

APPENDIX L

COST ESTIMATE

This document provides the capital cost assumptions and estimates for each Stream corridor, including vehicle costs, and costs for right-of-way, utilities, stations and signals.

MEMORANDUM

To: Darin Stavish

From: Stream System Expansion Study Project Team

Date: December 21, 2022

Subject: Planning Level Cost Assumptions for SSES Evaluation

INTRODUCTION

This memorandum summarizes capital cost estimates and presents estimating methodology used by in the Stream System Expansion Study (SSES). Planning level costs have been developed for all four corridors, including alignment routing alternatives using a program wide estimating methodology.

The study team worked in partnership with Pierce Transit to develop Stream System Service Standards and completed that work in the Spring of 2022. The Stream Service Standards are the most important aspect of the program level cost estimates.

The study team developed capital cost estimates based on the proposed service standards for each corridor and cost estimates for speed and reliability treatments unique to each corridor. These corridor speed and reliability treatments have been developed in partnership with local agencies and had planning level support from the local agencies.

HIGH LEVEL COST ESTIMATES

The SSES team estimated total implementation costs of Stream BRT service within the corridor options in May of 2022 as noted below.

Figure 1 Cost Summary

Corridor Option	Corridor Length (Miles)	Total Capital Cost Excluding Vehicles (2022 \$)	Total Capital Cost Including Vehicles (2022 \$)
A	12.0	\$38,600,000	\$64,100,000
A1	14.0	\$43,200,000	\$71,700,000
A2	7.2	\$23,100,000	\$38,100,000
B	11.2	\$31,200,000	\$56,700,000
B1	11.8	\$34,600,000	\$61,600,000
B2	11.2	\$33,700,000	\$59,200,000
C	8.6	\$27,600,000	\$48,600,000
C1	13.0	\$36,000,000	\$66,000,000
D	13.3	\$33,600,000	\$60,600,000
D1	11.8	\$30,400,000	\$49,900,000
D2	13.3	\$33,800,000	\$60,800,000

Costs presented are developed with comparison purposes in mind between the corridor options. Further cost certainty will be obtained with further planning and design advancement.

Why are the estimated costs of the next Stream BRT lines less than Stream 1? Speed and Reliability treatments proposed for the next generation of Stream BRT service aligns with an arterial BRT system without dedicated guideway and does not propose major traffic modifications to the existing street grid.

BASIS OF ESTIMATE

Cost assumptions

Potential BRT infrastructure improvements were evaluated for each corridor. These were grouped into the following high-level categories: guideway, stations, pedestrian & bicycle access to the stations, transit signal priority, right-of-way, and vehicles.

The costs for these improvements is based on recent, similar projects, and a typical unit cost is assigned to each improvement type. This is then multiplied by the number of estimated improvements of that type per corridor. In addition to the construction costs, an additional

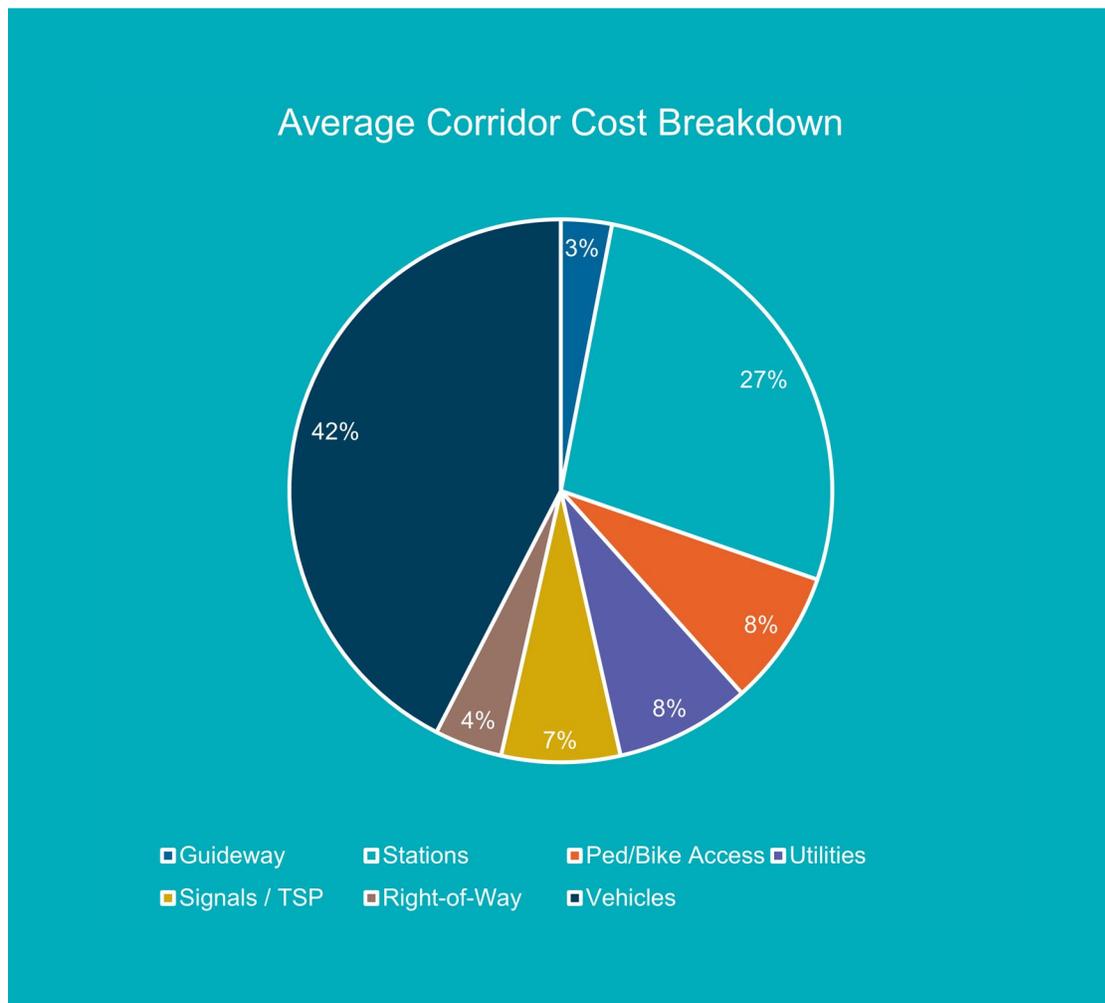
Program Cost factor is applied to cover generic project costs, administrative costs, and contingencies.

Program Cost

In order to determine a final cost for improvements, a programmatic cost factor has been developed. This factor includes miscellaneous construction costs including traffic control, erosion control, mobilization, and similar costs. It also includes administrative and soft costs such as planning, permitting, design, construction management, and staffing. Due to the high-level nature of this estimate, contingencies are also included within the factor.

For pedestrian & bicycle access, utilities, and ROW, the costs are based on a percentage of other costs. As such, they do not have the Program Cost factor added in, as it is already included within the costs of the original items.

The price for the vehicles does not have any additional factor applied either, as the components of the Program Cost factor either do not apply or are assumed already included within the cost provided by the manufacturer.



COST COMMENTARY

Guideway

The guideway includes all costs for improvements related to paving, channelization, and signage. This work includes removing existing stations, constructing in-lane stops, queue jumps, Business Access & Transit (BAT) lanes, and roadway widening. Roadway paving is assumed to be HMA with 11 ft. lanes. Concrete bus pads are assumed at each station, though this cost is included within the station costs.

It is assumed that most new stations will all be in-lane stops. In-lane stops provide more consistency as the vehicles do not need to find space to merge with traffic. As the existing stops are for the greater majority already in-lane stops, there is no additional cost to implement this. There is one mid-block conversion from pullout to in-lane, which is SB on Corridor C along Meridian Ave between 152nd St and 156th St, and includes costs for the removal of the pavement pullout. The new stations will also be placed less frequently, roughly every half mile rather than less than a quarter mile. The cost for stations themselves is included in a separate category below. The costs captured here for station removal only include those for demo of the existing station amenities, including removal of the shelter and signage.

Other costs within this category include the demo and paving needed to widen the roadway and construct queue jumps although the expected utilization of these two is very limited. Queue jumps will utilize existing right turn lanes where possible, however receiving lanes and in some locations queue jump lanes will need to be constructed or extended. Any costs for signal modifications are within the Signals category. Costs for restriping for Bus Access/Transit (BAT) lanes is also included in this category. BAT lanes consists of repurposing an existing general use lane.

For roadway widening, the only location that has been identified is a 250 ft. stretch along Route C on Meridian Ave E just north of 126th St E.

Stations

Stations costs are assumed to be all inclusive, with platforms, concrete bus pad, shelters, signage, and other amenities. Demo of existing curb, sidewalk, and pavement is also included here. This item does not discriminate between which costs will be borne by the contractor and which items are agency provided and only installed by the contractor.

Pedestrian & Bicycle Access

This category contains costs for improvements to bike lanes, sidewalks, and crossings. For bikes this includes an area within 1-3 miles of the stations, and within ½ mile of the stations for pedestrians. As this is a high-level programmatic estimate, the costs for these improvements is estimated at 30% of the station costs.

Signals

Signal upgrades are proposed at many intersections to improve transit speed and reliability throughout each of the corridors. All costs within this category include costs for trenching and restoration, conduits, wiring, and signal testing. It's also assumed that in most cases, the existing controller foundation can be re-used for the new controller box.

Signal costs include implementation of TSP at half of the intersections throughout the corridor. Each one services both directions. These improvements are assumed to only include controllers, using the existing poles, mast arms and signal heads. The TSP system functions by holding the green signal to allow buses through the intersection.

Several Queue jump signals are proposed as well. These include a new signal pole on the near side of the intersection, a new signal head on the existing mast arm on the far side, and a controller box.

Routes B & D also have a new priority transit signal at the SR-512 Park & Ride entrance onto S. Tacoma Way. This signal cost includes three new signal poles as well as the controller.

Utilities

This is a high-level estimate for all electrical, communication, ITS, and drainage costs. Due to this, and the assumption that most aspects will have some form of utility work included, the costs here are based on 20% of the guideway, station, and pedestrian & bike access.

Right-of-Way

All costs for right-of-way acquisition, as well both temporary and permanent easements are included in this cost. Due to the high-level nature of the design at this stage, the costs are assumed at 10% of the station cost and 20% of the pedestrian & bike costs. Those two items are the most likely to generate the need for additional right-of-way.

Vehicles

The vehicles for this Stream expansion are assumed to be the same as those procured for Stream 1, 60 ft. articulated buses. These are counted as a per vehicle cost, and it is assumed that all contingencies and other factors are already included in this cost, so no additional factor has been applied. While the costs and feasibility of electrification of the corridors will be evaluated in the future, those costs are not included here.

RESULTS

A summary of the cost estimate for the various corridor options is presented above in the summary table. These costs compile the various options for each corridor. Per these results, Corridor A2 has the lowest total capital cost, both with and without vehicles, as well as the lowest annualized cost. However the lowest non-vehicle cost per mile is corridor option D. While corridor D ranks in the middle for overall costs, it's relatively long corridor length of over 13 miles causes the per mile drops the per mile costs below the A2, which has the shortest length at just over 7 miles.

PROJECTS

All Corridors

Many of these projects and costs will occur on all routes, with the only difference between the routes being the number of the projects due to the differing lengths.

- Removal of Existing Stops
- Stations

- Utilities
- Pedestrian & Bicycle Access
- Transit Signal Priority
- Right-of-Way
- Vehicles

The projects listed below are grouped by corridor. The corridor option that each project is for is included within parentheses.

Corridor A

- Queue Jumps
 - NB Bridgeport Way W & Custer Rd W (A, A1, A2)
- BAT Lanes
 - EB/WB S 19th from Market to MLK (A, A1)
- Queue Jump Signals
 - EB S 19th St & S Sprague Ave (A, A1)
 - NB Bridgeport Way W & 67th Ave W (A, A1, A2)
 - SB Bridgeport Way W & Custer Rd W (A, A1, A2)
 - NB Bridgeport Way W & Custer Rd W (A, A1, A2)

Corridor B

- BAT Lanes
 - NB/SB S Tacoma Way from S 47th St to S 56th St (B, B1, B2)
- Queue Jump Signal
 - NB/SB S Tacoma Way & 96th St SW (B, B1, B2)
- Transit Priority Signal
 - NB/SB SR-512 Park and Ride & S Tacoma Way (B, B1, B2)

Corridor C

- In-Lane Stops
 - SB Meridian & 152nd St E (C, C1)
- Queue Jumps
 - NB 3rd & Pioneer (C, C1)
 - NB 3rd St SE & 7th Ave SE (C, C1)
 - SB Meridian & 132nd St E (C, C1)
 - NB Meridian & 136th St E (C, C1)
 - NB Meridian & 152nd St E (C, C1)
 - NB Meridian & 156th St E (C, C1)
 - SB Meridian & 160th St E (C, C1)
- BAT Lines
 - NB 3rd St SE from 9th Ave SE to 7th Ave SE (C, C1)

- NB 3rd St SE from 7th Ave SE to E Pioneer (C, C1)
- NB Meridian from north of 136th St E to 132nd St E (C, C1)
- SB Meridian from 132nd St E to 136th St E (C, C1)
- NB Meridian approaching 156th St E (C, C1)
- SB Meridian approaching 160th St E (C, C1)
- Widening
 - SB Meridian Ave E for 250' north of 136th St E (C, C1)
- Queue Jump Signal
 - SB Meridian and 512 On/Off Ramps (C, C1)

Corridor D

- Queue Jumps
 - EB 96th St SW & S Tacoma Way (D, D1)
 - EB 112th St S & Steele St S (D, D1, D2)
 - WB 112th St S & Steele St S (D, D1, D2)
 - WB 112th St S & Pacific Ave S (D, D1, D2)
- Queue Jump Signal
 - EB 112th St S & Pacific Ave S (D, D1, D2)
 - EB/WB 113th St S & Canyon Rd E (D, D1, D2)
- Transit Priority Signal
 - NB/SB SR-512 Park and Ride & S Tacoma Way (D, D1, D2)