

# West Santa Ana Branch Transit Corridor

Draft EIS/EIR Appendix Q  
Final Operating and Maintenance Costs



Metro®



**WEST SANTA ANA BRANCH TRANSIT CORRIDOR PROJECT**

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**Draft EIS/EIR Appendix Q  
Final Operating and Maintenance Costs**

*Prepared for:*



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#### APPENDIX A. O&M COST DETAILS FOR PROJECT ALTERNATIVES

## ACRONYMS AND ABBREVIATIONS

AA Study	Pacific Electric Right-of-Way/West Santa Ana Branch Corridor Alternatives Analysis Report
CEQA	California Environmental Quality Act
CHSRA	California High-Speed Rail Authority
CPI-U	Consumer price index for all urban consumers
Environmental Study	West Santa Ana Branch Transit Corridor Environmental Study
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FY	Fiscal Year
GCCOG	Gateway Cities Council of Governments
LA	Los Angeles
LRT	Light Rail Transit
LRTP	Long Range Transportation Plan
Metro	Los Angeles County Metropolitan Transportation Authority
MOS	Minimum Operable Segment
MWD	Metropolitan Water District
NEPA	National Environmental Policy Act
NTD	National Transit Database
O&M	Operations and Maintenance
OCTA	Orange County Transportation Authority
PEROW	Pacific Electric Right-of-Way
ROW	right-of-way
SCAG	Southern California Association of Governments
TRS	Technical Refinement Study
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 that would extend from four possible northern termini in southeast Los Angeles (LA) County to a southern terminus in the City of Artesia, traversing densely populated, low-income, and heavily transit-dependent communities. The Project would provide reliable, fixed guideway transit service that would 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, Orangeline Development Authority (now known as Eco-Rapid Transit), the Gateway Cities Council of Governments, the Los Angeles County Metropolitan Transportation Authority (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<sup>1</sup> and recommended two LRT alternatives for further study: West Bank 3 and the East Bank.

Following completion of the AA, Metro completed the WSAB Technical Refinement Study 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 Metro C (Green) Line Station
- Southern Terminus at Pioneer Station in Artesia

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

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<sup>1</sup> 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 (BRT).

Metro issued a Notice of Preparation (NOP) on May 25, 2017, with a revised NOP issued on June 14, 2017, extending the comment period. 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 of Directors 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 2018a). 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 of Directors approved Build Alternatives E and G for further evaluation (now referred to as Alternatives 1 and 2, respectively, in this report).

On July 11, 2018, Metro issued a revised and recirculated CEQA Notice of Preparation, thereby initiating a scoping comment period. The purpose of the revised Notice of Preparation was to inform the public of the Metro Board's decision to carry forward Alternatives 1 and 2 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 in August 24, 2018; over 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 refinements to the project description at their November 2018 meeting.

### 1.3 Project Description

This section describes the No Build Alternative and the four Build Alternatives studied in the WSAB Transit Corridor Draft EIS/EIR, including design options, station locations, and maintenance and storage facility (MSF) site options. The Build Alternatives were developed through a comprehensive alternatives analysis process and meet the purpose and need of the Project.

The No Build Alternative and four Build Alternatives are generally defined as follows:

- **No Build Alternative** - Reflects the transportation network in the 2042 horizon year without the proposed Build Alternatives. 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 (RTP/SCS) (SCAG 2016), as well as additional projects funded by Measure M that would be completed by 2042.

- **Build Alternatives:** The Build Alternatives consist of a new LRT line that would extend from different termini in the north to the same terminus in the City of Artesia in the south. The Build Alternatives are referred to as:
  - Alternative 1: Los Angeles Union Station to Pioneer Station; the northern terminus would be located underground at Los Angeles Union Station (LAUS) Forecourt
  - Alternative 2: 7th Street/Metro Center to Pioneer Station; the northern terminus would be located underground at 8th Street between Figueroa Street and Flower Street near 7th Street/Metro Center Station
  - Alternative 3: Slauson/A (Blue) Line to Pioneer Station; the northern terminus would be located just north of the intersection of Long Beach Avenue and Slauson Avenue in the City of Los Angeles, connecting to the current A (Blue) Line Slauson Station
  - Alternative 4: I-105/C (Green) Line to Pioneer Station; the northern terminus would be located at I-105 in the city of South Gate, connecting to the C (Green) Line along the I-105

Two design options are under consideration for Alternative 1. Design Option 1 would locate the northern terminus station box at the LAUS Metropolitan Water District (MWD) east of LAUS and the MWD building, below the baggage area parking facility. Design Option 2 would add the Little Tokyo Station along the WSAB alignment.

Figure 1-1 presents the four Build Alternatives and the design options. In the north, Alternative 1 would terminate at LAUS and primarily follow Alameda Avenue south underground to the proposed Arts/Industrial District Station. Alternative 2 would terminate near the existing 7th Street/Metro Center Station in the Downtown Transit Core and would primarily follow 8th Street east underground to the proposed Arts/Industrial District Station.

From the Arts/Industrial District Station to the southern terminus at Pioneer Station, Alternatives 1 and 2 share a common alignment. South of Olympic Boulevard, the Alternatives 1 and 2 would transition from an underground configuration to an aerial configuration, cross over the Interstate (I-) 10 freeway and then parallel the existing Metro A (Blue) Line along the Wilmington Branch ROW as it proceeds south. South of Slauson Avenue, which would serve as the northern terminus for Alternative 3, Alternatives 1, 2, and 3 would turn east and transition to an at-grade configuration to follow the La Habra Branch ROW along Randolph Street. At the San Pedro Subdivision ROW, Alternatives 1, 2, and 3 would turn southeast to follow the San Pedro Subdivision ROW and then transition to the Pacific Electric Right-of-Way (PEROW), south of the I-105 freeway. The northern terminus for Alternative 4 would be located at the I-105/C Line Station. Alternatives 1, 2, 3, and 4 would then follow the PEROW to the southern terminus at the proposed Pioneer Station in Artesia. The Build Alternatives would be grade-separated where warranted, as indicated on Figure 1-2.

Figure 1-1. Project Alternatives



Source: Metro, 2020

Figure 1-2. Project Alignment by Alignment Type



Source: Metro, 2020

The general characteristics of the four Build Alternatives are summarized in Table 1-1.

**Table 1-1. Summary of Build Alternative Components**

Component	Quantity			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Alignment Length	19.3 miles	19.3 miles	14.8 miles	6.6 miles
Stations Configurations	11 3 aerial; 6 at-grade; 2 underground <sup>3</sup>	12 3 aerial; 6 at-grade; 3 underground	9 3 aerial; 6 at-grade	4 1 aerial; 3 at-grade
Parking Facilities	5 (approximately 2,780 spaces)	5 (approximately 2,780 spaces)	5 (approximately 2,780 spaces)	4 (approximately 2,180 spaces)
Length of underground, at-grade, and aerial	2.3 miles underground; 12.3 miles at-grade; 4.7 miles aerial <sup>1</sup>	2.3 miles underground; 12.3 miles at-grade; 4.7 miles aerial <sup>1</sup>	12.2 miles at-grade; 2.6 miles aerial <sup>1</sup>	5.6 miles at-grade; 1.0 miles aerial <sup>1</sup>
At-grade crossings	31	31	31	11
Freight crossings	10	10	9	2
Freeway Crossings	6 (3 freeway undercrossings <sup>2</sup> at I-710; I-605, SR-91)	6 (3 freeway undercrossings <sup>2</sup> at I-710; I-605, SR-91)	4 (3 freeway undercrossings <sup>2</sup> at I-710; I-605, SR-91)	3 (2 freeway undercrossings <sup>2</sup> at I-605, SR-91)
Elevated Street Crossings	25	25	15	7
River Crossings	3	3	3	1
TPSS Facilities	22 <sup>3</sup>	23	17	7
Maintenance and Storage Facility site options	2	2	2	2

Source: WSP, 2020

Notes: <sup>1</sup> Alignment configuration measurements count retained fill embankments as at-grade.

<sup>2</sup> The light rail tracks crossing beneath freeway structures.

<sup>3</sup> Under Design Option 2 – Add Little Tokyo Station, an additional underground station and TPSS site would be added under Alternative 1

## 1.4 Report Structure and Purpose

This document provides operations and maintenance (O&M) cost details for the four Build alternatives:

- Alternative 1: Los Angeles Union Station to Pioneer Station;
- Alternative 2: 7th Street/Metro Center to Pioneer Station;
- Alternative 3: Slauson/A (Blue) Line to Pioneer Station; and
- Alternative 4: I-105/C (Green) Line to Pioneer Station.

The following sections describe the methodology used to develop the light rail O&M costs, followed by the estimated annual O&M costs for each alternative.





## 2 OPERATIONS AND MAINTENANCE COST ESTIMATES

This section presents the estimated annual O&M costs for WSAB alternatives. 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 each alternative.

### 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 the Los Angeles Metropolitan Transportation Authority (Metro) was used to develop unit cost data for light rail alternatives. Metro reports actual costs and service statistics to the Federal Transit Administration (FTA) in the National Transit Database (NTD). Metro's FY 2015 NTD submittal was used. While Metro's FY 2016 NTD would be more recent, some distortion may result from the partial years of service on the Metro L (Gold) Line extension to Azusa and E (Expo) Line extension to Santa Monica.

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-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.
- *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.
- *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 fiscal year (FY) 2015 calibration (base) year input are as follows:

- 290,617 annual revenue train-hours
- 680,077 annual revenue car-hours
- 13,702,192 annual revenue car-miles
- 144 peak rail cars
- 38 at-grade stations
- 24 aerial stations
- 4 subway stations
- 3 maintenance and storage yards
- 135.8 directional track miles

After selecting key supply variables, the next step to develop the light rail transit (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 2020 dollars by 13.48 percent, using the Bureau of Labor Statistics consumer price index for all urban consumers (CPI-U) for Los Angeles (March 2015 index compared to March 2020 index). Resulting aggregate unit costs for the calibration system in 2020 dollars are as follows:

- \$192.87 per annual revenue train-hour
- \$22.51 per annual revenue car-hour
- \$2.29 per annual revenue car-mile
- \$811,085 per peak rail car
- \$394,992 per at-grade rail station
- \$570,919 per aerial rail station
- \$746,846 per subway rail station
- \$7,519,620 per rail yard
- \$95,218 per directional track miles

An additional \$14,730,860 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 (FY 2015 Calibration).

## 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 2-1 summarizes annual statistics for each of the WSAB alternatives. 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.

More details regarding the assumed service plan are provided in a separate memorandum, *Operating Plans and Support Facilities with Northern Alignments*, October 26, 2018 (Task 5.5.2c).

**Table 2-1. Operating Statistics Summary**

Operating Statistic	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Revenue Train-Hours	66,500	66,500 <i>Short line +1,000 to +2,500**</i>	49,600	26,700
Revenue Car-Miles	5,214,400	5,239,400 <i>Short line +43,800 to +175,200**</i>	3,919,100	1,688,300
Revenue Car-Hours	178,600	178,600 <i>Short line +3,000 to +7,700**</i>	133,000	71,100
Peak Cars	51	51 <i>Short line +6 to +15**</i>	39	24
At-Grade Stations	6	6	6	3
Aerial Stations	3	3	3	1
Subway Stations	2*	3	0	0
Yards	1	1	1	1
Directional Track-Miles	37.7	37.9	28.3	12.2

Source: CTG, 2020

Notes \* Alternative 1 Design Option 2 adds a subway station at Little Tokyo for a total of 3 subway stations.

\*\* Alternative 2 Slauson/A Line short-line incremental statistics expressed as range, based on adding minimal amount of trains to address capacity, versus ultimate amount of trains to maintain 2.5-minute headway consistently throughout peak hour.

The operating statistics for the WSAB alternatives as presented in Table 2-1 are based on the basic service plan providing 5-minute peak headways on weekdays. Preliminary peak load analysis suggests that for Alternative 2, additional short-line trips between the 7th Street/Metro Center Station and Slauson/A Line Station may need to be scheduled during the peak hour, as discussed in a separate memorandum. A peak load analysis based on the year 2042 forecast suggests that a minimum of two to three extra short-line trips in the peak

hour would be needed to accommodate peak loads. Eventually, short-line trips can be scheduled between every other full-length trip to provide 2.5 minute trunk service for the peak hour between the 7th Street/Metro Center and Slauson/A Line Stations. Operating statistics related to extra short-line service are included in Table 2-1 as a range, based on the minimum short-line service providing a few trips during the peak hour, versus short-line service provided every five minutes during the peak hour.

Table 2-2 provides the estimated annual O&M cost to operate each of WSAB alternatives. The cost is presented in millions, in 2020 dollars.

**Table 2-2. O&M Cost Results by Alternative**

Alternative	O&M Costs (in FY20 \$, in millions)
Alternative 1: LA Union Station to Pioneer Station	\$86.9
<i>Design Option 2 (adds Little Tokyo station)</i>	\$87.6
Alternative 2: 7th Street/Metro Center to Pioneer Station	\$87.7
<i>Slauson short line service</i>	+\$5.2 to \$13.2
Alternative 3: Slauson/A (Blue) Line to Pioneer Station	\$67.5
Alternative 4: I-105/C (Green) Line to Pioneer Station	\$40.5

Source: CTG, 2020

The results show that for the two full alternatives going to Union Station or 7th Street/Metro Center, basic annual operating costs are approximately \$87 to \$88 million. Additional short-line service associated with Alternative 2 adds anywhere from \$5 million to \$13 million, depending on the number of extra trips scheduled during the peak hour.

O&M costs for Alternatives 3 and 4 range from about \$40 million to \$67 million. These alternatives are both shorter in length, with Alternative 4 having the lowest operating cost due to its significantly shorter length and number of stations.

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## APPENDIX A. O&M COST DETAILS FOR PROJECT ALTERNATIVES

Table A-1.	LA Metro LRT O&M Cost Model – FY 2015 Calibration
Table A-2.	Alternative 1: Los Angeles Union Station to Pioneer Station
Table A-3.	Alternative 1 Design Option 2 (with Little Tokyo Station)
Table A-4.	Alternative 2: 7 <sup>th</sup> Street/Metro Center to Pioneer Station
Table A-5.	Alternative 2 with Minimum Short-Line Service to Slauson/A Line Station
Table A-6.	Alternative 2 with Maximum Short-Line Service to Slauson/A Line Station
Table A-7.	Alternative 3: Slauson/A (Blue) Line to Pioneer Station
Table A-8.	Alternative 4: I-105/C (Green) Line to Pioneer Station



Table A-1. LA Metro LRT O&M Cost Model - FY 2015 Calibration

												Calibration	
												Inflate Factor	1.1348
												Inflation Factor	Estimated Annual Cost (2020)
Expense Line Item	2015	Supply Variable Unit Cost (\$2015)										Inflation Factor	Estimated Annual Cost (2020)
	LA Metro LRT 2015 NTD Expenses	Revenue Train-Hours	Revenue Car-Miles	Revenue Car-Hours	Peak Cars	At-Grade Stations	Aerial Stations	Subway Stations	Yards	Revenue Track-Miles	Fixed		
<b>VEHICLE OPERATIONS</b>	<b>\$134,616,338</b>												<b>\$152,759,924</b>
Operators' Salaries and Wages	\$15,816,955	\$54.43										1.135	\$17,948,764
Other Salaries and Wages	\$20,074,280	\$34.54				\$76,039	\$76,039	\$76,039	\$1,672,857			1.135	\$22,779,891
Fringe Benefits	\$24,788,461	\$61.44				\$52,517	\$52,517	\$52,517	\$1,155,367			1.135	\$28,129,449
Service Costs	\$55,354,411				\$384,405.63							1.135	\$62,815,077
Fuel and Lubricants	\$38,955				\$270.52							1.135	\$44,205
Tires and Tubes	\$0											1.135	\$0
Other Materials and Supplies	\$552,357				\$3,835.81							1.135	\$626,804
Utilities	\$17,990,919			\$19.84	\$31,234.23							1.135	\$20,415,734
Casualty and Liability Costs	\$0											1.135	\$0
Taxes	\$0											1.135	\$0
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$0											1.135	\$0
<b>VEHICLE MAINTENANCE</b>	<b>\$42,616,431</b>												<b>\$48,360,272</b>
Operators' Salaries and Wages	\$0											1.135	\$0
Other Salaries and Wages	\$18,441,181		\$1.01		\$32,015.94							1.135	\$20,926,683
Fringe Benefits	\$15,147,180		\$0.83		\$26,297.19							1.135	\$17,188,716
Service Costs	\$270,345		\$0.01		\$469.35							1.135	\$306,782
Fuel and Lubricants	\$60,636				\$421.08							1.135	\$68,809
Tires and Tubes	\$9,061				\$62.92							1.135	\$10,282
Other Materials and Supplies	\$8,688,028				\$60,333.53							1.135	\$9,859,000
Utilities	\$0											1.135	\$0
Casualty and Liability Costs	\$0											1.135	\$0
Taxes	\$0											1.135	\$0
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$0											1.135	\$0
<b>NON-VEHICLE MAINTENANCE</b>	<b>\$37,982,769</b>												<b>\$43,102,085</b>
Operators' Salaries and Wages	\$0											1.135	\$0
Other Salaries and Wages	\$14,719,880					\$60,081	\$120,162	\$180,243	\$1,471,988	\$32,518		1.135	\$16,703,825
Fringe Benefits	\$11,122,398					\$45,398	\$90,795	\$136,193	\$1,112,240	\$24,571		1.135	\$12,621,474
Service Costs	\$9,207,414					\$37,581	\$75,163	\$112,744	\$920,741	\$20,340		1.135	\$10,448,389
Fuel and Lubricants	\$0											1.135	\$0
Tires and Tubes	\$0											1.135	\$0
Other Materials and Supplies	\$2,933,077					\$11,972	\$23,943	\$35,915	\$293,308	\$6,480		1.135	\$3,328,397
Utilities	\$0											1.135	\$0
Casualty and Liability Costs	\$0											1.135	\$0
Taxes	\$0											1.135	\$0
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$0											1.135	\$0
<b>GENERAL ADMINISTRATION</b>	<b>\$50,486,696</b>												<b>\$57,291,291</b>
Operators' Salaries and Wages	\$0											1.135	\$0
Other Salaries and Wages	\$7,078,452	\$4.87			\$24,577.96						\$2,123,536	1.135	\$8,032,486
Fringe Benefits	\$6,477,503	\$4.46			\$22,491.33						\$1,943,251	1.135	\$7,350,541
Service Costs	\$12,298,277	\$8.46			\$42,702.35						\$3,689,483	1.135	\$13,955,838
Fuel and Lubricants	\$0											1.135	\$0
Tires and Tubes	\$0											1.135	\$0
Other Materials and Supplies	\$2,566,124	\$1.77			\$8,910.15						\$769,837	1.135	\$2,911,986
Utilities	\$4,613,411		\$0.17		\$16,018.79							1.135	\$5,235,206
Casualty and Liability Costs	\$8,512,750				\$14,779.08	\$64,491	\$64,491	\$64,491		\$2,128,188		1.135	\$9,660,098
Taxes	\$122,545									\$122,545		1.135	\$139,062
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$8,817,634				\$45,925.18					\$2,204,409		1.135	\$10,006,074
<b>TOTALS IN 2015 DOLLARS</b>	<b>\$265,702,234</b>	<b>\$169.96</b>	<b>\$2.02</b>	<b>\$19.84</b>	<b>\$714,751</b>	<b>\$348,078</b>	<b>\$503,110</b>	<b>\$658,141</b>	<b>\$6,626,500</b>	<b>\$83,909</b>	<b>\$12,981,248</b>		<b>\$301,513,573</b>
<b>TOTALS IN 2020 DOLLARS</b>	<b>\$301,513,573</b>	<b>\$192.87</b>	<b>\$2.29</b>	<b>\$22.51</b>	<b>\$811,085</b>	<b>\$394,992</b>	<b>\$570,919</b>	<b>\$746,846</b>	<b>\$7,519,620</b>	<b>\$95,218</b>	<b>\$14,730,860</b>	Rev. Train Hrs.	290,617
<b>2015 Resource Variable Values</b>		<b>290,617</b>	<b>13,702,192</b>	<b>680,077</b>	<b>144</b>	<b>38</b>	<b>24</b>	<b>4</b>	<b>3</b>	<b>135.8</b>	<b>1.0</b>	Rev. Car-Mi's.	13,702,192
												Rev. Car-Hrs.	680,077
												Peak Cars	144.00
												At-Grade Stat.	38.00
												Aerial Stat.	24.00
												Subway Stat.	4.00
												Total Stat.	66.00
												Yards	3.00
												Track-Mi's.	135.80

Appendix A. O&M Cost Details for Project Alternatives

Table A-2. O&M Cost Detail for Alternative 1: Los Angeles Union Station to Pioneer Station

LIGHT RAIL O&M COST MODEL											Inflate Factor	1.1348
(Reflects LA Metro Light Rail Cost Data)												
Expense Line Item	2015	Supply Variable Unit Cost (\$2015)									Inflation Factor	Estimated Annual Cost (2020)
	LA Metro LRT 2015 NTD Expenses	Revenue Train-Hours	Revenue Car-Miles	Revenue Car-Hours	Peak Cars	At-Grade Stations	Aerial Stations	Subway Stations	Yards	Revenue Track-Miles		
<b>VEHICLE OPERATIONS</b>	<b>\$134,616,338</b>											<b>\$44,477,580</b>
Operators' Salaries and Wages	\$15,816,955	\$54.43									1.135	\$4,107,099
Other Salaries and Wages	\$20,074,280	\$34.54				\$76,039	\$76,039	\$76,039	\$1,672,857		1.135	\$5,453,774
Fringe Benefits	\$24,788,461	\$61.44				\$52,517	\$52,517	\$52,517	\$1,155,367		1.135	\$6,603,264
Service Costs	\$55,354,411				\$384,405.63						1.135	\$22,247,006
Fuel and Lubricants	\$38,955				\$270.52						1.135	\$15,656
Tires and Tubes	\$0										1.135	\$0
Other Materials and Supplies	\$552,357				\$3,835.81						1.135	\$221,993
Utilities	\$17,990,919			\$19.84	\$31,234.23						1.135	\$5,828,787
Casualty and Liability Costs	\$0										1.135	\$0
Taxes	\$0										1.135	\$0
PT Funds In Report	\$0										1.135	\$0
Miscellaneous Expenses	\$0										1.135	\$0
<b>VEHICLE MAINTENANCE</b>	<b>\$42,616,431</b>											<b>\$17,887,940</b>
Operators' Salaries and Wages	\$0										1.135	\$0
Other Salaries and Wages	\$18,441,181		\$1.01		\$32,015.94						1.135	\$7,825,656
Fringe Benefits	\$15,147,180		\$0.83		\$26,297.19						1.135	\$6,427,821
Service Costs	\$270,345		\$0.01		\$469.35						1.135	\$114,723
Fuel and Lubricants	\$60,636				\$421.08						1.135	\$24,370
Tires and Tubes	\$9,061				\$62.92						1.135	\$3,642
Other Materials and Supplies	\$8,688,028				\$60,333.53						1.135	\$3,491,729
Utilities	\$0										1.135	\$0
Casualty and Liability Costs	\$0										1.135	\$0
Taxes	\$0										1.135	\$0
PT Funds In Report	\$0										1.135	\$0
Miscellaneous Expenses	\$0										1.135	\$0
<b>NON-VEHICLE MAINTENANCE</b>	<b>\$37,982,769</b>											<b>\$11,064,712</b>
Operators' Salaries and Wages	\$0										1.135	\$0
Other Salaries and Wages	\$14,719,880					\$60,081	\$120,162	\$180,243	\$1,471,988	\$32,518	1.135	\$4,288,030
Fringe Benefits	\$11,122,398					\$45,398	\$90,795	\$136,193	\$1,112,240	\$24,571	1.135	\$3,240,052
Service Costs	\$9,207,414					\$37,581	\$75,163	\$112,744	\$920,741	\$20,340	1.135	\$2,682,200
Fuel and Lubricants	\$0										1.135	\$0
Tires and Tubes	\$0										1.135	\$0
Other Materials and Supplies	\$2,933,077					\$11,972	\$23,943	\$35,915	\$293,308	\$6,480	1.135	\$854,431
Utilities	\$0										1.135	\$0
Casualty and Liability Costs	\$0										1.135	\$0
Taxes	\$0										1.135	\$0
PT Funds In Report	\$0										1.135	\$0
Miscellaneous Expenses	\$0										1.135	\$0
<b>GENERAL ADMINISTRATION</b>	<b>\$50,486,696</b>											<b>\$13,428,434</b>
Operators' Salaries and Wages	\$0										1.135	\$0
Other Salaries and Wages	\$7,078,452	\$4.87			\$24,577.96						1.135	\$1,790,024
Fringe Benefits	\$6,477,503	\$4.46			\$22,491.33						1.135	\$1,638,054
Service Costs	\$12,298,277	\$8.46			\$42,702.35						1.135	\$3,110,031
Fuel and Lubricants	\$0										1.135	\$0
Tires and Tubes	\$0										1.135	\$0
Other Materials and Supplies	\$2,566,124	\$1.77			\$8,910.15						1.135	\$648,930
Utilities	\$4,613,411		\$0.17		\$16,018.79						1.135	\$1,923,203
Casualty and Liability Costs	\$8,512,750				\$14,779.08	\$64,491	\$64,491	\$64,491			1.135	\$1,660,329
Taxes	\$122,545										1.135	\$0
PT Funds In Report	\$0										1.135	\$0
Miscellaneous Expenses	\$8,817,634				\$45,925.18						1.135	\$2,657,864
<b>TOTALS IN 2015 DOLLARS</b>	<b>\$265,702,234</b>	<b>\$169.96</b>	<b>\$2.02</b>	<b>\$19.84</b>	<b>\$714,751</b>	<b>\$348,078</b>	<b>\$503,110</b>	<b>\$658,141</b>	<b>\$6,626,500</b>	<b>\$83,909</b>		<b>\$86,858,667</b>
<b>TOTALS IN 2020 DOLLARS</b>	<b>\$301,513,573</b>	<b>\$192.87</b>	<b>\$2.29</b>	<b>\$22.51</b>	<b>\$811,085</b>	<b>\$394,992</b>	<b>\$570,919</b>	<b>\$746,846</b>	<b>\$7,519,620</b>	<b>\$95,218</b>	Rev. Train Hrs.	66,500
<b>2015 Resource Variable Values</b>		<b>290,617</b>	<b>13,702,192</b>	<b>680,077</b>	<b>144</b>	<b>38</b>	<b>24</b>	<b>4</b>	<b>3</b>	<b>135.8</b>	Rev. Car-Mi's.	5,214,400
											Rev. Car-Hrs.	178,600
											Peak Cars	51
											At-Grade Stat.	6
											Aerial Stat.	3
											Subway Stat.	2
											Total Stat.	11
											Yards	1
											Track-Mi's.	37.7



Table A-3. O&M Cost Detail for Alternative 1 Design Option 2 (with Little Tokyo Station)

**LIGHT RAIL O&M COST MODEL**

(Reflects LA Metro Light Rail Cost Data)

Expense Line Item	2015 LA Metro LRT 2015 NTD Expenses	Supply Variable Unit Cost (\$2015)									Inflate Factor	1.1348
		Revenue Train-Hours	Revenue Car-Miles	Revenue Car-Hours	Peak Cars	At-Grade Stations	Aerial Stations	Subway Stations	Yards	Revenue Track-Miles	Inflation Factor	Estimated Annual Cost (2020)
<b>VEHICLE OPERATIONS</b>	<b>\$134,616,338</b>											<b>\$44,623,462</b>
Operators' Salaries and Wages	\$15,816,955	\$54.43									1.135	\$4,107,099
Other Salaries and Wages	\$20,074,280	\$34.54				\$76,039	\$76,039	\$76,039	\$1,672,857		1.135	\$5,540,061
Fringe Benefits	\$24,788,461	\$61.44				\$52,517	\$52,517	\$52,517	\$1,155,367		1.135	\$6,662,859
Service Costs	\$55,354,411				\$384,405.63						1.135	\$22,247,006
Fuel and Lubricants	\$38,955				\$270.52						1.135	\$15,656
Tires and Tubes	\$0										1.135	\$0
Other Materials and Supplies	\$552,357				\$3,835.81						1.135	\$221,993
Utilities	\$17,990,919			\$19.84	\$31,234.23						1.135	\$5,828,787
Casualty and Liability Costs	\$0										1.135	\$0
Taxes	\$0										1.135	\$0
PT Funds In Report	\$0										1.135	\$0
Miscellaneous Expenses	\$0										1.135	\$0
<b>VEHICLE MAINTENANCE</b>	<b>\$42,616,431</b>											<b>\$17,887,940</b>
Operators' Salaries and Wages	\$0										1.135	\$0
Other Salaries and Wages	\$18,441,181		\$1.01		\$32,015.94						1.135	\$7,825,656
Fringe Benefits	\$15,147,180		\$0.83		\$26,297.19						1.135	\$6,427,821
Service Costs	\$270,345		\$0.01		\$469.35						1.135	\$114,723
Fuel and Lubricants	\$60,636				\$421.08						1.135	\$24,370
Tires and Tubes	\$9,061				\$62.92						1.135	\$3,642
Other Materials and Supplies	\$8,688,028				\$60,333.53						1.135	\$3,491,729
Utilities	\$0										1.135	\$0
Casualty and Liability Costs	\$0										1.135	\$0
Taxes	\$0										1.135	\$0
PT Funds In Report	\$0										1.135	\$0
Miscellaneous Expenses	\$0										1.135	\$0
<b>NON-VEHICLE MAINTENANCE</b>	<b>\$37,982,769</b>											<b>\$11,592,493</b>
Operators' Salaries and Wages	\$0										1.135	\$0
Other Salaries and Wages	\$14,719,880				\$60,081	\$120,162	\$180,243	\$1,471,988	\$32,518		1.135	\$4,492,566
Fringe Benefits	\$11,122,398				\$45,398	\$90,795	\$136,193	\$1,112,240	\$24,571		1.135	\$3,394,600
Service Costs	\$9,207,414				\$37,581	\$75,163	\$112,744	\$920,741	\$20,340		1.135	\$2,810,140
Fuel and Lubricants	\$0										1.135	\$0
Tires and Tubes	\$0										1.135	\$0
Other Materials and Supplies	\$2,933,077				\$11,972	\$23,943	\$35,915	\$293,308	\$6,480		1.135	\$895,187
Utilities	\$0										1.135	\$0
Casualty and Liability Costs	\$0										1.135	\$0
Taxes	\$0										1.135	\$0
PT Funds In Report	\$0										1.135	\$0
Miscellaneous Expenses	\$0										1.135	\$0
<b>GENERAL ADMINISTRATION</b>	<b>\$50,486,696</b>											<b>\$13,501,617</b>
Operators' Salaries and Wages	\$0										1.135	\$0
Other Salaries and Wages	\$7,078,452	\$4.87			\$24,577.96						1.135	\$1,790,024
Fringe Benefits	\$6,477,503	\$4.46			\$22,491.33						1.135	\$1,638,054
Service Costs	\$12,298,277	\$8.46			\$42,702.35						1.135	\$3,110,031
Fuel and Lubricants	\$0										1.135	\$0
Tires and Tubes	\$0										1.135	\$0
Other Materials and Supplies	\$2,566,124	\$1.77			\$8,910.15						1.135	\$648,930
Utilities	\$4,613,411		\$0.17		\$16,018.79						1.135	\$1,923,203
Casualty and Liability Costs	\$8,512,750				\$14,779.08	\$64,491	\$64,491	\$64,491			1.135	\$1,733,512
Taxes	\$122,545										1.135	\$0
PT Funds In Report	\$0										1.135	\$0
Miscellaneous Expenses	\$8,817,634				\$45,925.18						1.135	\$2,657,864
<b>TOTALS IN 2015 DOLLARS</b>	<b>\$265,702,234</b>	<b>\$169.96</b>	<b>\$2.02</b>	<b>\$19.84</b>	<b>\$714,751</b>	<b>\$348,078</b>	<b>\$503,110</b>	<b>\$658,141</b>	<b>\$6,626,500</b>	<b>\$83,909</b>		<b>\$87,605,512</b>
<b>TOTALS IN 2020 DOLLARS</b>	<b>\$301,513,573</b>	<b>\$192.87</b>	<b>\$2.29</b>	<b>\$22.51</b>	<b>\$811,085</b>	<b>\$394,992</b>	<b>\$570,919</b>	<b>\$746,846</b>	<b>\$7,519,620</b>	<b>\$95,218</b>	Rev. Train Hrs.	66,500
<b>2015 Resource Variable Values</b>		<b>290,617</b>	<b>13,702,192</b>	<b>680,077</b>	<b>144</b>	<b>38</b>	<b>24</b>	<b>4</b>	<b>3</b>	<b>135.8</b>	Rev. Car-Mi's.	5,214,400
											Rev. Car-Hrs.	178,600
											Peak Cars	51
											At-Grade Stat.	6
											Aerial Stat.	3
											Subway Stat.	3
											Total Stat.	12
											Yards	1
											Track-Mi's.	37.7

Table A-4. O&M Cost Detail for Alternative 2: 7<sup>th</sup> Street/Metro Center to Pioneer Station

LIGHT RAIL O&M COST MODEL

(Reflects LA Metro Light Rail Cost Data)

Expense Line Item	2015 LA Metro LRT 2015 NTD Expenses	Supply Variable Unit Cost (\$2015)										Inflate Factor	1.1348
		Revenue Train-Hours	Revenue Car-Miles	Revenue Car-Hours	Peak Cars	At-Grade Stations	Aerial Stations	Subway Stations	Yards	Revenue Track-Miles	Inflation Factor	Estimated Annual Cost (2020)	
<b>VEHICLE OPERATIONS</b>	<b>\$134,616,338</b>												<b>\$44,623,462</b>
Operators' Salaries and Wages	\$15,816,955	\$54.43										1.135	\$4,107,099
Other Salaries and Wages	\$20,074,280	\$34.54				\$76,039	\$76,039	\$76,039	\$1,672,857			1.135	\$5,540,061
Fringe Benefits	\$24,788,461	\$61.44				\$52,517	\$52,517	\$52,517	\$1,155,367			1.135	\$6,662,859
Service Costs	\$55,354,411				\$384,405.63							1.135	\$22,247,006
Fuel and Lubricants	\$38,955				\$270.52							1.135	\$15,656
Tires and Tubes	\$0											1.135	\$0
Other Materials and Supplies	\$552,357				\$3,835.81							1.135	\$221,993
Utilities	\$17,990,919			\$19.84	\$31,234.23							1.135	\$5,828,787
Casualty and Liability Costs	\$0											1.135	\$0
Taxes	\$0											1.135	\$0
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$0											1.135	\$0
<b>VEHICLE MAINTENANCE</b>	<b>\$42,616,431</b>												<b>\$17,940,517</b>
Operators' Salaries and Wages	\$0											1.135	\$0
Other Salaries and Wages	\$18,441,181		\$1.01		\$32,015.94							1.135	\$7,854,291
Fringe Benefits	\$15,147,180		\$0.83		\$26,297.19							1.135	\$6,451,342
Service Costs	\$270,345		\$0.01		\$469.35							1.135	\$115,143
Fuel and Lubricants	\$60,636				\$421.08							1.135	\$24,370
Tires and Tubes	\$9,061				\$62.92							1.135	\$3,642
Other Materials and Supplies	\$8,688,028				\$60,333.53							1.135	\$3,491,729
Utilities	\$0											1.135	\$0
Casualty and Liability Costs	\$0											1.135	\$0
Taxes	\$0											1.135	\$0
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$0											1.135	\$0
<b>NON-VEHICLE MAINTENANCE</b>	<b>\$37,982,769</b>												<b>\$11,609,632</b>
Operators' Salaries and Wages	\$0											1.135	\$0
Other Salaries and Wages	\$14,719,880				\$60,081	\$120,162	\$180,243	\$1,471,988	\$32,518			1.135	\$4,499,208
Fringe Benefits	\$11,122,398				\$45,398	\$90,795	\$136,193	\$1,112,240	\$24,571			1.135	\$3,399,619
Service Costs	\$9,207,414				\$37,581	\$75,163	\$112,744	\$920,741	\$20,340			1.135	\$2,814,294
Fuel and Lubricants	\$0											1.135	\$0
Tires and Tubes	\$0											1.135	\$0
Other Materials and Supplies	\$2,933,077				\$11,972	\$23,943	\$35,915	\$293,308	\$6,480			1.135	\$896,510
Utilities	\$0											1.135	\$0
Casualty and Liability Costs	\$0											1.135	\$0
Taxes	\$0											1.135	\$0
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$0											1.135	\$0
<b>GENERAL ADMINISTRATION</b>	<b>\$50,486,696</b>												<b>\$13,506,393</b>
Operators' Salaries and Wages	\$0											1.135	\$0
Other Salaries and Wages	\$7,078,452	\$4.87			\$24,577.96							1.135	\$1,790,024
Fringe Benefits	\$6,477,503	\$4.46			\$22,491.33							1.135	\$1,638,054
Service Costs	\$12,298,277	\$8.46			\$42,702.35							1.135	\$3,110,031
Fuel and Lubricants	\$0											1.135	\$0
Tires and Tubes	\$0											1.135	\$0
Other Materials and Supplies	\$2,566,124	\$1.77			\$8,910.15							1.135	\$648,930
Utilities	\$4,613,411		\$0.17		\$16,018.79							1.135	\$1,927,978
Casualty and Liability Costs	\$8,512,750				\$14,779.08	\$64,491	\$64,491	\$64,491				1.135	\$1,733,512
Taxes	\$122,545											1.135	\$0
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$8,817,634				\$45,925.18							1.135	\$2,657,864
<b>TOTALS IN 2015 DOLLARS</b>	<b>\$265,702,234</b>	<b>\$169.96</b>	<b>\$2.02</b>	<b>\$19.84</b>	<b>\$714,751</b>	<b>\$348,078</b>	<b>\$503,110</b>	<b>\$658,141</b>	<b>\$6,626,500</b>	<b>\$83,909</b>			<b>\$87,680,004</b>
<b>TOTALS IN 2020 DOLLARS</b>	<b>\$301,513,573</b>	<b>\$192.87</b>	<b>\$2.29</b>	<b>\$22.51</b>	<b>\$811,085</b>	<b>\$394,992</b>	<b>\$570,919</b>	<b>\$746,846</b>	<b>\$7,519,620</b>	<b>\$95,218</b>	Rev. Train Hrs.	66,500	
<b>2015 Resource Variable Values</b>		<b>290,617</b>	<b>13,702,192</b>	<b>680,077</b>	<b>144</b>	<b>38</b>	<b>24</b>	<b>4</b>	<b>3</b>	<b>135.8</b>	Rev. Car-Mi's.	5,239,400	
											Rev. Car-Hrs.	178,600	
											Peak Cars	51	
											At-Grade Stat.	6	
											Aerial Stat.	3	
											Subway Stat.	3	
											Total Stat.	12	
											Yards	1	
											Track-Mi's.	37.9	

Table A-5. O&M Cost Detail for Alternative 2 with Minimum Short-Line Service to Slauson/A Line Station

LIGHT RAIL O&M COST MODEL

(Reflects LA Metro Light Rail Cost Data)

Expense Line Item	2015 LA Metro LRT 2015 NTD Expenses	Supply Variable Unit Cost (\$2015)										Inflate Factor	1.1348
		Revenue Train-Hours	Revenue Car-Miles	Revenue Car-Hours	Peak Cars	At-Grade Stations	Aerial Stations	Subway Stations	Yards	Revenue Track-Miles	Inflation Factor	Estimated Annual Cost (2020)	
<b>VEHICLE OPERATIONS</b>	<b>\$134,616,338</b>												<b>\$47,719,601</b>
Operators' Salaries and Wages	\$15,816,955	\$54.43										1.135	\$4,168,860
Other Salaries and Wages	\$20,074,280	\$34.54				\$76,039	\$76,039	\$76,039	\$1,672,857			1.135	\$5,579,253
Fringe Benefits	\$24,788,461	\$61.44				\$52,517	\$52,517	\$52,517	\$1,155,367			1.135	\$6,732,583
Service Costs	\$55,354,411				\$384,405.63							1.135	\$24,864,301
Fuel and Lubricants	\$38,955				\$270.52							1.135	\$17,498
Tires and Tubes	\$0											1.135	\$0
Other Materials and Supplies	\$552,357				\$3,835.81							1.135	\$248,110
Utilities	\$17,990,919			\$19.84	\$31,234.23							1.135	\$6,108,996
Casualty and Liability Costs	\$0											1.135	\$0
Taxes	\$0											1.135	\$0
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$0											1.135	\$0
<b>VEHICLE MAINTENANCE</b>	<b>\$42,616,431</b>												<b>\$18,846,949</b>
Operators' Salaries and Wages	\$0											1.135	\$0
Other Salaries and Wages	\$18,441,181		\$1.01		\$32,015.94							1.135	\$8,122,448
Fringe Benefits	\$15,147,180		\$0.83		\$26,297.19							1.135	\$6,671,600
Service Costs	\$270,345		\$0.01		\$469.35							1.135	\$119,074
Fuel and Lubricants	\$60,636				\$421.08							1.135	\$27,237
Tires and Tubes	\$9,061				\$62.92							1.135	\$4,070
Other Materials and Supplies	\$8,688,028				\$60,333.53							1.135	\$3,902,521
Utilities	\$0											1.135	\$0
Casualty and Liability Costs	\$0											1.135	\$0
Taxes	\$0											1.135	\$0
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$0											1.135	\$0
<b>NON-VEHICLE MAINTENANCE</b>	<b>\$37,982,769</b>												<b>\$11,609,632</b>
Operators' Salaries and Wages	\$0											1.135	\$0
Other Salaries and Wages	\$14,719,880					\$60,081	\$120,162	\$180,243	\$1,471,988	\$32,518		1.135	\$4,499,208
Fringe Benefits	\$11,122,398					\$45,398	\$90,795	\$136,193	\$1,112,240	\$24,571		1.135	\$3,399,619
Service Costs	\$9,207,414					\$37,581	\$75,163	\$112,744	\$920,741	\$20,340		1.135	\$2,814,294
Fuel and Lubricants	\$0											1.135	\$0
Tires and Tubes	\$0											1.135	\$0
Other Materials and Supplies	\$2,933,077					\$11,972	\$23,943	\$35,915	\$293,308	\$6,480		1.135	\$896,510
Utilities	\$0											1.135	\$0
Casualty and Liability Costs	\$0											1.135	\$0
Taxes	\$0											1.135	\$0
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$0											1.135	\$0
<b>GENERAL ADMINISTRATION</b>	<b>\$50,486,696</b>												<b>\$14,731,230</b>
Operators' Salaries and Wages	\$0											1.135	\$0
Other Salaries and Wages	\$7,078,452	\$4.87			\$24,577.96							1.135	\$1,962,895
Fringe Benefits	\$6,477,503	\$4.46			\$22,491.33							1.135	\$1,796,248
Service Costs	\$12,298,277	\$8.46			\$42,702.35							1.135	\$3,410,382
Fuel and Lubricants	\$0											1.135	\$0
Tires and Tubes	\$0											1.135	\$0
Other Materials and Supplies	\$2,566,124	\$1.77			\$8,910.15							1.135	\$711,601
Utilities	\$4,613,411		\$0.17		\$16,018.79							1.135	\$2,045,413
Casualty and Liability Costs	\$8,512,750				\$14,779.08	\$64,491	\$64,491	\$64,491				1.135	\$1,834,138
Taxes	\$122,545											1.135	\$0
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$8,817,634				\$45,925.18							1.135	\$2,970,553
<b>TOTALS IN 2015 DOLLARS</b>	<b>\$265,702,234</b>	<b>\$169.96</b>	<b>\$2.02</b>	<b>\$19.84</b>	<b>\$714,751</b>	<b>\$348,078</b>	<b>\$503,110</b>	<b>\$658,141</b>	<b>\$6,626,500</b>	<b>\$83,909</b>			<b>\$92,907,413</b>
<b>TOTALS IN 2020 DOLLARS</b>	<b>\$301,513,573</b>	<b>\$192.87</b>	<b>\$2.29</b>	<b>\$22.51</b>	<b>\$811,085</b>	<b>\$394,992</b>	<b>\$570,919</b>	<b>\$746,846</b>	<b>\$7,519,620</b>	<b>\$95,218</b>	Rev. Train Hrs.		67,500
<b>2015 Resource Variable Values</b>		<b>290,617</b>	<b>13,702,192</b>	<b>680,077</b>	<b>144</b>	<b>38</b>	<b>24</b>	<b>4</b>	<b>3</b>	<b>135.8</b>	Rev. Car-Mi's.		5,283,200
											Peak Cars		181,600
											At-Grade Stat.		6
											Aerial Stat.		3
											Subway Stat.		3
											Total Stat.		12
											Yards		1
											Track-Mi's.		37.9

Table A-6. O&M Cost Detail for Alternative 2 with Maximum Short-Line to Slauson/A Line Station

LIGHT RAIL O&M COST MODEL

(Reflects LA Metro Light Rail Cost Data)

Expense Line Item	2015 LA Metro LRT 2015 NTD Expenses	Supply Variable Unit Cost (\$2015)										Inflate Factor	1.1348
		Revenue Train-Hours	Revenue Car-Miles	Revenue Car-Hours	Peak Cars	At-Grade Stations	Aerial Stations	Subway Stations	Yards	Revenue Track-Miles	Inflation Factor	Estimated Annual Cost (2020)	
<b>VEHICLE OPERATIONS</b>	<b>\$134,616,338</b>												<b>\$52,368,312</b>
Operators' Salaries and Wages	\$15,816,955	\$54.43										1.135	\$4,261,501
Other Salaries and Wages	\$20,074,280	\$34.54				\$76,039	\$76,039	\$76,039	\$1,672,857			1.135	\$5,638,042
Fringe Benefits	\$24,788,461	\$61.44				\$52,517	\$52,517	\$52,517	\$1,155,367			1.135	\$6,837,169
Service Costs	\$55,354,411				\$384,405.63							1.135	\$28,790,244
Fuel and Lubricants	\$38,955				\$270.52							1.135	\$20,261
Tires and Tubes	\$0											1.135	\$0
Other Materials and Supplies	\$552,357				\$3,835.81							1.135	\$287,285
Utilities	\$17,990,919			\$19.84	\$31,234.23							1.135	\$6,533,811
Casualty and Liability Costs	\$0											1.135	\$0
Taxes	\$0											1.135	\$0
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$0											1.135	\$0
<b>VEHICLE MAINTENANCE</b>	<b>\$42,616,431</b>												<b>\$20,344,770</b>
Operators' Salaries and Wages	\$0											1.135	\$0
Other Salaries and Wages	\$18,441,181		\$1.01		\$32,015.94							1.135	\$8,599,938
Fringe Benefits	\$15,147,180		\$0.83		\$26,297.19							1.135	\$7,063,800
Service Costs	\$270,345		\$0.01		\$469.35							1.135	\$126,074
Fuel and Lubricants	\$60,636				\$421.08							1.135	\$31,537
Tires and Tubes	\$9,061				\$62.92							1.135	\$4,713
Other Materials and Supplies	\$8,688,028				\$60,333.53							1.135	\$4,518,708
Utilities	\$0											1.135	\$0
Casualty and Liability Costs	\$0											1.135	\$0
Taxes	\$0											1.135	\$0
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$0											1.135	\$0
<b>NON-VEHICLE MAINTENANCE</b>	<b>\$37,982,769</b>												<b>\$11,609,632</b>
Operators' Salaries and Wages	\$0											1.135	\$0
Other Salaries and Wages	\$14,719,880					\$60,081	\$120,162	\$180,243	\$1,471,988	\$32,518		1.135	\$4,499,208
Fringe Benefits	\$11,122,398					\$45,398	\$90,795	\$136,193	\$1,112,240	\$24,571		1.135	\$3,399,619
Service Costs	\$9,207,414					\$37,581	\$75,163	\$112,744	\$920,741	\$20,340		1.135	\$2,814,294
Fuel and Lubricants	\$0											1.135	\$0
Tires and Tubes	\$0											1.135	\$0
Other Materials and Supplies	\$2,933,077					\$11,972	\$23,943	\$35,915	\$293,308	\$6,480		1.135	\$896,510
Utilities	\$0											1.135	\$0
Casualty and Liability Costs	\$0											1.135	\$0
Taxes	\$0											1.135	\$0
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$0											1.135	\$0
<b>GENERAL ADMINISTRATION</b>	<b>\$50,486,696</b>												<b>\$16,581,037</b>
Operators' Salaries and Wages	\$0											1.135	\$0
Other Salaries and Wages	\$7,078,452	\$4.87			\$24,577.96							1.135	\$2,222,202
Fringe Benefits	\$6,477,503	\$4.46			\$22,491.33							1.135	\$2,033,541
Service Costs	\$12,298,277	\$8.46			\$42,702.35							1.135	\$3,860,908
Fuel and Lubricants	\$0											1.135	\$0
Tires and Tubes	\$0											1.135	\$0
Other Materials and Supplies	\$2,566,124	\$1.77			\$8,910.15							1.135	\$805,606
Utilities	\$4,613,411		\$0.17		\$16,018.79							1.135	\$2,234,115
Casualty and Liability Costs	\$8,512,750				\$14,779.08	\$64,491	\$64,491	\$64,491				1.135	\$1,985,077
Taxes	\$122,545											1.135	\$0
PT Funds In Report	\$0											1.135	\$0
Miscellaneous Expenses	\$8,817,634				\$45,925.18							1.135	\$3,439,588
<b>TOTALS IN 2015 DOLLARS</b>	<b>\$265,702,234</b>	<b>\$169.96</b>	<b>\$2.02</b>	<b>\$19.84</b>	<b>\$714,751</b>	<b>\$348,078</b>	<b>\$503,110</b>	<b>\$658,141</b>	<b>\$6,626,500</b>	<b>\$83,909</b>			<b>\$100,903,752</b>
<b>TOTALS IN 2020 DOLLARS</b>	<b>\$301,513,573</b>	<b>\$192.87</b>	<b>\$2.29</b>	<b>\$22.51</b>	<b>\$811,085</b>	<b>\$394,992</b>	<b>\$570,919</b>	<b>\$746,846</b>	<b>\$7,519,620</b>	<b>\$95,218</b>	Rev. Train Hrs.		69,000
<b>2015 Resource Variable Values</b>		<b>290,617</b>	<b>13,702,192</b>	<b>680,077</b>	<b>144</b>	<b>38</b>	<b>24</b>	<b>4</b>	<b>3</b>	<b>135.8</b>	Rev. Car-Mi's.		5,414,600
											Rev. Car-Hrs.		186,300
											Peak Cars		66
											At-Grade Stat.		6
											Aerial Stat.		3
											Subway Stat.		3
											Total Stat.		12
											Yards		1
											Track-Mi's.		37.9

Table A-7. O&M Cost Detail for Alternative 3: Slauson/A (Blue) Line to Pioneer Station

LIGHT RAIL O&M COST MODEL

(Reflects LA Metro Light Rail Cost Data)

Expense Line Item	Supply Variable Unit Cost (\$2015)											Inflate Factor	1.1348
	2015 LA Metro LRT 2015 NTD Expenses	Revenue Train-Hours	Revenue Car-Miles	Revenue Car-Hours	Peak Cars	At-Grade Stations	Aerial Stations	Subway Stations	Yards	Revenue Track-Miles	Inflation Factor	Estimated Annual Cost (2020)	
<b>VEHICLE OPERATIONS</b>	<b>\$134,616,338</b>											<b>\$21,382,489</b>	
Operators' Salaries and Wages	\$15,816,955	\$54.43									1.135	\$1,649,016	
Other Salaries and Wages	\$20,074,280	\$34.54				\$76,039	\$76,039	\$76,039	\$1,672,857		1.135	\$3,289,908	
Fringe Benefits	\$24,788,461	\$61.44				\$52,517	\$52,517	\$52,517	\$1,155,367		1.135	\$3,411,092	
Service Costs	\$55,354,411				\$384,405.63						1.135	\$10,469,179	
Fuel and Lubricants	\$38,955				\$270.52						1.135	\$7,368	
Tires and Tubes	\$0										1.135	\$0	
Other Materials and Supplies	\$552,357				\$3,835.81						1.135	\$104,467	
Utilities	\$17,990,919			\$19.84	\$31,234.23						1.135	\$2,451,458	
Casualty and Liability Costs	\$0										1.135	\$0	
Taxes	\$0										1.135	\$0	
PT Funds In Report	\$0										1.135	\$0	
Miscellaneous Expenses	\$0										1.135	\$0	
<b>VEHICLE MAINTENANCE</b>	<b>\$42,616,431</b>											<b>\$6,807,882</b>	
Operators' Salaries and Wages	\$0										1.135	\$0	
Other Salaries and Wages	\$18,441,181		\$1.01		\$32,015.94						1.135	\$2,805,788	
Fringe Benefits	\$15,147,180		\$0.83		\$26,297.19						1.135	\$2,304,613	
Service Costs	\$270,345		\$0.01		\$469.35						1.135	\$41,132	
Fuel and Lubricants	\$60,636				\$421.08						1.135	\$11,468	
Tires and Tubes	\$9,061				\$62.92						1.135	\$1,714	
Other Materials and Supplies	\$8,688,028				\$60,333.53						1.135	\$1,643,167	
Utilities	\$0										1.135	\$0	
Casualty and Liability Costs	\$0										1.135	\$0	
Taxes	\$0										1.135	\$0	
PT Funds In Report	\$0										1.135	\$0	
Miscellaneous Expenses	\$0										1.135	\$0	
<b>NON-VEHICLE MAINTENANCE</b>	<b>\$37,982,769</b>											<b>\$6,351,504</b>	
Operators' Salaries and Wages	\$0										1.135	\$0	
Other Salaries and Wages	\$14,719,880				\$60,081	\$120,162	\$180,243	\$1,471,988	\$32,518		1.135	\$2,461,468	
Fringe Benefits	\$11,122,398				\$45,398	\$90,795	\$136,193	\$1,112,240	\$24,571		1.135	\$1,859,895	
Service Costs	\$9,207,414				\$37,581	\$75,163	\$112,744	\$920,741	\$20,340		1.135	\$1,539,670	
Fuel and Lubricants	\$0										1.135	\$0	
Tires and Tubes	\$0										1.135	\$0	
Other Materials and Supplies	\$2,933,077					\$11,972	\$23,943	\$35,915	\$293,308	\$6,480	1.135	\$490,471	
Utilities	\$0										1.135	\$0	
Casualty and Liability Costs	\$0										1.135	\$0	
Taxes	\$0										1.135	\$0	
PT Funds In Report	\$0										1.135	\$0	
Miscellaneous Expenses	\$0										1.135	\$0	
<b>GENERAL ADMINISTRATION</b>	<b>\$50,486,696</b>											<b>\$5,984,956</b>	
Operators' Salaries and Wages	\$0										1.135	\$0	
Other Salaries and Wages	\$7,078,452	\$4.87			\$24,577.96						1.135	\$816,968	
Fringe Benefits	\$6,477,503	\$4.46			\$22,491.33						1.135	\$747,609	
Service Costs	\$12,298,277	\$8.46			\$42,702.35						1.135	\$1,419,421	
Fuel and Lubricants	\$0										1.135	\$0	
Tires and Tubes	\$0										1.135	\$0	
Other Materials and Supplies	\$2,566,124	\$1.77			\$8,910.15						1.135	\$296,172	
Utilities	\$4,613,411		\$0.17		\$16,018.79						1.135	\$758,792	
Casualty and Liability Costs	\$8,512,750				\$14,779.08	\$64,491	\$64,491	\$64,491			1.135	\$695,234	
Taxes	\$122,545										1.135	\$0	
PT Funds In Report	\$0										1.135	\$0	
Miscellaneous Expenses	\$8,817,634				\$45,925.18						1.135	\$1,250,759	
<b>TOTALS IN 2015 DOLLARS</b>	<b>\$265,702,234</b>	<b>\$169.96</b>	<b>\$2.02</b>	<b>\$19.84</b>	<b>\$714,751</b>	<b>\$348,078</b>	<b>\$503,110</b>	<b>\$658,141</b>	<b>\$6,626,500</b>	<b>\$83,909</b>		<b>\$40,526,831</b>	
<b>TOTALS IN 2020 DOLLARS</b>	<b>\$301,513,573</b>	<b>\$192.87</b>	<b>\$2.29</b>	<b>\$22.51</b>	<b>\$811,085</b>	<b>\$394,992</b>	<b>\$570,919</b>	<b>\$746,846</b>	<b>\$7,519,620</b>	<b>\$95,218</b>	Rev. Train Hrs.	26,700	
<b>2015 Resource Variable Values</b>		<b>290,617</b>	<b>13,702,192</b>	<b>680,077</b>	<b>144</b>	<b>38</b>	<b>24</b>	<b>4</b>	<b>3</b>	<b>135.8</b>	Rev. Car-Mi's.	1,688,300	
											Peak Cars	24	
											At-Grade Stat.	3	
											Aerial Stat.	1	
											Subway Stat.	0	
											Total Stat.	4	
											Yards	1	
											Track-Mi's.	12.2	

Table A-8. O&M Cost Detail for Alternative 4: I-105/C (Green) Line to Pioneer Station

LIGHT RAIL O&M COST MODEL

(Reflects LA Metro Light Rail Cost Data)

Expense Line Item	Supply Variable Unit Cost (\$2015)											Inflate Factor	1.1348
	2015 LA Metro LRT 2015 NTD Expenses	Revenue Train-Hours	Revenue Car-Miles	Revenue Car-Hours	Peak Cars	At-Grade Stations	Aerial Stations	Subway Stations	Yards	Revenue Track-Miles	Inflation Factor	Estimated Annual Cost (2020)	
<b>VEHICLE OPERATIONS</b>	<b>\$134,616,338</b>											<b>\$34,558,864</b>	
Operators' Salaries and Wages	\$15,816,955	\$54.43									1.135	\$3,063,340	
Other Salaries and Wages	\$20,074,280	\$34.54				\$76,039	\$76,039	\$76,039	\$1,672,857		1.135	\$4,618,849	
Fringe Benefits	\$24,788,461	\$61.44				\$52,517	\$52,517	\$52,517	\$1,155,367		1.135	\$5,305,742	
Service Costs	\$55,354,411				\$384,405.63						1.135	\$17,012,417	
Fuel and Lubricants	\$38,955				\$270.52						1.135	\$11,972	
Tires and Tubes	\$0										1.135	\$0	
Other Materials and Supplies	\$552,357				\$3,835.81						1.135	\$169,759	
Utilities	\$17,990,919			\$19.84	\$31,234.23						1.135	\$4,376,784	
Casualty and Liability Costs	\$0										1.135	\$0	
Taxes	\$0										1.135	\$0	
PT Funds In Report	\$0										1.135	\$0	
Miscellaneous Expenses	\$0										1.135	\$0	
<b>VEHICLE MAINTENANCE</b>	<b>\$42,616,431</b>											<b>\$13,535,200</b>	
Operators' Salaries and Wages	\$0										1.135	\$0	
Other Salaries and Wages	\$18,441,181		\$1.01		\$32,015.94						1.135	\$5,905,997	
Fringe Benefits	\$15,147,180		\$0.83		\$26,297.19						1.135	\$4,851,056	
Service Costs	\$270,345		\$0.01		\$469.35						1.135	\$86,581	
Fuel and Lubricants	\$60,636				\$421.08						1.135	\$18,636	
Tires and Tubes	\$9,061				\$62.92						1.135	\$2,785	
Other Materials and Supplies	\$8,688,028				\$60,333.53						1.135	\$2,670,146	
Utilities	\$0										1.135	\$0	
Casualty and Liability Costs	\$0										1.135	\$0	
Taxes	\$0										1.135	\$0	
PT Funds In Report	\$0										1.135	\$0	
Miscellaneous Expenses	\$0										1.135	\$0	
<b>NON-VEHICLE MAINTENANCE</b>	<b>\$37,982,769</b>											<b>\$9,117,909</b>	
Operators' Salaries and Wages	\$0										1.135	\$0	
Other Salaries and Wages	\$14,719,880				\$60,081	\$120,162	\$180,243	\$1,471,988	\$32,518		1.135	\$3,533,564	
Fringe Benefits	\$11,122,398				\$45,398	\$90,795	\$136,193	\$1,112,240	\$24,571		1.135	\$2,669,974	
Service Costs	\$9,207,414				\$37,581	\$75,163	\$112,744	\$920,741	\$20,340		1.135	\$2,210,275	
Fuel and Lubricants	\$0										1.135	\$0	
Tires and Tubes	\$0										1.135	\$0	
Other Materials and Supplies	\$2,933,077					\$11,972	\$23,943	\$35,915	\$293,308	\$6,480	1.135	\$704,096	
Utilities	\$0										1.135	\$0	
Casualty and Liability Costs	\$0										1.135	\$0	
Taxes	\$0										1.135	\$0	
PT Funds In Report	\$0										1.135	\$0	
Miscellaneous Expenses	\$0										1.135	\$0	
<b>GENERAL ADMINISTRATION</b>	<b>\$50,486,696</b>											<b>\$10,270,979</b>	
Operators' Salaries and Wages	\$0										1.135	\$0	
Other Salaries and Wages	\$7,078,452	\$4.87			\$24,577.96						1.135	\$1,361,915	
Fringe Benefits	\$6,477,503	\$4.46			\$22,491.33						1.135	\$1,246,291	
Service Costs	\$12,298,277	\$8.46			\$42,702.35						1.135	\$2,366,226	
Fuel and Lubricants	\$0										1.135	\$0	
Tires and Tubes	\$0										1.135	\$0	
Other Materials and Supplies	\$2,566,124	\$1.77			\$8,910.15						1.135	\$493,730	
Utilities	\$4,613,411		\$0.17		\$16,018.79						1.135	\$1,457,621	
Casualty and Liability Costs	\$8,512,750				\$14,779.08	\$64,491	\$64,491	\$64,491			1.135	\$1,312,712	
Taxes	\$122,545										1.135	\$0	
PT Funds In Report	\$0										1.135	\$0	
Miscellaneous Expenses	\$8,817,634				\$45,925.18						1.135	\$2,032,484	
<b>TOTALS IN 2015 DOLLARS</b>	<b>\$265,702,234</b>	<b>\$169.96</b>	<b>\$2.02</b>	<b>\$19.84</b>	<b>\$714,751</b>	<b>\$348,078</b>	<b>\$503,110</b>	<b>\$658,141</b>	<b>\$6,626,500</b>	<b>\$83,909</b>		<b>\$67,482,952</b>	
<b>TOTALS IN 2020 DOLLARS</b>	<b>\$301,513,573</b>	<b>\$192.87</b>	<b>\$2.29</b>	<b>\$22.51</b>	<b>\$811,085</b>	<b>\$394,992</b>	<b>\$570,919</b>	<b>\$746,846</b>	<b>\$7,519,620</b>	<b>\$95,218</b>	Rev. Train Hrs.	49,600	
<b>2015 Resource Variable Values</b>		<b>290,617</b>	<b>13,702,192</b>	<b>680,077</b>	<b>144</b>	<b>38</b>	<b>24</b>	<b>4</b>	<b>3</b>	<b>135.8</b>	Rev. Car-Mi's.	3,919,100	
											Rev. Car-Hrs.	133,000	
											Peak Cars	39	
											At-Grade Stat.	6	
											Aerial Stat.	3	
											Subway Stat.	0	
											Total Stat.	9	
											Yards	1	
											Track-Mi's.	28.3	