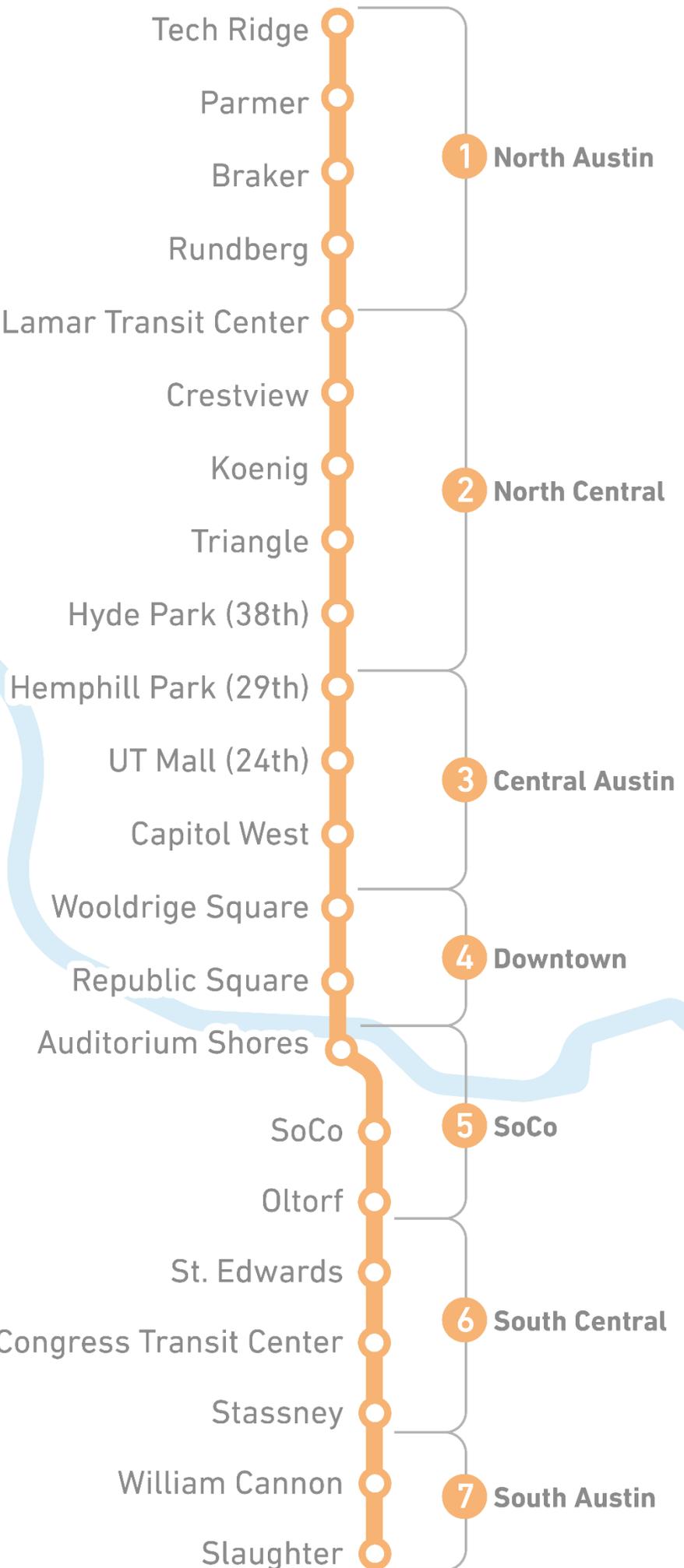


Orange Line Capital Cost

Draft for Public Review & Comment



Project Description

Central Texas is rapidly changing. While the region's population exceeds two million today, and is projected to double by 2040, road capacity is expected to increase by only 15 percent. Project Connect is a comprehensive transit vision to improve existing high-capacity transit services and develop new, high-capacity public transportation projects that provide efficient travel options into, out of, and around Central Austin from the surrounding region. Completed in December 2018, Project Connect lays out a regional vision for transit investment as shown in Figure 1-1. The Orange Line High-Capacity Transit (HCT) corridor, which connects Tech Ridge in the north, Central Austin, and Southpark Meadows in the south, was identified as the highest ridership HCT corridor (Figure 1-2). The Orange Line would serve as the spine of a regional HCT network that will provide faster, more reliable transit connections.

Project Connect is the community's plan for a complete system of reliable and frequent transit operating in a congestion-proof environment free from other traffic. This plan connects people, places and opportunities in an affordable, efficient and sustainable way. The Project Connect Long Term Vision Plan includes two dedicated pathway high capacity transit (HCT) corridors, seven Metro Rapid corridors, two commuter rail corridors, eight commuter bus corridors, and downtown circulator corridors, as well as numerous enhancement projects. The Orange Line is the first of the HCT corridors and would establish the north/south spine of the Project Connect system. The Project Connect Orange Line would operate from the North Lamar Transit Center to Stassney Lane, with possible extensions north to Tech Ridge and south to Slaughter Lane.

As shown on **Figure 1-1**, the Project Connect Orange Line Corridor is divided into seven segments to facilitate project evaluation and LPA selection. Segment 1 to Tech Ridge and Segment

7 to Slaughter require additional coordination with TxDOT.

Capital costs, demographics and potential environmental impacts are summarized for each segment alternative, allowing these evaluation criteria to be quickly summarized for each potential end to end alternative.

Orange Line Corridor Alternatives

Below is a description of each alternative being evaluated Capital Cost. All Build Scenarios assume a fully dedicated fixed guideway for the project. The modes being evaluated for the project are Bus Rapid Transit (BRT) and Light Rail Transit (LRT). Due to the project being fully dedicated fixed guideway, the only difference between the two modes is the fact that it would be either steel wheels running on metal tracks or rubber tires running on concrete transitway. There would be differences in terms of capacity that the ridership results will help identify and inform recommendations to help mitigate any issues related to carrying capacity.

No Build

The No Build alternative shows the "do nothing" option. The system routes are maintained as they are today and the MetroRapid 801 is represented as the project route for the study area. The stop-level ridership for this alternative has been grouped into the proposed Orange Line stations to be able to compare station-to-station ridership forecasts.

TSM

The Transit Systems Management (TSM) alternative presents the plan for system service improvements informed by the CMTA board-approved Connections 2025 plan. This scenario used Connections 2025 as a starting point and coordinated with CMTA staff to inform which roadway improvements and transit service changes will be implemented before 2025. The TSM identifies improvements to two existing MetroRapid routes (801 and 803) as well as the introduction of two new MetroRapid routes (804

and 820). The details for the TSM can be seen in the TSM Memo.

BUILD- CONFIGURATION A

Configuration A of the Build Scenarios is defined by a combination of both elevated and street-level transitway configuration for much of the alignment. The configuration would result in low ROW acquisition, low impact to existing traffic, and high operational efficiency. There would be a high cost and visual impact associated with the configuration.

BUILD- CONFIGURATION B

Configuration B of the Build Scenarios is defined by a street-level transitway configuration for most of the alignment. The configuration would result in high impacts on ROW acquisition, high impact to existing traffic, high utility impact, and high construction impacts. There would be potentially lower costs and a low-visual impact associated with the configuration as compared to Configuration A.

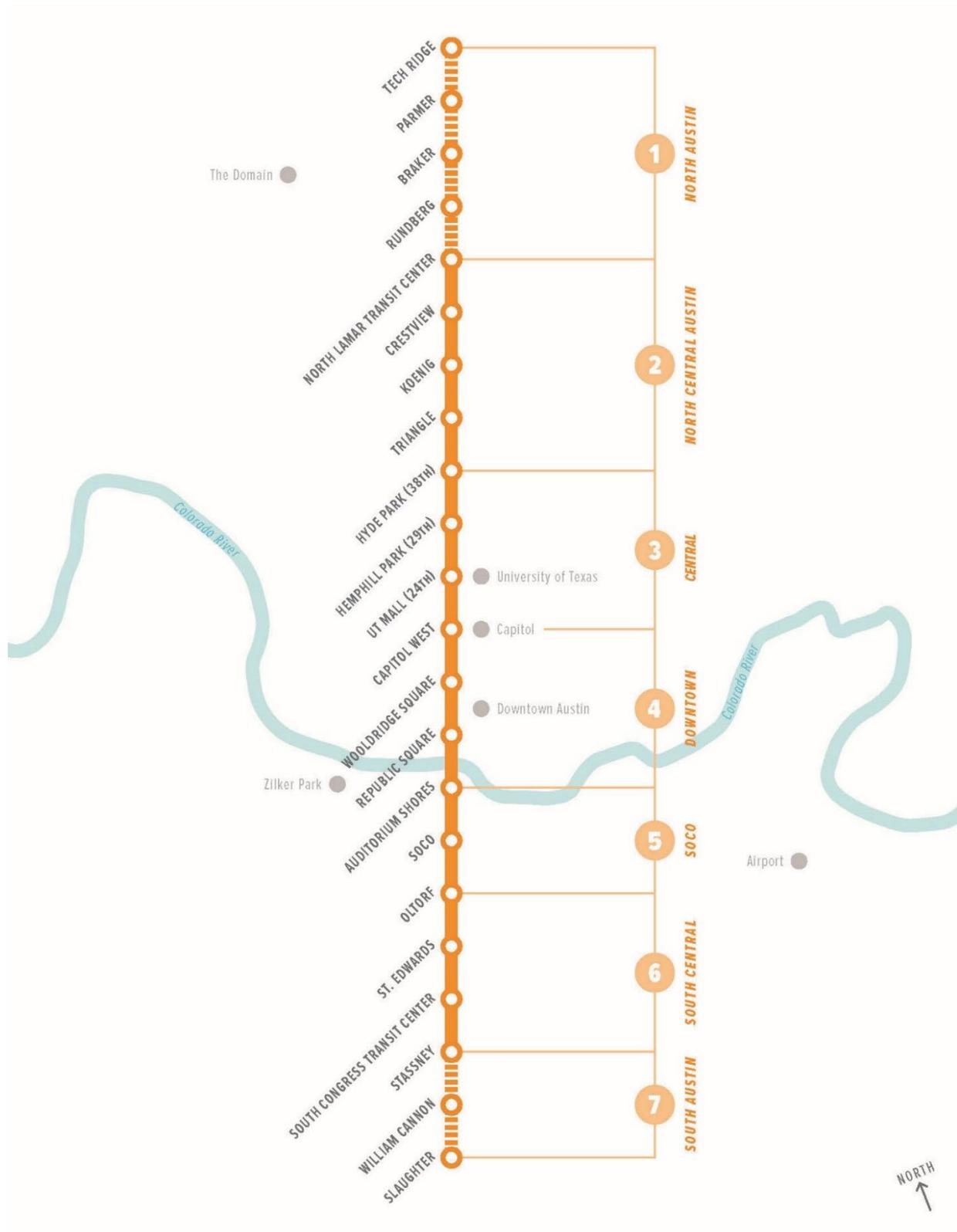


Figure 1-1. Orange Line Location and Stations

Purpose

Capital Cost is an important factor in selecting the appropriate alternative to move forward as the Locally Preferred Alternative (LPA) to advance towards implementation. Capital costs will be a key evaluation criterion for this Orange Line study.

Methodology

The Orange Line Study uses FTA’s Standard Cost Categories (SCC) format to present capital cost estimates. It allows for easy comparison between alternatives and to other projects seeking FTA Capital Investment Grants (CIG) funding and is required by FTA when seeking CIG funding. For example, FTA provides specific unit costs for some line items for purposes of facilitating comparison of projects nationwide. This evaluation uses the most recently released version of the FTA’s SCC workbook. Following is a summary of the major categories in the SCC format (these categories are defined in detail **Table 1**).

While the SCC structure is straightforward, it is relatively detailed. The SCC structure accounts for a range of cost drivers, including construction cost, professional services, right-of-way acquisition, and contingency.

The FTA SCC organization for capital cost estimates is developed for application to many different types of transit improvements, and on project phases ranging from planning to final design and construction.

Table 1: FTA SCC Capital Cost Estimate Organization

SCC	Description
10	Guideway Guideway grading and drainage; retaining walls, bridges and tunnels; trackwork; busway construction
20	Stations/Stops

SCC	Description
	Construction of station/stop platforms, enclosures, canopies and fixtures; elevators; escalators and stairs; parking structure
30	Support Facilities Operations, maintenance, and storage facilities
40	Sitework and Special Conditions Demolition, clearing, and excavation; utilities and utility relocation; hazardous soil and water remediation; environmental mitigation; reconstruction of roadways; intersections and non-guideway structures; pedestrian and bicycle accommodations, sidewalks and trails; landscaping, fencing and lighting, park-and-ride facilities, contractor temporary and support costs.
50	Systems Systems Train control signals; roadway grade crossing protection; traction power substations; overhead catenary system; communications systems; central control hardware and software; automated fare collection systems; roadway traffic signals
60	Right-of-Way Acquisition of right-of-way or easements for guideway, stations, and other facilities; relocation of existing households and businesses
70	Vehicles Enhanced bus or standard buses, modern streetcar vehicles, and non-revenue vehicles, spare parts
80	Professional Services Preliminary engineering; final design; project management for design and construction; construction administration and management; insurance; legal, permits review fees; surveys, testing, investigation, inspection; agency force account work
90	Unallocated Contingency Overall unallocated project contingency and reserves
100	Finance Charges

SCC	Description
	For the purposes of this evaluation of the alternatives, there are no assumptions related to financing charges.

Data Sources

The capital cost estimates are based on assumptions derived from various sources. These assumptions include capital cost parameters applied at certain steps during the process, unit prices for the various capital cost items, and specific quantity, location, and design information, which will be informed by the design plans.

Parameters

Capital cost parameters are necessary assumptions that are not related to the specific location or design features of the corridor. The capital cost estimates for the Orange Line alternatives are based on the following parameters:

- Base Year – Year 2019
- Assumed annual inflation rate 3.5 percent for capital costs
- Contingencies– Contingencies are intended to compensate for unforeseen items if work, quantity fluctuations, and variances in unit costs develop as the project progresses through the various stages of study and design development. Allocated contingencies are added to specific SCC categories based on the category’s degree of potential change or uncertainty, while unallocated contingency accounts for unknowns at the project level, totaled from a percentage applied to multiple SCC categories. At this stage of planning, FTA considers 30 to 40 percent of project costs typical for the total allocated and unallocated contingency, respectively. The following allocated contingencies have been applied to the capital cost estimates:
 - Infrastructure Costs (SCC 10, 20, 30, 40 and 50): 30 percent
 - Right-of-Way (SCC 60): 50 percent

- Vehicles (SCC 70): 5 percent, with 50 percent on the autonomous vehicle components
- Professional Services (SCC 80): 2.5 percent
- Unallocated contingencies (SCC 90): 10 percent (applied to SCC 10, 20, 30, 40, 50, 60, 70, and 80)

Unit Prices

Unit prices for the various capital cost elements have been developed in accordance with Texas Department of Transportation (TxDOT) and the Capital Metropolitan Transit Authority (CMTA). They are based in whole or in part on unit prices for TxDOT and CMTA projects as well as transit projects by other systems such as Pittsburgh BRT, MARTA, Metro Transit, WMATA, GoTriangle, and NICTD. Calculated estimates based on typical scope of work for a line item, and TxDOT average bid prices.

The professional services cost estimates are tied to the construction SCC categories (10-50). **Table 2** lists the percentages of the construction SCC categories allocated for professional services by project stage.

Table 2: Professional Services Costs

FTA SCC	Description	Percentage of SCC 10-50
80.01	Project Development	6%
80.02	Engineering	9%
80.03	Project Management for Design and Construction	6%
80.04	Construction Administration & Management	8%
80.05	Professional Liability and other Non-Construction Insurance	2%
80.06	Legal; Permits; Review Fees by other agencies, cities, etc.	2%

FTA SCC	Description	Percentage of SCC 10-50
80.07	Surveys, Testing, Investigation, Inspection	1%
80.08	Start up	1%
Total		35%

Quantities

Quantity estimates are based on the conceptual design plans developed for each alternative. The following assumptions were used for estimating quantities, grouped by SCC:

Guideway Elements (SCC 10)

- LRT: direct fixation on elevated structures with embedded track in non-elevated sections
- BRT: two-lane concrete guideway throughout the alignment
- Tunnel unit cost based on 24-foot Outside Diameter (OD) twin-bored tunnel; 30 percent premium applied to unit cost for tunnel under Colorado River due to increased complexity

Stations, Stops, Terminals, Intermodal (SCC 20)

- Two elevators for all elevated and underground stations
- Two real time signs and two ticket vending machines for all platforms
- Four fare validators for all stations
- Park and rides based on ridership forecasts provided by the STOPS model. Structured parking is assumed when the parking demand is 500 vehicles or greater and street-level parking is assumed when parking demand is less than 500 vehicles

Support Facilities: Yards, Shops, Admin. Bldgs. (SCC 30)

- Estimated based on number of vehicles

Sitework and Special Conditions (SCC 40)

- Reconstruction of sidewalk on both sides of the street along the entire alignment
- ADA crosswalks at all signalized intersections

- Mid-block crossings considered where they currently exist
- Intersection widening assumed when intersection must be rebuilt due to grade change or realignment of the intersection
- Intersection rehabilitation assumed when intersection must be tied to match new grade
- Signing and restriping assumed on Nueces St, Hemp Hill, and 27th and 29th for the street-level alternatives
- Assuming full reconstruction of roadway along alignment, matching the existing pavement type
- Roadway reconstruction includes curb and gutter, drainage, signing, and striping
- Turn lanes considered where they currently exist and at the same length
- Medians are 50 percent landscaped and 50 percent concrete
- Cut-and-cover and tunnel sections include guideway costs and full roadway reconstruction
- Utility Relocation
 - Street level and Retained Fill
 - Low range of utility relocation allowance unit costs assumed for Segment 7
 - Medium range of utility relocation allowance unit costs assumed for sections from Wasson Road to Riverside Drive and north of 29th Street to end of Segment 3
 - High range of utility relocation allowance unit costs assumed for sections from Riverside Drive to North 29th Street
 - Elevated
 - Low range of utility relocation allowance unit costs assumed
 - Cut and Cover
 - High range of utility relocation allowance unit costs assumed for cut-and-cover sections
 - Tunnel
 - No less than the medium range of utility relocation allowance used for the tunnel sections

Systems (SCC 50)

- Street-level crossings of the guideway limited to signalized intersections.
- All existing signalized intersections considered
- Signals in elevated sections modified

Right-of-Way, Land, Existing Improvements (SCC 60)

- Plans show existing right-of-way (ROW) based on Metro Rapid Survey
- Assumed proposed ROW based on typical cross sections shown on plan set
- Assumed full ROW takes where necessary to expand transit centers and park-and-rides
- Assumed 30 acres of ROW required for the maintenance facility

Vehicles (SCC 70)

- 60-foot articulated electric buses for BRT alternatives
- Light rail vehicles for LRT alternatives

Estimated Capital Costs

Estimated capital costs ranged from \$160.1 million for the TSM alternative to \$9,449.2 million for the LRT tunnel alternative. Capital costs are reported in 2025 dollars, applying an annual inflation rate of 3.5 percent. Table 3 on the next page summarizes capital costs by two-digit SCC code while Table 4 summarizes them by project segment. Costs that are not specific to a single segment such as vehicles and the maintenance facility are reported on the “OMF & Vehicles” line.

Table 3: Estimated Capital Costs by SCC (2025 \$, Millions)

FTA SCC	Street Level					Elevated		Cut-and-Cover		Tunnel	
	TSM	Couplet		Non-Couplet		BRT	LRT	BRT	LRT	BRT	LRT
		BRT	LRT	BRT	LRT						
10 Guideway	\$0.0	\$507.9	\$750.3	\$474.9	\$716.6	\$1,108.9	\$1,370.0	\$1,791.2	\$2,056.8	\$3,180.6	\$3,446.1
20 Stations/Stops	\$0.0	\$100.2	\$224.0	\$98.1	\$212.5	\$514.2	\$577.5	\$1,388.0	\$1,437.0	\$1,388.0	\$1,437.0
30 Support Facilities	\$31.3	\$34.3	\$246.1	\$34.3	\$246.1	\$28.4	\$201.4	\$28.4	\$201.4	\$28.4	\$201.4
40 Sitework and Special Conditions	\$3.3	\$412.2	\$511.3	\$410.3	\$508.3	\$508.0	\$604.3	\$668.3	\$763.5	\$792.0	\$887.3
50 Systems	\$1.6	\$42.5	\$497.0	\$41.3	\$495.2	\$35.7	\$489.7	\$33.2	\$487.2	\$33.2	\$487.2
60 Right-of-Way	\$48.2	\$314.4	\$367.5	\$314.4	\$367.5	\$326.2	\$326.2	\$278.0	\$278.0	\$278.0	\$278.0
70 Vehicles *	\$103.1	\$112.8	\$268.3	\$112.8	\$268.3	\$93.4	\$219.6	\$93.4	\$219.6	\$93.4	\$219.6
80 Professional Services	\$10.0	\$302.8	\$615.0	\$292.2	\$601.3	\$605.8	\$894.9	\$1,078.7	\$1,364.9	\$1,496.3	\$1,782.4
90 Unallocated Contingencies	\$16.8	\$145.6	\$281.5	\$141.7	\$276.3	\$258.6	\$379.4	\$433.4	\$553.1	\$590.5	\$710.2
100 Finance Charges	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total	\$214.3	\$1,972.6	\$3,761.0	\$1,919.8	\$3,692.1	\$3,479.1	\$5,062.7	\$5,792.4	\$7,361.4	\$7,880.2	\$9,449.2

* Based on fleet requirements reflected in the Orange Line Operations and Maintenance Preliminary Results (10/30/2019): BRT elevated – 48; BRT street-level – 60; LRT elevated – 36; LRT street-level – 32 (includes 20% spare ratio).

Table 4: Estimated Capital Costs by Segment (2025 \$, Millions)

Segment	TSM	Street Level Non-Couplet / Couplet		Elevated		Cut-and-Cover		Tunnel	
		BRT	LRT	BRT	LRT	BRT	LRT	BRT	LRT
1 – North Austin	\$0.0	\$476.4	\$795.6	\$549.1	\$885.1	\$549.1	\$885.1	\$549.1	\$885.1
2 – Uptown	\$0.0	\$230.3	\$500.7	\$510.0	\$744.8	\$1,635.2	\$1,858.0	\$2,585.9	\$2,808.7
3 – UT	\$0.0	\$83.4	\$214.5	\$411.9	\$507.6	\$918.0	\$1,017.0	\$1,331.1	\$1,430.1
4 – Downtown	\$0.0	\$366.6 / \$419.5	\$491.7 / \$560.6	\$563.2	\$671.3	\$1,293.9	\$1,397.4	\$1,649.4	\$1,752.9
5 – SoCo	\$0.0	\$111.9	\$209.7	\$694.6	\$777.2	\$697.3	\$780.1	\$1,065.8	\$1,148.6
6 – South Central	\$0.0	\$213.4	\$400.9	\$343.2	\$517.7	\$343.2	\$517.7	\$343.2	\$517.7
7 – South Austin	\$0.0	\$208.2	\$357.9	\$208.1	\$359.2	\$208.1	\$357.7	\$208.1	\$357.7
OMF & Vehicles	\$214.3	\$229.5	\$721.2	\$199.1	\$599.8	\$147.7	\$548.4	\$147.7	\$548.4
Total	\$214.3	\$1,919.8 / \$1,972.6	\$3,692.1 / \$3,761.0	\$3,479.1	\$5,062.7	\$5,792.4	\$7,361.4	\$7,880.2	\$9,449.2

