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**Date:** March 22, 2002

**To:** Brent Ogden

**From:** Manuel Padron

**Subject:** Bay Crossing Study – Operating Statistics and O&M Cost Estimates

This memo presents estimates of annual operating statistics and O&M cost estimates for the BART alternatives being considered in the Bay Crossing Study.

## Operating Statistics

Operating statistics were estimated with a model developed by MPA and calibrated to actual FY 2001 BART statistics. The existing (FY2001) BART service is in Table 1, for reference. The future operating plans assume the BART extension to San Jose and service to SFO/Millbrea. All operating plans assume a basic 12-minute peak and midday headway on each route (Red, Blue, Green, etc.) with supplemental service (i.e., rush hour trains) added where needed. The 12-minute headway is consistent with current BART service patterns and with long-range service assumptions in the MTC travel demand model.

Operating plan assumptions and associated statistics are as follows:

## Baseline Alternative

This alternative assumes 27 trains/hour through the existing trans-bay tube in the peak hour. The operating plan for this alternative assumes 12-minute headways on the four routes crossing the Bay (i.e., a combined service of 20 trains/hour), with an additional 7 trains/hour on the West Pittsburgh line. Since we only have a single, combined peak hour line load through the existing tube, we could not tailor service to the demand on each route. The combined peak hour, peak direction line load forecast through the existing tube is approximately 33,300. However, the maximum available capacity with 10-car trains on all 27 trains in the peak hour is 24,300 (67 seats/car and a 1.35 load standard, or a capacity of approximately 90 passengers per car). Therefore, we are well short of meeting the projected demand. We assumed 10-car trains in the peak hour and peak period shoulders for all routes crossing the Bay. We also had to assume train consists for the San Jose-Richmond line in the peak period (7-car trains), and for the midday and weekend periods on all lines. Again, we made these assumptions because we do not have ridership forecasts for each individual route.

Table 2 presents the operating statistics for the Baseline Alternative, using the train consist

assumptions mentioned above. The Baseline Alternative requires 896 cars, including spares.

### **Alternative 1**

This alternative assumes 30 trains/hour through the existing tube in the peak hour. The operating plan assumes 12-minute headways on the four lines crossing the Bay (i.e., 20 trains/hour), with an additional 9 trains/hour from the West Pittsburgh line plus one train/hour from Fremont. Again, we could not address the demand of each route individually because we only have the combined peak hour load of all routes across the Bay. The combined peak hour, peak direction line load forecast through the existing tube is approximately 32,400 (which, curiously is less than in the Baseline Alternative). However, the maximum available capacity with 10-car trains on all 30 trains in the peak hour is 27,000 (67 seats/car and a 1.35 load standard, or a capacity of approximately 90 per car). Again, we are well short of meeting the projected demand. We assumed 10-car trains in the peak hour and peak shoulders for all routes crossing the Bay. Without ridership forecasts by route, we also had to assume train consists for the San Jose-Richmond line, and for the midday and weekend periods on all routes.

Table 3 presents rail operating plan statistics for Alternative 1, using the train consist assumptions described above. Alternative 1 requires 943 cars in the fleet, including spares (47 cars more than the Baseline Alternative).

### **Alternative 2**

This alternative assumes a second Transbay Tube with service to Union Square. This alternative was modeled with 60 trains/hour crossing through both tubes (30 trains per hour through each). However, the line loads obtained indicate that this level of service *is not warranted*. Therefore, we revised the operating plan for this alternative with 45 trains/hour through both tubes. This plan assumes 12-minute service for each of the five routes through the existing tube, resulting in 25 trains/hour (10 trains/hour from Pittsburgh, 5 trains/hour from Richmond, 5 trains/hour from San Jose and 5 trains/hour from East Dublin). Another twenty (20) trains per hour would cross through the proposed new tube (5 trains/hour from Richmond, 5 trains/hour from Pittsburgh, 5 trains/hour from East Dublin and 5 trains/hour from Fremont). Ten-car trains are required for routes through the existing tube. Eight-car trains (average) are required for routes through the new tube. The combined capacity through both tubes with this operating plan would be 36,900, somewhat higher than the predicted combined peak hour line load of 33,100. Thus, this operating plan provides sufficient capacity to meet demand. As previously noted, we had to assume train consists for the San Jose-Richmond line, and for the midday and weekend periods on all lines since we do not have ridership data for each separate route.

Table 4 presents rail operating plan statistics for Alternative 3, using the train consist assumptions mentioned above. Alternative 2 requires 1,213 cars in the fleet, including spares (317 cars more than the Baseline Alternative).

## O&M Costs

The statistics generated from the operating plans were used to estimate annual operating and maintenance costs, with the BART O&M cost model. This model was developed by MPA with FY 2001 cost data, and recently updated for the Silicon Valley Rapid Transit Corridor. The worksheets at the end of this memo include a list of input data. Projected system ridership for the Baseline and Alternative 1 were *scaled down* in the cost model to reflect the capacity constraints of the Baseline and Alternative 1. The incremental annual cost of each alternative, in constant, 2001 dollars) over the Baseline Alternative is as follows:

Alternative 1 = \$5.1 million / year.

Alternative 2 = \$102.8 million / year.

Because of the many assumptions we made, the O&M cost estimates presented in this memo should be regarded as “order-of-magnitude.” A more refined analysis of line load forecasts and train capacity requirements would be required should this project advance further.

C:\BART XO\O&M Cost Results

**TABLE 1:  
BART EXISTING RAIL OPERATING PLAN  
Based on July 2001 Schedules**

From	To	Run Time	Distance (miles)	Day	Headway					Consist					Vehicles		Annual Revenue			Trains					
					Early	Peak	Shdr.	Base	Eve.	Early	Peak	Shdr.	Base	Eve.	Peak	Total	Car-Miles	Train-Hrs	Car-Hrs	Early	Peak	Shdr.	Base	Eve.	
Colma	Richmond	58.0	29.2	M-F	15.0	15.0	15.0	15.0	n/a	8.0	9.7	9.7	5.0	n/a	87	104	6,106,000	32,130	235,240	9	9	9	9	0	
				Sat	n/a	n/a	n/a	20.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5.0	n/a	456,000	3,640	18,200	0	0	0	7	0
				Sun	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0	0	0	0	0	0	0
Colma	Pittsburgh	74.0	44.8	M-F	15.0	15.0	15.0	15.0	20.0	8.2	10.0	10.0	7.5	7.5	110	132	14,659,000	53,680	449,920	11	11	11	11	8	
				Sat	20.0	n/a	n/a	20.0	20.0	7.5	n/a	n/a	10.0	5.0	n/a	n/a	2,132,000	7,900	63,440	8	0	0	8	8	
				Sun	20.0	n/a	n/a	20.0	20.0	7.5	n/a	n/a	10.0	5.0	n/a	n/a	2,066,000	7,420	61,480	8	0	0	8	8	
Colma	Pittsburgh	74.0	44.8	M-F	n/a	10.0	20.0	n/a	n/a	n/a	10.0	10.0	n/a	n/a	90	108	2,742,000	4,850	45,900	0	9	5	0	0	
<i>(Rush Trains - O-D's Vary)</i>																									
Daly City	Fremont	64.0	38.7	M-F	15.0	15.0	15.0	15.0	n/a	8.2	9.3	9.3	4.8	n/a	84	101	7,847,000	32,130	228,100	9	9	9	9	0	
				Sat	n/a	n/a	n/a	20.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.0	n/a	483,000	3,640	14,560	0	0	0	7	0
				Sun	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0	0	0	0	0	0	0
Daly City	E. Dublin	61.0	39.0	M-F	15.0	15.0	15.0	15.0	20.0	7.2	8.1	8.1	4.0	6.4	73	88	9,198,000	44,500	265,320	9	9	9	9	7	
				Sat	20.0	n/a	n/a	20.0	20.0	4.0	n/a	n/a	4.0	4.0	n/a	n/a	925,000	6,920	27,660	7	0	0	7	7	
				Sun	20.0	n/a	n/a	20.0	20.0	4.0	n/a	n/a	4.0	4.0	n/a	n/a	869,000	6,500	25,980	7	0	0	7	7	
Fremont	Richmond	62.0	36.1	M-F	15.0	15.0	15.0	15.0	20.0	4.5	6.3	6.3	3.0	4.1	63	76	6,187,000	49,730	214,250	10	10	10	10	8	
				Sat	20.0	n/a	n/a	20.0	20.0	4.5	n/a	n/a	4.5	4.5	n/a	n/a	963,000	7,900	35,570	8	0	0	8	8	
				Sun	20.0	n/a	n/a	20.0	20.0	4.6	n/a	n/a	4.6	4.6	n/a	n/a	930,000	7,420	34,340	8	0	0	8	8	
<b>ESTIMATED TOTALS:</b>															507	609	55,563,000	268,360	1,719,960	48	57	53	48	23	
<u>5% for Special Events</u>															<u>n/a</u>	<u>n/a</u>	<u>2,778,150</u>	<u>13,418</u>	<u>85,998</u>						
<b>GRAND TOTALS</b>															<b>507</b>	<b>609</b>	<b>58,341,150</b>	<b>281,778</b>	<b>1,805,958</b>						

**Total Car-Miles = 60,091,385** (3% on top of Rev. Car-Miles)  
**Total Train-Hours = 295,867** (5% on top of Rev. Train-Hours)  
**Total Car-Hours = 1,896,256** (5% on top of Rev. Car-Hours)

**TABLE 3:  
BART RAIL OPERATING PLAN  
Baseline Alternative:  
30 Trains/Hr. Through Tube**

From	To	Run Time	Distance (miles)	Day	Headway					Consist					Vehicles		Annual Revenue			Trains				
					Early	Peak	Shdr.	Base	Even.	Early	Peak	Shdr.	Base	Even.	Peak	Total	Car-Miles	Train-Hrs	Car-Hrs	Early	Peak	Shdr.	Base	Even.
Richmond	Daly City	54.0	27.6	M-F	12.0	12.0	12.0	12.0	N/A	10.0	10.0	10.0	7.0	N/A	100	115	8,481,000	35,700	307,280	10	10	10	10	0
				Sat	N/A	N/A	N/A	20.0	N/A	N/A	N/A	N/A	7.0	N/A	603,000	3,120	21,840	0	0	0	6	0		
				Sun	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	0	0	0	0	
Pittsburgh	Millbrae	85.0	52.1	M-F	12.0	12.0	12.0	12.0	20.0	10.0	10.0	10.0	10.0	10.0	160	184	24,578,000	75,390	754,800	16	16	16	16	10
				Sat	20.0	N/A	N/A	20.0	20.0	10.0	N/A	N/A	10.0	7.0	2,796,000	9,880	89,440	10	0	0	10	10		
				Sun	N/A	N/A	N/A	20.0	20.0	N/A	N/A	N/A	10.0	7.0	2,139,000	7,540	68,440	0	0	0	10	10		
<i>Rush Trains</i>																								
Pittsburgh	Daly City	70.0	43.2	M-F	N/A	3 trips	N/A	N/A	N/A	N/A	10.0	N/A	N/A	N/A	30	33	661,000	0	71,600	0	3	0	0	0
Pleas. Hill	Daly City	38.0	32.9	M-F	N/A	1 trip	N/A	N/A	N/A	N/A	10.0	N/A	N/A	70	81	3,764,000	10,710	107,100	0	7	7	0	0	
Pleas. Hill	Montg.	38.0	24.6	M-F	N/A	12.0	12.0	N/A	N/A	N/A	10.0	10.0	N/A	70	81	3,764,000	10,710	107,100	0	7	7	0	0	
San Jose	24th	87.0	55.4	M-F	12.0	12.0	12.0	12.0	N/A	10.0	10.0	10.0	7.0	N/A	160	184	17,023,000	57,120	491,640	16	16	16	16	0
San Jose	24th	87.0	55.4	M-F	12.0	12.0	12.0	12.0	N/A	10.0	10.0	10.0	7.0	N/A	160	184	17,023,000	57,120	491,640	16	16	16	16	0
				Sat	N/A	N/A	N/A	20.0	N/A	N/A	N/A	N/A	7.0	N/A	1,210,000	5,200	36,400	0	0	0	10	0		
				Sun	N/A	N/A	N/A	20.0	20.0	N/A	N/A	N/A	7.0	N/A	0	0	0	0	0	0	0	0	0	
E. Dublin	SFO	76.0	47.0	M-F	12.0	12.0	12.0	12.0	20.0	10.0	10.0	10.0	7.0	7.0	140	161	18,217,000	66,810	542,640	14	14	14	14	9
Fremont	24th	54.0	34.1	M-F	20.0	60.0	60.0	20.0	20.0	7.0	10.0	10.0	7.0	7.0	20	23	1,959,000	8,880	60,200	0	0	0	0	0
				Sat	N/A	N/A	N/A	20.0	20.0	N/A	N/A	N/A	7.0	7.0	1,488,000	6,790	47,500	0	0	0	9	9		
				Sun	N/A	N/A	N/A	20.0	20.0	N/A	N/A	N/A	7.0	7.0	0	0	0	0	0	0	0	0	0	
E. Dublin	SFO	76.0	47.0	M-F	12.0	12.0	12.0	12.0	20.0	10.0	10.0	10.0	7.0	7.0	140	161	18,217,000	66,810	542,640	14	14	14	14	9
				Sat	20.0	12.0	12.0	20.0	20.0	7.0	7.0	7.0	5.0	5.0	15,355,000	85,470	482,240	18	18	18	18	18		
				Sun	20.0	N/A	N/A	20.0	20.0	N/A	N/A	N/A	5.0	5.0	1,488,000	6,790	47,500	0	0	0	9	9		
San Jose	Richmond	94.0	57.4	M-F	12.0	12.0	12.0	12.0	20.0	7.0	7.0	7.0	5.0	5.0	126	145	15,735,000	85,170	493,430	18	18	18	18	11
				Sat	20.0	12.0	12.0	20.0	20.0	3.0	3.0	3.0	3.0	3.0	3	3	1,930,000	8,290	41,470	0	0	0	11	11
				Sun	20.0	N/A	N/A	20.0	20.0	N/A	N/A	N/A	3.0	3.0	1,298,000	8,290	41,470	0	0	0	11	11		
SFO	Millbrae	4.0	1.4	M-F	12.0	12.0	12.0	12.0	20.0	3.0	3.0	3.0	3.0	3.0	3	3	15,735,000	85,170	493,430	18	18	18	18	11
				Sat	20.0	12.0	12.0	20.0	20.0	N/A	N/A	N/A	3.0	3.0	1,930,000	8,290	41,470	0	0	0	11	11		
				Sun	20.0	N/A	N/A	20.0	20.0	N/A	N/A	N/A	3.0	3.0	1,298,000	8,290	41,470	0	0	0	11	11		
SFO	Millbrae	4.0	1.4	M-F	12.0	12.0	12.0	12.0	20.0	3.0	3.0	3.0	3.0	3	3	198,000	5,230	14,150	1	1	1	1	1	
				Sat	20.0	N/A	N/A	20.0	20.0	N/A	N/A	N/A	3.0	3.0	21,000	990	2,500	1	0	0	1	1		
				Sun	N/A	N/A	N/A	20.0	20.0	N/A	N/A	N/A	3.0	3.0	19,000	750	2,260	0	0	0	1	1		

**ESTIMATED TOTALS:**  
Ready Reserve Cars (Assume same req't. as Baseline):

5% for Special Events

5% for Contingency

**GRAND TOTALS:**

5% for Special Events

5% for Contingency

**GRAND TOTALS**

Prepared by Manuel Padron & Associates

Prepared by Manuel Padron & Associates

822	896	101,394,000	399,050	3,136,630	75	84	82	75	31
n/a	n/a	5,069,700	19,953	156,832					
n/a	n/a	5,069,700	19,953	156,832					
821	895	111,533,400	438,955	3,450,293	75	88	84	75	31
n/a	n/a	5,141,050	20,106	158,714					
n/a	n/a	5,141,050	20,106	158,714					
864	843	119,680,700	462,322	3,767,706					
		3,622,808							
		116,496,193							
		464,437							
		3,666,293							

March 22, 02

March 22, 02

**TABLE 4:  
BART RAIL OPERATING PLAN  
Alternative 3:  
Second Transbay Tube (45 Trains/Hr. Through Two Tubes)**

From	To	Run Time	Distance (miles)	Day	Headway					Consist					Vehicles		Annual Revenue			Trains				
					Early	Peak	Shdr.	Base	Eve.	Early	Peak	Shdr.	Base	Eve.	Peak	Total	Car-Miles	Train-Hrs	Car-Hrs	Early	Peak	Shdr.	Base	Eve.
Richmond	Daly City	54.0	27.6	M-F	12.0	12.0	12.0	12.0	n/a	10.0	10.0	10.0	7.0	n/a	100	115	8,481,000	35,700	307,280	10	10	10	10	0
				Sat	n/a	n/a	n/a	20.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	603,000	3,120	21,840	0	0	0	6	0
				Sun	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0	0	0	0	0	0	0
Richmond	Union Sq.	38.0	21.1	M-F	12.0	12.0	12.0	12.0	n/a	8.0	8.0	8.0	7.0	n/a	56	64	5,676,000	24,990	188,320	7	7	7	7	0
				Sat	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0	0	0	0	0	0	0
				Sun	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0	0	0	0	0	0	0
Pittsburgh	Millbrae	85.0	52.1	M-F	12.0	12.0	12.0	12.0	20.0	10.0	10.0	10.0	10.0	10.0	160	184	24,578,000	75,990	754,800	16	16	16	16	10
				Sat	20.0	n/a	n/a	20.0	20.0	10.0	n/a	n/a	10.0	7.0	n/a	n/a	2,796,000	9,880	89,440	10	0	0	10	10
				Sun	n/a	n/a	n/a	20.0	20.0	n/a	n/a	n/a	10.0	7.0	n/a	n/a	2,139,000	7,540	68,440	0	0	0	10	10
Pittsburgh	Union Sq.	55.0	38.5	M-F	12.0	12.0	12.0	12.0	20.0	8.0	8.0	8.0	10.0	10.0	88	101	16,690,000	52,400	476,850	11	11	11	11	7
				Sat	20.0	n/a	n/a	20.0	20.0	7.0	n/a	n/a	7.0	7.0	n/a	n/a	1,598,000	6,920	48,410	7	0	0	7	7
				Sun	n/a	n/a	n/a	20.0	20.0	n/a	n/a	n/a	7.0	7.0	n/a	n/a	1,219,000	5,280	36,950	0	0	0	7	7
<i>Rush Trains</i>																								
Pleas. Hill	Montg.	38.0	24.6	M-F	n/a	12.0	12.0	n/a	n/a	n/a	10.0	10.0	n/a	n/a	70	81	3,764,000	10,710	107,100	0	7	7	0	0
San Jose	24th	87.0	55.4	M-F	12.0	12.0	12.0	12.0	n/a	10.0	10.0	10.0	7.0	n/a	160	184	17,023,000	57,120	491,640	16	16	16	16	0
				Sat	n/a	n/a	n/a	20.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,210,000	5,200	36,400	0	0	0	10	0
				Sun	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0	0	0	0	0	0	0
Fremont	Union Sq.	49.0	32.8	M-F	12.0	12.0	12.0	12.0	n/a	8.0	8.0	8.0	7.0	n/a	80	92	8,824,000	35,700	269,030	10	10	10	10	0
				Sat	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0	0	0	0	0	0	0
				Sun	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0	0	0	0	0	0	0
E. Dublin	SFO	76.0	47.0	M-F	12.0	12.0	12.0	12.0	20.0	10.0	10.0	10.0	7.0	7.0	140	161	18,217,000	66,810	542,640	14	14	14	14	9
				Sat	20.0	n/a	n/a	20.0	20.0	7.0	n/a	n/a	7.0	7.0	n/a	n/a	1,950,000	8,890	62,240	9	0	0	9	9
				Sun	n/a	n/a	n/a	20.0	20.0	n/a	n/a	n/a	7.0	7.0	n/a	n/a	1,488,000	6,790	47,500	0	0	0	9	9
E. Dublin	Union Sq.	45.0	32.5	M-F	12.0	12.0	12.0	12.0	20.0	8.0	8.0	8.0	7.0	7.0	72	83	11,354,000	43,220	314,420	9	9	9	9	6
				Sat	20.0	n/a	n/a	20.0	20.0	7.0	n/a	n/a	7.0	7.0	n/a	n/a	1,349,000	5,930	41,500	6	0	0	6	6
				Sun	n/a	n/a	n/a	20.0	20.0	n/a	n/a	n/a	7.0	7.0	n/a	n/a	1,029,000	4,520	31,670	0	0	0	6	6
San Jose	Richmond	94.0	57.4	M-F	12.0	12.0	12.0	12.0	20.0	7.0	7.0	7.0	5.0	5.0	126	145	15,735,000	85,170	493,430	18	18	18	18	11
				Sat	20.0	n/a	n/a	20.0	20.0	n/a	n/a	n/a	5.0	5.0	n/a	n/a	1,433,000	10,870	45,760	11	0	0	11	11
				Sun	n/a	n/a	n/a	20.0	20.0	n/a	n/a	n/a	5.0	5.0	n/a	n/a	1,298,000	8,290	41,470	0	0	0	11	11
SFO	Millbrae	4.0	1.4	M-F	12.0	12.0	12.0	12.0	20.0	3.0	3.0	3.0	3.0	3.0	3	3	198,000	5,230	14,150	1	1	1	1	1
				Sat	20.0	n/a	n/a	20.0	20.0	n/a	n/a	n/a	3.0	3.0	n/a	n/a	21,000	990	2,500	1	0	0	1	1
				Sun	n/a	n/a	n/a	20.0	20.0	n/a	n/a	n/a	3.0	3.0	n/a	n/a	19,000	750	2,260	0	0	0	1	1

Ready Reserve Cars (assume 20 additional cars over Baseline):

62

ESTIMATED TOTALS:  
5% for Special Events  
5% for Contingency  
**GRAND TOTALS**

1,117 1,213  
n/a n/a  
n/a n/a  
**1,117 1,213**

148,692,000 578,010 4,536,040 112 119 119 112 44  
7,434,600 28,901 226,802  
7,434,600 28,901 226,802

**Total Car-Miles = 168,468,036** (3% on top of Rev. Car-Miles)  
**Total Train-Hours = 667,602** (5% on top of Rev. Train-Hours)  
**Total Car-Hours = 5,239,126** (5% on top of Rev. Car-Hours)

# BART XO - Baseline

## 27 Trains/Hr.

System Characteristic	Driving Variable	Input Value	Variable/Measure	Value/Amount
<b>Input Statistics:</b>			<b>Assumptions:</b>	
Forecast Year	YEAR	2025	Fare Increase	0
Linked Passenger Trips	RIDER	132.4 million	Extension	0
Lines	LINE	5	Demand Retention	0
Peak Vehicles	PEAKCAR	821	Maintenance	0
Fleet Vehicles	TOTALCAR	896	CPI	0.0%
Peak Trains	PEAKTRAIN	84		
Base Trains	BASETRAIN	75		
Early/Late Trains	ELTRAIN	31		
Total Car Miles	CARMILE	114.9 million	<b>Performance Measures:</b>	
Total Train Hours	TRAINHOUR	460.90 thousand	Cost per Train Hour	\$996
Revenue Route Miles	ROUTEMILE	125	Cost per Car Mile	\$4.00
Total Stations	STATION	53	Cost per Passenger	\$3.47
Elevated Stations	ELEVATED	18		
At-Grade Stations	ATGRADE	15	<b>EXPENSE SUMMARY:</b>	
Subway Stations	SUBWAY	20	<b>Total O&amp;M Cost \$458,982,614</b>	
Stations w/Parking Lots	PARKING	49	Net Labor	\$333,216,822
Yard w/ backshops	YARDwBS	2	Shuttle Service	\$0
Service & Inspection Yards	YARD	5	Express Bus Service	\$2,855,476
			ADA Service	\$0
			Traction & Station Power	\$31,603,166
			Other Non-Labor	\$91,307,150
<b>Growth &amp; Inflation (annual average):</b>			Calibration System-FY 2001 Budget \$327,002,848	
<b>Labor:</b>			<b>Incremental Cost of Case \$131,979,766</b>	
Labor Wage & Fringe Benefits	WAGEFAC	0.0%	<b>EMPLOYEE SUMMARY:</b>	
<b>Non-Labor:</b>			<b>Total Headcount 4,751.6</b>	
CC Material	CCMATLFAC	0.0%	Operating	4,415.6
CC Services	CCSERVFAC	0.0%	Capital	336.0
CC Travel & Miscellaneous	CCMISCFAC	0.0%		
CC Insurance	CCINSFAC	0.0%		
DP Material	DPMATLFAC	0.0%		
DP Miscellaneous	DPMISCFAC	0.0%		
DP Utilities	DPUTILFAC	0.0%		
DP Purchased Transportation	DPPTFAC	0.0%		
DP Bus Program	DPBUSFAC	0.0%		

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# BART XO - Alternative 1

30 Trains/Hr.

System Characteristic	Driving Variable	Input Value	Variable/Measure	Value/Amount
<b>Input Statistics:</b>			<b>Assumptions:</b>	
Forecast Year	YEAR	2025	Fare Increase	0
Linked Passenger Trips	RIDER	138.8 million	Extension	0
Lines	LINE	5	Demand Retention	0
Peak Vehicles	PEAKCAR	861	Maintenance	0
Fleet Vehicles	TOTALCAR	943	CPI	0.0%
Peak Trains	PEAKTRAIN	88		
Base Trains	BASETRAIN	75		
Early/Late Trains	ELTRAIN	31		
Total Car Miles	CARMILE	116.5 million	<b>Performance Measures:</b>	
Total Train Hours	TRAINHOUR	464.44 thousand	Cost per Train Hour	\$999
Revenue Route Miles	ROUTEMILE	125	Cost per Car Mile	\$3.98
Total Stations	STATION	53	Cost per Passenger	\$3.34
Elevated Stations	ELEVATED	18		
At-Grade Stations	ATGRADE	15	<b>EXPENSE SUMMARY:</b>	
Subway Stations	SUBWAY	20		
Stations w/Parking Lots	PARKING	49		
Yard w/ backshops	YARDwBS	2		
Service & Inspection Yards	YARD	5		
<b>Growth &amp; Inflation (annual average):</b>				
<b>Labor:</b>				
Labor Wage & Fringe Benefits	WAGEFAC	0.0%		
<b>Non-Labor:</b>				
CC Material	CCMATLFAC	0.0%		
CC Services	CCSERVFAC	0.0%		
CC Travel & Miscellaneous	CCMISCFAC	0.0%		
CC Insurance	CCINSFAC	0.0%		
DP Material	DPMATLFAC	0.0%		
DP Miscellaneous	DPMISCFAC	0.0%		
DP Utilities	DPUTILFAC	0.0%		
DP Purchased Transportation	DPPTFAC	0.0%		
DP Bus Program	DPBUSFAC	0.0%		
			<b>EMPLOYEE SUMMARY:</b>	
			<b>Total Headcount</b>	<b>4,799.2</b>
			Operating	4,463.2
			Capital	336.0
			<b>Total O&amp;M Cost</b>	<b>\$464,040,792</b>
			Net Labor	\$336,888,679
			Shuttle Service	\$0
			Express Bus Service	\$2,855,476
			ADA Service	\$0
			Traction & Station Power	\$31,979,704
			Other Non-Labor	\$92,316,933
			Calibration System-FY 2001 Budget	\$327,002,848
			<b>Incremental Cost of Case</b>	<b>\$137,037,944</b>

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**BART XO - Alternative 2**  
**45 Trains/Hr.**

System Characteristic	Driving Variable	Input Value	Variable/Measure	Value/Amount
<b>Input Statistics:</b>			<b>Assumptions:</b>	
Forecast Year	YEAR	2025	Fare Increase	0
Linked Passenger Trips	RIDER	162.7 million	Extension	0
Lines	LINE	5	Demand Retention	0
Peak Vehicles	PEAKCAR	1,117	Maintenance	0
Fleet Vehicles	TOTALCAR	1,213	CPI	0.0%
Peak Trains	PEAKTRAIN	119		
Base Trains	BASETRAIN	112		
Early/Late Trains	ELTRAIN	44		
Total Car Miles	CARMILE	168.5 million	<b>Performance Measures:</b>	
Total Train Hours	TRAINHOUR	667.60 thousand	Cost per Train Hour	\$841
Revenue Route Miles	ROUTEMILE	134	Cost per Car Mile	\$3.33
Total Stations	STATION	57	Cost per Passenger	\$3.45
Elevated Stations	ELEVATED	18		
At-Grade Stations	ATGRADE	15	<b>EXPENSE SUMMARY:</b>	
Subway Stations	SUBWAY	24		
Stations w/Parking Lots	PARKING	49		
Yard w/ backshops	YARDwBS	2		
Service & Inspection Yards	YARD	6		
<b>Growth &amp; Inflation (annual average):</b>				
<b>Labor:</b>				
Labor Wage & Fringe Benefits	WAGEFAC	0.0%		
<b>Non-Labor:</b>				
CC Material	CCMATLFAC	0.0%		
CC Services	CCSERVFAC	0.0%		
CC Travel & Miscellaneous	CCMISCFAC	0.0%		
CC Insurance	CCINSFAC	0.0%		
DP Material	DPMATLFAC	0.0%		
DP Miscellaneous	DPMISCFAC	0.0%		
DP Utilities	DPUTILFAC	0.0%		
DP Purchased Transportation	DPPTFAC	0.0%		
DP Bus Program	DPBUSFAC	0.0%		
			<b>EXPENSE SUMMARY:</b>	
			<b>Total O&amp;M Cost</b>	<b>\$561,779,799</b>
			Net Labor	\$406,070,046
			Shuttle Service	\$0
			Express Bus Service	\$2,855,476
			ADA Service	\$0
			Traction & Station Power	\$44,547,832
			Other Non-Labor	\$108,306,446
			Calibration System-FY 2001 Budget	\$327,002,848
			<b>Incremental Cost of Case</b>	<b>\$234,776,951</b>
			<b>EMPLOYEE SUMMARY:</b>	
			<b>Total Headcount</b>	<b>5,714.4</b>
			Operating	5,378.4
			Capital	336.0

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3/22/02

