



San Francisco Bay Crossings Study Update

Bay Area Toll Authority
May 2012

Prepared by **AECOM**

Executive Summary

- The San Francisco Bay Crossings Study Update (2012) is an update of the 2000 San Francisco Bay Crossings Study
- Current and Projected Conditions
 - Peak hour demand on the existing bridges will exceed capacity by more than 20% by 2035
 - The number of daily transbay person-trips is expected to increase by 33% between 2010 and 2035
 - BART ridership will exceed Transbay Tube capacity by 2025
- Alternatives Update
 - Due to reduced travel demand projections, reduced tolling revenue, and increased environmental / construction costs none of the updated alternatives from the previous study were recommended for further study

Executive Summary

- **BART Crossing Alternatives**
 - Three potential BART crossing alignments were identified and studied
 - The potential BART crossings would introduce forced transfers and increase travel time for most BART passengers and were therefore not recommended for further study
- **Transit Improvement Alternatives**
 - Four transit improvement alternatives were identified
 - Transit improvement alternatives are recommended for further study
- **Highway Approach Improvement Alternatives**
 - 19 approach improvement alternatives were identified and studied
 - Four approach improvements were recommended for further study

Executive Summary

Summary of Alternatives

Alternative		Cost (FY2011\$)	Recommended for Further Study
Alternatives Recommended in Previous Studies			
	New Multimodal Midbay Bridge / Tunnel – SR 238 to I-380	\$12,400,000,000	No
	Widening of San Mateo Bridge	\$2,900,000,000	No
	Dumbarton Bridge Approach Improvements	\$2,900,000,000	No
BART Crossing Alternatives			
	Northern Crossing Alignment	\$8,200,000,000	No
	Midway Crossing Alignment	\$9,100,000,000	No
	Southern Crossing Alignment	\$11,200,000,000	No
Transit Improvement Alternatives			
	BART Station Capacity Enhancements – Saddlebags	\$449,300,000	Yes
	BART Skip-Stop “Metro” Service Plan	NA	Yes
	East Bay Bus Terminal	NA	Yes
	Bus Service Expansions	NA	Yes
Highway Approach Improvement Alternatives			
1	Mandela Parkway Bus Ramp	\$46,200,000	No
2	MacArthur Boulevard Bus Ramp	\$11,100,000	Yes
3	Maritime Street HOV Lane Addition	\$19,600,000	No

Executive Summary

Summary of Alternatives

Alternative		Cost (FY2011\$)	Recommended for Further Study
4	SR 24 to I-80 HOV Bypass	\$439,400,000	No
5	Powell Street / I-80 Ramps Intersection - HOV Improvement	\$1,200,000	Yes
6	I-880 HOV Lane Merge - Lane Removal	\$114,000	No
7	I-880 HOV Lane Merge - Lane Extension	\$117,000	No
8	Fourth Street On-Ramp / Ninth Street Off-Ramp Braid	\$50,000,000	No
9	Bay Bridge to US 101 Lane Addition	\$134,900,000	No
10	US 101 to Cesar Chavez Street HOV Lane Addition	\$70,200,000	No
11	Cesar Chavez to US 101 HOV Lane Addition	\$35,900,000	No
12	Fifth Street On-Ramp HOV Lane Addition	\$4,300,000	No
13	US 101 (I-280 to Bay Bridge) HOV Lane Addition / Bypass	\$329,500,000	No
14	I-280 (US 101 to Bay Bridge) HOV Lane Addition / Bypass	\$171,300,000	No
15	San Mateo Bridge Open Road Tolling	\$4,200,000	Yes
16	Dumbarton Bridge Open Road Tolling	\$3,800,000	Yes
17	Western SR 84 / Northern I-880 HOV Connectors	\$104,000,000	No
18	SR 84 FasTrak Lane Extension	\$33,500,000	No
19	Newark Boulevard Westbound HOV Ramps	\$24,400,000	No

Executive Summary

- **Conclusions**

- No new highway bridge crossing is recommended for further study
- No new BART crossings are recommended for further study
- Four highway approach and four transit improvements are recommended for further study
- The four recommended highway approach improvements would have a total cost (FY2011\$) of \$20,348,000 and would require a \$0.01 toll increase on all 7 bridges to fund

- **Next Steps**

- Study recommended highway approach improvements further
- Midbay auto and BART improvements should be re-evaluated when warranted by transbay travel demand
- Recommended improvements should be considered as part of any future toll increase expenditure plan

Introduction

Introduction

- Current and Projected Conditions
- Alternatives Update
- BART Crossing Alternatives
- Transit Improvement Alternatives
- Highway Approach Improvement Alternatives
- Next Steps

Current and Projected Conditions

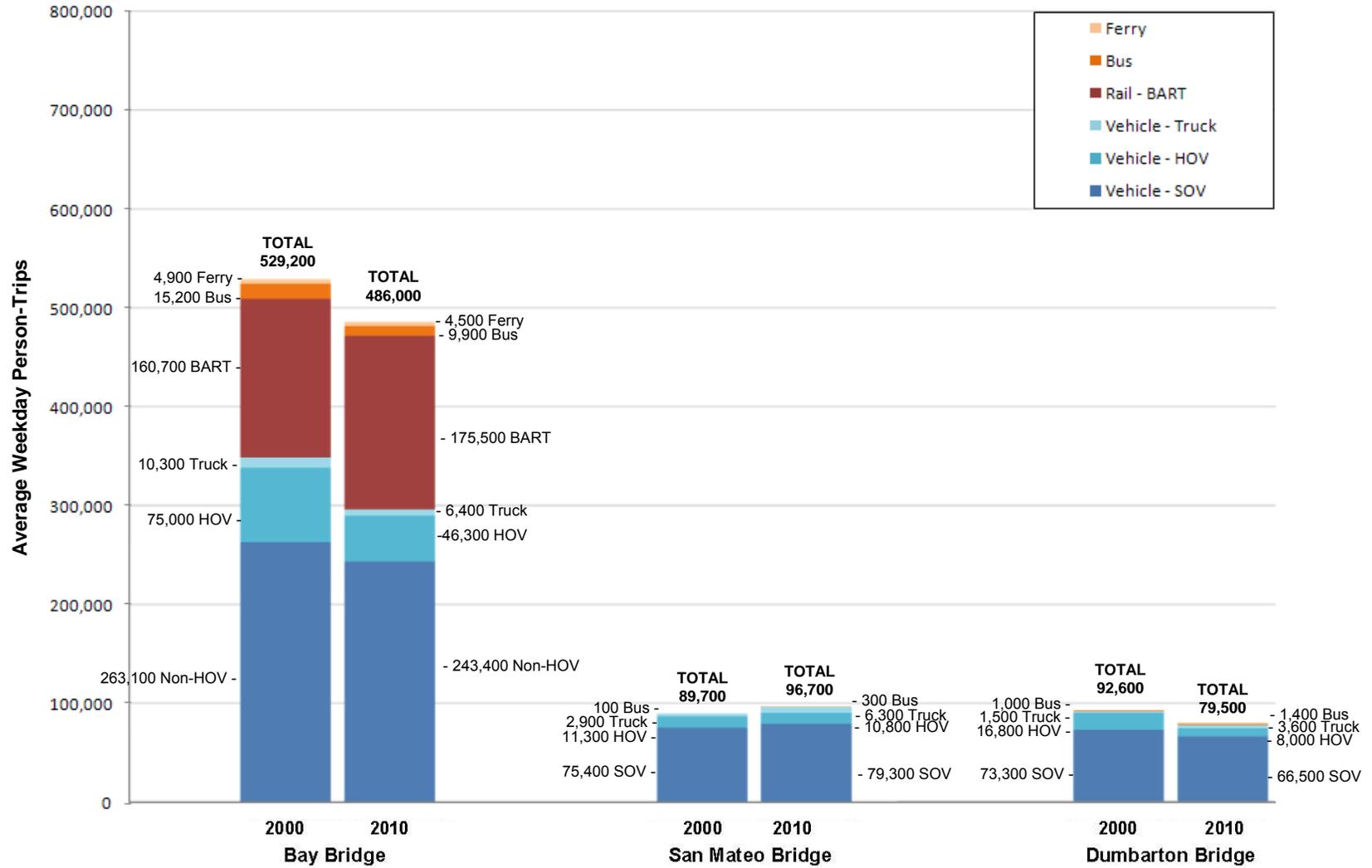
Current and Projected Conditions

Summary

- The San Francisco Bay Crossings Study Update (2012) is an update of the 2000 San Francisco Bay Crossings Study (previous study)
- 2010 (existing) daily transbay person-trips decreased since 2000 (previous study)
- The number of daily transbay person-trips is expected to increase by 33% between 2010 and 2035
- Peak hour demand is projected to exceed the capacity of the Bridge and BART Transbay crossings prior to 2035

Current and Projected Conditions

2000 vs. 2010 Volumes



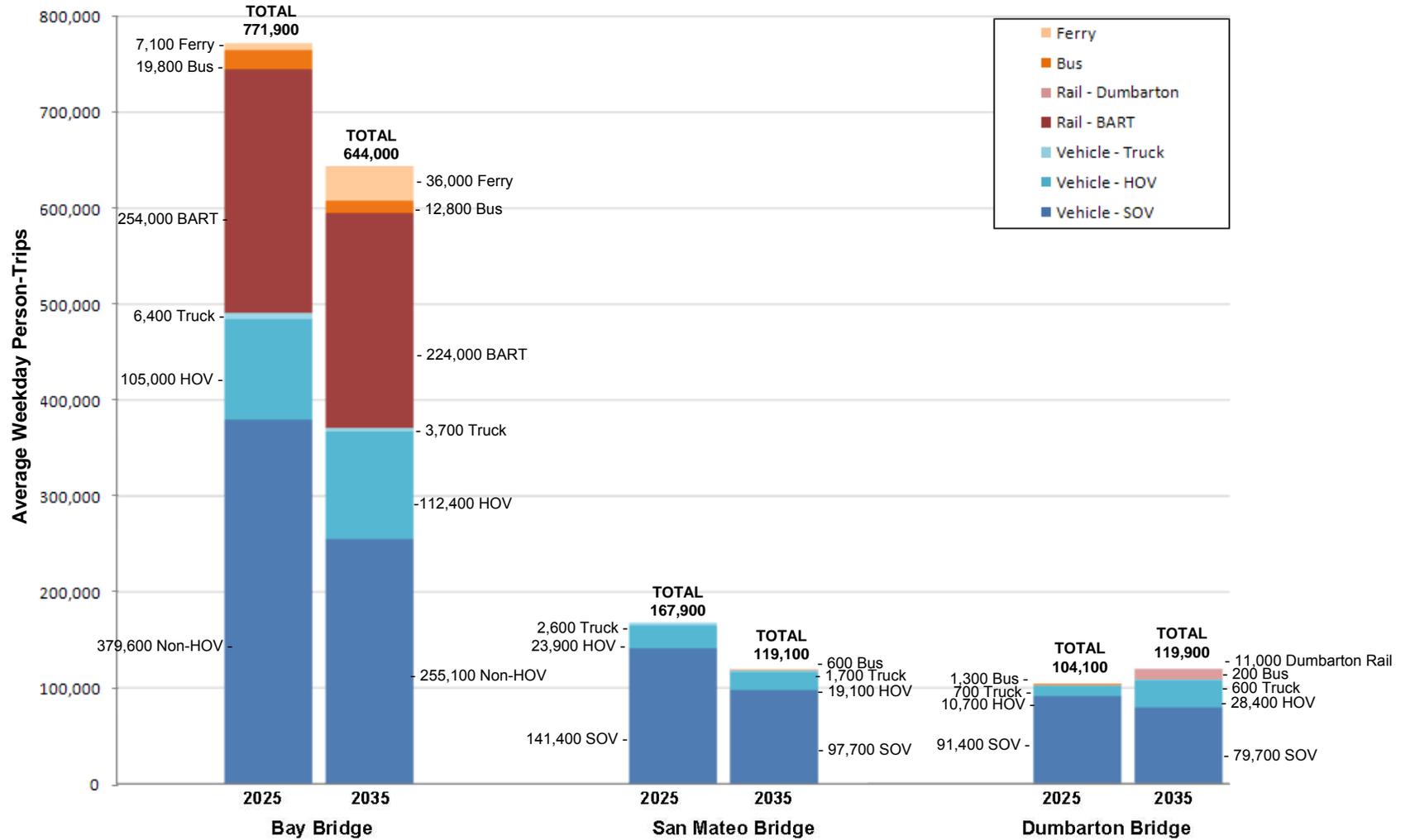
Current and Projected Conditions

2000 vs. 2010 Observations

- The following changes to transbay travel demand were observed since 2000:
 - HOV Person-Trips = **-37%**
 - Total Vehicle-Trips = **-2%**
 - BART Passengers = **+9%**
 - Bus Passengers = **-29%**

Current and Projected Conditions

2025 vs. 2035 Volumes



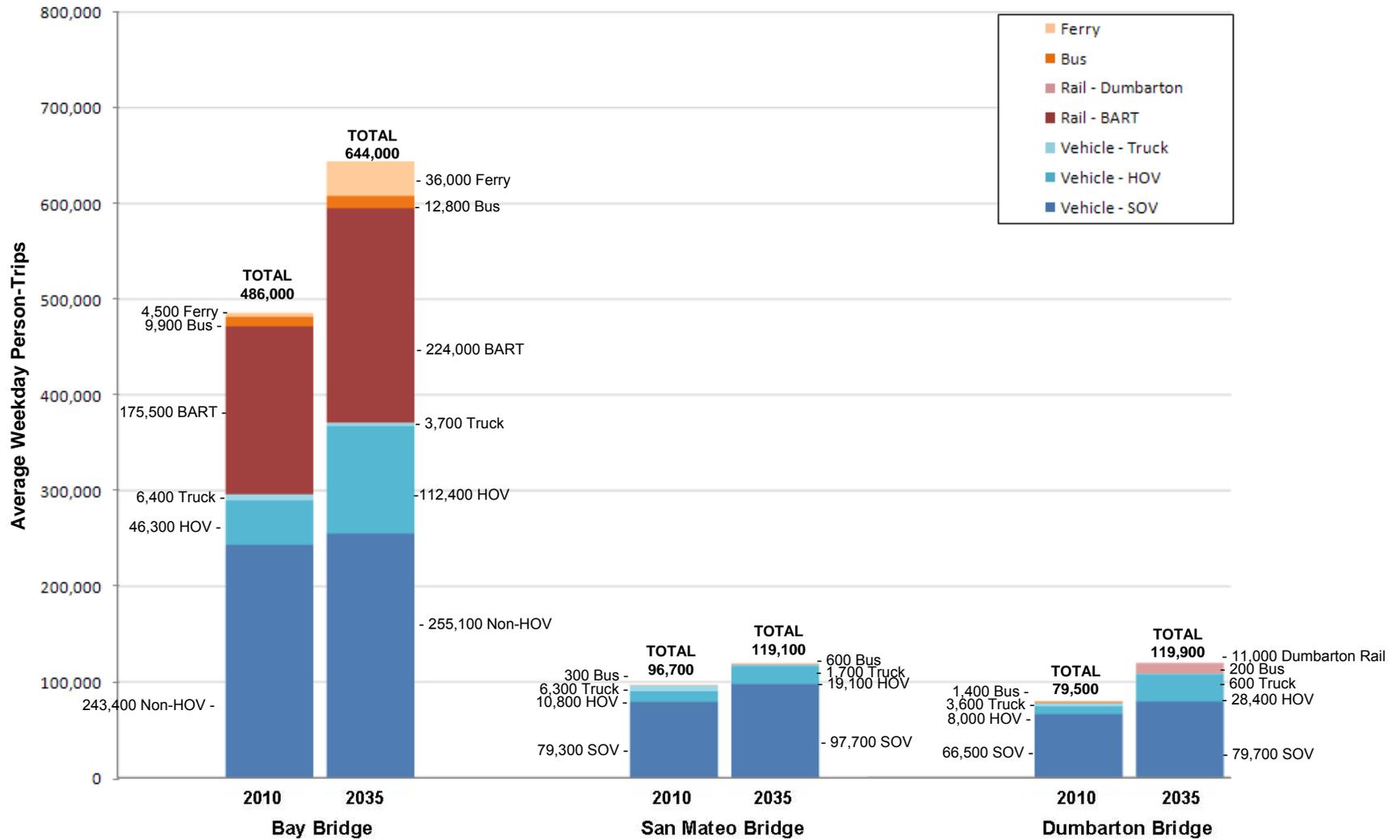
Current and Projected Conditions

2025 vs. 2035 Observations

- The following changes to transbay travel demand between the 2025 and 2035 projections are:
 - HOV Person-Trips = **+15%**
 - Total Vehicle-Trips = **-22%**
 - BART Trips = **-12%**
 - Bus Trips = **-36%**

Current and Projected Conditions

2010 vs. 2035 Volumes



Current and Projected Conditions

2010 vs. 2035 Observations

- The following increases in daily transbay demand / ridership are expected between 2010 and 2035:
 - Vehicle-Trips = **+95,000**
 - Transit-Trips = **+90,000**
 - BART Passengers = **+50,000**

Current and Projected Conditions

2010 vs. 2035 Observations

- The increases in transbay demand / ridership are expected to result in the following consequences:
 - Peak hour demand on the existing transbay bridges will exceed capacity by more than 20% by 2035
 - Significant delay will occur at the bridge approaches (the approaches constrain bridge capacity)
 - BART ridership will exceed Transbay Tube capacity by 2025
 - Bus ridership will be constrained by inefficient routes and redundant service

Alternatives Update

Alternatives Update

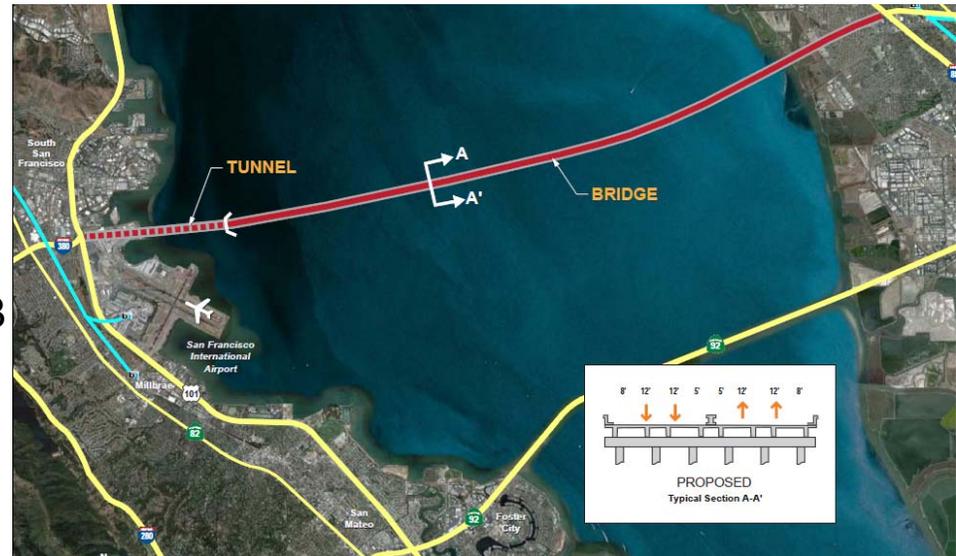
Summary

- Alternatives recommended in 2000 (previous study) were updated and re-evaluated, including:
 - New Multimodal Midbay Bridge / Tunnel – SR 238 to I-380
 - Widening of San Mateo Bridge
 - Dumbarton Bridge Approach Improvements
- Due to reduced travel demand projections, reduced tolling revenue, and increased environmental / construction costs, none of the updated alternatives from the previous study are recommended for further evaluation at this time
- Crossing alignments assessed in the previous study are not included because they were fully vetted in the 2007 Regional Rail Plan

Alternatives Update

New Multimodal Midbay Bridge / Tunnel – SR 238 to I-380

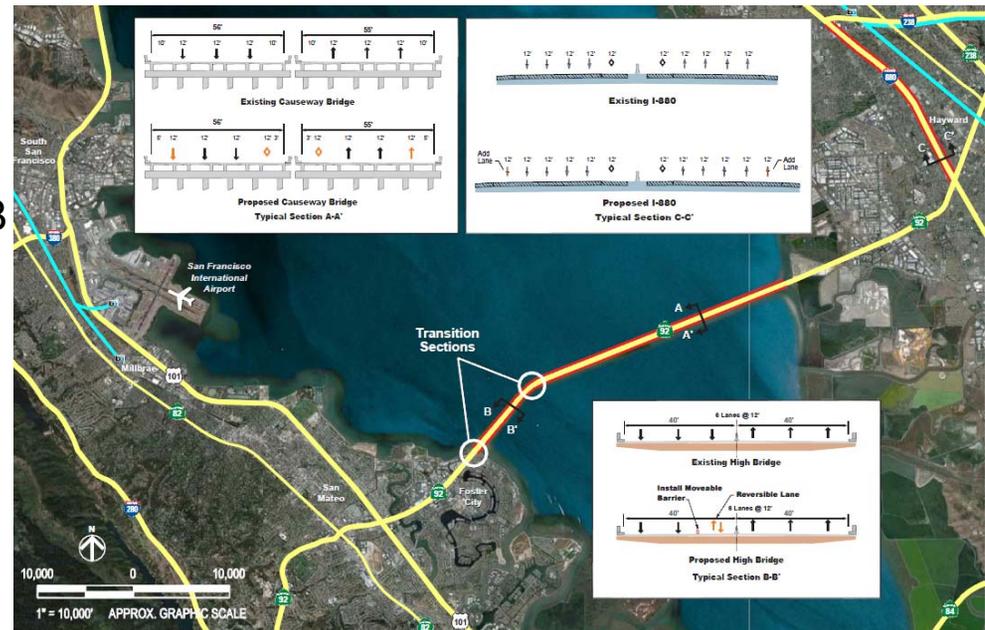
- Midbay crossing would result in the following:
 - Daily vehicle-trips that would utilize the Midbay crossing:
 - Previous study: 83,000
 - Current study: 61,300
 - Change in daily vehicle-trips that would cross the Bay (due to new bridge):
 - Previous study: +25,000
 - Current study: +27,100
 - Cost (FY2011\$):
 - Previous study: \$6.6B to \$8.2B
 - Current study: \$10.0B to \$12.4B
 - Net Toll Increase:
 - 4 Bridges = \$8
 - 8 Bridges = \$5



Alternatives Update

Widening of San Mateo Bridge

- San Mateo Bridge widening would result in the following:
 - Daily vehicle-trips that would utilize the widened bridge:
 - Previous study: 158,000
 - Current study: 125,800
 - Change in daily vehicle-trips that would cross the Bay:
 - Previous study: +2,100
 - Current study: -2,900
 - Cost (FY2011\$):
 - Previous study: \$1.8B to \$2.4B
 - Current study: \$2.3B to \$2.9B
 - Net Toll Increase:
 - 3 Bridges = \$2
 - 7 Bridges = \$1



Alternatives Update

Dumbarton Bridge Approach Improvements

- Approach improvements would result in the following:
 - Daily vehicle-trips that would utilize the approach:
 - Previous study: 20,900
 - Current study: 23,700
 - Cost (FY2011\$):
 - Previous study: \$0.7B to \$1.9B
 - Current study: \$1.0B to \$2.9B
 - Net Toll Increase:
 - 3 Bridges = \$2
 - 7 Bridges = \$1



BART Crossing Alternatives

BART Crossing Alternatives

Summary

- Three potential new BART crossing alignment alternatives were identified and studied:
 - Northern Crossing alignment
 - Midway Crossing alignment
 - Southern Crossing alignment
- The potential BART crossings would introduce forced transfers and would increase travel time for most BART passengers and are not recommended
- Additional BART transbay capacity would make the most sense in the Bay Bridge corridor



BART Crossing Alternatives

Northern Crossing Alignment



- Cost (FY2011\$): \$8,200,000,000
- This alignment would facilitate an airport-to-airport connector between SFO and OAK
- This alternative would introduce forced transfers and increase travel time for most BART passengers and was thus not recommended

BART Crossing Alternatives

Midway Crossing Alignment



- Cost (FY2011\$): \$9,100,000,000
- This alignment offers a direct route for passengers traveling from the East Bay to the SF / Peninsula trunk line and would offer a direct connection between SFO and OAK
- This alternative could reduce demand on the Transbay Tube by up to 22%. However, it would increase travel time for most passengers and was thus not recommended

BART Crossing Alternatives

Midway Crossing Alignment

- The Midway Crossing Operating Plan would provide Service on at headways of 7.5 minutes
- The Operating Plan would result in the following:
 - Travel time benefits for approx. 2,500 daily riders = **13 min.**
 - Travel time increases for approx. 120,000 daily riders = **2.5 min.**
 - Net travel time increase = **3,700 daily person-hours**



BART Crossing Alternatives

Southern Crossing Alignment



- Cost (FY2011\$): \$11,200,000,000
- This alternative may reduce demand on the Transbay Tube by up to 9%
- This alternative would introduce forced transfers and would increase travel time for most BART passengers and was thus not recommended

Transit Improvement Alternatives

Transit Improvement Alternatives

Summary

- Transit Improvement Alternatives include:

- BART Station Capacity Enhancements
- BART Skip-Stops
- East Bay Bus Terminal
- Bus Service Expansions



- BART Capacity Enhancements would increase the capacity of the Transbay Tube and are recommended for implementation before 2025 when daily systemwide ridership reaches approximately 500,000 passengers

Transit Improvement Alternatives

BART: Capacity Expansion

- “Saddlebags” at Embarcadero and Montgomery Stations will be necessary once daily systemwide ridership reaches 500,000 passengers (expected by 2025)
- “Saddlebags” will improve the capacity within the Transbay Tube
- Side platforms will improve:
 - Side passenger boarding
 - Vertical circulation
 - Platform density



Transit Improvement Alternatives

BART: Capacity Expansion

- The estimated cost (FY2011\$) of the BART capacity improvements including side platform tunnel and vertical circulation shafts is:
 - Embarcadero Station: \$277,500,000
 - Montgomery Station: \$171,800,000
- The total estimated cost (FY2011\$) of the BART capacity improvements is approximately \$449,300,000

Transit Improvement Alternatives

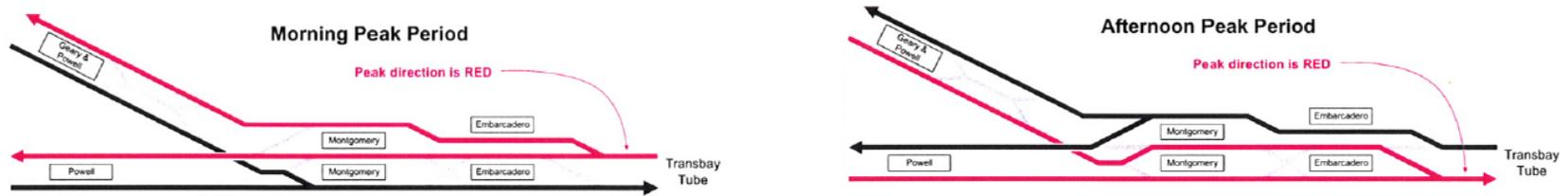
BART: East Bay and West Bay Skip-Stops w/ new San Francisco Alignment

- Currently, the stations at both ends of the Tube constrain transbay BART operations
- Introducing a skip-stop configuration would significantly increase the capacity of the Transbay Tube
- Implementation would be necessary once daily systemwide ridership reaches 500,000 passengers (expected by 2025)
- Improvements would be necessary on both sides of the bay in order to sufficiently increase transbay capacity
- Cost: N/A

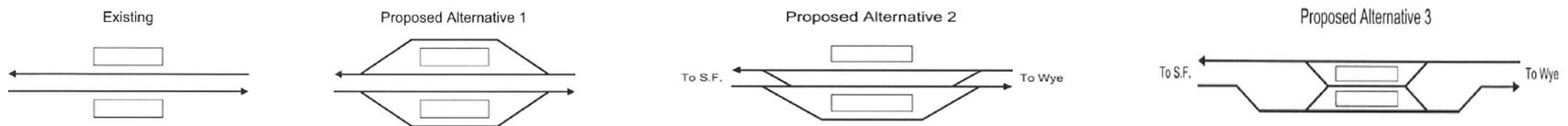
Transit Improvement Alternatives

BART: East Bay and West Bay Skip-Stops with San Francisco Improvements

- West Bay Skip-Stop with San Francisco Improvements
 - Skip-stop would allow trains to bypass the existing platform
 - New alignment could serve Embarcadero and Montgomery Stations



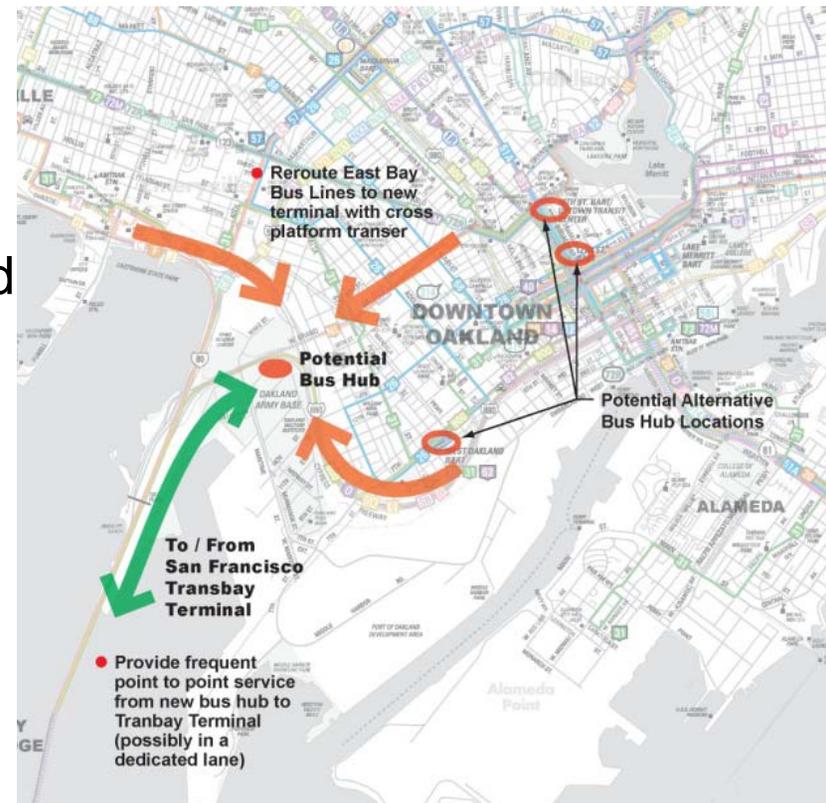
- East Bay Skip-Stop
 - Skip-stop configuration would increase Transbay Tube capacity
 - There are several proposed skip-stop configurations



Transit Improvement Alternatives

Bus: East Bay Terminal and Bay Bridge Shuttle

- Currently 25 routes are provided between the East Bay and San Francisco
- Could be consolidated at “transit node”
- Shuttle would provide service between East Bay “transit node” and Transbay Terminal
- This would:
 - Improve service frequency
 - Reduce resource needs
- Cost: N/A



Transit Improvement Alternatives

Bus: AC Transit Service Expansion in San Francisco

- AC Transit only serves the Transbay Terminal in San Francisco
- This would reduce the need for passengers transfer to another transit service
- Additional destinations could include:
 - Caltrain Station – 4th and King
 - Mission Bay
 - Cesar Chavez



Highway Approach Improvement Alternatives

Highway Approach Improvement Alternatives

Summary

- 19 Highway Approach Improvement Alternatives were identified on the bridge approaches
- Four Highway Approach Improvement Alternatives were recommended for further study:
 - Alternative 2: MacArthur Boulevard Bus Ramp
 - Alternative 5: Powell Street / I-80 Ramps Intersection – HOV Improvement
 - Alternative 15: San Mateo Bridge Open Road Tolling
 - Alternative 16: Dumbarton Bridge Open Road Tolling

Highway Approach Improvement Alternatives

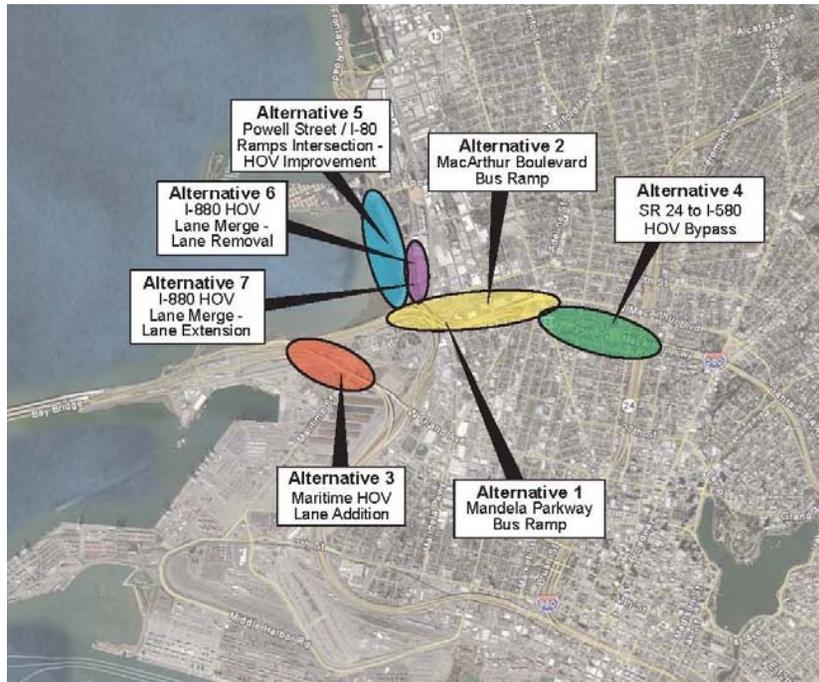
Summary

- Total cost of the four recommended alternatives (FY2011\$):
\$20,348,000
- Construction would require \$0.01 toll increase on all 7 bridges to fund

Highway Approach Improvement Alternatives

Highway Approach Improvement Alternative Locations

Bay Bridge (Eastern Approach) Improvement Alternatives



Bay Bridge (Western Approach) Improvement Alternatives



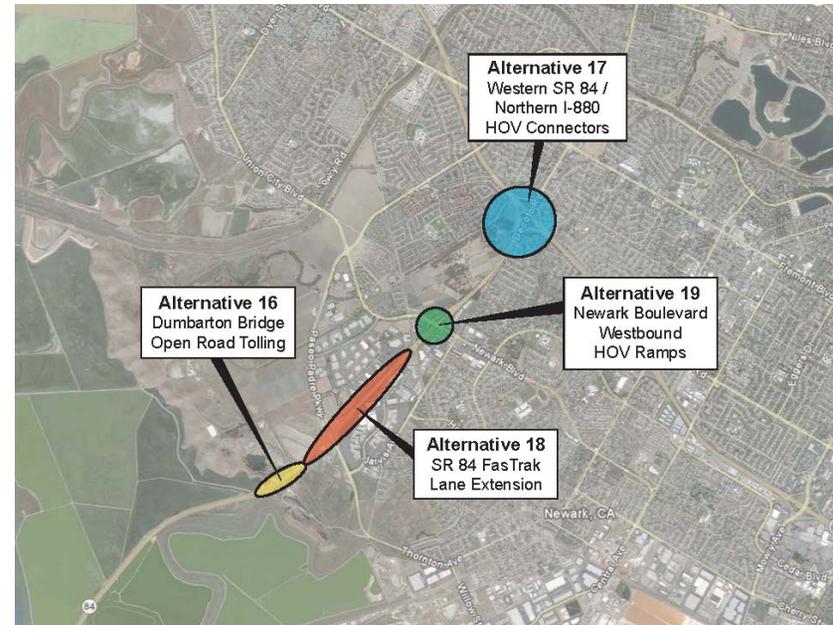
Highway Approach Improvement Alternatives

Highway Approach Improvement Alternative Locations

San Mateo Bridge Approach Improvement Alternatives



Dumbarton Bridge Approach Improvement Alternatives



Highway Approach Improvement Alternatives

Highway Approach Improvement Alternatives Ranking

Rank	#	Alternative	Cost (FY2011\$)	Time Savings Benefit	Cost / Benefit Ratio
1	5	Powell Street / I-80 Ramps Intersection - HOV Improvement	\$1,200,000	\$6,470,000	5.18
2	15	San Mateo Bridge Open Road Tolling	\$4,200,000	\$10,150,000	2.42
3	16	Dumbarton Bridge Open Road Tolling	\$3,800,000	\$8,530,000	2.24
4	2	MacArthur Boulevard Bus Ramp	\$11,100,000	\$13,340,000	1.20
5	8	Fourth Street On-Ramp / Ninth Street Off-Ramp Braid	\$50,000,000	\$16,550,000	0.33
6	1	Mandela Parkway Bus Ramp	\$46,200,000	\$11,130,000	0.24
7	11	Cesar Chavez to US 101 HOV Lane Addition	\$35,900,000	\$7,530,000	0.21
8	10	US 101 to Cesar Chavez Street HOV Lane Addition	\$70,200,000	\$12,580,000	0.18
9	9	Bay Bridge to US 101 Lane Addition	\$134,900,000	\$20,730,000	0.15
10	14	I-280 (US 101 to Bay Bridge) HOV Lane Addition / Bypass	\$171,300,000	\$24,430,000	0.14
11	13	US 101 (I-280 to Bay Bridge) HOV Lane Addition / Bypass	\$329,500,000	\$41,070,000	0.12
12	19	Newark Boulevard Westbound HOV Ramps	\$24,400,000	\$1,800,000	0.07
13	12	Fifth Street On-Ramp HOV Lane Addition	\$4,300,000	\$220,000	0.05
14	18	SR 84 FasTrak Lane Extension	\$33,500,000	\$1,660,000	0.05
15	4	SR 24 to I-80 HOV Bypass	\$439,400,000	\$9,500,000	0.02
16	17	Western SR 84 / Northern I-880 HOV Connectors	\$104,000,000	\$1,560,000	0.01
17	3	Maritime Street HOV Lane Addition	\$19,600,000	\$144,000	0.01
18	6	I-880 HOV Lane Merge - Lane Removal	\$114,000	NA	NA
19	7	I-880 HOV Lane Merge - Lane Extension	\$117,000	NA	NA

Notes:

Bold indicates alternative is recommended for further study

Highway Approach Improvement Alternatives

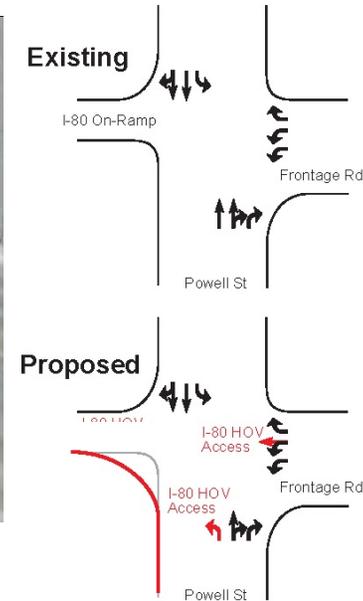
Alternative 2: MacArthur Boulevard Bus Ramp (Recommended)



- Cost (FY2011\$): \$11,100,000
- Time Savings Benefit: \$13,340,000
- Benefit / Cost Ratio: 1.20, Rank #4

Highway Approach Improvement Alternatives

Alternative 5: Powell Street / I-80 Ramps Intersection - HOV Improvement (Recommended)



- Cost (FY2011\$): \$1,248,000
- Time Savings Benefit: \$6,468,000
- Benefit / Cost Ratio: 5.18, Rank #1

Highway Approach Improvement Alternatives

Alternative 15: San Mateo Bridge Open Road Tolling (Recommended)



- Cost (FY2011\$): \$4,200,000
- Time Savings Benefit: \$10,150,000
- Benefit / Cost Ratio: 2.42, Rank #2

Highway Approach Improvement Alternatives

Alternative 16: Dumbarton Bridge Open Road Tolling (Recommended)



- Cost (FY2011\$): \$3,800,000
- Time Savings Benefit: \$8,530,000
- Benefit / Cost Ratio: 2.24, Rank #3

Next Steps

Next Steps

- Further study and evaluation of the recommended highway approach improvements
- Bus concepts should be further developed and evaluated as Transit Sustainability Projects
- Re-evaluation of midbay auto and BART crossings should be conducted when warranted by transbay travel demand
- Recommended BART approach improvements should be added to RM3 project list
- Recommended highway approach improvements should be considered as part of any future toll increase expenditure plan

Thank You

May 2012



Appendix

Alternatives Update

New Multimodal Bridge / Tunnel – SR 238 to I-380 (FY2011\$)

Scenario	Net Midbay Bridge	Gross Midbay Bridge	Gross 4 SF Bay Bridges	Gross 8 BATA Bridges
Vehicle Traffic (Weekday Daily)	+27,100	+61,300	+553,400	+962,000
Annual Revenue Needed (FY2011\$)	\$1,162M	\$1,162M	\$1,217M	\$1,356M
Toll Rate (Including Existing Tolls)	\$155	\$70	\$13	\$10

Alternatives Update

New Multimodal Bridge / Tunnel – SR 238 to I-380

Land Use Sensitivity Test

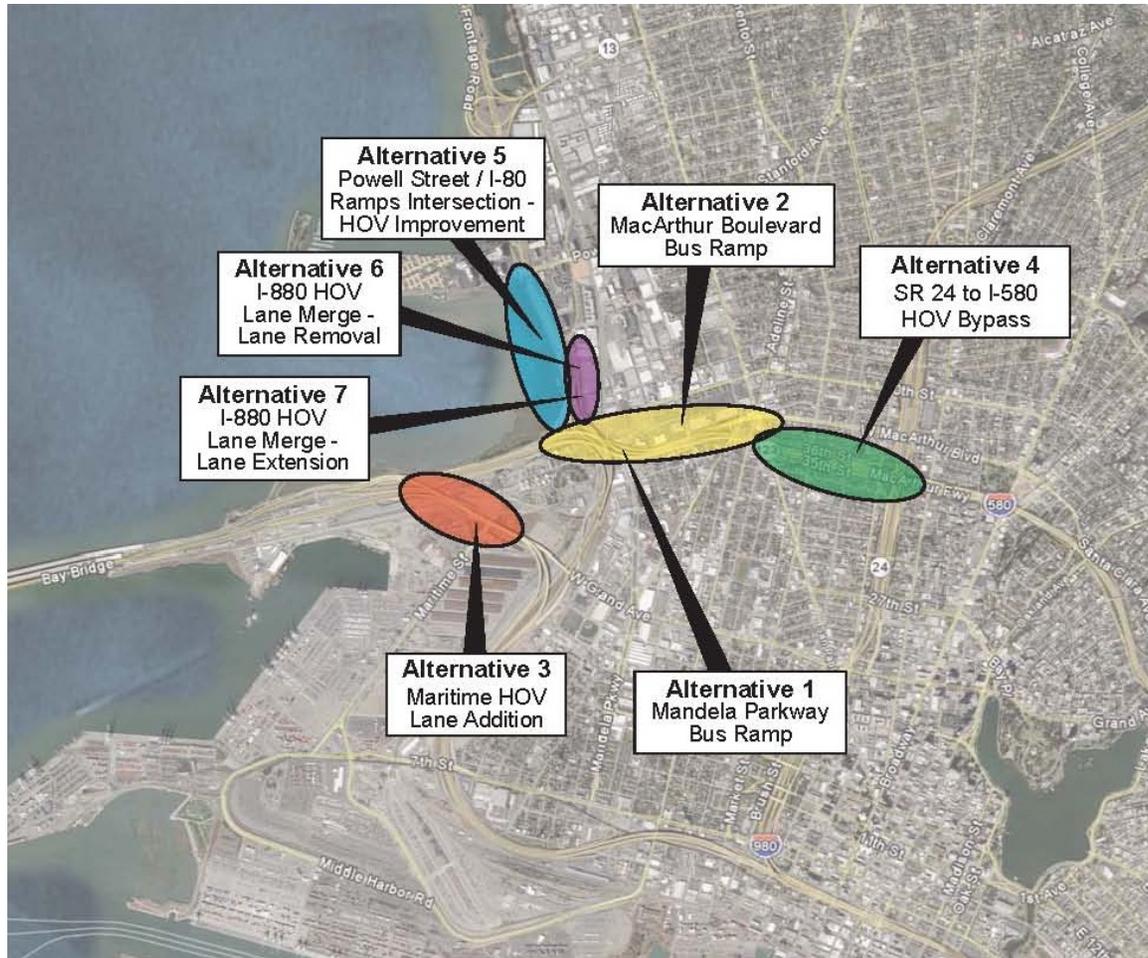
- Modeling based on Updated ABAG Projections (Proj 011):
 - 2005 vs. 2035 Bay Area Population = +1,970,000 (+28%)
 - 2005 vs. 2035 Bay Area Employment = +951,000 (+28%)
 - 2005 vs. 2035 Daily Vehicle Bay Crossings = +100,000 (+23%)
- If “Initial Vision” demographics were assumed instead:
 - Additional Bay Area Population = +364,000 (+4%)
 - Additional Bay Area Employment = +94,000 (+2%)
 - Additional Daily Vehicle Bay Crossings = +16,400 (+4%)
 - Would reduce estimated toll rates by 4%

Highway Approach Improvement Alternatives

- 19 Highway Approach Improvement Alternatives were identified for the bridge approaches including:
 - Bay Bridge (Eastern Approach)
 - Bay Bridge (Western Approach)
 - San Mateo Bridge Approach
 - Dumbarton Bridge Approach

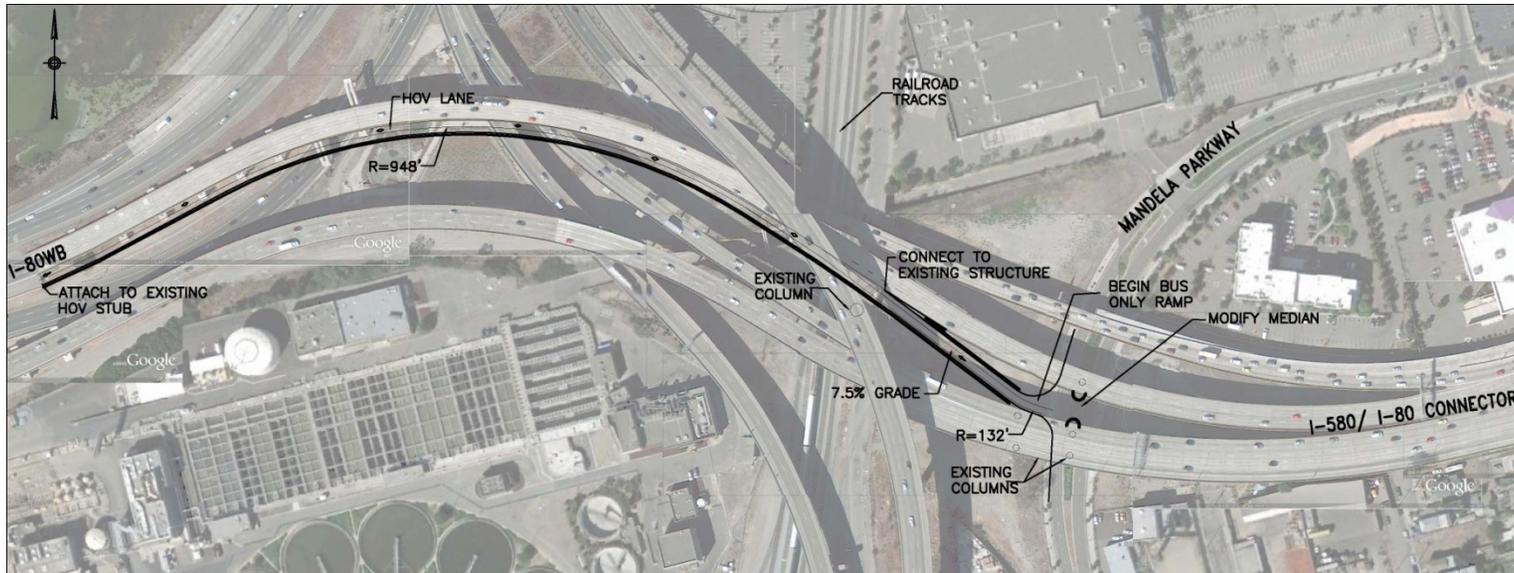
Highway Approach Improvement Alternatives

- Bay Bridge (Eastern Approach) Alternatives Include:



Bay Bridge (Eastern) Approach Improvement Alternatives

Alternative 1: Mandela Parkway Bus Ramp



- Cost (FY2011\$): \$46,200,000
- Time Savings Benefit: \$11,130,000
- Benefit / Cost Ratio: 0.24, Rank #6

Bay Bridge (Eastern) Approach Improvement Alternatives

Alternative 2: MacArthur Boulevard Bus Ramp



- Cost (FY2011\$): \$11,100,000
- Time Savings Benefit: \$13,340,000
- Benefit / Cost Ratio: 1.20, Rank #4

Bay Bridge (Eastern) Approach Improvement Alternatives

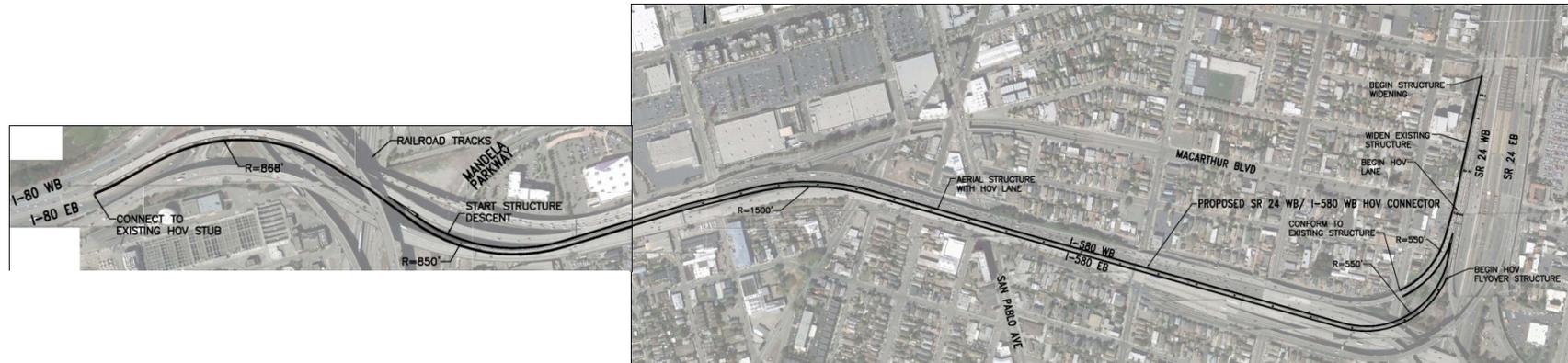
Alternative 3: Maritime Street HOV Lane Addition



- Cost (2011\$): \$19,600,000
- Time Savings Benefit: \$144,000
- Benefit / Cost Ratio: 0.01, Rank #17

Bay Bridge (Eastern) Approach Improvement Alternatives

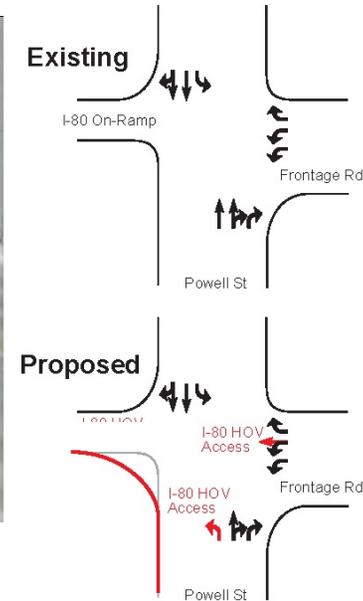
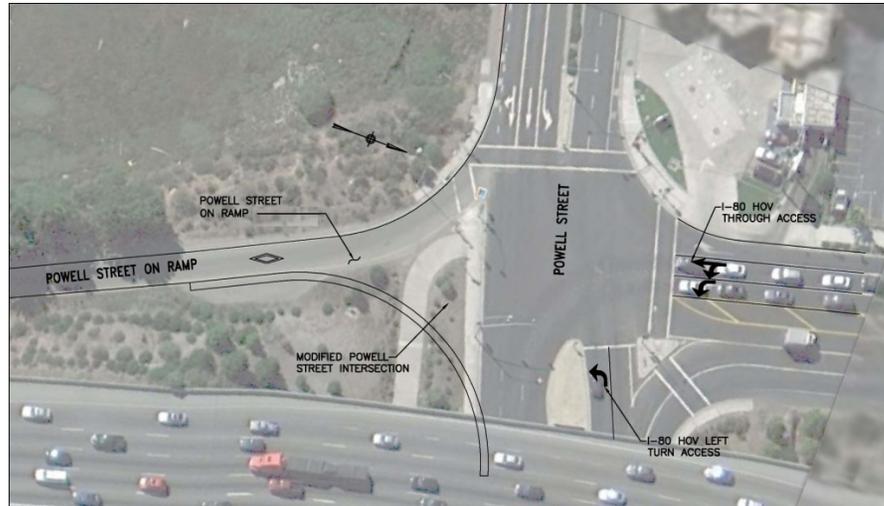
Alternative 4: SR 24 to I-80 HOV Bypass



- Cost (FY2011\$): \$439,400,000
- Time Savings Benefit: \$9,498,000
- Benefit / Cost Ratio: 0.02, Rank #15

Bay Bridge (Eastern) Approach Improvement Alternatives

Alternative 5: Powell Street / I-80 Ramps Intersection - HOV Improvement

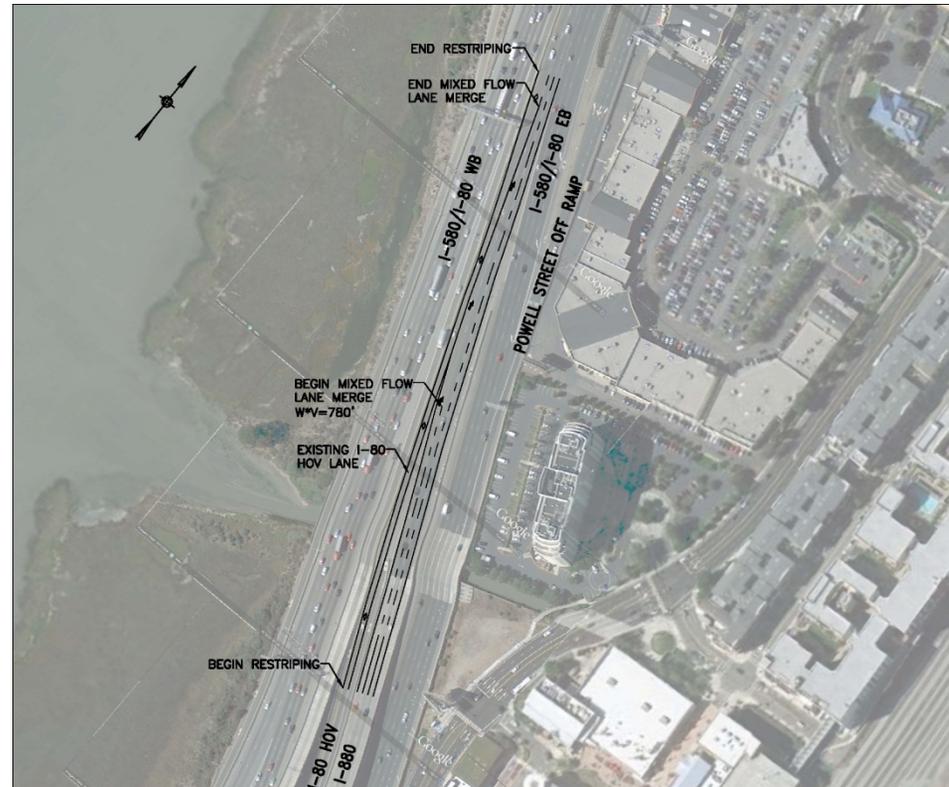


- Cost (FY2011\$): \$1,248,000
- Time Savings Benefit: \$6,468,000
- Benefit / Cost Ratio: 5.18, Rank #1

Bay Bridge (Eastern) Approach Improvement Alternatives

Alternative 6: I-880 HOV Lane Merge – Lane Removal

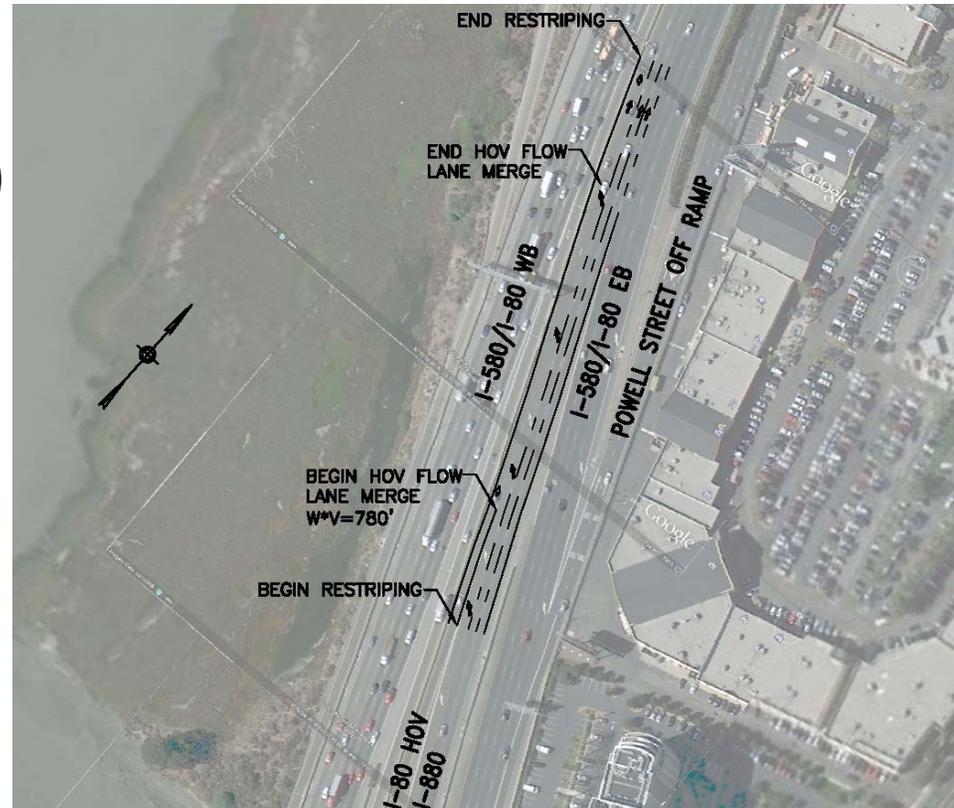
- Cost (FY2011\$): \$114,000
- Time Savings Benefit: NA
- Benefit / Cost Ratio: NA, Rank #18



Bay Bridge (Eastern) Approach Improvement Alternatives

Alternative 7: I-880 HOV Lane Merge – Lane Extension

- Cost (FY2011\$): \$117,000
- Time Savings Benefit: NA
- Benefit / Cost Ratio: NA, Rank #19



Highway Approach Improvement Alternatives

- Bay Bridge (Western Approach) Includes:



Bay Bridge (Western) Approach Improvement Alternatives

Alternative 8: Fourth Street On-Ramp / Ninth Street Off-Ramp Braid



- Cost (FY2011\$): \$50,000,000
- Time Savings Benefit: \$16,550,000
- Benefit / Cost Ratio: 0.33, Rank #5

Bay Bridge (Western) Approach Improvement Alternatives

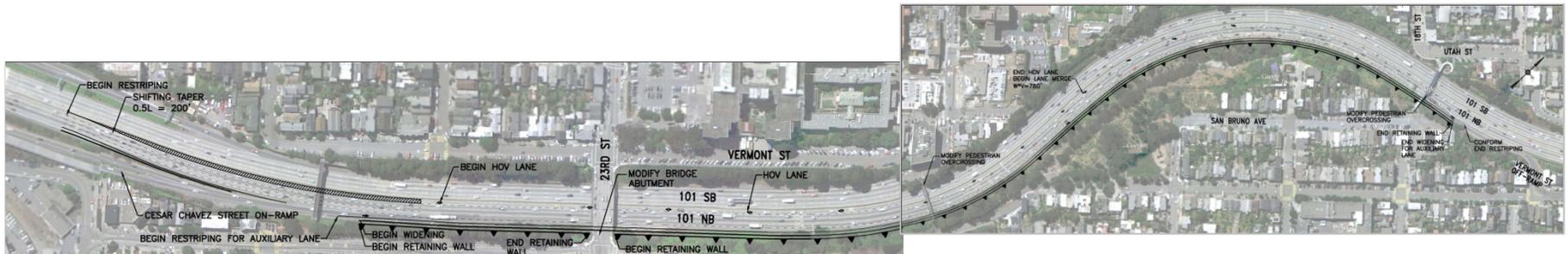
Alternative 10: US 101 to Cesar Chavez Street HOV Lane Addition



- Cost (FY2011\$): \$70,200,000
- Time Savings Benefit: \$12,580,000
- Benefit / Cost Ratio: 0.18, Rank #8

Bay Bridge (Western) Approach Improvement Alternatives

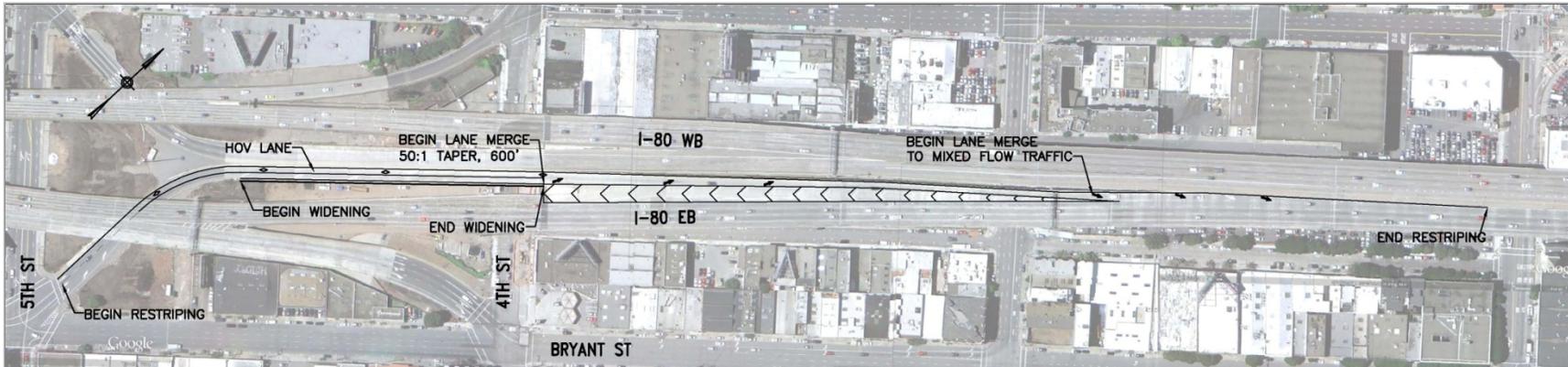
Alternative 11: Cesar Chavez Street to US 101 HOV Lane Addition



- Cost (FY2011\$): \$35,900,000
- Time Savings Benefit: \$7,530,000
- Benefit / Cost Ratio: 0.21, Rank #7

Bay Bridge (Western) Approach Improvement Alternatives

Alternative 12: Fifth Street On-Ramp HOV Lane Addition



- Cost (FY2011\$): \$4,300,000
- Time Savings Benefit: \$220,000
- Benefit / Cost Ratio: 0.05, Rank #13

Bay Bridge (Western) Approach Improvement Alternatives

Alternative 13: US 101 (I-280 to Bay Bridge) HOV Lane Addition / Bypass



- Cost (FY2011\$): \$329,500,000
- Time Savings Benefit: \$41,070,000
- Benefit / Cost Ratio: 0.12, Rank #11

Bay Bridge (Western) Approach Improvement Alternatives

Alternative 14: I-280 (US 101 to Bay Bridge) HOV Lane Addition / Bypass



Cost: \$171,300,000

Benefit: \$224,430,000

Ratio: 0.14, Rank #10

Highway Approach Improvement Alternatives

- San Mateo Bridge Approach Includes:



San Mateo Bridge Approach Improvement Alternatives

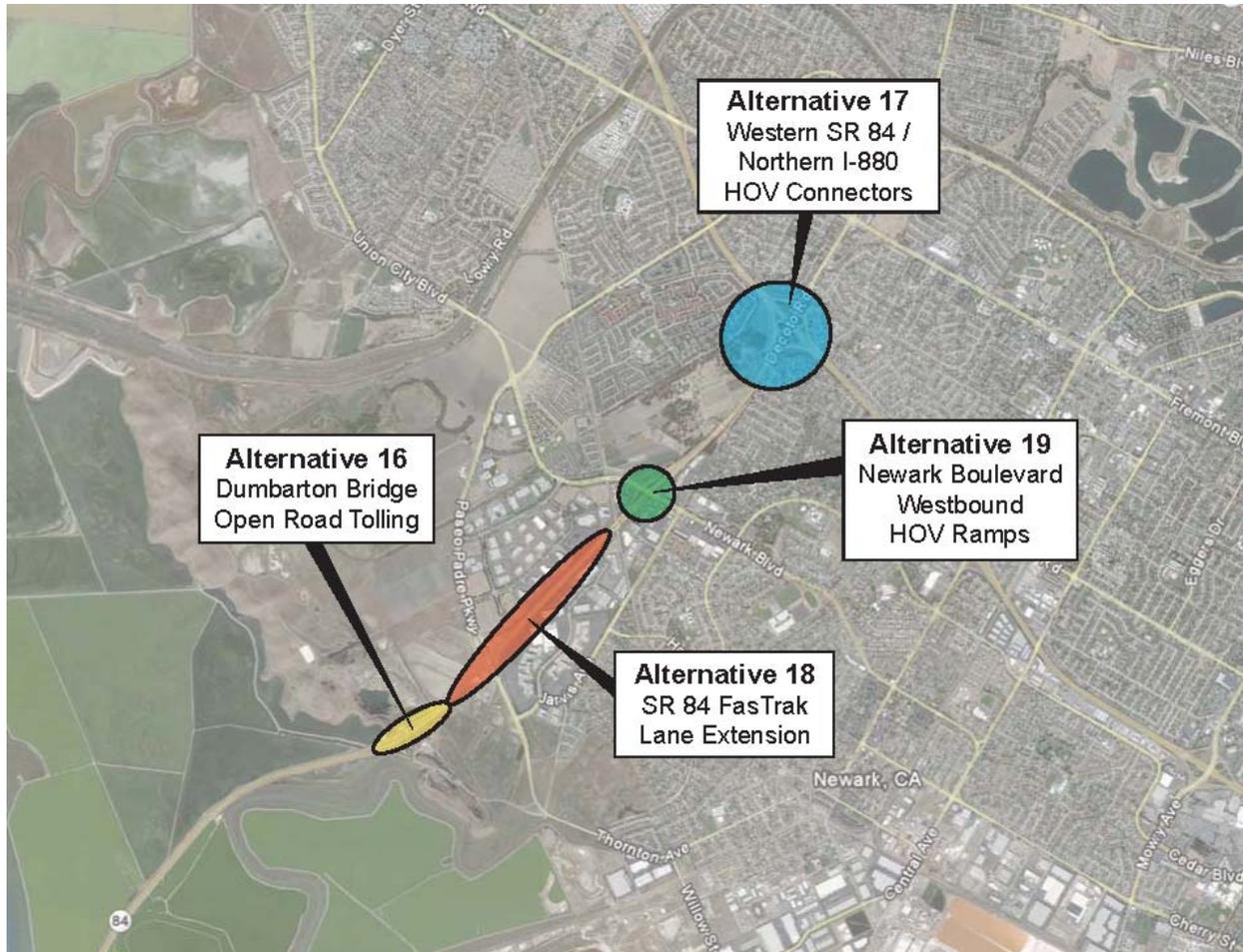
Alternative 15: San Mateo Bridge Open Road Tolling



- Cost (FY2011\$): \$4,200,000
- Time Savings Benefit: \$10,150,000
- Benefit / Cost Ratio: 2.42, Rank #2

Highway Approach Improvement Alternatives

- Dumbarton Bridge Approach Includes:



Dumbarton Bridge Approach Improvement Alternatives

Alternative 16: Dumbarton Bridge Open Road Tolling



- Cost (FY2011\$): \$3,800,000
- Time Savings Benefit: \$8,530,000
- Benefit / Cost Ratio: 2.24, Rank #3

Dumbarton Bridge Approach Improvement Alternatives

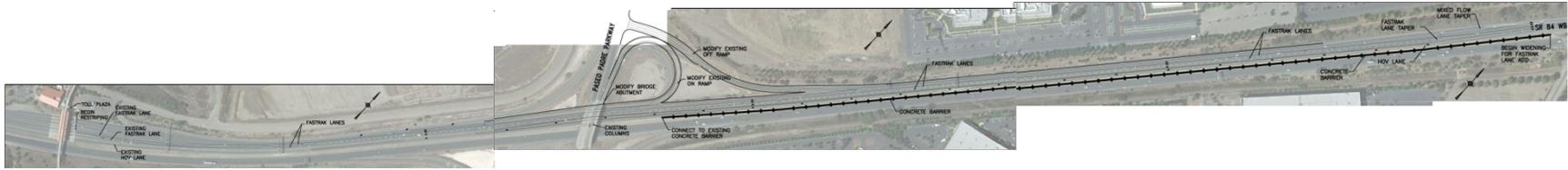
Alternative 17: Western SR 84 / Northern I-880 HOV Connectors

- Cost (FY2011\$): \$104,000,000
- Time Savings Benefit: \$1,560,000
- Benefit / Cost Ratio: 0.02, Rank ...



Dumbarton Bridge Approach Improvement Alternatives

Alternative 18: SR 84 FasTrak Lane Extension



- Cost (FY2011\$): \$33,500,000
- Time Savings Benefit: \$1,660,000
- Benefit / Cost Ratio: 0.05, Rank #14

Dumbarton Bridge Approach Improvement Alternatives

Alternative 19: Newark Boulevard Westbound HOV Ramps

- Cost (FY2011\$):
\$24,400,000
- Time Savings Benefit:
\$1,800,000
- Benefit / Cost Ratio:
0.07, Rank #12

