A benefit-cost (B/C) analysis was conducted for the preferred alternative of the California High Speed Train (HST) to assess several cost efficiency metrics of the proposed HST system. This memorandum documents technical details of the B/C analysis and results.

B/C analysis is a process that compares the societal benefits of a project to its total capital, operating and maintenance costs. This analysis includes only those benefits which are quantifiable, monetizable, not duplicative, and not transferred from one group of society to another. More specifically, the benefits include:

- Intercity passenger revenue;
- Benefits to both intercity and urban high-speed train passengers (net of fares paid);
- Reduction of airside delay for air passengers;
- Reduction in aircraft operating costs.
- Reduction of highway delay for both intercity and urban auto trips; and
- Reduction of accident and air pollution costs from intercity and urban auto trips

## Results Overview

Table 1 displays a summary of the B/C results for the full HST system. As shown in the table, the HST system is projected to achieve a B/C ratio of 2.84 through year 2050, indicating that HST will deliver benefits that are 184 percent larger than projected capital, operating and maintenance costs. Over 1/3 of the total benefits accrue as *user benefits* to HST travelers across California through improvements in their door-to-door travel time, travel cost, reliability, convenience and related factors compared to automobile, air and conventional rail travel options. Reductions in *highway delay* for intercity and urban highway travelers also account for nearly 1/3 of the total benefit stream, with HST *passenger revenue* also projected to be a sizeable benefit category. Overall, the B/C results indicate that all California residents will benefit from HST service, with a large portion of benefits enjoyed by air and auto travelers in the form of reduced delays, reduced air pollution, and reduced auto accidents and fatalities.

***Table 1 Summary of Benefit-Cost Analysis Results***

| **Benefits** | |
|---|---|
| Passenger Revenue | $33,718,000,000 |
| User Benefits | |
| Intercity | $55,210,000,000 |

| | |
|---|---|
| Urban | $1,542,000,000 |
| Non-User Benefits | |
| Intercity | |
| Airline Passenger Delay | $1,969,000,000 |
| Aircraft Operator Delay | $1,750,000,000 |
| Highway Delay | $27,081,000,000 |
| Highway Accident | $12,211,000,000 |
| Highway Air Pollution | $1,611,000,000 |
| Urban | |
| Highway Delay | $15,385,000,000 |
| Highway Accident | included in intercity |
| Highway Air Pollution | included in intercity |
| ***Total Benefits*** | ***$150,478,000,000*** |
| **Costs** | |
| Capital | $33,993,000,000 |
| Operations & Maintenance | $19,065,000,000 |
| ***Total Costs*** | ***$53,058,000,000*** |
| Benefit-Cost Ratio | 2.84 |
| Net Present Value | $97,420,000,000 |
| Internal Rate of Return | 8.8% |

Note: All monetary values are in 2008 dollars, with future monetary values discounted at 4 percent.
Source: Cambridge Systematics, September 2008.

Through the year 2050, California will accrue over $150 billion in directly measured benefits from HST. When compared to total costs of $53 billion, HST will produce a net-present value to California of over $97 billion. Table 1 also shows that the internal rate of return (IRR), which is the discount rate at which the net present value of a project is equal to zero, is 8.8 percent. This value indicates that the project would still be economically feasible if the discount rate were much higher than the 4 percent value assumed in this analysis. All of the analysis results point strongly to the HST system being economically justified.

## Key Analysis Assumptions

### *HST Implementation*

HST implementation was assumed to occur in two phases. Phase I, which included an HST alignment between San Francisco Transbay Terminal and Anaheim (plus a Downtown Merced station), was assumed to initiate construction in 2011 with revenue service initiating on January 1, 2020. Phase II, which included three extensions (Merced to Sacramento; Los Angeles Union Station to San Diego; Anaheim to Irvine) was assumed to initiate construction in 2020 with revenue service initiating on January 1, 2026.

For each service phase, a two-year ramp up period was assumed to account for the time it will take to increase public awareness and comfort with the new system. HST was assumed to capture 60% of projected ridership and revenue in the first year of service, increasing to 80 percent the second year and 100 percent in the third and subsequent years. All revenue and benefit streams account for this ramp-up period.

### *Benefits*

Benefits included in this analysis are divided into the general categories of passenger revenue, user benefits, and non-user benefits. User benefits are those experienced by HST riders as they shift from their prior travel option to HST. User benefits in this analysis include benefits to both intercity and urban HST passengers, as well as induced travel. Non-user benefits in this analysis include benefits from:

- Reduction of highway delay for both intercity and urban auto trips;
- Reduction of accident and air pollution costs from intercity and urban auto trips;
- Reduction of airside delay for air passengers; and
- Reduction in aircraft operating costs.

All benefits were estimated directly using ridership and revenue projections from the California High-Speed Rail Ridership and Revenue Model. The model provided projections for year 2030 using the "base case" travel times, costs and operating plan from the Bay Area to Central Valley Program EIR and Tier 1 EIS. Ridership, revenue and benefits for other years were derived from

the year 2030 value assuming an annual change of 1.5 percent, which is slightly higher than the projected California statewide population growth rate of 1% a year from 2020 to 2050[1] [2].

### *Project Costs*

As shown in Table 2, capital costs for Phase I were assumed to begin in 2011 and continue through 2020, while capital costs for Phase II are assumed to begin in 2020 and continue through 2025. Operating and maintenance (O&M) costs, including service testing and capital renewal, are incurred beginning in 2018 for Phase I and 2025 for Phase II. O&M costs are assumed to increase in real terms at 0.75% per year, which is one-half the rate of assumed ridership growth.

## Analysis Methodology

The procedures used to calculate benefits are consistent with guidance provided by the Environmental Protection Agency (*Guidelines for Preparing Economic Analyses*) and the Federal Highway Administration (*Economic Analysis Primer*). The benefit calculation procedures in each category are also consistent with the ones developed and followed for the Bay Area to Central Valley Program EIR and Tier 1 EIS.

### *Passenger Revenue*

The most recent HST Ridership and Revenue Model was used to generate year 2030 intercity passenger revenue. In the year 2030, Phase I and Phase II passenger revenues from the model were over $1.9 billion and over $1.2 billion respectively. To obtain an annual revenue stream, HST ridership and revenue were projected to grow at an annual rate of 1.5% from service initiation through year 2050, subject to the ramp-up assumptions noted previously. Annual intercity passenger revenues through year 2050 are shown in Table 3.

### *User Benefits*

Benefits to high-speed train passengers are a measure of the consumer surplus, or the difference between how much passengers were willing to pay to use HST and the actual fare that is paid. User benefits to intercity and urban HST passengers are shown in Tables 4 and 5, respectively.

User benefits were estimated through a process known as log-sum calculation. The log sums results from the 1999 high-speed rail travel demand model were used as a base to forecast mode

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1 California Department of Finance Population Projections.
http://www.dof.ca.gov/HTML/DEMOGRAP/ReportsPapers/Projections/P1/P1.php

2 Sensitivity tests were made using annual ridership, revenue and benefit growth rates between 0% and 3%. This range of growth rates produced B/C ratios between 2.73 and 2.98, and corresponding internal rates of return between 9.1 percent and 8.7 percent..

shift benefits, with a series of adjustments made to reflect differences between the 1999 and current travel demand models.

User benefits were estimated separately for intercity business users, intercity non-business users, and urban travelers. The benefits were estimated through a process known as a log-sum calculation. Using this process, the total benefit for switching from each mode to HST is calculated as a function of the log sum of utilities for travelers of that mode, using the following equation:

$$B_{\mathrm{mod}\,e} = \frac{\mu_{\mathrm{mod}\,e} - \ln(e^{\mu_{\mathrm{mod}\,e}} + e^{\mu_{HSR}})}{\beta_{\mathrm{cos}\,t}}$$

where $B_{\mathrm{mod}\,e}$ is the total benefit for that mode, $\mu_{\mathrm{mod}\,e}$ is the utility of travel on that mode, $\mu_{HSR}$ is the utility of travel on high speed train, and $\beta_{\mathrm{cos}\,t}$ is the coefficient of cost for travel on that mode (to monetize the benefits). The utility of a particular mode is calculated as a function of travel time and out-of-pocket costs, as follows:

$$\mu_{\mathrm{mod}\,e} = \alpha + \beta_{xost} \times Cost + \beta_{IVT} \times IVT + \beta_{Access} \times Access + \beta_{OVT} \times OVT$$

Where $\beta_{\mathrm{cos}\,t}$ is the coefficient of cost for travel on that mode, $\beta_{IVT}$ is the coefficient of line haul (in vehicle) time on that mode, $\beta_{Access}$ is the coefficient of access/egress time on that mode, and $\beta_{OVT}$ is the coefficient of out-of-vehicle (i.e., wait, terminal processing, etc.) on that mode.

These calculations use coefficients from the mode choice model developed for previous work by the HSRA, and travel time and cost information developed for the prior model. The mode choice coefficients for the relevant modes in the prior model are shown in Table 6. Monetary values that resulted from these coefficients were adjusted to 2002 dollars for purposes of the REMI analysis in the Statewide Program EIR/EIS.

A series of adjustments were undertaken to the prior log-sum values in order to reflect changes between the 1999 and current versions of the HST Ridership and Revenue Models. The adjustments accounted for differences in the following:

- Structure of analysis regions used for the economic forecasting, necessitating reallocation of log-sum totals;
- Forecasted source of HST ridership (e.g. auto, air, conventional rail, induced travel);
- Values of time;
- Number of trips by mode under high end assumptions;
- Inclusion of non-commute trips within urban areas in the new HST Ridership and Revenue Model;
- Conversion from 1999 to 2008 dollars; and,
- Travel model results by region for the preferred HST network alternatives.

## *Non-User Benefits*

### Air Traveler Benefits

Benefits of HST to air include benefits due to reduction of airside delay for air passengers and reduction in aircraft operating costs. These calculations are based on the assumption that as air passengers shift to HST, there will be a reduction in the number of intrastate flights needed resulting in reductions in delay for the remaining intrastate, interstate, and international air travelers. Aircraft passenger and operator delay reduction benefits through 2050 are shown in Tables 7 and 8.

This analysis considered the potential for air delay reduction benefits at airports throughout California. As with a previous analysis performed for the HSRA[3], this analysis focused on airside delay reductions to passengers and aircraft operations at nine major airports in California.

Airport capacity was determined on a regional basis, which allowed for continuation of assumptions from the earlier HSRA work that flights (particularly intrastate) could shift from airports with high levels of delay to less congested airports in the same region. The following regional groupings were used for major airports:

- **Los Angeles –** Los Angeles International, Burbank-Glendale-Pasadena; Ontario International, and Orange County (John Wayne Airport).
- **Bay Area –** San Francisco International, San Jose International, and Oakland International.
- **Sacramento –** Sacramento International.
- **San Diego –** San Diego International (Lindbergh Field).

Airside operational capacity (annual service volume) was estimated on a regional basis using the existing number of runways and terminal gates, and improvements defined for the No Project Alternative in the Bay Area to Central Valley Program EIR and Tier 1EIS. For this analysis, it was assumed that runway and terminal configurations were identical with and without HST. Physical facilities were converted to operational capacity using the following assumptions:

- Gate utilization factor of 525,000 passengers per gate per year[4];
- Gate to runway ratio of 30[5]; and

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[3] *Independent Ridership and Passenger Revenue Projections for High-Speed Rail Alternatives in California*, Appendix A, Charles River Associates, January 2000.

[4] *System Alternatives Definition – Deliberative Draft*, California High-Speed Rail Authority, November 18, 2002.

[5] ibid

- Average aircraft load of 81 passengers per operation[6].

The larger of the two values derived from runway and terminal gate improvements was assumed to represent the operational capacity in each region. A summary of the airport physical features and operational capacity used for this analysis is presented in Table 9.

Air demand projections from the HST Ridership and Revenue Model provided the region-to-region air flows for intrastate air travel. Forecasts were also made of interstate and international enplanements and deplanements in each major region using results from a previous HSRA analysis that had used travel model results for the Year 2000 Business Plan assumptions.[7] The difference between total airport demand (from the HSRA analysis) and intrastate airport demand (from the HST Ridership and Revenue Model) provided a year 2030 estimate of interstate and international airport demand (enplanements and deplanements). The total regional airport demand for this current analysis was estimated as the sum of the interstate/international airport demand and the intrastate travel model results.

Regional airport delay was estimated for each system alternative and HST design option using the equation:[8]

$$Delay\ per\ aircraft\ operation\ (\min.) = 0.19 + 2.33 * \left( \frac{annual \quad opertions}{annual\ service\ volume} \right)^6$$

Operations and service volume estimates for each system alternative were taken from previous steps. The delay reduction was derived by subtracting the delay value for conditions with HST from the delay value for conditions without HST.

Total delay reduction was calculated for aircraft operators and air travelers in each region by multiplying the delay reduction per operation by the estimated number of aircraft operations and air travel demand, respectively. Separate tabulations were maintained for intrastate and interstate/international travelers.

Total regional delay savings for air travelers were split into business and non-business components, assuming that business travel represented about 56 percent of total air travel. This percentage represents a statewide average for intrastate air travel using forecasts from the HST

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[6] This value is a statewide average for major airports, and was derived from data presented in Appendix A of the *Independent Ridership and Passenger Revenue Projections for High-Speed Rail Alternatives in California*.

[7] *Independent Ridership and Passenger Revenue Projections for High-Speed Rail Alternatives in California*, Appendix A, Charles River Associates, January 2000.

[8] Levinson, D., and D. Gillen, *The Full Cost of Air Travel in the California Corridor*, presented at the Annual Meeting of the Transportation Research Board, Washington, D.C., January 1999. This equation was used in previous work by the HSRA.

Ridership and Revenue Model. This percentage was assumed to apply equally to intrastate and interstate/international air travelers.

The delay reduction benefits were converted to monetary benefits using the following "values of time" (expressed in 2005 dollars):

- $57.72 per hour for a business or commute traveler;
- $18.33 per hour for a non-business/commute traveler; and
- $2,910 per aircraft operating hour.

The monetary benefits were assumed to accrue one-half at the origin end and one-half at the destination end of each trip. For interstate and international flights, this assumption means that one-half of delay savings accrues outside of California and is therefore excluded.

**Highway Traveler Benefits**

Benefits to the remaining auto users include reductions in air pollution, accidents, and highway congestion. Benefits due to reductions in air pollution and accidents are tied to reductions in vehicle miles traveled (VMT) from the HST Ridership and Revenue Model. Changes in VMT were then converted to monetary values using unit values of 7.8 cents per VMT for accident reduction and 10.0 cents per VMT for air pollution reductions (year 2008 dollars). Annual highway accident and pollution reduction benefits through 2050 are shown in Tables 10 and 11, respectively.

An HST system will divert trips from auto to HST. It is assumed that the year 2030 highway network will be identical with or without HST. The combination of constant highway capacity and decreased travel demand via auto will lead to reductions in travel delay for individuals who remain in the auto mode. Auto congestion reduction benefits for HST were estimated by calculating the absolute difference between the vehicle hours traveled (VHT) with and without the HST preferred alternatives. This calculation relied on results from the HST Ridership and Revenue Model. Total VHT was split into auto and truck components using VHT splits of 96.8% auto and 3.2% truck for urban area travel, and 95% auto and 5% truck for intercity[9].

VHT changes were converted to monetary values by multiplying the absolute change in VHT by values of time (VOTs) corresponding to different trip purposes and regions. For urban trips, average hourly wages for the Bay Area, Los Angeles, and the State were compiled from the Bureau of Labor Statistics and converted into hourly values by trip purposes using shares of wage rates by trip purpose that were determined by MTC. Table 12 summarizes these intraurban VOTs. For intercity trips, VOTs from the MTC Statewide High-Speed Rail Travel Demand Model were used. These intercity VOTs are shown in Table 13. Annual highway congestion reduction benefits through 2050 are shown in Tables 14 and 15.

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[9] *Truck Miles of Travel on the California State Highway System, 1989 – 2004*; California Department of Transportation Division of Transportation System Information; August 2006.

*Table 2* ***HST Capital, Operating and Maintenance Costs***
(thousands of year 2008 dollars)

| | Capital Costs | | | | Discounted at 4% | |
|---|---|---|---|---|---|---|
| Year | Phase I | Phase II | Total | O&M | Capital | O&M |
| 2010 | - | - | - | - | - | - |
| 2011 | 767,467 | - | 767,467 | - | 682,275 | - |
| 2012 | 2,984,712 | - | 2,984,712 | - | 2,551,344 | - |
| 2013 | 4,725,084 | - | 4,725,084 | - | 3,883,674 | - |
| 2014 | 5,381,848 | - | 5,381,848 | - | 4,253,353 | - |
| 2015 | 5,356,301 | - | 5,356,301 | - | 4,070,349 | - |
| 2016 | 5,682,022 | - | 5,682,022 | - | 4,151,798 | - |
| 2017 | 4,785,757 | - | 4,785,757 | - | 3,362,410 | - |
| 2018 | 2,037,353 | - | 2,037,353 | 1,170,893 | 1,376,363 | 791,013 |
| 2019 | 477,937 | - | 477,937 | 1,170,893 | 310,459 | 760,589 |
| 2020 | 104,316 | 1,927,715 | 2,032,031 | 1,179,674 | 1,269,200 | 736,821 |
| 2021 | - | 3,905,459 | 3,905,459 | 1,188,522 | 2,345,517 | 713,795 |
| 2022 | - | 4,082,157 | 4,082,157 | 1,197,436 | 2,357,344 | 691,489 |
| 2023 | - | 3,557,385 | 3,557,385 | 1,206,417 | 1,975,289 | 669,880 |
| 2024 | - | 1,969,228 | 1,969,228 | 1,215,465 | 1,051,387 | 648,947 |
| 2025 | - | 686,569 | 686,569 | 1,522,160 | 352,466 | 781,436 |
| 2026 | - | - | - | 1,533,577 | - | 757,017 |
| 2027 | - | - | - | 1,545,078 | - | 733,360 |
| 2028 | - | - | - | 1,556,666 | - | 710,442 |
| 2029 | - | - | - | 1,568,341 | - | 688,241 |
| 2030 | - | - | - | 1,580,104 | - | 666,733 |
| 2031 | - | - | - | 1,591,955 | - | 645,898 |
| 2032 | - | - | - | 1,603,894 | - | 625,714 |
| 2033 | - | - | - | 1,615,924 | - | 606,160 |
| 2034 | - | - | - | 1,628,043 | - | 587,218 |
| 2035 | - | - | - | 1,640,253 | - | 568,867 |
| 2036 | - | - | - | 1,652,555 | - | 551,090 |
| 2037 | - | - | - | 1,664,950 | - | 533,868 |
| 2038 | - | - | - | 1,677,437 | - | 517,185 |
| 2039 | - | - | - | 1,690,017 | - | 501,023 |
| 2040 | - | - | - | 1,702,693 | - | 485,366 |
| 2041 | - | - | - | 1,715,463 | - | 470,198 |
| 2042 | - | - | - | 1,728,329 | - | 455,505 |
| 2043 | - | - | - | 1,741,291 | - | 441,270 |
| 2044 | - | - | - | 1,754,351 | - | 427,480 |
| 2045 | - | - | - | 1,767,508 | - | 414,122 |
| 2046 | - | - | - | 1,780,765 | - | 401,180 |
| 2047 | - | - | - | 1,794,121 | - | 388,643 |
| 2048 | - | - | - | 1,807,576 | - | 376,498 |
| 2049 | - | - | - | 1,821,133 | - | 364,733 |
| 2050 | - | - | - | 1,834,792 | - | 353,335 |
| Total | 32,302,798 | 16,128,513 | 48,431,311 | 51,848,275 | 33,993,229 | 19,065,118 |

Note(s): O&M costs changed at 50% rate or ridership growth; assumes capital replacement costs and training/commissions for extension are included in the O&M cost.

***Table 3*** ***HST Passenger Revenue***
(thousands of year 2008 dollars)

| | Revenue (with ramp-up) | | | |
|---|---|---|---|---|
| Year | Phase I | Phase II | Total | Discounted at 4% |
| 2010 | $- | $- | $- | $- |
| 2011 | $- | $- | $- | $- |
| 2012 | $- | $- | $- | $- |
| 2013 | $- | $- | $- | $- |
| 2014 | $- | $- | $- | $- |
| 2015 | $- | $- | $- | $- |
| 2016 | $- | $- | $- | $- |
| 2017 | $- | $- | $- | $- |
| 2018 | $- | $- | $- | $- |
| 2019 | $- | $- | $- | $- |
| 2020 | $1,087,279 | $- | $1,087,279 | $679,111 |
| 2021 | $1,471,450 | $- | $1,471,450 | $883,715 |
| 2022 | $1,866,903 | $- | $1,866,903 | $1,078,090 |
| 2023 | $1,894,906 | $- | $1,894,906 | $1,052,174 |
| 2024 | $1,923,330 | $- | $1,923,330 | $1,026,881 |
| 2025 | $1,952,180 | $- | $1,952,180 | $1,002,197 |
| 2026 | $1,981,462 | $625,725 | $2,607,187 | $1,286,981 |
| 2027 | $2,011,184 | $846,814 | $2,857,999 | $1,356,527 |
| 2028 | $2,041,352 | $1,074,396 | $3,115,748 | $1,421,987 |
| 2029 | $2,071,972 | $1,090,512 | $3,162,484 | $1,387,804 |
| 2030 | $2,103,052 | $1,106,869 | $3,209,921 | $1,354,444 |
| 2031 | $2,134,598 | $1,123,472 | $3,258,070 | $1,321,885 |
| 2032 | $2,166,617 | $1,140,325 | $3,306,941 | $1,290,109 |
| 2033 | $2,199,116 | $1,157,429 | $3,356,545 | $1,259,097 |
| 2034 | $2,232,103 | $1,174,791 | $3,406,894 | $1,228,830 |
| 2035 | $2,265,584 | $1,192,413 | $3,457,997 | $1,199,291 |
| 2036 | $2,299,568 | $1,210,299 | $3,509,867 | $1,170,462 |
| 2037 | $2,334,061 | $1,228,453 | $3,562,515 | $1,142,325 |
| 2038 | $2,369,072 | $1,246,880 | $3,615,953 | $1,114,866 |
| 2039 | $2,404,608 | $1,265,583 | $3,670,192 | $1,088,066 |
| 2040 | $2,440,678 | $1,284,567 | $3,725,245 | $1,061,911 |
| 2041 | $2,477,288 | $1,303,836 | $3,781,123 | $1,036,384 |
| 2042 | $2,514,447 | $1,323,393 | $3,837,840 | $1,011,471 |
| 2043 | $2,552,164 | $1,343,244 | $3,895,408 | $987,157 |
| 2044 | $2,590,446 | $1,363,393 | $3,953,839 | $963,427 |
| 2045 | $2,629,303 | $1,383,844 | $4,013,147 | $940,268 |
| 2046 | $2,668,742 | $1,404,601 | $4,073,344 | $917,665 |
| 2047 | $2,708,774 | $1,425,670 | $4,134,444 | $895,606 |
| 2048 | $2,749,405 | $1,447,055 | $4,196,461 | $874,077 |
| 2049 | $2,790,646 | $1,468,761 | $4,259,408 | $853,065 |
| 2050 | $2,832,506 | $1,490,793 | $4,323,299 | $832,559 |
| Total | $69,764,796 | $30,723,120 | $100,487,916 | $33,718,428 |

*Table 4* ***HST User Benefits for Intercity Travelers***
(thousands of year 2008 dollars)

| | Benefits (with ramp-up) | | | |
|---|---|---|---|---|
| Year | Phase I | Phase II | Total | Discounted at 4% |
| 2010 | $- | $- | $- | $- |
| 2011 | $- | $- | $- | $- |
| 2012 | $- | $- | $- | $- |
| 2013 | $- | $- | $- | $- |
| 2014 | $- | $- | $- | $- |
| 2015 | $- | $- | $- | $- |
| 2016 | $- | $- | $- | $- |
| 2017 | $- | $- | $- | $- |
| 2018 | $- | $- | $- | $- |
| 2019 | $- | $- | $- | $- |
| 2020 | $1,780,306 | $- | $1,780,306 | $1,111,974 |
| 2021 | $2,409,347 | $- | $2,409,347 | $1,446,991 |
| 2022 | $3,056,859 | $- | $3,056,859 | $1,765,260 |
| 2023 | $3,102,712 | $- | $3,102,712 | $1,722,826 |
| 2024 | $3,149,253 | $- | $3,149,253 | $1,681,412 |
| 2025 | $3,196,491 | $- | $3,196,491 | $1,640,993 |
| 2026 | $3,244,439 | $1,024,560 | $4,268,998 | $2,107,298 |
| 2027 | $3,293,105 | $1,386,571 | $4,679,676 | $2,221,173 |
| 2028 | $3,342,502 | $1,759,212 | $5,101,713 | $2,328,355 |
| 2029 | $3,392,639 | $1,785,600 | $5,178,239 | $2,272,385 |
| 2030 | $3,443,529 | $1,812,384 | $5,255,913 | $2,217,761 |
| 2031 | $3,495,182 | $1,839,569 | $5,334,751 | $2,164,449 |
| 2032 | $3,547,610 | $1,867,163 | $5,414,773 | $2,112,419 |
| 2033 | $3,600,824 | $1,895,170 | $5,495,994 | $2,061,640 |
| 2034 | $3,654,836 | $1,923,598 | $5,578,434 | $2,012,081 |
| 2035 | $3,709,659 | $1,952,452 | $5,662,111 | $1,963,714 |
| 2036 | $3,765,304 | $1,981,739 | $5,747,042 | $1,916,509 |
| 2037 | $3,821,783 | $2,011,465 | $5,833,248 | $1,870,439 |
| 2038 | $3,879,110 | $2,041,637 | $5,920,747 | $1,825,477 |
| 2039 | $3,937,297 | $2,072,261 | $6,009,558 | $1,781,595 |
| 2040 | $3,996,356 | $2,103,345 | $6,099,701 | $1,738,768 |
| 2041 | $4,056,301 | $2,134,895 | $6,191,197 | $1,696,971 |
| 2042 | $4,117,146 | $2,166,919 | $6,284,065 | $1,656,178 |
| 2043 | $4,178,903 | $2,199,423 | $6,378,326 | $1,616,366 |
| 2044 | $4,241,587 | $2,232,414 | $6,474,001 | $1,577,511 |
| 2045 | $4,305,210 | $2,265,900 | $6,571,111 | $1,539,590 |
| 2046 | $4,369,789 | $2,299,889 | $6,669,677 | $1,502,581 |
| 2047 | $4,435,335 | $2,334,387 | $6,769,722 | $1,466,461 |
| 2048 | $4,501,865 | $2,369,403 | $6,871,268 | $1,431,210 |
| 2049 | $4,569,393 | $2,404,944 | $6,974,337 | $1,396,806 |
| 2050 | $4,637,934 | $2,441,018 | $7,078,952 | $1,363,229 |
| Total | $114,232,604 | $50,305,916 | $164,538,521 | $55,210,423 |

*Table 5* ***HST User Benefits for Urban Travelers***
(thousands of year 2008 dollars)

| | Benefits (with ramp-up) | | | |
|---|---|---|---|---|
| Year | Phase I | Phase II | Total | Discounted at 4% |
| 2010 | $- | $- | $- | $- |
| 2011 | $- | $- | $- | $- |
| 2012 | $- | $- | $- | $- |
| 2013 | $- | $- | $- | $- |
| 2014 | $- | $- | $- | $- |
| 2015 | $- | $- | $- | $- |
| 2016 | $- | $- | $- | $- |
| 2017 | $- | $- | $- | $- |
| 2018 | $- | $- | $- | $- |
| 2019 | $- | $- | $- | $- |
| 2020 | $49,732 | $- | $49,732 | $31,063 |
| 2021 | $67,304 | $- | $67,304 | $40,421 |
| 2022 | $85,392 | $- | $85,392 | $49,312 |
| 2023 | $86,673 | $- | $86,673 | $48,127 |
| 2024 | $87,973 | $- | $87,973 | $46,970 |
| 2025 | $89,293 | $- | $89,293 | $45,841 |
| 2026 | $90,632 | $28,621 | $119,253 | $58,867 |
| 2027 | $91,992 | $38,733 | $130,725 | $62,048 |
| 2028 | $93,372 | $49,143 | $142,515 | $65,042 |
| 2029 | $94,772 | $49,880 | $144,653 | $63,478 |
| 2030 | $96,194 | $50,628 | $146,822 | $61,953 |
| 2031 | $97,637 | $51,388 | $149,025 | $60,463 |
| 2032 | $99,101 | $52,159 | $151,260 | $59,010 |
| 2033 | $100,588 | $52,941 | $153,529 | $57,591 |
| 2034 | $102,097 | $53,735 | $155,832 | $56,207 |
| 2035 | $103,628 | $54,541 | $158,169 | $54,856 |
| 2036 | $105,183 | $55,359 | $160,542 | $53,537 |
| 2037 | $106,760 | $56,190 | $162,950 | $52,250 |
| 2038 | $108,362 | $57,033 | $165,394 | $50,994 |
| 2039 | $109,987 | $57,888 | $167,875 | $49,768 |
| 2040 | $111,637 | $58,756 | $170,393 | $48,572 |
| 2041 | $113,312 | $59,638 | $172,949 | $47,404 |
| 2042 | $115,011 | $60,532 | $175,544 | $46,265 |
| 2043 | $116,736 | $61,440 | $178,177 | $45,153 |
| 2044 | $118,488 | $62,362 | $180,849 | $44,067 |
| 2045 | $120,265 | $63,297 | $183,562 | $43,008 |
| 2046 | $122,069 | $64,247 | $186,316 | $41,974 |
| 2047 | $123,900 | $65,210 | $189,110 | $40,965 |
| 2048 | $125,758 | $66,189 | $191,947 | $39,980 |
| 2049 | $127,645 | $67,181 | $194,826 | $39,019 |
| 2050 | $129,559 | $68,189 | $197,748 | $38,081 |
| Total | $3,191,055 | $1,405,281 | $4,596,336 | $1,542,287 |

*Table 6 Values of Time from Previous HST Mode Choice Models*

| | Local Air | Conventional Rail | Private Auto | |
|---|---|---|---|---|
| | | | Short Distance | Long Distance |
| Business Trips | | | | |
| Modal Constant | 0.0993 | 0.7848 | -0.6600 | -0.7995 |
| Line-haul Time (IVT) | -0.0357 | -0.0254 | -0.0142 | -0.0110 |
| Access/Egress Time | -0.0382 | -0.0325 | -0.0175* | -0.0184 |
| Wait Time (OVT) | -0.0207 | -0.0225 | | -0.0060 |
| Cost | -0.0505 | -0.1046 | -0.0450 | -0.026 |
| Non-Business Trips | | | | |
| Modal Constant | 0.1174 | 0.5226 | -1.0369 | -0.8768 |
| Line-haul Time (IVT) | -0.0373 | -0.0197 | -0.0057 | -0.0066 |
| Access/Egress Time | -0.0141 | -0.0212 | -0.035** | -0.0093 |
| Wait Time (OVT) | -0.0321 | -0.0144 | | -0.0031 |
| Cost | -0.0744 | -0.0860 | -0.0553 | -0.0293 |

Source: Charles River Associates, 1996.

Notes:

* This access/egress coefficient is applied the following ratio of travel times – (*OVT*)*(1.5**access*)/*IVT*.

** This access/egress coefficient is applied the following ratio of travel times – (0.5**OVT*)* (1.5**access*)/*IVT*.

*Table 7* ***Delay Reduction Benefits for Airline Passengers***
(thousands of year 2008 dollars)

| | Benefits (with ramp-up) | | | |
|---|---|---|---|---|
| Year | Phase I | Phase II | Total | Discounted at 4% |
| 2010 | $- | $- | $- | $- |
| 2011 | $- | $- | $- | $- |
| 2012 | $- | $- | $- | $- |
| 2013 | $- | $- | $- | $- |
| 2014 | $- | $- | $- | $- |
| 2015 | $- | $- | $- | $- |
| 2016 | $- | $- | $- | $- |
| 2017 | $- | $- | $- | $- |
| 2018 | $- | $- | $- | $- |
| 2019 | $- | $- | $- | $- |
| 2020 | $63,490 | $- | $63,490 | $39,656 |
| 2021 | $85,923 | $- | $85,923 | $51,603 |
| 2022 | $109,015 | $- | $109,015 | $62,953 |
| 2023 | $110,650 | $- | $110,650 | $61,440 |
| 2024 | $112,310 | $- | $112,310 | $59,963 |
| 2025 | $113,994 | $- | $113,994 | $58,522 |
| 2026 | $115,704 | $36,538 | $152,243 | $75,151 |
| 2027 | $117,440 | $49,448 | $166,888 | $79,212 |
| 2028 | $119,201 | $62,738 | $181,939 | $83,035 |
| 2029 | $120,989 | $63,679 | $184,668 | $81,039 |
| 2030 | $122,804 | $64,634 | $187,438 | $79,091 |
| 2031 | $124,646 | $65,603 | $190,250 | $77,189 |
| 2032 | $126,516 | $66,587 | $193,104 | $75,334 |
| 2033 | $128,414 | $67,586 | $196,000 | $73,523 |
| 2034 | $130,340 | $68,600 | $198,940 | $71,756 |
| 2035 | $132,295 | $69,629 | $201,924 | $70,031 |
| 2036 | $134,280 | $70,673 | $204,953 | $68,347 |
| 2037 | $136,294 | $71,734 | $208,027 | $66,704 |
| 2038 | $138,338 | $72,810 | $211,148 | $65,101 |
| 2039 | $140,413 | $73,902 | $214,315 | $63,536 |
| 2040 | $142,519 | $75,010 | $217,530 | $62,009 |
| 2041 | $144,657 | $76,135 | $220,793 | $60,518 |
| 2042 | $146,827 | $77,277 | $224,105 | $59,063 |
| 2043 | $149,030 | $78,437 | $227,466 | $57,643 |
| 2044 | $151,265 | $79,613 | $230,878 | $56,258 |
| 2045 | $153,534 | $80,807 | $234,341 | $54,905 |
| 2046 | $155,837 | $82,019 | $237,856 | $53,586 |
| 2047 | $158,174 | $83,250 | $241,424 | $52,297 |
| 2048 | $160,547 | $84,498 | $245,046 | $51,040 |
| 2049 | $162,955 | $85,766 | $248,721 | $49,813 |
| 2050 | $165,400 | $87,052 | $252,452 | $48,616 |
| Total | $4,073,803 | $1,794,027 | $5,867,831 | $1,968,934 |

*Table 8* ***Delay Reduction Benefits for Aircraft Operators***
(thousands of year 2008 dollars)

| | Benefits (with ramp-up) | | | |
|---|---|---|---|---|
| Year | Phase I | Phase II | Total | Discounted at 4% |
| 2010 | $- | $- | $- | $- |
| 2011 | $- | $- | $- | $- |
| 2012 | $- | $- | $- | $- |
| 2013 | $- | $- | $- | $- |
| 2014 | $- | $- | $- | $- |
| 2015 | $- | $- | $- | $- |
| 2016 | $- | $- | $- | $- |
| 2017 | $- | $- | $- | $- |
| 2018 | $- | $- | $- | $- |
| 2019 | $- | $- | $- | $- |
| 2020 | $56,432 | $- | $56,432 | $35,248 |
| 2021 | $76,372 | $- | $76,372 | $45,867 |
| 2022 | $96,897 | $- | $96,897 | $55,955 |
| 2023 | $98,350 | $- | $98,350 | $54,610 |
| 2024 | $99,825 | $- | $99,825 | $53,298 |
| 2025 | $101,323 | $- | $101,323 | $52,016 |
| 2026 | $102,843 | $32,477 | $135,319 | $66,797 |
| 2027 | $104,385 | $43,952 | $148,337 | $70,407 |
| 2028 | $105,951 | $55,764 | $161,715 | $73,805 |
| 2029 | $107,540 | $56,600 | $164,141 | $72,030 |
| 2030 | $109,154 | $57,449 | $166,603 | $70,299 |
| 2031 | $110,791 | $58,311 | $169,102 | $68,609 |
| 2032 | $112,453 | $59,186 | $171,638 | $66,960 |
| 2033 | $114,139 | $60,073 | $174,213 | $65,350 |
| 2034 | $115,852 | $60,975 | $176,826 | $63,779 |
| 2035 | $117,589 | $61,889 | $179,478 | $62,246 |
| 2036 | $119,353 | $62,817 | $182,171 | $60,750 |
| 2037 | $121,143 | $63,760 | $184,903 | $59,289 |
| 2038 | $122,961 | $64,716 | $187,677 | $57,864 |
| 2039 | $124,805 | $65,687 | $190,492 | $56,473 |
| 2040 | $126,677 | $66,672 | $193,349 | $55,116 |
| 2041 | $128,577 | $67,672 | $196,250 | $53,791 |
| 2042 | $130,506 | $68,687 | $199,193 | $52,498 |
| 2043 | $132,464 | $69,718 | $202,181 | $51,236 |
| 2044 | $134,450 | $70,763 | $205,214 | $50,004 |
| 2045 | $136,467 | $71,825 | $208,292 | $48,802 |
| 2046 | $138,514 | $72,902 | $211,416 | $47,629 |
| 2047 | $140,592 | $73,996 | $214,588 | $46,484 |
| 2048 | $142,701 | $75,106 | $217,807 | $45,367 |
| 2049 | $144,841 | $76,232 | $221,074 | $44,276 |
| 2050 | $147,014 | $77,376 | $224,390 | $43,212 |
| Total | $3,620,963 | $1,594,605 | $5,215,568 | $1,750,069 |

*Table 9 Assumed Year 2030 Airport Characteristics*

| | Airport Physical Features | | | | Annual Service Volumes (Thousands of Operations) | |
|---|---|---|---|---|---|---|
| | Year 2005 | | Increase from Year 2005 for No-Project and HST Alternatives | | | |
| **Region** | **Runways** | **Gates** | **Runways** | **Gates** | **Year 2002** | **Year 2030** |
| Los Angeles | 10 | 194 | 0 | 24 | 2,153 | 2,307 |
| Bay Area | 10 | 172 | 0 | 29 | 1,267 | 1,455 |
| Sacramento | 2 | 30 | 0 | 14 | 315 | 405 |
| San Diego | 1 | 41 | 0 | 8 | 270 | 322 |

*Table 10* ***Accident Reduction Benefits for Highway Travelers***
(thousands of year 2008 dollars)

| | Benefits (with ramp-up) | | | |
|---|---|---|---|---|
| Year | Phase I | Phase II | Total | Discounted at 4% |
| 2010 | $- | $- | $- | $- |
| 2011 | $- | $- | $- | $- |
| 2012 | $- | $- | $- | $- |
| 2013 | $- | $- | $- | $- |
| 2014 | $- | $- | $- | $- |
| 2015 | $- | $- | $- | $- |
| 2016 | $- | $- | $- | $- |
| 2017 | $- | $- | $- | $- |
| 2018 | $- | $- | $- | $- |
| 2019 | $- | $- | $- | $- |
| 2020 | $393,767 | $- | $393,767 | $245,945 |
| 2021 | $532,898 | $- | $532,898 | $320,044 |
| 2022 | $676,114 | $- | $676,114 | $390,439 |
| 2023 | $686,255 | $- | $686,255 | $381,053 |
| 2024 | $696,549 | $- | $696,549 | $371,893 |
| 2025 | $706,997 | $- | $706,997 | $362,954 |
| 2026 | $717,602 | $226,611 | $944,214 | $466,090 |
| 2027 | $728,366 | $306,681 | $1,035,047 | $491,277 |
| 2028 | $739,292 | $389,101 | $1,128,393 | $514,984 |
| 2029 | $750,381 | $394,938 | $1,145,319 | $502,604 |
| 2030 | $761,637 | $400,862 | $1,162,499 | $490,523 |
| 2031 | $773,062 | $406,875 | $1,179,936 | $478,731 |
| 2032 | $784,658 | $412,978 | $1,197,635 | $467,223 |
| 2033 | $796,427 | $419,172 | $1,215,600 | $455,992 |
| 2034 | $808,374 | $425,460 | $1,233,834 | $445,031 |
| 2035 | $820,499 | $431,842 | $1,252,341 | $434,333 |
| 2036 | $832,807 | $438,319 | $1,271,126 | $423,892 |
| 2037 | $845,299 | $444,894 | $1,290,193 | $413,702 |
| 2038 | $857,979 | $451,568 | $1,309,546 | $403,758 |
| 2039 | $870,848 | $458,341 | $1,329,189 | $394,052 |
| 2040 | $883,911 | $465,216 | $1,349,127 | $384,579 |
| 2041 | $897,170 | $472,195 | $1,369,364 | $375,335 |
| 2042 | $910,627 | $479,277 | $1,389,905 | $366,312 |
| 2043 | $924,287 | $486,467 | $1,410,753 | $357,507 |
| 2044 | $938,151 | $493,764 | $1,431,914 | $348,913 |
| 2045 | $952,223 | $501,170 | $1,453,393 | $340,525 |
| 2046 | $966,506 | $508,688 | $1,475,194 | $332,340 |
| 2047 | $981,004 | $516,318 | $1,497,322 | $324,351 |
| 2048 | $995,719 | $524,063 | $1,519,782 | $316,554 |
| 2049 | $1,010,655 | $531,924 | $1,542,579 | $308,944 |
| 2050 | $1,025,815 | $539,902 | $1,565,717 | $301,518 |
| Total | $25,265,879 | $11,126,624 | $36,392,503 | $12,211,399 |

*Table 11* ***Air Pollution Reduction Benefits for Highway Travelers***
(thousands of year 2008 dollars)

| | Benefits (with ramp-up) | | | |
|---|---|---|---|---|
| Year | Phase I | Phase II | Total | Discounted at 4% |
| 2010 | $- | $- | $- | $- |
| 2011 | $- | $- | $- | $- |
| 2012 | $- | $- | $- | $- |
| 2013 | $- | $- | $- | $- |
| 2014 | $- | $- | $- | $- |
| 2015 | $- | $- | $- | $- |
| 2016 | $- | $- | $- | $- |
| 2017 | $- | $- | $- | $- |
| 2018 | $- | $- | $- | $- |
| 2019 | $- | $- | $- | $- |
| 2020 | $51,932 | $- | $51,932 | $32,437 |
| 2021 | $70,282 | $- | $70,282 | $42,210 |
| 2022 | $89,170 | $- | $89,170 | $51,494 |
| 2023 | $90,508 | $- | $90,508 | $50,256 |
| 2024 | $91,865 | $- | $91,865 | $49,048 |
| 2025 | $93,243 | $- | $93,243 | $47,869 |
| 2026 | $94,642 | $29,887 | $124,529 | $61,471 |
| 2027 | $96,062 | $40,447 | $136,509 | $64,793 |
| 2028 | $97,503 | $51,317 | $148,820 | $67,919 |
| 2029 | $98,965 | $52,087 | $151,052 | $66,287 |
| 2030 | $100,450 | $52,868 | $153,318 | $64,693 |
| 2031 | $101,956 | $53,661 | $155,618 | $63,138 |
| 2032 | $103,486 | $54,466 | $157,952 | $61,620 |
| 2033 | $105,038 | $55,283 | $160,321 | $60,139 |
| 2034 | $106,614 | $56,112 | $162,726 | $58,694 |
| 2035 | $108,213 | $56,954 | $165,167 | $57,283 |
| 2036 | $109,836 | $57,808 | $167,644 | $55,906 |
| 2037 | $111,484 | $58,676 | $170,159 | $54,562 |
| 2038 | $113,156 | $59,556 | $172,711 | $53,250 |
| 2039 | $114,853 | $60,449 | $175,302 | $51,970 |
| 2040 | $116,576 | $61,356 | $177,932 | $50,721 |
| 2041 | $118,325 | $62,276 | $180,601 | $49,502 |
| 2042 | $120,099 | $63,210 | $183,310 | $48,312 |
| 2043 | $121,901 | $64,158 | $186,059 | $47,150 |
| 2044 | $123,729 | $65,121 | $188,850 | $46,017 |
| 2045 | $125,585 | $66,098 | $191,683 | $44,911 |
| 2046 | $127,469 | $67,089 | $194,558 | $43,831 |
| 2047 | $129,381 | $68,095 | $197,477 | $42,777 |
| 2048 | $131,322 | $69,117 | $200,439 | $41,749 |
| 2049 | $133,292 | $70,154 | $203,445 | $40,746 |
| 2050 | $135,291 | $71,206 | $206,497 | $39,766 |
| Total | $3,332,228 | $1,467,451 | $4,799,679 | $1,610,518 |

*Table 12. Intraurban Values of Time by Trip Purpose (2005 Dollars per hour)*

| | Share of Wage Rate | Bay Area | Southern California | California State |
|---|---|---|---|---|
| Average Hourly Wage | | **$24.00** | **$20.40** | **$20.44** |
| Home-Based Work | 46% | $11.20 | $9.30 | $9.50 |
| Home-Based Shopping | 32% | $7.60 | $6.30 | $6.50 |
| Home-Based Social/Recreational | 4% | $0.90 | $0.80 | $0.80 |
| Home-Based Grade School | 2% | $0.40 | $0.30 | $0.30 |
| Home-Based High School | 1% | $0.30 | $0.20 | $0.20 |
| Home-Based College | 3% | $0.80 | $0.60 | $0.70 |
| Non-Home-Based | 5% | $1.30 | $1.00 | $1.10 |
| Trucks | 100% | $24.00 | $20.40 | $20.44 |

Source: U.S. Bureau of Labor Statistics; Metropolitan Transportation Commission (http://www.mtc.ca.gov/maps_and_data/datamart/forecast/table4.htm).

*Table 13. Intercity Values of Time by Trip Purpose (2005 Dollars per hour)*

| | Business Trips | Commute Trips | Other Trips | Truck Trips |
|---|---|---|---|---|
| Long Trips (>100 miles) | $57.71 | $57.71 | $18.33 | $30.00 |
| Short Trips (<100 miles) | $27.60 | $10.12 | $7.93 | $30.00 |

Source: Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study, Interregional Model System Development, Cambridge Systematics, Inc., August 2006; Table 3.14.

*Table 14* ***Delay Reduction Benefits for Intercity Highway Travelers***
(thousands of year 2008 dollars)

| | Benefits (with ramp-up) | | | |
|---|---|---|---|---|
| Year | Phase I | Phase II | Total | Discounted at 4% |
| 2010 | $- | $- | $- | $- |
| 2011 | $- | $- | $- | $- |
| 2012 | $- | $- | $- | $- |
| 2013 | $- | $- | $- | $- |
| 2014 | $- | $- | $- | $- |
| 2015 | $- | $- | $- | $- |
| 2016 | $- | $- | $- | $- |
| 2017 | $- | $- | $- | $- |
| 2018 | $- | $- | $- | $- |
| 2019 | $- | $- | $- | $- |
| 2020 | $873,243 | $- | $873,243 | $545,425 |
| 2021 | $1,181,789 | $- | $1,181,789 | $709,752 |
| 2022 | $1,499,395 | $- | $1,499,395 | $865,863 |
| 2023 | $1,521,886 | $- | $1,521,886 | $845,049 |
| 2024 | $1,544,714 | $- | $1,544,714 | $824,735 |
| 2025 | $1,567,885 | $- | $1,567,885 | $804,910 |
| 2026 | $1,591,403 | $502,548 | $2,093,951 | $1,033,633 |
| 2027 | $1,615,274 | $680,115 | $2,295,389 | $1,089,489 |
| 2028 | $1,639,503 | $862,896 | $2,502,399 | $1,142,062 |
| 2029 | $1,664,096 | $875,840 | $2,539,935 | $1,114,609 |
| 2030 | $1,689,057 | $888,977 | $2,578,034 | $1,087,815 |
| 2031 | $1,714,393 | $902,312 | $2,616,705 | $1,061,666 |
| 2032 | $1,740,109 | $915,847 | $2,655,955 | $1,036,145 |
| 2033 | $1,766,210 | $929,584 | $2,695,795 | $1,011,238 |
| 2034 | $1,792,704 | $943,528 | $2,736,232 | $986,929 |
| 2035 | $1,819,594 | $957,681 | $2,777,275 | $963,205 |
| 2036 | $1,846,888 | $972,046 | $2,818,934 | $940,051 |
| 2037 | $1,874,591 | $986,627 | $2,861,218 | $917,454 |
| 2038 | $1,902,710 | $1,001,426 | $2,904,137 | $895,400 |
| 2039 | $1,931,251 | $1,016,448 | $2,947,699 | $873,875 |
| 2040 | $1,960,220 | $1,031,695 | $2,991,914 | $852,869 |
| 2041 | $1,989,623 | $1,047,170 | $3,036,793 | $832,367 |
| 2042 | $2,019,467 | $1,062,877 | $3,082,345 | $812,358 |
| 2043 | $2,049,759 | $1,078,821 | $3,128,580 | $792,831 |
| 2044 | $2,080,506 | $1,095,003 | $3,175,509 | $773,772 |
| 2045 | $2,111,713 | $1,111,428 | $3,223,141 | $755,172 |
| 2046 | $2,143,389 | $1,128,099 | $3,271,488 | $737,019 |
| 2047 | $2,175,540 | $1,145,021 | $3,320,561 | $719,302 |
| 2048 | $2,208,173 | $1,162,196 | $3,370,369 | $702,011 |
| 2049 | $2,241,295 | $1,179,629 | $3,420,925 | $685,136 |
| 2050 | $2,274,915 | $1,197,324 | $3,472,238 | $668,666 |
| Total | $56,031,292 | $24,675,140 | $80,706,432 | $27,080,809 |

*Table 15* ***Delay Reduction Benefits for Urban Highway Travelers***
(thousands of year 2008 dollars)

| | Benefits (with ramp-up) | | | |
|---|---|---|---|---|
| Year | Phase I | Phase II | Total | Discounted at 4% |
| 2010 | $- | $- | $- | $- |
| 2011 | $- | $- | $- | $- |
| 2012 | $- | $- | $- | $- |
| 2013 | $- | $- | $- | $- |
| 2014 | $- | $- | $- | $- |
| 2015 | $- | $- | $- | $- |
| 2016 | $- | $- | $- | $- |
| 2017 | $- | $- | $- | $- |
| 2018 | $- | $- | $- | $- |
| 2019 | $- | $- | $- | $- |
| 2020 | $496,101 | $- | $496,101 | $309,863 |
| 2021 | $671,390 | $- | $671,390 | $403,220 |
| 2022 | $851,826 | $- | $851,826 | $491,908 |
| 2023 | $864,604 | $- | $864,604 | $480,084 |
| 2024 | $877,573 | $- | $877,573 | $468,543 |
| 2025 | $890,736 | $- | $890,736 | $457,280 |
| 2026 | $904,097 | $285,504 | $1,189,602 | $587,221 |
| 2027 | $917,659 | $386,383 | $1,304,042 | $618,953 |
| 2028 | $931,424 | $490,223 | $1,421,647 | $648,821 |
| 2029 | $945,395 | $497,576 | $1,442,971 | $633,224 |
| 2030 | $959,576 | $505,040 | $1,464,616 | $618,003 |
| 2031 | $973,970 | $512,616 | $1,486,585 | $603,147 |
| 2032 | $988,579 | $520,305 | $1,508,884 | $588,648 |
| 2033 | $1,003,408 | $528,109 | $1,531,517 | $574,498 |
| 2034 | $1,018,459 | $536,031 | $1,554,490 | $560,688 |
| 2035 | $1,033,736 | $544,072 | $1,577,807 | $547,210 |
| 2036 | $1,049,242 | $552,233 | $1,601,475 | $534,056 |
| 2037 | $1,064,981 | $560,516 | $1,625,497 | $521,218 |
| 2038 | $1,080,955 | $568,924 | $1,649,879 | $508,689 |
| 2039 | $1,097,170 | $577,458 | $1,674,627 | $496,460 |
| 2040 | $1,113,627 | $586,120 | $1,699,747 | $484,526 |
| 2041 | $1,130,332 | $594,911 | $1,725,243 | $472,879 |
| 2042 | $1,147,287 | $603,835 | $1,751,122 | $461,512 |
| 2043 | $1,164,496 | $612,893 | $1,777,388 | $450,418 |
| 2044 | $1,181,963 | $622,086 | $1,804,049 | $439,590 |
| 2045 | $1,199,693 | $631,417 | $1,831,110 | $429,023 |
| 2046 | $1,217,688 | $640,888 | $1,858,577 | $418,710 |
| 2047 | $1,235,953 | $650,502 | $1,886,455 | $408,645 |
| 2048 | $1,254,493 | $660,259 | $1,914,752 | $398,822 |
| 2049 | $1,273,310 | $670,163 | $1,943,473 | $389,235 |
| 2050 | $1,292,410 | $680,216 | $1,972,625 | $379,878 |
| Total | $31,832,132 | $14,018,279 | $45,850,411 | $15,384,972 |