



February 25, 2009

Attention: East Link DEIS Comments
Sound Transit
Union Station
401 South Jackson Street
Seattle, WA 98104

Dear Sirs:

Thank you for the opportunity to comment on the East Link DEIS. I am writing to offer the comments of Kemper Development Company ("KDC"). While we opposed the ballot measure to establish the East Link because we believe there are more cost effective transportation management options, that decision has been made. The hard work of determining the location for and construction of the East Link is now at hand. KDC is committed to work diligently to ensure that the decisions that now must be made serve the best interests of the Eastside. Our comments on the DEIS are offered in that spirit.

We have organized our comments using the comparative tables found in the Executive Summary for Segments B, C and D. We found these tables helpful but believe they need to be expanded to offer a more comprehensive summary of the information contained in the DEIS for the segment alternatives. We have illustrated this observation by adding factors or issues to each table and ask that the tables be expanded to allow a more accurate comparison of alternatives. Our suggested revisions to the tables and detailed DEIS comments are attached to this letter as Attachments A through E.

The DEIS and associated documents contain a wealth of information and analysis on the impacts of the East Link. We understand the analytical challenges presented by a project of such vast scope. But, as we describe in the attached detailed comments, the environmental documents fail to disclose critical impacts and alternatives. Therefore, to satisfy SEPA and NEPA requirements, a Supplemental Draft Environmental Impact Statement ("SEIS") will be necessary to ensure that the environmental documents for the East Link are adequate as a matter of law and offer decision makers, Eastside residents, and Eastside businesses full disclosure of the environmental consequences of the East Link decisions. We would like especially to emphasize several of our detailed comments.

COST EFFECTIVENESS ANALYSIS. Sound Transit is to be commended for making the DEIS a comprehensive decision making document that includes both economic and environmental factors. However, the DEIS analysis is incomplete. The DEIS Executive Summary presents a cost figure for each segment alternative and then, a cost effectiveness ratio. No detail is offered for the cost figures but they appear to simply be construction cost estimates. Using these numbers to compare alternatives is not meaningful. A more complete cost effectiveness analysis is needed that includes land acquisition, environmental mitigation, traffic management, and business and residential disruption. Cost cannot be judged on construction cost alone. We recognize that some comparative factors are more qualitative in nature. Still, there are readily available techniques to account for both qualitative and quantitative factors in a cost effectiveness analysis.

It is equally important to accurately quantify the effectiveness of the East Link Project. The DEIS uses estimates of train boardings for each segment alternative. This is also not meaningful. The cost effectiveness analysis must, at least, use the net new transit riders. However, the cost effectiveness analysis would be more meaningful if mobility and delay reduction were used. And, as discussed below, to be truly meaningful the cost effectiveness analysis should compare route not segment alternatives.

SEGMENT LINKAGE. SEPA discourages the fragmenting of decisions. We understand that in this phase Sound Transit is seeking feedback on segment alternatives. Obviously, all of the segments must be connected to create the East Link Project. The DEIS notes these interconnections but, for the most part, evaluates each segment independently. It is not possible to accurately compare alternatives in this manner. In some of the chapters, the DEIS purports to evaluate the impacts of various combinations of the segment alternatives, but, frankly, we found the comparisons very hard to follow. For example, B-7 can be compared with other Segment B Alternatives only if Segment A is included because of the projected shift of 500 riders to the Mercer Island station. The same observation holds true for Segment C Alternatives. Meaningful comparisons are possible only when A, B, C, D, and E Segments are considered together. Therefore, we ask that the alternatives included in the SEIS combine segments so that the review is of full route alternatives. The DEIS analysis is fragmented and, as a result, the full environmental consequences of alternatives cannot be ascertained.

NO ACTION AND OTHER ALTERNATIVES. The DEIS refers to "No Build" alternatives. However, the reference to these No Build alternatives between sections of the DEIS and Executive Summary are inconsistent and confusing. The Executive Summary, which will be the only document many read, suggests that the No Build alternative is relevant only to Segment A, implying that it is not evaluated for the other Segments. *See*, p. ES-4. Perhaps more importantly, SEPA requires the evaluation of alternatives that can reasonably attain or approximate a proposal's objectives at a lesser environmental cost. Clearly, the DEIS only considers light rail alternatives. This fails to satisfy the requirements of SEPA.

We are aware of the prior studies that have been completed. However, we are not aware of any prior SEPA or NEPA documents that have been prepared that carefully document and compare

the environmental consequences of light rail verses other alternatives that can accomplish the twin objectives of increasing mobility and reducing congestion at a lesser environmental cost. The DEIS does not reference or adopt any prior environmental documents that justify limiting alternatives to light rail and there is no indication that phased review, as permitted by SEPA, is being used. Therefore, to be adequate legally, other reasonable alternatives need to be compared with light rail alternatives.

IRREVERSIBLE, PERMANENT COMMITMENT OF TRANSPORTATION

CAPACITY. One of the very important purposes of SEPA and NEPA is to identify in advance when decisions involve irreversible and irretrievable commitment of resources. RCW 43.21C.030(2)(c)(v). It is critical that decision makers have this information. Particular attention should be given to the possibility of foreclosing future options by implementing a proposal. WAC 197-11-440(5)(c)(vii). Eastside transportation system capacity is a finite resource that we must use prudently. The DEIS fails to compare alternatives for two very critical factors: 1) the extent to which current transportation capacity is modified or reduced; and 2) how and to what extent future transportation capacity decisions are permanently foreclosed or limited. The DEIS notes differences inconsistently and does not offer a comparison between alternatives.

We ask that the SEIS include this comparison so that irreversible and irretrievable use of present and future transportation system capacity will be clearly acknowledged. For example, the segment ridership estimates are based on assumptions regarding bus route terminations and rerouting. And, some segment alternatives remove roadway capacity both temporarily and permanently. The SEIS needs to clearly and concisely compare alternatives for these considerations.

CONSTRUCTION IMPACTS. The impacts during the construction time period (3 to 5 years) need to be described in much greater detail. The segment alternatives disrupt neighborhoods and businesses very differently. They require very different mitigation. They also necessitate very different acquisition scenarios. The DEIS describes but does not offer a comparison of these factors. For example, the DEIS indicates that B-1 will have the greatest construction impacts of the B alternatives and B-7 will have the lowest impact. This is all that the DEIS offers in the way of a comparison of the Segment B Alternatives. But, this observation is buried in the DEIS text. The tables in the Executive Summary compare construction risk and not construction impacts. The SEIS needs to offer a complete assessment of construction impacts for each of the route alternatives.

SEGMENT BOARDINGS. It is not clear whether segment boarding estimates are or are not important. However, the DEIS presents estimates for each alternative and then, as mentioned above, uses these estimates to judge cost effectiveness. The DEIS does not adequately explain why there is a variation in daily ridership between the alternatives. See, pp. 3-22 thru 3-27. The calculated difference in total 2030 ridership is no more than 7%. Are these variations significant? If so, what assumptions were used to make these calculations?

Estimated segment boardings vary significantly. For example, B-7 boardings are 25% of the estimates calculated for other Segment B Alternatives. The DEIS offers only a one sentence explanation for this surprising difference. Similarly, B-7 boardings are projected to be static from 2020 to 2030 (no increase), while boardings at the majority of the other B and C Segment stations increase. These differences do not appear to be explained by population density or travel mode. If segment boarding estimates matter, then the SEIS needs to offer a detailed explanation of boarding calculations. It should also describe measures that could be taken to equalize boardings.

Station boardings need to be divided into trips that are diverted from bus routes under the No Build Alternative and new transit trips diverted from auto modes by East Link. This is particularly important for the downtown Bellevue stations where the City has planned for a significant increase in transit mode share of travel by 2030.

IMPACTS OF SEGMENT ALTERNATIVES ON THE NATURAL ENVIRONMENT. In general, the DEIS does not permit an even-handed comparison of the impact of segment alternatives on the natural environment. The discussion of visual impacts and wetland impacts for Segment B Alternatives provides two examples of this unevenness.

Regular park users are expected to have high viewer sensitivity. DEIS, p. 4.5-7. However, only one view is taken from the vantage of a user of Mercer Slough Nature Park. That view, shown in Exhibit F4.5-9, is from the I-90 Trail and is relevant only to alternative B-7. Yet, all of the Segment B Alternatives (except B-7) have a visual impact on park users. We suspect that an analysis of the viewshed from the Mercer Slough Nature Park would demonstrate that the alternatives to the west of the Park will have the greatest impact on the Park. Also, no mitigation for visual impacts is discussed in the DEIS. One obvious but costly solution is to depress the Segment B Alternatives that run on the west side of the Park.

The DEIS divides the wetlands affected by Segment B into 5 wetland resource areas (WRs). WR-1 and WR-2 are quite large and likely have variations in resource value and sensitivity, yet they are treated as if they were homogeneous. In order to compare the impacts of the Segment B Alternatives, more specific localized resource characterization is necessary.

For example, the DEIS provides calculations of wetland impact and buffer impact for each segment alternative. However, we were not able to determine what aspects of the Segment B Alternatives will cause loss of wetland or wetland buffer and the location of those impacts. For example, the DEIS explains that B-7 would have operational impacts on 1.8 acres of wetland. It explains only that this is a loss across Mercer Slough (WR-1). DEIS, p. 4.8-15. Presumably, this impact comes from the crossing of the Mercer Slough Nature Park. Does this figure include only the support columns or does it include the elevated structure? And, again why were mitigation measures not considered such as moving the route closer to either the north or south side of I-90?

PREFERRED SEGMENT ALTERNATIVES. KDC understands the task at this point is to combine segment alternatives into route alternatives. Therefore, we offer these observations on the alternatives presented in the DEIS.

Segment B. Based on the impacts disclosed in the DEIS, it is very clear that alternative B-7 causes less environmental impact than the other Segment B Alternatives. We are aware of a new Segment B Alternative proposed by the Bellevue City Council that may avoid some of the impacts associated with the other Segment B Alternatives. We ask that this new alternative and B-7 be further reviewed in the SEIS. The other Segment B Alternatives should be abandoned.

Segment C. The only Segment C Alternative that is acceptable is to place light rail underground in a bored or mined tunnel following generally the C-2T alignment. All other options will have environmental and social impacts that are simply unacceptable. We are adamantly opposed to any cut and cover, surface or elevated Segment C Alternative. We ask that Segment C Alternatives be limited to those that use a bored or mined tunnel in the C-2T alignment. In addition, a shortened alignment should be considered that reaches the Bellevue Transit Center. Further, detailed comments (Attachment D to this letter) describe an alternative that uses the BNSF right-of-way with a station on the east side of I-405. This station would then connect to the Bellevue Transit Center in the NE 6th corridor. This alternative should also be given further consideration in the SEIS.

Again, thank you for the opportunity to offer our comments. Please note we endorse without qualification the comments offered by the Vision Line Coalition except as modified by our comments regarding Segment C Alternatives. The decisions on East Link alternatives are both complex and consequential. These alternatives have markedly different environmental consequences. We ask that the SEIS provide a detailed and complete comparison so that both the public and decision makers can better understand the comparative consequences of each alternative.

Sincerely,

A handwritten signature in dark ink, reading "Bruce L. Nurse". The signature is fluid and cursive, with the first letters of each name being capitalized and prominent.

Bruce L. Nurse
Vice President
Kemper Development Company

Attachments A-E

ATTACHMENT A
TABLE ES-4
Comparison of Segment B Alternatives

Features	B1	B2A	B2E	B3	B7
No. of Stations	1	2	2	1	1
Estimated Cost in millions, 2007 \$	\$420	\$500	\$550	\$520	\$510
Segment Boardings	4,000	4,500	4,500	4,000	1,000
Total East Link Ridership	46,000	44,500	45,500	45,500	43,500
Travel Time through Segment in minutes	5	5	5	5	5
Length in miles	2.3	2.1	2.1	2.3	2.6
Comparative Cost Effectiveness--annualized cost divided by annual segment ridership in 2030	\$8.60	\$8.75	\$9.10	\$9.40	\$54.15
Construction Risk	Low	Low	Low	Low	Low
Construction Impacts	High	Moderate	Moderate	Moderate	Low
Traffic Delay During Construction	High	High	High	Moderate	Low
Environmental Impacts					
Land Acquisition (in acres)	20.2	18.2	14.3	15.8	10.5
Residential Displacements - No. of housing units	13	3	1	3	0
Business Displacements (No. of employees)	2 (20)	0 (0)	0 (0)	0 (0)	4 (130)
Wetland Impact in acres	0	0	<0.1	0.4	1.8
Wetland Buffer Impact (in acres)	2.0	3.5	3.0	3.7	0.8
Total Wetland & Wetland Buffer Impact (in acres)	2.0	3.5	3.0	4.1	2.6

Features		B1	B2A	B2E	B3	B7
High-Value Nonwetland Habitat Loss in acres		1.7	0.7	0.4	0.7	3.0 ¹
Decrease in Visual Quality?		Yes	Yes	Yes	Yes	No
Noise-Impacted Receptors - No. of living units (No. after mitigation)	Traffic Related	80 (0)	20 (0)	0	20 (0)	0
	Light Rail Related	3 (0)	0	0	0	98 (0)
Vibration-Impacted Buildings with Vibration Impacts (No. after mitigation)		1 (0)	0	0	0	0
Permanent Park Impacts (area in acres before mitigation)	Surface	0.4	1.4	0.3	1.2	0.1
	Elevated	0	0.3	0.4	0.4	0.9
Intersections Not Meeting Local Standard and Operating Worse than No Build Alternative (No. after Mitigation)		4(0) 2	4(0) 2	0(0) 1	4(0) 2	4(0) 1 ²
Estimated Traffic Delay at So. Bellevue Park and Ride in seconds		>150	>150	141.5	141.5	93.6
Potential for vehicle/train accidents		Yes	Yes	No	Yes	No
Parking Spillover		Yes	Yes	Yes	Yes	No
HOV Access Affected		Yes	Yes	Yes	Yes	No
Existing Roadway Capacity Affected		Yes	Yes	Yes	Yes	No
Future Roadway Expansion Affected		Yes	Yes	Yes	Yes	No
Neighborhood Traffic Intrusion		Yes	Yes	Yes	Yes	No
Bus Routes Affected		Yes	Yes	Yes	Yes	No

¹ Corrected to be consistent with Chapter 4.

² Corrected to be consistent with Appendix D

ATTACHMENT B
TABLE ES-5
Comparison of Segment C Alternatives

Feature	C1T	C2T	C3T	C4A	C7E	C8E
No. of Stations	3	2 to 3	2 to 3	2 to 3	2 to 3	2 to 3
Estimated Cost in millions, 2007 \$	\$1,610	\$1,280 to 1,360	\$1,120 to 1,260	\$610 to 700	\$500 to 600	\$700
2030 Daily Ridership	800	7,500	8,000	6,500	5,500	6,500
Total East Link Ridership	46,000	46,500	48,000	44,000	44,000	45,500
Travel Time through Segment in minutes	5	5	4	7	4	4
Length in miles	1.9	2.1 to 2.2	1.8 to 2.0	1.6 to 1.7	1.4 to 1.5	1.6 to 1.7
Comparative Cost Effectiveness--annualized cost divided by annual segment ridership in 2030	\$45.55	\$41.45-44.60	\$9.30-10.00	\$6.95-7.95	\$6.60-7.90	\$7.45
Construction Risk	High	High	High	Moderate	Low	Low
Traffic Delay During Construction	High	High	High	Moderate	Moderate	Moderate
Environmental Impacts						
Needed Land Acquisition (in acres)	17.8	25 to 48	25 to 59	16.4 to 21.6	11.9 to 17.5	19.1
Residential Displacements - No. of housing units	93	0-12	7-19	8	0	2

Feature	C1T	C2T	C3T	C4A	C7E	C8E
Business Displacements (No. of employees)	18 (300)	8 to 16 (210 to 290)	50 to 57 (680 to 770)	59 to 61 (670 to 830)	44 to 45 (530 to 570)	48 (590)
Decrease in Visual Quality?	No	No	Yes	Yes	No	Yes
Hazardous Material Sites	6	2	3	0	0	0
Light Rail Noise Impacted Receptors - No. of living units (No. after mitigation)	12 (0)	12 to 36 (0)	0 to 24 (0)	4 to 12 (0)	4 to 12 (0)	87 (0)
Traffic Noise Impacted Receptors - No. of living units (No. after mitigation)	21 (0)	0	0	0	0	0
Vibration Impacted Receptors - No. of buildings (No. after mitigation)	3 (0)	1 to 2 (0 to 1)	0 to 1 (0 to 1)	7 to 8 (3 to 4)	0 to 1 (0 to 1)	7 (3)
Ground-Borne Noise Impacted Receptors - No. of buildings (No. after mitigation)	2 (0)	1 to 2 (0 to 1)	3 to 12 (0)	0	0	0
Permanent Park Impacts - area in acres before mitigation	0	< 0.1	0.6	1.0	0	0.4
	0	0	0	0.3	0	0.2
Utility Relocation	High	High	Medium	High	Low	Low
Intersections Not Meeting Local Standard and Operating Worse than No Build Alternative (No. after mitigation)	0 3	0 2	0 2	0 1	0 2	4 (4) 2 ¹

¹ Corrected to be consistent with Appendix D

Feature	C1T	C2T	C3T	C4A	C7E	C8E
Existing Roadway Capacity Affected	No	No	No	Yes	Yes	Yes
Future Roadway Expansion Affected	No	No	No	Yes	Yes	Yes
Neighborhood Traffic Intrusion	Yes	No	No	No	No	No
Bus Routes Affected	Yes	Yes	Yes	Yes	Yes	Yes

ATTACHMENT C
TABLE ES-6
Comparison of Segment D Alternatives

Feature	D2A	D2E	D3	D5
No. of Stations	3 to 4	3 to 4	3 to 4	2
Estimated Cost in millions, 2007 \$	\$690 to 710	\$800 to 840	\$840 to 870	\$530 to 580
Segment Boardings	6,500	6,500	6,000	6,000
Total East Link Ridership	46,000	46,000	45,500	46,000
Travel Time through Segment in minutes	10	9	10	7
Length in miles	3.4 to 3.5	3.4 to 3.5	3.5 to 3.6	3.5
Comparative Cost Effectiveness--annualized cost divided by annual segment ridership in 2030	\$7.45-7.50	\$7.85-8.10	\$9.00-9.20	\$5.70-6.10
Construction Risk	Low	Low	Moderate	Low
Traffic Delay During Construction	High	Moderate	High	Moderate
Environmental Impacts				
Needed Land Acquisition (in acres)	31 to 33.6	32.3 to 35.2	35 to 37.6	11.1 to 13.5
Business Displacements (No. of employees)	41 to 49 (1,270 to 1,480)	43 to 46 (960 to 1,180)	64 to 72 (1,260 to 1,480)	43 to 52 (430 to 570)
Wetland Impact in acres	0.4	0.3	0.1	0.5
High-Value Nonwetland Habitat Loss in acres	0.7	0.6	0.1	1.27
Hazardous Material Sites	3	3	5	2
Noise Impacted Receptors - No. of living units (No. after mitigation)	0	0	0	10 (0)

Feature	D2A	D2E	D3	D5
Stream Crossings	4	4	4	3
Intersections Not Meeting Local Standard and Operating Worse than No Build Alternative (No. after Mitigation)	2 (0) 5	2 (0) 5	1 (0) 4	0 (0) 4 ¹
Existing Roadway Capacity Affected	Low	Low	Moderate	Low
Future Roadway Expansion Affected	Yes	Yes	No	Yes
Risk of Traffic Delay	Yes	Yes	Yes	Yes
Neighborhood Traffic Intrusion	No	No	No	No
Bus Routes Affected	Yes	Yes	Yes	Yes

¹ Corrected to be consistent with Appendix D

ATTACHMENT D DETAILED COMMENTS

CONSTRUCTION PHASE IMPACTS

The DEIS offers an overview of construction approach (pp. 2-31 through 2-36) and construction impacts (pp. 2-72 through 2-80). A brief discussion of staging area impacts is presented at pp. 4.1-7 and 4.1-8 and construction and vibration impacts are discussed briefly at pp. 4.7-17 through 4.7-21. Construction impacts on environmental features and land use are also discussed. However, the entire construction impact discussion amounts to fewer than 20 pages of the multi-volume environment document.

The DEIS offers no systematic evaluation of construction impacts for each alternative. The East Link Project will be the most expensive and extensive construction project ever experienced by Eastside neighborhoods and businesses. Bus routes and road systems will be altered. Some existing businesses will be forced to end operation and the everyday activities we now take for granted will change to accommodate construction. The construction of the East Link Project will likely adversely affect virtually all residents and businesses for many years. The SEIS needs to present the discussion of construction impacts in a format that will allow alternatives to be compared.

We have modified Table ES-4 to provide a qualitative evaluation of Segment B construction impacts. We have derived this assessment from Table 3-39, but it conveys only a partial picture. To discuss the impacts of the construction phase adequately requires a complete reformatting of the DEIS as well as new information on duration and extent of the land use impacts caused by business and residential disruption.

VISUAL IMPACTS

Visual impacts are described in Section 4.5 of the DEIS as well as in Appendix F4.5. The DEIS acknowledges the use of the FHWA Visual Assessment Methodology. The purpose of a FHWA Method visual analysis is to determine the visual impacts that will occur to a viewshed. In other words, how will the proposal affect visually the environment within which it will be located? However, as presented, the analysis is not only incomplete but also does not consistently apply the FHWA Method.

For example, the visual quality classification is confined to a narrow band paralleling each segment alternative rather than the viewshed. The DEIS would much more effectively present visual impacts if it analyzed the entire viewshed rather than a mere slice of it and the visual impacts were scored either numerically or qualitatively so that the alternatives could be ranked in terms of visual impact.

Further, the key observation points do not allow worst-case impacts to be analyzed. These deficiencies can be seen clearly, for example, in Exhibit 4.5-2. Only one of the observation points are located to simulate views of Mercer Slough Park users.

TRAFFIC AND TRANSPORTATION

We have an ongoing interest that Bellevue's transportation networks perform for the entire City including the Bel/Red Corridor, Overlake, and downtown. In particular, we seek to ensure that no area of the City fails the transportation concurrency tests, which would have the potential to shut down development in all areas. It is for these reasons that our comments and questions focus on transportation, under the following headings:

- Major Issues
- Alternatives for Segments B and C
- Other Questions and Comments

A. Major Issues

These documents are impressive in their detail. However, this detail obscures key issues. One has to wonder if this was intentional. Some relatively minor issues receive extensive discussion while important information regarding East Link's actual performance is hidden in obscure text.

1. Why Invest so Much for only 45,000 Daily Rides? East Link's projected 2030 figure of about 45,000 daily trips sounds impressive. However, only 9,500 of these are new transit trips; the remainder would have been bus riders in the No Build scenario. (Appendix H-1, p. 4-30 and DEIS, p. 3-14).

- At a 2007\$ cost of \$2.8 billion to \$4.4 billion, the investment to add one new daily transit rider (2 trips per rider) is \$600 million to \$900 million.
- The 9,500 new rider trips per day represent only a 1.7% increase in projected regional daily transit ridership in 2030 (Appendix H-1, Table 4-10, page 4-23). This is less than one year of projected transit trip demand growth for the region.
- Many believe that the rail system is necessary to accommodate future access to downtown Bellevue. By 2030 downtown Bellevue is estimated to generate at least 610,000 person trips per day. The 2030 East Link total daily boardings estimate for downtown Bellevue is only 8,000, or 16,000 trips both ways combined. About 25% of those trips are transfers from rail feeder bus routes to/from Kirkland and East Bellevue. As a result, East Link will serve only about 2% of total CBD trips by 2030. Does this warrant the spending up to \$4.4 billion for East Link?
- The areas of East King County that will be funding East Link are estimated to generate 3.5 million person trips per day by 2030 (PSRC's 2007 update of the Metropolitan Transportation Plan, Appendix 8, Table 8-21.). East Link will serve 39,200 (1%) of these trips (excluding Seattle Rainier Station boardings). But only 21% of those trips will be New Trips on transit compared to No Build. As a result, only about 0.2% of East King County taxpayers shift from auto to transit.
- East Link claims a reduction of 215,000 daily vehicle miles of travel (VMT) (DEIS, p. 3-3), but does not acknowledge how trivial this is until 6 pages later (Table 3-2). This is only 2/10ths of 1% of the region's projected 93.6 million daily VMT. (DEIS, pp. 3-3 and 3-9; PSRC's 2007 update of the Metropolitan Transportation Plan, Table 8-18).
- East Link ridership is Seattle-centric. Based on analysis of station boardings and link volumes, about 80% of the projected ridership is oriented to and from Seattle. Only

about 20% of the projected trips are internal to the Eastside. There is minimum benefit to Bellevue or other Eastside communities. All 10 travel time examples started or ended in downtown Seattle (Table 5-10, p. 5-24, H1 Transportation Appendix). Similarly, all 20 existing examples (Table 3-17, DEIS) and all six 2030 examples (Table 3-21, DEIS) have either their origin or destination in downtown Seattle.

2. How did Sound Transit Estimate Cost-Effectiveness? There are a number of discrepancies in the discussion of cost-effectiveness on pp. 6-16, 17 of the DEIS. Specifically:

- Sound Transit reports cost-effectiveness per total East Link rider, even though only about 21% are new riders (DEIS, p. 6-16, and H1 Appendix). Cost-effectiveness should be reported per new transit rider. That would result in a capital cost per rider nearly 5 times that reported by Sound Transit – a range more like \$35 to \$50 per new rider
- The results shown on Figure 6-1, p. 6-16, of the DEIS depend on an operational life of 87 years (email from Don Billen to Kevin Wallace, 9-Feb-09). How can this be justified, without even any replacement costs?
- The DEIS also claims that the high cost project would serve “...roughly 7% greater ridership than the low cost project” (DEIS, p. 6-16). For the segment alternatives appropriate to low and high cost options from Table 6-1 on p. 6-2 of the DEIS, this figure should be about 3.5%
- Why are net operating and maintenance (O&M) costs not included?
- The figures provided in the DEIS do not measure “cost-effectiveness”. They are only annualized capital costs per ride.

3. Why is there No Low-Cost, Transportation System Management Alternative Provided in the DEIS? In addition to No Build, all branches of government are required to study, develop and describe appropriate alternatives to recommended courses of action. The range of alternatives should be representative of the range of choices to permit intelligent comparative evaluation. In analysis of person throughput on I-90 (see p.3-38), there is no acknowledgement that a well-designed BRT system could far exceed the East Link capacity and do so in seated comfort, and while also providing for other high-occupancy vehicles in the center roadway. A well-marketed vanpool expansion program could well outperform East Link.

4. Why were No Alternatives Evaluated for Segment A? No alternatives were provided for Segment A. Surely there must be alternatives to taking the Center Roadway of a vital highway facility. According to ST’s Leonard McGhee (27-Jan-09), none were ever considered except for a comparison of SR-520 and I-90. This apparently happened outside of a NEPA/SEPA analysis.

5. East Link alignments may limit future opportunities to widen key roadways. All of the Segment B alternatives except B7 would restrict these future opportunities. Maintaining the existing lane count may not be enough. Surface and elevated alternatives will limit or at least complicate future roadway expansions. For example, the need to widen Bellevue Way was identified during the Downtown Implementation Plan (DIP) update. Alternatives using Bellevue Way, particularly B1, will take some or all of the width available for expansion.

6. DEIS fails to disclose serious technical and financial issues with converting the I-90 center roadway to light rail. The Expert Review Panel has called attention to these issues (*see* pp. 18, 19, Final ERP letter, 30-Oct-08). These include:

- Effect on bridge life expectancy
- Stray current mitigation
- Impact of track installation on the bridge.
- Design of expansion joints
- Seismic vulnerability
- Effects of wind and waves

How and when will these issues be resolved? Do the cost estimates include these items? Do the O&M cost estimates include the cost of Sound Transit taking responsibility for maintenance? The capital cost estimates do not include the major item of paying WSDOT for the taking of the Center Roadway.

7. Loss of roadway capacity during construction. The DEIS does an inadequate job of disclosing what drivers will actually experience during construction. Partial or full closures can be a serious inconvenience for residents and devastating for some businesses. ST should provide more specific information by segment/alternative, including:

- Time of day for partial or full closures
- Duration of closures (weeks, months, years)

In Segment B, all the alternatives would have serious impacts for all alternatives except B7. The others all will interfere with Bellevue Way

In Segment C, the worst construction impact would be with alternatives C1T and C2T because of extensive cut and cover construction. The least disruptive would be C3T because of its mined tunnel.

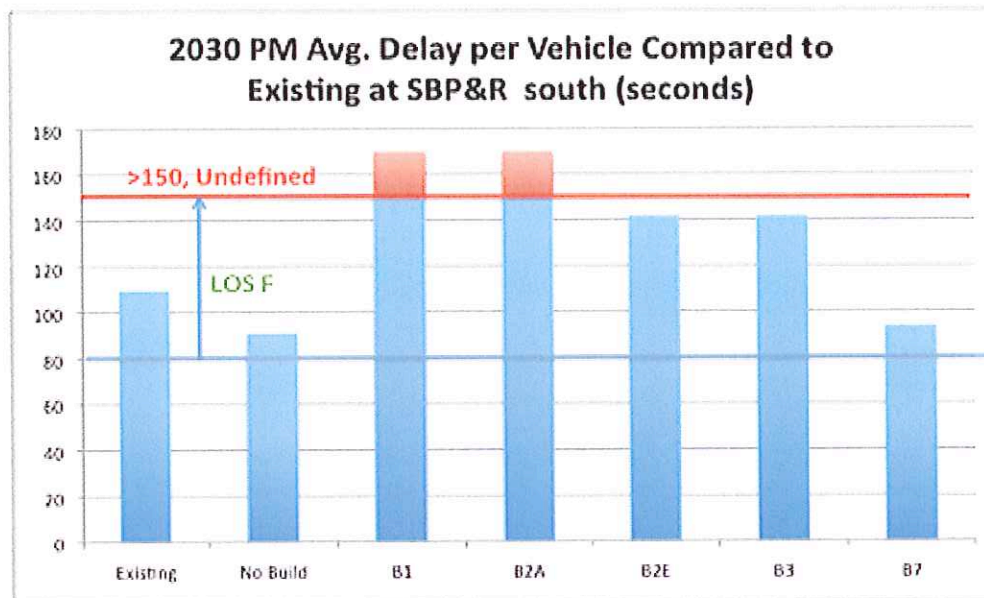
8. Traffic Conditions at South Bellevue Park & Ride/Connections to I-90. The DEIS does not disclose the real impact on traffic operations with the tripling the number of spaces. It only discloses that:

- No Build and all Segment B alternatives would operate at LOS F at the southerly access intersection (pp. 3-56, 58), and
- At Screenline 4, "With the East Link project, congestion would improve slightly..." (p. 11).

These "disclosures" would surely lead a reader to believe that future conditions would be no worse than today's. There are degrees of LOS F measured by delay. The range of "LOS F" results is illustrated on Table D-8 from Appendix D of the H1 Appendix (which would be seen by few readers). Delays for Build conditions are about 60% worse and in some cases into the >150 second, undefined range.

Readers may also have missed the definition earlier in the document that Screenline 4 includes both Bellevue Way and I-405 (pp 3-5, 3-7). By averaging volume to capacity conditions on Bellevue Way and I-405, ST has masked the actual operations on Bellevue Way. Also, by

placing Screenline 4 north of the SBP&R, ST has avoided the worse operations between SBP&R and I-90. The DEIS text, described above does little to inform what the actual driver experience will be.



TDA Inc., 5-Feb-09, using data from ST Eastlink Appx. H1

9. ST offers no mitigation for tripling the size of the South Bellevue Park & ride. PM peak traffic is a problem today. How can it be less of a problem in 2030 with this tripling and when East Link provides such a small increase in transit ridership? (See pp. 3-10, 11, DEIS)

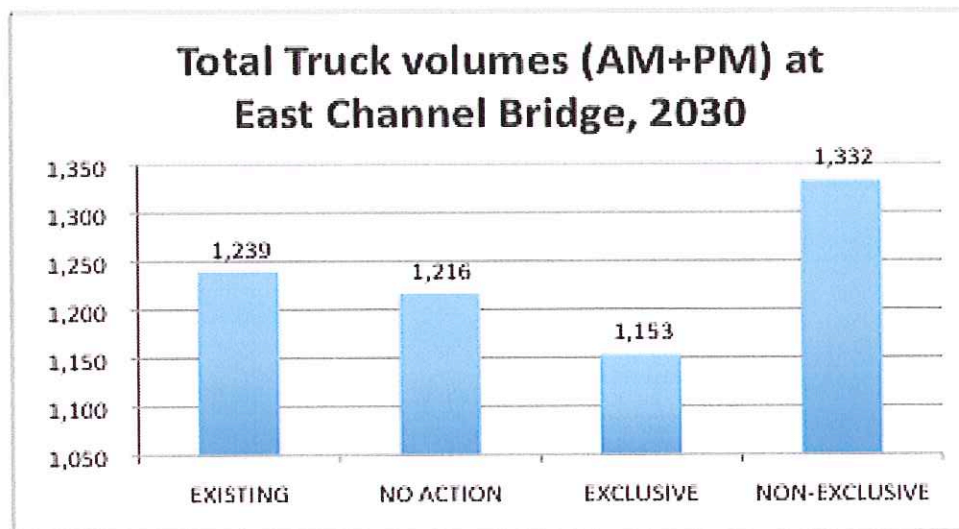
10. Vehicle Throughput on I-90. If the person throughput goes up as ST claims, that is good. However, vehicles are important too. Transit does not and will not connect all the origins and destinations, does not carry freight, and, for many, transit does not provide a competitive service for other reasons.

PSRC projects a regional population and vehicle trip increase of 35% to 40% by 2030. In comparison, the DEIS projects a vehicle throughput increase of only about 10% at Screenline 2 (floating bridge) by 2030. WSDOT in their 2006 I-90 Center Roadway Study projects a decline of 10% with exclusive use of the center roadway by HCT (this includes an interpolated adjustment to a 2007 base year). The DEIS correctly points out that center roadway capacity is constrained by end conditions, particularly at the west end. However, those conditions could be fixed and probably at a lower cost than East Link.

11. Freight Movements on I-90. The DEIS has a lengthy discussion of vehicle and person throughput on I-90 but nothing specific about trucks (Section 3.5, starting on page 3-28). Section 3.8 starting on p. 3-89 does provide a more detailed discussion of freight. The text

strives to show that travel times will improve with East Link on the center roadway and does show that truck volumes would be down in the peak direction.

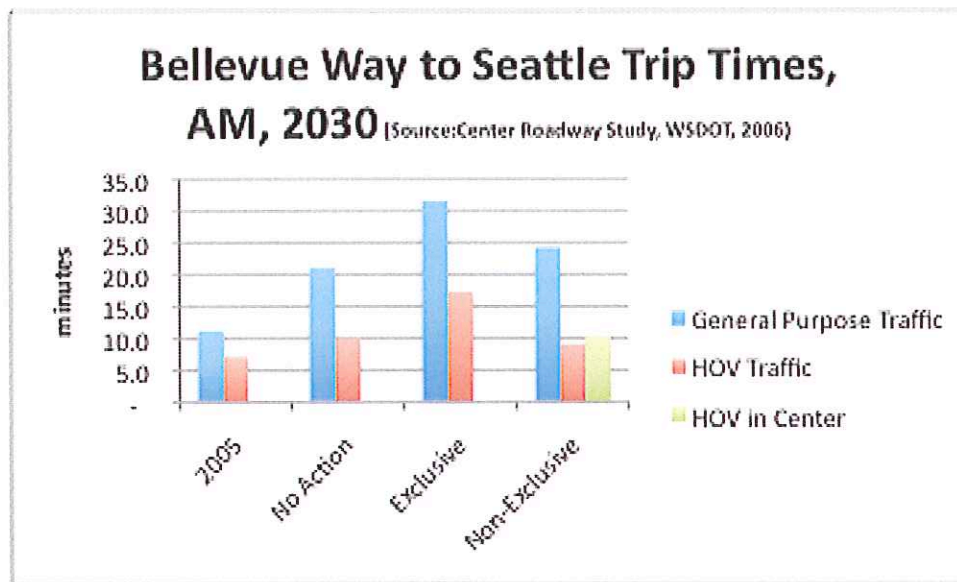
WSDOT's I-90 Center Roadway Study showed the negative effect of exclusive use of the center roadway for HCT. For example, the chart below shows peak period truck volume from page 19 of the WSDOT study. It shows higher truck volumes can be supported with the "non-exclusive" case (with buses, Mercer Island traffic and HOV in the center roadway). Trucks will not use the center roadway but forcing all the other vehicles to also use the outer roadways, higher volumes and increased weaving will reduce capacity.



Why are the DEIS representations of truck traffic with East Link so much more positive than in the WSDOT study?

12. High Occupancy Vehicle (HOV) Operations. East Link would be built at the expense of service to far more important HOV needs. In Seattle, East Link may remove buses from the D2 roadway, and will remove other HOV's from D2 (see p. 3-33). If East Link has exclusive use of the D2 roadway, buses would be rerouted to other roadways to access I-90 from South Seattle (such as 4th Ave S via SR 519). PM bus travel time would increase up to 13 minutes eastbound in 2030 (p. 3-42). According to the WSDOT Center Roadway study, this would more than double bus and HOV travel times between Seattle and Bellevue Way (p. 16, WSDOT Center Roadway Study and see the chart below). In no East Link case would HOV be allowed on the D2 roadway. **What are the impacts on HOV travel times?**

In south Bellevue, Alt B1 would eliminate eastbound and westbound HOV access to I-90. Other Segment B alternatives would either eliminate the eastbound off-ramp or require reconstruction. In serving regional travel needs, carpools and vanpools are orders of magnitude more important than the trivial role played by ST's light rail. In East King County, trips in carpools and vanpools are 25 times those on transit (for year 2030, based on PSRC'S 2007 update of the Metropolitan Transportation Plan, Table 8-21).



This will hurt vanpool use. That is important because vanpools offer the opportunity for far more use than light rail and at a tiny fraction of the cost.

13. East Link Capacity of 9,000 to 12,000 people per hour in each direction. ST says this is equivalent to 6 to 10 freeway lanes of traffic (p. 3-3, DEIS). This is based on a “comfortable” capacity of 150 persons per car to a “crush” capacity of 200 persons with a 4-car train and with a headway (time between trains) of 4 minutes. To ST, “comfortable” means fewer than half of passengers are seated.

- How could crush capacity be sustained for an entire hour? That would require a station queue equaling or exceeding train crush capacity for every departure during the peak hour. The average (mean) peak load per car for 8 western U.S. operating light rail lines is about half of the Sound Transit crush load, at about 106 passengers per car. (Source: “An Analysis Of Ridership Forecasts For The Los Angeles Metro Red Line”, PublicTransit.us, updated Sept. 30, 2007.)
- The planned peak period headway in 2030 is 9 minutes not 4 minutes (p.3-36)
- In this specious comparison, ST used a freeway lane capacity of 2000 vehicles per hour with 1.17 persons per vehicle. A fair comparison would also use crush capacity of a freeway lane with 2,200 vehicles per hour with cars carrying 6 passengers, resulting in 13,200 persons per hour per lane. Therefore, at crush capacity, LRT doesn’t quite reach the capacity of one freeway lane. Of course, no freeway would operate at such crush capacity, but neither do light rail systems.
- The DEIS follows the practice of comparing bus capacity with all passengers seated with light rail using a floor area per person, assuming that many will be standing. The usual argument is that light rail is smoother, and that, therefore, it is easier for standees. However, BRT on major routes would have similar characteristics, as opposed to local bus routes operating on minor arterial and collector.

ALTERNATIVE ALIGNMENTS

This primarily deals with Segments B and C, but has some comments on Segment D.

1. **Level-of-service at South Bellevue Park & Ride Station with Alt. B7.** The LOS at the southerly intersection is still LOS F, but note, as shown in item #8 above, that the delay is about the same as No Build, and better than existing 2007 (109.5 sec). None of the other B alternatives are better than existing, and the other B alternatives would experience delay significantly worse than No Build.

2. **Property Acquisitions.** The BN SF alignment (Alt. B7) would require the fewest number of property acquisitions (see Table 4.1-2, p. 4.1-3, DEIS)

3. **Neighborhood Impacts.** The BN SF alignment (Alt. B7) will minimize neighborhood impacts. The only impact cited by ST is view of the elevated structure by users of the I-90 trail (see Table 4.4-2, p. 4.4-14, DEIS). However, the number of users is small and they already view the structures of I-90. Also these view impacts are far different than that of a residence will full-time, permanent view of an elevated structure.

4. **Preservation of Permanent Roadway Capacity.** The DEIS promises replacement of lane takings, with the exceptions of the I-90 Center Roadway, Couplet (C4A) and 110th NE Elevated (C8E). The DEIS also claims that, after mitigation, no intersections fail to meet both local LOS standards and operate at an LOS worse than No Build, with one exception in Segment C (see Tables ES-4, and 5 of the DEIS Executive Summary). This does not agree with Tables D-2, D-8, D-10 and D-14 in Appendix D to the H1 Transportation Technical Report. Those tables show the following numbers of intersections that fail to meet the local LOS standard and with estimated delay worse than No Build to be:

Segment B Alternatives	Segment C Alternatives	Segment D Alternatives
B1: 2	C1T: 3	D2A: 5
B2a: 2	C2T: 2	D2E: 5
B2E: 1	C3T: 2	D3: 4
B3: 2	C4A: 1	D5: 4
B7: 1	C7E: 2	
	C8E: 2	

The mitigation section of the H1 Transportation Technical Report refers to Table D-14 for detail. Results on that Table are shown only for Segments, not by alternative within segments. That table shows for Segments B, C and D the number of intersections that fail to meet the local LOS standard and with estimated delay worse than No Build to be (the number after mitigation is shown in parentheses):

- Segment B: 3(2)
- Segment C: 2(2)
- Segment D: 3(3)

5. Maintain Ability to Expand Roadways. Maintaining the existing lane count may not be enough. Surface and elevated alternatives will limit or at least complicate future roadway expansions. For example, the need to widen Bellevue Way was identified during the Downtown Implementation Plan (DIP) update. Alternatives using Bellevue Way, particularly B1 will take some of the width available for expansion. Alternative B7 is the best in Segment B because it does not use existing roads.

All of the Segment D alternatives potentially restrict the ability to expand SR-520. A major expansion will probably be required in the future.

6. Ridership at the 118th SE Station. Review of the population density figures and modes of arrival at Segment A and B stations suggests that the 118th SE station was treated differently and underperforms in comparison. This station has relatively high population within 1/2 mile, has unusually low parking utilization and is adjacent of I-405, which has an adopted plan for BRT service. As a result we have 2 questions. First, how do you explain the apparently unusual performance of this station? Second, what is the significance of boardings per segment alternative? Because segment boardings have secondary effects on other segments including changes in bus services, performance of the total East Link is more meaningful.

Even the DEIS recognizes this on page 3-23 with, "Due to the proximity of the East Main Station to Segment B, project-wide ridership presents a more informative assessment of alternatives B3 and B7 than Segment B daily boardings."

Why does daily ridership for the 118th St. Station not change between 2020 and 2030 (see table 3-10, p. 3-23)? All of the other Segment B stations show significant increases.

7. Use NE 6th for East Link. From downtown across I-405 to 124th NE, NE 6th is or will be limited to transit, HOV and pedestrians, so it's logical to use it for East Link rather than interfere with other east-west streets.

8. 112th SE/Bellevue Way intersection. B7 and B2E provide better level-of-service at this intersection

WETLANDS IMPACTS

Table ES-4 provides a wetland acreage impacts among the Segment B Alternatives, but not buffer impacts. The failure to include buffer impacts presents a partial picture of the impacts. The buffer impacts range from 0.8 acre for alternative B-7 to 3.7 acres for alternative B3. By not presenting this information, Table ES-4 does not permit a fair, balanced comparison of the Segment B Alternatives. We have revised Table ES-4 to include this information.

We were not able to determine from the Executive Summary, DEIS or Appendix H3 what aspects of the Segment B Alternatives will cause loss of wetland or wetland buffer and anything more than a very general location of those impacts. For example, the DEIS explains that B-7 would have operational impacts on 1.8 acres of wetland. The Executive Summary explains that

this loss results from crossing Mercer Slough Nature Park. See, p. ES-19. Does this figure include only the support columns or does it include the elevated structure? Is this impact to the I-90 Seismic Retrofit Wetland Mitigation site? If so, is the Mitigation Site successful? Can the alignment be adjusted to avoid this impact?

Further, the DEIS divides the wetlands in Segment B into 5 wetland resource areas (War's). WR-1 and WR-2 are quite large and likely have variations in resource value and sensitivity, yet they are treated as if they were homogeneous. Again using B-7 as an example, Exhibit 3-6 in Appendix H3 shows that the B-7 crossing of the Nature Park is comprised of blackberry, riparian forest, and urban mostly vegetated deciduous forest. In order to compare the impacts of the B alternatives, more specific localized resource characterization is necessary.

Appendix H3, Table 4-6 presents long-term vegetation impacts within the project vicinity. There is a mathematical error for the B7 subtotal. The subtotal should be 3.0, rather than 3.1. This error is repeated in Table ES 4. The "Grand Total" does not appear to be a sum of the columns in Table 4-6. To what does it refer?

ATTACHMENT E

ADDITIONAL COMMENTS and QUESTIONS

1. Truck traffic on I-90. On pp. 3-90, 91, there is discussion of the shift of trucks out of peak periods into off-peak periods. This is probably true, but as shown on Exhibit 3-27, peak period truck traffic is still significant.

2. Project Costs. DEIS section 2.6.2 deals with project costs in terms of 2007\$. The FTA requires that actual (inflated) costs through project completion also be shown. We request that the FEIS include a summary at the end of that section showing costs in both 2007\$ and in YOES\$.

ST2 Capital Cost Estimates for East King

\$millions	2007\$	YOES
Regional Express	98	126
Light Rail	3,153	4,580
East Link to Overlake TC (Aerial)	2,714	3,897
East Link Maint Fac and Vehicles	325	506
Overlake to Red CBD Prelim Engr	19	32
BNSF Corridor Contribution	50	79
I-90 R8A Stage 3	45	66
Total Capital Expenditures	\$3,251	\$4,706

The discussion should also provide a comparison to the cost estimates at the time of Prop 1/ST2 approval. The table to the right shows the ST2 projects and cost estimates as approved by the ST Board on May 24, 2008.

Note that the East Link project included a line item for a Maintenance Facility and LRT vehicles. It also included a contribution to I-90 R-8A Stage 3 that must be constructed before the I-90 center roadway can be taken over for exclusive rail use. The FEIS must explain why the Maintenance Facility and LRT Vehicles are no longer needed.

It appears that the cost of Segment A includes no right-of-way allowance for the takeover of the I-90 center roadway. The FEIS must explain how road users are being compensated for this takeaway of a major part of the I-90 facility.

3. Person Throughput on I-90. On page 3-1, the DEIS says, "The East Link project would increase the I-90 person capacity across Lake Washington by close to 60% without any roadway widening. Was this based on another hypothetical and unrealistic estimate based on crush capacity for an entire hour? The 60% claim is grossly inconsistent with figures in Tables 3-19 and 3-20 on page 3-38.

4. Why are the screenline results in Table 3.3 in the DEIS different than those in Table 3-6 of the H1 Appendix? Assuming the H1 Appendix is correct, the DEIS overstates the benefit of East Link for Screenline 2 westbound.

5. Construction sequence. For East Link alternatives that take existing traffic lanes, will replacement lanes be completed prior to the beginning of East Link construction? (see p. 2-32, for example)

6. "...in the median of 112th NE..." (bottom of first column, p 2-21). What does this mean?

8. East King County Subarea Funding. Why should funding for all of East Link east of the Rainier station be funded by the East King County subarea. Only about 20% of East Link ridership serves Eastside trips. The other 80% is to serve trips beginning and/or ending in Seattle.

9. Person-capacity on I-90 (see text just below Table 2-7 on p 2-42). Had the DEIS considered, as it should have, a low-cost all bus alternative it could have shown that an all-bus alternative could provide even higher person capacity, and could have also provided added capacity for carpools and vanpools.

10. Travel times. From p. 3-2, DEIS, "...light rail has faster travel time...than bus or auto." A similar claim is made on p.3-34 under "Traffic Forecasts". Are these results only for certain segments of trips or for the door-to-door trips? Are weighted penalties for transfers included? Please provide detailed comparisons for door-to-door trips.

12. Future Traffic Growth (see Table 3-1, DEIS). How can travel on segment A continue growth at an annual 2% if I-90 is at capacity in 2015 as reported on p. 1-6?

13. Screenline Coverage (pp. 3-4,3-5, 3-10). I-405 was included in Screenline 4. Why was I-5 not included in Screenline 1?

14. Park-and-Ride facilities (p.3-13). Why are there no Park-and-Ride facilities in the City of Seattle? Only about 20% of East Link ridership serves Eastside trips. The other 80% is to serve trips beginning and/or ending in Seattle, so why not some park-and-ride on the Seattle side?

15. Bel/Red and Overlake Redevelopment. Current Bellevue and Redmond plans are mentioned in the DEIS but not included in the ridership estimates. ST justifies this because the respective Councils have not adopted the plans. Then why were Segment D alignment alternatives tailored to the Bel/Red and Overlake plans? Where else has ST incorporated provisions that have not been adopted? Taking of the I-90 center roadway for East Link has not been adopted by WSDOT.

16. ST claims that passenger transfer rates would "...stay similar with and without light rail..." This section tries to mask the reality that more transfers will be required with East Link than are required today with a bus system. (see, for example, Table 2, Appendix C, ST2 Plan, which shows a 14% higher transfer rate in 2030 with the ST2 plan)

17. Parking was treated as unconstrained by actual parking capacity. Had it been constrained by actual capacity at Mercer Island, South Bellevue and Overlake, what would have been the system effects? What would be the effect on boardings at the 118th SE station? (See Table 3-27, p. 3-70, DEIS)

18. HOV restrictions. Were HOV restrictions at I-90/Bellevue Way factored into the modeling and resulting levels-of-service for traffic (see p. 3-58, DEIS, for example)

19. What has happened to the HOV lanes? The DEIS does not make clear the configuration of HOV lanes with East Link. Please provide more detailed schematics and description.

20. With the tripling of parking at South Bellevue Park-and-Ride, did the analysis show northbound queues backing up onto I-90 in the AM?

21. “East Link is planned to operate 20 hours per day, 7 days per week.” (see p.2-31 DEIS). How does this compare to actual operations in Denver, Portland, San Diego and elsewhere?

22. Screenline 3. Why did this screenline not include East Link (B7)? Other screenlines appear to have included East Link.

23. “...close to 10,000 more people would use transit...” with East Link (p.3-14, DEIS). This information is vitally important to understanding the effects of East Link. Why was this hidden here rather than under “Project-Wide Ridership Summary” where it logically should have been (p. 3-22)?

24. Adjusting Services. Why is it easier to adjust light rail operations than it is for bus service, as claimed on p.3-18, DEIS?

25. Minimum headways. Are 4-minute headways for East Link consistent with headway limitations in the Downtown Seattle Transit Tunnel? (see p.3-36)

26. Roadway Changes. The list of changes in Segment C does not include the City’s planned extension of NE 6th (see p. 3-57, DEIS)

27. 5,000 truck trips per day. This is reported for I-90 on p. 4.3-4, DEIS. Is this existing or 2030?

28. Base Year. What does “Base Year” in Table 4.3-6 mean on p.4.3-8?

29. Public access. Explain what is meant by “The BNSF alternative (B7) would be the most limiting for public access...” Access for whom? Emergency access?

30. Diverted trips. East Link ridership is estimated at about 45,000 per day in 2030 (see Table 6-1, p. 6-2, for example). However, p. 4-30 of the H1 Transportation Appendix discloses that system wide transit ridership is increased by only 9,500 new transit trips compared to No Build. The other 80% of East Link boardings merely shift from bus routes that will be reduced or eliminated. Station boardings need to be divided into Diverted Trips from bus routes under No Build and New transit Trips diverted from auto modes by East Link. This is particularly important for the downtown Bellevue stations where the City believes that East Link will provide a significant increase in transit mode share of travel by 2030. The station boardings estimates need to be compared to total person trips generated in downtown Bellevue by 2030.

31. HOV travel times. Table 5-11 of the H1 Transportation Appendix shows very significant increases in HOV travel times with East Link HOV changes. This is an important negative effect of East Link because HOV's have a larger market share than East Link. A well-marketed vanpool program could increase this market share.

32. Peaks. This is a confusing array of "peak" definitions. For example:

- Table 5-17, p. 5-34, of the H1 Transportation Appendix refers to "peak hour"
- Table 5-18, p. 5-35, of the H1 Transportation Appendix refers to "peak period", with no definition of what that means
- Table 6-17, p. 6-27, of the H1 Transportation Appendix refers to "3-hour peak period",

33. Bellevue Way & S Bellevue P&R. There are 2 identical entries in the first column of Table 6-25, p. 6-41, of the H1 Transportation Appendix. The first must refer to south and the second to north.

34. Limitations on turning movements. Right-in, right-out limitations will have long-term negative effects on traffic operations (see Table 6-25, p. 6-41, of the H1 Transportation Appendix, for example).

35. New alignment alternatives. In reviewing the DEIS, we found several issues for which we wished that we could have considered alternatives beyond those provided in the DEIS. These included:

- A variation of B7 that crossed over I-405 in the vicinity of SE 6th to a new Segment C alternative on the BNSF right-of-way. An additional option for this would be a park-and-ride facility on the NE 6th alignment in the vicinity of BNSF right-of-way.
- A B7 connection to C3T
- For B alternatives except B7, a mitigation measure providing a flyover from southbound 112th SE to southbound Bellevue Way.
- A variation of B7 that was on the south side of I-90 connecting to the existing BNSF bridge over I-90
- A B7 alignment adjacent to I-90, between I-90 and the Mercer Slough trail."
- A variation of C2T, with a shorter, mined, not cut-and-cover, tunnel (on 108th NE or 110th NE?)

36. Downtown Bellevue and Downtown Seattle. The DEIS suggests a "...need for expanded road, transit and communications capacity between Downtown Bellevue and Downtown Seattle." That may be true, but other needs are more important. Sound Transit continues to focus its planning on the already well-served transit access to central Seattle. It does little to focus on the transit needs of the Eastside. By 2030, only 10% of all trips generated in East King have Seattle/North King as a destination. Only 7% of all trips generated in Seattle/North King will have a destination in East King. Yet regional transit planning continues to focus only on travel patterns from the Eastside to Seattle. (Source: "A Better Transit Plan for East King County", Jim Mac Isaac, PE, Sept. 2008)