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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 | 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 | 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 | |
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**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 | 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 | 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 | | |
| 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 | 126 | 145 | 15,355,000 | 85,470 | 482,240 | 18 | 18 | 18 | 18 | 11 |
| | | | | 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 | 11 | 11 | | |
| 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 | 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 | | |
| | | | | 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 | | |
| 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

| | | | | | | | | | |
|-----|-----|-------------|---------|-----------|----|----|----|----|----|
| 821 | 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 | 896 | 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 | 442,322 | 3,637,709 | | | | | |
| | | 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 |
|---|------------------|-----------------|---|---------------|
| Input Statistics: | | | Assumptions: | |
| 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 | Performance Measures: | |
| 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 | EXPENSE SUMMARY: | |
| Subway Stations | SUBWAY | 20 | Total O&M Cost \$458,982,614 | |
| 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 |
| Growth & Inflation (annual average): | | | Calibration System-FY 2001 Budget | \$327,002,848 |
| Labor: | | | Incremental Cost of Case \$131,979,766 | |
| Labor Wage & Fringe Benefits | WAGEFAC | 0.0% | EMPLOYEE SUMMARY: | |
| Non-Labor: | | | Total Headcount 4,751.6 | |
| 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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3/22/02

BART XO - Alternative 1

30 Trains/Hr.

| System Characteristic | Driving Variable | Input Value | Variable/Measure | Value/Amount | | | | | | | | | | | | | | |
|---|----------------------|-----------------|--|--------------|-----------------------------------|----------------------|---------------------------------|----------------------|-----------------|-------|---------------------|-------------|-------------|-----|--------------------------|--------------|-----------------|--------------|
| Input Statistics: | | | Assumptions: | | | | | | | | | | | | | | | |
| 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 | Performance Measures: | | | | | | | | | | | | | | | |
| 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 | EXPENSE SUMMARY: | | | | | | | | | | | | | | | |
| Subway Stations | SUBWAY | 20 | <table border="1"> <tr> <td>Total O&M Cost</td> <td>\$464,040,792</td> </tr> <tr> <td>Net Labor</td> <td>\$336,888,679</td> </tr> <tr> <td>Shuttle Service</td> <td>\$0</td> </tr> <tr> <td>Express Bus Service</td> <td>\$2,855,476</td> </tr> <tr> <td>ADA Service</td> <td>\$0</td> </tr> <tr> <td>Traction & Station Power</td> <td>\$31,979,704</td> </tr> <tr> <td>Other Non-Labor</td> <td>\$92,316,933</td> </tr> </table> | | Total O&M Cost | \$464,040,792 | 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 |
| Total O&M Cost | \$464,040,792 | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | |
| Stations w/Parking Lots | PARKING | 49 | <table border="1"> <tr> <td>Calibration System-FY 2001 Budget</td> <td>\$327,002,848</td> </tr> <tr> <td>Incremental Cost of Case</td> <td>\$137,037,944</td> </tr> </table> | | Calibration System-FY 2001 Budget | \$327,002,848 | Incremental Cost of Case | \$137,037,944 | | | | | | | | | | |
| Calibration System-FY 2001 Budget | \$327,002,848 | | | | | | | | | | | | | | | | | |
| Incremental Cost of Case | \$137,037,944 | | | | | | | | | | | | | | | | | |
| Yard w/ backshops | YARDwBS | 2 | EMPLOYEE SUMMARY: | | | | | | | | | | | | | | | |
| Service & Inspection Yards | YARD | 5 | <table border="1"> <tr> <td>Total Headcount</td> <td>4,799.2</td> </tr> <tr> <td>Operating</td> <td>4,463.2</td> </tr> <tr> <td>Capital</td> <td>336.0</td> </tr> </table> | | Total Headcount | 4,799.2 | Operating | 4,463.2 | Capital | 336.0 | | | | | | | | |
| Total Headcount | 4,799.2 | | | | | | | | | | | | | | | | | |
| Operating | 4,463.2 | | | | | | | | | | | | | | | | | |
| Capital | 336.0 | | | | | | | | | | | | | | | | | |
| Growth & Inflation (annual average): | | | | | | | | | | | | | | | | | | |
| Labor: | | | | | | | | | | | | | | | | | | |
| Labor Wage & Fringe Benefits | WAGEFAC | 0.0% | | | | | | | | | | | | | | | | |
| Non-Labor: | | | | | | | | | | | | | | | | | | |
| 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% | | | | | | | | | | | | | | | | |

Prepared by Manuel Padron & Associates
3/22/02

BART XO - Alternative 2
45 Trains/Hr.

| System Characteristic | Driving Variable | Input Value | Variable/Measure | Value/Amount |
|---|------------------|-----------------|-----------------------------------|----------------------|
| Input Statistics: | | | Assumptions: | |
| 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 | Performance Measures: | |
| 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 | EXPENSE SUMMARY: | |
| Subway Stations | SUBWAY | 24 | | |
| Stations w/Parking Lots | PARKING | 49 | | |
| Yard w/ backshops | YARDwBS | 2 | | |
| Service & Inspection Yards | YARD | 6 | | |
| Growth & Inflation (annual average): | | | | |
| Labor: | | | | |
| Labor Wage & Fringe Benefits | WAGEFAC | 0.0% | | |
| Non-Labor: | | | | |
| 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% | | |
| | | | EXPENSE SUMMARY: | |
| | | | Total O&M Cost | \$561,779,799 |
| | | | 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 |
| | | | Incremental Cost of Case | \$234,776,951 |
| | | | EMPLOYEE SUMMARY: | |
| | | | Total Headcount | 5,714.4 |
| | | | Operating | 5,378.4 |
| | | | Capital | 336.0 |

Prepared by Manuel Padron & Associates
3/22/02

