rail Alternative would save the most travel time at 4.6 million hours annually, followed closely by the L3: SR 99 Elevated Alternative at 3.8 million hours annually. Savings for the L2: SR 99 Mixed Profile Light Rail Alternative would be substantially less at 2.4 million and the B2: Multi-Corridor BRT Alternative would save the fewest hours at 1 million annually.
- **New Transit Trips to Regional Centers:** This measure looks at changes in travel to selected PSRC-designated Regional Growth Centers such as Lynnwood and downtown Seattle. The pattern of the results is very similar to the measure of new riders. The L1: I-5 Light Rail Alternative performs the best, followed by the L3: SR 99 Elevated Light Rail Alternative, the L2: SR 99 Mixed Profile Light Rail Alternative, and finally the B2: Multi-Corridor BRT Alternative.
- **Passenger Capacity:** This category was evaluated in two ways. First, the total seated and standing riders that the project could carry in a single hour in one direction was evaluated. Next, the share of total capacity that would be filled in the 2030 design year was determined. The latter measure provides information about how much growth—beyond target year ridership—the system could accommodate, and also whether the system would have room for additional riders if it were extended north to Everett, as envisioned in Sound Transit’s Long-Range Plan. Both the L1: I-5 Light Rail Alternative and the L3: SR 99 Elevated Light Rail Alternative would have a capacity of 8,880 passengers per hour per direction. By 2030 it is estimated that 72 percent of L1: I-5 Light Rail Alternative’s and 62 percent of the L3: SR 99 Elevated Light Rail Alternative’s capacity would be required to meet peak hour demand, with the excess capacity available for continued growth in ridership in the project area, and to extend the system north to Everett. The L2: SR 99 Mixed Profile Light Rail Alternative would have half the capacity of L1: I-5 Light Rail Alternative and L3: SR 99 Elevated Light Rail Alternative, because it would operate on 8-minute rather than 4-minute headways (the time between successive train movements in a given direction). The factors constraining L2: SR 99 Mixed Profile Light Rail Alternative headways are the five signalized intersections that would be traversed in this alternative. As a result, the L2: SR 99 Mixed Profile Light Rail Alternative would operate at 95 percent capacity in 2030 with virtually no capacity for ridership growth in the corridor or for extending the system to Everett. The B2: Multi-Corridor BRT would have substantially less capacity than the rail alternatives and be at 86 percent of capacity in 2030. The TSM/Baseline Alternative would provide even less capacity, and would be at capacity in 2030, with no

potential to handle future ridership growth or accommodate additional riders associated with extending the routes to Everett.

- **Travel Time:** The speed advantage of the L1: I-5 Light Rail Alternative is reflected in travel time differences for specific individual trips. Light rail in I-5 would cut peak-period transit travel time between Lynnwood and Northgate¹ in half, compared to the bus in the TSM/Baseline Alternative, and would be 20 minutes faster than driving. The L3: SR 99 Elevated Light Rail Alternative is the next best performer, but would be 4 minutes slower than the L1: I-5 Light Rail Alternative. This is followed by the L2: SR 99 Mixed Profile Light Rail Alternative, which would be 7 minutes slower than light rail in I-5. Finally, the bus in the B2: Multi-Corridor BRT Alternative would be 10 minutes slower than light rail in I-5. The L1: I-5 Light Rail Alternative also would be the fastest in comparison to driving from Lynnwood to downtown Seattle; it would be 10 minutes faster than the average AM peak hour automobile trip. The L3: SR 99 Elevated Light Rail Alternative is next best at 6 minutes faster than driving, while the L2: SR 99 Mixed Profile Alternative would be only 3 minutes faster, and the B2: Multi-Corridor BRT Alternative would take the same amount of time as driving.
- **Measures of Reliability:** Miles of operation on non-exclusive right-of-way and the number of at-grade signalized intersections traversed are indicators of potential sources of variable travel delays and resulting unreliable travel times. In many respects the reliability of trip times is as important to riders as actual travel times. On these measures, both the L1: I-5 Light Rail Alternative and L3: SR 99 Elevated Light Rail Alternative would result in the most reliable travel times because both operate on fully exclusive, grade-separated guideways. The L2: SR 99 Mixed Profile Light Rail Alternative would be somewhat less reliable because it includes at-grade crossings of five signalized intersections, and the B2: Multi-Corridor BRT would be the least reliable because of the mixed traffic and HOV lane operations.
- **Impacts to Existing Transit Service:** Both the L1: I-5 Light Rail and L3: SR 99 Elevated Light Rail alternatives would replace the existing I-5 Community Transit express bus routes that connect Snohomish County to destinations in Seattle. Because of the slower rail travel times and lower capacity these bus routes would continue to operate on I-5 with the L2: SR 99 Mixed Profile Light Rail Alternative. While light rail on either the I-5 or SR 99 corridor would affect ridership on King County Metro's RapidRide BRT and Community Transit's SWIFT BRT lines operating along SR 99, the SR 99 light rail alternatives would more directly connect to and compete with those services. Metro's RapidRide E line could experience lower ridership as some riders choose instead to use light rail along SR 99, while Community Transit's SWIFT line could see increased ridership prompted by a direct connection to light rail in Shoreline not provided by light rail running along I-5. The B2: Multi-Corridor BRT Alternative would have impacts

¹ Reflects travel time to reach the regional light rail system at Northgate, which includes an added 5 minutes for non-rail modes to transfer to light rail at the Northgate Station.

on the existing bus transit services similar to the L2: SR 99 Mixed Profile Light Rail Alternative.

7.1.2 Equitable Community Impacts and Benefits

Community equity looks at potential adverse and beneficial effects on minority and low-income populations and communities, generally categorized as “environmental justice communities.” Impacts include construction effects, effects on community cohesion and interaction, effects on community facilities, and displacement of residences and businesses. Benefits include long-term mobility improvements, reflecting access to stations, improvements in travel time, and access to employment.

All of the alternatives are located in an area where there are higher percentages of low-income and minority populations compared to the rest of King County or Snohomish County. Many of these communities are located in the band between SR 99 and I-5 and extend from Northgate to Lynnwood.

Impacts on affected communities for the B2: Multi-Corridor BRT Alternative are low because new facilities would be limited. Benefits are also low because the BRT alternative would attract fewer riders and provide less travel time savings than the light rail alternatives. Community impacts are moderate for the L1: I-5 Light Rail Alternative, high for the L2: SR 99 Mixed Profile Light Rail Alternative, and moderate to high for the L3: SR 99 Elevated Light Rail Alternative. The L1: I-5 Light Rail Alternative would be constructed along the freeway with fewer potential impacts on identified environmental justice communities than either of the SR 99 alternatives, which would be built in new right-of-way along a fully developed arterial highway. Community benefits would be higher for the L1: I-5 Light Rail Alternative because it would attract more riders and provides faster service, moderate to high for the L3: SR 99 Elevated Light Rail Alternative, and moderate for the L2: SR 99 Mixed Profile Light Rail Alternative.

7.1.3 Supportive Land Use and Economic Development Effects

Two key categories were used to assess land use and economic development performance: access to regional growth centers and station areas with high transit-oriented development (TOD) potential. The first measure addresses the fundamental question of how well each alternative would serve the region’s adopted growth management and economic development strategies, while the second addresses TOD potential near individual stations within the project area. Key findings by these two categories include:

- **Access to Regional Growth Centers:** The North Corridor Transit Project connects two of the PSRC-designated Regional Growth Centers (Lynnwood and Northgate) to each other to help balance the regional transit system. The alternatives line up from higher to lower performing in the same order that they line up on ridership and travel time measures: the L1: I-5 Light Rail Alternative and the L3: SR 99 Elevated Light Rail Alternative perform much better than the others, followed by the L2: SR 99 Mixed Profile Light Rail Alternative and finally the B2: Multi-Corridor BRT Alternative. This

ranking and relative performance is the result of the quality, as measured by ridership and travel time, and quantity, as measured by service capacity, of transportation that would be provided.

- **Transit-Oriented Development Potential:** On TOD potential, however, the alternatives are distinguished from each other in a different order. The L2: SR 99 Mixed Profile Light Rail Alternative and L3: SR 99 Elevated Light Rail Alternative perform best on this measure because the three stations along SR 99 would provide more opportunities for TOD—where there is already a mix of supportive land uses and density—than would the two stations along I-5 in King County, which are in predominantly single-family neighborhoods. The B2: Multi-Corridor BRT Alternative also would serve the station areas along SR 99 with high TOD opportunities, but it does not rank as high as the SR 99 Light Rail Alternatives because the travel times, capacity, and reliability of the BRT service is significantly lower than for light rail. All of the alternatives would share common stations at Northgate, Mountlake Terrace, and Lynnwood.

7.1.4 Preservation of a Healthy Environment

Environmental measures focus on the range of impacts on the natural environment including water, air, endangered and protected species, and sensitive lands, as well as on the human environment including aesthetics; noise; historic and archaeological resources; property; and existing traffic, transit, pedestrian, and bicycle travel. While there are areas where environmental impacts are anticipated, none of the alternatives are expected to have impacts that would prevent an alternative from being implemented, especially considering potential avoidance and mitigation measures. At this conceptual level of development and analysis of alignments, the environmental measures do not yet reflect the potential for impact avoidance and mitigation measures that the project could incorporate through further design and environmental efforts. Despite these qualifications, there are some differences in the level of potential effects among the alternatives, including:

- **General Effects:** The light rail alternatives would construct the largest amounts of new transportation infrastructure and would require more right-of-way dedicated to transportation in the corridor. This would result in more effects on both the natural and human environments. The L2: SR 99 Mixed Profile Alternative would have the greatest effects, followed by the L3: SR 99 Elevated Light Rail Alternative, the L1: I-5 Light Rail Alternative, and then the B2: Multi-Corridor BRT Alternative.
- **Reduction in Air Pollutants and Greenhouse Gas Emissions:** Reductions in these emissions are a function of the reductions in vehicle miles traveled (VMT) and roadway congestion. While the forecasts are made at a regional level, several of the alternatives still would result in notable reductions in vehicle emissions among the alternatives, providing environmental benefits. The L1: I-5 Light Rail Alternative is forecasted to result in the largest emission reductions, followed closely by the L3: SR 99 Elevated

Light Rail Alternative. Emission reductions for the L2: SR 99 Mixed Profile Light Rail Alternative would be roughly half of those resulting from the L1: I-5 Light Rail Alternative, while the B2: Multi-Corridor BRT Alternative would be similar to the No Build Alternative.

- **Noise:** The light rail alternatives would all be near a large number of noise-sensitive properties and have the potential for noise impacts requiring mitigation. Mitigation for the L2: SR 99 Mixed Profile Light Rail Alternative and L3: SR 99 Elevated Light Rail Alternative could be more complex, particularly for the at-grade sections of SR 99. Noise walls would be less effective given the nature of the uses fronting the arterial and the need for frequent driveway and street access. The elevated sections also have the potential to create noise impacts at greater distances. Mitigation would likely involve noise barriers along the elevated sections, which would increase the visual prominence of the guideway. For the L1: I-5 Light Rail Alternative, there are also a large number of noise-sensitive properties nearby including many single-family homes, but there are more opportunities to avoid impacts through guideway placement (for example, below the existing I-5 cut slopes) or mitigate them with noise walls. As with SR 99, the elevated guideway sections on I-5 would have the potential to cause noise impacts. Potentially affected sensitive receptors would be substantially fewer for the B2: Multi-Corridor BRT Alternative.
- **Acquisitions and Displacements:** The light rail alternatives would require continuous construction of new transportation facilities for the length of the alignment, and therefore have the greatest potential impacts. Acquisitions are greatest for the L2: SR 99 Mixed Profile Light Rail Alternative because the existing SR 99 right-of-way is nearly fully developed and adding light rail would require predominantly all new transportation right-of-way. This is followed by the L3: SR 99 Elevated Light Rail Alternative, which requires slightly less new transportation right-of-way than the L2: SR 99 Mixed Profile Light Rail Alternative because of the smaller ground footprint of the additional elevated sections. The L1: I-5 Light Rail Alternative, which would use portions of the WSDOT I-5 right-of-way, would require roughly half the new transportation right-of-way required by the L2: SR 99 Mixed Profile Light Rail Alternative. The B2: Multi-Corridor BRT Alternative would require substantially less new right-of-way in more localized areas than the light rail alternatives.
- **Transportation Effects:** In general, all of the alternatives would have beneficial effects on the existing roadway, bus transit, pedestrian, and bicycle systems. Many of these benefits are a direct result of the effectiveness of the alternatives in meeting transportation needs as discussed in Section 7.2.1. Benefits would be greatest for the L1: I-5 Light Rail Alternative, followed by the L3: SR 99 Elevated Light Rail Alternative, and then the L2: SR 99 Mixed Profile Light Rail Alternative. Benefits would be substantially fewer for the B2: Multi-Corridor BRT. On the impact side, the L2: SR 99 Mixed Profile Light Rail Alternative would degrade the performance of a number of

intersections along SR 99, while all the other alternatives would have few, if any, localized negative effects.

7.1.5 Cost and Constructability

Project affordability was evaluated based on costs, including total capital and annual O&M costs, and on cost-effectiveness measures, including the cost per unit of user benefit and cost per new rider. Key findings on these measures include:

- **Capital Costs (mid-2010 dollars):** These vary significantly among the alternatives. With a range of \$2,010 to \$2,310 million, the L3: SR 99 Elevated Light Rail Alternative would be the most costly to build. The L2: SR 99 Mixed Profile Light Rail Alternative is nearly as costly with an estimated range of \$1,830 to \$2,100. While not shown in Table 7-1, the SR 99 alignment variations are estimated to increase the capital cost of the L2: SR 99 Mixed Profile Light Rail Alternative by \$30 to \$35 million for the Roosevelt Way Variation and \$140 to \$160 million for the SR 99 North Variation in Snohomish County. Both of these variations together would raise the capital cost for the L2: SR 99 Mixed Profile Light Rail Alternative to \$1,990 to \$2,280 million. This is followed by the L1: I-5 Light Rail Alternative at a total capital cost of \$1,420 to \$1,640, which is roughly \$400 to \$500 million less than the range for the L2: SR 99 Mixed Profile Light Rail Alternative and \$600 to \$700 million less than the L3: SR 99 Elevated Light Rail Alternative. At \$640 to \$730 million in total, the B2: Multi-Corridor Alternative would be substantially less costly than the rail alternatives, and at \$200 to \$230 million the TSM/Baseline Alternative would be the least costly to build. Sound Transit's current financial plan funds \$1,540 million in North Corridor Transit Project capital costs. In comparison to this, the capital costs of the TSM/Baseline and B2: Multi-Corridor BRT Alternatives are well within Sound Transit's current financial capacity to fund. The L1: I-5 Light Rail Alternative is affordable within that capacity at the low end of its cost range, but not affordable at the high end of the range. The costs of the L2: SR 99 Mixed Profile Light Rail and L3: SR 99 Elevated Light Rail Alternatives are well outside Sound Transit's financial capacity to fund.
- **2030 Net Annual O&M Costs (mid-2010 dollars):** These costs include savings in Sound Transit express regional bus services that would no longer be needed. Both King County Metro and Community Transit also are likely to see operating cost savings as a result of bus services that will no longer be needed with implementation of some of the light rail alternatives. These potential savings, however, are not included in the estimates, as they would accrue to those agencies, not Sound Transit. Overall, the rail alternatives would be less costly to operate and maintain than the bus alternatives. The L2: SR 99 Mixed Profile Light Rail Alternative would be the least costly at \$10.4 million per year, followed closely by the L1: I-5 Light Rail Alternative at \$11.0 million annually, and the L3: SR 99 Elevated Light Rail Alternative at \$14.6 million. The TSM/Baseline Alternative would be next at \$17.6 million and the B2: Multi-Corridor BRT Alternative would be the most expensive at \$33.6 million annually.

- **Cost/Hour of 2030 User Benefits (mid-2010 dollars):** This is a measure of the annualized capital and year 2030 O&M costs divided by the estimated year 2030 annual hours of travel time savings. While an abstract number, the results are useful for making comparisons among alternatives to determine the relative costs of user benefits—a measure of cost effectiveness. The L1: I-5 Light Rail Alternative is by far the best performing on this measure, at roughly 60 percent of the cost per hour of user benefit of the next best-performing L3: SR 99 Elevated Light Rail Alternative. This cost measure for both the L2: SR 99 Mixed Profile Light Rail and TSM/Baseline Alternatives are over twice that for the L1: I-5 Light Rail Alternative. The B2: Multi-Corridor BRT is the least cost effective based on this measure.
- **Incremental Cost/2030 New Passenger (mid-2010 dollars):** This is another measure of cost effectiveness and calculates the annualized capital and year 2030 O&M costs divided by the year 2030 annual new transit riders. The cost per new rider calculation shows a pattern similar to the travel time savings calculations. The L1: I-5 Light Rail Alternative performs substantially better than the other alternatives, followed by the L3: SR 99 Elevated Light Rail Alternative, then the TSM/Baseline Alternative, the L2: SR 99 Mixed Profile Light Rail Alternative, and the B2: Multi-Corridor BRT Alternative in that order.

7.1.6 Consistency with Sound Transit's Long-Range Plan Vision

The final Purpose and Need category addresses whether the project is consistent with Sound Transit's Long-Range Plan, which requires it to meet the State of Washington's definition of HCT and be able to eventually extend the service north to Everett. Key findings include:

- **Consistency with State Definition of HCT:** Sound Transit's Washington State enabling legislation defines HCT as being located in exclusive rights-of-way and providing substantially higher levels of service in terms of capacity, speed, and frequency than traditional public transportation systems operating on general purpose roadways. Express buses operating in HOV lanes are recognized as an interim form of HCT service. Under this definition, only the L1: I-5 Light Rail, L2: SR 99 Mixed Profile Light Rail and L3: SR 99 Elevated Light Rail Alternatives would meet the definition of permanent HCT. Both the TSM/Baseline and B2: Multi-Corridor BRT Alternatives, while utilizing in part the I-5 HOV lanes and the SR 99 BAT lanes, would operate in large sections in general purpose traffic lanes. Thus, the B2: Multi-Corridor BRT Alternative does not meet the definition of permanent HCT.
- **Consistency with Sound Transit's Long-Range Plan:** Only the L1: I-5 Light Rail Alternative and L3: SR 99 Elevated Light Rail Alternatives are consistent with Sound Transit's Long-Range Plan for regional transit, because they are the only alternatives that provide capacity for future extensions to Everett. In addition, the L1: I-5 Light Rail Alternative would have substantially shorter travel times between Lynnwood and Northgate compared to any of the other alternatives. The L2: SR 99 Mixed Profile Light

Rail Alternative is constrained by the limitations of the at-grade segments and crossings of five major intersections, and would provide half the capacity of the L1: I-5 Light Rail Alternative. As a result, the L2: SR 99 Mixed Profile Light Rail Alternative is forecasted to be near capacity in 2030 with little capability to absorb growth or the riders added by extending the line north of Lynnwood. The B2: Multi-Corridor BRT Alternative would have some excess capacity within the project area itself by 2030, but only limited capacity to accommodate more riders from the project area, or for expansion to the north.

7.2 SUMMARY FINDINGS

The sections that follow discuss the overall findings for each build alternative. The section begins with a brief discussion of the findings regarding the TSM/Baseline Alternative, which, while not a build alternative, is the alternative that will be used as the basis for all comparisons in the FTA New Starts process.

7.2.1 TSM/Baseline Alternative

The TSM/Baseline Alternative has evolved through the AA process, beginning with an early concept of a single new express bus route to now include a comprehensive program of service changes and improvements, along with a number of low-cost transit facility, roadway, and traffic engineering enhancements. The TSM/Baseline Alternative represents the most that can be done to improve the existing regional transit system to meet the North Corridor Transit Project Purpose and Need short of major new capital investments. The analysis of the TSM/Baseline Alternative is a requirement of the FTA New Starts planning process. It will ultimately serve as the basis for the measures of cost effectiveness that will be used to judge the performance of the build alternatives and ultimately the preferred alternative later in the project development process. The alternative includes three new express bus routes connecting the project area to the light rail system at Northgate. It also includes park-and-ride supply additions and transit center enhancements to improve access to the regional transit system, along with various traffic engineering and signalization enhancements, as well as new freeway ramp and arterial bus-only lanes.

This alternative would not be very effective in meeting the principal transportation needs identified in the corridor. The TSM/Baseline Alternative would be inconsistent with both the definition of HCT and Sound Transit's Long-Range Plan vision of extending the regional transit system north to Everett. It also is the least costly and would have the fewest likely potential impacts on the surrounding environment.

7.2.2 L1: I-5 Light Rail Alternative

The L1: I-5 Light Rail Alternative has evolved from the concept originally developed as the representative light rail alignment during the ST2 system planning work. The initial alternative,

based on the ST2 concept, included a fully elevated trackway from Northgate to Lynnwood running primarily along the east side of I-5 and four new elevated stations. As a result of additional discussions with WSDOT and further concept refinements, it was determined that a significant portion of the trackway and at least one of the stations could be placed at-grade adjacent to the freeway. The at-grade sections include multiple locations along the east side of I-5 through Seattle and Shoreline and in the median of I-5 in Snohomish County. These changes have the potential to reduce the cost and impacts of this alternative as well as improve its performance.

In general, the L1: I-5 Light Rail Alternative is the best performing in terms of the transportation criteria and is the least costly of the light rail alternatives. While it has the potential for effects on the surrounding built and natural environment, the alignment along I-5 would help avoid many effects. With further planning and design, it is likely that the level of impacts can be reduced by avoidance and mitigation measures. From a land use and economic development perspective, it would do the best job of providing access to the PSRC-designated regional centers, but fall short of the L3: SR 99 Elevated Light Rail, L2: SR 99 Mixed Profile Light Rail, and B2: Multi-Corridor BRT Alternatives when it comes to serving station areas with high TOD potential. The L1: I-5 Light Rail Alternative is one of two alternatives studied in Level 2 that are capable of supporting Sound Transit's Long-Range Plan vision of extending the regional system north to Everett. From a transportation standpoint, the key findings compared to the No Build Alternative include:

- Year 2030 average weekday riders is projected to be 52,000, over twice the riders carried by the TSM/Baseline Alternative and over 4,000 daily riders more than the next best-performing alternative.
- Year 2030 total annual transit system new riders of 4.5 million and 4.6 million total annual hours of travel time savings, roughly eight times the new riders and travel time savings of the TSM/Baseline Alternative, and 15 percent more new riders and 20 percent more travel time savings than the next best-performing alternative.
- This alternative would have the capacity to carry 8,880 passengers per hour per direction, which is the same as the L3: SR 99 Elevated Light Rail Alternative, over five times the capacity of the TSM/Baseline Alternative.
- Lynnwood-to-Northgate peak-period travel times of 14 minutes would be the shortest of all the alternatives and 20 minutes faster than travel by automobile. Travel on the next best-performing L3: SR 99 Elevated Light Rail Alternative would take 4 minutes longer.
- Based on exclusive operation on a fully grade-separated guideway, the L1: I-5 Light Rail and L3: SR 99 Elevated Light Rail Alternatives would be the most reliable of all of the alternatives studied.
- In terms of impacts on regional vehicle travel statistics, the L1: I-5 Light Rail Alternative is forecasted to result in more than 10 times the reduction in VMT than the

TSM/Baseline Alternative, and slightly less than 20 percent greater VMT reductions forecasted for the next best-performing L3: SR 99 Elevated Light Rail Alternative.

The L1: I-5 Light Rail Alternative is consistent with Sound Transit's Long-Range Plan as a result of full operation on exclusive, grade-separated guideway, and conforms to the definition of HCT. In addition, extending light rail from Northgate to Lynnwood in a configuration that would allow reliable operation of trains at 4-minute peak period headways has been determined to be necessary to support eventual extension of the line north to Everett. At headways longer than 4 minutes in this segment, supplemental express bus service may be required to serve the resulting passenger demand.

Because this alternative uses substantial portions of the WSDOT I-5 right-of-way, it requires the least amount of new transportation right-of-way of the light rail alternatives, roughly half of the new transportation right-of-way needed for either of the SR 99 alternatives.

From a land use and economic development standpoint, the L1: I-5 Light Rail Alternative would do the best job of improving access to and from the two PSRC-designated Regional Growth Centers in the project area (Northgate and Lynnwood) by providing the most people-moving capacity and the shortest travel times. However, it would serve only a single station area north of Northgate (Lynnwood) that has high potential for TOD compared to two station areas (Lynnwood and North 130th Street) with high potential for the L2: SR 99 Mixed Profile Light Rail, L3: SR 99 Elevated Light Rail, and the B2: Multi-Corridor BRT Alternatives.

With a capital cost range of \$1,420 to \$1,640 million (mid-2010 dollars), it is the least costly of the light rail alternatives considered. From a cost-effectiveness standpoint, the L1: I-5 Light Rail Alternative is by far the best performing, with user benefit and new rider costs of 60 percent of the next best-performing L3: SR 99 Elevated Light Rail Alternative, 40 percent of those of the L2: SR 99 Mixed Profile Light Rail and TSM/Baseline Alternatives, and 30 percent of those for the B2: Multi-Corridor BRT Alternative. Based on an available budget of \$1,540 million in Sound Transit's current financial plan, the L1: I-5 Light Rail Alternative is affordable at the low end of its cost range.

7.2.3 L2: SR 99 Mixed Profile Light Rail Alternative

The L2: SR 99 Mixed Profile Light Rail Alternative is a hybrid based on two earlier concepts studied during the Level 1 evaluation. It combines both at-grade and elevated alignments along portions of SR 99 through the cities of Seattle and Shoreline, then elevated on the south side of SR 104 along the county line between Shoreline and Mountlake Terrace, and then along I-5 to Lynnwood. In addition, the Level 2 alternatives evaluation process included variations using an elevated I-5 and Roosevelt Way alignment to reach SR 99 in Seattle, and a combined elevated and at-grade alignment continuing north into Snohomish County along SR 99 to 208th Street SW and then along 208th Street SW to the Lynnwood Transit Center.

As discussed in Section 4.4, early in the Level 2 alternatives development process, a major change was made to this alternative from the concept evaluated during the Level 1 alternatives

evaluation. Based on more detailed analysis of traffic and train operation through the at-grade intersections along SR 99, it was concluded that reliable operation of trains of up to four cars in length at 4-minute headways in both directions was not possible without severe impacts on cross-street and left-turn movements. The resulting traffic congestion and high potential for conflicts would increase the probability of traffic conditions that could produce train delays. Based on Sound Transit's current experience with at-grade operations, at longer headways with shorter trains on Martin Luther King Jr. Way, there is a high probability of operating delays with 4-minute headway operation at-grade on this section of SR 99. Because of the planned structure of the regional light rail network from Tacoma to Everett and across Lake Washington to Redmond, failure to maintain reliable 4-minute headways in this section would result in impacts throughout the regional system. As a result, it was determined that 8-minute headways were the most that could be achieved with partial at-grade operations and the other operating constraints of the regional light rail system.

This change would require that one of the two light rail lines serving the Northgate Station be turned back at Northgate and only one of the lines continue on to Lynnwood. This, in turn, may affect the desired configurations of the tail track and turn-back connections currently being designed at Northgate as part of Sound Transit's North Link project. It would also increase the number of transfers needed to reach some destinations served by the light rail network. In addition, as a result of the lower resulting capacity on the SR 99 link and slower speeds, it is assumed that Community Transit express bus operations from Snohomish County to downtown Seattle and the University District would continue to operate on I-5 and would not be truncated at light rail stations as in the L1: I-5 Light Rail Alternative.

With longer headways, lower capacity, and longer travel times, the L2: SR 99 Mixed Profile Light Rail Alternative does not perform as well as the L1: I-5 Light Rail Alternative or L3: SR 99 Elevated Light Rail Alternative from a transportation standpoint. The L2: SR 99 Mixed Profile Light Rail Alternative has the second highest capital costs of the alternatives studied and does not have the capacity needed for the eventual extension of light rail north to Everett. The L2: SR 99 Mixed Profile Light Rail and L3: SR 99 Elevated Light Rail Alternatives were judged to have the most proportionate beneficial land use and economic development effects around the proposed stations of all the alternatives studied in the Level 2 evaluation.

From a transportation standpoint, the key findings compared to the No Build Alternative include:

- Year 2030 average weekday riders are projected to be 41,000, the third highest of the alternatives studied and roughly 20 percent fewer than the best-performing L1: I-5 Light Rail Alternative.
- Year 2030 annual new system riders of 2.5 million and 2.4 million total annual hours of travel time savings would be realized, which is the third best-performing of the alternatives but only roughly half that of the best-performing L1: I-5 Light Rail Alternative.

- This alternative would have the capacity to carry 4,440 passengers per hour per direction, nearly three times the capacity of the TSM/Baseline Alternative but only half the capacity of the L1: I-5 Light Rail Alternative and the L3 SR 99 Elevated Light Rail Alternative.
- Lynnwood-to-Northgate morning peak-period travel times of 21 minutes would be 7 minutes longer than the L1: I-5 Light Rail Alternative but faster than travel by bus or automobile.
- Based on fully exclusive guideway operation with limited at-grade crossings, the L2: SR 99 Mixed Profile Light Rail Alternative would be more reliable than bus or automobile travel but less reliable than the L1: I-5 Light Rail Alternative or L3: SR 99 Elevated Light Rail Alternative.
- In terms of impacts on regional vehicle travel statistics, the L2: SR 99 Mixed Profile Light Rail Alternative is forecasted to result in over five times the reduction in daily VMT compared to the TSM/Baseline Alternative. However, VMT reductions are less than those forecasted for the L1: I-5 Light Rail Alternative or L3: SR 99 Elevated Light Rail Alternative.

The L2: SR 99 Mixed Profile Light Rail Alternative is consistent with the definition of HCT in the Long-Range Plan, but the 8-minute headways and resulting capacity and travel times do not support the Sound Transit's Long-Range Plan vision of eventually extending the regional system north to Everett. Based on the Level 2 ridership forecasts and 8-minute peak headways, the line to Lynnwood would operate near its practical capacity in 2030 and could not accommodate much growth or the additional riders it would attract if it were extended north to Everett.

Because this alternative involves the longest rail alignment (roughly 2 miles longer with one additional station compared to the L1: I-5 Light Rail Alternative) and the largest amount of new transportation right-of-way, it has the greatest potential for affecting the natural and constructed environment of all the alternatives.

From a land use and economic development perspective, the L2: SR 99 Mixed Profile Light Rail and L3: SR 99 Elevated Light Rail Alternatives would serve the most station areas with the highest potential for transit-oriented development of all the alternatives. However, its lower capacity and longer travel times mean that it does not perform as well as the L1: I-5 Light Rail Alternative or the L3: SR 99 Elevated Light Rail Alternative from the perspective of access between the PSRC-designated Regional Growth Centers of Northgate and Lynnwood.

With a range of \$1,830 to \$2,100 million (mid-2010 dollars), the L2: SR 99 Mixed Profile Light Rail Alternative is the second most costly of the alternatives considered, roughly \$400 to \$500 million (mid-2010 dollars) more than the L1: I-5 Light Rail Alternative. From a cost-effectiveness standpoint, the L2: SR 99 Mixed Profile Light Rail Alternative is similar to the TSM/Baseline Alternative and better than the B2: Multi-Corridor BRT Alternative, but still nearly two-and-one-half times the cost per hour of user benefit and cost per new rider compared to the best-performing L1: I-5 Light Rail Alternative. Based on an available budget of \$1,540

million in Sound Transit's current financial plan, the L2: SR 99 Mixed Profile Light Rail Alternative is not within Sound Transit's financial capacity to fund.

Based on the results of the Level 2 evaluation, both the Roosevelt Way Variation and the SR 99 North Variation of the L2: SR 99 Mixed Profile Light Rail Alternative are recommended to be dropped from further consideration. In both cases, these alignment variations perform no better on most measures and on some measures worse than the base alternative when it comes to meeting the project's Purpose and Need. In addition, they are both more costly than the base alternative.

The Roosevelt Way Variation elevated alignment, while decreasing travel time by 2 minutes, would substantially alter the character and setting of what is now a low-volume arterial collector street as it passes through a neighborhood of predominantly single-family homes. In addition, this alignment would not reach SR 99 until North 145th Street, well north of the desired potential station at North 130th Street. As a result, the Roosevelt Way Variation would eliminate much of the land use and economic development advantage that the L2: SR 99 Mixed Profile Light Rail Alternative has over the L1: I-5 Light Rail Alternative. Finally, the Roosevelt Way Variation is estimated to add \$30 to \$35 million (mid-2010 dollars) to the cost of the base L2: SR 99 Mixed Profile Light Rail Alternative.

The SR 99 North Variation that continues the light rail line north along SR 99 into Snohomish County and then east along 208th Street SW also has several problems. It is longer than the base L2: SR 99 Mixed Profile Light Rail Alternative and would add an additional 2 minutes to the travel time between Northgate and Lynnwood. While it would provide an opportunity for a station at SR 99 and 220th Street SW, it bypasses the Mountlake Terrace Transit Center, which represents a large infrastructure investment and major node in Snohomish County's transit system. In addition, the alignment along 208th Street SW would affect the adjacent surroundings in a manner similar to that discussed for the potential impacts along Roosevelt Way. Both streets are currently low-volume residential arterials, and the introduction of light rail on a combination aerial structure and at-grade would substantially change the character and setting of the area. The SR 99 North Variation would also increase the amount of new transportation right-of-way needed. Finally, the SR 99 North Variation is estimated to increase the cost of the L2: SR 99 Mixed Profile Light Rail Alternative by \$140 to \$160 million (mid-2010 dollars).

7.2.4 L3: SR 99 Elevated Light Rail Alternative

The L3: SR 99 Elevated Light Rail Alternative alignment is similar to the L2: SR 99 Mixed Profile Alternative except that the at-grade running sections and two at-grade stations along SR 99 of the latter would be replaced with elevated facilities running along the west side of SR 99. These changes address the capacity and reliability problems found with the L2: Mixed Profile Light Rail Alternative and would allow operation of four car trains at 4-minute headways similar to the L1: I-5 Light Rail Alternative. In addition, this change would reduce the amount of new transportation right-of-way required and the associated potential effects on the natural and

constructed environment. On the negative side, these changes would increase construction costs with the result that the L3: SR 99 Elevated Light Rail Alternative is the most costly alternative studied, costing from \$600 to \$700 million (mid-2010 dollars) more than the least costly light rail alternative (L1: I-5 Light Rail Alternative).

From a transportation standpoint, the key findings compared to the No Build Alternative include:

- Year 2030 average weekday riders are projected to be 48,000, the second highest of the alternatives studied and roughly 10 percent fewer than the best-performing L1: I-5 Light Rail Alternative.
- Year 2030 annual new system riders of 3.9 million and 3.8 million total annual hours of travel time savings make this the second best performing of the alternatives and within 15 to 20 percent of the best-performing L1: I-5 Light Rail Alternative.
- This alternative has the capacity to carry 8,880 passengers per hour per direction, equal to the L1: I-5 Light Rail Alternative and twice the capacity of the L2: SR 99 Mixed Profile Light Rail Alternative.
- Lynnwood-to-Northgate morning peak-period travel times of 18 minutes would be 4 minutes slower than the L1: I-5 Light Rail Alternative but faster than travel by bus or automobile.
- Based on fully exclusive and grade-separated guideway operation, the L3: SR 99 Elevated Light Rail Alternative would be equal in reliability to the best-performing L1: I-5 Light Rail Alternative.
- In terms of impacts on regional vehicle travel statistics, the L3: SR 99 Elevated Light Rail Alternative is forecasted to result in nearly 10 times the reduction in daily VMT compared to the TSM/Baseline Alternative, but would not provide as large a reduction compared to the L1: I-5 Light Rail Alternative.

The L3: SR 99 Elevated Light Rail Alternative is consistent with Sound Transit's Long-Range Plan as a result of full operation on exclusive, grade-separated guideway, and conforms to the definition of HCT. In addition, extending light rail from Northgate to Lynnwood in a configuration that allows reliable operation of four car trains at 4-minute peak period headways would be necessary to support eventual extension of the line north to Everett. At headways longer than 4 minutes in this segment, supplemental express bus service could be required to serve the resulting passenger demand.

Because this alternative involves major infrastructure investment and construction along its entire length, it has the second greatest potential for affecting the natural and constructed environment. Overall, the levels of effects are judged to be larger than those of the L1: I-5 Light Rail Alternative. Only the L2: SR 99 Mixed Profile Light Rail Alternative, which would increase the amount of new transportation right-of-way, would have greater possible effects.

From a land use and economic development perspective, the L3: SR 99 Elevated Light Rail and L2: SR 99 Mixed Profile Light Rail Alternatives would serve the most station areas with the

highest potential for TOD of all the alternatives. However, the longer travel times of the L3: SR 99 Elevated Light Rail Alternative mean it does not perform quite as well as the L1: I-5 Light Rail Alternative from the perspective of access to the PSRC-designated Regional Growth Centers of Northgate and Lynnwood.

With a range of \$2,010 to \$2,310 million (mid-2010 dollars), the L3: SR 99 Elevated Light Rail Alternative is by far the most costly of the alternatives considered, roughly \$200 to \$500 million (mid-2010 dollars) more than the next most costly L2: SR 99 Mixed Profile Light Rail Alternative and \$600 to \$900 more than the L1: I-5 Light Rail Alternative. From a cost-effectiveness standpoint, the L3: SR 99 Elevated Light Rail Alternative is the second best-performing alternative, but would still be over 60 percent more costly than the best-performing L1: I-5 Light Rail Alternative. Based on an available budget of \$1,540 million in Sound Transit's current financial plan, the L3: SR 99 Elevated Light Rail Alternative is well outside Sound Transit's financial capacity to fund.

7.2.5 B2: Multi-Corridor BRT Alternative

The B2: Multi-Corridor BRT Alternative consists of three BRT lines serving the project corridor between Lynnwood and the Link light rail terminus at Northgate. This alternative includes an I-5 BRT line that would connect the Lynnwood Transit Center to the Northgate Transit Center with an intermediate stop at the Mountlake Terrace Freeway Station; a line serving north Seattle and Shoreline in the SR 99 corridor that connects to I-5 at NE 130th Street; and a line serving the 15th Avenue NE corridor from Mountlake Terrace through Shoreline and north Seattle to an I-5 connection at NE 130th Street. This alternative takes greatest advantage of the BRT infrastructure that already exists in both the SR 99 and I-5 corridors and adds HOV direct access ramps between the I-5 HOV lane at NE 130th Street to and from the south, and transit-only direct access ramps at Northgate to and from the north only.

In general, this alternative's transportation performance is better than the TSM/Baseline Alternative but falls well short of the performance of the light rail alternatives, while having significantly fewer potential impacts and substantially lower capital costs than the light rail alternatives. The B2: Multi-Corridor BRT Alternative is inconsistent with both the definition of HCT and Sound Transit's Long-Range Plan vision of extending the regional transit system north to Everett.

From a transportation standpoint, the key findings compared to the No Build Alternative include:

- Year 2030 average weekday riders are projected to be 24,000, an increase of 15 percent over the TSM/Baseline Alternative, but less than half the ridership of the best-performing alternative.
- Year 2030 annual new system riders would be 1.1 million, and 1 million total annual hours of travel time savings would be realized, roughly twice the TSM/Baseline Alternative but only one-quarter to one-fifth of the best-performing alternative.

- Capacity to carry 3,600 persons per hour direction (pphd), over twice the TSM/Baseline Alternative but only 40 percent of the capacity of the best-performing alternative.
- Lynnwood-to-Northgate morning peak-period travel times of 24 minutes would be 6 minutes faster than the TSM/Baseline Alternative, 10 minutes faster than travel by auto, but 10 minutes longer than the L1: I-5 Light Rail Alternative.
- Because the B2: Multi-Corridor BRT Alternative includes significant mixed traffic operations and a transfer at Northgate to reach the balance of the region served by the light rail network, it is judged to be considerably less reliable than the light rail alternatives.
- In terms of impacts on regional vehicle travel statistics, the B2: Multi-Corridor BRT Alternative is forecasted to result in twice the reduction in daily VMT compared to the TSM/Baseline Alternative. However, VMT reductions are less than one-sixth of those forecast for the best-performing alternative.

The B2: Multi-Corridor BRT Alternative is not consistent with the definition of HCT as a result of the significant segments of mixed traffic operations of the 15th Avenue NE and SR 99 BRT lines. In addition, the use of the I-5 HOV lanes, while meeting the definition of interim HCT services, does not meet the long-range definition. The B2: Multi-Corridor BRT Alternative is also not consistent with the Long-Range Plan vision for the extension of service north of Lynnwood to Everett because it is estimated to be near capacity in the year 2030.

The B2: Multi-Corridor BRT Alternative would likely have fewer effects on the environment than any of the rail alternatives because it includes substantially less new infrastructure and transportation right-of-way, and its estimated capital costs are much lower at \$640 to \$730 million (mid-2010 dollars). On measures of cost effectiveness, however, the B2: Multi-Corridor BRT Alternative performs the worst of all the alternatives, with costs per hour of user benefits and cost per new rider substantially higher than any of the alternatives.

Over the course of the AA, different versions of the BRT alternative have been substantially refined and modified to address its shortcomings in meeting the project's Purpose and Need. However, even after substantial refinements through the Level 2 evaluation, the BRT alternative continued to perform poorly in three critical areas of the Purpose and Need: transportation effectiveness, cost and constructability (cost-effectiveness), and consistency with Sound Transit's Long-Range Plan vision. From a transportation effectiveness standpoint, the B2: Multi-Corridor BRT Alternative falls well short of the performance of the rail alternatives on every performance measure and is only marginally better than the TSM/Baseline Alternative on many. The weak transportation benefits combined with large capital and O&M costs result in very unfavorable cost-effectiveness performance for the B2: Multi-Corridor Alternative, falling well short of the performance of the TSM/Baseline Alternative on all three performance measures. Finally, the B2: Multi-Corridor BRT Alternative would not have sufficient capacity to support the long-range plan goal of extension north to Everett.

8 CONCLUSIONS AND NEXT STEPS

Based on the results of the North Corridor Transit Project AA, Sound Transit plans to move forward with the next steps in the development of a major capital investment in the North Corridor connecting Northgate to Lynnwood. This chapter summarizes the conclusions of the AA and provides an overview of the next steps in the New Starts project development process, including satisfying the requirements for environmental review under NEPA and SEPA.

Following both federal and local review of the findings and conclusions of the AA, Sound Transit plans to identify those alternatives to carry forward for further development and study in the NEPA and SEPA environmental process, including the possible identification of a Locally Preferred Alternative (LPA).

8.1 CONCLUSIONS AND TRADE-OFFS AMONG THE ALTERNATIVES

Figure 8-1 summarizes the entire AA alternatives screening and evaluation process. The AA process started with the identification of both bus and light rail concepts and numerous alignment and corridor variations, progressed through both a pre-screening and concept screening step, and then moved through two levels of detailed evaluation. The AA process initially identified three primary light rail alternatives (one along 15th Avenue NE, one focused on I-5, and one along SR 99) and two BRT alternatives. Through the initial screening and Level 1 evaluation process, these alternatives were refined to four (one I-5 light rail concept, two SR 99 light rail concepts, and a multi-corridor BRT concept) that showed the greatest promise for meeting Purpose and Need and were studied in greater detail as part of the Level 2 evaluation. This work resulted in the following primary conclusions regarding the performance and trade-offs among these four alternatives:

- Light rail transit is the only mode that would satisfy the North Corridor Transit Project's Purpose and Need related to transportation effectiveness in meeting the corridor's mobility, access, and capacity needs; as well as Purpose and Need related to consistency with Sound Transit's Long-Range Plan vision.



- Fully grade-separated light rail alternatives markedly outperform alternatives that include at-grade crossings in satisfying Purpose and Need related to transportation effectiveness in meeting the corridor's mobility, access, and capacity needs. Moreover, fully grade-separated light rail alternatives are the only alternatives that would meet Purpose and Need related to consistency with Sound Transit's Long-Range Plan vision.
- The fully grade-separated alignments of the L1: I-5 Light Rail and L3: SR 99 Elevated Light Rail alternatives provide the best balance of transportation benefits while accomplishing other elements of the North Corridor Transit Project's Purpose and Need. These elements include community equity, supportive land use and economic development effects, and consistency with Sound Transit's Long-Range Plan vision.
- The transportation performance of the L1: I-5 Light Rail Alternative is superior or equal to the L3: SR 99 Elevated Light Rail Alternative on all measures. In addition, the L1: I-5 Light Rail Alternative would be substantially less costly than the L3: SR 99 Elevated Light Rail Alternative. As a result, the L1: I-5 Light Rail Alternative's cost effectiveness is substantially better than the L3: SR 99 Elevated Light Rail Alternative on measures related to the cost per new rider and cost per unit of user benefit.
- Given the \$1,540 million (mid-2010 dollars) currently budgeted for the North Corridor Transit Project capital costs in Sound Transit's current financial plan, the SR 99 light rail alternatives (L2 and L3) would both be well outside of Sound Transit's existing financial capacity to fund. The L1: I-5 Light Rail Alternative, however, is affordable within that capacity at the low end of its capital cost range.
- The L1: I-5 Light Rail Alternative results in the shortest travel times and greatest access improvements to Northgate and Lynnwood, the primary regional centers designated by Vision 2040 to accommodate future growth within the North Corridor. The L3: SR 99 Elevated Light Rail Alternative would have greater economic development and TOD potential in the intermediate station areas in the cities of Seattle and Shoreline than would the L1: I-5 Light Rail Alternative.
- The L1: I-5 Light Rail Alternative takes advantage of substantial portions of the existing WSDOT I-5 right-of-way that are not needed for current or future roadway, while the SR 99 alternatives would require new rights-of-way. The use of the I-5 right-of-way reduces the likely level of potential effects on the environment compared to the L3: SR 99 Elevated Light Rail Alternative, which requires almost twice the amount of new transportation right-of-way.

Based on the conclusions of the Level 2 evaluation, the TSM/Baseline Alternative should move forward in its current form as the basis for the FTA New Starts comparisons, but it would not be a build alternative within the EIS because it would not achieve the project's purpose and need.

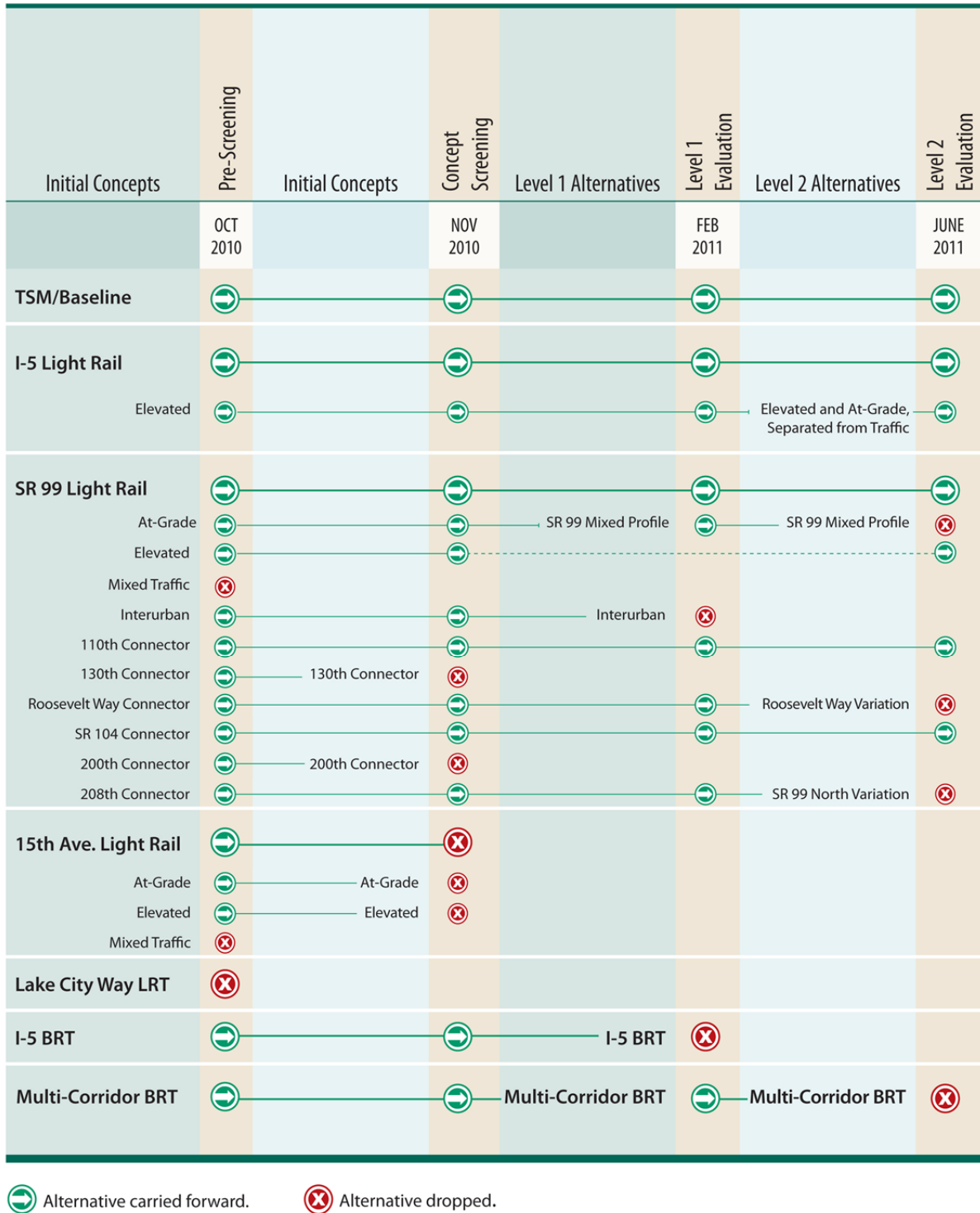


Figure 8-1. Summary of Alternatives Development, Screening, and Evaluation Process

8.2 ENVIRONMENTAL PROCESS AND SAFETEA-LU REQUIREMENTS

Sound Transit will conduct further scoping and subsequent environmental review for the North Corridor Transit Project in accordance with NEPA and SEPA regulations. Based on the scope of the proposed action and the potential environmental effects information developed through the AA, Sound Transit and FTA will prepare an EIS.

The EIS process will begin with environmental scoping under NEPA and SEPA involving the public, agencies, and tribes. Following scoping and a decision by the Sound Transit Board concerning the alternatives to be studied further in the EIS and the potential identification of a Locally Preferred Alternative (LPA), Sound Transit will move ahead with the preparation of a Draft EIS and conduct conceptual design, environmental analysis, public involvement, and agency coordination. The EIS process will continue through issuance of the Draft EIS for public and agency review and comment, preparation of a Final EIS, and conclude the NEPA process with a Record of Decision (ROD) by FTA. More information about the EIS process is provided in the North Corridor Transit Project *Environmental Scoping Information Report*, which is available on the project Web site.

FTA's regulations implementing NEPA, as well as provisions enacted through the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), emphasize the importance of public involvement in the EIS process. SAFETEA-LU provides additional direction on how agencies and tribes are to be involved. Section 6002 of SAFETEA-LU requires that this agency: "(1) Extend an invitation to other Federal and non-Federal agencies and Indian tribes that may have an interest in the proposed project to become "cooperating" or "participating agencies," (2) provide an opportunity for involvement by agencies and the public in helping to define the purpose and need for a proposed project, as well as the range of alternatives for consideration in the impact statement, and (3) establish a plan for coordinating public and agency participation in and comment on the environmental review process." Sound Transit and the FTA have prepared a Coordination Plan (available on the project website) to guide their efforts for coordinating the participation of the public, agencies, and tribes in the environmental review of the North Corridor Transit Project.

8.3 NEXT STEPS

Based on the results of the North Corridor Transit Project AA, Sound Transit plans to move forward in developing a major transit capital investment in the corridor between Northgate and Lynnwood. The next step is to share the findings of the AA with the public and elicit agency and public feedback through formal environmental scoping.

Sound Transit and FTA will initiate scoping for the EIS with a 30-day public comment period that will include several public meetings and one agency meeting. In accordance with SAFETEA-LU Section 6002, Sound Transit and FTA will invite agencies and tribes to be involved as cooperating or participating agencies, including WSDOT; Federal Highway Administration; the

cities of Seattle, Shoreline, Mountlake Terrace, Edmonds, and Lynnwood; Snohomish and King counties (including King County Metro Transit); Community Transit; tribes; and other local, regional, state, and federal agencies.

The EIS scoping process provides an opportunity for public comments on the Purpose and Need for the project, the proposed alternatives to be considered, and environmental issues to be evaluated in the EIS. This AA report was prepared to provide further details about the alternatives that have been considered. The report, which will be an important part of the environmental record for the project, describes how alternatives were developed leading to the EIS. It also describes how their anticipated performance was used to identify the most promising alternatives, and it explains why other alternatives have been removed from consideration.

Following scoping, Sound Transit will prepare and release a scoping summary report. The scoping summary report will document the comments Sound Transit has received about the Purpose and Need, alternatives, and environmental issues. The public and agency comments received during scoping will help Sound Transit, at the direction of the Sound Transit Board, to confirm the Purpose and Need for the project, identify the issues and alternatives to be considered in the Draft EIS, and potentially identify an LPA. The comments will also be considered as Sound Transit, FTA, and other participating and cooperating agencies define the scope of the EIS and its related technical analysis, including any special issues to be addressed.

Work on the Draft EIS will start early in 2012 and take from 12 to 18 months to complete. The No Build Alternative will be carried forward to provide the basis for comparison of the impacts and benefits of the build alternative(s). The TSM/Baseline Alternative, however, will move forward in its current form only as the basis for the FTA New Starts comparisons, but not as a build alternative. If Sound Transit does not identify an LPA prior to the start of the DEIS, then multiple build alternatives will be developed further and studied as part of the DEIS, with identification of the LPA occurring after the DEIS is issued. Following public review of the DEIS, Sound Transit will complete preliminary engineering for the LPA and develop a Final EIS. Based on the Final EIS, the Sound Transit Board will select the project to be built and operated. FTA will issue a Record of Decision (ROD) and the project will then move into the final design, construction, start-up and testing, and ultimately operation. Service is planned to begin in 2023.