Los Angeles County
Metropolitan Transportation Authority

West Santa Ana Branch Transit Corridor

Locally Preferred Alternative Capital Cost Report

Metro®

WEST SANTA ANA BRANCH TRANSIT CORRIDOR PROJECT

Locally Preferred Alternative Capital Cost Report

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Metro

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TABLE OF CONTENTS

Figures

Tables

Appendices

ACRONYMS AND ABBREVIATIONS

Acronym	Definition
AA	Alternatives Analysis
AACE	AACE International (American Association of Cost Engineers)
ACE	Advanced Conceptual Engineering
CEQA	California Environmental Quality Act
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
ENR	Engineering News Record
FTA	Federal Transit Administration
LA	Los Angeles
LPA	Locally Preferred Alternative
LRT	Light Rail Transit
LRTP	Long Range Transportation Plan
Metro	Los Angeles County Metropolitan Transportation Authority
MSF	maintenance and storage facility
NEPA	National Environmental Policy Act
NOP	Notice of Preparation
OCR	Overhead Conductor Rail
OCS	Overhead Catenary System
PEROW	Pacific Electric Right-of-Way
ROW	right-of-way
SCADA	Supervisory Control and Data Acquisition
SCC	Standard Cost Categories
SCAG	Southern California Association of Governments
TPSS	traction power substation
TVM	ticket vending machine
UPRR	Union Pacific Railroad
WSAB	West Santa Ana Branch
YOE	Year of Expenditure

1 INTRODUCTION

1.1 Study Background

The West Santa Ana Branch (WSAB) Transit Corridor (Project) is a proposed light rail transit (LRT) line. In January 2022, the Los Angeles County Metropolitan Transportation Authority (Metro) Board of Directors identified the Locally Preferred Alternative (LPA), which will extend approximately 14.5 miles from the northern terminus in the City of Los Angeles/Florence-Firestone community of Los Angeles (LA) County to the southern terminus in the City of Artesia, traversing densely populated, low-income, and heavily transit-dependent communities. The Project will provide reliable, fixed-guideway transit service that will increase mobility and connectivity for historically underserved, transit-dependent, and environmental justice communities; reduce travel times on local and regional transportation networks; and accommodate substantial future employment and population growth.

1.2 Alternatives Evaluation, Screening, and Selection Process

A wide range of potential alternatives have been considered and screened through the alternatives analysis processes. In March 2010, the Southern California Association of Governments (SCAG) initiated the Pacific Electric Right-of-Way (PEROW)/WSAB Alternatives Analysis (AA) Study (SCAG 2013) in coordination with the relevant cities, the Orangeline Development Authority (renamed to Eco-Rapid Transit, which has since been dissolved), the Gateway Cities Council of Governments, Metro, the Orange County Transportation Authority, and the owners of the right-of-way (ROW)—Union Pacific Railroad (UPRR), BNSF Railway, and the Ports of Los Angeles and Long Beach. The AA Study evaluated a wide variety of transit connections and modes for a broader 34-mile corridor from Union Station in downtown Los Angeles to the City of Santa Ana in Orange County. In February 2013, SCAG completed the PEROW/WSAB Corridor Alternatives Analysis Report[1] and recommended two LRT alternatives for further study: West Bank 3 and the East Bank.

Following completion of the AA, Metro completed the West Santa Ana Branch Transit Corridor Project Technical Refinement Study (Metro 2015) in 2015 focusing on the design and feasibility of five key issue areas along the 19-mile portion of the WSAB Transit Corridor within LA County:

- Access to Union Station in downtown Los Angeles
- Northern Section options
- Huntington Park Alignment and Stations
- New C (Green) Line Station
- Southern Terminus at Pioneer Station in Artesia

In September 2016, Metro initiated the WSAB Transit Corridor Environmental Study (Environmental Study) with the goal of environmentally clearing the Project under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

[1] Initial concepts evaluated in the SCAG report included transit connections and modes for the 34-mile corridor from Union Station in downtown Los Angeles to the City of Santa Ana. Modes included low-speed magnetic levitation (maglev) heavy rail, light rail, and bus rapid transit.

Metro issued a Notice of Preparation (NOP) on May 25, 2017, with a revised NOP issued on June 14, 2017, extending the comment period to 60 days. In June 2017, Metro held public scoping meetings in the Cities of Bellflower, Los Angeles, South Gate, and Huntington Park. Metro provided project updates and information to stakeholders with the intent to receive comments and questions through a comment period that ended in August 2017. A total of 1,122 comments were received during the public scoping period from May through August 2017. The comments focused on concerns regarding the Northern Alignment options, with specific concerns related to potential impacts to Alameda Street with an aerial alignment. Given potential visual and construction issues raised through public scoping, additional Northern Alignment concepts were evaluated.

In February 2018, the Metro Board approved further study of the alignment in the Northern Section due to community input during the 2017 scoping meetings. A second alternatives screening process was initiated to evaluate the original four Northern Alignment options and four new Northern Alignment concepts. The Final Northern Alignment Alternatives and Concepts Updated Screening Report was completed in May 2018 (Metro 2018). The alternatives were further refined and, based on the findings of the second screening analysis and the input gathered from the public outreach meetings, the Metro Board approved Alternatives E and G for further evaluation.

On July 11, 2018, Metro issued a revised and recirculated CEQA NOP, thereby initiating a scoping comment period. The purpose of the revised NOP was to inform the public of the Metro Board's decision to carry forward Alternatives E and G into the Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR). During the scoping period, one agency and three public scoping meetings were held in the Cities of Los Angeles, Cudahy, and Bellflower. The meetings provided project updates and information to stakeholders with the intent to receive comments and questions to support the environmental process. The comment period for scoping ended on August 24, 2018; more than 250 comments were received.

Following the July 2018 scoping period, a number of project refinements were made to address comments received, including additional grade separations, removing certain stations with low ridership, and removing the Bloomfield extension option. The Metro Board adopted these project refinements at its November 2018 meeting.

1.3 Draft Environmental Impact Statement/Environmental Impact Report

The Draft EIS/EIR and corresponding technical studies included evaluation of a No Build Alternative, four Build Alternatives, two station design options, and two site options for a maintenance and storage facility (MSF):

- Alternative 1: Los Angeles Union Station to Pioneer Station
  - Design Option 1: Los Angeles Union Station – Metropolitan Water District (MWD)
  - Design Option 2: Addition of Little Tokyo Station
- Alternative 2: 7th St/Metro Center to Pioneer Station
- Alternative 3: Slauson/A Line (Blue) to Pioneer Station
- Alternative 4: I-105/C Line (Green) to Pioneer Station

- Paramount MSF site option
- Bellflower MSF site option

Figure 1-1 illustrates the Build Alternatives evaluated in the Draft EIS/EIR.

Figure 1-1. Draft EIS/EIR Build Alternatives

Source: Metro 2020

The Draft EIS/EIR was released for public review and comment in July 2021 for 45 days, which was then extended to a 60-day public review period through September 28, 2021, to provide additional time for the public to respond. Notices of the Draft EIS/EIR release were done in accordance with CEQA and NEPA regulations and included two rounds of notices to announce details of the release of the Draft EIS/EIR, as well as to provide information on the public hearings and comment methods. The Notice of Availability was distributed to 261 agencies via USB drives, which included an electronic copy of the Draft EIS/EIR.

During the 60-day public review period, Metro hosted four virtual public hearings, four virtual community information sessions, and over 19 pop-up booths for in-person engagement at locations throughout the project corridor. In addition, Metro held approximately 20 briefings to key stakeholders, elected officials, corridor cities, and other agencies. In total, approximately 450 submissions were received during the public review and comment period. In January 2022, the Metro Board identified Alternative 3 as the LPA. The LPA extends from a northern terminus at the Slauson/A Line Station located in the City of Los Angeles/Florence-Firestone unincorporated area of LA County to a southern terminus at the Pioneer Station located in Artesia for a total of 14.5 miles. With identification of the LPA, the Metro Board also identified the MSF site option located in the City of Bellflower as a component of the LPA.

1.4 Project Description

This section describes the No Build Alternative and the LPA studied in the WSAB Transit Corridor Final EIS/EIR, including station locations, and the MSF. The LPA was developed through a comprehensive alternatives analysis process and meets the Purpose and Need of the Project.

The No Build Alternative and LPA are generally defined as follows:

- **No Build Alternative:** Reflects the transportation network in the 2042 horizon year without the LPA. The No Build Alternative includes the existing transportation network along with planned transportation improvements that have been committed to and identified in the constrained Metro 2009 Long Range Transportation Plan (2009 LRTP) (Metro 2009) and SCAG's 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy (SCAG 2016), as well as additional projects funded by Measure M that would be completed by 2042.
- **LPA:** The LPA consists of a 14.5-mile LRT line that will extend from the northern terminus in the City of Los Angeles/Florence-Firestone community of LA County to a southern terminus in the City of Artesia.

Figure 1-2 illustrates the LPA. The northern terminus of the LPA will be located just south of the intersection of Long Beach Avenue and Slauson Avenue, connecting to the current Slauson/A Line Station. South of Slauson Avenue, the LPA will follow the UPRR-owned La Habra Branch[2] ROW east along Randolph Street. At the Ports-owned San Pedro Subdivision ROW, the LPA will turn southeast to follow the San Pedro Subdivision ROW and then transition to the PEROW south of the I-105 freeway. The LPA will then follow the Metro-

[2] The La Habra Branch may also be referred to as the La Habra Subdivision. La Habra Branch is used within this document.

owned PEROW to the southern terminus at the Pioneer Station in the City of Artesia. The LPA will be grade-separated where warranted, as indicated on Figure 1-2.

Figure 1-2. Locally Preferred Alternative Alignment by Grade

Source: Metro 2023

1.4.1 Alignment Configuration

This section summarizes the LPA alignment. The general characteristics of the LPA are summarized in Table 1-1.

Table 1-1. Summary of LPA Components

Component	Quantity
Alignment length	14.5 miles
Length of at-grade and aerial	12.1 miles at-grade; 2.4 miles aerial[1]
Station configurations	9 along WSAB alignment, 1 at-grade infill station along C Line 3 aerial; 6 at-grade
Parking facilities	5 total: (4 surface lots and 1 parking structure) (approximately 2,800 spaces)
At-grade crossings	30
Elevated street crossings	15
Freight crossings	6
Freeway crossings	4 (1 aerial/overcrossing at I-105; 3 freeway undercrossings[2] at I-710, I-605, SR 91)
Freight realignment	8.7 miles
River crossings	3 (Rio Hondo, LA River, and San Gabriel)
TPSS facilities	17
Maintenance and storage facility site	1 (City of Bellflower)

Source: WSP 2023
Notes: [1] Alignment configuration measurements count retained fill embankments as at-grade.
[2] The light rail tracks crossing beneath freeway structures.
LA = Los Angeles; LPA = Locally Preferred Alternative; TPSS = traction power substation; WSAB = West Santa Ana Branch

2 COST ESTIMATES AND ESTIMATING METHODOLOGY

The cost estimates submitted within this report have been developed for the LPA under consideration in accordance with Federal Transit Administration (FTA) guidelines, using the latest revision of FTA's Standard Cost Categories (SCC). These estimates were prepared in a standard estimating format appropriate for this stage of project development.

The following elements are included in this report:

- Estimate Criteria
- Estimate Summary by Standard Cost Category
- Estimate Detail Worksheets (as appropriate)
- Unit Pricing
- Quantities

2.1 Cost Estimates for Locally Preferred Alternative – FTA SCC Format

The Project is the Locally Preferred Alternative:

2.1.1 LPA: Slauson/A Line to Pioneer

- Three aerial stations (Slauson/A Line, Firestone, Paramount/Rosecrans)
- Six at-grade stations (Pacific/Randolph, Florence/Salt Lake, Gardendale, WSAB I-105/C Line, Bellflower, Pioneer)
- One new infill I-105/C Line at-grade station
- Park-and-ride facilities:
  - Four surface lots with approximately 1,700 parking spaces
  - One multi-story parking structure with approximately 1,100 parking spaces
- Three river crossings: Los Angeles River, Rio Hondo channel, and San Gabriel River
- Four freeway crossings (I-710, I-105, SR-91, I-610)
- 30 at-grade and 15 aerial LRT crossings
- 12.1 miles of at-grade guideway and 2.4 miles of aerial guideway
- 8.7 miles of freight track and 2.8 miles of freight spurs realignment
- 17 traction power substation (TPSS) facilities
- Bellflower MSF facility

2.2 Locally Preferred Alternative Cost Estimate

Table 2.1 presents the costs associated with the LPA in 2023 dollars. The cost estimate includes cost contingency to cover unexpected cost increases consistent with FTA recommendations for transit projects at the current level of Advanced Conceptual Engineering (ACE) completion. The contingency consists of amounts allocated in varying amounts to each cost category based on "known unknowns such as design changes, historical perspective related to construction, cost growth, etc." Furthermore, an additional amount of 10 percent unallocated contingency has been added to address "unknown unknowns" such as unanticipated events, including political events, widespread economic downturns, labor strife, weather, differing site conditions, mercurial commodity pricing, unfavorable market conditions, bid risk, change orders, etc. Together, the allocated and unallocated amounts make up the total contingency. Table 2.2 identifies the total amount of contingency that is included in the cost estimate for the LPA.

Table 2.1. Capital Cost Estimate for Locally Preferred Alternative and Standardized Cost Category in 2023 Dollars (x000)

Cost Categories		West Santa Ana Branch Transit Corridor
		Locally Preferred Alternative Slauson/A Line To Pioneer and 47 LRVs
SCC - 10	Guideway and Track Elements	1,032,845
SCC - 20	Stations, Stops, Terminals, Intermodal	349,543
SCC - 30	Support Facilities	299,064
SCC - 40	Sitework And Special Conditions	515,720
SCC - 50	Systems	893,793
SCC - 60	Right-Of-Way, Land, Existing Improvements	1,146,138
SCC - 70	Vehicles	265,976
SCC - 80	Professional Services	898,414
SCC - 90	Unallocated Contingency	540,149
SCC - 100	Finance Charges	
	Total Cost (2023 dollars)	**5,941,642**

Source: Metro 2024
Note: See Appendix A for sources of the LPA costs.

Table 2.2. Total Allocated and Unallocated Contingency for the LPA in 2023 Dollars (x000)

Cost Categories	West Santa Ana Branch Transit Corridor
	Locally Preferred Alternative Slauson/A Line to Pioneer and 47LRVs
Allocated Contingency	1,300,028
Unallocated Contingency	540,149
Total Contingency	**1,840,177**
Contingency as Percent of Capital Cost	44.87%

Source: Metro 2024

The estimates produced during this EIS/EIR process consist of estimates compatible with the level of design. At the conclusion of this EIS/EIR process, the design will not have progressed beyond the 15 percent level. As a result, there are parametric cost elements within the estimate. These parametric cost elements are based on previously bid Metro projects, including Crenshaw/LAX LRT, Regional Connector, Exposition Line LRT, and Purple Line Segments One-, Two- and Three-unit price contracts that are escalated to present-day costs. This methodology forms a sound basis and high confidence in the project estimate.

The cost estimate in Table 2.1 and Table 2.2 is originally based on 2023 prices. However, it is crucial to consider the impact of inflation on future expenditures given the WSAB Project's timeline extending from 2023 to its expected commencement of revenue service in 2035. Inflation costs, which include factors such as rising labor rates, material prices, and equipment rates, will significantly affect the Project's overall expenses as the years progress.

To accurately account for these inflationary effects, an adjustment is made to the estimate to align it with Year of Expenditure (YOE) values. A comprehensive analysis of the WSAB Project schedule was conducted, resulting in the calculation of inflation costs associated with upcoming expenditures. An annual inflation rate of 3 percent was assumed for these calculations. The YOE values are detailed in Table 2.3.

Table 2.3. Year of Expenditure Estimate

Cost Categories	West Santa Ana Branch Transit Corridor
	Locally Preferred Alternative Slauson/A Line to Pioneer and 47LRVs
Total Cost (2023 dollars)	5,941,642
Inflation Costs (at 3% per year)	1,225,358
Total Cost in Year of Expenditure (YOE)	**7,167,000**

Source: Metro 2024

In summary, while the cost estimate in Table 2.1 is initially rooted in 2023 prices, the Project's extended timeline and the inevitable cost escalation are recognized. Consequently, necessary adjustments were made to incorporate YOE values, reflecting the impact of inflationary expenses, as outlined in Table 2.3.

3 FTA STANDARD COST CATEGORY

The methodology that is used for generating capital cost estimates is consistent with FTA guidelines for estimating capital costs. The FTA guidelines are based on the Standard Cost Categories (SCC), which enable projects to develop budget baselines that summarize to the SCC. This cost structure will be used for the capital cost detail and summary sheets and is described below. Where the level of design does not support quantity measurements, parametric estimating techniques are used. These parametric cost elements shall be based upon previously bid Crenshaw/LAX LRT, Exposition Line LRT, LA Regional Connector, and Purple Line Segments One and Two contracts escalated to March 2023. The methodology also uses the AACE International Class 4 estimate approach identifying Typical Purpose of Estimate (END USAGE) as Concept Study or Feasibility (from 1 percent to 15 percent). The Class 4 estimate has Expected Accuracy Range as follows: a low range of -15 percent to -30 percent and a high range of +20 percent to +50 percent.

3.1 Capital Cost Categories

The following summarizes the SCC codification structure:

10 Guideway and Track Elements
20 Station, 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

3.1.1 SCC 10 – Guideway and Track Elements

This section includes guideway and track elements for a light rail project. The unit of measure is route miles of guideway, regardless of the width. As associated with the guideway, included are costs for rough grading, excavation, and concrete base for guideway where applicable. All construction materials and labor are included regardless of who is performing the work.

10.01 Guideway: At-Grade

This section contains costs for exclusive at-grade guideways and at-grade crossings.

10.02 Guideway at-Grade Semi-exclusive (allow cross-traffic)

This section contains costs for semi-exclusive at-grade crossings.

10.04 Guideway: Aerial

This section includes costs for aerial guideway structures. The aerial guideway includes foundation excavation and guideway structures such as caissons, columns, bridges, viaducts, crossovers, and fly-overs.

10.05 Guideway: Built-up Fill

This section includes built-up fill, retaining walls, backfill, the transition from at-grade to aerial structures, and finishes.

10.06 Guideway: Underground Cut and Cover

This section includes costs for cut and cover of U-section structures. The underground cut and cover includes excavation, retaining walls, backfill, underground guideway structure, and finishes.

10.07 Guideway: Underground Bored Tunnel

This section includes the double-bored tunnel, assumed to be bored with a tunnel boring machine, tunnel structures, pedestrian and vehicular tunnels, and finishes.

10.08 Guideway: Retained Cut or Fill

This section includes excavation, retaining walls, backfill, underground guideway structures, and finishes. This section also includes costs for retained fill and retained cut.

10.09 - 10.13 Track: Direct Fixation, Ballasted, Special and Vibration and Noise Dampening

This section includes the construction of trackwork (including rail, ties, ballast, second pour, concrete panels, and attachments) and special trackwork (including turnouts, crossovers, etc.).

3.1.2 SCC 20 – Stations, Stops, Terminals, Intermodal

This section is associated with stations and includes costs for rough grading, excavation, retaining walls, station structures, enclosures, finishes, equipment, mechanical and electrical components, including heating/ventilation/air conditioning, ventilation shafts and equipment, station power, lighting, public address/customer information system, safety systems such as fire detection and prevention, security surveillance, access control, fire/life safety systems, etc. It includes all construction materials and labor regardless of who is performing the work.

20.01 At-Grade Stations

This section includes costs for at-grade stations based on the LPA.

20.02 Aerial Station

This section includes station structures, including caissons, columns, platforms, superstructure, etc. This section includes three aerial stations based on the LPA.

20.03 Underground Stations

This section includes cost for underground stations.

20.07 Elevators and Escalators

The quantity of escalators and elevators pertaining to each specific station listed is included in the estimate worksheet for the LPA. The estimate assumes geared-traction elevators with cabs that contain stainless-steel finishes and laminated glass walls, and are

constructed for high durability/high traffic. Escalators are assumed to be constructed for high durability/high traffic with stainless-steel finishes.

3.1.3 SCC 30 – Support Facilities: Yards, Shops, Administration Buildings

30.01, 30.03, 30.04 and 30.05 Administrative Building, Heavy Maintenance Facility, Yard and Yard Track

This section includes an allowance for a complete rail yard and multiple shops that are capable of serving up to 80 light rail vehicles located on more than 21 acres. These yard and shops will have capabilities similar to the Metro A (Blue) Line's light rail yard and shops.

Items in this category include site demolition and preparation, traction power, office support areas, maintenance-of-way facilities, trackwork for vehicle storage, cleaning and maintenance facilities, and storage/maintenance buildings. Quantity takeoff as applicable to 15 percent ACE level of engineering will be provided and priced with developed and historical unit cost data as applicable to each yard option and is included in this estimate.

3.1.4 SCC 40 – Sitework and Special Conditions

This cost category includes the sitework and special conditions that may be in addition to scope covered under standard profiles for guideway and station construction. Subcategories include:

40.01 Demolition, Clearing, Earthwork
40.02 Site Utilities, Utility Relocation
40.03 Hazardous Materials, Contaminated Soil Removal and Mitigation, Groundwater Treatment
40.04 Environmental Mitigation, etc. Wetland, Historic/Archaeological, Parks
40.05 Site Structures including Retaining Walls, Sound Walls
40.06 Pedestrian/Bike Access and Accommodation, Landscaping
40.07 Automobile, Bus, and Van Accessways, including Roads, Parking Lots
40.08 Temporary Facilities and Other Indirect Costs during Construction

40.01 Demolition, Clearing, Earthwork

This cost category includes costs associated with building and other demolition and can also include existing rail structures.

40.02 Site Utilities, Utility Relocation

This cost category includes relocation of both public and private utilities and specifically excludes betterments.

40.03 Hazardous Material, Contaminated Soil Removal/Mitigation, Ground Water Treatments.

No particular hazardous material or environmental mitigation information will be available during this study. Therefore a “plug” number based on the overall alignment length is used.

40.04 Environmental Mitigation

No specific hazardous material or environmental mitigation information will be available during this study. Therefore a "plug" number based on the overall alignment length is used.

40.05 Site Structures Including Retaining Walls, Sound Walls

Work items in this category include retaining walls, sound walls, shared lots, structures where there might be retail/economic/community activities on the ground floor, and other work that is adjacent to the actual alignment. For purposes of this study, parametric cost elements are used for these unit costs.

40.06 Pedestrian/Bike Access and Accommodation, Landscaping

Work items in this category include sidewalks, paths, plazas, landscape, site and station furniture, sight lighting, signage, public artwork, bike facilities, and fencing. This category also includes the Stations Public Artwork allowance in the amount of 0.5 percent of the project construction cost. For purposes of this study, parametric cost elements were used for these unit costs.

40.07 Automobile, Bus, Van Accessways, Including Roads, Parking Lots

This cost category includes roadways, streets, surface parking areas, sidewalks, curbs, and gutters. Additionally, this cost category if applicable may include shared lots or structures where there might be retail/economic or community activities on the ground floor. For purposes of this study, parametric cost elements were used for these unit costs.

40.08 Temporary Facilities and Other Indirect Costs During Construction

This cost category includes temporary facilities and other indirect costs during construction. Such costs shall include additional temporary construction easements to facilitate construction, phasing costs. These costs were determined as a percentage of the overall capital construction cost and included in all unit prices.

3.1.5 SCC 50 – Systems

The Systems cost category includes several relevant subcategories:

50.01 Train Control and Signals
50.02 Traffic Signals and Crossing Protection
50.03 Traction Power Supply: Substations
50.04 Traction Power Distribution: Catenary and Overhead Conductor Rail
50.05 Communications
50.06 Fare Collection System and Equipment
50.07 Central Control

50.01 Train Control and Signals

Work in this category includes signaling and control systems required for safe and efficient operations of the transit technology. Wayside signals and automatic train stop circuitry in the track and vehicles are included. Where appropriate, Supervisory Control and Data Acquisition (SCADA) will also be assumed.

50.02 Traffic Signals and Crossing Protection

Work in this category includes signal prioritization at intersections. Crossings consist of devices that are expected to be at each crossing, including a quad gates system with traffic loop detectors. The traffic signals must be rearranged to accommodate the new crossing configuration and the crossing system pre-emption, and new conduits and cables have to connect the train signals and traffic signals. The estimate for the train control systems is based on the historical data from the comparable LRT and Freight Train Crossings projects.

50.03 Traction Power Supply: Substations

A TPSS converts electrical power from AC to DC. This cost category involves the cost with the station, including structural, mechanical, electrical, and civil work. This work is typically estimated based on industry-standard per unit costs for each TPSS.

50.04 Traction Power Distribution: Catenary – Overhead Catenary System (OCS)

The scope covers the cost of electrical construction for an Overhead Catenary System (OCS) and Rigid Overhead Conductor Rail (OCR) system used in the Metro tunnels. It includes associated electrical site work and installation of a complete catenary system inclusive of poles, feeder poles, cantilevers, pole bands, traction power feeder connections, disconnect switches, cable supports, and messenger and contact wire.

50.05 Communications

The scope of this estimate covers the cost of electrical construction for a communications system. This includes associated communications/electrical site and stations work, and installation of complete communications system inclusive of equipment, shelters, train communication and control buildings, systems cabling, cables connections, cable supports, and labor.

50.06 Fare Collection System and Equipment

Fare collection costs include ticket vending machines (TVMs), fare gates, a cost inclusive of vendor design, manufacture, and installation. TVM pricing for estimating purposes was based on the assumed Smart Card technology planned for implementation on all Metro properties.

50.07 Central Control

Currently, the estimate includes an allowance for the expansion cost of the Rail Operations Center Facilities. Per discussions with Metro, an allowance of $10 million was included in the LPA estimate.

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

This cost category includes real estate acquisition and relocation costs.

60.01 Purchase or Lease of Real Estate

60.02 Relocation of Existing Households and Businesses

60.03 Right-of-Way (ROW)

Fee acquisitions of permanent and temporary easements, relocation costs, and "loss of business" compensation are included. Real estate acquisition and relocation estimates were provided by Metro based on information provided by the Metro Real Estate Department for similar types of property. Refined real estate pricing was produced by Del Richardson & Associates, Inc. and is included in the final version of this report. Real estate acquisitions/easements will primarily be associated with track, grade crossing improvements, construction staging, and station parking. Cost estimates were prepared by Del Richardson & Associates, Inc. based on ROW drawings provided by WSP for inclusion in the cost estimate.

Exclusions include:

- Railroad ROW owned by railroads (Wilmington Branch, La Habra Branch, and San Pedro Subdivision). Pending final negotiations, the estimate includes a $500M placeholder
- California Department of Transportation ROW
- Metro-owned ROW
- Any publicly-owned ROW or real estate

3.1.7 SCC 70 – Vehicles

This cost category includes the cost of revenue and non-revenue vehicles. Revenue vehicle pricing is based on recent historical and industry-standard unit costs and includes design engineering, manufacture, testing, and spare parts. The estimate assumes there will be no need to retrofit any of Metro's existing fleet for consist compatibility with newer technologies.

3.1.8 SCC 80 – Professional Services (applies to SCC 10-50)

This cost category covers alternatives analysis, environmental process, engineering and design and design support during construction, construction management, Metro agency costs, professional insurance costs, surveys and testing, specialty subconsultants, and legal expenses.

3.1.9 SCC 90 – Unallocated Contingency

Unallocated contingency is intended to cover bid risk and construction risk that cannot reasonably be allocated to specific SCC codes. It is intended to cover unknowns that cannot be anticipated but is nonetheless prudent to include for planning purposes. This is calculated as a percentage add-on based on the total capital cost estimate, typically in the range of 10 to 15 percent (refer to Section 4.7). The Project will use 10 percent per Metro's recommendation. Note that additionally allocated contingencies ranging from 16 to 50 percent are allocated to specific cost categories as addressed in Section 4.6 and Table 4.1.

3.1.10 SCC 100 – Finance Charges

Finance charges are not included in the scope of the initial estimates.

4 ESTIMATING METHODOLOGY

Estimates were prepared in a standard estimating format appropriate to the stage of project development. The following elements are comprised of the estimate deliverable under Locally Preferred Alternative Task Cost Analysis:

- Letter of Transmittal
- Basis and Assumptions Document
- Estimate Reconciliation (if the previous estimate exists)
- Estimate Summary by Standard Cost Category
- Estimate Detail Worksheets (as appropriate)
- Unit Pricing
- Quantities

The capital cost estimate is provided for LPA alignment and stations.

4.1 Estimate Assumptions – General

Estimates for the conceptual phase are based on the following assumptions:

- The estimates are prepared uses first quarter 2023 dollars.
- Adequate experience craft labor will be available.
- Compatible trade agreements exist in the region.
- No unusual labor pacts or agreements have been negotiated.
- Sufficient experienced contractors will be available to complete the work.
- No unusual weather conditions will occur.

4.2 Software (MS Excel)

The estimates for this study were prepared on Microsoft Excel spreadsheets. This enables the review, edit, consolidation, and reporting of estimate components over the course of time, and provides Metro with the flexibility to easily make internal adjustments. Estimates will be transmitted in electronic formats.

4.3 Estimate Basis and Assumptions – Detail

The Cost Comparison Analysis document is integral to providing a full understanding of the estimate submittal and an evaluation of the LPA. As each estimate was developed, the document provides specific information relating to:

- Estimate Scope: A brief explanation of the LPA.
- Drawings and other technical documentation: Description of drawings, sketches and other technical documentation used, including titles and dates.
- Quantities: A description of the basis for quantity assessments for each major Standard Cost Category, including a general description of the level of design completion.
- Unit Prices: At the conclusion of this EIS/EIR process, the design will not have progressed beyond approximately 15 percent. As a result, there are parametric cost elements within the estimate. These parametric cost elements are based upon previously bid Crenshaw/LAX LRT, Exposition Line LRT, LA Regional Connector,

and Purple Line Segments, as well as One- and Two-unit price contracts escalated to the present day.

- Exclusions: Provides identification of items that are specifically not included in the estimate, such as insurance, a contingency for construction and bid risk, escalation, etc.
- Other Information: May include a record of site visits, documents that served as the basis for certain assumptions, reference of articles from newspapers and magazines, documentation of unusual factors having an influence on the final cost, etc.

4.4 Pricing Approach

The two methodologies used for establishing unit rates include (1) historical information and (2) "bottom-up" pricing. Typically, estimates are developed using a combination of the two. However, in the early stages of the design and with few engineering details, the historical bid price method was used almost exclusively. The Metro Parametric Unit Cost Matrix was consulted and used as appropriate. As the Project evolves further beyond this EIS/EIR phase, a mix of detailed pricing and historical information will be used[3].

4.5 Quantities

Quantity takeoffs are prepared consistent with the level of design. Quantity assessments are made based on general descriptions of horizontal and vertical alignments, standard design criteria, and order-of-magnitude assessments.

4.6 Allocated Contingencies

By FTA Standard Cost Categories, allocated contingencies are typically included in an estimate to address lack of scope and quantity definition during the in-progress design stages. Metro's Project Contingency Policy was reviewed and addressed during this process. In the early stages, the Design Allowance represented a significant portion of the estimate for any particular Standard Cost Category. As the design progresses and more detailed quantity takeoffs can be made, the allowance is reduced; at 100 percent design completion, the Design Allowance, by definition, will be zero.

For purposes of the EIS/EIR, few detailed quantity takeoffs were performed due to the early stage of engineering completion. Instead, quantities were determined consistent with the level of design at the time of estimate preparation. The amount of allocated contingency depends on the complexity of any particular SCC code as well as the stage of engineering completion. For the EIS/EIR, the allocated contingency will typically be within the 30 to 50 percent range, as described in Table 4.1.

[3] It should be noted that unit pricing is not adjusted to reflect items such as market conditions and bid risk, agency reputation in the contracting community, and other considerations. These adjustments will be addressed at the appropriate time through the application of unallocated contingency as the Project further evolves.

Table 4.1. Allocated Contingencies Percentages

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, and Intermodal	30
30	Support Facilities: Yards, Shops, and Administration Buildings	30
40	Sitework and Special Conditions	
	Demolition, Clearing, and Earthwork	30
	Site Utilities and Utility Relocation	30
	Hazardous Materials, Contaminated Soil Removal/Mitigation, and Groundwater Treatments	30
	Environmental Mitigation, e.g., Wetlands, Historic/Archaeological, and Parks	30
	Site Structures, including Retaining Walls and Sound Walls	30
	Pedestrian/Bike Access and Accommodation, including Landscaping	30
	Automobile, Bus, and Van Access, including Roads and Parking Lots	30
50	Systems	30
60	ROW, Land, Existing Improvements	50
70	Vehicles (number) Spare Parts (10% of SCC 70 Total)	16
80	Professional Services (applies to Categories 10-50)	23
90	Unallocated Contingency (See 4.7)	10

Source: Metro 2023
FTA = Federal Transit Administration; ROW = right-of-way; SCC = Standard Cost Category

4.7 Unallocated Contingency

In addition to allocated contingency, project contingency addresses bid risks, construction risks, and project reserve. Contingency has been allocated in varying amounts to each SCC code based on "known unknowns" (allocated contingency). That is, historical perspectives provided insight where other projects have previously experienced cost growth. If similar conditions exist on the WSAB Transit Corridor, this risk was identified to a particular SCC code and reflected through an appropriately allocated contingency.

Unallocated contingency was also established at the total project level. Combined, the allocated and unallocated contingencies reflects the total contingency. Unallocated contingency is intended to address "unknown unknowns," or to simply reflect a prudent amount to cover unanticipated events, including political events, labor strife, weather, differing site conditions, mercurial commodity pricing, unfavorable market conditions, bid risk, change orders, etc. The unallocated contingency is simply a percentage add-on in the range of 10 to 15 percent, as indicated in Section 3.1.9. For this Project, 10 percent is used per Metro's recommendation.

4.8 Escalation

The estimates developed during the EIS/EIR were completed in April 2023 dollars, inclusive of an escalation of 14.75 percent from the previous report dated March 2020. As the Project progresses and estimates are updated, the escalation factors will be revised based upon the Historical Cost Indexes in Los Angeles as published by Engineering News Record (ENR).

4.9 Estimate Review and Approval

At the completion of any given estimate deliverable, copies are reviewed internally for reasonableness and an overall quality check. The quality check includes a review for deliverable completeness, an arithmetic check, back-up documentation, and consistency with SCC coding structures. A review meeting is conducted with all participants to address and respond to any comments. All estimates will be considered drafts until approved for submittal to Metro. Record copies are provided to each participant.

4.10 Estimate Reconciliation

Over the course of the EIS/EIR process, estimates for the LPA and options continue to evolve. For each formal estimate submittal, a narrative is provided that explains the primary differences compared to previous submittals with regard to these factors.

5 ESTIMATE LIMITATIONS

Uncertainty exists at the early stages of engineering completion to the extent of the level that work scope has been defined. Estimates that support the EIS/EIR are based on documents that are developed to an approximate 15 percent level of engineering completion. The uncertainty inherent in the Project at this stage may include:

- Scope and Quantity Definition
- Commodity Pricing
- Unforeseen Problems

5.1 Project Criteria

The most recent Metro projects that have similar elements to the WSAB Transit Corridor include the Crenshaw/LAX LRT, Exposition Line LRT, LA Regional Connector, and the Purple Line Segments One and Two, which are all considered in the cost evaluation. This information is used to develop scope relative to this Project.

5.2 Scope and Quantity Definition

The lack of scope definition, coupled with an inability to make precise quantity takeoffs, almost certainly results in changes to the project cost as the design evolves. Therefore, the scope cannot be completely defined in this EIS/EIR. As the engineering design progresses, changes to the scope's assumptions are incorporated into the estimate and each iteration documents the updates. Although the allocated contingency is intended to mitigate some of these impacts, significant cost risk still remains.

5.3 Material Pricing

Over the past few years, the cost of commodities such as petroleum, concrete, and steel have increased and decreased dramatically. Many of these commodities continue to be unpredictable and may remain uncertain in the estimate for this Project. The inclusion of a factor based on Civil Construction Cost Index values as published by ENR is used to address this risk.

5.4 Construction and Bid Risk

The risk associated with project implementation represents a significant uncertainty in the project cost. Over the past several years, many projects have seen substantial variations in bids compared to estimates as a result of unfavorable market conditions, lack of competition in the marketplace, or perceived contractor risk. These types of risk are addressed through application of contingency.

APPENDIX A – LPA ALTERNATIVE ESTIMATE

The following page contain estimates for each of the options described in this report as follows:

A-1: Locally Preferred Alternative Alignment, Bellflower MSF and 47 LRVs

A-1: Locally Preferred Alternative Alignment, Bellflower MSF and 47 LRVs

MAIN WORKSHEET-BUILD ALTERNATIVE (Rev.23, May, 2022)

West Santa Ana Branch Transit Corridor
Advanced Conceptual Engineering
Locally Preferred Alternative Alignment

Today's Date 1/3/24
Yr of Base Year $ 2023
Yr of Revenue Ops 2035

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	**14.49**	794,496	238,349	**1,032,845**	**$71,291**	**33%**	**17%**	**0**
10.01 Guideway: At-grade exclusive right-of-way	7.90	196,648	58,994	255,642	$32,354			0
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	0.67	13,845	4,154	17,999	$26,990			0
10.03 Guideway: At-grade in mixed traffic	0.00	0	0	0				0
10.04 Guideway: Aerial structure	2.41	237,032	71,110	308,142	$127,948			0
10.05 Guideway: Built-up fill	3.45	162,974	48,892	211,866	$61,432			0
10.06 Guideway: Underground cut & cover	0.00	0	0	0				0
10.07 Guideway: Underground tunnel	0.06	9,544	2,863	12,407	$198,515			0
10.08 Guideway: Retained cut or fill	0.00	0	0	0				0
10.09 Track: Direct fixation	2.47	14,663	4,399	19,062	$7,715			0
10.10 Track: Embedded	0.67	7,000	2,100	9,100	$13,646			0
10.11 Track: Ballasted	11.35	89,204	26,761	115,965	$10,217			0
10.12 Track: Special (switches, turnouts)		38,631	11,589	50,220				0
10.13 Track: Vibration and noise dampening		24,955	7,487	32,442				0
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)	**10**	268,879	80,664	**349,543**	**$34,954**	**11%**	**6%**	**0**
20.01 At-grade station, stop, shelter, mall, terminal, platform	7	66,428	19,928	86,356	$12,337			0
20.02 Aerial station, stop, shelter, mall, terminal, platform	3	80,577	24,173	104,750	$34,917			0
20.03 Underground station, stop, shelter, mall, terminal, platform	0	0	0	0				0
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.	0	0	0	0				0
20.05 Joint development	0	0	0					0
20.06 Automobile parking multi-story structure	0	82,362	24,709	107,071				0
20.07 Elevators, escalators		39,512	11,854	51,366				0
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	14.49	230,049	69,015	**299,064**	$20,642	**10%**	**5%**	**0**
30.01 Administration Building: Office, sales, storage, revenue counting		31,349	9,405	40,754				0
30.02 Light Maintenance Facility		0	0	0				0
30.03 Heavy Maintenance Facility		96,251	28,875	125,126				0
30.04 Storage or Maintenance of Way Building		33,268	9,980	43,248				0
30.05 Yard and Yard Track		69,181	20,754	89,935				0
40 SITEWORK & SPECIAL CONDITIONS	14.49	396,708	119,012	**515,720**	$35,597	**17%**	**9%**	**0**
40.01 Demolition, Clearing, Earthwork		114,422	34,327	148,749				0
40.02 Site Utilities, Utility Relocation		67,850	20,355	88,205				0
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments		17,348	5,204	22,552				0
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		7,097	2,129	9,226				0
40.05 Site structures including retaining walls, sound walls		120,886	36,266	157,152				0
40.06 Pedestrian / bike access and accommodation, landscaping		69,105	20,732	89,837				0
40.07 Automobile, bus, van accessways including roads, parking lots		0	0	0				0
40.08 Temporary Facilities		0	0	0				0
50 SYSTEMS	14.49	687,533	206,260	**893,793**	$61,693	**29%**	**15%**	**0**
50.01 Train control and signals		167,007	50,102	217,109				0
50.02 Traffic signals and crossing protection		77,453	23,236	100,689				0
50.03 Traction power supply: substations		221,799	66,540	288,339				0
50.04 Traction power distribution: catenary and third rail		78,581	23,574	102,155				0
50.05 Communications		119,306	35,792	155,098				0
50.06 Fare collection system and equipment		13,387	4,016	17,403				0
50.07 Central Control		10,000	3,000	13,000				0
Construction Subtotal (10 - 50)	14.49	2,377,665	713,300	**3,090,965**	$213,349	**100%**	**52%**	**0**
60 ROW, LAND, EXISTING IMPROVEMENTS	14.49	764,092	382,046	**1,146,138**	$79,110		**19%**	**0**
60.01 Purchase or lease of real estate		702,014	351,007	1,053,021				0
60.02 Relocation of existing households and businesses		62,078	31,039	93,117				0
70 VEHICLES (number)	**47**	229,290	36,686	**265,976**	**$5,659**		**4%**	**0**
70.01 Light Rail	47	208,445	33,351	241,796	$5,145			0
70.02 Heavy Rail	0	0	0	0				0
70.03 Commuter Rail	0	0	0	0				0
70.04 Bus	0	0	0	0				0
70.05 Other	0	0	0	0				0
70.06 Non-revenue vehicles	0	0	0	0				0
70.07 Spare parts	47	20,845	3,335	24,180	$514			0
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	14.49	730,418	167,996	**898,414**	**$62,012**	**29%**	**15%**	**0**
80.01 Project Development		43,749	10,062	53,811				0
80.02 Engineering		224,689	51,678	276,367				0
80.03 Project Management for Design and Construction		197,108	45,335	242,443				0
80.04 Construction Administration & Management		140,520	32,320	172,840				0
80.05 Professional Liability and other Non-Construction Insurance		1,427	328	1,755				0
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		25,203	5,797	31,000				0
80.07 Surveys, Testing, Investigation, Inspection		40,183	9,242	49,425				0
80.08 Start up		57,539	13,234	70,773				0
Subtotal (10 - 80)	14.49	4,101,465	1,300,028	**5,401,493**	**$372,830**		**91%**	**0**
90 UNALLOCATED CONTINGENCY				**540,149**			**9%**	**0**
Subtotal (10 - 90)	14.49			**5,941,642**	**$410,113**		**100%**	**0**
100 FINANCE CHARGES				**0**			**0%**	**0**
Total Project Cost (10 - 100)	14.49			**5,941,642**	**$410,113**		**100%**	**0**
Allocated Contingency as % of Base Yr Dollars w/o Contingency				31.70%				
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				13.17%				
Total Contingency as % of Base Yr Dollars w/o Contingency				44.87%				
Unallocated Contingency as % of Subtotal (10 - 80)				10.00%				
YOE Construction Cost per Mile (X000)								$0
YOE Total Project Cost per Mile Not Including Vehicles (X000)								$0
YOE Total Project Cost per Mile (X000)								$0