

DELIVERY ASSESSMENT

Center City Connector

Executive Summary

Prepared for: Seattle Department of Transportation

October 31, 2023



1 / BACKGROUND AND PURPOSE

1.1 Purpose of the Delivery Assessment

The purpose of this delivery assessment is to inform decision making by the Seattle Department of Transportation (SDOT), the Mayor, the City Council, the Federal Transit Administration, the Puget Sound Regional Council, and King County Metro related to funding and implementation of the Center City Connector project, also known as the “Culture Connector” or “C3” (the Project). To inform decision making, the delivery assessment aims to:

- Identify potential solutions to previously identified project challenges;
- Identify changed conditions and requirements affecting the project;
- Identify risks and opportunities affecting cost and schedule, and
- Establish a new baseline cost and schedule estimate that incorporates appropriate contingencies.

1.1.1 Key Findings of the Delivery Assessment

Key findings of the Delivery Assessment include:

- Most of the design that was completed prior to bidding the project in 2018 could be carried forward to a new bid for construction, through a design validation process that can be completed in approximately 6 months.
- SDOT can establish assumptions for the design of the streetcar vehicle that are consistent with the 2018 design, and carry this forward into technical specifications for a new streetcar vehicle procurement, to minimize any conflicts between the new vehicles and the existing infrastructure of the South Lake Union and First Hill Streetcars.
- There are viable options for expansion of the South Lake Union Operations & Maintenance Facility that will address the City Landmark status of a building on that site.
- The most significant project challenges to be addressed are related to the condition of existing structures in Pioneer Square, including bridges over the BNSF railroad and areaway “streetwalls.” There are options to phase the repair or replacement

of these structures, either as concurrent or as independent projects.

- The cost of the core streetcar project elements (independent of structures and utilities), including appropriate allowances and contingencies, is assessed to be \$246 M in current year dollars or \$269 M in year of expenditure dollars. Funding and phasing strategies would also need to be identified for the repair/replacement of deficient structures, and funding for City utility relocations would need to be budgeted within the Seattle City Light and Seattle Public Utilities capital improvement programs (which are funded via utility rates).
- The schedule duration for validation of the existing design, design of new and modified elements, and updates to the environmental documentation is anticipated to be approximately 18 months.
- The mainline construction duration is expected to be approximately 24 months.
- The critical path for the project is expected to be the design, manufacturing, delivery and testing of ten new streetcar vehicles, with a duration of up to 4.5 years.

Year	1				2				3				4				5				6				7			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Funding & Budget Process					Design																							
													Construction & Vehicles															
Design Phase					Validation & Refined Costs Estimates																							
					Early Works (Jackson Street Bridges, Areaways, Utilities)																							
					Environmental Review & Permit Updates																							
					Final Design																							
Construction Phase									Early Works (Jackson Street Bridges, Areaways, Utilities)																			
									Streetcar																			
Vehicles					Procurement & Delivery																							
									Startup & Testing																			
													★ Start of Service															

1.1.2 The Seattle Streetcar System - Summary, Background and Characteristics of Significance to the Delivery Assessment

The City of Seattle, through its Department of Transportation, has developed two streetcar lines, which it operates through an interlocal agreement with King County METRO Transit. The South Lake Union Streetcar (SLU) line opened in 2007, providing connections between downtown Seattle and the Denny Triangle and South Lake Union neighborhoods along a 1.25-mile alignment. The First Hill Streetcar line (FHS) opened in 2016, providing connections between the Pioneer Square, Chinatown/International District, Central District, Yesler Terrace, First Hill and Capitol Hill neighborhoods along a 2.5-mile alignment. Each of the lines is supported by an Operations and Maintenance Facility (OMF).

A notable and unusual characteristic of the operating environment for the SLU and FHS lines is the presence of King County Metro’s Electric Trolleybus system crossing or running parallel to portions of the alignment. On the SLU line, where the overhead contact systems (OCS) of the streetcar and trolleybus cross, special crossing hardware was installed, and the streetcar is powered conventionally through the overhead contact system. On the FHS line, the interfaces of the bus and streetcar overhead contact systems were too extensive to be addressed through crossing hardware, so the FHS fleet is served by vehicles with On-Board Energy Storage Systems that

provide battery power for streetcar propulsion on portions of the FHS alignment.

1.1.3 The Connector - Project Development and Small Starts Evaluation

Plans to connect these lines through Seattle’s center city were formalized as early as 2008 in a Streetcar Network Plan endorsed by the City Council, and project development began in 2012. The project development phase culminated in the completion of an evaluation and rating process for the FTA “Small Starts” Capital Investment Grant (CIG) funding process. The Project was approved for entry into the Project Development phase of the Small Starts Capital Investment Grant Process in July 2014, and Congress later appropriated \$50M of Small Starts program funding for the Project.

Key features of the Project as proposed in the Small Starts evaluation included:

- Operation of the streetcar in an “exclusive guideway” (transit-only lanes) on First Avenue;
- A service plan allowing for very frequent service, and the purchase of ten additional streetcars to support the service plan; and
- Expansion of the SLU OMF, including expanding the yard to provide additional streetcar vehicle storage and construction of the “SLU OMF Annex” to provide facilities accommodating additional staff, parts and equipment.

1.1.4 Project Status as of 2018

By 2018, design of the advanced utility relocations and the mainline track and civil components of the project had advanced through final design and had been issued for bid at the time of a decision to pause the project. Four bids had been submitted for the mainline track and civil package, but that package was not awarded. An expansion of the SLU OMF to add vehicle storage capacity and an annex to accommodate additional staff and spare parts, had advanced to 100% design but had not been issued for bid. The advanced state of design and procurement of the project by 2018 provides a well-informed baseline for the scope, schedule and cost of the project should it be resumed, although some aspects of the project scope and design would likely be revised to reflect changed conditions. Therefore, this assessment refers to “the 2018 project” as a shorthand for all of the elements of the project that were significantly advanced by 2018.

1.1.5 Key Project Challenges and Decision to Pause the Project

Although the low bid received for the mainline track and civil package was within 10% of the Engineer’s Estimate, several project challenges were identified that presented significant risks:

- After award of the vehicle contract, SDOT identified conflicts between the configuration of the new streetcar vehicles procured for the 2018 project, the existing Seattle Streetcar infrastructure, and the design of the 2018 project infrastructure—referred to broadly as “Vehicle/Project Interface” issues. These included conflicts between the vehicle length and configuration and the design of some of the existing SLU and FHS passenger platforms; conflicts with existing OMF infrastructure; and heavier streetcars that would likely require further strengthening of the bridges crossed by the FHS line (known as the Jackson Street Structures).
- In addition to the vehicle/project interface issues, SDOT had growing concerns in 2018 about the potential impact of the streetcar loading, or the construction of the streetcar, on “areaways,” which are building basement areas that extend beneath sidewalks, supported by a “street wall.” By 2019, SDOT had posted restrictions limiting the gross vehicle weight for vehicles traveling along First Avenue in Pioneer Square to 10,000 lbs.

- As the SLU OMF Annex project advanced through the City’s permitting process, the issue of the eligibility of an existing structure on the site for designation as a Seattle Landmark came to the fore. Subsequently the ‘Bricklayer’s Building,” which was proposed to be demolished to accommodate the increased vehicle storage capacity necessary to the 2018 Project, was designated by the Seattle Landmarks Board. This called into question the ability to move forward with the SLU OMF Annex project as designed; Landmark status does not in and of itself preclude demolition, but Board approval would be required for demolition or major alterations to the building.

Taken together, the vehicle/project interface issues, areaway issues, and project cost and funding concerns led the City to pause the project; the contract for the construction of the mainline project scope was not awarded after bid; the AUP-1 utilities contract was terminated after completion of the scope between Jackson and Columbia streets; and the AUP-2 contract was terminated prior to the start of construction.

1.1.6 The 2019 Vehicle/Project Interface Report and the KPMG Report

In 2019, SDOT completed a study of the vehicle/project interface issues, with the goal of identifying the scope and cost of changes to the 2018 Project, and/or to existing SLU and FHS infrastructure, that would be needed to accommodate the CAF streetcar vehicles (including some recommended changes to the SLU OMF lead track and yard tracks). This report provided planning-level cost estimates, some of which were carried forward to inform the Delivery Assessment. In addition, the City commissioned an independent streetcar cost review by KPMG, which included estimates of various soft costs and start-up costs that have also been carried forward to inform the Delivery Assessment. Both studies assumed the CAF vehicle as design vehicle for the project.



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2 / RISK AND OPPORTUNITY ASSESSMENT

2.1 Changed Conditions and Requirements Affecting the Project

The risk and opportunity assessment identifies changes to conditions (such as new and planned public or private development projects) or requirements (such as updated design and construction standards) that could impact the project. Some of these impacts could require changes that would increase the cost of the project (and are therefore categorized as “risks”), while others might provide an opportunity to make changes that could reduce the capital or operating costs of the project (and are therefore characterized as “opportunities.”)

This risk and opportunity assessment considers the following issues:

- General Escalation and Construction Escalation
- Streetcar Design Vehicle
- Operational Plans and Practices
- Traction Power Issues and Opportunities
- Areaways
- Jackson Street Roadway Structures
- Transit Operations on the Stewart/Olive Couplet
- Public Agency Capital Improvements and Plans
- Sound Transit West Seattle and Ballard Link Extensions
- City Capital Improvement Projects in the Project Corridor
- Updates to City Standard Plans and Specifications
- Utilities in the Project Corridor
- Private Development Activity
- Board and Commission Approvals
- Stakeholder Engagement and Business/Property Owner Coordination
- Options for Expansion of the SLU Operations and Maintenance Facility



3 / COST AND SCHEDULE ASSESSMENT

3.1 Cost Assessment

3.1.1 Cost Assessment Methodology

The cost assessment considers:

- Cost information available from the 2018 Project—including construction bids received for construction of the two Advanced Utilities bid packages and the main “SDOT Streetcar” package for construction of the track, platforms, traction electrification system, and miscellaneous municipal construction (street and sidewalk improvements, drainage improvements, traffic signal improvements, etc.)
- Project risks identified previously, including those addressed in the 2019 Vehicle/Project Interface analysis and KPMG independent cost review;
- Changed conditions that present risks or opportunities, as described in [Section 2](#) of this assessment.

All of these elements of project cost were escalated to a common base year (2023), and SDOT allowances for design and construction soft costs, estimating allowances and construction contingencies were applied, after adjustment for the type and scale of the project (drawing on experience from similar recent projects such as the FTA-funded Madison Bus Rapid Transit Project). Costs were also escalated to the assumed mid-point of construction, to provide a planned year of expenditure estimate based on the project schedule assumptions described in **Section 3.3**. The assumptions and allowances are detailed in **Section 3.1**

3.1.2 Project Cost Assessment

TABLE 3.1 SUMMARY - ALL PROGRAM ELEMENTS

Item	Cost Assessment (Current Year \$)	Cost Assessment (Year of Expenditure \$)
SDOT Streetcar Core Project Subtotal	\$246,000,000	\$269,000,000
Repair/Replace Deficient Structures Subtotal	\$90,000,000	\$98,000,000
City Utility Relocations & Betterments Subtotal	\$74,000,000	\$78,000,000

TABLE 3.2 SUMMARY OF PROGRAM ELEMENTS BY PHASE AND POTENTIAL FUNDING SOURCES

Item	Phase	Potential Sources
Core Streetcar Project	Core Project	City & Federal Funds
Repair Deficient Areaway Streetwalls	Core Project or Phased	City & Federal Funds
Repair/Replace Jackson Street Bridges (Bridge Deck)	Phased	City & Federal Funds
City Utility Relocations & Betterments	Early Works or Core Project	SPU/SCL Revenues

TABLE 3.3 PROGRAM ELEMENTS BY PHASE, DURATION AND COST

Item	Phase	Duration (Years)	Cost Assessment (Current Year \$)
Design & Environmental Review	Design-In Advance of Core Project		\$17,300,000
Streetcar		1.5	\$10,400,000
Areaways		1.5	\$6,900,000
Construction & Startup-Core Streetcar Project Elements	Core Project		\$235,800,000
Streetcar Track, Power, Stations, Roadway		2	\$133,400,000
Operations & Maintenance Facility Expansion at SLU		1	\$15,900,000
Streetcar Vehicle Design, Manufacturing, Testing & Startup		4.5	\$86,500,000
Repair/Replace Deficient Structures	Phased		\$83,100,000
Jackson Street Bridges	Concurrent with Core Project	TBD	\$38,400,000
Areaway Street Walls		1	\$44,700,000
Utility Relocations & Upgrades	Early Works & Concurrent with Core Project		\$74,300,000
SPU/SCL		1	\$74,300,000

3.2 Delivery Method

Advanced Utilities

Utility relocations and betterments can be completed as independent bid packages. This approach can be beneficial as the utility design may be completed earlier than other project elements, and constructing this work in advance of the streetcar elements decouples any schedule risks that may be associated with the underground utility work from the streetcar construction contract. SDOT was proceeding on this basis prior to the project pause in 2018, and it is assumed that advanced utilities would be part of the delivery strategy for a resumed project, regardless of the delivery method selected for the streetcar and OMF scope.

Design-Bid-Build

The traditional delivery method for public works construction is Design-Bid-Build; the public agency project owner (in this case SDOT) completes the design and advertises a bid package of plans, specifications and general conditions for competitive bidding by contractors. The advantage of this method is that the owner has control of all design decisions. This

is beneficial for municipal construction where the requirements and preferences of the public asset owners are typically tailored to their specific urban environment and governance structure; for example, in Seattle there are various boards and commissions with oversight and approval authority over elements of the design. The disadvantage is, there is less constructability input into the design (although SDOT staff and consultants with construction experience can provide constructability input). Additionally, because vehicle procurement and integrated testing of the vehicles and infrastructure is a significant element of a streetcar project, the owner retains considerable coordination responsibilities.

Design-Build-Equip

Design-Build-Equip is a variant of the Design-Build alternative delivery method. In Design-Build delivery, the owner develops the design sufficiently to identify any definitive requirements, and also develops project requirements and performance criteria that the Design-Builder must follow in completing the design. Design-Build-Equip adds the provision of equipment—in this case, the streetcar vehicles—to the Design-Builder’s responsibilities. The advantage

of this approach is the Design-Builder is responsible for delivering a project that successfully integrates the vehicles and infrastructure. The disadvantage of this approach is that some degree of design control is transferred from the owner to the Design-Builder; this is challenging in the context of a project that is subject to extensive ongoing input from stakeholders, Boards and Commissions. SDOT could seek to tailor the delivery method such that the level of design completion reflected in the procurement documents is greater than typical, leaving the Design-Builder responsible primarily for the final details of track, platform and systems design that are most closely related to the operation of the streetcar vehicles. A challenge for SDOT would be lack of experience with Design-Build procurement.

GC/CM

General Contractor/Construction Manager (GC/CM) is an alternative delivery method in which the owner selects a GC/CM during the design phase through a best-value evaluation that considers the qualifications, project approach as well as a fixed fee to be applied as a percentage of the construction cost. The GC/CM provides constructability and value engineering input during the design phase, negotiates a price for the work, and then manages all subcontracting in addition to self-performing some of the work (typically between 30 and 50%). The owner continues to manage the design to 100% completion. SDOT used the GC/CM method for the SLU and FHS lines. The primary advantage of GC/CM is the ability to select a highly qualified contractor. A disadvantage is the lack of competitive bidding for the self-performed work. Typically, a GC/CM is selected as early as possible in the design process, such as at 30% design, to maximize the potential for constructability and value engineering input. Given much of the project has already advanced to 100% design, there is likely less potential for design input, but SDOT could still consider GC/CM given the specialized nature of urban rail transit work and the importance of contractor qualifications. Alternatively, SDOT can include robust qualification requirements in the bid documents for Design-Bid-Build delivery.

3.3 Schedule Assessment

3.3.1 Schedule Assessment Methodology

A schedule was developed using the Critical Path Method in Primavera P6. Inputs included schedules developed for the 2018 Project; lessons learned from SLU and FHS projects and other relevant projects; and workshops with SDOT staff. These schedules are intended to represent the earliest possible delivery of the Project, and incorporate assumptions about funding and authorization that would support the earliest delivery path.

Activities were grouped into the following categories:

- Funding & Authorization
- Environmental Review & Permitting
- Procurement
- Design
- Utility Relocation
- Streetcar Construction (Mainline, OMF, and Off-Mainline)
- Rolling Stock
- Testing & Startup

Key Schedule Assumptions by Activity Category

Funding and Authorization

The schedule was developed with the assumption that the Project will be funded with a combination of local and Federal grant sources. While the funding and financing plan for the project may continue to evolve, for scheduling purposes it was assumed that local and federal funding approvals would be required at two project phases:

Phase 1: The first phase, authorizing SDOT to initiate design, environmental review, and engineering support for rolling stock procurement, could be funded in the City's 2024 Budget and Capital Improvement Program (to be adopted November 2023), and would include Federal grant funds to be reprogrammed with the approval of the Puget Sound Regional Council. The Phase 1 activities would support an ongoing review by the FTA of project readiness, leading up to the execution of the Capital Investment Grant agreement, and would also provide the information that the City Council would need to authorize Phase 2 of the project through budget and legislative actions.

Phase 2: The second phase would authorize SDOT to proceed with all remaining project activities (including construction, rolling stock procurement, testing and start-up), and would be funded either in a future City Budget cycle (assumed to be the 2025 Budget and Capital Improvement Program, adopted in November 2024). The schedule assumes that vehicle procurement could begin upon this City authorization, while award of major construction contracts would be preceded by execution of a Capital Investment Grant Agreement between SDOT and the Federal Transit Administration (FTA) (assumed to be executed when the design of the project is close to completion [approximately May 2025]).

Environmental Review and Permitting

An Environmental Assessment (EA) following the requirements of the National Environmental Policy Act (NEPA) and culminating in a Finding of No Significant Impact by the FTA, was completed for the 2018 Project. The schedules developed for this Assessment assume that a Supplemental EA will be required to incorporate new information and design changes into the FONSI. An alternative to a Supplemental EA, Re-evaluation, is expected to have a similar timeframe but would not require a public comment period. The schedule assumes that preparation of the Supplemental EA can begin upon completion of preliminary design (30% design completion milestone).

The schedule identifies the following local permits to be obtained:

1. Landmarks Preservation Board Incentives & Controls Agreement (OMF)
2. Seattle Design Commission Review
3. Master Use Permit (OMF)
4. Pioneer Square Preservation Board Certificate of Approval
5. Pike Place Market Historical Commission Certificate of Approval
6. Building Permit (OMF)

The permitting process for these local permits is informed by the progression of the design. Items 1 through 3 are assumed to begin with the start of detailed design; items 4 and 5 are assumed to begin with the start of final design; and item 6 is assumed to begin with the completion of the 100% design milestone (running concurrent with the development of Issue for Bid documents).

Design

The schedules developed for this Assessment assume that much of the 2018 project “Existing Design” could be advanced to a new bid package through a “design validation” process on an accelerated schedule, while “New and Modified” project elements would progress through a traditional design process. The schedules for validation of the 2018 design and for preliminary engineering of new and modified project elements would be similar, allowing for a complete project cost estimate, informed by a 90/100% engineer’s estimate for the “existing” project elements and a preliminary engineering engineer’s estimate for the new and revised project elements, to be assembled in advance of the Phase 2 funding decisions.

Utility Relocation

The 2018 Project incorporated the design of new utility infrastructure to avoid or minimize conflicts with the streetcar infrastructure and to make planned upgrades to utility infrastructure. The utility relocations were developed as separate bid packages, and a portion of the utility scope (generally, on First Avenue from S Jackson Street to Columbia Street) was constructed. To complete the project, the balance of the utility scope would be constructed in advance of track construction, in any given block or multi-block segment. This work could be completed either as a separately bid utility construction package or incorporated into the bid package for construction of the streetcar infrastructure. These delivery options for the utility scope would be available for both Design-Bid-Build and Design-Build delivery.

In addition to the relocation of City utilities, private utilities such as gas (Puget Sound Energy), Steam (CenTrio) and telecommunications, which are located in City streets subject to SDOT Street Use permits, would need to relocate at their own expense in advance of construction of the streetcar infrastructure.

Streetcar Construction (Mainline, OMF, and Off-Mainline)

The streetcar infrastructure scope of work is comprised of three categories of work:

- Mainline “SDOT Streetcar” scope which extends from S Jackson at Occidental Avenue S to 6th Avenue and Denny Way, includes track, station platforms, traction power and overhead contact systems, train signalization, traffic signal modifications, as well as any reconstruction of general municipal infrastructure within this mainline project area.
- OMF scope includes new construction and modifications to the existing SLU OMF at Fairview Avenue N and Harrison Street, including any track and overhead contact system construction or modification in the vicinity of the OMF
- Off-Mainline scope includes any work that is not within the mainline project area or OMF project area, such as deck replacement on the Jackson Street structures and any platform modifications that may be needed to accommodate the new streetcar vehicles. A turnback track proposed at Republican Street between Terry Avenue N and Westlake Avenue N, or an alternative turnback design option, may also be included in the Off-Mainline scope.

Each of these categories of work could be incorporated into a single construction package.

Rolling Stock

The Rolling Stock activity category consists of all of the sub-activities necessary to develop vehicle technical specifications, develop and issue vehicle procurement documents, select a manufacturer, review design submittals, manufacture the vehicles, inspect the vehicles during the manufacturing process, take delivery of vehicles, test them and accept them. The schedule was developed assuming a full vehicle procurement process; however, SDOT may have an opportunity to purchase vehicles by “piggybacking” on vehicle procurements initiated by other streetcar entities in the U.S., which may reduce some of the durations related to procurement, design review, and initial acceptance testing, but may also extend some of the manufacturing and delivery durations.

Testing and Startup

The Testing and Startup activity category includes all of the sub-activities necessary to certify conformance of the infrastructure and vehicles with the safety certification plan; perform integrated testing of the vehicles and infrastructure; hire and train operations and maintenance staff; complete training and drills required for safety certification; provide public information; operate pre-revenue service without passengers; and plan and execute a grand opening event.

The schedule developed for this assessment assumes that these activities begin with substantial completion of the Mainline work, and progress with completion other predecessors as applicable to the particular activity, such as completion of the OMF and Off-Mainline work and delivery and acceptance of new streetcar vehicles.

3.3.1.1 Design-Bid-Build

The project schedule, assuming a design-bid-build delivery method and advanced utilities packages, is presented at several activity levels using the critical path method, as well as in a longest path view, in [Appendix G](#). The funding and authorization assumptions are critical to this schedule. If those milestones are achieved, manufacturing and delivery of the new streetcars becomes the critical path for the schedule, and there is considerable float available in the construction schedule.

The Delivery Assessment does not present a separate schedule for the GC/CM alternative project delivery method. However, it is expected that the schedule for GC/CM delivery would be very similar to Design-Bid-Build delivery. Some additional Procurement activities would be added for selection of the GC/CM.

3.3.1.2 Design-Build-Equip

The project schedule, assuming a design-build-equip delivery method and advanced utilities packages, is presented at several activity levels using the critical path method, as well as in a longest path view, in [Appendix H](#). The project schedule is expected to be similar between the two delivery methods; the primary reason for considering Design-Build-Equip delivery would be to shift responsibility for integration of the vehicle and infrastructure from SDOT to the design-builder.

3.4 Residual Risk and Opportunities

In addition to the risks and opportunities that were incorporated into the cost assessment, there are risks and opportunities that are not assumed as part of the baseline cost but could be realized. These are summarized in Section 3.4 of the Delivery Assessment.



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