Los Angeles County
Metropolitan Transportation Authority

West Santa Ana Branch Transit Corridor

Final Operating and Maintenance Cost Report

Metro®

WEST SANTA ANA BRANCH TRANSIT CORRIDOR PROJECT

Final

Operating and Maintenance Cost Report

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Metro

Los Angeles County
Metropolitan Transportation Authority

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APPENDIX A. O&M COST DETAILS

ACRONYMS AND ABBREVIATIONS

Acronyms	Definition
AA	Alternatives Analysis
CEQA	California Environmental Quality Act
CPI-U	consumer price index for all urban consumers
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
Environmental Study	West Santa Ana Branch Transit Corridor Environmental Study
FY	Fiscal Year
LA	Los Angeles
LPA	Locally Preferred Alternative
LRT	light rail transit
Metro	Los Angeles County Metropolitan Transportation Authority
MSF	maintenance and storage facility
NEPA	National Environmental Policy Act
NOP	Notice of Preparation
NTD	National Transit Database
O&M	operations and maintenance
PEROW	Pacific Electric Right-of-Way
ROW	right-of-way
SCAG	Southern California Association of Governments
UPRR	Union Pacific Railroad
WSAB	West Santa Ana Branch

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-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.

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

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 OPERATIONS AND MAINTENANCE COST ESTIMATE

This section presents the estimated annual Operating & Maintenance (O&M) costs for the LPA. There are two steps to this process. The first step is to develop O&M unit costs. The O&M methodology section discusses how this was accomplished. In the second step, the O&M unit cost is applied to the operating statistics to determine annual O&M costs for the LPA.

2.1 O&M Cost Methodology

Annual O&M costs have been estimated with spreadsheet models that tie costs to the level of service that is to be operated and facilities that are to be maintained. Specifically, the cost allocation models assume that each operating expense incurred is driven by a key supply variable such as revenue hours, revenue miles, or number of vehicles operated during peak periods. Unit costs are developed and applied to future service statistics. The result is an estimated annual O&M cost that is specific for the test scenario.

Actual cost data from Metro was used to develop unit cost data for light rail alternatives. Metro reports actual costs and service statistics to the Federal Transit Administration in the National Transit Database (NTD). Metro's fiscal year (FY) 2018 NTD submittal was used. In accordance with Metro staff, this methodology did not use more recent data to avoid distortions resulting from the opening of the New Blue Improvement Project and the COVID-19 pandemic.

However, conversations with Metro staff suggested that O&M costs have likely increased since FY18 due to multiple factors other than cost inflation and labor wage increase. Additional expenses are related to the customer experience initiatives such as extra cleaning, homelessness initiatives, and security expenses. To account for this, total O&M costs in Metro's 2018 approved budget were compared to Metro's 2023 approved budget. The ratio was calculated, and after accounting for inflation, it is estimated that O&M costs should be about 8.5 percent higher than what is shown in the 2018 data. The values submitted by Metro to the NTD for FY18 were, therefore, increased by this percentage to generate unit costs that are more realistic and applicable to post-pandemic service.

Service statistics used in the development of unit costs are as follows:

- **Annual Revenue Train-Hours**: The hours that trains (of any length) travel while in revenue service over the entire fiscal year. Revenue train-hours include layover and schedule recovery but exclude time for deadhead, operator training, and maintenance testing.
- **Annual Revenue Car-Miles**: The miles that passenger vehicles travel while in revenue service over the entire fiscal year. Revenue car-miles include layover and schedule recovery but exclude miles for deadhead, operator training, and maintenance testing.
- **Annual Revenue Car-Hours**: The hours that passenger vehicles travel while in revenue service over the entire fiscal year. Revenue car-hours include layover and schedule recovery but exclude time for deadhead, operator training, and maintenance testing.
- **Peak Cars**: The maximum number of passenger service vehicles operated simultaneously on an average weekday. In some cases, peak cars may be used as a

supply variable when the model needs to base a line item expense on overall rail system size.

- **Stations***:* Passenger boarding/alighting facilities with a platform and associated equipment and amenities such as stairs, elevators, canopies, lighting, ticket vending machines, and signage. Unit costs have been defined based on station profile (at-grade, aerial, and subway) to account for additional costs associated with vertical circulation requirements for aerial and subway stations and ventilation and lighting requirements for subway stations.
- **Maintenance and Storage Yards**: The total number of yard facilities allocated.
- **Revenue Track-Miles**: Miles of directional revenue track reported in NTD.

Key supply variables and values used to represent LA Metro's FY18 calibration (base) year input are summarized in Table 2-1.

Table 2-1. Key Supply Variables – FY18 Calibration (Base) Year

Key Supply Variable	Quantity
Annual Revenue Train-Hours	339,891
Annual Revenue Car-Miles	17,999,250
Annual Revenue Car-Hours	866,272
Peak Rail Cars	196
At-Grade Stations	52
Aerial Stations	23
Subway Stations	4
Maintenance and Storage Yards	5
Directional Track-Miles	171.9

Source: WSP 2023
Note: FY = fiscal year

After selecting key supply variables, the next step to develop the LRT O&M cost model was to record Metro's light rail operating expenses as a series of line items. The NTD report format categorizes operating expenses within the four functional areas of Vehicle Operations, Vehicle Maintenance, Non-Vehicle Maintenance, and General Administration. For each functional area, line item expenses are further classified as salaries/wages, fringe benefits, services, materials/supplies, utilities, casualty and liability, taxes/fees, and miscellaneous.

After the list of line items was established, each was assigned a key supply variable as its most relevant cost driver. Several line item expenses were deemed to be strongly influenced by more than one key supply variable, thus the LRT O&M cost model splits those specific expenses among two or more cost drivers. A portion of general administrative costs were also identified as fixed costs that would not be impacted by changes in levels of rail service or facilities since Metro presently operates an extensive LRT system.

Costs were inflated to 2023 dollars by 20.22 percent using the Bureau of Labor Statistics consumer price index for all urban consumers (CPI-U) for Los Angeles (March 2018 index compared to February 2023 index), and adjusted to account for more realistic post-pandemic operations, as previously described. Resulting aggregate unit costs for the calibration system in 2023 dollars are summarized in Table 2-2.

Table 2-2. Aggregate Unit Costs for the Calibration System

Key Supply Variable	Aggregate Unit Cost (in FY23 $)
Annual Revenue Train-Hours	$308.50
Annual Revenue Car-Miles	$4.02
Annual Revenue Car-Hours	$22.63
Peak Rail Cars	$1,020,907
At-Grade Stations	$484,175
Aerial Stations	$666,734
Subway Stations	$849,292
Maintenance and Storage Yards	$5,393,025
Directional Track-Miles	$87,605

Source: WSP 2023
Note: FY = fiscal year

An additional $31,078,253 was identified as fixed costs. The LRT O&M cost spreadsheet that generates the aggregate unit costs noted above is provided in Appendix A, Table A-1.

2.2 O&M Cost Estimates

Once unit costs are established for each of the identified cost drivers, unit costs are multiplied by operating statistics as calculated for each of the project alternatives. Table 2-3 summarizes annual statistics for the LPA. Service statistics are based on the following assumed service levels:

- Weekday service (21.5-hour span Mondays through Thursdays, 22-hour span Fridays): 5 minute peak, 10 minute midday, 10-20 minute evening/night headways.
- Weekend service (22-hour span Saturdays, 21.5-hour span Sundays): 10 minute all-day headways tapering to 15-20 minute evening/night headways.

Table 2-3. Operating Statistics Summary

Operating Statistic	LPA Slauson/A Line – Pioneer
Revenue Train-Hours	49,600
Revenue Car-Miles	3,905,986
Revenue Car-Hours	133,000
Peak Cars	39
At-Grade Stations	6
Aerial Stations	3
Subway Stations	0
Yards	1
Directional Track-Miles	28.2

Source: WSP 2023
Note: LPA = Locally Preferred Alternative

More details regarding the assumed service plan are provided in a separate memorandum, Operating Plans and Support Facilities with Northern Alignments, dated October 26, 2018 (Task 5.5.2c). The statistics in Table 2-4 include the shift of the Slauson/A Line Station to the south in the winter of 2023.

Table 2-4. O&M Cost Results

Alternative	O&M Costs (in FY23 $, in millions)	O&M Costs (in FY35 $, in millions)
LPA: Slauson/A Line to Pioneer Station	$117.7	$177.8

Source: WSP 2023
Notes: FY = fiscal year; LPA = Locally Preferred Alternative; O&M = operations and maintenance

The operating statistics for the WSAB LPA as presented in Table 2-3 are based on the basic service plan providing 5-minute peak headways on weekdays.

Table 2-4 provides the estimated annual O&M cost to operate the LPA. The cost is presented in millions, in 2023 dollars. The table also presents the O&M costs inflated to the estimated opening year of 2035, using a 3.5 percent escalation rate for future years.

O&M costs for the LPA equal about $118 million in 2023 dollars and about $178 million in 2035 dollars. About 35 percent of these costs are for "Vehicle Operations," about 20 percent for "Vehicle Maintenance," about 5 percent for "Non-Vehicle Maintenance," and the remaining 40 percent for "General Administration." Among the specific cost subcategories reported to the NTD, the main cost drivers are service costs for vehicle operations, salaries and wages, and fringe benefits. Refer to Appendix A for additional backup information on the specific cost elements associated with the LPA O&M cost estimate.

C Line Infill Station

Metro is evaluating the addition of a new infill station along the existing C Line. The additional station would be at-grade within the median of the I-105 Freeway. Based on the methodology described in this report, adding this station would increase annual O&M costs for the LPA by about $0.5 million to $118.2 million in 2023 dollars, equal to $178.6 million in 2035 dollars.

REFERENCES

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Southern California Association of Governments (SCAG). 2016. *2016-2040 Regional Transportation Plan/Sustainable Communities Strategy*. Adopted April 2016. Website: http://scagrtpscs.net/Pages/default.aspx.

APPENDIX A. O&M COST DETAILS

Table A-1. LA Metro LRT O&M Cost Model – FY 2018 Calibration

Table A-2. LPA: Slauson/A Line to Pioneer Station

WEST SANTA ANA BRANCH
LIGHT RAIL O&M COST MODEL
(Reflects LA Metro Light Rail Cost Data)

Calibration

Inflate Factor	**1.2022**

Expense Line Item	2018 LA Metro LRT 2018 NTD Expenses	Supply Variable Unit Cost ($2018)											Inflation Factor	Estimated Annual Cost (2023)
		Revenue Train-Hours	Revenue Car-Miles	Revenue Car-Hours	Peak Cars	At-Grade Stations	Aerial Stations	Subway Stations	Total Stations	Yards	Revenue Track-Miles	Fixed		
VEHICLE OPERATIONS	***$191,718,122***													***$230,483,709***
Operators' Salaries and Wages	*$20,972,978*	$61.71											1.202	$25,213,734
Other Salaries and Wages	*$27,662,457*	$40.69				$87,539	$87,539	$87,539		$1,152,602			1.202	$33,255,832
Fringe Benefits	*$44,597,571*	$93.90				$80,272	$80,272	$80,272		$1,056,910			1.202	$53,615,242
Service Costs	*$77,378,475*				$394,788.14								1.202	$93,024,477
Fuel and Lubricants	*$89,014*				$454.15								1.202	$107,013
Tires and Tubes	*$0*												1.202	$0
Other Materials and Supplies	*$988,106*				$5,041.36								1.202	$1,187,902
Utilities	*$20,029,521*			$17.34	$25,547.86								1.202	$24,079,509
Casualty and Liability Costs	*$0*												1.202	$0
Taxes	*$0*												1.202	$0
PT Funds In Report	*$0*												1.202	$0
Miscellaneous Expenses	*$0*												1.202	$0
VEHICLE MAINTENANCE	***$82,145,816***													***$98,755,778***
Operators' Salaries and Wages	*$0*												1.202	$0
Other Salaries and Wages	*$36,407,643*		$1.52		$46,438.32								1.202	$43,769,303
Fringe Benefits	*$33,646,271*		$1.40		$42,916.16								1.202	$40,449,579
Service Costs	*$796,208*		$0.03		$1,015.57								1.202	$957,202
Fuel and Lubricants	*$56,312*				$287.31								1.202	$67,698
Tires and Tubes	*$7,194*				$36.70								1.202	$8,649
Other Materials and Supplies	*$11,232,188*				$57,307.08								1.202	$13,503,347
Utilities	*$0*												1.202	$0
Casualty and Liability Costs	*$0*												1.202	$0
Taxes	*$0*												1.202	$0
PT Funds In Report	*$0*												1.202	$0
Miscellaneous Expenses	*$0*												1.202	$0
NON-VEHICLE MAINTENANCE	***$38,477,884***													***$46,258,149***
Operators' Salaries and Wages	*$0*												1.202	$0
Other Salaries and Wages	*$17,915,641*					$65,148	$130,296	$195,443		$895,782	$31,263		1.202	$21,538,201
Fringe Benefits	*$16,285,616*					$59,220	$118,441	$177,661		$814,281	$28,418		1.202	$19,578,583
Service Costs	*$342,960*					$1,247	$2,494	$3,741		$17,148	$598		1.202	$412,307
Fuel and Lubricants	*$0*												1.202	$0
Tires and Tubes	*$0*												1.202	$0
Other Materials and Supplies	*$3,933,667*					$14,304	$28,608	$42,913		$196,683	$6,864		1.202	$4,729,058
Utilities	*$0*												1.202	$0
Casualty and Liability Costs	*$0*												1.202	$0
Taxes	*$0*												1.202	$0
PT Funds In Report	*$0*												1.202	$0
Miscellaneous Expenses	*$0*												1.202	$0
GENERAL ADMINISTRATION	***$85,699,471***													***$103,027,986***
Operators' Salaries and Wages	*$0*												1.202	$0
Other Salaries and Wages	*$28,183,525*	$16.58			$71,896.75							$8,455,058	1.202	$33,882,261
Fringe Benefits	*$26,041,876*	$15.32			$66,433.36							$7,812,563	1.202	$31,307,568
Service Costs	*$11,952,683*	$7.03			$30,491.54							$3,585,805	1.202	$14,369,527
Fuel and Lubricants	*$0*												1.202	$0
Tires and Tubes	*$0*												1.202	$0
Other Materials and Supplies	*$2,060,329*	$1.21			$5,255.94							$618,099	1.202	$2,476,929
Utilities	*$4,672,258*		$0.13		$11,919.03								1.202	$5,616,993
Casualty and Liability Costs	*$10,010,586*				$12,768.60	$63,358	$63,358	$63,358				$2,502,647	1.202	$12,034,736
Taxes	*$201,010*											$201,010	1.202	$241,654
PT Funds In Report	*$0*												1.202	$0
Miscellaneous Expenses	*$2,577,204*				$9,861.75							$644,301	1.202	$3,098,317
TOTALS IN 2018 DOLLARS	***$398,041,293***	**$236.45**	**$3.08**	**$17.34**	**$782,460**	**$371,089**	**$511,008**	**$650,928**	**$0**	**$4,133,406**	**$67,144**	**$23,819,481**		**$478,525,623**
TOTALS IN 2023 DOLLARS	***$478,525,623***	**$284.26**	**$3.71**	**$20.85**	**$940,674**	**$446,123**	**$614,335**	**$782,546**	**$0**	**$4,969,185**	**$80,720**	**$28,635,803**	Rev. Train Hrs.	339,891
2018 Resource Variable Values		**339,891.0**	**17,999,250.0**	**866,272.0**	**196.0**	**52.0**	**23.0**	**4.0**	**79.0**	**6.0**	**171.9**	**1.0**	Rev. Car-Mi's.	17,999,250
													Rev. Car-Hrs.	866,272
Increased to account for higher O&M costs after pandemic (email from Ahmadi on 2/15/23)	**2018$**	**$256.62**	**$3.34**	**$18.82**	**$849,198**	**$402,740**	**$554,594**	**$706,448**	**$0**	**$4,485,959**	**$72,871**	**$25,851,130**	Peak Cars	196.00
	2023$	**$308.50**	**$4.02**	**$22.63**	**$1,020,907**	**$484,175**	**$666,734**	**$849,292**	**$0**	**$5,393,025**	**$87,605**	**$31,078,253**	At-Grade Stat.	52
													Aerial Stat.	23
													Subway Stat.	4
													Total Stat.	79.00
													Yards	6.00
													Track-Mi's.	171.9

WEST SANTA ANA BRANCH
LIGHT RAIL O&M COST MODEL
(Reflects LA Metro Light Rail Cost Data)

Calibration

Inflate Factor	1.2022	Pandemic adj.	8.53%

Expense Line Item	2018 LA Metro LRT 2018 NTD Expenses	Supply Variable Unit Cost ($2018)											Inflation Factor	Estimated Annual Cost (2023)	Adjustment Factor	Estimated Annual Cost (2023)
		Revenue Train-Hours	Revenue Car-Miles	Revenue Car-Hours	Peak Cars	At-Grade Stations	Aerial Stations	Subway Stations	Total Stations	Yards	Revenue Track-Miles	Fixed				
VEHICLE OPERATIONS	***$191,718,122***													***$38,915,049***		***$42,234,252***
Operators' Salaries and Wages	*$20,972,978*	$61.71											1.202	$3,679,418	1.085	$3,993,249
Other Salaries and Wages	*$27,662,457*	$40.69				$87,539	$87,539	$87,539		$1,152,602			1.202	$4,759,317	1.085	$5,165,256
Fringe Benefits	*$44,597,571*	$93.90				$80,272	$80,272	$80,272		$1,056,910			1.202	$7,738,125	1.085	$8,398,138
Service Costs	*$77,378,475*				$394,788.14								1.202	$18,509,972	1.085	$20,088,754
Fuel and Lubricants	*$89,014*				$454.15								1.202	$21,293	1.085	$23,110
Tires and Tubes	*$0*												1.202	$0	1.085	$0
Other Materials and Supplies	*$988,106*				$5,041.36								1.202	$236,368	1.085	$256,529
Utilities	*$20,029,521*			$17.34	$25,547.86								1.202	$3,970,554	1.085	$4,309,217
Casualty and Liability Costs	*$0*												1.202	$0	1.085	$0
Taxes	*$0*												1.202	$0	1.085	$0
PT Funds In Report	*$0*												1.202	$0	1.085	$0
Miscellaneous Expenses	*$0*												1.202	$0	1.085	$0
VEHICLE MAINTENANCE	***$82,145,816***													***$20,802,093***		***$22,576,378***
Operators' Salaries and Wages	*$0*												1.202	$0	1.085	$0
Other Salaries and Wages	*$36,407,643*		$1.52		$46,438.32								1.202	$9,301,025	1.085	$10,094,342
Fringe Benefits	*$33,646,271*		$1.40		$42,916.16								1.202	$8,595,580	1.085	$9,328,727
Service Costs	*$796,208*		$0.03		$1,015.57								1.202	$203,406	1.085	$220,756
Fuel and Lubricants	*$56,312*				$287.31								1.202	$13,471	1.085	$14,620
Tires and Tubes	*$7,194*				$36.70								1.202	$1,721	1.085	$1,868
Other Materials and Supplies	*$11,232,188*				$57,307.08								1.202	$2,686,891	1.085	$2,916,065
Utilities	*$0*												1.202	$0	1.085	$0
Casualty and Liability Costs	*$0*												1.202	$0	1.085	$0
Taxes	*$0*												1.202	$0	1.085	$0
PT Funds In Report	*$0*												1.202	$0	1.085	$0
Miscellaneous Expenses	*$0*												1.202	$0	1.085	$0
NON-VEHICLE MAINTENANCE	***$38,477,884***													***$6,608,187***		***$7,171,823***
Operators' Salaries and Wages	*$0*												1.202	$0	1.085	$0
Other Salaries and Wages	*$17,915,641*					$65,148	$130,296	$195,443		$895,782	$31,263		1.202	$3,076,830	1.085	$3,339,264
Fringe Benefits	*$16,285,616*					$59,220	$118,441	$177,661		$814,281	$28,418		1.202	$2,796,890	1.085	$3,035,446
Service Costs	*$342,960*					$1,247	$2,494	$3,741		$17,148	$598		1.202	$58,900	1.085	$63,924
Fuel and Lubricants	*$0*												1.202	$0	1.085	$0
Tires and Tubes	*$0*												1.202	$0	1.085	$0
Other Materials and Supplies	*$3,933,667*					$14,304	$28,608	$42,913		$196,683	$6,864		1.202	$675,567	1.085	$733,189
Utilities	*$0*												1.202	$0	1.085	$0
Casualty and Liability Costs	*$0*												1.202	$0	1.085	$0
Taxes	*$0*												1.202	$0	1.085	$0
PT Funds In Report	*$0*												1.202	$0	1.085	$0
Miscellaneous Expenses	*$0*												1.202	$0	1.085	$0
GENERAL ADMINISTRATION	***$85,699,471***													***$42,106,740***		***$45,698,174***
Operators' Salaries and Wages	*$0*												1.202	$0	1.085	$0
Other Salaries and Wages	*$28,183,525*	$16.58			$71,896.75							$8,455,058	1.202	$14,524,499	1.085	$15,763,345
Fringe Benefits	*$26,041,876*	$15.32			$66,433.36							$7,812,563	1.202	$13,420,791	1.085	$14,565,498
Service Costs	*$11,952,683*	$7.03			$30,491.54							$3,585,805	1.202	$6,159,866	1.085	$6,685,263
Fuel and Lubricants	*$0*												1.202	$0	1.085	$0
Tires and Tubes	*$0*												1.202	$0	1.085	$0
Other Materials and Supplies	*$2,060,329*	$1.21			$5,255.94							$618,099	1.202	$1,061,799	1.085	$1,152,364
Utilities	*$4,672,258*		$0.13		$11,919.03								1.202	$1,168,300	1.085	$1,267,949
Casualty and Liability Costs	*$10,010,586*				$12,768.60	$63,358	$63,358	$63,358				$2,502,647	1.202	$4,292,874	1.085	$4,659,028
Taxes	*$201,010*											$201,010	1.202	$241,654	1.085	$262,266
PT Funds In Report	*$0*												1.202	$0	1.085	$0
Miscellaneous Expenses	*$2,577,204*				$9,861.75							$644,301	1.202	$1,236,956	1.085	$1,342,460
TOTALS IN 2018 DOLLARS	***$398,041,293***	**$236.45**	**$3.08**	**$17.34**	**$782,460**	**$371,089**	**$511,008**	**$650,928**	**$0**	**$4,133,406**	**$67,144**	**$23,819,481**		**$108,432,069**		**$117,680,626**
TOTALS IN 2023 DOLLARS	***$478,525,623***	**$284.26**	**$3.71**	**$20.85**	**$940,674**	**$446,123**	**$614,335**	**$782,546**	**$0**	**$4,969,185**	**$80,720**	**$28,635,803**				
2018 Resource Variable Values		**339,891.0**	**17,999,250.0**	**866,272.0**	**196.0**	**52.0**	**23.0**	**4.0**	**79.0**	**6.0**	**171.9**	**1.0**				
Increased to account for higher O&M costs after pandemic (email from Ahmadi on 2/15/23)	**2018$**	**$256.62**	**$3.34**	**$18.82**	**$849,198**	**$402,740**	**$554,594**	**$706,448**	**$0**	**$4,485,959**	**$72,871**	**$25,851,130**				
	2023$	**$308.50**	**$4.02**	**$22.63**	**$1,020,907**	**$484,175**	**$666,734**	**$849,292**	**$0**	**$5,393,025**	**$87,605**	**$31,078,253**				

Rev. Train Hrs.	49,600
Rev. Car-Mi's.	3,905,986
Rev. Car-Hrs.	133,000
Peak Cars	39.00
At-Grade Stat.	6.00
Aerial Stat.	3.00
Subway Stat.	0.00
Total Stat.	9.00
Yards	1.00
Track-Mi's.	28.2