



Jim Jacobson, Chair, ST3 Expert Review Panel
93 Pike Street, Suite 315
Seattle, WA 98101

October 23, 2015

Dear Chairman Jacobson:

Sound Transit deeply appreciates the time, effort and thoughtfulness all members of the Expert Review Panel have contributed to the development of a new high capacity transit plan for our fast-growing region of central Puget Sound. Thank you for your August letter regarding your questions and recommendations on Sound Transit's system planning process.

Below we address the topics raised in the letter. We have also attached supporting documentation, and look forward to addressing additional questions at our Nov. 9-10 meeting and in future deliverables. In addition to attached documents, this letter responds directly to the issues raised in your letter. Sound Transit staff will follow up with the Panel Administrator, Mr. John Howell, to address any additional information the Panel will need for its upcoming meeting.

PSRC Population and Employment Forecasting

Sound Transit is coordinating closely with PSRC regarding updated population and employment forecasts, and staying abreast of ongoing correspondence as PSRC addresses Dr. Sööt's concerns. We understand that PSRC has followed up on Dr. Sööt's request and calculated population and employment ratios using appropriately comparable data.

PSRC cross-checked these ratios for our region and found that the region is closer to average than would be suggested by certain data sources. For example, PSRC's forecast includes a high number of military personnel in forecasts because of the Puget Sound Region's many military facilities. Military "households" tend to be very small, with very high employment levels. Some data sources do not count military employment, partly contributing to the PSRC's higher reported employment figures and forecasts. This is important because some of the transit projects being investigated for Sound Transit 3 (ST3) are intended to increase transit access to the large military bases in Pierce County.

We anticipate that Sound Transit and PSRC will brief the panel on several factors

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that account for this high employment to population ratio, and changes to modeling assumptions (including population and employment forecasts) that will allow Sound Transit to assemble a system plan using the most recent available data.

Ridership Forecasting

The information below responds to Panel inquiries regarding ridership forecasting. Backup documentation is attached.

1. Sensitivity test: highway tolling and congestion levels

To better understand the incremental impacts of tolling and congestion levels on ridership estimates, Sound Transit conducted two sensitivity tests. The tests adjusted some of the travel cost inputs that affect Stage 2 of the incremental ridership model. For context, Sound Transit uses an incremental ridership model that incorporates three stages. Stage 1 examines the changes to ridership from differences in population and employment over time. Stage 2 measures changes in transit ridership due to changes in travel costs. Stage 3 measures how changes to the transit network affect ridership. For the purposes of this this sensitivity test, Stage 2 was modified to incorporate tolling and congestion cost changes as follows:

	Original Stage 2 assumptions	Test A	Test B
Tolling	Distance-based tolling on all limited access highways	Tolling only on existing or planned tolled facilities	Distance-based tolling on all limited access highways at 50% of the toll rates assumed in original assumption
Congestion levels	No change in congestion	Increased congestion	Increased congestion

Table 1 (attached) shows the results of the sensitivity tests. For the original assumption, distance-based tolling with no change in congestion levels resulted in a 6% increase in daily transit trips from Stage 1 to Stage 2. For Test A, these revised assumptions resulted in a 2% increase in daily transit trips. Test B assumptions resulted in a 10% increase in transit trips. As expected, the combination of increased road user fees relative to today and increased congestion (Test B) has the biggest impact on future year transit ridership estimates.

2. Suggestion: parking price assumptions - work with cities

Sound Transit conducted a sensitivity test on parking price assumptions which is explained below. In general, the impact of parking price assumptions on ridership is small relative to other factors. Given the range of different parking prices across the jurisdictions in the regions, we feel a representative

assumption is appropriate to test sensitivity at this level of planning. While it's possible we could commit time and resources to work directly with all affected jurisdictions to modify the assumptions, it's reasonable to assume such info would yield very small changes in ridership estimates, while potentially introducing location-specific error.

3. Sensitivity test: parking price

Sound Transit conducted a test to study the effects of adjusting parking price assumptions. The parking cost inputs for Stage 2 were adjusted by selecting a set of zones to have a higher incremental change in parking costs from the base year to the future year. The set of zones was selected based in criteria that included changes in employment density, development characteristics, parking characteristics and proximity to a station area. The zones selected for the test are shown on the map *Areas with Parking Costs in ST Model* (attached). The incremental change in daily parking costs was increased in the selected zones by an average of \$2 more than what was assumed in the original assumptions.

The results of the test are shown in Table 2 (attached). The test resulted in less than 1% increase in total daily transit trips compared to the original assumptions.

4. Documentation: FTA review of ST forecasting process

FTA reviewed Sound Transit's ridership modeling methods in spring 2015 and sent the attached email. FTA did not recommend any changes to our methods but did have two requests related to highway travel time validation for the base year, and creating a "backcast". In response to those requests, Sound Transit sent two memos in June 2015 to FTA. Both memos are attached. The memo titled *Highway Travel Time Comparison Memorandum* shows observed and estimated highway travel times for base year 2014. The memo concludes that the project implementation of the PSRC regional travel model is an appropriate tool for the estimation of highway travel times and changes in congestion. The memo titled *Backcast Test Memorandum* explains the methods and results for a transit ridership estimate for 2004, using the 2014 base year model. The memo concludes that the incremental model is a sound and reasonable tool for performing transit ridership analysis and highlights the need to periodically update the model with observed data. FTA provided no further comments.

5. Documentation: Before & After Study

The Final Report for the Before and After Study for the Initial Segment/Airport Link project is attached. The report was sent to FTA in February 2014. A discussion of ridership is shown on pages 14 – 15. The predicted ridership for 2011 was approximately 47% higher than the actual ridership in 2011. This overestimate was primarily due to a severe economic recession, as well as a ridership maturity and growth period that lasted much longer than two years after service opening.

6. Documentation of assumption: location and size of P&R at stations

Park and ride facility assumptions will be shown in the project templates. Modeling assumptions will be consistent with these assumptions.

7. Documentation of assumption: feeder bus service at stations

Bus service assumptions at station areas will be described and summarized for the ST3 system plan in a ridership forecasting results report. In general, it appears that final assumptions regarding interagency integration, including transfers at HCT stations, will be more aggressive than in the past.

8. Modeling results: ST3 network with current year population and employment versus ST3 network with future year population and employment

Sound Transit conducted a test to isolate the effects of population and employment using the ST3 baseline network, which assumes completion of the ST2 system. The results of the test are shown in Table 4 (attached). Growth in demographics and employment resulted in 44% more transit trips. Light rail boardings increased by 48%. As expected, this increase in transit ridership is consistent with the amount of population and employment growth assumed from the base year to the future year, a 37% increase in households and a 56% increase in employment by 2040. This is also reinforced by the illustration *Build-up Analysis – Daily Transit Trip Forecasts* (attached). The illustration shows that Stage 1 (population and employment changes) alone resulted in a 44% increase in daily linked transit trips over the base year.

9. Documentation: justification for using the ST incremental model rather than the PSRC synthetic model

The benefits of using a data-driven incremental transit ridership model are described in the *Transit Ridership Forecasting Methodology Report* (March 2015), section 2.1. The incremental model is preferred because it:

- Begins with observed travel data rather than travel theory
- Reduces the need for calibration and eliminates “error factors”
- Is simpler and more efficient
- Allows focus on the effects of transit network changes
- Follows FTA recommendations to provide more clarity in forecasts about transit ridership

10. Modeling results: maximum load points and passenger capacity for ST2 (no build) and ST3, including downtown tunnel

Passenger load and capacity comparisons will be developed along with development of the ST3 system plan. We believe that with any likely system expansion, the Link LRT peak-load point will extend from the north end of the downtown Seattle Link tunnel to a few stations north of that point.

11. Assumption: effect of ST3 options on downtown bus capacity

Assuming a sample ST3 network with light rail extending to Everett, Tacoma, Ballard and West Seattle and corresponding bus network changes, Sound Transit developed an estimate of the number of buses crossing a cordon around downtown Seattle. With this sample network there could be a reduction in the number of buses crossing the downtown cordon – about 200 less in the PM peak period and about 600 less daily when compared to a network without the ST3 light rail extensions. This reduction could include Sound Transit buses and other buses operated by partner agencies. However, both Sound Transit and these partner agencies are conducting long-range planning efforts that are still in the early stages. As Sound Transit continues the development of the ST3 system plan, we will coordinate with our partner

agencies to develop bus network assumptions for use in the system plan analysis. This may be a topic that the Panel will wish to receive briefings on from time to time.

Cost Estimating – Capital and O&M

1. Cost comparisons at various stages of project development (capital, operations and maintenance)

The panel requested a presentation regarding “the philosophy, procedures, and practice for taking projects from cost estimation through project delivery, including how contingencies are adjusted along the way.” In addition to this presentation, Sound Transit plans to address the status of cost comparisons, and how cost estimates have changed since the adoption of the ST2 System Plan. ST2 will not substantially be complete until 2023, and projects are in various stages of development.

Sound Transit continues to evaluate components of the cost estimating methodology such as unit costs and appropriate levels of contingency. Projects including East Link, Lynnwood Link, and the Federal Way Link Extension have recently reached important milestones. Sound Transit staff will be able to report on findings and the status of project costs in November, and at future meetings if requested. In addition, while few ST2 projects are currently in operation, Sound Transit plans to present on long-term operations and maintenance cost control.

2. Soft costs

In addition, the panel asked a question regarding soft costs as a percentage of project budgets. Sound Transit bases a number of allowances and contingencies as a percentage of construction costs, and has evaluated small and large projects to determine costs for professional services, etc. relative to construction costs.

Sound Transit evaluated 79 ST capital projects that were either completed or had advanced in project development beyond being baselined. 50 projects were under \$25 million; 29 were over \$25 million. Projects over \$25m were found to have soft costs of 32% or less of construction costs 80% of the time, while soft costs on projects under \$25m were 48% of construction costs on 80% of the selected small projects. Soft Costs correspond to these ST budget phases: Administration, PE/ED, Construction Services, and Third Party. Soft costs do not include permits or startup costs, which ST budgets as part of the construction phase.

3. OCIP

Regarding the panel’s question on owner-controlled insurance programs (OCIP), Sound Transit used OCIPs for the Central Link Light Rail Initial Segment and Airport projects, and refined its approach for developing and implementing OCIPs for the University Link Project and for the Northgate Link Extension Project.

Sound Transit performs an OCIP feasibility study to provide an overview of the primary issues related to the viability and practicality of using an OCIP as an insurance and risk management strategy on a

construction project or program. Sound Transit Risk Management prepares a formalized risk assessment of all capital development projects and provides a recommendation for the insurance & risk management program structure that should be used on ST3 projects.

The Risk Assessment is based on differences in the overall project risks; geographical locations (urban and suburban), physical site logistics, types of alignment structures (tunnel, elevated or at-grade), project delivery method to be used (Design-Bid-Build, Design-Build, GC-CM), and other project attributes. Using an OCIP or a traditional commercial insurance program with contractor(s) providing their own insurance coverage may provide ST with the best overall result depending on these attributes.

ST3 Finance Plan

1. Grant assumptions

Sound Transit currently assumes that 10% of ST3 capital projects will be funded by federal grants. The ST3 grant assumption is consistent with the grant assumptions for ST2.

The main funding source assumed for ST3 projects will be FTA's New Starts program. New Starts is FTA's primary grant program for funding major transit capital investments. Other grant sources could include FTA formula funding (mainly FTA Section 5307) and national and regional competitive grant programs. Although these funding sources have been identified as potential funding sources for ST3 projects, currently there is no estimated breakout between the New Starts and regional grant programs. The ST3 grant assumptions will be further refined as the ST3 project list and timeframe is identified in more detail. For example, the timeframe of the ST3 program would affect the number of New Start/FFGA projects that could be secured.

Although the overall federal funding environment continues to be uncertain and the national New Starts process is very competitive, Sound Transit has achieved a high level of success in grant funding for Sound Move and ST2 projects. Sound Transit's ST3 grant assumptions are being developed assuming that trend to continue and are consistent with past performance.

2. Sales tax revenue

Sound Transit uses the Puget Sound Economic Forecast to forecast rates of sales and use tax revenue growth that are included in the agency's financial plan. Sound Transit staff may provide more specifics on forecasting methods at the panel's request. While counties, municipalities and other special districts impose different sales and use tax rates, Sound Transit's enabling statute requires uniform taxation across the Sound Transit district.

The sales and use tax rate collected by Sound Transit is currently .9%, and recent legislation allows a public vote to increase that amount up to an additional .5% for a total of 1.4%. A slide showing sources of taxable retail sales was included in a presentation at your last meeting and showed the distribution of retail sales among different goods. The panel should note that motor fuel is exempt from the sales and use tax collected by Sound Transit, but that the sales and use tax also covers services that are not

represented in this chart and contribute to the breadth of the tax base and its strength as a revenue source.

3. Please see below under “project templates” for a discussion of potential cost-sharing agreements with partner entities.

Evaluation Methodology

ST3 project templates will show information, such as ridership and costs, broken down into segments. Sound Transit considered listing cost per rider on individual templates. However, since there are strong network effects on ridership when projects are assembled, this information is more useful at the corridor level to compare potential system plan elements at the Draft System Plan stage. Sound Transit will present information on cost and ridership to the Board at both the template and corridor level, so that these items can be compared across projects that are being considered.

At the panel's request, Sound Transit is working to incorporate ways to quantify the evaluation measures under consideration.

- Certain elements, such as ridership, capital cost, operation and maintenance cost, and travel time provide specific quantitative results that can be compared between projects.
- Sound Transit is evaluating reliability by quantifying the percentage of the representative alignment that is in exclusive right-of-way.
- For system integration, access, land use and development, and socioeconomic benefit Sound Transit is completing assessments of each project that produces a quantitative result on a scale of 1 to 5 that will allow each of the evaluation measures to be compared across projects. We can provide more specific explanation of these elements at the next ERP meeting.
- Sound Transit is also measuring overall mobility and connectivity within a project by the number of PSRC-designated centers that are served. This is a quantitative measure that highlights if areas designated as employment and population centers are being connected with high capacity transit.

The focus of the templates is to summarize important information for the Board to consider in the development of system plan. Specific weighting of criteria is an element that would require direction from the Sound Transit Board. As the template results are shared with the Board members, we will use the opportunity to gain input on their most important criteria and can use this to refine the project elements that advance into the system plan. We have attached a table displaying the evaluation measures that will be included in project templates.

Public Outreach and Engagement

As requested, we plan to provide an update on public outreach and engagement at the November meeting, and a summary of results from the outreach conducted in the spring is attached in the materials

with this letter. A copy of last December's survey results and an accompanying presentation are also included in the attachments.

Project Templates

The Panel raised an issue that remains of definite concern to ST; that being the need for, and potential benefit of interlocal agreements of some form between ST and other agencies and jurisdictions regarding the scope of proposed projects and their costs and ultimate budgets. The Panel further suggested that these agreements could also be "cost-sharing." Cost-sharing arrangements could :

- Waive local government fees of various types,
- Provide that other agencies or jurisdictions would construct some ST facilities,
- Provide land for ST facilities,
- Provide funding directly to Sound Transit, and/or
- Create local improvement districts and/or impose special assessments on properties benefitting from ST investments

ST concurs that project agreements of these types could help finance and/or expand ST3 facilities. However, project definition is sufficiently conceptual at this point that binding agreements would be difficult to achieve in the time remaining in the system plan development schedule. For example, the projects actually included in the final ST3 program won't be known with any certainty until sometime in the last 60 days (or even far less) prior to Board adoption of the new system plan.

Sound Transit is pursuing a strategy of obtaining accord with the directly affected agencies and jurisdictions pertaining to the scope and cost estimates of candidate projects. Sound Transit plans to request and obtain written acknowledgement of the specific scope of the projects, as a long-term protective strategy against ongoing growth in project scope and, ultimately, costs. Sound Transit will contact affected jurisdictions to obtain this acknowledgement when project templates are complete, leading up to the development and release of a Draft System Plan. This is the approach that Sound Transit used during development of ST2, and it has largely eliminated misunderstandings regarding the specific components of project scope.

Once again, Sound Transit thanks the Expert Review Panel for providing your independent oversight as Sound Transit plans for a third major expansion of high capacity transit in the Puget Sound Region. We look forward to your upcoming November 9-10 meeting. Please contact us with any remaining questions at this stage of our planning efforts.

Best regards,



Mike Harbour

Acting CEO
Sound Transit

Cc: Expert Review Panel Members
Executive/Chair Dow Constantine
Secretary Lynn Peterson, WSDOT
Josh Brown, President, PSRC

Attachments:

Ridership Information

- Table 1 – Highway tolling and congestion level sensitivity test
- Areas with parking costs (map)
- Table 2 – Higher parking costs increment in new areas sensitivity test
- FTA comments on ridership forecasting methods (email)
- Memo to FTA re: Lynnwood Link highway travel times
- Memo to FTA re: Lynnwood Link backcast
- Initial Light Rail Segment Before and After Study Final Report
- Table 4 – Current year vs. 2040 changes in ridership in baseline network
- Build up Analysis - Daily Transit Trip Forecasts

Outreach information

- Report of telephone survey results
- ST3 Draft Priority Project List outreach summary memo
- ST3 online survey topline results

ST3 project template evaluation measures (table)