



# Final Working Paper

## *Ridership Model Sensitivity Analysis*

*Prepared by:*

Cambridge Systematics, Inc.

July 25, 2002

*Prepared for:*

**WATER TRANSIT AUTHORITY**



# Table of Contents

<b>Overview.....</b>	<b>1</b>
<b>Sensitivity Runs .....</b>	<b>1</b>
<b>Summary of Ridership Forecasts .....</b>	<b>4</b>
<b>Mode of Access .....</b>	<b>9</b>
<b>Modal Diversion .....</b>	<b>10</b>
<b>User Benefits .....</b>	<b>14</b>

# List of Tables

1.	Model Assumptions for Alternative 5 – Increased Headways .....	2
2.	Comparison of Ridership Forecasts for Alternatives 4, 5, 7, 8, and 10 (Future 2025).....	5
3.	Comparison of Ridership Forecasts for Alternatives 2, 3, 6, and 9 (Future 2025).....	7
4.	Mode of Access for Ferry Service by Alternative.....	10
5.	Ferry Routes in Each Screenline .....	11
6.	Person Trips by Mode Across Screenlines (2025).....	12
7.	Average Weekday Daily User Benefits (2001 \$).....	14

# WTA Ridership Model Sensitivity Analysis

## ■ Overview

In 2000, the State of California, through legislation, created the Bay Area Water Transit Authority (WTA) to further study expansion of ferry service. It was clear that the acceptance of the WTA's results hinges heavily on the credibility of their ridership forecasts. In 2001, the WTA selected Cambridge Systematics to provide ridership forecasts services, based primarily on a unique approach that responds to concerns from previous studies.

This report presents the results of sensitivity analysis for ridership forecasts for seven alternatives and compares these alternatives to the alternatives developed as part of the initial ridership forecasting, which is documented under separate cover. The same measures of performance and user benefits are presented for these sensitivity runs as were originally presented for the first three alternatives.

## ■ Sensitivity Runs

All of the sensitivity runs are based on the network assumptions included in Alternative (Expanded Service), except Alternatives 6 and 9, which are based on the network assumptions in Alternative 3 (Enhanced Existing Service). Each of the runs tests a specific assumption within this alternative. The sensitivity runs completed include the following tests:

- **Alternative 4 - Pricing Options.** This sensitivity run increased tolls on all state bridges and included a \$2 parking charge for BART park-and-ride lots at stations. The tolls were increased from current tolls by \$1 on each bridge, with the Golden Gate Bridge increased to \$5. The Golden Gate Bridge increase to \$5 has recently been implemented for existing conditions.
- **Alternative 5 - New Ferry Headways.** Increased headways on most routes are implemented in the transit networks by increasing maximum wait times on individual routes. The wait time is determined as the lesser of half the headway or the maximum wait time for each route. Specific changes to headways and maximum wait times are presented in Table 1 for peak and off-peak conditions, for both the base scenario

(Alternative 2 with expanded service) and the sensitivity run (Alternative 5 with new ferry headways).

**Table 1. Model Assumptions for Alternative 5 - Increased Headways**

Corridor/Ferry Route	Alternative 2				Alternative 5			
	Headways		Maximum Wait Time		Headways		Maximum Wait Time	
	Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak
<b>Solano</b>								
Vallejo to San Francisco	15	30	10	10	45	60	14	14
Benicia/Martinez to San Francisco	30	60	10	10	60	60	14	10
<b>Contra Costa</b>								
Antioch/Pittsburg to San Francisco	30	60	10	10	60	60	14	10
Hercules/Rodeo to San Francisco	30	30	10	10	60	240	14	20
Richmond-San Francisco	15	30	10	10	60	60	16	14
<b>Alameda</b>								
Berkeley-SF-Mission Bay	15	15	10	10	30	60	12	16
Alameda Point-Mission Bay-San Francisco	15	15	10	10	30	60	12	16
Oakland to San Francisco	15	15	10	10	30	60	12	16
Harbor Bay to San Francisco	30	30	10	10	60	none	14	none
San Leandro to San Francisco	30	30	10	10	30	30	10	10
<b>Peninsula</b>								
Harbor Bay to So. San Francisco	30	30	10	10	60	none	14	none
Harbor Bay to Redwood City	30	30	10	10	60	none	14	none
Harbor Bay to Moffett Field	30	30	10	10	60	none	14	none
<b>Marin</b>								
Sausalito to San Francisco	30	30	10	10	60	60	14	14
Tiburon to San Francisco	30	30	10	10	60	60	14	14
Larkspur to San Francisco	15	15	10	10	20	60	11	16
<b>Sonoma</b>								
Port Sonoma to San Francisco	30	60	10	10	30	60	10	10

**Table 1. Model Assumptions for Alternative 5 - Increased Headways (continued)**

Corridor/Ferry Route	Alternative 2				Alternative 5			
	Headways		Maximum Wait Time		Headways		Maximum Wait Time	
	Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak
<b>San Mateo</b>								
South San Francisco to San Francisco	30	30	10	10	30	60	10	14
Redwood City to San Francisco	30	30	10	10	60	60	14	14
<b>Santa Clara</b>								
Moffett Field to San Francisco	30	30	10	10	30	30	10	10
<b>Treasure Island</b>								
Berkeley to Treasure Island	15	15	10	10	30	30	12	12
Oakland to Treasure Island	15	15	10	10	30	30	12	12
San Francisco to Treasure Island	15	15	10	10	30	30	12	12

- Alternative 6 - Alternative Transit Investment.** This alternative includes offering alternative transit services for the same origin-destination markets proposed ferry routes serve. The alternative assumes the same express bus routes as the Bay Crossing Study and uses bus routes developed by PTM for corridors outside the Bay Crossing Study. Headways and fares are set equal to competing ferry schedules for a consistent comparison. It is possible that these headways would not contain enough bus capacity to meet the demand, but demand is not constrained to capacity. Parking is provided for bus services to match catchment areas of nearby ferry terminals. Parking is unconstrained in the model run. There is a \$2 parking charge at all alternative bus stations to match the \$2 parking charge at ferry terminals.
- Alternative 7 - Alternative Transit with Expanded Ferry.** This alternative is a combination of Alternatives 6 and Alternative 2. Alternative bus service from Alternative 6 (Alternative Transit Investment) is added to proposed ferry service in Alternative 2 (Expanded Ferry Service).
- Alternative 8 - Pricing Options with New Ferry Headways.** This alternative is a combination of Alternatives 4 and 5. This alternative includes increased tolls, \$2 BART parking charges, and reduced ferry headways. The one other change in this alternative is that the Martinez-Benicia route has been removed in favor of the Antioch/Pittsburg-Martinez-SF route. The Benicia catchment area for drive access has

been reassigned to the Vallejo ferry terminal. The Antioch-Pittsburg terminal is physically located in Pittsburg.

- **Alternative 9 – Alternative Transit Investment with Pricing Options.** This alternative is a combination of Alternatives 4 and 6. This alternative includes increased tolls, \$2 BART parking charges, and alternative bus service that replaces ferry services.
- **Alternative 10 – Alternative Transit Investment with Expanded Ferry and Pricing Options.** This alternative is a combination of Alternatives 4 and 7. This alternative includes increased tolls, \$2 BART parking charges, bus service from Alternative 6, and the Expanded Ferry Service from Alternative 2.

A few additional assumptions are applied to all sensitivity runs. These are summarized as follows:

- Bus services have been added to serve ferry terminals;
- Transit and ferry fares are assumed to increase with CPI;
- There is a \$2 parking charge at every ferry terminal; and
- Parking, bus, or ferry capacities are not included as constraints on demand.

## ■ Summary of Ridership Forecasts

The ridership forecasts are compared by route and corridor to the alternative used as the basis for the sensitivity run. For Alternatives 4, 5, 7, and 8, the base alternative is Alternative 2 (Expanded Service). These results are presented in Table 2. For Alternatives 6 and 9, the base alternative is Alternative 3 (Enhanced Service Alternative). These results are presented in Table 3. Since Alternatives 6 and 9 have additional bus service, the bus ridership results are also presented for these two alternatives and the total bus and ferry ridership are compared to the ridership from Alternative 2. The following summarizes the ridership for each sensitivity run:

- **Alternative 4** – The effects of increasing tolls on bridges and adding a \$2 parking charge to BART parking lots (along with the \$2 parking charge already included in Alternative 2) are to increase ridership systemwide by 3,829 riders or eight percent. The corridor with the highest increase in ridership is Alameda (with 1,265 new riders); Solano (with 899 new riders); and Contra Costa (with 798 new riders), indicating that pricing increases have more effect in the Bay Bridge corridor than in other corridors.
- **Alternative 5** – The effects of increasing headways and wait times for ferries are to decrease ridership systemwide by 6,268 riders or 14 percent. The largest decreases in ridership are in Alameda (with 2,582 fewer riders) and Marin (with 1,610 fewer riders).

This is likely due to the fact that these corridors have alternate transit modes that are competitive in terms of headways and wait times.

- **Alternative 6** – The effects of providing alternative transit investments (buses) in ferry markets are virtually the same ferry ridership (difference of one percent) compared to the base alternative (3), and an overall decrease in bus and ferry ridership compared to the ferry ridership in Alternative 2 (14 percent decrease in riders). This indicates that the alternative bus investment is not as effective at attracting riders as the same ferry service. The results also indicate that the Peninsula and Marin corridors are better served by alternative bus services (with increases in total riders of 4,185 and 1,773, respectively), while the Alameda corridor is not served as well (with decreases in riders of 4,158).
- **Alternative 7** – The effects of combining the alternative transit investment with expanded ferry services are to reduce systemwide ridership by 3,730 riders or eight percent. As in Alternative 6, the alternative bus investment is not as effective at attracting riders as the same ferry service in most of the corridors, except the Treasure Island corridor. The San Francisco to Treasure Island express bus accounts for six out of the total eight percent reduction in ferry ridership.

**Table 2. Comparison of Ridership Forecasts for Alternatives 4, 5, 7, 8, and 10 (Future 2025)**

Corridor/Route	Alternative					
	2	4	5	7	8	10
<b>Solano</b>						
Vallejo to San Francisco	4,220	4,745	3,516	4,179	4,411	5,309
Martinez to San Francisco	1,261	1,635	1,275	1,261	N/A	N/A
Subtotal	5,481	6,380	4,791	5,440	4,411	5,309
<b>Contra Costa</b>						
Antioch/Pittsburg to San Francisco	1,000	1,324	1,016	997	2,038	2,096
Hercules/Rodeo to San Francisco	903	1,109	772	842	933	1,051
Richmond-San Francisco	1,854	2,122	1,573	1,750	1,780	2,029
Subtotal	3,757	4,555	3,361	3,589	4,751	5,176
<b>Alameda</b>						
Berkeley-SF-Mission Bay	2,776	3,097	1,995	2,540	2,357	2,880
Alameda Point-Mission Bay-SF	2,135	2,415	1,504	1,363	1,705	1,523
Oakland to San Francisco	2,540	2,807	2,067	2,560	2,327	2,791
Harbor Bay to San Francisco	1,451	1,635	509	1,394	679	1,579
San Leandro to San Francisco	1,378	1,591	1,623	1,356	1,848	1,562
Subtotal	10,280	11,545	7,698	9,213	8,916	10,335

**Table 2. Comparison of Ridership Forecasts for Alternatives 4, 5, 7, 8, and 10 (Future 2025) (continued)**

Corridor/Route	Alternative					
	2	4	5	7	8	10
<b>Peninsula</b>						
Harbor Bay to So. San Francisco	465	473	306	436	324	440
Harbor Bay to Redwood City	98	119	61	98	50	108
Harbor Bay to Moffett Field	54	57	32	51	35	74
Subtotal	617	649	399	585	409	622
<b>Marin</b>						
Sausalito to San Francisco	5,329	5,491	5,089	5,294	5,118	5,441
Tiburon to San Francisco	2,823	2,881	2,669	2,758	2,649	2,811
Larkspur to San Francisco	7,820	8,001	6,604	7,672	6,576	7,842
Subtotal	15,972	16,373	14,362	15,724	14,343	16,094
<b>Sonoma</b>						
Port Sonoma to San Francisco	1,392	1,483	1,634	1,438	1,657	1,467
Subtotal	1,392	1,483	1,634	1,438	1,657	1,467
<b>San Mateo</b>						
South San Francisco to San Francisco	2,187	2,340	2,345	2,135	2,496	2,284
Redwood City to San Francisco	1,477	1,516	1,392	1,490	1,420	1,490
Subtotal	3,664	3,856	3,737	3,625	3,916	3,774
<b>Santa Clara</b>						
Moffett Field to San Francisco	529	529	591	527	590	523
Subtotal	529	529	591	527	590	523
<b>Treasure Island</b>						
Berkeley to Treasure Island	477	546	478	823	493	791
Oakland to Treasure Island	539	616	498	745	535	749
San Francisco to Treasure Island	3,587	3,592	2,478	856	2,485	856
Subtotal	4,603	4,754	3,454	2,424	3,513	2,396
<b>Total</b>	<b>46,295</b>	<b>50,124</b>	<b>40,027</b>	<b>42,565</b>	<b>42,506</b>	<b>45,696</b>
<b>Percent Change from Alternative 2</b>		<b>8%</b>	<b>-14%</b>	<b>-8%</b>	<b>-8%</b>	<b>-1%</b>

**Table 3. Comparison of Ridership Forecasts for Alternatives 2, 3, 6, and 9 (Future 2025)**

Corridor/Route	Alternative		Alternative 6			Alternative 9		
	2	3	Ferry	Bus	Total	Ferry	Bus	Total
<b>Solano</b>								
Vallejo to San Francisco	4,220	4,935	5,008	43	5,051	5,612	350	5,962
Martinez to San Francisco	1,261	-	-	443	443	-	519	519
Subtotal	5,481	4,935	5,008	486	5,494	5,612	869	6,481
<b>Contra Costa</b>								
Antioch/Pittsburg to San Francisco	1,000	-	-	108	108	-	95	95
Hercules/Rodeo to San Francisco	903	-	-	531	531	-	550	550
Richmond-San Francisco	1,854	-	-	1,523	1,523	-	1,796	1,796
Subtotal	3,757	-	-	2,162	2,162	-	2,441	2,441
<b>Alameda</b>								
Berkeley-SF-Mission Bay	2,776	-	-	771	771	-	770	770
Alameda Point-Mission Bay-SF	2,135	-	-	458	458	-	1,198	1,198
Oakland to San Francisco	2,540	2,776	2,691	93	2,784	3,236	118	3,354
Harbor Bay to San Francisco	1,451	1,591	1,634	475	2,109	1,835	545	2,380
San Leandro to San Francisco	1,378	-	-	-	-	-	-	-
Subtotal	10,280	4,367	4,325	1,797	6,122	5,071	2,631	7,702
<b>Peninsula</b>								
Harbor Bay to So. San Francisco	465	-	-	4,802	4,802	-	954	954
Harbor Bay to Redwood City	98	-	-	-	-	-	-	-
Harbor Bay to Moffett Field	54	-	-	-	-	-	-	-
Subtotal	617	-	-	4,802	4,802	-	954	954

**Table 3. Comparison of Ridership Forecasts for Alternatives 2, 3, 6, and 9 (Future 2025) (continued)**

Corridor/Route	Alternative		Alternative 6			Alternative 9		
	2	3	Ferry	Bus	Total	Ferry	Bus	Total
<b>Marin</b>								
Sausalito to San Francisco	5,329	5,390	5,642	282	5,924	5,820	480	6,300
Tiburon to San Francisco	2,823	2,820	2,780	576	3,356	2,836	810	3,646
Larkspur to San Francisco	7,820	7,873	7,861	604	8,465	8,049	1,478	9,527
Subtotal	15,972	16,083	16,283	1,462	17,745	16,705	2,768	19,473
<b>Sonoma</b>								
Port Sonoma to San Francisco	1,392	-	-	96	96	-	741	741
Subtotal	1,392	-	-	96	96	-	741	741
<b>San Mateo</b>								
South San Francisco to San Francisco	2,187	-	-	-	-	-	-	-
Redwood City to San Francisco	1,477	-	-	-	-	-	-	-
Subtotal	3,664	-	-	-	-	-	-	-
<b>Santa Clara</b>								
Moffett Field to San Francisco	529	-	-	-	-	-	-	-
Subtotal	529	-	-	-	-	-	-	-
<b>Treasure Island</b>								
Berkeley to Treasure Island	477	-	-	73	73	-	75	75
Oakland to Treasure Island	539	-	-	167	167	-	175	175
San Francisco to Treasure Island	3,587	-	-	3,309	3,309	-	3,180	3,180
Subtotal	4,603	-	-	3,549	3,549	-	3,430	3,430
<b>Total</b>	<b>46,295</b>	<b>25,385</b>	<b>25,616</b>	<b>14,354</b>	<b>39,970</b>	<b>27,388</b>	<b>13,834</b>	<b>41,222</b>
<b>Percent Change from Alternative 2</b>					<b>-14%</b>			<b>-11%</b>
<b>Percent Change from Alternative 3</b>			<b>1%</b>			<b>8%</b>		

- **Alternative 8** – The effects of combining the pricing options with new ferry headways are to reduce systemwide ridership by 3,789 riders or eight percent. This decrease in ridership is greatest for Alameda (with 1,629 fewer riders) and Marin (with 1,364 fewer riders, which are the same corridors most greatly affected by headway changes in Alternative 5. Sonoma and San Mateo corridors have increases in ridership with this alternative. In this alternative, there was no off-peak service from Harbor Bay to San Francisco and the Peninsula. This forced riders to take the San Leandro ferry, which increased its ridership. Riders in the Sonoma corridor, who previously took the Larkspur ferry now, got diverted to the Port Sonoma ferry due to reduction in service on the Larkspur route.
- **Alternative 9** – The effects of combining the pricing options with alternative transit investments (buses) in ferry markets, along with existing ferry services, are to increase systemwide ridership by eight percent or 2,003 riders compared to the base alternative (3), and an overall decrease in bus and ferry ridership compared to the ferry ridership in Alternative 2 (11 percent decrease in riders). This alternative is a combination of the pricing options and Alternative 6. While the pricing options increase the ferry ridership by three percent when compared to Alternative 6, this alternative is still not as effective at attracting riders as the Alternative 2 ferry service.
- **Alternative 10** – The effects of combining the pricing options with alternative transit investments (buses) in ferry markets, along with expanded ferry services, are to decrease systemwide ridership by one percent or 600 riders. Pricing options account for the increase in riders in all the routes, except the Alameda Point and Treasure Island routes, where a big percentage of riders get diverted to the competitive bus service.

## ■ Mode of Access

A comparison of the systemwide mode of access for the ferry service is presented in Table 4. This table shows a slight increase in drive access for Alternative 4, indicating that the toll increases may be converting some existing drive alone or carpool trips to drive access to ferry trips and the BART parking charges may be converting some existing drive access to BART users to drive access to ferry users. Table 4 also shows a decrease in transit access for Alternative 5, indicating that the increased ferry headways are converting some transit access to ferry users to other transit modes.

**Table 4. Mode of Access for Ferry Service by Alternative**

Alternative	Description	Walk Access	Drive Access	Transit Access
1	Comprehensive Service	18%	66%	16%
2	Expanded Service	20%	63%	17%
3	Enhanced Existing Service	24%	61%	15%
4	Pricing Options	19%	65%	17%
5	New Ferry Headways	19%	66%	15%
6	Alternative Transit Investment	24%	62%	15%
7	Alternative Transit with Expanded Ferry	17%	71%	12%
8	Pricing Options with New Ferry Headways	18%	67%	15%
9	Alternative Transit Investment with Pricing Options	23%	62%	15%
10	Alternative Transit with Expanded Ferry and Pricing Options	17%	71%	12%

## ■ Modal Diversion

Table 5 presents a list of the ferry routes that are combined into screenlines for an analysis of modal diversion. Some routes are not included in a screenline, but are noted here for reference purposes. The ferry ridership is combined with auto, rail, and bus trips from the WTA forecasting model to produce estimates of person trips across major screenlines in the Bay Area, developed for the purposes of this study. Table 6 presents these data for person trips. These are minor differences in total person trips crossing each screenline for each alternative due to changes in mode or route that are not captured in this analysis.

The following summarizes the modal diversion for each sensitivity run:

- **Alternative 4** - The effects of increasing tolls on bridges and adding a \$2 parking charge to BART parking lots (along with the \$2 parking charge already included in Alternative 2) are to significantly decrease BART ridership across the Bay Bridge and the San Mateo/San Francisco County line. This also results in an increase in highway trips across all bridges, except the Golden Gate Bridge, which has a decrease in highway trips. Ferry trips increase across all screenlines in this alternative.

**Table 5. Ferry Routes in Each Screenline**

<b>Corridor</b>	<b>Ferry Route</b>	<b>Screenline</b>
Solano	Vallejo to San Francisco	Carq/Ben Bridges
	Benicia/Martinez to San Francisco	Carq/Ben Bridges
Contra Costa	Antioch/Pittsburg to San Francisco	Bay Bridge
	Hercules/Rodeo to San Francisco	Bay Bridge
	Richmond-San Francisco	Bay Bridge
Alameda	Berkeley-SF-Mission Bay	Bay Bridge
	Alameda Point-Mission Bay-SF	Bay Bridge
	Oakland to San Francisco	Bay Bridge
	Harbor Bay to San Francisco	Bay Bridge
	San Leandro to San Francisco	Bay Bridge
Peninsula	Oakland Army Base to San Francisco	Bay Bridge
	Harbor Bay to So. San Francisco	SM Bridge
	Harbor Bay to Redwood City	SM Bridge
	Harbor Bay to Moffett Field	SM Bridge
	Harbor Bay to Hunters Pt	SM Bridge
Marin	Harbor Bay to Coyote pt	SM Bridge
	Harbor Bay to Foster City	SM Bridge
	Harbor Bay to East Palo Alto	SM Bridge
	Sausalito to San Francisco	Golden Gate
	Tiburon to San Francisco	Golden Gate
Sonoma	Larkspur to San Francisco	Golden Gate
	Port Sonoma to San Francisco	Golden Gate
San Mateo	South San Francisco to San Francisco	None
	Redwood City to San Francisco	SF/SM County
	Coyote Pt to San Francisco	SF/SM County
Santa Clara	Foster City to San Francisco	SF/SM County
	Moffett Field to San Francisco	SF/SM County
	E Palo Alto to San Francisco	SF/SM County
Treasure Island	Berkeley to Treasure Island	Bay Bridge
	Oakland to Treasure Island	Bay Bridge
	San Francisco to Treasure Island	None

**Table 6. Person Trips by Mode Across Screenlines (2025)**

Screenline	Alternative							
	2	4	5	6	7	8	9	10
<b>Bay Bridge</b>								
BART	256,073	236,653	257,256	261,010	256,776	238,449	241,769	234,124
AC Transit	3,682	4,011	3,629	9,665	8,963	4,101	10,672	9,376
Ferry Transit	15,053	17,262	12,035	4,325	14,089	14,695	5,071	17,051
Highway	446,168	457,217	448,018	451,459	444,941	461,318	462,164	454,804
Subtotal	720,976	715,143	720,938	726,459	724,769	718,563	719,676	714,264
<b>Golden Gate</b>								
Golden Gate Transit	13,471	13,624	13,578	16,037	16,204	12,837	17,125	14,460
Ferry Transit	17,364	17,856	15,996	16,283	17,192	16,000	16,705	17,561
Highway	166,307	166,564	167,591	167,457	166,504	168,055	166,883	166,426
Subtotal	197,142	198,044	197,165	199,777	199,900	196,892	200,713	198,447
<b>San Francisco/San Mateo County Line</b>								
Samtrans	4,998	5,508	4,998	5,100	5,066	5,507	5,633	5,517
Caltrain	8,092	8,235	8,095	8,037	7,839	8,238	8,177	8,257
BART	85,009	72,576	85,047	85,901	85,508	72,525	73,442	72,583
Ferry Transit	4,193	4,385	4,328	-	4,168	4,506	0	4,297
Highway	377,223	382,356	377,243	380,248	377,259	382,400	385,525	382,044
Subtotal	479,515	473,060	479,711	479,286	479,840	473,176	472,777	472,698
<b>San Mateo Bridge</b>								
San Mateo Express		-	-	954	954	-	954	954
Ferry Transit	617	649	399	-	592	409	0	622
Highway	161,271	164,384	161,525	160,757	160,499	164,378	164,346	163,958
Subtotal	161,888	165,033	161,924	163,140	163,418	164,787	165,300	164,580
<b>Dumbarton Bridge</b>								
Highway	161,765	162,634	161,772	161,856	161,715	162,632	162,573	162,562
Subtotal	161,765	162,634	161,772	161,856	161,715	162,632	162,573	162,562
<b>Richmond-San Rafael Bridge</b>								
Highway	91,103	90,947	90,736	91,106	90,544	91,340	91,361	90,818
Subtotal	91,103	90,947	90,736	91,106	90,544	91,340	91,361	90,818

**Table 6. Person Trips by Mode Across Screenlines (2025) (continued)**

Screenline	Alternative							
	2	4	5	6	7	8	9	10
<b>Carquinez/Benicia Bridges</b>								
Ferry Transit	5,481	6,380	4,791	5,008	5,455	4,411	5,612	5,309
Highway	176,471	178,531	176,810	176,763	176,399	178,905	178,806	178,411
Subtotal	181,952	184,911	181,601	181,771	181,854	183,316	184,418	183,720
<b>Total</b>	<b>1,994,341</b>	<b>1,989,772</b>	<b>1,993,848</b>	<b>2,003,396</b>	<b>2,002,039</b>	<b>1,990,705</b>	<b>1,996,819</b>	<b>2,095,803</b>

- **Alternative 5** - The effects of increasing headways and wait times for ferries are to significantly decrease ferry ridership across the Bay Bridge and the Golden Gate Bridge. This also results in a decrease in highway trips across the Bay Bridge and San Mateo/San Francisco county line. There are increases across these screenlines for other transit services, but there is an overall reduction in person trips across these screenlines.
- **Alternative 6** - The effects of providing alternative transit investments (buses) in ferry markets are to significantly increase person trips on alternative transit modes across all screenlines. In the Bay Bridge screenline, the increase in BART and AC Transit trips is equivalent to the decrease in ferry trips and there is very little change in highway trips. In the Golden Gate Bridge screenline, the increase in Golden Gate buses is greater than the decrease in ferry trips, resulting in an overall increase in person trips across this screenline. In the San Mateo/San Francisco county line, there is a significant decrease in ferry trips, which is not countered by a significant increase in Samtrans and BART trips, resulting in an overall decrease in person trips across this screenline.
- **Alternative 7** - The effects of combining the alternative transit investment with expanded ferry services are to significantly increase person trips on alternative transit modes across all screenlines. In the Bay Bridge, San Mateo Bridge, and Golden Gate screenlines, there is an increase in alternative transit trips and a decrease in highway trips and very little change in ferry trips. In the San Mateo/San Francisco county line, there is a significant decrease in highway trips, which is not countered by increases in other modes resulting in an overall decrease in person trips across this screenline.
- **Alternative 8** - The effects of combining the pricing options with new ferry headways are to significantly decrease BART ridership across the Bay Bridge and the San Mateo/San Francisco County line. This also results in an increase in highway trips across all bridges. Ferry trips decrease across all screenlines in this alternative, except the San Mateo/San Francisco county line.

- **Alternative 9** – The effects of providing alternative transit investments (buses) in ferry markets along with expanded ferry services are to significantly decrease BART ridership across the Bay Bridge and the San Mateo/San Francisco County line. This also results in an increase in highway trips across all bridges. Ferry trips decrease across all screenlines in this alternative, except the Benicia/Carquinez Bridge screenline.
- **Alternative 10** – The effects of combining the pricing options with alternative transit investments (buses) in ferry markets, along with expanded ferry services, are to significantly decrease BART ridership across the Bay Bridge and the San Mateo/San Francisco County line, with increases in all other modes across these screenlines, but overall decreases in total person trips.

## ■ User Benefits

Average weekday daily user benefits are calculated using the Federal Transit Administration (FTA) procedures, which also are implemented by the MTC for regional planning studies. Values of time used in this analysis to convert travel time for existing and new users are derived from the mode choice model and weighted across trip purposes. Table 7 presents a summary of these results for the three original alternatives and for the six additional sensitivity runs. The Expanded Service alternative provides the highest user benefits, with the majority of these benefits for auto users and all of the Pricing Options alternatives providing the worst user benefits.

**Table 7. Average Weekday Daily User Benefits (2001 \$)**

Alternative	Description	Travel Time	Out-of-Pocket Costs	Total
1	Comprehensive Service	\$137,303	-\$3,283	\$134,020
2	Expanded Service	\$197,765	\$2,114	\$199,879
3	Enhanced Existing Service	\$69,995	-\$10,180	\$59,815
4	Pricing Options	-\$156,912	-\$761,112	-\$918,024
5	New Ferry Headways	-\$52,673	-\$3,560	-\$56,232
6	Alternative Transit Investment	-\$314,723	-\$15,054	-\$329,777
7	Alternative Transit with Expanded Ferry	\$162,601	-\$11,358	\$151,243
8	Pricing Options with New Ferry Headways	-\$194,461	-\$764,478	-\$958,939
9	Alternative Transit Investment with Pricing Options	-\$313,526	-\$782,274	-\$1,095,800
10	Alternative Transit with Expanded Ferry and Pricing Options	-\$139,931	-\$748,647	-\$888,578