

Appendix G  
**Preliminary Cost Estimates**

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# Memorandum

**To:** Ric Rattray, Program Manager

**Cc:** Michael Tree, Executive Director

**Subject:** Valley Link Operations and Maintenance Cost Memorandum – Revised

**From:** Justin Fox, AECOM; Ryan Park, AECOM

**Date:** July 2, 2020

## Introduction

This memorandum presents the conceptual operations and maintenance (O&M) costs for the Valley Link project. Both a discussion on the methodology to develop the O&M cost and the summary-level projected O&M costs for the project are included.

The Valley Link service is envisioned to operate with self-propelled rail cars known as multiple units (MUs). O&M costs for various Valley Link scenarios have been developed, covering the full project from the Dublin/Pleasanton BART station to North Lathrop as well as three initial operating segments (IOS) terminating at Southfront Road, Greenville Road, or Mountain House. The full route and IOS to Mountain House scenarios include a station in eastern Livermore at either Southfront Road or Greenville Road (but not both). An overview of the stations included in each scenario is found in **Table 1**.

**Table 1: Scenario Station Locations**

	Full Build – Greenville	Full Build – Southfront	IOS – Greenville	IOS – Southfront	IOS – Greenville + Mountain House	IOS – Southfront + Mountain House
Dublin/Pleasanton	x	x	x	x	x	x
Isabel Avenue	x	x	x	x	x	x
Greenville Road	x		x		x	
Southfront Road		x		x		x
Mountain House	x	x			x	x
Downtown Tracy	x	x				
River Islands	x	x				
North Lathrop	x	x				

The operating plans for the scenarios are defined in **Table 2**. The 2025 scenarios (both Full Build and IOS options) assume that Valley Link would operate with an initial service window between 5:00 a.m. and 8:00 p.m. By 2040, it is assumed that there would be sufficient ridership growth to justify a longer service window that would more closely match BART’s current service hours.

Two operating segments are proposed for the Valley Link service: the Tri-Valley IOS segment, between Mountain House and Dublin/Pleasanton BART, and the Full Build route between North Lathrop and Dublin/Pleasanton. For the IOS options, there is no distinction between the two; all service would operate at the Tri-Valley segment headways.

Service on the Tri-Valley segment would operate at a base headway of 12, 24, or 36 minutes, while the service on the rest of the route (for the Full Build route scenarios) would operate at twice the base IOS headway, with one exception: during peak hours in the 2040 scenarios, service would be provided at 12-minute headways along the full route.

It is assumed that the IOS scenarios in 2025 would be extended to full route operations by 2040; therefore, O&M costs for the IOS scenarios have only been calculated for 2025.

**Table 2: Project Scenarios**

Scenario	Hours of Service			Headways (minutes) Tri-Valley segment   full route						
	Week-days	Satur-days	Sun-days and Holi-days	Weekdays						Weekend s And Holidays
				Morning (start – 5 a.m.)	AM peak (5 a.m. – 8 a.m.)	Midday (8 a.m. – 4 p.m.)	PM peak (4 p.m. – 7 p.m.)	Evening (7 p.m. – 8 p.m.)	Late Evening (8 p.m. – 1 a.m.)	
2025 Scenarios (12/24)	5 a.m. – 8 p.m.	8 a.m. – 8 p.m.	—	—	12   24	36   72	12   24	24   48	—	36   72
2040 Scenarios (12/12)	4 a.m. – 1 a.m.	6 a.m. – 1 a.m.	8 a.m. – 1 a.m.	24   48	12   12	24   48	12   12	24   48	24   48	36   72

## O&M Cost Estimates Methodology

The conceptual O&M estimates were calculated using existing costs from MU services in the U.S. that have similar operating conditions. This methodology focuses on calculating costs on a per train mile basis. The approach requires an average cost per train mile of similar existing MU services, which, when multiplied by the total train miles for each Valley Link scenario, yields a reliable estimate of O&M costs for the service.

The cost per train mile was calculated using data from the National Transit Database (NTD) *2017 Operating Expense Report*<sup>1</sup> on the existing MU services in the U.S. listed in **Table 3**. Fuel was not included as the proposed MU vehicle type concept for Valley Link is an MU Hybrid (that is, MUs that draw power from battery packs as well as from diesel motors), while the MUs in the NTD Report are not (drawing power from diesel motors only). Since fuel consumption statistics are different, fuel costs per mile for the MU Hybrid were added to the average NTD cost per train mile without fuel to get the total cost per train mile.

Of the five services listed, only two – New Jersey Transit’s River LINE in southern New Jersey and North County Transit District’s SPRINTER in San Diego County – were used in the

<sup>1</sup> 2017 Annual Database Operating Expense <https://www.transit.dot.gov/ntd/data-product/2017-annual-database-operating-expense>

calculations. Despite being another MU service, the A-Train operated by Denton County Transportation Authority near Dallas was not considered in the calculations due to outlier maintenance costs. The vehicle maintenance cost for the A-Train was far lower than the average vehicle maintenance cost for the other services listed (\$0.16 per train mile versus an average value of \$6.07 per train mile). Similarly, Capital Metro MetroRail in Austin and Westside Express (WES) Commuter Rail near Portland were also not included due to low total vehicle miles, making them dissimilar to the proposed Valley Link operations.

The average cost per train mile most similar to Valley Link was determined to be \$22.16, based on the average between the River LINE and SPRINTER. The estimated fuel costs for the MU Hybrid is \$1.04 per mile. Adding the MU Hybrid fuel cost of \$1.04 per mile to the River LINE / SPRINTER average cost per train mile of \$22.16 per mile without fuel resulted in a total operating cost per train mile of **\$23.20** per mile for Valley Link.

**Table 3: U.S. MU Cost Metrics**

Service	Annual Total Train Miles	Annual Deadhead Miles	Cost per Train Mile (no Fuel)
Westside Express (WES)	165,000	2,200	\$ 42.31
MetroRail	340,000	38,200	\$ 62.69
A-Train	560,000	26,500	\$ 24.17
River LINE	1,300,000	27,900	\$ 22.85
SPRINTER	690,000	4,000	\$ 21.47

The expected Valley Link annual train miles (**Table 4**) were calculated using each scenario’s operating schedule and alignment measurements to find revenue miles, and then applying a deadhead factor of 1.63 percent. The deadhead factor was derived by dividing the average annual deadhead miles (15,959) by the average annual revenue miles (979,087) between the two aforementioned MU services found in the NTD *2017 Operating Expense Report*<sup>2</sup>. In the table below, train miles are shown by service scenario.

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<sup>2</sup> Ibid., p. 1

**Table 4: Annual Train Miles by Service Scenario**

Scenario Year	Scenario	Train Miles		
		Revenue	Deadhead	Total
2025	IOS – Greenville	372,800	6,100	378,900
	IOS - Southfront	308,400	5,00	313,400
	IOS - Greenville + Mountain House	773,300	12,600	785,900
	IOS - Southfront + Mountain House	773,300	12,600	785,900
	Full Build - Greenville	1,034,900	16,900	1,051,700
	Full Build - Southfront	1,034,900	16,900	1,051,700
2040	Full Build - Greenville	1,600,300	26,100	1,626,400
	Full Build - Southfront	1,600,300	26,100	1,626,400

The conceptual O&M cost estimates were then calculated by multiplying the average cost per train mile with fuel (\$23.20) by the total annual train miles for each Valley Link scenario.

### O&M Cost Estimates

Cost projections for 2028 and 2040 (for \$Year of Expenditure [\$YOE]) are displayed in **Table 5**. The assumed year that operating service begins is 2028. The values are escalated using a standard California yearly inflation rate of 3.2 percent.

**Table 5: Annual O&M Cost Projections (\$YOE) By Service Scenario**

Scenario	Scenario	Year of Expenditure (YOE)	
		\$ 2028	\$ 2040
12/24	IOS - Greenville	\$ 12,430,000	N/A
	IOS - Southfront	\$ 10,283,000	N/A
	IOS - Greenville + Mountain House	\$ 25,783,000	N/A
	IOS - Southfront + Mountain House	\$ 25,783,000	N/A
	Full Build - Greenville	\$ 34,504,000	\$ 55,344,000
	Full Build - Southfront	\$ 34,504,000	\$ 55,344,000
12/12	Full Build - Greenville	N/A	\$ 85,581,000
	Full Build - Southfront	N/A	\$ 85,581,000

### O&M Cost Estimate Bottom-up Validation

In order to validate these costs, a *pro forma* calculation of O&M costs for the Valley Link service was performed in May 2019. The estimate assumed a Full Build scenario in 2028, a total of 140 Valley Link employees, inclusive of administration, operations and dispatch, maintenance of equipment, signals, communication, and maintenance of way functions. The employees were

assigned average wage rates by classification.

In addition to labor, costs were assumed for consumables and insurance. Consumables include parts, miscellaneous services (e.g., marketing, legal, etc.), fuel/electrical power for the maintenance facility vehicles, and station maintenance. Cost estimates for consumables were largely based on costs incurred by the Altamont Corridor Express (ACE) commuter rail service. The vehicle fuel cost was calculated based on the schedules. The insurance cost estimate also was scaled from ACE insurance costs.

The resultant cost estimate, which was then escalated from 2019 dollars using a 3.2 percent annual adjustment factor, varied about one percent from estimate based on the all-inclusive cost per train mile figure multiplied by total train miles, as described in the preceding section. The escalated figure in 2025 dollars totaled \$27 million. Increasing that figure by the growth in train miles assumed by the current schedules (17 percent), the total becomes \$34.8 million, similar to the total cost estimate shown in Table 5.