Capital Cost Estimating Methodology

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Acronyms and Abbreviations

AACE	Association for the Advancement of Cost Engineering
ASTM	American Society for Testing and Materials
BRT	Bus Rapid Transit
CSI	Construction Specification Institute
EIS	Environmental Impact Statement
ENR	Engineering News-Record
FTA	Federal Transit Administration
OCIP	Owner Controlled Insurance Program
PCPP	Project Control Policies and Procedures
SCC	Standard Cost Categories
Sound Transit	Central Puget Sound Regional Transit Authority
WSDOT	Washington State Department of Transportation

Chapter 1
Executive Summary

This Capital Cost Estimating Methodology report describes the development of capital cost estimates for System Plan Development (ST3) projects that will be ~~identified~~ selected by the Sound Transit Board of Directors.

The scope of work includes three stages:

- Review and update, as needed, Capital Cost Estimating Methodology
- Update and utilize unit cost data developed for recent Sound Transit HCT studies
- Prepare and present capital cost estimates for identified projects per the approved methodology

Each submittal will include an estimate of the probable cost of construction with appropriate ~~design allowances,~~ unallocated and allocated contingency~~, basis of estimate summarizing scope and limitations of the estimate and cost/quantity support documentation~~. The probable construction costs will be Class 4 level of project detail, as defined in Recommended Practice No. 17R-97 issued by the Association for the Advancement of Cost Engineering (AACE). Submittal formats will follow the Construction Specification Institute (CSI) divisions (Master Format 2004 update), latest Federal Transit Administration (FTA) Standard Cost Categories (SCC), and Sound Transit Project Controls Policies and Procedures PCPP-02 (Cost Estimating) to address route alignment, segment, and other system costs.

The system planning cost estimate submittals will involve the preparation of a capital cost estimate based on the outline in the following methodology when the project definition differs from that depicted in the ST2 or HCT study. A Unit Cost Library (UCL) will be developed to current year dollars (4th quarter 2014) and the quantities for identified alternatives will be estimated and used to prepare the Final System Planning Cost Estimate Report.

Where the ST2 or HCT study project definition is not revised, the construction cost plus allocated contingency from the ST2 or HCT study will be inflated to 4th quarter 2014 dollars. Soft costs are then calculated from the inflated construction cost.

~~The cost estimates will include appropriate design allowances, allocated and unallocated contingency markups as individual line items.~~ A Basis of Estimate Report~~-~~ explaining the scope, assumptions and limitations of the estimating process will accompany the cost estimate.

Chapter 2
Background and Purpose

Revision to Sound Transit's (ST) Long Range Plan (LRP) was started in October 2013. Using the updated LRP as a basis for project development, ST's System Plan Development (ST3) was then begun to develop the list of projects for the ST Board of Directors to consider for a 2016 ballot measure. Evaluation of the projects will be undertaken to refine the list for board consideration. Among the evaluation criteria to be used, capital costs will be an important consideration.

In order to estimate project capital costs, further conceptual engineering design development of identified projects will be undertaken where necessary as part of the ST3 planning process. The refinement in project definition that arises, based on ST3 conceptual engineering work, will provide an increased level of confidence in the assumptions and cost ranges when compared to the earlier work that was carried out for the Long-Range Plan Update and High-Capacity Transit Corridor studies.

The purpose of the cost estimation phase of ST3 is to identify the likely capital and operations and maintenance costs of projects such that an adequate funding scenario can be developed for the project/program implementation. This report documents the approach to capital cost estimation. The capital cost estimating methodology described in this document acknowledges the varying degrees of design that will be available for potential ST3 projects, takes advantage of ST experience in estimating and building similar facilities and focuses cost estimating resources on the largest projects with the greatest potential to impact the overall cost estimate for the ST3 program.

Chapter 3
Estimating Scope and Methodology

The capital cost estimating methodology is structured to comply with the FTA Standard Cost Categories (SCC) for Major Capital Projects. Use of the FTA SCC format has the benefit of presenting the capital cost estimates in an industry-recognized format that requires consideration of all project components known to drive costs.

The general cost categories defined in the FTA SCC are as follows:

10	Guideway and Track Elements
20	Stations, Stops, Terminals, Intermodal
30	Support Facilities: Yards, Shops, Administration Buildings
40	Sitework and Special Conditions
50	Systems
60	Right-of-Way, Land, Existing Improvements
70	Vehicles
80	Professional Services
90	Unallocated Contingency
100	Finance Charges

Each project that will be developed for system planning will have conceptual alignment drawings, typical sections, potential station locations and/or written descriptions prepared that will provide needed definition for each of the major cost components. These documents form the basis for the identification of various composite cost elements that will be used to prepare the capital cost estimates.

These facility elements can be classified into one of two broad groups, either non-typical, unique facilities or typical composite cost elements. A unique facility cost will be developed based on specific conceptual engineering and design of the facility under consideration. One example is the storage and maintenance facility. The cost of such a facility is highly dependent on the operational and maintenance requirements for that particular location in addition to the site's geographical constraints. The number of vehicles to be stored, type of maintenance to be performed and the topographical conditions of a particular location does not lend itself to a "typical" per-square-foot cost approach.

Typical facility costs are developed for elements that can be reasonably defined by a typical cross-section and applied over a given length of an alignment. The typical facility composite unit cost is developed by combining the costs for all of the individual construction elements

applicable to a given typical section or facility and then creating a representative composite unit cost. Typical sections or facilities composite unit costs have been developed for other recent Sound Transit corridor studies. These unit costs will be reviewed and updated to 4th quarter 2014 dollars.

In some cases a typical facility will be based on a conceptual scope of work developed as appropriate for a specific type of facility that is not linear, for example a typical parking garage. The cost for a typical parking garage would be developed and then translated into a unit cost per stall.

After quantities are prepared for both typical and non-typical facilities and the cost data is developed, it will be put into the cost estimate based on the stationing of the alignment for each alternative. This format relates the cost directly to the alignment drawings and assists in summarizing costs, as well as in the analysis of various alignment alternatives.

The general approach for the capital cost estimating methodology consists of the following steps:

1. Cost Estimates for SCC 10 through 50 will be prepared and submitted with the following stipulations:
   - Construction Cost Estimates will be submitted to Sound Transit for review of each estimate and provide written comments as required.
   - Construction Cost Estimates will reflect an opinion of probable cost for the construction work based on professional experience and judgment.
   - Appropriate ~~design allowance and~~ allocated contingency markup~~s~~ will be included on a line item basis, based on professional judgment and in consultation with Sound Transit staff.
2. Cost Estimates for SCC 60 (Right-of-Way): Sound Transit real estate staff will provide the property cost estimates (in 2014 dollars) for needed right-of-way, including WSDOT property.
3. Cost Estimates for SCC 70 (Vehicles): Costs for vehicles will be included in this estimate based on recent procurement contracts by Sound Transit.
4. Cost Estimates for SCC 80 (Professional Services): Sound Transit will provide guidance on percentage allowances for SCC 80 costs.
5. Cost Estimates for SCC 90 (Unallocated Contingency): Costs will be based on percentage of the construction cost for SCC 10 through 50.
6. Cost Estimates for SCC 100 (Finance Charges): This cost category will not be included in the capital cost estimates but will be addressed in the financial modeling task.

3.1 General Estimating Methodology

The following describes the process used to develop scope, quantity, and cost parameters for each composite cost item used (for SCC 10 through 50) in the estimate:

- Scope—For most cost items, the scope will be determined by an evaluation of the discrete construction items or activities that could reasonably be associated with that cost item based on a review of the system planning drawings prepared for identified projects.
- Quantities—Construction items and their related quantities will be developed from the system planning drawings and/or associated technical reports. Direct measurements from drawings and mathematical calculations used in the technical reports will be used to prepare quantities for significant construction items in the cost estimates. Some quantities will be estimated by the use of allowances or other indirect means for items where there is not sufficient detail to perform a direct quantity takeoff at the system planning level.
- Cost—Unit prices for each of the construction items or activities will be developed utilizing the commercial cost estimating database software Timberline (see discussion in Section 3.3). Unit prices will then be applied to the unit quantities identified for each cost item to produce an overall unit price for each element. For some minor lump sum items or items where the scope of work cannot be readily determined, an allowance cost will be used.
- Contingencies—~~Design allowance and a~~Allocated contingency markups, typically greater than 20 percent, will be added to the estimate on a line-by-line basis based on professional judgment and in consultation with Sound Transit. Appendix A lists proposed typical allocated contingencies. This appendix will be revised based on the uncertainty levels and remaining unknowns at the time the estimates are prepared.

3.2 Report Format

The estimate report will be developed in a spreadsheet format that presents construction cost items and unit quantities sorted according to individual line items based on CSI Master Format 2004. These individual line items will then be organized and reported by FTA SCC categories.

Figure 3-1 summarizes the elements included in the FTA SCC categories.

Figure 3-1. Definitions of FTA Standard Cost Categories (Rev 16, June 2014)

Standard Cost Categories for Capital Projects	Definitions
10.00 GUIDEWAYAND TRACK ELEMENTS (route miles)	Include guideway and track costs for all transit modes (heavy rail, light rail, commuter rail, bus rapid transit [BRT], rapid bus, bus, monorail, cable car, etc.). The unit of measure is route miles of guideway, regardless of width. As associated with the guideway, include costs for rough grading, excavation, and concrete base for guideway where applicable. Include all construction materials and labor regardless of whom is performing the work. In the written description of the scope and in supporting graphic diagrams, indicate whether busway or rail track is single, double, triple, relocated, etc. Put guideway and track elements

Standard Cost Categories for Capital Projects		Definitions
		associated with yards in 30 Support Facilities below.
10.01	Guideway: At-grade exclusive right-of-way	
10.02	Guideway: At-grade semi-exclusive (allows cross-traffic)	
10.03	Guideway: At-grade in mixed traffic	
10.04	Guideway: Aerial structure	Include foundation excavation; guideway structures including caissons, columns, bridges, viaducts, cross-overs, and fly-overs.
10.05	Guideway: Built-up fill	Include construction of earthen berms.
10.06	Guideway: Underground cut and cover	Include excavation, retaining walls, backfill, underground guideway structure, and finishes.
10.07	Guideway: Underground tunnel	Include tunneling by means of a tunnel boring machine, drill blasting, mining, and immersed tube tunneling; and tunnel structure and finishes.
10.08	Guideway: Retained cut or fill	Include excavation, retaining walls, backfill, underground guideway structure, and finishes.
10.09	Track: Direct fixation	Include rails and connectors.
10.10	Track: Embedded	Include rails, ties, and ballast where applicable.
10.11	Track: Ballasted	Include rails, ties, and ballast.
10.12	Track: Special (switches, turnouts)	Include transitional curves.
10.13	Track: Vibration and noise dampening	Include upcharge for vibration/noise dampening to any track condition above.

20.00 STATIONS, STOPS, TERMINALS, INTERMODAL (number)		As associated with stations, include costs for rough grading, excavation, station structures, enclosures, finishes, and equipment; mechanical and electrical components including HVAC, ventilation shafts and equipment, station power, lighting, public address/customer information system, safety systems such as fire detection and prevention, security surveillance, access control, life safety systems, etc. Include all construction materials and labor regardless of whom is performing the work.
		Put guideway and track associated with stations in 10 Guideway and Track Elements above.
20.01	At-grade station, stop, shelter, mall, terminal, platform	
20.02	Aerial station, stop, shelter, mall, terminal, platform	Include station structures including caissons, columns, platforms, and superstructures, etc.
20.03	Underground station, stop, shelter, mall, terminal, platform	Include retaining walls, backfill, and structure.

Standard Cost Categories for Capital Projects		Definitions
20.04	Other stations, landings, terminals: intermodal, ferry, trolley, etc.	
20.05	Joint development	As stated in FTA's Joint Development Guidance, "Joint development is any income-producing activity with a transit nexus related to a real estate asset in which FTA has an interest. Joint development projects are commercial, residential, industrial, or mixed-use developments that are induced by or enhance the effectiveness of transit projects."
20.06	Automobile parking multi-story structure	Include retaining walls, backfill, and structure.
20.07	Elevators, escalators	

30.00 SUPPORT FACILITIES: YARDS, SHOPS, ADMINISTRATION BUILDINGS		As associated with support facilities, include costs for rough grading, excavation, support structures, enclosures, finishes, and equipment; mechanical and electrical components including HVAC, ventilation shafts and equipment, facility power, lighting, public address system, safety systems such as fire detection and prevention, security surveillance, access control, and life safety systems, etc. Include fueling stations. Include all construction materials and labor regardless of whom is performing the work.
		Where a support facility shares the structure with a station, its cost may be included with station cost. Identify this with a note.
		Except for guideway and track associated with a yard, include all guideway and track costs associated with support facilities in 10 Guideway and Track Elements above.
30.01	Administration building: Office, sales, storage, revenue counting	
30.02	Light maintenance facility	Include service, inspection, storage facilities, and equipment.
30.03	Heavy maintenance facility	Include heavy maintenance and overhaul facilities and equipment.
30.04	Storage or maintenance of way building	
30.05	Yard and yard track	Include yard construction, guideway, and track associated with yard.

40.00 SITEWORKAND SPECIAL CONDITIONS		Include all construction materials and labor regardless of whom is performing the work.
40.01	Demolition, clearing, earthwork	Include project-wide clearing, demolition, and fine grading.
40.02	Site utilities, utility relocation	Include all site utilities: storm, sewer, water, gas, and electric.
40.03	Hazardous material, contaminated soil	Include underground storage tanks, fuel tanks, and

Standard Cost Categories for Capital Projects		Definitions
	removal/mitigation, groundwater treatments	other hazardous materials and treatments, etc.
40.04	Environmental mitigation, e.g., wetlands, historic/archaeological, parks	Include other environmental mitigation not listed.
40.05	Site structures including retaining walls, sound walls	
40.06	Pedestrian/bicycle access and accommodation, landscaping	Include sidewalks, paths, plazas, landscape, site and station furniture, site lighting, signage, public artwork, bicycle facilities, and permanent fencing.
40.07	Automobile, bus, van accessways including roads, parking lots	Include all on-grade paving.
40.08	Temporary facilities and other indirect costs during construction	As a general rule and to the extent possible, appropriately allocate indirect costs among the construction costs in Categories 10 through 50. Where that is not possible, include in 40.08 Temporary Facilities costs for mobilization, demobilization, and phasing; time and temporary construction associated with weather (heat, rain, freezing, etc.); temporary power and facilities; temporary construction, easements, and barriers for stormwater pollution prevention, temporary access, and to mitigate construction impacts; project and construction supervision; general conditions, overhead, and profit. Note: Include contractor's general liability and other insurance related to construction such as builder's risk in Categories 10 through 50, not in 80 Professional Services below.
50.00 SYSTEMS		Include all construction materials and labor regardless of whom is performing the work.
50.01	Train control and signals	
50.02	Traffic signals and crossing protection	Include signal prioritization at intersections.
50.03	Traction power supply: substations	
50.04	Traction power distribution: catenary and third rail	
50.05	Communications	Include passenger information systems at stations and on vehicles (real time travel information, static maps, and schedules). Include equipment to allow communication among vehicles and with central control.
50.06	Fare collection system and equipment	Include fare sales, swipe machines, and fare-counting equipment.

Standard Cost Categories for Capital Projects		Definitions
50.07	Central control	
Construction Subtotal (10 through50)		**Sum of 10 through50**
60.00 RIGHT-OF-WAY, LAND, EXISTING IMPROVEMENTS (sq. ft.). See Appendix B for ST pricing methodology.		Include professional services associated with the real estate component of the project. These costs may include agency staff oversight and administration, real estate and relocation consultants, legal counsel, court expenses, and insurance, etc.
60.01	Purchase or lease of real estate	If the value of right-of-way, land, and existing improvements is to be used as a local match to the federal funding of the project, include the total cost on this line item. In backup documentation, separate cost for land from cost for improvements. Identify whether items are leased, purchased, or acquired through payment or for free. Include the costs for permanent surface and subsurface easements, and trackage rights, etc.
60.02	Relocation of existing households and businesses	In compliance with Uniform Relocation Act.
70.00 VEHICLES (number)		Include professional services associated with the vehicle component of the project. These costs may include agency staff oversight and administration, vehicle consultants, design and manufacturing contractors, legal counsel, warranty and insurance costs, etc.
70.01	Light rail	Include light rail and streetcar rail using electric, diesel, or other power supply.
70.02	Heavy rail	
70.03	Commuter rail	Include locomotives (diesel, electric, or other), trailer cars, and self-propelled multiple units (electric multiple unit, diesel multiple unit, or other power supply).
70.04	Bus	Include "rubber-tired" buses and trolleys that are new, used, historic replica, or articulated, using electric, diesel, dual-power, or other power supply.
70.05	Other	Include vans, sedan/station wagon, cable car, people mover, monorail, car/inclined railway, ferry boat, and transferred vehicle.
70.06	Non-revenue vehicles	
70.07	Spare parts	
80.00 PROFESSIONAL SERVICES (applies to Categories 10 through 50)		Category 80 applies to Categories 10 through50. Category 80 includes all professional, technical, and management services related to the design and

Standard Cost Categories for Capital Projects		Definitions
		construction of fixed infrastructure (Categories 10 through50) during the preliminary engineering, final design, and construction phases of the project. This includes environmental work, design, engineering, and architectural services; specialty services such as safety or security analyses; and value engineering, risk assessment, cost estimating, scheduling, before and after studies, ridership modeling and analyses, auditing, legal services, administration and management, etc. by agency staff or outside consultants.
80.01	Preliminary engineering	
80.02	Final design	
80.03	Project management for design and construction	
80.04	Construction administration and management	
80.05	Professional liability and other non-construction insurance	
80.06	Legal; permits; review fees by other agencies, cities, etc.	
80.07	Surveys, testing, investigation, inspection	
80.08	Startup	Include startup and training. Include in Categories 10 through 50 above access and protection work by agency staff or outside contractors.
Subtotal (10 through 80)		Sum of 10 through80
90 UNALLOCATED CONTINGENCY		Includes unallocated contingency and project reserves. Document allocated contingencies for individual line items on the main worksheets.
Subtotal (10 through90)		Sum of 10 through90
100.00 FINANCE CHARGES		Include finance charges expected to be paid by the project sponsor/grantee prior to either the completion of the project or the fulfillment of the New Starts funding commitment, whichever occurs later in time. Finance charges incurred after this date should not be included in Total Project Cost. (See FFGA Circular FTA C5200.1A Chapter III for additional information.)
Total Project Cost (10 through100)		**Sum of 10 through100**

3.3 Development of Unit Cost Library

Planning level cost data has been developed and utilized on a number of HCT corridor studies and LRP efforts completed to date and will provide a beginning point for the development of a Unit Cost Library (UCL). Unit costs will be developed as described in Section 3.4 to 3.8 below and will be evaluated to historical unit costs seen in the greater Seattle region for similar types of construction. The first task in developing the UCL will be to prepare a list of work items that are typical based on the scope of work for anticipated transit technology. This cost data will be compiled into a database format to form a Unit Cost Library. The key elements of the UCL are an Item Code, Item Description, Unit of Measure, and Unit Cost. All unit costs will include contractor's direct construction cost plus all taxes, general expense, overhead and profit and are intended to represent typical contractors "bid prices". The unit costs will not include items such as engineering, construction management, owner's administrative costs and allowances for contingencies. These costs will be included as percentage add-ons to the cost estimate at the summary level.

3.4 Unit Price Development for SCC 10 through 50

Unit costs for identified construction items/activities will be developed using the Timberline estimating software and will include labor, equipment, material, and subcontract cost elements. These unit costs are based on a Design-Bid-Build (DBB) project delivery method. In addition, markups will be added for typical contractors' indirect, overhead, and profit.

The following cost elements will be developed for the Seattle/King County area and will be in 2014 dollars:

- Labor Rates—Craft rates and related benefits will be estimated using current State of Washington prevailing wages for King County. These labor rates include base wage rate, all applicable fringe benefits, unemployment insurance, and payroll taxes. Worker's compensation insurance will be included separately as a markup.
- Equipment Rates—Hourly equipment rental and operating rates will be estimated using commercially available equipment rates published by RS Means. For some unique equipment types that are not included in the RS Means data, hourly rental and operating costs will be estimated from other sources.
- Material Prices—Permanent and consumable material prices will be estimated using published data from RS Means and adjusted to the Seattle/King County area. Significant material unit prices will be evaluated and adjusted using cost data from recent Engineering News-Record (ENR) material reports for the Seattle area and/or quotes from local suppliers.
- Contractor's Overhead, Indirect Costs, and Profit—Allowances for typical contractor overhead, indirect costs, and profit add-on costs will be included to calculate bid level unit pricing that would typically be expected when using a competitive bid contracting method. These add-on costs will be calculated as percentage add-ons to various construction cost parameters such as labor, equipment, material, or subcontracts. The following is a list of these add-ons and their associated percentage markup:

- o Contractor's Overhead~~Labor markup~~15~~68~~.0%
- o Subcontractors ~~Material~~ markup 1~~0~~7.0%
- o Field Supervision~~Equipment markup~~18.0%
- o Home Office~~Subcontract markup~~ 1~~9~~.5~~0~~%
- o Sales Tax - General 9.5%
- o Sales Tax - Subcontractor 4.75%
- o Bond 1.0%
- o Gen. Libility & Builders Risk 2.0%
- o Profit 4.0%
- o General Conditions 6.0%

3.5 Cost Development for SCC 60

This cost category covers all land acquisition and acquisition-related costs required to obtain various real property needed for the construction, operation, and maintenance of the proposed alignments. Sound Transit real estate staff will provide the property estimates (in 2014 dollars) for needed right-of-way, including Washington State Department of Transportation (WSDOT) property.

3.6 Cost Development for SCC 70

Costs for vehicles will be included in this estimate based on recent procurement contracts by Sound Transit. The quantity of vehicles to include will also be provided by Sound Transit.

3.7 Cost Development for SCC 80

This cost category includes allowances for preliminary engineering, final design, third party coordination, design services during construction (DSDC), project and construction management, and agency program management costs. Sound Transit ~~will~~ provided allowance percentages for SCC 80 costs~~.~~ are as follows:

Projects over $25M	Allowance
Admin *	6.0%
Prelim. Engineering	5.0%
Final Design/ DSDC	10.0%
Third Parties	2.0%
Const. Management	9.0%
**Total ** **	**32.0%**

Projects under $25M	Allowance
Admin *	7.0%
Prelim. Engineering	9.5%
Final Design/ DSDC	15.5%
Third Parties	2.0%
Const. Management	14.0%
**Total ** **	**48.0%**

*Admin is a percent of SCC 10-70 plus all other soft costs. All others are percent of construction.

**Actual effective total is greater than shown due to the application of Admin to non-construction costs.

3.8 Cost Development for SCC 90

Unallocated contingency is similar to allocated contingency in that it is primarily applied as an allowance for unknowns and uncertainties due to the level of project development completed. The major difference is that allocated contingencies are intended to address uncertainties in the estimated construction, right-of-way, and vehicle costs that typically occur as the amount of engineering and design information advances, while unallocated contingencies are typically much broader in nature and often address changes in the project scope and schedule. Unallocated contingency will be calculated as ~~10~~ 20 percent of the total of SCC 10 through 80.

Chapter 4
Assumptions

The following is a list of general assumptions or qualifications that will be applied to all cost estimates:

- All quantities will be based on information provided by the most current design documents.
- Labor rates will be based on the King County Prevailing Wages, published by the Washington State Department of Labor and Industry, which include fringe benefits, but exclude Workmen's Compensation and other project insurance.
- The project will not have an Owner Controlled Insurance Program (OCIP) in place; as a result, the cost of all required insurance including General Liability, Owner's Risk, etc. will be included in the estimates as a markup.
- Estimates will be prepared as competitive construction bids, assuming an environment in which a minimum of three bids will be received for each contract package.
- Any sole source or proprietary items will be identified in advance and priced accordingly.
- If overtime or shift premiums are used in the estimate, they will be identified for specific work items. If "incidental overtime" is included, costs of this item will be noted separately.
- Construction Cost Estimates will not consider the effect of strikes, material or labor shortages, or other Force Majeure events.
- ~~The schedule assumed for estimating purposes will be aligned with the master schedule developed for the project.~~
- Right-of-way acquisition cost estimates will be prepared by ~~Sound Transit and provided for inclusion in the capital construction cost estimates~~the consultant by utilizing county tax assessor values. The assessor values will be modified by adjustment factors provided by ST as described in Appendix B.

More information on the following items will be provided as these items are developed:

- TOD
- ~~Accessibility~~
- ~~Sustainability~~
- Integration
- Innovation

Chapter 5
Exclusions

The following will not be included in the Construction Cost Estimates:

- Specific project mitigations, unless identified in SCC 10 through 50 by Sound Transit
- Escalation to Year of Expenditure (YOE)
- Operation and maintenance

APPENDIX A

Capital Cost Estimate
Allocated Contingencies

FTA Category No.	Description	Allocated Contingency Percentage
10	Guideway and Track Elements	
	Guideway Elements (Except Underground)	30
	Guideway Elements (Underground)	30
	Track Elements	30
20	Stations, Stops, Terminals, Intermodals	30
30	Support Facilities: Yards, Shops, Admin Buildings	30
40	Sitework and Special Conditions	
	Demolition, Clearing, Earthwork	30
	Site Utilities, Utility Relocation	30
	Hazardous Materials, Contaminated Soil Removal/Mitigation, Groundwater Treatments	30
	Environmental Mitigation, e.g., Wetlands, Historic/ Archaeological, Parks	30
	Site Structures including Retaining Walls, Sound Walls	30
	Pedestrian/Bike Access and Accommodation, Landscaping	30
	Automobile, Bus, Van Access including Roads, Parking Lots	30
50	Systems	30
60	Right-of-Way, Land, Existing Improvements (See Appendix B)	TBD
70	Vehicles	20

APPENDIX B

Capital Cost Estimate
ST Right of Way Cost Estimating Methodology

Right of Way Costs (SCC 60)

Sound Transit real estate, appraisal, and right of way engineering staff in the Design and Construction Management (DECM) department assisted planners and consultants in developing a method for estimating the required right of way (ROW) and associated costs:

ROW Cost Estimates will be calculated using property values by land use type and location, and specific factors based on segment profile. Consultants used a market-based adjustment of assessed values by neighborhood, assuming buffers and the square footage of acquired properties. Sound Transit appraisers and right of way engineers developed appropriate factors to determine property values relative to the assessed value. A 65% contingency accounted for overhead, relocation, etc. was included, as well as a +/- 15% cost reporting range.

The cost estimating formula could be summarized as follows:
[(assessed property value * real estate adjustment factor * profile factor) * ROW contingency] * +/- range

- Assessed property values:

  Property values for private property came from county assessor records, and were collected by project consultants. For WSDOT property where no assessed value exists, "over-the-fence" property values were used (the assessed value of abutting private property).

- Real Estate adjustment factors:

  Real estate adjustment factors account for the typical difference between assessed property value and sale value by location. Real estate adjustment factors are listed on the next page.

- Profile factors:

  Profile factors represent the percentage of the total value of property staff anticipated paying for. Profile factors are:

  - Aerial = .75
  - At-grade = 1.00
  - Deep Tunnel (>70') = .05
  - Shallow Tunnel (<70') = .65

- ROW contingency:

  ROW contingency accounts for administrative fees, TCEs and other expenses associated with real estate acquisition. ROW contingency for Level 2 ROW cost estimates is:

  - 1.65 (or an additional 65%)

- Range:

  A range of +/-15% is applied to Level 2 ROW cost estimates to account for unidentified risk.

- Full and partial property acquisition:

In general, if a building falls inside the buffer of a representative alignment, full acquisition will be budgeted. If a building falls outside the buffer of a representative alignment, partial acquisition will be budgeted. This guidance offers clear direction for most parcels. For a remaining few, ST ROW engineers offer guidance. Examples of such exceptions include: an alignment that does not impact a building but causes excessive impacts on a building's parking; an alignment that impacts a building on a very large parcel; or an alignment that barely clips a very large building.

Market-based Adjustment Factors for Properties

Corridors/Areas	Major Routing	Assessed Value Adjustment Factor	
Burien to Renton	via I-405 and SR 518	Residential Commercial	1.45 1.53
Downtown Seattle to West Seattle Junction	South out of Downtown through SODO, either on or parallel to the West Seattle Bridge (on a new Bridge), and along Fauntleroy to the Junction	Residential Commercial	1.28 1.67
Downtown Seattle Tunnel/Surface	From Stewart St. to International District	Residential Commercial	N/A 1.75
Downtown Seattle to Ballard	From Stewart St. to Elliot/15th and up to Market St. *Corridor B/C*	Residential Commercial	1.25 1.66
Downtown Seattle to Ballard	From Stewart ST. to Westlake to Leary to Market St. *Corridor E*	Residential Commercial	1.26 1.19
Ballard to U-District	From Market St. and 15th to 45th to vicinity of the U-District Station	Residential Commercial	1.25 1.94
Lynnwood to North Everett via Paine Field	Lynnwood Link Station to Everett Transit Center via I-5 and Paine Field. Should also include a north extension from Everett Transit Center to North Everett Community College	Residential Commercial	1.42 1.82
Lynnwood to North Everett LRT via I-5 or SR-99	Lynnwood Link Station to Everett Transit Center via I-5. Could alternatively travel via I-5 to 128th, then west on 128th to SR99, then north on SR-99/Evergreen way to Downtown Everett, and east to Everett Station. Should also include a north extension from Everett Transit Center to North Everett Community College	Residential Commercial	1.42 1.82
Overlake to Downtown Redmond	LRT	Residential Commercial	1.18 1.38
U-District to Kirkland to Redmond	ST Route 520--from U-District station to SR 520 to S Kirkland park and ride back to SR 520 east to downtown Redmond	Residential Commercial	1.35 1.60
Lynnwood to Renton	I-405	Residential Commercial	1.65 1.80
Totem Lake to Bellevue	via Eastside Rail Corridor	Residential Commercial	1.35 1.75

~~County~~	~~Location~~	~~Areas~~	~~Commercial / Industrial~~	~~Multi-Family Residential~~	~~Single-Family Residential~~	~~Zip codes~~
~~KC~~	~~Bellevue~~	~~West of I-405~~	~~1.35~~	~~1.3~~	~~1.35~~	~~98004~~
~~KC~~	~~Bellevue~~	~~South Bellevue around I-90~~	~~1.3~~	~~1.27~~	~~1.3~~	~~98007, 98027~~

County	Location	Areas	Commercial / Industrial	Multi-Family Residential	Single-Family Residential	Zip codes
KC	Bothell	Within King County	1.25	1.3	1.3	98011, 98072, 98052, 98033
SC	Bothell	Within Snohomish County	1.14	1.2	1.25	
KC	Burien	-	1.16	1.2	1.25	98126, 98146, 98106
KC	Burien	-	1.15	1.15	1.25	98055, 98188
KC	Clyde Hill	-	1.35	1.3	1.35	98004
SC	Everett	-	1.14	1.2	1.25	
KC	Federal Way	-	1.15	1.3	1.2	
KC	Issaquah	-	1.3	1.27	1.3	98007, 98027
KC	Kirkland	-	1.25	1.3	1.3	98011, 98072, 98052, 98033
SC	Lynnwood	-	1.14	1.2	1.25	
PC	Pierce County	-	1.1	1.2	1.25	
KC	Redmond	-	1.25	1.3	1.3	98011, 98072, 98052, 98033
KC	Renton	Including Newcastle	1.15	1.15	1.25	98055, 98188
KC	SeaTac	-	1.15	1.15	1.25	98055, 98188
KC	Seattle	Ballard, U District, Fremont, Wallingford	1.25	1.25	1.25	98103, 98107
KC	Seattle	West Seattle	1.16	1.2	1.25	98126, 98146, 98106
KC	Seattle	Downtown Seattle	1.30	N/A	N/A	
KC	Seattle	SODO	1.30	N/A	N/A	
KC	Tukwila	-	1.15	1.15	1.25	98055, 98188
KC	White Center	-	1.16	1.2	1.25	98126, 98146, 98106
KC	Woodinville	-	1.25	1.3	1.3	98011, 98072, 98052, 98033

Corridors/Areas	Major Routing	Assessed Value Adjustment Factor	
Bellevue to Issaquah/Issaquah Highlands	I-405 to I90 to Issaquah and then north to Issaquah Highlands	Residential Commercial	1.33 1.74
Kent/Des Moines to Tacoma Mall via I-5	From Kent/Des Moines LRT Station to Tacoma Mall via I-5 and 99	Residential Commercial	1.18 1.23
Tacoma Link Expansion	To Tacoma Mall and to Tacoma Community College	Residential Commercial	1.25 1.50
HCT options along 522	ST Route 522 between I-405 to ST Route 523	Residential Commercial	1.45 1.45
Connection from 145th Station to ST Route 522	ST Route 524 (145th) between ST Route 522 and I-5	Residential Commercial	1.45 1.45
Service between U-District and Redmond	St Route 520 between U-District and Redmond via South Kirkland P/R	Residential Commercial	1.35 1.75
Potential Additional Stations	Stations at I-5/130th and I-5/220th	Residential Commercial	1.25 1.40
Potential Additional Stations	Station at Graham St. and Boeing Access Rd.	Residential Commercial	1.50 1.50
Spine extension to Downtown Redmond	Overlake to Downtown Redmond (LRT)--per East Link preferred alternative route	Residential Commercial	1.18 1.38
West Seattle Junction to Burien via White Center	West Seattle Junction to Burien via White Center	Residential Commercial	1.34 1.45
South King/Pierce projects	Parking lots: Auburn, Sumner, Puyallup	Residential Commercial	1.45 1.65
Potential HCT	Puyallup to Orting	Residential Commercial	1.25 1.65
Potential Commuter Rail/LRT	Tacoma to DuPont	Residential Commercial	1.18 1.23