**To:** **Peter Rogoff, CEO**
**From:** **Kimberly Farley, Deputy CEO**
**Date:** **January 5, 2021**
**Subject:** **Capital program cost estimate growth and response actions**

This memo reviews concerns relating to increasing cost estimates for transit expansion projects currently in development that have not yet been baselined – which is to say that the Board has not yet selected the project to be built or established a final cost estimate or delivery schedule. The memo also outlines Sound Transit's planned response, including information and next steps that staff are preparing to review with the Board and public.

We are now seeing many of the same challenging factors, which boosted the costs of our Lynnwood and Federal Way light rail extensions, impact the estimates of light rail projects that are currently early in design. As we move this next wave of projects toward baselining their budgets and schedules in the coming years, it is clear from the latest estimates that the ultimate costs will be higher than previously estimated. These challenges are also present in other local projects and other areas of the country where rapid population growth, urban development and economic growth have driven up costs of construction and real estate.

Sound Transit projects that are now in construction continue to advance within their current budgets and schedules, having already accounted for these challenging market factors. Sound Transit is fully on track to nearly triple the reach of the region's light rail system from 22 miles to 62 miles by 2024.

Recent design advancements contributing to significant cost estimate increases for the next wave of projects have primarily involved three projects: (1) the West Seattle and Ballard Link Extensions (WSBLE); (2) Tacoma Dome Link Extension (TDLE); and (3) the Link Operations and Maintenance Facility (OMF) South. For these projects, the cumulative impact of the revised estimates is significant: approximately $4.8 billion to $6.2 billion, or an increase of more than 40%. These increases across the program break down as follows:

| Category of Cost Estimate Increase | Change from 2019 to 2020* | % Increase* |
|---|---|---|
| Increased right-of-way costs | $2.090B - $2.470B | 40% - 43% |
| Increased construction costs from design advancement/additions | $1.701B - $2.276B | 35% - 37% |
| Increased contingencies and other soft costs (based on percentages of overall estimates) | $1.045B - $1.420B | 22% - 23% |
| **Total** | **$4.835B - $6.1657B** | **42% - 50%** |

* Costs in 2019 dollars. Information is also available by project. Ranges reflect multiple OMF South project alternatives, and the preferred alternatives as identified by the Sound Transit Board for TDLE and WSBLE, with the following clarifications: where a preferred alternative was not identified within a segment, the alternative most like the ST3 representative project was used; the cost range also reflects the difference between the two elevated preferred alternatives in West Seattle.

While cost pressures continue across the region, design advancements reflect that our challenges are particularly acute in areas where we are seeking to build within highly urbanized areas of Seattle, as is the case with the West Seattle and Ballard light rail extensions. In these areas, advancement of our design work shows that real estate development and cost pressures have continued to outpace the assumptions in our cost-estimating methodology. These and other issues associated with building in densely developed areas are further discussed below.

These projects are also seeing increases in construction costs as design advances and the scope is better understood. As an example, the updated estimates now assume, in some places, replacing surface stormwater management options with underground detention facilities. These and other changes and provisions will be reviewed through value engineering, although many of the construction cost estimate changes discussed below reflect better understanding of project requirements that are not likely to change. These include long aerial guideway spans over railroad and utility corridors, challenging site conditions, and larger maintenance facilities as a result of more detailed operational analysis.

Given this cost growth, I have initiated an independent assessment of Sound Transit's updated cost estimates and underlying methodologies. It will include a focus on what actions Sound Transit can take to reduce costs and update its estimating approaches going forward. The independent assessment will be completed in sufficient time to inform the upcoming capital program realignment process. The timelines for our expedited procurement and work plan are discussed below.

Significant design work remains before we reach each project's baselining milestone—usually at 60% design unless we are employing alternate delivery methods—at which time we can more confidently set budgets and schedules. The focus of the independent review and other upcoming work will be to verify our cost estimates and refine our approaches and do everything possible to more effectively manage risks and uncertainties.

In combination with the significant revenue reductions caused by the COVID-19 pandemic, the upward cost pressures reviewed here increase the challenges the Sound Transit Board is required to address during its upcoming capital program realignment. Because there are no indications at this time that the cost pressures will change dramatically, equipping the Board to make informed realignment decisions will also require updating cost assumptions for voter-approved light rail projects scheduled later in the Sound Transit 3 plan (ST3). These projects include the light rail extension from Lynnwood to Everett and the OMF North, which recently entered the development process, as well as the future light rail extensions from Kirkland to Issaquah and the extension of Tacoma Link to Tacoma Community College, which have not yet entered development.

Ahead of future development work, the staff is updating the agency's Long-Range Financial Plan to assume cost increases of 36% for these later projects based on the recent Tacoma Dome Link estimates, as discussed later in this memo. These adjustments, when applied to the Everett Extension and OMF North, the South Kirkland to Issaquah Extension, and the extension to Tacoma Community College total $2.7 billion in 2019 dollars.

Cumulatively, the cost estimate increases described and included within the finance plan total $7.9 billion in 2019 dollars and $12 billion in year-of-expenditure dollars on current project schedules. They contribute to an overall $11.5 billion affordability gap, that is 10.9% of the agency's Long-Range Financial Plan through 2041 as the Board moves forward with its realignment process.

**OVERVIEW**

Cost estimates for projects outlined in the 2016 ST3 ballot measure were initially developed in 2015 to support public and Board consideration. The cost estimates were necessarily conceptual in nature and were based on very limited design plans. Prior to voter approval, transit agencies are limited in the resources available to spend on designs. This limitation was referenced in the ST3 ballot measure.[1]

Under state law, the process to shape the Sound Move, ST2 and ST3 ballot measures required an independent Expert Review Panel (ERP) to ensure that key assumptions used in the development of high-capacity transportation plans were reasonable. By law, the panel members were appointed jointly by the co-chairs of the Joint Transportation Committee, the secretary of the Department of Transportation and the governor. The ERP provided independent technical review of the primary assumptions and methodologies used to develop the ST3 plan. In 2015 the ERP noted:

> "It is important to recognize that at this stage of project planning (and when the projects go to the ballot) the necessary environmental work has not begun for most of the projects. The level of design is minimal—less than one percent in some cases. This makes cost estimating with any precision difficult."

In its final review in September 2016, the ERP concluded:

> "The level of allowances, contingencies and reserves at this very early stage of planning and design is appropriate. Further, the capital cost estimating methodology is sound and consistent with good industry practice."

Following voter approval, Sound Transit began work on ST3 projects that are now experiencing significant upward cost pressures. These include the West Seattle and Ballard Link Extensions, the Tacoma Dome Link Extension, the Operations and Maintenance Facility South and the bus base associated with the Stride Bus Rapid Transit (BRT) program. The development process starts with comparative estimates used to select alternatives for environmental review, continues with conceptual engineering estimates during environmental review, and then progresses into preliminary engineering and final design estimates. As design progresses and more is known about detailed project conditions and requirements, the estimates become more accurate. This further refinement in cost estimates stems in part from the insights we get through our processes of engaging with the public and local jurisdictions, starting very early by seeking input on the conceptual designs.

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[1] Page 25 of the voter-approved ST3 measure states: "Cost risk: The projects in Sound Transit 3 are based on conceptual engineering estimates. The risks for costs to grow beyond initial estimates include: faster than anticipated growth in construction costs; faster than anticipated growth in real estate values; the addition of new required elements or projects not currently included in the plan and more expensive project elements. The Sound Transit Board will closely monitor and manage project scope and cost risks to minimize cost increases. In addition, the Sound Transit 3 Plan includes contingencies within the project budgets that allow for uncertainties and unforeseen conditions that arise during the design and construction of the projects."

Early indications of cost estimate increases across the ST3 program emerged even as comparative estimates were developed for the purposes of identifying alternatives for environmental review. These increases were discussed at the February 14, 2019, System Expansion Committee meeting, at which Associated General Contractors of America Chief Economist Ken Simonson reviewed cost pressures on projects both locally and nationally. In particular, he summarized that:

- Cost of construction materials rose sharply over the previous two years.
- Labor costs accelerated as the pool of experienced unemployed jobseekers dried up.
- Contractors wanted to add workers in 2019 but were having trouble finding them; and, as a result, some contractors responded by increasing bid prices or lengthening completion times.

Prior to the initiation of construction on our Lynnwood Link extension in 2019 and our Federal Way Link extension in 2020, Sound Transit responded to this challenging landscape by taking actions to increase project budgets as necessary prior to baselining and after completing value engineering efforts. However, these actions occurred well after our work to develop the ST3 measure. Our work to shape ST3 did not benefit from the market knowledge we have acquired since, or the project design work that has occurred since. At the time the ST3 plan was being developed, project cost estimates were informed, in part, by comparison with the lower pre-baseline estimates for the Lynnwood and Federal Way extensions as well as historical data from previously completed projects of Sound Move and ST2. Cost estimates for Sounder garages in Sumner, Kent and Auburn as approved in ST2 have also increased during project development. In 2020, the Board approved a limited action for consultant support to examine ways to reduce Sounder garage costs through combined contracting packaging and construction options.

Recent work by consultants and staff to update estimates as part of conceptual engineering for the ST3 projects has identified significant project requirements and challenges that were not identified through the limited level of design work available in 2015 and 2019. These include:

- Increasingly urbanized development
- Public and local jurisdictions input and preferences
- Topography, terrain and soil conditions
- Environmental conditions
- Real estate and construction markets that point toward further significant cost increases

More recently, work has also begun on the Everett Link Extension Project, which, along with projects scheduled later in the ST3 plan, will likely also face similar increased cost pressures.

Other transit projects across the country have seen similar increases in costs.

- Central Subway Project: The San Francisco Municipal Transportation Authority's project, currently under construction, will extend the underground Muni Metro T Third Line from the Fourth Street Caltrain Station to Chinatown. The Central Subway project is estimated to be roughly 15% over its $1.6 billion budget by the time it opens in 2022. [2]
- Phase II Silicon Valley BART Extension: Valley Transportation Authority's project will extend BART service six miles from the Berryessa Transit Center into downtown San Jose, terminating in Santa Clara. As the project has moved into design and engineering, the estimate has increased from $4.7 billion in 2018 to $6.5 billion earlier in summer 2020.[3]

[2] https://www.sfexaminer.com/news/central-subway-estimated-to-be-15-percent-over-1-6-billion-budget/
[3] https://www.mercurynews.com/2020/09/18/opinion-megaprojects-are-hard-lets-get-bart-extension-right/

- Regional Connector: This project, under construction since 2014, is a 1.9-mile light rail subway in downtown Los Angeles. The connector ties together the Metro Blue, Gold and Expo Lines, making for transfer-free travel from Long Beach to Azusa, and from Santa Monica to East L.A. Originally scheduled to open in 2020, early construction difficulties associated with building in a complex urban environment resulted in delays and a 9% project cost increase to $1.6 billion. The line is now 70% complete and will open to the public in summer/fall 2022.[4]

**INDEPENDENT ASSESSMENT PURPOSE AND SCOPE**

Sound Transit establishes a baseline cost estimate and schedule for each project once it has been designed to 60% level, or 30% for alternate delivery methods such as design-build. It is only at this point when estimates of cost and schedules can be predicted with relatively high confidence. Until this point in project development, Sound Transit has consistently emphasized that cost and schedule assumptions cannot be considered reliable final estimates, as they are certain to change as we gain more information about the project.

The independent analysis we have commissioned will support ongoing estimate work for specific projects. It will also support the realignment process that the Sound Transit Board is currently leading to review the plans and schedules for agency projects that are not yet in construction. Uncertainties and risks will remain inherent to the agency's work to build long-deferred high-capacity transit infrastructure through what have become highly developed and expensive urban environments.

In fulfilling the Board's requirement to realign our capital program to one that is affordable based on legally available funds, it is critical to incorporate the best available cost estimates for projects, including appropriate contingencies based on the level of design completion, as well as the best available projections for future revenues. Fully updating cost estimates and future cost projections will also better ensure that the Board does not need to realign the capital program multiple times as project costs continue to rise. The independent review that we are about to launch will analyze and seek to verify the increased estimates reflected in the chart below as well as the underlying methodologies we have used. We are committed to continually refining and improving the agency's processes as we move forward. The sections that follow the chart discuss recent cost estimation work that will be independently reviewed. In addition to the independent review, we will also initiate other work by staff to analyze cost drivers and reach out to peer agencies for consultation.

What follows is a table summarizing the changes in costs that we are witnessing across major ST3 projects that are currently progressing through initial planning phases. The first columns of the table summarize cost estimates developed in 2015, 2019 and 2020. The 2015 estimates were developed to support consideration of the proposed ST3 measure based on representative alignments that necessarily had to be based on very limited designs. The 2019 estimates, based on 5% design completion, were developed to assist in the comparison of alternatives as project development and environmental review began. The 2020 estimates, based on 10% or more design completion, are from recent work to advance our environmental review processes. The 2019 and 2020 estimates also reflect preferred alternatives in locations where the Board has identified them.

[4] https://la.streetsblog.org/2020/10/15/metro-committee-approves-regional-connector-service-plan/

**Cost Estimates During Project Development**

| Project | 2015 ST3 Plan Estimate | 2019 Comparative Estimate | 2020 Conceptual Estimate | % Change from ST3 Plan to 2020 Estimate | % Change from 2019 to 2020 Estimate |
|---|---|---|---|---|---|
| I-405 BRT | $1,037 | $1,088 | $1,016 | -2% | -7% |
| SR 522 BRT | $481 | $658 | $544 | 13% | -17% |
| BRT Base | $191 | $208 | $238 | 25% | 14% |
| OMF South: Low Option* (Federal Way Sites) | $649 | $759 | $1,167 | 80% | 54% |
| OMF South: High Option* (Midway Landfill) | $649 | $1,366 | $2,424 | 273% | 77% |
| TDLE: Preferred Alternative; (including options through Fife) ** | $2,431 | $2,999 | $3,308 | 36% | 10% |
| WSBLE: Preferred Alternative; Elevated Fauntleroy station ** | $7,094 | $7,929 | $12,103 | 71% | 53% |
| WSBLE: Preferred Alternative; Elevated SW 41st/42nd station ** | $7,094 | $7,929 | $12,581 | 77% | 59% |

Costs in 1,000s and 2019 dollars

*OMF South: Reflects the range for the alternative sites under study in environmental review, which includes a site located on a former landfill and Superfund site.

** The 2019 and 2020 estimates are derived from the Preferred Alternatives (PA) as identified by the Sound Transit Board, with the following clarifications: Where a preferred alternative was not identified within a segment, the alternative most like the ST3 representative project was used, and for WSBLE, the cost estimates reflect the two elevated PAs in West Seattle.

The project-specific descriptions below provide more detail on recent changes between the 2019 and 2020 estimates. As we move further into the realignment process with this month's workshop, we have updated our long-range financial assumptions to reflect increases and decreases for each of these projects. The independent assessment will also seek to verify these updates and will do so in sufficient time to inform the upcoming capital program realignment process.

**West Seattle and Ballard Link Extensions**

The need to commission an independent review of our newly estimated project costs is particularly acute given the estimated increase of approximately $4 billion, or over 50%, to this project since 2019. This project includes construction of a new tunnel through the West Coast's densest urban environment north of San Francisco, as well as crossing the Ballard Ship Canal and Duwamish Waterway while preserving maritime navigation. The description below of costs uses the $12.1 billion number located in the table above, which, of the two preferred elevated alternatives in West Seattle, uses the 41st/42nd Avenue alternative.

The largest single cost driver for these extensions is the need to acquire right-of-way (ROW) while acquisition prices continue to rise unabated, even during the pandemic. The recent estimates that will

undergo independent review reflect increased property costs of $2.13 billion, or an increase of 263% from 2019 estimates. Factors include:

- New development throughout the corridor means having to purchase large, recently constructed commercial/residential buildings, and projects currently in construction. An example of this is at Southwest Alaska St. and Fauntleroy Way Southwest in West Seattle, one block from Alaska Junction. Three parcels are being redeveloped into a mixed-use site with 306 apartments. These parcels, initially estimated at $76 million to acquire, are now estimated to cost over $250 million, including relocation of 306 households.
- Early ROW estimates were developed by establishing an assumed "buffer" surrounding representative alignments. Following the development of alternatives for the project, the footprints of these alternatives are more detailed and better define the specific parcels that are likely to be needed. This work has identified significantly greater property acquisition requirements.
- Current market conditions point to the need to assume a much higher rate of real estate appreciation than reflected in the index the agency has previously used. In a recent analysis of high value properties along the corridor, assessment values increased by an average of 21% in one year. The increased ROW cost estimates for the elevated options within West Seattle and Ballard may also mean that the cost differential associated with tunneling options may have shrunk as a percentage of total project costs. These differentials will be recalculated based on updated data for both options and will be reported to the Board as part of the ongoing WSBLE project development process.

The recent estimates that will undergo independent review also reflect an increase of $1.27 billion, or 26%, in construction costs. As designs have advanced, they reflect:

- Needs for wider and extra-long spans for aerial guideway with associated large shafts/foundations and supporting structures to minimize impacts to existing infrastructure, facilities and businesses, particularly in industrial areas along the corridor.
- Increased costs for mined stations in the downtown area given challenging site conditions, physical constraints, and the need to ensure sufficient structural support during excavation activities.
- Increased project scope related to additional station entrances, underground and aboveground pedestrian walkways, and elevators and escalators to facilitate convenient passenger movement and intermodal connections, particularly at the transfer hubs and terminus station locations.
- Improved understanding of utility relocation requirements, particularly in the downtown area.
- Better understanding of environmental mitigation, particularly at the water crossing locations.

Because construction costs have increased, unallocated contingencies and soft costs, which are calculated as percentages of construction costs, increased correspondingly by $775 million.

**Tacoma Dome Link Extension**

While estimates for many elements of this project remain consistent with the 2019 estimates, the advancement of the design for this project has identified adjustments resulting in a cost estimate increase of 10%, as noted in the table above. The 2020 estimates for the PA with the two options through Fife via SR 99 and I-5 are both approximately $3.3 billion. Compared to the West Seattle and Ballard extension projects, this project has much smaller growth in property acquisition costs as it runs largely within Washington State Department of Transportation right-of-way and largely avoids densely developed properties apart from certain areas in Fife and Tacoma. The primary changes to the project cost are associated with:

- Refinement of stormwater collection requirements.
- Improved station and guideway definition.
- Elevation of three miles of alignment along I-5 previously assumed to be at-grade. The change in guideway is due to improved understanding of the environmental and culturally sensitive areas in the corridor from fieldwork investigations and tribal consultations. This is an important change in the profile as it enables the project to avoid or minimize potential affects to the Hylebos Creek system and to important cultural and historic areas.

**Operations and Maintenance Facility South**

Three sites are being studied for this facility in the Draft Environmental Impact Statement. Advancement of the design involved further analysis and identification of Sound Transit's long-term systemwide operational needs. The outcome of this analysis added facilities to support the entire light rail system and refined the configuration of the site. As a result, we found that a larger site is needed to accommodate a much larger total building square footage (50% larger) as well as additional tracks. Additionally, to minimize the increased site size, stormwater collection vaults are used to address site drainage.

The updated estimates that will be independently reviewed include increases over the 2019 estimates of $424 million for the South 336th Street site option; $360 million to $365 million for the South 344th Street site option; and $478 million to $1.1 billion for the design options at the Midway Landfill site. The Midway Landfill estimates have higher construction costs than the other sites due to unique requirements to address ongoing ground settlement at the landfill and the complex structures required to support building on top of a Superfund site.

**Stride Bus Rapid Transit (BRT)**

The Stride program consists of new BRT service on I-405 and SR 522 along with a new bus base. The estimates for the Stride alignments have decreased from the numbers presented in 2019. The construction costs of the roadway structures needed for BRT have remained consistent. The I-405 BRT alignment saw minor reductions in cost estimates: the estimates for this project have held steady at around $1 billion since ST3. A 17% reduction of the SR 522 BRT estimate from the 2019 is a result of reduction in scope and right-of-way assumptions. The project team and partners were able to identify where scope could be reduced due to complimentary existing service, and design changes to reduce property impacts in Lake Forest Park and Bothell while providing the same or improved speed and reliability advantages. Additionally, the introduction of a roundabout at 5th Ave Northeast and Northeast 145th in Shoreline will reduce travel time without requiring other more expensive planned capital improvements. The bus base estimate has increased but is also being sized to accommodate a portion of the ST Express bus fleet in addition to BRT vehicles. Consistent with our approach with planned light rail extensions, the independent assessment will include a review of the Stride program to assure a fully updated cost estimate for the entire ST3 program.

**Other ST3 light rail projects**

Project development began for the Everett Link Extension and the Operations and Maintenance Facility North in November. The first task for the project consultant is to review the project scope and estimate from the ST3 plan. We anticipate that these projects will experience similar cost estimate increases to those described above and that other light rail extensions scheduled for the later years of the ST3 plan—the extension from South Kirkland to Issaquah and to Tacoma Community College—will see similar increases.

In advance of future design work, we are incorporating the earlier referenced increase of 36% from the ST3 cost estimates for these projects within our Long-Range Financial Plan. Because project development has just started for the Everett and OMF North projects and is not scheduled to start for several years on the other two projects, we are using an adjustment based on the overall increase of the TDLE project from its ST3 estimate to its current 2020 estimate. The TDLE project, which, like the Everett and Issaquah projects, is assumed to have alternatives that make significant use of property along WSDOT right of way. This assumption will be tested as part of the independent review described below and is also likely to change as future design work provides more project-specific information.

**SOUND TRANSIT COST ESTIMATING APPROACHES**

Sound Transit used similar early cost estimating methodologies for ST3 projects to those used to advance earlier Sound Transit projects that are either now complete or in different stages of construction. These include the Link Initial Segment (completed 2009); Airport Link (completed 2009); University Link (completed 2016); South 200$^{th}$ Link (completed 2016); Northgate Link (97.6% percent complete), Hilltop Tacoma Link (68.8% complete); East Link (88% percent complete); Lynnwood Link (31% complete); Downtown Redmond Link (19% complete); and Federal Way Link (25% complete). These percentages of completion are based on reported progress through November 2020.

While past cost estimation approaches have worked well for many projects, recent work reflects that our methods have not been as effective in the most urbanized parts of our region. With WSBLE, TDLE, Everett Link and the BRT projects in early planning, it is prudent to examine what changes would be effective now in order to have more certainty before baselining projects currently in the development phase.

Specifically, Sound Transit's past planning estimates have relied on parametric estimating methods that utilize a unit cost library. The library is updated throughout the conceptual engineering design by project consultants in coordination with staff. This library has identified specific unit cost assumptions for major work elements associated with construction of light rail, commuter rail and BRT projects such as at-grade, elevated and underground tracks. These assumptions have been applied across projects. However, advancement of the WSBLE design in particular shows that the unit cost library and the initial planning assumptions used to define the project did not adequately capture the complexity of the project or the pace of real estate development in Seattle.

Recent work that will be independently reviewed reflects that the parametric estimating model and approach to project definition in early planning were more successful for the Stride BRT program and Tacoma Dome Link Extension. As an example, the current estimate for TDLE reflecting the change in profile from at-grade to elevated for three miles is relatively similar to the library's cost assumptions.

In general, the model worked well in early work to advance the Northgate Link, East Link and Redmond Link Extension projects that Sound Transit is tracking toward on-budget and on-time openings in 2021, 2023, and 2024, respectively. The independent review will seek to increase understanding of where the past unit cost model and approach to project definition in early planning for developing early cost estimates has worked, where it has not worked, and what accounts for the differences.

Other topics that will be evaluated through the independent review will look at whether Sound Transit should use cost ***ranges*** instead of a hard cost estimates to better reflect the risks and uncertainties that can't be fully identified at planning and conceptual levels of design.

**SCOPE AND TIMELINE OF THE INDEPENDENT REVIEW AND NEXT STEPS**

A contract procurement for an independent cost estimate assessment is now underway. We expect a consultant onboard by the end of January 2021 to conduct an expedited review, enabling the Sound Transit Board to receive insights this spring that can support the realignment process now underway. We intend for the process to provide recommendations for updating our cost assumptions and methodologies. By design, the independent review will be conducted by consultant staff without previous ST3 cost estimating involvement.

Staff will share findings from the independent cost review with the Sound Transit Board and committees starting in April. Following review by the staff and Board, updated cost assumptions as well as updated revenue assumptions will be included in future Board resources for the realignment process.