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Evaluation of Truck and Bus Automation Scenarios: Operations Cost Analysis

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Evaluation of Truck and Bus Automation Scenarios: Operations Cost Analysis

Volume 1

Final Report

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March 2004

ABSTRACT

Automated bus and truck systems hold the potential to improve road safety by eliminating some human error, increase the vehicle throughput by allowing vehicle convoying to shorten headways, and reduce costs associated with infrastructure, user time, and drivers. In this study, an automated bus system (ABUS) was compared with more-conventional light rail and bus-on-dedicated-lane (BDL) alternatives. A cost comparison (excluding accident costs) was also made among an automated freight trucking system (AHS-Truck), a no-build base condition, and configurations involving the addition of a conventional lane or a dedicated truck lane to the existing roadway. In both the ABUS and the Truck-AHS cases, the buses and trucks were assumed to operate in convoys. The benefits and costs were assessed from a societal perspective. Another comparison, based on shipping rates, was made among the AHS-truck, conventional trucking, and intermodal rail. The study concludes that the proposed bus alternatives could have substantially-lower costs than a functionally-equivalent light rail system for relatively low passenger volumes, but that there is no significant difference between the ABUS and BDL options at these volumes. At intermediate and high passenger volumes, ABUS and light rail may be the preferred alternatives, respectively. With regards to the freight systems, the analysis presented here indicates that the AHS lane performed better than the other two alternatives, primarily because of the lower vehicle operating and user costs. Additional research is recommended that addresses safety, demand change, and other impacts of the systems considered in this study.

KEYWORDS

Automated Highway Systems (AHS) Automated transit Automated trucking Benefit cost analysis

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EXECUTIVE SUMMARY

Vehicle automation has the potential to aid in improving road safety by eliminating some human error, increasing the vehicle throughput by shortening headways and decreasing vehicle operating costs. Automated vehicles that convoy (i.e. – operate in electronically-linked "trains") could require less and less-costly infrastructure and fewer driver-related and fuel-related operating costs. For instance, a "truck train" would possibly require only one driver for multiple vehicles, and a decrease in fuel costs could be attained if vehicles were to convoy closely at relatively high speeds.

The primary goal of the study detailed in this report was to evaluate and compare the costs of some configurations of automated bus and truck systems. The costs of an automated bus transit system (ABUS) were compared with the costs of conventional transit alternatives: a light rail system and a non-automated bus-on-dedicated-lane (BDL) system. The costs of an automated freight transportation system (Truck-AHS), wherein automated trucks operate on a dedicated lane, were compared with the costs of some conventional freight transportation alternatives. A direct comparison was made between the existing condition and an alternative where a conventional lane was added, as well as between the existing configuration and an alternative comprised of adding a conventional dedicated truck lane. In both the ABUS and the Truck-AHS cases, the buses and trucks were assumed to operate in convoys. Another comparison, based on shipping rates, was made among AHS-truck, conventional trucking and intermodal rail.

The study reported here is in partial fulfillment if Task Order TO 4236 funded by the Partners for Advanced Transit and Highways (PATH). This study utilized funding of \$80,517.97 out of a total amount of \$124,897.00 allocated to San Jose State University for the project. Contributions by Professor Randolph Hall of the University of Southern California are also included in this report.

The basic approach followed in the study was to base the comparisons on existing systems so as to make the comparisons as realistic as possible. The transit systems were based on the route and passenger characteristics of a portion of the light rail system of the Santa Clara Valley Transportation Authority (VTA) in California, while the freight systems were based on portions of route and traffic characteristics of Interstate Route 5 (I-5) and State Route 710 (SR-710) in California.

The comparisons were carried out for alternative systems that were functionally comparable, i.e. the same volume of passengers or freight between two end points was transferred. Both agency and user costs were considered. It should be noted that the objective of the evaluation was not to determine if the systems are worthwhile to implement – it was to compare the costs for functionally comparable systems. However, the way in which the analysis was conducted for the freight systems did enable making conclusions of this nature.

The benefits and costs were assessed from a societal perspective, i.e. no differentiation was made as to whom the benefits and costs accrue to. However, individual stakeholders often view benefits and costs differently from the societal viewpoint. This could mean that a

project is worthwhile from a societal point of view but not necessarily from, say, a group of users of the facility. Some aspects of stakeholders' perspectives were discussed but not analyzed.

Ideally, a comparison should be made among optimally-configured systems that are functionally the same at a specified traffic volume level. Determining the optimal configuration for each alternative was outside the scope of this project. The configurations that were used were considered to be reasonable and were related to the existing systems. It is also conceivable that the demand for the different systems would be different, but considering this effect would entail extensive analysis that was considered outside the scope of this project.

Costs for transportation systems generally fall into the following categories:

- System planning and design costs
- Construction, rehabilitation and other infrastructure capital costs
- System maintenance costs
- Administration and system operating costs
- Vehicle operating costs
- Travel time costs
- Accident costs

All of the above costs, with the exception of accident costs, were considered in this study. As stated before, external costs such as environmental costs were not considered. The approach utilized in this report was to discuss them where appropriate, but not quantify them.

A summary of the major conclusions and recommendations follows:

Transit Conclusions

- i. Based on the findings of this study, the Automated Busway System (ABUS) and Buson-Dedicated-Lane (BDL) system have been found to have substantially lower costs than a functionally-equivalent light rail system for relatively low passenger volumes. The primary source of the difference comes from the relatively-high costs for planning, designing, and constructing the light rail system. It should be noted that the results of the analysis do not indicate that any of the systems studied are economically feasible, or that there would be obvious promise in creating an ABUS system.
- ii. For the base configuration at the relatively-low base volume levels, the overall costs of the ABUS scenarios are comparable to those of the non-automated BDL system. ABUS is the favored alternative in terms of infrastructure (due to narrower lanes) and driver-related costs (due to bus convoying). The advantage of the BDL system was primarily related to the shorter headways, and thus less wait time-related costs for passengers. Given that individual cost items may vary from place to place, some or all of the cost differences between these two systems may be insignificant.
- iii. The analysis did not attempt to quantify safety considerations as part of the evaluation of the systems. Due to the different natures of the ABUS, BDL, and light rail

systems, it is possible that costs associated with safety could vary considerably among the alternatives. Such costs could include those related to accidents, infrastructure, and others. This study also did not attempt to quantify the differences in costs among the systems resulting from environmental factors, ridership and user diversion, or impact on the surrounding transportation systems. These types of costs could be substantial, and could alter the outcomes of the analysis and, consequently, the conclusions presented here.

- iv. At relatively-small increases in passenger volumes, the BDL system would likely be the best-performing system, since it would still have the advantage over the other systems with regard to passenger wait time. At significantly-large volumes, the light rail system could be the preferred system. It would be capable of offering a larger capacity than the other systems, and probably at greater safety standards.
- v. At moderate volume increases, when decreasing headways becomes a safety problem for the BDL system, the ABUS would have an advantage over the BDL system largely due to proportionally-smaller driver-related vehicle-operating costs for the ABUS. Also, at moderate volumes, the ABUS would have the advantage over the light rail system, with fewer costs in most cost categories.
- vi. One advantage for bus systems, versus light rail, was that buses could enter a dedicated lane from a feeder route and thereby eliminate the need for passengers to transfer from a feeder bus line. This could reduce costs associated with wait time and potentially induce an increase in demand resulting from eliminating the need to transfer for some passengers.
- vii. On-board travel time hours account for substantially more of the total user travel time than do wait time for all of the transit systems, so finding ways to decrease on-board travel time may be a more effective way to reduce travel-time costs. That could entail increasing the speed of operations on the system, which could require a better-protected right-of-way, and consequently, increased construction, rehabilitation, and maintenance costs. Also, at higher speeds, the issue of safety for the ABUS could become an issue of greater concern. This might not be favorable when comparing and ABUS versus a light rail or BDL system.

Transit Recommendations

- i. It could be beneficial to investigate, more rigorously, the effect of increased passenger volumes, combined with different convey lengths, on the rail and bus systems presented here. It is highly recommended that this analysis be conducted before additional funds are spent on further research or implementation of strategies involving automated buses in convoys.
- ii. The extent to which bus convoys could be expanded would be a safety issue, whereas in the case of rail systems, it has been proven that long trains can be safely operated. The passenger volume at which light rail could become the favored option could then depend upon the safety issue, and not necessarily the economic criteria examined in

- this study. Further research into the level of safety that can be attained, as well as the economic operations thereof, should be conducted.
- iii. The additional impacts of implementing the alternative systems should be further evaluated. Impacts such as noise and air pollution are hard to quantify, but some of the impacts of the implementation of the alternative systems on the surrounding street system could be quantified. The delay imparted to other vehicle traffic could be quantified and included in the economic analysis. The impacts on bicyclists and pedestrians are also important, but may be difficult to quantify.
- iv. Changes in demand due to the attributes of each system were not addressed in this study, and could significantly alter the outcomes of the analysis, and the extent to which each system would attract users should be examined in future research.
- v. Since the impact of rehabilitation and periodic maintenance of light rail systems beyond the 30-year assumed useful life of the systems was not investigated, definitive conclusions cannot be made regarding this issue. The issue of differing useful lives of the projects was identified early in this report, and should be addressed further in subsequent research.

Freight Conclusions

- i. The analysis presented here for road-based freight indicates that, based on current vehicle volumes, the reduction in user costs would not offset the increase in agency costs for any of the options (addition of a conventional lane, addition of an AHS lane, and addition of a dedicated truck lane). The AHS lane performed better than the other two alternatives, primarily because of the lower vehicle operating and user costs. It should be noted that different assumptions regarding truck speeds, diversion to a dedicated lane, and unit costs could influence the results significantly, although the advantage of the AHS over the other alternatives should remain. Construction costs had a large influence on the outcome. Dealing more specifically with the physical environment and the effects thereof on the construction costs, as well as developing more accurate unit costs and considering real estate costs for local circumstances, could also influence the results in a meaningful way. Additionally, accident costs were considered to be outside the scope of this study, and could affect the results significantly.
- ii. An analysis based on a segmentation of the study section into low-, medium-, and high-volume sections indicates that, for a low-volume road, the agency costs are lower than the savings from user costs associated with the addition of an AHS at low volumes. This may appear to be counter-intuitive, but this result is a consequence of, among other factors, significantly-lower construction costs in rural areas, where passenger volumes are lower. Again, it should be noted that assumptions, especially regarding truck speeds and diversion, and the exclusion of accident and real estate costs, influenced those results significantly.

iii. Based on the analysis related to shipping rates, it was found that the unit costs for intermodal rail are the highest for the three study systems for short-haul shipping distances (shorter than 800 miles), and the lowest for long-haul shipping distances (greater than 800 miles). The results of this analysis show that, for distances shorter than 800 miles, the cost of conventional trucking was very similar to that of AHS-truck. It could be surmised that AHS-truck may become less costly than conventional trucking at longer distances because the cost of freight transfer would be spread over a longer travel distance. It should be noted, however, that the analysis conducted does not indicate at which distances one mode may become more advantageous than another.

Freight Recommendations

- i. The results of this analysis were based on a number of assumptions, calculations, and unit costs that can all be varied with good reason. In order to evaluate the effects of those assumptions, a sensitivity analysis should be undertaken. This would be especially important for the AHS options, since their b/c ratios are not that far removed from a value of one, and could possibly change to values exceeding one with changes in the assumptions and values of the parameters used in the analysis presented in this report. Based on such a sensitivity analysis, a decision could be made to refine those costs or other aspects of the analysis that would influence the outcome most significantly. Additionally, future research should address the use of unit costs that vary with speed and their effects on vehicle operating costs, as well as accident costs.
- ii. It is recommended that an in-depth study be undertaken based on real costs to compare AHS-truck and intermodal rail; however, such a study should only be undertaken once a sensitivity analysis for the road-based freight alternatives has been undertaken. This should be done to ensure that AHS-truck is a viable option and that the envelope of constraints within which this would be true is established.

Overall Conclusions and Recommendations

It appears that there is some promise for automation of vehicles, as it was discussed in this report. For both transit and freight automation, however, accidents costs could affect the economic feasibility significantly.

It is recommended that this evaluation be continued and refined. Refining the costs and some other aspects of the analysis would make the analysis more definitive, and could also indicate where the most gains could be made through further development of automation. Investing more resources in the study of the feasibility of the overall design and operation, both in concept and in the economic feasibility thereof, could lead to better decisions regarding how to spend finite funds for specific research and development of automation.

1 INTRODUCTION

1.1 Background and Study Goals

Vehicle automation has the potential to aid in improving road safety, by eliminating some human error, increasing the vehicle throughput by shortening headways and decreasing vehicle operating costs. Vehicle operating costs could be reduced by having vehicles convoy (tying them together electronically) and removing drivers (or all except the driver of the lead vehicle). A decrease in fuel costs could be attained if vehicles were to convoy closely at relatively high speeds.

The primary goal of the study detailed in this report was to evaluate and compare the costs of some configurations of automated bus and truck systems. The costs of an automated bus transit system (ABUS) were compared with the costs of conventional transit alternatives (i.e. – a light rail system and a bus system operating on a dedicated right-of-way). Additionally, the costs of an automated freight transportation system (Truck-AHS) were compared with the costs of some conventional freight transportation alternatives: adding a conventional lane to the existing configuration, adding a dedicated lane for use by conventional trucks to the existing system, and intermodal rail. The study reported here is in partial fulfillment if Task Order TO 4236 funded by the Partners for Advanced Transit and Highways (PATH). This study utilized funding of \$80,517.97 out of a total amount of \$124,897.00 allocated to San Jose State University for the project. Contributions by Professor Randolph Hall of the University of Southern California are also included in this report.

The basic approach followed in the study was to base the comparisons on existing systems so as to make the comparisons as realistic as possible. The transit systems were based on the route and passenger characteristics of a portion of the light rail system of the Santa Clara Valley Transportation Authority (VTA) in California, while the freight systems were based on portions of route and traffic characteristics of Interstate Route 5 (I-5) and State Route 710 (SR-710) in California.

The comparisons were carried out for alternative systems that were functionally comparable, i.e. the same volume of passengers or freight between two end points were transferred. Both agency and user costs were considered. It should be noted that the objective of the evaluation was not to determine if the systems are worthwhile to implement – it was to compare the costs for functionally comparable systems. However, the way in which the analysis was conducted for the freight systems did enable making conclusions of this nature. This issue will be more fully articulated later in the following section of the report as well as in later sections of the report when discussing the results of the analyses.

1.2 Report Outline

Some of the salient broad issues related to the cost analysis are discussed in the next section. The comparison of the transit alternatives are discussed in Chapters 3 through 8. The comparison of the freight systems follows in Chapters 9 through 14. Additional impacts are discussed in Chapter 15 and some aspects of stakeholder concerns in Chapter 16. Finally,

conclusions and recommendations are presented in Chapter 17. References are provided at the end of each chapter. Details of some parts of the calculations are presented in Appendices A through J for the transit component of the research, and in Appendices K through Y for the freight component. It should be noted that a broad literature review is not provided here, since this was included in a previous report (1). Also, the material included in the appendices is extensive, which was done to enable the reader to evaluate the basis of the evaluation. Given all the variables and parameters considered in the benefit-cost analysis, a considerable amount of variation can be experienced in the final outcome, depending upon the variations inherent in the parameters and variables. Ideally, this variation should be contained in the analyses, but resources in addition to the amount expended for this study would be required to carry out such an extensive study.

1.3 Reference

1. Tsao, H.-S.J., Botha, J.L., Zabyshny, A.A., Day, J.E. Definition and Evaluation of Bus and Truck Automation Operations Concepts: Final Report. California PATH Research Report UCB-ITS-PRR-2003-19. May 2003.

2 SOME SALIENT ASPECTS OF THE COST COMPARISON

The overall goal of this section is to discuss some of the broad aspects of the analysis in order to lay a foundation for putting the results of the study in perspective. Specifically, the following will be discussed:

- Objectives of the analysis.
- Basic approach to the benefit-cost analysis.
- Proposed options for analysis.
- Some complicating factors and potential pitfalls.
- Economic feasibility.
- Major cost categories.

2.1 Objectives of the Analysis

As stated before, the ultimate goal of the benefit-cost analysis was to compare the costs of alternative systems which are (as far as possible) functionally the same, i.e. they convey a specified volume of traffic between two specific points. The effect of different levels of traffic volume is discussed in the case of the transit systems, and in the case of the freight systems, an analysis was performed to assess the effects of varying volumes.

The benefits and costs were assessed from a societal perspective, i.e. no differentiation was made as to whom the benefits and costs accrue to. However, individual stakeholders often view benefits and costs differently from the societal viewpoint. This could mean that a project may be worthwhile from a societal point of view but not necessarily from, say, a group of users of the facility. Some aspects of stakeholders' perspectives are discussed but not analyzed.

2.2 Basic Approach to the Benefit-Cost Analysis

It is worthwhile to review some aspects of benefit-cost analysis to enable some perspective on the possible shortcomings of and some of the practical issues involved in such an analysis, as they may pertain to this study.

The term "benefit-cost analysis" is used in a generic sense here. The term encompasses the whole family of benefit-cost analyses and not just the benefit-cost ratio. When evaluating transportation systems, the term "benefits" often means a reduction in user costs while the term "costs" indicates an increase in the system costs which accrue to the agency, e.g. construction costs. When the benefits exceed the costs, a project is generally considered worthwhile. These definitions are consistent with conducting the analysis from the societal viewpoint and are used in this report. However, instead of using benefits and costs, it is often convenient to use "total cost" (the sum of user and system costs) when analyzing the performance of systems. When using total costs for a comparison, the best alternative is the one with the lowest costs. In the event of comparing the incremental total costs of an alternative to the base case, a negative value for the incremental costs would signify an

improvement. When using a total-cost analysis correctly, it will be precisely equivalent to using a comparison of benefits and costs correctly.

When conducting a benefit-cost analysis, all values have to be brought to a common basis. Because of the large number of cost items that were recurring costs, the comparisons were based on equivalent uniform annual amounts. The discount rate used was six percent, which is a discount rate used by the California Department of Transportation (Caltrans) (1). The base year for the evaluation was chosen to be 2001, and all costs were inflated or deflated to this base year. It is worth noting that the results of this study are a function of the basis on which the calculations were carried out. Vehicle-hours and vehicle-miles of travel were used as a basis in many of the calculations, and a different basis could produce different results.

Since the resources available for this study did not allow for an estimation of the total cost of all alternatives, only differences in cost among the alternatives were considered where this was suitable.

Ideally, the comparison should be made among optimally-configured systems that are functionally the same at a specified traffic volume level. Determining the optimal configuration for each alternative was outside the scope of this project. The configurations that were used were considered to be reasonable and were related to the existing systems, which were the VTA light rail system for the transit component and Interstate 5 (I-5) and California State Route 710 (SR-710) for the freight comparison. Related assumptions will be discussed in more detail later in the report. The analyses for both transit and freight were undertaken using the existing traffic volumes as a starting point. A zero growth rate was assumed for the vehicular traffic and passenger volumes because assuming a greater-thanzero growth rate would have added complexity to the analysis, would have made the understanding of the effect of different volumes on the different systems less transparent, and would not have added more insight or clarity to the study. It is also conceivable that the demand for the different systems would be different, but considering this effect would entail extensive analysis that is considered outside the scope of this project.

2.3 Options Analyzed

The options analyzed are as follows:

Transit:

- Conventional light-rail system
- Automated Bus System (ABUS)
- Bus-on-Dedicated-Lane (BDL) System

Freight Transportation:

- Added conventional lane
- Automated truck system operating on a dedicated lane (Truck-AHS)
- Dedicated truck lane

• Intermodal rail

Details of these alternatives are discussed in a previous report (2). However, it should be noted that the emphasis here is on the benefits that convoying automated vehicles (with, consequently, fewer drivers required overall) can effect, and not so much on the other benefits that could result from automation.

2.4 Some Complicating Factors and Potential Pitfalls

It should be noted that the comparison conducted for the transit systems consisted of a least-cost analysis for all three systems. Because a comparison was not made with an automobile-only or conventional bus system, it cannot be concluded that any of these systems are economically feasible. For the road-based freight alternatives, most of the incremental costs over the existing system were calculated for each of the alternatives. Therefore, conclusions about the economic feasibility of each alternative over the base system can be inferred in the latter case.

When doing a comparison, it would be desirable to hold all variables, related to the quality of service and that cannot be quantified, constant for all alternatives and to make the two systems functionally the same i.e. to transport the same traffic volume (passengers or freight) over the same distance. For instance, in the case of the transit systems, the system that would transport a specified volume of passengers within assumed standards such as travel comfort, reliability etc., with the least cost for a specified distance, should then be selected as the appropriate system for that volume.

A comparison between ABUS and the BDL system would be relatively "pure" in the sense that almost everything will be the same except for the cost. A relatively "pure" comparison between a truck-AHS and conventional truck operations on a dedicated lane could also be accomplished. A comparison between the ABUS system and a light-rail system is not as "pure". There are aspects, such as the quality of ride, seating comfort etc., that would most likely differ between the two alternatives. Similar issues could arise in the comparison of AHS-truck versus the inter-modal rail alternative. The inter-modal rail option could be very different in terms of the quality of service that is experienced by a shipper.

Some costs were not readily quantifiable because it is impossible to do so or beyond the scope of the next phase of the project. They will only be discussed and not quantified. For example, in the case of the light rail system, it should offer the benefit (or lower cost) of generating less air pollution in the immediate area (it is possible that more air pollution could be generated at the source of power generation) than conventionally powered buses. However, it is beyond the scope of the project to estimate the costs of air pollution. The light rail system may also offer a more comfortable ride than buses, but this is difficult to quantify in terms of reduced costs, and is also considered to be outside the scope of this project.

The comparison of costs for the intermodal rail to trucking in a specific corridor would be a significant and potentially-difficult undertaking. Costs data for the rail are, in many cases, proprietary, and it is difficult to make a realistic direct comparison in a specific corridor. As

stated in the project proposal, a different approach was followed for this comparison. The comparison is discussed in Chapter 16 of this report.

As stated before, the viewpoint taken for the comparison of alternatives is the societal viewpoint. Ideally, projects that employ public funds should all be evaluated from this point of view before other viewpoints are considered. This does not take into account to whom the costs accrue. A project could be economically feasible from the societal point of view, but may not be economically or financially feasible from a specific stakeholder's (or group's) vantage point. For instance, if an AHS lane were added, user costs on all lanes could be reduced. It is conceivable that the user cost savings for the AHS lane users may not offset the cost of outfitting the vehicles. Furthermore, the use of the lane may not be beneficial if tolls were levied for use of the AHS lane. It should be noted that issues related to financing, revenue generation, and pricing were not part of this benefit-cost analysis except as the flow rates and, consequently, user costs would be affected.

When considering another vantage point, such as the view of a freight shipping company, the issue of cost allocation becomes pertinent. Trucks are often not allocated the full cost burden of providing the road, and their shipping rates would include only the direct costs that they will incur. In the case of a rail system, it is more likely that the rates will include the full cost of the track. The way in which the respective two shipping companies will view the costs will not only depend on which costs they have to bear, but also how they finance their operations and how costs are accounted for. In U.S. accounting practice, costs are accounted for according to accounting rules, which consider costs differently from the way a conventional benefit-cost analysis would account for costs.

A shipping company would also consider an increase in net revenues or profits as the major reason for investing in new technology. Since the benefits, from a societal point of view, are not necessarily proportional to net revenues or profits, there would not necessarily be a one-to-one correspondence between the investment decisions from the societal point of view and the business point of view.

Because of the basic approach proposed, i.e., to consider real costs, this requires eliminating taxes, financing cost etc. from the amounts. This was accomplished where there was evidence of the presence of such items in any of the data used; however, it is possible that some of these costs could have been present in some of the data but not explicitly itemized, especially where borrowing was used to finance the systems. Given the available time and the anticipated difficulty of obtaining information on the internal business practices of shipping companies, a full-blown analysis of the benefits and costs accruing to different stakeholders was not conducted (as stated in the project proposal). A discussion of some issues related to the various stakeholders is presented in Chapter 16.

When conducting a benefit-cost or cost analysis, the focus is naturally on the benefits and costs, and on the final outcome. It should be kept in mind, however, that the benefit and cost calculations are dependent on the accuracy of a large number of parameters. These parameters were not only related to the benefit and cost calculations themselves (such as unit costs, interest rates), but also to the operating concepts and the associated conditions, such as

traffic volumes, etc. For this reason, the interpretation of the results should be viewed from a holistic perspective, with understanding of all elements of the analysis. This makes the analysis and understanding thereof very difficult because it requires knowledge of all of these elements.

2.5 Economic Feasibility

Economic feasibility refers to a determination of whether a project is favorable as compared to the no-build alternative, and to other available alternatives. It should be noted that the results of the transit portion of this analysis did not indicate that any of the transit systems that were studied are economically feasible. To determine feasibility, the transit alternatives should also be compared to a no-build condition, and an incremental analysis should be undertaken to determine the best transit alternative. Note also that the base condition could be a condition without a transit alternative. In regards to the freight system, the nature of this analysis provides a basis for a feasibility argument, since the proposed alternatives are compared to a no-build base case.

2.6 Cost Items

Costs for transportation systems generally fall into the following categories:

- System planning and design costs
- Construction, rehabilitation and other infrastructure capital costs
- System maintenance costs
- Administration and system operating costs
- Vehicle operating costs
- Travel time costs
- Accident costs

All of the above costs, with the exception of accident costs, were considered in this study. The operating concepts are not adequately understood to enable reliable prediction of the frequency and severity of accidents. As stated before, external costs such as environmental costs will not be considered. The approach utilized in this report is to discuss them where appropriate, but not quantify them.

2.7 References

- 1. Booz: Allen and Hamilton Inc. *California Life-Cycle Benefit/Cost Analysis Model* (Cal-B/C). California Department of Transportation. September 1999.
- 2. Tsao, H.-S.J., Botha, J.L., Zabyshny, A.A., Day, J.E. Definition and Evaluation of Bus and Truck Automation Operations Concepts: Final Report. California PATH Research Report UCB-ITS-PRR-2003-19. May 2003.

3 GENERAL ISSUES RELATED TO THE TRANSIT SYSTEMS EVALUATION

3.1 Route Location

The route location chosen as a basis for the analysis is the part of the Santa Clara Valley Transportation Authority (VTA) light rail system route north of the downtown area. A part of this system is located in the median of a freeway, another on city streets and also a part in the downtown area of the City of San Jose. A portion of the route located on city streets was chosen as a basis for the analysis, because the authors of this report consider this part to have the character of light rail systems most likely to be found elsewhere and also the most representative of the characteristics of a main transit route.

The current and planned route of the light rail system is shown in Figure 3.1. The portion used as a basis for this analysis is boxed in the figure. The study section is a 5.19-mile section extending from the Japantown/Ayer station in the south to the Baypointe station in the north.

3.2 System Design and Operating Concepts

The alternative transit systems that were considered consisted of a light rail system, a bus system on a dedicated lane and an automated bus system on a dedicated lane. Some aspects of these systems were discussed in a report by Tsao, Botha, Zabyshny, and Day (1). It should be noted that these systems could operate at different speeds and at different levels of safety standards. The speed of operation was assumed to be equivalent to the current speed of existing light rail operations on the study section. Barriers to divide traffic flowing in opposite directions and to separate vehicles using the dedicated lanes from the regular traffic stream were not considered in the cost estimates, but should be considered in future studies, depending on the physical conditions and desired safety standards of the implementation location.

3.2.1 Light Rail

The portion of the light rail system chosen for analysis consists of an at-grade track system operating on a dedicated right-of-way. Dimensions for the minimum width of a typical light rail section in Santa Clara County are shown in Figure 3.2. Currently, the system is operated with minimum headways of 15 minutes, which, according to VTA staff, can be shortened to a minimum of 10 minutes, although 5-minute headways have been used in the past. Three-car, two-car and one-car trains are currently used, depending upon demand. The limitation of three cars per train results from available length of platforms.

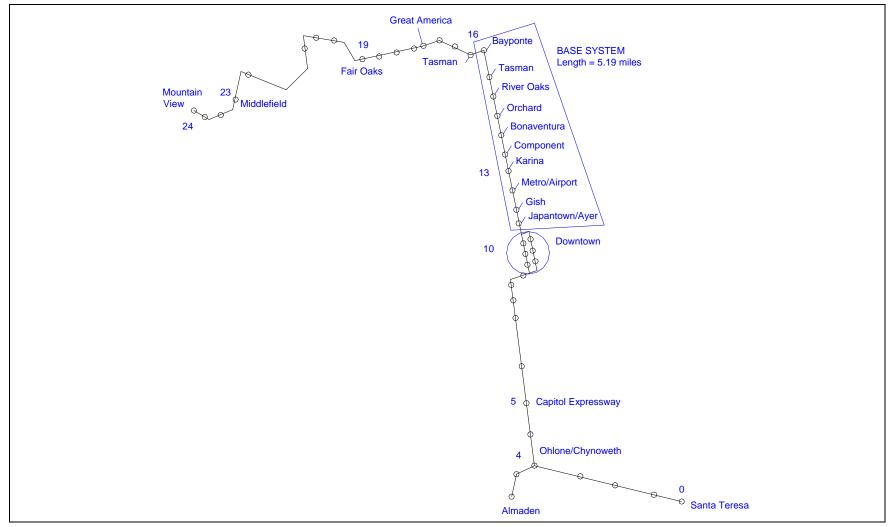


FIGURE 3.1 SANTA CLARA VALLEY TRANSPORTATION AUTHORITY (VTA) LIGHT RAIL SYSTEM

3.2.2 ABUS

Like a conventional light rail system, ABUS vehicles would convoy in "bus convoys." The buses would be electronically linked together using automation technology. For the purpose of this study, it was assumed that the maximum length of a train will be no more than five vehicles and that a train of five buses would be technologically feasible and safe. The length of five vehicles is somewhat arbitrary, but was selected so that the capacity of a five-bus train would be approximately the same as that of a three-car light-rail train.

Like a conventional light rail system, the ABUS design includes a traveled way for vehicles in each direction, without a breakdown lane. This means that it would be functionally equivalent to the light rail system and that stalled vehicles would have to be removed from the operational lane before operation could proceed. The system could be placed in the median of the roadway. It would have at-grade intersection crossings with regular traffic, and signal priority would be given to ABUS vehicles in a similar fashion as is given to the light rail system in Santa Clara County. A barrier between the ABUS and regular traffic would probably be desirable, but, again, to maintain functional equivalence with the light rail system, it was not included.

Two possible design scenarios are given in this report. In the first, the dimensions of the cross section were based on principles for road widening in the *Policy on Geometric Design of Highways and Streets*, 2001, published by the American Association of Highway and Transportation Officials (AASHTO) (2). In the second, dimensions of the cross-sectional design are based on the principle that travel lanes for trucks and buses using automated technologies need be only 30 cm (0.98 feet) wider than the vehicles using them (suggested by Dr. Steven Shladover of PATH). Further discussion of the required space is presented in Section 5.2. A schematic representation of the two designs are presented in Figures 3.3 and 3.4.

3.2.3 Bus-On-Dedicated-Lane

The Bus-On-Dedicated-Lane (BDL) system design is similar to that of the ABUS except, that the buses do not convoy and operate at equal headways. A schematic representation of this design is presented in Figure 3.5. The design follows AASHTO standards.

3.3 Some Issues Related to the Evaluation

3.3.1 The Approach to the Economic Evaluation

The basic premise of the economic analysis was to compare the alternative systems which would, as much as possible, be functionally the same. This would mean that they would convey the same number of passengers between the same origins and destinations with the same service standards. It is assumed that the safety standards would be comparable, although they probably would not be. The quality of service for passengers is also assumed to be the same. Because all the systems operate on the same right of way under the same traffic control systems, the speeds are assumed to be similar. This

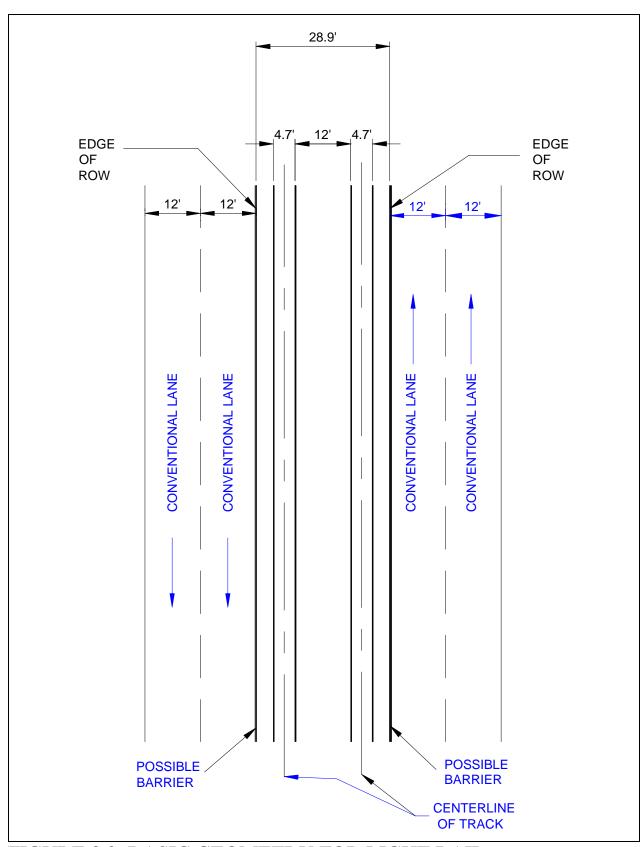


FIGURE 3.2 BASIC GEOMETRY FOR LIGHT RAIL

assumption may not hold entirely for the BDL system because the buses are more dispersed than the vehicles of the other two alternatives and consequently the traffic control system may have to be different and could possibly affect the travel time of the buses. Without investigation of the control system, this possible effect cannot be quantified. Such an investigation falls outside the scope of this project.

Equivalent uniform annual costs (EUACs) were calculated for all cost categories. The project life assumed for the analysis was 30 years, with a 6 percent discount rate, and 2001 was used as the base year. The choice of the analysis period of 30 years was deemed reasonable, although longer projects lives could certainly be considered appropriate for fixed projects such as the light rail. Ideally, the project life should be such that it would be a multiple of individual project lives, which would include rehabilitation, etc. Alternatively, the issue could have been dealt with through salvage values, though this would have added complexity to the analysis which would probably not have been worthwhile, given the level of aggregation used in the study. Since Caltrans uses a 6 percent discount rate for its economic analyses, this rate was deemed appropriate for this project.

The costs that were assumed to differ for the different systems were calculated. Those costs that were common were not considered. It should again be noted that a comparison of these costs does not indicate that the system with the least cost would be economically feasible, or necessarily the best system to implement, because a comparison would have to be made with an automobile-only option or an automobile-plus-bus option – a base system that is not one of the considered alternatives.

3.3.2 Cost Categories

The following costs categories were identified for the analysis. All costs apply to all proposed systems, and were calculated for both design scenarios:

- System Planning and Design Costs
- Construction, Rehabilitation, and Other Infrastructure Costs
- Vehicle Operations Costs
- Vehicle Maintenance Costs
- System (Non-Vehicle) Maintenance Costs
- System Administration Costs
- User Costs

Some general comments regarding these cost categories will be provided in the following sections.

System Planning and Design Costs

System planning and design costs for the light rail and ABUS systems would generally be expected to be higher than the corresponding costs for the BDL system because of the greater complexity associated with the light rail and ABUS systems. The costs could be relatively

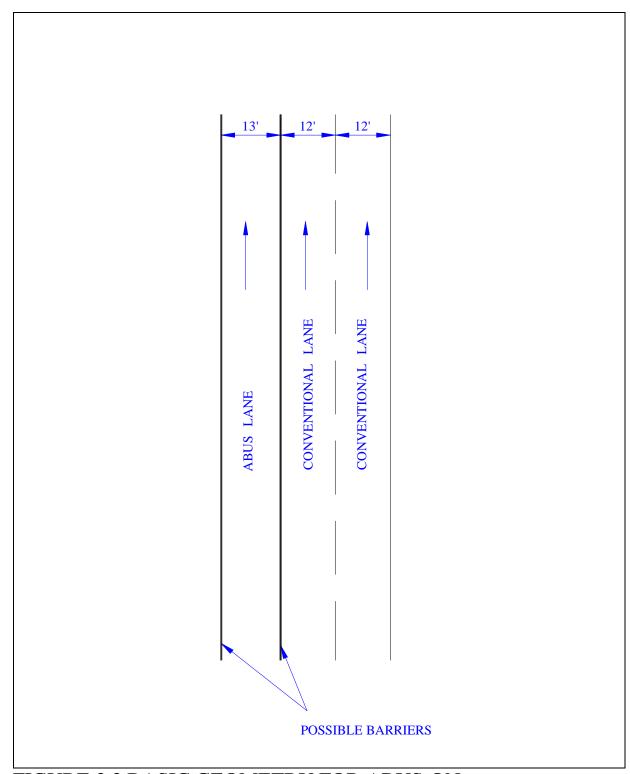


FIGURE 3.3 BASIC GEOMETRY FOR ABUS-ON-DEDICATED-LANE CONFIGURATION – SCENARIO 1: DESIGN BASED ON AASHTO STANDARDS

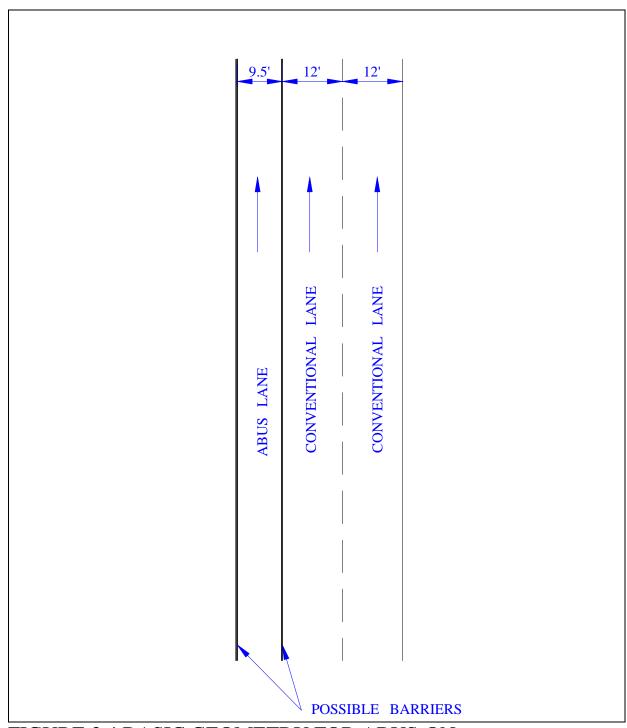


FIGURE 3.4 BASIC GEOMETRY FOR ABUS-ON-DEDICATED-LANE CONFIGURATION – SCENARIO 2: REDUCED WIDTH

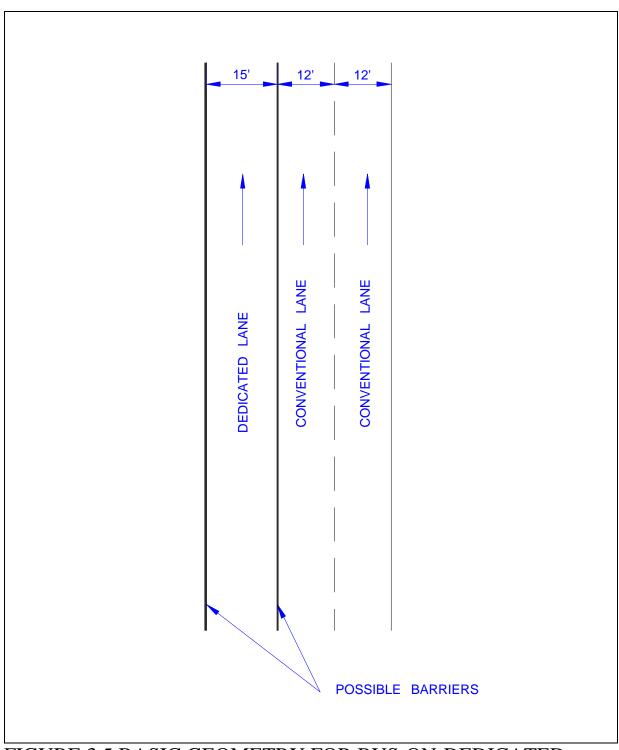


FIGURE 3.5 BASIC GEOMETRY FOR BUS-ON-DEDICATED-LANE CONFIGURATION

higher for the ABUS as compared to the BDL system, depending on the components of design and possible increased safety appurtenances.

Construction, Rehabilitation, and Other Infrastructure Costs

There will be a difference in the costs associated with providing the track or way for the systems. This cost will include the construction and rehabilitation of the systems. For the ABUS system, costs for magnetic strips used in automation – both for the initial construction and rehabilitation – are also included as part of this cost category. Rehabilitation costs are included in this category, since these costs are more akin to construction costs than to maintenance costs that are incurred on a more routine basis. In addition, costs associated with fleet purchase and renewal are included in this category, since they are capital costs. Right-of-way costs are also considered here. It is noteworthy that right-of-way costs for stations and system-supporting infrastructure (such as overhead electrical) were included for the light rail system, but were not included for the ABUS and BDL systems. Depending on the type of bus stations provided, these could be minimal or significant.

Because of the differences in the traveled way provided for the different options, there will be differences in costs. It should be noted that the roadway for the ABUS may be narrower and related costs will be lower than the corresponding costs for the dedicated bus lanes because of more accurate lane-keeping by AHS vehicles. The structural cost of the pavement may also be lower, because of more efficient construction resulting from less "wander" of the vehicles, but that is difficult to quantify without extensive study.

Vehicle Operations Costs

Vehicle operations costs include costs associated with driver wages and fringe benefits, fuel, tires, and other materials, supplies, wages, fringe benefits, and miscellaneous expenses.

Vehicle operating costs will be fundamentally different for all of the systems because of the difference in the vehicle types and capacity, the number of vehicle-miles traveled, the number of vehicle-hours operated, and the number of operators needed. There may also be reduced fuel consumption for the ABUS because of reduced wind drag resulting from close following, although this may not be significant at low operating speeds, and were not considered in this analysis. There will be additional costs related to vehicle operations to automate the ABUS.

To estimate the vehicle operations costs, operational revenue-miles and revenue-hours for four different time regimes were calculated for each of the three systems being compared. These periods were the same as the periods used by the VTA in its data collection. They are: AM Peak (5:30-8:30), Midday (8:30 to 14:30), PM Peak (14:30 to 17:30), and Off-Peak (17:30 to 5:30) periods. Also, a differentiation was made between weekday, Saturday, and Sunday traffic volumes for calculation purposes for each system.

In order to assure functional equivalence of the three systems being compared, the revenuemiles and –hours used for calculation of costs of the light rail system were based on the existing VTA schedule, and user volumes were considered to be constant for all three systems. The revenue-miles and –hours associated with the ABUS were found by creating an ABUS system that is functionally-equivalent to the light rail. This was done by assuming that the ABUS convoys operate with the same frequencies as the light rail trains in the VTA system and that a three-car light rail train is equivalent to (i.e. - carries the same number of passengers as) a five-car ABUS convoy, a two-car train is equivalent to a three-car ABUS convoy, and a one-car train is equivalent to a one-bus convoy.

The BDL system was assumed to operate the same number of buses as the ABUS system, though those buses are each operated by a driver and do not convoy. Rather than convoying, BDL buses were assumed to operate under shorter headways, though hourly passenger throughput remained the same as for the ABUS. Also with regards to functional equivalence, the service lengths for all systems were considered to be identical.

Vehicle Maintenance Costs

Annual costs for vehicle maintenance include vehicle upkeep, and are a function of the number of operating hours and operating miles each system uses annually, and of the unit cost for each expense incurred in terms of operating hours and operating miles. The procedures used to calculate these costs were similar to those used for calculation of vehicle operating costs.

System (Non-Vehicle) Maintenance Costs

Annual costs for system (non-vehicle) maintenance include routine system upkeep, and are a function of the number of operating hours and operating miles each system uses annually, and of the unit cost for each expense incurred in terms of operating hours and operating miles. The procedures used to calculate these costs were similar to those used for calculation of vehicle operating costs.

System Administration Costs

Annual general administration costs include those costs related to coordination and other office functions necessary for the operation of the system, and are a function of the number of operating hours and operating miles each system uses annually, and of the unit cost for each expense incurred in terms of operating hours and operating miles. The procedures used to calculate these costs were similar to those used for calculation of vehicle operating costs.

Administration costs and system operating costs have some fixed elements and some elements are a function of the size of the system. These costs are related to the management and offices, salaries and benefits, transportation supervision (dispatchers, inspectors etc.), office expenditures (heat, light, telephone, rentals etc.), building and fixed plant expenditures, support services (promotion, legal, audit, purchasing and taxes). Since only a part of the complete transit system functioning concurrently with the study section was considered (the remainder of the bus service and purchased transportation operating off the main trunkline was not considered), it would be difficult to separate out the differences in

these costs that could be attributed to using the light rail versus the ABUS. These costs were therefore considered to be common to both systems.

User Costs

The only user costs considered here were those associated with travel time. It should be noted that counting the fare as a cost would actually amount to double-counting.

Travel time consists of user on-board travel time, access time, and egress time. The system boundaries were chosen such that only users and vehicles operating along the specified trunkline are considered to be within the project domain. Consequently, the feeder and distribution system, which in this case would be buses or automobiles, will be excluded. When a bus, for instance, exits the dedicated bus lane onto another city street, that vehicle has effectively exited the domain of the project.

The on-board travel times for all systems were the same, since it was assumed that the vehicle travel times would be equivalent. The access time was assumed to consist only of the wait time, which was equivalent for the ABUS and light rail systems, and considerably less for the BDL system. Egress time was, in general, not considered in this study because it was assumed to be equal for all systems. Some issues related to transfer time for the AHS and BDL systems will be discussed in a later section.

The passenger volumes for all systems were assumed to be the same, although it is possible that the demand could change depending on the type of system and the access to the system. For instance, on the BDL system, if buses were to access the dedicated lane from an origin some distance from the dedicated lane and there were no transfer time involved, this could reduce user transfer time, making the system more attractive. A similar situation could arise for the ABUS system, although in this case additional travel time could result from the time taken by the convoys to "form up."

3.4 References

- 1. Tsao, H.-S.J., Botha, J.L., Zabyshny, A.A., Day, J.E. Definition and Evaluation of Bus and Truck Automation Operations Concepts: Final Report. California PATH Research Report UCB-ITS-PRR-2003-19. May 2003.
- 2. A Policy on the Geometric Design of Highways and Streets. American Association of State Highway and Transportation Officials (AASHTO). 2001.

4 LIGHT-RAIL COSTS

4.1 Light Rail Study Section Specifications

As stated before, the study section consists of a 5.19-mile segment of the VTA light rail system extending from Japantown/Ayer Station north to Baypointe Station. The 5.19-mile section (10.38 track-miles in both directions) does not include mileage necessary for crossovers and yard tracks. An estimate of this effective mileage is required for the calculation of some of the costs – specifically, those costs associated with traveled-way construction. In order to estimate the total effective system mileage it was assumed that the percentage of crossover and yard track miles for the study section is the same as for the overall-light rail system operated by VTA.

The VTA system consists of roughly 60 miles of track dedicated to route miles, and 2 additional miles dedicated to crossovers and yard miles. This means that the total effective mileage is equal to the total route mileage increased by roughly 2/60, or 3.33%. The effective track mileage for the study section is therefore 5.36. Station and link data for the light rail system, supplied by the VTA, are presented in Appendix A. Appendix A also shows system length calculations and supporting tables. Figure 3.2 shows a schematic description of the light rail track layout.

For the base system, existing passenger volumes, as reported by the VTA, were assumed to apply to the light rail system. These are the passenger volumes which are used in all applicable calculations.

4.2 Light-Rail Costs – Base Volume

4.2.1 Light-Rail System Planning and Design Costs

The costs for the VTA Tasman West light-rail project was used as a basis for estimating planning and design costs for the study section. Planning and design costs include VTA labor, consulting and legal costs. The 7.6-mile double-track (which includes crossover and yard-track miles) Tasman West line was completed in 1999, and information on system planning and design was provided by the VTA in the form of a summary of construction costs.

The 1999 costs were converted to 1999-equivalent unit costs by dividing the total cost of construction by 15.2 miles (twice 7.6 miles) to calculate a cost per track-mile. Then, the unit costs were converted to 2001-equivalent costs by accounting for inflation. The unit costs were multiplied by 10.73, the total number of track-miles in the study section (5.36 miles in each direction) to obtain the total 2001-equivalent costs for the proposed light rail study section. It is noteworthy that rounding error was the cause of the two-directional study section length to be approximated at 10.73 miles, instead of the 10.72 miles expected when 5.36 is doubled. Because of the magnitude of the costs reported here, and also because of the approximate nature of the cost calculations, this rounding error only negligibly affects the

TABLE 4.1. LIGHT RAIL SYSTEM PLANNING, DESIGN, CONSTRUCTION, REHABILITATION, INFRASTRUCTURE, AND OTHER CAPITAL COSTS

| Cost Element | ltem | Year | VTA Total Cost (\$) | Unit Cost (\$)ª | Unit | Unit Cost (2001- Equiv. \$) | Unit | # of Units in Study Section | Unit | One-Time Cost (\$) | EUAC (2001- Equiv. \$) |
|---|--|------|------------------------|-----------------|-----------------------------------|--------------------------------|------------------------------------|--------------------------------|-----------------------|-----------------------|---------------------------|
| | Design Consultants | 1999 | 60,266,983 | 3,964,933 | track mile | 4,104,895 | track mile | 10.73 | track miles | 44,027,686 | 3,198,563 |
| | Professional Consultants | 1999 | 49,651,941 | 3,266,575 | track mile | 3,381,885 | track mile | 10.73 | track miles | 36,272,930 | 2,635,189 |
| System Planning and Design Costs | VTA Labor | 1999 | 25,086,106 | 1,650,402 | track mile | 1,708,661 | track mile | 10.73 | track miles | 18,326,506 | 1,331,401 |
| | Non-Technical Services | 1999 | 3,453,199 | 227,184 | track mile | 235,204 | track mile | 10.73 | track miles | 2,522,714 | 183,272 |
| | TOTAL | | | | | | | | | | 7,348,425 |
| | Property Costs/ ROW Acquistion | 1999 | 34,166,626 | 23.65 | sq. foot | 24.49 | sq. foot | 791,952 | sq. feet | 19,391,768 | 1,408,791 |
| | Utility Relocations | 1999 | 9,015,859 | 593,149 | track mile | 614,087 | track mile | 10.73 | track miles | 6,586,482 | 478,501 |
| Infrastructure Costs | Material and Equipment | 1999 | 12,619,406 | 830,224 | track mile | 859,531 | track mile | 10.73 | track miles | 9,219,032 | 669,753 |
| initastructure Costs | Civil/Structural Construction | 1999 | 113,150,901 | 7,444,138 | track mile | 7,706,916 | track mile | 10.73 | track miles | 82,661,718 | 6,005,284 |
| | Systems | 1999 | 19,547,712 | 1,286,034 | track mile | 1,331,431 | track mile | 10.73 | track miles | 14,280,465 | 1,037,460 |
| | TOTAL | | | | | | | | | | 9,599,788 |
| Non-Infrastructure Capital Costs | Fleet Purchase (Vehicle Purchase) | 2001 | N/A | 3,000,000 | vehicle | 3,000,000 | USD per veh | 6.288 | vehicles | 18,863,654 | 1,370,424 |
| | Major Rehabilitation (Tangent Track Sections) ^b | 2002 | N/A | 0 | year | 0 | per year per veh | N/A | N/A | 0 | 0 |
| Periodic Capital Costs | Major Rehabilitation (Curved Track Sections) | 2002 | N/A | 134,228 | per 10 years per track mile | 8,319 | per year per track mile | 4.037 | track miles | N/A | 33,586 |
| i enouic capital costs | Major Rehabilitation (System/ Wayside Maintenance) | 2002 | N/A | 50,000 | per year per double-track mile | 49,020 | per year per double- track mile | 5.19 | double-track miles | N/A | 254,414 |
| | TOTAL | | | | | | | | | | 287,999 |
| Fleet Renewal | Vehicle Replacement Costs | | | 0 | per year per veh. | 0 | per year per veh. | 0 | veh. | 0 | 0 |
| TOTAL CONSTRUCTION, REHABILITATION, AN | TAL CONSTRUCTION, REHABILITATION, AND OTHER INFRASTRUCTURE COSTS | | | | | | | | 11,258,212 | | |
| TOTAL SYSTEM PLANNING, DESIGN, CONSTRUCTION, REHABILITATION, AND OTHER INFRASTRUCTURE COSTS | | | | | | | | | 18,606,637 | | |
| Posed on 7.6 mile line length, double track aveter | - f t-t-t-f-f-f-0 tt | | | | | | | | | | |

^a Based on 7.6-mile line length, double-track system, for a total of 15.2 trackway miles.

b Rehabilitation of tangent track sections is estimated by VTA personnel to occur every 75 to 100 years. This time period is beyond the scope of this study, and tangent section rehabilition is thus considered to be negligable.

results of the study. Using a 30-year useful life, an Equivalent Uniform Annual Cost (EUAC) was calculated using 2001 as the base year. The costs for the study section are shown in Table 4.1. Methodologies and sample calculations are available in Appendix C.

4.2.2 Light Rail Infrastructure Costs

Construction costs for the light-rail system were also estimated using the completed VTA Tasman West light rail project as a basis. Information on construction costs was provided by VTA in the form of a summary of construction contract costs. The same procedure used to determine light rail system planning and design costs was used to determine the construction costs. Construction costs include those expenses associated with civil infrastructure, electrical systems, right-of-way acquisition, utilities, materials and equipment, and non-technical services. This cost category does not include vehicle procurement. The resulting costs are shown in Table 4.1.

4.2.3 Light-Rail Fleet Purchase

Initial fleet purchase costs for the light-rail system for the study section depend on the cost per vehicle and the number of vehicles purchased. VTA personnel estimate that an average light rail vehicle purchased in 2001 costs in the range of \$2.5 - \$3 million, depending on traction, drive, integration, and other factors. A cost of \$3 million per light-rail vehicle was assumed for the purposes of this project.

To determine the costs of the light rail vehicles allocated to the study section, it was assumed that the number of vehicles would be proportional to the length of the study section for the base volume condition. Appendix C shows calculations for the number of light rail cars needed to service the proposed light rail line for this project (see Table C4) and discusses annual cost calculation methodologies. Table 4.1 shows the costs.

4.2.4 Light-Rail Rehabilitation Costs

Rehabilitation costs associated with a light-rail system can be subdivided into three categories:

- Tangent track section rehabilitation
- Curved track section rehabilitation
- Wayside Rehabilitation

Wayside rehabilitation refers to the costs for repairing and upgrading non-track elements of the light rail system (e.g. – shelters at passenger stations, electrical lines, etc.). These costs reflect as-needed improvements, which is why they are classified as rehabilitation expenses and not included in the "System Maintenance Costs" described in a later section.

The costs of the various categories of rehabilitation for the study section were based on data provided by the VTA.

Tangent and Curved Track Mileages

For the entire VTA system, the 60 miles of single track is comprised of 22.35 miles of curved track and 39.65 miles of tangent sections (this figure does not include approximately 2 miles of track dedicated to crossovers and yard tracks). Assuming crossover mileage fits into the curved track category, and yard tracks are tangent sections, and assuming that one mile of the aforementioned two miles is used for crossovers, this implies that roughly 37.66% (23.35/62) of the VTA rail system is made up of curved track. Applying this percentage to the 10.72-effective track-miles (5.36 miles in each direction) study section this would result in the following lengths of curved and tangent tracks:

Curved track: 4.037 milesTangent track: 6.683 miles

Curved Track Section Rehabilitation

VTA personnel estimate that \$3,000,000 (in 2002 dollars) is required every ten years to rehabilitate the curved sections of the existing Guadalupe light rail line. For the estimated 4.037 miles of curved sections of the study section, the rehabilitation cost would amount to \$33,586 per year per one-directional track mile after converting the cost to 2001 dollars. Methodologies used to arrive at this figure can be viewed in Appendix C.

Tangent Track Section Rehabilitation

For tangent track sections, VTA personnel estimate that rehabilitation occurs at a 75 to 100-year frequency. Because the rehabilitation cycle is longer than the 30-year assumed life of this project, costs associated with tangent track rehabilitation are considered to be negligible for the purpose of this analysis.

Wayside Rehabilitation

VTA personnel estimate system and wayside rehabilitation costs at approximately \$50,000 per year per double-track mile (2002 dollars) for the existing Guadalupe line, which is 20.8 miles long. For the 5.19 track-mile study section, this results in system and wayside rehabilitation costs of \$254,414 per year per double-track mile after conversion to 2001 dollars. It is noteworthy that the effective track length is not used here because there would be little, if any, wayside rehabilitation associated with crossover tracks and yard tracks. Table 4.1 shows tabulated costs for wayside rehabilitation. Methodologies and sample calculations for determination of costs can be found in Appendix C.

4.2.5 Light Rail Fleet Renewal Costs

According to VTA personnel, modern light rail vehicles are built to have a useful life of 30 years, to comply with the 25-year amortization period required by the federal government. Since the assumed life of this project is also 30 years, fleet renewal is of zero cost in the domain of this project. It is noteworthy that VTA is currently replacing its 15-year-old fleet

– not due to vehicle wear, but because the vehicles are being upgraded with low-floor light rail cars.

4.2.6 Light Rail Vehicle Operations Costs

Costs associated with vehicle operations include daily costs necessary to run the system, including operators' salaries, wages and benefits, fuel and oil, utilities, and other expenses. Vehicle operating costs do not include costs for routine vehicle maintenance, such as tire replacement and labor costs for workers performing the maintenance.

The calculation of the light rail study system vehicle operating costs was carried out in the following phases:

- Determination of individual cost elements that comprise costs in this category (discussed in Appendix C).
- Determination of unit costs for those cost elements in terms of vehicle-revenue-miles and vehicle-revenue-hours (discussed in Appendix C).
- Determination of annual train-revenue-miles and –hours for the study section (discussed in Appendix D).
- Determination of unit costs for each cost element, based on the VTA light rail system, in terms of vehicle-revenue-miles and vehicle-revenue-hours, or trainrevenue-miles and –hours.
- Calculation of light rail study system annual costs based on unit costs and calculated vehicle-revenue-miles and –hours, or train-revenue-miles and –hours.

Individual cost elements, unit costs, annual vehicle-revenue-miles and –hours (which are the same for all cost categories), and overall annual costs are shown in Table 4.2. Methodologies and sample calculations for operating cost calculations are shown in Appendix C.

4.2.7 Light Rail Vehicle Maintenance Costs

Costs associated with vehicle maintenance include materials, supplies, fuels, lubricants, utilities, and labor used to keep the system in good working order, and are not included in vehicle operating costs. Cost calculations for vehicle maintenance follow identical methodologies for those in the "Vehicle Operating Costs" category. Individual cost elements, unit costs, annual vehicle-revenue-miles and –hours, and overall annual costs are shown in Table 4.3. Methodologies and sample calculations for operating cost calculations are shown in Appendix C.

4.2.8 Light Rail System (Non-Vehicle) Maintenance Costs

Costs associated with system maintenance include maintenance expenses for stations and trackways. Cost calculations for system maintenance follow identical methodologies for those in the previous "Vehicle Operating Costs" category. Individual cost elements, unit costs, annual vehicle-revenue-miles and –hours (which are the same for all cost categories),

TABLE 4.2. LIGHT RAIL VEHICLE OPERATIONS COSTS

| | | | Revenue | -Miles | | Revenue-Hours | | | | |
|--------------------|-------------------------------|--------------------------------|------------------------------|--------------|---------------------------|--------------------------------|------------------------------|--------------|---------------------------|--|
| Cost Element | ltem | Unit Cost (2001- Equiv. \$) | Annual Units in LR System | Unit | EUAC (2001- Equiv. \$) | Unit Cost (2001- Equiv. \$) | Annual Units in LR System | Unit | EUAC (2001- Equiv. \$) | |
| Salaries and Wages | Operators' Salaries and Wages | 2.27 | 276,035 | Train-Rev-Mi | 625,840 | 33.55 | 15,439 | Train-Rev-Hr | 517,923 | |
| Salaries and wages | Other Salaries and Wages | 0.48 | 448,068 | Veh-Rev-Mi | 213,235 | 7.06 | 25,061 | Veh-Rev-Hr | 176,823 | |
| Fringe Benefits | Operators' Fringe Benefits | 1.86 | 276,035 | Train-Rev-Mi | 514,622 | 27.59 | 15,439 | Train-Rev-Hr | 425,883 | |
| Fillige belieffts | Other Fringe Benefits | 0.39 | 448,068 | Veh-Rev-Mi | 175,341 | 5.80 | 25,061 | Veh-Rev-Mi | 145,400 | |
| Services | Services | 0.30 | 448,068 | Veh-Rev-Mi | 136,416 | 4.51 | 25,061 | Veh-Rev-Mi | 113,122 | |
| Materials and | Fuel and Lubricants | | | | | | | | | |
| Supplies | Tires and Lubes | | | | | | | | | |
| Supplies | Other Materials and Supplies | 0.01 | 448,068 | Veh-Rev-Mi | 3,589 | 0.12 | 25,061 | Veh-Rev-Mi | 2,976 | |
| Utilities | Utilities | 0.82 | 448,068 | Veh-Rev-Mi | 366,665 | 12.13 | 25,061 | Veh-Rev-Mi | 304,054 | |
| Taxes | Taxes | | | | | | | | | |
| Misc. | Miscellaneous Expenses | -0.01 | 448,068 | Veh-Rev-Mi | -6,555 | -0.22 | 25,061 | Veh-Rev-Mi | -5,435 | |
| Expense Transfers | Expense Transfers | | | | | | | | | |
| TOTAL LIGHT RAIL V | /EHICLE OPERATIONS COSTS | | | | 2,029,153 | | | | 1,680,746 | |

TABLE 4.3. LIGHT RAIL VEHICLE MAINTENANCE COSTS

| | | Vehic | de-Revenue-Miles | 3 | Vehic | le-Revenue-Hours | |
|------------------------|-------------------------------|------------------------|------------------|------------------|------------------------|------------------|------------------|
| Cost Element | Item | Unit Cost (2001-Equiv. | Annual Units in | Annual Cost | Unit Cost (2001-Equiv. | Annual Units in | Annual Cost |
| | | \$) | LR System | (2001-Equiv. \$) | \$) | LR System | (2001-Equiv. \$) |
| | Operators' Salaries and Wages | | | | | | |
| Salaries and Wages | Operating Time | | | | | | |
| Salaries and Wages | Paid Non-Operating Work Time | | | | | | |
| | Other Salaries and Wages | 1.36 | 448,068 | 609,023 | 20.15 | 25,061 | 505,027 |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | |
| Tillige Delients | Other Fringe Benefits | 0.95 | 448,068 | 426,521 | 14.11 | 25,061 | 353,690 |
| Services | Services | 0.22 | 448,068 | 98,617 | 3.26 | 25,061 | 81,778 |
| | Fuel and Lubricants | 0.03 | 448,068 | 12,147 | 0.40 | 25,061 | 10,073 |
| Materials and Supplies | Tires and Lubes | | | | | | |
| | Other Materials and Supplies | 0.49 | 448,068 | 221,011 | 7.31 | 25,061 | 183,272 |
| Utilities | Utilities | 0.00 | 448,068 | 928 | 0.03 | 25,061 | 770 |
| Taxes | Taxes | | | | | | |
| Misc. | Miscellaneous Expenses | 0.01 | 448,068 | 2,960 | 0.10 | 25,061 | 2,454 |
| Expense Transfers | Expense Transfers | | | | | | |
| TOTAL LIGHT RAIL VEHIC | CLE MAINTENANCE COSTS | 3.06 | | 1,371,208 | 45.37 | | 1,137,063 |

and overall annual costs are shown in Table 4.4. Methodologies and sample calculations for operating cost calculations are shown in Appendix C.

4.2.9 Light Rail System Administration Costs

Costs associated with system administration include expenses incurred for system support personnel in VTAs offices. Cost calculations for system administration follow identical methodologies for those in the previous "Vehicle Operating Costs" category. Individual cost elements, unit costs, annual vehicle-revenue-miles and –hours (which are the same for all cost categories), and overall annual costs are shown in Table 4.5. Methodologies and sample calculations for operating cost calculations are shown in Appendix C.

4.2.10 Light Rail User Costs

For the purposes of this study, user costs are assumed to be costs associated with rider wait and on-board travel time, and do not include fares. Table 4.6 shows a summary of calculated user costs for the study segment. Tables containing user time calculations can be found in Appendix E, along with methodologies and sample calculations.

User costs were based on on-off ridership data for the VTA light rail system. The data were obtained from VTA, and are given for weekday, Saturday, and Sunday ridership in both the northbound and southbound directions. Additionally, data for each day are divided into four periods: AM Peak (5:30-8:30 am), Midday (8:30 am – 2:30 pm), PM Peak (2:30 pm – 5:30 pm), and Off-Peak (5:30 pm – 5:30 am). Appendix F shows the on-off data.

Cost calculations for overall user costs were completed in the following sequence:

- Determination of user wait- and travel-time unit values (in \$).
- Calculation of daily passenger wait time for weekdays and weekends.
- Calculation of daily passenger on-board travel time for weekdays and weekends.
- Summation of daily wait time and travel time, and of annual wait and travel time.
- Calculation of wait- and travel-time costs.

The unit value of user wait and travel time was found to be equal to \$8.32 in 2001-dollars. This value was based on a value of \$8.16 (in 1999 dollars) used by Caltrans (1), which was adjusted for inflation to 2001 dollars using a factor of 1.0353 (2).

Methodologies, sample calculations, and supporting tables for the user cost calculations can be found in Appendix E.

4.3 Light-Rail Cost Summaries

Table 4.7 shows a summary of all calculated costs associated with the rail system.

4.4 References

- 1. Booz: Allen and Hamilton Inc. *California Life-Cycle Benefit/Cost Analysis Model* (Cal-B/C). California Department of Transportation. September 1999.
- 2. GDP Deflator Inflation Calculator. Online. http://www.jsc.nasa.gov/bu2/inflate.html

TABLE 4.4. LIGHT RAIL SYSTEM (NON-VEHICLE) MAINTENANCE COSTS

| | | V | ehicle-Revenue-N | Miles | V | ehicle-Revenue-F | lours |
|------------------------|-------------------------------|------------------|------------------|--------------------|------------------|------------------|--------------------|
| Cost Element | Item | Unit Cost (2001- | # Units in LR | Annual Cost (2001- | Unit Cost (2001- | # Units in LR | Annual Cost (2001- |
| | | Equiv. \$) | System | Equiv. \$) | Equiv. \$) | System | Equiv. \$) |
| | Operators' Salaries and Wages | | | | | | |
| Salaries and Wages | Operating Time | | | | | | |
| Salaries and wayes | Paid Non-Operating Work Time | | | | | | |
| | Other Salaries and Wages | 1.05 | 448,068 | 468,739 | 15.51 | 25,061 | 388,698 |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | |
| Fringe Benefits | Other Fringe Benefits | 0.65 | 448,068 | 293,388 | 9.71 | 25,061 | 243,289 |
| Services | Services | 0.37 | 448,068 | 166,745 | 5.52 | 25,061 | 138,272 |
| | Fuel and Lubricants | 0.00 | 448,068 | 2,029 | 0.07 | 25,061 | 1,682 |
| Materials and Supplies | Tires and Lubes | | | | | | |
| | Other Materials and Supplies | 0.04 | 448,068 | 17,726 | 0.59 | 25,061 | 14,699 |
| Utilities | Utilities | 0.20 | 448,068 | 87,721 | 2.90 | 25,061 | 72,742 |
| Taxes | Taxes | | | | | | |
| Misc. | Miscellaneous Expenses | 0.01 | 448,068 | 4,666 | 0.15 | 25,061 | 3,869 |
| Expense Transfers | Expense Transfers | | | | | | |
| TOTAL LIGHT RAIL VEHI | CLE MAINTENANCE COSTS | 2.32 | | 1,041,014 | 34.45 | | 863,252 |

TABLE 4.5. LIGHT RAIL SYSTEM ADMINISTRATION COSTS

| | | Ve | ehicle-Revenue-M | 1iles | Vehicle-Revenue-Hours | | | |
|------------------------|-------------------------------|------------------|------------------|-------------|-----------------------|---------------|-------------|--|
| Cost Category | Item | Unit Cost (2001- | # Units in LR | EUAC (2001- | Unit Cost (2001- | # Units in LR | EUAC (2001- | |
| | | Equiv. \$) | System | Equiv. \$) | Equiv. \$) | System | Equiv. \$) | |
| | Operators' Salaries and Wages | | | | | | | |
| Salaries and Wages | Operating Time | | | | | | | |
| Salalies and Wages | Paid Non-Operating Work Time | | | | | | | |
| | Other Salaries and Wages | 2.50 | 448,068 | 1,119,918 | 37.06 | 25,061 | 928,683 | |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | | |
| Fillige Bellelits | Other Fringe Benefits | 2.26 | 448,068 | 1,013,297 | 33.53 | 25,061 | 840,268 | |
| Services | Services | 0.70 | 448,068 | 312,903 | 10.35 | 25,061 | 259,472 | |
| | Fuel and Lubricants | | | | | | | |
| Materials and Supplies | Tires and Lubes | | | | | | | |
| | Other Materials and Supplies | 0.12 | 448,068 | 55,810 | 1.85 | 25,061 | 46,280 | |
| Utilities | Utilities | 0.02 | 448,068 | 8,819 | 0.29 | 25,061 | 7,313 | |
| Taxes | Taxes | | | | | | | |
| Misc. | Miscellaneous Expenses | 0.18 | 448,068 | 81,613 | 2.70 | 25,061 | 67,677 | |
| Expense Transfers | Expense Transfers | | | | | | | |
| TOTAL LIGHT RAIL SYSTE | EM ADMINISTRATION COSTS | 5.79 | | 2,592,359 | 85.78 | | 2,149,693 | |

TABLE 4.6. LIGHT RAIL TOTAL USER COSTS

| Day | Element | Daily User-Hours | Cost/User-Hour (\$) | Daily Cost (\$) | Annual Cost (\$) |
|----------------------------|----------------------|------------------|---------------------|-----------------|------------------|
| Weekday | Wait Time | 733 | 8.32 | 6099 | 1,591,724 |
| vveekuay | On-Board Travel Time | 1126 | 8.32 | 9366 | 2,444,462 |
| Saturday | Wait Time | 408 | 8.32 | 3395 | 176,532 |
| Saturday | On-Board Travel Time | 601 | 8.32 | 4999 | 259,952 |
| Sunday | Wait Time | 346 | 8.32 | 2877 | 149,625 |
| Sunday | On-Board Travel Time | 511 | 8.32 | 4252 | 221,084 |
| TOTAL WAIT TIME | | | | | 1,917,881 |
| TOTAL ON-BOARD TRAVEL TIME | | | | | 2,925,498 |
| TOTAL | | | | 30,987 | 4,843,378 |

TABLE 4.7. LIGHT RAIL COST SUMMARY (\$)

| Cost Category | Vehicle-Revenue-Miles | Vehicle-Revenue-Hours | Average |
|--|-----------------------|-----------------------|---------------|
| Cost Category | EUAC (30 yrs) | EUAC (30 yrs) | EUAC (30 yrs) |
| System Planning and Design | 7,348,425 | 7,348,425 | |
| Construction, Rehabilitation, and Other Infrastructure | 11,258,212 | 11,258,212 | |
| Vehicle Operations | 2,029,153 | 1,680,746 | |
| Vehicle Maintenance | 1,371,208 | 1,137,063 | |
| System (Non-Vehicle) Maintenance | 1,041,014 | 863,252 | |
| System Administration | 2,592,359 | 2,149,693 | |
| User | 4,843,378 | 4,843,378 | |
| TOTAL COST | 30,483,749 | 29,280,770 | 29,882,259 |

5 ABUS COSTS

5.1 System Characteristics

The ABUS study system is assumed to be functionally equivalent to the light rail study section discussed in Chapter 4 of this report. In order to achieve functional similarity, the following light rail system characteristics have also been applied to the ABUS system:

- Study system length and location
- Study system passenger stations
- Study system passenger volume data

5.2 ABUS Study Section Specifications

Two separate design scenarios were developed for the ABUS system. Design Scenario 1 reflects standards set forth by the American Association of State Highway and Transportation Officials (AASHTO), which provides geometric design standards for non-automated streets and highways in its *A Policy on Geometric Design of Highways and Streets* (1). Design Scenario 2 reflects a principle suggested by Steven Shladover of The California Partners for Advanced Transit and Highways (PATH) project, which asserts that travel lanes for trucks and buses using automated technologies need be only 30 cm (0.98 feet) wider than the vehicles using them.

The following dimensions, which include travel lanes in both directions, were determined to be the minimum required right-of-way width for the ABUS system:

Design Scenario 1: 26 feet Design Scenario 2: 19 feet.

The ABUS system operates on a dedicated right-of-way in the median of a regular roadway. As with the light rail system, the ABUS lanes operate at-grade, without physical barriers to separate the ABUS lanes from each other, or from the regular traffic. AASHTO (1) requires a 15-foot pavement width be used in this case to accommodate any design bus; however, included in this 15 feet is a two-foot width which accounts for wandering of the vehicle within the lane. Because it is assumed that automated technology will guide these buses without the wavering associated with manual steering, it is assumed that this two feet can be subtracted from the lane width. The resulting requirement is a 13-foot pavement width for each direction of travel. AASHTO standards for tangent sections of ramps were used to determine required widths. Additional widths may be required for horizontal curves.

The width of 19 feet associated with Design Scenario 2 was determined based on the principle that the width required for the roadway must be 30 cm (0.98 feet) wider than the design vehicle. The chosen design vehicle, the City Bus, is 8.5 feet wide. This implies a 9.5-foot traveled way in each direction, or 19 feet in total. Appendix G discusses width

calculations for Design Scenarios 1 and 2 in more detail. Figures 3.3 and 3.4 show design concepts for Design Scenarios 1 and 2, respectively.

5.3 ABUS Cost Calculations

5.3.1 ABUS Infrastructure Costs

The ABUS is a theoretical system, and therefore costs related to infrastructure and other capital expenditures are not available in literature or other research reports. Costs associated with construction, rehabilitation, and other capital expenses were estimated based on data obtained from the VTA and the City of San Jose (CSJ).

Costs associated with constructing the ABUS system were calculated based on a recent City of San Jose roadway improvement project – the Hope Street project – where the roadway was widened but some existing pavement was salvaged for the new design. Discussion of the Hope Street project as the base project is available in Appendix G.

The ABUS study system construction cost calculations are based on the assumption that the aforementioned Hope Street project is scalable to ABUS system dimensions. For all costs except those associated with right-of-way acquisition, the following general procedure was followed to calculate construction costs for the ABUS system:

- The cost items were divided into two categories: those which would be applicable to any ABUS section, and those which were site-specific, meaning that they are dependent on the location of the project.
- Unit costs for work items were identified from the Hope Street project contract documents.
- Unit costs were converted to 2001-equivalent costs by adjusting for inflation
- The unit costs were applied to corresponding quantities for the ABUS section to calculate the construction costs.
- Construction costs were calculated based on adjusted unit costs and unit quantities for the ABUS system.
- Costs were converted to Equivalent Uniform Annual Costs (EUAC) with 2001 as the base year.

Tables 5.1a and 5.1b give tabulated annual costs for the ABUS Design Scenarios 1 and 2, respectively. Methodologies, sample calculations, and supporting tables for derivation of these costs are given in Appendix G. Costs associated with right-of-way acquisition are also discussed in Appendix G.

5.3.2 ABUS System Planning and Design Costs

Project engineers for the City of San Jose estimated the planning and design costs for the Hope Street project to be roughly \$96,000. Since the Hope Street project is much smaller than the proposed ABUS system, the system planning and design costs were scaled up using the same approach as was used for the construction costs to obtain ABUS system planning

and design costs. Methodologies, sample calculations, and supporting tables for derivation of these costs are given in Appendix G. Tables 5.1a and 5.1b show the tabulated estimated system planning and design costs for Design Scenarios 1 and 2, respectively.

5.3.3 ABUS Non-Infrastructure Capital Costs

Costs for non-infrastructure capital expenses include bus fleet purchase and purchase of automation technology for outfitting the vehicles to operate in an automated mode.

ABUS Fleet Purchase Costs

The following assumptions were used in determining fleet size:

- Fleet requirements were determined by the number of buses needed during the weekday period with the highest-volume and the lowest average headways (this is the PM peak northbound direction).
- In order to make the ABUS system compatible to the light rail system, bus-convoy sizes were calculated that would provide a capacity approximately equal to that of the corresponding light rail train sizes. It is assumed that bus-convoy sizes of these magnitudes would be possible and safe. The following equivalencies represent light-rail-train and equivalent bus-convoy sizes:
 - 3 light rail vehicles = 5 buses
 - 2 light rail vehicles = 3 buses
 - 1 light rail vehicle = 1 bus
- The number of buses allocated to the cost of the 5.19-mile proposed ABUS system length is proportional to the length of the line. This assumption is appropriate because it is assumed that the proposed project system is a portion of the regular system, and not a stand-alone system in itself.
- Approximately 20 percent of vehicles are not in service at any given time for maintenance and contingency purposes.

Three significant figures have been retained in the calculation of ABUS-system fleet requirements to distinguish this number as being a derived quantity, and a portion of a whole, rather than representative of a self-contained system.

It was determined that 10.180 buses are required to operate an ABUS system equivalent to the VTA light rail operations on the study segment. This number appears in the "# Units in ABUS System" column in Tables 5.1a and 5.1b for Design Scenarios 1 and 2, respectively.

Table G10 in Appendix G shows the applicable calculations for arriving at this figure. Appendix G also discusses methodologies and sample calculations for fleet size calculations.

TABLE 5.1a. ABUS SYSTEM PLANNING AND DESIGN, CONSTRUCTION, REHABILITATION, AND OTHER INFRASTRUCTURE COSTS - DESIGN SCENARIO 1: DESIGN FOLLOWS AASHTO STANDARDS

| | ltem | Year | Unit Cost (\$) | Unit | Unit Cost (2001-Equiv. | Unit | # of Units in ABUS System | One-Time Cost (2001-Equiv. \$) | EUAC (2001- Equiv. \$) |
|--|---|-------|----------------|-------------|------------------------|-------------|------------------------------|--------------------------------|---------------------------|
| System Planning and D | Design Costs | | | | (2001 Equit: | | 71200 Gyotom | (2001 Σαμίν. ψ) | Lqαιν. ψ) |
| | VTA Personnel Labor Costs and Design Expenses | 2002 | 2,077,842 | One-Time | 2,037,115.83 | One-Time | 1 | 2,037,116 | 147,994 |
| Construction, Rehabilita | ation, and Other Infrastructure Capital Costs | | | | | | | | |
| | Right-of-Way Acquisition | 1999 | 23.65 | Sq. Foot | 24.49 | Sq. Foot | 712,483 | 17,445,882 | 1,267,424 |
| | Street Clean-Up | 2002 | 150.00 | Day | 147.06 | Day | 433 | 63,660 | 4,625 |
| | Mobilization | 2002 | 10,000.00 | Lump Sum | 9,804.00 | Lump Sum | 21.64 | 212,200 | 15,416 |
| | Traffic Control | 2002 | 2,000.00 | Lump Sum | 1,960.80 | Lump Sum | 21.64 | 42,440 | 3,083 |
| | Clearing, Grubbing, and Removal of Obstructions | 2002 | 2,500.00 | Lump Sum | 2,451.00 | Lump Sum | 21.64 | 53,050 | 3,854 |
| | Roadway Excavation | 2002 | 30.00 | Cu. Yard | 29.41 | Cu. Yard | 7,359 | 216,444 | 15,724 |
| | Subgrade Preparation-Class A | 2002 | 1.00 | Sq. Foot | 0.98 | Sq. Foot | 467,514 | 458,351 | 33,299 |
| | Imported Fill Materials | 2002 | 30.00 | Cu. Yard | 29.41 | Cu. Yard | 7,359 | 216,444 | 15,724 |
| | Deeplift/Base AC (8" max.) | 2002 | 70.00 | Ton | 68.63 | Ton | 13,203 | 906,092 | 65,827 |
| Infractructure Coate | AC Surface Course | 2002 | 80.00 | Ton | 78.43 | Ton | 5,757 | 451,561 | 32,805 |
| Infrastructure Costs | AC Base Course | 2002 | 80.00 | Ton | 78.43 | Ton | 9,091 | 712,991 | 51,798 |
| | Cold Planing | 2002 | 1.50 | Sq. Foot | 1.47 | Sq. Foot | 21,644 | 31,830 | 2,312 |
| | Pavement Reinforcing Fabric | 2002 | 1.00 | Sq. Yard | 0.98 | Sq. Yard | 75,755 | 74,270 | 5,396 |
| | Gravel Conform | 2002 | 50.00 | Ton | 49.02 | Ton | 433 | 21,220 | 1,542 |
| | Traffic Stripes and Pavement Markings | 2002 | 800.00 | Lump Sum | 784.32 | Lump Sum | 21.64 | 16,976 | 1,233 |
| | Street Lighting System | 2002 | 60,000.00 | Lump Sum | 58,824.00 | Lump Sum | 21.64 | 1,273,197 | 92,496 |
| | Geotextile | 2002 | 3.00 | Linear Foot | | Linear Foot | 23,809 | 70,026 | 5,087 |
| | Site-SpecificWork Items | 2002 | 9,828,623.28 | Lump Sum | 9,635,982.26 | Lump Sum | 1.00 | 9,635,982 | 700,044 |
| | Magnetic Reference Markers - Includes Installation | 2001 | 5,000.00 | Lane Mile | 5,000.00 | Lane Mile | 10.38 | 51,900 | 3,770 |
| | TOTAL INFRASTRUCTURE COST | | | | | | | | 2,321,461 |
| Non-Infrastructure | Fleet Purchase | 2002 | 293,000.00 | Bus | 287,257.20 | Bus | 10.180 | 2,924,389 | 212,454 |
| Capital Costs | Automation Technology Outfitting for Vehicle | 2001 | 25,000.00 | Bus | 25,000.00 | Bus | 10.180 | 254,510 | 18,490 |
| | Minor Rehabilitation - Seals | 2002 | See Table G11 | N/A | N/A | N/A | N/A | N/A | 30,732 |
| Periodic Capital Costs | Major Rehabilitation - Resurfacing | 2002 | See Table G11 | N/A | N/A | N/A | N/A | N/A | 84,443 |
| · | Magnetic Reference Markers - Includes Installation | 2001 | See Table G11 | N/A | N/A | N/A | N/A | N/A | 8,550 |
| Flact Denousel | Bus Replacement Costs | 2002 | 293,000.00 | Bus | 287,257.20 | Bus | 10.180 | N/A | 194,959 |
| Fleet Renewal | Vehicle Automation Technology Replacement Costs | 2001 | 25,000.00 | Bus | 25,000.00 | Bus | 10.180 | N/A | 16,967 |
| FOTAL CONSTRUCTION, REHABILITATION, AND OTHER INFRASTRUCTURE COSTS 2,888,05 | | | | | | | | | |
| TOTAL DESIGN, PLAN | INING, CONSTRUCTION, REHABILITATION, AND OTHER INFR | ASTRU | CTURE COSTS | | | | | | 3,036,050 |

TABLE 5.1b. ABUS SYSTEM PLANNING AND DESIGN, CONSTRUCTION, REHABILITATION, AND OTHER INFRASTRUCTURE COSTS - SCENARIO 2: DESIGN FOLLOWS 30-CM PRINCIPLE

| | Item | Year | Unit Cost (\$) | Unit | Unit Cost (2001- Equiv. \$) | Unit | # of Units in ABUS System | One-Time Cost (2001-Equiv. \$) | EUAC (2001- Equiv. \$) |
|------------------------|--|-------|----------------|-------------|--------------------------------|-------------|------------------------------|-----------------------------------|---------------------------|
| System Planning and | d Design Costs | | | | | | | | |
| | VTA Personnel Labor Costs and Design Expenses | 2002 | 1,518,422.65 | One-Time | 1,488,661.57 | One-Time | 1 | 1,488,662 | 108,150 |
| Construction, Rehab | bilitation, and Other Infrastructure Capital Costs | | | | | | | | |
| , | Right-of-Way Acquisition | 1999 | 23.65 | Sq. Foot | 24.49 | Sq. Foot | 520,661 | 12,748,913 | 926,195 |
| | Street Clean-Up | 2002 | 150.00 | Day | 147.06 | Day | 316 | 46,521 | 3,380 |
| | Mobilization | 2002 | 10,000.00 | Lump Sum | 9,804.00 | Lump Sum | 15.82 | 155,069 | 11,266 |
| | Traffic Control | 2002 | 2,000.00 | Lump Sum | 1,960.80 | Lump Sum | 15.82 | 31,014 | 2,253 |
| | Clearing, Grubbing, and Removal of Obstructions | 2002 | 2,500.00 | Lump Sum | 2,451.00 | Lump Sum | 15.82 | 38,767 | 2,816 |
| | Roadway Excavation | 2002 | 30.00 | Cu. Yard | 29.41 | Cu. Yard | 5,378 | 158,170 | 11,491 |
| | Subgrade Preparation-Class A | 2002 | 1.00 | Sq. Foot | 0.98 | Sq. Foot | 341,645 | 334,949 | 24,334 |
| | Imported Fill Materials | 2002 | 30.00 | Cu. Yard | 29.41 | Cu. Yard | 5,378 | 158,170 | 11,491 |
| | Deeplift/Base AC (8" max.) | 2002 | 70.00 | Ton | 68.63 | Ton | 9,648 | 662,144 | 48,104 |
| Infraatrijatijes Caata | AC Surface Course | 2002 | 80.00 | Ton | 78.43 | Ton | 4,207 | 329,987 | 23,973 |
| Infrastructure Costs | AC Base Course | 2002 | 80.00 | Ton | 78.43 | Ton | 6,643 | 521,032 | 37,852 |
| | Cold Planing | 2002 | 1.50 | Sq. Foot | 1.47 | Sq. Foot | 15,817 | 23,260 | 1,690 |
| | Pavement Reinforcing Fabric | 2002 | 1.00 | Sq. Yard | 0.98 | Sq. Yard | 55,359 | 54,274 | 3,943 |
| | Gravel Conform | 2002 | 50.00 | Ton | 49.02 | Ton | 316 | 15,507 | 1,127 |
| | Traffic Stripes and Pavement Markings | 2002 | 800.00 | Lump Sum | 784.32 | Lump Sum | 15.82 | 12,406 | 901 |
| | Street Lighting System | 2002 | 60,000.00 | Lump Sum | 58,824.00 | Lump Sum | 15.82 | 930,413 | 67,594 |
| | Geotextile | 2002 | 3.00 | Linear Foot | 2.94 | Linear Foot | 17,399 | 51,173 | 3,718 |
| | Site-SpecificWork Items | 2002 | 7,182,455.47 | Lump Sum | 7,041,679.35 | Lump Sum | 1.00 | 7,041,679 | 511,570 |
| | Magnetic Reference Markers - Includes Installation | 2001 | 5,000.00 | Lane Mile | 5,000.00 | Lane Mile | 10.38 | 51,900 | 3,770 |
| | TOTAL INFRASTRUCTURE COST | | | | | | | | 1,697,467 |
| Non-Infrastructure | Fleet Purchase | 2002 | 293,000.00 | Bus | 287,257.20 | Bus | 10.180 | 2,924,389 | 212,454 |
| Capital Costs | Automation Technology Outfitting for Vehicle | 2001 | 25,000.00 | Bus | 25,000.00 | Bus | 10.180 | 254,510 | 18,490 |
| | Minor Rehabilitation - Seals | 2002 | See Table G12 | N/A | N/A | N/A | N/A | N/A | 22,458 |
| Periodic Capital | Major Rehabilitation - Resurfacing | 2002 | See Table G12 | N/A | N/A | N/A | N/A | N/A | 61,708 |
| Costs | Magnetic Reference Markers - Includes Installation | 2001 | See Table G12 | N/A | N/A | N/A | N/A | N/A | 8,550 |
| Floor Denousel | Vehicle Replacement Costs | 2002 | 293,000.00 | Bus | 287,257.20 | Bus | 10.180 | N/A | 194,959 |
| Fleet Renewal | Vehicle Automation Technology Replacement Costs | 2001 | 25,000.00 | Bus | 25,000.00 | Bus | 10.180 | N/A | 16,967 |
| | TION, REHABILITATION, AND OTHER INFRASTRUCTURE | COSTS | • | | | | | | 2,233,054 |
| | ANNING AND DESIGN, CONSTRUCTION, REHABILITATION | | R INFRASTRUCT | URE COSTS | | | | | 2,341,204 |

ABUS Automation Technology Outfitting for Vehicles

Costs in this category are calculated using an identical methodology as for fleet purchase in the previous section. Automation technology would purchased for every vehicle at a cost of roughly \$25,000 per bus. PATH personnel, who supplied this figure, believe that technology costs could be reduced to as low as \$5,000 per vehicle if large numbers of vehicles are outfitted. The \$25,000 per-bus cost used in this study, then, is a conservative estimate of technology costs. Tables 5.1a and 5.1b show results for Design Scenarios 1 and 2, respectively.

5.3.4 ABUS Periodic Capital Costs

Rehabilitation costs for the ABUS system include routine pavement sealing and resurfacing costs, replacement of automated technology on vehicles, and replacement of magnetic reference markers when the roadway is rehabilitated. In this report, they are referred to as follows:

- Major Rehabilitation Pavement Resurfacing
- Minor Rehabilitation –Seals
- Magnetic Reference Marker Replacement

None of these types of maintenance are included in the VTA "System Maintenance" cost category because VTA does not maintain the roads on which its buses operate. Costs and other information pertaining to rehabilitation were obtained from engineers in the City of San Jose, and are historic costs based on previous projects. They are considered to be accurate for the years 2002 and 2003. The unit costs are all-inclusive, meaning that all costs associated with the given type of work are included in the figure. This includes overhead, internal costs, engineering, contract costs, etc.

Minor Rehabilitation – Seals

For minor rehabilitation, a seal is applied to the surface of a typical asphalt concrete roadway with a frequency of 5 to 7 years. A unit cost of \$3.90 per square yard (in 2002 dollars) was cited by City of San Jose engineers as representative of the cost of preventative seals. This cost is all-inclusive, as described above, and also includes the repair of localized failures, such as potholes, before the seal is applied. Assuming a 5-year seal frequency, the annual costs for this type of minor rehabilitation to the roadway surface were calculated. The applicable values are shown in Tables 5.1a and 5.1b.

Major Rehabilitation - Pavement Resurfacing

In a major rehabilitation, roadway resurfacing – typically with an asphaltic concrete overlay – occurs. According to City of San Jose engineers, a typical resurfacing of an asphaltic concrete roadway occurs every 2-to-3 seal cycles. For this study, a conservative 10-year resurfacing cycle was assumed. A unit cost of \$17.21 per square yard (in 2002 dollars) was given by City of San Jose personnel. Like costs for preventative seals, this cost is all-

inclusive, as described above, and also includes the repair of localized failures, such as potholes, before resurfacing. Based on these unit costs, costs for the rehabilitation of the ABUS system were calculated and are shown in Tables 5.1a and 5.1b for the two design scenarios. Appendix G details calculation methodologies, and gives calculation tables and sample calculations.

Magnetic Reference Marker Replacement

Magnetic reference markers are mounted on the pavement to guide automated vehicles, and must be replaced every time the roadway is sealed or resurfaced. In this study, the replacement frequency for magnetic reference markers is five years at a cost of \$5000 per mile. Tables 5.1a and 5.1b show results for Design Scenarios 1 and 2, respectively. Methodologies appear in Appendix G.

5.3.5 ABUS Fleet Renewal

Fleet renewal includes:

- Vehicle Replacement Costs Fleet Renewal
- Vehicle Automation Technology Replacement Costs

Bus Replacement

VTA personnel were consulted, and it was determined that the organization typically replaces an operating bus after 14 years of service. The buses used for this project cost \$287,257 in 2001-equivalent dollars. This figure is adjusted for inflation and does not include taxes, as discussed in Appendix G.

For compatibility with the ABUS study system 30-year life cycle, a 15-year fleet replacement cycle was assumed. Thus, $1/15^{th}$ of the fleet will be assumed to be replaced each year, at a per-bus cost of \$287,257 (in 2001-equivalent dollars).

It was previously calculated that 10.180 buses are required to service the study segment. If $1/15^{th}$ of these are replaced each year, then the annual cost, in 2001-equivalent dollars, is calculated as follows:

EUAC (2001-Equiv.) = [10.180/15] x \$287,257 = \$194,959

Fleet renewal calculations are identical for Design Scenarios 1 and 2. Tables 5.1a and 5.1b show the tabulated values. Tables 5.1a and 5.1b show the calculated costs for Design Scenarios 1 and 2, respectively. EUAC (2001-Equiv.) calculations are presented in Appendix G.

ABUS Vehicle Automation Technology Replacement Costs

Vehicle automation is assumed to be replaced as the bus housing it is replaced. Thus, costs in this category are calculated using an identical methodology as for fleet renewal in the

previous section. Automation technology is purchased for every vehicle at a cost of roughly \$25,000 per bus. Tables 5.1a and 5.1b show results for Design Scenarios 1 and 2, respectively.

5.3.6 ABUS Vehicle Operating Costs

Costs associated with vehicle operations include daily costs necessary to run the system, including operators' salaries, wages, and benefits, utilities, and other expenses. Vehicle operating costs do not include costs for routine vehicle maintenance, such as tire replacement and labor costs for workers performing the maintenance.

Determination of the ABUS study system vehicle operating costs was performed in several major phases:

- Determination of individual cost elements that comprise costs in that category (discussed in Appendix G).
- Determination of unit costs for those cost elements in terms of vehicle-revenue-miles and vehicle-revenue-hours (discussed in Appendix G).
- Determination of annual convoy-revenue-miles and –hours for the study section (discussed in Appendix H).
- Determination of unit costs for each cost element, based on the VTA bus system, in terms of vehicle-revenue-miles and vehicle-revenue-hours, or convoy-revenue-miles and –hours.
- Calculation of ABUS study system annual costs based on unit costs and calculated vehicle-revenue-miles and –hours, or convoy-revenue-miles and –hours.

Unit costs were calculated in terms of revenue-miles and revenue-hours because both data were given by VTA in the source data used, and calculation according to unit costs derived from both data, though relatively similar, do not yield the same costs. Individual cost elements, unit costs, annual vehicle-revenue-miles and –hours, and overall annual costs are shown in Table 5.2. Methodologies and sample calculations for operating cost calculations are shown in Appendix G.

5.3.7 ABUS Vehicle Maintenance Costs

Cost calculations for vehicle maintenance follow identical methodologies for those in the previous "Vehicle Operating Costs" category. All unit costs are calculated in terms of vehicle-revenue-miles and –hours. Costs are shown in Table 5.3.

5.3.8 ABUS System (Non-Vehicle) Maintenance Costs

Costs associated with system maintenance include maintenance expenses for bus stops and other infrastructure, and also for minor roadway maintenance activities such as street sweeping, cleaning of storm sewers, landscaping, streetlights, traffic signals, signs, and

TABLE 5.2. ABUS VEHICLE OPERATING COSTS

| | | | Reve | nue-Miles | | | Re | evenue-Hours | |
|------------------------|-------------------------------|------------------|-----------------|---------------------|--------------------|------------------|-----------------|---------------------|-------------------|
| Cost Element | ITEM | Unit Cost (2001- | Annual Units in | Unit | Annual Cost (2001- | Unit Cost (2001- | Annual Units in | Linit | Annual Cost (2001 |
| | | Equiv. \$) | ABUS System | Unit | Equiv. \$) | Equiv. \$) | ABUS System | s in Linit | Equiv. \$) |
| Salaries and Wages | Operators' Salaries and Wages | 2.27 | 276,035 | convoy-revenue-hour | 625,840 | 33.55 | 15,439 | convoy-revenue-hour | 517,923 |
| Salaries and wages | Other Salaries and Wages | 0.48 | 620,101 | bus-revenue-hour | 300,469 | 6.30 | 34,683 | B bus-revenue-hour | 218,577 |
| Fringe Benefits | Operators' Fringe Benefits | 1.86 | 276,035 | convoy-revenue-hour | 514,622 | 27.59 | 15,439 | convoy-revenue-hour | 425,883 |
| Fillige Bellelits | Other Fringe Benefits | 0.28 | 620,101 | bus-revenue-hour | 173,790 | 3.65 | 34,683 | B bus-revenue-hour | 126,424 |
| Services | Services | 0.19 | 620,101 | bus-revenue-hour | 114,794 | 2.41 | 34,683 | bus-revenue-hour | 83,507 |
| | Fuel and Lubricants | 0.30 | 620,101 | bus-revenue-hour | 187,306 | 3.93 | | | 136,256 |
| Materials and Supplies | Tires and Lubes | 0.07 | 620,101 | bus-revenue-hour | 41,765 | 0.88 | 34,683 | B bus-revenue-hour | 30,382 |
| | Other Materials and Supplies | 0.01 | 620,101 | bus-revenue-hour | 4,912 | 0.10 | 34,683 | B bus-revenue-hour | 3,573 |
| Utilities | Utilities | 0.12 | 620,101 | bus-revenue-hour | 74,441 | 1.56 | 34,683 | bus-revenue-hour | 54,152 |
| Taxes | Taxes | | | | | | | | |
| Misc. | Miscellaneous Expenses | 0.03 | 620,101 | bus-revenue-hour | 19,373 | 0.41 | 34,683 | B bus-revenue-hour | 14,093 |
| Expense Transfers | Expense Transfers | | | | | | | | |
| TOTAL OPERATING COSTS | | | • | | 2,057,312 | | | | 1,610,770 |

TABLE 5.3. ABUS VEHICLE MAINTENANCE COSTS

| | | , | Vehicle-Revenue-Miles | | Vehicle-Revenue-Hours | | | |
|--------------------|-------------------------------|-----------------|-----------------------|--------------------|-----------------------|----------------------|------------------|--|
| Cost Element | Item | Unit Cost (2001 | Annual Units in ABUS | Annual Cost (2001) | Unit Cost (2001 | Annual Units in ABUS | Annual Cost | |
| | | Equiv. \$) | System | Equiv. \$) | Equiv. \$) | System | (2001-Equiv. \$) | |
| | Operators' Salaries and Wages | | | | | | | |
| Salaries and Wages | Operating Time | | | | | | | |
| Salaties and wages | Paid Non-Operating Work Time | | | | | | | |
| | Other Salaries and Wages | 0.91 | 620,101 | 564,772 | 11.85 | 34,683 | 410,845 | |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | | |
| Fillige beliells | Other Fringe Benefits | 0.54 | 620,101 | 336,119 | 7.05 | 34,683 | 244,510 | |
| Services | Services | 0.17 | 620,101 | 107,631 | 2.26 | 34,683 | 78,297 | |
| Materials and | Fuel and Lubricants | | | | | | | |
| Supplies | Tires and Lubes | | | | | | | |
| Supplies | Other Materials and Supplies | 0.28 | 620,101 | 176,453 | 3.70 | 34,683 | 128,361 | |
| Utilities | Utilities | 0.00 | 620,101 | 89 | 0.00 | 34,683 | 65 | |
| Taxes | Taxes | | | | | | | |
| Misc. | Miscellaneous Expenses | 0.01 | 620,101 | 5,562 | 0.12 | 34,683 | 4,046 | |
| Expense Transfers | Expense Transfers | | | | | | | |
| TOTAL ABUS VEHIC | LE MAINTENANCE COSTS | 1.92 | | 1,190,627 | 24.97 | | 866,123 | |

markings. System maintenance does not include resurfacing or rehabilitation (i.e. – resurfacing and preventative seals) for the roadways on which the buses travel. Roadway rehabilitation of this sort is included in infrastructure and capital costs, under the heading of "Rehabilitation." Cost calculations for system maintenance follow identical methodologies for those in the previous "Vehicle Operating Costs" category. Individual cost elements, unit costs, annual vehicle-revenue-miles and –hours (which are the same for all cost categories), and overall annual costs are shown in Table 5.4. Methodologies and sample calculations for operating cost calculations are shown in Appendix G.

5.3.9 ABUS System Administration Costs

Costs associated with system administration include expenses incurred for system support personnel in VTA's offices. Costs for system administration are assumed to be more compatible with the administration costs for a light rail system than with the VTA bus system. Since the ABUS system shares train-based operating principles with a light rail system, and since scheduling and other administrative tasks are likely to be reliant on the type of operation, this assumption is reasonable. For this reason, unit costs for ABUS system administration are extracted directly from the light rail section of the report (see Table 4.5). To calculate annual ABUS system administration costs, annual vehicle-revenue-miles and – hours for the ABUS system are used, and the calculation methodology is identical to that used to calculate vehicle operations costs. Individual cost elements, unit costs, annual vehicle-revenue-miles and –hours, and overall annual costs are shown in Table 5.5. Methodologies and sample calculations for operating cost calculations are shown in Appendix G.

5.3.10 ABUS User Costs

User costs for the ABUS study system, like the light rail study system, are based on user onboard travel time and wait time. Because the ABUS system is assumed to run with the same headways and at the same speed as the light rail system, and to carry the same passenger volumes, there is no variation in cost between ABUS user costs and light rail user costs.

Table 5.6 shows a summary of calculated user costs for the ABUS system. These costs are identical; to the light rail system Table 4.6. Refer to the Appendix E for procedures and methodologies.

5.4 ABUS Cost Summaries

Tables 5.7a and 5.7b show a summary of all calculated costs associated with the ABUS systems for Design Scenarios 1 and 2, respectively.

5.5 Reference

1. A Policy on the Geometric Design of Highways and Streets. American Association of State Highway and Transportation Officials (AASHTO). 2001.

TABLE 5.4. ABUS SYSTEM (NON-VEHICLE) MAINTENANCE COSTS

| | | | Vehicle-Revenue-Miles | 3 | Vel | nicle-Revenue-Ho | urs |
|------------------------|--|------------------|-----------------------|------------------|------------------|------------------|------------------|
| Cost Element | Item | Unit Cost (2001- | Annual Units in ABUS | Annual Cost | Unit Cost (2001- | Annual Units in | Annual Cost |
| | | Equiv. \$) | System | (2001-Equiv. \$) | Equiv. \$) | ABUS System | (2001-Equiv. \$) |
| | Operators' Salaries and Wages | | | | | | |
| Salaries and Wages | Operating Time | | | | | | |
| Salaties and wages | Paid Non-Operating Work Time | | | | | | |
| | Other Salaries and Wages | 0.15 | 620,101 | 91,718 | 1.92 | 34,683 | 66,721 |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | |
| Fillige Bellelits | Other Fringe Benefits | 0.08 | 620,101 | 47,139 | 0.99 | 34,683 | 34,291 |
| Services | Services | 0.13 | 620,101 | 80,152 | 1.68 | 34,683 | 58,307 |
| | Fuel and Lubricants | | | | | | |
| Materials and Supplies | Tires and Lubes | | | | | | |
| | Other Materials and Supplies | 0.01 | 620,101 | 9,038 | 0.19 | 34,683 | 6,575 |
| Utilities | Utilities | 0.02 | 620,101 | 11,363 | 0.24 | 34,683 | 8,266 |
| Taxes | Taxes | | | | | | |
| | Street Sweeping | N/A | N/A | 6,988 | N/A | N/A | 6,988 |
| | Storm Sewers (Includes Inlet Cleaning) | N/A | N/A | 3,669 | N/A | N/A | 3,669 |
| | Landscaping (Includes Median Islands) | N/A | N/A | 7,903 | N/A | N/A | 7,903 |
| Street Maintenance* | Streetlights | N/A | N/A | 4,517 | N/A | N/A | 4,517 |
| | Traffic Signals | N/A | N/A | 3,910 | N/A | N/A | 3,910 |
| | Signs | N/A | N/A | 1,681 | N/A | N/A | 1,681 |
| | Markings | N/A | N/A | 2,684 | N/A | N/A | 2,684 |
| Misc | Miscellaneous Expenses | 0.00 | 620,101 | 1,847 | 0.04 | 34,683 | 1,344 |
| Expense Transfers | Expense Transfers | | | | | | |
| TOTAL ABUS SYSTEM (N | ION-VEHICLE) MAINTENANCE COSTS | | | 272,609 | | | 206,855 |

^{*}See Table G17 for street maintenance cost calculations.

TABLE 5.5. ABUS SYSTEM ADMINISTRATION COSTS

| | | | Vehicle-Revenue-Mile | S | | Vehicle-Revenue-Hours | |
|------------------------|-------------------------------|------------------|----------------------|--------------------|------------------|-----------------------|--------------------|
| Cost Element | Item | Unit Cost (2001- | Annual Units in ABUS | Annual Cost (2001- | Unit Cost (2001- | Annual Units in ABUS | Annual Cost (2001- |
| | | Equiv. \$) | System | Equiv. \$) | Equiv. \$) | System | Equiv. \$) |
| | Operators' Salaries and Wages | | | | | | |
| Salaries and Wages | Operating Time | | | | | | |
| Salaties and Wages | Paid Non-Operating Work Time | | | | | | |
| | Other Salaries and Wages | 2.50 | 620,101 | 1,549,903 | 37.06 | 34,683 | 1,285,245 |
| Eringo Ponofito | Operators' Fringe Benefits | | | | | | |
| Fringe Benefits | Other Fringe Benefits | 2.26 | 620,101 | 1,402,346 | 33.53 | 34,683 | 1,162,884 |
| Services | Services | 0.70 | 620,101 | 433,040 | 10.35 | 34,683 | 359,095 |
| | Fuel and Lubricants | | | | | | |
| Materials and Supplies | Tires and Lubes | | | | | | |
| | Other Materials and Supplies | 0.12 | 620,101 | 77,238 | 1.85 | 34,683 | 64,049 |
| Utilities | Utilities | 0.02 | 620,101 | 12,204 | 0.29 | 34,683 | 10,120 |
| Taxes | Taxes | | | | | | |
| Misc. | Miscellaneous Expenses | 0.18 | 620,101 | 112,948 | 2.70 | 34,683 | 93,661 |
| Expense Transfers | Expense Transfers | | | | | | |
| TOTAL ABUS SYSTEM ADM | MINISTRATION COSTS | 5.79 | | 3,587,679 | 85.78 | | 2,975,054 |

TABLE 5.6. ABUS TOTAL USER COSTS

| Day | Element | Daily User-Hours | Cost/User-Hour (\$) | Daily Cost (\$) | Annual Cost |
|----------------------------|----------------------|------------------|---------------------|-----------------|-------------|
| Weekday | Wait Time | 733 | 8.32 | 6,099 | 1,591,724 |
| vveekuay | On-Board Travel Time | 1,126 | 8.32 | 9,366 | 2,444,462 |
| Saturday | Wait Time | 408 | 8.32 | 3,395 | 176,532 |
| Saturday | On-Board Travel Time | 601 | 8.32 | 4,999 | 259,952 |
| Sunday | Wait Time | 346 | 8.32 | 2,877 | 149,625 |
| Sullday | On-Board Travel Time | 511 | 8.32 | 4,252 | 221,084 |
| TOTAL WAIT TIME | | | | | 1,917,881 |
| TOTAL ON-BOARD TRAVEL TIME | | | | | 2,925,498 |
| TOTAL | | | | 30,987 | 4,843,378 |

TABLE 5.7a. ABUS SYSTEM COST SUMMARY (\$) - DESIGN SCENARIO 1: DESIGN FOLLOWS AASHTO STANDARDS

| Cost Category | Calculations Based on | Calculations Based on | Average |
|---|-----------------------|-----------------------|---------------|
| Cost Category | Vehicle-Revenue-Miles | Vehicle-Revenue-Hours | EUAC (30 yrs) |
| System Planning and Design | 147,994 | 147,994 | |
| Construction, Rehabilitation, and Other Capital Costs | 2,888,056 | 2,888,056 | |
| Vehicle Operations | 2,057,312 | 1,610,770 | |
| Vehicle Maintenance | 1,190,627 | 866,123 | |
| System (Non-Vehicle) Maintenance | 272,609 | 206,855 | |
| System Administration | 3,587,679 | 2,975,054 | |
| User | 4,843,378 | 4,843,378 | |
| TOTAL COST | 14,987,655 | 13,538,231 | 14,262,943 |

TABLE 5.7b. ABUS SYSTEM COST SUMMARY (\$) - DESIGN SCENARIO 2: REDUCED-WIDTH DESIGN

| Coat Catagory | Calculations Based on | Calculations Based on | Average |
|---|-----------------------|-----------------------|---------------|
| Cost Category | Vehicle-Revenue-Miles | Vehicle-Revenue-Hours | EUAC (30 yrs) |
| System Planning and Design | 108,150 | 108,150 | |
| Construction, Rehabilitation, and Other Capital Costs | 2,233,054 | 2,233,054 | |
| Vehicle Operations | 2,057,312 | 1,610,770 | |
| Vehicle Maintenance | 1,190,627 | 866,123 | |
| System (Non-Vehicle) Maintenance | 272,609 | 206,855 | |
| System Administration | 3,587,679 | 2,975,054 | |
| User | 4,843,378 | 4,843,378 | |
| TOTAL COST | 14,292,808 | 12,843,384 | 13,568,096 |

6 BUS-ON-DEDICATED-LANE (BDL) COSTS

6.1 System Characteristics

The BDL system is assumed to be functionally equivalent to the light rail study section discussed in Chapter 4 of this report and the ABUS study section discussed in Chapter 5. In order to achieve functional similarity, the following light rail/ABUS system characteristics have also been applied to the BDL system:

- Study system length and location
- Study system passenger stations
- Study system passenger volume data

6.2 BDL Study Section Specifications

6.2.1 BDL Cross-Sectional Geometry (Width Requirements)

The BDL system, like the ABUS and light rail systems, will operate on a dedicated right-of-way in the median of a regular roadway, without physical barriers that separate the dedicated lanes from each other or well as from the regular traffic. According to AASHTO (1), a 15-foot pavement width is necessary to accommodate any design bus. As was the case for ABUS, the roadway width was based on design standards for tangent sections of turning roadways, with no provision for passing a stalled vehicle. Thus, for dedicated bus lanes running in both directions, a total width of 30 feet is required to accommodate two 15-foot pavement widths. Figure 3.5 shows a schematic depiction of the BDL concept.

6.3 BDL Cost Calculations – Base VTA System

6.3.1 BDL System Planning, Design, Construction, Rehabilitation, and Other Infrastructure Costs

The BDL system planning, design, construction, and other infrastructure costs were calculated in the same manner, and using the same methodologies, as the corresponding costs for the ABUS. The results are shown in Table 6.1 and Appendix I. Rehabilitation cost calculations appear in Table 6.2. It is noteworthy that the BDL system does not require construction, rehabilitation, and maintenance of automation technologies, so these do not appear as costs in the tables or appendices.

| | Itam | Vacr | Linit Coat (ft) | Unit | Unit Cost | Unit | # of Units in ABUS | One-Time Cost | EUAC (2001- |
|---------------------|---|------------|-----------------|-------------|------------------|-------------|--------------------|------------------|-------------|
| | Item | Year | Unit Cost (\$) | Unit | (2001-Equiv. \$) | Unit | System | (2001-Equiv. \$) | Equiv. \$) |
| System Planning | and Design Costs | | | | | | | | |
| | VTA Personnel Labor Costs and Design Expenses | 2002 | 2,398,266 | One-Time | 2,351,260.29 | One-Time | 1 | 2,351,260 | 170,81 |
| Construction, Reh | abilitation, and Other Infrastructure Capital Costs | | | | | | | | |
| | Property Costs/ ROW Acquistion | 1999 | 23.65 | Sq. Foot | 24.49 | Sq. Foot | 826,848 | 20,246,221 | 1,470,86 |
| | Street Clean-Up | 2002 | 150.00 | Day | 147.06 | Day | 500 | 73,477 | 5,33 |
| | Mobilization | 2002 | 10,000.00 | Lump Sum | 9,804.00 | Lump Sum | 25 | 244,923 | 17,79 |
| | Traffic Control | 2002 | 2,000.00 | Lump Sum | 1,960.80 | Lump Sum | 25 | 48,985 | 3,55 |
| | Clearing, Grubbing, and Removal of Obstructions | 2002 | 2,500.00 | Lump Sum | 2,451.00 | Lump Sum | 25 | 61,231 | 4,44 |
| | Roadway Excavation | 2002 | 30.00 | Cu. Yard | 29.41 | Cu. Yard | 8,494 | 249,821 | 18,14 |
| | Subgrade Preparation-Class A | 2002 | 1.00 | Sq. Foot | 0.98 | Sq. Foot | 539,610 | 529,034 | 38,43 |
| | Imported Fill Materials | 2002 | 30.00 | Cu. Yard | 29.41 | Cu. Yard | 8,494 | 249,821 | 18,14 |
| lafaa atuu satu saa | Deeplift/Base AC (8" max.) | 2002 | 70.00 | Ton | 68.63 | Ton | 15,239 | 1,045,821 | 75,97 |
| Infrastructure | AC Surface Course | 2002 | 80.00 | Ton | 78.43 | Ton | 9,993 | 783,753 | 56,93 |
| Costs | AC Base Course | 2002 | 80.00 | Ton | 78.43 | Ton | 10,492 | 822,941 | 59,78 |
| | Cold Planing | 2002 | 1.50 | Sq. Foot | 1.47 | Sq. Foot | 24,982 | 36,738 | 2,66 |
| | Pavement Reinforcing Fabric | 2002 | 1.00 | Sq. Yard | 0.98 | Sq. Yard | 87,437 | 85,723 | 6,22 |
| | Gravel Conform | 2002 | 50.00 | Ton | 49.02 | Ton | 500 | 24,492 | 1,77 |
| | Traffic Stripes and Pavement Markings | 2002 | 800.00 | Lump Sum | 784.32 | Lump Sum | 25 | 19,594 | 1,42 |
| | Street Lighting System | 2002 | 60,000.00 | Lump Sum | 58,824.00 | Lump Sum | 25 | 1,469,538 | 106,76 |
| | Geotextile | 2002 | 3.00 | Linear Foot | 2.94 | Linear Foot | 27,480 | 80,825 | 5,87 |
| | Site-SpecificWork Items | 2002 | 9,828,623.28 | Lump Sum | 9,635,982.26 | Lump Sum | 1 | 9,635,982 | 700,04 |
| | TOTAL INFRASTRUCTURE COST | | | · | | • | | | 2,594,21 |
| Non- | | | | | | | | | |
| Infrastructure | Vehicle Purchase* | 2002 | 293,000.00 | Bus | 287,257.20 | Bus | 10.180 | N/A | 194,95 |
| Capital Costs | | | | | | | | | |
| Periodic Capital | Minor - Seals | 2002 | See Table I3 | N/A | See Table I3 | N/A | See Table I3 | N/A | 35,46 |
| Costs | Major - Resurfacing | 2002 | See Table I3 | N/A | See Table I3 | N/A | See Table I3 | N/A | 97,43 |
| | Vehicle Replacement Costs | 2002 | | Bus | 287,257.20 | Bus | 10.180 | N/A | 194,95 |
| OTAL CONSTR | UCTION, REHABILITATION, INFRASTRUCTURE, AND C | THER CAF | PITAL COSTS | | | | | | 3,117,02 |
| OTAL SYSTEM | PLANNING, DESIGN, CONSTRUCTION, REHABILITATION | ON. INFRAS | STRUCTURE. | AND OTHER | CAPITAL COST | rs | | | 3,287,84 |

^{*}Required number of vehicles is considered to be the same for the ABUS and BDL systems.

TABLE 6.2. BDL ROADWAY REHABILITATION COSTS

| Type | Unit Cost (2002 \$) | | Unit Cost (2001-Equiv. \$) | | | Project Surface Area Total Cost per R | | oject Surface Area Total Cost per Rehab. Cycle Frequency | | uonov | Annual Cost (2001 | |
|---------------------|---------------------|------|----------------------------|------|---------|---------------------------------------|--------|--|------------------|-------|-------------------|------------|
| Туре | Cost | Unit | Cost | Unit | Area | Unit | Area | Unit | (2001-Equiv. \$) | rieq | uericy | Equiv. \$) |
| Minor - Seals | 3.90 | SY | 3.82 | SY | 822,096 | Sq. Feet | 91,344 | Sq. Yards | 349,259 | 5 | years | 35,460 |
| Major - Resurfacing | 17.21 | SY | 16.87 | SY | 822,096 | Sq. Feet | 91,344 | Sq. Yards | 1,541,218 | 10 | years | 97,434 |

6.3.2 BDL Vehicle Operating Costs

BDL study system vehicle operating costs were determined using a similar methodology as was used for the ABUS study system vehicle operating costs, with the exception of driver-related costs (i.e. – salaries and wages, and fringe benefits). All costs, including driver-related costs, for the BDL system were based upon vehicle-revenue-miles and –hours. This is a departure from the ABUS methodology, where driver-related costs were calculated based on convoy-revenue-miles and –hours.

Annual vehicle-revenue-miles and –hours used in the calculations for the BDL system were identical to those used in the ABUS calculations, and are shown in Table 6.3. The rationale for this equivalence is discussed in the following paragraphs.

In order to have a valid cost comparison, functional equivalency among the three study systems must be maintained. This implies that each system must transport the same number of passengers in the same time period. Since the same type of bus was assumed to operate on both bus systems, the same number of buses would be required to transport a given volume of passengers in a given time period for the ABUS and the BDL systems. For this reason, identical vehicle-miles and –hours were used for the two systems. It is noteworthy that, under the assumptions made here, the BDL and light rail system are also functionally equivalent, since the ABUS and light rail systems are functionally equivalent.

It is also noteworthy that, although the BDL and ABUS systems operate with the same number of vehicle-revenue-hours and –miles, the assumed bus headways are not the same for the two systems. This difference is due to the convoying capacity of the ABUS, and is discussed in Section 6.3.6, on DBL user costs.

Individual cost elements, unit costs, annual vehicle-revenue-miles and –hours (which are the same for all cost categories), and overall annual costs are also shown in Table 6.3. Methodologies for operating cost calculations are identical to those for the ABUS system, which are shown in Appendix G. Appendix I gives general explanations of the procedure and references Appendix G.

6.3.3 BDL Vehicle Maintenance Costs, System (Non-Vehicle) Maintenance, and System Administration Costs

Cost calculations for vehicle maintenance, system maintenance, and system administration follow identical methodologies for those in the previous "Vehicle Operating Costs" category. Category descriptions are identical to those in the ABUS section of the report, excluding those items that support automation (such as maintenance and replacement of magnetic reference markers and vehicle automating technology). Individual cost elements, unit costs, annual vehicle-revenue-miles and –hours (which are the same for all cost categories), and overall annual costs are shown in Tables 6.4, 6.5, and 6.6, respectively.

TABLE 6.3. BUS-ON-DEDICATED-LANE VEHICLE OPERATIONS COSTS

| | ABLE 0.3. BOS-ON-DEDICATED-LANE VEHICLE OF ENATIONS COSTS | | | | | | | | | |
|------------------------|---|------------------|--------------------|--------------------|------------------|---------------------|------------------|--|--|--|
| | | V | ehicle-Revenue-Mil | | | Vehicle-Revenue-Hoι | | | | |
| Cost Element | Item | Unit Cost (2001- | Annual Units in | Annual Cost (2001- | Unit Cost (2001- | Annual Units in BDL | Unit Cost (2001- | | | |
| | | Equiv. \$) | BDL System* | Equiv. \$) | Equiv. \$) | System* | Equiv. \$) | | | |
| | Operators' Salaries and Wages | | | | | | | | | |
| Salaries and Wages | Operating Time | 1.81 | 620,101 | 1,124,106 | 23.58 | 34,683 | 817,733 | | | |
| | Paid Non-Operating Work Time | 0.14 | 620,101 | 88,470 | 1.86 | 34,683 | 64,358 | | | |
| | Other Salaries and Wages | 0.48 | 620,101 | 300,469 | 6.30 | 34,683 | 218,577 | | | |
| | Operators' Fringe Benefits | | | | | | | | | |
| Fringe Benefits | Operating Time | 1.05 | 620,101 | 650,178 | 13.64 | 34,683 | 472,973 | | | |
| Fillige Bellelius | Paid Non-Operating Work Time | 0.08 | 620,101 | 51,171 | 1.07 | 34,683 | 37,224 | | | |
| | Other Fringe Benefits | 0.28 | 620,101 | 173,790 | 3.65 | 34,683 | 126,424 | | | |
| Services | Services | 0.19 | 620,101 | 114,794 | 2.41 | 34,683 | 83,507 | | | |
| | Fuel and Lubricants | 0.30 | 620,101 | 187,306 | 3.93 | 34,683 | 136,256 | | | |
| Materials and Supplies | Tires and Lubes | 0.07 | 620,101 | 41,765 | 0.88 | 34,683 | 30,382 | | | |
| | Other Materials and Supplies | 0.01 | 620,101 | 4,912 | 0.10 | 34,683 | 3,573 | | | |
| Utilities | Utilities | 0.12 | 620,101 | 74,441 | 1.56 | 34,683 | 54,152 | | | |
| Taxes | Taxes | | | | | | | | | |
| Misc. | Miscellaneous Expenses | 0.03 | 620,101 | 19,373 | 0.41 | 34,683 | 14,093 | | | |
| Expense Transfers | Expense Transfers | | | | | | | | | |
| TOTAL OPERATING COSTS | | | | 2,830,775 | 59.37 | | 2,059,252 | | | |

^{*}Annual vehicle-revenue-miles and vehicle-revenue-hours are equal for the ABUS and BDL systems.

TABLE 6.4. BUS-ON-DEDICATED-LANE VEHICLE MAINTENANCE COSTS

| | | V | ehicle-Revenue-Mile | es | | Vehicle-Revenue-Hour | rs |
|--------------------|-------------------------------|-----------------|---------------------|-------------------|-------------------|----------------------|-------------------|
| Cost Elements | Item | Unit Cost (2001 | Annual Units in | Annual Cost (2001 | Annual Cost (2001 | Annual Units in | Annual Cost (2001 |
| | | Equiv. \$) | System* | Equiv. \$) | Equiv. \$) | System* | Equiv. \$) |
| | Operators' Salaries and Wages | | | | | | |
| Salaries and Wages | Operating Time | | | | | | |
| Salaries and Wages | Paid Non-Operating Work Time | | | | | | |
| | Other Salaries and Wages | 0.91 | 620,101 | 564,772 | 11.85 | 34,683 | 410,845 |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | |
| | Other Fringe Benefits | 0.54 | 620,101 | 336,119 | 7.05 | 34,683 | 244,510 |
| Services | Services | 0.17 | 620,101 | 107,631 | 2.26 | 34,683 | 78,297 |
| Materials and | Fuel and Lubricants | | | | | | |
| | Tires and Lubes | | | | | | |
| Supplies | Other Materials and Supplies | 0.28 | 620,101 | 176,453 | 3.70 | 34,683 | 128,361 |
| Utilities | Utilities | 0.00 | 620,101 | 89 | 0.00 | 34,683 | 65 |
| Taxes | Taxes | | | | | | |
| Misc. | Miscellaneous Expenses | 0.01 | 620,101 | 5,562 | 0.12 | 34,683 | 4,046 |
| Expense Transfers | Expense Transfers | | | | | | |
| TOTAL BDL VEHICL | E MAINTENANCE COSTS | 1.92 | • | 1,190,627 | 24.97 | | 866,123 |
| | E MAINTENANCE COSTS | | | 1,190,627 | 24.97 | | |

*Annual vehicle-revenue-miles and vehicle-revenue-hours are equal for the ABUS and BDL systems.

TABLE 6.5 BUS-ON-DEDICATED-LANE SYSTEM (NON-VEHICLE) MAINTENANCE COSTS

| | | V | ehicle-Revenue-M | iles | , | Vehicle-Revenue-Ho | ours |
|------------------------|--|------------------|------------------|--------------------|------------------|--------------------|-------------------|
| Cost Elements | Item | Unit Cost (2001- | Annual Units in | Annual Cost (2001- | Annual Cost | Annual Units in | Annual Cost (2001 |
| | | Equiv. \$) | ABUS System* | Equiv. \$) | (2001-Equiv. \$) | ABUS System* | Equiv. \$) |
| | Operators' Salaries and Wages | | | | | | |
| Salaries and Wages | Operating Time | | | | | | |
| Salaries and Wages | Paid Non-Operating Work Time | | | | | | |
| | Other Salaries and Wages | 0.15 | 620,101 | 91,718 | 1.92 | 34,683 | 66,72 |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | |
| i filige beliefits | Other Fringe Benefits | 0.08 | 620,101 | 47,139 | | 34,683 | 34,29 |
| Services | Services | 0.13 | 620,101 | 80,152 | 1.68 | 34,683 | 58,307 |
| | Fuel and Lubricants | | | | | | |
| Materials and Supplies | Tires and Lubes | | | | | | |
| | Other Materials and Supplies | 0.01 | 620,101 | 9,038 | 0.19 | 34,683 | 6,575 |
| Utilities | Utilities | 0.02 | 620,101 | 11,363 | 0.24 | 34,683 | 8,266 |
| Taxes | Taxes | | | | | | |
| | Street Sweeping | N/A | N/A | 6,988 | N/A | N/A | 6,988 |
| | Storm Sewers (Includes Inlet Cleaning) | N/A | N/A | 3,669 | N/A | N/A | 3,669 |
| | Landscaping (Includes Median Islands) | N/A | N/A | 7,903 | N/A | N/A | 7,903 |
| Street Maintenance | Streetlights | N/A | N/A | 4,517 | N/A | N/A | 4,517 |
| | Traffic Signals | N/A | N/A | 3,910 | N/A | N/A | 3,910 |
| | Signs | N/A | N/A | 1,681 | N/A | N/A | 1,681 |
| | Markings | N/A | N/A | 2,684 | N/A | N/A | 2,684 |
| Misc | Miscellaneous Expenses | 0.00 | 620,101 | 1,847 | 0.04 | 34,683 | 1,344 |
| Expense Transfers | Expense Transfers | | | | | | |
| TOTAL BDL SYSTEM (NO | N-VEHICLE) MAINTENANCE COSTS | | | 272,609 | | | 206,855 |

^{*}Annual vehicle-revenue-miles and vehicle-revenue-hours are equal for the ABUS and BDL systems.

TABLE 6.6. BUS-ON-DEDICATED-LANE SYSTEM ADMINISTRATION COSTS

| | | Ve | ehicle-Revenue-N | /liles | Ve | ehicle-Revenue-l | Hours |
|------------------------|-------------------------------|--------------------------------|----------------------------|----------------------------------|--------------------------------|----------------------------|----------------------------------|
| Cost Element | ltem | Unit Cost (2001- Equiv. \$) | Annual Units in System* | Annual Cost (2001- Equiv. \$) | Unit Cost (2001- Equiv. \$) | Annual Units in System* | Annual Cost (2001- Equiv. \$) |
| | Operators' Salaries and Wages | | | | | | |
| Salaries and Wages | Operating Time | | | | | | |
| Salalies and Wages | Paid Non-Operating Work Time | | | | | | |
| | Other Salaries and Wages | 0.86 | 620,101 | 530,314 | 11.12 | 34,683 | 385,778 |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | |
| Fillige Berleills | Other Fringe Benefits | 1.28 | 620,101 | 791,109 | 16.59 | 34,683 | 575,494 |
| Services | Services | 0.45 | 620,101 | 278,770 | 5.85 | 34,683 | 202,792 |
| | Fuel and Lubricants | | | | | | |
| Materials and Supplies | Tires and Lubes | | | | | | |
| | Other Materials and Supplies | 0.06 | 620,101 | 39,354 | 0.83 | 34,683 | 28,628 |
| Utilities | Utilities | 0.01 | 620,101 | 3,579 | 0.08 | 34,683 | 2,603 |
| Taxes | Taxes | | | | | | |
| Misc. | Miscellaneous Expenses | 0.08 | 620,101 | 51,897 | 1.09 | 34,683 | 37,752 |
| Expense Transfers | Expense Transfers | | | | | | |
| OTAL BDL SYSTEM ADMI | NISTRATION COSTS | 2.73 | | 1,695,023 | 35.55 | | 1,233,048 |

^{*}Annual vehicle-revenue-miles and vehicle-revenue-hours are equal for the ABUS and BDL systems.

6.3.6 BDL User Costs

User costs for the BDL study system, like the light rail and ABUS study systems, were based on user on-board travel time and wait time. Because the BDL study system is assumed to run at the same speed as the light rail and ABUS study systems, and to carry the same passenger volumes, there is no variation in cost between ABUS user costs, light rail user costs, and BDL user costs for the on-board travel time. However, because the BDL study system is assumed to run the same number of buses as the ABUS system, but without convoying, the total passenger wait time will be different for the BDL and ABUS/light rail systems.

For this study, in order to maintain functional equivalence between the BDL and other systems, it is assumed that the BDL system requires the same number of buses per daily period as the ABUS system, but without convoying. This means that headways could be dispersed throughout the time period. For ease of computation, it is assumed here that headways are evenly distributed.

Cost calculations for overall user costs were completed in the following sequence:

- Calculation of BDL headways for each daily period, both on weekdays and weekends.
- Calculation of daily passenger wait time for weekdays and weekends.
- Determination of daily passenger on-board travel time for weekdays and weekends (this is identical, both numerically and in methodology, to that for the ABUS system).
- Summation of daily wait time and travel time, and of annual wait time and travel time.
- Calculation of wait- and travel-time costs.

Table 6.7 shows a summary of calculated user costs for the BDL system. Appendix J shows procedures, methodologies, and sample calculations for user costs.

TABLE 6.7. BDL TOTAL USER COSTS (\$)

| Day | Element | Daily User-Hours | Cost/User-Hour | Daily Cost | Annual Cost |
|----------------------------|----------------------|------------------|----------------|------------|-------------|
| Weekday | Wait Time | 397 | 8.32 | 3307 | 863,107 |
| vveekuay | On-Board Travel Time | 1126 | 8.32 | 9366 | 2,444,462 |
| Saturday | Wait Time | 426 | 8.32 | 3545 | 184,359 |
| Saturday | On-Board Travel Time | 601 | 8.32 | 4999 | 259,952 |
| Sunday | Wait Time | 363 | 8.32 | 3022 | 157,156 |
| Suriday | On-Board Travel Time | 511 | 8.32 | 4252 | 221,084 |
| TOTAL WAIT | ГТІМЕ | | | | 1,204,622 |
| TOTAL ON-BOARD TRAVEL TIME | | | | | 2,925,498 |
| TOTAL | | | | 28,491 | 4,130,120 |

6.4 BDL Cost Summaries

Table 6.8 shows a summary of all calculated costs associated with the BDL system.

TABLE 6.8. BUS-ON-DEDICATED LANE SYSTEM COST SUMMARY - EUAC (\$)

| Cost Category | Vehicle-Revenue-Miles | Vehicle-Revenue-Hours | Average |
|--|-----------------------|-----------------------|------------|
| System Planning and Design | 170,817 | 170,817 | |
| Construction, Rehabilitation, and Other Infrastructure | 3,117,027 | 3,117,027 | |
| Vehicle Operations | 2,830,775 | 2,059,252 | |
| Vehicle Maintenance | 1,190,627 | 866,123 | |
| System (Non-Vehicle) Maintenance | 272,609 | 206,855 | |
| System Administration | 1,695,023 | 1,233,048 | |
| User | 4,130,120 | 4,130,120 | |
| TOTAL COST | 13,406,997 | 11,783,241 | 12,595,119 |

6.5 Reference

1. A Policy on the Geometric Design of Highways and Streets. American Association of State Highway and Transportation Officials (AASHTO). 2001.

7 COST COMPARISON OF LIGHT RAIL, ABUS, AND BDL SYSTEMS

7.1 Comparison for Systems Operating at Base Volumes and Base Conditions

A summary of cost calculations for the three study systems is shown in Table 7.1. The calculations were carried out according to both vehicle-revenue-miles and vehicle-revenue-hours. Both calculation procedures yielded slightly different results for individual cost items, but cost trends are generally consistent for costs based on vehicle-miles and vehicle-hours.

In general, the results show that the bus alternatives have the lowest costs for existing passenger volumes on a section of the light rail base system in Santa Clara County. Light rail is shown to be the least cost-efficient design for these volumes, with costs of more than twice the alternative systems. The remainder of the alternatives are comparable in cost. The differences could be accounted for by certain assumptions made, and also variations in elements of the analysis. The variations could arise from such sources as the origin of unit costs and the base system chosen.

The largest cost differentials between the light rail and other systems occur in the category of construction, rehabilitation, and other capital costs, with costs for infrastructure accounting for the largest single portion of the differential. Even considering the substantially-lower fleet renewal costs associated with a light rail system, the light rail system cannot compete with the ABUS and BDL systems at this passenger volume. This is reasonable considering that light rail systems require more infrastructure, and this cost is more significant at lower volume levels.

In the case of design and planning, the high cost differentials could be partially explained by the fact that the cost data were obtained from different sources for the light rail and ABUS/BDL systems. For the light rail system, costs for design, planning, construction, and infrastructure were based largely on the recently-completed Tasman West light rail project in the Santa Clara Valley Transit Authority (VTA), while costs for the ABUS and BDL systems were extrapolated from data based on a recent roadway improvement project in the City of San Jose. It is noteworthy that the total design and planning costs for the Tasman West project constituted a large portion of the total infrastructure costs – a characteristic that is reflected in the light rail study system costs – while system planning and design for the ABUS and BDL systems are a smaller fraction of the construction costs. Especially in the case of design costs, differences in practices among these two agencies could account for some of the difference: for the Tasman West light rail project, planning and design was largely contracted to private agencies, while the City of San Jose did most of the design for the Hope Street project in-house. It should be noted that the system planning and design costs for the ABUS system may be higher than shown here because differences in design complexity between a conventional bus system and an automated one were not accounted for in this analysis.

Construction and rehabilitation costs for the ABUS are different from corresponding costs for the BDL due to roadway design widths and costs for magnetic strips, and non-infrastructure

Table 7.1. LIGHT RAIL, ABUS, AND BDL COST COMPARISON

| Table 7.1. LIGHT RAIL, ABOS, AND BDL COST COMPARISON | | | | | | | | | | |
|---|------------|-------------|-------------|----------------|------------|-------------|-------------|----------------|--|--|
| | | Cost | s (\$) | | | Cost | ts (\$) | | | |
| Coot Cotogony | | Based on Re | venue-Miles | | | Based on Re | venue-Hours | | | |
| Cost Category | Light Rail | AB | ABUS | | Light Rail | AB | ABUS | | | |
| | Light Kali | Scenario 1 | Scenario 2 | Dedicated-Lane | Light Rail | Scenario 1 | Scenario 2 | Dedicated-Lane | | |
| System Planning and Design | 7,348,425 | 147,994 | 108,150 | 170,817 | 7,348,425 | 147,994 | 108,150 | 170,817 | | |
| Construction, Rehabilitation, and Other Capital Costs | 11,258,212 | 2,888,056 | 2,233,054 | 3,117,027 | 11,258,212 | 2,888,056 | 2,233,054 | 3,117,027 | | |
| Infrastructure Costs ^a | 9,599,788 | 2,321,461 | 1,697,467 | 2,594,214 | 9,599,788 | 2,321,461 | 1,697,467 | 2,594,214 | | |
| Non-Infrastructure Capital Costs ^a | 1,370,424 | 230,944 | 230,944 | 194,959 | 1,370,424 | 230,944 | 230,944 | 194,959 | | |
| Periodic Capital Costs ^a | 287,999 | 123,725 | 92,717 | 132,894 | 287,999 | 123,725 | 92,717 | 132,894 | | |
| Fleet Renewal ^a | 0 | 211,927 | 211,927 | 194,959 | 0 | 211,927 | 211,927 | 194,959 | | |
| Vehicle Operations | 2,029,153 | 2,057,312 | 2,057,312 | 2,830,775 | 1,680,746 | 1,610,770 | 1,610,770 | 2,059,252 | | |
| Vehicle Maintenance | 1,371,208 | 1,190,627 | 1,190,627 | 1,190,627 | 1,137,063 | 866,123 | 866,123 | 866,123 | | |
| System (Non-Vehicle) Maintenance | 1,041,014 | 272,609 | 272,609 | 272,609 | 863,252 | 206,855 | 206,855 | 206,855 | | |
| System Administration | 2,592,359 | 3,587,679 | 3,587,679 | 1,695,023 | 2,149,693 | 2,975,054 | 2,975,054 | 1,233,048 | | |
| User | 4,843,378 | 4,843,378 | 4,843,378 | 4,130,120 | 4,843,378 | 4,843,378 | 4,843,378 | 4,130,120 | | |
| TOTAL COST | 30,483,749 | 14,987,655 | 14,292,808 | 13,406,997 | 29,280,770 | 13,538,231 | 12,843,384 | 11,783,241 | | |

^a This is a subheading of Construction, Rehabilitation, Infrastructure, and Other Capital Costs

capital costs differ due to the costs associated with automating technologies for the ABUS buses. Table 7.1 indicates that the infrastructure and periodic capital costs (including pavement rehabilitation and, for the ABUS, magnetic reference marker replacement) for the ABUS are lower than those for the BDL system. It is noteworthy, in the case of both infrastructure costs and periodic capital costs, that decreases in pavement width have a more substantial effect on the cost decreases for the ABUS than do savings resulting from not placing magnetic strips on the roadway in the case of the BDL system. This can be seen in Tables 5.1a, 5.1b, and 6.1. In the case of non-infrastructure capital costs, the additional costs for installing the automating technology on each bus in the ABUS is the only factor resulting in cost differences between the ABUS and the BDL, with the BDL favored slightly. This can also be seen in Tables 5.1a, 5.1b, and 6.1. With regards to fleet renewal, Table 7.1 indicates that the BDL scenario is less expensive than the ABUS configurations. This is due to the costs associated with automating technologies that are assumed to be replaced when each ABUS bus is replaced.

The calculated costs for vehicle operations indicate that the BDL system is the most expensive in this category, and the ABUS system the least expensive. The difference in cost between the BDL and ABUS/light rail systems is not insignificant (about \$800,000 per year), which constitutes about 5 to 7 percent of the total bus-system costs, depending on the system and whether vehicle-miles or vehicle-hours are used for the calculations. This result is reasonable because vehicle operating costs are dominated by driver costs, which comprise approximately 67 percent to 80 percent of the total costs in the category (see Tables 4.2, 5.2, and 6.3) depending on the system. Because of the fact that light rail and ABUS options can have trains and convoys, it could be expected that the costs for drivers could be reduced for these options relative to the associated cost for the BDL system because each bus in the BDL system requires a driver. Light rail costs in this category are not significantly different from corresponding ABUS costs because higher costs for light rail utilities, other wages, and services offset the additional costs incurred from having more ABUS vehicles in operation than light rail vehicles. Notably, it was assumed that ABUS trains would require drivers of similar training and, consequently, salary level, as drivers for light rail, and driver wages for ABUS were assumed to be the same per unit as driver wages for those of light rail operators.

Costs for vehicle maintenance appear to be comparable for all systems, with light rail maintenance slightly higher than the other alternatives.

The costs for system (non-vehicle) maintenance are lower for the bus systems than for the light rail. This could be attributed to the fact that the light rail infrastructure is more extensive and costs more to maintain. However, this comparison is complex because the VTA does not maintain the roads upon which its buses operate (VTA does maintain the light-rail right-of-way), and a separate source of costs was utilized to estimate the maintenance costs for the roadway. In order to make the comparison as realistic as possible, costs for traveled-way and wayside rehabilitation were added to the system (non-vehicle) costs for bus operations reported by VTA in order to arrive at a total system maintenance figure for both bus systems. It is possible that, because of the record-keeping and the fact that different sources were utilized to find maintenance costs for light rail and the two bus systems, not all cost items were included for the system maintenance of the bus systems. Further

investigation of this issue was not pursued for the purposes of this study since this is not a major cost item.

System administration costs are highest for the ABUS system, and lowest for the BDL system. Costs in this category are a product of vehicle-revenue-hours and –miles, and unit costs for system administration, as given in VTA source data. Since the ABUS study system operates more vehicles than the functionally-equivalent light-rail system, it is expected that costs for the ABUS system would be higher than the corresponding costs for the light rail. It should be noted that the ABUS administrative costs were calculated using the same unit costs as the light rail system because of the expected similarity in administration.

The significant differences in system administration costs come not between the ABUS and light rail, but between BDL and the other study systems. The cost differentials between the ABUS/light rail and BDL systems arise primarily from the difference in unit costs, based on either revenue-miles or revenue-hours. Care should be taken when interpreting these results (pertaining to system administration costs) because of the way in which the costs were estimated. The assumption in this study was that these costs could be estimated on the basis of vehicle-revenue-miles and —hours for all systems, as opposed to other possible methods of factoring these costs. Using this way of factoring may contribute to this larger-than-expected difference in costs. This difference in costs between the BDL and ABUS scenarios is significant in this comparison and could unfairly favor the BDL over the ABUS.

The results in Table 7.1 indicate that the user costs, which are comprised only of travel-time costs, are not largely different among the three systems compared in this report. There are several reasons for this. First, in the analysis presented here, there are two components of travel time and the resultant costs: wait time and on-board travel time. In order to maintain functional equivalence, the vehicles in all systems were assumed to travel at the same speed, and the same number of passengers were assumed to be transported on all systems. For these reasons, the total on-board travel time is identical for the light rail, ABUS, and BDL options. The only differences in travel time costs resulted from differentials in passenger wait time. It should be noted that transfer time from the study system to other modes was not included in this part of the analysis and was assumed to be comparable for all systems. The latter assumption would, of course, not hold true if passenger volumes were a function of the demand for a particular system. This study assumed the same passenger volumes for all systems compared, and did not attempt to determine whether the demand for one system alternative would be different from another.

Costs associated with wait time for ABUS and light rail are identical, since the systems are assumed to operate functionally-equivalent vehicle trains, and it is assumed that every passenger transfers from another mode to the mainline system. Wait-time (in terms of userhours) for the BDL system, as it is proposed in this study, is substantially less than that for the ABUS and light rail systems. When represented as an annual cost, this difference in cost amounts to roughly \$715,000 – a significant percentage of the ABUS and light rail wait-time costs (more than 37 percent, as per Table 5.6 and 4.6), though a relatively-small fraction of the total user costs, which are approximately \$4,900,000 for the ABUS and light rail systems,

and an even smaller fraction (roughly 2 to 6 percent) of the total system costs for any of the three systems.

It is also noteworthy that the wait-time cost calculations performed in this report assumed a uniform passenger arrival rate, implying that the average passenger waits for half of the bus headway. For smaller headways, this assumption could be expected to yield more accurate cost savings than for larger headways. This is because, with larger headways, passengers might be more inclined to coordinate their arrival at the station to be close to the train arrival time. Assumption of non-uniform arrival rates could significantly reduce passenger wait-time, and consequently diminish the significance of wait-time costs.

A change in the cost of user time could affect the comparative cost of the systems. The cost per hour of user time of \$8.32 was used, based on a value used by Caltrans (1). The significance of the difference in travel time costs is undercut by the relative smallness of the value of user travel time. The annual cost for light rail and ABUS wait time amounts to roughly \$1.9 million, and \$1.2 million for BDL. If user travel-time unit costs were doubled, this would produce approximately \$3.8 million annually for user wait-time costs associated with the ABUS and light rail systems, and roughly \$2.4 million for the BDL system. This roughly \$1.4 million difference in cost of the BDL system over the two other systems would mean that the total cost for the BDL system would still favor the BDL over the lower-cost ABUS alternative.

Changes in costs related to safety (i.e. – reduction or increase in accidents) were not addressed in this report because safety was not an element of the proposed research. It is noteworthy that the calculations and conclusions presented here with respect to transit are largely dependent upon safe operation of up to five automated buses formed into a convoy; however, the extent to which bus convoys could be formed and expanded would be a safety issue (it has been proven that light rail trains can safely operate with multiple cars). It is also worth noting that, because of the high costs associated with accidents, quantification of safety factors could significantly affect the conclusions presented here. Future research should address the feasibility of the five-bus convoy assumption, and of other related safety issues.

7.2 Effects of Changes in System Configurations at Base Passenger Volumes

The comparative costs could change as a result of changes in passenger volumes, system configuration, or a combination of both. The effect of changes in system configuration of ABUS will be discussed in this section.

There are several potential system configurations for the ABUS that were not considered as part of the analysis, but which could impact the cost comparison. These alternative systems could have fewer or more buses in a convoy, or automated buses operating on a dedicated lane without convoying. In addition, a system wherein a bus entering the automated lane attaches itself to a convoy, and then disengages from the convoy when exiting the system, could be imagined. In a previous report (2), an ABUS configuration was proposed wherein buses would enter the ABUS system, drop off drivers, and assemble in convoys. Then, individual buses would pick up drivers at the exits to the system and continue to service bus

routes outside the automated system. This operational scheme could result in a reduction of driver-related costs. It is assumed that one driver would remain in the lead bus of the convoy.

Another potential configuration for an ABUS, rather than the system proposed in this report, is one that involves formation of convoys at intermediate points, rather than at the beginning of the main line. The cost of drivers would increase because of the time that drivers would spend transferring in and out of buses, and the time that drivers would be idle between driving assignments. The waiting time of passengers could potentially be reduced as compared to a light rail system because of the elimination of transfer time of bus passengers to the main-line service. A BDL system operating in a similar manner could have similar wait-time reductions to the ABUS. A discussion of wait-time-related cost savings appears in the following paragraphs.

As can be seen from Table 7.2, which is based on data received from the VTA, approximately 33.9 percent of light rail riders transferred from a bus in the northbound direction (the southbound data supplied by the VTA were incomplete, and therefore not used in the analysis). Assuming that their wait time would be half of the average headway (7.5 minutes per passenger), and that weekday passenger volumes (5076 passengers boarding per day for northbound and southbound combined) and bus-transfer percentages (33.9 percent) are representative of volumes for all days in the year, the value of the wait time for these passengers would constitute roughly \$650,000 per year (refer to Tables E1 and E2 in Appendix E for the relevant passenger volumes). Moreover, if it were assumed that the same costs could be allocated to the transfer time when exiting from the light rail system, and that the configuration of the system off the main line was such that no passengers commuting to the main line by bus would have to transfer once reaching the line, then the total value of entrance and egress transfer time for passengers transferring from buses to the light rail would be \$1,300,000 per year.

TABLE 7.2. PERCENTAGE OF LIGHT RAIL RIDERS TRANSFERRING FROM BUS - WEEKDAY NORTHBOUND CONDITION

| Station | Total Passengers Using | Passengers | Transferring from Bus | |
|------------------|------------------------|------------|--------------------------|--|
| Station | Station | Number | % of Total Station Users | |
| Japantown/Ayer | 190 | 34 | 17.9 | |
| Civic Center | 1051 | 416 | 39.6 | |
| Gish | 491 | 0 | 0.0 | |
| Metro/Airport | 548 | 154 | 28.1 | |
| Karina Court | 435 | 104 | 23.9 | |
| Component | 382 | 63 | 16.5 | |
| Bonaventura | 503 | 41 | 8.2 | |
| Orchard | 365 | 66 | 18.1 | |
| River Oaks | 639 | 54 | 8.5 | |
| Tasman | 635 | 95 | 15.0 | |
| Baypointe | 1415 | 319 | 22.5 | |
| TOTAL | 6654 | N/A | N/A | |
| WEIGHTED AVERAGE | N/A | N/A | 33.9 | |

Assuming that this cost would be the same for the ABUS system, some speculation about the magnitude of savings in transfer and wait-time costs, as well as the increased cost for drivers due to the change in configuration, could be undertaken. For instance, if driver costs increased by, say, 20 percent, due to the implementation of this type of configuration, the increase in driver-related costs would be approximately \$200,000. In this situation, the passenger wait time would also increase due to the time taken to form convoys. Hypothetically, if the passenger wait time were assumed to increase by that same 20 percent, this would amount to roughly \$400,000 per year. The total increased costs, then, would be roughly \$600,000. Compared to the \$1,300,000 potential savings of transfer time, this implies an annual savings of \$700,000 for the implementation of the aforementioned ABUS configuration change. It is noteworthy that this \$700,000 savings is the maximum potential savings under this configuration, and is based on the assumption that all passengers currently commuting to the light rail study system by bus would be served (in the proposed bus systems) by buses that collect all passenger at their points of origin and then access the main line. Also, savings could also be reduced by the need for passengers to transfer from one bus to another on the main line if the bus on which they enter the system does not go to their destinations. It is possible, due to resource limitations, that some passengers would still have to transfer once reaching the main line, or while on the main line. As a result, the actual magnitude of the savings may be much less than the annual \$700,000 aforementioned.

Even more significant savings (relative to the ABUS savings over light rail) could be expected for the BDL system, were it operating with the seamless configuration discussed in the immediately-preceding paragraph. For the BDL, the additional savings over ABUS would arise from the elimination of delay related to convoy formation. Though driver cost increases could be higher, the non-automated configuration would eliminate the added delay resulting from buses waiting for others to join a convoy, resulting in similar cost savings. Assuming the same conditions as assumed for the ABUS configuration in the previous paragraph, the wait-time cost increases (at 20 percent of the total wait-time costs) would be \$240,000. Since no cost increases would be incurred from convoy-formation-related delay, the total BDL savings would be over \$1 million. Of course, the same limitations of the ABUS, in terms of transfer-time savings reductions, would apply to the BDL system. It is also worth noting that this savings could be even higher if passenger demand were evaluated and it were found that more of the passengers who formerly commuted to the light rail station via other means (e.g. – by car) chose to access the system on one of the feeder routes, rather than at the main line. Cost differentials due to demand for each system could be impacted by such factors as decreased congestion on streets in the corridor where the system operates. Demand analysis was considered to be beyond the scope of this study, but could be addressed in future research.

Furthermore, any route system design that could utilize the benefit of eliminating transfer costs could be different from the one currently employed by the VTA, e.g. – the structure of north/south versus east/west routes may have to be modified. It is therefore questionable whether a configuration based on the formation of convoys at intermediate points would be beneficial at these passenger volumes. At an increased frequency of service, the transfer time plays less of a role, and any benefits arising from elimination of transfer time decreases. It is important to note that the benefits of bus-based configurations that eliminate the transfer time

associated with light rail is not tied to automation per se, but is more directly related to using buses operating on a dedicated lane instead of a multimodal system where transfer is necessary. The elimination of transfer time would probably not impact the total overall cost differential between the light rail and the bus options significantly; however, the magnitude of the savings associated with transfer time and driver idle time could be significant enough to make BDL more cost-effective relative to the ABUS.

Another potential configuration would involve automated buses operating on an ABUS lane, but without the capacity for convoying. In this case, the system would operate similarly to the BDL system, and offer the increased user wait-time savings that the BDL provides. Also, were the automated buses to operate without drivers, driver-related vehicle-operating costs would be eliminated on the system. Moreover, with the reduced headways, transfer-time costs (if applicable) would be reduced. In this scenario, the ABUS system would likely be the preferred scenario, outscoring both the light rail and the BDL in terms of cost savings.

Unless changes were made to the number of vehicles in a convoy/train or the headways, there would be no potential for cost savings for the ABUS over the light rail, given the assumptions that were made regarding the constitution of trains for the ABUS. If ABUS trains were comprised of fewer individual vehicles running at smaller convoy headways, the travel-time costs would decrease, principally because of the reduction in wait time, but driver operating costs would increase. However, because wait-time costs are approximately double the costs associated with operators' wages and fringe benefits (see Tables 5.6 and 5.2), there is some potential for reduction in cost by operating smaller bus convoys at more frequent headways.

As it stands now, user wait-time costs account for roughly 6 percent of total light rail costs, 13 percent of the ABUS costs, and 9 percent of BDL costs (calculated Using Table 7.1 and Tables 4.6, 5.6, and 6.7 for the light rail, ABUS, and BDL study systems, respectively). If wait-time costs were a more significant portion of the total system costs, it could be argued that any option that would result in wait-time reductions would be the more attractive alternative. Using fewer buses in a convoy would essentially mean that the ABUS system costs would become more similar to the BDL costs, and the characteristics of the system would more closely resemble those of the BDL.

It is noteworthy that on-board travel time hours account for substantially more of the total user travel time than do wait time, so finding ways to decrease on-board travel time may be a more effective way to reduce travel-time costs. That could entail increasing the speed of operations on the system, which could require a better-protected right-of-way, and consequently, increased construction, rehabilitation, and maintenance costs. Also, at higher speeds, the issue of safety for the ABUS could become an issue of greater concern because of short headways and few physical restraints, unless inexpensive technological advances could mitigate this potential problem. This might not be favorable when comparing ABUS versus a light rail or BDL system, and it may be construed that, for longer-distance commuting with greater distances between stations and increased cruising speeds, safety conditions may relatively favor the rail and BDL systems. Thus, increasing speed to reduce on-board travel time may favor the BDL system and the light rail system over the ABUS. Since the

additional infrastructure necessary to accommodate safety concerns for each system was not determined as part of this study, the cost differentials with respect to infrastructure construction, rehabilitation, and maintenance cannot be ascertained from this study. This would be a critical element of future research that deals with safety considerations.

It should also be noted that individual buses could also be outfitted with some automated features that would add to the quality of service and safety. Such additions could be added to buses on the dedicated lane, and could be beneficial without calling into question the safety issues related to a convoy of buses.

It is also noteworthy that, rail systems have, in the past, been associated with a better level of service related to comfort than buses. When comparing a light rail system to the ABUS at higher speeds, it is difficult to imagine that ABUS could operate with the same quality of service as a light rail system. Quality-of-service issues are related to demand, and could be quantified as such in future research.

In summary, it would appear that changes in configuration at base volume could possibly favor the BDL system over the other alternatives.

7.3 Effects of Changes in Passenger Volumes

Increases in passenger volumes over the base volumes could affect multiple aspects of the costs. User costs could change. However, increased passenger volumes can imply a necessary increase in service, which could affect such items as rehabilitation frequency, maintenance activities, vehicle replacement frequency, and user costs.

For the purposes of this research, the effects of changes in passenger volumes are discussed in terms of increases in passenger volumes from the base volume. Although it is possible that changes in service characteristics (e.g. – decreased headways, increased convoy sizes, etc.) would be implemented by the operating agency to increase the efficiency of the system for significantly increased passenger volumes on the transit systems studied in this report, performing this type of analysis in a precise fashion is beyond the scope of this study. For the purposes of this study, the increased volumes are assumed to be accommodated by the existing system or, where changes in service are required, some reasoned (but not necessarily optimal) changes in configuration are assumed.

Analyses regarding the relative cost-effectiveness of the three systems are presented in the following passages for individual cost elements (e.g. – infrastructure) as passenger volumes increase, and projections about overall relative cost-effectiveness of the systems are made thereafter.

For small volume increases (i.e. - increases in volume not accompanied by changes in service such as increased frequency of trains, convoys, or buses), increases in costs would be primarily the result of user-cost increases. Other system costs, such as those associated with vehicle operations, maintenance, etc., would not change. As discussed in previous sections of this report, user costs for this study are quantified in terms of passenger wait-time costs and passenger on-board travel-time costs. All transit vehicles are assumed to operate at the

same speed, and speed increases/decreases are not considered. Under this assumption, changes in travel-time costs for increased passenger volumes increase proportionally to the increases in user volumes (i.e. – a doubling of passenger volumes would imply a doubling of user on-board travel-time and wait-time costs). Based on the results shown in Table 7.1, the BDL system would be favorable over the ABUS at increased passenger volumes. This would be due to the smaller cost increases associated with wait time for the BDL, since perpassenger wait time is less for the BDL than for the ABUS (resulting from the shorter headways associated with the BDL), and the on-board travel time is equivalent for all systems. The BDL would also be favored over light rail, for the same reason. Overall, then, for small volume increases, the BDL would likely be the favored system.

Increases in passenger volumes can only be accommodated, without changes in service frequency or other capacity expansions, up to the capacity of the base system, whereupon changes must be made to increase the system capacity. The increased service frequencies resulting from the volume increases and associated change in system capacity would also result in an increase in system (i.e. - agency) costs, as well as user costs. These concepts are discussed in the following paragraphs.

An increase in system capacity could mean an increase in vehicle capacity, increasing the number of vehicles (or trains or convoys) or increasing the capacity of the traveled way (such as adding lanes). For the sake of simplifying the discussion below, it was assumed that vehicle and traveled-way capacities would be held constant.

At moderate passenger volume increases, the bus systems would still be more cost-effective alternatives with respect to system planning, design, some initial capital costs, and periodic capital costs. If more than one lane were to be constructed, ABUS would have an advantage over BDL due to its narrower lane-width requirements. Also, as passenger volumes increase, there is a possibility that ABUS could have an additional competitive advantage over BDL because the ABUS allows for greater capacity than the BDL alternative.

It is worth noting that, since the impact of rehabilitation and periodic maintenance of light rail systems beyond the 30-year assumed useful life of the systems was not investigated, definitive conclusions cannot be made regarding the issue of savings in the category of periodic capital costs. The issue of differing useful lives of the projects was identified early in this report, and should be addressed further in subsequent research.

It is noteworthy that, at very high volumes, the capacity of the bus systems may not be adequate to accommodate the demand without adding additional lanes (for which there may not be adequate space). Also, ABUS should have an advantage over BDL regarding capacity expansion. The capacity advantages for the light rail and ABUS arise because, in a train or convoy, the vehicles are linked together and, on the average, it should be theoretically possible for the ABUS vehicles and practically possible for the light rail vehicles to operate at average vehicle headways that are shorter than for BDL. The extent to which bus convoys could be expanded would be a safety issue, whereas in the case of rail systems, it has been proven that long trains can be safely operated. The passenger volumes at which ABUS and

light rail would become the respective favored option could then depend upon the safety issue, and not necessarily an economic criterion.

Increased vehicle volumes could impact system-rehabilitation and fleet-replacement costs for all systems. Considering additional wear-and-tear of vehicles and the infrastructure, rehabilitation needs could increase in frequency, as could vehicle replacement needs, and a resultant increase in cost could occur. Again, since the impact of rehabilitation and periodic maintenance of light rail systems beyond the 30-year assumed useful life of the systems was not investigated, definitive conclusions cannot be made regarding this issue.

Even if fleet replacement cost differences could favor the light rail system as volumes increase and vehicle frequency is increased, this might not be significantly meaningful unless volumes increase substantially. Based on the findings of this study, costs associated with light rail fleet renewal are negligible for the assumed 30-year project life, while ABUS and BDL fleet renewal costs sum to approximately \$212,000 and \$195,000 (EUAC), respectively. Given this disparity, it is likely that increases in volume would incur larger increases in the bus-based options' costs. However, given the large initial capital cost of the light rail system, drastically increased volumes might be necessary for savings related to periodic capital costs to overcome the initial cost differential. The difference in costs between the ABUS and BDL systems are not significant given the assumptions regarding the rehabilitation of the magnetic strips.

An increase in the number of vehicles, convoys, or trains would increase the number of vehicle-miles and vehicle-hours and, consequently, those costs that depend on the number of vehicle-miles and vehicle-hours of service. These costs include vehicle operations, vehicle maintenance, system (non-vehicle) maintenance, system administration, and user costs, and are discussed in the following passages. Because the vehicle operations, vehicle maintenance, system (non-vehicle) maintenance, and system administration costs are directly related to vehicle-miles and –hours, it is expected that the trends forecast here would hold for small, moderate, and significant passenger volume increases, with the numeric quantity of any cost differences proportional to the increase in passenger volumes (e.g. – higher passenger volumes imply a higher cost difference than moderate passenger volumes, etc.).

Increased passenger volumes could result in relatively greater total vehicle operations cost increases for the light rail system as compared to the ABUS, assuming the train/convoy configuration as used in the analysis described previously, i.e. – the number of ABUS trains and light rail convoys held to be the same as service is expanded to accommodate higher passenger volumes. Non-driver-related operating unit costs for the ABUS amount to about two-thirds of the non-driver operating unit costs for the light rail (in terms of vehicle-revenue-hours, approximately \$19.24 for ABUS versus \$29.40 for light rail, as per Tables C7b and G13b). Vehicle-hours and –miles for the light rail are roughly 72 percent those of the ABUS (as per Tables C7b and G13b). Since the costs are the products of unit costs and vehicle-revenue-miles/hours, non-driver-related operating costs would therefore be approximately the same for light rail and ABUS, with perhaps a slight inclination toward favoring the ABUS. Since driver unit costs are equal for the ABUS and light rail systems, and the number of train/convoy miles/hours are the same, the net increase in driver-related

costs resulting from the addition of vehicle-miles or –hours in reaction to increased passenger volume levels, would be the same for the ABUS and the light rail. However, if the number of buses in a convoy would be restricted for safety reasons, then the driver costs for the ABUS would increase relatively faster than the corresponding light rail costs.

When increasing the number of vehicles to account for passenger volume increases, the increase in vehicle operating costs would be proportionally less for ABUS than for the BDL system. The difference in vehicle operating costs arises only from the difference in driver costs between the two systems and constitutes a smaller proportion of total costs for ABUS than for the BDL system, while the two systems function with identical revenue-miles and revenue-hours (see Tables G13b and I7b).

Non-driver operating costs for the BDL are the same as those for the ABUS and, therefore, as concluded in the comparison of the light rail system and the ABUS non-driver operating costs above, the non-driver operating costs for the BDL would be about the same as those for the light rail, with perhaps a slight advantage for the BDL. However, since there is a difference in the number of drivers and the driver unit costs, this would imply a probable driver-related operations cost difference and, thus, an overall vehicle-operating-cost difference. This difference is discussed in the following paragraph.

In terms of costs associated with drivers' wages and fringe benefits, the differences are not easy to see because of the differing base units (i.e.- vehicle-revenue-hours versus train-hours) used in Tables C7b and I7b (corresponding to light-rail and BDL costs, respectively), so some attempt will be made here to simplify the analysis. For the BDL, the driver-related unit costs for operations amount to about \$40.15 per vehicle-hour, and there are roughly 34,700 annual vehicle-revenue-hours used by the system. For the light rail system, driver-related unit costs amount to \$61.14 per train-revenue-hour of operation, and there are roughly 15,000 annual train-revenue-hours used by the system. This would result in a unit cost of roughly \$38.00 per vehicle-revenue-hour for the roughly 24,000 annual vehicle-revenue-hours. Based on these estimates, and given that the unit costs for the two systems are approximately the same (roughly \$40 for the light rail, and roughly \$38 for the BDL), differences in costs would arise because of the differences in annual vehicle-revenue-hours for the two systems. Since the light rail uses roughly two-thirds of the BDL annual vehicle-revenue-hours, the total driver-related costs for the light rail should increase at a lower rate than the BDL driver-related costs as vehicle-hours increase to accommodate increases in passenger volumes.

For the light rail system, unit costs for vehicle maintenance are about 188 percent those of the ABUS (based on the calculations for vehicle-revenue-miles, with an approximate unit cost of \$45 for light rail and \$24 for ABUS - see Tables 5.3 and 4.3), yet annual vehicle-miles for the light rail are about 72 percent of those for the light rail (refer, again, to Tables 5.3 and 4.3). This implies that the total vehicle-maintenance costs for the light rail system would be about one-third higher than for the ABUS with a specified volume of passengers. Therefore, as volume increases, the costs for light rail would increase relatively faster than the corresponding ABUS costs.

For the ABUS versus the BDL system, the costs associated with vehicle maintenance would be expected to be comparable as volumes increase, since the two systems operate the same number of vehicle-revenue-miles and –hours and have the same unit costs. This would imply that the BDL system would perform relatively better than the light rail system as volumes increase.

The costs associated with system (non-vehicle) maintenance would be expected to increase at a higher rate for the light rail than for the ABUS and BDL options, as volumes increase. Table 4.4 gives unit costs for the light rail system maintenance to be roughly \$45 per vehicle-hour. Table 5.4 does not give a unit cost for ABUS system maintenance, but one can be derived: the cost per vehicle-revenue-hour for the ABUS system is approximately \$206,855/34,683 annual vehicle-revenue-hours, or \$6 per vehicle-revenue-hour. Although the light rail operates about two-thirds of the total annual vehicle-revenue-hours as the ABUS, the light rail unit cost is roughly 7.5 times that of the ABUS. This implies that, as volumes increase, the light rail costs would increase significantly faster than those for the ABUS, so the ABUS system would be favored. As per Table 6.5, the BDL unit costs, and annual vehicle-revenue-miles and hours, are the same as those for ABUS. This implies that, based on the model presented in this report, the system (non-vehicle) maintenance costs for the ABUS and BDL systems would increase at the same rate with volume increases.

For the purposes of this analysis, system administration costs are assumed to increase as a function of annual vehicle-revenue-miles and –hours, and also as a function of the base condition unit costs. Costs associated with system administration could increase due to increased need for coordination of the system and its employees, and it is noteworthy that the extent to which system administration costs would increase with increased service might not be proportional to vehicle-mile and vehicle-hour increases. However, determination of cost-increase patterns beyond this assumed proportionality are beyond the scope of this study.

In comparing the light rail system to the ABUS in terms of system administration costs, unit costs are the same for both systems (this was assumed for the purposes of the study), at approximately \$86 per vehicle-revenue-hour (as per Tables 4.5 and 5.5). However, the light rail annual vehicle-revenue-hours and –miles are roughly 72 percent of those for the ABUS. This implies that increasing volumes would favor the light rail. For the comparison of the BDL administrative costs versus the ABUS administrative costs, a unit cost of roughly \$36 per vehicle-revenue-hour (see Table 6.6) was applied to the BDL system. Since the ABUS and BDL systems are assumed to operate the same number of vehicle-revenue-hours annually, this implies that the BDL would be the favored configuration in reference to system administration. Also, the BDL option would likely be favored over the light rail option. This is because the unit costs per vehicle-revenue-hour for the BDL system administration are roughly 42 percent of the unit cost for the light rail (\$36 as opposed to \$86, respectively), while the light rail uses 72 percent of the annual vehicle-revenue-hours that the BDL uses. In sum, then, since the BDL would be favored over the light rail at increased volumes, and since the light rail would be favored over the ABUS, the BDL is the favored system in regards to system administration. It should be noted, however, that the connection between administration costs and vehicle-hours/miles could be considered very tenuous, given that administration could also be a function of the difficulty involved in operational coordination,

which could vary considerably among the three options explored in this report. As volumes increase, there may or may not be a linear relationship (as was assumed here) between administration costs and vehicle-hours/miles for all systems.

As passenger volumes increase, costs associated with user travel time could increase as a result of increases in user on-board travel time and wait time. Since, according to the parameters of this study, on-board travel time is the same for all alternatives, the relative increases in travel-time costs would be related to wait-time costs for each of the systems. If passenger volumes were increased by 50 percent without a concomitant decrease in vehicle or convoy headways, it would be expected that passenger wait-time total costs would increase by 50 percent. However, such an increase in passenger volumes could imply a proportional decrease in headways (i.e. – a 33 percent decrease over the headways associated with the base volume). Similarly, a 200 percent volume increase would imply a 67 percent decrease in headways, and a 300 percent volume increase would imply a 75 percent decrease in headways. When passenger volumes are multiplied by the per-passenger wait-time, the total wait times are the same for each alternative, regardless of the passenger volume. Under these assumptions, for all of the systems examined in this study, user time costs would then still favor the BDL system over the light rail and ABUS.

However, some additional factors could be taken into consideration. Previously in this report, an equivalence (i.e – 3 light rail cars equals 5 buses, etc.) was assumed for buses and light rail vehicles. With larger passenger volume increases, the need to add vehicles to a light rail train would occur at a slower rate than the addition of vehicles to a bus convoy or to the BDL system, since light rail vehicles carry more passengers per vehicle. This would imply that, as passenger volumes increase, headways would not necessarily decrease at the same rate for the bus and non-bus systems. It is likely that the ABUS and BDL headways would decrease at a faster rate. This configuration would favor the ABUS, and especially the BDL, systems over the light rail because user wait time would decrease with the decreasing headways. However, there would be a limit to the decrease in headways: at some headway, safety would become an issue, and the favorability of the BDL system would yield to that of the light rail or ABUS.

Passenger transfer time was discussed in the previous section. At increased volumes, it is expected, based on the study systems presented in this report, that the net change in transfer-time costs would be negligible as passenger volumes increase. The reasoning for this is similar to the argument for wait-time-related costs: as passenger volumes increase, costs related to wait-time increase. The average wait time, however, would decrease as a result of decreased train, convoy, or bus headways.

In summary, then, at relatively-small increases in passenger volumes, the BDL system would likely be the best-performing system, since it would still have the advantage over the other systems with regard to passenger wait time. At significantly-large volumes, the light rail system could be the preferred system. It would be capable of offering a larger capacity than the other systems, and probably at greater safety standards.

At moderate volume increases, when decreasing headways becomes a safety problem for the BDL system, the ABUS would have an advantage over the BDL system – largely due to proportionally-smaller driver-related vehicle-operating costs for the ABUS. It should again be noted that a major cost difference between the ABUS and BDL system is related to the system administration costs and, as noted previously, this difference could be smaller, and could result in the ABUS system being the preferred system at lower volumes (such as those volumes used as a basis for this report). At very low volumes and large headways, the advantage that the ABUS offers, i.e. – of not requiring drivers in all buses, would not be reasonable, since convoys would not be justified based on passenger volumes. Also, at the intermediate volumes, the ABUS would have the advantage over the light rail system because it would have a cost advantage in all categories except for user costs (where they have equal costs) and fleet renewal, which was not included in this comparison because it was outside the comparison period. Inclusion of this cost would still favor the ABUS.

In Section 7.1, the issue of safety was broached in the context of operations at base volumes. At increased volumes, system safety would likely be of increasingly-significant concern for the ABUS and BDL systems. The extent to which bus convoys could be expanded would be more of an issue than light-rail train expandability to accommodate increased passenger volumes, while with light rail, it has been proven that expanded trains can be safely operated. The passenger volumes at which the light rail could become the favored option would depend on safety issues surrounding convoy formation and expansion, the quantification of which is beyond the scope of this study.

Technological improvements addressed in this study include those associated with ABUS automated operations. It is notable that, although technological advances could reduce ABUS-associated costs, technological advances could also result in reduction of costs for the other systems (i.e. – more efficient engines, fuel cell-powered vehicles, etc.), which were not considered as part of this study. However, the major reduction in costs for the ABUS as a result of technological improvements, and as compared to the other two modes considered, was the reduction in driver costs. The cost of outfitting the buses and the road for ABUS operation was a relatively-small proportion of the total cost, and any reduction in this cost would not amount to a significant change in the comparative costs. In contrast, technological improvements, such as ABUS, that reduce labor costs have the potential to decrease operations costs substantially.

7.4 References

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- 2. Tsao, H.-S.J., Botha, J.L., Zabyshny, A.A., Day, J.E. Definition and Evaluation of Bus and Truck Automation Operations Concepts: Final Report. California PATH Research Report UCB-ITS-PRR-2003-19. May 2003.

8 GENERAL ISSUES RELATED TO THE FREIGHT SYSTEMS EVALUATION

8.1 Study Section Location

The choice of an existing route as a basis for the analysis was done for two reasons. It allowed for some understanding of the feasibility of placing an additional lane in the median of an existing freeway (placement of an additional lane anywhere but in the median could be more costly than median placement). Also, this approach allowed for using a realistic range and mix of traffic volumes in time and space (location along the route).

The ideal candidate route for analysis should allow for a "fair" comparison of alternatives. Historically, rail systems have been more competitive relative to truck transportation, over longer distances, i.e. in excess of 500 miles (1). The AHS-truck is also intended for longer distances, but without analysis it is unclear at what trip distance it becomes competitive relative to intermodal rail or to conventional truck transportation. To gain insight into this issue, it would be useful to define a system with a length of more than 500 miles. Moreover, the comparison should be made in a corridor where intermodal rail is already in operation. This would make cost comparisons more realistic. However, there are some major complicating factors that force a simplification of this comparison, given the resources available for this study.

Finding rail routes and truck routes that are comparable is difficult. The rail systems are generally old systems with terminals in central urban areas, and it would be difficult and very artificial to conceive a truck terminal at the same location. If the truck terminal were placed elsewhere, differences is costs related to access would be difficult to attribute to differences inherent in the systems, rather than difference in access locations. This could be partially overcome by defining a rail system and a road system with the same lengths, but different terminal locations. One problem with this approach is that the terminal access costs would not be exactly the same and the costs would be less for the AHS-truck option, because access outside Central Business District (CBD) areas would generally be less costly. It is conceivably possible to substitute a highway on a rail route, but estimating costs for this comparison would also be outside the scope of this project. As will be discussed subsequently, an ideal corridor, for which data were readily available, could not be found.

The route chosen as a basis of analysis was Interstate 5 (I-5) in California because this provided a relatively long (418-mile) section of road for analysis. Although the section was less than the 500-mile minimum ideal length, the route was used because data were readily available. In addition, a segment of California State Route 710 (SR 710) was added to the I-5 study section to connect it to the port at Long Beach Harbor, thus providing a more realistic simulation of a trucking route. Long Beach was chosen as the southern boundary for the study section, and Sacramento as the northern boundary. Although this route is only 418 miles in length, which is less than the length that would have been ideal for this study, it does provide a relatively suitable basis for comparison. The issue of distance in the comparison of trucking options to the intermodal rail option will be addressed in subsequent sections of this report.

This study section allowed for varied traffic volumes, truck percentages, and geometric configurations in several urban and non-urban areas to be included in the analysis, and provided for the inclusion of long-distance service providers from Southern California traveling to the San Francisco Bay Area. Figure 8.1 shows the study section.

It would have been advantageous to have a rail section between Sacramento and Long Beach as a base rail system for this study; however, information provided by J.B. Hunt Transport, Inc. indicated that intermodal rail was not being operated on this route at the time that this study was undertaken. To make a comparison between rail and trucking for this study, permile freight shipping rates were obtained for the same product between two points where intermodal rail and trucking services exist. This issue will be further discussed in a later section of the report.

8.2 Some Issues Related to System Design and Operating Concepts

8.2.1 Introduction

All of the road-based alternative developments consisted of adding a lane to the existing configuration (one added lane for each direction). For the different alternatives, the added lane would be:

- A conventional lane
- A dedicated AHS lane
- A dedicated truck lane

An added lane can be provided in several different ways:

- The least expensive way to add lanes is usually to add them in the median of the freeway, should there be adequate space. That would usually entail provision of a separator between opposing traffic streams should the distance between them become too narrow for safe operation. In the case of an exclusive AHS or a dedicated truck lane, a separator would also be desirable between the exclusive lane and conventional lanes. However, this could require substantial infrastructure for access to the median because it would not be good operation to have trucks weave through traffic to get through to the center lane.
- If space were not available to add the extra lanes in the median, then one of the existing lanes could be dedicated as an AHS-truck lane or for conventional trucks. This option may be politically infeasible because of the difficulty presented by taking away space from existing users.
- Adding space on the outside of the roadway is generally very costly, because it
 involves major redesign and construction of interchanges. Acquisition of additional
 right-of-way may also be required in this case, and may be politically infeasible in
 urban areas.
- Constructing a completely new roadway, which is a very expensive alternative.

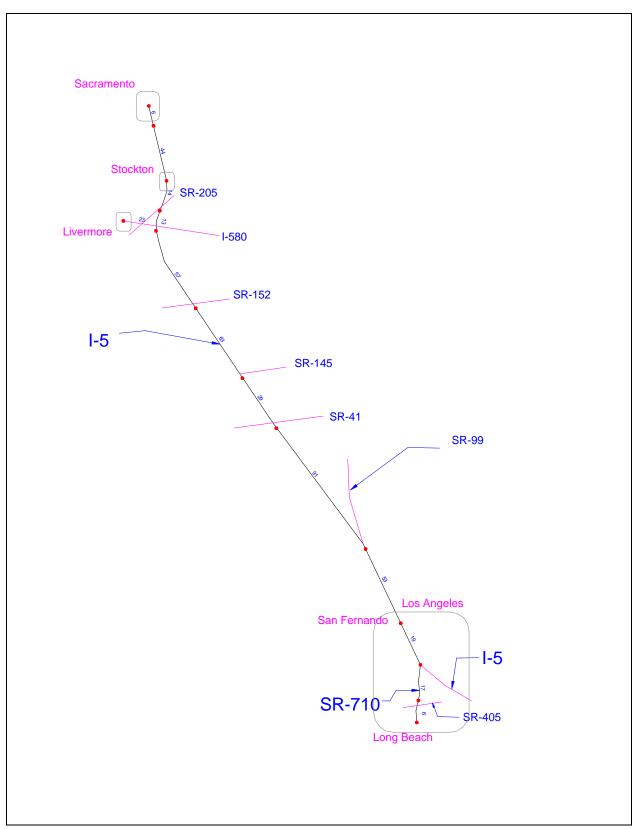


FIGURE 8.1 FREIGHT STUDY SECTION

 Another option to provide the requisite space would be to double-deck the existing roadway. Double-decking the freeway may be costly and may be unacceptable to the public because of the fear of failure during earthquakes. However, in future, this option may become acceptable, especially if rising congestion levels would become unacceptable, leading to a change in the public's priorities.

In the remainder of the report, the distinction was only made between providing lanes in the median and placement elsewhere but the median (non-median). No distinction was made among the non-median alternatives because this would have involved very specific analysis of road sections, which is considered outside the scope of this report.

8.2.2 Added Conventional Freeway Lanes

Adding a conventional lane would not change the operation of the road, except that it would have the benefit of reduced traffic density in the other lanes. No special access would be required.

8.2.3 AHS

The concept used in this study for AHS-truck consisted of truck convoys of three trucks operating on a dedicated lane, with a driver in the front vehicle only. This configuration was assumed to be reasonable for study purposes, though research could be conducted in the future to ascertain safe, feasible, and optimal convoy lengths. Also, for the purposes of this study, the AHS has major access points at relatively large spatial intervals. At each one of these access points, a transfer terminal (which serves as an assembly/disassembly area) would have to be constructed to transfer freight from conventional trucks to AHS-outfitted trucks that operate on the AHS. The operating concept is discussed in Appendix N, which was authored by Professor Randolph Hall of the University of Southern California. In addition, infrastructure (interchanges, etc.) would have to be provided to allow trucks access to the AHS lanes.

8.2.4 Dedicated Truck Lane

The alternative ways to place the dedicated lane would be similar to those for the AHS, as discussed above. The access points could be closer together than those for AHS because no transfer terminals are required. The spacing of these access points would affect the number of trucks using the truck lane, and it would have been necessary to consider different alternatives to examine this effect. For the purpose of this study, however, the only alternative considered was one where the access spacing was equivalent to that of the AHS. This would give some insight into the incremental cost differences between the AHS system and functionally-equivalent truck operation on a dedicated lane.

8.3 Some Issues Related to the Evaluation

8.3.1 Functional Equivalence of All Systems

For the purposes of this study, two systems were considered to be functionally equivalent if they transported the same number of vehicles in the same time period. Because vehicles do

not access the added conventional freeway lanes in the same manner as they access the AHS and dedicated truck lanes, the systems are not truly equivalent. Because the added lanes would improve traffic flow in different ways for each alternative system, traffic demand would be affected differently for each alternative. For this reason, it was assumed, for this study, that the addition of AHS, dedicated-truck, or conventional freeway lanes would not affect demand on the system. This allowed for a more "clear" comparison for research purposes. Additionally, zero traffic growth was assumed. Analysis conducted to evaluate the effects of volume levels using a traffic growth rate would have added complexity to the analysis without being meaningful for the evaluation. Applying traffic growth rates would have resulted in higher equivalent uniform annual costs (EUACs) for all alternatives, but was unnecessary for purposes of this evaluation. Of course, if a benefit/cost analysis were to be conducted to determine whether an additional lane should actually be constructed over a real-life specific section of roadway, then exact traffic volumes (as opposed to the approximate traffic volumes used in this study) and growth rates should be used.

Additionally, only one direction of travel –in the South-to-North direction – was considered for all systems. It was assumed that traffic volumes in both directions would be comparable, since volumes that span the entire day are used.

8.3.2 The Approach to the Economic Evaluation

The costs to construct a new section of freeway, or to add a lane to an existing freeway, vary widely. For the purposes of this study, costs per unit length and unit area (e.g. – linear and square feet) are influenced by geography (i.e. – whether the area is urban or rural) and alignment (i.e. – median or non-median placement). Costs associated with rural median-placed segments are the least expensive to construct; costs associated with urban non-median alignment are the most expensive.

Since it was impossible, given resource constraints, to conduct a detailed cost analysis for the whole road, a simplified approach was followed. This consisted of partitioning the roadway into sections that were relatively homogeneous with respect to the average daily traffic (AADT), the number of existing travel lanes in each direction, and the availability of space in the median. The following procedure was used:

- 1. The route was first characterized and segmented according to the location of the truck lane, i.e. whether the lane was placed inside or outside of the median.
- 2. Each route segment was further partitioned into sections according to the volume, the number of lanes, and type of development (i.e. urban, suburban, or rural).
- 3. The costs associated with each of the sections were calculated.
- 4. The total costs for all sections for each alternative design were calculated and compared.

The accuracy of the comparison was therefore dependent not only upon the accuracy and detail of the analysis, but also on the degree of idealization and approximation of the actual

conditions in steps 1, 2 and 3. This approach allowed for the best allocation of the available resources to obtain the best result, while still maintaining the realism of using an existing section of roadway. This procedure is discussed in Chapters 9, 10, and 11 for the three system options.

A major barrier to an accurate comparison of costs is that cost data for inter-modal rail in a specific corridor are proprietary and it is therefore very difficult to estimate the real cost of intermodal rail in a specific corridor. In order to arrive at a tractable comparison between the intermodal rail and trucking options, an approximate approach to the comparison was undertaken.

First, it was assumed that the two industries share a common ratio between the actual costs of transportation versus the actual shipping rate. Since shipping rates for both industries are in the public domain and the actual cost of trucking was assumed to have been calculated with reasonable accuracy in this study, this assumption enables a very rough estimation of the actual cost of the rail industry. In this study, the costs of intermodal rail were estimated by multiplying the shipping rate for intermodal rail by the ratio of the shipping cost for the truck alternative to the shipping rate for trucks. In this study, the aforementioned estimate is based on the rates per mile for an existing intermodal rail section elsewhere and applying it to the corridor selected for comparison. When interpreting the results, allowance should be made for the fact that distortions will be present because of accounting and business practices as well as the allocation of fixed costs. This ratio-based estimate is not expected to be very accurate, but this approach does offer a solution to estimating intermodal rail costs, given the limitations of available resources and the unavailability of certain data. It is noteworthy that this comparison would be more realistic, were the corridor used for comparison one where competition between trucking and intermodal rail does take place.

8.3.3 Cost Categories

The cost elements are:

- System planning and design costs
- Construction, rehabilitation and other infrastructure capital costs
- System maintenance costs
- Administration and system operating costs
- Vehicle operating costs
- Travel time costs

An overview of these elements will be discussed in the following paragraphs. The details of each cost category will be discussed in Sections 9, 10, and 11.

System Planning and Design Costs

System planning and design costs consist of all costs incurred before and during the design phase of the project. These costs include engineering, environmental review, etc. As will be seen below, the system planning and design costs were included in the construction costs.

Construction, Rehabilitation and Other Infrastructure Capital Costs

Construction costs consist of those costs incurred for the construction of the additional lanes and other system infrastructure. As stated above, system planning and design costs were included in construction costs for the purposes of this study. Rehabilitation costs include those costs associated with periodic reconstruction and major maintenance activities for the infrastructure. It is noteworthy that costs for acquisition of right-of-way were not considered as part of this study, except for the land costs related to the AHS transfer terminals. Consideration of land costs would have required a very detailed study. Such a study would have entailed determination of whether sufficient right-of-way existed outside the median to place those segments where median alignment of the added lane was not possible. For those segments of the study section where the added lane could not be located in the median, differentiation was not made among non-median placements (e.g. – elevated structures, atgrade placement, etc.). Since the costs associated with alternative placements could vary considerably depending on both availability of right-of-way and infrastructure needs, the costs associated with the additional right-of-way could not be ascertained.

Both the AHS-truck option and the dedicated-truck-lane option require infrastructure to provide access to the dedicated and AHS lanes (i.e. – interchanges). In addition, the AHS also requires assembly and disassembly areas (called "transfer terminals" and "staging areas" in this report).

System Maintenance Costs

Generally, system maintenance costs consist of routine roadway maintenance, including pavement patching, culvert cleaning, etc. There would also be additional maintenance costs for the interchanges associated with the AHS and dedicated lane systems. Costs for maintenance of assembly areas and associated buildings would also be incurred; however, these costs for maintenance of assembly-area infrastructure were considered to be relatively insignificant and were not included in this analysis.

Administration and System Operating Costs

Costs for administration and system operation include all functions for which costs would be incurred by an operating agency such as Caltrans, excluding the planning, design, construction, rehabilitation, and maintenance costs. The basic administration and system operating costs should be different for the three proposed systems. For instance, possibly levying tolls for the AHS lane would result in additional administration costs. Also, operating the AHS staging areas would result in extra costs. However, since it is not clear how the AHS lane would be operated and how overall administration costs would be allocated, estimation of these types of costs was considered to be outside the scope of this study. Operating costs for the AHS-truck staging areas were included in the cost estimates of this study.

Vehicle Operating Costs

The vehicle operating costs are those expenses necessary to operate a vehicle on the freeway lane. Typically, costs for vehicle operations include driver wages and fringe benefits, other wages and fringe benefits, equipment rents and purchased transportation, insurance, depreciation, tires, outside maintenance, fuel, tax, licensing, and other miscellaneous items. For the purposes of this study, taxes and licensing fees were not included in vehicle operations costs because they are considered transferred costs. This exclusion is proper because this analysis was performed from a societal perspective.

The driver-related costs associated with the AHS-truck system would be less than for the other options, because of using fewer drivers to drive the trucks over the line-haul sections. The trip lengths for the trucks using the AHS and dedicated truck lane could be longer than for conventional systems because there are fewer access points to the freeway, and the access and egress trips may therefore be more circuitous than for the conventional freeway. Because the trucks using the AHS system will be traveling longer distances to the access points, vehicle-related costs would increase. The extra cost of access was not included in this analysis because this would have entailed establishing an origin and destination for each truck, and then to estimate the extra distance traveled. This was considered outside the scope of this project.

There is evidence that fuel use for the AHS-truck would be less because of the decrease of wind resistance when the trucks are in a train with short headways between the individual trucks (2). The added cost for outfitting the trucks to enable them to be a part of a convoy could offset some of these savings; however, these costs were not included because it was outside the scope of this project to estimate how many individual trucks would be outfitted for this purpose, how many of these trucks would repeatedly use this particular lane, and how many of these trucks would be using other automated lanes. It was therefore impossible to determine, without a significant study, which proportion of these costs would be allocated to this particular route.

Travel Time Costs

Travel-time costs would be reduced by implementation of any of the alternatives because the added lanes should lead to increases in vehicle speeds, resulting in fewer expended user hours on the system. Compared to conventional traffic, it was assumed that truck speeds on the AHS would be higher than on the other alternatives, because of improved control provided by the automation technology, and also because of the separation of AHS traffic from regular traffic. With the removal of trucks from the regular traffic stream (in the case of the AHS and dedicated systems) or the dispersal of vehicles into an extra lane (as with the added-conventional-lane scenario), in some cases, speeds for the vehicles remaining on the conventional lanes increased. This could reduce user travel time costs for the line haul more significantly for the AHS than for the other systems. Also, since fewer drivers are necessary, this, conceivably, would further reduce travel-time costs for the AHS-truck system.

Compared to conventional traffic, additional time is taken by the AHS-lane traffic for formation and disassembly of convoys. Drivers may have to wait at the assembly areas for a truck to drive after disassembly, which will be an added cost for the AHS-truck. Also, it is anticipated that there will be additional travel time for the AHS-truck and dedicated lane because of the longer distances traveled from access points to destinations that are not near system access/egress locations. The costs discussed in this paragraph were not explicitly calculated because it was considered outside the scope of this study.

8.4 References

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9 CONVENTIONAL FREEWAY LANE COSTS

9.1 Cross-Section

For this alternative, a standard 12-ft. lane was added in each direction. It was assumed that a barrier would be necessary to divide the two directions. This implies a total added width of 26 feet, including two travel lanes and one two-foot Caltrans standard barrier (1). Although this barrier might not be necessary in some instances, it is outside the scope of this project to determine where such a barrier may be needed. For uniformity across the analysis of the different alternatives, it was assumed that a center barrier was always necessary when the added lanes were placed in the median. The minimum space requirements for placing a lane in the median is shown in the layout presented in Figure 9.1. The non-median space requirements are not shown here because there are multiple possibilities that would depend on specific section constraints.

9.2 Section Characterization

The segmentation of the road, based on availability of space in the median, AADT, number of existing lanes, and type of development was carried out using data for the northbound direction. Using only one direction for the analysis, it was assumed that the northbound traffic volumes are representative of traffic volumes in northbound and southbound directions, and that the roadway is generally symmetric, so roadway characteristics (i.e. – number of lanes, traveled way width) in the north- and southbound directions are generally the same.

The procedure developed to partition the study section into these homogeneous segments is discussed in detail in Appendix K. The partitions are shown in Table 9.1.

9.3 Conventional Freeway Cost Calculations - Base Volume

9.3.1 Conventional Freeway Planning, Design and Construction Costs

Some freeway-related unit costs (in 1999 dollars), obtained from Caltrans, were used to calculate costs related to traveled way and shoulder planning, design, and construction. A range of values for 8-lane urban and 4-lane rural freeways were provided by Caltrans, and appear in Table 9.2. The procedure for assigning a unit cost to the roadway is explained in the following passages.

According to Caltrans, the related planning and design costs are included in each of the cost items shown. Based on these costs, a cost per mile per one foot width was obtained assuming a 78-foot total pavement width for the rural four-lane freeway and a 136-foot total pavement width for the eight-lane urban freeway. These widths were based on cross-section information obtained from the *California Highway Design Manual* (1). An inflator of 1.0353 (using the same base as was used for the transit systems) was then applied to each value to find the unit costs shown in Table 9.3.

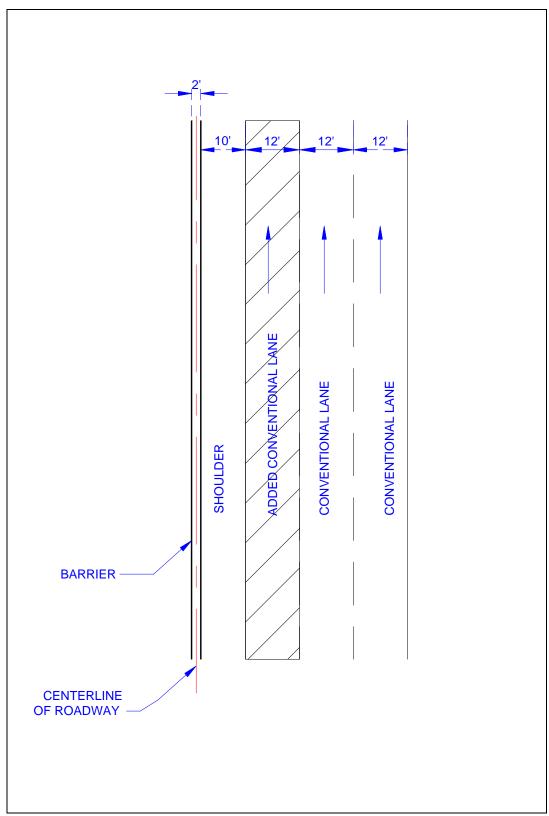


FIGURE 9.1 BASIC GEOMETRY FOR ADDED-CONVENTIONAL-FREEWAY-LANE CONFIGURATION

| TABLE 9.1 SECTION P. | City/Suburban/ | | ost Mile of Se | | Conventional | AHS Lane | Base AADT | | Truck AADT | Peak Period | Peak Period | Peak Period | Nighttime Off- | Nighttime Off- | Nighttime Off-Peak | Nighttime Off- Peak Period Flow, | Daytime Off- Peak Period | Daytime Off-Peak | |
|--------------------------------------|----------------|----------------|----------------|---------------|-----------------------------------|----------------------|--------------------|----------------|--------------------|---------------------|------------------------------|--------------------------------|---------------------------------|-----------------------|---------------------------------------|-------------------------------------|-----------------------------|---------------------------------------|-------------------------------------|
| County | Rural | Begin | End | Length (mi) | Freeway Lanes in One Direction | Placement | (One Direction) | Truck % | (One Direction) | Duration (hours) | Flow, One Direction (vph) | Volume, One Direction (veh) | Peak Period Duration (hours) | Peak Period % AADT | Period Volume, One Direction (veh) | One Direction (vph) | Duration (hours) | Period Volume, One Direction (veh) | Period Flow, One Direction (vph) |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 2 | Median | 40,000 | 16.0% | 6,400 | 6 | 3,500 | 21,000 | 5 | 4.81% | 1,923 | 385 | 13 | 17,077 | 1,314 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 3 | Median | 49,000 | 11.0% | 5,390 | 6 | 4,900 | 29,400 | 5 | 4.81% | 2,356 | 471 | 13 | 17,244 | 1,326 |
| I-5: Sacramento | Urban | 26.69 25.53 | 26.94 | 0.25 | 3 | Median | 49,000 67,000 | 9.0% | 4,410 8,710 | 6 | 4,900 6,500 | 29,400 19,500 | 5 | 4.81% 4.76% | 2,356 3,189 | 471 532 | 13 15 | 17,244 44.311 | 1,326 2,954 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 3 | Median Median | 73,000 | 9.0% | 6,710 | 3 | 7.300 | 21.900 | 6 | 4.76% | 3,169 | 579 | 15 | 44,311 | 3,175 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 5 | Non-Median | 80,000 | 10.0% | 8.000 | 3 | 7,100 | 21,300 | 6 | 4.76% | 3,808 | 635 | 15 | 54.892 | 3,659 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 3 | Non-Median | 75,000 | 11.0% | 8,250 | 3 | 7,000 | 21,000 | 6 | 4.76% | 3,570 | 595 | 15 | 50,430 | 3,362 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 4 | Non-Median | 65,000 | 14.0% | 9,100 | 3 | 6,000 | 18,000 | 6 | 4.76% | 3,094 | 516 | 15 | 43,906 | 2,927 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 5 | Non-Median | 63,000 | 14.0% | 8,820 | 3 | 5,400 | 16,200 | 6 | 4.76% | 2,999 | 500 | 15 | 43,801 | 2,920 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 4 | Median | 50,000 | 14.0% | 7,000 | 3 | 5,000 | 15,000 | 6 | 4.76% | 2,380 | 397 | 15 | 32,620 | 2,175 |
| I-5: Sacramento I-5: Sacramento | Urban Rural | 14.46 0 | 16.7 14.46 | 2.24 14.46 | 2 | Median Median | 40,000 30,000 | 14.0% 25.0% | 5,600 7,500 | 3 | 4,000 3,000 | 12,000 9,000 | 6 11 | 4.76% 19.13% | 1,904 5,738 | 317 522 | 15 10 | 26,096 15,262 | 1,740 1,526 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 2 | Median | 25.000 | 24.0% | 6,000 | 4 | 2,300 | 9,200 | 8 | 11.58% | 2,895 | 362 | 12 | 12,905 | 1,075 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 3 | Median | 40,000 | 23.0% | 9.200 | 5 | 4,000 | 20,000 | 5 | 4.03% | 1,613 | 323 | 14 | 18,387 | 1,313 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 3 | Median | 45,000 | 24.0% | 10,800 | 5 | 4,500 | 22,500 | 5 | 4.03% | 1,814 | 363 | 14 | 20,686 | 1,478 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 4 | Median | 50,000 | 24.0% | 12,000 | 5 | 5,000 | 25,000 | 5 | 5.58% | 2,791 | 558 | 14 | 22,209 | 1,586 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 3 | Median | 40,000 | 26.0% | 10,400 | 5 | 4,000 | 20,000 | 5 | 5.58% | 2,233 | 447 | 14 | 17,767 | 1,269 |
| I-5: San Joaquin I-5: San Joaquin | Rural Rural | 12.69 | 14.34 12.69 | 1.65 0.89 | 5 3 | Median Median | 63,000 42,000 | 26.0% 26.0% | 16,380 10,920 | 5 | 5,000 4,200 | 25,000 21,000 | 5 6 | 5.58% 8.17% | 3,517 3,430 | 703 572 | 14 13 | 34,483 17,570 | 2,463 1,352 |
| I-5: San Joaquin I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 2 | Median | 10,000 | 26.0% | 2,600 | 3 | 1,000 | 3,000 | 5 | 8.17% | 3,430 803 | 161 | 16 | 6,197 | 1,352 |
| I-5: Stanislaus | Rural | o o | 28.06 | 28.06 | 2 | Median | 10,000 | 28.0% | 2,800 | 4 | 1,000 | 4,000 | 6 | 15.57% | 1,557 | 259 | 14 | 4,443 | 317 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 2 | Median | 15,000 | 29.0% | 4,350 | 4 | 1,500 | 6,000 | 6 | 15.57% | 2,335 | 389 | 14 | 6,665 | 476 |
| I-5: Fresno | | 0 | 66.16 | 66.16 | 2 | Median | 15,000 | 30.0% | 4,500 | 5 | 1,500 | 7,500 | 7 | 18.05% | 2,708 | 387 | 12 | 4,792 | 399 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 2 | Median | 15,000 | 30.0% | 4,500 | 5 | 1,500 | 7,500 | 7 | 17.32% | 2,597 | 371 | 12 | 4,903 | 409 |
| I-5: Kern | Rural | 15.86 15.08 | 87.03 | 71.17 | 2 | Median | 17,000 | 29.0% | 4,930 | 5 | 1,700 3,000 | 8,500 15,000 | 5 | 10.17% 10.95% | 1,728 | 346 547 | 14 13 | 6,772 | 484 |
| I-5: Kern I-5: Kern | Rural | 15.08 | 15.86 15.08 | 0.78 4.73 | 4 | Median Median | 30,000 30,000 | 28.0% | 8,400 8.400 | 5 6 | 3,000 | 15,000 18,000 | 6 | 10.95% | 3,284 3,284 | 547 547 | 13 12 | 11,716 8.716 | 901 726 |
| I-5: Kern | Rural Rural | 9.28 | 10.35 | 1.07 | 4 | Median | 30,000 | 28.0% | 8,400 | 6 | 3,000 | 18,000 | 6 | 10.95% | 3,284 | 547 | 12 | 8,716 | 726 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 4 | Median | 30,000 | 30.0% | 9,000 | 6 | 3,000 | 18,000 | 6 | 10.95% | 3,284 | 547 | 12 | 8,716 | 726 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 4 | Median | 30,000 | 28.0% | 8,400 | 6 | 3,000 | 18,000 | 6 | 10.95% | 3,284 | 547 | 12 | 8,716 | 726 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 4 | Median | 30,000 | 28.0% | 8,400 | 6 | 3,000 | 18,000 | 6 | 10.95% | 3,284 | 547 | 12 | 8,716 | 726 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 4 | Median | 30,000 | 28.0% | 8,400 | 6 | 3,000 | 18,000 | 6 | 10.95% | 3,284 | 547 | 12 | 8,716 | 726 |
| I-5: Kern I-5: Los Angeles | Rural Rural | 0 84.76 | 0.58 88.61 | 0.58 3.85 | 4 | Median Non-Median | 30,000 35,000 | 28.0% 27.0% | 8,400 9,450 | 6 | 3,000 3,500 | 18,000 21,000 | 6 | 10.95% 10.14% | 3,284 3,550 | 547 592 | 12 12 | 8,716 10,450 | 726 871 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 4 | Median | 35,000 | 27.0% | 9,450 | 6 | 3,500 | 21,000 | 6 | 10.14% | 3,550 | 592 | 12 | 10,450 | 871 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 4 | Median | 35,000 | 18.0% | 6,300 | 6 | 3,500 | 21,000 | 7 | 10.14% | 3,550 | 507 | 11 | 10,450 | 950 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 4 | Median | 35,000 | 19.0% | 6,650 | 6 | 3,500 | 21,000 | 7 | 10.14% | 3,550 | 507 | 11 | 10,450 | 950 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 4 | Median | 35,000 | 18.0% | 6,300 | 6 | 3,500 | 21,000 | 7 | 10.14% | 3,550 | 507 | 11 | 10,450 | 950 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 4 | Median | 35,000 | 18.0% | 6,300 | 6 | 3,500 | 21,000 | 7 | 10.14% | 3,550 | 507 | 11 | 10,450 | 950 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 4 | Median | 40,000 65,000 | 16.0% | 6,400 | 5 | 4,000 | 20,000 | 5 5 | 6.08% | 2,433 3,953 | 487 | 14 14 | 17,567 | 1,255 |
| I-5: Los Angeles I-5: Los Angeles | Rural Urban | 52.33 46.9 | 54.16 52.33 | 1.83 5.43 | 4 | Median Median | 90,000 | 10.0% | 6,500 9,000 | 6 | 6,500 8,600 | 32,500 51,600 | 5 | 6.08% 5.89% | 5,953 | 791 1,061 | 13 | 28,547 33,095 | 2,039 2,546 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 4 | Median | 92,000 | 9.0% | 8.280 | 6 | 8.900 | 53,400 | 5 | 5.89% | 5,423 | 1.085 | 13 | 33,177 | 2,552 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 5 | Median | 92,000 | 10.0% | 9,200 | 6 | 8,900 | 53,400 | 5 | 5.89% | 5,423 | 1,085 | 13 | 33,177 | 2,552 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 5 | Median | 100,000 | 9.0% | 9,000 | 6 | 8,900 | 53,400 | 5 | 5.89% | 5,895 | 1,179 | 13 | 40,705 | 3,131 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 5 | Median | 115,000 | 10.0% | 11,500 | 6 | 9,100 | 54,600 | 5 | 5.89% | 6,779 | 1,356 | 13 | 53,621 | 4,125 |
| I-5: Los Angeles | Urban Urban | 43.9 41.6 | 44.01 43.9 | 0.11 | 4 | Median Non-Median | 115,000 120.000 | 8.0% 8.0% | 9,200 9,600 | 6 | 8,500 9,500 | 51,000 57,000 | 5 | 6.62% | 7,618 7,949 | 1,524 1,590 | 13 13 | 56,382 55.051 | 4,337 4,235 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 40.27 | 43.9 | 1.33 | 3 | Non-Median | 120,000 | 9.0% | 10.530 | 4 | 9,500 4.600 | 18,400 | 5 | 4.88% | 7,949 5.710 | 1,590 | 13 | 92,890 | 6,193 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 4 | Non-Median | 65,000 | 9.0% | 5,850 | 4 | 4,800 | 19,200 | 5 | 4.88% | 3,172 | 634 | 15 | 42,628 | 2,842 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 5 | Non-Median | 70,000 | 8.0% | 5,600 | 4 | 5,000 | 20,000 | 5 | 4.88% | 3,416 | 683 | 15 | 46,584 | 3,106 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 5 | Non-Median | 135,000 | 8.0% | 10,800 | 5 | 10,200 | 51,000 | 5 | 4.20% | 5,675 | 1,135 | 14 | 78,325 | 5,595 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 6 | Median | 140,000 | 8.0% | 11,200 | 5 | 10,000 | 50,000 | 5 | 4.20% | 5,885 | 1,177 | 14 | 84,115 | 6,008 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 4 | Median Non-Median | 140,000 90,000 | 8.0% 8.0% | 11,200 7,200 | 5 5 | 9,600 6,800 | 48,000 34,000 | 5 | 4.20% 4.20% | 5,885 3,783 | 1,177 757 | 14 14 | 86,115 52,217 | 6,151 3,730 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 35.94 29.16 | 36.22 35.94 | 0.28 6.78 | 4 | Non-Median | 90,000 | 8.0% | 7,200 | 5 | 7,200 | 36,000 | 5 | 4.20% | 3,783 | 757 | 14 | 52,217 | 3,730 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.78 | 4 | Non-Median | 102.000 | 8.0% | 8.160 | 5 | 8.200 | 41,000 | 5 | 4.20% | 4.288 | 858 | 14 | 56,712 | 4.051 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 5 | Non-Median | 130,000 | 7.0% | 9,100 | 5 | 9,500 | 47,500 | 5 | 4.20% | 5,465 | 1,093 | 14 | 77,035 | 5,503 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 4 | Non-Median | 130,000 | 7.0% | 9,100 | 5 | 9,500 | 47,500 | 5 | 4.20% | 5,465 | 1,093 | 14 | 77,035 | 5,503 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 5 | Non-Median | 138,000 | 8.0% | 11,040 | 8 | 9,900 | 79,200 | 5 | 4.48% | 6,184 | 1,237 | 11 | 52,616 | 4,783 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 4 | Non-Median | 140,000 | 8.0% | 11,200 | 8 | 9,600 | 76,800 | 5 | 4.48% | 6,273 | 1,255 | 11 | 56,927 | 5,175 |
| I-5: Los Angeles | Urban | 17.21 16.9 | 20.58 17.21 | 3.37 0.31 | 4 | Non-Median Median | 120,000 120,000 | 8.0% 8.0% | 9,600 9,600 | - 8 - 6 | 8,000 7,900 | 64,000 47,400 | 5 5 | 4.48% 2.79% | 5,377 3,350 | 1,075 670 | 11 13 | 50,623 69,250 | 4,602 5,327 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 16.9 | 16.9 | 0.31 2.74 | 4 | Non-Median | 120,000 | 8.0% | 10.400 | 6 | 7,900 8,000 | 47,400 | 5 | 2.79% | 3,350 | 726 | 13 | 78,371 | 6,029 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 4 | Median | 128.000 | 8.0% | 10,400 | 6 | 8,400 | 50,400 | 5 | 2.79% | 3,574 | 715 | 13 | 74.026 | 5,694 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 4 | Non-Median | 110,000 | 15.0% | 16,500 | 8 | 8,000 | 64,000 | 5 | 4.48% | 4,929 | 986 | 11 | 41,071 | 3,734 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 4 | Non-Median | 88,000 | 14.0% | 12,320 | 8 | 7,500 | 60,000 | 5 | 4.48% | 3,943 | 789 | 11 | 24,057 | 2,187 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 3 | Non-Median | 70,000 | 15.0% | 10,500 | 8 | 6,000 | 48,000 | 5 | 4 48% | 3,137 | 627 | 11 | 18,863 | 1.715 |

TABLE 9.2 FREEWAY CONSTRUCTION AND REHABILITATION UNIT COST DATA (IN MILLIONS OF DOLLARS) - CALTRANS 1999

| | | Freewa | ау Туре | | |
|----------------------------|--------|--------|--------------|------|--|
| Project Type | 8-Lane | Urban | 4-Lane Rural | | |
| | Low | High | Low | High | |
| 1 Mile New Freeway | 40 | 150 | 15 | 25 | |
| New Interchange - Arterial | 20 | 50 | 10 | 20 | |
| 1 Mile Pavement Rehab. | 2.5 | 8 | 0.65 | 6 | |

Table 9.3 shows unit costs for urban and rural sections of roadway (cost per mile per 12-foot width, which accounts for one direction of travel), for "low" and "high" cost scenarios. Low and high values were used to provide a range of costs because roadway construction costs vary considerably from project to project, and using only one number to represent these various cost scenarios would be misleading.

TABLE 9.3. NEW FREEWAY UNIT CONSTRUCTION COSTS FOR ADDED-CONVENTIONAL-LANE CONFIGURATION

| Type of | Year | Cost per Mile pe | er Foot Width (\$) | Cost per Mile of 26 ft Cross-Section - per 12 ft (\$) | | | | |
|---------|-------|------------------|--------------------|---|------------|--|--|--|
| Area | i eai | Low | High | Low | High | | | |
| Rural | 1999 | 192,308 | 320,513 | 2,307,692 | 3,846,154 | | | |
| Urban | 1999 | 294,118 | 1,102,941 | 3,529,412 | 13,235,294 | | | |
| Rural | 2001 | 199,096 | 331,827 | 2,389,154 | 3,981,923 | | | |
| Urban | 2001 | 304,500 | 1,141,875 | 3,654,000 | 13,702,500 | | | |

Roadway segments were classified as urban, suburban, or rural based on proximity to a metropolitan area. A segment was classified as urban if it was within the boundaries of the city, as outlined in the *California Highway Log* (2). Segments were classified as suburban or rural if outside these boundaries. Suburban status was applied if the segments were considered to fall within the greater metropolitan area of the nearest major city. Where those boundaries were questionable (for instance, in Los Angeles), traffic volumes were analyzed. If the traffic volumes in the segment were comparable to those of an adjacent urban area, that segment was classified as suburban. Otherwise, it was classified as rural.

The unit costs in Table 9.3 were used to calculate the cost for each section of the road for the added lane, as described in Appendix L. The unit costs were applied as follows:

Urban Median Lane – low urban unit costs
Urban Non-Median Lane – high urban unit costs
Suburban Median Lane – average of low urban and rural unit costs
Suburban Non-Median Lane – average of high urban and rural unit costs
Rural Median Lane – low rural unit costs
Rural Non-Median Lane – high rural unit costs

Costs associated with barriers, like those associated with the roadway, are dependent upon segment classification. For the added conventional freeway lane option, a median barrier was assumed to be necessary to separate opposing travel directions on those partitions where

the lanes are placed in the roadway median. If the added lanes were placed outside the median on a given partition, it was assumed that no barriers are necessary. On those segments where barrier costs are applicable, then, one-half of the barrier costs were assigned to each travel direction. For segments where no barrier is necessary, the barrier costs are listed as zero. Costs per mile for a barrier are equal to \$94,776, as shown in Table L1 in Appendix L (this cost is based on barrier costs of \$17.95 per linear foot, as provided by Caltrans (3)).

The total cost for barriers amounted to \$17,114,176. An equivalent uniform annual cost of \$1,243,326 was then found (using the same methodologies discussed in the transit sections – with an assumed project life of 30 years and a discount rate of 6 percent). Refer to Appendix L for costs itemized by segment.

It should be noted that right-of-way (ROW) costs were not considered because it was considered outside the scope of this study to determine whether space was available in the existing ROW. Total planning, design, and construction costs for the added conventional freeway lane amount to \$1,561,745,939, which has an EUAC value of \$113,459,142 in 2001-dollars.

9.3.2 Conventional Freeway Rehabilitation Costs

The rehabilitation costs were based on data obtained from Caltrans. The data from Caltrans are shown in Table 9.2. A unit cost was developed in the same way that a unit cost was developed for the construction costs and applied to the identified sections of the road. Those unit costs are shown in Table 9.4. An equivalent uniform annual cost of \$5,357,421 was calculated assuming rehabilitation was carried out in years 10 and 20 and using a discount rate of 6 percent. Procedures used for inflation adjustments and discounting are identical to those used in the transit component of the report. Calculation tables appear in Appendix L.

TABLE 9.4. FREEWAY REHABILITATION UNIT COSTS FOR ADDED-CONVENTIONAL-LANE CONFIGURATION

| Type of Area | Voor | Cost per Mil | e per Foot (\$) | Cost per Mile of 26 ft Cross-Section - per 12 ft (\$) | | | |
|-------------------|------|--------------|-----------------|---|---------|--|--|
| Type of Area Year | | Low | High | Low | High | | |
| Rural | 1999 | 8,333 | 76,923 | 100,000 | 923,077 | | |
| Urban | 1999 | 18,382 | 58,824 | 220,588 | 705,882 | | |
| Rural | 2001 | 8,628 | 79,638 | 103,530 | 955,662 | | |

9.3.3 Conventional Freeway Maintenance Costs

According to data provided in "Economic Analysis of Transportation Investments and Economic Development" (4), the routine annual maintenance costs for a 4-lane (48-footwidth) road was \$528 per mile in 1983 dollars – a figure which is based on historical Federal Department of Transportation figures. This translates to roughly \$11 per mile per foot width in 1983 dollars, and \$17.24 in 2001-equivalent dollars per foot width (\$0.003 in 2001-equivalent dollars per square foot). This resulted in a total maintenance cost of \$86,479 per

year. This number was obtained by multiplying the 2001-equivalent EUAC per foot width by the system length of 418.01 miles.

9.3.4 Conventional Freeway System Administration and Operating Costs

As discussed in Chapter 8, the administration and operating costs associated with an added conventional lane were not considered in this study.

9.3.5 Conventional Freeway Vehicle Operating Costs

Vehicle operating costs were also determined on a per-section basis for the same sections as used for determining construction costs. The vehicle operating costs were determined for the categories of trucks and other vehicles and for three periods of the day: peak, off-peak and nighttime off-peak.

The duration and traffic volumes during the periods of the day were based on a sample of selected 24-hour traffic flow profiles obtained from Caltrans. Estimates were made of the peak and nighttime period durations and volumes. The duration of the daytime off-peak period was then found by subtracting the durations of the peak and nighttime periods from 24 hours. The traffic volume for the daytime off-peak period was found in a similar fashion. Traffic flow data were taken from the Caltrans website (5), as were truck data (6).

The vehicle operating costs were found by multiplying the annual vehicle-miles of travel with the unit cost per mile of travel for the categories of trucks and other vehicles. Unit costs per mile of travel for trucks were obtained from *American Trucking Trends* (7). For trucks, the total cost per mile of travel amounted to \$1.68 in 1998 dollars, or \$1.77 in 2001-equivalent dollars. (For the 2001-equivalent costs, the figure includes \$0.41 per mile in costs for driver salaries and wages.) These values were then multiplied by an inflator of 1.0487 to bring the values to the year 2001. Appendix M shows vehicle operating costs itemized according to the cost categories discussed in Section 8.3.3.

For all other vehicles (assumed in this study to be passenger cars or the equivalent), the cost per mile of operations was assumed to be \$0.325 per mile, which was the reimbursement for vehicle use at San Jose State University in the year 2001. The vehicle-miles of travel are the product of the section length and the volume of traffic in the section during the specific period.

These calculations were first carried out for the base condition (i.e. – the current configuration of the road) with the existing flow rates (i.e. – base volume). The same process was completed for the configuration wherein a lane is added and with the base volume. The incremental operating costs are equal to the difference between the operating costs for the base system and the operating costs for the base system plus the added lane. Since the unit cost in this case does not vary with speed, the addition of the lane does not yield a difference in vehicle operating costs. In future research, the use of unit costs that vary with speed could be used to quantify the effect of varying speed on vehicle operating costs. However, as will be seen later, the addition of an AHS lane will affect vehicle operating costs. The tables

showing the calculations for the vehicle operating costs for the added lane are shown in Appendix M. A summary of vehicle-miles of travel for each daily period is shown in Table 9.5. A cost summary is provided in Table 9.6.

TABLE 9.5. SUMMARY OF DAILY VEHICLE MILES FOR ADDED-CONVENTIONAL-LANE CONFIGURATION AT BASE VOLUMES

| Condition | Daried of the Day | Daily Vel | nicle-Miles |
|------------------------------|--------------------|-----------|----------------|
| Condition | Period of the Day | Trucks | Other Vehicles |
| | Peak Period | 1,281,653 | 5,586,341 |
| Base Condition - Base Volume | Nighttime Off-Peak | 263,550 | 912,542 |
| | Daytime Off-Peak | 1,088,269 | 5,221,226 |
| TOTAL | | 2,633,471 | 11,720,109 |
| | | | |
| Conventional Lanes including | Peak Period | 1,281,653 | 5,586,341 |
| added lane | Nighttime Off-Peak | 263,550 | 912,542 |
| added lane | Daytime Off-Peak | 1,088,269 | 5,221,226 |
| TOTAL | | 2,633,471 | 11,720,109 |

9.3.6 Conventional Freeway User Costs

User costs are costs incurred for user travel time. Freeway user costs were found by multiplying vehicle-hours of travel by the unit cost per hour. This task was carried out in a similar fashion as was outlined in the foregoing section. The same traffic volumes as used in the previous section were utilized here. The travel time for each section was calculated by dividing the section length by travel speed during the period. The travel speed was found by calculating the passenger car equivalent flow rates for the section and period, according to the methodology contained in the Highway Capacity Manual (HCM) (8), and the speeds then read from the curve of freeway speeds versus flow rates. Truck speeds were assumed to be 50 mph on the average.

The unit time cost values used for automobile and truck passengers were obtained from the *California Life-Cycle Benefit/Cost Analysis Model (Cal-B/C)* (9). These values are \$8.16 and \$27.72 per user hour, respectively, for the year 2000. Inflating these values to 2001 values yielded \$8.32 and \$28.27. An automobile occupancy value of 1.1 (10) was applied.

The tables showing the calculations for the user costs for the added lane are presented in Appendix M. A summary of vehicle-hours for each daily period appears in Table 9.7. A cost summary is provided in Table 9.8. From Table 9.8, it can be seen that the travel time costs were reduced by an EUAC of roughly \$11.5 million when an additional conventional lane is added.

TABLE 9.6. VEHICLE OPERATING COSTS AND COST DIFFERENCES (ADDED-CONVENTIONAL-LANE CONFIGURATION VERSUS BASE VOLUME/CONDITION CONFIGURATION

| Condition | Daily Ve | Daily Vehicle-Miles | | Unit Cost - 2001(\$) | | Total Cost per Day (\$) | | EUAC (\$) | | | |
|---|-----------|---------------------|--------|----------------------|-----------|-------------------------|---------------|----------------|---------------|--|--|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles | | |
| Base Condition - Base Volume | 2,633,471 | 11,720,109 | 1.77 | 0.325 | 4,650,739 | 3,809,035 | 1,697,519,582 | 1,390,297,906 | 3,087,817,488 | | |
| Conventional Lanes including added lane | 2,633,471 | 11,720,109 | 1.77 | 0.325 | 4,650,739 | 3,809,035 | 1,697,519,582 | 1,390,297,906 | 3,087,817,488 | | |
| Cost Difference | 0 | 0 | | | 0 | 0 | 0 | 0 | 0 | | |

TABLE 9.7. SUMMARY OF DAILY VEHICLE HOURS FOR ADDED-CONVENTIONAL-LANE CONFIGURATION AT BASE VOLUMES

| | | Daily Veh | icle-Hours |
|------------------------------|--------------------|-----------|------------|
| Condition | Period of the Day | Trucks | Other |
| | | TTUCKS | Vehicles |
| | Peak Period | 25,633 | 95,243 |
| Base Condition - Base Volume | Nighttime Off-Peak | 5,271 | 14,675 |
| | Daytime Off-Peak | 21,765 | 87,711 |
| TOTAL | | 52,669 | 197,630 |
| | | | |
| Conventional Lanes including | Peak Period | 25,633 | 91,721 |
| 9 | Nighttime Off-Peak | 5,271 | 14,862 |
| added lane | Daytime Off-Peak | 21,765 | 87,634 |
| TOTAL | | 52,669 | 194,217 |

TABLE 9.8. TRAVEL TIME COSTS AND COST DIFFERENCES (ADDED-CONVENTIONAL-LANE CONFIGURATION VERSUS BASE VOLUME/CONDITION CONFIGURATION)

| | Daily Vehicle-Hours | | Unit Cost - 2001(\$) | | Total Cost per Day (\$) | | EUAC (\$) | | EUATC (\$) |
|---|---------------------|----------------|----------------------|----------------|-------------------------|----------------|-------------|----------------|---------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 52,669 | 197,630 | 28.27 | 9.16 | 1,489,196 | 1,809,401 | 543,556,672 | 660,431,429 | 1,203,988,101 |
| Conventional Lanes including added lane | 52,669 | 194,217 | 28.27 | 9.16 | 1,489,196 | 1,778,154 | 543,556,672 | 649,026,049 | 1,192,582,721 |
| Cost Difference | | | | | 0 | -31,248 | 0 | -11,405,380 | -11,405,380 |

9.4 Conventional Lane Cost Summaries

A summary of the cost calculations for the conventional freeway lanes is shown in Table 9.9. From the table it can be seen that the travel-time savings do not offset the costs for adding the lane. It should be kept in mind that the vehicle operating costs that may be time-related were not included.

TABLE 9.9. INCREMENTAL COST SUMMARY FOR ADDED-CONVENTIONAL-FREEWAY-LANE CONFIGURATION AT BASE VOLUMES

| Cost Category | Incremental Cost (EUAC) |
|----------------------------------|----------------------------|
| System Administration, Planning, | |
| Design and Construction | 113,459,142 |
| Rehabilitation | 5,357,421 |
| System Maintenance | 86,479 |
| Vehicle Operating Cost | 0 |
| Travel Time | -11,405,380 |
| Total Incremental Cost | 107,497,663 |

9.5 References

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10 AHS LANE COSTS

10.1 AHS-Lane Operating Concept

An overview of the basic operating concept was provided in Section 8.2.3. Details of the operating concept for the transfer points are provided in Appendix N, which was authored by Professor Randolph Hall of the University of Southern California. Key points of the AHS lane operating concepts are as follows:

- The AHS system provides one lane in each direction, with provision for passing a stalled vehicle at reduced speeds.
- The AHS lanes provide exclusive right-of-way to trucks with automation technology, and are separated from regular traffic lanes and opposing AHS lanes by physical barriers.
- Vehicles outfitted with AHS technology convoy in "truck convoys," with convoy assembly occurring at staging areas. These staging areas, which occur at access/egress points, provide space for convoy assembly, disassembly, and trailer storage.

Figure 10.1 shows basic operating concepts for the AHS system in the median. Figure 10.2 shows proposed access/egress locations along the proposed route. These access and egress points were suggested by Professor Randolph Hall of the University of Southern California. The volumes of trucks using AHS lanes at the various access points are shown in Table 10.1.

10.2 AHS-Lane Cross Section

Although California law does not currently allow all vehicles used in some other states, one potential benefit of AHS lanes is the ability of such vehicles to operate safely in California, thus increasing freight throughput. For this reason, the cross section used for the purpose of calculating costs made provision for all vehicles currently specified in the *A Policy on the Geometric Design of Highways and Streets* (1) published by AASHTO.

To determine the required width of the AHS-Lane cross section, the required width for tangent sections as specified for turning roadways was used as a starting point. The reason for using this approach as opposed to the section on open highways, was that it was assumed that the operation of the system would be tightly controlled and that vehicles would be slowed down to pass any stalled vehicle. Consequently the values specified for one-lane, one-way operation with provision for passing a stalled vehicle was used. The minimum width required under this provision was 21 feet. Another option would be to make the system such that the stalled vehicle could be passed at speed, but this could be undertaken in future research. Physical barriers will separate the AHS lanes from each other, as well as from the regular traffic. These physical barriers will be two feet wide (2). Figure 10.3 shows the space required for the AHS system when it is placed in the median. The non-median placement is not shown here because there are multiple possibilities for placement that would depend

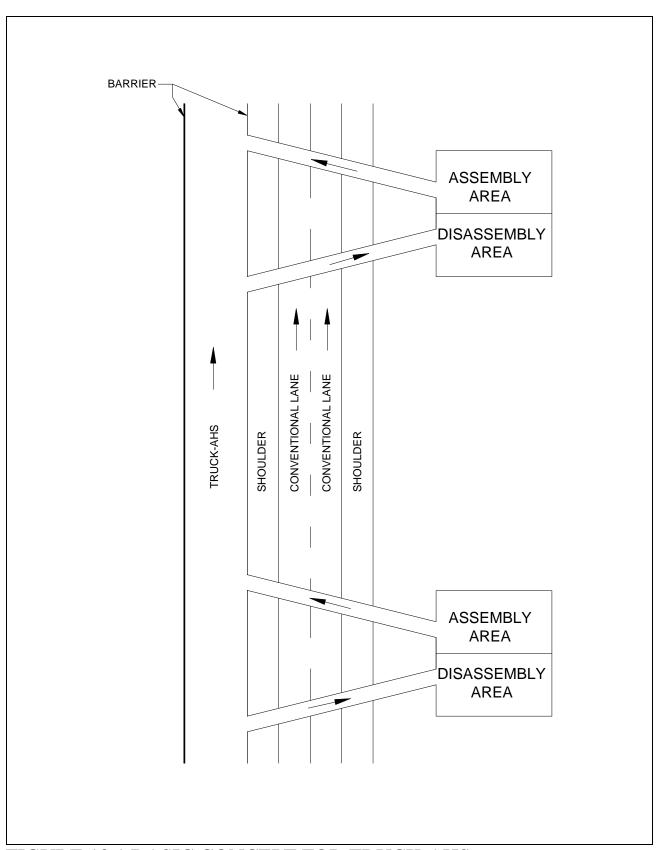


FIGURE 10.1 BASIC CONCEPT FOR TRUCK-AHS

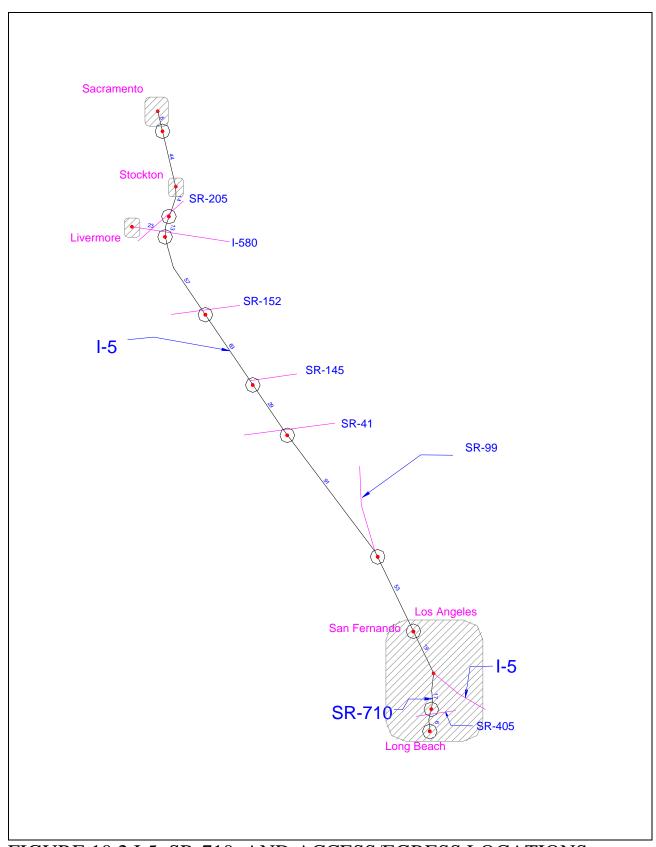


FIGURE 10.2 I-5, SR-710, AND ACCESS/EGRESS LOCATIONS

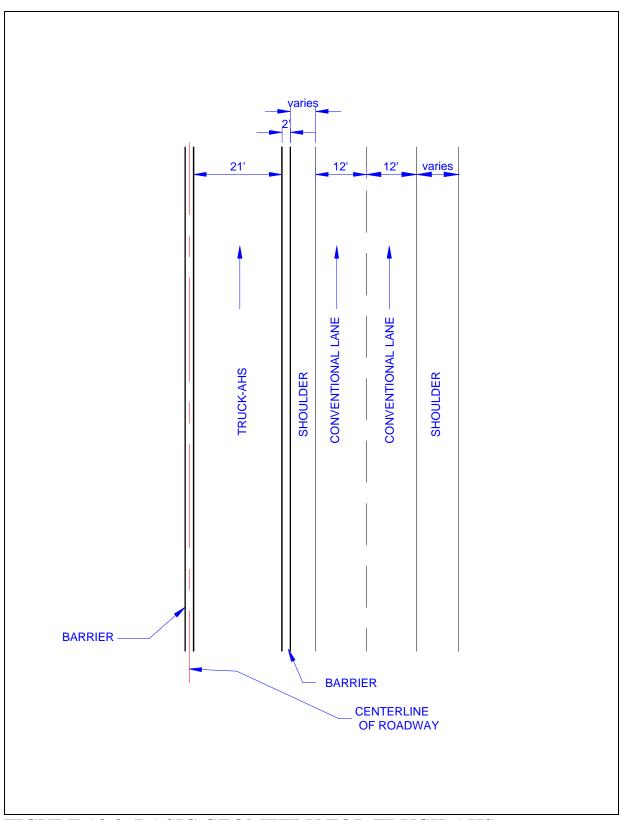


FIGURE 10.3 BASIC GEOMETRY FOR TRUCK-AHS CONFIGURATION

TABLE 10.1. TRAFFIC VOLUME ENTERING AHS

| Tarminal | Freework | Interchense | Milanaat | | Daily Tr | | Terminal | Land | |
|---------------|----------|----------------|----------|----------|----------|---------|-------------|---------|------------|
| Terminal | Freeway | Interchange | Milepost | Terminal | AHS Seg | Tot Trk | Tot Lrg Trk | Sq Ft | Cost |
| Long Beach | 710 | Del Almo | 0 | 2000 | 2000 | 25490 | 16135 | 500,000 | 12,500,000 |
| Commerce | 710 | 5 | 11 | 2000 | 4000 | 20192 | 7924 | 500,000 | 12,500,000 |
| Sylmar | 5 | Roxford | 41 | 2000 | 6000 | 21551 | 16124 | 500,000 | 7,500,000 |
| Wheeler Ridge | 5 | 184 | 101.5 | 2000 | 4000 | 8120 | 6415 | 500,000 | 5,000,000 |
| Lost Hills | 5 | 46 | 159.6 | 500 | 4000 | 8990 | 6922 | 150,000 | 750,000 |
| Coalinga | 5 | 198 | 202.1 | 500 | 4000 | 8550 | 6669 | 150,000 | 750,000 |
| Los Banos | 5 | 152 | 269.8 | 1000 | 3500 | 9013 | 7490 | 275,000 | 1,375,000 |
| Vernalis | 5 | 580 | 313 | 2000 | 1500 | 3961 | 3204 | 500,000 | 2,500,000 |
| Lathrop | 5 | Lathrop Rd. | 331 | 500 | 1000 | 18130 | 14468 | 150,000 | 2,250,000 |
| Sacramento | 5 | Freeport Blvd. | 376 | 1000 | | | | 275,000 | 4,125,000 |

Total Terminal Traffic/day13,500.00Total Truck Trips/day6,750.00Total Truck Miles/day1,401,400.00Average Trip Length208

upon specific constraints in the area where the segment is located.

It should be noted that although it should be possible for automated vehicles to travel in lanes that are narrower than normally required because the tracking of the vehicle can be more tightly controlled using automating technology. However, when one vehicle must pass another, it would probably be accomplished manually (because magnetic strips will possible not allow for passing maneuvers). The 21-foot lane width used in this analysis only allows the sum of all clearances to be a maximum of four feet. This could be construed to allow for a clearance of one foot on the outside of the vehicles and two feet between them. It is not known at this time whether this allowance would be adequate for steering a truck-convoy consisting of three vehicles around a stalled truck-convoy; however, this could be investigated in future research.

10.3 AHS-Lane Section Characterization

The lane section characterization was carried out in the same manner as outlined in Section 9.2 except that the limitation on placing the extra road space in the center was more restrictive because of the greater space requirements. Consequently the road was divided into more sections. Appendix O shows the AHS segment characterization.

10.4 AHS-Lane Cost Calculations – Base Volume

10.4.1 AHS-Lane Planning, Design and Construction Costs

The planning, design and construction costs related to the AHS travel lane were generally determined in identical fashion to the methods used to calculate the corresponding costs for the added conventional freeway lane, except for the addition of some cost items. These additional cost items consist of the barriers to separate the AHS lanes from regular traffic, the magnetic strips necessary for guiding the automated vehicles, the interchanges required to access the road from the transfer terminals, and the construction of the transfer terminals themselves. Additional roadway surface is also necessary for the AHS option to account for the wider lane width (the AHS lane has a 48-foot cross section).

For sections where the AHS lane is placed within the median, it was assumed that a barrier would be placed on each side of the AHS lane. The total barrier-related costs amounted to \$64,451,471. This is equivalent to an EUAC of \$4,682,329 in 2001-dollars.

The cost of constructing the magnetic strips necessary for operating the automated vehicles were taken into account. According to Steven Shladover of PATH, the cost of these strips could amount to \$5,000 per lane-mile. The EUAC for the construction of the magnetic strips, pavement, and barriers was found to be \$228,896,732.

The cost of the interchanges were based on an estimate of the cost, provided by Caltrans and shown in Table 9.2, of an interchange for an arterial. For the purposes of this study, interchange costs were assumed to fall at the high end of each cost range shown in Table 9.2. The suburban interchange costs was assumed to be the average of the values for urban and

rural interchanges. The appropriate inflator was applied to convert the cost to 2001 dollars. Table 10.2 shows interchange costs.

TABLE 10.2. INTERCHANGE CONSTRUCTION COSTS (\$) - AHS AND DEDICATED LANE

| Interchange | Interchange Type (Urban/Rural) | Unit Cost (1999) | Unit Cost (2001) | EUAC |
|---------------|-----------------------------------|---------------------|---------------------|------------|
| | (Ulbali/Kulai) | High | High | High |
| Long Beach | Suburban** | 35,000,000 | 36,235,500 | 2,632,470 |
| Commerce | Suburban** | 35,000,000 | 36,235,500 | 2,632,470 |
| Sylmar | Urban | 50,000,000 | 51,765,000 | 3,760,671 |
| Wheeler Ridge | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Lost Hills | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Coalinga | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Los Banos | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Vernalis | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Lathrop | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Sacramento | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| TOTAL | | | 269,178,000 | 19,555,489 |

^{*} Freeway costs in this study are assumed to correspond to the highest values in each range.

The cost of the transfer terminals, including terminal area requirements and costs for land and operational labor, were based on information provided by Professor Randolph Hall of the University of Southern California. The cost of providing the terminal surface was based on the same unit costs as used for the calculation of the road surface costs. Determining the cost of a terminal building was considered outside the scope of this project and a cost of \$500,000 was assumed based on an assumption that the building would cost as much as a large house. The costs for individual terminals are shown in Table 10.3.

The incremental AHS lane planning, design, and construction costs amount to \$228,896,732. Appendix O shows planning, design, and construction cost calculation tables.

10.4.2 AHS Rehabilitation Costs

The cost of rehabilitation for the AHS travel lane was calculated in the same way as presented for the addition of the conventional lane except that the surface is larger, and additional rehabilitation cost was incurred due to replacement of magnetic strips each time the roadway is rehabilitated. Additionally, the AHS system requires rehabilitation of the AHS interchanges and transfer terminals (staging areas).

It may be surmised that there should be a difference between the unit rehabilitation costs for the conventional lanes and the AHS lane because of the greater average per-axle weight of the vehicles in the AHS lane versus the conventional lanes. However, at the level of detail that this evaluation is being conducted, performing an analysis that would underscore the difference in cost was considered to be outside the scope of this study. For the additional cost of rehabilitation due to the presence of the magnetic strips, it is assumed that this would

^{**}Suburban values are an average of the rural and urban high values.

TABLE 10.3. AHS TRANSFER TERMINAL CONSTRUCTION COSTS

| Interchange | Freeway | Interchange Type (Urban/Rural) | Terminal Square Footage | Land Cost (2001 \$) | Pavement Unit Cost* (2001 \$ per Sq. Ft) | Pavement Cost (\$) | Building Cost (\$) | Total One-Time Cost (\$) | EUATC (\$) |
|---------------|---------|-----------------------------------|-------------------------|---------------------|---|--------------------|--------------------|-----------------------------|------------|
| Long Beach | SR-710 | Suburban | 500,000 | 12,500,000 | 48 | 23,844,515 | 500,000 | 36,844,515 | 2,674,912 |
| Commerce | SR-710 | Suburban | 500,000 | 12,500,000 | 48 | 23,844,515 | 500,000 | 36,844,515 | 2,674,912 |
| Sylmar | I-5 | Urban | 500,000 | 7,500,000 | 58 | 28,835,227 | 500,000 | 36,835,227 | 2,674,238 |
| Wheeler Ridge | I-5 | Rural | 500,000 | 5,000,000 | 38 | 18,853,802 | 500,000 | 24,353,802 | 1,768,086 |
| Lost Hills | I-5 | Rural | 150,000 | 750,000 | 38 | 5,656,141 | 500,000 | 6,906,141 | 501,386 |
| Coalinga | I-5 | Rural | 150,000 | 750,000 | 38 | 5,656,141 | 500,000 | 6,906,141 | 501,386 |
| Los Banos | I-5 | Rural | 275,000 | 1,375,000 | 38 | 10,369,591 | 500,000 | 12,244,591 | 888,957 |
| Vernalis | I-5 | Rural | 500,000 | 2,500,000 | 38 | 18,853,802 | 500,000 | 21,853,802 | 1,586,586 |
| Lathrop | I-5 | Rural | 150,000 | 2,250,000 | 38 | 5,656,141 | 500,000 | 8,406,141 | 610,286 |
| Sacramento | I-5 | Rural | 275,000 | 4,125,000 | 38 | 10,369,591 | 500,000 | 14,994,591 | 1,088,607 |
| TOTAL | | | 3,500,000 | 49,250,000 | | 151,939,467 | 5,000,000 | 206,189,467 | 14,969,355 |

^{*}Pavement Unit Cost is the low value for rural or urban interchange construction unit cost depending upon where the interchange is located.

require full installation of new strips at each rehabilitation cycle. This would amount to an additional \$5000 per lane mile in years 10 and 20 (as described in Section 9.3.2), at an equivalent uniform cost of \$132,131.

For the additional costs of rehabilitating the interchanges, it was assumed that the ramp of each interchange is one mile in length (implying a two-mile interchange length that accounts for interchange lengths for both travel directions) and as wide as the AHS travel lane (21 feet). Costs were then calculated in the same fashion as for the added conventional lane. Table 10.4 shows interchange rehabilitation costs totaling \$2,314,061 (EUAC).

TABLE 10.4. INTERCHANGE REHABILITATION COSTS - AHS AND DEDICATED LANE

| Interchange | Interchange Type (Urban/Rural) | Unit Cost (2001-Equiv. \$) | Length (mi) | Total Cost (2001-Equiv. \$) | EUAC (2001- Equiv. \$) |
|---------------|--------------------------------------|-------------------------------|-------------|-----------------------------------|---------------------------|
| Long Beach | Suburban** | 1,475,654 | 2 | 2,951,308 | 214,265 |
| Commerce | Suburban** | 1,475,654 | 2 | 2,951,308 | 214,265 |
| Sylmar | Urban | 1,278,900 | 2 | 2,557,800 | 185,696 |
| Wheeler Ridge | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Lost Hills | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Coalinga | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Los Banos | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Vernalis | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Lathrop | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Sacramento | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Total | | | 20 | 31,874,123 | 2,314,061 |

For the additional costs associated with transfer terminal rehabilitation, a unit cost per square foot was calculated. This unit cost, shown in Table 10.5, was derived by dividing the rehabilitation costs per mile per foot width (shown in Table 9.4) by 5280 (the number of feet in a mile). This unit cost was then multiplied by the square footage of each terminal for a total cost, and an EUAC of \$3,574,947 was obtained.

TABLE 10.5. AHS TERMINAL REHABILITATION COSTS

| | | III/ (BIEIII/ (IIIOIT GGG | | | |
|---------------|---------------|---------------------------|-----------|--------------|-----------|
| | Interchange | Pavement Unit | Terminal | Total Cost | |
| Interchange | Type | Cost* (2001-Equiv. | Square | (2001-Equiv. | EUAC |
| _ | (Urban/Rural) | \$ per Sq. Ft) | Footage | \$) | |
| Long Beach | Suburban | 13 | 500,000 | 6,654,283 | 483,101 |
| Commerce | Suburban | 13 | 500,000 | 6,654,283 | 483,101 |
| Sylmar | Urban | 12 | 500,000 | 5,767,045 | 418,688 |
| Wheeler Ridge | Rural | 15 | 500,000 | 7,541,521 | 547,514 |
| Lost Hills | Rural | 15 | 150,000 | 2,262,456 | 164,254 |
| Coalinga | Rural | 15 | 150,000 | 2,262,456 | 164,254 |
| Los Banos | Rural | 15 | 275,000 | 4,147,837 | 301,133 |
| Vernalis | Rural | 15 | 500,000 | 7,541,521 | 547,514 |
| Lathrop | Rural | 15 | 150,000 | 2,262,456 | 164,254 |
| Sacramento | Rural | 15 | 275,000 | 4,147,837 | 301,133 |
| Total | | | 3,500,000 | 49,241,696 | 3,574,947 |

Appendix O shows rehabilitation cost-calculation tables.

10.4.3 AHS Maintenance Costs

Maintenance costs for the AHS lanes were calculated in the same way as they were for the added conventional lane, based on square footage. This resulted in a total lane maintenance cost of \$102,045 in 2001-equivalent EUAC.

Interchange and staging area maintenance costs for the AHS system were also calculated based on square footage. An interchange was assumed to be 2 miles long and have the same width as the AHS roadway. Square footages for the transfer terminals (staging areas) in the study system were given by Professor Randolph Hall of the University of Southern California, and appear in Table 10.5. A unit cost of \$0.003 per square foot was applied, to yield a total 2001-equivalent EUAC of \$11,428 for staging-area maintenance.

Table 10.6 summarizes maintenance costs for the AHS system.

TABLE 10.6. SUMMARY OF AHS MAINTENANCE COSTS

| Cost Category | EUAC (2001- Equiv. \$) |
|---------------|---------------------------|
| Travel Lane | 86,479 |
| Interchange | 4,138 |
| Staging Area | 11,428 |
| TOTAL | 102,045 |

10.4.4 AHS-System Administration and Operating Costs

As discussed in Section 8.3.3, the only administrative and system-related operating costs considered were the costs for transfer-terminal operations. Table 10.7 shows AHS transfer terminal operating costs, which were provided by Professor Randolph Hall of the University of Southern California. Appendix N, also authored by Professor Hall, shows supporting tables and discusses calculation procedures.

10.4.5 AHS Vehicle Operating Costs

For the purpose of calculating vehicle operating costs, the same general procedure as used for the adding of the conventional lane was used with some exceptions.

The calculations were conducted separately for the AHS lane and the remaining lanes. As stated in Section 9.3.5, the 2001-equivalent per-mile unit cost for truck operation was \$1.77 (including \$0.41 for driver wages and benefits and \$0.11 for fuel). However, it was assumed for the AHS that a convoy of three trucks would be used and only one driver per convoy was necessary. Thus, the driver cost would amount to one-third of that of trucks not operating on the automated configuration. In addition, it has been estimated that the fuel cost

TABLE 10.7. AHS TRANSFER TERMINAL OPERATIONS COSTS

| Interchange | Freeway | Interchange Type | Required | Labor Cost | EUAC (2001- |
|---------------|-----------------------|------------------|-------------|------------|-------------|
| interchange | 1 1 cc way | (Urban/Rural) | Daily Staff | (\$/day) | Equiv. \$) |
| Long Beach | SR-710 | Suburban | 50 | 10,000 | 726 |
| Commerce | SR-710 | Suburban | 50 | 10,000 | 726 |
| Sylmar | I-5 | Urban | 50 | 10,000 | 726 |
| Wheeler Ridge | I-5 | Rural | 50 | 10,000 | 726 |
| Lost Hills | I-5 | Rural | 15 | 3,000 | 218 |
| Coalinga | I-5 | Rural | 15 | 3,000 | 218 |
| Los Banos | I-5 | Rural | 25 | 5,000 | 363 |
| Vernalis | I-5 | Rural | 50 | 10,000 | 726 |
| Lathrop | I-5 | Rural | 15 | 3,000 | 218 |
| Sacramento | I-5 | Rural | 25 | 5,000 | 363 |
| TOTAL | | | | | 5,013 |

would decrease because of convoy-related decreases in wind drag. The reduction that was used for this report amounts to 15 percent. This percentage is based upon research conducted within the PROMOTE-CHAUFFER project (5). The fuel-consumption reduction of two heavy-duty trucks driving at close spacing amounted to 6 percent for the lead truck and 17 to 21 percent for the trailing truck. Given the assumption that three-truck convoys would be used, a weighted average of these values resulted in a fuel reduction of about 15 percent – the value used for this evaluation. The cost for truck operation on the AHS lane, then, amounted to \$1.48 after reductions in costs to account for fewer drivers and fuel savings. Appendix P shows itemization of vehicle operating cost elements for the AHS.

Also, each vehicle using the AHS system must be outfitted with automating technology. These costs were not identified in this study because of the high degree of uncertainty involved in the cost calculations. The cost-per-truck for technology outfitting is currently estimated to range from \$5,000 to \$25,000 per vehicle, depending on the novelty of the technology and the number of vehicles outfitted. At the present time, it would be difficult to estimate the number of individual trucks that would be using the system (one outfitted truck could potentially use the system several times), including the number of trucks outfitted by each trucking company – a factor which could cause considerable variation in automating technology costs (as bulk-buying might bring costs down). For future study, it should be assumed that the automating technology is purchased initially, and replaced when the host truck is replaced. Costs for technology, then, would be dependent on fleet size and replacement frequency.

The tables showing the calculations for the vehicle operating costs for the added lane are presented in Appendix P. A summary of vehicle-miles of travel for each daily period is shown in Table 10.8. A cost summary is provided in Table 10.9. It should be noted that the additional distance added for trucks to access the AHS lane at the specified points, as opposed to at every existing interchange on the study segment, and related transfer costs were not considered in the cost calculations.

TABLE 10.8. SUMMARY OF DAILY VEHICLE MILES FOR AHS-LANE CONFIGURATION AT BASE VOLUMES

| Condition | Period of the Day | Daily Vehi | Daily Vehicle-Miles | | | |
|------------------------------|--------------------|------------|---------------------|--|--|--|
| Condition | Period of the Day | Trucks | Other Vehicles | | | |
| | Peak Period | 1,281,866 | 5,588,784 | | | |
| Base Condition - Base Volume | Nighttime Off-Peak | 263,637 | 913,331 | | | |
| | Daytime Off-Peak | 1,087,968 | 5,217,993 | | | |
| TOTAL | | 2,633,471 | 11,720,109 | | | |
| | | • | - | | | |
| | Peak Period | 372,928 | 0 | | | |
| AHS Lane - Base Volume | Nighttime Off-Peak | 88,740 | 0 | | | |
| | Daytime Off-Peak | 290,720 | 0 | | | |
| TOTAL | | 752,388 | 0 | | | |
| | | | | | | |
| | Peak Period | 908,725 | 5,586,341 | | | |
| Remaining Conventional Lanes | Nighttime Off-Peak | 174,898 | 913,331 | | | |
| | Daytime Off-Peak | 797,461 | 5,220,436 | | | |
| TOTAL | | 1,881,084 | 11,720,109 | | | |

10.4.6 AHS-User Costs

The AHS user costs were calculated in a similar fashion as was done for the addition of the conventional lane. Table 10.10 shows a summary of daily vehicle-hours, and Table 10.11 shows AHS user costs. The exceptions were that the speed for trucks was assumed to be 70 mph for the AHS lane, and that time costs were only considered for one-third of the drivers in the AHS lane. This figure is arbitrary, but the assumption was made that these trucks would be capable of this speed, and that the operating companies would desire them to travel at high speeds. It should be noted that applying the full time cost for a truck passenger of \$28.27 probably would involve some double-counting, considering that the driver cost has already been applied in the previous section; however, it would involve a major effort to be able to find the incremental time-related costs, and this is considered outside the scope of this project. Therefore, the time cost of \$28.27 was applied to get some estimate of what any time-related benefits might be. It should be also kept in mind that time-related costs for the vehicles are not included, and this may offset some possible double counting. It should be noted that, in the case of the AHS lane user costs, the total cost was found by multiplying the vehicle-hours by the unit cost and dividing by three, thereby accounting for this study's assumption that each convoy requires only one driver. Appendix P shows the calculation tables.

10.5 AHS-Cost Summaries

A summary of the costs calculations for the AHS is shown in Table 10.12. From the table it can be seen that the travel-time savings do not offset the costs for adding the lane.

TABLE 10.9. VEHICLE OPERATING COSTS AND COST DIFFERENCES (AHS-LANE CONFIGURATION VERSUS BASE VOLUME/CONDITION CONFIGURATION)

| Condition | Daily Vehicle-Miles | | 2001-Equiv. Unit Cost (\$) | | Total Cost per Day (\$) | | EUAC (\$) | | EUATC (\$) |
|------------------------------------|---------------------|----------------|----------------------------|----------------|-------------------------|----------------|---------------|----------------|---------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 2,633,471 | 11,720,109 | 1.77 | 0.325 | 4,650,739 | 3,809,035 | 1,697,519,582 | 1,390,297,906 | 3,087,817,488 |
| AHS Lane - Base Volume | 752,388 | 0 | 1.48 | 0 | 1,112,031 | 0 | 405,891,260 | 0 | 405,891,260 |
| Remaining Conventional Lanes | 1,881,084 | 11,720,109 | 1.77 | 0.325 | 3,322,014 | 3,809,035 | 1,212,535,157 | 1,390,297,906 | 2,602,833,064 |
| Total - AHS and Conventional Lanes | 2,633,471 | 11,720,109 | | | 4,434,045 | 3,809,035 | 1,618,426,417 | 1,390,297,906 | 3,008,724,324 |
| Cost Difference | | | | | -216,694 | 0 | -79,093,165 | 0 | -79,093,165 |

TABLE 10.10. SUMMARY OF DAILY VEHICLE HOURS FOR AHS-LANE CONFIGURATION AT BASE VOLUMES

| Condition | Period of the Day | Daily Vehic | cle-Hours |
|------------------------------|--------------------|-------------|----------------|
| Condition | Period of the Day | Trucks | Other Vehicles |
| | Peak Period | 25,637 | 94,944 |
| Base Condition - Base Volume | Nighttime Off-Peak | 5,273 | 14,690 |
| | Daytime Off-Peak | 21,759 | 87,652 |
| TOTAL | | 52,669 | 197,286 |
| | | | - |
| | Peak Period | 5,328 | 0 |
| AHS Lane - Base Volume | Nighttime Off-Peak | 1,268 | 0 |
| | Daytime Off-Peak | 4,153 | 0 |
| TOTAL | | 10,748 | 0 |
| | · | | |
| | Peak Period | 18,175 | 93,926 |
| Remaining Conventional Lanes | Nighttime Off-Peak | 3,498 | 14,690 |
| | Daytime Off-Peak | 15,949 | 87,696 |
| TOTAL | | 37,622 | 196,312 |

TABLE 10.11. TRAVEL TIME COSTS AND COST DIFFERENCES (AHS-LANE CONFIGURATION VERSUS BASE VOLUME/CONDITION CONFIGURATION)

| Condition | Daily Vehicle-Hours | | 2001-Equiv. Unit Cost (\$) | | Total Cost per Day (\$) | | EUAC (\$) | | EUATC (\$) |
|------------------------------------|---------------------|----------------|----------------------------|----------------|-------------------------|----------------|--------------|----------------|---------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 52,669 | 197,286 | 28.27 | 9.16 | 1,489,196 | 1,806,253 | 543,556,672 | 659,282,458 | 1,202,839,130 |
| AHS - Base Volume | 10,748 | 0 | 28.27 | 0 | 101,301 | 0 | 36,975,030 | 0 | 36,975,030 |
| Remaining Conventional Lanes | 37,622 | 196,312 | 28.27 | 9.16 | 1,063,730 | 1,797,337 | 388,261,545 | 656,027,844 | 1,044,289,389 |
| Total - AHS and Conventional Lanes | 48,370 | 196,312 | | | 1,165,032 | 1,797,337 | 425,236,575 | 656,027,844 | 1,081,264,419 |
| Cost Difference | | | | | -324,165 | -8,917 | -118,320,097 | -3,254,614 | -121,574,711 |

TABLE 10.12. INCREMENTAL COST SUMMARY FOR ADDED-AHS-LANE CONFIGURATION AT BASE VOLUMES

| Cost Increments | Incremental Cost (EUAC) |
|---|-------------------------|
| System Administration, Planning, Design | |
| and Construction | 263,421,576 |
| Rehabilitation | 19,381,065 |
| System Maintenance | 102,045 |
| System Operating | 5,013 |
| Vehicle Operating | -79,093,165 |
| Travel Time | -121,574,711 |
| Total Incremental Cost | 82,241,825 |

10.6 References

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11 DEDICATED TRUCK LANE COSTS

11.1 Dedicated Truck Lane Operating Concept

An overview of the basic operating concept was provided in Section 8.2.4. Key points of the dedicated truck lane operating concepts are as follows:

- The dedicated truck lane system includes one lane in each direction, with provision for passing a stalled vehicle at reduced speeds.
- The dedicated truck lanes provide exclusive right-of-way to trucks operated manually, and are separated from regular traffic lanes and opposing dedicated truck lanes by physical barriers.
- Convoying does not occur.

In the case of dedicated truck lanes, the system was assumed to operate the same way as the AHS lane with regard to access points and truck volumes. The truck volumes using the dedicated lane will probably be different from those using the AHS lane, but the extent to which they differ is considered to outside the scope of this study. They are assumed to be identical here. A basic operating concept for the dedicated truck lane in the median is shown in Figure 11.1.

11.2 Dedicated Truck Lane Cross Section

The width of the dedicated truck lane was assumed to be identical to that identified for the AHS system, as discussed in Section 10.2. Figure 11.2 provides a schematic layout for the dedicated truck lane when it is placed in the median. As for the AHS and added conventional lane, the non-median alignment is not shown here because there are multiple possibilities (e.g. – elevated structure, underground right-of-way, or parallel right-of-way) that are possible when the system is placed outside the median.

11.3 Dedicated Truck Lane Section Characterization

The lane section characterization was carried out in the same manner as outlined in Section 9.2, except that (like the AHS) the limitation on placing the extra road space in the center was more restrictive because of the greater space requirements. Consequently the road was divided into more sections. Since AHS and dedicated-truck-land widths are both 48 feet, the segments given in Appendix O apply to the dedicated truck lane as well. The segmentations are shown in Appendix Q.

11.4 Dedicated Truck Lane Cost Calculations – Base Volume

11.4.1 Dedicated Truck Lane Planning, Design and Construction Costs

The planning, design and construction costs related to the dedicated truck lane were generally determined in identical fashion to the methods used to calculate the corresponding costs for

AHS lane planning, design, and construction, less the costs of the magnetic strips necessary for guiding the automated vehicles and the construction of the transfer terminals. It is assumed for this study that access to the dedicated truck lane is provided from local streets and highways using access/egress interchanges, but without staging areas.

The total incremental dedicated truck lane planning, design, and construction costs (including interchanges) amounted to an EUAC of \$248,300,381 and are shown in Table 11.1. Appendix Q shows calculation tables.

11.4.2 Dedicated Truck Lane Rehabilitation Costs

Since the cross-sectional widths for the AHS and Dedicated-Truck-Lane options are identical, most costs are identical. The cost of rehabilitation was calculated in the same way as presented for the addition of the AHS lanes, less the cost of rehabilitating transfer terminals and replacing magnetic strips used for automation. Rehabilitation costs associated with the dedicated truck lane amounted to \$15,673,987 in 2001-EUAC dollars and are shown in Table 11.1.

11.4.3 Dedicated Truck Lane Maintenance Costs

The maintenance costs were also calculated in an identical fashion as was done for the addition of the AHS lane except, again, less the cost of maintaining transfer terminals. Table 11.2 shows the related maintenance costs, which sum to \$90,617 in 2001-EUAC dollars.

11.4.4 Dedicated Truck Lane System Administration and Operating Costs

Although it is likely that a dedicated-truck-lane system would incur more administrative costs than a conventional system (and perhaps more or less than an AHS system), the estimation of the difference in cost is outside the scope of this study. For this reason, costs for administration and operation of the dedicated truck lane are not included here.

11.4.5 Dedicated Truck Lane Vehicle Operating Costs

For the purpose of calculating vehicle operating costs, the same general procedure as used for the adding of the conventional lane was used. Table 11.3 shows a summary for daily vehicle-miles for the dedicated truck lane, and Table 11.4 shows vehicle operating costs. Appendix R shows supporting tables.

11.4.6 Dedicated Truck Lane User Costs

The user travel-time costs for all vehicles (those using the normal and dedicated lanes) were calculated in a similar fashion as was done for the addition of the conventional lane. Table 11.5 summarizes daily vehicle-hours for the dedicated truck lane, and Table 11.6 shows annual travel time costs for the base condition, the dedicated lane, and for the non-dedicated conventional lanes, and itemized according to vehicle type. Table 11.6 also shows the total

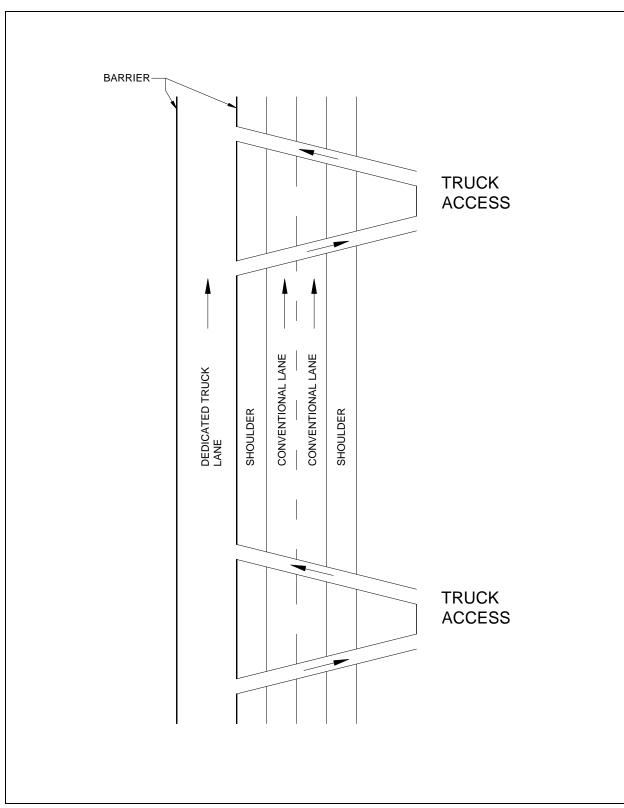


FIGURE 11.1 BASIC CONCEPT FOR DEDICATED TRUCK LANE

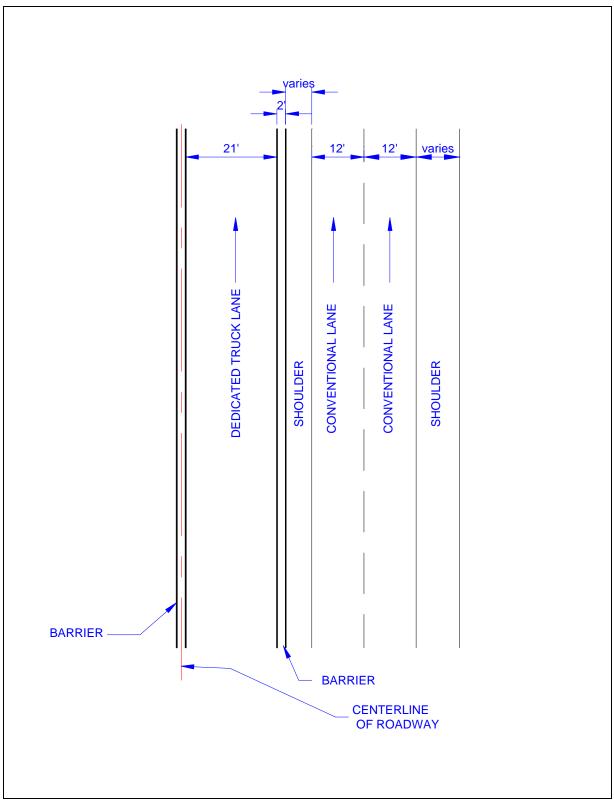


FIGURE 11.2 BASIC GEOMETRY FOR DEDICATED-TRUCK-LANE CONFIGURATION

annual cost difference between the added lane configuration and the base condition. Appendix R shows supporting tables.

TABLE 11.1 INCREMENTAL COST SUMMARY FOR DEDICATED-TRUCK-LANE CONFIGURATION AT BASE VOLUMES

| Cost Increments | Incremental Cost (20014- |
|----------------------------------|--------------------------|
| Cost increments | Equiv. EUAC) |
| System Administration, Planning, | |
| Design and Construction | 248,300,381 |
| Rehabilitation | 15,673,987 |
| System Maintenance | 90,617 |
| Vehicle Operating Cost | 0 |
| Travel Time | -3,254,614 |
| Total Incremental Cost | 260,810,372 |

TABLE 11.2. SUMMARY OF DEDICATED-TRUCK-LANE MAINTENANCE COSTS

| Cost Category | 2001-Equiv. EUAC |
|---------------|---------------------|
| Travel Lane | 86,479 |
| Interchange | 4,138 |
| TOTAL | 90,617 |

TABLE 11.3. SUMMARY OF DAILY VEHICLE MILES FOR DEDICATED-TRUCK-LANE CONFIGURATION AT BASE VOLUMES

| Condition | Period of the Day | Daily V | ehicle-Miles |
|------------------------------|--------------------|-----------|----------------|
| Condition | Period of the Day | Trucks | Other Vehicles |
| | Peak Period | 1,281,866 | 5,588,784 |
| Base Condition - Base Volume | Nighttime Off-Peak | 263,637 | 913,331 |
| | Daytime Off-Peak | 1,087,968 | 5,217,993 |
| TOTAL | | 2,633,471 | 11,720,109 |
| | | • | |
| Dedicated Truck Lane - Base | Peak Period | 372,928 | 0 |
| Volume | Nighttime Off-Peak | 88,740 | 0 |
| Volume | Daytime Off-Peak | 290,720 | 0 |
| TOTAL | | 752,388 | 0 |
| | | | |
| | Peak Period | 908,725 | 5,586,341 |
| Remaining Conventional Lanes | Nighttime Off-Peak | 174,898 | 913,331 |
| | Daytime Off-Peak | 797,461 | 5,220,436 |
| TOTAL | | 1,881,084 | 11,720,109 |

TABLE 11.4. VEHICLE OPERATING COSTS AND COST DIFFERENCES (DEDICATED-TRUCK-LANE CONFIGURATION VERSUS BASE VOLUME/CONDITION CONFIGURATION)

| O a series a | Daily Ve | Daily Vehicle-Miles | | 2001-Unit Cost (\$) | | Total Cost per Day (\$) | | JAC (\$) | EUATC (\$) |
|---|-----------|---------------------|--------|---------------------|-----------|-------------------------|---------------|----------------|---------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 2,633,471 | 11,720,109 | 1.77 | 0.325 | 4,650,739 | 3,809,035 | 1,697,519,582 | 1,390,297,906 | 3,087,817,488 |
| Dedicated Lane - Base Volume | 752,388 | 0 | 1.77 | 0.00 | 1,328,724 | 0 | 484,984,425 | 0 | 484,984,425 |
| Remaining Conventional Lanes | 1,881,084 | 11,720,109 | 1.77 | 0.325 | 3,322,014 | 3,809,035 | 1,212,535,157 | 1,390,297,906 | 2,602,833,064 |
| Total - Dedicated Lane and Conventional Lanes | 2,633,471 | 11,720,109 | | | 4,650,739 | 3,809,035 | 1,697,519,582 | 1,390,297,906 | 3,087,817,488 |
| Cost Difference | | | | | 0 | 0 | 0 | 0 | 0 |

TABLE 11.5. SUMMARY OF DAILY VEHICLE HOURS FOR DEDICATED-TRUCK-LANE CONFIGURATION AT BASE VOLUMES

| Condition | Period of the Day | Daily Vo | ehicle-Hours |
|------------------------------|--------------------|----------|----------------|
| Condition | Period of the Day | Trucks | Other Vehicles |
| | Peak Period | 25,637 | 94,944 |
| Base Condition - Base Volume | Nighttime Off-Peak | 5,273 | 14,690 |
| | Daytime Off-Peak | 21,759 | 87,652 |
| TOTAL | | 52,669 | 197,286 |
| | | | |
| Dedicated Truck Lane - Base | Peak Period | 7,459 | 0 |
| Volume | Nighttime Off-Peak | 1,775 | 0 |
| Volume | Daytime Off-Peak | 5,814 | 0 |
| TOTAL | | 15,048 | 0 |
| | | | |
| | Peak Period | 18,175 | 93,926 |
| Remaining Conventional Lanes | Nighttime Off-Peak | 3,498 | 14,690 |
| | Daytime Off-Peak | 15,949 | 87,696 |
| TOTAL | | 37,622 | 196,312 |

TABLE 11.6. TRAVEL TIME COSTS AND COST DIFFERENCES (DEDICATED-TRUCK-LANE CONFIGURATION VERSUS BASE VOLUME/CONDITION CONFIGURATION)

| 0 137 | Daily Vehicle-Hours | | 2001-Unit Cost (\$) | | Total Cost per Day (\$) | | EUAC (\$) | | EUATC (\$) |
|--|---------------------|----------------|---------------------|----------------|-------------------------|----------------|-------------|----------------|---------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 52,669 | 197,286 | 28.27 | 9.16 | 1,489,196 | 1,806,253 | 543,556,672 | 659,282,458 | 1,202,839,130 |
| Dedicated Lane - Base Volume | 15,048 | 0 | 28.27 | 0.00 | 425,466 | 0 | 155,295,127 | 0 | 155,295,127 |
| Remaining Conventional Lanes | 37,622 | 196,312 | 28.27 | 9.16 | 1,063,730 | 1,797,337 | 388,261,545 | 656,027,844 | 1,044,289,389 |
| Total - Dedicated and Conventional Lanes | 52,669 | 196,312 | | | 1,489,196 | 1,797,337 | 543,556,672 | 656,027,844 | 1,199,584,516 |
| Cost Difference | | | | | 0 | -8,917 | 0 | -3,254,614 | -3,254,614 |

11.5 Dedicated Truck Lane Cost Summaries

Table 11.1 shows cost summaries for the addition of dedicated lanes. The results show that the savings in vehicle operating costs and travel-time costs do not offset the costs of adding the lane.

12 EVALUATION OF VARIOUS TRAFFIC VOLUMES ON COSTS OF ROAD-BASED FREIGHT OPTIONS

In order to determine the effect of various volume levels on the relative costs associated with building and operating the three systems under study here (added conventional freeway lane, AHS, and dedicated truck lane), the road sections were sorted according to the passenger car per hour per lane (pcphpl) flow rates. The sections were then divided at a flow rate of 1000 and 2000 pcphpl, respectively. This resulted in having sections of road that represented flow rates designated as follows:

```
"low" – flow rates between zero and 1000 "medium" – flow rates between 1000 and 2000 "high" – flow rates between 2000 and 2500.
```

Although the sections of roadway in each of the categories were not contiguous, the result could be thought of as a simulated road section that is based on existing roadway conditions. The sections were sorted according to the existing roadway and base (existing) volumes and grouped together using the categories shown above. All ensuing calculations were based on these same sections – even though flow rates for individual sections may have changed after addition of extra lanes. The AHS transfer terminals were allocated to the physical sections with which they are associated geographically.

The procedures followed to calculate the costs were identical to the methodologies outlined in Sections 9 through 11. A summary of the costs for all categories are shown in Tables 12.1 though 12.3. Some details of the calculations are shown in Appendices S through X, and the intermediate calculation and summary tables are contained in Appendix Y.

From the results shown in Tables 12.1 through 12.3, it can be seen that the reduction in user costs for the AHS-truck option exceeds the agency costs for the low-volume road option, indicating that the addition of the AHS lane may be beneficial for a low-volume road condition.

TABLE 12.1. SUMMARY OF ANNUAL COSTS FOR CONVENTIONAL LANE – BASED ON VOLUME

| | | Incremental Cost (2001-Equiv. \$) | | | | | | | |
|-------------|---|-----------------------------------|-------------|-----------------------------|------------|----------------------------|------------|--|--|
| Category | Cost Category | High Volume Road | | Medium Vo | lume Road | Low Volume Road | | | |
| Calegory | Cost Category | Incremental Cost (EUAC) | EUATC | Incremental Costs (EUAC) | EUATC | Incremental Cost (EUAC) | EUATC | | |
| | System Administration, Planning, Design | | | | | | | | |
| Agency | and Construction | 26,863,668 | 28,564,445 | 36,444,072 | 38,083,304 | 50,151,403 | 52,255,294 | | |
| Agency | Rehabilitation | 1,692,657 | 20,304,443 | 1,618,982 | 30,003,304 | 2,045,782 | 32,233,294 | | |
| | System Maintenance | 8,120 | | 20,250 | | 58,109 | | | |
| Heor | Vehicle Operating | 0 | -10,831,041 | 0 | -574,339 | 0 | 0 | | |
| User T | Travel Time | -10,831,041 | -10,031,041 | -574,339 | -574,559 | 0 | U | | |
| Total Incre | mental Cost | 17,733,404 | 17,733,404 | 37,508,965 | 37,508,965 | 52,255,294 | 52,255,294 | | |

TABLE 12.2 SUMMARY OF COSTS FOR AHS LANE (\$) - BASED ON VOLUME

| | | | Incremental Cost (EUAC) | | | | | |
|------------------------|----------------------------------|----------------------------|-------------------------|----------------------------|--------------------|----------------------------|--------------|--|
| Category | Cost Category | High Vol | High Volume Road | | Medium Volume Road | | ne Road | |
| Category | Cost Category | Incremental Cost (EUAC) | EUATC | Incremental Cost (EUAC) | EUATC | Incremental Cost (EUAC) | EUATC | |
| | System Administration, Planning, | | | | | | | |
| | Design and Construction | 67,072,902 | | 89,355,273 | | 106,993,402 | | |
| Agency | Rehabilitation | 4,753,134 | 71,839,702 | 5,679,363 | 95,060,455 | 8,948,569 | 116,009,543 | |
| | System Maintenance | 12,213 | | 24,511 | | 65,321 | | |
| | System Operating | 1,453 | | 1,308 | | 2,252 | | |
| User | Vehicle Operating | -7,960,958 | -23,011,709 | -10,621,093 | -26,622,935 | -60,511,113 | -151,033,231 | |
| Osei | Travel Time | -15,050,751 | -23,011,709 | -16,001,842 | -20,022,933 | -90,522,118 | -131,033,231 | |
| Total Incremental Cost | | 48,827,992 | 48,827,992 | 68,437,520 | 68,437,520 | -35,023,688 | -35,023,688 | |

TABLE 12.3. SUMMARY OF ANNUAL COSTS FOR DEDICATED TRUCK LANE - BASED ON VOLUME

| | | | Incremental Costs (2001-Equiv. \$) | | | | | | | |
|---------------|--|-------------------------|------------------------------------|----------------------------|------------|----------------------------|-------------|--|--|--|
| Catagory | Cost Category | High Volume R | load | Medium Vol | ume Road | Low Volume Road | | | | |
| Category | Cost Category | Incremental Cost (EUAC) | EUATC | Incremental Cost (EUAC) | EUATC | Incremental Cost (EUAC) | EUATC | | | |
| Aganay | System Administration, Planning, Design and Construction | 61,708,821 | 65,492,294 | 84,946,588 | 89,732,428 | 101,644,972 | 108,840,264 | | | |
| Agency | Rehabilitation | 3,774,525 | 05,492,294 | 4,764,349 | 09,732,420 | 7,135,113 | 100,040,204 | | | |
| | System Maintenance | 8,948 | | 21,491 | | 60,178 | | | | |
| User | Vehicle Operating | 0 | -3,141,488 | 0 | -113.126 | 0 | 0 | | | |
| USEI | Travel Time | -3,141,488 | -5,141,400 | -113,126 | -113,120 | 0 | 0 | | | |
| Total Increme | ental Cost | 62,350,806 | 62,350,806 | 89,619,302 | 89,619,302 | 108,840,264 | 108,840,264 | | | |

13 COST COMPARISON OF ROAD-BASED FREIGHT OPTIONS

A comparison of incremental costs among the different alternative lane additions for the whole road is shown in Table 13.1. It can be seen that the lowest total incremental cost is for the AHS lane, although the cost associated with constructing and operating the lane still exceeds the cost savings for users. In making this comparison, an attempt was made to make the systems functionally as equivalent as possible. The same number of vehicles travel over the same distances for all three system options; however, the level of service (LOS) may not be the same for all systems. Operating speeds differ, and access to the systems is not equivalent, because all trucks have access at any existing access point for the conventional system, whereas truck access to the dedicated lanes is restricted to the designated access/egress points.

TABLE 13.1. SUMMARY OF ANNUAL COSTS FOR ALL LANE TYPES - WHOLE ROAD

| | | | Incremental Cost (2001-Equiv. \$) | | | | | | | |
|----------------------|----------------------------------|----------------------------|-----------------------------------|----------------------------|--------------|----------------------------|-------------|--|--|--|
| Cotogony | Cost Cotogony | Added Conve | Added Conventional Lane | | Lane | Dedicated Lane | | | | |
| Category | Cost Category | Incremental Cost (EUAC) | EUATC | Incremental Cost (EUAC) | EUATC | Incremental Cost (EUAC) | EUATC | | | |
| | System Administration, Planning, | | | | | | | | | |
| | Design and Construction | 113,459,142 | | 263,421,576 | | 248,300,381 | | | | |
| Agency | Rehabilitation | 5,357,421 | 118,903,043 | 19,381,065 | | 15,673,987 | | | | |
| | System Maintenance | 86,479 | | 102,045 | | 90,617 | | | | |
| | System Operating | 0 | | 5,013 | | 0 | | | | |
| User | Vehicle Operating | 0 | -11,405,380 | -79,093,165 | -200,667,875 | 0 | -3,254,614 | | | |
| Usei | Travel Time | -11,405,380 | -11,400,300 | -121,574,711 | -200,007,073 | -3,254,614 | , , | | | |
| Total Incremental Co | ost | 107,497,663 | 107,497,663 | 82,241,825 | 82,241,825 | 260,810,372 | 260,810,372 | | | |

In Chapter 12, it was seen that addition of an AHS lane at low volumes (which generally occur in rural areas) was the only option where the decrease in user costs offsets the costs of constructing and operating the lane. This may be counterintuitive to an expectation that these types of lanes would be more attractive in urban congested areas. As stated in Chapter 12, the principal reason for this result was the fact that the infrastructure unit costs used in this report for non-urban areas were significantly lower than the costs associated with infrastructure in urban areas.

Direct total cost comparisons between the sets of alternatives, based on the whole road, and the segmentations, which are based on volume, are not appropriate. The reason for this is that the segmentations based on volume are shorter in length, and therefore not functionally equivalent to the whole-road alternatives. To gain some understanding of the performance of each alternative per unit of investment by the agency, the benefit-cost ratios were calculated. Table 13.2 shows these benefit-cost ratios for all categories of analysis. These ratios were calculated using the vehicle-operating and travel-time cost savings as benefits, and using all other costs as costs.

TABLE 13.2 BENEFIT-COST RATIO ANALYSIS FOR ALL CATEGORIES OF LANES

| Category | Conventional Lane | AHS Lane | Dedicated Lane |
|---------------|----------------------|----------|-------------------|
| Whole Road | 0.096 | 0.709 | 0.012 |
| High Volume | 0.379 | 0.320 | 0.048 |
| Medium Volume | 0.015 | 0.280 | 0.001 |
| Low Volume | 0.000 | 1.302 | 0.000 |

It is important to note that the calculated b/c ratios shown in Table 13.2 cannot be interpreted to make a direct comparison among alternatives. If these alternatives were mutually exclusive, meaning that only one could be implemented in a specific location, then an incremental benefit-cost analysis would have had to be carried out. For instance, if more than one alternative had a b/c ratio of greater than one, then an incremental benefit-cost ratio would have had to be calculated to determine whether one alternative with a larger investment than another would have an incremental b/c ratio greater than one.

As expected, based on the results discussed above, only the AHS lane option at low volumes resulted in an incremental b/c ration greater than 1. It should be kept in mind that these results are based on a number of assumptions, calculations, and unit costs that can all be varied with good reason. For instance, a doubling of the unit cost for travel time would significantly affect the outcome. If construction costs turned out to be less than were assumed, and this was combined with other values for travel time, the b/c ratios could be significantly affected. In order to evaluate these effects, a sensitivity analysis should be undertaken. Such an analysis is considered to be outside the scope of this study. However, it should be noted that because the b/c ratios for the AHS lane especially are not that far removed from a value of one, that such variations in parameter values could very well result in b/c ratios with values greater than one.

It is also noteworthy that costs for acquisition of right-of-way were not considered as part of this study, except in reference to the land costs for the AHS transfer terminals, because of the difficulty of doing so. This was explained in Section 8.3.3 of this report. It should be noted, however, that costs for right-of-way could add considerably to the total system costs, especially in urban areas. Land acquisition costs would decrease the benefit-cost ratio of each system alternative, and could potentially affect the feasibility of the AHS low-volume scenario (the only alternative shown to be economically feasible by this study). When the systems are compared incrementally, addition of land acquisition costs would favor the addition-of-a-conventional-freeway-lane option, since it requires less width for implementation, and consequently less land.

As construction costs had a large influence over the outcome, dealing more specifically with the physical environment and the effects thereof on the construction costs, as well as developing more accurate unit costs and considering real estate costs for local circumstances, could also influence the results in a meaningful way.

It should be further noted that a number of assumptions regarding truck speeds and diversion to the dedicated lanes were made, and unit costs for truck operations were assumed to be constant, even with varying speeds. Different assumptions could influence the results significantly, although the advantage of the AHS over the other alternatives should remain. In addition, all results would be significantly influenced by the costs associated with an increase or reduction in accidents, which were not considered in this study. In addition, the use of unit costs that vary with speed could be used to quantify the effect of varying speed on vehicle operating costs. These topics should be addressed in future research.

14 INTERMODAL FREIGHT TRANSPORTATION COST COMPARISON

14.1 Introduction

A comparison between AHS-truck and intermodal rail transportation was also conducted. Unlike the AHS and Dedicated Truck Lane (DTL) alternatives presented previously in this report, costs for building, maintaining, and operating an intermodal rail freight transport system are not presented here. Obtaining cost data for intermodal rail for a particular route is difficult due to the proprietary nature of such data. This makes a comparison on the same basis as the comparison of the road-based alternatives impossible. It should also be noted that the comparison that follows is, in a sense, more similar to the comparison made for the transit alternatives than the freight options discussed in the previous sections. This means that the comparison is only between two modes, and does not address the economic feasibility of either one of the two options as discussed in this section of the report. What follows is a "cost" comparison based on shipping rates.

14.2 Cost vs. Pricing

It is important to make the distinction here between "costs" and "pricing." For the purposes of this research, which examines total societal-level costs for operating different trucking systems, the term "costs" refers to the overall economic costs for constructing, rehabilitating, operating, and maintaining a system such as the three proposed previously in this report.

As used here, the term "pricing" refers to the current market freight shipping rates for a particular mode. It should be noted that prices are not necessarily a reflection of costs for several reasons. The price could be lower or higher than the true costs depending upon the pricing strategy followed by a particular business. The business costs which the prices are predicated have been compiled according to accounting principles, and these costs are not necessarily reflections of the true economic costs. Moreover, the way that the cost of infrastructure is reflected in pricing of trucking services versus rail service might not reflect the true cost of the infrastructure for the respective modes. In the case of trucking, the recovery of the cost of providing the infrastructure may not fully occur through the taxes that are collected from the trucking companies. Therefore, the shipping rates presented may be lower than they should be, were they to reflect the actual costs of the infrastructure. In addition, it should be noted that taxes are excluded in an economic cost comparison, but are normally reflected in pricing strategies. It should also be noted that pricing values presented here do not reflect the difference in delivery time for trucking mode versus intermodal rail.

14.3 Cost Calculations

14.3.1 General Procedure

Rough calculations were made to determine costs for the comparison between the trucking and the intermodal rail shipping alternatives. The following general procedure was used to achieve the desired objectives:

- 1. Unit costs (in terms of dollars per revenue-mile) were calculated for the AHS and dedicated-truck-lane systems. These calculations were based on the costs and vehicle-miles reported in previous sections of this report.
- 2. Market-rate unit pricing rates (in terms of dollars per vehicle-mile) for freight shipping via truck and intermodal rail were obtained for relatively-short (less than 800 miles) and relatively long (greater than 800 miles) haul routes.
- 3. Unit pricing rates for AHS freight shipping were estimated (for both low- and high-mileage options).
- 4. Costs for the intermodal rail option were calculated based on the shipping rates (for both short- and long-haul options).

The reason for having low- and high-mileage options is explained in Section 14.3.2.

14.3.2 Estimations of AHS-Truck and Truck-on-Dedicated-Lane Unit Costs

Table 14.1 shows unit cost calculations for the AHS and dedicated-truck-lane systems. The costs were comprised of the (additional) costs of the AHS lane and the dedicated lane, respectively, less the time-related user costs. The reason for excluding the time-related costs were that differences in shipping times (for trucking and intermodal rail) were not considered in this part of the study. It is worth stressing that the unit costs for the AHS and dedicated truck lanes do not include the vehicle operations costs for those vehicles not operating on the dedicated lane. The unit costs were calculated by dividing the EUAC by the total annual vehicle-revenue-miles operated on the system.

TABLE 14.1. UNIT COSTS FOR AHS AND DEDICATED TRUCK LANES

| TYPE | Total Cost in \$ (Exc. | Total Annual | Unit Cost (\$ per |
|----------------------|------------------------|--------------|-------------------|
| IIFE | Travel Time Cost) | Veh-Rev-Mi | Veh-Rev-Mi) |
| AHS LANE | 688,800,960 | 274,621,620 | 2.72 |
| DEDICATED TRUCK LANE | 749,049,410 | 274,621,620 | 2.73 |

14.3.3 Shipping Rates

Market-rate unit pricing rates were obtained from J. B. Hunt Transport, Inc., a shipping company that offers container-based truck and intermodal shipping. According to J.B. Hunt personnel, intermodal rail is, where available, generally the preferred shipping method for freight due to its relatively-low cost compared to comparable truck-based freight movement when the movement is longer than 800 miles. When the trip is less than 800 miles, truck freight movement is generally the more economical of the two alternatives. Consequently, regional movements are generally made by truck, and long-haul movements employ relatively more intermodal rail shipping. For the 418-mile study section presented in this analysis (extending from Long Beach to Sacramento), then, intermodal rail could be the less economically advantageous option when compared to shipping via truck.

As discussed earlier in this report, the analysis performed here would, ideally, compare intermodal and trucking rates along the same corridor. However, the shipping companies

that were contacted for rate information did not offer intermodal shipping services between Sacramento and Long Beach. For this reason, the study section used for the previous parts of the study was not used as a base system for this part of the analysis. Rather, rates for freight transport via both trucking and intermodal rail were acquired for alternate routes for this portion of the analysis. In order to maintain the integrity of the comparison, routes were chosen where rates for shipping via both modes were available.

As previously mentioned, the study segment (with a length of 418 miles) is less than the ideal length for comparison of intermodal rail and truck freight shipping options because intermodal rail shipping is most cost-efficient when the shipping route is greater than 800 miles (according to J.B. Hunt Transport, Inc. personnel). For this reason, and also because the study section is less than 800 miles, two comparisons are made here to account for the substantial pricing differential for intermodal rail trip lengths below 800 miles and higher than 800 miles.

According to J.B. Hunt Transport, Inc. personnel, the rates for freight shipping exhibit a high degree of fluctuation with seasonality, with rates generally higher in the third and fourth quarters as retailers acquire stock for the winter holidays. The rates quoted here are shown as a range of values for this reason. The low values in each range represent first- and second-quarter rates, and the high values represent third- and fourth-quarter rates. It is a general trend that trucking rates are more subject to seasonal pricing fluctuations than rates associated with intermodal rail.

Four routes were identified where intermodal rail and trucking services were available. The identified routes with associated lengths are:

- Oakland, California to Los Angeles, California (375 miles)
- Los Angeles to Dallas, Texas (1350 miles)
- Los Angeles to Kansas City (1589 miles)
- Los Angeles to Elizabeth, New Jersey (2763 miles)

The rates quoted for all routes are in terms of cost per 53-foot trailer load per mile, hauling a weight up to approximately 45,000 pounds, and transporting non-perishable and non-fragile goods.

Table 14.2 shows rates and average rates for various trip lengths. Since only one data point was gathered for a less-than-800-mile trip, the average rates shown for the Oakland-to-Los Angeles trip are based on this one data point. For longer trip lengths, the average of the three data points that were obtained for long-haul shipping was used in subsequent calculations.

| TABLE 14:2: KATEO (#TEK MILE) TOK TKOOKINO AND INTERMIODAE KAIET KEIOTT OTILITING (#) | | | | | | | |
|---|---------|-------|------|-----------------------|------|------|---------|
| Route | Route | Truck | | Truck Intermodal Rail | | ail | |
| Route | Mileage | Low | High | Average | Low | High | Average |
| Oakland-to-Los Angeles | 375 | 1.13 | 1.20 | 1.17 | 2.20 | 2.20 | 2.20 |
| Los Angeles-to-Dallas | 1350 | 1.25 | 1.75 | 1.50 | 1.15 | 1.20 | 1.18 |
| Los Angeles-to-Kansas City | 1589 | 1.05 | 1.50 | 1.28 | 0.95 | 1.00 | 0.98 |
| Los Angeles-to-Elizabeth | 2763 | 1.10 | 1.45 | 1.28 | 0.84 | 0.89 | 0.87 |

1.35

TABLE 14.2. RATES (\$ PER MILE) FOR TRUCKING AND INTERMODAL RAIL FREIGHT SHIPPING (\$)

As can be seen from Table 14.2, the rates associated with shipping via intermodal rail for a route comparable in length to the 418-mile study system route are substantially higher than trucking rates on the same route. However, for routes above 800 miles in length, intermodal rail rates are substantially less than trucking rates for identical routes. Both intermodal rail and truck shipping rates decrease substantially as haul lengths increase.

14.3.4 Estimation of AHS Shipping Rates

Average of Long-Distance Trips

It was assumed that the shipping rates obtained were based on cost plus an allowance for profit. Given this assumption, it was further assumed that the following relationship held:

Based on the unit costs contained in Table 14.1 and the shipping rates contained in Table 14.2, the following relationship resulted for a shipping distance shorter than 800 miles:

$$(AHS Rate)/2.72 = 1.17/2.73$$

which implies that

The AHS rate for the longer-haul option (greater than 800 miles) was calculated similarly. The rates are contained in Table 14.3 show the results for the low- and high-mileage scenarios, respectively.

TABLE 14.3. COSTS AND SHIPPING RATES BY MODE

| Haul Type | Туре | Intermodal Rail | AHS | Dedicated Truck Lane |
|------------|--------------------------------|-----------------|------|----------------------|
| Short Haul | Cost (\$ per veh-mi) | 5.15 | 2.72 | 2.73 |
| Short Haui | Shipping Rates (\$ per veh-mi) | 2.20 | 1.16 | 1.17 |
| Long Houl | Cost (\$ per veh-mi) | 2.03 | 2.72 | 2.73 |
| Long Haul | Shipping Rates (\$ per veh-mi) | 1.01 | 1.35 | 1.35 |

It should be noted that the truck shipping rates are based on traffic conditions that may not be the same as those on the dedicated lane. Also, in the case of the dedicated lane, the full recovery of the cost of the infrastructure was allocated to the dedicated truck lane, while the full recovery of infrastructure costs is probably not reflected in the trucking rates.

14.3.5 Estimation of Intermodal Rail Unit Costs

Assuming a similar ratio between costs and shipping rates, as was used for trucking, the unit costs for intermodal rail were estimated. The following relationship was then assumed to hold:

```
(Intermodal Rail Unit Cost)/(Intermodal Rail Shipping Rate)
= (DTL Unit Costs)/(DTL Shipping Rate)
```

The estimated unit cost for intermodal rail for a shipping distance less than 800 miles is, then,

Intermodal Rail Unit Cost = 2.20(2.73)/1.35 = \$2.03 per vehicle-mile

The results of the calculations are shown in Table 14.3 for the short- and long-haul scenarios, respectively. It should be noted again that the true costs of infrastructure and operations for rail are probably not reflected in the shipping rates because of accounting procedures and the fact that rail infrastructure was created some time ago.

14.4 Intermodal Option Comparison

According to the results presented in Table 14.3, the unit costs for intermodal rail are the highest for the three study systems for short-haul shipping distances (shorter than 800 miles), and are lower for long-haul shipping distances (greater than 800 miles). The results also show that, for distances shorter than 800 miles, the cost of conventional trucking is very similar to that of AHS-truck. It could be surmised that, at very short distances, conventional truck costs would be less than the costs of AHS-truck because conventional trucking does not include costs associated with activity in transfer terminals. It could be further surmised that AHS-truck may become less costly than conventional trucking at longer distances because the cost of freight transfer will be spread over a longer travel distance. It should be noted, however, that the analysis conducted does not indicate at which distances one mode may become more advantageous than another.

It should be noted again, however, that these conclusions are based on simple assumptions that may not be true for a specific corridor. It is also important to remember that the cost allocation of infrastructure for rail is not the same as for trucking options. Based on the foregoing statements, it is unlikely that the estimates as produced in Table 14.3 are very accurate. However, because these values are not different by orders of magnitude, it probably implies that there could be a situation where shipping by AHS-truck could be an economical option as opposed to conventional trucking or intermodal rail.

15 ADDITIONAL IMPACTS

Any of the transportation systems analyzed in this report would have significant impacts in addition to the benefits and costs that have been estimated. Some of the important impacts are:

- Safety costs
- Air pollution, noise, and other environmental impacts
- Impact on land-use decisions, and the associated costs
- Service quality, comfort, and perceptions of personal safety, and their impacts on ridership for each system
- Impact on surrounding traffic and transportation systems

Safety considerations (i.e. – accident costs) may be the most significant unexplored cost for the three systems being compared here. Safety impacts were not included in this study, but as was pointed out in several places in the report, they would have a critical impact on the desirability and feasibility of implementing the automated systems. This would imply inclusion of costs of possible accidents in the economic comparison (i.e. – predicting accident frequency and severity, placing a monetary value on each type of accident, and calculating total equivalent annual costs of accidents). Predicting accidents related to the automated options would be difficult because the accident rates cannot be related to past experience, as is the case for the conventional alternatives. Accident costs could be a large cost item, and could influence the feasibility of a proposed project significantly. Also, the impact of the variation in the predicted accident rates would be significant and, therefore, a great deal of accuracy in the study of the safety costs would be required.

Reference has already been made regarding the issue of safe automated bus- and truck-convoy sizes. Assumptions were made about the possible size of these convoys, but these assumptions may prove to be inaccurate when such automated technologies are implemented and empirical data become available. There are also several other safety issues that could have an impact on the feasible configuration of an automated system. These include: safe minimum headways, stopping distances, etc.

Implementation of ABUS could result in greater noise pollution than a comparable light-rail system, but possibly less noise pollution than would be generated by conventional bus systems. The amount of pollution generated by ABUS would depend upon the degree to which smooth acceleration and deceleration could be maintained with automation. Light rail also has an advantage over bus systems with regard to air pollution in the urban setting where the project would be implemented. By replacing conventional bus engines with fuel-cell or hybrid engines, the impacts on air quality could become less for the bus systems, and consequently for the automated bus system as well. In the case of the freight systems, the difference among the truck and rail systems' air and noise pollution should be less significant, although that would depend on how much of the rail operation would be in an urban area. Notwithstanding the importance of the environmental impacts, it is difficult,

given the current state of knowledge of air and noise pollution impacts, to accurately quantify the differences in impacts among the alternatives at a project level.

The impacts of each system on land use vary in scope from using available land (which could be used for other purposes) for the transit system to impacts on community and regional development. The latter is more relevant to the transit component of this report than to the trucking because a smaller portion of the freight system would be in an urban area. It would be difficult to quantify the impacts on regional and community development in a general sense, considering that the difference between the widest and narrowest widths for the transit systems amount to seven feet, and twenty-two feet for the trucking systems. While it is true that, in the case of the freeway, implementing projects in the available space in the freeway right-of-way (high-occupancy-vehicle lanes, for example) might yield some additional economic benefits for an option requiring a narrower right-of-way, the quantification of these benefits is beyond the scope of this study.

In regards to community- and regional-level land-use decisions and their relation to the transit system chosen, it may again reasonable to argue that one transit system may be better able than others to complement land-use strategies and fit the regional plans for transportation and land. However, quantification of transportation impacts on land-use decisions is excluded in this study. It should also be noted that two of the underlying specifications of this study were maintaining functional equivalence of all systems and holding demand constant for all the systems, and over time. This excluded consideration of changes in transportation demand because of the system and/or any land-use changes that are effected by the system.

The issue of service quality and its potential effects on choices among the transit alternatives were addressed in Chapter 7, and it was concluded that it could have an effect on the selection of an alternative. With regard to the freight options, the quality-of-service issue is harder to quantify. For the freight segment, this is unlikely to be a significant issue, since freight shipping via rail and truck are generally considered to be of similar quality, and diversion issues are more likely to be centered around cost.

The impact of the automated freight system on the remainder of the freeway lanes was accounted for in the cost comparisons; however, the impact beyond the freeway route itself (i.e. – on the corridor and on the surface collection and distribution systems) was not included in the comparison. This could be a significant issue in urban areas, and should be considered in further research.

Some reference is made in a previous section to the desirability of having "bunched" vehicles, such as light rail trains and bus convoys, on the intersections of the dedicated system. However, the effects of each system on surrounding vehicular, pedestrian, and bicycle traffic have not been included and should be considered in further research.

16 SOME ASPECTS OF STAKEHOLDER CONCERNS

16.1 Introduction

The various stakeholder viewpoints will be briefly discussed in this section. These viewpoints will of course be better articulated by the stakeholders themselves. Also, since the evaluation in this study was undertaken from the societal viewpoint, it does not take into account some of the economic and financial analysis that would have to be undertaken by the stakeholders to evaluate a proposal from their point of view. It should also be noted that it is not intended that this discussion of stakeholders' concerns would be exhaustive and that all subgroups' viewpoints would be represented.

16.2 Transit Systems

For the transit system, the major stakeholders are the transit-system users, the users of other transportation systems that could be affected, the taxpayers and the providers of the systems. The latter group ranges from the design professionals to the operators and administrators of the systems.

From the users' point of view, the introduction of an automated bus system could be viewed from different perspectives. If the automated system could be more easily introduced because of lower total costs and would result in greater access to potential users, they should be in favor of such a system. It is worth noting, again, that the total cost for a system, as presented in this study, does not include passenger fares. Based on the analysis contained in this report, however, it would not seem that the cost advantages of ABUS over a conventional bus could be sufficiently large to affect access. However, substitution of an automated bus system for a rail system could result in a loss of service quality because of the potentially smoother ride of a rail system, and because it could be viewed negatively by potential users.

As stated before, a convoy of buses could have less of an impact on the surrounding transportation system than a large volume of single buses using the same route. This would probably be true if the signal system were coordinated and possibly also in the absence of signal coordination (buses stopping to load and unload passengers interfere with street traffic).

The taxpayers would likely appreciate the introduction of an ABUS system that could reduce costs for public transportation at certain passenger volume levels. Also, because of the lower fixed cost (roadway construction etc.) as opposed to a rail system, would make the initial commitment to the introduction of ABUS easier. It would also make the abandonment of the system at a later date easier, especially if the road space could easily be converted to conventional road use.

Introduction of ABUS as opposed to a BDL system would result in fewer drivers, but would likely increase the complexity of both the design and operation of the system, which could

have the consequence of having to develop and maintain expertise in more advanced system design and operation.

Safety would be a very important concern for all the stakeholders. Because of the unknown safety implications of the ABUS, it would likely mean that the system safety would have to be pre-proven and demonstrated before full-scale introduction. It will be essential to evaluate and enumerate the safety impacts and include that as part of the overall evaluation, as conducted in this study.

16.3 Freight Systems

The major stakeholders for the freight system are similar to those of the transit system, with an additional stakeholder group arising from competing freight companies who would not be able to use the implemented system and draw benefits from it. These additional stakeholder groups could include the truckers not using the AHS, intermodal rail as well as possible shippers that make use of air and water transportation. Trucking companies that would use the AHS, most likely because of cost advantages offered by such a system, could change their pricing strategies and consequently their competitive position relative to that of their competitors. In this respect, the way in which they would pay or not pay for the infrastructure would influence their cost and the concomitant effects.

The introduction of an AHS-Truck system would only be successful if the potential users would find it financially rewarding to outfit their vehicles for this purpose and be willing to pay any tolls that may be levied to pay for the construction, maintenance and operation of the infrastructure.

It is possible that the taxpayers, through the agency(ies) responsible for providing the infrastructure may find it worthwhile to provide the infrastructure without charging tolls if the safety benefits would offset the cost of the infrastructure. It is also conceivable that the agency may find it worthwhile to provide the infrastructure, in the absence of tolls, if the capacity could be more economically provided through an AHS system than otherwise. Providing this additional capacity would benefit all road users although not equally.

The AHS system would in many respects require additional functions to that currently practiced by road agencies. Operation of the infrastructure to make it serviceable and safe would require a degree of participation that exceeds that required for normal operation of roads or toll roads. Legal issues related to accidents will require serious consideration.

17 SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

A summary of the major conclusions and recommendations follows:

17.1 Transit Conclusions

- viii. Based on the findings of this study, the Automated Busway System (ABUS) and Buson-Dedicated-Lane (BDL) system have been found to have substantially lower costs than a functionally-equivalent light rail system for relatively low passenger volumes (the same volumes were used for all systems). This analysis was based on the current passenger volumes served on the Santa Clara Valley Transit Authority (VTA) light rail system. The primary source of the difference comes from the relatively-high costs for planning, designing, and constructing the light rail system. There is some difference in the costs for vehicle operations among the three systems, with the ABUS favored and the BDL the least favored. Costs in the category of vehicle maintenance did not prove to be very different, while the light rail non-vehicle maintenance costs were higher than those for the bus systems. There is some difference among the costs for system administration, but this could be attributable to assumptions regarding the unit costs used for the calculations. The analysis indicates some differences in user wait-time costs (a subcategory of user costs), which favors the BDL system. It is noteworthy that all costs are a function of the specific project chosen as the base system, and a different base system might have yielded different costs. The results are also a function of the basis on which the calculations were carried out. Vehicle-hours and vehicle-miles of travel were used in many of the calculations, and a different basis could produce different results. It should be noted that the results of the analysis do not indicate that any of the systems that were studied are economically feasible. To determine feasibility, the transit alternatives should also be compared to a no-build condition, and an incremental analysis should be undertaken to determine the best transit alternative.
- ix. To determine feasibility, these alternatives should also be compared with alternative uses of the space, such as providing lanes for mixed traffic. Note also that the base condition could be a condition without a transit alternative. Such an analysis should also consider the incremental costs over the base (i.e. existing) condition.
- x. For the base configuration at the relatively-low base volume levels, the overall costs of the ABUS scenarios were comparable to those of the non-automated BDL system. ABUS is the favored alternative in terms of infrastructure (due to narrower lanes) and driver-related vehicle operating costs (due to bus convoying). The advantage of the BDL system is primarily related to the shorter headways, and thus less wait time-related costs for passengers. The system administration costs for the BDL system were found to be less costly than the corresponding ABUS costs. Again, the latter may be due to assumptions. Given that individual cost items may vary from place to place, some or all of these differences may be insignificant.

- xi. The analysis presented here does not attempt to quantify safety considerations as part of the evaluation of the systems. Due to the different natures of the ABUS, BDL, and light rail systems, it is possible that costs associated with safety could vary considerably among the alternatives. Such costs could include those related to accidents, infrastructure, and others. This study also does not attempt to quantify the differences in costs among the systems resulting from environmental factors, ridership and user diversion, or impact on the surrounding transportation systems. These types of costs could be substantial, and could alter the outcomes of the analysis and, consequently, the conclusions presented here.
- xii. At relatively-small increases in passenger volumes, the BDL system would likely be the best-performing system, since it would still have the advantage over the other systems with regard to passenger wait time. At significantly-large volumes, the light rail system could be the preferred system. It would be capable of offering a larger capacity than the other systems, and probably at greater safety standards.
- xiii. At moderate volume increases, when decreasing headways becomes a safety problem for the BDL system, the ABUS would have an advantage over the BDL system largely due to proportionally-smaller driver-related vehicle-operating costs for the ABUS. It should again be noted that a major cost difference between the ABUS and BDL system is related to the system administration costs and, as noted previously, this difference could be smaller, and could result in the ABUS system being the preferred system at lower volumes (such as those volumes used as a basis for this report). At very low volumes and large headways, the advantage that the ABUS offers, i.e. of not requiring drivers in all buses, would not be reasonable, since convoys would not be justified based on passenger volumes. Also, at intermediate volumes, the ABUS would have the advantage over the light rail system because it would have a cost advantage in all categories except for user costs (where they have equal costs) and fleet renewal, which was not included in this comparison because it was outside the comparison period. Inclusion of this cost would still favor the ABUS.
- xiv. One advantage for bus systems, versus light rail, is that buses could enter a dedicated lane from a feeder route and thereby eliminate the need for passengers to transfer from a feeder bus line. This, in turn, could reduce costs associated with wait time. Another potential advantage (which was discussed only qualitatively in this study) is an increase in demand resulting from eliminating the need to transfer for some passengers. However, in the case of ABUS convoy formation, time would be lost due to having buses enter the automated system, drop off a driver, and form-up into a convoy, from which individual buses could split along the way to proceed to regular city streets. Without considering changes in demand, the transfer-time savings associated with this type of configuration could potentially outweigh the additional driver-related costs required to implement the system with this configuration. This would only be true, though, if few passengers would have to transfer to another bus because their destination would not match that of the bus on which they entered. These potential savings would also diminish when headways decrease (as a result of passenger-volume increases). Implementation of such an ABUS configuration would

require a high level of system modification, administration, and coordination to operate properly, to maximize the efficiency of bus operators' time, to assure that a driver is on a bus when it leaves the main line, and to assure that passengers either board a bus bound for their destinations, or can transfer easily. In a configuration where automated or non-automated buses use the system without joining a convoy, there would be no time lost due to convoy formation or passenger transfers between buses.

xv. On-board travel time hours account for substantially more of the total user travel time than do wait time, so finding ways to decrease on-board travel time may be a more effective way to reduce travel-time costs. That could entail increasing the speed of operations on the system, which could require a better-protected right-of-way, and consequently, increased construction, rehabilitation, and maintenance costs. Also, at higher speeds, the issue of safety for the ABUS could become an issue of greater concern. This might not be favorable when comparing and ABUS versus a light rail or BDL system, and it may be construed that, for longer-distance commuting with greater distances between stations and increased cruising speeds, safety conditions may relatively favor the rail and BDL systems.

17.2 Transit Recommendations

- i. As was stated at the beginning of this study, a conclusion could not be made whether an ABUS system would be economically feasible. In order to do this, the use of the space for means other than transit would first have to be investigated. Given the results of the study, a conclusion cannot be made that there would be obvious promise in creating an ABUS system. However, it could be beneficial to further investigate the effect of increased passenger volumes combined with different convey lengths. It is highly recommended that this analysis be conducted before additional funds are spent on further research or implementation of strategies involving automated buses in conveys.
- ii. The extent to which bus convoys could be expanded would be a safety issue, whereas in the case of rail systems, it has been proven that long trains can be safely operated. The passenger volume at which light rail could become the favored option could then depend upon the safety issue, and not necessarily the economic criteria examined in this study and, therefore, further research into the level of safety that can be attained, as well as the economic operations thereof, should be conducted.
- iii. The additional impacts of implementing the alternative systems should be further evaluated. Impacts such as noise and air pollution are hard to quantify, but some of the impacts of the implementation of the alternative systems on the surrounding street system could be quantified. The delay imparted to other vehicle traffic could be quantified and included in the economic analysis. The impacts on bicyclists and pedestrians are also important, but may be difficult to quantify.

- iv. One of the assumptions used in this study was that passenger volumes would be the same for all three systems under study at the base condition, and also under the configuration changes and passenger-volume increases discussed in this report. Changes in demand due to the attributes of each system could significantly alter the outcomes of the analysis, and the extent to which each system would attract users should be examined in future research.
- v. Since the impact of rehabilitation and periodic maintenance of light rail systems beyond the 30-year assumed useful life of the systems was not investigated, definitive conclusions cannot be made regarding this issue. The issue of differing useful lives of the projects was identified early in this report, and should be addressed in subsequent research.

17.3 Freight Conclusions

- i. The analysis presented for road-based freight options for the whole section of I-5 and SR-710 between Sacramento and Long Beach indicates that, based on current vehicle volumes, the reduction in user costs would not offset the increase in agency costs for any of the options (addition of a conventional lane, addition of an AHS lane, and addition of a dedicated truck lane). The AHS lane performed better than the other two alternatives primarily because of the decrease in vehicle operating and user costs. It should be noted that a number of assumptions regarding truck speeds and diversion to the dedicated lanes were made; different assumptions could influence the results significantly, although the advantage of the AHS over the other alternatives should remain. Construction costs had a large influence on the outcome. Dealing more specifically with the physical environment and the effects thereof on the construction costs, as well as developing more accurate unit costs and considering real estate costs for local circumstances, could also influence the results in a meaningful way. Additionally, accident costs were considered to be outside the scope of this study, and could affect the results significantly.
- ii. An analysis based on a segmentation of the study section into low-, medium-, and high-volume sections indicates that, for a low-volume road, the agency costs were lower than the savings from user costs associated with the addition of an AHS at low volumes. This may appear to be counter-intuitive, but this result is a consequence of, among other factors, significantly-lower construction costs in rural areas, where passenger volumes are lower. Again, it should be noted that assumptions especially regarding truck speeds, diversion, and unit costs and the exclusion of accident and real estate costs, influenced those results significantly.
- iii. Based on a different type of analysis (using shipping rates as a basis), it was found that the unit costs for intermodal rail were the highest for the three study systems for short-haul shipping distances (shorter than 800 miles), and the lowest for long-haul shipping distances (greater than 800 miles). The results of the analysis show that, for distances shorter than 800 miles, the cost of conventional trucking is very similar to that of AHS-truck. It could be surmised that, at very short distances, conventional

truck costs would be less than the costs of AHS-truck because conventional trucking does not include costs associated with activity in transfer terminals. It could be further surmised that AHS-truck may become less costly than conventional trucking at longer distances because the cost of freight transfer will be spread over a longer travel distance. It should be noted, however, that the analysis conducted does not indicate at which distances one mode may become more advantageous than another.

17.4 Freight Recommendations

- i. The analysis presented here for road-based freight indicates that, based on current vehicle volumes, the reduction in user costs did not offset the increase in agency costs for any of the options (addition of a conventional lane, addition of an AHS lane, and addition of a dedicated truck lane). The AHS lane performed better than the other two alternatives primarily because of the lower vehicle operating and user costs. It should be noted that different assumptions regarding truck speeds, diversion, and unit costs could influence the results significantly, although the advantage of the AHS over the other alternatives should remain. Construction costs had a large influence over the outcome. Dealing more specifically with the physical environment and the effects thereof on the construction costs, as well as developing more accurate unit costs and considering real estate costs for local circumstances, could also influence the results in a meaningful way. Additionally, accident costs were considered to be outside the scope of this study, and could affect the results significantly.
- ii. It is recommended that an in-depth study be undertaken based on real costs to compare AHS-truck and intermodal rail; however, such a study should only be undertaken once a sensitivity analysis for the road-based freight alternatives has been undertaken. This should be done to ensure that AHS-truck is a viable option and that the envelope of constraints within which this would be true is established.

17.5 Overall Conclusions and Recommendations

It appears that there is some promise for automation of vehicles, as it was discussed in this report. In the case of the transit systems, there may be a niche for bus convoys serving intermediate passenger volumes. This niche could appear between the low-volume condition, where having non-automated buses operate in a dedicated lane might be the best alternative of those presented here, and a high-volume condition, where a light-rail system could be the best alternative. In the case of the freight transportation system, there is an indication that automation of trucks, and operation of them in convoys, holds promise. For both transit and freight automation, however, safety costs could affect the economic feasibility significantly.

It is recommended that this evaluation be continued and refined. Refining the costs and some other aspects of the analysis would not only make the analysis more definitive, but could also indicate where the most gains could be made through further development of automation. Possible benefits due to optimization of convoy sizes, development of different types of vehicles or roadways, and access, could be ascertained. It should be kept in mind that a

benefit-cost analysis encompasses almost all aspects of the system, including design and operation. The amount spent to produce the analysis contained in this report is very modest compared to the funds that would be expended on the remainder of research, construction, and operation of transportation systems such as those in this report. Investing more resources in the study of the feasibility of the overall design and operation, both in concept and in the economic feasibility thereof, could lead to better decisions regarding how to spend finite funds for specific research and development of automation.

18 ACKNOWLEDGEMENTS

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Evaluation of Truck and Bus Automation Scenarios: Benefit-Cost Analysis

Volume 2

Appendices A Through J

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APPENDIX A

LIGHT RAIL, ABUS, AND BDL SYSTEM LENGTH AND STATION LINK LENGTH INFORMATION

System Length

In this study, a distinction is made between actual system length and effective system length for the light rail study system. For both ABUS and BDL, actual and effective system lengths are identical.

The study section is a 5.19-mile segment of the VTA light rail system extending from Japantown/Ayer Station north to Baypointe Station. Directional route track miles are 5.19 in each direction, for a total of 10.38 miles. However, this does not include mileage necessary for crossovers and yard tracks. Tables A1 and A2 show station and link information for the light rail base system, supplied by VTA. This data includes station link length for each link along the VTA Guadalupe line, within the domain of the study section. Table A3 summarizes route mileage from the VTA link information.

In order to estimate total effective system mileage for the light rail study section - which includes directional route miles, crossover and yard track miles – it was assumed that the percentage of crossover and yard track miles for the proposed system is the same as for the overall light rail system operated by VTA.

The VTA system consists of roughly 60 miles of track dedicated to route miles, and 2 additional miles dedicated to crossovers and yard miles. This means that the total effective mileage is equal to the total route mileage increased by roughly 2/60, or 3.33%.

Since no additional infrastructure is necessary for crossovers in the ABUS and BDL systems, actual and effective system lengths are assumed to be 5.19 miles for both of these cases. Implicit in this assumption is the neglect of yard roadway miles that might be constructed for these systems. The costs associated with this roadway length is considered to be negligible. Table A3 shows the calculated effective mileage.

Table A3 also shows an average route travel time of 17.42 minutes for the study section. This average route travel time represents the number of minutes required for a light rail vehicle to travel the length of the study section. This is a calculated value, and is based on a weighted average of the route travel times shown in Tables E18 through E23 in Appendix E. A calculated value was used here because exact travel times between the Baypointe and Japantown stations (the endpoints of the study system) were not available from VTA.

TABLE A1. SOUTHBOUND LINK LENGTH

| TABLE AT. SOUTHBOOND LINK LENGTH | |
|---|-------|
| Baypointe - Tasman | 0.50 |
| Tasman - River Oaks | 0.53 |
| River Oaks - Orchard | 0.57 |
| Orchard - Bonaventura | 0.55 |
| Bonaventura - Component | 0.42 |
| Component - Karina | 0.55 |
| Karina - Metro/Airport | 0.52 |
| Metro/Airport - Gish | 0.59 |
| Gish - Civic Center | 0.82 |
| Civic Center - Japantown/Ayer | 0.14 |
| Japantown/Ayer - St. James | 0.96 |
| St. James - Santa Clara | 0.26 |
| Santa Clara - San Antonio | 0.27 |
| San Antonio - Covention Center | 0.39 |
| Convention Center - Children's Discovery Mu | 0.32 |
| Children's Discovery Museum - Virginia | 0.74 |
| Virginia - Tamien | 0.52 |
| Tamien - Curtner | 0.98 |
| Curtner - Capitol | 0.79 |
| Capitol - Branham | 0.48 |
| Branham - Ohlone/Chynoweth | 0.42 |
| Ohlone/Chynoweth - Blossom Hill | 1.04 |
| Blossom Hill - Snell | 0.49 |
| Snell - Cottle | 0.95 |
| Cottle - Santa Teresa | 0.73 |
| TOTAL | 14.53 |
| | |

TABLE A2. NORTHBOUND LINK LENGTH

| 0 0 0 | 0.00 |
|--------------------------------|-------|
| Civic Center - Gish | 0.82 |
| Gish - Metro/Airport | 0.59 |
| Metro/Airport - Karina | 0.52 |
| Karina - Component | 0.55 |
| Component - Bonaventura | 0.42 |
| Bonaventura - Orchard | 0.55 |
| Orchard - River Oaks | 0.57 |
| River Oaks - Tasman | 0.53 |
| Tasman - Baypointe | 0.50 |
| Baypointe - Champion | 0.50 |
| Champion - Lick Mill | 0.74 |
| Lick Mill - Great America | 0.69 |
| Great America - Old Ironsides | 0.27 |
| Old Ironsides - Reamwood | 0.46 |
| Reamwood - Vienna | 0.60 |
| Vienna - Fair Oaks | 0.61 |
| Fair Oaks - Crossman | 0.52 |
| Crossman - Borregas | 0.33 |
| Borregas - Lockheed Martin | 0.82 |
| Lockheed Martin - Moffeit Park | 0.83 |
| Moffeit Park - Bayshore/Nasa | 0.91 |
| Bayshore/Nasa - Middlefield | 0.74 |
| Middlefield - Whisman | 0.48 |
| Whisman - Evelyn | 0.56 |
| Evelyn - Mountain View | 0.67 |
| TOTAL | 14.76 |

TABLE A3. BAYPOINTE TO JAPANTOWN ROUTE LENGTH AND TRAVEL TIME

| Link | Route | Effective | Average Route |
|-----------------------|---------|---------------|-------------------|
| LIIIK | Mileage | Route Mileage | Travel Time (min) |
| Japantown - Baypointe | 5.19 | 5.36 | 17.42 |

APPENDIX B

VTA LIGHT RAIL SCHEDULE GUADALUPE LINE Tables B1 through B4 show the Santa Clara Valley Transportation Authority (VTA) train schedule for the Guadalupe line for weekdays and weekends, north- and south-bound.

| Period | Santa Teresa | Baypointe |
|--------|----------------|----------------|
| | 5:20 | 6:12 |
| | 5:38 | 6:30 |
| | 5:55 | 6:47 |
| | 6:10 | 7:02 7:17 |
| | 6:25 6:40 | 7:17 |
| AM | 6:55 | 7:47 |
| | 7:10 | 8:02 |
| | 7:25 | 8:17 |
| | 7:40 | 8:32 |
| | 7:55 | 8:47 |
| | 8:10 8:25 | 9:02 9:17 |
| | 8:40 | 9:32 |
| | 8:55 | 9:47 |
| | 9:10 | 10:02 |
| | 9:25 | 10:17 |
| | 9:40 | 10:32 |
| | 9:55 | 10:47 |
| | 10:10 10:25 | 11:02 11:17 |
| | 10:40 | 11:32 |
| | 10:55 | 11:47 |
| | 11:10 | 12:02 |
| MID | 11:25 | 12:17 |
| | 11:40 | 12:32 |
| | 11:55 12:10 | 12:47 1:02 |
| | 12:10 | 1:17 |
| | 12:40 | 1:32 |
| | 12:55 | 1:47 |
| | 1:10 | 2:02 |
| | 1:25 | 2:17 |
| | 1:40 | 2:32 |
| | 1:55 2:10 | 2:47 3:02 |
| | 2:25 | 3:17 |
| | 2:40 | 3:32 |
| | 2:55 | 3:47 |
| | 3:10 | 4:02 |
| | 3:25 | 4:17 |
| | 3:40 3:55 | 4:32 4:47 |
| PM | 4:10 | 5:02 |
| | 4:25 | 5:17 |
| | 4:40 | 5:32 |
| | 4:55 | 5:47 |
| | 5:10 | 6:02 |
| | 5:25 | 6:17 |
| | 5:40 5:55 | 6:32 6:47 |
| | 6:10 | 7:02 |
| | 6:25 | 7:17 |
| | 6:40 | 7:32 |
| | 6:55 | 7:47 |
| | 7:11 | 8:03 |
| | 7:26 | 8:18 |
| | 7:41 7:57 | 8:33 8:51 |
| | 8:12* | 8:51 - |
| | 8:27 | 9:21 |
| OFF | 8:57 | 9:51 |
| OFF | 9:27 | 10:21 |
| | 9:57 | 10:51 |
| | 10:28 | 11:22 |
| | 10:58 | 11:52 |
| | 11:28 11:49 | 12:22 |
| | 12:17 | 12:39 1:11 |
| | 1:18 | 2:11 |
| | 2:21 | 3:13 |
| | 3:21 | 4:13 |
| | 4:20 | 5:12 |
| | 4:40 | 5:32 5:52 |
| | 5:00 | |

TABLE B2. VTA SCHEDULE -WEEKDAY SOUTHBOUND

| WLENDAT 30 | | |
|------------|--------------------------------|----------------------|
| Period | Baypointe | Santa Teresa |
| | 5:28 | 6:20 |
| | 5:48 | 6:40 |
| | 6:08 | 7:00 |
| | | |
| | 6:23 | 7:15 |
| | 6:38 | 7:30 |
| | 6:53 | 7:45 |
| AM | | |
| | 7:08 | 8:00 |
| | 7:23 | 8:15 |
| | 7:38 | 8:30 |
| | 7:53 | 8:45 |
| | | |
| | 8:08 | 9:00 |
| | 8:23 | 9:15 |
| | 8:38 | 9:30 |
| | 8:53 | 9:45 |
| | | |
| | 9:08 | 10:00 |
| | 9:23 | 10:15 |
| | 9:38 | 10:30 |
| | 9:53 | 10:45 |
| | | |
| | 10:08 | 11:00 |
| | 10:23 | 11:15 |
| | 10:38 | 11:30 |
| | 10:53 | 11:45 |
| | | |
| | 11:08 | 12:00 |
| MID | 11:23 | 12:15 |
| MID | 11:38 | 12:30 |
| | | 12:45 |
| | 11:53 | |
| | 12:08 | 1:00 |
| | 12:23 | 1:15 |
| | 12:38 | 1:30 |
| | | |
| | 12:53 | 1:45 |
| | 1:08 | 2:00 |
| | 1:23 | 2:15 |
| | 1:38 | 2:30 |
| | | |
| | 1:53 | 2:45 |
| | 2:08 | 3:00 |
| | 2:23 | 3:15 |
| | 2:38 | 3:30 |
| | | |
| | 2:53 | 3:45 |
| | 3:08 | 4:00 |
| | 3:23 | 4:15 |
| | 3:38 | 4:30 |
| | 3:53 | 4:45 |
| PM | | |
| | 4:08 | 5:00 |
| | 4:23 | 5:15 |
| | 4:38 | 5:30 |
| | | |
| | 4:53 | 5:45 |
| | 5:08 | 6:00 |
| | 5:23 | 6:15 |
| | 5:38 | 6:30 |
| | | |
| | 5:53 | 6:45 |
| | 6:08 | 7:00 |
| | 6:23 | 7:15 |
| | 6:38 | 7:30 |
| | | |
| | 6:53 | 7:45 |
| | 7:08 | 8:00 |
| | 7:23 | 8:15 |
| | 7:40 | 8:32 |
| | | |
| | 8:00 | 8:56 |
| | 8:30 | 9:26 |
| OFF | 9:00 | 9:56 |
| | 9:30 | 10:26 |
| | 10:01 | 10:56 |
| | | |
| | 10:31 | 11:26 |
| | 11:01 | 11:56 |
| | 11:31 | 12:26 |
| | | |
| | | 12.56 |
| | 12:05 | 12:56 |
| | 12:05 12:35 | 1:26 |
| | 12:05 | |
| | 12:05 12:35 1:23 | 1:26 2:14 |
| | 12:05 12:35 1:23 2:23 | 1:26 2:14 3:14 |
| | 12:05 12:35 1:23 | 1:26 2:14 |

<sup>5:00 5:52

*</sup>Train terminates at Civic Center station, and does not continue to Baypointe, the terminal station.

TABLE B3. VTA SCHEDULE - WEEKEND NORTHBOUND

Santa Teresa Baypointe Period 5:20 6:14 5:55 6:46 6:25 7:16 7:31 6:40 6:55 7:46 AM 7:10 8:01 7:25 8:16 7:40 8:31 7:55 8:46 8:10 9:01 8:25 9:16 8:40 9:31 8:55 9:46 9:10 10:01 9:25 10:16 9:40 10:31 9:55 10:46 10:10 11:01 11:16 10:25 11:31 10:40 10:55 11:46 11:10 12:01 11:25 12:16 MID 11:40 11:55 12:46 12:10 1:01 12:25 1:16 12:40 1:31 12:55 1:46 1:10 2:01 1.25 2:16 1:40 2:31 1:55 2:46 2:10 3:01 2:25 3:16 3:31 2:40 2:55 3:10 3:46 4:01 3:25 4:16 3:40 4:31 4:46 3:55 PM 4:10 5:01 4:25 5:16 4:40 4:55 5:46 5:10 6:01 5:25 6:16 5:40 6:31 5:55 6:46 6:10 7:01 6:25 7:16 6:40 7:31 6:55 7:46 7:10 8:01 7:25 8:16 7:41 8:32 7:57 8:51 8:12* 9:21 8:27 OFF 8:42* 8:57 9:51 9:27 10:21 9:57 10:51 10:27 11:21 11:52 10:58 12:22 11:28 11:49 12:39 12:17 1:11 1:18 2:11 2:21 3:13 4:13 4:20 5:12

TABLE B4. VTA SCHEDULE -

| WEEKEND SOUTHBOUND | | | | | |
|--------------------|--|---|--|--|--|
| Period | Baypointe | Santa Teresa | | | |
| | 5:23 | 6:14 | | | |
| | 5:51* | 6:26 | | | |
| | 6:06* | 6:41 | | | |
| | 6:21* | 6:56 | | | |
| | 6:34** | 6:59** | | | |
| | 6:24 | 7:15 | | | |
| AM | 6:57* 6:54 | 7:32 7:45 | | | |
| | 7:25* | 8:00 | | | |
| | 7:24 | 8:15 | | | |
| | 7:39 | 8:30 | | | |
| | 7:54 | 8:45 | | | |
| | 8:09 | 9:00 | | | |
| | 8:24 | 9:15 | | | |
| | 8:39 | 9:30 | | | |
| | 8:54 | 9:45 | | | |
| | 9:09 | 10:00 | | | |
| | 9:24 | 10:15 | | | |
| | 9:39 | 10:30 | | | |
| | 9:54 | 10:45 | | | |
| | 10:09 | 11:00 | | | |
| | 10:24 | 11:15 | | | |
| | 10:39 | 11:30 | | | |
| | 10:54 | 11:45 | | | |
| | 11:09 | 12:00 | | | |
| MID | 11:24 | 12:15 | | | |
| | 11:39 | 12:30 | | | |
| | 11:54 | 12:45 | | | |
| | 12:09 | 1:00 | | | |
| | 12:24 | 1:15 1:30 | | | |
| | 12:39 12:54 | 1:45 | | | |
| | 1:09 | 2:00 | | | |
| | 1:24 | 2:15 | | | |
| | 1:39 | 2:30 | | | |
| | 1:54 | 2:45 | | | |
| | 2:09 | 3:00 | | | |
| | 2:24 | 3:15 | | | |
| | 2:39 | 3:30 | | | |
| | 2:54 | 3:45 | | | |
| | 3:09 | 4:00 | | | |
| | 3:24 | 4:15 | | | |
| | 3:39 | 4:30 | | | |
| PM | 3:54 | 4:45 | | | |
| | 4:09 | 5:00 | | | |
| | 4:24 | 5:15 | | | |
| | 4:39 | 5:30 | | | |
| | 4:54 | 5:45 | | | |
| | 5:09 5:24 | 6:00 6:15 | | | |
| | 5:24 | 6:30 | | | |
| | 5:54 | 6:45 | | | |
| | 6:09 | 7:00 | | | |
| | 6:24 | 7:15 | | | |
| | | | | | |
| | | | | | |
| | 6:39 | 7:30 7:45 | | | |
| | | 7:30 | | | |
| | 6:39 6:54 | 7:30 7:45 | | | |
| | 6:39 6:54 7:09 | 7:30 7:45 7:59 | | | |
| | 6:39 6:54 7:09 7:22 | 7:30 7:45 7:59 8:13 | | | |
| | 6:39 6:54 7:09 7:22 7:36 | 7:30 7:45 7:59 8:13 8:27 | | | |
| OFF | 6:39 6:54 7:09 7:22 7:36 7:51 8:06 8:31 | 7:30 7:45 7:59 8:13 8:27 8:42 8:57 9:26 | | | |
| OFF | 6:39 6:54 7:09 7:22 7:36 7:51 8:06 8:31 9:01 | 7:30 7:45 7:59 8:13 8:27 8:42 8:57 9:26 9:56 | | | |
| OFF | 6:39 6:54 7:09 7:22 7:36 7:51 8:06 8:31 9:01 9:31 | 7:30 7:45 7:59 8:13 8:27 8:42 8:57 9:26 9:56 | | | |
| OFF | 6:39 6:54 7:09 7:22 7:36 7:51 8:06 8:31 9:01 9:31 | 7:30 7:45 7:59 8:13 8:27 8:42 8:57 9:26 9:56 10:26 | | | |
| OFF | 6:39 6:54 7:09 7:22 7:36 7:51 8:06 8:31 9:01 9:31 10:01 10:31 | 7:30 7:45 7:59 8:13 8:27 8:42 8:57 9:26 9:56 10:26 10:56 11:26 | | | |
| OFF | 6:39 6:54 7:09 7:22 7:36 7:51 8:06 8:31 9:01 9:31 10:01 10:31 11:01 | 7:30 7:45 7:59 8:13 8:27 8:42 8:57 9:26 9:56 10:26 10:56 11:26 11:56 | | | |
| OFF | 6:39 6:54 7:09 7:22 7:36 7:51 8:06 8:31 9:01 9:31 10:01 10:31 11:01 11:31 | 7:30 7:45 7:59 8:13 8:27 8:42 8:57 9:26 9:56 10:26 11:26 11:56 12:26 | | | |
| OFF | 6:39 6:54 7:09 7:22 7:36 7:51 8:06 8:31 9:01 9:31 10:01 10:31 11:01 11:31 12:05 | 7:30 7:45 7:59 8:13 8:27 8:42 8:57 9:26 9:56 10:26 10:56 11:26 11:56 12:26 12:56 | | | |
| OFF | 6:39 6:54 7:09 7:22 7:36 7:51 8:06 8:31 9:31 10:01 10:31 11:01 11:31 12:05 12:35 | 7:30 7:45 7:59 8:13 8:27 8:42 8:57 9:26 10:26 10:56 11:26 11:56 12:26 12:56 1:26 | | | |
| OFF | 6:39 6:54 7:09 7:22 7:36 7:51 8:06 8:31 9:01 9:31 10:01 10:31 11:01 11:31 12:05 12:35 | 7:30 7:45 7:59 8:13 8:27 8:42 8:57 9:26 10:26 10:56 11:26 11:56 12:26 12:56 12:26 2:14 | | | |
| OFF | 6:39 6:54 7:09 7:22 7:36 7:51 8:06 8:31 9:31 10:01 10:31 11:01 11:31 12:05 12:35 | 7:30 7:45 7:59 8:13 8:27 8:42 8:57 9:26 10:26 10:56 11:26 11:56 12:26 12:56 1:26 | | | |

^{*}Train terminates at Civic Center station, and does not continue to Baypointe, the terminal station.

^{*}Train terminates at Civic Center station, and does not continue to Baypointe, the terminal station.

^{**}Trains 1 and 3 are taken out-of-service at Civic Center station, and do not continue on to Baypointe.

APPENDIX C LIGHT RAIL SYSTEM AGENCY COSTS

Introduction

This appendix details methodologies and procedures for calculating the agency costs associated with the light rail study system. These costs include:

- System Planning and Design Costs
- Construction, Rehabilitation, and Other Infrastructure-Related Capital Costs
- Vehicle Operations Costs
- Vehicle Maintenance Costs
- System (Non-Vehicle) Maintenance Costs
- System Administration Costs

LIGHT RAIL SYSTEM PLANNING AND DESIGN, CONSTRUCTION, REHABILITATION, AND OTHER INFRASTRUCTURE-RELATED CAPITAL COSTS

Light Rail Cross-Sectional Geometry (Width Requirements)

As with the VTA Guadalupe light rail line on the segment being studied, the proposed light rail system is assumed to operate at-grade, with no physical separation of travel lanes from each other, or from street traffic.

According to the Santa Clara Valley Transportation Authority (VTA), the smallest possible right-of-way (ROW) width required for two light rail lanes to operate side-by-side and at normal speeds is 28.9 feet. This width includes a 12-foot spacing between the innermost rails and a track gauge of 4.7 ft (56.5 inches). The minimum distance between the center of the track and the edge of the light rail right-of-way is 5.44 ft. Figure 3.2 in the main report shows a schematic representation of the light rail system at minimum width.

It is important to note the distinction between the minimum allowable ROW width and the average ROW width for the study section. The minimum allowable ROW width refers to the smallest possible ROW for safe light-rail operation, as described above. The average ROW width for the study section refers to a calculated average of the 5.19-mile stretch of the VTA Guadalupe line, which was used as a base system for this study. Both of these lengths will be used in the subsequent sections of this appendix. The length used for a particular calculation depends upon which would be the more representative of the system with reference to the cost being calculated.

Light Rail Study System Actual and Effective Lengths

The actual length of the study section is 5.19 miles, in correspondence of the length of the VTA light rail segment running between Baypointe and Japantown. However, for the purposes of this study, a distinction is made between actual study section length, the one-directional effective length, and the effective length. These values are 5.19 miles and 5.36 miles, respectively.

The reason for this distinction is, in short, as follows: The VTA system consists of roughly 60 miles of track dedicated to route miles, and 2 additional miles dedicated to crossovers and yard miles. This implies that there is additional track mileage that must be constructed for the study section which is not included in the 5.19-mile one-directional operating length. The total one-directional effective mileage is an adjustment to account for the aforementioned service track mileage. The one-directional effective mileage is equal to the total route mileage increased by roughly 2/60, or 3.33%. A more detailed explanation is available in Appendix A.

It is important to distinguish the calculations where the 5.19-mile actual track length is appropriate, and where it is appropriate to use the 5.36-mile effective length in calculations. Effective track mileage is used in the following calculations:

- System planning and design costs
- Infrastructure and construction costs, excluding those pertaining to right-of-way.

For all other calculations, it is appropriate to use the actual track mileage in calculations. It is noteworthy that right-of-way cost calculations are not included in the set of calculations based on effective track mileage because, for crossover sections and yard miles, it is not necessary to purchase additional right-of-way on which to place the tracks.

Light Rail System Planning and Design Costs

Planning and design costs include agency labor, consulting and legal costs associated with system design. The costs for the VTA Tasman West light rail project were used as a basis for estimating planning and design costs for the proposed light rail system. The 7.6-mile double-track Tasman West line was completed in 1999, and information on system planning and design was provided by the VTA as part of a summary of construction costs.

Table C1 shows system planning and design costs and cost calculations for the Tasman West line. The following paragraphs describe procedures and show sample calculations for the columns in Table C1.

"VTA Total Cost" figures were obtained from Tasman West project contract documents provided by VTA.

The "Unit Cost" quantities were calculated by dividing the applicable "VTA Total Cost" quantity by 15.2 miles (twice 7.6 miles) to arrive at a cost per track-mile.

Sample Calculation (Design Consultants): \$3,964,933 = \$60,266,983/15.2

The "Unit Cost (2001-Equiv.)" figures were obtained by adjusting the "Unit Cost" quantities for inflation. The inflation factor for adjustment from 1999 to 2001-equivalent dollars is 1.0353 (1). Therefore, numbers in the "Unit Cost (2001-Equiv.)" column were obtained by multiplying "Unit Cost" quantities by 1.0353.

| Cost Element | Item | Year | VTA Total Cost (\$) | Unit Cost (\$) ^a | Unit | Unit Cost (2001- Equiv. \$) | Unit | # of Units in Study Section | Unit | One-Time Cost (\$) | EUAC (2001- Equiv. \$) |
|---|--|------|------------------------|-----------------------------|-----------------------------------|--------------------------------|------------------------------------|--------------------------------|-----------------------|-----------------------|---------------------------|
| | Design Consultants | 1999 | 60,266,983 | 3,964,933 | track mile | 4,104,895 | track mile | 10.73 | track miles | 44,027,686 | 3,198,563 |
| | Professional Consultants | 1999 | 49,651,941 | 3,266,575 | track mile | 3,381,885 | track mile | 10.73 | track miles | 36,272,930 | 2,635,189 |
| System Planning and Design Costs | VTA Labor | 1999 | 25,086,106 | 1,650,402 | track mile | 1,708,661 | track mile | 10.73 | track miles | 18,326,506 | 1,331,401 |
| | Non-Technical Services | 1999 | 3,453,199 | 227,184 | track mile | 235,204 | track mile | 10.73 | track miles | 2,522,714 | 183,272 |
| | TOTAL | | | | | | | | | | 7,348,425 |
| | Property Costs/ ROW Acquistion | 1999 | 34,166,626 | 23.65 | sq. foot | 24.49 | sq. foot | 791,952 | sq. feet | 19,391,768 | 1,408,791 |
| | Utility Relocations | 1999 | 9,015,859 | 593,149 | track mile | 614,087 | track mile | 10.73 | track miles | 6,586,482 | 478,501 |
| Infrastructure Costs | Material and Equipment | 1999 | 12,619,406 | 830,224 | track mile | 859,531 | track mile | 10.73 | track miles | 9,219,032 | 669,753 |
| mirastructure Costs | Civil/Structural Construction | 1999 | 113,150,901 | 7,444,138 | track mile | 7,706,916 | track mile | 10.73 | track miles | 82,661,718 | 6,005,284 |
| | Systems | 1999 | 19,547,712 | 1,286,034 | track mile | 1,331,431 | track mile | 10.73 | track miles | 14,280,465 | 1,037,460 |
| | TOTAL | | | | | | | | | | 9,599,788 |
| Non-Infrastructure Capital Costs | Fleet Purchase (Vehicle Purchase) | 2001 | N/A | 3,000,000 | vehicle | 3,000,000 | USD per veh | 6.288 | vehicles | 18,863,654 | 1,370,424 |
| | Major Rehabilitation (Tangent Track Sections) ^b | 2002 | N/A | 0 | year | 0 | per year per veh | N/A | N/A | 0 | 0 |
| Periodic Capital Costs | Major Rehabilitation (Curved Track Sections) | 2002 | N/A | 134,228 | per 10 years per track mile | | per year per track mile | 4.037 | track miles | N/A | 33,586 |
| | Major Rehabilitation (System/ Wayside Maintenance) | 2002 | N/A | 50,000 | per year per double-track mile | 49,020 | per year per double- track mile | 5.19 | double-track miles | N/A | 254,414 |
| | TOTAL | | | | | | | | | | 287,999 |
| Fleet Renewal | Vehicle Replacement Costs | | | 0 | per year per veh. | 0 | per year per veh. | 0 | veh. | 0 | 0 |
| OTAL CONSTRUCTION, REHABILITATION, AND | TAL CONSTRUCTION, REHABILITATION, AND OTHER INFRASTRUCTURE COSTS | | | | | | | | 11,258,212 | | |
| TAL SYSTEM PLANNING, DESIGN, CONSTRUCTION, REHABILITATION, AND OTHER INFRASTRUCTURE COSTS | | | | | | 18,606,637 | | | | | |

^a Based on 7.6-mile line length, double-track system, for a total of 15.2 trackway miles.

^b Rehabilitation of tangent track sections is estimated by VTA personnel to occur every 75 to 100 years. This time period is beyond the scope of this study, and tangent section rehabilition is thus considered to be negligable.

Sample Calculation (Design Consultants): \$4,104,895 = \$3,964,933 x 1.0353

The "One-Time Cost" quantities were calculated by multiplying "Unit Cost (2001—Equiv.)" quantities by 10.73, the total number of track-miles in the light rail section under study (5.36 miles in each direction).

```
Sample Calculation (Design Consultants): $44,027,686 = $4,104,895 x 10.73
```

Finally, the Equivalent Uniform Annual Cost for the base year of 2001 ["EUAC (2001-Equiv.)"] values were calculated, assuming a 30-year useful project life and a discount rate of 6%. All formulae were obtained from Sullivan (2). Methodologies are as follows:

```
[EUAC (2001-Equiv.)] = [One-Time Cost] x [A/P, i, n], where i=6% and n=30.

= [One-Time Cost] x [i(1+i)^n]/[(1+i)^n-1]

= [One-Time Cost] x 0.0726
```

Sample Calculation (Design Consultants): 3,198,563 = 44,027,686 x 0.0726

Light Rail Infrastructure Costs

Construction costs for the light rail system were also estimated using the completed VTA Tasman West light rail project as a model. For all costs except those associated with right-of-way acquisition, the same procedure used to determine light rail system planning and design costs was used to determine the construction costs. Construction costs include those expenses associated with civil infrastructure, electrical systems, right-of-way acquisition, utilities, materials and equipment, and non-technical services. This cost category does not include vehicle procurement. The resulting costs are shown in Table C1.

Right-of-way acquisition costs were calculated according to the following procedure:

- 1. Right-of-Way unit costs (\$ per Sq. Ft.) were calculated.
- 2. Square footage of the light project right-of-way was estimated.
- 3. Unit costs were adjusted for inflation to 2001-equivalent dollars.
- 4. Adjusted unit costs were multiplied by cost per square foot to get a total cost.
- 5. Total cost was converted to EUAC (2001-Equivalent).

Right-of-Way Unit Cost Calculations

All proposed systems (light rail, ABUS, and BDL) follow the existing alignment of the Santa Clara Valley Transportation Authority (VTA) light rail system over a 5.19-mile segment of the Guadalupe Line. Although the line has some curved segments, it is relatively straight in alignment. It is noteworthy that the 5.19-mile actual system length is used for this calculation, rather than the 5.36-mile effective track length

Costs for acquiring right-of-way for the proposed systems were based, as were most construction costs, on data from the completed the VTA Tasman West light rail project. For the VTA, right-of-way is generally acquired in two ways:

- 1. Fee Acquisition
- 2. Easement

In fee acquisition, land for right-of-way is purchased at market value and retained for use by the agency. In an easement, use of the land is granted by the owner, but the transit agency does not gain ownership of the land.

In general, right-of-way acquired by fee acquisition is substantially more expensive than land acquired via easement. In some cases, easements may be granted at no cost – for instance, if the land is owned by the city where the project is being built.

For the VTA Tasman West project – upon which the right-of-way costs derived here is based – substantially more land was acquired via easement than via fee acquisition. Exact figures regarding the breakdown between easement and fee acquisition were not readily available from the VTA.

Additionally, right-of-way is generally acquired for a project for the following reasons (this list is not meant to be comprehensive, but to show some examples of need for land acquisition):

- 1. Trackway placement
- 2. Passenger stations
- 3. Roadway widening (so median placement of tracks is possible)
- 4. Park & Ride Stations
- 5. Electrical sub-stations
- 6. Maintenance stations
- 7. Temporary (for construction)

The VTA Tasman West light rail project was used as a base system to estimate costs per square foot of land acquired for a light rail system. For the purposes of this project, one unit cost representing an average cost for all right-of-way – regardless of whether it was acquired by fee acquisition or easement – was desired. This unit cost would be used to calculate right-of-way costs for all three systems being compared. Implicit in the use of this simplified unit cost are the following assumptions:

- 1. Proportions of fee-acquired and easement lands are equal for all proposed systems and the VTA Tasman West line.
- 2. All land used for such a construction project must be acquired. In the case of the VTA Tasman West line, the owner agency (VTA) had to acquire land from the City of San Jose and other landholders in order to install the light rail infrastructure. The VTA originally owned only a small portion of the land where the line was built. In the case where the same agency owns and operates the systems, and is also the

principal landowner (e.g. – if the City of San Jose built and operated its own light rail system, rather than cooperating with VTA), the calculations presented here may not be representative of land costs.

Calculation of the said unit cost occurred via the following procedure:

- 1. Total cost for right-of-way acquisition was obtained from Tasman West project contract documents.
- 2. Total square footage for the Tasman West light rail project was estimated.
- 3. Division of total cost by square footage yielded unit cost.

Calculation of Total Study Section Square Footage

Calculation of total square footage for the Tasman West light rail project was conducted in an imprecise manner, and is meant only to give a ballpark figure on project square footage. The following assumptions are implicit in the process, which will be described below:

- 1. The Tasman West line is assumed to be straight, and the surface area of the project rectangular. Curved sections of the line add negligible area to the total project area.
- 2. The calculated area for the Tasman West project is based on average width occupied by the stations and trackway. It does not include such infrastructure as maintenance stations, park & ride stations, or electrical sub-stations. Notably, total costs for land acquisition, which were used to find the unit cost for land, also include land area for maintenance stations, park & ride lots, and other infrastructure. The result of using this approach is that total cost for all land acquired is represented in terms of a unit cost for average trackway plus passenger station width. The assumption implicit here is that costs for these types of infrastructure are proportional to the length of the line.

It is noteworthy that a figure for the land area used in the Tasman West light rail project was unavailable through VTA. Given the high variability in land costs, both within a region and among different regions, error introduced into the land-cost calculations presented here would probably be more-significantly impacted by variations in price than by a more or less-accurate estimation of land area.

An average width for the Tasman West right-of-way was estimated by taking evenly-spaced point measurements from seventeen locations along the Tasman West line. Civil engineering plans were used for the said width measurements, which were read at mid-block locations, intersections, and station locations – thus representing an average width for the right-of-way that includes stations and trackway, but not other supporting infrastructure. This average width, which was found to be roughly 36 feet, was multiplied by the system length to obtain a project square footage.

Right-of-Way Unit Cost Calculation

Unit cost (in \$ per square foot) for land acquisition was obtained by dividing total land acquisition costs for the Tasman West by the previously-calculated square footage. Table C2

shows tabulated values and cost calculations. The length of the Tasman West line appears in the columns headed "Tasman West Line Length." Table C2 also shows the average width of the Tasman West line -- assumed, also, to be the average width of the proposed light rail line - in the column headed "Avg. Width." The column headed "Tasman Project Square

TABLE C2. RIGHT-OF-WAY UNIT COSTS (\$ PER SQUARE FOOT) - 1999-EQUIV.

| Total VTA | Tasman We | est Line Length | Avg. | Tasman Project | \$ per Sq. |
|------------|-----------|-----------------|------|----------------|------------|
| Cost (\$) | Miles | Miles Feet | | Square Footage | Foot |
| 34,166,626 | 7.6 | 40,128 | 36 | 1,444,608 | 23.65 |

Footage" shows the calculated Tasman project area. The column headed "\$ per Sq. Foot" gives the estimated unit cost for land acquisition.

Square Footage of Light Rail Study Section Right-of-Way

In order to maintain functional equivalence between the light rail study section and the ABUS and BDL study sections discussed in subsequent sections of this report, the right-of-way width used for the light rail study section was assumed to be the minimum allowable (28.9 feet), as discussed previously in this appendix. Assuming that the added area due to curved sections is negligible, the area of the light rail study section was approximated by multiplying system length by minimum allowable width of the double-trackway. Area required for stations and other supporting infrastructure was neglected because it is assumed that space requirements for these infrastructure elements are similar for all three systems being compared.

Table C3 shows system length, width, and area for the light rail study section.

TABLE C3. LIGHT RAIL STUDY SECTION DIMENSIONS

| System Length | | Width (Feet) | Area (Sq. Feet) |
|---------------|--------|----------------|-----------------|
| Miles | Feet | Min. Allowable | Two Directions |
| 5.19 | 27,403 | 28.9 | 791,952 |

2001-Equivalent EUAC for Proposed Light Rail Right-of-Way

Light rail right-of-way costs are contained in Table C1.

The unit cost was converted to 2001-equivalent dollars using an inflation index of 1.0353 (3). The following sample calculation showing unit cost conversion to 2001-equivalent dollars comes from Table C1:

$$24.49$$
 per sq. ft. = 23.65 per sq. ft. $x = 1.0353$

This unit cost was then multiplied by the light rail system two-directional square footage (see Table C3) to arrive at "One-Time Cost (2001-Equiv.)," as per the following sample calculation:

$$19,391,768 =$$
[\$24.49 per sq. ft.] x [791,952 sq. ft.]

Finally, costs were converted to EUAC (2001-equivalent). Methodologies for this calculation are identical to other EUAC calculations in Table C1.

Non-Infrastructure Capital Costs

For this project, the only costs considered under the initial, non-infrastructure heading were those associated with fleet purchase. Initial fleet purchase costs for the light rail study system depend on the cost per vehicle and the number of vehicles purchased. VTA personnel estimate that an average light rail vehicle purchased in 2001 cost in the range of \$2.5 - \$3 million, depending on traction, drive, integration, and other factors. A cost of \$3 million per light rail vehicle was assumed for the purposes of this project.

To determine the cost of the light rail vehicles associated with the study section, it was assumed that the number of vehicles necessary is proportional to the length of the line. Since the proposed system is a portion of the existing VTA Guadalupe light rail line, the following proportion was utilized:

$$\frac{L_G}{L_P} = \frac{C_G}{C_P}$$

where

 L_G = the length of the Guadalupe Line,

 L_p = the length of the study section,

 C_G = the number of cars in operating on the existing Guadalupe line,

 C_p = the number of light rail cars necessary for the light rail study system.

Then,

$$C_P = \frac{L_P C_G}{L_G}$$

Table C4 shows calculations for the number of light rail cars needed to service the study section. The calculations that appear in this table are based on the following assumptions:

- The highest volume and the shortest headways for the light rail system occur during
 the PM pear period, so the highest number of light rail vehicles in operation during
 any period in the system operation would also occur during this period. Therefore,
 the number of light rail vehicles necessary to operate the system during the PM peak
 period would be adequate to accommodate the system operating needs during the
 other daily periods.
- 2. According to VTA personnel, for purposes of maintenance and contingency purposes, the system requires a 20 percent vehicle reserve, meaning that one out of every six vehicles must be withheld from operation at any given time.

Train Cars Train # Guadalupe Line Proposed System Existing Scale Factor Scaled # Cars | Effective # Cars 0.250 0.749 0.898 2 3 0.250 0.749 0.898 3 2 0.250 0.499 0.599 4 3 0.250 0.749 0.898 5 2 0.250 0.499 0.599 6 3 0.749 0.250 0.898 7 2 0.250 0.499 0.599 8 3 0.250 0.749 0.898 **TOTAL** 21 5.240 6.288

TABLE C4. LIGHT RAIL VEHICLES REQUIRED DURING PM PEAK HOUR

A total of eight trains are operated on the VTA system during any given period. The column entitled "Train #" refers to the train in operation, and the column entitled "Existing # Veh" refers to the number of train cars currently operated on that train during the PM peak period.

The column entitled "Scale Factor" refers to the ratio used to scale the number of vehicles from Guadalupe-line size to proposed-system size. Since the Guadalupe line is 20.8 miles in length (not including crossover miles and yard miles), and the study section is 5.19 miles in length (again, not including crossover and yard miles), the applicable scale factor was calculated as follows:

Scale Factor =
$$5.19/20.8 = 0.250$$

This implies that one-half of the vehicles necessary to operate the Guadalupe line would be allocated to the study section.

The values in the column "Scaled # Cars" was calculated by multiplying the number of vehicles used in the existing Guadalupe line by the scale factor.

Sample Calculation (Train 1):
$$0.749 = 3 \times 0.250$$

The "Effective # Cars" calculation exists due to the assumption above (regarding the additional 20 percent of the fleet required for maintenance and contingency). The effective number of light rail cars required was calculated as follows:

Three decimal places are maintained throughout the fleet size calculations to distinguish the fleet size as a calculated value, and also because rounding to the next whole number could produce substantial error.

Periodic Capital Costs

Periodic capital costs, or rehabilitation costs, can be subdivided into three categories:

- Tangent Track Sections
- Curved Track Sections
- System/Wayside Maintenance

Tangent and Curved Track Mileages

For the entire VTA system, the 60 miles of single track is comprised of 22.35 miles of curved track and 39.65 miles of tangent sections (this figure does not include approximately 2 miles of track dedicated to crossovers and yard tracks). Assuming crossover mileage fits into the curved track category, and yard tracks are tangent sections, and assuming that one mile of the aforementioned two miles is used for crossovers, this implies that roughly 37.66% (23.35/62) of the VTA rail system is made up of curved track. Applying this percentage to the 10.72-effective track-mile (5.36 miles in each direction) study section would result in the following lengths of curved and tangent tracks:

Curved track: 4.037 miles Tangent track: 6.683 miles

Tangent Track Section Costs

For tangent track sections, VTA personnel estimate that rehabilitation occurs at a 75 to 100-year frequency. Because the rehabilitation cycle is longer than the 30-year assumed life of this project, costs associated with tangent trackway rehabilitation are considered to be negligible for the purposes of this study.

Curved Track Section Costs

The listed unit cost (in \$ per year per track mile) for curved track section rehabilitation appears in Table C1 under the columns headed "Unit Cost (2001-Equiv.). The following procedure was followed to arrive at this unit cost:

- 1. Cost per track mile per ten years was calculated.
- 2. Cost per track mile per ten years was converted to 2001-equivalent dollars.
- 3. Costs per track mile per ten years were brought to present worth.
- 4. Annual costs were calculated in \$ per track mile.

Table C5 shows the details of the calculations.

TABLE C5. CURVED TRACK REHABILITATION

| Total VTA | Costs (2002) | VTA Curved Track | Unit Cost (\$ per Track | Unit Cost (2001-Equiv.) (\$ per | Present | Unit Cost (2001-Equiv.) (\$ |
|-----------|---------------------------|------------------|-------------------------|---------------------------------|------------|-----------------------------|
| \$ | Unit | Mileage | Mile per 10 Years) | Track Mile per 10 Years) | Worth (\$) | per Track Mile per year) |
| 3,000,000 | per mile per ten years | 22.35 | 134,228 | 131,597 | 114,516 | 8,319 |

VTA personnel estimate that \$3,000,000 (in 2002 dollars) is required every ten years to rehabilitate the curved sections of the existing Guadalupe light rail line. With 22.35 miles of curved segments, this implies a cost of \$134,228 per ten years, as per the following formula:

[\$134,228 per track mile per 10 years] = [\$3,000,000 per 10 years]/[22.35 track miles]

This figure was adjusted for inflation. Conversion to 2001-equivalent dollars is as follows (1):

[\$131,597 per track mile per 10 years] = [\$134,228 per track mile per 10 years] x 0.9804

Rehabilitation occurs at year 10 and 20 (but not at year 30, since this is the end of the project life). The following formula converts rehabilitation costs to 2001-equivalent present worth (2):

PW = \$131,597 x [(P/F,i,10) + (P/F,i,20)]
= \$131,597 x
$$\left[\left(\frac{1}{1+i} \right)^{10} + \left(\frac{1}{1+i} \right)^{20} \right]$$
 where i=6%
= \$131,597 x [0.5584 + 0.3118]
= \$114,516

The following formula converts the present worth to an annuity (2):

A = \$114,516 x [A/P,i,30] where discount rate i=6%.
= \$114,516 x
$$\left[\frac{i(1+i)^{30}}{(1+i)^{30}-1}\right]$$

= \$114,516 x 0.0726

= \$8,319 per year per track mile

Thus, a 2001-equivalent unit cost of \$8,319 per year per track mile applies to the light rail rehabilitation for curved track sections.

The EUAC (2001-equivalent) was calculated by multiplying the \$8,319 annual per-mile unit cost by 4.037, the number of curved track miles in the study system. Table C1 shows the results of the calculations.

System/Wayside Rehabilitation

Table C6 shows unit cost calculations for wayside rehabilitation. These calculations are based on the entire Guadalupe line. VTA personnel estimate system and wayside

rehabilitation costs to be approximately \$50,000 per year per double-track mile (in 2002-dollars) for the existing Guadalupe line. Effective track mileage is not used here because the unit cost per double-track mile includes crossover and yard mileage, according to VTA personnel.

| TABLE C6. | TABLE C6. LIGHT RAIL WAYSIDE REHABILITATION | | | | |
|-----------|---|---------------------------------|--|--|--|
| Total V1 | TA Costs (2002) | Unit Cost (2001-Equiv.) (\$ per | | | |
| \$ | Unit | Double-Track Mile per Year) | | | |
| 50,000 | per year per double-track mile | 49,020 | | | |

Adjusting for inflation, the unit cost in terms of 2001-equivalent dollars was found to be:

This value appears both as a result in Table C6 and in the column headed "Unit Cost (2001-Equiv.)" in Table C1. Calculation of the EUAC (2001-equivalent) follows the same methodologies as that of the curved track section rehabilitation.

Fleet Renewal

According to VTA personnel, modern light rail vehicles are built to have a useful life of 30 years, with a 25-year amortization period required by the federal government. Since the assumed life of this project is also 30 years, fleet renewal would have a zero cost in the domain of this project. It is noteworthy that VTA is currently replacing its 15-year-old fleet – not due to vehicle wear, but because the vehicles are being upgraded with low-floor light rail cars.

LIGHT RAIL SYSTEM NON-INFRASTRUCTURE AGENCY COSTS

Light rail system non-infrastructure agency costs include:

- Vehicle Operating Costs
- Vehicle Maintenance Costs
- System (Non-Vehicle) Maintenance Costs
- System Administration Costs

The cost elements included in these categories will be discussed subsequently.

Determination of the light rail study section costs was performed in several major phases for each of the four aforementioned cost categories:

- 1. Determination of individual cost elements that comprise costs in that category
- 2. Determination of vehicle-revenue-miles and vehicle-revenue-hours (the calculation of which is discussed in Appendix D).

- 3. Determination of annual train-revenue-miles and –hours for the study section (the calculation of which is discussed in Appendix D).
- 4. Determination of unit costs for each cost element, based on the VTA light rail system, in terms of vehicle-revenue-miles and vehicle-revenue-hours, or train-revenue-miles and –hours.
- 5. Calculation of light rail study system annual costs based on unit costs and calculated vehicle-revenue-miles and –hours, or train-revenue-miles and –hours.

Items 1, 4, and 5 are the foci of this appendix.

Agency Cost Category Descriptions

Light Rail Vehicle Operations

Costs associated with vehicle operations include daily costs necessary to run the system, including operators' salaries, wages, and benefits, fuel and oil, utilities, and other expenses. Vehicle operating costs do not include costs for routine vehicle maintenance, such as tire replacement and labor costs for workers performing the maintenance.

Light Rail Vehicle Maintenance Costs

Costs associated with vehicle maintenance include those costs for materials, supplies, fuels, lubricants, utilities, and labor used to keep the system in good working order, which are not included in vehicle operating costs.

Light Rail System (Non-Vehicle) Maintenance Costs

Costs associated with system maintenance include maintenance expenses for stations and trackways.

Light Rail System Administration Costs

Costs associated with system administration include expenses incurred for system support personnel in the offices of the operating agency.

Unit Cost Calculations

The procedures described herein are general to the four cost categories discussed in this section. Procedures are illustrated here using the "Vehicle Operating Costs" tables and quantities as a model.

The VTA's 1999-2000 report to the National Transit Database (NTD) itemizes operating expenses according to "Expense Object Classes" (EOCs) and also according to function (Vehicle Operations, Vehicle Maintenance, Non-Vehicle Maintenance, and General Administration) in Form 301 of the report (3). The EOCs listed in Form 301 were used to compile a list of cost elements associated with these four categories for the light rail.

Tables C7a, C7b, C8a, C8b, C9a, C9b, C10a, and C10b show itemized lists of cost elements, raw source data, and unit cost data for light rail. The VTA report to the NTD (3) also gives total annual vehicle-revenue-miles and total annual vehicle-revenue-hours to be 2,421,865 and 163,350, respectively, for the fiscal year ending in June 2000. Unit costs (in 2002 dollars) in terms of vehicle-revenue-miles and vehicle-revenue-hours for all EOCs excluding operator wages and operator fringe benefits were found by dividing the given VTA total operating expenses for the year 2000 by 2,421,865 miles and 163,350 hours, respectively.

Unit costs for operator wages and fringe benefits were calculated according to train-revenue-miles and train-revenue-hours. The VTA report to NTD (3) gives the two aforementioned quantities as 1,614,566 and 109,120, respectively.

It was necessary in this report to distinguish operators' wages and fringe benefits from other wages and fringe benefits. In its report to NTD, VTA distinguishes between operators' salaries and wages and other salaries and wages, but does not distinguish between operators' fringe benefits and other fringe benefits. In order to itemize fringe benefits according to operator/other cost categories, it was assumed that salaries and wages are proportional to fringe benefits, and the following ratio was applied:

$$O_{SW}/T_{SW} = O_{FB}/T_{FB}$$

Where O_{SW} represents operators' salaries and wages, O_{FB} represents other fringe benefits, T_{SW} represents total salaries and wages, and T_{FB} represents total fringe benefits.

Then,

$$O_{FB} = O_{SW}T_{FB}/T_{SW}$$

and

Operator Fringe Benefits =
$$T_{FB}$$
 - O_{FB}

This procedure yielded the following "Annual Cost (VTA Total)" quantities listed in Table C7a:

Operators' Fringe Benefits = \$2,951,068 Other Fringe Benefits = \$929,156

TABLE C7a. LIGHT RAIL VEHICLE OPERATING COSTS - SOURCE DATA

| | | | Annual Coat (V/TA | F | Revenue-Miles | F | Revenue-Hours | | |
|------------------------|-------------------------------|------|----------------------------|------------------------|----------------------|------------------------|----------------------|--|--|
| Cost Element | Item | Year | Annual Cost (VTA Total \$) | Unit Cost (2000 \$) | Unit | Unit Cost (2000 \$) | Unit | | |
| | Operators' Salaries and Wages | 2000 | 3,588,844 | 2.22 | train-revenue-mile | 32.89 | train-revenue-hour | | |
| | Other Salaries and Wages | 2000 | 1,129,962 | 0.47 | vehicle-revenue-mile | 6.92 | vehicle-revenue-hour | | |
| Eringo Ponofito | Operators' Fringe Benefits | 2000 | 2,951,068 | 1.83 | train-revenue-mile | 27.04 | train-revenue-hour | | |
| Fringe Benefits | Other Fringe Benefits | 2000 | 929,156 | 0.38 | vehicle-revenue-mile | 5.69 | vehicle-revenue-hour | | |
| Services | Services | 2000 | 722,888 | 0.30 | vehicle-revenue-mile | 4.43 | vehicle-revenue-hour | | |
| | Fuel and Lubricants | | | | | | | | |
| Materials and Supplies | Tires and Lubes | | | | | | | | |
| | Other Materials and Supplies | 2000 | 19,016 | 0.01 | vehicle-revenue-mile | 0.12 | vehicle-revenue-hour | | |
| Utilities | Utilities | 2000 | 1,943,008 | 0.80 | vehicle-revenue-mile | 11.89 | vehicle-revenue-hour | | |
| Taxes | Taxes | | | | | | | | |
| Misc. | Miscellaneous Expenses | 2000 | -34,734 | -0.01 | vehicle-revenue-mile | -0.21 | vehicle-revenue-hour | | |
| Expense Transfers | Expense Transfers | | | | | | | | |
| OTAL OPERATING CO | STS | | 11,249,208 | | | | | | |

TABLE C7b. LIGHT RAIL VEHICLE OPERATIONS

| | | | Revenue | -Miles | | Revenue-Hours | | | | |
|------------------------|-------------------------------|--------------------------------|------------------------------|--------------|---------------------------|--------------------------------|------------------------------|--------------|---------------------------|--|
| Cost Element | ltem | Unit Cost (2001- Equiv. \$) | Annual Units in LR System | Unit | EUAC (2001- Equiv. \$) | Unit Cost (2001- Equiv. \$) | Annual Units in LR System | Unit | EUAC (2001- Equiv. \$) | |
| Salaries and Wages | Operators' Salaries and Wages | 2.27 | 276,035 | Train-Rev-Mi | 625,840 | 33.55 | 15,439 | Train-Rev-Hr | 517,923 | |
| Salaries and wages | Other Salaries and Wages | 0.48 | 448,068 | Veh-Rev-Mi | 213,235 | 7.06 | 25,061 | Veh-Rev-Hr | 176,823 | |
| Fringe Benefits | Operators' Fringe Benefits | 1.86 | 276,035 | Train-Rev-Mi | 514,622 | 27.59 | 15,439 | Train-Rev-Hr | 425,883 | |
| Fringe Benefits | Other Fringe Benefits | 0.39 | 448,068 | Veh-Rev-Mi | 175,341 | 5.80 | 25,061 | Veh-Rev-Mi | 145,400 | |
| Services | Services | 0.30 | 448,068 | Veh-Rev-Mi | 136,416 | 4.51 | 25,061 | Veh-Rev-Mi | 113,122 | |
| Materials and | Fuel and Lubricants | | | | | | | | | |
| Supplies | Tires and Lubes | | | | | | | | | |
| Supplies | Other Materials and Supplies | 0.01 | 448,068 | Veh-Rev-Mi | 3,589 | 0.12 | 25,061 | Veh-Rev-Mi | 2,976 | |
| Utilities | Utilities | 0.82 | 448,068 | Veh-Rev-Mi | 366,665 | 12.13 | 25,061 | Veh-Rev-Mi | 304,054 | |
| Taxes | Taxes | | | | | | | | | |
| Misc. | Miscellaneous Expenses | -0.01 | 448,068 | Veh-Rev-Mi | -6,555 | -0.22 | 25,061 | Veh-Rev-Mi | -5,435 | |
| Expense Transfers | Expense Transfers | | | | | | | | | |
| TOTAL OPERATING | COSTS | | · | | 2,029,153 | | | | 1,680,746 | |

TABLE C8a. LIGHT RAIL VEHICLE MAINTENANCE COSTS - SOURCE DATA

| Cost Flament | Item | Vear | Annual Cost | Unit Cost per Veh- | Unit Cost per Veh- |
|---|-------------------------------|-----------------------------------|----------------|--------------------|--------------------|
| Cost Element | item | i Gai | (VTA Total \$) | Rev-Mile (\$) | Rev-Hr (\$) |
| | Operators' Salaries and Wages | 2000 | | | |
| Cost Element Item Year (VTA Total \$) Rev-Mile (\$) | | | | | |
| Salaries and wages | Paid Non-Operating Work Time | 2000 | | | |
| | Other Salaries and Wages | 2000 | 3,227,297 | 1.33 | 19.76 |
| Eringo Ponofito | Operators' Fringe Benefits | 2000 | | | |
| Fillige Bellents | Other Fringe Benefits | 2000 | 2,260,198 | 0.93 | 13.84 |
| Services | Services | 2000 | 522,588 | 0.22 | 3.20 |
| | Fuel and Lubricants | 2000 | 64,369 | 0.03 | 0.39 |
| Materials and Supplies | Tires and Lubes | 2000 | | | |
| | Other Materials and Supplies | Actors' Salaries and Wages 2000 | 1,171,171 | 0.48 | 7.17 |
| Utilities | Utilities | 2000 | 4,919 | 0.00 | 0.03 |
| Taxes | Taxes | 2000 | | | |
| Misc. | Miscellaneous Expenses | 2000 | 15,683 | 0.01 | 0.10 |
| Expense Transfers | Expense Transfers | 2000 | | | |
| TOTAL LIGHT RAIL VEHI | CLE MAINTENANCE COSTS | | 7,266,225 | 3.00 | 44.48 |

TABLE C8b. LIGHT RAIL VEHICLE MAINTENANCE COSTS

| | | Vehic | cle-Revenue-Miles | 3 | Vehicle-Revenue-Hours | | | |
|------------------------|-------------------------------|------------------------|-------------------|------------------|------------------------|-----------------|------------------|--|
| Cost Element | Item | Unit Cost (2001-Equiv. | Annual Units in | Annual Cost | Unit Cost (2001-Equiv. | Annual Units in | Annual Cost | |
| | | \$) | LR System | (2001-Equiv. \$) | \$) | LR System | (2001-Equiv. \$) | |
| | Operators' Salaries and Wages | | | | | | | |
| Salarios and Wagos | Operating Time | | | | | | | |
| Salaries and Wages | Paid Non-Operating Work Time | | | | | | | |
| | Other Salaries and Wages | 1.36 | 448,068 | 609,023 | 20.15 | 25,061 | 505,027 | |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | | |
| Fillige Bellellis | Other Fringe Benefits | 0.95 | 448,068 | 426,521 | 14.11 | 25,061 | 353,690 | |
| Services | Services | 0.22 | 448,068 | 98,617 | 3.26 | 25,061 | 81,778 | |
| | Fuel and Lubricants | 0.03 | 448,068 | 12,147 | 0.40 | 25,061 | 10,073 | |
| Materials and Supplies | Tires and Lubes | | | | | | | |
| | Other Materials and Supplies | 0.49 | 448,068 | 221,011 | 7.31 | 25,061 | 183,272 | |
| Utilities | Utilities | 0.00 | 448,068 | 928 | 0.03 | 25,061 | 770 | |
| Taxes | Taxes | | | | | | | |
| Misc. | Miscellaneous Expenses | 0.01 | 448,068 | 2,960 | 0.10 | 25,061 | 2,454 | |
| Expense Transfers | Expense Transfers | _ | | | | | | |
| TOTAL LIGHT RAIL VEHIC | CLE MAINTENANCE COSTS | 3.06 | | 1,371,208 | 45.37 | | 1,137,063 | |

TABLE C9a. LIGHT RAIL SYSTEM (NON-VEHICLE) MAINTENANCE COSTS - SOURCE DATA

| Cost Florant | Itom | Year | Annual Cost | Unit Cost per Veh- | Unit Cost per Veh- |
|------------------------|------------------------------------|------|----------------|--------------------|--------------------|
| Cost Element | Item | real | (VTA Total \$) | Rev-Mi (\$) | Rev-Hr (\$) |
| | Operators' Salaries and Wages | 2000 | | | |
| Salaries and Wages | Operating Time | 2000 | | | |
| Salaries and wages | Paid Non-Operating Work Time | 2000 | | | |
| | Other Salaries and Wages | 2000 | 2,483,915 | 1.03 | 15.21 |
| Fringe Benefits | Operators' Fringe Benefits | 2000 | | | |
| Fillige Bellellis | Other Fringe Benefits | 2000 | 1,554,703 | 0.64 | 9.52 |
| Services | Services | 2000 | 883,608 | 0.36 | 5.41 |
| | Fuel and Lubricants | 2000 | 10,751 | 0.00 | 0.07 |
| Materials and Supplies | Tires and Lubes | 2000 | | | |
| | Other Materials and Supplies | 2000 | 93,932 | 0.04 | 0.58 |
| Utilities | Utilities | 2000 | 464,846 | 0.19 | 2.85 |
| Taxes | Taxes | 2000 | | | |
| Misc. | Miscellaneous Expenses | 2000 | 24,725 | 0.01 | 0.15 |
| Expense Transfers | Expense Transfers | 2000 | | | |
| TOTAL LIGHT RAIL SYST | EM (NON-VEHICLE) MAINTENANCE COSTS | | 5,516,480 | 2.28 | 33.77 |

TABLE C9b. LIGHT RAIL SYSTEM (NON-VEHICLE) MAINTENANCE

| | | V | ehicle-Revenue-N | /liles | Vehicle-Revenue-Hours | | | |
|------------------------|-------------------------------|------------------|------------------|--------------------|-----------------------|---------------|--------------------|--|
| Cost Element | Item | Unit Cost (2001- | # Units in LR | Annual Cost (2001- | Unit Cost (2001- | # Units in LR | Annual Cost (2001- | |
| | | Equiv. \$) | System | Equiv. \$) | Equiv. \$) | System | Equiv. \$) | |
| | Operators' Salaries and Wages | | | | | | | |
| Salaries and Wages | Operating Time | | | | | | | |
| Salaries and wages | Paid Non-Operating Work Time | | | | | | | |
| | Other Salaries and Wages | 1.05 | 448,068 | 468,739 | 15.51 | 25,061 | 388,698 | |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | | |
| Fillige Berleills | Other Fringe Benefits | 0.65 | 448,068 | 293,388 | 9.71 | 25,061 | 243,289 | |
| Services | Services | 0.37 | 448,068 | 166,745 | 5.52 | 25,061 | 138,272 | |
| | Fuel and Lubricants | 0.00 | 448,068 | 2,029 | 0.07 | 25,061 | 1,682 | |
| Materials and Supplies | Tires and Lubes | | | | | | | |
| | Other Materials and Supplies | 0.04 | 448,068 | 17,726 | 0.59 | 25,061 | 14,699 | |
| Utilities | Utilities | 0.20 | 448,068 | 87,721 | 2.90 | 25,061 | 72,742 | |
| Taxes | Taxes | | | | | | | |
| Misc. | Miscellaneous Expenses | 0.01 | 448,068 | 4,666 | 0.15 | 25,061 | 3,869 | |
| Expense Transfers | Expense Transfers | | | | | | | |
| TOTAL LIGHT RAIL VEHI | CLE MAINTENANCE COSTS | 2.32 | · | 1,041,014 | 34.45 | | 863,252 | |

TABLE C10a. LIGHT RAIL SYSTEM ADMINISTRATION COSTS - SOURCE DATA

| Cost Category | Item | Year | Annual Cost (VTA Total \$) | Unit Cost per Veh- Rev-Mi (\$) | Unit Cost per Veh- Rev-Hr (\$) |
|------------------------|--|------|----------------------------|-----------------------------------|--|
| | Operators' Salaries and Wages | 2000 | | | |
| Salaries and Wages | Operating Time | 2000 | | | |
| Salaries and wages | Paid Non-Operating Work Time | 2000 | | | |
| | Other Salaries and Wages | 2000 | 5,934,604 | 2.45 | Rev-Hr (\$) 45 36.33 22 32.87 68 10.15 12 1.81 02 0.29 18 2.65 |
| Fringe Benefits | Operators' Fringe Benefits | 2000 | | | |
| Fillige Bellellis | Other Fringe Benefits | 2000 | 5,369,604 | 2.22 | 32.87 |
| Services | Services | 2000 | 1,658,116 | 0.68 | 10.15 |
| | Fuel and Lubricants | 2000 | | | |
| Materials and Supplies | Tires and Lubes | 2000 | | | |
| | Operators' Salaries and Wages Operating Time Paid Non-Operating Work Time Other Salaries and Wages Operators' Fringe Benefits Other Fringe Benefits Services Fuel and Lubricants | 2000 | 295,744 | 0.12 | 1.81 |
| Utilities | Utilities | 2000 | 46,731 | 0.02 | 0.29 |
| Taxes | Taxes | 2000 | | | |
| Misc. | Miscellaneous Expenses | 2000 | 432,480 | 0.18 | 2.65 |
| Expense Transfers | Expense Transfers | 2000 | | | |
| TOTAL LIGHT RAIL SYST | EM ADMINISTRATION COSTS | | 13,737,279 | 5.67 | 84.10 |

TABLE C10b. LIGHT RAIL SYSTEM ADMINISTRATION COSTS

| | | Ve | hicle-Revenue-M | liles | Vehicle-Revenue-Hours | | | |
|------------------------|-------------------------------|------------------|-----------------|-------------|-----------------------|---------------|-------------|--|
| Cost Category | Item | Unit Cost (2001- | # Units in LR | EUAC (2001- | Unit Cost (2001- | # Units in LR | EUAC (2001- | |
| | | Equiv. \$) | System | Equiv. \$) | Equiv. \$) | System | Equiv. \$) | |
| | Operators' Salaries and Wages | | | | | | | |
| Salarios and Wagos | Operating Time | | | | | | | |
| Salaries and Wages | Paid Non-Operating Work Time | | | | | | | |
| | Other Salaries and Wages | 2.50 | 448,068 | 1,119,918 | 37.06 | 25,061 | 928,683 | |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | | |
| Tillige Deficits | Other Fringe Benefits | 2.26 | 448,068 | 1,013,297 | 33.53 | 25,061 | 840,268 | |
| Services | Services | 0.70 | 448,068 | 312,903 | 10.35 | 25,061 | 259,472 | |
| | Fuel and Lubricants | | | | | | | |
| Materials and Supplies | Tires and Lubes | | | | | | | |
| | Other Materials and Supplies | 0.12 | 448,068 | 55,810 | 1.85 | 25,061 | 46,280 | |
| Utilities | Utilities | 0.02 | 448,068 | 8,819 | 0.29 | 25,061 | 7,313 | |
| Taxes | Taxes | | | | | | | |
| Misc. | Miscellaneous Expenses | 0.18 | 448,068 | 81,613 | 2.70 | 25,061 | 67,677 | |
| Expense Transfers | Expense Transfers | | | | | | | |
| TOTAL LIGHT RAIL SYSTE | EM ADMINISTRATION COSTS | 5.79 | | 2,592,359 | 85.78 | | 2,149,693 | |

Unit costs were then calculated according to the same procedure outlined above. The following sample calculation comes from Table C7a, from the line entitled "Operators' Salaries and Wages."

Sample Calculation: \$32.89 per train-revenue-hour = \$3,588,844/109,120 train-revenue-hours

Unit Cost Conversions to Base Year – 2001-Equivalent

The procedures described herein are general to the four cost categories discussed in this section. Procedures are illustrated here using the "Vehicle Operating Costs" tables and quantities as a model.

Unit costs derived from source data were found in terms of 2000-dollars, and were converted to 2001-dollars (the project base year) by accounting for inflation. An inflator of 1.02—corresponding to a 2 percent inflation rate--was used to perform the conversion (1).

The following sample calculation comes from Tables C7a and C7b, from the line entitled "Operators' Salaries and Wages."

Sample Calculation: \$2.27 per train-revenue-mile = \$2.22 per train-revenue-mile x 1.02

Calculation of Annual Costs for Proposed Light Rail System

The procedures described herein are general to the four cost categories mentioned discussed in this section. Procedures are illustrated here using the "Vehicle Operating Costs" tables and quantities as a model.

The 2001-equivalent unit costs were multiplied by the number of service units in the project domain to obtain 2001-equivalent costs for each cost element. Appendix D discusses methodologies for determining the annual vehicle-revenue-miles and vehicle-revenue-hours, train-revenue-miles and train-revenue-hours for the light rail study system.

Tables C7b, C8b, C9b, andC10b show the tabulated costs for light rail study system vehicle operations, vehicle maintenance, system (non-vehicle) maintenance, and system administration. The following sample calculation comes from Table C7b, from the line entitled "Operators' Salaries and Wages."

Sample Calculation: \$625,840 = 276,035 train-revenue-miles x \$2.27 per train-revenue-mile

References

1. Gross Domestic Product Deflator Inflation Calculator. http://www.jsc.nasa.gov/bu2/inflateGDP.html

- 2. Sullivan, W. G., et al. *Engineering Economy: Seventh Edition*. Prentice Hall. Upper Saddle River, New Jersey. 2000.
- 3. *Final Annual Report 1999-2000*. Prepared for Federal Transit Administration National Transit Database by Santa Clara County Transportation Authority.

APPENDIX D

LIGHT RAIL SYSTEM ANNUAL REVENUE-MILES AND REVENUE-HOURS OF OPERATION

Introduction

Determination of the light rail system vehicle operating costs was performed in several major phases, the first and second of which are the foci of this appendix:

- 1. Determination of individual cost elements that comprise costs in that category
- 2. Determination of vehicle-revenue-miles and vehicle-revenue-hours.
- 3. Determination of annual train-revenue-miles and –hours for the study section.
- 4. Determination of unit costs for each cost element, based on the VTA light rail system, in terms of vehicle-revenue-miles and vehicle-revenue-hours, or train-revenue-miles and –hours.
- 5. Calculation of light rail study system annual costs based on unit costs and calculated vehicle-revenue-miles and –hours, or train-revenue-miles and –hours.

Definitions

For the purposes of this report, language was adapted from the Santa Clara Valley Transportation Authority (VTA) 1999-2000 report to the National Transit Database (1) to describe operational quantities of the light rail system. The following pertinent terms defined here are used throughout the report:

Vehicle-Revenue-Mile: Defined as one light rail vehicle or bus traveling one mile during revenue operation.

Vehicle-Revenue-Hour: Defined as one light rail vehicle or bus operating for one hour under revenue-generating operation.

Train-Revenue-Mile: Defined as one light rail or bus train traveling one mile during revenue-generating operation.

Train-Revenue-Hour: Defined as one light rail or bus train traveling for one hour under revenue-generating operation.

Additionally, the terms "revenue-miles" and "revenue-hours" are used in this report to discuss these defined terms in a more general sense.

Determination of Annual Revenue-Miles and -Hours Used by the Proposed Light Rail System - General Procedure

The calculation of annual revenue-miles and –hours for the proposed light rail study section was carried out in the following phases:

- 1. The number of train trips occurring on the study system during each daily period, both for the weekday and weekend condition, were extrapolated from data obtained from the VTA.
- 2. Daily train trips on the system during each daily period were calculated.

- 3. Daily revenue-miles and revenue-hours were calculated for the study section.
- 4. Annual revenue-miles and revenue-hours were calculated for the study section.

Calculation of Daily Train Trips on System

Weekday

VTA personnel were consulted for data related to train operation during each daily period. In the VTA system on the Guadalupe line (the base system for this study), eight trains were operated in 2003. Based on VTA input, the following patterns, where each number refers to the number of cars per train, were applied to the VTA schedule:

AM Peak: 3-2-3-2-3-3 Midday: 2-2-2-2-2-2 PM Peak: 3-2-3-2-3-3 Off-Peak: 1-1-1-1-1-1

The application of these patterns to the VTA schedule is shown in Tables D1 and D2. Table D3 summarizes train trips for weekdays, as determined by Tables D1 and D2, according to 3-car, 2-car, and 1-car trains.

Weekend

Procedures for determining weekend train trips is identical to the procedure for determination of weekday trips; however, the following alteration was made to align with VTA operating procedures for the Guadalupe line:

• All trains operate on a 1-1-1-1-1-1-1 pattern (i.e. – only one-car trains operate during the weekends)

Tables D4 and D5 show the train pattern aligned with the weekend train schedule. Table D6 summarizes weekend daily train trips.

Calculation of Daily Revenue-Miles and Revenue-Hours

Tables D7 and D8 show weekday and weekend revenue-mile and revenue-hours. They are divided into sections for 3-car trains, 2-car trains, 1-car trains, and totals.

Each of these tables shows four previously-defined data points for each category of train:

- Train-Revenue-Miles
- Vehicle-Revenue-Miles
- Train-Revenue-Hours
- Vehicle-Revenue-Hours

TABLE D1. VTA SCHEDULE WITH TRAIN PATTERN - WEEKDAY NORTHBOUND

Period Santa Teresa Train Pattern Train # Baypointe 5:20 1 3 6:12 3 5:55 3 6:47 6:10 4 2 7:02 6:25 5 7:17 6:40 6 2 7:32 AM 6:55 7 3 7:47 7:10 8 3 8:02 7:25 3 8:17 7:40 2 2 8:32 7:55 3 3 8:47 8:10 4 9:02 5 3 9:17 8:25 8:40 6 2 9:32 8:55 7 2 9:47 9:10 8 10:02 2 9:25 1 10:17 2 9:40 2 10:32 9:55 10:47 10:10 4 2 11:02 2 5 11:17 10:25 10:40 6 2 11:32 10:55 11:47 11:10 8 2 12:02 11:25 1 2 12:17 MID 11:40 12:32 11:55 3 2 12:47 2 12:10 4 1:02 12:25 5 1:17 6 2 1:32 12:40 2 12:55 1:47 1:10 8 2 2:02 2 2 2:32 1:40 1:55 3 2 2:47 2:10 3:02 2:25 5 2 3:17 2:40 6 3 3:32 2:55 7 2 3:47 3:10 8 3 4:02 3:25 2 4:17 3 3:40 2 4:32 3:55 3 4:47 РМ 4:10 4 3 5:02 4.25 5 3 5:17 4:40 6 3 5:32 4:55 5:47 5:10 8 3 6:02 5:25 1 2 6:17 5:40 6:32 3 5:55 1 6:47 4 1 6:10 7:02 6:25 5 1 7:17 6 7:32 6:40 1 6:55 1 7:47 7:11 8 1 8:03 7:26 1 1 8:18 7:41 2 1 8:33 3 7:57 1 8:51 8:12 4 1 9:21 8:27 5 1 8:57 6 1 9:51 OFF 9:27 7 1 10:21 9:57 8 1 10:51 10:28 1 11:22 1 10:58 1 11:52 11:28 3 1 12:22 11:49 4 1 12:39 12:17 5 1 1:11 1:18 6 1 2:11 2:21 1 3:13 3:21 8 1 4:13 4:20 1 1 5:12 4:40 1 5:32 5:00 3 1 5:52

TABLE D2. VTA SCHEDULE WITH TRAIN PATTERN - WEEKDAY SOUTHBOUND

| SOUTHBOUN | עו | | | 1 |
|-----------|-----------|---------|---------------|--------------|
| Period | Baypointe | Train # | Train Pattern | Santa Teresa |
| | 5:28 | 6 | 2 | 6:20 |
| | 5:48 | 7 | 3 | 6:40 |
| | 6:08 | 8 | 3 | 7:00 |
| | 6:23 | 1 | 3 | 7:15 |
| | | | | |
| | 6:38 | 2 | 2 | 7:30 |
| AM | 6:53 | 3 | 3 | 7:45 |
| 7 4141 | 7:08 | 4 | 2 | 8:00 |
| | 7:23 | 5 | 3 | 8:15 |
| | 7:38 | 6 | 2 | 8:30 |
| | | 7 | 3 | 8:45 |
| | 7:53 | | | |
| | 8:08 | 8 | 3 | 9:00 |
| | 8:23 | 1 | 3 | 9:15 |
| | 8:38 | 2 | 2 | 9:30 |
| | 8:53 | 3 | 2 | 9:45 |
| | 9:08 | 4 | 2 | 10:00 |
| | 9:23 | 5 | 2 | 10:15 |
| | | | | |
| | 9:38 | 6 | 2 | 10:30 |
| | 9:53 | 7 | 2 | 10:45 |
| | 10:08 | 8 | 2 | 11:00 |
| | 10:23 | 1 | 2 | 11:15 |
| | 10:38 | 2 | 2 | 11:30 |
| | | | | |
| | 10:53 | 3 | 2 | 11:45 |
| | 11:08 | 4 | 2 | 12:00 |
| MID | 11:23 | 5 | 2 | 12:15 |
| MID | 11:38 | 6 | 2 | 12:30 |
| | 11:53 | 7 | 2 | 12:45 |
| | | 8 | | |
| | 12:08 | | 2 | 1:00 |
| | 12:23 | 1 | 2 | 1:15 |
| | 12:38 | 2 | 2 | 1:30 |
| | 12:53 | 3 | 2 | 1:45 |
| | 1:08 | 4 | 2 | 2:00 |
| | 1:23 | 5 | 2 | 2:15 |
| | | | | |
| | 1:38 | 6 | 2 | 2:30 |
| | 1:53 | 7 | 2 | 2:45 |
| | 2:08 | 8 | 2 | 3:00 |
| | 2:23 | 1 | 2 | 3:15 |
| | 2:38 | 2 | 3 | 3:30 |
| | 2:53 | 3 | 2 | 3:45 |
| | | 4 | | |
| | 3:08 | | 3 | 4:00 |
| | 3:23 | 5 | 2 | 4:15 |
| | 3:38 | 6 | 3 | 4:30 |
| D14 | 3:53 | 7 | 2 | 4:45 |
| PM | 4:08 | 8 | 3 | 5:00 |
| | 4:23 | 1 | 3 | 5:15 |
| | | | | |
| | 4:38 | 2 | 3 | 5:30 |
| | 4:53 | 3 | 2 | 5:45 |
| | 5:08 | 4 | 3 | 6:00 |
| | 5:23 | 5 | 2 | 6:15 |
| | 5:38 | 6 | 1 | 6:30 |
| | 5:53 | 7 | 1 | 6:45 |
| | | | | |
| | 6:08 | 8 | 1 | 7:00 |
| | 6:23 | 1 | 1 | 7:15 |
| | 6:38 | 2 | 1 | 7:30 |
| | 6:53 | 3 | 1 | 7:45 |
| | 7:08 | 4 | 1 | 8:00 |
| | 7:23 | 5 | 1 | 8:15 |
| | | | 1 | |
| | 7:40 | 6 | | 8:32 |
| | 8:00 | 7 | 1 | 8:56 |
| | 8:30 | 8 | 1 | 9:26 |
| OFF | 9:00 | 1 | 1 | 9:56 |
| | 9:30 | 2 | 1 | 10:26 |
| | 10:01 | 3 | 1 | 10:56 |
| | | | | |
| | 10:31 | 4 | 1 | 11:26 |
| | 11:01 | 5 | 1 | 11:56 |
| | 11:31 | 6 | 1 | 12:26 |
| | 12:05 | 7 | 1 | 12:56 |
| | 12:35 | | 1 | 1:26 |
| | | 8 | | |
| | 1:23 | 1 | 1 | 2:14 |
| | 2:23 | 2 | 1 | 3:14 |
| | | | | |
| | 3:23 | 3 | 1 | 4:14 |
| | | 3 4 | 1 | 4:14 5:14 |

TABLE D3. LIGHT RAIL WEEKDAY TRAINS TRAVELED ON SYSTEM

| | | Northbound | | Southbound | | | | | |
|----------|-------|------------|-------|------------|-------|-------|--|--|--|
| Period | 3-Car | 2-Car | 1-Car | 3-Car | 2-Car | 1-Car | | | |
| AM Peak | 8 | 5 | 0 | 8 | 4 | 0 | | | |
| Midday | 0 | 24 | 0 | 0 | 24 | 0 | | | |
| PM Peak | 7 | 5 | 0 | 7 | 5 | 0 | | | |
| Off-Peak | 0 | 0 | 26 | 0 | 0 | 23 | | | |
| TOTAL | 15 | 34 | 26 | 15 | 33 | 23 | | | |

TABLE D4. VTA SCHEDULE WITH TRAIN PATTERN - WEEKEND NORTHBOUND

| NORTHBOUN | D | | | |
|-----------|--------------|----------|---------------|-----------|
| Period | Santa Teresa | Train # | Train Pattern | Baypointe |
| | 5:20 | 7 | 1 | 6:14 |
| | 5:55 | 8 | 1 | 6:46 |
| | 6:25 | 1 | 1 | 7:16 |
| | 6:40 | 2 | 1 | 7:31 |
| | 6:55 | 3 | 1 | 7:46 |
| AM | 7:10 | 5 | 1 | 8:01 |
| | 7:25 | 6 | 1 | 8:16 |
| | 7:40 | 7 | 1 | 8:31 |
| | 7:55 | 8 | 1 | 8:46 |
| | 8:10 | 1 | 1 | 9:01 |
| | 8:25 | 2 | 1 | 9:16 |
| | 8:40 | 3 | 1 | 9:31 |
| | 8:55 | 4 | 1 | 9:46 |
| | 9:10 | 5 | 1 1 | 10:01 |
| | 9:25 | 6 | 1 1 | 10:16 |
| | 9:40 | 7 | 1 1 | 10:31 |
| | 9:55 | 8 | 1 | 10:46 |
| | | 1 | 1 1 | |
| | 10:10 | 2 | 1 | 11:01 |
| | 10:25 | | | 11:16 |
| | 10:40 | 3 | 1 | 11:31 |
| | 10:55 | 4 | 1 | 11:46 |
| | 11:10 | 5 | 1 | 12:01 |
| MID | 11:25 | 6 | 1 | 12:16 |
| | 11:40 | 7 | 1 | 12:31 |
| | 11:55 | 8 | 1 | 12:46 |
| | 12:10 | 11 | 1 | 1:01 |
| | 12:25 | 2 | 1 | 1:16 |
| | 12:40 | 3 | 1 | 1:31 |
| | 12:55 | 4 | 1 | 1:46 |
| | 1:10 | 5 | 1 | 2:01 |
| | 1:25 | 6 | 1 | 2:16 |
| | 1:40 | 7 | 1 | 2:31 |
| | 1:55 | 8 | 1 | 2:46 |
| | 2:10 | 1 | 1 | 3:01 |
| | 2:25 | 2 | 1 | 3:16 |
| | 2:40 | 3 | 1 | 3:31 |
| | 2:55 | 4 | 1 | 3:46 |
| | 3:10 | 5 | 1 | 4:01 |
| | 3:25 | 6 | 1 | 4:16 |
| | 3:40 | 7 | 1 1 | 4:31 |
| | 3:55 | 8 | 1 | 4:46 |
| PM | 4:10 | 1 | 1 | 5:01 |
| | 4:25 | 2 | 1 | 5:16 |
| | 4:40 | 3 | 1 | 5:31 |
| | 4:55 | 4 | 1 1 | 5:46 |
| | | 5 | 1 | |
| | 5:10 | | | 6:01 |
| | 5:25 | 6 | 1 1 | 6:16 |
| | 5:40 | 7 | 1 | 6:31 |
| | 5:55 | 8 | 1 | 6:46 |
| | 6:10 | 1 | 1 | 7:01 |
| | 6:25 | 2 | 1 | 7:16 |
| | 6:40 | 3 | 1 | 7:31 |
| | 6:55 | 4 | 1 1 | 7:46 |
| | 7:10 | 5 | 1 | 8:01 |
| | 7:25 | 6 | 1 | 8:16 |
| | 7:41 | 7 | 1 | 8:32 |
| | 7:57 | 8 | 1 | 8:51 |
| | 8:12* | 1 | 1 | - |
| | 8:27 | 2 | 1 | 9:21 |
| OFF | 8:42* | 3 | 1 | - |
| | 8:57 | 4 | 1 | 9:51 |
| | 9:27 | 5 | 1 | 10:21 |
| | 9:57 | 6 | 1 | 10:51 |
| | 10:27 | 7 | 1 | 11:21 |
| | 10:58 | 8 | 1 | 11:52 |
| | 11:28 | 2** | 1 | 12:22 |
| | 11:49 | <u> </u> | 1 | 12:39 |
| | 12:17 | 5 | 1 | 1:11 |
| | | | | |
| | 1:18 | 6 | 1 1 | 2:11 |
| | 2:21 | 7 | 1 1 | 3:13 |
| | 3:21 | 8 | 1 | 4:13 |
| | 4:20 | 2** | 1 | 5:12 |

TABLE D5. VTA SCHEDULE WITH TRAIN PATTERN - WEEKEND SOUTHBOUND

| Period | Baypointe | Train # | Train Pattern | |
|--------|-----------|---------|---------------|--------------|
| | 5:23 | 1 | 1 | 6:14 |
| | 5:51* | 2 | 1 | 6:26 |
| | 6:06* | 3 | 1 | 6:41 |
| | 6:21* | 5 | 1 | 6:56 |
| | 6:34** | | - | 6:59** |
| | 6:24 | 6 | 1 | 7:15 |
| AM | 6:57* | 7 | 1 | 7:32 |
| | 6:54 | 8 | 1 | 7:45 |
| | 7:25* | 1 | 1 | 8:00 |
| | 7:24 | 2 | 1 | 8:15 |
| | 7:39 | 3 | 1 | 8:30 |
| | 7:54 | 4 | 1 | 8:45 |
| | 8:09 | 5 | 1 | 9:00 |
| | 8:24 | 6 | 1 | 9:15 |
| | 8:39 | 7 | 1 | 9:30 |
| | 8:54 | 8 | 1 | 9:45 |
| | 9:09 | 1 | 1 | 10:00 |
| | 9:24 | 2 | 1 | 10:15 |
| | 9:39 | 3 | 1 | 10:30 |
| | 9:54 | 4 | 1 | 10:45 |
| | 10:09 | 5 | 1 | 11:00 |
| | 10:24 | 6 | 1 | 11:15 |
| | 10:39 | 7 | 1 | 11:30 |
| | 10:54 | 8 | 1 | 11:45 |
| | 11:09 | 1 | 1 | 12:00 |
| | 11:24 | 2 | 1 | 12:15 |
| MID | 11:39 | 3 | 1 | 12:30 |
| | 11:54 | 4 | 1 | 12:45 |
| | 12:09 | 5 | 1 1 | 1:00 |
| | 12:24 | 6 | 1 1 | 1:15 |
| | 12:39 | 7 | 1 | 1:30 |
| | 12:54 | 8 | 1 1 | 1:45 |
| | 1:09 | 1 | 1 1 | 2:00 |
| | 1:24 | 2 | 1 1 | 2:15 |
| | 1:39 | 3 | 1 1 | 2:30 |
| | | 4 | 1 1 | |
| | 1:54 | | | 2:45 |
| | 2:09 | 5 | 1 1 | 3:00 |
| | 2:24 | 6 | 1 | 3:15 |
| | 2:39 | 7 | 1 | 3:30 |
| | 2:54 | 8 | 1 | 3:45 |
| | 3:09 | 1 | 1 | 4:00 |
| | 3:24 | 2 | 1 | 4:15 |
| | 3:39 | 3 | 1 | 4:30 |
| PM | 3:54 | 4 | 1 | 4:45 |
| | 4:09 | 5 | 1 | 5:00 |
| | 4:24 | 6 | 1 | 5:15 |
| | 4:39 | 7 | 1 | 5:30 |
| | 4:54 | 8 | 1 | 5:45 |
| | 5:09 | 1 | 1 | 6:00 |
| | 5:24 | 2 | 1 | 6:15 |
| | 5:39 | 3 | 1 | 6:30 |
| | 5:54 | 4 | 1 | 6:45 |
| | 6:09 | 5 | 1 | 7:00 |
| | 6:24 | 6 | 1 | 7:15 |
| | 6:39 | 7 | 1 | 7:30 |
| | 6:54 | 8 | 1 | 7:45 |
| | 7:09 | 1 | 1 | 7:59 |
| | 7:22 | 2 | 1 | 8:13 |
| | 7:36 | 3 | 1 1 | 8:27 |
| | | 4 | 1 1 | |
| | 7:51 | | 1 | 8:42 8:57 |
| | 8:06 | 5 | | 8:57 |
| OFF | 8:31 | 6 | 1 1 | 9:26 |
| | 9:01 | 7 | 1 1 | 9:56 |
| | 9:31 | 8 | 1 | 10:26 |
| | 10:01 | 1 | 1 1 | 10:56 |
| | 10:31 | 2 | 1 | 11:26 |
| | 11:01 | 3 | 1 | 11:56 |
| | 11:31 | 4 | 1 | 12:26 |
| | 12:05 | 5 | 1 | 12:56 |
| | 12:35 | 6 | 1 | 1:26 |
| | 1:23 | 7 | 1 | 2:14 |
| | 2:23 | 8 | 1 | 3:14 |
| | 3:23 | 1 | 1 | 4:14 |
| | 3.23 | | | |

^{**}Trains 1 and 3 are taken out-of-service at Civic Center station, and do not continue on to Baypointe.

^{**}Trains 1 and 3 are taken out-of-service at Civic Center station, and do not continue on to Baypointe.

TABLE D6. LIGHT RAIL WEEKEND TRAINS TRAVELED ON SYSTEM

| Period | | Northbound | | Southbound | | | | | |
|----------|-------|------------|-------|------------|-------|-------|--|--|--|
| Period | 3-Car | 2-Car | 1-Car | 3-Car | 2-Car | 1-Car | | | |
| AM Peak | 0 | 0 | 11 | 0 | 0 | 13 | | | |
| Midday | 0 | 0 | 24 | 0 | 0 | 24 | | | |
| PM Peak | 0 | 0 | 12 | 0 | 0 | 12 | | | |
| Off-Peak | 0 | 0 | 25 | 0 | 0 | 24 | | | |
| TOTAL | 0 | 0 | 72 | 0 | 0 | 73 | | | |

TABLE D7. LIGHT RAIL WEEKDAY REVENUE-MILES AND REVENUE-HOURS

| | | 3-C | Car-Train | | | | 2-0 | Car-Train | | | 1-Car-Train | | | | | |
|----------|----------------------|------------|-----------|------------|----------|-----------------------------------|------------|--------------|------------|----------------------|-----------------|------------|----------|------------|----------|--|
| Period | # Trains Traveled (2 | Rever | nue Mile | Reven | ue Hour | # Trains Traveled (2 Revenue Mile | | Revenue Hour | | # Trains Traveled (2 | (2 Revenue Mile | | Reven | ue Hour | | |
| | Directions) | Train-Mile | Car-Mile | Train-Hour | Car-Hour | Directions) | Train-Mile | Car-Mile | Train-Hour | Car-Hour | Directions) | Train-Mile | Car-Mile | Train-Hour | Car-Hour | |
| AM Peak | 16 | 83.04 | 249.12 | 4.64 | 13.93 | 9 | 46.71 | 93.42 | 2.61 | 5.23 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Midday | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 48 | 249.12 | 498.24 | 13.93 | 27.87 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| PM Peak | 14 | 72.66 | 217.98 | 4.06 | 12.19 | 10 | 51.90 | 103.80 | 2.90 | 5.81 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Off-Peak | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 49 | 254.31 | 254.31 | 14.22 | 14.22 | |
| TOTAL | 30 | 155.70 | 467.10 | 8.71 | 26.13 | 67 | 347.73 | 695.46 | 19.45 | 38.90 | 49 | 254.31 | 254.31 | 14.22 | 14.22 | |

TABLE D8. LIGHT RAIL WEEKEND REVENUE-MILES AND REVENUE-HOURS.

| TABLE D8 | <u>. LIGHT RAIL WEEKEN</u> | D REVENUE | -MILES AND F | REVENUE-HO | URS | | | | | | | | | | |
|----------|----------------------------|------------|--------------|--------------|----------|----------------------|--------------|----------|--------------|----------|----------------------|--------------|----------|------------|----------|
| | | 3-0 | Car-Train | | | | Car-Train | | | | 1-C | ar-Train | | | |
| Period | # Trains Traveled (2 | Rever | nue Mile | Revenue Hour | | # Trains Traveled (2 | Revenue Mile | | Revenue Hour | | # Trains Traveled (2 | Revenue Mile | | Reven | ue Hour |
| | Directions) | Train-Mile | Car-Mile | Train-Hour | Car-Hour | Directions) | Train-Mile | Car-Mile | Train-Hour | Car-Hour | Directions) | Train-Mile | Car-Mile | Train-Hour | Car-Hour |
| AM Peak | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 24 | 124.56 | 124.56 | 6.97 | 6.97 |
| Midday | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 48 | 249.12 | 249.12 | 13.93 | 13.93 |
| PM Peak | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 24 | 124.56 | 124.56 | 6.97 | 6.97 |
| Off-Peak | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 49 | 254.31 | 254.31 | 14.22 | 14.22 |
| TOTAL | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 145 | 752.55 | 752.55 | 42.09 | 42.09 |

Calculation methodologies and sample calculations are shown below. The sample calculations shown here apply to the 3-car train, Weekday AM Peak scenario, from Table D7. Values for route mileage and total travel time come from Table D9. It is noteworthy that calculations for revenue-miles and –hours are based on actual route mileage (5.19 miles) rather than effective route mileage (5.36 miles). This is because vehicles would not be expected to use a significant portion of crossover rails or yard rails while in normal operation.

TABLE D9. BAYPOINTE TO JAPANTOWN ROUTE LENGTH AND TRAVEL TIME

| Link | Route | Effective | Average Route |
|-----------------------|---------|---------------|-------------------|
| LITIK | Mileage | Route Mileage | Travel Time (min) |
| Japantown - Baypointe | 5.19 | 5.36 | 17.42 |

Table D9 also shows an average route travel time of 17.42 minutes for the study section. This average route travel time represents the number of minutes required for a light rail vehicle to travel the length of the study section. This is a calculated value, and is based on a weighted average of the route travel times shown in Tables E18 through E23 in Appendix E. A calculated value was used here because exact travel times between the Baypointe and Japantown stations (the endpoints of the study system) were not available from VTA.

Train-Revenue-Miles

Train-Revenue-Miles = [# Trains Traveled (2 Directions)] x [Route Mileage] Sample Calculation (from Table D7): 83.04 = 16 x 5.19

Vehicle-Revenue-Miles

Vehicle-Revenue-Miles = $[\# Vehicles per Train] \times [Train-Revenue-Miles]$ Sample Calculation (from Table D7): $249.12 = 3 \times 83.04$

Train-Revenue-Hours

Train-Revenue-Hours = [# Trains Traveled (2 Directions)] x [Total Travel Time (min)/60] Sample Calculation (from Table D7): 4.64 = 16 x 17.42/60

Vehicle-Revenue-Hours

Vehicle-Revenue-Hours = [# Vehicles per Train] x [Train-Revenue-Hours] Sample Calculation (from Table D7): 13.93 = 4.64 x 3

Calculation of Annual Revenue-Miles and –Hours

Tables D10 and D11 show calculated annual revenue-miles and –hours. Tables D12 and D13 summarize the values tabulated in Tables D10 and D11. Sample calculation values

again apply to the 3-car train, Weekday AM Peak scenario. The methodology for calculation is as follows:

The values in Tables D10 and D11 are computed by multiplying the appropriate value from Table D14, which shows the number of weekdays, Saturdays, and Sundays in the year, by the corresponding values in Tables D7 and D8.

The following sample calculation comes from Table D10, from the column entitled "# Trains Traveled (2 Directions)," and uses values from Table D14:

Sample Calculation: $4176 = 261 \times 16$

Reference

1. *Final Annual Report 1999-2000*. Prepared for Federal Transit Administration National Transit Database by Santa Clara Valley Transportation Authority.

TABLE D10. LIGHT RAIL WEEKDAY ANNUAL REVENUE-MILES AND REVENUE-HOURS

| | | | | 1-Car-Train | | | | | | | | | | | |
|----------|----------------------|--------------|----------|--------------|----------|----------------------|-----------------------------------|----------|--------------|----------|----------------------|------------|----------|------------|----------|
| Weekday | # Trains Traveled (2 | Revenue Mile | | Revenue Hour | | # Trains Traveled (2 | # Trains Traveled (2 Revenue Mile | | Revenue Hour | | # Trains Traveled (2 | Reven | ue Mile | Reven | ue Hour |
| | Directions) | Train-Mile | Car-Mile | Train-Hour | Car-Hour | Directions) | Train-Mile | Car-Mile | Train-Hour | Car-Hour | Directions) | Train-Mile | Car-Mile | Train-Hour | Car-Hour |
| AM Peak | 4176 | 21673 | 65020 | 1212 | 3637 | 2349 | 12191 | 24383 | 682 | 1364 | 0 | 0 | 0 | 0 | 0 |
| Midday | 0 | 0 | 0 | 0 | 0 | 12528 | 65020 | 130041 | 3637 | 7273 | 0 | 0 | 0 | 0 | 0 |
| PM Peak | 3654 | 18964 | 56893 | 1061 | 3182 | 2610 | 13546 | 27092 | 758 | 1515 | 0 | 0 | 0 | 0 | 0 |
| Off-Peak | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12789 | 66375 | 66375 | 3712 | 3712 |
| TOTAL | 7830 | 40638 | 121913 | 2273 | 6819 | 17487 | 90758 | 181515 | 5076 | 10152 | 12789 | 66375 | 66375 | 3712 | 3712 |

TABLE D11. LIGHT RAIL WEEKEND ANNUAL REVENUE-MILES AND REVENUE-HOURS

| | | 3-0 | ar-Train | | | | 1-Car-Train | | | | | | | | |
|----------|----------------------|---------------------------|----------|----------------------|----------|---------------------------|-------------|----------------------|-----------------------------------|----------|--------------|------------|----------|------------|----------|
| Weekend | # Trains Traveled (2 | Revenue Mile Revenue Hour | | # Trains Traveled (2 | Rever | Revenue Mile Revenue Hour | | # Trains Traveled (2 | # Trains Traveled (2 Revenue Mile | | Revenue Hour | | | | |
| | Directions) | Train-Mile | Car-Mile | Train-Hour | Car-Hour | Directions) | Train-Mile | Car-Mile | Train-Hour | Car-Hour | Directions) | Train-Mile | Car-Mile | Train-Hour | Car-Hour |
| AM Peak | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2496 | 12954 | 12954 | 725 | 725 |
| Midday | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4992 | 25908 | 25908 | 1449 | 1449 |
| PM Peak | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2496 | 12954 | 12954 | 725 | 725 |
| Off-Peak | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5096 | 26448 | 26448 | 1479 | 1479 |
| TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15080 | 78265 | 78265 | 4377 | 4377 |

TABLE D12. LIGHT RAIL ANNUAL REVENUE-MILES OF OPERATION

| Day | | Car Mi | iles | | Train Miles | | | | | |
|---------|-------------|-------------|-------------|--------|-------------|-------------|-------------|--------|--|--|
| Day | 3-Car Train | 2-Car Train | 1-Car Train | TOTAL | 3-Car Train | 2-Car Train | 1-Car Train | TOTAL | | |
| Weekday | 121913 | 181515 | 66375 | 369803 | 40638 | 90758 | 66375 | 197770 | | |
| Weekend | 0 | 0 | 78265 | 78265 | 0 | 0 | 78265 | 78265 | | |
| TOTAL | | | | 448068 | | | | 276035 | | |

TABLE D13. LIGHT RAIL ANNUAL REVENUE-HOURS OF OPERATION

| Dov | | Car Ho | urs | | Train Hours | | | | | |
|---------|-------------|-------------|-------------|-------|-------------|-------------|-------------|-------|--|--|
| Day | 3-Car Train | 2-Car Train | 1-Car Train | TOTAL | 3-Car Train | 2-Car Train | 1-Car Train | TOTAL | | |
| Weekday | 6819 | 10152 | 3712 | 20683 | 2273 | 5076 | 3712 | 11061 | | |
| Weekend | 0 | 0 | 4377 | 4377 | 0 | 0 | 4377 | 4377 | | |
| TOTAL | · | | | 25061 | | | | 15439 | | |

TABLE D14. DAYS OF WEEK PER YEAR

| Day of Week | # of Days |
|-------------|-----------|
| Weekday | 261 |
| Saturday | 52 |
| Sunday | 52 |

APPENDIX E

LIGHT RAIL SYSTEM USER COSTS

Introduction

For the purposes of this study, user costs are assumed to be costs associated with rider wait and on-board travel time, and do not include fares.

Tables E1 through E24 show tables containing user time calculations. Table E25 shows a summary of calculated user costs for the previously-described light rail system. Table E26 shows the annual number of weekdays and weekends assumed for the calculations.

User costs were calculated based on relevant on-off ridership data for the VTA light rail system. On-off data were obtained from VTA, and were given for weekday, Saturday, and Sunday ridership in both the northbound and southbound directions. Data for each day are divided into four periods: AM Peak (5:30-8:30 am), Midday (8:30 am – 2:30 pm), PM Peak (2:30 pm – 5:30 pm), and Off-Peak (5:30 pm – 5:30 am). Appendix F contains the VTA on/off data for the Guadalupe line, which is the base system for this study.

Cost calculations for overall user costs were completed in the following sequence:

- 1. Determination of user wait- and travel-time value (in \$).
- 2. Calculation of daily passenger wait time for weekdays and weekends.
- 3. Calculation of daily passenger on-board travel time for weekdays and weekends.
- 4. Summation of daily wait time and travel time, and of annual wait time and travel time.
- 5. Calculation of wait- and travel-time costs.

Value of User Wait- and On-Board Travel Time

California Life-Cycle Benefit/Cost Analysis Model (1) gives a value of user time as \$8.16 per hour in 2000-dollars. Adjusting this value for inflation using an inflation factor of 1.02 (2), we see that the value of user time is given as follows:

Cost/User Hour = $8.16 \times 1.02 = \$8.32$.

Daily Passenger Wait-Time

The following procedures describe the methodologies used to calculate light rail user waittime costs:

- 1. Per-station passenger "on" volume data for weekdays, Saturdays and Sundays, in both the northbound and southbound directions, are shown in Tables E1 through E6. These data represent passengers waiting to board the system at a given station during a given daily time period, and were extracted from the VTA data tables shown in Appendix F.
- 2. The VTA light rail schedule was used to approximate average headways for the system for each daily period during weekdays, Saturdays, and Sundays. Appendix B

- contains the VTA schedules used. The schedule shown in the appendix is for the entire Guadalupe line, rather than for the study section only, which is a subset of the Guadalupe line; however, it is assumed that headways remain constant over the entire run. Table E7 shows summarized headways for each time period.
- 3. Total passenger wait time for each segment during each daily time period was calculated for weekdays, Saturdays, and Sundays. The following formula was used:

Wait time = (0.5) x (Headway) x (# Passengers Waiting to Board)

TABLE E1. LIGHT RAIL WEEKDAY NB PASSENGERS WAITING TO BOARD

| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL |
|----------------|------------|-------------|--------------|-------------|-------|
| Station | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | TOTAL |
| Japantown/Ayer | 46 | 47 | 26 | 23 | 142 |
| Civic Center | 98 | 158 | 71 | 80 | 407 |
| Gish | 36 | 36 | 9 | 19 | 100 |
| Metro/Airport | 17 | 33 | 19 | 9 | 78 |
| Karina Court | 14 | 28 | 28 | 14 | 84 |
| Component | 1 | 5 | 6 | 6 | 18 |
| Bonaventura | 5 | 20 | 12 | 6 | 43 |
| Orchard | 3 | 2 | 5 | 2 | 12 |
| River Oaks | 2 | 5 | 6 | 3 | 16 |
| Tasman | 1 | 2 | 3 | 0 | 6 |
| Baypointe | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 223 | 336 | 185 | 162 | 906 |

TABLE E2. LIGHT RAIL WEEKDAY SB PASSENGERS WAITING TO BOARD

| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL |
|----------------|------------|-------------|--------------|-------------|-------|
| Station | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | IOIAL |
| Baypointe | 166 | 281 | 294 | 298 | 1,039 |
| Tasman | 46 | 46 | 61 | 44 | 197 |
| River Oaks | 30 | 57 | 112 | 34 | 233 |
| Orchard | 12 | 30 | 48 | 25 | 115 |
| Bonaventura | 14 | 93 | 90 | 43 | 240 |
| Component | 10 | 34 | 76 | 24 | 144 |
| Karina Court | 35 | 81 | 122 | 73 | 311 |
| Metro/Airport | 20 | 111 | 127 | 79 | 337 |
| Gish | 69 | 171 | 132 | 69 | 441 |
| Civic Center | 81 | 404 | 259 | 95 | 839 |
| Japantown/Ayer | 43 | 138 | 54 | 39 | 274 |
| TOTAL | 526 | 1,446 | 1,375 | 823 | 4,170 |

TABLE E3. LIGHT RAIL SATURDAY NB PASSENGERS WAITING TO BOARD

| Station - | AM Peak | Midday | PM Peak | Off-Peak | TOTAL |
|----------------|------------|-------------|--------------|-------------|-------|
| | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | TOTAL |
| Japantown/Ayer | 11 | 41 | 16 | 19 | 87 |
| Civic Center | 31 | 99 | 41 | 72 | 243 |
| Gish | 4 | 28 | 6 | 15 | 53 |
| Metro/Airport | 2 | 20 | 12 | 8 | 42 |
| Karina Court | 3 | 20 | 10 | 12 | 45 |
| Component | 2 | 1 | 2 | 3 | 8 |
| Bonaventura | 0 | 3 | 1 | 1 | 5 |
| Orchard | 0 | 4 | 4 | 0 | 8 |
| River Oaks | 0 | 3 | 1 | 1 | 5 |
| Tasman | 3 | 0 | 0 | 2 | 5 |
| Baypointe | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 56 | 219 | 93 | 133 | 501 |

TABLE E4. LIGHT RAIL SATURDAY SB PASSENGERS WAITING TO BOARD

| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL |
|----------------|------------|-------------|--------------|-------------|-------|
| Station | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | TOTAL |
| Baypointe | 61 | 222 | 172 | 272 | 727 |
| Tasman | 3 | 23 | 11 | 8 | 45 |
| River Oaks | 6 | 17 | 8 | 6 | 37 |
| Orchard | 4 | 11 | 9 | 9 | 33 |
| Bonaventura | 5 | 17 | 14 | 12 | 48 |
| Component | 5 | 13 | 14 | 6 | 38 |
| Karina Court | 15 | 53 | 43 | 46 | 157 |
| Metro/Airport | 14 | 83 | 45 | 54 | 196 |
| Gish | 41 | 127 | 63 | 50 | 281 |
| Civic Center | 33 | 189 | 108 | 100 | 430 |
| Japantown/Ayer | 20 | 79 | 33 | 44 | 176 |
| TOTAL | 207 | 834 | 520 | 607 | 2,168 |

TABLE E5. LIGHT RAIL SUNDAY NB PASSENGERS WAITING TO BOARD

| TABLE ESTEINT WALL COMPAN AND TAGGETTO THE TANKE TO DOTARD | | | | | | | |
|--|------------|-------------|--------------|-------------|-------|--|--|
| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL | | |
| | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | TOTAL | | |
| Japantown/Ayer | 11 | 34 | 14 | 7 | 66 | | |
| Civic Center | 18 | 65 | 36 | 67 | 186 | | |
| Gish | 3 | 13 | 8 | 15 | 39 | | |
| Metro/Airport | 0 | 24 | 14 | 25 | 63 | | |
| Karina Court | 1 | 7 | 4 | 4 | 16 | | |
| Component | 1 | 0 | 3 | 0 | 4 | | |
| Bonaventura | 0 | 2 | 2 | 4 | 8 | | |
| Orchard | 0 | 2 | 3 | 0 | 5 | | |
| River Oaks | 0 | 1 | 0 | 1 | 2 | | |
| Tasman | 0 | 1 | 0 | 2 | 3 | | |
| Baypointe | 0 | 0 | 0 | 0 | 0 | | |
| TOTAL | 34 | 149 | 84 | 125 | 392 | | |

TABLE E6. LIGHT RAIL SUNDAY SB PASSENGERS WAITING TO BOARD

| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL |
|----------------|------------|-------------|--------------|-------------|-------|
| Station | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | TOTAL |
| Baypointe | 49 | 191 | 141 | 265 | 646 |
| Tasman | 4 | 18 | 9 | 10 | 41 |
| River Oaks | 1 | 13 | 6 | 5 | 25 |
| Orchard | 2 | 9 | 7 | 10 | 28 |
| Bonaventura | 6 | 15 | 10 | 4 | 35 |
| Component | 2 | 7 | 5 | 10 | 24 |
| Karina Court | 9 | 46 | 32 | 44 | 131 |
| Metro/Airport | 15 | 59 | 48 | 63 | 185 |
| Gish | 20 | 90 | 51 | 44 | 205 |
| Civic Center | 25 | 161 | 164 | 58 | 408 |
| Japantown/Ayer | 18 | 56 | 28 | 23 | 125 |
| TOTAL | 151 | 665 | 501 | 536 | 1,853 |

TABLE E7. LIGHT RAIL HEADWAYS (min)

| |) | | | | | | | |
|--------|----|-------|---------|----|--|--|--|--|
| Period | We | ekday | Weekend | | | | | |
| renou | NB | SB | NB | SB | | | | |
| AM | 15 | 15 | 18 | 18 | | | | |
| MID | 15 | 15 | 15 | 15 | | | | |
| PM | 15 | 15 | 15 | 15 | | | | |
| OFF | 27 | 27 | 26 | 26 | | | | |

TABLE E8. LIGHT RAIL WEEKDAY NB TOTAL PASSENGER WAIT TIME (min)

| TABLE EO. LIGHT KAIL WEEKDAT NO TOTAL PASSENGER WAIT TIME (IIIIII) | | | | | | | |
|--|------------|-------------|--------------|-------------|-------|--|--|
| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL | | |
| Station | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | TOTAL | | |
| Japantown/Ayer | 345 | 353 | 195 | 311 | 1203 | | |
| Civic Center | 735 | 1185 | 533 | 1080 | 3533 | | |
| Gish | 270 | 270 | 68 | 257 | 864 | | |
| Metro/Airport | 128 | 248 | 143 | 122 | 639 | | |
| Karina Court | 105 | 210 | 210 | 189 | 714 | | |
| Component | 8 | 38 | 45 | 81 | 171 | | |
| Bonaventura | 38 | 150 | 90 | 81 | 359 | | |
| Orchard | 23 | 15 | 38 | 27 | 102 | | |
| River Oaks | 15 | 38 | 45 | 41 | 138 | | |
| Tasman | 8 | 15 | 23 | 0 | 45 | | |
| Baypointe | 0 | 0 | 0 | 0 | 0 | | |
| TOTAL | 1673 | 2520 | 1388 | 2187 | 7767 | | |
| TOTAL (Hours) | | | | | 129 | | |

TABLE E9. LIGHT RAIL WEEKDAY SB TOTAL PASSENGER WAIT TIME (min)

| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL |
|----------------|------------|-------------|--------------|-------------|-------|
| Station | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | TOTAL |
| Baypointe | 1245 | 2108 | 2205 | 4023 | 9581 |
| Tasman | 345 | 345 | 458 | 594 | 1742 |
| River Oaks | 225 | 428 | 840 | 459 | 1952 |
| Orchard | 90 | 225 | 360 | 338 | 1013 |
| Bonaventura | 105 | 698 | 675 | 581 | 2058 |
| Component | 75 | 255 | 570 | 324 | 1224 |
| Karina Court | 263 | 608 | 915 | 986 | 2771 |
| Metro/Airport | 150 | 833 | 953 | 1067 | 3002 |
| Gish | 518 | 1283 | 990 | 932 | 3722 |
| Civic Center | 608 | 3030 | 1943 | 1283 | 6863 |
| Japantown/Ayer | 323 | 1035 | 405 | 527 | 2289 |
| TOTAL | 3945 | 10845 | 10313 | 11111 | 36213 |
| TOTAL (Hours) | | | | | 604 |

TABLE E10. LIGHT RAIL SATURDAY NB TOTAL PASSENGER WAIT TIME (min)

| | 1 | | 5145 | | |
|----------------|------------|-------------|--------------|-------------|-------|
| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL |
| Station | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | TOTAL |
| Japantown/Ayer | 99 | 308 | 120 | 247 | 774 |
| Civic Center | 279 | 743 | 308 | 936 | 2265 |
| Gish | 36 | 210 | 45 | 195 | 486 |
| Metro/Airport | 18 | 150 | 90 | 104 | 362 |
| Karina Court | 27 | 150 | 75 | 156 | 408 |
| Component | 18 | 8 | 15 | 39 | 80 |
| Bonaventura | 0 | 23 | 8 | 13 | 43 |
| Orchard | 0 | 30 | 30 | 0 | 60 |
| River Oaks | 0 | 23 | 8 | 13 | 43 |
| Tasman | 27 | 0 | 0 | 26 | 53 |
| Baypointe | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 504 | 1643 | 698 | 1729 | 4573 |
| TOTAL (Hours) | | | | | 76 |

TABLE E11. LR SATURDAY SB TOTAL PASSENGER WAIT TIME (min)

| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL |
|----------------|------------|-------------|--------------|-------------|-------|
| Station | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | TOTAL |
| Baypointe | 549 | 1665 | 1290 | 3536 | 7040 |
| Tasman | 27 | 173 | 83 | 104 | 386 |
| River Oaks | 54 | 128 | 60 | 78 | 320 |
| Orchard | 36 | 83 | 68 | 117 | 303 |
| Bonaventura | 45 | 128 | 105 | 156 | 434 |
| Component | 45 | 98 | 105 | 78 | 326 |
| Karina Court | 135 | 398 | 323 | 598 | 1453 |
| Metro/Airport | 126 | 623 | 338 | 702 | 1788 |
| Gish | 369 | 953 | 473 | 650 | 2444 |
| Civic Center | 297 | 1418 | 810 | 1300 | 3825 |
| Japantown/Ayer | 180 | 593 | 248 | 572 | 1592 |
| TOTAL | 1863 | 6255 | 3900 | 7891 | 19909 |
| TOTAL (Hours) | | | | · | 332 |

TABLE E12. LIGHT RAIL SUNDAY NB TOTAL PASSENGER WAIT TIME (min)

| TABLE ETEL EIGHT WALL GOW | AM Peak | Midday | PM Peak | Off-Peak | |
|---------------------------|------------|-------------|--------------|-------------|-------|
| Station | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | TOTAL |
| Japantown/Ayer | 99 | 255 | 105 | 91 | 550 |
| Civic Center | 162 | 488 | 270 | 871 | 1791 |
| Gish | 27 | 98 | 60 | 195 | 380 |
| Metro/Airport | 0 | 180 | 105 | 325 | 610 |
| Karina Court | 9 | 53 | 30 | 52 | 144 |
| Component | 9 | 0 | 23 | 0 | 32 |
| Bonaventura | 0 | 15 | 15 | 52 | 82 |
| Orchard | 0 | 15 | 23 | 0 | 38 |
| River Oaks | 0 | 8 | 0 | 13 | 21 |
| Tasman | 0 | 8 | 0 | 26 | 34 |
| Baypointe | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 306 | 1118 | 630 | 1625 | 3679 |
| TOTAL (Hours) | | | | | 61 |

TABLE E13. LIGHT RAIL SUNDAY SB TOTAL PASSENGER WAIT TIME (min)

| TABLE LIS. LIGHT RAIL SUNDAT | DIOIALIA | OOLINGER WAI | 1 111VIE (1111111) | | |
|------------------------------|------------|--|--------------------|-------------|-------|
| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL |
| Station | 530 to 830 | 530 to 830 830 to 1430 1430 to 173 | | 1730 to 530 | TOTAL |
| Baypointe | 441 | 1433 | 1058 | 3445 | 6376 |
| Tasman | 36 | 135 | 68 | 130 | 369 |
| River Oaks | 9 | 98 | 45 | 65 | 217 |
| Orchard | 18 | 68 | 53 | 130 | 268 |
| Bonaventura | 54 | 113 | 75 | 52 | 294 |
| Component | 18 | 53 | 38 | 130 | 238 |
| Karina Court | 81 | 345 | 240 | 572 | 1238 |
| Metro/Airport | 135 | 443 | 360 | 819 | 1757 |
| Gish | 180 | 675 | 383 | 572 | 1810 |
| Civic Center | 225 | 1208 | 1230 | 754 | 3417 |
| Japantown/Ayer | 162 | 420 | 210 | 299 | 1091 |
| TOTAL | 1359 | 4988 | 3758 | 6968 | 17072 |
| TOTAL (Hours) | | | | | 285 |

TABLE E14. LIGHT RAIL TOTAL DAILY PASSENGER WAIT TIME SUMMARY (hrs)

| | <u> </u> | | |
|----------|----------|------|-------|
| Day | NB | SB | TOTAL |
| Weekday | 129 | 604 | 733 |
| Saturday | 76 | 332 | 408 |
| Sunday | 61 | 285 | 346 |
| TOTAL | 267 | 1220 | 1487 |

TABLE E15. LIGHT RAIL BAYPOINT-TO-CIVIC CENTER SEGMENT TRAVEL TIME CALCULATIONS

| | | Segment | | | Dwell | Time | | Segment Runn | ing Time + Delay |
|-------------|----------|---------|------------------------|-----------------------------------|-------|-------------------------------|-------------------|-------------------------------|---|
| Direction F | | | Segment Length (mi) | Percentage of Segment Travel Time | Min | # Station Dwell Periods | Per Station (min) | Running Time + Delay (min) | (Running Time + Delay) (min per mile) |
| | AM Peak | 17 | 5.05 | 17.3% | 2.94 | 10.00 | 0.29 | 14.06 | 2.78 |
| North- | Midday | 17 | 5.05 | 13.4% | 2.27 | 10.00 | 0.23 | 14.73 | 2.92 |
| bound | PM Peak | 17 | 5.05 | 14.5% | 2.47 | 10.00 | 0.25 | 14.53 | 2.88 |
| | Off-Peak | 17 | 5.05 | 13.4% | 2.27 | 10.00 | 0.23 | 14.73 | 2.92 |
| | AM Peak | 17 | 5.05 | 11.2% | 1.90 | 10.00 | 0.19 | 15.10 | 2.99 |
| South- | Midday | 17 | 5.05 | 13.2% | 2.25 | 10.00 | 0.22 | 14.75 | 2.92 |
| bound | PM Peak | 17 | 5.05 | 7.1% | 1.20 | 10.00 | 0.12 | 15.80 | 3.13 |
| | Off-Peak | 17 | 5.05 | 7.1% | 1.20 | 10.00 | 0.12 | 15.80 | 3.13 |

TABLE E16. LIGHT RAIL SYSTEM NB SEGMENT TRAVEL TIME

| Station | Segment | Total | Segment T | ravel Time | (min) |
|-------------------------------|-------------|---------|-----------|------------|----------|
| Station | Length (mi) | AM Peak | Midday | PM Peak | Off-Peak |
| Japantown/Ayer - Civic Center | 0.14 | 0.68 | 0.64 | 0.65 | 0.64 |
| Civic Center - Gish | 0.82 | 2.58 | 2.62 | 2.61 | 2.62 |
| Gish - Metro/Airport | 0.59 | 1.94 | 1.95 | 1.94 | 1.95 |
| Metro/Airport - Karina | 0.52 | 1.74 | 1.74 | 1.74 | 1.74 |
| Karina - Component | 0.55 | 1.83 | 1.83 | 1.83 | 1.83 |
| Component - Bonaventura | 0.42 | 1.46 | 1.45 | 1.46 | 1.45 |
| Bonaventura - Orchard | 0.55 | 1.83 | 1.83 | 1.83 | 1.83 |
| Orchard - River Oaks | 0.57 | 1.88 | 1.89 | 1.89 | 1.89 |
| River Oaks - Tasman | 0.53 | 1.77 | 1.77 | 1.77 | 1.77 |
| Tasman - Baypointe | 0.5 | 1.69 | 1.69 | 1.69 | 1.69 |
| TOTAL | 5.19 | 17.39 | 17.41 | 17.40 | 17.41 |

TABLE E17. LIGHT RAIL SYSTEM SB SEGMENT TRAVEL TIME

| Station | Segment | Total | Segment T | ravel Time | (min) |
|-------------------------------|-------------|---------|-----------|------------|----------|
| Station | Length (mi) | AM Peak | Midday | PM Peak | Off-Peak |
| Baypointe - Tasman | 0.50 | 1.69 | 1.69 | 1.68 | 1.68 |
| Tasman - River Oaks | 0.53 | 1.77 | 1.77 | 1.78 | 1.78 |
| River Oaks - Orchard | 0.57 | 1.89 | 1.89 | 1.90 | 1.90 |
| Orchard - Bonaventura | 0.55 | 1.83 | 1.83 | 1.84 | 1.84 |
| Bonaventura - Component | 0.42 | 1.45 | 1.45 | 1.43 | 1.43 |
| Component - Karina | 0.55 | 1.83 | 1.83 | 1.84 | 1.84 |
| Karina - Metro/Airport | 0.52 | 1.74 | 1.74 | 1.75 | 1.75 |
| Metro/Airport - Gish | 0.59 | 1.95 | 1.95 | 1.97 | 1.97 |
| Gish - Civic Center | 0.82 | 2.64 | 2.62 | 2.69 | 2.69 |
| Civic Center - Japantown/Ayer | 0.14 | 0.61 | 0.63 | 0.56 | 0.56 |
| TOTAL | 5.19 | 17.42 | 17.41 | 17.44 | 17.44 |

TABLE F18 LIGHT RAIL WEEKDAY NB ON-BOARD PASSENGER TRAVEL TIME

| Station* | On | Off | No. Passengers On- | | Seg | gment Travel Time | (min) | | Total Passenger |
|-----------------------------|------------|-------|--------------------|---------|--------|-------------------|----------|------------------|-----------------|
| Station | On | Oil | Board for Segment | AM Peak | Midday | PM Peak | Off-Peak | Weighted Average | Time (hr) |
| Santa Teresa | 772 | 0 | 772 | | | | | | |
| Cottle | 321 | 18 | 1,075 | | | | | | |
| Snell | 324 | 32 | 1,367 | | | | | | |
| Blossom Hill | 421 | 43 | 1,745 | | | | | | |
| Ohlone-Chynoweth | 1,000 | 139 | 2,606 | | | | | | |
| Branham | 253 | 70 | 2,789 | | | | | | |
| Capitol | 579 | 240 | 3,128 | | | | | | |
| Curtner | 390 | 192 | 3,326 | | | | | | |
| Tamien | 518 | 463 | 3,381 | | | | | | |
| Virginia | 126 | 129 | 3,378 | | | | | | |
| Childrens' Discovery Museum | 78 | 211 | 3,245 | | | | | | |
| Convention Center | 338 | 411 | 3,172 | | | | | | |
| San Antonio | 491 | 881 | 2,782 | | | | | | |
| Santa Clara | 1,414 | 816 | 3,380 | | | | | | |
| St. James | 384 | 237 | 3,527 | | | | | | |
| TOTAL PASSENGERS ON BOARD A | T ST JAMES | | 3,527 | | | | | | |
| Japantown/Ayer | 142 | 268 | 3,401 | 0.68 | 0.64 | 0.65 | 0.64 | 0.64 | 36.46 |
| Civic Center | 407 | 866 | 2,942 | 2.58 | 2.62 | 2.61 | 2.62 | 2.61 | 128.08 |
| Gish | 100 | 498 | 2,544 | 1.94 | 1.95 | 1.94 | 1.95 | 1.95 | 82.52 |
| Metro/Airport | 78 | 382 | 2,240 | 1.74 | 1.74 | 1.74 | 1.74 | 1.74 | 65.09 |
| Karina Court | 84 | 328 | 1,996 | 1.83 | 1.83 | 1.83 | 1.83 | 1.83 | 60.89 |
| Component | 18 | 207 | 1,807 | 1.46 | 1.45 | 1.46 | 1.45 | 1.45 | 43.79 |
| Bonaventura | 43 | 238 | 1,612 | 1.83 | 1.83 | 1.83 | 1.83 | 1.83 | 49.17 |
| Orchard | 12 | 97 | 1,527 | 1.88 | 1.89 | 1.89 | 1.89 | 1.89 | 48.05 |
| River Oaks | 16 | 220 | 1,323 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 | 39.08 |
| Tasman | 6 | 186 | 1,143 | 1.69 | 1.69 | 1.69 | 1.69 | 1.69 | 32.11 |
| Baypointe | 0 | 1,143 | 0 | | | | | | |
| TOTAL | | | | 17.39 | 17.41 | 17.40 | 17.41 | 17.41 | 585.23 |

^{*} Stations from Santa Teresa to St. James are not part of the proposed LR system, an are shown here only for calculation purposes.

TABLE E19. LIGHT RAIL WEEKDAY SB OB-BOARD PASSENGER TRAVEL TIME

| Station | On | Off | No. Passengers On- | Passengers On- Segment Travel Time (min) | | | | | | |
|----------------|-------|-----|--------------------|--|--------|---------|----------|------------------|-----------|--|
| Station | On | Oii | Board for Segment | AM Peak | Midday | PM Peak | Off-Peak | Weighted Average | Time (hr) | |
| Baypointe | 1,039 | 0 | 1,039 | 1.69 | 1.69 | 1.68 | 1.68 | 1.68 | 29.17 | |
| Tasman | 197 | 3 | 1,233 | 1.77 | 1.77 | 1.78 | 1.78 | 1.78 | 36.51 | |
| River Oaks | 233 | 28 | 1,438 | 1.89 | 1.89 | 1.90 | 1.90 | 1.90 | 45.51 | |
| Orchard | 115 | 15 | 1,538 | 1.83 | 1.83 | 1.84 | 1.84 | 1.84 | 47.11 | |
| Bonaventura | 240 | 57 | 1,721 | 1.45 | 1.45 | 1.43 | 1.43 | 1.44 | 41.30 | |
| Component | 144 | 24 | 1,841 | 1.83 | 1.83 | 1.84 | 1.84 | 1.84 | 56.39 | |
| Karina Court | 311 | 80 | 2,072 | 1.74 | 1.74 | 1.75 | 1.75 | 1.75 | 60.29 | |
| Metro/Airport | 337 | 94 | 2,315 | 1.95 | 1.95 | 1.97 | 1.97 | 1.96 | 75.62 | |
| Gish | 441 | 96 | 2,660 | 2.64 | 2.62 | 2.69 | 2.69 | 2.66 | 118.09 | |
| Civic Center | 839 | 365 | 3,134 | 0.61 | 0.63 | 0.56 | 0.56 | 0.58 | 30.47 | |
| Japantown/Ayer | 274 | 116 | 3,292 | | | | | | | |
| TOTAL | | | | 17.42 | 17.41 | 17.44 | 17.44 | 17.43 | 540.46 | |

TABLE E20. LIGHT RAIL SATURDAY NB ON-BOARD TRAVEL TIME

| Station* | On | Off | No. Passengers On- | | Seg | gment Travel Time | (min) | | Total Passenger |
|-----------------------------|------------|-----|--------------------|---------|--------|-------------------|----------|------------------|-----------------|
| Station | Oli | Oil | Board for Segment | AM Peak | Midday | PM Peak | Off-Peak | Weighted Average | Time (hr) |
| Santa Teresa | 439 | 0 | 439 | | | | | | |
| Cottle | 164 | 17 | 586 | | | | | | |
| Snell | 181 | 24 | 743 | | | | | | |
| Blossom Hill | 252 | 32 | 963 | | | | | | |
| Ohlone-Chynoweth | 503 | 118 | 1,348 | | | | | | |
| Branham | 102 | 35 | 1,415 | | | | | | |
| Capitol | 289 | 158 | 1,546 | | | | | | |
| Curtner | 225 | 104 | 1,667 | | | | | | |
| Tamien | 295 | 205 | 1,757 | | | | | | |
| Virginia | 83 | 82 | 1,758 | · | | | | | |
| Childrens' Discovery Museum | 58 | 151 | 1,665 | | | | | | |
| Convention Center | 274 | 357 | 1,582 | | | | | | |
| San Antonio | 266 | 286 | 1,562 | | | | | | |
| Santa Clara | 757 | 517 | 1,802 | | | | | | |
| St. James | 216 | 147 | 1,871 | | | | | | |
| TOTAL PASSENGERS ON BOARD A | T ST JAMES | | 1,871 | | | | | | |
| | | | | | | | | 2.24 | |
| Japantown/Ayer | 87 | 181 | 1,777 | 0.68 | 0.64 | 0.65 | 0.64 | 0.64 | 19.05 |
| Civic Center | 243 | 493 | 1,527 | 2.58 | 2.62 | 2.61 | 2.62 | 2.61 | 66.48 |
| Gish | 53 | 305 | 1,275 | 1.94 | 1.95 | 1.94 | 1.95 | 1.95 | 41.35 |
| Metro/Airport | 42 | 202 | 1,115 | 1.74 | 1.74 | 1.74 | 1.74 | 1.74 | 32.40 |
| Karina Court | 45 | 191 | 969 | 1.83 | 1.83 | 1.83 | 1.83 | 1.83 | 29.56 |
| Component | 8 | 50 | 927 | 1.46 | 1.45 | 1.46 | 1.45 | 1.45 | 22.46 |
| Bonaventura | 5 | 58 | 874 | 1.83 | 1.83 | 1.83 | 1.83 | 1.83 | 26.66 |
| Orchard | 8 | 26 | 856 | 1.88 | 1.89 | 1.89 | 1.89 | 1.89 | 26.94 |
| River Oaks | 5 | 37 | 824 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 | 24.34 |
| Tasman | 5 | 50 | 779 | 1.69 | 1.69 | 1.69 | 1.69 | 1.69 | 21.88 |
| Baypointe | 0 | 779 | 0 | | | | | | |
| TOTAL | | | | 17.39 | 17.41 | 17.40 | 17.41 | 17.41 | 311.13 |

^{*} Stations from Santa Teresa to St. James are not part of the proposed LR system, an are shown here only for calculation purposes.

TABLE E21. LIGHT RAIL SATURDAY SB PASSENGER ON-BOARD TRAVEL TIME

| Station | On | Off | No. Passengers On- | | Seç | ment Travel Time | (min) | | Total Passenger |
|----------------|-----|-----|--------------------|---------|--------|------------------|----------|------------------|-----------------|
| Station | Oli | Oil | Board for Segment | AM Peak | Midday | PM Peak | Off-Peak | Weighted Average | Time (hr) |
| Baypointe | 727 | 0 | 727 | 1.69 | 1.69 | 1.68 | 1.68 | 1.68 | 20.41 |
| Tasman | 45 | 1 | 771 | 1.77 | 1.77 | 1.78 | 1.78 | 1.78 | 22.83 |
| River Oaks | 37 | 10 | 798 | 1.89 | 1.89 | 1.90 | 1.90 | 1.90 | 25.25 |
| Orchard | 33 | 3 | 828 | 1.83 | 1.83 | 1.84 | 1.84 | 1.84 | 25.36 |
| Bonaventura | 48 | 6 | 870 | 1.45 | 1.45 | 1.43 | 1.43 | 1.44 | 20.88 |
| Component | 38 | 4 | 904 | 1.83 | 1.83 | 1.84 | 1.84 | 1.84 | 27.69 |
| Karina Court | 157 | 38 | 1,023 | 1.74 | 1.74 | 1.75 | 1.75 | 1.75 | 29.77 |
| Metro/Airport | 196 | 37 | 1,182 | 1.95 | 1.95 | 1.97 | 1.97 | 1.96 | 38.61 |
| Gish | 281 | 49 | 1,414 | 2.64 | 2.62 | 2.69 | 2.69 | 2.66 | 62.77 |
| Civic Center | 430 | 183 | 1,661 | 0.61 | 0.63 | 0.56 | 0.56 | 0.58 | 16.15 |
| Japantown/Ayer | 176 | 62 | 1,775 | | | | | | |
| TOTAL | | | | 17.42 | 17.41 | 17.44 | 17.44 | 17.43 | 289.73 |

TABLE E22. LIGHT RAIL SUNDAY NB PASSENGER ON-BOARD TRAVEL TIME

| | | | No. Passengers On- | | Seg | gment Travel Time | (min) | _ | Total Passenger |
|-----------------------------|------------|-----|--------------------|---------|--------|-------------------|----------|------------------|-----------------|
| Station* | On | Off | Board for Segment | AM Peak | Midday | PM Peak | Off-Peak | Weighted Average | • |
| Santa Teresa | 400 | 0 | 400 | | | | | | |
| Cottle | 111 | 7 | 504 | | | | | | |
| Snell | 140 | 30 | 614 | | | | | | |
| Blossom Hill | 170 | 23 | 761 | | | | | | |
| Ohlone-Chynoweth | 360 | 94 | 1,027 | | | | | | |
| Branham | 81 | 25 | 1,083 | | | | | | |
| Capitol | 239 | 130 | 1,192 | | | | | | |
| Curtner | 223 | 111 | 1,304 | | | | | | |
| Tamien | 207 | 173 | 1,338 | | | | | | |
| Virginia | 87 | 62 | 1,363 | | | | | | |
| Childrens' Discovery Museum | 66 | 144 | 1,285 | | | | | | |
| Convention Center | 210 | 219 | 1,276 | | | | | | |
| San Antonio | 191 | 198 | 1,269 | | | | | | |
| Santa Clara | 648 | 412 | 1,505 | | | | | | |
| St. James | 149 | 111 | 1,543 | | | | | | |
| TOTAL PASSENGERS ON BOARD A | T ST JAMES | | 1,543 | | | | | | |
| | | | | | | | | | |
| Japantown/Ayer | 66 | 158 | 1,451 | 0.68 | 0.64 | 0.65 | 0.64 | 0.64 | 15.55 |
| Civic Center | 186 | 432 | 1,205 | 2.58 | 2.62 | 2.61 | 2.62 | 2.61 | 52.46 |
| Gish | 39 | 223 | 1,021 | 1.94 | 1.95 | 1.94 | 1.95 | 1.95 | 33.12 |
| Metro/Airport | 63 | 163 | 921 | 1.74 | 1.74 | 1.74 | 1.74 | 1.74 | 26.76 |
| Karina Court | 16 | 115 | 822 | 1.83 | 1.83 | 1.83 | 1.83 | 1.83 | 25.08 |
| Component | 4 | 32 | 794 | 1.46 | 1.45 | 1.46 | 1.45 | 1.45 | 19.24 |
| Bonaventura | 8 | 27 | 775 | 1.83 | 1.83 | 1.83 | 1.83 | 1.83 | 23.64 |
| Orchard | 5 | 38 | 742 | 1.88 | 1.89 | 1.89 | 1.89 | 1.89 | 23.35 |
| River Oaks | 2 | 32 | 712 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 | 21.03 |
| Tasman | 3 | 51 | 664 | 1.69 | 1.69 | 1.69 | 1.69 | 1.69 | 18.65 |
| Baypointe | 0 | 664 | 0 | | | | | | |
| TOTAL | | | | 17.39 | 17.41 | 17.40 | 17.41 | 17.41 | 258.88 |

^{*} Stations from Santa Teresa to St. James are not part of the proposed LR system, an are shown here only for calculation purposes.

TABLE E23. LIGHT RAIL SUNDAY SB PASSENGER ON-BOARD TRAVEL TIME

| | | | No. Passengers On- | | Se | gment Travel Time | (min) | | Total Passenger |
|----------------|-----|-----|--------------------|---------|--------|-------------------|----------|------------------|-----------------|
| Station | On | Off | Board for Segment | AM Peak | Midday | PM Peak | Off-Peak | Weighted Average | |
| Baypointe | 646 | 0 | 646 | 1.69 | 1.69 | 1.68 | 1.68 | 1.68 | 18.14 |
| Tasman | 41 | 2 | 685 | 1.77 | 1.77 | 1.78 | 1.78 | 1.78 | 20.28 |
| River Oaks | 25 | 7 | 703 | 1.89 | 1.89 | 1.90 | 1.90 | 1.90 | 22.25 |
| Orchard | 28 | 4 | 727 | 1.83 | 1.83 | 1.84 | 1.84 | 1.84 | 22.27 |
| Bonaventura | 35 | 3 | 759 | 1.45 | 1.45 | 1.43 | 1.43 | 1.44 | 18.22 |
| Component | 24 | 0 | 783 | 1.83 | 1.83 | 1.84 | 1.84 | 1.84 | 23.98 |
| Karina Court | 131 | 28 | 886 | 1.74 | 1.74 | 1.75 | 1.75 | 1.75 | 25.78 |
| Metro/Airport | 185 | 32 | 1,039 | 1.95 | 1.95 | 1.97 | 1.97 | 1.96 | 33.94 |
| Gish | 205 | 51 | 1,193 | 2.64 | 2.62 | 2.69 | 2.69 | 2.66 | 52.96 |
| Civic Center | 408 | 129 | 1,472 | 0.61 | 0.63 | 0.56 | 0.56 | 0.58 | 14.31 |
| Japantown/Ayer | 125 | 62 | 1,535 | | | | | | |
| TOTAL | | | | 17.42 | 17.41 | 17.44 | 17.44 | 17.43 | 252.13 |

TABLE E24. LIGHT RAIL DAILY ON-BOARD TRAVEL TIME SUMMARY

| Element | Daily User-Hours |
|----------|------------------|
| Weekday | 1126 |
| Saturday | 601 |
| Sunday | 511 |

TABLE E25. LIGHT RAIL TOTAL USER COSTS

| Day | Element | Daily User-Hours | Cost/User-Hour (\$) | Daily Cost (\$) | Annual Cost (\$) |
|----------------------------|----------------------|------------------|---------------------|-----------------|------------------|
| \Mankday. | Wait Time | 733 | 8.32 | 6099 | 1,591,724 |
| Weekday | On-Board Travel Time | 1126 | 8.32 | 9366 | 2,444,462 |
| Saturday | Wait Time | 408 | 8.32 | 3395 | 176,532 |
| | On-Board Travel Time | 601 | 8.32 | 4999 | 259,952 |
| Sunday | Wait Time | 346 | 8.32 | 2877 | 149,625 |
| Suriday | On-Board Travel Time | 511 | 8.32 | 4252 | 221,084 |
| TOTAL WAIT TIME | | | | | 1,917,881 |
| TOTAL ON-BOARD TRAVEL TIME | | | | | 2,925,498 |
| TOTAL | | | | 30,987 | 4,843,378 |

TABLE E26. DAYS OF WEEK PER YEAR

| Day of Week | # of Days |
|-------------|-----------|
| Weekday | 261 |
| Saturday | 52 |
| Sunday | 52 |

Tables E8 through E13 show the calculated total passenger wait time values for weekdays, Saturdays, and Sundays. Table E14 shows summarized values for passenger wait time.

Daily Passenger On-Board Travel Time

Tables E15 through E23 show computation of passenger on-board travel time for both the northbound and southbound directions on weekdays, Saturdays, and Sundays. The following procedure describes the calculation methodologies:

- 1. Number of passengers aboard the VTA system at each station was determined.
- 2. Segment travel time was estimated for each segment of the light rail system.
- 3. Total passenger on-board travel time (in hours) for each segment was calculated.

Determination of Passengers Aboard System at Each Station

On-off data from VTA were used to determine how many passengers would be on-board the system at each station in the study section. The source data appears in Appendix F. The number of passengers on-board at any given station is the sum of the previous on-board total and the number getting on at that particular station, less the number getting off at that station.

Stations listed in boldface were not included in the study section, but it was necessary to display them in the tables because they are used in the calculation of subsequent values.

Calculation of Segment Travel Time

Tables E15 through E17 show the applicable calculations for segment travel time. Tables E16 and E17 show travel times for each segment according to day-of-week, direction (NB or SB) and time of day. The segment travel time for each station-to-station segment for the study section was calculated according to the following procedure:

- 1. Calculation of individual-train travel rates and delay rates for each segment (both in minutes per mile), and dwell time per station.
- 2. Calculation of total segment travel time for each segment of the study section.
- 3. Calculation of total passenger on-board travel time (in hours) for all station-to-station segments on the route.

<u>Calculation of Individual-Train Travel Rates and Delay Rates for Each Segment (both in minutes per mile), and Dwell Time per Station</u>

Calculations for individual-train travel time and delay rates (in minutes per mile), and calculation of per-station dwell times, were based on data from Breslin and Botha (3) regarding dwell time on the VTA Guadalupe line. The segment of the Guadalupe line studied by Breslin and Botha spans all but 0.14 miles of the study section presented in this report, so the data are considered to be highly applicable. Once per-station dwell rates, and running-time-plus-delay rates (in minutes per mile) were determined, these rates were applied to the study section.

Values for segment travel time were calculated based on an assumed constant 17-minute total route travel time for the Baypointe-to-Civic Center segment of the Guadalupe line. This 17-minute travel time was acquired from the VTA schedule that was effective as of July 8, 2002, and was assumed here to apply to the Baypointe-to-Civic Center segment on weekdays and weekends, all four daily periods, and both the north- and southbound directions. Dwell time, as cited here, varies according to time-of-day and travel direction. It is unknown whether variation of overall travel time for day, period, and direction would significantly affect overall passenger travel time, but the effect in this case was assumed to be negligible considering that the VTA light rail system operates with signal priority on a separated right-of-way.

The Baypointe-to-Civic Center segment length is 5.05 miles. In their study of VTA Guadalupe line operational characteristics, Breslin and Botha (3) give the "Percentage of Segment Travel Time" that is constituted by dwell time for each daily period in the northbound and southbound directions. These percentages are shown in Table E15.

Dwell time is calculated as follows:

Dwell Time (min) = [Total Segment Travel Time (min)] x [Percentage of Segment Travel Time that is Dwell Time] Sample Calculation: 2.94 min = 17 min x 17.3%

The column entitled "# Station Dwell Periods" in Table E15 refers to the number of times a train dwells at a station on the segment during a specified period (e.g. – AM Peak). The following assumptions were applied:

- One-half of a dwell period is assumed at the beginning- and end-of-line stations.
- Each station between the beginning- and end-of-line stations uses one whole dwell period.

In total, the study section contains ten dwell periods, with eleven total stations included in the segment (two endpoint stations and nine in-between).

"Dwell Time Per Station" in Table E15 is calculated by dividing the total dwell time by the number of dwell periods.

Sample Calculation: 0.29 min/station = 2.94 min/10.00 stations

"Running Time + Delay (min)" is a quantity that represents time spent by a train in both transit and delayed at intersections due to traffic and pedestrians. It was calculated by subtracting the minutes of dwell time from the segment travel time (min).

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Sample Calculation: 14.06 \text{ (min)} = 17 \text{ min} - 2.94 \text{ min}
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"(Running Time + Delay) (min. per mile)" is a quantity that represents the amount of running time and delay per mile of train travel, and is calculated here by dividing the (Running Time + Delay) (min) by the total segment mileage.

Sample Calculation: 2.78 min/mile = 14.06min /5.05 miles

Calculation of Total Segment Travel Time for Each Segment of the Study Section.

Table E16 shows northbound travel times for each segment along the light rail route according to time-of-day, and Table E17 shows southbound travel times. "Segment Length" quantities were obtained from VTA.

The following formula was used in the calculation:

```
[Total Segment Travel Time (min)] = [Segment Length] x [(Running Time + Delay) (min. per mile)] + [Dwell Time per Station (min)]
```

And the following assumptions were applied to the calculations:

- One full station dwell period is utilized along any segment, including one-half at the origin station and one-half at the destination station.
- The quantity (Running Time + Delay) is a rate given in minutes per mile. This rate is applicable to all segments along the route, including the Japantown-to-Civic Center segment.

Sample Calculation: For the northbound AM peak segment travel time shown in Table E16,

```
0.68 \text{ min} = (0.14 \text{ miles x } 2.78 \text{ min/mile}) + 0.29 \text{ min}
```

Calculation of Total Passenger On-Board Travel Time (in hours) for Each Segment

Tables E18 through E23 show calculated passenger on-board travel times for each segment. Table E24 summarizes on-board passenger travel time from Tables E18 through E23. Total passenger time (in hours) for each segment was calculated by multiplying the total segment travel time by the number of passengers aboard the system on each segment during each daily period, then summing those values. The following formula was used for these calculations:

Total Passenger Time (hr) =

No. Pass. On-Board for Segment) x (Weighted Average Segment Travel Time (min))/60

The value of 60 in the formula is used to convert calculated passenger travel time from minutes to hours, and "Weighted Average Segment Travel Time (min)" is an average travel time calculated by the following formula:

```
Weighted Average Segment Travel Time (min) = (3/24) x Segment Travel Time (min), AM Peak + (6/24) x Segment Travel Time (min), Midday + (3/24) x Segment Travel Time (min), PM Peak + (12/24) x Segment Travel Time (min), Off-Peak
```

Sample Calculation from Table E18, AM Peak:

Total Passenger Time (hr) = $36.46 \text{ hr} = 3401 \text{ passengers } \times 0.64 \text{ min} / (60 \text{ min/hr})$

User Travel Time Summary and Annual User Cost Calculations

Table E25 summarizes all user time, including passenger wait and on-board travel time from Tables E14 and E24. This table also shows cost per user hour, daily user costs, and annual user costs itemized by day-of-week and wait time/on-board travel time. The value of cost/user hour is calculated above. Calculation methodologies for daily and annual user costs are as follows:

- 1. Daily Cost = (Daily User-Hours) x (Cost/User Hour)
- 2. Annual $Cost = (Daily Cost) \times (Number of Days per Year)$

Table E26 shows the number of days per year for weekdays, Saturdays, and Sundays.

References

- 1. California Life-Cycle Benefit/Cost Analysis Model (Cal-B/C). A Report to the California Department of Transportation. Prepared by Booz-Allen & Hamilton Inc. September 1999.
- 2. Gross Domestic Product Deflator Inflation Calculator. http://www.jsc.nasa.gov/bu2/inflateGDP.html
- 3. Breslin, A., Botha, J. Santa Clara Light Rail Transit: Travel Time, Station Dwell Time, and Intersection Delay Between Japantown/Ayer Station and Old Ironsides Station.

 Department of Civil Engineering, San Jose State University. November 1992.

APPENDIX F

VTA LIGHT RAIL SYSTEM ON/OFF DATA GUADALUPE LINE

Passenger on/off data pertaining to Santa Clara Valley Transportation Authority (VTA) Guadalupe line passenger volumes are shown in Tables F1 through F6. This information was provided by the VTA.

Data in the columns labeled "ON" represent passengers boarding the light rail system at the corresponding station. Likewise, data in the columns labeled "OFF" represent passengers exiting the system at the corresponding station. "NB" refers to data collected for trains traveling in the northbound direction. "SB" refers to data collected for trains traveling southbound.

TABLE F1. VTA GUADALUPE LINE ON/OFF DATA - WEEKDAY NB

| | AM F | PEAK | MID | PEAK | PM PEAK | | OFF PEAK | | TOTAL | |
|-----------------------------|------------|-------|--------|-------------|---------|--------------|----------|--------|-------|-------|
| Station | 530 to 830 | | 830 to | 830 to 1430 | | 1430 to 1730 | | to 530 | TOTAL | |
| | ON | OFF | ON | OFF | ON | OFF | ON | OFF | ON | OFF |
| Santa Teresa | 220 | 0 | 235 | 0 | 152 | 0 | 165 | 0 | 772 | 0 |
| Cottle | 94 | 1 | 114 | 4 | 54 | 9 | 59 | 4 | 321 | 18 |
| Snell | 86 | 7 | 117 | 13 | 63 | 5 | 58 | 7 | 324 | 32 |
| Blossom Hill | 136 | 7 | 158 | 12 | 72 | 12 | 55 | 12 | 421 | 43 |
| Ohlone-Chynoweth | 219 | 25 | 307 | 59 | 296 | 25 | 178 | 30 | 1,000 | 139 |
| Branham | 107 | 13 | 76 | 15 | 37 | 25 | 33 | 17 | 253 | 70 |
| Capitol | 164 | 33 | 230 | 72 | 106 | 83 | 79 | 52 | 579 | 240 |
| Curtner | 111 | 31 | 155 | 62 | 61 | 59 | 63 | 40 | 390 | 192 |
| Tamien | 177 | 106 | 200 | 140 | 76 | 137 | 65 | 80 | 518 | 463 |
| Virginia | 35 | 14 | 47 | 38 | 20 | 47 | 24 | 30 | 126 | 129 |
| Childrens' Discovery Museum | 12 | 45 | 36 | 87 | 18 | 46 | 12 | 33 | 78 | 211 |
| Convention Center | 22 | 101 | 140 | 199 | 111 | 64 | 65 | 47 | 338 | 411 |
| San Antonio | 98 | 279 | 194 | 390 | 104 | 130 | 95 | 82 | 491 | 881 |
| Santa Clara | 416 | 176 | 526 | 312 | 223 | 173 | 249 | 155 | 1,414 | 816 |
| St. James | 72 | 45 | 196 | 113 | 67 | 47 | 49 | 32 | 384 | 237 |
| Japantown/Ayer | 46 | 33 | 47 | 117 | 26 | 64 | 23 | 54 | 142 | 268 |
| Civic Center | 98 | 208 | 158 | 390 | 71 | 154 | 80 | 114 | 407 | 866 |
| Gish | 36 | 115 | 36 | 170 | 9 | 102 | 19 | 111 | 100 | 498 |
| Metro/Airport | 17 | 120 | 33 | 143 | 19 | 49 | 9 | 70 | 78 | 382 |
| Karina Court | 14 | 127 | 28 | 87 | 28 | 50 | 14 | 64 | 84 | 328 |
| Component | 1 | 100 | 5 | 62 | 6 | 19 | 6 | 26 | 18 | 207 |
| Bonaventura | 5 | 88 | 20 | 101 | 12 | 27 | 6 | 22 | 43 | 238 |
| Orchard | 3 | 53 | 2 | 19 | 5 | 15 | 2 | 10 | 12 | 97 |
| River Oaks | 2 | 103 | 5 | 53 | 6 | 34 | 3 | 30 | 16 | 220 |
| Tasman | 1 | 78 | 2 | 43 | 3 | 36 | 0 | 29 | 6 | 186 |
| Baypointe | 0 | 284 | 0 | 366 | 0 | 233 | 0 | 260 | 0 | 1,143 |
| TOTAL | 2,192 | 2,192 | 3,067 | 3,067 | 1,645 | 1,645 | 1,411 | 1,411 | 8,315 | 8,315 |

TABLE F2. VTA GUADALUPE LINE ON/OFF DATA - WEEKDAY SB

| | AM F | PEAK | MIDI | PEAK | PM PEAK | | OFF PEAK | | TOTAL | |
|-----------------------------|------------|-------|--------|-------|--------------|-------|-------------|-------|-------|-------|
| Station | 530 to 830 | | 830 to | 1430 | 1430 to 1730 | | 1730 to 530 | | TOTAL | |
| | ON | OFF | ON | OFF | ON | OFF | ON | OFF | ON | OFF |
| Baypointe | 166 | 0 | 281 | 0 | 294 | 0 | 298 | 0 | 1,039 | 0 |
| Tasman | 46 | 1 | 46 | 1 | 61 | 0 | 44 | 1 | 197 | 3 |
| River Oaks | 30 | 9 | 57 | 13 | 112 | 5 | 34 | 1 | 233 | 28 |
| Orchard | 12 | 7 | 30 | 7 | 48 | 0 | 25 | 1 | 115 | 15 |
| Bonaventura | 14 | 24 | 93 | 21 | 90 | 8 | 43 | 4 | 240 | 57 |
| Component | 10 | 12 | 34 | 9 | 76 | 2 | 24 | 1 | 144 | 24 |
| Karina Court | 35 | 30 | 81 | 25 | 122 | 11 | 73 | 14 | 311 | 80 |
| Metro/Airport | 20 | 12 | 111 | 32 | 127 | 26 | 79 | 24 | 337 | 94 |
| Gish | 69 | 6 | 171 | 33 | 132 | 30 | 69 | 27 | 441 | 96 |
| Civic Center | 81 | 52 | 404 | 132 | 259 | 119 | 95 | 62 | 839 | 365 |
| Japantown/Ayer | 43 | 10 | 138 | 37 | 54 | 35 | 39 | 34 | 274 | 116 |
| St. James | 20 | 46 | 106 | 170 | 72 | 114 | 27 | 53 | 225 | 383 |
| Santa Clara | 126 | 124 | 263 | 476 | 198 | 432 | 169 | 257 | 756 | 1,289 |
| San Antonio | 52 | 77 | 321 | 188 | 243 | 123 | 138 | 70 | 754 | 458 |
| Convention Center | 14 | 37 | 162 | 213 | 163 | 89 | 108 | 38 | 447 | 377 |
| Childrens' Discovery Museum | 30 | 8 | 51 | 24 | 65 | 21 | 40 | 21 | 186 | 74 |
| Virginia | 37 | 11 | 36 | 35 | 23 | 43 | 19 | 28 | 115 | 117 |
| Tamien | 113 | 35 | 127 | 137 | 104 | 203 | 90 | 90 | 434 | 465 |
| Curtner | 50 | 46 | 61 | 128 | 49 | 126 | 25 | 97 | 185 | 397 |
| Capitol | 55 | 77 | 74 | 171 | 60 | 185 | 38 | 110 | 227 | 543 |
| Branham | 18 | 20 | 13 | 63 | 9 | 89 | 7 | 54 | 47 | 226 |
| Ohlone-Chynoweth | 13 | 175 | 52 | 312 | 40 | 249 | 22 | 135 | 127 | 871 |
| Blossom Hill | 8 | 41 | 16 | 118 | 8 | 133 | 5 | 76 | 37 | 368 |
| Snell | 3 | 32 | 18 | 81 | 7 | 103 | 8 | 66 | 36 | 282 |
| Cottle | 3 | 54 | 2 | 84 | 1 | 67 | 2 | 61 | 8 | 266 |
| Santa Teresa | 0 | 122 | 0 | 238 | 0 | 204 | 0 | 196 | 0 | 760 |
| TOTAL | 1,068 | 1,068 | 2,748 | 2,748 | 2,417 | 2,417 | 1,521 | 1,521 | 7,754 | 7,754 |

TABLE F3. VTA GUADALUPE LINE ON/OFF DATA - SATURDAY NB

| | AM P | PEAK | MID | PEAK | PM F | PEAK | OFF PEAK | | TO | ΓΛΙ |
|-----------------------------|------------|------|--------|-------------|------|--------------|----------|-------|-------|-------|
| Station | 530 to 830 | | 830 to | 830 to 1430 | | 1430 to 1730 | | o 530 | TOTAL | |
| | ON | OFF | ON | OFF | ON | OFF | ON | OFF | ON | OFF |
| Santa Teresa | 56 | 0 | 158 | 0 | 77 | 0 | 148 | 0 | 439 | 0 |
| Cottle | 14 | 3 | 68 | 3 | 36 | 3 | 46 | 8 | 164 | 17 |
| Snell | 20 | 1 | 77 | 10 | 33 | 3 | 51 | 10 | 181 | 24 |
| Blossom Hill | 41 | 1 | 125 | 9 | 46 | 4 | 40 | 18 | 252 | 32 |
| Ohlone-Chynoweth | 38 | 10 | 180 | 50 | 138 | 30 | 147 | 28 | 503 | 118 |
| Branham | 10 | 3 | 35 | 10 | 21 | 12 | 36 | 10 | 102 | 35 |
| Capitol | 27 | 5 | 128 | 55 | 54 | 47 | 80 | 51 | 289 | 158 |
| Curtner | 26 | 5 | 104 | 31 | 40 | 29 | 55 | 39 | 225 | 104 |
| Tamien | 39 | 18 | 136 | 81 | 47 | 49 | 73 | 57 | 295 | 205 |
| Virginia | 13 | 1 | 40 | 31 | 13 | 19 | 17 | 31 | 83 | 82 |
| Childrens' Discovery Museum | 6 | 13 | 19 | 79 | 21 | 26 | 12 | 33 | 58 | 151 |
| Convention Center | 8 | 48 | 108 | 180 | 95 | 84 | 63 | 45 | 274 | 357 |
| San Antonio | 30 | 28 | 105 | 98 | 49 | 53 | 82 | 107 | 266 | 286 |
| Santa Clara | 145 | 55 | 312 | 217 | 134 | 121 | 166 | 124 | 757 | 517 |
| St. James | 31 | 13 | 92 | 71 | 38 | 34 | 55 | 29 | 216 | 147 |
| Japantown/Ayer | 11 | 10 | 41 | 62 | 16 | 62 | 19 | 47 | 87 | 181 |
| Civic Center | 31 | 45 | 99 | 251 | 41 | 72 | 72 | 125 | 243 | 493 |
| Gish | 4 | 46 | 28 | 82 | 6 | 63 | 15 | 114 | 53 | 305 |
| Metro/Airport | 2 | 45 | 20 | 74 | 12 | 29 | 8 | 54 | 42 | 202 |
| Karina Court | 3 | 42 | 20 | 72 | 10 | 24 | 12 | 53 | 45 | 191 |
| Component | 2 | 14 | 1 | 23 | 2 | 6 | 3 | 7 | 8 | 50 |
| Bonaventura | 0 | 17 | 3 | 25 | 1 | 5 | 1 | 11 | 5 | 58 |
| Orchard | 0 | 5 | 4 | 10 | 4 | 3 | 0 | 8 | 8 | 26 |
| River Oaks | 0 | 4 | 3 | 12 | 1 | 7 | 1 | 14 | 5 | 37 |
| Tasman | 3 | 4 | 0 | 17 | 0 | 13 | 2 | 16 | 5 | 50 |
| Baypointe | 0 | 124 | 0 | 353 | 0 | 137 | 0 | 165 | 0 | 779 |
| TOTAL | 560 | 560 | 1,906 | 1,906 | 935 | 935 | 1,204 | 1,204 | 4,605 | 4,605 |

TABLE F4. VTA GUADALUPE LINE ON/OFF DATA - SATURDAY SB

| | AM F | PEAK | MID | PEAK | PM PEAK | | OFF PEAK | | TO | ΓΛΙ |
|-----------------------------|------------|------|--------|-------------|---------|--------------|----------|--------|-------|-------|
| Station | 530 to 830 | | 830 to | 830 to 1430 | | 1430 to 1730 | | to 530 | TOTAL | |
| | ON | OFF | ON | OFF | ON | OFF | ON | OFF | ON | OFF |
| Baypointe | 61 | 0 | 222 | 0 | 172 | 0 | 272 | 0 | 727 | 0 |
| Tasman | 3 | 0 | 23 | 0 | 11 | 0 | 8 | 1 | 45 | 1 |
| River Oaks | 6 | 2 | 17 | 3 | 8 | 2 | 6 | 3 | 37 | 10 |
| Orchard | 4 | 0 | 11 | 0 | 9 | 1 | 9 | 2 | 33 | 3 |
| Bonaventura | 5 | 1 | 17 | 4 | 14 | 0 | 12 | 1 | 48 | 6 |
| Component | 5 | 2 | 13 | 1 | 14 | 1 | 6 | 0 | 38 | 4 |
| Karina Court | 15 | 4 | 53 | 8 | 43 | 14 | 46 | 12 | 157 | 38 |
| Metro/Airport | 14 | 6 | 83 | 19 | 45 | 4 | 54 | 8 | 196 | 37 |
| Gish | 41 | 3 | 127 | 17 | 63 | 18 | 50 | 11 | 281 | 49 |
| Civic Center | 33 | 22 | 189 | 80 | 108 | 42 | 100 | 39 | 430 | 183 |
| Japantown/Ayer | 20 | 8 | 79 | 20 | 33 | 15 | 44 | 19 | 176 | 62 |
| St. James | 17 | 15 | 64 | 81 | 31 | 35 | 28 | 35 | 140 | 166 |
| Santa Clara | 54 | 66 | 180 | 284 | 135 | 202 | 143 | 205 | 512 | 757 |
| San Antonio | 20 | 18 | 97 | 112 | 56 | 53 | 110 | 51 | 283 | 234 |
| Convention Center | 8 | 21 | 106 | 137 | 119 | 59 | 97 | 41 | 330 | 258 |
| Childrens' Discovery Museum | 13 | 8 | 42 | 39 | 70 | 19 | 37 | 25 | 162 | 91 |
| Virginia | 12 | 2 | 32 | 18 | 20 | 23 | 16 | 37 | 80 | 80 |
| Tamien | 42 | 22 | 98 | 80 | 52 | 62 | 46 | 86 | 238 | 250 |
| Curtner | 19 | 17 | 54 | 89 | 39 | 76 | 36 | 80 | 148 | 262 |
| Capitol | 11 | 31 | 66 | 114 | 30 | 78 | 31 | 92 | 138 | 315 |
| Branham | 4 | 14 | 12 | 33 | 10 | 25 | 5 | 33 | 31 | 105 |
| Ohlone-Chynoweth | 7 | 75 | 32 | 202 | 50 | 134 | 40 | 117 | 129 | 528 |
| Blossom Hill | 4 | 15 | 10 | 81 | 6 | 65 | 13 | 50 | 33 | 211 |
| Snell | 3 | 22 | 9 | 61 | 6 | 47 | 10 | 61 | 28 | 191 |
| Cottle | 1 | 8 | 0 | 38 | 3 | 53 | 5 | 49 | 9 | 148 |
| Santa Teresa | 0 | 40 | 0 | 115 | 0 | 119 | 0 | 166 | 0 | 440 |
| TOTAL | 422 | 422 | 1,636 | 1,636 | 1,147 | 1,147 | 1,224 | 1,224 | 4,429 | 4,429 |

TABLE F5. VTA GUADALUPE LINE ON/OFF DATA - SUNDAY NB

| | AM F | PEAK | MIDI | MID PEAK | | PM PEAK | | PEAK | TO | ТЛІ |
|-----------------------------|------------|------|--------|-------------|-----|--------------|-----|--------|-------|-------|
| Station | 530 to 830 | | 830 to | 830 to 1430 | | 1430 to 1730 | | to 530 | TOTAL | |
| | ON | OFF | ON | OFF | ON | OFF | ON | OFF | ON | OFF |
| Santa Teresa | 55 | 0 | 146 | 0 | 64 | 0 | 135 | 0 | 400 | 0 |
| Cottle | 13 | 1 | 49 | 1 | 24 | 0 | 25 | 5 | 111 | 7 |
| Snell | 13 | 6 | 59 | 9 | 38 | 8 | 30 | 7 | 140 | 30 |
| Blossom Hill | 13 | 1 | 73 | 10 | 33 | 4 | 51 | 8 | 170 | 23 |
| Ohlone-Chynoweth | 15 | 11 | 143 | 39 | 93 | 27 | 109 | 17 | 360 | 94 |
| Branham | 12 | 0 | 37 | 10 | 11 | 9 | 21 | 6 | 81 | 25 |
| Capitol | 23 | 8 | 94 | 44 | 65 | 38 | 57 | 40 | 239 | 130 |
| Curtner | 18 | 9 | 105 | 53 | 47 | 24 | 53 | 25 | 223 | 111 |
| Tamien | 32 | 12 | 97 | 67 | 31 | 45 | 47 | 49 | 207 | 173 |
| Virginia | 7 | 3 | 46 | 21 | 13 | 13 | 21 | 25 | 87 | 62 |
| Childrens' Discovery Museum | 3 | 14 | 19 | 75 | 22 | 32 | 22 | 23 | 66 | 144 |
| Convention Center | 2 | 18 | 54 | 99 | 104 | 46 | 50 | 56 | 210 | 219 |
| San Antonio | 18 | 16 | 87 | 85 | 36 | 45 | 50 | 52 | 191 | 198 |
| Santa Clara | 99 | 30 | 305 | 149 | 95 | 96 | 149 | 137 | 648 | 412 |
| St. James | 15 | 10 | 84 | 50 | 22 | 23 | 28 | 28 | 149 | 111 |
| Japantown/Ayer | 11 | 6 | 34 | 69 | 14 | 43 | 7 | 40 | 66 | 158 |
| Civic Center | 18 | 31 | 65 | 258 | 36 | 60 | 67 | 83 | 186 | 432 |
| Gish | 3 | 33 | 13 | 55 | 8 | 41 | 15 | 94 | 39 | 223 |
| Metro/Airport | 0 | 33 | 24 | 72 | 14 | 27 | 25 | 31 | 63 | 163 |
| Karina Court | 1 | 24 | 7 | 36 | 4 | 22 | 4 | 33 | 16 | 115 |
| Component | 1 | 4 | 0 | 12 | 3 | 10 | 0 | 6 | 4 | 32 |
| Bonaventura | 0 | 7 | 2 | 7 | 2 | 6 | 4 | 7 | 8 | 27 |
| Orchard | 0 | 4 | 2 | 16 | 3 | 12 | 0 | 6 | 5 | 38 |
| River Oaks | 0 | 2 | 1 | 8 | 0 | 11 | 1 | 11 | 2 | 32 |
| Tasman | 0 | 3 | 1 | 20 | 0 | 15 | 2 | 13 | 3 | 51 |
| Baypointe | 0 | 86 | 0 | 282 | 0 | 125 | 0 | 171 | 0 | 664 |
| TOTAL | 372 | 372 | 1,547 | 1,547 | 782 | 782 | 973 | 973 | 3,674 | 3,674 |

TABLE F6. VTA GUADALUPE LINE ON/OFF DATA - SUNDAY SB

| | AM F | PEAK | MID | PEAK | PM F | PEAK | OFF | PEAK | то- | TAL |
|-----------------------------|-------|-------|--------|-------|--------|--------|-------|--------|-------|-------|
| Station | 530 t | o 830 | 830 to | 1430 | 1430 t | o 1730 | 1730 | to 530 | 10 | IAL |
| | ON | OFF | ON | OFF | ON | OFF | ON | OFF | ON | OFF |
| Baypointe | 49 | 0 | 191 | 0 | 141 | 0 | 265 | 0 | 646 | 0 |
| Tasman | 4 | 0 | 18 | 1 | 9 | 0 | 10 | 1 | 41 | 2 |
| River Oaks | 1 | 1 | 13 | 1 | 6 | 1 | 5 | 4 | 25 | 7 |
| Orchard | 2 | 0 | 9 | 1 | 7 | 2 | 10 | 1 | 28 | 4 |
| Bonaventura | 6 | 0 | 15 | 3 | 10 | 0 | 4 | 0 | 35 | 3 |
| Component | 2 | 0 | 7 | 0 | 5 | 0 | 10 | 0 | 24 | 0 |
| Karina Court | 9 | 1 | 46 | 8 | 32 | 6 | 44 | 13 | 131 | 28 |
| Metro/Airport | 15 | 4 | 59 | 12 | 48 | 11 | 63 | 5 | 185 | 32 |
| Gish | 20 | 3 | 90 | 14 | 51 | 15 | 44 | 19 | 205 | 51 |
| Civic Center | 25 | 9 | 161 | 59 | 164 | 35 | 58 | 26 | 408 | 129 |
| Japantown/Ayer | 18 | 6 | 56 | 21 | 28 | 16 | 23 | 19 | 125 | 62 |
| St. James | 12 | 14 | 41 | 59 | 21 | 42 | 17 | 39 | 91 | 154 |
| Santa Clara | 41 | 52 | 140 | 223 | 79 | 177 | 123 | 182 | 383 | 634 |
| San Antonio | 10 | 11 | 57 | 66 | 52 | 59 | 82 | 48 | 201 | 184 |
| Convention Center | 7 | 16 | 51 | 101 | 115 | 34 | 67 | 27 | 240 | 178 |
| Childrens' Discovery Museum | 9 | 4 | 28 | 35 | 50 | 16 | 38 | 18 | 125 | 73 |
| Virginia | 8 | 4 | 20 | 17 | 18 | 23 | 22 | 29 | 68 | 73 |
| Tamien | 29 | 17 | 74 | 53 | 40 | 56 | 39 | 71 | 182 | 197 |
| Curtner | 14 | 20 | 54 | 80 | 19 | 71 | 20 | 62 | 107 | 233 |
| Capitol | 7 | 22 | 60 | 75 | 24 | 62 | 27 | 55 | 118 | 214 |
| Branham | 3 | 6 | 9 | 19 | 5 | 15 | 4 | 22 | 21 | 62 |
| Ohlone-Chynoweth | 14 | 48 | 23 | 176 | 23 | 110 | 23 | 93 | 83 | 427 |
| Blossom Hill | 1 | 9 | 8 | 43 | 5 | 50 | 7 | 44 | 21 | 146 |
| Snell | 1 | 12 | 8 | 37 | 5 | 35 | 5 | 51 | 19 | 135 |
| Cottle | 0 | 9 | 1 | 30 | 3 | 32 | 2 | 46 | 6 | 117 |
| Santa Teresa | 0 | 39 | 0 | 105 | 0 | 92 | 0 | 137 | 0 | 373 |
| TOTAL | 307 | 307 | 1,239 | 1,239 | 960 | 960 | 1,012 | 1,012 | 3,518 | 3,518 |

APPENDIX G

ABUS AGENCY COSTS

Introduction

This appendix details methodologies and procedures for calculating the agency costs associated with the ABUS study system. These costs include:

- System Planning and Design Costs
- Construction, Rehabilitation, and Other Infrastructure-Related Capital Costs
- Vehicle Operations Costs
- Vehicle Maintenance Costs
- System (Non-Vehicle) Maintenance Costs
- System Administration Costs

ABUS SYSTEM PLANNING AND DESIGN, CONSTRUCTION, REHABILITATION, AND OTHER INFRASTRUCTURE-RELATED CAPITAL COSTS

ABUS Cross-Sectional Geometry (Width Requirements)

As with the VTA Guadalupe light rail line on the segment being studied, the ABUS system is assumed to operate at-grade, with no physical separation of ABUS travel lanes from each other, or from regular traffic. Two potential design scenarios were selected for determining the necessary cross-sectional width for the ABUS system. They are described in the following paragraphs.

Scenario 1: Cross-Sectional Design Based on AASHTO Standards

The design for this project assumes that the ABUS system will operate on a dedicated right-of-way in the median of a regular roadway. As with the light rail system, the ABUS lanes operate at-grade, without physical barriers to separate the ABUS lanes from each other, or from the regular traffic. Exhibit 3-54 (1) requires that a 15-foot pavement width be used in this case to accommodate any design bus; however, included in this 15 feet is a Z-factor of two feet, which accounts for wandering of the vehicle within the lane (see Exhibit 3-53). Because it is assumed that automated technology will guide these buses without the wandering associated with manual steering, this Z-factor can be subtracted from the lane width. The resulting requirement is a 13-foot pavement width for each direction of travel.

The design was based on standards provided in the American Association of State Highway Transportation Officials (AASHTO) for streets and highways in its *A Policy on the Geometric Design of Highways and Streets* (1). For ABUS lanes running in both directions, a width of 26 feet is required for the right-of-way, including two 13-foot pavement widths. Figure 3.3 in the main report shows a schematic layout of this ABUS concept. Table G1 shows system dimensions.

TABLE G1. ABUS PROJECT DIMENSIONS - SCENARIO 1: DESIGN FOLLOWS AASHTO STANDARDS

| Le | ngth | Effective System Length* | | Width (Feet) | Area | Scale Factor |
|-------|--------|--------------------------|--------|----------------|----------|--------------|
| Miles | Feet | Miles | Feet | Two Directions | Sq. Feet | 21.64 |
| 5.19 | 27,403 | 5.19 | 27,403 | 26 | 712,483 | 21.04 |

Scenario 2: Cross-Sectional Design Reduced-Width

In this scheme, dimensions of the cross-sectional design are based on a design standard, contributed by Dr. Steven Shladover of PATH, that travel lanes for trucks and buses using automated technologies need be only 30 cm (0.98 feet) wider than the vehicles using them. The design vehicle chosen is the City Transit Bus, which and is 8.5 feet wide (1); however, it should be noted that 8.5 feet is the widest of any design bus, so all buses can be accommodated on a system designed for a vehicle of width 8.5 feet. By the reduced-width design standard, this bus would require a total travel lane width of 9.5 feet to operate on an automated lane, and a total ABUS system width of 19 feet. Figure 3.4 in the main report shows a schematic layout of this ABUS concept. Table G2 shows system dimensions.

TABLE G2. ABUS PROJECT DIMENSIONS - SCENARIO 2: REDUCED-WIDTH DESIGN

| Ler | ngth | Effective Sys | tem Length* | Width (Feet) | Area | Scale Factor |
|-------|--------|---------------|-------------|----------------|----------|--------------|
| Miles | Feet | Miles | Feet | Two Directions | Sq. Feet | 15.82 |
| 5.19 | 27,403 | 5.19 | 27,403 | 19 | 520,661 | 15.62 |

ABUS Infrastructure Costs

Costs associated with infrastructure appear in Tables G3a and G3b for Design Scenarios 1 and 2, respectively.

As ABUS is a theoretical system, costs for infrastructure and other capital costs are not directly available. Costs associated with construction, rehabilitation, and other capital expenses were estimated based on a recent City of San Jose roadway improvement project where the roadway was widened but some existing pavement was salvaged for the new design. This project, the Hope Street Improvement Project, was chosen for several reasons:

- 1. The project was completed in 2002, so cost data are recent.
- 2. City of San Jose personnel recommended this project as representative of a typical (in terms of cost) roadway improvement/widening project.
- 3. The project site is in the City of San Jose, as is the site of the proposed ABUS route.
- 4. Information was readily available.
- 5. Pavement design was deemed acceptable for frequent use by heavy vehicles.

Prior to construction, the stretch of Hope Street between Mill Street and Catherine Street in San Jose had an irregular traveled way with sections of varying widths. The roughly 850-linear foot stretch of improved road has a 20-foot standard width for each travel direction at all cross sections. This width is from centerline to face of curb, including shoulder width.

Varying widths of existing pavement were able to be salvaged. These widths range from 25 feet to about 18 feet.

There are at least two potential shortcomings of using the Hope Street project as a base system for ABUS infrastructure cost estimations. The first is that the Hope Street improvement spanned only about 850 linear feet of roadway, compared to the 5.19-mile proposed ABUS stretch. Although it is acknowledged that unit costs for the larger system are likely to be smaller, the City of San Jose has very little, if any, data available on such large roadway improvement projects. Typically, a project as large as the proposed ABUS would be broken into several smaller projects, with each project bid separately. This is to allow small local contractors with more limited bonding capacity to bid on these local projects, rather than having large national contracting companies winning bids because no local companies have sufficient bonding capacity.

It was assumed here that the differentials between unit costs associated with the Hope Street project quantities, and also with a potential ABUS, would be negligible, and thus were ignored. To deal with the size-inconsistency for unit quantities in application of the data from Hope Street to ABUS, the Hope Street Project unit quantities were scaled up to ABUS project size. Scaling methodologies are discussed in subsequent sections.

The second potential difficulty with justifying the use of Hope Street data for an ABUS lane is that Hope Street is a roadway zoned for light commercial traffic, meaning that the pavement is designed to support mostly residential traffic, with occasional heavy truck traffic. An ABUS lane, in contrast, will carry heavy vehicle traffic.

While it is acknowledged that a project dealing with modifications on a commercially-zoned arterial would be ideal for estimating construction costs in this situation, the City of San Jose has established arterials that have not required major widening or other applicable work in recent years. Despite this potential shortcoming, discussion with pavement design experts led to the belief that the rehabilitated Hope Street pavement design could be sufficient to accommodate frequent heavy vehicle traffic.

General Procedure

For all costs except those associated with right-of-way acquisition and magnetic reference markers for vehicle automation, the following general procedure was followed to calculate construction costs for the ABUS system:

- 1. The cost items were divided into two categories: those which would be applicable to any ABUS section, and those which were site-specific, meaning that they are dependent on the location of the project.
- 2. Unit costs for work items were identified from the Hope Street project contract documents.
- 3. Quantities associated with each work item were determined for the ABUS by scaling the Hope Street project quantities to the size of the ABUS project, based on square footage of roadway.

TABLE G3a. ABUS SYSTEM PLANNING AND DESIGN, CONSTRUCTION, REHABILITATION, AND OTHER INFRASTRUCTURE COSTS - DESIGN SCENARIO 1: DESIGN FOLLOWS AASHTO STANDARDS

| | Item | Year | Unit Cost (\$) | Unit | Unit Cost (2001-Equiv. | Unit | # of Units in ABUS System | One-Time Cost (2001-Equiv. \$) | EUAC (2001- Equiv. \$) |
|--------------------------|---|-------|----------------|-------------|------------------------|-------------|------------------------------|---|---------------------------|
| System Planning and D | Design Costs | | | | | | Í | , | , ,, |
| | VTA Personnel Labor Costs and Design Expenses | 2002 | 2,077,842 | One-Time | 2,037,115.83 | One-Time | 1 | 2,037,116 | 147,994 |
| Construction, Rehabilita | ation, and Other Infrastructure Capital Costs | | | | | | | | |
| | Right-of-Way Acquisition | 1999 | 23.65 | Sq. Foot | 24.49 | Sq. Foot | 712,483 | 17,445,882 | 1,267,424 |
| | Street Clean-Up | 2002 | 150.00 | Day | 147.06 | Day | 433 | 63,660 | 4,625 |
| | Mobilization | 2002 | 10,000.00 | Lump Sum | 9,804.00 | Lump Sum | 21.64 | 212,200 | 15,416 |
| | Traffic Control | 2002 | 2,000.00 | Lump Sum | 1,960.80 | Lump Sum | 21.64 | 42,440 | 3,083 |
| | Clearing, Grubbing, and Removal of Obstructions | 2002 | 2,500.00 | Lump Sum | 2,451.00 | Lump Sum | 21.64 | 53,050 | 3,854 |
| | Roadway Excavation | 2002 | 30.00 | Cu. Yard | 29.41 | Cu. Yard | 7,359 | 216,444 | 15,724 |
| | Subgrade Preparation-Class A | 2002 | 1.00 | Sq. Foot | 0.98 | Sq. Foot | 467,514 | 458,351 | 33,299 |
| | Imported Fill Materials | 2002 | 30.00 | Cu. Yard | 29.41 | Cu. Yard | 7,359 | 216,444 | 15,724 |
| | Deeplift/Base AC (8" max.) | 2002 | 70.00 | Ton | 68.63 | Ton | 13,203 | 906,092 | 65,827 |
| Infrastructure Costs | AC Surface Course | 2002 | 80.00 | Ton | 78.43 | Ton | 5,757 | 451,561 | 32,805 |
| illiastructure Costs | AC Base Course | 2002 | 80.00 | Ton | 78.43 | Ton | 9,091 | 712,991 | 51,798 |
| | Cold Planing | 2002 | 1.50 | Sq. Foot | 1.47 | Sq. Foot | 21,644 | 31,830 | 2,312 |
| | Pavement Reinforcing Fabric | 2002 | 1.00 | Sq. Yard | 0.98 | Sq. Yard | 75,755 | 74,270 | 5,396 |
| | Gravel Conform | 2002 | 50.00 | Ton | 49.02 | Ton | 433 | 21,220 | 1,542 |
| | Traffic Stripes and Pavement Markings | 2002 | 800.00 | Lump Sum | 784.32 | Lump Sum | 21.64 | 16,976 | 1,233 |
| | Street Lighting System | 2002 | 60,000.00 | Lump Sum | 58,824.00 | Lump Sum | 21.64 | 1,273,197 | 92,496 |
| | Geotextile | 2002 | 3.00 | Linear Foot | 2.94 | Linear Foot | 23,809 | 70,026 | 5,087 |
| | Site-SpecificWork Items | 2002 | 9,828,623.28 | Lump Sum | 9,635,982.26 | Lump Sum | 1.00 | 9,635,982 | 700,044 |
| | Magnetic Reference Markers - Includes Installation | 2001 | 5,000.00 | Lane Mile | 5,000.00 | Lane Mile | 10.38 | 51,900 | 3,770 |
| | TOTAL INFRASTRUCTURE COST | | | | | | | | 2,321,461 |
| Non-Infrastructure | Fleet Purchase | 2002 | 293,000.00 | Bus | 287,257.20 | Bus | 10.180 | 2,924,389 | 212,454 |
| Capital Costs | Automation Technology Outfitting for Vehicle | 2001 | 25,000.00 | Bus | 25,000.00 | Bus | 10.180 | 254,510 | 18,490 |
| | Minor Rehabilitation - Seals | 2002 | See Table G11 | N/A | N/A | N/A | N/A | N/A | 30,732 |
| Periodic Capital Costs | Major Rehabilitation - Resurfacing | 2002 | See Table G11 | N/A | N/A | N/A | N/A | N/A | 84,443 |
| | Magnetic Reference Markers - Includes Installation | 2001 | See Table G11 | N/A | N/A | N/A | N/A | N/A | 8,550 |
| | Bus Replacement Costs | 2002 | 293,000.00 | Bus | 287,257.20 | Bus | 10.180 | N/A | 194,959 |
| Fleet Renewal | Vehicle Automation Technology Replacement Costs | 2001 | 25,000.00 | Bus | 25,000.00 | Bus | 10.180 | N/A | 16,967 |
| | ON, REHABILITATION, AND OTHER INFRASTRUCTURE COST | S | | | | | | | 2,888,056 |
| TOTAL DESIGN, PLAN | NNING, CONSTRUCTION, REHABILITATION, AND OTHER INFR | ASTRU | CTURE COSTS | | | | | | 3,036,050 |

TABLE G3b. ABUS SYSTEM PLANNING AND DESIGN, CONSTRUCTION, REHABILITATION, AND OTHER INFRASTRUCTURE COSTS - SCENARIO 2: DESIGN FOLLOWS 30-CM PRINCIPLE

| | Item | Year | Unit Cost (\$) | Unit | Unit Cost (2001- Equiv. \$) | Unit | # of Units in ABUS System | One-Time Cost (2001-Equiv. \$) | EUAC (2001- Equiv. \$) |
|----------------------|--|------|----------------|-------------|--------------------------------|-------------|------------------------------|-----------------------------------|---------------------------|
| System Planning and | | | | | | | | | |
| | VTA Personnel Labor Costs and Design Expenses | 2002 | 1,518,422.65 | One-Time | 1,488,661.57 | One-Time | 1 | 1,488,662 | 108,150 |
| Construction, Rehab | llitation, and Other Infrastructure Capital Costs | | | | | | | | |
| | Right-of-Way Acquisition | 1999 | 23.65 | | 24.49 | | 520,661 | 12,748,913 | 926,195 |
| | Street Clean-Up | 2002 | 150.00 | | 147.06 | | 316 | 46,521 | 3,380 |
| | Mobilization | 2002 | , | Lump Sum | | Lump Sum | 15.82 | 155,069 | 11,266 |
| | Traffic Control | 2002 | 2,000.00 | | , | Lump Sum | 15.82 | 31,014 | 2,253 |
| | Clearing, Grubbing, and Removal of Obstructions | 2002 | 2,500.00 | Lump Sum | 2,451.00 | Lump Sum | 15.82 | 38,767 | 2,816 |
| | Roadway Excavation | 2002 | 30.00 | Cu. Yard | 29.41 | Cu. Yard | 5,378 | 158,170 | 11,491 |
| | Subgrade Preparation-Class A | 2002 | 1.00 | | 0.98 | Sq. Foot | 341,645 | 334,949 | 24,334 |
| | Imported Fill Materials | 2002 | 30.00 | Cu. Yard | 29.41 | Cu. Yard | 5,378 | 158,170 | 11,491 |
| | Deeplift/Base AC (8" max.) | 2002 | 70.00 | Ton | 68.63 | Ton | 9,648 | 662,144 | 48,104 |
| Infrastructure Costs | AC Surface Course | 2002 | 80.00 | Ton | 78.43 | Ton | 4,207 | 329,987 | 23,973 |
| ininastructure Costs | AC Base Course | 2002 | 80.00 | Ton | 78.43 | Ton | 6,643 | 521,032 | 37,852 |
| | Cold Planing | 2002 | 1.50 | Sq. Foot | 1.47 | Sq. Foot | 15,817 | 23,260 | 1,690 |
| | Pavement Reinforcing Fabric | 2002 | 1.00 | Sq. Yard | 0.98 | Sq. Yard | 55,359 | 54,274 | 3,943 |
| | Gravel Conform | 2002 | 50.00 | Ton | 49.02 | Ton | 316 | 15,507 | 1,127 |
| | Traffic Stripes and Pavement Markings | 2002 | 800.00 | Lump Sum | 784.32 | Lump Sum | 15.82 | 12,406 | 901 |
| | Street Lighting System | 2002 | 60,000.00 | Lump Sum | 58,824.00 | Lump Sum | 15.82 | 930,413 | 67,594 |
| | Geotextile | 2002 | 3.00 | Linear Foot | 2.94 | Linear Foot | 17,399 | 51,173 | 3,718 |
| | Site-SpecificWork Items | 2002 | 7,182,455.47 | Lump Sum | 7,041,679.35 | Lump Sum | 1.00 | 7,041,679 | 511,570 |
| | Magnetic Reference Markers - Includes Installation | 2001 | 5,000.00 | Lane Mile | 5,000.00 | Lane Mile | 10.38 | 51,900 | 3,770 |
| | TOTAL INFRASTRUCTURE COST | | • | | | | | | 1,697,467 |
| Non-Infrastructure | Fleet Purchase | 2002 | 293,000.00 | Bus | 287,257.20 | Bus | 10.180 | 2,924,389 | 212,454 |
| Capital Costs | Automation Technology Outfitting for Vehicle | 2001 | 25,000.00 | Bus | 25,000.00 | Bus | 10.180 | 254,510 | 18,490 |
| | Minor Rehabilitation - Seals | 2002 | See Table G12 | N/A | N/A | N/A | N/A | N/A | 22,458 |
| Periodic Capital | Major Rehabilitation - Resurfacing | 2002 | See Table G12 | N/A | N/A | N/A | N/A | N/A | 61,708 |
| Costs | Magnetic Reference Markers - Includes Installation | 2001 | See Table G12 | N/A | N/A | N/A | N/A | N/A | 8,550 |
| Floor Donous-1 | Vehicle Replacement Costs | 2002 | 293,000.00 | Bus | 287,257.20 | Bus | 10.180 | N/A | 194,959 |
| Fleet Renewal | Vehicle Automation Technology Replacement Costs | 2001 | 25,000.00 | Bus | 25,000.00 | Bus | 10.180 | N/A | 16,967 |
| TOTAL CONSTRUC | TION, REHABILITATION, AND OTHER INFRASTRUCTURE CO | | , | | , | | | | 2,233,054 |
| | ANNING AND DESIGN, CONSTRUCTION, REHABILITATION, | | R INFRASTRUCT | TURE COSTS | | | | | 2,341,204 |

- 4. Unit costs were converted to 2001- equivalent costs by adjusting for inflation.
- 5. One-time construction costs were calculated based on adjusted unit costs and unit quantities for the ABUS system.
- 6. Costs were converted to Equivalent Uniform Annual Costs (EUAC) with 2001 as the base year.

Costs associated with right-of-way acquisition and magnetic reference markers are discussed in the section below entitled "Right-of-Way Cost Calculations" and "Magnetic Reference Marker Cost Calculations."

Site-Specific Work Items

To estimate the cost for installing an ABUS lane, it was assumed that unit costs for ABUS would be the same as the costs associated with the Hope Street Improvement project in San Jose. Some items that were site-specific to the Hope Street project, such as manhole relocation, sewage line additions or relocations, or resident driveway readjustments to the new grade, were lumped together as cost element "Site-Specific Work Items." Such items are those construction tasks that occur on an as-needed basis at a construction site, but cannot be included as a task that is common to all potential ABUS construction projects because their occurrence is dependent on the existing conditions at the specific job site. This cost element will be associated with a percentage of the total project cost.

Tables G4 and G5 show a comprehensive list of construction tasks for the Hope Street project, with site-specific work items highlighted, and Tables G6 and G7 show a summary of site-specific and non-site-specific work-items as percentages of the project cost, for Design Scenarios 1 and 2, respectively. Site-specific work items are shaded. For the Hope Street project, site-specific work items were determined to comprise 66.7 percent of the total project cost. The general assumption of this approach is that all construction will have site-specific elements that comprise roughly the same percentage of the total project cost. To this end, Tables G3a and G3b show the site-specific work items summed to comprise one unit cost. This unit cost is applied as a lump sum.

Unit Costs

For the Hope Street project, unit costs were extracted directly from the Hope Street Project engineer's estimate from the bid documents. The unit costs for the contractor awarded the project were not used because several unit costs quoted by the winning bidder varied vastly from the engineer's estimate and from the other bidders' unit costs. It was assumed that the engineer's estimate would more accurately reflect the cost associated with a particular work item. It should be noted that the engineer's estimate for the total project cost was roughly 20 percent higher than the contractor's estimate.

Quantities

Quantities of units for each work item were found by scaling-up from the Hope Street project size to the proposed ABUS project size. The scaling procedure is discussed in the following paragraphs.

In order to scale the Hope Street project to the size of the ABUS system, quantities of materials and resources used were resized accordingly. Unit costs were held constant. For the purposes of this study, it was assumed that the ratio of total surface area to unit cost is proportional for the Hope Street project and ABUS system, and the following ratio equivalence was used:

$$\frac{HS_A}{HS_Q} = \frac{ABUS_A}{ABUS_Q} \implies ABUS_Q = \frac{ABUS_A * HS_Q}{HS_A}$$

where

 HS_A is the total Hope Street new-pavement surface area HS_Q is the corresponding unit cost from the Hope Street bid documents $ABUS_A$ is the total new-pavement surface area for the ABUS system $ABUS_Q$ is the derived corresponding unit cost.

To estimate ABUS and Hope Street new-pavement surface areas, engineering plans for the Hope Street project were used to determine scale factors, which were then applied to the number of units used in the Hope Street project to arrive at the number of units necessary for construction of the ABUS system. Approximately 32,918 square feet of new pavement were laid for the project, and 16,589 square feet of pavement was allowed to remain.

Table G4 shows derived unit quantities necessary for construction of the ABUS system for the scenario based on AASHTO standards. The ABUS system has a length of 5.19 miles (27,403 feet) and a width of 26 feet for both directions of travel. Assuming a straight trunkline, this implies a surface area of roughly 712,483 square feet.

Given that $ABUS_A = 712,483$ sq. ft. and $HS_A = 32,918$ sq. ft., then, the aforementioned equation reduces to:

$$ABUS_Q = \frac{712,483 * HS_Q}{32.918} = 21.64 * HS_Q$$

In short, the quantities necessary to complete a project the size of the ABUS system is approximately 21.64 times the corresponding quantity necessary for the Hope Street project. Table G1 shows the scale factor for Design Scenario 1. Table G4 shows the applicable calculations for Design Scenario 1.

For example, street clean-up on the Hope Street project (Design Scenario 1) requires 20 days (see Table G4). Then, to find the number of days required for street clean-up on the ABUS project, the following calculation was performed:

$$ABUS_{o} = 21.64 * HS_{o} = 21.64 * 20 = 433$$

Thus, 433 days of street clean-up units are required. It is important to note that it is not expected that 433 days will be taken to perform this task. The quantity of 433 days is simply a reflection of the relative size of the ABUS and Hope Street projects.

All but one of the scaled quantities shown in Table G4 for Design Scenario 1 were calculated based on the procedure above. The exception to this rule was the calculation related to AC surface course. The procedure for this calculation is outlined in the following paragraphs.

A 2-inch asphalt concrete overlay was applied to the entire surface area of the Hope Street project, including the 16,589 square feet (SF) of remaining pavement. For the ABUS project, only the costs of surface course for the ABUS lanes are computed, since lane widths of existing pavements would detract from the generality of the calculations.

Thus, the appropriate tonnage of asphalt had to be removed from the original 400 tons of AC surface course, so as not to include the 2-inch overlay that was laid on the 16,589 SF of remaining pavement. The total overlay surface area for the Hope Street project covers 49,507 SF – the sum of 16,589 SF of remaining pavement and 32,918 SF of new pavement. Of this 49,507 SF, remaining pavement constitutes approximately 33.5% of the surface area, and new pavement constitutes 66.5%.

Assuming that the 2-inch overlay was applied uniformly to the new and remaining surfaces, then, it is reasonable to assume that 33.5% of the AC surface course used in the Hope Street project was used on remaining pavement. Since it is assumed here that the surface course applied only to new pavement, this 33.5% must be removed from the quantity (in tons) of AC surface course applied to the Hope Street project.

The original Hope Street project contract documents show that 400 tons of AC surface course are required for the Hope Street project. The required tonnage for the new-pavement surface course for the Hope Street project is calculated as follows:

Hope Street New Pavement Surface Tonnage = $400 \times 0.665 = 266 \text{ tons}$.

The surface course applied to the new pavement must then be scaled to the ABUS project size. Since only the course applied to the new pavement is scaled, the scale factor used above is applicable.

The surface course tonnage for the ABUS system, then, would be calculated by the following equation:

ABUS AC Surface Course = (400) x (66.5%) x (21.64) = 266 x 21.64 = 5,757 tons where 21.64 is the scale factor between the two projects, and 66.5% is the percentage of the Hope Street AC surface course applied to the new-pavement surface.

After scaling, annual costs were calculated, and those costs were then converted to an

| | | | Hope Street Project | Hope Street Pro | oject | | | | 0.00 | |
|------|--|------|---------------------|-----------------------|-------------|-----------|----------------------|---------------------|---------------------|--------------------|
| Item | Cost Element | | Total Cost | Unit Cost | ĺ | Hope Stre | et Project Units | Derived ABUS | S Project Units | ABUS Cost (2002-\$ |
| | | Year | | (Engineer's Estimate) | Unit | Number | Unit | Number | Unit | |
| 1 | Street Clean-Up | 2002 | 3000.00 | 150.00 | Day | 20 | Day | 433 | Day | 64,93 |
| | Mobilization | 2002 | 10000.00 | 10,000.00 | Lump Sum | 1 | Lump Sum | 22 | Lump Sum | 216,44 |
| | Traffic Control | 2002 | 2000.00 | 2,000.00 | Lump Sum | 1 | Lump Sum | 22 | Lump Sum | 43,28 |
| | Adjust Water Valve to Grade | 2002 | 1500.00 | 250.00 | Each | 6 | Each | 130 | Each | 32,46 |
| | Adjust Manhole to Grade | 2002 | 5000.00 | 500.00 | Each | 10 | Each | 216 | Each | 108,22 |
| | Relocating County Park Sign | 2002 | 1500.00 | 1,500.00 | Each | 1 | Each | 22 | Each | 32,46 |
| | Replace Existing Detector Looop | 2002 | 4200.00 | 700.00 | Each | 6 | Each | 130 | Each | 90,90 |
| | Adjust Fire Hydrant to Grade | 2002 | 2400.00 | 1,200.00 | Each | 2 | Each | 43 | Each | 51,94 |
| | Relocate and Adjust Fire Hydrant to Grade | 2002 | 3600.00 | 3,600.00 | Each | 1 | Each | 22 | Each | 77,91 |
| | Clearing, Grubbing, and Removal of Obstructions | 2002 | 2500.00 | 2,500.00 | Lump Sum | 1 | Lump Sum | 22 | Lump Sum | 54,11 |
| | Roadway Excavation | 2002 | 10200.00 | 30.00 | Cu. Yard | 340 | Cu. Yard | 7,359 | Cu. Yard | 220,77 |
| | Plant New Trees | 2002 | 20400.00 | 600.00 | Each | 34 | Each | 736 | Each | 441,54 |
| | Misc. Landscaping | 2002 | 9600.00 | 2.00 | Sq. Foot | 4,800 | Sq. Foot | 103,892 | Sq. Foot | 207,78 |
| | Tree, Schrub, and Landscape Maintenance | 2002 | 10000.00 | 10,000.00 | Lump Sum | 4,000 | Lump Sum | 22 | Lump Sum | 207,78 |
| | Polythylene Root Barrier | 2002 | 700.00 | 1.00 | Linear Foot | 700 | Linear Foot | 15,151 | Linear Foot | 15,15 |
| | Subgrade Preparation-Class A | 2002 | 21600.00 | 1.00 | Sq. Foot | 21,600 | Sq. Foot | 467,514 | Sq. Foot | 467,51 |
| | Imported Fill Materials | 2002 | 10200.00 | 30.00 | Cu. Yard | 340 | Cu. Yard | 7,359 | Cu. Yard | 220,77 |
| | Deeplift/Base AC (8" max.) | 2002 | 42700.00 | 70.00 | Ton | 610 | Ton | 13,203 | Ton | 924,20 |
| | AC Surface Course | 2002 | 32000.00 | 80.00 | Ton | 400 | Ton | 5,757 | Ton | 924,20 460,58 |
| | AC Base Course | 2002 | 33600.00 | 80.00 | Ton | 420 | Ton | 9,091 | Ton | 727,24 |
| | Cold Planing | 2002 | 1500.00 | 1.50 | Sq. Foot | 1,000 | Sq. Foot | 21,644 | Sq. Foot | 32,46 |
| | Pavement Reinforcing Fabric | 2002 | 3500.00 | 1.00 | Sq. Yard | 3,500 | Sq. Yard | 75,755 | Sq. Yard | 75,75 |
| | Redwood Retaining Wall | 2002 | 12000.00 | 40.00 | Linear Foot | 300 | Linear Foot | 6,493 | Linear Foot | 259,73 |
| | PCC Curb and Gutter - Type A2 | 2002 | 51000.00 | 30.00 | Linear Foot | 1,700 | Linear Foot | 36,795 | Linear Foot | 1,103,85 |
| | PCC Sidewalk, Plain finish, including 1" of Structural Fill) | 2002 | 60300.00 | 9.00 | Sq. Foot | 6,700 | Sq. Foot | 145,016 | Sq. Foot | 1,305,14 |
| | PCC Driveway | 2002 | 21600.00 | 12.00 | Sq. Foot | 1,800 | Sq. Foot | 38,960 | Sq. Foot | 467,51 |
| | PCC Wheelchair Ramp | 2002 | 3200.00 | 800.00 | Each | 4 | Each | 87 | Each | 69,26 |
| | PCC Wheelchair Ramp PCC Driveway Conform | 2002 | 27000.00 | 10.00 | Sq. Foot | 2,700 | Sq. Foot | 58,439 | Sq. Foot | 584,39 |
| | PCC Berm (Type A1-B3) | 2002 | 600.00 | 6.00 | Linear Foot | 100 | Linear Foot | 2,164 | Linear Foot | |
| | Gravel Conform | 2002 | 1000.00 | 50.00 | Ton | 20 | Ton | 433 | Ton | 12,98 |
| | Install New Survey Monument | 2002 | 2500.00 | 500.00 | Each | 5 | Each | 108 | Each | 21,64 |
| | | 2002 | 800.00 | 800.00 | | 1 | Lump Sum | 22 | Lump Sum | 54,11 |
| | Traffic Stripes and Pavement Markings Street Lighting System | 2002 | 60000.00 | 60,000.00 | Lump Sum | 1 | Lump Sum Lump Sum | 22 | | 17,31 1,298,65 |
| | Install New Water Valve | 2002 | 3000.00 | 3,000.00 | Lump Sum | 1 | Each | 22 | Lump Sum Each | |
| | | 2002 | | | Each | | | 22 | | 64,93 |
| | Remove Existing Water Valve and Reconnect Existing Waterlin 12" Diameter RCP | 2002 | 3000.00 | 3,000.00 110.00 | Each | 1 180 | Each | 3,896 | Each | 64,93 |
| | | 2002 | 19800.00 | | Linear Foot | | Linear Foot | , | Linear Foot | 428,55 |
| | 27" Diameter RCP | 2002 | 12000.00 | 160.00 40.00 | Linear Foot | 75 150 | Linear Foot | 1,623 3,247 | Linear Foot | 259,73 |
| | 8" Diameter PVC Pipe | 2002 | 6000.00 | | Linear Foot | 150 4 | Linear Foot Each | 3,24 <i>7</i> 87 | Linear Foot Each | 129,86 |
| | Abandon and Cap Off Exist. 12" Dia. RCP | | 3200.00 | 800.00 | Each | | | | | 69,26 |
| | Cap off New 27" Dia. RCP | 2002 | 800.00 | 800.00 | Each | 700 | Each | 22 | Each | 17,31 |
| | Remove Exist. VCP, Replace with PVC | 2002 | 79000.00 | 100.00 | Linear Foot | 790 | Linear Foot | 17,099 | Linear Foot | 1,709,89 |
| | Geotextile Province Observed to Province | 2002 | 3300.00 | 3.00 | Linear Foot | 1,100 | Linear Foot | 23,809 | Linear Foot | 71,42 |
| | Trench Sheeting, Shoring,a dn Bracing | 2002 | 6000.00 | 6,000.00 | Lump Sum | 1 | Lump Sum | 22 | Lump Sum | 129,86 |
| | Trench Dewatering | 2002 | 12000.00 | 12,000.00 | Lump Sum | 1 | Lump Sum | 22 | Lump Sum | 259,73 |
| | Sewer Lateral Verification | 2002 | 300.00 | 30.00 | Each | 10 | Each | 216 | Each | 6,49 |
| | Reconnect Exist. Sanitary Sewer | 2002 | 2000.00 | 200.00 | Each | 10 | Each | 216 | Each | 43,28 |
| | Replace 4" Dia. Sanitary Sewer | 2002 | 9000.00 | 90.00 | Linear Foot | 100 | Linear Foot | 2,164 | Linear Foot | 194,79 |
| | Install Std. Storm Manhole | 2002 | 6400.00 | 3,200.00 | Each | 2 | Each | 43 | Each | 138,52 |
| | Install Large Hooded Inlet | 2002 | 14000.00 | 2,000.00 | Each | 7 | Each | 152 | Each | 303,01 |
| | Install Std. Flat Grate Inlet | 2002 | 16500.00 | 1,500.00 | Each | 11 | Each | 238 | Each | 357,12 |
| 51 | Remove and Replace SS Manhole | 2002 | 24000.00 | 4,800.00 | Each | 5 | Each | 108 | Each | 519,460 |
| | Total Cost | | 692,000.00 | 133,386.50 | | | | | | 14,745,749 |

TABLE G5. ABUS CONSTRUCTION COST CALCULATIONS - SCENARIO 2: REDUCED-WIDTH DESIGN

| | | Hope Street Project | Hope Street Pro | ject | Hono Stroot | Project Units | Dorived ARLI | S Project Units | |
|---|------|-----------------------|-----------------------|-------------|-------------|---------------|--------------|-----------------|---------------------|
| Item Cost Element | Year | Total Cost (\$) | Unit Cost (\$) | Unit | Hope Street | Project Units | Derived ABU | S Project Units | ABUS Cost (2002 \$) |
| | | (Engineer's Estimate) | (Engineer's Estimate) | Offic | Number | Unit | Number | Unit | |
| 1 Street Clean-Up | 2002 | 3000.00 | 150.00 | Day | 20 | Day | 316 | Day | 47,451 |
| 2 Mobilization | 2002 | 10000.00 | 10,000.00 | Lump Sum | 1 | Lump Sum | 16 | Lump Sum | 158,169 |
| 3 Traffic Control | 2002 | 2000.00 | 2,000.00 | Lump Sum | 1 | Lump Sum | 16 | Lump Sum | 31,634 |
| 4 Adjust Water Valve to Grade | 2002 | 1500.00 | 250.00 | Each | 6 | Each | 95 | Each | 23,725 |
| 5 Adjust Manhole to Grade | 2002 | 5000.00 | 500.00 | Each | 10 | Each | 158 | Each | 79,085 |
| 6 Relocating County Park Sign | 2002 | 1500.00 | 1,500.00 | Each | 1 | Each | 16 | Each | 23,725 |
| 7 Replace Existing Detector Looop | 2002 | 4200.00 | 700.00 | Each | 6 | Each | 95 | Each | 66,431 |
| 8 Adjust Fire Hydrant to Grade | 2002 | 2400.00 | 1,200.00 | Each | 2 | Each | 32 | Each | 37,961 |
| 9 Relocate and Adjust Fire Hydrant to Grade | 2002 | 3600.00 | 3,600.00 | Each | 1 | Each | 16 | Each | 56,941 |
| 10 Clearing, Grubbing, and Removal of Obstructions | 2002 | 2500.00 | 2,500.00 | Lump Sum | 1 | Lump Sum | 16 | Lump Sum | 39,542 |
| 11 Roadway Excavation | 2002 | 10200.00 | 30.00 | Cu. Yard | 340 | Cu. Yard | 5,378 | Cu. Yard | 161,332 |
| 12 Plant New Trees | 2002 | 20400.00 | 600.00 | Each | 34 | Each | 538 | Each | 322,665 |
| 13 Misc. Landscaping | 2002 | 9600.00 | 2.00 | Sq. Foot | 4,800 | Sq. Foot | 75,921 | Sq. Foot | 151,842 |
| 14 Tree, Schrub,a nd Landscape Maintenance | 2002 | 10000.00 | 10,000.00 | Lump Sum | 1 | Lump Sum | 16 | Lump Sum | 158,169 |
| 15 Polythylene Root Barrier | 2002 | 700.00 | 1.00 | Linear Foot | 700 | Linear Foot | 11,072 | Linear Foot | 11,072 |
| 16 Subgrade Preparation-Class A | 2002 | 21600.00 | 1.00 | Sq. Foot | 21,600 | Sq. Foot | 341,645 | Sq. Foot | 341,645 |
| 17 Imported Fill Materials | 2002 | 10200.00 | 30.00 | Cu. Yard | 340 | Cu. Yard | 5,378 | Cu. Yard | 161,332 |
| 18 Deeplift/Base AC (8" max.) | 2002 | 42700.00 | 70.00 | Ton | 610 | TON | 9,648 | Ton | 675,382 |
| 19 AC Surface Course | 2002 | 32000.00 | 80.00 | Ton | 400 | TON | 4,207 | Ton | 336,584 |
| 20 AC Base Course | 2002 | 33600.00 | 80.00 | Ton | 420 | TON | 6,643 | Ton | 531,448 |
| 21 Cold Planing | 2002 | 1500.00 | 1.50 | Sq. Foot | 1,000 | Sq. Foot | 15,817 | Sq. Foot | 23,725 |
| 22 Pavement Reinforcing Fabric | 2002 | 3500.00 | 1.00 | Sq. Yard | 3,500 | Sq. Yard | 55,359 | Sq. Yard | 55,359 |
| 23 Redwood Retaining Wall | 2002 | 12000.00 | 40.00 | Linear Foot | 300 | Linear Foot | 4,745 | Linear Foot | 189,803 |
| 24 PCC Curb and Gutter - Type A2 | 2002 | 51000.00 | 30.00 | Linear Foot | 1,700 | Linear Foot | 26,889 | Linear Foot | 806,662 |
| 25 PCC Sidewalk, Plain finish, including 1" of Structural Fill) | 2002 | 60300.00 | 9.00 | Sq. Foot | 6,700 | Sq. Foot | 105,973 | Sq. Foot | 953,759 |
| 26 PCC Driveway | 2002 | 21600.00 | 12.00 | Sq. Foot | 1,800 | Sq. Foot | 28,470 | Sq. Foot | 341,645 |
| 27 PCC Wheelchair Ramp | 2002 | 3200.00 | 800.00 | Each | 4 | Each | 63 | Each | 50,614 |
| 28 PCC Driveway Conform | 2002 | 27000.00 | 10.00 | Sq. Foot | 2,700 | Sq. Foot | 42,706 | Sq. Foot | 427,056 |
| 29 PCC Berm (Type A1-B3) | 2002 | 600.00 | 6.00 | Linear Foot | 100 | Linear Foot | 1,582 | Linear Foot | 9,490 |
| 30 Gravel Conform | 2002 | 1000.00 | 50.00 | Ton | 20 | TON | 316 | Ton | 15,817 |
| 31 Install New Survey Monument | 2002 | 2500.00 | 500.00 | Each | 5 | Each | 79 | Each | 39,542 |
| 32 Traffic Stripes and Pavement Markings | 2002 | 800.00 | 800.00 | Lump Sum | 1 | Lump Sum | 16 | Lump Sum | 12,654 |
| 33 Street Lighting System | 2002 | 60000.00 | 60,000.00 | Lump Sum | 1 | Lump Sum | 16 | Lump Sum | 949,014 |
| 34 Install New Water Valve | 2002 | 3000.00 | 3,000.00 | Each | 1 | Each | 16 | Each | 47,451 |
| 35 Remove Existing Water Valve and Reconnect Existing Waterlin | 2002 | 3000.00 | 3,000.00 | Each | 1 | Each | 16 | Each | 47,451 |
| 36 12" Diameter RCP | 2002 | 19800.00 | 110.00 | Linear Foot | 180 | Linear Foot | 2,847 | Linear Foot | 313,175 |
| 37 27" Diameter RCP | 2002 | 12000.00 | 160.00 | Linear Foot | 75 | Linear Foot | 1,186 | Linear Foot | 189,803 |
| 38 8" Diameter PVC Pipe | 2002 | 6000.00 | 40.00 | Linear Foot | 150 | Linear Foot | 2,373 | Linear Foot | 94,901 |
| 39 Abandon and Cap Off Exist. 12" Dia. RCP | 2002 | 3200.00 | 800.00 | Each | 4 | Each | 63 | Each | 50,614 |
| 40 Cap off New 27" Dia. RCP | 2002 | 800.00 | 800.00 | Each | 1 | Each | 16 | Each | 12,654 |
| 41 Remove Exist. VCP, Replace with PVC | 2002 | 79000.00 | 100.00 | Linear Foot | 790 | Linear Foot | 12,495 | Linear Foot | 1,249,535 |
| 42 Geotextile | 2002 | 3300.00 | 3.00 | Linear Foot | 1,100 | Linear Foot | 17,399 | Linear Foot | 52,196 |
| 43 Trench Sheeting, Shoring,a dn Bracing | 2002 | 6000.00 | 6,000.00 | Lump Sum | 1 | Lump Sum | 16 | Lump Sum | 94,901 |
| 44 Trench Dewatering | 2002 | 12000.00 | 12,000.00 | Lump Sum | 1 | Lump Sum | 16 | Lump Sum | 189,803 |
| 45 Sewer Lateral Verification | 2002 | 300.00 | 30.00 | Each | 10 | Each | 158 | Each | 4,745 |
| 46 Reconnect Exist. Sanitary Sewer | 2002 | 2000.00 | 200.00 | Each | 10 | Each | 158 | Each | 31,634 |
| 47 Replace 4" Dia. Sanitary Sewer | 2002 | 9000.00 | 90.00 | Linear Foot | 100 | Linear Foot | 1,582 | Linear Foot | 142,352 |
| 48 Install Std. Storm Manhole | 2002 | 6400.00 | 3,200.00 | Each | 2 | Each | 32 | Each | 101,228 |
| 49 Install Large Hooded Inlet | 2002 | 14000.00 | 2,000.00 | Each | 7 | Each | 111 | Each | 221,437 |
| 50 Install Std. Flat Grate Inlet | 2002 | 16500.00 | 1,500.00 | Each | 11 | Each | 174 | Each | 260,979 |
| 51 Remove and Replace SS Manhole | 2002 | 24000.00 | 4,800.00 | Each | 5 | Each | 79 | Each | 379,606 |
| | | | , | | | | | | 10,775,739 |

Equivalent Uniform Annual Cost (EUAC) with 2001 as the base year. Methodologies for EUAC computations are discussed in subsequent sections. Table G4 shows the values calculated above. Table G3a shows summarized costs.

Procedures and methodologies used for scaling the Hope Street project quantities to an ABUS-scale project for the reduced-width design scenario, were similar to those used for computation of unit quantities for Design Scenario 1.

In Design Scenario 2, the dimensions of the cross-sectional design are based on the principle that travel lanes for trucks and buses using automated technologies need be only 30 cm (0.98 feet) wider than the vehicles using them. This design guideline was provided by Dr. Steven Shladover of PATH. The design vehicle chosen is the City Transit Bus, which and is 8.5 feet wide (1). This implies a total travel lane width of 9.48 feet. Rounding to 9.5 feet, this implies a total AHS system width of 19 feet.

Table G2 shows applicable calculations for the system scale factor, which was computed according to the same procedures as in Scenario 1. Table G5 shows scaled construction costs. Table G3b shows tabulated costs and EUAC.

Adjusted Unit Costs (Conversion to 2001-Equivalent Unit Costs)

As the Hope Street project was completed in 2002, the engineer's estimates for unit costs is assumed to be in 2002-dollars. Conversion to 2001-equivalent dollars was necessary. An inflation factor of 0.9804 (2) was applied to all Hope Street project unit costs to convert them to 2001-equivalent costs. The following formula was used:

Unit Cost (2001-Equiv.) = Unit Cost x 0.9804

TABLE G6. ABUS CONSTRUCTION COST CALCULATIONS - SITE-SPECIFIC WORK ITEMS - SCENARIO 1

| Type of Work Item | Total Cost (\$) | Percent Cost |
|---|-----------------|--------------|
| Site-Specific Work Items | 9,828,623 | 66.7% |
| General Work Items Associated with ABUS | 4,917,125 | 33.3% |
| TOTAL | 14,745,749 | 100.00% |

TABLE G7. SUMMARY - ABUS CONSTRUCTION COSTS - SCENARIO 2

| Type of Work Item | Total Cost (\$) | Percent Cost | | |
|---|-----------------|--------------|--|--|
| Site-Specific Work Items | 7,182,455 | 66.7% | | |
| General Work Items Associated with ABUS | 3,593,284 | 33.3% | | |
| TOTAL | 10,775,739 | 100.00% | | |

The following sample calculation comes from Table G3a, from the line pertaining to Street Clean-Up:

$$$147.06 = 150.00 \times 0.9804$$

One-Time Construction Costs

For both Scenarios 1 and 2, 2001-equivalent one-time costs for construction are calculated by multiplying the scaled unit quantities by the appropriate 2001-equivalent unit costs (see previous sections). The following sample calculation is taken from Table G3a for Scenario 1, from the row pertaining to Street Clean-Up.

$$$63,660 = $147.06 \times 433$$

Equivalent Uniform Annual Cost (EUAC) Calculations

One-time construction costs were converted to annual costs for compatibility with other cost calculations in this study, which generally appear in source data as annuities. Table G3a shows itemized construction costs for Design Scenario 1, and Table G3b shows itemized construction costs for Design Scenario 2, as adapted for the ABUS system, and also converted to 2001-equivalent EUAC. The following formula was used for the EUAC calculation:

```
EUAC (2001-Equiv.) = One-Time Cost (2001-Equiv.) x [A/P,i,n]
= One-Time Cost (2001-Equiv.) x [i(1+i)^n]/[((1+i)^n)-1]
= One-Time Cost (2001-Equiv.) x 0.0726
where the discount rate i=6% and project life n=30 years.
```

The following sample calculation was taken from Table G3a, from the line pertaining to Street Clean-Up:

```
$4,625 = $63,660 \times 0.0726
```

Right-of-Way (ROW) Cost Calculations

Right-of-way costs for the ABUS system were calculated according to the following procedure:

- 1. Right-of-way unit costs (\$ per Sq. Ft.) were assumed to be the same as those used in the light rail infrastructure calculations.
- 2. Square footage of ABUS project right-of-way was estimated.
- 3. Unit costs were adjusted for inflation to 2001-equivalent dollars.
- 4. Adjusted unit costs were multiplied by cost per square foot to get a total cost.
- 5. Total cost was converted to EUAC (2001-Equivalent).

Square Footage of ABUS Project Right-of-Way

Assuming that the added area due to curved sections is negligible, the area of the ABUS project was approximated by multiplying the 5.19-mile system length by the total width of the right-of-way for both directions. The area required for stations and other supporting infrastructure was neglected because it is assumed that space requirements for these infrastructure elements are similar for all three systems being compared.

Tables G1 and G2 show effective system length (which is the same as the base system length for the ABUS system), two-directional width, and total (two-directional) area for ABUS Scenarios 1 and 2, respectively.

2001-Equivalent EUAC for ABUS Project Right-of-Way

The following description applies to ABUS Design Scenarios 1 and 2, of which the costs are summarized in Tables G3a and G3b, respectively.

The unit cost of ROW was calculated in Appendix C and was converted to 2001-equivalent dollars using an inflation index of 1.0353 (2). The following sample calculation showing unit cost conversion to 2001-equivalent dollars comes from Table G3a (Design Scenario 1):

$$24.49$$
 per sq. ft. = 23.65 per sq. ft. x 1.0353

This unit cost was then multiplied by the ABUS square footage to arrive at "One-Time Cost (2001-Equiv.)," as per the following sample calculation (see Table G3a Design Scenario 1):

$$17,445,882 = [24.49 \text{ per sq. ft.}] \times [712,483 \text{ sq. ft.}]$$

Finally, costs were converted to EUAC (2001-equivalent). Methodologies for this calculation are identical to other EUAC calculations in Tables G3a and G3b.

Magnetic Reference Marker Cost Calculations

Magnetic strips used to interact with AHS technology on automated vehicles would be placed on the roadway for both ABUS scenarios. Estimated costs for this amount to approximately \$5000 per mile, according to Professor Randolph Hall of the University of Southern California. With a 10.73-mile system length, this amounts to \$51,900 in total construction costs, or \$3,770 annually over a 30-year project life. EUAC calculations follow identical methodologies as construction costs. Results are shown in Table G3a.

ABUS System Planning and Design Costs

Project engineers for the City of San Jose, which supplied all personnel and expenses for the Hope Street project design, estimate the planning and design costs for the project to be roughly \$96,000. The researchers acknowledge that the larger-scale ABUS project might imply increased efficiency and, therefore, lower design costs per unit area; however, due to

unknown complexities that might arise in the ABUS design, the relationship between the Hope Street and ABUS system is assumed to be linear. No adjustments are made for increased complexity or efficiency. Thus, since the Hope Street project is much smaller than the ABUS system, the system planning and design costs were scaled according to the same scale factor as the construction costs to obtain an estimated ABUS system planning and design cost. Tables G8 and G9 show the applicable calculations for Design Scenarios 1 and 2, respectively. Tables G3a and G3b show the tabulated estimated system planning and design costs for Design Scenarios 1 and 2.

TABLE G8. ABUS SYSTEM PLANNING AND DESIGN COSTS - SCENARIO 1

| Hope St. Project | Scale | ABUS System |
|------------------|--------|-------------|
| Costs (\$) | Factor | Costs (\$) |
| 96,000 | 21.64 | 2,077,842 |

TABLE G9. ABUS SYSTEM PLANNING AND DESIGN COSTS - SCENARIO 2

| Hope St. Project | Scale | ABUS System |
|------------------|--------|-------------|
| Costs (\$) | Factor | Costs (\$) |
| 96,000 | 15.82 | 1,518,423 |

ABUS Non-Infrastructure Capital Costs

Non-infrastructure capital costs include those costs associated with vehicle purchase, and also with the initial purchase of the automating technology outfitting for the automated vehicles.

Fleet Purchase

Values for fleet purchase are identical for Design Scenarios 1 and 2. Calculations for determining fleet purchase costs were completed in the following sequence:

- 1. Cost per bus was determined (in 2001-equivalent dollars).
- 2. Fleet size was determined.
- 3. One-time fleet purchase costs were calculated.
- 4. One-time fleet purchase costs were converted to Equivalent Uniform Annual Costs (EUAC), with 2001 as the base year.

Cost per Bus

In 2002, VTA purchased 40-foot, low-floor buses at \$315,000 each. Of that cost, the \$22,000 attributed to taxes was not included in bus cost used in this study. The effective cost per bus for this study, without considering the cost of automating technologies, would be \$293,000. Automation technology would be purchased for every vehicle at a cost of roughly \$25,000 per bus. It is noteworthy that PATH personnel, who supplied this figure, believe

that technology costs could be reduced to as low as \$5,000 per vehicle if large numbers of vehicles are outfitted. The \$25,000 per-bus cost used in this study, then, is a conservative estimate of technology costs. The unit cost per bus was adjusted for inflation to 2001-equivalent dollars. Tables G3a and G3b show the tabulated values for Design Scenarios 1 and 2, respectively.

The applicable calculations were performed according to the following formula:

Unit Cost (2001-Equiv.) = Unit Cost x
$$0.9804$$

For the bus itself, the per-bus unit costs for both Scenarios 1 and 2 were:

$$$287,257 = $293,000 \times 0.9804$$

For the automating technology, the per-bus unit costs for both scenarios were \$25,000 in 2001-dollars.

Fleet Size

To operate an ABUS system equivalent to the VTA light rail operations on the project segment, 10.180 buses are required. This number appears in the "# Units in ABUS System" column in Tables G3a and G3b for Design Scenarios 1 and 2, respectively.

Table G10 shows the applicable calculations. The methodology is discussed here.

TABLE G10. ABUS BUSES REQUIRED DURING PM PEAK HOUR

| Train # | # LR Cars | # Buses | | |
|---------|------------|-------------|----------------------|--------------------|
| | Guad. Line | ABUS-Equiv. | # Buses in Operation | Effective # Buses* |
| 1 | 3 | 5 | 1.248 | 1.497 |
| 2 | 3 | 5 | 1.248 | 1.497 |
| 3 | 2 | 3 | 0.749 | 0.898 |
| 4 | 3 | 5 | 1.248 | 1.497 |
| 5 | 2 | 3 | 0.749 | 0.898 |
| 6 | 3 | 5 | 1.248 | 1.497 |
| 7 | 2 | 3 | 0.749 | 0.898 |
| 8 | 3 | 5 | 1.248 | 1.497 |
| TOTAL | 21 | 34 | 8.484 | 10.180 |

Guadalupe Line Length (miles) = 20.8

Project System Length (miles) = 5.19

The number of buses required for this system was arrived at by designing a system which would be functionally equivalent to the light rail system. Given the capacity of the buses and light rail cars, the following equivalencies for light rail trains and bus convoys were assumed:

- 3 light rail vehicles = 5 buses
- 2 light rail vehicles = 3 buses
- 1 light rail vehicle = 1 bus

^{*}Approx. 20% of fleet assumed to be withheld from service for maintenance and contingency.

To determine the total number of buses required, the schedule for the peak light rail train usage was assumed, and the same number of bus convoys as light rail trains was assumed to run during that period. Bus convoy size was adjusted according to the equivalencies above. Based on information obtained from the VTA, then, the number of required buses was adjusted to account for the additional vehicles that would be withheld from service at any given time. Like the light rail, an additional 20 percent of the maximum number of vehicles needed for normal operations are withheld from service for maintenance and contingency purposes. The column entitled "Effective # Buses" in Table G10 refers to the necessary bus fleet size plus the additional 20 percent.

The VTA Guadalupe light rail line, which is the base system for the ABUS, operates eight trains during the PM Peak period. Table C4 (in Appendix C) shows the number of light-rail vehicles required. The number of light rail cars per train is also shown in Table G10.

Also shown in Table G10 is the ABUS-system bus-equivalence for each of the eight trains. This equivalence is based on the ABUS-light rail vehicle equivalences described above.

As previously stated, it is assumed that the number of buses necessary to operate on the 5.19-mile proposed ABUS system length is proportional to the length of the line. This assumption is possible because it is assumed that the proposed project system is a portion of the regular system, and not a stand-alone system in itself. In symbolic notation, then:

$$\frac{L_{\text{ABUS}}}{L_{\text{Guadalupe}}} = \frac{V_{\text{ABUS}}}{V_{\text{Guadalupe}}}$$

where

 L_{ABUS} = the one-directional length of the proposed ABUS line (5.19 miles) $L_{Guadalupe}$ = the one-directional length of the existing VTA Guadalupe line (20.8 miles). This figure was supplied by VTA personnel.

 V_{ABUS} = the number of vehicles operated on the proposed ABUS system $V_{Guadalupe}$ = the number of vehicles operated on the existing VTA Guadalupe line

Then,

$$V_{ABUS} = \frac{L_{ABUS}}{L_{Guadaluoe}} V_{Guadalupe} = \frac{5.19}{20.8} x V_{Guadalupe}$$

The column entitled "# Buses in Operation" in Table G10 shows the proportional number of ABUS vehicles necessary for the 5.19-mile ABUS system. The calculations for this column were completed using the preceding equation. The following sample calculation refers to the TOTAL row:

$$8.484 \text{ buses} = (5.19/20.8) \times 34 \text{ buses}$$

It is noteworthy that three significant figures have been retained in the calculation of ABUS-system fleet requirements to distinguish this number as being a derived quantity, and a portion of a whole, rather than a self-contained system.

As stated previously, the number of buses in the ABUS system was adjusted to reflect that an additional 20 percent of the fleet is routinely held from service for maintenance and contingency. To this end, the column entitled "Effective # Buses" refers to the actual number of buses in the fleet, including those in operation, and those withheld from service. The following formula was used to determine "Effective # Buses:"

```
Effective # Buses = #Buses in Operation System x 1.2
```

The following sample calculation refers to the TOTAL row:

```
10.180 \text{ buses} = 8.484 \text{ buses x } 1.2
```

As previously stated, three significant figures have been retained in the calculation of ABUS-system fleet requirements to distinguish this number as being a derived quantity, and a portion of a whole, rather than a self-contained system.

One-Time Cost (2001-Equivalent)

Tables G3a and G3b show a column entitled "One-Time Cost (2001-Equivalent)," which refers to the total cost for the ABUS system fleet purchase in 2001-dollars for Design Scenarios 1 and 2, respectively. This number was arrived at by multiplying the 2001-equivalent cost per bus by the number of buses in the ABUS system, as per the following sample calculation from Table G3a:

$$$2,924,389 = $287,257 \times 10.180$$

EUAC (2001-Equivalent)

Tables G3a and G3b (for Design Scenarios 1 and 2, respectively) show a column entitled "EUAC (2001-Equiv.)," which refers to an annualized cost for fleet purchase, assuming a 30-year project life and a 6% discount rate. EUAC was calculated according to the following formulae:

```
[EUAC (2001-Equiv.)] = [One-Time Cost (2001-Equiv.)] x [A/P,i,n]
= [One-Time Cost (2001-Equiv.)] x [i(1+i)^n]/[((1+i)^n)-1))]
= [One-Time Cost (2001-Equiv.)] x 0.0726
```

Thus, numerically,

```
$212,454 = $2,924,389 \times 0.0726
```

Automation Technology for Vehicles

Automating technology is assumed to cost \$25,000 per bus, and was assumed to be purchased for each bus using the system. Methodologies for vehicle automation technology purchase are identical to those used to calculate fleet purchase costs in the previous section. Tables G3a and G3b show the calculated costs for Design Scenarios 1 and 2, respectively.

ABUS Periodic Capital Costs

Periodic capital costs for the ABUS system include routine pavement sealing and resurfacing costs, replacement of automated technology on vehicles, and replacement of magnetic reference markers when the roadway is rehabilitated. Pavement maintenance is not included in the VTA "System Maintenance" cost category. Costs for pavement sealing and resurfacing were obtained from engineers in the City of San Jose pavement design division, and are historic costs based on previous projects. They are considered to be accurate for the years 2002 and 2003. The unit costs used in this study are all-inclusive, meaning that all costs associated with the given type of work are included in the figure. These costs include overhead, internal costs, engineering, contract costs, etc.

Tables G3a and G3b show tabulated rehabilitation costs for the ABUS system, itemized by rehabilitation type, for each design scenario (design following AASHTO standards, and the reduced-width design). Tables G11 and G12 show rehabilitation cost calculations for the two design scenarios. The rehabilitation types are:

- Minor Rehabilitation Seals
- Major Rehabilitation Resurfacing
- Magnetic Reference Marker Replacement

Minor Rehabilitation –Seals

As part of routine preventative roadway maintenance, a sealant is applied to the surface of a typical asphalt concrete roadway with a frequency of 5 to 7 years according to City of San Jose (CSJ) pavement department engineers. A unit cost of \$3.90 per square yard (in 2002-dollars) was cited, also by CSJ engineers, as representative of the cost of preventative sealants. This cost is all-inclusive, as described above, and also includes the repair of localized failures, such as potholes, before the sealant is applied.

Assuming a 5-year sealant frequency, the annual cost for this type of minor rehabilitation to the roadway surface was calculated. Tables G11 and G12 show cost calculations for Design Scenario 1 (where design follows AASHTO standards) and Design Scenario 2 (where design follows the previously-described reduced-width standards).

Methodologies and sample calculations appear in the section of this appendix entitled "ABUS Rehabilitation Cost Calculations – Methodologies and Sample Calculations."

TABLE G11. ROADWAY REHABILITATION COSTS - SCENARIO 1: DESIGN FOLLOWS AASHTO STANDARDS

| TABLE OT IT ROAD WATER RELIABLE TO A GOOT OF | | | | | | | | | | | | | |
|--|---------------------|-----------|---------------|----------------------------|--------|-------------|--------|--------|------|----------------------------|-----------|-------|------------------|
| Type | Unit Cost (2002 \$) | | Unit Cost (20 | Unit Cost (2001-Equiv. \$) | | Project Din | nensio | ns | | Total Cost (\$) per Rehab. | Frequency | | Annual Cost |
| Туре | Cost | Unit | Cost | Unit | Length | Area | Unit | Area | Unit | Cycle (2001-Equiv.) | Frequency | | (2001-Equiv. \$) |
| Minor - Seals | 3.90 | SY | 3.82 | SY | N/A | 712,483 | SF | 79,165 | SY | 302,691 | 5 | years | 30,732 |
| Major - Resurfacing | 17.21 | SY | 16.87 | SY | N/A | 712,483 | SF | 79,165 | SY | 1,335,723 | 10 | years | 84,443 |
| Magnetic Reference Markers - Includes Installation | 5,000 | Lane Mile | 5,000 | Lane Mile | 10.38 | N/A | N/A | N/A | N/A | 51,900 | 5 | years | 8,550 |

TABLE G12. ROADWAY REHABILITATION COSTS - SCENARIO 2: REDUCED-WIDTH DESIGN

| Typo | Unit Cost (2002 \$) | | Unit Cost (20 | Unit Cost (2001-Equiv. \$) | | Project Din | nensio | ns | | Total Cost (\$) per Rehab. | | | Annual Cost |
|--|---------------------|-----------|---------------|----------------------------|--------|-------------|--------|--------|------|----------------------------|-----------------------|-------|------------------|
| Туре | Cost | Unit | Cost | Unit | Length | Area | Unit | Area | Unit | Cycle (2001-Equiv.) | 001-Equiv.) Frequence | | (2001-Equiv. \$) |
| Minor - Seals | 3.90 | SY | 3.82 | SY | N/A | 520,661 | SF | 57,851 | SY | 221,198 | 5 | years | 22,458 |
| Major - Resurfacing | 17.21 | SY | 16.87 | SY | N/A | 520,661 | SF | 57,851 | SY | 976,105 | 10 | years | 61,708 |
| Magnetic Reference Markers - Includes Installation | 5,000 | Lane Mile | 5,000 | Lane Mile | 10.38 | N/A | N/A | N/A | N/A | 51,900 | 5 | years | 8,550 |

Major Rehabilitation – Resurfacing

According to City of San Jose engineers, a typical resurfacing of an asphalt concrete roadway occurs every 2-to-3 sealant cycles. For this study, a conservative 2-cycle, or 10-year, resurfacing cycle was assumed. A unit cost of \$17.21 per square yard (in 2002 dollars) was given by City of San Jose personnel. Like costs for preventative sealants, this cost is all-inclusive, as described above, and also includes the repair of localized failures, such as potholes, before resurfacing.

Tables G11 and G12 show cost calculations for Design Scenario 1 (where design follows AASHTO standards) and Design Scenario 2 (where design follows the previously-described reduced-width standards).

Methodologies and sample calculations appear in subsequent sections.

ABUS Magnetic Reference Markers

For the purposes of this study, magnetic reference markers were assumed to be replaced each time the roadway would be resealed or resurface. This works out to a five-year replacement frequency, at \$5,000 per mile.

Tables G11 and G12 show cost calculations for Design Scenario 1 (where design follows AASHTO standards) and Design Scenario 2 (where design follows the reduced-width standard).

Methodologies and sample calculations appear in subsequent sections.

ABUS Rehabilitation Cost Calculations – Methodologies and Sample Calculations

The following cost calculations apply to Table G11, costs for "Minor Rehabilitation – Preventative Sealants" pertaining to Design Scenario 1. Identical methodologies were used to calculate all costs in Table G12, which pertain to Design Scenario 2.

Unit Cost (2001-Equiv.)

```
[Unit Cost (2001-Equiv.)] = [Unit Cost (2002)] x [2002-to-2001 Inflation Factor)] Sample Calculation: $3.82 = $3.90 x 0.9804 (see Reference (2))
```

Project Surface Area

ABUS project surface area is previously-calculated in square feet for Design Scenarios 1 and 2 in Tables G1 and G2. It was converted here to square yards by dividing the square footage by 9.

Total Cost per Rehab. Cycle

```
[Total Cost per Rehab. Cycle (2001-Equiv.)] = [Project Surface Area] x [Unit Cost (2001-Equiv.)]
```

Sample Calculation: $$302,691 = 79,165 \times 3.82

<u>Frequency</u>

This column refers to the frequency of rehabilitation, in years. These values were taken from data given by VTA personnel.

Annual Cost (2001-Equiv.)

Minor Rehabilitation - Seals

```
[Annual Cost (2001-Equiv.)] = [Total Cost per Rehab. Cycle (2001-Equiv.)] x [(P/F,i,5) + (P/F,i,15) + (P/F,i,25)] x [A/P,i,30] where the interest rate i=6%, the project life (n) is assumed to be 30 years, and where the formulae for [P/F,i,n] and [A/P,i,n] are given as follows:
```

```
[P/F,i,n] = 1/(1+i)^{n}
[A/P,i,n] = i(1+i)^{n}/[(1+i)^{n}-1]
Sample Calculation: $30,732 = $302,691 x
(0.7473+0.4173+0.2330) \times 0.0726
```

Major Rehabilitation - Resurfacing

```
[Annual Cost (2001-Equiv.)] = [Total Cost per Rehab. Cycle (2001-Equiv.)] x [(P/F,i,10) + (P/F,i,20)] x [A/P,i,30]
```

where the interest rate i=6%, the project life (n) is assumed to be 30 years, and where the formulae for [P/F,i,n] and [A/P,i,n] are as given in the previous calculation for Minor Rehabilitation.

Magnetic Reference Markers

```
[Annual Cost (2001-Equiv.)] = [Total Cost per Rehab. Cycle (2001-Equiv.)] x [(P/F,i,5) + (P/F,i,10) + (P/F,i,15) + (P/F,i,20) + (P/F,i,25)] x [A/P,i,30] where the interest rate i=6%, the project life (n) is assumed to be 30 years, and where the formulae for [P/F,i,n] and [A/P,i,n] are as given in the previous calculation for Minor Rehabilitation.
```

Fleet Renewal

Fleet renewal involves replacing the buses that serve the study system, and also the automating technology used on the buses.

Bus Replacement Costs

It was assumed for the purposes of this study that, when additional buses would be purchased, the associated automating technology for the bus would also be replaced. Fleet renewal calculations are identical for Design Scenarios 1 and 2. Tables G3a and G3b show the tabulated values. The following procedures were used:

VTA personnel were consulted, and it was determined that the organization typically replaces an operating bus after 14 years of service. The buses used for this project cost \$287,257 in 2001-equivalent dollars, as discussed in previous sections of this appendix.

For compatibility with the ABUS study system 30-year life cycle, a 15-year fleet replacement cycle was assumed. Thus, it was assumed that $1/15^{th}$ of the fleet would be replaced each year, at a per-bus cost of \$287,257 per bus (in 2001-equivalent dollars). Tables G3a and G3b show the calculated costs for Design Scenarios 1 and 2, respectively. Calculations and methodologies are as follows:

It was previously calculated that 10.180 buses were required to service the study segment. If $1/15^{th}$ of these were replaced each year, then the annual cost, in 2001-equivalent dollars, would be calculated as follows:

EUAC (2001-Equiv.) =
$$$194,959 = [10.180/15] \times $287,257$$

Vehicle Automation Technology Replacement Costs

Automating technology is assumed to cost \$25,000 per bus, and is assumed to be replaced at the same frequency as the bus fleet. Methodologies for vehicle automation technology replacement are identical to those used to calculate fleet renewal costs in the previous section. Tables G3a and G3b show the calculated costs for Design Scenarios 1 and 2, respectively.

ABUS SYSTEM NON-INFRASTRUCTURE AGENCY COSTS

ABUS system non-infrastructure agency costs include those costs for operation and maintenance of the ABUS system. They include:

- Vehicle Operating Costs
- Vehicle Maintenance Costs
- System (Non-Vehicle) Maintenance Costs
- System Administration Costs

Descriptions of the cost elements included in these categories will be discussed below.

Determination of the ABUS study system vehicle operating costs was performed in several major phases for each of the four aforementioned cost categories:

- 1. Determination of individual cost elements that comprise costs in that category.
- 2. Determination of unit costs for those cost elements in terms of vehicle-revenue-miles and vehicle-revenue-hours (discussed in Appendix H).
- 3. Determination of annual convoy-revenue-miles and –hours for the study section (discussed in Appendix H).
- 4. Determination of unit costs for each cost element, based on the VTA bus system, in terms of vehicle-revenue-miles and vehicle-revenue-hours, or convoy-revenue-miles and –hours.
- 5. Calculation of ABUS study system annual costs based on unit costs and calculated vehicle-revenue-miles and –hours, or convoy-revenue-miles and –hours.

Items 1, 4 and 5 are the focus of this appendix.

Agency Cost Category Descriptions

ABUS Vehicle Operations

Costs associated with vehicle operations include daily costs necessary to run the system, including operators' salaries, wages, and benefits, fuel and oil, utilities, and other expenses. Vehicle operating costs do not include costs for routine vehicle maintenance, such as tire replacement and labor costs for workers performing the maintenance.

ABUS System Vehicle Maintenance Costs

Costs associated with vehicle maintenance include those costs for materials, supplies, fuels, lubricants, utilities, and labor used to keep the system in good working order, which are not included in vehicle operating costs.

ABUS System (Non-Vehicle) Maintenance Costs

Costs associated with system maintenance include maintenance expenses for bus stops and other infrastructure, and also for minor roadway maintenance activities such as street sweeping, cleaning of storm sewers, landscaping, streetlights, traffic signals, signs, and markings. System maintenance does not include resurfacing or rehabilitation (i.e. – resurfacing and preventative sealants) for the roadways on which the buses travel. Roadway rehabilitation of this sort is included in infrastructure and capital costs, under the heading of "Rehabilitation."

ABUS System Administration Costs

Costs associated with system administration include expenses incurred for system support personnel in VTA's offices.

Unit Cost Calculations

Four types of unit costs were calculated for this study:

- 1. Unit cost per vehicle-revenue-mile
- 2. Unit cost per vehicle-revenue-hour
- 3. Unit cost per convoy-revenue-mile
- 4. Unit cost per convoy-revenue-hour

The procedures described herein are general to the four cost categories discussed in this section. Procedures are illustrated here using the "Vehicle Operating Costs" tables and quantities as a model.

For the ABUS system, data for the operation of VTA buses were used to estimate most costs to operate ABUS vehicles. VTA's 1999-2000 report to the National Transit Database (NTD) itemizes operating expenses for buses according to "Expense Object Classes" (EOCs) and also according to function (Vehicle Operations, Vehicle Maintenance, Non-Vehicle Maintenance, and General Administration) in Form 301 of the report (3). The general "Expense Object Classes" listed in Form 301 was used to construct a working list of potential cost elements for the light rail, bus, and ABUS components of this benefit/cost analysis.

Tables G13a through G16b show itemized lists of cost elements, raw source data, and unit cost data for ABUS vehicle operating costs, vehicle maintenance costs, system maintenance costs, and system administration costs, respectively. The NTD (3) gives total annual vehicle-revenue-miles and total annual vehicle-revenue-hours for the VTA bus system to be 19,140,121 and 1,471,604, respectively, for the fiscal year ending in June 2000. Unit costs in terms of revenue miles and revenue hours for all EOCs excluding operator wages and operator fringe benefits (discussed in a later section) were found by dividing the given VTA total operating expenses for the year 2000 by 19,140,121 and 1,471,604, respectively.

For costs associated with vehicle operations, vehicle maintenance, and system administration, VTA data reported to the NTD were assumed to be an exhaustive list of costs associated with operating an ABUS system. This assumption was not applicable, however, in the case of system (non-vehicle) maintenance costs. The discrepancy arises because the VTA does not maintain the streets on which its buses operate. For the purposes of this study, it is assumed that the agency that builds and maintains the ABUS system also maintains the roadways, so costs for street maintenance (such as sweeping and culvert cleaning) had to be added.

In Tables G15a and G15b, the costs itemized under the heading "Street Maintenance" were obtained from the City of San Jose (CSJ) Department of Transportation Street Maintenance division. Table G17 shows calculations and tabulated values for determining costs for roadway maintenance activities. For reasons described in subsequent paragraphs, no distinction was made between costs for Design Scenarios 1 and 2; all street maintenance calculations are assumed to apply to both scenarios. Methodologies and sample calculations are discussed in the following paragraphs.

TABLE G13a. ABUS VEHICLE OPERATING COSTS - SOURCE DATA

| | | | Annual Cost (VTA | Reve | nue-Miles | Reven | ue-Hours |
|------------------------|-------------------------------|------|------------------|----------------|---------------------|----------------|---------------------|
| Cost Element | ltem ltem | Year | Total \$) | Unit Cost (\$) | Unit | Unit Cost (\$) | Unit |
| Salaries and Wages | Operators' Salaries and Wages | 2000 | 3,588,844 | 2.22 | convoy-revenue-mile | 32.89 | convoy-revenue-hour |
| Salaries and wages | Other Salaries and Wages | 2000 | 9,092,463 | 0.48 | bus-revenue-mile | 6.18 | bus-revenue-hour |
| Fringe Benefits | Operators' Fringe Benefits | 2000 | 2,951,068 | 1.83 | convoy-revenue-mile | 27.04 | convoy-revenue-hour |
| Fillige Bellelits | Other Fringe Benefits | 2000 | 5,259,043 | 0.27 | bus-revenue-mile | 3.57 | bus-revenue-hour |
| Services | Services | 2000 | 3,473,770 | 0.18 | bus-revenue-mile | 2.36 | bus-revenue-hour |
| | Fuel and Lubricants | 2000 | 5,668,049 | 0.30 | bus-revenue-mile | 3.85 | bus-revenue-hour |
| Materials and Supplies | Tires and Lubes | 2000 | 1,263,850 | 0.07 | bus-revenue-mile | 0.86 | bus-revenue-hour |
| | Other Materials and Supplies | 2000 | 148,627 | 0.01 | bus-revenue-mile | 0.10 | bus-revenue-hour |
| Utilities | Utilities | 2000 | 2,252,658 | 0.12 | bus-revenue-mile | 1.53 | bus-revenue-hour |
| Taxes | Taxes | | | | | | |
| Misc. | Miscellaneous Expenses | 2000 | 586,232 | 0.03 | bus-revenue-mile | 0.40 | bus-revenue-hour |
| Expense Transfers | Expense Transfers | | | | | | |
| TOTAL OPERATING COSTS | | | 34,284,604 | | | | |

TABLE G13b. ABUS VEHICLE OPERATING COSTS

| | | | Reve | nue-Miles | | | Re | venue-Hours | |
|------------------------|-------------------------------|------------------|-----------------|---------------------|--------------------|------------------|-----------------|---------------------|--------------------|
| Cost Element | ITEM | Unit Cost (2001- | Annual Units in | Unit | Annual Cost (2001- | Unit Cost (2001- | Annual Units in | Unit | Annual Cost (2001- |
| | | Equiv. \$) | ABUS System | Unit | Equiv. \$) | Equiv. \$) | ABUS System | Unit | Equiv. \$) |
| Salaries and Wages | Operators' Salaries and Wages | 2.27 | 276,035 | convoy-revenue-hour | 625,840 | 33.55 | 15,439 | convoy-revenue-hour | 517,923 |
| Salaries and wages | Other Salaries and Wages | 0.48 | 620,101 | bus-revenue-hour | 300,469 | 6.30 | 34,683 | bus-revenue-hour | 218,577 |
| Fringe Benefits | Operators' Fringe Benefits | 1.86 | 276,035 | convoy-revenue-hour | 514,622 | 27.59 | 15,439 | convoy-revenue-hour | 425,883 |
| Tillige Bellelits | Other Fringe Benefits | 0.28 | 620,101 | bus-revenue-hour | 173,790 | 3.65 | 34,683 | bus-revenue-hour | 126,424 |
| Services | Services | 0.19 | 620,101 | bus-revenue-hour | 114,794 | 2.41 | 34,683 | bus-revenue-hour | 83,507 |
| | Fuel and Lubricants | 0.30 | 620,101 | bus-revenue-hour | 187,306 | 3.93 | 34,683 | bus-revenue-hour | 136,256 |
| Materials and Supplies | Tires and Lubes | 0.07 | 620,101 | bus-revenue-hour | 41,765 | 0.88 | 34,683 | bus-revenue-hour | 30,382 |
| | Other Materials and Supplies | 0.01 | 620,101 | bus-revenue-hour | 4,912 | 0.10 | 34,683 | bus-revenue-hour | 3,573 |
| Utilities | Utilities | 0.12 | 620,101 | bus-revenue-hour | 74,441 | 1.56 | 34,683 | bus-revenue-hour | 54,152 |
| Taxes | Taxes | | | | | | | | |
| Misc. | Miscellaneous Expenses | 0.03 | 620,101 | bus-revenue-hour | 19,373 | 0.41 | 34,683 | bus-revenue-hour | 14,093 |
| Expense Transfers | Expense Transfers | | | | | | | | |
| TOTAL OPERATING COSTS | | | · | | 2,057,312 | | | | 1,610,770 |

TABLE G14a. ABUS VEHICLE MAINTENANCE COSTS - SOURCE DATA

| Cost Element | Item | Year | Annual Cost (VTA Total \$) | Unit Cost per Veh- Rev-Mi (\$) | Unit Cost per Veh- Rev-Hr (\$) |
|--------------------|-------------------------------|------|-------------------------------|-----------------------------------|-----------------------------------|
| | Operators' Salaries and Wages | 2000 | | | |
| Salaries and Wages | Operating Time | 2000 | | | |
| Salaties and wages | Paid Non-Operating Work Time | 2000 | | | |
| | Other Salaries and Wages | 2000 | 17,090,526 | 0.89 | 11.61 |
| Fringe Benefits | Operators' Fringe Benefits | 2000 | | | |
| Fillige Deficition | Other Fringe Benefits | 2000 | 10,171,267 | 0.53 | 6.91 |
| Services | Services | 2000 | 3,257,024 | 0.17 | 2.21 |
| Materials and | Fuel and Lubricants | 2000 | | | |
| | Tires and Lubes | 2000 | | | |
| Supplies | Other Materials and Supplies | 2000 | 5,339,616 | 0.28 | 3.63 |
| Utilities | Utilities | 2000 | 2,708 | 0.00 | 0.00 |
| Taxes | Taxes | 2000 | | | |
| Misc. | Miscellaneous Expenses | 2000 | 168,299 | 0.01 | 0.11 |
| Expense Transfers | Expense Transfers | 2000 | | | |
| TOTAL ABUS VEHIC | LE MAINTENANCE COSTS | | 36,029,440 | 1.88 | 24.48 |

TABLE G14b. ABUS VEHICLE MAINTENANCE COSTS

| | | , | /ehicle-Revenue-Miles | | V | ehicle-Revenue-Hours | |
|--------------------|-------------------------------|-----------------|-----------------------|-------------------|-----------------|----------------------|------------------|
| Cost Element | Item | Unit Cost (2001 | Annual Units in ABUS | Annual Cost (2001 | Unit Cost (2001 | Annual Units in ABUS | Annual Cost |
| | | Equiv. \$) | System | Equiv. \$) | Equiv. \$) | System | (2001-Equiv. \$) |
| | Operators' Salaries and Wages | | | | | | |
| Salaries and Wages | Operating Time | | | | | | |
| Salaries and wages | Paid Non-Operating Work Time | | | | | | |
| | Other Salaries and Wages | 0.91 | 620,101 | 564,772 | 11.85 | 34,683 | 410,845 |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | |
| Fillige beliefits | Other Fringe Benefits | 0.54 | 620,101 | 336,119 | 7.05 | 34,683 | 244,510 |
| Services | Services | 0.17 | 620,101 | 107,631 | 2.26 | 34,683 | 78,297 |
| Materials and | Fuel and Lubricants | | | | | | |
| | Tires and Lubes | | | | | | |
| Supplies | Other Materials and Supplies | 0.28 | 620,101 | 176,453 | 3.70 | 34,683 | 128,361 |
| Utilities | Utilities | 0.00 | 620,101 | 89 | 0.00 | 34,683 | 65 |
| Taxes | Taxes | | | | | | |
| Misc. | Miscellaneous Expenses | 0.01 | 620,101 | 5,562 | 0.12 | 34,683 | 4,046 |
| Expense Transfers | Expense Transfers | | | | | | |
| TOTAL ABUS VEHIC | LE MAINTENANCE COSTS | 1.92 | | 1,190,627 | 24.97 | | 866,123 |

TABLE G15a. ABUS SYSTEM (NON-VEHICLE) MAINTENANCE COSTS - SOURCE DATA

| Cost Element | Item | Year | Annual Cost (VTA Total \$) | Unit Cost per Veh- Rev-Mi (\$) | Unit Cost per Veh- Rev-Hr (\$) |
|------------------------|--|------|----------------------------|-----------------------------------|-----------------------------------|
| | Operators' Salaries and Wages | 2000 | | , | , , |
| Salaries and Wages | Operating Time | 2000 | | | |
| Salaties and wages | Paid Non-Operating Work Time | 2000 | | | |
| | Other Salaries and Wages | 2000 | 2,775,476 | 0.15 | 1.89 |
| Fringe Benefits | Operators' Fringe Benefits | 2000 | | | |
| Fillige Deficills | Other Fringe Benefits | 2000 | 1,426,458 | 0.07 | 0.97 |
| Services | Services | 2000 | 2,425,464 | 0.13 | 1.65 |
| | Fuel and Lubricants | 2000 | | | |
| Materials and Supplies | Tires and Lubes | 2000 | | | |
| | Other Materials and Supplies | 2000 | 273,506 | 0.01 | 0.19 |
| Utilities | Utilities | 2000 | 343,855 | 0.02 | 0.23 |
| Taxes | Taxes | 2000 | | | |
| | Street Sweeping | 2002 | See Table G17 | N/A | N/A |
| | Storm Sewers (Includes Inlet Cleaning) | 2002 | See Table G17 | N/A | N/A |
| | Landscaping (Includes Median Islands) | 2002 | See Table G17 | N/A | N/A |
| Street Maintenance* | Streetlights | 2002 | See Table G17 | N/A | N/A |
| | Traffic Signals | 2002 | See Table G17 | N/A | N/A |
| | Signs | 2002 | See Table G17 | N/A | N/A |
| | Markings | 2002 | See Table G17 | N/A | N/A |
| Misc | Miscellaneous Expenses | 2000 | 55,906 | 0.00 | 0.04 |
| Expense Transfers | Expense Transfers | 2000 | | | |
| TOTAL ABUS SYSTEM | (NON-VEHICLE) MAINTENANCE COSTS | | | | |

^{*}See Table G17 for street maintenance cost calculations.

TABLE G15b. ABUS SYSTEM (NON-VEHICLE) MAINTENANCE COSTS

| | | | Vehicle-Revenue-Miles | 3 | Veh | nicle-Revenue-Ho | urs |
|------------------------|--|------------------|-----------------------|------------------|------------------|------------------|--------------------|
| Cost Element | Item | Unit Cost (2001- | Annual Units in ABUS | Annual Cost | Unit Cost (2001- | Annual Units in | Annual Cost |
| | | Equiv. \$) | System | (2001-Equiv. \$) | Equiv. \$) | ABUS System | (2001-Equiv. \$) |
| | Operators' Salaries and Wages | | | | | | |
| Salaries and Wages | Operating Time | | | | | | |
| Salaries and Wages | Paid Non-Operating Work Time | | | | | | |
| | Other Salaries and Wages | 0.15 | 620,101 | 91,718 | 1.92 | 34,683 | 66,72 |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | |
| Thinge Benefits | Other Fringe Benefits | 0.08 | 620,101 | 47,139 | 0.99 | 34,683 | 34,29 ⁻ |
| Services | Services | 0.13 | 620,101 | 80,152 | 1.68 | 34,683 | 58,307 |
| | Fuel and Lubricants | | | | | | |
| Materials and Supplies | Tires and Lubes | | | | | | |
| | Other Materials and Supplies | 0.01 | 620,101 | 9,038 | 0.19 | 34,683 | 6,575 |
| Utilities | Utilities | 0.02 | 620,101 | 11,363 | 0.24 | 34,683 | 8,266 |
| Taxes | Taxes | | | | | | |
| | Street Sweeping | N/A | N/A | 6,988 | N/A | N/A | 6,988 |
| | Storm Sewers (Includes Inlet Cleaning) | N/A | N/A | 3,669 | N/A | N/A | 3,669 |
| | Landscaping (Includes Median Islands) | N/A | N/A | 7,903 | N/A | N/A | 7,900 |
| Street Maintenance* | Streetlights | N/A | N/A | 4,517 | N/A | N/A | 4,517 |
| | Traffic Signals | N/A | N/A | 3,910 | N/A | N/A | 3,910 |
| | Signs | N/A | N/A | 1,681 | N/A | N/A | 1,681 |
| | Markings | N/A | N/A | 2,684 | N/A | N/A | 2,684 |
| Misc | Miscellaneous Expenses | 0.00 | 620,101 | 1,847 | 0.04 | 34,683 | 1,344 |
| Expense Transfers | Expense Transfers | | | | | | |
| TOTAL ABUS SYSTEM (1 | NON-VEHICLE) MAINTENANCE COSTS | | | 272,609 | | | 206,85 |

^{*}See Table G17 for street maintenance cost calculations.

TABLE G16a. ABUS SYSTEM ADMINISTRATION COSTS - SOURCE DATA

| Cost Element | Item | Year | Annual Cost (VTA Total \$) | Unit Cost per Veh- Rev-Mi (\$) | Unit Cost per Veh- Rev-Hr (\$) |
|--------------------|-------------------------------|------|-------------------------------|-----------------------------------|-----------------------------------|
| | Operators' Salaries and Wages | 2000 | | | |
| Calarias and Magas | Operating Time | 2000 | | | |
| Salaries and Wages | Paid Non-Operating Work Time | 2000 | | | |
| | Other Salaries and Wages | 2000 | 5,934,604 | 2.45 | 36.33 |
| Cringo Donofito | Operators' Fringe Benefits | 2000 | | | |
| Fringe Benefits | Other Fringe Benefits | 2000 | 5,369,604 | 2.22 | 32.87 |
| Services | Services | 2000 | 1,658,116 | 0.68 | 10.15 |
| Materials and | Fuel and Lubricants | 2000 | | | |
| | Tires and Lubes | 2000 | | | |
| Supplies | Other Materials and Supplies | 2000 | 295,744 | 0.12 | 1.81 |
| Utilities | Utilities | 2000 | 46,731 | 0.02 | 0.29 |
| Taxes | Taxes | 2000 | | | |
| Misc. | Miscellaneous Expenses | 2000 | 432,480 | 0.18 | 2.65 |
| Expense Transfers | Expense Transfers | 2000 | | | |
| TOTAL ABUS SYSTE | M ADMINISTRATION COSTS | | 13,737,279 | 5.67 | 84.10 |

TABLE G16b. ABUS SYSTEM ADMINISTRATION COSTS

| | | | Vehicle-Revenue-Miles | | | Vehicle-Revenue-Hours | |
|------------------------|-------------------------------|------------------------|-----------------------|--------------------|------------------|-----------------------|--------------------|
| Cost Element | Item | Unit Cost (2001-Equiv. | Annual Units in ABUS | Annual Cost (2001- | Unit Cost (2001- | Annual Units in ABUS | Annual Cost (2001- |
| | | \$) | System | Equiv. \$) | Equiv. \$) | System | Equiv. \$) |
| | Operators' Salaries and Wages | | | | | | |
| Salaries and Wages | Operating Time | | | | | | |
| Salaries and wages | Paid Non-Operating Work Time | | | | | | |
| | Other Salaries and Wages | 2.50 | 620,101 | 1,549,903 | 37.06 | 34,683 | 1,285,245 |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | |
| i illige bellellis | Other Fringe Benefits | 2.26 | 620,101 | 1,402,346 | 33.53 | 34,683 | 1,162,884 |
| Services | Services | 0.70 | 620,101 | 433,040 | 10.35 | 34,683 | 359,095 |
| | Fuel and Lubricants | | | | | | |
| Materials and Supplies | Tires and Lubes | | | | | | |
| | Other Materials and Supplies | 0.12 | 620,101 | 77,238 | 1.85 | 34,683 | 64,049 |
| Utilities | Utilities | 0.02 | 620,101 | 12,204 | 0.29 | 34,683 | 10,120 |
| Taxes | Taxes | | | | | | |
| Misc. | Miscellaneous Expenses | 0.18 | 620,101 | 112,948 | 2.70 | 34,683 | 93,661 |
| Expense Transfers | Expense Transfers | | | | | | |
| TOTAL ABUS SYSTEM ADM | MINISTRATION COSTS | 5.79 | | 3,587,679 | 85.78 | | 2,975,054 |

In Table G17, the columns headed "CSJ Total Annual Cost (\$)," "CSJ Profile," and "CSJ 30-Foot Equivalent Miles in System" contain values obtained directly from CSJ. "CSJ Total Annual Cost (\$)" refers to the dollar amount that the City of San Jose (CSJ) spent in 2002 forall maintenance activity in the corresponding cost category (street sweeping, etc.). "CSJ Profile" refers to the total quantity of infrastructure maintained by the City of San Jose in 2002 (for instance, CSJ maintained 8,320 curb miles that year). "CSJ 30-Foot Equivalent Miles in System" is a figure that refers to the total roadway mileage maintained by the City of San Jose. One 30-foot equivalent mile is equal to thirty feet of roadway width that is one mile in length.

The columns headed "Units per 30-Foot Equiv. Mile" contain calculated values in units per 30-foot equivalent mile. The following sample calculation is for the row entitled "Street Sweeping:"

[3.62 curb miles/ 30-foot equiv. mile] = [8,320 curb miles] / [2300 30-foot equiv. miles]

The column headed "ABUS System Mileage (30-Foot Equiv. Miles)" represents the number of 30-foot equivalent miles assumed to be in the ABUS system. Although the ABUS system is at maximum 26 feet (for Design Scenario 1) in width, adjusting the 30-foot equivalent mileage figure to reflect a width of 26 feet (or, in the case of Design Scenario 2, 21 feet) was deemed unnecessary by the authors. Resulting adjustments made to annual costs would have been negligible. For this reason, also, the resulting costs are assumed to apply to Design Scenarios 1 and 2.

The columns headed "Equivalent ABUS Profile" contains calculated values resulting from the following formula:

Equivalent ABUS Profile = [Units per 30-Foot Equiv. Mile] x [ABUS System Mileage (30-Foot Equiv. Miles)]

The following sample calculation comes from the row entitled "Street Sweeping:"

18.77 Curb Miles = [3.62 Curb Miles per 30-Foot Equiv. Mile] x [5.19 30-Foot Equiv. Miles]

The columns headed "Unit Cost (\$)" contain values for the unit cost for each work item, and were calculated by dividing the "CSJ Total Annual Cost (\$)" by the number of units from the "CSJ Profile" column. The following sample calculation comes from the row entitled "Street Sweeping:"

\$379.64 per Curb Mile = \$3,158,619 / 8,320 Curb Miles The column headed "Annual Cost (2002)" is a calculated quantity arrived at by the following formula:

Annual Cost (2002) = [Equivalent ABUS Profile] x [Unit Cost (\$)]

TABLE G17. ROADWAY MAINTENANCE

| TABLE GIT. ROADWAT MAINTENANCE | _ | | | | | | | | | | | | |
|--|------------------|------------|-----------------|------------------------|----------|-------------------------------------|------------------------|--------------|-----------------|-----------|--------------------|-------------|------------------|
| Activity | CSJ Total Annual | CSJ | Profile | CSJ 30-Foot Equivalent | U | nits per 30-Foot Equiv. Mile | ABUS System Mileage | Equivalent A | ABUS Profile | Unit | Cost (\$) | Annual Cost | Annual Cost |
| Activity | Cost (\$) | Number | Unit | Miles in System | Number | Unit | (30-Foot Equiv. Miles) | Number | Unit | Number | Unit | (2002 \$) | (2001-Equiv. \$) |
| Street Sweeping | 3,158,619 | 8,320 | Curb Miles | 2300 | 3.62 | Curb Miles/30-Foot Equiv Mile | 5.19 | 18.77 | Curb Miles | 379.64 | per Curb Mile | 7,127 | 6,988 |
| Storm Sewers (Includes Inlet Cleaning) | 1,658,511 | 907 | Miles | 2300 | 0.39 | Miles/30-Foot Equiv. Mile | 5.19 | 2.05 | Miles | 1,828.57 | per Mile | 3,742 | 3,669 |
| Landscaping (Includes Median Islands) | 3,572,324 | 187 | Acres | 2300 | | Acres/30-Foot Equiv. Mile | 5.19 | 0.42 | Acres | 19,103.34 | per Acre | 8,061 | 7,903 |
| Streetlights | 2,041,814 | 55,480 | Streetlights | 2300 | 24.12 | Streetlights/30-Foot Equiv. Mile | 5.19 | 125.19 | Streetlights | 36.80 | per Streetlight | 4,607 | 4,517 |
| Traffic Signals | 1,767,422 | 803 | Traffic Signals | 2300 | 0.35 | Traffic Signals/30-Foot Equiv. Mile | 5.19 | 1.81 | Traffic Signals | 2,201.02 | per Traffic Signal | 3,988 | 3,910 |
| Signs | 759,736 | 95,000 | Signs | 2300 | 41.30 | Signs/30-Foot Equiv. Mile | 5.19 | 214.37 | Signs | 8.00 | per Sign | 1,714 | 1,681 |
| Markings | 1,213,094 | 12,600,000 | Sq. Feet | 2300 | 5,478.26 | Sq. Feet/30-Foot Equiv. Mile | 5.19 | 28,432.17 | Sq. Feet | 0.10 | per Sq. Foot | 2,737 | 2,684 |

The following sample calculation comes from the row entitled "Street Sweeping:"

$$7,127 = [18.77 \text{ Curb Miles}] \times 379.64$$

Then, annual costs for the ABUS system were adjusted for inflation to 2001-equivalent values. An inflator of 0.9804 (2) was used, as per the following sample calculation (for street sweeping):

$$$6,988 = $7,127 \times 0.9804$$

Table G15b shows annual 2001-equivalent costs applied to the system (non-vehicle) maintenance costs for the ABUS system.

Unit Costs for Operators' Wages and Fringe Benefits

Unit costs for operators' wages and fringe benefits for the ABUS system were assumed to be identical to unit costs for operator wages and fringe benefits for the light rail system. Because VTA buses do not convoy as do the buses in the proposed ABUS system, and because it is assumed for the study system that the ABUS and light rail systems are functionally equivalent (meaning that transport the same number of passengers in the same time periods), the VTA light rail unit cost data pertaining to driver wages and fringe benefits was considered to be a more accurate reflection of potential ABUS driver costs than would VTA bus system unit costs. Thus, the unit costs appearing in Table G13a are copied directly from Table C7a, the comparable table in the light rail section of the report. Subsequent calculations were carried out via the same methodologies as in previous sections using vehicle-revenue-miles and –hours calculated for the ABUS system. Separation of fringe benefits into operators' and other categories were calculated according to the same methodology used in Appendix C.

Calculation of Annual Costs for ABUS Study System

Conversion of unit costs to the base year (2001) and calculation of annual costs for the proposed ABUS system were performed using an identical methodology as was used for comparable light rail calculations. This process is described in Appendix C.

References

- 1. A Policy of the Geometric Design of Highways and Streets. AASHTO. 2001
- 2. Gross Domestic Product Deflator Inflation Calculator. http://www.jsc.nasa.gov/bu2/inflateGDP.html
- 3. *Final Annual Report 1999-2000*. Prepared for Federal Transit Administration National Transit Database by Santa Clara County Transportation Authority.

APPENDIX H

ABUS ANNUAL REVENUE-MILES AND REVENUE-HOURS OF OPERATION

Introduction

Determination of the ABUS system vehicle operating costs was performed in several major phases, the first and second of which are the focus of this appendix:

- 1. Determination of annual vehicle-revenue-miles and –hours used by the proposed ABUS system.
- 2. Determination of annual convoy-revenue-miles and –hours used by the proposed light rail system.
- 3. Determination of unit costs for the VTA bus system in terms of vehicle-revenue-miles and vehicle-revenue-hours, and in some cases, convoy-revenue-miles and convoy-revenue-hours.
- 4. Calculation of proposed ABUS system annual costs.

Definitions

The following pertinent terms will listed defined here are used throughout this appendix:

Bus-Revenue-Mile: Defined as one bus traveling one mile during revenue operation.

Bus-Revenue-Hour: Defined as one bus operating for one hour under revenue-generating operation.

Convoy-Revenue-Mile: Defined as one bus-train traveling one mile during revenue operation.

Convoy-Revenue-Hour: Defined as one bus-train traveling for one hour under revenue-generating operation.

Additionally, the more terms "revenue-miles" and "revenue-hours" are used in this in this appendix to discuss these defined terms in a more general sense.

Equivalence Relations for ABUS System Compatibility with the Light Rail System

In order to maintain consistency with the light rail system passenger and train volumes shown previously, ABUS system operations were converted to an equivalent system, with buses replacing light rail vehicles as follows:

```
1 light rail vehicle = 1 bus
2 light rail vehicles = 3 buses
3 light rail vehicles = 5 buses
```

These conversions are based on a light rail vehicle seating capacity of 67 and a bus seating capacity of 45. Generally, VTA guidelines dictate that adding a car to a light rail train occurs when standees are consistently observed on the cars. This same rule was adopted for the

ABUS vehicles, and the number of buses in a bus-train that would be equivalent to the number of cars in a light-rail train was assumed as shown:

| Light | t Rail | В | us |
|-----------|-----------------|------------|-----------------|
| # of Cars | Seated Capacity | # of Buses | Seated Capacity |
| 3 | 201 | 5 | 225 |
| 2 | 134 | 3 | 135 |
| 1 | 67 | 1 | 45 |

From the above, it can be seen that the capacities for the two types of vehicles are not exactly the same. They were, however, considered close enough that the differences could be accommodated by standees. It should be noted that in two cases, the bus capacity exceeds the standing capacity, and in one case, the reverse is true.

Determination of Annual Revenue-Miles and –Hours Used by the Proposed ABUS System – General Procedure

Unless otherwise specified, procedures used to determine annual revenue-miles and –hours for the ABUS system are identical to those procedures employed to determine such quantities for the light rail system. Determination of annual revenue-miles and –hours used by the proposed ABUS system was accomplished as follows:

- 1. Data on how many trains travel on the system during each daily period, both for the weekday and weekend condition, were determined for the light rail system in Appendix D.
- 2. The proposed ABUS system was assumed to operate the same number of busconvoys as the VTA light rail system on the 5.19-mile project domain at the same headways. The difference between the two systems is the number of vehicles per train/convoy, which were determined using the bus-to-light rail vehicle equivalencies shown in the previous section.
- 3. Daily train trips on the system during each daily period were determined. These are identical to the number of train trips used by the light rail system (see Tables D7 and D8). Values reappear in Tables H1 and H2, are based upon schedules shown in Appendix B.
- 4. Daily revenue-miles and revenue-hours were calculated for the system. The calculations appear in Tables H1 and H2.
- 5. Annual revenue-miles and revenue-hours were calculated for the system. Tables H3 and H4 show summaries of the annual revenue-miles and –hours in terms of train-revenue-miles, vehicle-revenue-miles, train-revenue-hours, and vehicle-revenue-hours.

Calculation of Daily Train Trips on System

Tables H1 and H2 show daily train trips traveled weekdays and weekends in the columns entitled "# of Convoy Trips (2 Directions)." The values in these columns are extracted directly from Tables D7 and D8, from the corresponding columns labeled "# Trains Traveled (2 Directions)." The number of light rail train trips and ABUS convoy trips are identical.

Calculation of Daily Revenue-Miles and Revenue-Hours

Procedures used are identical to those used for the light rail system. Tables H1 and H2 show weekday and weekend revenue-mile and revenue-hour calculations. They are divided into sections for 5-bus convoys, 3-bus convoys, 1-bus convoys, and totals.

Each of these tables shows four previously-defined data points for each category of train:

- Convoy-Revenue-Miles
- Bus-Revenue-Miles
- Convoy-Revenue-Hours
- Bus-Revenue-Hours

Calculation methodologies are identical to those used for the light rail system, with adjustments in formulas made to account for 5-, 3-, and 1-bus convoys as opposed to 3-, 2-, and 1-car trains.

Calculation of Annual Revenue-Miles and –Hours

Calculation procedures are identical to those employed in the light rail system annual revenue-miles and –hours calculations. Tables H3 and H4 show calculated annual revenue-miles and –hours, and summaries. Tables H5 and H6 show summaries of annual revenue-miles and –hours. Table H7 shows the number of days per year, itemized according to weekday, Saturday, and Sunday.

TABLE H1. ABUS WEEKDAY REVENUE-MILES AND REVENUE-HOURS

| .,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | | | | | | | | | | | | | | | | |
|---|-----------------------|-------------|----------|-------------|----------|-----------------------|-------------|----------|--------------|----------|-----------------------|-------------|-------------|-------------|----------|--------------|
| | | 5-Bus | Convoy | | | | 3-Bus- | Convoy | | | | | Total Buses | | | |
| Period | Total Convoy Trips (2 | Revenu | e Mile | Revenu | ie Hour | Total Convoy Trips (2 | Revenue | Mile | Revenue Hour | | Total Convoy Trips (2 | Revenue | e Mile | Revenu | ie Hour | Traveled (2- |
| | Directions) | Convoy-Mile | Bus-Mile | Convoy-Hour | Bus-Hour | Directions) | Convoy-Mile | Bus-Mile | Convoy-Hour | Bus-Hour | Directions) | Convoy-Mile | Bus-Mile | Convoy-Hour | Bus-Hour | Directions) |
| AM Peak | 16 | 83.04 | 415.20 | 4.64 | 23.22 | 9 | 46.71 | 140.13 | 2.61 | 7.84 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 107.00 |
| Midday | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 48 | 249.12 | 747.36 | 13.93 | 41.80 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 144.00 |
| PM Peak | 14 | 72.66 | 363.30 | 4.06 | 20.32 | 10 | 51.90 | 155.70 | 2.90 | 8.71 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 100.00 |
| Off-Peak | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 49 | 254.31 | 254.31 | 14.22 | 14.22 | 49.00 |
| TOTAL | 30 | 155.70 | 778.50 | 8.71 | 43.54 | 67.00 | 347.73 | 1043.19 | 19.45 | 58.35 | 49.00 | 254.31 | 254.31 | 14.22 | 14.22 | 400.00 |

TABLE H2. ABUS WEEKEND REVENUE-MILES AND REVENUE-HOURS OF OPERTION

| | | 5-Bus | Convoy | | | | | | | | Total Buses | | | | | |
|----------|-----------------------|-------------|----------|-------------|----------|-----------------------|--------------|----------|--------------|----------|-----------------------|-------------|----------|-------------|----------|--------------|
| Period | Total Convoy Trips (2 | Revenu | e Mile | Revenu | ie Hour | Total Convoy Trips (2 | Revenue Mile | | Revenue Hour | | Total Convoy Trips (2 | Revenu | e Mile | Revenu | ie Hour | Traveled (2- |
| | Directions) | Convoy-Mile | Bus-Mile | Convoy-Hour | Bus-Hour | Directions) | Convoy-Mile | Bus-Mile | Convoy-Hour | Bus-Hour | Directions) | Convoy-Mile | Bus-Mile | Convoy-Hour | Bus-Hour | Directions) |
| AM Peak | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 24 | 124.56 | 124.56 | 6.97 | 6.97 | 24.00 |
| Midday | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 48 | 249.12 | 249.12 | 13.93 | 13.93 | 48.00 |
| PM Peak | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 24 | 124.56 | 124.56 | 6.97 | 6.97 | 24.00 |
| Off-Peak | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 49 | 254.31 | 254.31 | 14.22 | 14.22 | 49.00 |
| TOTAL | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 145 | 752.55 | 752.55 | 42.09 | 42.09 | 145.00 |

TABLE H3. ABUS ANNUAL WEEKDAY REVENUE-MILES AND REVENUE-HOURS

| | | 5-Bus C | onvoy | | | | 3-Bus C | onvoy | | | 1-Bus Convoy | | | | | |
|----------|-----------------------|-------------|----------|-------------|----------|-----------------------|-------------|----------|--------------|----------|-----------------------|-------------|----------|-------------|----------|--|
| Period | Total Convoy Trips (2 | Revenue | Mile | Revenue | Hour | Total Convoy Trips (2 | Revenue | Mile | Revenue Hour | | Total Convoy Trips (2 | Revenue | Mile | Revenue | Hour | |
| | Directions) | Convoy-Mile | Bus-Mile | Convoy-Hour | Bus-Hour | Directions) | Convoy-Mile | Bus-Mile | Convoy-Hour | Bus-Hour | Directions) | Convoy-Mile | Bus-Mile | Convoy-Hour | Bus-Hour | |
| AM Peak | 4176 | 21673 | 108367 | 1212 | 6061 | 2349 | 12191 | 36574 | 682 | 2046 | 0 | 0 | 0 | 0 | 0 | |
| Midday | 0 | 0 | 0 | 0 | 0 | 12528 | 65020 | 195061 | 3637 | 10910 | 0 | 0 | 0 | 0 | 0 | |
| PM Peak | 3654 | 18964 | 94821 | 1061 | 5303 | 2610 | 13546 | 40638 | 758 | 2273 | 0 | 0 | 0 | 0 | 0 | |
| Off-Peak | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12789 | 66375 | 66375 | 3712 | 3712 | |
| TOTAL | 7830 | 40638 | 203189 | 2273 | 11364 | 17487 | 90758 | 272273 | 5076 | 15228 | 12789 | 66375 | 66375 | 3712 | 3712 | |

TABLE H4. ABUS ANNUAL WEEKEND REVENUE-MILES AND REVENUE-HOURS

| | | 5-Bus C | 001/01/ | | | | 2 Due C | 001/01/ | | | | 1-Bus C | 001/01/ | | |
|----------|-----------------------|-------------|----------|-------------|----------|-----------------------|-------------|----------|-------------|----------|-----------------------|-------------|----------|-------------|----------|
| | | | | | | | 3-Bus C | | | | | | orivoy | | |
| Period | Total Convoy Trips (2 | Revenue | Mile | Revenue | Hour | Total Convoy Trips (2 | Revenue | Mile | Revenue | Hour | Total Convoy Trips (2 | Revenue | Mile | Revenue | Hour |
| | Directions) | Convoy-Mile | Bus-Mile | Convoy-Hour | Bus-Hour | Directions) | Convoy-Mile | Bus-Mile | Convoy-Hour | Bus-Hour | Directions) | Convoy-Mile | Bus-Mile | Convoy-Hour | Bus-Hour |
| AM Peak | 0 | 0 | 0 | Ó | 0 | 0 | 0 | 0 | Ô | 0 | 2496 | 12954 | 12954 | 725 | 725 |
| Midday | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4992 | 25908 | 25908 | 1449 | 1449 |
| PM Peak | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2496 | 12954 | 12954 | 725 | 725 |
| Off-Peak | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5096 | 26448 | 26448 | 1479 | 1479 |
| TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15080 | 78265 | 78265 | 4377 | 4377 |

TABLE H5. SUMMARY - ABUS ANNUAL REVENUE-MILES OF OPERATION

| | | Bus Mi | les | | | Convoy N | /liles | |
|---------|--------------|-------------|--------------|---------|--------------|-------------|--------------|---------|
| | 5-Bus Convoy | 3-BusConvoy | 1-Bus Convoy | TOTAL | 5-Bus Convoy | 3-BusConvoy | 1-Bus Convoy | TOTAL |
| Weekday | 203,189 | 272,273 | 66,375 | 541,836 | 40,638 | 90,758 | 66,375 | 197,770 |
| Weekend | 0 | 0 | 78,265 | 78,265 | 0 | 0 | 78,265 | 78,265 |
| TOTAL | 203,189 | 272,273 | 144,640 | 620,101 | 40,638 | 90,758 | 144,640 | 276,035 |

TABLE H6. SUMMARY - ABUS ANNUAL VEHICLE-REVENUE-HOURS OF OPERATION

| | | Bus Ho | urs | | | Train Ho | urs | |
|---------|--------------|-------------|--------------|--------|--------------|-------------|--------------|--------|
| | 5-Bus Convoy | 3-BusConvoy | 1-Bus Convoy | TOTAL | 5-Bus Convoy | 3-BusConvoy | 1-Bus Convoy | TOTAL |
| Weekday | 11,364 | 15,228 | 3,712 | 30,305 | 2,273 | 5,076 | 3,712 | 11,061 |
| Weekend | 0 | 0 | 4,377 | 4,377 | 0 | 0 | 4,377 | 4,377 |
| TOTAL | 11,364 | 15,228 | 8,090 | 34,683 | 2,273 | 5,076 | 8,090 | 15,439 |

TABLE H7. DAYS OF WEEK PER YEAR

| Day of Week | # of Days |
|-------------|-----------|
| Weekday | 261 |
| Saturday | 52 |
| Sunday | 52 |

APPENDIX I

BDL SYSTEM AGENCY COSTS

Introduction

This appendix details methodologies and procedures for calculating the agency costs associated with the BDL study system. These costs include:

- System Planning and Design Costs
- Construction, Rehabilitation, and Other Infrastructure-Related Capital Costs
- Vehicle Operations Costs
- Vehicle Maintenance Costs
- System (Non-Vehicle) Maintenance Costs
- System Administration Costs

BUS-ON-DEDICATED-LANE SYSTEM PLANNING AND DESIGN, CONSTRUCTION, REHABILITATION, AND OTHER INFRASTRUCTURE-RELATED CAPITAL COSTS

Procedures and assumptions for the design of the Bus-on-Dedicated-Lane (BDL) system are identical to those used for the ABUS system. Numerical differences occur due to differing lane width requirements between the BDL and ABUS systems.

BDL Cross-Sectional Geometry (Width Requirements)

The American Association of State Highway Transportation Officials (AASHTO) gives universally-accepted geometric design standards for streets and highways in its *A Policy on the Geometric Design of Highways and Streets* (1). Because the Bus-on-Dedicated-Lane (BDL) system operates on urban streets, the system concepts were designed according to AASHTO standards.

Like the ABUS system, the BDL system operates on a dedicated right-of-way in the median of a regular roadway, without physical barriers separating the dedicated lanes from each other or from the regular traffic. Exhibit 3-54 (1) requires a 15-foot pavement width be used in this case to accommodate any design bus.

Thus, for dedicated bus lanes running in both directions, a width of 30 feet would be required for the right-of-way, including two 15-foot pavement widths. Figure 3.5 in the main report shows a schematic layout of this BDL concept.

Bus-on-Dedicated-Lane Infrastructure, System Planning, and Design Costs

Costs for construction, planning, and design of the BDL infrastructure are derived in the same manner as the ABUS system construction, planning, and design costs. The differing costs shown for the BDL system and the ABUS system result from differences in pavement widths for the two systems.

Table I1 shows the BDL system width requirements. The procedure used for scaling is identical to the ABUS procedure outline in Appendix G. Table I1 also shows the computed

scale factor used in construction cost calculations. Table I2 shows scaling for each work item. It also indicates site-specific work items by shading. Non-site-specific work items are unshaded. The percentage of site-specific and non-site-specific costs are shown in Table I3. Table I4 shows rehabilitation costs. Table I5 shows planning and design cost calculations. Table I6 shows final EUAC 2001-equivalent costs for infrastructure, planning, and design.

TABLE I1. BDL PROJECT DIMENSIONS - SCENARIO 1: DESIGN FOLLOWS AASHTO STANDARDS

| Actual Sys | tem Length | Effective System Length | | Width | Area | Scale Factor |
|------------|------------|-------------------------|-------|-------|----------|--------------|
| Miles | Feet | Miles | Feet | Feet | Sq. Feet | 24.00 |
| 5.19 | 27,403 | 5.36 | 28308 | 30 | 822,096 | 24.98 |

Bus-on-Dedicated-Lane Non-Infrastructure Capital Costs

Fleet purchase is the only cost element associated with this category. Methodologies for determining the BDL system fleet purchase costs are identical for those of the ABUS system. In order to maintain functional equivalence between the ABUS and BDL systems, it was assumed that the same number of buses operate on each system during each daily period, carrying the same number of passengers. Appendix G shows calculations and describes methodologies for determining the required number of buses needed to serve the proposed ABUS system. One notable difference between the calculations for the BDL system and the corresponding ABUS-system calculations is that there is no convoying in the BDL system, However, this difference does not affect fleet purchase costs (it does affect user costs due by changing headways). Table I6 shows fleet purchase costs.

Bus-On-Dedicated-Lane Periodic Capital Costs

BDL rehabilitation costs, like ABUS system rehabilitation costs, include routine pavement resealing and resurfacing costs:

- Minor Rehabilitation Seals
- Major Rehabilitation Resurfacing

Assumptions and methodologies for determining BDL rehabilitation costs are identical to those for the ABUS system. Differences in numeric values between the BDL and ABUS systems arise due to the differences in surface area requirements of the ABUS and BDL systems. Magnetic strips for automation are also not necessary for the BDL system, as they are for the ABUS.

Tables I4 and I6 show the applicable cost calculations.

Bus-On-Dedicated-Lane Fleet Renewal

Methodologies for the BDL study system fleet renewal costs are identical for those of the ABUS study system, where calculations are made based on a 15-year renewal cycle for the fleet (with 1/15th of the fleet replaced each year). Table I6 shows the calculated costs for

TABLE 12: BDL CONSTRUCTION COST CALCULATIONS

| No. Cost Element Var Total Cost (8) | IAB | E I2: BDL CONSTRUCTION COST CALCULATIONS | | Liana Circat Drainat | Llana Ctraat Drai | a a 4 | | 1 | | | |
|---|------|--|------|----------------------|-------------------|-------|--------------|---------------|---------------|--------------|--------------------|
| Street Cean-Up | Itom | Coat Flament | Voor | Hope Street Project | | ect | Hope Street | Project Units | Derived BDL P | roject Units | BDI Coot (2002 ¢) |
| Section Committee Commit | item | Cost Element | rear | (' / | (' / | Unit | Niconala a u | I Imit | Nimakau | Linit | DDL COSt (2002 \$) |
| 2000000000000000000000000000000000000 | 1 | Stroot Cloop I In | 2002 | | | Day | | | | | 74 045 92 |
| 3 Traffic Control 2,000 | | | | | | _ | | | | | |
| A depta Water Valve to Grodes | | | | | | | | | | | |
| Selection Company Plant Styn 2002 1900.00 1,500.00 Each 10 Each 25 Each 37,472,91 | | | | | | | | | | | |
| 6 Relocating Detector Loops 2002 4200.00 700.00 Each 1 Each 28 Each 37.4725 8 Agust Fine Hydrant to Grade 2002 4200.00 700.00 Each 6 Each 150 Each 150 Each 5.555.666 8 Agust Fine Hydrant to Grade 2002 4200.00 700.00 Each 2 Each 50 Each 5.555.666 8 Agust Fine Hydrant to Grade 2002 4200.00 1.200.00 Each 2 Each 50 Each 5.555.666 8 Agust Fine Hydrant to Grade 2002 4200.00 1.200.00 Each 2 Each 50 Each 5.555.666 8 Agust Fine Hydrant to Grade 2002 4200.00 1.200.00 Each 1.200.00 Each 1.200.00 Each 50.555.666 9 Agust Fine Hydrant to Grade 2002 4200.00 1.200.00 Each 1 | | | | | | | | | | | |
| Record R | | | | | | | | | | | |
| 8 Agus Frier Hydrant to Grade 2002 2400,00 1,200,00 Each 2 Each 59,956,66 PR GRotzer and Agus Frier Hydrant to Grade 2002 3800,00 3,800,00 Lump Sum 1 Lump Sum 25 Lump Sum 1 Clarifold 2002 100,00 1,000,00 Lump Sum 1 Lump Sum 25 Lump Su | | | | | | | • | | | | |
| 9 Recouse and Adjust Fire Hydrants to Grade 2002 2500.00 3,000.00 Each 1 Each 25 Each 89.934.99 (1) Clearing, Globberg, and Removal of Obstructions 2002 2500.00 2,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 62,544.68 (1) Roadway Excavation 2002 1000.00 30.00 Cu, Yard 340 Cu, Yard 8,494 Cu, Yard 254,815.90 13 Max 1975 Frees 2002 2600.00 600.00 Each 34 Each 849 Each 59,631.59 13 Max 1975 Free 2002 2700.00 50.00 Cu, Yard 4,800 Cu, Yard 8,494 Cu, Yard 254,815.90 13 Max 1975 Free 2002 2700.00 Free 2002 | | | | | | | | | | | |
| 10 Glarang, Grubbing, and Removal of Obstructions 2002 12000.00 2,500.00 Lump Sum 1 Lump Sum 25 Lump Sum 62,544.85 12 Plant New Trees 2002 20400.00 600.00 Each 34 Each 509,631.59 13 Miss Landscaping 2002 20400.00 10,000.00 Each 34 Each 509,631.59 14 Tree, Schruba and Landscape Marinenance 2002 100000.00 10,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 248,419.41 15 Polythyteine Rock Burrier 2002 700.00 10,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 248,419.41 15 Subgrade Preparation Class A 2002 21000.00 1,000 Sa Foot 21,000 Sa Foot 30,000 Sa | | , , | | | , | | | | | | |
| 11 Roadway Exervation 2002 100000 30.00 Cu Yard 340 Cu Yard 8.494 Cu Yard 129.4815.80 13 Misc. Landscaping 2002 9600.00 2.00 Sq. Foot 4.800 Sq. Foot 119.913 Sq. Foot 239.8268.31 Sq. Foot 119.913 Sq. Foot 239.8268.31 Sq. Foot 119.913 Sq. Foot 1 | | | | | | | • | | | | |
| 12 Plant New Trees | | | | | | | | | | | |
| 13 Misc. Landscaping | | | | | | | | | | | |
| 14 Tree, Schruba, and Landscape Maintenance 2002 10000.00 1,000.00 1,000.00 1,000.00 1,000 1 | | | | | | | | | | | |
| 15 Polythylene Root Barrier | | | | | | | | | | | |
| 16 Subgrade Preparation-Class A 2002 21600,00 1.00 Sq. Foot 21,800 Sq. Foot 539,610 Sq. Foot 539,609.92 | | | | | | | | | | | |
| 17 Imported Fill Materials 2002 10200 0 30.00 Cu. Yard 340 Cu. Yard 8,494 Cu. Yard 19,405 Cu. Yard 1 | | | | | | | | | | | |
| 18 Despit/Base AC (8" max.) | | | | | | | | | | | |
| 19] AC Surface Course 2002 32000.00 80.00 Ton 400 Ton 9.993 Ton 799.422.10 Ton 10.492 | | | | | | | | | | | |
| 201 Cold Planing 2002 35600.00 5.0 | | | | | | | | | | | |
| 2012 1500.00 1.50 Sq. Foot 1.000 Sq. Foot 24.982 Sq. Foot 37.472.91 22.9 23.800.00 1.00 Sq. Yard 33.742.91 23.864wood Retaining Wall 2002 12000.00 40.00 Linear Foot 300 Linear Foot 7.495 Linear Foot 24.762 Cyber Value 24.902 25.000.00 26.000 | | | | | | | | | | | |
| 22 Pavement Reinforcing Fabric 2002 3500.00 1.00 Sq. Yard 3,500 Sq. Yard 87,437 Sq. Yard 87,436.72 Sq. Revnox Retaining Wall 2002 12000.00 40.00 Linear Foot 7,495 Linear Foot 7,495 Linear Foot 299,783.29 24 PCC Curb and Gutter - Type A2 2002 51000.00 30.00 Linear Foot 1,700 Linear Foot 42,469 Linear Foot 1,274.078.98 25 PCC Subwalk, Plain finish, including 1" of Structural Fill) 2002 63000.00 9.00 Sq. Foot 6,700 Sq. Foot 167,379 Sq. Foot 1,5006.41 Sq. Foot | | | | | | | | | | | |
| 23 Redwood Retaining Wall | | | | | | | , | | , | | |
| 24 PCC Curb and Gutter - Type A2 2002 51000.00 30.00 Linear Foot 1,700 Linear Foot 1,274,078.98 Linear Foot 1, | | | | | | | | | - , - | | |
| 25 PCC Sidewalk, Plain finish, including 1° of Structural Fill) 2002 60300.00 9.00 \$q. Foot 6,700 \$q. Foot 167,379 \$q. Foot 1,506,411.02 26 PCC Driveway 2002 21600.00 12.00 \$q. Foot 4,967 \$q. Foot 5,96.091 27 PCC Wheelchair Ramp 2002 3200.00 800.00 Each 4 Each 100 Each 79,942.21 28 PCC Driveway Conform 2002 27000.00 10.00 \$q. Foot 2,700 \$q. Foot 674,512.40 29 PCC Berm (Type A1-B3) 2002 600.00 6.00 Linear Foot 100 Linear Foot 4,498 Linear Foot 14,989.16 30 Gravel Conform 2002 25000.00 500.00 Each 5 Each 125 Each 62,454.84 31 Install New Survey Monument 2002 800.00 800.00 Lump Sum 1 Lump Sum 25 Lump Sum 19,985.55 32 Traffic Stripes and Pavement Markings 2002 8000.00 800.00 Lump Sum 1 Lump Sum 25 Lump Sum 19,985.55 33 Street Lighting System 2002 8000.00 3,000.00 Each 1 Each 25 Each 14,495.82 34 Install New Water Valve and Reconnect Existing Waterliir 2002 3000.00 3,000.00 Each 1 Each 25 Each 74,945.82 36 It2* Diameter RCP 2002 1980.00 110.00 Linear Foot 1,801 Linear Foot 1,474 Linear Foot 1,498.916.44 38 B* Diameter PVC Pipe 2002 1000.00 1000.00 Each 1 Each 25 Each 74,945.82 38 B* Diameter PVC Pipe 2002 2000.00 1000.00 Each 1 Each 25 Each 74,945.82 38 B* Diameter PVC Pipe 2002 2000.00 1000.00 Linear Foot 1,874 Linear Foot 1,898.916.44 39 Abandon and Cap Off Exist 12* Dia. RCP 2002 3000.00 800.00 Each 1 Each 25 Each 74,945.82 39 Abandon and Cap Off Exist 12* Dia. RCP 2002 3000.00 800.00 Each 1 Each 25 Each 74,945.82 30 Abandon and Cap Off Exist 12* Dia. RCP 2002 3000.00 800.00 Each 1 Each 25 Each 74,945.82 30 Abandon and Cap Off Exist 12* Dia. RCP 2002 3000.00 800.00 Each 1 Each 25 Each 74,945.82 30 Abandon and Cap Off Exist 12* Dia. RCP 2002 3000.00 800.00 Each | | | | | | | | | | | |
| 26 PCC Driveway 2002 21600.00 12.00 Sq. Foot 1,800 Sq. Foot 44,967 Sq. Foot 539,609.92 | | | | | | | | | | | |
| 27 PCC Wheelchair Ramp | | | | | | | | | | | |
| 28 PCC Driveway Conform 2002 27000.00 10.00 Sq. Foot 2,700 Sq. Foot 674.51 Sq. Foot 674.512 Sq. Foot 674.513 Sq. Foot 674.512 | 27 | PCC Wheelchair Ramp | | | | | | | | | |
| 29 PCC Berm (Type A1-B3) | | | | | | | | | | | |
| 30 Gravel Conform 2002 1000.00 50.00 Ton 20 Ton 500 Ton 24,981.94 | | | | | | | | | | | |
| 31 Install New Survey Monument 2002 2500.00 500.00 Each 5 Each 125 Each 62,454.85 | | | | | | | | | | | |
| 32 Traffic Stripes and Pavement Markings 2002 800.00 800.00 Lump Sum 1 Lump Sum 25 Lump Sum 19,985.55 | | | | | | | | | | | |
| 33 Street Lighting System 2002 60000.00 60,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 1,498,916.44 34 Install New Water Valve 2002 3000.00 3,000.00 Each 1 Each 25 Each 74,945.82 35 Remove Existing Water Valve and Reconnect Existing Wateriling 2002 3000.00 3,000.00 Each 1 Each 25 Each 74,945.82 36 12" Diameter RCP 2002 19800.00 110.00 Linear Foot 180 Linear Foot 4,497 Linear Foot 494,642.43 37 27" Diameter RCP 2002 12000.00 160.00 Linear Foot 75 Linear Foot 1,874 Linear Foot 299,783.29 38 8" Diameter PVC Pipe 2002 6000.00 40,00 Linear Foot 150 Linear Foot 1,874 Linear Foot 149,891.64 39 Abandon and Cap Off Exist. 12" Dia. RCP 2002 3200.00 800.00 Each 4 Each 100 Each 79,942.21 40 Cap off New 27" Dia. RCP 2002 800.00 800.00 Each 1 Each 25 Each 1,985.55 41 Remove Exist. VCP, Replace with PVC 2002 3300.00 300.00 Linear Foot 1,100 Linear Foot 1,736 Linear Foot 1,9735.73.31 42 Geotextile 2002 3300.00 3.00 Linear Foot 1,100 Linear Foot 27,480 Linear Foot 1,9735.73.31 43 Trench Sheeting, Shoring, and Bracing 2002 6000.00 6,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 149,891.64 44 Trench Dewatering 2002 12000.00 12,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 149,891.64 45 Sewer Lateral Verification 2002 300.00 30.00 Each 10 Each 250 Each 7,494.8 46 Reconnect Exist. Sanitary Sewer 2002 2000.00 200.00 Each 10 Each 250 Each 4,963.88 46 Reconnect Exist. Sanitary Sewer 2002 2000.00 200.00 Each 10 Each 250 Each 4,963.84 47 Replace 4" Dia. Sanitary Sewer 2002 4000.00 2,000.00 Each 10 Each 250 Each 159,884.42 49 Install Std. Flat Grate Inlet 2002 14000.00 2,000.00 Each 7 Each 175 Each 349,747.17 48 Install Std. Flat Grate Inlet 2002 14000.00 2,000.00 Each 5 Ea | | | | | | | | | | | |
| 34 Install New Water Valve 2002 3000.00 3,000.00 Each 1 Each 25 Each 74,945.82 | | | | | | | | | | | |
| 35 Remove Existing Water Valve and Reconnect Existing Waterline 2002 3000.00 3,000.00 Each 1 Each 25 Each 74,945.82 | | | | | , | | | | | | |
| 36 12" Diameter RCP 2002 19800.00 110.00 Linear Foot 4,497 Linear Foot 494,642.43 37 27" Diameter RCP 2002 12000.00 160.00 Linear Foot 75 Linear Foot 1,874 Linear Foot 299,783.29 38 B" Diameter PVC Pipe 2002 6000.00 40.00 Linear Foot 150 Linear Foot 1,874 Linear Foot 299,783.29 38 B" Diameter PVC Pipe 2002 6000.00 40.00 Linear Foot 150 Linear Foot 1,874 Linear Foot 299,783.29 | | | | | | | • | | | | |
| 37 27" Diameter RCP | | | | | | | | | | | |
| 38 8" Diameter PVC Pipe 2002 6000.00 40.00 Linear Foot 3,747 Linear Foot 149,891.64 39 Abandon and Cap Off Exist. 12" Dia. RCP 2002 3200.00 800.00 Each 4 Each 100 Each 79,942.21 40 Cap off New 27" Dia. RCP 2002 800.00 800.00 Each 1 Each 25 Each 193,985.55 41 Remove Exist. VCP, Replace with PVC 2002 79000.00 100.00 Linear Foot 79 Linear Foot 19,736 Linear Foot 1,93,985.55 Each 19,736 Linear Foot 1,93,985.55 Each 19,736 Linear Foot 1,93,985.55 Each 1,93,857.33 1 Linear Foot 19,736 Linear Foot 1,93,985.55 Each 1,93,857.33 1 Linear Foot 19,736 Linear Foot 1,93,857.33 1 Linear Foot 1,93,857.33 1 Linear Foot 1,93,857.33 1 Linear Foot 1,93,857.33 1 Linear Foot 1,93,85.25 Linear Foot 1,93,85.25 Linear Foot< | | | | | | | | | | | |
| 39 Abandon and Cap Off Exist. 12" Dia. RCP 2002 3200.00 800.00 Each 4 Each 100 Each 79,942.21 40 Cap off New 27" Dia. RCP 2002 800.00 800.00 Each 1 Each 25 Each 19,985.55 41 Remove Exist. VCP, Replace with PVC 2002 79000.00 100.00 Linear Foot 790 Linear Foot 19,736 Linear Foot 1,973,73.31 42 Geotextile 2002 3300.00 3.00 Linear Foot 1,100 Linear Foot 27,480 Linear Foot 82,440.40 43 Trench Sheeting, Shoring, and Bracing 2002 6000.00 6,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 24 Trench Dewatering 2002 12000.00 12,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 299,781.64 Reconnect Exist. Sanitary Sewer 2002 2000.00 30.00 Each 10 Each 250 Each 7,494.58 46 Reconnect Exist. Sanitary Sewer 2002 2000.00 200.00 Each 10 Each 250 Each 49,963.88 47 Replace 4" Dia. Sanitary Sewer 2002 9000.00 90.00 Linear Foot 100 Linear Foot 2,498 Linear Foot 224,837.47 48 Install Std. Storm Manhole 2002 6400.00 3,200.00 Each 1 Each 2 Each 50 Each 159,884.42 49 Install Large Hooded Inlet 2002 14000.00 1,500.00 Each 1 Each 275 Each 349,747.17 50 Install Std. Each 11 Each 275 Each 412,202.02 51 Remove and Replace SS Manhole 2002 24000.00 4,800.00 Each 5 Each 125 Each 599,566.58 | | | | | | | | | | | |
| 40 Cap off New 27" Dia. RCP 2002 800.00 800.00 Each 1 Each 25 Each 19,985.55 41 Remove Exist. VCP, Replace with PVC 2002 7900.00 100.00 Linear Foot 790 Linear Foot 19,736 Linear Foot 1,973,573.31 42 Geotextile 2002 3300.00 3.00 Linear Foot 1,100 Linear Foot 27,480 Linear Foot 82,404.04 43 Trench Sheeting, Shoring, and Bracing 2002 6000.00 6,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 149,891.64 44 Trench Dewatering 2002 12000.00 12,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 149,891.64 45 Sewer Lateral Verification 2002 300.00 30.00 Each 10 Each 250 Each 7,494.58 46 Reconnect Exist. Sanitary Sewer 2002 2000.00 200.00 Each 10 Each 250 Each 49,963.88 47 Replace 4" Dia. Sanitary Sewer 20 | | | | | | | | | | | |
| 41 Remove Exist. VCP, Replace with PVC 2002 79000.00 100.00 Linear Foot 790 Linear Foot 19,736 Linear Foot 1,973,573.31 42 Geotextile 2002 3300.00 3.00 Linear Foot 1,100 Linear Foot 27,480 Linear Foot 82,440.40 43 Trench Sheeting, Shoring, and Bracing 2002 6000.00 6,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 149,891.64 44 Trench Dewatering 2002 12000.00 12,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 299,783.29 45 Sewer Lateral Verification 2002 300.00 30.00 Each 10 Each 250 Each 7,494.52 46 Reconnect Exist. Sanitary Sewer 2002 2000.00 200.00 Each 10 Each 250 Each 49,63.88 47 Replace 4" Dia. Sanitary Sewer 2002 9000.00 90.00 Linear Foot 100 Linear Foot 2,498 Linear Foot 224,837.47 48 Install Std. Stor | | | | | | | | | | | |
| 42 Geotextile 2002 3300.00 3.00 Linear Foot 27,480 Linear Foot 82,440.40 43 Trench Sheeting, Shoring, and Bracing 2002 6000.00 6,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 149,891.64 44 Trench Dewatering 2002 12000.00 12,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 299,783.29 45 Sewer Lateral Verification 2002 300.00 30.00 Each 10 Each 250 Each 7,494.58 46 Reconnect Exist. Sanitary Sewer 2002 2000.00 200.00 Each 10 Each 250 Each 49,963.88 47 Replace 4" Dia. Sanitary Sewer 2002 9000.00 90.00 Linear Foot 100 Linear Foot 2,498 Linear Foot 224,837.47 48 Install Std. Storm Manhole 2002 6400.00 3,200.00 Each 2 Each 50 Each 159,884.42 49 Install Large Hooded Inlet 2002 14000.00 2,000.00 | | | | | | | | | | | |
| 43 Trench Sheeting, Shoring, and Bracing 2002 6000.00 6,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 149,891.64 44 Trench Dewatering 2002 12000.00 12,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 299,783.29 45 Sewer Lateral Verification 2002 300.00 30.00 Each 10 Each 250 Each 7,494.58 46 Reconnect Exist. Sanitary Sewer 2002 2000.00 200.00 Each 10 Each 250 Each 49,963.88 47 Replace 4" Dia. Sanitary Sewer 2002 9000.00 90.00 Linear Foot 100 Linear Foot 2,498 Linear Foot 224,837.47 48 Install Std. Storm Manhole 2002 6400.00 Each 2 Each 50 Each 159,884.42 49 Install Large Hooded Inlet 2002 14000.00 Each 7 Each 175 Each 349,747.17 50 Install Std. Flat Grate Inlet 2002 16500.00 1,500.00 Each 11 Each 275 Each 412,202.02 51 Remove and Replace SS Manhole 2002 24000.00 4,800.00 Each 5 Each 125 Each 599,566.58 | | | | | | | | | | | |
| 44 Trench Dewatering 2002 12000.00 12,000.00 Lump Sum 1 Lump Sum 25 Lump Sum 299,783.29 45 Sewer Lateral Verification 2002 300.00 30.00 Each 10 Each 250 Each 7,494.58 46 Reconnect Exist. Sanitary Sewer 2002 2000.00 200.00 Each 10 Each 250 Each 49,963.88 47 Replace 4" Dia. Sanitary Sewer 2002 9000.00 90.00 Linear Foot 100 Linear Foot 2,498 Linear Foot 224,837.47 48 Install Std. Storm Manhole 2002 6400.00 3,200.00 Each 2 Each 50 Each 159,884.42 49 Install Large Hooded Inlet 2002 14000.00 2,000.00 Each 7 Each 175 Each 349,747.17 50 Install Std. Flat Grate Inlet 2002 16500.00 1,500.00 Each 11 Each 275 Each 412,202.02 51 Remove and Replace SS Manhole 2002 24000.00 4,800.00 Each 5 Each 125 Each <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>,</td><td></td><td></td><td></td><td></td></td<> | | | | | | | , | | | | |
| 45 Sewer Lateral Verification 2002 300.00 30.00 Each 10 Each 250 Each 7,494.58 46 Reconnect Exist. Sanitary Sewer 2002 2000.00 200.00 Each 10 Each 250 Each 49,963.88 47 Replace 4" Dia. Sanitary Sewer 2002 9000.00 90.00 Linear Foot 100 Linear Foot 2,498 Linear Foot 224,837.47 48 Install Std. Storm Manhole 2002 6400.00 3,200.00 Each 2 Each 50 Each 159,884.42 49 Install Large Hooded Inlet 2002 14000.00 2,000.00 Each 7 Each 175 Each 349,747.17 50 Install Std. Flat Grate Inlet 2002 16500.00 1,500.00 Each 11 Each 275 Each 412,202.02 51 Remove and Replace SS Manhole 2002 24000.00 4,800.00 Each 5 Each 125 Each 599,566.58 | | | | | | | | | | | |
| 46 Reconnect Exist. Sanitary Sewer 2002 2000.00 200.00 Each 10 Each 250 Each 49,963.88 47 Replace 4" Dia. Sanitary Sewer 2002 9000.00 90.00 Linear Foot 100 Linear Foot 2,498 Linear Foot 224,837.47 48 Install Std. Storm Manhole 2002 6400.00 3,200.00 Each 2 Each 50 Each 159,884.42 49 Install Large Hooded Inlet 2002 14000.00 2,000.00 Each 7 Each 175 Each 349,747.17 50 Install Std. Flat Grate Inlet 2002 16500.00 1,500.00 Each 11 Each 275 Each 412,202.02 51 Remove and Replace SS Manhole 2002 24000.00 4,800.00 Each 5 Each 125 Each 599,566.58 | | | | | | | | | | | |
| 47 Replace 4" Dia. Sanitary Sewer 2002 9000.00 90.00 Linear Foot 2,498 Linear Foot 224,837.47 48 Install Std. Storm Manhole 2002 6400.00 3,200.00 Each 2 Each 50 Each 159,884.42 49 Install Large Hooded Inlet 2002 14000.00 2,000.00 Each 7 Each 175 Each 349,747.17 50 Install Std. Flat Grate Inlet 2002 16500.00 1,500.00 Each 11 Each 275 Each 412,202.02 51 Remove and Replace SS Manhole 2002 24000.00 4,800.00 Each 5 Each 125 Each 599,566.58 | | | | | | | | | | | |
| 48 Install Std. Storm Manhole 2002 6400.00 3,200.00 Each 2 Each 50 Each 159,884.42 49 Install Large Hooded Inlet 2002 14000.00 2,000.00 Each 7 Each 175 Each 349,747.17 50 Install Std. Flat Grate Inlet 2002 16500.00 1,500.00 Each 11 Each 275 Each 412,202.02 51 Remove and Replace SS Manhole 2002 24000.00 4,800.00 Each 5 Each 125 Each 599,566.58 | | | | | | | | | | | |
| 49 Install Large Hooded Inlet 2002 14000.00 2,000.00 Each 7 Each 175 Each 349,747.17 50 Install Std. Flat Grate Inlet 2002 16500.00 1,500.00 Each 11 Each 275 Each 412,202.02 51 Remove and Replace SS Manhole 2002 24000.00 4,800.00 Each 5 Each 125 Each 599,566.58 | | | | | | | | | | | |
| 50 Install Std. Flat Grate Inlet 2002 16500.00 1,500.00 Each 11 Each 275 Each 412,202.02 51 Remove and Replace SS Manhole 2002 24000.00 4,800.00 Each 5 Each 125 Each 599,566.58 | | | | | | | | | | | |
| 51 Remove and Replace SS Manhole 2002 24000.00 4,800.00 Each 5 Each 125 Each 599,566.58 | | | | | | | | | | | |
| | | | | | | | | | | | |
| | - 31 | Total Cost | 2002 | 692,000.00 | 133,386.50 | Lacii | , | Lacii | 120 | Lacii | 17,287,502.96 |

TABLE 13. BDL SITE-SPECIFIC WORK ITEMS

| TABLE 10. DDL OHL OL | OII 10 WORKETTEIN | 9 |
|---|-------------------|--------------|
| Туре | Total Cost | Percent Cost |
| Site-Specific Work Items | 11,369,281.21 | 65.77% |
| General Work Items Associated with ABUS | 5,918,221.75 | 34.23% |
| TOTAL | 17,287,502.96 | 100.00% |

TABLE I4. BDL ROADWAY REHABILITATION COSTS

| Type | Unit Co | st (2002) | Unit Cost (2 | :001-Equiv.) | | Project Su | ırface Area | | Total Cost (\$) per Rehab. | Frage | uonov | Annual Cost (2001 |
|---------------------|---------|-----------|--------------|--------------|---------|------------|-------------|-----------|----------------------------|-----------|-------|-------------------|
| Туре | Cost | Unit | Cost | Unit | Area | Unit | Area | Unit | Cycle (2001-Equiv.) | Frequency | | Equiv. \$) |
| Minor - Seals | 3.90 | SY | 3.82 | SY | 822,096 | Sq. Feet | 91,344 | Sq. Yards | 349,259 | 5 | years | 35,460 |
| Major - Resurfacing | 17.21 | SY | 16.87 | SY | 822,096 | Sq. Feet | 91,344 | Sq. Yards | 1,541,218 | 10 | years | 97,434 |

TABLE I5. 2002-EQUIVALENT BDL SYSTEM PLANNING AND DESIGN COSTS

| Hope St. Project | Scale Factor | BDL System |
|------------------|--------------|------------|
| Costs | Scale Factor | Costs |
| 96,000 | 24.98 | 2,398,266 |

| TABLE I6. BUS- | ON-DEDICATED LANE CONSTRUCTION, REHABILITATION | I, INFR | ASTRUCTURE | , AND OTHE | R CAPITAL CO | STS | | | |
|-------------------|---|---------|----------------|-------------|-------------------------------|-------------|------------------------------|-----------------------------------|---------------------------|
| | Item | Year | Unit Cost (\$) | Unit | Unit Cost (2001-Equiv. \$) | Unit | # of Units in ABUS System | One-Time Cost (2001-Equiv. \$) | EUAC (2001- Equiv. \$) |
| System Planning | and Design Costs | | | | | | | | |
| | VTA Personnel Labor Costs and Design Expenses | 2002 | 2,398,266 | One-Time | 2,351,260.29 | One-Time | 1 | 2,351,260 | 170,817 |
| Construction, Reh | abilitation, and Other Infrastructure Capital Costs | | | | | | | | |
| | Property Costs/ ROW Acquistion | 1999 | 23.65 | Sq. Foot | 24.49 | Sq. Foot | 826,848 | 20,246,221 | 1,470,866 |
| | Street Clean-Up | 2002 | 150.00 | Day | 147.06 | Day | 500 | 73,477 | 5,338 |
| | Mobilization | 2002 | 10,000.00 | Lump Sum | 9,804.00 | Lump Sum | 25 | 244,923 | 17,793 |
| | Traffic Control | 2002 | 2,000.00 | Lump Sum | 1,960.80 | Lump Sum | 25 | 48,985 | 3,559 |
| | Clearing, Grubbing, and Removal of Obstructions | 2002 | 2,500.00 | Lump Sum | 2,451.00 | Lump Sum | 25 | 61,231 | 4,448 |
| | Roadway Excavation | 2002 | 30.00 | Cu. Yard | 29.41 | Cu. Yard | 8,494 | 249,821 | 18,149 |
| | Subgrade Preparation-Class A | 2002 | 1.00 | Sq. Foot | 0.98 | Sq. Foot | 539,610 | 529,034 | 38,434 |
| | Imported Fill Materials | 2002 | 30.00 | Cu. Yard | 29.41 | Cu. Yard | 8,494 | 249,821 | 18,149 |
| | Deeplift/Base AC (8" max.) | 2002 | 70.00 | Ton | 68.63 | Ton | 15,239 | 1,045,821 | 75,978 |
| Infrastructure | AC Surface Course | 2002 | 80.00 | Ton | 78.43 | Ton | 9,993 | 783,753 | 56,939 |
| Costs | AC Base Course | 2002 | 80.00 | Ton | 78.43 | Ton | 10,492 | 822,941 | 59,786 |
| | Cold Planing | 2002 | 1.50 | Sq. Foot | 1.47 | Sq. Foot | 24,982 | 36,738 | 2,669 |
| | Pavement Reinforcing Fabric | 2002 | 1.00 | Sq. Yard | 0.98 | Sq. Yard | 87,437 | 85,723 | 6,228 |
| | Gravel Conform | 2002 | 50.00 | Ton | 49.02 | Ton | 500 | 24,492 | 1,779 |
| | Traffic Stripes and Pavement Markings | 2002 | | Lump Sum | 784.32 | Lump Sum | 25 | 19,594 | 1,423 |
| | Street Lighting System | 2002 | 60,000.00 | Lump Sum | 58,824.00 | Lump Sum | 25 | 1,469,538 | 106,760 |
| | Geotextile | 2002 | 3.00 | Linear Foot | 2.94 | Linear Foot | 27,480 | 80,825 | 5,872 |
| | Site-SpecificWork Items | 2002 | 9,828,623.28 | Lump Sum | 9,635,982.26 | Lump Sum | 1 | 9,635,982 | 700,044 |
| | TOTAL INFRASTRUCTURE COST | | | | | | | | 2,594,214 |
| Non- | | | | | | | | | |
| Infrastructure | Vehicle Purchase* | 2002 | 293,000.00 | Bus | 287,257.20 | Bus | 10.180 | N/A | 194,959 |
| Capital Costs | | | | | | | | | |
| Periodic Capital | Minor - Seals | 2002 | See Table I3 | N/A | See Table I3 | N/A | See Table I3 | N/A | 35,460 |
| Costs | Major - Resurfacing | 2002 | See Table I3 | N/A | See Table I3 | N/A | See Table I3 | N/A | 97,434 |
| Fleet Renewal | Vehicle Replacement Costs | 2002 | 293,000.00 | Bus | 287,257.20 | Bus | | N/A | 194,959 |
| TOTAL CONSTR | TOTAL CONSTRUCTION, REHABILITATION, INFRASTRUCTURE, AND OTHER CAPITAL COSTS | | | | | | | | 3,117,027 |
| TOTAL SYSTEM | PLANNING, DESIGN, CONSTRUCTION, REHABILITATION, | INFRAS | STRUCTURE, | AND OTHER | CAPITAL COS | TS | | | 3,287,843 |

^{*}Required number of vehicles is considered to be the same for the ABUS and BDL systems.

BDL study system fleet renewal. Methodologies are identical to those for the ABUS system, presented in Appendix G.

BDL SYSTEM NON-INFRASTURCTURE AGENCY COSTS

Bus-on-Dedicated-Lane (BDL) system non-infrastructure agency costs include those costs for operation and maintenance of the system. They include:

- Vehicle Operating Costs
- Vehicle Maintenance Costs
- System (Non-Vehicle) Maintenance Costs
- System Administration Costs

The cost elements included in these categories will be discussed subsequently.

Determination of the BDL system vehicle operating costs was performed in several major phases for each of the four aforementioned cost categories:

- 1. Determination of individual cost elements that comprise costs in that category (these are identical to those for the ABUS study system).
- 2. Determination of annual vehicle-revenue-miles and –hours used by the proposed BDL system (discussed in Appendix H).
- 3. Determination of unit costs for the VTA bus system in terms of vehicle-revenue-miles and vehicle-revenue-hours.
- 4. Calculation of proposed BDL system annual costs.

Bulleted items 3 and 4 are the focus of this section of this appendix.

Agency Cost Category Descriptions

BDL Vehicle Operations

Costs associated with vehicle operations include daily costs necessary to run the system, including operators' salaries, wages, and benefits, fuel and oil, utilities, and other expenses. Vehicle operating costs do not include costs for routine vehicle maintenance, such as tire replacement and labor costs for workers performing the maintenance.

BDL System Vehicle Maintenance Costs

Costs associated with vehicle maintenance include those costs for materials, supplies, fuels, lubricants, utilities, and labor used to keep the system in good working order, which are not included in vehicle operating costs.

BDL System (Non-Vehicle) Maintenance Costs

Costs associated with system maintenance include maintenance expenses for bus stops and other infrastructure, and also for minor roadway maintenance activities such as street sweeping, cleaning of storm sewers, landscaping, streetlights, traffic signals, signs, and markings. System maintenance does not include resurfacing or rehabilitation (i.e. – resurfacing and preventative seals) for the roadways on which the buses travel. Roadway rehabilitation of this sort is included in infrastructure and capital costs, under the heading of "Rehabilitation."

BDL System Administration Costs

Costs associated with system administration include expenses incurred for system support personnel in the offices of the operating agency.

Unit Cost Calculations

The procedures described herein are general to the four cost categories aforementioned. For the BDL system, as for the ABUS system, the operating expenses incurred by the Santa Clara Valley Transportation Authority (VTA) for bus operations were used to calculate unit costs in terms of cost-per-vehicle-revenue-mile and cost-per-vehicle-revenue-hour. For most calculations, procedures for calculating unit costs for the BDL system are identical to those calculated for the ABUS system, since both are based on VTA's bus operating expenses, as reported in the 1999-2000 VTA report to the National Transit Database (NTD) (2). Exceptions to this rule are the unit costs associated with driver wages and fringe benefits, and for system administration. For both of these items in the ABUS system, it was reasoned that light rail unit costs would be more accurate than bus unit costs for the ABUS system. However, for the BDL system, unit costs are derived from the bus data provided to the NTD by VTA.

Procedures for calculating unit costs are identical to those reported in the ABUS section of the report, and are based on the following annual quantities, as reported to the NTD by VTA (2): the total annual vehicle-revenue-miles for the VTA bus system accrue to 19,140,121; total annual vehicle-revenue-hours for the VTA bus system accrue to 1,471,604. Numeric unit cost values are tabulated in Tables I7a and I7b, I8a and I8b, I9a and I9b, and I10a and I10b for vehicle operations, vehicle maintenance, system maintenance, and system administration costs, respectively.

Unit Cost Conversions to Base Year – 2001-Equivalent

The procedures described herein are general to the four cost categories aforementioned mentioned.

Unit cost conversion procedures to base-year 2001 are identical to those employed for the ABUS and light rail tables. Unit costs adjusted to base-year 2001 are tabulated in Tables I7b, I8b, I9b, and I10b.

TABLE I7a. BDL VEHICLE OPERATIONS COSTS - SOURCE DATA

| Cost Element | Item | Year | Annual Cost (VTA Total \$) | Unit Cost per Veh- Rev-Mi (\$) | Unit Cost per Veh- Rev-Hr (\$) |
|------------------------|-------------------------------|------|-------------------------------|-----------------------------------|-----------------------------------|
| | Operators' Salaries and Wages | | | | |
| Salaries and Wages | Operating Time | 2000 | 34,016,476 | 1.78 | 23.12 |
| Salaries and Wages | Paid Non-Operating Work Time | 2000 | 2,677,189 | 0.14 | 1.82 |
| | Other Salaries and Wages | 2000 | 9,092,463 | 0.48 | 6.18 |
| | Operators' Fringe Benefits | | | | |
| Fringe Benefits | Operating Time | 2000 | 19,674,989 | 1.03 | 13.37 |
| i illige bellellis | Paid Non-Operating Work Time | 2000 | 1,548,475 | 0.08 | 1.05 |
| | Other Fringe Benefits | 2000 | 5,259,043 | 0.27 | 3.57 |
| Services | Services | 2000 | 3,473,770 | 0.18 | 2.36 |
| | Fuel and Lubricants | 2000 | 5,668,049 | 0.30 | 3.85 |
| Materials and Supplies | Tires and Lubes | 2000 | 1,263,850 | 0.07 | 0.86 |
| | Other Materials and Supplies | 2000 | 148,627 | 0.01 | 0.10 |
| Utilities | Utilities | 2000 | 2,252,658 | 0.12 | 1.53 |
| Taxes | Taxes | | | | |
| Misc. | Miscellaneous Expenses | 2000 | 586,232 | 0.03 | 0.40 |
| Expense Transfers | Expense Transfers | | | | |
| TOTAL OPERATING COSTS | | 2000 | 85,661,821 | | |

TABLE 17b. BDL VEHICLE OPERATIONS COSTS

| | | V | ehicle-Revenue-Mile | es | Vehicle-Revenue-Hours | | |
|------------------------|-------------------------------|------------------|---------------------|--------------------|-----------------------|---------------------|------------------|
| Cost Element | Item | Unit Cost (2001- | Annual Units in | Annual Cost (2001- | Unit Cost (2001- | Annual Units in BDL | Unit Cost (2001- |
| | | Equiv. \$) | BDL System | Equiv. \$) | Equiv. \$) | System | Equiv. \$) |
| | Operators' Salaries and Wages | | | | | | |
| Salaries and Wages | Operating Time | 1.81 | 620,101 | 1,124,106 | 23.58 | 34,683 | 817,733 |
| Salaries and wages | Paid Non-Operating Work Time | 0.14 | 620,101 | 88,470 | 1.86 | 34,683 | 64,358 |
| | Other Salaries and Wages | 0.48 | 620,101 | 300,469 | 6.30 | 34,683 | 218,577 |
| | Operators' Fringe Benefits | | | | | | |
| Fringe Benefits | Operating Time | 1.05 | 620,101 | 650,178 | 13.64 | 34,683 | 472,973 |
| Fillige Bellelits | Paid Non-Operating Work Time | 0.08 | 620,101 | 51,171 | 1.07 | 34,683 | 37,224 |
| | Other Fringe Benefits | 0.28 | 620,101 | 173,790 | 3.65 | 34,683 | 126,424 |
| Services | Services | 0.19 | 620,101 | 114,794 | 2.41 | 34,683 | 83,507 |
| | Fuel and Lubricants | 0.30 | 620,101 | 187,306 | 3.93 | 34,683 | 136,256 |
| Materials and Supplies | Tires and Lubes | 0.07 | 620,101 | 41,765 | 0.88 | 34,683 | 30,382 |
| | Other Materials and Supplies | 0.01 | 620,101 | 4,912 | 0.10 | 34,683 | 3,573 |
| Utilities | Utilities | 0.12 | 620,101 | 74,441 | 1.56 | 34,683 | 54,152 |
| Taxes | Taxes | | | | | | |
| Misc. | Miscellaneous Expenses | 0.03 | 620,101 | 19,373 | 0.41 | 34,683 | 14,093 |
| Expense Transfers | Expense Transfers | | | | | | |
| TOTAL OPERATING COSTS | | | | 2,830,775 | 59.37 | | 2,059,252 |

^{*}Annual vehicle-revenue-miles and vehicle-revenue-hours are equal for the ABUS and BDL systems.

TABLE 18a. BDL VEHICLE MAINTENANCE COSTS - SOURCE DATA

| Cost Elements | ltem | Year | Annual Cost (VTA Total \$) | Unit Cost per Veh-Rev-Mi (\$) | Unit Cost per Veh-Rev-Hr (\$) |
|--------------------|-------------------------------|------|-------------------------------|----------------------------------|----------------------------------|
| | Operators' Salaries and Wages | 2000 | | | |
| Salaries and Wages | Operating Time | 2000 | | | |
| Salaries and wages | Paid Non-Operating Work Time | 2000 | | | |
| | Other Salaries and Wages | 2000 | 17,090,526 | 0.89 | 11.61 |
| Fringe Benefits | Operators' Fringe Benefits | 2000 | | | |
| Fillige beliefits | Other Fringe Benefits | 2000 | 10,171,267 | 0.53 | 6.91 |
| Services | Services | 2000 | 3,257,024 | 0.17 | 2.21 |
| Materials and | Fuel and Lubricants | 2000 | | | |
| Supplies | Tires and Lubes | 2000 | | | |
| Supplies | Other Materials and Supplies | 2000 | 5,339,616 | 0.28 | 3.63 |
| Utilities | Utilities | 2000 | 2,708 | 0.00 | 0.00 |
| Taxes | Taxes | 2000 | | | |
| Misc. | Miscellaneous Expenses | 2000 | 168,299 | 0.01 | 0.11 |
| Expense Transfers | Expense Transfers | 2000 | | | |
| TOTAL BDL VEHICLE | MAINTENANCE COSTS | | 36,029,440 | 1.88 | 24.48 |

TABLE 18b. BDL VEHICLE MAINTENANCE COSTS

| | | \ | /ehicle-Revenue-Mile | es | Vehicle-Revenue-Hours | | | |
|--------------------|-------------------------------|-----------------|----------------------|-------------------|-----------------------|-----------------|-------------------|--|
| Cost Elements | Item | Unit Cost (2001 | Annual Units in | Annual Cost (2001 | Annual Cost (2001 | Annual Units in | Annual Cost (2001 | |
| | | Equiv. \$) | System* | Equiv. \$) | Equiv. \$) | System* | Equiv. \$) | |
| | Operators' Salaries and Wages | | | | | | | |
| Salaries and Wages | Operating Time | | | | | | | |
| Salaties and wages | Paid Non-Operating Work Time | | | | | | | |
| | Other Salaries and Wages | 0.91 | 620,101 | 564,772 | 11.85 | 34,683 | 410,845 | |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | | |
| Fillige Deficition | Other Fringe Benefits | 0.54 | 620,101 | 336,119 | 7.05 | 34,683 | 244,510 | |
| Services | Services | 0.17 | 620,101 | 107,631 | 2.26 | 34,683 | 78,297 | |
| Materials and | Fuel and Lubricants | | | | | | | |
| | Tires and Lubes | | | | | | | |
| Supplies | Other Materials and Supplies | 0.28 | 620,101 | 176,453 | 3.70 | 34,683 | 128,361 | |
| Utilities | Utilities | 0.00 | 620,101 | 89 | 0.00 | 34,683 | 65 | |
| Taxes | Taxes | | | | | | | |
| Misc. | Miscellaneous Expenses | 0.01 | 620,101 | 5,562 | 0.12 | 34,683 | 4,046 | |
| Expense Transfers | Expense Transfers | | | | | | | |
| TOTAL BDL VEHICL | E MAINTENANCE COSTS | 1.92 | | 1,190,627 | 24.97 | | 866,123 | |

*Annual vehicle-revenue-miles and vehicle-revenue-hours are equal for the ABUS and BDL systems.

TABLE 19a. BDL SYSTEM (NON-VEHICLE) MAINTENANCE COSTS - SOURCE DATA

| Cost Element | Item | | Annual Cost (VTA | Unit Cost per | Unit Cost per |
|------------------------|--|------|------------------|-----------------|-----------------|
| Cost Element | item | Year | Total \$) | Veh-Rev-Mi (\$) | Veh-Rev-Hr (\$) |
| | Operators' Salaries and Wages | 2000 | | | |
| Salaries and Wages | Operating Time | 2000 | | | |
| Salaries and Wages | Paid Non-Operating Work Time | 2000 | | | |
| | Other Salaries and Wages | 2000 | 2,775,476 | 0.15 | 1.89 |
| Eringo Ronofito | Operators' Fringe Benefits | 2000 | | | |
| Fringe Benefits | Other Fringe Benefits | 2000 | 1,426,458 | 0.07 | 0.97 |
| Services | Services | 2000 | 2,425,464 | 0.13 | 1.65 |
| | Fuel and Lubricants | 2000 | | | |
| Materials and Supplies | Tires and Lubes | 2000 | | | |
| | Other Materials and Supplies | 2000 | 273,506 | 0.01 | 0.19 |
| Utilities | Utilities | 2000 | 343,855 | 0.02 | 0.23 |
| Taxes | Taxes | 2000 | | | |
| | Street Sweeping | 2002 | See Table G17 | N/A | N/A |
| | Storm Sewers (Includes Inlet Cleaning) | 2002 | See Table G17 | N/A | N/A |
| | Landscaping (Includes Median Islands) | 2002 | See Table G17 | N/A | N/A |
| Street Maintenance | Streetlights | 2002 | See Table G17 | N/A | N/A |
| | Traffic Signals | 2002 | See Table G17 | N/A | N/A |
| | Signs | 2002 | See Table G17 | N/A | N/A |
| | Markings | 2002 | See Table G17 | N/A | N/A |
| Misc | Miscellaneous Expenses | 2000 | 55,906 | 0.00 | 0.04 |
| Expense Transfers | Expense Transfers | 2000 | | | |
| TOTAL BDL SYSTEM (NO | N-VEHICLE) MAINTENANCE COSTS | | | _ | |

TABLE 19b. BUS-ON-DEDICATED-LANE SYSTEM (NON-VEHICLE) MAINTENANCE COSTS

| | | V | ehicle-Revenue-M | iles | Vehicle-Revenue-Hours | | |
|------------------------|--|------------------|------------------|-------------------|-----------------------|-----------------|-------------------|
| Cost Elements | Item | Unit Cost (2001- | Annual Units in | Annual Cost (2001 | Annual Cost | Annual Units in | Annual Cost (2001 |
| | | Equiv. \$) | ABUS System* | Equiv. \$) | (2001-Equiv. \$) | ABUS System* | Equiv. \$) |
| | Operators' Salaries and Wages | | | | | | |
| Salaries and Wages | Operating Time | | | | | | |
| Salaries and Wages | Paid Non-Operating Work Time | | | | | | |
| | Other Salaries and Wages | 0.15 | 620,101 | 91,718 | 1.92 | 34,683 | 66,72 |
| Fringe Benefits | Operators' Fringe Benefits | | | | | | |
| i filige beliefits | Other Fringe Benefits | 0.08 | 620,101 | 47,139 | 0.99 | 34,683 | 34,29 |
| Services | Services | 0.13 | 620,101 | 80,152 | 1.68 | 34,683 | 58,307 |
| | Fuel and Lubricants | | | | | | |
| Materials and Supplies | Tires and Lubes | | | | | | |
| | Other Materials and Supplies | 0.01 | 620,101 | 9,038 | 0.19 | 34,683 | 6,575 |
| Utilities | Utilities | 0.02 | 620,101 | 11,363 | 0.24 | 34,683 | 8,266 |
| Taxes | Taxes | | | | | | |
| | Street Sweeping | N/A | N/A | 6,988 | N/A | N/A | 6,988 |
| | Storm Sewers (Includes Inlet Cleaning) | N/A | N/A | 3,669 | N/A | N/A | 3,669 |
| | Landscaping (Includes Median Islands) | N/A | N/A | 7,903 | N/A | N/A | 7,900 |
| Street Maintenance | Streetlights | N/A | N/A | 4,517 | N/A | N/A | 4,517 |
| | Traffic Signals | N/A | N/A | 3,910 | N/A | N/A | 3,910 |
| | Signs | N/A | N/A | 1,681 | N/A | N/A | 1,681 |
| | Markings | N/A | N/A | 2,684 | N/A | N/A | 2,684 |
| Misc | Miscellaneous Expenses | 0.00 | 620,101 | 1,847 | 0.04 | 34,683 | 1,344 |
| Expense Transfers | Expense Transfers | | | | | | |
| TOTAL BDL SYSTEM (NO | N-VEHICLE) MAINTENANCE COSTS | | | 272,609 | | | 206,855 |

^{*}Annual vehicle-revenue-miles and vehicle-revenue-hours are equal for the ABUS and BDL systems.

TABLE I10a. BDL SYSTEM ADMINISTRATION COSTS - SOURCE DATA

| Cost Element | Item | Year | Annual Cost (VTA Total \$) | Unit Cost per Veh Rev-Mi (\$) | Unit Cost per Veh- Rev-Hr (\$) |
|--------------------|-------------------------------|------|-------------------------------|----------------------------------|-----------------------------------|
| | Operators' Salaries and Wages | 2000 | | | |
| Salaries and Wages | Operating Time | | | | |
| | Paid Non-Operating Work Time | 2000 | | | |
| | Other Salaries and Wages | 2000 | 16,047,769 | 0.84 | 10.90 |
| Fringe Benefits | Operators' Fringe Benefits | 2000 | | | |
| | Other Fringe Benefits | 2000 | 23,939,690 | 1.25 | 16.27 |
| Services | Services | 2000 | 8,435,843 | 0.44 | 5.73 |
| Materials and | Fuel and Lubricants | 2000 | | | |
| | Tires and Lubes | 2000 | | | |
| Supplies | Other Materials and Supplies | 2000 | 1,190,895 | 0.06 | 0.81 |
| Utilities | Utilities | 2000 | 108,301 | 0.01 | 0.07 |
| Taxes | Taxes | 2000 | | | |
| Misc. | Miscellaneous Expenses | 2000 | 1,570,444 | 0.08 | 1.07 |
| Expense Transfers | Expense Transfers | 2000 | | | |
| TOTAL BDL SYSTEM | ADMINISTRATION COSTS | | 51,292,942 | | |

TABLE 110b. BDL SYSTEM ADMINISTRATION COSTS

| | | Ve | ehicle-Revenue-N | /liles | Vehicle-Revenue-Hours | | |
|------------------------|--------------------------------------|------------------|------------------|--------------------|-----------------------|-----------------|--------------------|
| Cost Element | Item | Unit Cost (2001- | Annual Units in | Annual Cost (2001- | Unit Cost (2001- | Annual Units in | Annual Cost (2001- |
| | item | Equiv. \$) | System* | Equiv. \$) | Equiv. \$) | System* | Equiv. \$) |
| | Operators' Salaries and Wages | | | | | | |
| Salaries and Wages | Operating Time | | | | | | |
| Salaries and wages | Paid Non-Operating Work Time | | | | | | |
| | Other Salaries and Wages | 0.86 | 620,101 | 530,314 | 11.12 | 34,683 | 385,778 |
| Cringo Donofita | Operators' Fringe Benefits | | | | | | |
| Fringe Benefits | Other Fringe Benefits | 1.28 | 620,101 | 791,109 | 16.59 | 34,683 | 575,494 |
| Services | Services | 0.45 | 620,101 | 278,770 | 5.85 | 34,683 | 202,792 |
| | Fuel and Lubricants | | | | | | |
| Materials and Supplies | Tires and Lubes | | | | | | |
| | Other Materials and Supplies | 0.06 | 620,101 | 39,354 | 0.83 | 34,683 | 28,628 |
| Utilities | Utilities | 0.01 | 620,101 | 3,579 | 0.08 | 34,683 | 2,603 |
| Taxes | Taxes | | | | | | |
| Misc. | Miscellaneous Expenses | 0.08 | 620,101 | 51,897 | 1.09 | 34,683 | 37,752 |
| Expense Transfers | Expense Transfers | | | | | | |
| TOTAL BDL SYSTEM ADMI | OTAL BDL SYSTEM ADMINISTRATION COSTS | | | 1,695,023 | 35.55 | | 1,233,048 |

^{*}Annual vehicle-revenue-miles and vehicle-revenue-hours are equal for the ABUS and BDL systems.

Calculation of Annual Costs for Proposed BDL System

Annual cost calculation procedures are identical to those employed for the ABUS and light rail tables. Annual costs with base-year 2001 are tabulated in Tables I7b, I8b, I9b, and I10b for vehicle operations, vehicle maintenance, system (non-vehicle) maintenance, and system administration, respectively.

References

- 1. A Policy of the Geometric Design of Highways and Streets. AASHTO. 2001.
- 2. *Final Annual Report 1999-2000*. Prepared for Federal Transit Administration National Transit Database by Santa Clara County Transportation Authority.

APPENDIX J

BDL SYSTEM USER COSTS

Introduction

User costs for the ABUS system, like the light rail system, are based on user on-board travel time and wait time. Unlike the ABUS system, the Bus-on-Dedicated-Lane (BDL) system would not employ convoying, so each bus would be operated by a driver.

For the purpose of maintaining functional equivalence between the study systems, annual and daily vehicle-revenue-hours and –miles were assumed to be the same for the ABUS and BDL systems. Implicit in this is that the same number of buses traverse the system in each daily time period for the ABUS and BDL systems. However, since the BDL buses do not convoy, the implication is that the buses running on the route would need to be dispersed – with headways adjusted to account for non-convoying.

Cost calculations for overall user costs were completed in the following sequence:

- 1. Calculation of BDL headways for each daily period, both on weekdays and weekends.
- 2. Calculation of daily passenger wait time for weekdays and weekends
- 3. Determination of daily passenger on-board travel time for weekdays and weekends.
- 4. Summation of daily wait time and travel time, and of annual wait time and travel time.
- 5. Calculation of wait- and travel-time costs.

The general assumptions used in this process are:

- Headways are constant over each daily time period.
- Buses in the ABUS convoys and the BDL system travel at the same speeds, so passenger on-board travel time is unaffected.

Value of User Wait- and On-Board Travel Time

As with the light rail and ABUS systems, the value travel time for passengers using the BDL system was calculated to be \$8.32 per user-hour.

Headway Calculations

Table J1 shows tabulated headway values for weekdays and weekends, and for all daily time periods (AM Peak, Midday, PM Peak, and Off-Peak). The calculation methodologies and sample calculations are discussed in this section.

In Table J2, the values in the columns headed "Total Bus Trips (2 Directions)" refer to the total number of times a single bus traverses the system length during a given time period, and are taken directly from ABUS Tables H1 and H2, the column entitled "Total Convoy Trips (2 Directions)." As mentioned previously in this appendix, total annual vehicle-

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|------|-----|--------|-------------------|----------|--------|
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| | | | | | |

| Period | Weekday | | Satu | ırday | Sunday | | |
|--------|---------|----|------|-------|--------|----|--|
| Period | NB | SB | NB | SB | NB | SB | |
| AM | 4 | 4 | 15 | 15 | 15 | 15 | |
| MID | 5 | 5 | 15 | 15 | 15 | 15 | |
| PM | 4 | 4 | 15 | 15 | 15 | 15 | |
| OFF | 30 | 30 | 30 | 30 | 30 | 30 | |

revenue-miles and –hours were held constant for ABUS and BDL systems for functional equivalency purposes, which underlies the idea (reflected in Table J2) that the total number of buses traveled is the same on the ABUS and BDL systems for each daily period.

To arrive at the values in the columns headed "Total Bus Traveled (1 Direction)," corresponding values in the columns headed "Total Bus Trips (2 Directions)" were halved.

In Table J2, the column headed "Length of Period" refers to the number of hours that the period lasts each day.

To arrive at the values in the "Headway" columns in Table J2, the length of period (in minutes) was divided by the total number of buses per period (in one direction) to arrive at headways for each daily period. Each headway was rounded up to the nearest minute.

The following sample calculation is for the AM peak period weekday headway calculation:

Headway (min) = [3 hours x 60 min/hr]/53.5 = 3.36 minRound the answer to 4 min.

Daily Passenger Wait-Time

The procedure used to calculate BDL user wait-time costs were identical to that employed in the light rail and ABUS system calculations; however, differing headways in the BDL system yielded different wait time values. The following procedure was used in the calculations:

- 1. Per-station passenger "on" volume data for weekdays, Saturdays and Sundays are shown in Tables E1 through E6 of Appendix E. These data represent passengers waiting to board system at a given station during a given daily time period, and were extracted from the VTA data tables shown in Appendix F.
- 2. Headways were calculated as per the procedures in the previous section of this appendix.
- 3. Total passenger wait time for each segment during each daily time period was calculated for weekdays, Saturdays, and Sundays. The following formula was used:

TABLE J2. BDL SYSTEM HEADWAY CALCULATIONS

| Period | Total Bus Trips | s (2-Directions) | Total Bus Trip | s (1-Direction) | Length of | Headwa | ay (min) |
|----------|-----------------|------------------|-----------------|-----------------|--------------|---------|----------|
| Pellou | Weekday | Weekend | Weekday Weekend | | Period (hrs) | Weekday | Weekend |
| AM Peak | 107 | 24 | 53.5 | 12.0 | 3 | 4 | 15 |
| Midday | 144 | 48 | 72.0 | 24.0 | 6 | 5 | 15 |
| PM Peak | 100 | 24 | 50.0 | 12.0 | 3 | 4 | 15 |
| Off-Peak | 49 | 49 | 24.5 | 24.5 | 12 | 30 | 30 |
| TOTAL | 400 | 145 | 200.00 | 72.50 | | | |

Wait time = [0.5] x [headway] x [passengers waiting to board]

Tables J3 through J8 show the calculated total passenger wait time values for weekdays, Saturdays, and Sundays. Table J9 shows summarized values for passenger wait time.

Daily Passenger On-Board Travel Time

Values for on-board travel time are constant for the BDL, light rail, and ABUS systems, since all systems are assumed to transport the same number of passengers and travel at the same speeds on the line. The calculation tables are not reproduced here. Table J10 summarizes on-board daily travel time for all users. Appendix E (which pertains to light rail user costs) shows appropriate formulae and sample calculations, and Tables E15 through E23 in Appendix E show appropriate values.

User Travel Time Summary and Annual User Cost Calculations

Table J10 summarizes all user time, including passenger wait and on-board travel time. This table also shows cost per user hour, daily user costs, and annual user costs itemized by day-of-week and wait time/on-board travel time. The value of cost/user hour is calculated above. Calculation methodologies for daily and annual user costs are as follows:

- 1. Daily Cost = (Daily User-Hours) x (Cost/User Hour)
- 2. Annual Cost = (Daily Cost) x (Number of Days per Year)

Table J11 shows the number of days per year for weekdays, Saturdays, and Sundays.

TABLE J3. BDL WEEKDAY NB TOTAL PASSENGER WAIT TIME (min)

| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL |
|----------------|------------|-------------|--------------|-------------|-------|
| Station | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | TOTAL |
| Japantown/Ayer | 92 | 118 | 52 | 345 | 607 |
| Civic Center | 196 | 395 | 142 | 1200 | 1933 |
| Gish | 72 | 90 | 18 | 285 | 465 |
| Metro/Airport | 34 | 83 | 38 | 135 | 290 |
| Karina Court | 28 | 70 | 56 | 210 | 364 |
| Component | 2 | 13 | 12 | 90 | 117 |
| Bonaventura | 10 | 50 | 24 | 90 | 174 |
| Orchard | 6 | 5 | 10 | 30 | 51 |
| River Oaks | 4 | 13 | 12 | 45 | 74 |
| Tasman | 2 | 5 | 6 | 0 | 13 |
| Baypointe | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 446 | 840 | 370 | 2430 | 4086 |
| TOTAL (Hours) | | | | | 68 |

TABLE J4. BDL WEEKDAY SB TOTAL PASSENGER WAIT TIME (min)

| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL | |
|----------------|------------|-------------|--------------|-------------|-------|--|
| Station | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | TOTAL | |
| Baypointe | 332 | 703 | 588 | 4470 | 6093 | |
| Tasman | 92 | 115 | 122 | 660 | 989 | |
| River Oaks | 60 | 143 | 224 | 510 | 937 | |
| Orchard | 24 | 75 | 96 | 375 | 570 | |
| Bonaventura | 28 | 233 | 180 | 645 | 1086 | |
| Component | 20 | 85 | 152 | 360 | 617 | |
| Karina Court | 70 | 203 | 244 | 1095 | 1612 | |
| Metro/Airport | 40 | 278 | 254 | 1185 | 1757 | |
| Gish | 138 | 428 | 264 | 1035 | 1865 | |
| Civic Center | 162 | 1010 | 518 | 1425 | 3115 | |
| Japantown/Ayer | 86 | 345 | 108 | 585 | 1124 | |
| TOTAL | 1052 | 3615 | 2750 | 12345 | 19762 | |
| TOTAL (Hours) | | | | | 329 | |

TABLE J5. BDL SATURDAY NB TOTAL PASSENGER WAIT TIME (min)

| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL |
|----------------|------------|-------------|--------------|-------------|-------|
| Station | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | TOTAL |
| Japantown/Ayer | 83 | 308 | 120 | 285 | 795 |
| Civic Center | 233 | 743 | 308 | 1080 | 2363 |
| Gish | 30 | 210 | 45 | 225 | 510 |
| Metro/Airport | 15 | 150 | 90 | 120 | 375 |
| Karina Court | 23 | 150 | 75 | 180 | 428 |
| Component | 15 | 8 | 15 | 45 | 83 |
| Bonaventura | 0 | 23 | 8 | 15 | 45 |
| Orchard | 0 | 30 | 30 | 0 | 60 |
| River Oaks | 0 | 23 | 8 | 15 | 45 |
| Tasman | 23 | 0 | 0 | 30 | 53 |
| Baypointe | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 420 | 1643 | 698 | 1995 | 4755 |
| TOTAL (Hours) | | | | | 79 |

TABLE J6. BDL SATURDAY SB TOTAL PASSENGER WAIT TIME (min)

| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL |
|----------------|------------|-------------|--------------|-------------|-------|
| Station | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | IOTAL |
| Baypointe | 458 | 1665 | 1290 | 4080 | 7493 |
| Tasman | 23 | 173 | 83 | 120 | 398 |
| River Oaks | 45 | 128 | 60 | 90 | 323 |
| Orchard | 30 | 83 | 68 | 135 | 315 |
| Bonaventura | 38 | 128 | 105 | 180 | 450 |
| Component | 38 | 98 | 105 | 90 | 330 |
| Karina Court | 113 | 398 | 323 | 690 | 1523 |
| Metro/Airport | 105 | 623 | 338 | 810 | 1875 |
| Gish | 308 | 953 | 473 | 750 | 2483 |
| Civic Center | 248 | 1418 | 810 | 1500 | 3975 |
| Japantown/Ayer | 150 | 593 | 248 | 660 | 1650 |
| TOTAL | 1553 | 6255 | 3900 | 9105 | 20813 |
| TOTAL (Hours) | | | | | 347 |

TABLE J7. BDL SUNDAY NB TOTAL PASSENGER WAIT TIME (min)

| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL |
|----------------|------------|-------------|--------------|-------------|-------|
| Station | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | TOTAL |
| Japantown/Ayer | 83 | 255 | 105 | 105 | 548 |
| Civic Center | 135 | 488 | 270 | 1005 | 1898 |
| Gish | 23 | 98 | 60 | 225 | 405 |
| Metro/Airport | 0 | 180 | 105 | 375 | 660 |
| Karina Court | 8 | 53 | 30 | 60 | 150 |
| Component | 8 | 0 | 23 | 0 | 30 |
| Bonaventura | 0 | 15 | 15 | 60 | 90 |
| Orchard | 0 | 15 | 23 | 0 | 38 |
| River Oaks | 0 | 8 | 0 | 15 | 23 |
| Tasman | 0 | 8 | 0 | 30 | 38 |
| Baypointe | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 255 | 1118 | 630 | 1875 | 3878 |
| TOTAL (Hours) | | | | | 65 |

TABLE J8. BDL SUNDAY SB TOTAL PASSENGER WAIT TIME (min)

| Station | AM Peak | Midday | PM Peak | Off-Peak | TOTAL | |
|----------------|------------|-------------|--------------|-------------|-------|--|
| Station | 530 to 830 | 830 to 1430 | 1430 to 1730 | 1730 to 530 | TOTAL | |
| Baypointe | 368 | 1433 | 1058 | 3975 | 6833 | |
| Tasman | 30 | 135 | 68 | 150 | 383 | |
| River Oaks | 8 | 98 | 45 | 75 | 225 | |
| Orchard | 15 | 68 | 53 | 150 | 285 | |
| Bonaventura | 45 | 113 | 75 | 60 | 293 | |
| Component | 15 | 53 | 38 | 150 | 255 | |
| Karina Court | 68 | 345 | 240 | 660 | 1313 | |
| Metro/Airport | 113 | 443 | 360 | 945 | 1860 | |
| Gish | 150 | 675 | 383 | 660 | 1868 | |
| Civic Center | 188 | 1208 | 1230 | 870 | 3495 | |
| Japantown/Ayer | 135 | 420 | 210 | 345 | 1110 | |
| TOTAL | 1133 | 4988 | 3758 | 8040 | 17918 | |
| TOTAL (Hours) | | | | | 299 | |

TABLE J9. BDL TOTAL DAILY PASSENGER WAIT TIME SUMMARY

(hours)

| (110 111 0) | | | |
|-------------|----|-----|-------|
| Day | NB | SB | TOTAL |
| Weekday | 68 | 329 | 397 |
| Saturday | 79 | 347 | 426 |
| Sunday | 65 | 299 | 363 |

TABLE J10. BDL TOTAL USER COSTS (\$)

| 7, 222 0 101 222 1 0 17, 12 0 0 2 1 0 (4) | | | | | | | | | |
|---|-------------------------------------|---------------|----------------|------------|-------------|--|--|--|--|
| Day | Element Daily User-Hours Cost/Use | | Cost/User-Hour | Daily Cost | Annual Cost | | | | |
| Weekday | Wait Time | 397 | 8.32 | 3307 | 863,107 | | | | |
| vveekuay | On-Board Travel Time | 1126 | 8.32 | 9366 | 2,444,462 | | | | |
| Saturday | Wait Time | 426 | 8.32 | 3545 | 184,359 | | | | |
| Salurday | On-Board Travel Time | 601 8.32 4999 | 259,952 | | | | | | |
| Sunday | Wait Time | 363 | 8.32 | 3022 | 157,156 | | | | |
| Suriday | On-Board Travel Time | 511 | 8.32 | 4252 | 221,084 | | | | |
| TOTAL WAIT | TIME | | | | 1,204,622 | | | | |
| TOTAL ON-BOARD TRAVEL TIME | | | | | 2,925,498 | | | | |
| TOTAL | | | | 28,491 | 4,130,120 | | | | |

TABLE J11. DAYS OF WEEK PER YEAR

| Day of Week | # of Days |
|-------------|-----------|
| Weekday | 261 |
| Saturday | 52 |
| Sunday | 52 |

Evaluation of Truck and Bus Automation Scenarios: Benefit-Cost Analysis

Volume 3

Appendices K Through Y

By

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APPENDIX K FREIGHT SYSTEMS SEGMENT CHARACTERIZATION

Introduction

This appendix describes the procedure developed to partition the study section into segments. The study section of the roadway was partitioned into segments that are relatively homogeneous with respect to average annual daily traffic volumes (AADT), the number of existing travel lanes in each direction, the availability of space in the median, and the type of development (i.e. – rural, urban, or suburban). Using only one direction for analysis, it was assumed that the northbound traffic volumes were representative of traffic volumes in the northbound and southbound directions, and that the roadway was generally symmetric, so roadway characteristics (i.e. – number of lanes, traveled way width) in the north- and southbound directions are generally the same.

General Procedure

The following general procedure for route partitioning was used to determine the route segmentation shown in Table 9.1 of the main report:

- 1. For each county, Caltrans traffic volume data (1) were consulted, and the route was partitioned at each mile marker where there appeared to be significant changes in traffic volumes, read "Ahead." (In the Caltrans data, both "Ahead" and "Back" traffic volume data were available, where "Ahead" means that traffic counts were taken looking downstream, or toward higher mile markers, from the mile marker indicated; "Behind" means that traffic counts were taken looking upstream, or toward lower mile markers, from the mile marker indicated. Mile markers increase on I-5 from south to north. For the sake of consistency, the "Ahead" data were used exclusively for the results reported here.
- 2. The segments were further partitioned according to available median widths, based on data drawn from the *California State Highway Log* (2). For the conventional-lane segmentation shown in Table 9.1, partitions were made based on whether the minimum required linear footage is available in the roadway median to accommodate the two added conventional lanes and supporting infrastructure. Each time the available median width changed from greater than the required 26-foot width to less than the required width (or vice versa), a new partition was formed. The same procedure was followed for both AHS and dedicated truck lanes, except that the cutoff width was 48 feet.
- 3. For each of the subsequent partitions, *California State Highway Log* (2) data were consulted, and each partition was further partitioned based on the number of regular travel lanes that exist. The number of travel lanes were determined by dividing the left roadbed traveled way width by 12, the assumed standard lane width (in feet) for freeway lanes. Also, partitions were not created at each mile marker where the roadbed width changes. The following criteria were used to partition according to number of lanes:

- Short segments (less than one mile) of roadway that are flanked by relatively long segments of uniform roadway were assumed to be absorbed by the dominant width. For instance, the following 3.1-mile roadway segment would be classified for the purposes of this study as having two travel lanes in each direction: a 48-foot (four-lane) roadway of 0.1 miles in length bordered on both sides by a 24-foot (two-lane) roadway of three-mile length.
- Significant widening of the roadway at interchanges is attributed to merging lanes and other auxiliary lanes, and the included segments are assumed to have width (and, consequently, number of travel lanes) equal to the roadway width either before or after the interchange.

References

- 1. Caltrans Traffic Volume Data, 2001. www.dot.ca.gov.
- 2. California State Highway Log. California Department of Transportation. 1997.

APPENDIX L

ADDED CONVENTIONAL FREEWAY LANE PLANNING, DESIGN, CONSTRUCTION, AND REHABILITATION COSTS

Summary of Cost Calculation Procedure

Costs for planning, design, construction, and rehabilitation of the added conventional freeway lane (26-foot cross section) were calculated on a segment-by-segment basis. Costs for a unit-length of freeway were considered to be dependent on whether the roadway is classified as rural, urban, or suburban, and also on whether the lane would be placed within the median or outside the median.

Tables 9.2, 9.3, and 9.4 (in the main report) show unit costs for design, planning, construction, and rehabilitation of urban and rural sections placed within and outside the median. In the assignment of costs to each roadway segment, the segment was matched to the appropriate value in Table 9.3 based on the following paired characteristics:

Urban Median Lane – low urban unit costs
Urban Non-Median Lane – high urban unit costs
Suburban Median Lane – average of low urban and rural unit costs
Suburban Non-Median Lane – average of high urban and rural unit costs
Rural Median Lane – low rural unit costs
Rural Non-Median Lane – high rural unit costs

Table L1 shows planning, design, and construction costs itemized according to each roadway segment. It is noteworthy that, in this study, costs associated with planning, design, and construction are shown as a single combined cost because source data (obtained from Caltrans) give costs in this format. The combined planning, design, and construction costs associated with the construction of the roadway were found by multiplying the appropriate unit cost per mile from Table 9.3 (these values also appear in Table L1) by the segment mileage.

For sections where the added freeway lane would be placed within the median, one barrier was assumed to be necessary to separate the traffic flow in opposing directions. One-half of the cost for that barrier was assigned to each travel direction. The barriers used for the design are Caltrans Standard Barriers (1) having two-foot width, and with a cost of \$17.95 per linear foot (2). For the segments where the lane would be placed outside the median, no barriers were considered to be necessary, and no barrier costs were calculated.

Similarly, costs associated with rehabilitation were found by multiplying the appropriate unit cost per mile from Table 9.4 by the segment mileage, which appears in Table 9.1 of the main report (and also in Table L2 of this appendix). Equivalent Uniform Annual Costs (EUAC) were calculated based on a discount rate of 6 percent and a project life of 30 years. Procedures for EUAC calculations are identical to those followed for the transit construction costs calculations that appear in Appendix C.

References

- 1. *California Highway Design Manual*. Online version. July 1999. http://www.dot.ca.gov/hq/esc/oe/project_plans/HTM/stdplns-met-new99.htm
- 2. Caltrans Cost Data Information. 2001. http://www.dot.ca.gov/hq/esc/oe/awards/>

| | | | | | Conventional | FREEWAY FOR ROADWAY S | | | | | | | Total Construc | ction Costs (\$) | |
|--------------------------------------|-------------------------|----------------|----------------|---------------------|------------------|-----------------------|----------------------------|--------------------------|------------------------|---------------|---------------------|----------------------|------------------|--------------------------|----------------------|
| County | City/Suburban/ Rural | Pos | t Mile of Se | gment | Freeway Lanes | AHS Lane Placement | 2001-Unit Cost | Total Cost | EUAC | | 2001-Unit Cost per | Total Cost | EUAC | Total Cost | EUAC |
| I-5: Sacramento | Rural | Begin 29.87 | End 34.65 | Length (mi) 4.78 | in One Direction | Median | per Lane Mile 2,389,154 | 11.420.155 | 829.662 | One Direction | Lane Mile 94,776 | 226.515 | 16,456 | 11.646.670 | 846.11 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 3 | Median | 3,654,000 | 10,706,220 | 777.795 | 0.5 | 94,776 | 138,847 | 10,430 | 10.845.067 | 787.88 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 3 | Median | 3,654,000 | 913,500 | 66,365 | 0.5 | 94,776 | 11.847 | 861 | 925,347 | 67,22 |
| -5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 3 | Median | 3,654,000 | 4,238,640 | 307,933 | 0.5 | 94,776 | 54,970 | 3,994 | 4,293,610 | 311,92 |
| l-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 4 | Median | 3,654,000 | 3,727,080 | 270,768 | 0.5 | 94,776 | 48,336 | 3,512 | 3,775,416 | 274,28 |
| -5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 5 | Non-Median | 13,702,500 | 19,320,525 | 1,403,615 | 0.0 | 94,776 | 0 | 0 | 19,320,525 | 1,403,61 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 3 | Non-Median | 13,702,500 | 15,072,750 | 1,095,019 | 0.0 | 94,776 | 0 | 0 | 15,072,750 | 1,095,01 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 4 | Non-Median | 13,702,500 | 38,915,100 | 2,827,140 | 0.0 | 94,776 | 0 | 0 | 38,915,100 | 2,827,14 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 5 4 | Non-Median | 13,702,500 | 4,658,850 | 338,460 | 0.0 | 94,776 | 400.400 | 0 | 4,658,850 | 338,46 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 16.7 14.46 | 18.82 16.7 | 2.12 | 3 | Median Median | 3,654,000 3,654,000 | 7,746,480 8,184,960 | 562,773 594,628 | 0.5 0.5 | 94,776 94,776 | 100,463 106,149 | 7,298 7,712 | 7,846,943 8,291,109 | 570,07 602,34 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 2 | Median | 2,389,154 | 34,547,165 | 2,509,814 | 0.5 | 94,776 | 685,230 | 49,781 | 35.232.395 | 2 559 59 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 2 | Median | 2,389,154 | 22,314,697 | 1,621,138 | 0.5 | 94,776 | 442,604 | 32,155 | 22,757,301 | 1,653,29 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 3 | Median | 2,389,154 | 28,407,039 | 2,063,740 | 0.5 | 94,776 | 563,443 | 40,934 | 28,970,483 | 2,104,67 |
| I-5: San Joaquin | | 28.34 | 28.56 | 0.22 | 3 | Median | 3,654,000 | 803,880 | 58,401 | 0.5 | 94,776 | 10,425 | 757 | 814,305 | 59,15 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 4 | Median | 3,654,000 | 12,935,160 | 939,725 | 0.5 | 94,776 | 167,754 | 12,187 | 13,102,914 | 951,91 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 3 | Median | 2,389,154 | 24,990,549 | 1,815,536 | | 94,776 | 495,678 | 36,011 | 25,486,228 | 1,851,54 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 5 | Median | 2,389,154 | 3,942,104 | 286,390 | | 94,776 | 78,190 | 5,680 | 4,020,294 | 292,07 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 3 | Median | 2,389,154 | 2,126,347 | 154,477 | | 94,776 | 42,175 | 3,064 | 2,168,522 | 157,54 |
| I-5: San Joaquin | | 0 | 11.8 | 11.8 28.06 | 2 | Median | 2,389,154 | 28,192,015 | 2,048,119 4.870,358 | | 94,776 94,776 | 559,178 1.329.707 | 40,624 96,602 | 28,751,194 68,369,364 | 2,088,74 4,966,96 |
| I-5: Stanislaus I-5: Merced | | 0 | 28.06 32.45 | 32.45 | 2 | Median Median | 2,389,154 2,389,154 | 67,039,657 77,528,042 | 5,632,328 | | 94,776 | 1,329,707 | 111,715 | 79,065,783 | 5,744,04 |
| I-5: Mercea I-5: Fresno | | 0 | 66.16 | 66.16 | 2 | Median | 2,389,154 | 158,066,418 | 11,483,353 | 0.5 | 94,776 | 3,135,190 | 227.768 | 161,201,609 | 11,711,12 |
| I-5: Kings | | 0 | 26.72 | 26.72 | 2 | Median | 2,389,154 | 63,838,191 | 4.637.775 | | 94,776 | 1,266,207 | 91,989 | 65,104,398 | 4,729,76 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 2 | Median | 2,389,154 | 170,036,079 | 12,352,936 | 0.5 | 94,776 | 3,372,604 | 245,016 | 173,408,683 | 12,597,95 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 4 | Median | 2,389,154 | 1,863,540 | 135,384 | 0.5 | 94,776 | 36,963 | 2,685 | 1,900,503 | 138,06 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 4 | Median | 2,389,154 | 11,300,698 | 820,983 | 0.5 | 94,776 | 224,145 | 16,284 | 11,524,843 | 837,26 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 4 | Median | 2,389,154 | 2,556,395 | 185,719 | | 94,776 | 50,705 | 3,684 | 2,607,100 | 189,40 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 4 | Median | 2,389,154 | 5,351,705 | 388,796 | | 94,776 | 106,149 | 7,712 | 5,457,854 | 396,50 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 4 | Median | 2,389,154 | 1,505,167 | 109,349 | | 94,776 | 29,854 | 2,169 | 1,535,021 | 111,51 |
| I-5: Kern I-5: Kern | Rural Rural | 5.36 0.58 | 6.41 5.36 | 1.05 4.78 | 4 | Median Median | 2,389,154 2,389,154 | 2,508,612 11,420,155 | 182,248 829,662 | 0.5 | 94,776 94,776 | 49,757 226,515 | 3,615 16.456 | 2,558,369 11.646.670 | 185,86 846,11 |
| I-5: Kern | Rural | 0.56 | 0.58 | 0.58 | 4 | Median | 2,389,154 | 1,385,709 | 100,670 | 0.5 | 94,776 | 27,485 | 1,997 | 1,413,194 | 102,66 |
| I-5: Los Angeles | Rural | 84.76 | 88.61 | 3.85 | 4 | Non-Median | 3,981,923 | 15,330,404 | 1,113,737 | 0.0 | 94,776 | 0 | 1,557 | 15,330,404 | 1,113,73 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 4 | Median | 2,389,154 | 15,123,344 | 1,098,694 | 0.5 | 94,776 | 299,966 | 21,792 | 15,423,310 | 1,120,48 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 4 | Median | 2,389,154 | 20,976,771 | 1,523,940 | 0.5 | 94,776 | 416,067 | 30,227 | 21,392,837 | 1,554,16 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 4 | Median | 2,389,154 | 3,703,188 | 269,033 | 0.5 | 94,776 | 73,451 | 5,336 | 3,776,640 | 274,36 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 4 | Median | 2,389,154 | 6,379,041 | 463,430 | 0.5 | 94,776 | 126,526 | 9,192 | 6,505,567 | 472,62 |
| I-5: Los Angeles | | 59.95 | 65.43 | 5.48 | 4 | Median | 2,389,154 | 13,092,563 | 951,160 | 0.5 | 94,776 | 259,686 | 18,866 | 13,352,249 | 970,02 |
| I-5: Los Angeles | | 54.16 | 59.95 | 5.79 | 4 | Median | 2,389,154 | 13,833,201 | 1,004,967 | 0.5 | 94,776 | 274,377 | 19,933 | 14,107,577 | 1,024,90 |
| I-5: Los Angeles I-5: Los Angeles | Rural Urban | 52.33 46.9 | 54.16 52.33 | 1.83 5.43 | 4 | Median Median | 2,389,154 3,654,000 | 4,372,152 19.841,220 | 317,632 1,441,443 | 0.5 | 94,776 94,776 | 86,720 257,317 | 6,300 18.694 | 4,458,872 20.098.537 | 323,93 1,460,13 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 4 | Median | 3,654,000 | 1,096,200 | 79,638 | 0.5 | 94,776 | 14,216 | 1,033 | 1.110.416 | 80,67 |
| I-5: Los Angeles | | 45.93 | 46.6 | 0.67 | 5 | Median | 3,654,000 | 2.448.180 | 177.858 | 0.5 | 94,776 | 31,750 | 2,307 | 2,479,930 | 180.16 |
| I-5: Los Angeles | | 45.1 | 45.93 | 0.83 | 5 | Median | 3,654,000 | 3,032,820 | 220,331 | 0.5 | 94,776 | 39,332 | 2,857 | 3,072,152 | 223,18 |
| I-5: Los Angeles | | 44.01 | 45.1 | 1.09 | 5 | Median | 3,654,000 | 3,982,860 | 289,350 | 0.5 | 94,776 | 51,653 | 3,753 | 4,034,513 | 293,10 |
| I-5: Los Angeles | | 43.9 | 44.01 | 0.11 | 4 | Median | 3,654,000 | 401,940 | 29,201 | 0.5 | 94,776 | 5,213 | 379 | 407,153 | 29,57 |
| I-5: Los Angeles | | 41.6 | 43.9 | 2.3 | 5 | Non-Median | 13,702,500 | 31,515,750 | 2,289,585 | 0.0 | 94,776 | 0 | 0 | 31,515,750 | 2,289,58 |
| I-5: Los Angeles | | 40.27 | 41.6 | 1.33 | 3 | Non-Median | 13,702,500 | 18,224,325 | 1,323,977 | 0.0 | 94,776 | 0 | 0 | 18,224,325 | 1,323,97 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 4 | Non-Median | 13,702,500 | 6,303,150 | 457,917 | 0.0 | 94,776 | 0 | 0 | 6,303,150 | 457,91 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 5 | Non-Median | 13,702,500 | 6,166,125 | 447,962 | 0.0 | 94,776 | 0 | 0 | 6,166,125 | 447,96 |
| I-5: Los Angeles | Urban Urban | 36.65 36.43 | 39.36 36.65 | 2.71 0.22 | 5 6 | Non-Median Median | 13,702,500 3,654,000 | 37,133,775 803,880 | 2,697,728 58,401 | 0.0 | 94,776 94,776 | 0 10,425 | 757 | 37,133,775 814,305 | 2,697,72 59,15 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.22 | 4 | Median | 3,654,000 | 767,340 | 55,746 | 0.5 | 94,776 | 9,951 | 757 | 777,291 | 56,46 |
| I-5: Los Angeles | | 35.94 | 36.22 | 0.28 | 4 | Non-Median | 13,702,500 | 3,836,700 | 278,732 | | 94,776 | უ,უა I N | 723 | 3,836,700 | 278,73 |
| l-5: Los Angeles | | 29.16 | 35.94 | 6.78 | 4 | Non-Median | 13,702,500 | 92,902,950 | 6,749,298 | 0.0 | 94,776 | 0 | 0 | 92,902,950 | 6,749,29 |
| -5: Los Angeles | | 28.25 | 29.16 | 0.91 | 4 | Non-Median | 13,702,500 | 12,469,275 | 905,879 | | 94,776 | 0 | 0 | 12,469,275 | 905,87 |
| -5: Los Angeles | | 22.78 | 28.25 | 5.47 | 5 | Non-Median | 13,702,500 | 74,952,675 | 5,445,230 | 0.0 | 94,776 | 0 | 0 | 74,952,675 | 5,445,23 |
| -5: Los Angeles | | 22.28 | 22.78 | 0.5 | 4 | Non-Median | 13,702,500 | 6,851,250 | 497,736 | 0.0 | 94,776 | 0 | 0 | 6,851,250 | 497,73 |
| -5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 5 | Non-Median | 13,702,500 | 11,921,175 | 866,060 | 0.0 | 94,776 | 0 | 0 | 11,921,175 | 866,06 |
| -5: Los Angeles | | 20.58 | 21.41 | 0.83 | 4 | Non-Median | 13,702,500 | 11,373,075 | 826,242 | | 94,776 | 0 | 0 | 11,373,075 | 826,24 |
| -5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 4 | Non-Median | 13,702,500 | 46,177,425 | 3,354,740 | | 94,776 | 0 | 0 | 46,177,425 | 3,354,74 |
| -5: Los Angeles | Urban | 16.9 14.16 | 17.21 | 0.31 | 4 | Median Non Median | 3,654,000 | 1,132,740 | 82,292 2,727,592 | 0.5 | 94,776 94,776 | 14,690 | 1,067 | 1,147,430 37,544,850 | 83,36 2,727,59 |
| -5: Los Angeles -5: Los Angeles | Urban Urban | 13.78 | 16.9 14.16 | 2.74 0.38 | 4 | Non-Median Median | 13,702,500 3,654,000 | 37,544,850 1,388,520 | 100,874 | 0.0 | 94,776 | 18,007 | 1,308 | 1,406,527 | 2,727,58 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 4 | Non-Median | 8,842,212 | 91,163,201 | 6,622,907 | 0.0 | 94,776 | 10,007 | 1,306 | 91,163,201 | 6,622,90 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 4 | Non-Median | 8,842,212 | 24,669,770 | 1,792,232 | 0.0 | 94,776 | n | 0 | 24,669,770 | 1,792,23 |
| CA 710: Los Angeles | Suburban | 4.96 | 10.18 | 5.22 | 3 | Non-Median | 8,842,212 | 46,156,344 | 3,353,208 | 0.0 | 94,776 | n | 0 | 46,156,344 | 3,353,20 |
| TOTAL | 2020.2011 | | | | · | | 0,0 .2,2 12 | 1,544,631,763 | 112,215,816 | | 5.,770 | 17,114,176 | U | 1,561,745,939 | 113,459,14 |

| TABLE L2. CONVENT | IONAL FREEW | AY INCREMEN | ITAL REHABIL | ITATION COSTS | | SPACE | | | |
|---|-------------------|----------------|------------------|---------------|-------------------------------|--------------------------|------------------------|----------------------|-------------------|
| County | City/Suburban/ | Po | ost Mile of Segn | nent | Conventional Freeway Lanes | Added Lane | Reha 2001-Unit Cost | abilitation Costs | |
| County | Rural | Begin | End | Length (mi) | in One Direction | Placement | per Lane Mile | Total Cost | EUAC |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 2 | Median | 103,530 | 494,873 | 31,285 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 3 | Median | 228,375 | 669,139 | 42,302 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 26.69 25.53 | 26.94 26.69 | 0.25 1.16 | 3 | Median Median | 228,375 228,375 | 57,094 264.915 | 3,609 16,748 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 4 | Median | 228,375 | 232,943 | 14,726 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 5 | Non-Median | 730,800 | 1,030,428 | 65,143 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 3 | Non-Median | 730,800 | 803,880 | 50,821 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 19.16 18.82 | 22 19.16 | 2.84 0.34 | 4 5 | Non-Median Non-Median | 730,800 730,800 | 2,075,472 248,472 | 131,209 15,708 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 4 | Median | 228,375 | 484,155 | 30,608 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 3 | Median | 228,375 | 511,560 | 32,340 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 2 | Median | 103,530 | 1,497,044 | 94,642 |
| I-5: San Joaquin | Rural | 40.45 28.56 | 49.79 40.45 | 9.34 11.89 | 3 | Median Median | 103,530 | 966,970 1,230,972 | 61,131 77,821 |
| I-5: San Joaquin I-5: San Joaquin | Rural Urban | 28.34 | 28.56 | 0.22 | 3 | Median | 103,530 228,375 | 50,242 | 3,176 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 4 | Median | 228,375 | 808,448 | 51,109 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 3 | Median | 103,530 | 1,082,924 | 68,461 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 5 | Median | 103,530 | 170,825 | 10,799 |
| I-5: San Joaquin I-5: San Joaquin | Rural Rural | 11.8 0 | 12.69 11.8 | 0.89 11.8 | 3 2 | Median Median | 103,530 103,530 | 92,142 1,221,654 | 5,825 77,232 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 2 | Median | 103,530 | 2,905,052 | 183,655 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 2 | Median | 103,530 | 3,359,549 | 212,387 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 2 | Median | 103,530 | 6,849,545 | 433,022 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 2 | Median | 103,530 | 2,766,322 | 174,884 |
| I-5: Kern I-5: Kern | Rural Rural | 15.86 15.08 | 87.03 15.86 | 71.17 0.78 | 2 4 | Median Median | 103,530 103,530 | 7,368,230 80,753 | 465,812 5,105 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 4 | Median | 103,530 | 489,697 | 30,958 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 4 | Median | 103,530 | 110,777 | 7,003 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 4 | Median | 103,530 | 231,907 | 14,661 |
| I-5: Kern | Rural | 6.41 | 7.04 6.41 | 0.63 | 4 | Median | 103,530 | 65,224 108,707 | 4,123 6,872 |
| I-5: Kern I-5: Kern | Rural Rural | 5.36 0.58 | 5.36 | 1.05 4.78 | 4 | Median Median | 103,530 103,530 | 494,873 | 31,285 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 4 | Median | 103,530 | 60,047 | 3,796 |
| I-5: Los Angeles | Rural | 84.76 | 88.61 | 3.85 | 4 | Non-Median | 955,662 | 3,679,297 | 232,602 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 4 | Median | 103,530 | 655,345 | 41,430 |
| I-5: Los Angeles | Rural Rural | 69.65 68.1 | 78.43 69.65 | 8.78 | 4 | Median Median | 103,530 103,530 | 908,993 160,472 | 57,466 10,145 |
| I-5: Los Angeles I-5: Los Angeles | Rural | 65.43 | 68.1 | 1.55 2.67 | 4 | Median | 103,530 | 276,425 | 10,145 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 4 | Median | 103,530 | 567,344 | 35,867 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 4 | Median | 103,530 | 599,439 | 37,896 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 4 | Median | 103,530 | 189,460 | 11,977 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 46.9 46.6 | 52.33 46.9 | 5.43 0.3 | 4 | Median Median | 228,375 228,375 | 1,240,076 68,512 | 78,396 4,331 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 5 | Median | 228,375 | 153,011 | 9,673 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 5 | Median | 228,375 | 189,551 | 11,983 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 5 | Median | 228,375 | 248,929 | 15,737 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 43.9 | 0.11 | 4 | Median Non Median | 228,375 | 25,121 | 1,588 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 41.6 40.27 | 41.6 | 2.3 1.33 | 5 3 | Non-Median Non-Median | 730,800 730,800 | 1,680,840 971,964 | 106,261 61,447 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 4 | Non-Median | 730,800 | 336,168 | 21,252 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 5 | Non-Median | 730,800 | 328,860 | 20,790 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 5 | Non-Median | 730,800 | 1,980,468 | 125,203 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 6 | Median | 228,375 | 50,242 | 3,176 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 36.22 35.94 | 36.43 36.22 | 0.21 0.28 | 4 | Median Non-Median | 228,375 730,800 | 47,959 204,624 | 3,032 12,936 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 4 | Non-Median | 730,800 | 4,954,824 | 313,239 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 4 | Non-Median | 730,800 | 665,028 | 42,042 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 5 | Non-Median | 730,800 | 3,997,476 | 252,717 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 22.28 21.41 | 22.78 22.28 | 0.5 0.87 | 4 5 | Non-Median Non-Median | 730,800 730,800 | 365,400 635,796 | 23,100 40,194 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 4 | Non-Median | 730,800 | 606,564 | 38,346 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 4 | Non-Median | 730,800 | 2,462,796 | 155,696 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 4 | Median | 228,375 | 70,796 | 4,476 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 4 | Non-Median | 730,800 | 2,002,392 | 126,589 |
| I-5: Los Angeles CA 710: Los Angeles | Urban Suburban | 13.78 12.97 | 14.16 23.28 | 0.38 10.31 | 4 | Median Non-Median | 228,375 843,231 | 86,783 8,693,709 | 5,486 549,608 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 4 | Non-Median | 843,231 | 2,352,614 | 148,730 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 3 | Non-Median | 843,231 | 4,401,665 | 278,269 |
| TOTAL | | | | | | | | 84,743,776 | 5,357,421 |

APPENDIX M

ADDED CONVENTIONAL FREEWAY LANE VEHICLE-HOURS AND VEHICLE-MILES, VEHICLE OPERATING COSTS, AND USER COSTS

Introduction

This appendix details the methodologies and procedures used to calculate the vehicle operating costs and user costs for both the trucks and regular cars operating on an added conventional freeway lane on the study section. In order to calculate vehicle operating costs, which were given in literature in terms of dollars per mile of operation, annual vehicle-miles of travel were determined. Similarly, user costs can be quantified in terms of dollars per hour of travel time. So, in order to determine user costs, annual vehicle-hours of operation were determined for the study section.

Assumptions and General Issues

The vehicle-miles of travel, vehicle-hours of travel, vehicle operations, and user costs were determined for one direction (northbound) of the roadway and were computed separately for trucks and other vehicles. All calculations were carried out for each of the homogeneous sections of roadway described in Appendix K. The calculations were done for three periods during the day: the peak period, a nighttime period and an off-peak period. The segmentation of the day into these different periods, which were based on volume levels, will be discussed in subsequent sections.

Also, for the purposes of the calculations presented here, a distinction is made between trucks (i.e. – heavy vehicles, or those vehicles having more than four tires touching the ground) and "other vehicles," which are assumed to be passenger cars. No distinctions are made here for any other types of vehicles.

General Procedure (and Relevance to the Cost Calculations)

As aforementioned, the purpose of calculating annual vehicle-miles on the study section was to determine operations costs for the system configuration with an added conventional freeway lane. Vehicle-hours were calculated in order to estimate user costs for the added-lane configuration.

In studying the added-lane system, values for vehicle-miles and vehicle-hours were calculated for the base system (i.e. – the existing system, with no added lane), and also for the existing-system-plus-added-lane configuration. Cost calculations were carried out for each configuration, and the differences in costs for the two systems were found. The cost calculations are not discussed further in this appendix, but are mentioned here to add clarity and context.

Calculation Procedure for Vehicle-Miles and Vehicle-Hours

The following procedure was used to determine vehicle-miles and vehicle-hours for the base system (i.e. – the study segment with no added lane), and also for the configuration with the added lane.

- Determination of the average daily traffic (AADT)
- Determination of truck percentages and truck AADT
- Determination of the peak-period flows, durations, and volumes
- Determination of nighttime period flows, durations, and volumes
- Determination of daytime off-peak period flows, durations, and volumes
- Determination of vehicle speeds and passenger-car-equivalent flows
- Determination of daily vehicle-miles and vehicle-hours on the study section.

Sample calculations herein refer to the base condition. The difference between base-condition calculations and added-lane calculations is the result of the number of lanes on each study segment. For the added-lane configuration, an additional lane was added to the number of existing lanes on each segment, and subsequent calculations were affected accordingly.

AADT

Traffic volume data (AADT) for the year 2001 were obtained from the Caltrans website (1). The data includes two-directional (northbound and southbound) AADT at certain post-mile markers.

As described in Appendix K, the study section was partitioned into relatively homogeneous segments (in terms of traffic volume, existing number of lanes, and median width), so traffic volumes on each section were relatively constant over that section. For each partition, a volume was chosen that was representative of the AADT over the range. When volumes varied somewhat considerably on a segment, volumes were assigned to that section using approximate averages. These approximated averages took into account the length of the partition at each volume level, in case some of the individual sections were longer than some of the sections within the section of freeway for which the AADT was being determined, and the AADT was chosen so as to be an approximate weighted average of the volumes on the section. For all those sections of the freeway for which no data were available, the AADT was assumed to be same or nearly same as the section closest to the section whose data was available.

Once a two-directional AADT was assigned to each segment, half of that volume was assumed to apply to the northbound direction. This was considered to be a reasonable assumption because traffic daily traffic volumes were used, which would account for any variations in flow based on time-of-day. AADT for each partition is shown in Table M1a for the base condition, and in Table M2a for the added-lane scenario.

Truck Percentage and Truck AADT

For each partition of the study section, the percentage of the vehicles which were heavy vehicles (i.e. – more than four wheels touching the road) was determined using data obtained from the Caltrans website (2). This percentage was assumed to apply to the added-lane configuration.

Like AADT and peak period flows, the truck percentages were given in the data at specific mile markers. For each of the partitions determined in Appendix K, a truck percentage was assigned based on the Caltrans truck data. The mile marker for each truck-percentage reading was matched to the appropriate segment in the previously-partitioned study section, and the corresponding truck percentage was assigned to that partition.

It is noteworthy that truck-percentage readings were given in the source data at wider-spaced mile markers than the traffic volumes described in previous sections. For this reason, most of the study-section partitions contained three or fewer truck-percentage readings, and some of the partitions contained no truck-percentage readings. When only one truck-percentage reading fell into a given partition, the truck percentage assigned was that reading. When two or more truck-percentage readings fell into a partition, a rough average of the truck percentages was used. If no truck-percentage data were available for a section, then the data available for an adjacent section with similar characteristics (i.e. – AADT, number of lanes, etc.) was assumed as the truck percentage for that section.

The truck AADT was then calculated for each partition of the study section. Truck AADT is the product of truck percentage and the AADT. Calculated values for truck AADT for each partition of the study section are shown in Tables M1a and M2a for the base condition and the added-lane scenario, respectively. The following sample calculation is also taken from the first partition shown in Table M1a:

AADT = 40000 Truck percentage = 16% Truck AADT = 40000*16% = 6400 trucks

Peak-Period Flows, Durations, and Volumes

Peak period flow (in vehicles per hour) were obtained from the same source as the AADT data discussed in the previous section. A peak period flow was assigned to each partition of the study section in the same manner that AADT was assigned. Like the AADT data, the peak period flows were given by Caltrans (1) as two-directional, and northbound flows were assumed to be half of the two-directional flows. Table M1a shows the peak period flows as assigned to each partition of the study section for the base condition, and Table M2a shows flows as assigned to each partition for the added-lane scenario.

A three-day average hourly traffic volume was used to determine peak period duration (i.e. – the length of the daily peak period, in hours) for each partition of the study section. This average was calculated from data obtained from Caltrans for the month of April for the dates 4/9/02, 4/10/02, and 4/11/02, which are Tuesday, Wednesday and Thursday respectively. These data were given in the form of a 14-hour profile of hourly traffic volumes at select mile markers. The aforementioned dates were chosen because, of the dates for which data was provided, they were the most representative of normal weekday traffic conditions (i.e. – no substantial holiday travel or other event-related changes in travel patterns were expected on these days). It is noteworthy that Caltrans data only

provided readings for the month of April. It is also noteworthy that weekend travel conditions were assumed for the purposes of this study to be the same as weekday conditions.

Peak period duration was determined at each mile marker in the hourly-volume data provided by Caltrans according to the procedure outline in the next paragraph. Like the truck percentages discussed above, data were not available for each partition determined in Appendix K and shown in Tables M1a and M2a. Once peak-period durations were determined for the mile markers for which data were provided, durations were assigned to each partition of the study section using the same general rules as used to assign truck percentages (see above). The following procedure describes the process by which peak-hour durations were determined for each mile marker for which data was provided:

Bar charts were developed using the 3-day-average hourly traffic volumes. The peak period duration was then determined from those bar charts by observation: where obvious peaks occurred in hourly volumes, these were considered to be peak periods. The number of peak hours was the number of hours whose volumes which were included in the peak volume category.

The peak-period volume was then calculated by multiplying peak-period flow by the peak-period duration. The calculated flows are shown in Table M1a for the base condition, and in Table M2a for the added-lane scenario. The following sample calculation also appears in Table M1a, for the first segmentation of the study section:

Peak Period Flow = 3500 vph Peak period duration = 6 hrs. Peak period Volume = 3500*6 = 21000 vehicles

Nighttime Period Flows, Durations, and Volumes

Nighttime period duration (in hours) was determined in the same way as peak period duration. From the bar charts developed from given Caltrans hourly volume data for three consecutive weekdays (see previous section), the consecutive hours during which the lowest volumes occurred on a 24-hour profile were assumed to be the nighttime hours. The nighttime duration is the number of hours in this volume category. Tables M1a and M2a show nighttime durations as assigned to each partition of the study segment, for the base condition and the added-lane scenario, respectively. As with the assignment of peak period duration and truck percentages (see previous sections), data were not available for each partition determined in Appendix K and shown in Tables M1a and M2a. Once nighttime-period durations were determined for the mile markers for which data were provided, durations were assigned to each partition of the study section using the same general rules as used to assign truck percentages (see above).

From the nighttime period duration, the percentage of vehicles using the study section during nighttime hours was calculated. The ratio of the nighttime volume (total vehicles

on the system during the nighttime hours) to the total daily volume (i.e. – the sum of all hourly volumes) resulted in the estimated nighttime off-peak percentage.

The nighttime volume was then calculated as the product of the nighttime traffic percentage and the traffic AADT given by Caltrans for 2001 (1), and nighttime flow rates were determined by dividing the nighttime period volume by the number of hours in the nighttime period (i.e. – the nighttime duration). The following sample calculation is from Table M1a.

```
Nighttime duration = 5 hrs.

Nighttime traffic percentage = 4.81%

AADT = 40000

Nighttime off-peak period volume = 4.81% * 40000 = 1923

Nighttime flow (vehicle per hour) = 1923/5 = 385
```

Daytime Off-Peak Period Flows, Duration, and Volumes

The daytime off-peak duration for each partition of the study section was, for the purposes of this study, considered to be the number of hours which were not classified as part of either peak or nighttime periods. Daytime off-peak period duration, then, was found by subtracting the peak-period and nighttime-period durations from twenty-four (the number of hours in a day). Daytime off-peak period durations were assigned to each partition of the study segment in a similar manner as durations were applied for the peak and off-peak periods. Tables M1a and M2a show daytime off-peak period durations as assigned to each of the partitions of the study section, for the base condition and the added-lane scenario, respectively.

Similarly, daytime off-peak period volume was, for the purposes of this study, considered to be that portion of the daily volume not accounted for in the peak and nighttime periods. Daytime off-peak volume was calculated by subtracting the peak and nighttime volumes from the AADT given by Caltrans (1). Hourly flows were then calculated by dividing the daytime off-peak period volume by the duration of the period. Flows and volumes for the daytime off-peak period for each partition of the study section appear in Tables M1a and M2a. The following sample calculation is taken from the same table, from the first partition:

```
AADT = 40000

Peak period volume = 21000

Nighttime off-peak period volume = 1923

Daytime off-peak period volume = 40000 - (21000 + 1923) = 17077

Daytime off-peak period duration = 13

Nighttime/daytime off-peak flow = 17077/13 = 1314 vph
```

Passenger-Car-Equivalent Flows and Vehicle Speeds

Passenger Car Equivalent Flows

Flows for each partition of the study segment were determined, as discussed in previous sections, for the peak, nighttime, and daytime off-peak periods. Lane flows were then determined by dividing the hourly flow for all lanes by the number of lanes on the segment. Then, hourly passenger car equivalent flows (pcphpl) were determined. The process for this is described in the following paragraph.

For the purposes of this study, a passenger car-to-truck equivalence of 1.5 was assumed (i.e. – 1.5 passenger cars is equal to one truck), and all volumes were converted to passenger car equivalent volumes. This was done to assure an accurate comparison, since the ratio of trucks to passenger cars varies from partition to partition. The passenger car equivalent hourly flow per lane (pcphpl) for each period on each partition was determined by multiplying the truck flow by a factor of 1.5, and then adding that product to the remaining vehicular flow. The calculated passenger car equivalent flows appear in Tables M1b and M2b for the base and added-lane conditions, respectively. The following sample calculation was taken from Tables M1a and M1b, from the data pertaining to peak period flow for the first segment:

```
Peak Period Flow = 3500 vph (from Table M1a)

Peak period flow per lane = 1750 vphpl (see Table M1b)

% of trucks traveling in the section = 16% (from Table M1a)

Flow per lane for trucks = 0.16*1750 = 280 (intermediate step; not shown in tables)

Passenger equivalent flow (for trucks) = 280*1.5 = 420 (intermediate step; not shown in tables)

Flow per lane for other vehicles = 1750*(1-0.16) = 1470 (intermediate step; not shown in tables)

Passenger car equivalent flow for all vehicles = 1470 + 420 = 1890 pcphpl (see Table M1b)
```

Vehicle Speeds

The operating speed for trucks on the non-automated dedicated lanes, and also for trucks traveling in the conventional lanes, was assumed to be 50mph. For trucks traveling on the AHS lanes, the speed was assumed to be 70mph. This assumption was considered to be reasonable because the relatively widely-spaced system access points would decrease speed reductions associated with merging and exiting maneuvers, as compared to operations on a non-dedicated lane.

The non-truck vehicles operating on the conventional lanes were assumed to have free flow speeds of 55mph and 65mph on urban and suburban/rural road sections, respectively. These speeds were determined from the speed-flow charts in the *Highway Capacity Manual* (3), and were based on the input parameters of free flow speed and passenger car equivalent flow (pcphpl). The operating speeds for each type of vehicle considered in this study (truck or passenger car) on each type of lane

(automated/dedicated,dedicated/non- automated, or conventional) for each daily period (peak, nighttime, and daytime off-peak) are shown for each partition of the study section in Tables M1b and M2b for the base condition and added-lane condition, respectively.

Vehicle-Miles and Vehicle-Hours

Vehicle-Miles

The vehicle-miles of travel were calculated for each partition during each daily period (peak, nighttime, and daytime off-peak), for both the base condition and the added-lane scenario. Vehicle-miles for a given segment during a given period are the product of the travel distance (in miles) for that partition and the volume of traffic estimated for that period. Vehicle-miles for a given daily period are equal to the sum of the vehicle-miles for each partition. Daily vehicle-miles are equal to the sum of vehicle-miles for all daily periods. Tables M1c and M2c show daily vehicle-miles for the base condition and the added-lane scenario, respectively. A summary of daily vehicle-miles appears in Table M3.

Vehicle-Hours

The vehicle-hours of travel were calculated for each partition during each daily period (peak, nighttime, and daytime off-peak). Vehicle-hours for a given segment during a given period are the product of the travel time for that partition and the volume of traffic estimated for that period. The travel time was calculated by dividing the section length by travel speed during the period (methodologies for determining travel speed appear in the previous section). Vehicle-hours for a given daily period are equal to the sum of the vehicle-hours for each partition. Daily vehicle-hours are equal to the sum of vehicle-hours for all daily periods. Tables M1c and M2c show daily vehicle-hours for the base condition and the added-lane scenario, respectively, for each partition of the study system. A summary of daily vehicle-hours appears in Table M4.

Vehicle Operations Costs

The calculations for annual vehicle operations costs are a function of annual vehiclemiles and per-mile unit costs for vehicle operations. Costs for vehicle operations were determined according to the following procedure:

- Determination of unit costs for vehicle operations (in terms of dollars per vehicle-mile)
- Determination of daily vehicle operating costs
- Determination of annual vehicle operating costs.

Unit Costs for Vehicle Operations

The vehicle operating costs are those expenses necessary to operate a vehicle on the freeway lane. Typically, costs for vehicle operations include driver wages and fringe

benefits, other wages and fringe benefits, equipment rents and purchased transportation, insurance, depreciation, tires, outside maintenance, fuel, tax, licensing, and other miscellaneous items. For the purposes of this study, taxes and licensing fees were not included in vehicle operations costs because they are considered transferred costs. This exclusion is allowable because this analysis was performed from a societal perspective.

Unit costs for the operation of trucks on freeways were published in the *American Trucking Trends* (4). For the trucks operating without automation on the dedicated lane and the other conventional lanes, the per-mile cost was assumed to be equal to those costs published in *American Trucking Trends*, with adjustment for inflation from 1998 to 2001 (5). The 2001-equivalent unit costs used for trucks operating on conventional lanes was determined to be \$1.77. Table M5 shows itemized unit costs for non-automated truck operations.

For non-truck traffic (assumed for the purposes of this study to be passenger-car traffic), the unit cost for operations was assumed to be equal to the mileage reimbursement given to San Jose State University employees for employment-related use of their personal vehicles. This figure (\$0.325 per mile in 2001-dollars) was assumed to cover all costs associated with operating a passenger car under freeway conditions. This cost is also shown in Table M6.

Vehicle Operating Costs

The vehicle operating costs were calculated by multiplying the vehicle-miles with the per-mile unit cost of operating the vehicle. This calculation was performed for all vehicles operating on the study section, including trucks on the AHS lane, trucks on the dedicated lane, trucks on the conventional lanes, and other vehicles on the conventional lane. Costs were calculated for all of the aforementioned vehicles on each partition within the study section, and then summed to determine the total vehicle operating costs.

The vehicle operating costs were then calculated for each section for all vehicles. Tables M1d and M2d show details of vehicle operating costs calculations for the base condition and the base condition plus the added lane configuration, respectively.

The following sample calculation comes from Table M1d, and is associated with the first segment of the study section (VOC represents vehicle operating cost):

```
Unit cost for truck operation on dedicated lane = $1.77
Truck-Miles traveled on the system (peak period) = 16,061
Truck VOC on the dedicated lane (per day) = 1.77* 16,061 = $28,364
```

Annual vehicle operating costs are summarized in Table M6. Total daily vehicle-miles were extracted from Table M1c and M2c for the base and added-lane scenarios. Total daily costs were calculated by multiplying the unit cost for operations by the appropriate number of vehicle-miles. Equivalent uniform annual cost (EUAC) was found by multiplying the daily cost by 365, for the "truck" and "other vehicles" categories. Then,

equivalent uniform annual total cost (EUATC) was found by summing the EUACs of the "truck" and "other vehicles" traffic.

User Costs

System user costs include those costs associated with user travel time on the system. These costs do not include the costs incurred for driver wages and fringe benefits (these are considered to be part of vehicle operations). Tables M1e and M2e show calculated costs for each partition, for the base condition and the added-lane configurations, respectively.

The calculation of annual user costs was performed using the same procedure as for the annual vehicle operating costs in the previous section of this appendix. Per-hour user costs for passenger cars (considered here to represent all "other vehicles") and trucks were based on data from *California Life-Cycle Benefit/Cost Analysis Model (Cal-B/C)* (6), and were determined to be \$9.16 and \$28.27, respectively. Table M7 shows a summary of the costs.

Summary of Results

The details for the calculations of vehicle-miles and vehicle-hours of travel are shown in Tables M1a through M1e for the existing configuration of the freeway, and in Tables M2a through M2e for the existing configuration plus the conventional added lane. Tables M1a and M2a show the flow rates, duration, and volumes for the various periods of the day for which analysis was conducted. The passenger-car equivalents and speeds are shown in Tables M1b and M2b. The vehicle-hours and –miles of travel calculations are presented in Tables M1c and M2c. Tables M1d and M2d show details of vehicle operating costs calculations, and Tables M1e and M2e show user cost calculations.

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- 4. American Trucking Trends. American Trucking Associations' Economics and Statistics Group. 2000.
- 5. Gross Domestic Product Deflation Inflation Calculator. Online. http://www.jsc.nasa.gov/bu2/inflateGDP.html
- 6. Booz: Allen and Hamilton Inc. *California Life-Cycle Benefit/Cost Analysis Model* (Cal-B/C). California Department of Transportation. September 1999.

| TABLE M1a. SECTION | I VOLUME DATA | - BASE C | ONDITION | - BASE VOLU | IME - SEGMENTA | TION 26 ET DAS | ei c | | | | | | | | | | | | |
|--------------------------------------|----------------|----------------|----------------|--------------|-----------------------------------|--------------------------|--------------------|----------------|--------------------|---------------------|------------------------------|--------------------------------|---------------------------------|-----------------------|---------------------------------------|-------------------------------------|-----------------------------|---------------------------------------|-------------------------------------|
| | City/Suburban/ | | st Mile of S | | Conventional | AHS Lane | Base AADT | | Truck AADT | Peak Period | Peak Period | Peak Period | Nighttime Off- | Nighttime Off- | Nighttime Off-Peak | Nighttime Off- Peak Period Flow, | Daytime Off- Peak Period | Daytime Off-Peak | Daytime Off-Peak |
| County | Rural | Begin | End | Length (mi) | Freeway Lanes in One Direction | Placement | (One Direction) | Truck % | (One Direction) | Duration (hours) | Flow, One Direction (vph) | Volume, One Direction (veh) | Peak Period Duration (hours) | Peak Period % AADT | Period Volume, One Direction (veh) | One Direction (vph) | Duration (hours) | Period Volume, One Direction (veh) | Period Flow, One Direction (vph) |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 2 | Median | 40,000 | 16.0% | 6,400 | 6 | 3,500 | 21,000 | 5 | 4.81% | 1,923 | 385 | 13 | 17,077 | 1,314 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 3 | Median | 49,000 | 11.0% | 5,390 | 6 | 4,900 | 29,400 | 5 | 4.81% | 2,356 | 471 | 13 | 17,244 | 1,326 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 3 | Median | 49,000 | 9.0% | 4,410 | 6 | 4,900 | 29,400 | 5 | 4.81% | 2,356 | 471 | 13 | 17,244 | 1,326 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 3 | Median | 67,000 | 13.0% | 8,710 | 3 | 6,500 | 19,500 | 6 | 4.76% | 3,189 | 532 | 15 | 44,311 | 2,954 |
| I-5: Sacramento | Urban | 24.51 | 25.53 24.51 | 1.02 | 4 | Median | 73,000 80.000 | 9.0% | 6,570 8,000 | 3 | 7,300 7,100 | 21,900 21,300 | 6 | 4.76% 4.76% | 3,475 3,808 | 579 635 | 15 15 | 47,625 54.892 | 3,175 3,659 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 23.1 | 23.1 | 1.41 | 3 | Non-Median Non-Median | 75,000 | 11.0% | 8,250 | 3 | 7,100 | 21,000 | 6 | 4.76% | 3,570 | 595 | 15 | 50,430 | 3,362 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 4 | Non-Median | 65.000 | 14.0% | 9,100 | 3 | 6,000 | 18,000 | 6 | 4.76% | 3,094 | 516 | 15 | 43.906 | 2,927 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 5 | Non-Median | 63,000 | 14.0% | 8,820 | 3 | 5,400 | 16,200 | 6 | 4.76% | 2,999 | 500 | 15 | 43,801 | 2,920 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 4 | Median | 50,000 | 14.0% | 7,000 | 3 | 5,000 | 15,000 | 6 | 4.76% | 2.380 | 397 | 15 | 32,620 | 2.175 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 3 | Median | 40,000 | 14.0% | 5,600 | 3 | 4,000 | 12,000 | 6 | 4.76% | 1,904 | 317 | 15 | 26,096 | 1,740 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 2 | Median | 30,000 | 25.0% | 7,500 | 3 | 3,000 | 9,000 | 11 | 19.13% | 5,738 | 522 | 10 | 15,262 | 1,526 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 2 | Median | 25,000 | 24.0% | 6,000 | 4 | 2,300 | 9,200 | 8 | 11.58% | 2,895 | 362 | 12 | 12,905 | 1,075 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 3 | Median | 40,000 | 23.0% | 9,200 | 5 | 4,000 | 20,000 | 5 | 4.03% | 1,613 | 323 | 14 | 18,387 | 1,313 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 3 | Median | 45,000 | 24.0% | 10,800 | 5 | 4,500 | 22,500 | 5 | 4.03% | 1,814 | 363 | 14 | 20,686 | 1,478 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 4 | Median | 50,000 | 24.0% | 12,000 | 5 | 5,000 | 25,000 | 5 | 5.58% | 2,791 | 558 | 14 | 22,209 | 1,586 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 3 | Median | 40,000 | 26.0% | 10,400 | 5 | 4,000 | 20,000 | 5 | 5.58% | 2,233 | 447 | 14 | 17,767 | 1,269 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 5 | Median | 63,000 | 26.0% | 16,380 | 5 | 5,000 | 25,000 | 5 | 5.58% | 3,517 | 703 | 14 | 34,483 | 2,463 |
| I-5: San Joaquin I-5: San Joaquin | Rural Rural | 11.8 | 12.69 11.8 | 0.89 11.8 | 3 | Median Median | 42,000 10.000 | 26.0% 26.0% | 10,920 2,600 | 5 3 | 4,200 1,000 | 21,000 3.000 | - 6 - 5 | 8.17% 8.03% | 3,430 803 | 572 161 | 13 16 | 17,570 6.197 | 1,352 387 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 2 | Median | 10,000 | 28.0% | 2,800 | 4 | 1,000 | 4.000 | 6 | 15.57% | 1.557 | 259 | 14 | 4.443 | 317 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 2 | Median | 15,000 | 29.0% | 4.350 | 4 | 1,500 | 6,000 | 6 | 15.57% | 2.335 | 389 | 14 | 6,665 | 476 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 2 | Median | 15,000 | 30.0% | 4,500 | 5 | 1,500 | 7,500 | 7 | 18.05% | 2,708 | 387 | 12 | 4,792 | 399 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 2 | Median | 15,000 | 30.0% | 4,500 | 5 | 1,500 | 7,500 | 7 | 17.32% | 2.597 | 371 | 12 | 4,903 | 409 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 2 | Median | 17,000 | 29.0% | 4,930 | 5 | 1,700 | 8,500 | 5 | 10.17% | 1,728 | 346 | 14 | 6,772 | 484 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 4 | Median | 30,000 | 28.0% | 8,400 | 5 | 3,000 | 15,000 | 6 | 10.95% | 3,284 | 547 | 13 | 11,716 | 901 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 4 | Median | 30,000 | 28.0% | 8,400 | 6 | 3,000 | 18,000 | 6 | 10.95% | 3,284 | 547 | 12 | 8,716 | 726 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 4 | Median | 30,000 | 28.0% | 8,400 | 6 | 3,000 | 18,000 | 6 | 10.95% | 3,284 | 547 | 12 | 8,716 | 726 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 4 | Median | 30,000 | 30.0% | 9,000 | 6 | 3,000 | 18,000 | 6 | 10.95% | 3,284 | 547 | 12 | 8,716 | 726 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 4 | Median | 30,000 | 28.0% | 8,400 | 6 | 3,000 | 18,000 | 6 | 10.95% | 3,284 | 547 | 12 | 8,716 | 726 |
| I-5: Kern I-5: Kern | Rural Rural | 5.36 0.58 | 6.41 5.36 | 1.05 4.78 | 4 | Median Median | 30,000 30.000 | 28.0% 28.0% | 8,400 8,400 | 6 | 3,000 3,000 | 18,000 18,000 | 6 | 10.95% 10.95% | 3,284 3,284 | 547 547 | 12 12 | 8,716 8,716 | 726 726 |
| I-5: Kern | Rural | 0.58 | 0.58 | 0.58 | 4 | Median | 30,000 | 28.0% | 8,400 | 6 | 3,000 | 18,000 | 6 | 10.95% | 3,284 | 547 | 12 | 8,716 | 726 |
| I-5: Los Angeles | Rural | 84.76 | 88.61 | 3.85 | 4 | Non-Median | 35.000 | 27.0% | 9,450 | 6 | 3,500 | 21.000 | 6 | 10.14% | 3,550 | 592 | 12 | 10.450 | 871 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 4 | Median | 35,000 | 27.0% | 9,450 | 6 | 3,500 | 21,000 | 6 | 10.14% | 3,550 | 592 | 12 | 10,450 | 871 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 4 | Median | 35.000 | 18.0% | 6.300 | 6 | 3,500 | 21,000 | 7 | 10.14% | 3.550 | 507 | 11 | 10,450 | 950 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 4 | Median | 35,000 | 19.0% | 6,650 | 6 | 3,500 | 21,000 | 7 | 10.14% | 3,550 | 507 | 11 | 10,450 | 950 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 4 | Median | 35,000 | 18.0% | 6,300 | 6 | 3,500 | 21,000 | 7 | 10.14% | 3,550 | 507 | 11 | 10,450 | 950 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 4 | Median | 35,000 | 18.0% | 6,300 | 6 | 3,500 | 21,000 | 7 | 10.14% | 3,550 | 507 | 11 | 10,450 | 950 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 4 | Median | 40,000 | 16.0% | 6,400 | 5 | 4,000 | 20,000 | 5 | 6.08% | 2,433 | 487 | 14 | 17,567 | 1,255 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 4 | Median | 65,000 | 10.0% | 6,500 | 5 | 6,500 | 32,500 | 5 | 6.08% | 3,953 | 791 | 14 | 28,547 | 2,039 |
| I-5: Los Angeles | Urban | 46.9 | 52.33 | 5.43 | 4 | Median | 90,000 | 10.0% | 9,000 | 6 | 8,600 | 51,600 | 5 | 5.89% | 5,305 | 1,061 | 13 | 33,095 | 2,546 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 4 | Median Median | 92,000 92,000 | 9.0% | 8,280 | 6 | 8,900 8,900 | 53,400 53,400 | 5 | 5.89% 5.89% | 5,423 5,423 | 1,085 1,085 | 13 13 | 33,177 33,177 | 2,552 2,552 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 45.93 45.1 | 46.6 45.93 | 0.67 | 5 5 | Median | 100.000 | 9.0% | 9,200 9,000 | 6 | 8,900 | 53,400 | 5 5 | 5.89% | 5,895 | 1,179 | 13 | 40,705 | 3.131 |
| I-5: Los Angeles | Urban | 44.01 | 45.93 | 1.09 | 5 | Median | 115,000 | 10.0% | 11,500 | 6 | 9,100 | 54,600 | 5 | 5.89% | 6,779 | 1,179 | 13 | 53,621 | 4,125 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 4 | Median | 115,000 | 8.0% | 9,200 | 6 | 8,500 | 51,000 | 5 | 6.62% | 7.618 | 1,524 | 13 | 56,382 | 4,337 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 5 | Non-Median | 120,000 | 8.0% | 9,600 | 6 | 9,500 | 57,000 | 5 | 6.62% | 7,949 | 1,590 | 13 | 55,051 | 4,235 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 3 | Non-Median | 117,000 | 9.0% | 10,530 | 4 | 4,600 | 18,400 | 5 | 4.88% | 5,710 | 1,142 | 15 | 92,890 | 6,193 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 4 | Non-Median | 65,000 | 9.0% | 5,850 | 4 | 4,800 | 19,200 | 5 | 4.88% | 3,172 | 634 | 15 | 42,628 | 2,842 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 5 | Non-Median | 70,000 | 8.0% | 5,600 | 4 | 5,000 | 20,000 | 5 | 4.88% | 3,416 | 683 | 15 | 46,584 | 3,106 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 5 | Non-Median | 135,000 | 8.0% | 10,800 | 5 | 10,200 | 51,000 | 5 | 4.20% | 5,675 | 1,135 | 14 | 78,325 | 5,595 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 6 | Median | 140,000 | 8.0% | 11,200 | 5 | 10,000 | 50,000 | 5 | 4.20% | 5,885 | 1,177 | 14 | 84,115 | 6,008 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 4 | Median | 140,000 | 8.0% | 11,200 | 5 | 9,600 | 48,000 | 5 | 4.20% | 5,885 | 1,177 | 14 | 86,115 | 6,151 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 35.94 | 0.28 | 4 | Non-Median | 90,000 | 8.0% | 7,200 7,200 | 5 5 | 6,800 | 34,000 | 5 5 | 4.20% | 3,783 | 757 | 14 14 | 52,217 | 3,730 |
| I-5: Los Angeles | Urban Urban | 29.16 28.25 | 29 16 | 6.78 0.91 | 4 | Non-Median Non-Median | 90,000 | 8.0% 8.0% | 7,200 8.160 | 5 | 7,200 8,200 | 36,000 41,000 | 5 | 4.20% 4.20% | 3,783 4,288 | 757 858 | 14 | 50,217 56,712 | 3,587 4.051 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 5 | Non-Median | 130,000 | 7.0% | 9,100 | 5 | 9,500 | 47,500 | 5 | 4.20% | 4,288 5.465 | 1.093 | 14 | 77.035 | 5,503 |
| I-5: Los Angeles | Urban | 22.78 | 22.78 | 0.5 | 4 | Non-Median | 130,000 | 7.0% | 9,100 | 5 | 9,500 | 47,500 | 5 | 4.20% | 5,465 | 1.093 | 14 | 77,035 | 5,503 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 5 | Non-Median | 138,000 | 8.0% | 11.040 | 8 | 9,900 | 79,200 | 5 | 4.48% | 6.184 | 1,237 | 11 | 52.616 | 4.783 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 4 | Non-Median | 140,000 | 8.0% | 11,200 | 8 | 9,600 | 76,800 | 5 | 4.48% | 6,273 | 1,255 | 11 | 56,927 | 5,175 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 4 | Non-Median | 120,000 | 8.0% | 9,600 | 8 | 8,000 | 64,000 | 5 | 4.48% | 5,377 | 1,075 | 11 | 50,623 | 4,602 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 4 | Median | 120,000 | 8.0% | 9,600 | 6 | 7,900 | 47,400 | 5 | 2.79% | 3,350 | 670 | 13 | 69,250 | 5,327 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 4 | Non-Median | 130,000 | 8.0% | 10,400 | 6 | 8,000 | 48,000 | 5 | 2.79% | 3,629 | 726 | 13 | 78,371 | 6,029 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 4 | Median | 128,000 | 8.0% | 10,240 | 6 | 8,400 | 50,400 | 5 | 2.79% | 3,574 | 715 | 13 | 74,026 | 5,694 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 4 | Non-Median | 110,000 | 15.0% | 16,500 | 8 | 8,000 | 64,000 | 5 | 4.48% | 4,929 | 986 | 11 | 41,071 | 3,734 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 4 | Non-Median | 88,000 | 14.0% | 12,320 | 8 | 7,500 | 60,000 | 5 | 4.48% | 3,943 | 789 | 11 | 24,057 | 2,187 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 3 | Non-Median | 70.000 | 15.0% | 10,500 | 8 | 6.000 | 48,000 | 5 | 4.48% | 3,137 | 627 | 11 | 18,863 | 1.715 |

| | City/Suburban | | DATA - BA | | Peak Period Flow, | Peak Period Passenger | Nighttime Off-Peak Period | Nighttime Off-Peak Period Passenger Car Equivalent | Daytime Off-Peak | Daytime Off-Peak Passenger | Peak Period | d Speed (mph) | | ff-Peak Speed | | f-Peak Period d (mph) |
|--------------------------------------|----------------|----------------|----------------|---------------|-----------------------------------|--|---|---|---|---|-------------|---------------|----------|---------------|----------|--------------------------|
| County | /Rural | Begin | End | Length (mi) | One Direction per Lane (vphpl) | Car Equivalent Flow, One Direction (pcphpl) | Flow, One Direction per Lane (vphpl) | Flow, One Direction per Lane (pcphpl) | Flow, One Direction per Lane (vphpl) | Car Equivalent Flow, One Direction (pcphpl) | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 1,750 | 1,890 | 192 | 208 | 657 | 709 | 50 | 63 | 50 | 65 | 50 | 65 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 1,633 | 1,723 | 157 | 166 | 442 | 466 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 1,633 | 1,707 | 157 | 164 | 442 | 462 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 2,167 | 2,308 | 177 | 189 | 985 | 1,049 | 50 | 48 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 1,825 | 1,907 | 145 | 151 | 794 | 829 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 1,420 2,333 | 1,491 2,462 | 127 198 | 133 209 | 732 1,121 | 768 1,182 | 50 50 | 55 38 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 19.16 | 23.1 | 2.84 | 1,500 | 1,605 | 129 | 138 | 732 | 783 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 1,080 | 1,156 | 100 | 107 | 584 | 625 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 1,250 | 1,338 | 99 | 106 | 544 | 582 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 1,333 | 1,427 | 106 | 113 | 580 | 621 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 1,500 | 1,688 | 261 | 293 | 763 | 859 | 50 | 64 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 1,150 | 1,288 | 181 | 203 | 538 | 602 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 1,333 | 1,487 | 108 | 120 | 438 | 488 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 1,500 1,250 | 1,680 | 121 140 | 135 156 | 493 397 | 552 444 | 50 50 | 65 55 | 50 50 | 55 | 50 50 | 55 55 |
| I-5: San Joaquin I-5: San Joaquin | Urban Rural | 24.8 14.34 | 28.34 24.8 | 3.54 10.46 | 1,333 | 1,400 1,507 | 149 | 168 | 423 | 444 | 50 | 65 | 50 | 55 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 1,000 | 1,130 | 141 | 159 | 493 | 557 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 1,400 | 1,582 | 191 | 215 | 451 | 509 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 500 | 565 | 80 | 91 | 194 | 219 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 500 | 570 | 130 | 148 | 159 | 181 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 750 | 859 | 195 | 223 | 238 | 273 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 750 | 863 | 193 | 222 | 200 | 230 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 750 850 | 863 | 186 173 | 213 198 | 204 242 | 235 277 | 50 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern I-5: Kern | Rural Rural | 15.86 15.08 | 87.03 15.86 | 71.17 0.78 | 750 | 973 855 | 173 | 198 | 242 | 277 | 50 | 65 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 750 | 855 | 137 | 156 | 182 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 750 | 855 | 137 | 156 | 182 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 750 | 863 | 137 | 157 | 182 | 209 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 750 | 855 | 137 | 156 | 182 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 750 | 855 | 137 | 156 | 182 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 750 | 855 | 137 | 156 | 182 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 750 875 | 855 993 | 137 148 | 156 168 | 182 218 | 207 247 | 50 50 | 65 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 84.76 78.43 | 88.61 84.76 | 3.85 6.33 | 875 | 993 | 148 | 168 | 218 | 247 | 50 | 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 875 | 954 | 127 | 138 | 237 | 259 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 875 | 958 | 127 | 139 | 237 | 260 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 875 | 954 | 127 | 138 | 237 | 259 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 875 | 954 | 127 | 138 | 237 | 259 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 1,000 | 1,080 | 122 | 131 | 314 | 339 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 1,625 | 1,706 | 198 | 208 | 510 | 535 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Urban Urban | 46.9 46.6 | 52.33 46.9 | 5.43 0.3 | 2,150 2,225 | 2,258 2,325 | 265 271 | 279 283 | 636 638 | 668 667 | 50 50 | 50 46 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 1,780 | 1,869 | 217 | 228 | 510 | 536 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 1,780 | 1,860 | 236 | 246 | 626 | 654 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 1,820 | 1,911 | 271 | 285 | 825 | 866 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 2,125 | 2,210 | 381 | 396 | 1,084 | 1,128 | 50 | 51 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 1,900 | 1,976 | 318 | 331 | 847 | 881 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 1,533 | 1,602 | 381 | 398 | 2,064 | 2,157 | 50 | 55 | 50 | 55 | 50 | 53 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 39.81 39.36 | 40.27 39.81 | 0.46 | 1,200 1,000 | 1,254 1,040 | 159 137 | 166 142 | 710 621 | 742 646 | 50 50 | 55 55 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 39.36 | 39.81 | 2.71 | 1,000 2,040 | 1,040 2.122 | 137 | 142 236 | 621 1.119 | 1.164 | 50 | 55 | 50 | 55 55 | 50 50 | 55 55 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 1.667 | 1,733 | 196 | 204 | 1,001 | 1,104 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 2,400 | 2,496 | 294 | 306 | 1,538 | 1,599 | 50 | 32 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 1,700 | 1,768 | 189 | 197 | 932 | 970 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 1,800 | 1,872 | 189 | 197 | 897 | 933 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 2,050 | 2,132 | 214 | 223 | 1,013 | 1,053 | 50 | 53 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 1,900 | 1,967 | 219 | 226 | 1,101 | 1,139 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 2,375 1,980 | 2,458 2.059 | 273 247 | 283 | 1,376 957 | 1,424 995 | 50 | 40 | 50 | 55 55 | 50 50 | 55 |
| I-5: Los Angeles | Urban | 21.41 20.58 | 22.28 21.41 | 0.87 | 1,980 2,400 | 2,059 2,496 | 314 | 257 326 | 957 1,294 | 995 1,346 | 50 50 | 54 32 | 50 50 | 55 | 50 | 55 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 17.21 | 20.58 | 3.37 | 2,400 | 2,496 | 269 | 280 | 1,294 | 1,346 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 1,975 | 2,054 | 168 | 174 | 1,332 | 1,385 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 2,000 | 2,080 | 181 | 189 | 1,507 | 1,567 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 2,100 | 2,184 | 179 | 186 | 1,424 | 1,481 | 50 | 52 | 50 | 55 | 50 | 55 |
| CA 710: Los Angele | Suburban | 12.97 | 23.28 | 10.31 | 2,000 | 2,150 | 246 | 265 | 933 | 1,003 | 50 | 59 | 50 | 65 | 50 | 65 |
| CA 710: Los Angele | Suburban | 10.18 | 12.97 | 2.79 | 1,875 | 2,006 | 197 | 211 | 547 | 585 | 50 | 59 | 50 | 65 | 50 | 65 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 2,000 | 2,150 | 209 | 225 | 572 | 614 | 50 | 59 | 50 | 65 | 50 | 65 |

TABLE M1c. SECTION TRAVEL DATA - BASE CONDITION - BASE VOLUME - SEGMENTATION 26 FT. BASIS Daytime Off-Peak Period Vehicle Peak Period Vehicle-Miles of Nighttime Off-Peak Other Vehicle eak Period Vehicle-Hours of Nighttime Off-Peak Period Vehicle Daytime Off-Peak Period Vehicle City/Suburba Post Mile of Segment Hours of Travel, One Direction Travel, One Direction Miles of Travel, One Direction Miles of Travel, One Direction County Travel. One Direction Hours of Travel. One Direction n/Rural Truck Other Veh. Truck Other Veh. Truck Other Veh. Truck Other Veh. Begin End Truck Other Veh Other Veh. Truck Length (mi) 29 87 1,338.4 118.8 1,054.9 16,061 84,319 1 471 13,060 68,567 I-5: Sacramento Rural 34 65 4.78 321 2 29.4 261.2 7.722 I-5: Sacramento Urban 26.94 189.5 1.393.9 15.2 111.7 111.2 817.6 9.476 76,666 759 6.143 5.558 44.968 29.87 2.93 -5: Sacramento Urban 26.69 6.94 13.2 121.6 1.1 9.7 7.8 71.3 662 6.689 53 536 388 3.923 58.8 58.5 133.6 2,941 481 44,718 -5: Sacramento Urban 25.53 26.69 1.16 410.0 9.6 813.1 19,679 3,219 6,682 58.6 -5: Sacramento Urhan 24.51 1.02 40.2 369 6 64 87 4 803.7 2.010 20.328 319 3.225 4.372 44 206 60.1 491.4 10.7 87.9 154.8 1,266.5 3,003 27,030 537 4.833 7,740 69,658 Urban 4.51 1.41 5: Sacramento 50.8 541.0 63.5 897.7 2,541 20,559 432 3,495 49,371 8.6 122.0 6.102 I-5: Sacramento Urban 22 23 1 1 1 19.16 2.84 143.1 799.3 24.6 137.4 349.1 1,949.7 7,157 43,963 1,230 7,557 17,457 107,236 -5: Sacramento Urban 22 18.82 19.16 34 15.4 2.9 15.9 41.7 232.9 771 877 2,085 12,807 5: Sacramento Urban 86.1 4,737 143 59,473 Urban 16.7 2.12 89.0 497.2 14 1 78.9 193.6 1.081.3 4.452 27,348 706 4.339 9.682 -5: Sacramento Urban 14.46 16.7 24 75.3 420.3 11.9 66.7 163.7 914.0 3,763 23,117 597 3,668 8,184 50,271 32.535 650.7 1 525 1 414 8 957.3 2 546 5 97 605 20 742 165 519 1 103 5 62,226 55,173 5: Sacramento Rural 14 46 14.46 Rural 40.45 49.79 9.34 412.5 1.004.7 129.8 316.1 578.6 1.409.3 20.623 65,305 6.489 20,547 28.929 91,607 I-5: San Joaquin 28.56 40 45 11 89 1 093 9 2.817.0 88.2 227 1 1 005 7 2.589.9 54.694 183,106 4 410 14 763 50 284 168 343 I-5: San Joaquin Rural 5: San Joaquin Urban 28.34 28.56).22 23.8 57.9 1.9 5.5 21.8 62.9 1,188 3,762 96 303 1,092 3,459 -5: San Joaquin Urban 24.8 28.34 424.8 1.222.9 47.4 136.5 377.4 1,086.4 21,240 67,260 2,371 7,510 18,869 59,750 .54 121.5 265.9 2,115.7 54.392 154.808 17,284 137.524 I-5: San Joaquin Rural 14 34 24 8 10.46 1.087.8 2.381.7 966.4 6.073 48.319 10,725 14.34 214.5 647.7 1,509 4,294 14,793 42,104 I-5: San Joaquin Rural 12.69 1.65 469.6 30.2 66.1 295.9 30,525 97.2 15.9 34.7 4,859 794 2,259 -5: San Joaquin 11.8 12.69 0.89 212.8 81.3 178.0 13,831 4.066 11.572 Rural 184.1 107.9 7.013 I-5: San Joaquir Rural 11.8 403.0 49.3 380.2 832.5 26.196 2.464 19.012 54.111 -5: Stanislaus Rural 28.06 28.06 628.5 1.243.3 244.6 483.8 698.2 1.381.1 31,427 80.813 12.231 31,450 34,910 89.769 5: Merced 32.45 32.45 1,129.3 2,126.7 439.5 827.7 1,254.4 2,362.4 56,463 138,237 21,974 53,798 62,721 153,558 Rural -5: Fresno 2,977.2 5,343.7 1,074.9 1,929.2 1,902.3 3,414.4 148,860 347,340 53,743 125,401 95,117 221,939 Rural 66.16 66.16 I-5: Kings Rural 26.72 26.72 1,202.4 2,158.2 416 4 747 4 786.0 1,410,7 60,120 140 280 20.821 48 583 39 299 91 697 3,508.7 6,607.9 713.3 1,343.4 2,795.3 5,264.4 175,434 429,511 35,667 87,323 139,767 342,188 5: Kern Rural 87.03 71.17 I-5: Kern 65.5 129.6 14.3 28.4 51.2 101.2 3.276 8.424 717 1.845 2.559 6.579 Rural 15.08 15.86 0.78 10.35 476.8 943.1 87.0 172.1 230.9 456.6 23,839 61.301 4,350 11.185 11.543 29.682 5: Kern Rural 15.08 4.73 38.9 5,393 2,611 107.9 213.3 19.7 52.2 103.3 13,867 984 2,530 6,714 -5: Kern Rural 9.28 10.35 1.07 5: Kern Rural 7.04 9.28 2.24 241.9 434.2 44.1 79.2 117.1 210.2 12,096 28,224 2,207 5,150 5.857 13,666 -5: Kern Rural 6.41 7.04 63.5 125.6 11.6 22.9 30.7 60.8 3,175 8,165 579 1,490 1,537 3,953 0.63 38.2 51.2 966 2.562 -5: Kern Rural 5.36 6 41 1 05 105.8 209 4 19.3 101 4 5 292 13 608 2 483 6.589 481.8 87.9 173.9 461.5 24,091 61,949 4,396 11,304 11,665 29,996 -5: Kern Rural 0.58 5.36 4.78 953.1 233.3 5: Kern Rural 0.58 58.5 115.6 10.7 21.1 56.0 2.923 533 1.372 1.415 3.640 0.5828.3 7.517 5: Los Angeles Rural 84.76 8.6 436.6 908.0 73.8 217.2 451.8 21.830 59,020 3,691 9,978 10,862 29,369 Rural 78.43 84.76 6.33 717.8 1,492.9 121.4 252.4 357.2 742.9 35,891 97,039 6,068 16,405 17,860 48,287 5: Los Angeles I-5: Los Angeles Rural 69.65 78.43 8.78 663.8 2,326.0 112.2 393.2 330.3 1,157.4 33,188 151,192 5.611 25,560 16,515 75,234 -5: Los Angeles Rural 68.1 69.65 .55 123.7 405.6 20.9 68.6 61.5 201.8 6,185 26,366 1,046 4,457 3,077 13,120 34.1 352.0 10.093 7.773 65.43 68.1 2 67 201.9 707.3 119.6 100.4 45,977 1,706 5.022 22.879 I-5: Los Angeles Rural I-5: Los Angeles Rural 65.43 5.48 414.3 1,451.8 70.0 245.4 206.2 722.4 20,714 94,366 3,502 15,953 10,308 46,957 370.6 1 496 5 45 1 182 0 1 314 5 18 528 97 272 2,254 11 832 16 274 85 440 I-5: Los Angeles Rural 54 16 59 95 5 79 325.5 5: Los Angeles Rural 52.33 54.16 119.0 823.5 14.5 100.2 104.5 723.3 723 6,511 5,224 47,016 -5: Los Angeles 5,043.4 57.6 471.4 359.4 2,940.6 28,019 252,169 2,881 25,927 17,970 Urban 46.9 52.33 5.43 560.4 161,734 I-5: Los Angeles Urban 46.6 46.9 0.3 28.8 316.9 2.9 26.9 17.9 164.7 1 442 14.578 146 1.481 896 9.057 71.6 7.3 59.5 44.5 363 -5: Los Angeles Urban 45.93 46.6 0.67 585.5 363.7 3,578 32,200 3,270 2,223 20,006 Urban 45.1 45.93 0.83 79.8 733.3 8.8 81.0 60.8 559.0 3.989 40.333 440 4.452 3.041 30.745 I-5: Los Angeles -5: Los Angeles Urban 44.01 45.1 1.09 119.0 973.9 14.8 120.9 116.9 956.4 5,951 53,563 739 6,650 5,845 52,602 101.2 14.0 9.9 103.7 449 5.161 771 496 5.706 -5: Los Angeles Urban 43.9 44.01 0.11 9.0 1.3 67 209.8 2.233.6 29.3 305.8 2.118.0 10.488 120,612 1.463 16.821 10,129 116,487 Urban 41.6 43.9 5: Los Angele 404.9 13.7 125.6 2,121.2 11,119 112,425 -5: Los Angeles Urban 40.27 41.6 1.33 44.0 222.4 2,202 22,270 683 6.910 15.9 146.1 2.6 131 17.844 l-5: Los Angeles Urban 39.81 40.27 0.46 24.1 35.3 324.4 795 8.037 1,328 1,765 Urban 39.36 39.81 14.4 150.5 2.5 25.7 33.5 350.7 720 8,280 123 1,414 1,677 19,286 I-5: Los Angeles Urban 36.65 39.36 2.71 221.1 2,399.1 24.6 257.3 339.6 3,550.5 11,057 127,153 1.230 14,149 16.981 195,280 I-5: Los Angeles -5: Los Angeles Urban 36.43 36.65 0.22 17.6 184.0 2.1 21.7 29.6 309.5 880 10,120 104 1,191 1,480 17,025 16.1 289.8 2.0 20.7 302.5 806 99 1,137 1,447 16,637 5: Los Angeles Urban 36.22 36.43) 21 28.9 9.274 Urban 35.94 36.22 0.28 15.2 159.2 1.7 17.7 23.4 244.6 762 8.758 85 975 1,170 13,451 I-5: Los Angeles Urban 29.16 35.94 6.78 390.5 4,082.8 41.0 429.1 544.8 5,695.1 19,526 224,554 2,052 23,599 27,238 313,231 647.6 65.3 3,590 47,479 5: Los Angeles Urban 28.25 29.16 0.91 59.7 6.2 82 6 863.3 2 985 34,325 312 4.129 I-5: Los Angeles Urban 363.8 4.393.4 41.8 505.5 589.9 7.125.2 18.188 27.800 29,497 391.886 22 28 22 78 0.5 33.3 552.2 3.8 46.2 53.9 651.3 1,663 22,088 191 2,541 2,696 35,821 I-5: Los Angeles Urban -5: Los Angeles Urban 21.41 22.28 0.87 110.2 1,173.9 8.6 90.0 73.2 765.7 5,512 63,392 430 4,949 3,662 42,114 1.41 102.0 1,832.6 8.3 87.1 75.6 790.3 5,100 58,644 417 4.790 3,780 43,469 5: Los Angeles Urban 0.83 -5: Los Angeles Urban 17.21 20.58 3.37 345.1 3,674.5 29.0 303.1 273.0 2,853.7 17.254 198,426 1,450 16,671 13,648 156.951 I-5: Los Angeles Urban 16.9 17.21 0.31 23.5 250.3 1.7 17.4 34.3 359.1 1,176 13,518 83 956 1,717 19,750 15.9 166.3 796 9,149 197,556 -5: Los Angeles Urban 14 16 16.9 2.74 210.4 2,240.7 343.6 3,591.9 10,522 120,998 17,179 I-5: Los Angeles Urban 13.78 4.16 30.6 338.8 22.7 1,249 2,250 25,880 CA 710: Los Angeles 12.97 23.28 1.979.5 9.506.2 152.5 664.6 1 270 3 5.537.3 98.976 560 864 7 623 43,196 63,516 359.925 Suburban CA 710: Los Angeles 10.18 2.97 468.7 2.440.1 30.8 145.6 187.9 888.0 23,436 143,964 1,540 9,461 9.397 57,722 Suburban 2.79 CA 710: LA Suburban 4.96 10.18 5.22 751.7 3,609.8 49.1 214.1 295.4 1,287.6 37,584 212,976 2,456 13,917 14,770 83,697

TOTAL

25,633.1

95,243.4

5,271.0

14,675.4

21.765.4

87,710.7

1,281,653

5,586,341

263,550

912.542

1.088.269

5.221.226

TABLE M1d. VEHICLE OPERATING COSTS - BASE CONDITION - BASE VOLUME - SEGMENTATION 26 FT. BASIS Nighttime Off-Peak Other Vehicle-Daytime Off-Peak Period Vehicle eak Period Vehicle-Miles o Vehicle Operating Cost (\$) City/Suburba Post Mile of Segment County Travel. One Direction Miles of Travel, One Direction Miles of Travel. One Direction Peak Nighttime Off-Peak Daytime Off-Peak n/Rural Begin End Length (m Truck Other Veh. Truck Other Veh. Truck Other Veh. Truck Other Veh Truck Other Veh. Truck Other Veh. I-5: Sacramento Rural 29.87 34.65 16,061 84,319 1.471 7,722 13,060 68,567 28.364 27,404 2 597 23,065 22,28 4.78 2.51 I-5: Sacramento Urban 26 94 2 93 9,476 76,666 759 6,143 5,558 44,968 16,734 24,91 1,341 1,997 9,815 14,61 Urhan 662 6.689 53 536 388 3.923 1.168 2.17 174 1.27 -5: Sacramento 26 69 6 94 0.25 68 481 11 801 5: Sacramento Urban 25 53 26.69 1.16 2 941 19 679 3 219 6.682 44 718 5 193 6.396 849 1 046 14 53 5: Sacramento Urban 24 51 1.02 2,010 20,328 319 3,225 4,372 44,206 3,550 6,606 563 1,048 7,721 14.36 7.740 5.304 948 13.668 5: Sacramento Urban 4.51 1.41 3,003 27.030 537 4,833 69,658 8.78 1.57 22.63 I-5: Sacramento Urban 1.1 2,541 20,559 432 3,495 6,102 49,371 4,487 6,682 763 1,136 10,776 16,046 5: Sacramento Urban 19.16 2.84 7,157 43,963 1,230 7,557 17,457 107,236 12,639 14,288 2,173 2,456 30,829 34,85 0.34 -5: Sacramento Urhan 18 82 19 16 771 4 737 143 877 2 085 12 807 1 362 1.539 252 285 3 682 4 162 19,329 I-5: Sacramento Urban 16.7 18.82 2.12 4,452 27,348 706 4.339 9.682 59.473 7.862 8,888 1,248 1.410 17.098 5: Sacramento Urban 3,763 23,117 597 3,668 8,184 50.271 6,646 1,05 1.192 14.45 16.33 Rural 14 46 14.46 32,535 97,605 20,742 62,226 55,173 165,519 57,457 31,722 36,630 97,436 53,794 5: Sacramento 20.22 65 305 Rural 49 79 20 547 36 420 21 22 11 459 51 088 5. San Joaquin 40 45 9 34 20 623 6 489 28 929 91 607 6 678 29 77 54 694 50 284 59 50 54 71 14 763 168,343 96 590 7.788 88 80 I-5: San Joaquin Rural 28.56 40 45 11 89 183,106 4 410 4 798 Urban 96 1,092 1,223 1,124 I-5: San Joaquin 28.34 28.56 0.22 1,188 3,762 303 3,459 2,098 169 1,929 21,240 2.371 4.188 2.441 5: San Joaquin Urban 24.8 3.54 67,260 7.510 18.869 59.750 37,510 21.86 33.322 19.41 Rural 14.34 54.392 85.332 I-5: San Joaquin 24.8 10.46 154.808 6.073 17,284 48.319 137,524 96.057 50.31 10.725 5.617 44.695 13.684 I-5: San Joaquin Rural 12.69 14.34 1.65 10.725 30.525 1.509 4.294 14.793 42.104 18.940 9.92 2.665 1.396 26.125 Rural 4.859 13,831 794 2,259 4.066 11.572 8.582 4.49 1.402 734 7.180 3.76 I-5: San Joaquin 11.8 12.69 0.89 11.8 9,204 26,196 2,464 7,013 19,012 54,111 16,254 8,514 4,35 2,279 33,575 17 586 -5: San Joaquin Rural Rural 28.06 31,427 80,813 12,231 31,450 34,910 89.769 55,50 26,26 21,599 10,22 61,652 29,175 I-5: Stanislaus 56,463 138,237 153,558 44,92 110,765 Rural 32.45 32.45 21.974 53.798 62,721 99.714 38.806 17.484 49.906 I-5: Merced -5: Fresno Rural 66 16 66.16 148 860 347 340 53 743 125 401 95 117 221 939 262 888 112 886 94 91 40 755 167 977 72.130 -5: Kings Rural 26.72 26.72 60 120 140,280 20.821 18 583 39 299 91 697 106,173 45.50 36 770 15 789 69 402 29.80 175,434 429,511 35,667 87,323 139,767 342,188 309,818 139,59 62,989 28,380 246,830 111,21 I-5: Kern Rural 87.03 71.17 5: Kern Rural 15.08 15.86 3,276 8,424 717 1,845 2,559 6,579 5,785 2,738 1,267 599 4,519 2,138 0.78 Rural 23.839 61.301 4.350 11.185 11.543 29.682 42,100 19.923 7.682 3.635 20.385 9.647 I-5: Kern 10.35 15.08 4.73 I-5: Kern Rural 9 28 10.35 1.07 5.393 13 867 984 2 530 2 611 6 714 9 524 4 50 1 738 822 4 611 2 182 I-5: Kern Rural 7.04 9.28 2.24 12,096 28,224 2,207 5.150 5.857 13,666 21.362 9.173 3.898 1.674 10.343 4.441 1,490 1,537 1,023 484 I-5: Kern Rural 6.41 7.04 0.63 3.175 8,165 579 3,953 5.607 2.65 2.715 1.28 Rural 13.608 966 2,562 11,665 6.589 4.423 807 4.525 I-5: Kern 5.36 3.41 1.05 5.292 2.483 9.346 1.705 2.14 24,091 61,949 4,396 11,304 29,996 42,545 7,763 3,674 20,600 9.749 -5: Kern Rural 1.58 36 4 78 I-5. Kern Rural 158 0.58 2,923 7.517 533 1,372 1 415 3,640 5,162 2,443 942 446 2,500 1.183 I-5: Los Angeles Rural 88.61 21,830 59,020 3,691 9,978 10.862 29,369 38.55 19.182 6.517 3,243 19 183 9.54 5: Los Angeles Rural 78.43 84.76 6.33 35.891 97.039 6.068 16.405 17,860 48,287 63.384 31.538 10.716 5,332 31.540 15.693 Rural 33.188 151,192 5.611 25.560 16.515 75.234 58.611 49.13 9.909 8.307 29,165 24.45 I-5: Los Angeles 69.65 78.43 8.78 Rural 6.185 1.046 13.120 10.922 8.569 1.846 1.449 I-5: Los Angeles 68.1 39.65 1.55 26.366 4.457 3.077 5.435 4.264 Rural 10.093 45.977 1.706 7.773 5.022 22.879 17.824 14 94: 3.013 2.526 8.869 7.436 I-5: Los Angeles 65.43 38.1 2.67 5: Los Angeles Rural 59 95 55.43 5.48 20,714 94,366 3,502 15,953 10,308 46,957 36,582 30,669 6,185 5,185 18,203 15,261 18,528 11,832 85,440 I-5: Los Angeles Rural 54.16 59.95 5.79 97,272 2,254 16.274 32,721 31.61 3.980 3.846 28.740 27.768 Rural I-5: Los Angeles 5.948 53.528 6.511 47.016 2.116 52.33 54.16 1.83 723 5.224 10.503 17.396 1.278 9.226 15.280 I-5: Los Angeles Urban 46.9 5.43 28 019 252 169 2 881 25 927 17 970 161 734 49 482 81 95 5.087 8 426 31 736 52 564 I-5: Los Angeles Urban 46.6 46.9 0.3 1,442 14,578 146 1.481 896 9,057 2,546 4,738 259 481 1,582 2,944 I-5: Los Angeles Urban 45.93 0.67 3,578 32,200 363 3,270 2,223 20,006 6,318 10,46 642 1,063 3,926 6,50 I-5: Los Angeles Urban 45.1 0.83 3,989 40,333 440 4.452 3,041 30.745 7,045 13,108 778 1.447 5,370 9,992 45.93 5.951 53.563 739 52,602 17,408 1.305 2.161 10.322 17.096 6.650 5.845 5: Los Angeles Urban 44.01 45.1 1.09 I-5: Los Angeles Urhan 43.9 44 01 0.11 449 5 161 67 771 496 5 706 79: 1.67 118 251 876 1.854 Urban 2.3 10.488 120,612 1.463 16,821 10,129 116.487 18,522 39,199 2,583 5,467 17,889 37.85 I-5: Los Angeles 41.6 43.9 11,119 112,425 3,890 1,207 2,246 19,63 5: Los Angeles Urban 1.33 2,202 22,270 683 6.910 7.23 36.53 41.6 Urban 0.46 795 8,037 131 1,328 1,765 17,844 1,404 232 432 3,117 5,79 39.81 2.61 5: Los Angeles 40 27 Urban 720 123 1,677 19,286 2,69 217 460 -5: Los Angeles 39.36 39.81 0.45 8.280 1.414 1.272 2.962 6.26 5: Los Angeles Urban 39.36 2.71 11.057 127,153 1,230 14.149 16,981 195,280 19,526 41.32 2,173 4,598 29,988 63,466 I-5: Los Angeles Urban 36.65 0.22 880 10,120 104 1,191 1,480 17,025 1,554 3,289 183 387 2,614 5,533 5: Los Angeles Urban 36.43 806 9,274 1,447 16.637 1.424 3.01 175 370 5.40 36.22 317 2,066 Urhan 35 94 36 22 0.28 762 8,758 85 975 1.170 13,451 1,345 2,846 150 4,372 -5. Los Angeles 23.599 7.670 19.526 224.554 2.052 27,238 313,231 34,484 72.98 3.624 48,102 101.80 I-5: Los Angeles Urban 29.16 35.94 6.78 2 985 5 271 1 167 15 43 -5: Los Angeles Urhan 28 25 29 16 0.91 34 325 312 3 590 4 129 47 479 11 156 551 7.291 Urban 5.47 18,188 241,637 2,092 27,800 29,497 391,886 32,120 78,532 3,695 9,035 52,092 127,36 I-5: Los Angeles 22.78 28.25 I-5: Los Angeles Urban 1,663 22,088 2,696 35.821 82 2 78 5,512 63,392 430 4,949 42,114 9,735 20,602 760 1,609 6,467 13,687 3.662 I-5: Los Angeles Urban 21.41 22.28 0.87 -5: Los Angeles Urhan 20.58 21 41 0.83 5.100 58 644 417 4 790 3 780 43 469 9 006 19.059 736 1.557 6 675 14 127 17,254 1 450 16.671 156,951 30.471 2.560 5.418 51.00 I-5: Los Angeles Urban 17.21 20.58 3.37 198,426 13,648 64.488 24.102 I-5: Los Angeles Urban 17.21 0.31 1,176 13,518 83 956 1,717 19,750 2,076 4,394 147 311 3,03 6,419 Urban 10.522 796 9.149 17.179 197,556 18,581 1.40 2.973 64.20 I-5: Los Angeles 14.16 2.74 120.998 39,32 30.338 Urban 0.38 1.532 1,249 2.250 192 13.78 14.16 17.620 109 25.880 2,706 5.726 406 3.974 8.411 -5: Los Angeles 98.976 560.864 7.623 43,196 63.516 359.925 174.793 182.28 13.462 14.039 112.170 116.97 CA 710: Los Angeles Suburban 12 97 23 28 CA 710: Los Angeles Suburban 10.18 12.97 2.79 23,436 143 964 1 540 9 461 9 397 57,722 41 388 46.788 2,720 3.075 16.594 18.76 CA 710: LA 10.18 5.22 37,584 212,976 2,456 13,917 14,770 83,697 66,374 69,21 4,337 4,523 26,084 27,20 Suburban 4.96 1,281,653 5,586,341 263,550 912,542 5,221,226 2,263,413 1,815,561 465,431 296,576 1,921,894 TOTAL 1.088.269 1.696.898

| Post-line | TABLE M1e. TRAVEL | TIME COST - BA | SE COND | ITION - BA | ASE VOLUME - | SEGMENTATION | 26 FT BASIS | | | | | | | | | | |
|---|---|----------------|---------|------------|--------------|-------------------|---------------------|--------------------|----------------------|-----------------|-------------------|---------|---------|---------|---------|---------|---------------------|
| Secretary Secr | 17(BEE MIO) 11(7(VEE | | | | | Peak Period Vehic | de-Hours of Travel, | Nighttime Off-Peak | Period Vehicle-Hours | Daytime Off-Pea | k Period Vehicle- | | | | | | |
| Security | County | | | | | | | | | | | | ui. | | | | |
| Separation Main 24 26 26 26 26 26 26 26 | I E: Cooromonto | | | | | | | | | | | | | | | | |
| Secretary 1 1 2 2 3 1 3 2 4 3 3 4 3 3 4 3 3 4 3 3 | | | | | | | | | | | | 0,002 | | | ., | | 7,485 |
| Security Mode 55 5602 10 562 410 562 410 562 410 563 410 465 416 410 | | | | | 0.25 | | | | | | | 374 | | | | | 653 |
| Secure 1,18 | | | | | | | | 0.0 | | | | | | | | | 7,444 |
| 2 September 1990 1972 1973 1975 1975 1975 1975 1975 1975 1975 1975 | | | | | | | | | | | | | | | | | 7,359 |
| Separation Comp. 1914 722 744 1241 7703 744 7774 3461 1491 4077 7718 688 1268 2677 7718 | | | | | | | | | | | | | | | | | 11,596 |
| September March | | | | | | | | | | | | | | | | | |
| Secrettic U-Sac (2.7 192) 2/2 810 497.2 11.1 79.2 79.6 12.1 2.213 4.500 39.6 72.2 5.400 2.204 2.204 2.204 2.205 2.20 | | | | | | | | | | | | | | | | | 2,132 |
| Second Usbar 1466 167 234 753 403 119 667 1077 946 218 348 338 61 4468 159 150 | | | | | | | | | | | | | | | | | 9,900 |
| Seminorian | I-5: Sacramento | | 14.46 | | | | | | | | | | 3,848 | | | | 8,368 |
| Separate Note 1456 40.46 11.00 120.1 | I-5: Sacramento | | 0 | | | | | | | | | | | | | | 23,314 |
| Seri Jaspann Usban 334 2856 1022 233 579 13 58 228 629 672 500 56 50 618 50 618 5 50 618 5 50 618 5 50 618 5 50 618 5 50 618 5 50 618 5 50 | I-5: San Joaquin | | | | | | | | | | | | | | | | 12,903 |
| S Sal Assemble Word 44.4 23.4 24.8 1.697.2 2.281.7 17.5 2.281.7 2.281.7 2.281.7 2.281.7 2.281.7 2.281.7 2.281.7 2.281.7 2.281.7 2.281.7 2.281.7 2.281.7 2.281.7 2.281.7 | | | | | | | | | | | | | | | | | 23,712 |
| S BAN SCROOL NOT THE WAY SET TO SET T | | | | | | | | | | | | | | | | | 576 |
| Semination Found 12.09 14.34 11.05 21.45 46.06 30.02 16.1 22.03 46.77 0.000 4.300 4.300 4.500 4.500 5.00 4.500 5.00 | | | | | | | | | | | | | | | | | 19.37 |
| S. Sen Josephia. Found 1 18 1/200 July 17 18 1/200 July 17 18 19 19 19 19 19 19 19 19 19 19 19 19 19 | | | | | | | | | | | | | | | | | 5,930 |
| S San Jassaul North 9 118 | I-5: San Joaquin | | | | | | | | | | | | | | | | 1,630 |
| Samelang Rural 0 20.00 | I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 184.1 | 403.0 | 49.3 | 107.9 | 380.2 | 832.5 | 5,205 | 3,690 | 1,393 | 988 | 10,751 | 7,622 |
| S Freeze Nury 0 | I-5: Stanislaus | itarai | 0 | | | | | | | | | | | | | | 12,644 |
| Section Repair Section Secti | I-5: Merced | | 0 | | | | | | | | | | | | | | 21,629 |
| Seem Rural 15.68 37.07 71.17 3.508.7 6.607.9 71.33 1.341.4 2.796.3 5.364.4 99.208 60.498 20.108 12.300 79.008 48.15 6.607.8 6.607.8 6.607.8 71.33 72.4 72.2 71.2 7 | | | 0 | | | | | | | | | | | | | | 31,261 |
| Seam | | | 15.86 | | | | | | | | | | | | | | 12,916 48,199 |
| Seam | I-5: Kem | | | | | | | | | | | | | | | | 927 |
| 8 Kerm Rural 164 764 828 224 241 241 441 792 117.1 2102 6.840 3.075 1.248 725 3.312 1.9 8 Kerm Rural 6.14 704 0.83 63.5 125.6 116 229 30.7 60.8 1.796 1.150 328 2.10 869 5.8 8 Kerm Rural 6.14 704 0.83 63.5 125.6 116 229 30.7 60.8 1.796 1.150 328 2.10 869 5.8 8 Kerm Rural 6.14 704 0.83 63.5 125.6 116 2.29 30.7 10.14 2.295 1.177 548 350 1.469 0.9 8 Kerm Rural 8.74 8.85 6.14 10.5 10.58 20.04 10.3 38.2 2.12 10.14 2.295 1.177 548 350 1.469 0.9 8 Kerm Rural 8.74 8.75 8.85 1.05 | I-5: Kern | | | | | | | | | | | | | | | | 4,181 |
| Stem Rural 6.41 7.04 0.83 6.35 125.6 11.6 22.9 30.7 60.8 1,776 1,150 328 210 869 5.5 | I-5: Kern | | | | | | | | | | | | | | | | 946 |
| Sear Rural S.30 6.41 105 1058 2094 193 382 512 1014 2,993 1,917 546 330 1,448 95 556 546 146 147 | I-5: Kern | | | | | | | | | | | | | | | | 1,925 |
| 8 Kerm Rural 0.58 5.58 4.79 481.8 953.1 87.9 173.9 233.3 461.5 13.623 8,726 2.486 1,592 6,596 4.2 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 6.5 | . 0. 1.0111 | | | | | | | | | | | | | | | | 557 |
| 8 Kerm Rural 0 058 058 68.5 115.6 10.7 21.1 28.3 66.0 1,683 1,059 302 198 800 5.5 5 Los Angeles Rural 37.6 88.61 3.85 3.85 3.85 3.85 3.85 5 Los Angeles Rural 78.43 84.76 8.33 71.78 1,492.9 121.4 252.4 38.3 77.2 451.8 12.344 8.313 2,087 1,495 6.18 5 Los Angeles Rural 6.85 75.85 5 | | | | | | | | | | | | | | | | | 928 |
| \$\text{\$5\$ (so Angeles \text{ Rural } \text{ \$4.76 } \text{ \$8.66 } \text{ \$3.85 } \text{ \$4.96.6 } \text{ \$9.06.0 } \text{ \$7.38 } \text{ \$15.25 } \text{ \$2.24 } \text{ \$35.72 } \text{ \$74.9 } \text{ \$2.02.96 } \text{ \$1.56.08 } \text{ \$3.431 } \text{ \$2.311 } \text{ \$1.000 } \text{ \$6.55 } \text{ \$1.000 } \text{ \$7.43 } \text{ \$8.76 } \text{ \$3.77 } \text{ \$3.43 } \text{ \$3.77 } \text{ \$3.43 } \text{ \$3.77 } \text{ \$3.43 } \text{ \$3.77 } \text{ \$3.65 } \text{ \$3.92 } \text{ \$3.93 } \text{ \$3.03 } \text{ \$3.03 } \text{ \$3.174 } \text{ \$1.688 } \text{ \$3.173 } \text{ \$3.600 } \text{ \$0.339 } \text{ \$1.05 } \text{ \$1.000 } \text{ \$1.0000 } \text{ \$1.0000 } \text{ \$1.0000 } \text | 1 0. 110111 | | 0.56 | | | | | | | | | | | | | | <u>4,225</u> 513 |
| St. Los Angeles Rural 98,55 78,43 878 663.8 2,336.0 112.2 393.2 330.3 1,157.4 18,768 21,296 3,173 3,000 9,338 10,55 Los Angeles Rural 88.1 69.65 1,55 1,237 40.66 20.9 68.6 61.5 201.8 3,497 3,714 591 620 1,740 18.8 51.05 Angeles Rural 65.43 68.1 2,67 201.9 707.3 34.1 119.6 100.4 352.0 5,707 6,476 96.5 1,096 2,840 3.2 5.105 Angeles Rural 54.16 59.95 65.43 5.48 414.3 1,451.8 70.0 24.64 20.62 722.4 11,714 13,292 1,880 2,247 5,829 6.6 5.105 Angeles Rural 54.16 59.95 57.9 370.6 1,465.5 46.1 182.0 325.5 1,314.5 10,477 13,701 1,274 1,667 2,203 12.0 5.105 Angeles Rural 54.16 59.95 57.9 370.6 1,465.5 46.1 182.0 325.5 1,314.5 10,477 13,701 1,274 1,667 2,203 12.0 5.105 Angeles Urban 46.9 52.33 54.16 1.83 118.0 823.5 14.5 100.2 104.5 723.3 3.363 7,540 40.9 917 2,954 6.6 6.1 | I-5: Los Angeles | | 84.76 | | | | | | | | | | | | | | 4.137 |
| S. Los Angeles Rural 88.1 98.65 1.55 123.7 405.6 20.9 68.6 61.5 201.8 3.497 3.714 591 6.28 1.740 1.8 5 1.06 Angeles Rural 86.43 88.1 2.67 201.9 707.3 34.1 119.6 100.4 352.0 5.707 6.476 965 1.095 2.240 2.5 1.06 Angeles Rural 89.95 6.43 5.48 141.3 1.451.8 70.0 245.4 206.2 722.4 11.714 13.202 1.980 2.247 5.829 8.6 5.10 1.00 1.00 1.00 1.00 1.00 1.00 1.00 | I-5: Los Angeles | | | | | | | | | | | | | | | | 6,801 |
| 5. Los Angeles Rural 65.43 86.1 267 201.9 707.3 34.1 119.6 100.4 352.0 5.707 6.476 965 1.095 2.840 32.5 Los Angeles Rural 9.95 66.5 1.095 79.3 14.6 14.95 70.0 245.4 206.2 722.4 117.14 13.292 1.980 2.247 5.829 6.6 5. Los Angeles Rural 54.16 59.95 6.79 370.6 1.496.5 45.1 182.0 325.5 1.314.5 10.477 13.701 1.274 1.667 9.203 12.0 12.5 Los Angeles Rural 54.16 59.95 6.79 370.6 1.496.5 45.1 182.0 325.5 1.314.5 10.477 13.701 1.274 1.667 9.203 12.0 12.5 Los Angeles Urban 46.0 45.3 1.90 1.3 50.0 1.2 1.3 110.0 1.2 14.4 1.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 | I-5: Los Angeles | | | | | | | | | | | | | | | | 10,597 |
| S. Los Angeles Rural 59.95 65.43 5.48 414.3 1.451.8 70.0 245.4 206.2 722.4 11.714 13.232 1.880 2.247 5.829 6.6 | I-5: Los Angeles | | | | | | | | | | | | | | | | 1,848 |
| S. Los Angeles Rural S4.16 59.95 879 370.6 1.496.5 45.1 182.0 325.5 1.314.5 10.477 13.701 1.274 1.667 9.203 12.0 | | | | | | | | | | | | | | | | | 3,223 |
| 5. Los Angeles Rural 52.33 54.16 18.3 119.0 623.5 14.5 100.2 104.5 723.3 3.363 7.540 409 917 2.554 5.5 5. Los Angeles Utban 46.9 52.33 54.3 560.4 5,043.4 57.6 471.4 5359.4 2,940.6 15.844 64.175 15.29 4.316 10.162 263.6 5. Los Angeles Utban 46.9 63.3 28.8 316.9 2.9 26.9 17.9 164.7 815 2.902 83 246 507 1.5 5. Los Angeles Utban 45.93 46.6 0.67 71.6 585.5 7.3 595.5 44.5 363.7 2.203 5.360 205 544 1.257 3.3 5. Los Angeles Utban 45.93 46.6 0.67 71.6 585.5 7.3 595.5 44.5 363.7 2.203 5.360 205 544 1.257 3.3 5. Los Angeles Utban 45.1 45.93 0.83 79.8 733.3 8.8 81.0 60.8 559.0 2.256 6.714 2.49 74.1 1.719 5.1 5. Los Angeles Utban 45.1 45.9 10.9 119.0 97.39 14.8 120.9 116.9 956.4 3.365 8.916 418 1.107 3.305 8.7 5. Los Angeles Utban 4.0 1 45.1 1.09 119.0 97.39 14.8 120.9 116.9 956.4 3.365 8.916 418 1.107 3.305 8.7 5. Los Angeles Utban 4.9 4.0 1 40.1 40.1 9.0 119.0 97.3 5. Los Angeles Utban 4.9 4.0 1 40.1 40.1 9.0 119.0 11.2 1.3 14.0 9.9 103.7 254 927 38 12.2 98 12.2 1.2 5. Los Angeles Utban 4.0 1 45.1 45.9 2.3 209.8 223.3 505.8 202.6 2.118.0 5.931 20.449 827 2.800 5.728 19.3 5. Los Angeles Utban 40.2 41.6 1.33 44.0 40.4 9.9 13.7 125.6 222.4 2.121.2 1.245 3.707 386 1.150 5.288 19.4 5. Los Angeles Utban 40.2 1 1.2 1.3 14.0 19.0 13.0 1.2 1.3 14.0 19.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1 | | | | | | | | | | | | | | | | | |
| 6. Los Angeles Urban 46.9 52.33 5.43 56.04 5.043.4 5.76.6 471.4 339.4 2.940.6 15,844 46.175 1.629 4.316 10.162 22.9 5.05.0 1.79.1 164.7 815 2.90.0 83 2.46 507 1.5 5.05.0 7.3 59.5 4.4 507.7 2.023 5.360 205 5.44 1.257 3.3 5.0 5.05.0 6.071 7.16 565.5 7.3 59.5 4.4.5 363.7 2.023 5.360 205 5.44 1.277 3.3 5.0 5.05.0 7.3 59.5 4.4.5 363.7 2.023 5.360 6.714 2.49 7.41 1.719 6.1 5.105.0 7.3 59.5 4.4.5 363.7 2.023 5.360 6.071 7.1 1.719 1.6.29 4.4.5 1.719 1.6.2 8.4.5 1.1 1.719 1.6.2 8.2.2 3.30 8.8 1.1 1.1 1.719 1.1 <td></td> <td>6.622</td> | | | | | | | | | | | | | | | | | 6.622 |
| 5: Los Angeles Urban 46.6 46.9 0.3 28.8 316.9 2.9 26.9 17.9 164.7 815 2.902 83 246 507 1.5 51.05 Angeles Urban 45.93 46.6 0.67 77.16 585.5 7.3 595.5 44.5 363.7 2.023 5.360 205 544 1.257 3.3 5.5 Los Angeles Urban 45.93 46.6 0.67 77.16 585.5 7.3 595.5 44.5 363.7 2.023 5.360 205 544 1.257 3.3 5.5 Los Angeles Urban 45.01 44.01 45.1 1.09 1119.0 97.9 14.8 120.9 116.9 956.4 3.365 8.916 418 1.107 3.305 8.7 5.5 Los Angeles Urban 43.9 44.01 0.11 9.0 110.2 1.3 14.0 9.9 103.7 254 927 38 1.28 281 9.9 5.5 Los Angeles Urban 41.6 43.9 2.3 209.8 2.236 29.3 305.8 20.26 2.118.0 5.931 20.449 827 2.800 5.728 19.3 5.5 Los Angeles Urban 40.07 41.6 1.33 44.0 404.9 13.7 125.6 22.4 2.121.2 1.245 3.707 386 1.150 6.288 19.4 5.5 Los Angeles Urban 39.81 40.27 44.6 15.5 146.1 2.6 24.1 35.3 3.24.4 44.9 1.338 7.4 221 9.98 2.9 5.5 Los Angeles Urban 39.81 0.45 14.4 150.5 2.5 25.7 33.5 30.7 407 1.378 70 2.35 9.8 9.8 2.9 5.5 Los Angeles Urban 36.65 3.93 3.9 3.9 3.9 3.9 3.9 3.9 3.9 3.9 3. | | | | | | | | | | | | | | | | | 26,923 |
| 5: Los Angeles Urban 45:1 45:93 0.83 79.8 733.3 8.8 81:0 60.8 559:0 2.256 6,714 24.9 74:1 1,719 5:1.5 5:1.0s Angeles Urban 46:1 109 118:0 973.9 14.8 120.9 116:9 956.4 3.385 8.916 418 1,107 3.05 8.7 5: Los Angeles Urban 43.9 44.01 0.11 9.0 101:2 1.3 14.0 9.3 103.7 254 927 38 128 2211 9.9 5: Los Angeles Urban 40.27 41.6 1.33 24.0 40.49 13.7 125.6 222.4 2,121.2 1,245 3,707 366 1,150 6.286 19.4 5: Los Angeles Urban 40.27 41.6 1.33 44.0 404.9 13.7 125.6 222.4 2,121.2 1,245 3,707 366 1,150 6.286 19.4 10.0 4.0 | I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 28.8 | 316.9 | 2.9 | 26.9 | 17.9 | 164.7 | 815 | | 83 | | | 1,508 |
| Stop Los | I-5: Los Angeles | | | | | | | | | | | | | | | | 3,330 |
| 5. Los Angeles Urban 44.9 44.01 0.11 9.0 101.2 1.3 14.0 9.9 103.7 254 927 38 128 281 9 5. Los Angeles Urban 41.6 43.9 2.3 20.80 5.728 19.3 5. Los Angeles Urban 40.27 41.6 1.33 44.0 40.49 13.7 125.6 22.2.4 2.12.12 1.245 3.707 386 1.150 6.288 19.4 5. Los Angeles Urban 39.81 40.27 0.46 15.9 146.1 2.6 24.1 35.3 324.4 449 1.388 74 221 99.8 2.9 5. Los Angeles Urban 39.85 35.81 0.4 4.1 150.5 2.5 25.7 33.5 350.7 407 1.376 70 2.35 948 3.2 5. Los Angeles Urban 36.65 39.36 2.71 221.1 2.399.1 2.46 257.3 33.5 35 | | | | | | | | | | | | | | | | | 5,118 |
| 5. Los Angeles Urban 41 6 43 9 2.3 209.8 2.233.6 29.3 305.8 202.6 2,118.0 5.931 20,449 827 2,800 5,728 19.3 5. Los Angeles Urban 40.27 41.6 1.33 44.0 40.49 13.7 125.6 222.4 2,121.2 1.245 3,707 386 1,150 6,288 19.4 5. Los Angeles Urban 39.81 40.27 0.46 15.9 146.1 2.6 24.1 35.3 324.4 449 1,338 74 221 998 2.9 2.9 5.10s Angeles Urban 39.36 39.91 0.45 14.4 150.5 2.5 25.7 33.5 350.7 407 1,378 70 235 948 3.2 5.10s Angeles Urban 36.65 9.2 21.1 2.99.1 24.6 257.3 339.6 3,550.5 6,522 21,966 696 2,355 9.00.2 2.5 1.5 1.5 | | | | | | | | | | | | | | | | | 8,756 |
| 5: Los Angeles Urban 40.27 41.6 1.33 44.0 404.9 13.7 125.6 222.4 2.121.2 1.245 3.707 386 1.150 6.288 19.4 As Angeles Urban 39.81 40.27 0.46 115.9 146.1 2.6 24.1 35.3 3524.4 44.9 1.338 74 221 988 2.9 5: Los Angeles Urban 39.36 39.81 0.45 14.4 150.5 2.5 25.7 33.5 350.7 407 1,378 70 235 948 3.2 51.0s Angeles Urban 36.65 39.36 2.71 221.1 2,399.1 24.6 257.3 339.6 3,550.5 6,252 2.1965 696 2,355 9.602 32.5 51.0s Angeles Urban 36.23 36.43 0.21 16.1 289.8 2.0 20.7 28.9 302.5 498 1.685 59 198 818 2.7 51.0s Angeles Urban | | | | | | | | | | | | | | 00 | | | 19.391 |
| Stock Angeles Urban 39.81 40.27 0.46 15.9 146.1 2.6 24.1 35.3 324.4 449 1.338 74 221 998 2.9 | · • · = • • · · · · · · · · · · · · · · | | | | | | | | | | | | | | | | 19,421 |
| 5: Los Angeles Urban 36.65 39.36 2.71 221.1 2,399.1 24.6 257.3 339.6 3,550.5 6,252 21,965 696 2,355 9,602 32,55 Los Angeles Urban 36.43 36.55 0.22 17.6 184.0 2.1 21.7 29.6 309.5 498 1,685 59 198 818 2.7 5: Los Angeles Urban 36.22 36.43 0.21 16.1 28.8 2.0 20.7 28.9 302.5 456 2.653 56 189 818 2.7 5: Los Angeles Urban 35.94 36.22 0.28 15.2 159.2 1.7 17.7 23.4 244.6 431 1.458 48 162 661 2.5 51.0s Angeles Urban 29.16 35.94 6.78 390.5 4,082.8 41.0 429.1 544.8 5,695.1 11,042 37,380 1,160 3,325 52.1 55.10s Angeles Urban 22.78 | I-5: Los Angeles | | | | | | | | | | | | | | | | 2.970 |
| E. Los Angeles Urban 36.43 36.65 0.22 17.6 184.0 2.1 21.7 29.6 309.5 498 1.685 59 198 837 2.8 25 1.05 Angeles Urban 36.22 36.43 0.21 16.1 289.8 2.0 20.7 28.9 302.5 456 2.653 56 189 818 2.7 25.1 25.1 25.1 25.1 25.1 25.1 25.1 25.1 | I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 14.4 | 150.5 | 2.5 | 25.7 | 33.5 | 350.7 | 407 | 1,378 | 70 | 235 | 948 | 3,210 |
| 5: Los Angeles Urban 36.22 36.43 0.21 16.1 289.8 2.0 20.7 28.9 302.5 456 2,653 56 189 818 2,7 5: Los Angeles Urban 35.94 36.22 0.28 15.2 159.2 1.7 17.7 23.4 244.6 431 1,458 48 162 661 2,2 5: Los Angeles Urban 29.16 35.94 67.8 390.5 4,602.8 41.0 429.1 544.8 5,695.1 11,042 37,380 1,160 3,928 15,402 52.1 5: Los Angeles Urban 28.25 29.16 0.91 59.7 647.6 6.2 65.3 82.6 863.3 1,688 5,930 177 598 2,335 7,9 5: Los Angeles Urban 22.78 28.25 5.47 363.8 4,393.4 41.8 505.5 589.9 7,125.2 10,285 40,224 1,183 4,628 16,680 65.2 5: Los Angeles Urban 22.28 22.78 0.5 33.3 552.2 3.8 46.2 53.9 651.3 940 5,056 108 423 16,225 5.2 5: Los Angeles Urban 21.41 22.28 0.87 110.2 1,173.9 8.6 90.0 73.2 765.7 3,117 10,748 243 824 2,071 7,0 5: Los Angeles Urban 20.58 21.41 0.83 102.0 1,832.6 8.3 87.1 75.6 790.3 2,884 16,79 236 797 2,138 7,2 5: Los Angeles Urban 17.21 20.58 3.37 345.1 3,674.5 29.0 303.1 273.0 2,853.7 9,757 33,642 820 2,775 7,718 26,1 5: Los Angeles Urban 14.16 16.9 2.74 210.4 2,240.7 15.9 166.3 343.6 3,591.9 5,950 20,515 450 1,523 9,714 32.8 5: Los Angeles Urban 13.78 14.16 0.38 30.6 338.8 2.2 22.7 45.0 470.5 866 3,102 61 208 1,273 9,767 3,240 1,340 3,514 8,14 3,470 2.05 468.7 2,440.1 30.8 445.6 187.9 888.0 13,253 22,340 871 1,333 5,314 8,14 7,010 1,400 | I-5: Los Angeles | | | | | | | | | | | | | | | | 32,507 |
| 5: Los Angeles Urban 35.94 36.22 0.28 15.2 159.2 1.7 17.7 23.4 244.6 431 1.458 48 162 661 2.2 5: Los Angeles Urban 29.16 35.94 6.78 390.5 4,082.8 41.0 429.1 544.8 5,695.1 11,042 37,380 1,160 3,928 15,402 52.1 5.10s Angeles Urban 28.25 29.16 0.91 59.7 647.6 6.2 65.3 82.6 863.3 1,688 5,930 177 598 2,335 79.5 5: Los Angeles Urban 22.78 28.25 5.47 363.8 4,393.4 41.8 505.5 589.9 7,125.2 10,285 40,224 1,183 4,628 16,680 65.2 5: Los Angeles Urban 22.28 22.78 0.5 33.3 552.2 3.8 46.2 53.9 651.3 940 5,056 108 423 1,525 5.9 5: Los Angeles Urban 21.41 22.28 0.87 110.2 1,173.9 8.6 90.0 73.2 765.7 3,117 10,748 243 824 2,071 7.0 5: Los Angeles Urban 20.58 21.41 0.83 102.0 1,832.6 8.3 87.1 75.6 790.3 2,884 16,779 236 797 2,138 7.2 5: Los Angeles Urban 16.9 17.21 0.31 23.5 250.3 1.7 17.4 34.3 359.1 665 2,292 47 159 971 3.2 5: Los Angeles Urban 16.9 17.21 0.31 23.5 250.3 1.7 17.4 34.3 359.1 665 2,292 47 159 971 3.2 5: Los Angeles Urban 17.8 10.8 10.9 17.21 0.31 23.5 250.3 1.7 17.4 34.3 359.1 665 2,292 47 159 971 3.2 5: Los Angeles Urban 17.8 10.8 10.9 17.21 0.31 23.5 250.3 1.7 17.4 34.3 359.1 665 2,292 47 159 971 3.2 5: Los Angeles Urban 17.8 10.8 10.9 17.2 10.31 23.5 250.3 1.7 17.4 34.3 359.1 665 2,292 47 159 971 3.2 5: Los Angeles Urban 17.8 11.8 16.9 2.74 210.4 2,240.7 15.9 166.3 343.6 3,591.9 5,950 20,515 450 1,523 9,714 32.8 3.4 710: Los Angeles Urban 12.97 23.2 10.31 1,979.5 9,506.2 152.5 664.6 1,270.3 5,537.3 55,970 87,034 4,311 6,084 35,918 50.6 A710: Los Angeles Suburban 12.97 2.7 9 468.7 2,440.1 30.8 145.6 187.9 888.0 13,253 33,049 1,389 1,960 8,352 11.7 17.0 10.4 12.54 10.54 10.55 1 | | | | | | | | | | | | | | | | | 2,834 |
| 5: Los Angeles Urban 29.16 35.94 6.78 390.5 4,082.8 41.0 429.1 544.8 5,695.1 11,042 37,380 1,160 3,928 15,402 52,1 5; Los Angeles Urban 28.25 29.16 0.91 59.7 647.6 6.2 65.3 82.6 863.3 1,688 5,930 177 598 2,335 7,9 65. Los Angeles Urban 22.78 28.25 547 363.8 4,393.4 41.8 505.5 589.9 7,125.2 10,285 40,224 1,183 4,628 16,680 65.2 5; Los Angeles Urban 22.28 22.78 0.5 33.3 552.2 3.8 46.2 53.9 651.3 940 5,056 108 423 1,525 5,9 5; Los Angeles Urban 21.41 22.28 0.87 110.2 1,173.9 8.6 90.0 73.2 765.7 3,117 10,748 243 824 2,071 7,0 5; Los Angeles Urban 20.58 21.41 0.83 102.0 1,832.6 8.3 87.1 75.6 790.3 2,884 16,779 236 797 2,138 7,2 5; Los Angeles Urban 17.21 20.58 3.37 345.1 3,674.5 29.0 303.1 273.0 2,853.7 9,757 33,642 820 2,775 7,718 26,1 5; Los Angeles Urban 16.9 17.21 0.31 23.5 250.3 1.7 17.4 34.3 359.1 665 2,292 47 159 971 3,2 5; Los Angeles Urban 13.78 14.16 0.38 30.6 338.8 2.2 22.77 45.0 46.6 1,270.3 5,537.3 55,970 87,034 4,311 6,084 35,918 50,6 4,710; Los Angeles Suburban 12.97 23.28 10.31 1,979.5 9,506.2 152.5 664.6 1,270.3 5,537.3 55,970 87,034 4,311 6,084 35,918 50,6 4,710; Los Angeles Suburban 10.18 12.97 2.79 468.7 2,440.1 30.8 145.6 187.9 888.0 13,253 33,049 1,389 1,960 8,352 11,7 17.0 17.4 12.5 12.5 13,049 1,389 1,960 8,352 11,7 17.0 18.1 12.0 19.1 13.2 13.0 19.1 13.3 5,314 8,14 14.1 14.1 14.1 14.1 14.1 14.1 14.1 1 | | | | | | | | | | | | | | | | | 2,770 |
| 5: Los Angeles Urban 28.25 29.16 0.91 59.7 647.6 6.2 65.3 82.6 863.3 1,688 5,930 177 598 2,335 7,9 5: Los Angeles Urban 22.78 28.25 5.47 363.8 4,393.4 41.8 505.5 589.9 7,125.2 10.285 40,224 1,183 4,628 16,680 65,2 5: Los Angeles Urban 22.28 22.78 0.5 33.3 552.2 3.8 46.2 53.9 661.3 940 5,066 108 423 16,525 5,9 6: Los Angeles Urban 21.41 22.28 0.87 110.2 1,173.9 8.6 90.0 73.2 765.7 3,117 10,748 243 824 2,071 7,0 6: Los Angeles Urban 21.41 0.83 102.0 1,832.6 8.3 87.1 75.6 790.3 2,884 16,779 236 797 2,138 7,2 6: Los Angeles Urban 17.21 20.58 3.37 345.1 3,674.5 29.0 303.1 273.0 2,853.7 9,757 33,642 820 2,775 7,718 26.1 6: Los Angeles Urban 16.9 17.21 0.31 23.5 250.3 1.7 17.4 34.3 359.1 665 2,292 47 15.9 971 3.2 6: Los Angeles Urban 13.78 14.16 16.9 2.74 210.4 2,240.7 15.9 166.3 343.6 3,591.9 5,950 20,515 450 1,523 9,714 32.8 6: Los Angeles Urban 13.78 14.16 0.38 30.6 338.8 2.2 22.77 45.0 470.5 866 3,102 61 208 1,273 9,704 3,2 8.710: Los Angeles Suburban 12.97 23.28 10.31 1,979.5 9,506.2 152.5 664.6 1,270.3 5,537.3 55,970 87,034 4,311 6,084 35,918 50,6 8.710: Los Angeles Suburban 14.96 10.18 12.97 2.79 468.7 2,440.1 30.8 49.1 214.1 295.4 1,287.6 21,253 33,049 1,389 1,960 8,352 11.7 | | | | | | | | | | | | | | i | | | 52,142 |
| 5: Los Angeles Urban 22.78 28.25 5.47 363.8 4,393.4 41.8 505.5 589.9 7,125.2 10,285 40,224 1,183 4,628 16,680 65.2 5: Los Angeles Urban 22.28 22.78 0.5 33.3 552.2 3.8 46.2 53.9 651.3 940 5,056 108 423 1,525 5.9 5: Los Angeles Urban 21.41 22.28 0.87 110.2 1,173.9 8.6 90.0 73.2 765.7 3,117 10,748 243 824 2,071 7,0 5: Los Angeles Urban 20.58 21.41 0.83 102.0 1,832.6 8.3 87.1 75.6 790.3 2,884 16,779 236 797 2,138 7,2 5: Los Angeles Urban 17.21 20.58 3.37 345.1 3,674.5 29.0 303.1 273.0 2,853.7 9,757 33,642 820 2,775 7,718 | I-5: Los Angeles | | | | | | | | | | | | | | | | 7.904 |
| 5: Los Angeles Urban 22.28 22.78 0.5 33.3 552.2 3.8 46.2 53.9 651.3 940 5,056 108 423 1,525 5,9 5; Los Angeles Urban 21.41 22.28 0.87 110.2 1,173.9 8.6 90.0 73.2 765.7 3,117 10,748 243 824 2,071 7,0 7,0 7,0 7,0 7,0 7,0 7,0 7,0 7,0 7,0 | I-5: Los Angeles | | | | | | | | | | | | | | 000 | | 65,235 |
| 5: Los Angeles Urban 20.58 21.41 0.83 102.0 1,832.6 8.3 87.1 75.6 790.3 2,884 16,779 236 797 2,138 7,2 5: Los Angeles Urban 17.21 20.58 3.37 345.1 3,674.5 29.0 303.1 273.0 2,853.7 9,757 33,642 820 2,775 7,718 26.1 5: Los Angeles Urban 16.9 17.21 0.31 23.5 250.3 1.7 17.4 34.3 359.1 665 2,292 47 159 971 3.2 5: Los Angeles Urban 14.16 16.9 2.74 210.4 2,240.7 15.9 166.3 343.6 3,591.9 5,950 20,515 450 1,523 9,714 32.8 5: Los Angeles Urban 13.78 14.16 0.38 30.6 338.8 2.2 22.7 45.0 470.5 866 3,102 61 208 1,273 4.3 | I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 33.3 | 552.2 | 3.8 | 46.2 | 53.9 | 651.3 | 940 | 5,056 | 108 | 423 | 1,525 | 5,963 |
| 5: Los Angeles Urban 17.21 20.58 3.37 345.1 3,674.5 29.0 303.1 273.0 2,853.7 9,757 33,642 820 2,775 7,718 26,1 5: Los Angeles Urban 16.9 17.21 0.31 23.5 250.3 1.7 17.4 34.3 359.1 665 2,292 47 159 971 3.2 5: Los Angeles Urban 14.16 16.9 2.74 210.4 2,240.7 15.9 166.3 343.6 3,591.9 5,950 20,515 450 1,523 9,714 32.8 5: Los Angeles Urban 13.78 14.16 0.38 30.6 338.8 2.2 22.7 45.0 470.5 866 3,102 61 208 1,273 4,3 A 710: Los Angeles Suburban 12.97 23.28 10.31 1,979.5 9,506.2 152.5 664.6 1,270.3 5,537.3 55,970 87,034 4,311 6,084 35,918 <td>I-5: Los Angeles</td> <td></td> <td>7,010</td> | I-5: Los Angeles | | | | | | | | | | | | | | | | 7,010 |
| 5: Los Angeles Urban 16.9 17.21 0.31 23.5 250.3 1.7 17.4 34.3 359.1 665 2.292 47 159 971 3.2 5: Los Angeles Urban 14.16 16.9 2.74 210.4 2.240.7 15.9 166.3 343.6 3.591.9 5.950 20.515 450 1,523 9.714 32.8 5: Los Angeles Urban 13.78 14.16 0.38 30.6 338.8 2.2 22.7 45.0 470.5 866 3.102 61 208 1,273 4.3 4.710: Los Angeles Suburban 12.97 23.28 10.31 1,979.5 9.506.2 152.5 664.6 1,270.3 5.537.3 55.970 87.034 4.311 6.084 35.918 50.6 4.710: Los Angeles Suburban 10.18 12.97 2.79 468.7 2.440.1 30.8 145.6 187.9 888.0 13.253 22.340 871 1,333 5.314 8.1 4.710: LA Suburban 4.96 10.18 5.22 751.7 3.609.8 49.1 214.1 295.4 1,287.6 21.253 33.049 1,389 1,960 8.352 11.7 | I-5: Los Angeles | | | | | | | | | | | | | | | | 7,230 |
| 5: Los Angeles Urban 14.16 16.9 2.74 210.4 2,240.7 15.9 166.3 343.6 3,591.9 5,950 20,515 450 1,523 9,714 32,8 5: Los Angeles Urban 13.78 14.16 0.38 30.6 338.8 2.2 22.7 45.0 470.5 866 3,102 61 208 1,273 4,3 A 710: Los Angeles Suburban 12.97 23.28 10.31 1,979.5 9,506.2 152.5 664.6 1,270.3 5,537.3 55,970 87,034 4,311 6,084 35,918 50,6 A 710: Los Angeles Suburban 10.18 12.97 2.79 468.7 2,440.1 30.8 145.6 187.9 888.0 13,253 22,340 871 1,333 5,314 8,1 A 710: LA Suburban 4.96 10.18 5.22 751.7 3,609.8 49.1 214.1 295.4 1,287.6 21,253 33,049 1,389 1,960 8,352 11,7 | I-5: Los Angeles | | | | | | | | | | | | | | | | 26,12 |
| 5: Los Angeles Urban 13.78 14.16 0.38 30.6 338.8 2.2 22.7 45.0 470.5 866 3,102 61 208 1,273 4,3 A 710: Los Angeles Suburban 12.97 23.28 10.31 1,979.5 9,506.2 152.5 664.6 1,270.3 5,537.3 55,970 87,034 4,311 6,084 35,918 50,6 A 710: Los Angeles Suburban 10.18 12.97 2.79 468.7 2,440.1 30.8 145.6 187.9 888.0 13,253 22,340 871 1,333 5,314 8,1 A 710: LA Suburban 4.96 10.18 5.22 751.7 3,609.8 49.1 214.1 295.4 1,287.6 21,253 33,049 1,389 1,960 8,352 11,7 | · • · = • • · · · · · · · · · · · · · · | | | | | | | | | | | | | | | | |
| A 710: Los Angeles Suburban 12.97 23.28 10.31 1,979.5 9.506.2 152.5 664.6 1,270.3 5,537.3 55,970 87.034 4,311 6,084 35,918 50.6 10.18 12.97 2.79 468.7 2,440.1 30.8 145.6 187.9 888.0 13,253 22,340 871 1,333 5,314 8,11 A 710: LA Suburban 4.96 10.18 5.22 751.7 3,609.8 49.1 214.1 295.4 1,287.6 21,253 33,049 1,389 1,960 8,352 11,7 | | | | | | | | | | | | | -7- | | | | |
| A 710: Los Angeles Suburban 10.18 12.97 2.79 468.7 2,440.1 30.8 145.6 187.9 888.0 13,253 22,340 871 1,333 5,314 8,1 A 710: LA Suburban 4.96 10.18 5.22 751.7 3,609.8 49.1 214.1 295.4 1,287.6 21,253 33,049 1,389 1,960 8,352 11,7 | CA 710: Los Angeles | | | | | | | | | | | | | 0. | | | 50.69 |
| A 710: LA Suburban 4.96 10.18 5.22 751.7 3,609.8 49.1 214.1 295.4 1,287.6 21,253 33,049 1,389 1,960 8,352 11,7 | CA 710: Los Angeles | | | | | | | | | | | | | | | | 8,130 |
| OTAL 25,633.1 95,243.4 5,271.0 14,675.4 21,765.4 87,710.7 724,759 872,003 149,034 134,361 615,403 803,0 | CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | | | | | | | | | | | 0,002 | 11,789 |
| | TOTAL | | | | | 25,633.1 | 95,243.4 | 5,271.0 | 14,675.4 | 21,765.4 | 87,710.7 | 724,759 | 872,003 | 149,034 | 134,361 | 615,403 | 803,037 |

| TABLE M2a. SECTION | N VOLUME DATA | A - CONVE | NTIONAL | LANES WITH | ADDED LANE - E | BASE VOLUM | E | | | | | | | | | | | |
|--------------------------------------|----------------|----------------|----------------|---------------------|------------------|--------------------|----------------------|---------------------|---------------|-----------------------|---------------------------|------------------|----------------|--------------------------|----------------------|----------------|---------------------------|----------------|
| | City/Suburban/ | Pos | st Mile of S | Seament | Conventional | AADT (One | Truck % of | Truck AADT | Peak | Peak Period Flow, One | Peak Period | Nighttime Off- | Nighttime Off- | Nighttime Off-Peak | Nighttime Off- | Daytime Off- | | |
| County | Rural | | | | Freeway Lanes | Direction) | Conventional | (One | Period | Direction (vph) | Volume, One | Peak Period | Peak Period % | Period Volume, One | | Peak Period | | |
| I-5: Sacramento | Rural | Begin 29.87 | End 34.65 | Length (mi) 4.78 | in One Direction | 40.000 | Lanes AADT 16.00% | Direction) 6.400 | Duration 6 | 3,500 | Direction (veh) 21,000 | Duration (hours) | AADT 5% | Direction (veh) 1.923 | One Direction 385 | Duration 13 | Direction (veh) 17.077 | (vph) 1,314 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 4 | 49,000 | 11.00% | 5,390 | 6 | 4 900 | 29,400 | 5 | 5% | 2.356 | 471 | 13 | 17,077 | 1,326 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 4 | 49,000 | 9.00% | 4,410 | 6 | 4,900 | 29,400 | 5 | 5% | 2,356 | 471 | 13 | 17,244 | 1,326 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 4 | 67,000 | 13.00% | 8,710 | 3 | 6,500 | 19,500 | 6 | 5% | 3,189 | 532 | 15 | 44,311 | 2,954 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 5 | 73,000 | 9.00% | 6,570 | 3 | 7,300 | 21,900 | 6 | 5% | 3,475 | 579 | 15 | 47,625 | 3,175 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 6 | 80,000 | 10.00% | 8,000 | 3 | 7,100 | 21,300 | 6 | 5% | 3,808 | 635 | 15 | 54,892 | 3,659 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 4 | 75,000 | 11.00% | 8,250 | 3 | 7,000 | 21,000 18,000 | 6 | 5% | 3,570 | 595 | 15 | 50,430 | 3,362 |
| I-5: Sacramento | Urban | 19.16 18.82 | 22 19.16 | 2.84 0.34 | 5 6 | 65,000 63,000 | 14.00% 14.00% | 9,100 8,820 | 3 | 6,000 5,400 | 18,000 | 6 | 5% 5% | 3,094 2,999 | 516 500 | 15 15 | 43,906 43,801 | 2,927 2,920 |
| I-5: Sacramento | Urban Urban | 16.7 | 18.82 | 2.12 | 5 | 50,000 | 14.00% | 7.000 | 3 | 5,400 | 15,000 | 6 | 5% | 2,999 | 397 | 15 | 32,620 | 2,920 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 4 | 40,000 | 14.00% | 5,600 | 3 | 4,000 | 12,000 | 6 | 5% | 1,904 | 317 | 15 | 26,096 | 1,740 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 3 | 30,000 | 25.00% | 7,500 | 3 | 3.000 | 9.000 | 11 | 19% | 5,738 | 522 | 10 | 15,262 | 1.526 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 3 | 25,000 | 24.00% | 6,000 | 4 | 2,300 | 9,200 | 8 | 12% | 2,895 | 362 | 12 | 12,905 | 1,075 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 4 | 40,000 | 23.00% | 9,200 | 5 | 4,000 | 20,000 | 5 | 4% | 1,613 | 323 | 14 | 18,387 | 1,313 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 4 | 45,000 | 24.00% | 10,800 | 5 | 4,500 | 22,500 | 5 | 4% | 1,814 | 363 | 14 | 20,686 | 1,478 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 5 | 50,000 | 24.00% | 12,000 | 5 | 5,000 | 25,000 | 5 | 6% | 2,791 | 558 | 14 | 22,209 | 1,586 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 4 | 40,000 | 26.00% | 10,400 | 5 | 4,000 | 20,000 | 5 | 6% | 2,233 | 447 | 14 | 17,767 | 1,269 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 6 | 63,000 | 26.00% | 16,380 | 5 | 5,000 | 25,000 | 5 | 6% | 3,517 | 703 | 14 | 34,483 | 2,463 1,352 |
| I-5: San Joaquin I-5: San Joaquin | Rural Rural | 11.8 | 12.69 11.8 | 0.89 | 3 | 42,000 10.000 | 26.00% 26.00% | 10,920 2,600 | 5 3 | 4,200 1,000 | 21,000 3.000 | 6 5 | 8% 8% | 3,430 803 | 572 161 | 13 16 | 17,570 6.197 | 1,352 |
| I-5: San Joaquin I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 3 | 10,000 | 28.00% | 2,800 | 4 | 1,000 | 4,000 | 6 | 16% | 1,557 | 259 | 14 | 4,443 | 317 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 3 | 15,000 | 29.00% | 4.350 | 4 | 1,500 | 6,000 | 6 | 16% | 2.335 | 389 | 14 | 6,665 | 476 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 3 | 15,000 | 30.00% | 4,500 | 5 | 1,500 | 7,500 | 7 | 18% | 2,708 | 387 | 12 | 4,792 | 399 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 3 | 15,000 | 30.00% | 4,500 | 5 | 1,500 | 7,500 | 7 | 17% | 2,597 | 371 | 12 | 4,903 | 409 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 3 | 17,000 | 29.00% | 4,930 | 5 | 1,700 | 8,500 | 5 | 10% | 1,728 | 346 | 14 | 6,772 | 484 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 5 | 30,000 | 28.00% | 8,400 | 5 | 3,000 | 15,000 | 6 | 11% | 3,284 | 547 | 13 | 11,716 | 901 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 5 | 30,000 | 28.00% | 8,400 | 6 | 3,000 | 18,000 | 6 | 11% | 3,284 | 547 | 12 | 8,716 | 726 |
| I-5: Kern | Rural | 9.28 7.04 | 10.35 | 1.07 2.24 | 5 5 | 30,000 | 28.00% 30.00% | 8,400 9,000 | 6 | 3,000 3,000 | 18,000 18,000 | 6 | 11% | 3,284 3,284 | 547 547 | 12 12 | 8,716 8,716 | 726 726 |
| I-5: Kern I-5: Kern | Rural Rural | 6.41 | 9.28 7.04 | 0.63 | 5 | 30,000 30,000 | 28.00% | 8,400 | 6 | 3,000 | 18,000 | 6 | 11% 11% | 3,284 | 547 | 12 | 8,716 | 726 |
| I-5: Kem | Rural | 5.36 | 6.41 | 1.05 | 5 | 30,000 | 28.00% | 8,400 | 6 | 3,000 | 18,000 | 6 | 11% | 3,284 | 547 | 12 | 8,716 | 726 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 5 | 30,000 | 28.00% | 8,400 | 6 | 3,000 | 18,000 | 6 | 11% | 3,284 | 547 | 12 | 8,716 | 726 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 5 | 30,000 | 28.00% | 8,400 | 6 | 3,000 | 18,000 | 6 | 11% | 3,284 | 547 | 12 | 8,716 | 726 |
| I-5: Los Angeles | Rural | 84.76 | 88.61 | 3.85 | 5 | 35,000 | 27.00% | 9,450 | 6 | 3,500 | 21,000 | 6 | 10% | 3,550 | 592 | 12 | 10,450 | 871 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 5 | 35,000 | 27.00% | 9,450 | 6 | 3,500 | 21,000 | 6 | 10% | 3,550 | 592 | 12 | 10,450 | 871 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 5 | 35,000 | 18.00% | 6,300 | 6 | 3,500 | 21,000 | 7 | 10% | 3,550 | 507 | 11 | 10,450 | 950 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 5 | 35,000 | 19.00% | 6,650 | 6 | 3,500 | 21,000 | 7 | 10% | 3,550 | 507 | 11 | 10,450 | 950 |
| I-5: Los Angeles | Rural | 65.43 59.95 | 68.1 65.43 | 2.67 5.48 | 5 5 | 35,000 35,000 | 18.00% 18.00% | 6,300 6,300 | 6 | 3,500 3,500 | 21,000 21,000 | 7 | 10% 10% | 3,550 3,550 | 507 507 | 11 11 | 10,450 10,450 | 950 950 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 54.16 | 59.95 | 5.48 | 5 | 40.000 | 16.00% | 6,400 | 6 5 | 4.000 | 20,000 | 5 | 6% | 2,433 | 487 | 14 | 17,567 | 1,255 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 5 | 65,000 | 10.00% | 6,500 | 5 | 6,500 | 32,500 | 5 | 6% | 3,953 | 791 | 14 | 28,547 | 2,039 |
| I-5: Los Angeles | Urban | 46.9 | 52.33 | 5.43 | 5 | 90,000 | 10.00% | 9,000 | 6 | 8,600 | 51,600 | 5 | 6% | 5,305 | 1,061 | 13 | 33,095 | 2,546 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 5 | 92,000 | 9.00% | 8,280 | 6 | 8,900 | 53,400 | 5 | 6% | 5,423 | 1,085 | 13 | 33,177 | 2,552 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 6 | 92,000 | 10.00% | 9,200 | 6 | 8,900 | 53,400 | 5 | 6% | 5,423 | 1,085 | 13 | 33,177 | 2,552 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 6 | 100,000 | 9.00% | 9,000 | 6 | 8,900 | 53,400 | 5 | 6% | 5,895 | 1,179 | 13 | 40,705 | 3,131 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 6 | 115,000 | 10.00% | 11,500 | 6 | 9,100 | 54,600 | 5 | 6% | 6,779 | 1,356 | 13 | 53,621 | 4,125 |
| I-5: Los Angeles | Urban Urban | 43.9 41.6 | 44.01 43.9 | 0.11 2.3 | 5 6 | 115,000 120,000 | 8.00% 8.00% | 9,200 9,600 | 6 | 8,500 9,500 | 51,000 57,000 | 5 5 | 7% 7% | 7,618 7,949 | 1,524 1,590 | 13 13 | 56,382 55,051 | 4,337 4,235 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 40.27 | 43.9 | 1.33 | 4 | 120,000 | 9.00% | 10.530 | 4 | 9,500 4.600 | 18,400 | 5 | 5% | 7,949 5,710 | 1,590 | 13 | 92,890 | 4,235 6.193 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 5 | 65,000 | 9.00% | 5,850 | 4 | 4,800 | 19,200 | 5 | 5% | 3,172 | 634 | 15 | 42,628 | 2,842 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 6 | 70,000 | 8.00% | 5,600 | 4 | 5.000 | 20,000 | 5 | 5% | 3,416 | 683 | 15 | 46,584 | 3,106 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 6 | 135,000 | 8.00% | 10,800 | 5 | 10,200 | 51,000 | 5 | 4% | 5,675 | 1,135 | 14 | 78,325 | 5,595 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 7 | 140,000 | 8.00% | 11,200 | 5 | 10,000 | 50,000 | 5 | 4% | 5,885 | 1,177 | 14 | 84,115 | 6,008 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 5 | 140,000 | 8.00% | 11,200 | 5 | 9,600 | 48,000 | 5 | 4% | 5,885 | 1,177 | 14 | 86,115 | 6,151 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 5 | 90,000 | 8.00% | 7,200 | 5 | 6,800 | 34,000 | 5 | 4% | 3,783 | 757 | 14 | 52,217 | 3,730 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 5 | 90,000 | 8.00% | 7,200 | 5 | 7,200 | 36,000 | 5 | 4% | 3,783 | 757 | 14 | 50,217 | 3,587 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 5.47 | 5 6 | 102,000 130.000 | 8.00% 7.00% | 8,160 9,100 | 5 5 | 8,200 9,500 | 41,000 47,500 | 5 | 4% 4% | 4,288 5,465 | 858 1.093 | 14 14 | 56,712 77.035 | 4,051 5,503 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 22.78 | 28.25 22.78 | 0.5 | 5 | 130,000 | 7.00% | 9,100 | 5 | 9,500 | 47,500 | 5 | 4% | 5,465 | 1,093 | 14 | 77,035 | 5,503 |
| I-5: Los Angeles | Urban | 21.41 | 22.78 | 0.87 | 6 | 138,000 | 8.00% | 11,040 | 8 | 9,900 | 79,200 | 5 | 4% | 6,184 | 1,237 | 11 | 52,616 | 4,783 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 5 | 140,000 | 8.00% | 11,200 | 8 | 9,600 | 76,800 | 5 | 4% | 6,273 | 1,255 | 11 | 56,927 | 5,175 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 5 | 120,000 | 8.00% | 9,600 | 8 | 8,000 | 64,000 | 5 | 4% | 5,377 | 1,075 | 11 | 50,623 | 4,602 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 5 | 120,000 | 8.00% | 9,600 | 6 | 7,900 | 47,400 | 5 | 3% | 3,350 | 670 | 13 | 69,250 | 5,327 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 5 | 130,000 | 8.00% | 10,400 | 6 | 8,000 | 48,000 | 5 | 3% | 3,629 | 726 | 13 | 78,371 | 6,029 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 5 | 128,000 | 8.00% | 10,240 | 6 | 8,400 | 50,400 | 5 | 3% | 3,574 | 715 | 13 | 74,026 | 5,694 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 2.79 | 5 | 110,000 88,000 | 15.00% 14.00% | 16,500 12,320 | 8 | 8,000 7,500 | 64,000 | 5 5 | 4% 4% | 4,929 3,943 | 986 | 11 | 41,071 | 3,734 |
| CA 710: Los Angeles CA 710: LA | Suburban | 10.18 4.96 | 10.18 | 5.22 | 5 | 70,000 | 14.00% 15.00% | 12,320 | 8 | 7,500 6.000 | 60,000 48,000 | 5 | 4% 4% | 3,943 3,137 | 789 627 | 11 | 24,057 18.863 | 2,187 1.715 |
| UA / 10: LA | Suburban | 4.90 | 10.18 | D.22 | 4 | 70,000 | 13.00% | 10,500 | | 0,000 | 40,000 |] 3 | 470 | 3,13/ | 027 | | 10,003 | 1,710 |

| TABLE M2b. SECTIO | N FLOW AND SE | PEED DATA | A - CONVE | NTIONAL LA | NES WITH ADDED LANE | - BASE VOLUME | | | | | | | | | | |
|--------------------------------------|----------------|----------------|----------------|--------------|-----------------------|------------------------|---------------------------------|------------------------------|---------------------|----------------------------|-------------|-------------|----------|---------------|----------|------------------|
| | City/Suburban/ | Pos | st Mile of Se | eament | Peak Period Flow, One | Peak Period Passenger | Nighttime Off-Peak Period | Nighttime Off-Peak Period | Daytime Off-Peak | Daytime Off-Peak Passenger | Peak Period | Speed (mph) | | ff-Peak Speed | | eak Period Speed |
| County | Rural | | | • | Direction per Lane | Car Equivalent Flow, | Passenger Car Equivalent Flow, | Passenger Car Equivalent | Flow, One Direction | Car Equivalent Flow, One | | | / | nph) | | nph) |
| | | Begin | End | Length (mi) | (vphpl) | One Direction (pcphpl) | One Direction per Lane (pcphpl) | Flow, One Direction per Lane | per Lane (vphpl) | Direction (pcphpl) | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 1,167 1,225 | 1,307 1.315 | 192 157 | 208 166 | 438 332 | 473 350 | 50 50 | 65 | 50 50 | 65 | 50 50 | 65 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 26.94 26.69 | 29.87 26.94 | 2.93 0.25 | 1,225 | 1,315 | 157 | 164 | 332 | 347 | 50 | 55 55 | 50 | 55 55 | 50 | 55 55 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 1,625 | 1,766 | 177 | 189 | 739 | 787 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 1,460 | 1,542 | 145 | 151 | 635 | 664 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 1,183 | 1,254 | 127 | 133 | 610 | 640 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 1,750 | 1,878 | 198 | 209 | 840 | 887 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | | 19.16 | 22 | 2.84 | 1,200 | 1,305 | 129 | 138 | 585 | 626 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 900 | 976 | 100 | 107 | 487 | 521 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 1,000 | 1,088 | 99 | 106 | 435 | 465 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 1,000 | 1,093 | 106 | 113 | 435 | 465 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 1,000 | 1,188 | 261 | 293 | 509 | 572 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 767 | 905 | 181 | 203 | 358 | 402 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 1,000 | 1,153 | 108 | 120 | 328 | 366 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 1,125 | 1,305 | 121 | 135 | 369 | 414 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 1,000 | 1,150 | 140 | 156 | 317 | 355 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1,000 | 1,173 | 149 | 168 | 317 | 359 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural Rural | 12.69 | 14.34 12.69 | 1.65 0.89 | 833 1.050 | 963 1,232 | 141 191 | 159 215 | 411 338 | 464 382 | 50 50 | 65 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| | Rural | 11.0 N | 11.8 | 11.8 | 333 | 398 | 80 | 91 | 129 | 146 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 333 | 403 | 130 | 148 | 106 | 121 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 500 | 609 | 195 | 223 | 159 | 182 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 500 | 613 | 193 | 222 | 133 | 153 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 500 | 613 | 186 | 213 | 136 | 157 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | | 15.86 | 87.03 | 71.17 | 567 | 690 | 173 | 198 | 161 | 185 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 600 | 705 | 137 | 156 | 180 | 205 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 600 | 705 | 137 | 156 | 145 | 166 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 600 | 705 | 137 | 156 | 145 | 166 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 600 | 713 | 137 | 157 | 145 | 167 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 600 | 705 | 137 | 156 | 145 | 166 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 600 | 705 | 137 | 156 | 145 | 166 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 0.58 | 600 | 705 | 137 | 156 | 145 | 166 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 0 84.76 | 0.58 88.61 | 3.85 | 600 700 | 705 818 | 137 148 | 156 168 | 145 174 | 166 198 | 50 50 | 65 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 78.43 | 84.76 | 6.33 | 700 | 818 | 148 | 168 | 174 | 198 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 700 | 779 | 127 | 138 | 190 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 700 | 783 | 127 | 139 | 190 | 208 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 700 | 779 | 127 | 138 | 190 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 700 | 779 | 127 | 138 | 190 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 800 | 880 | 122 | 131 | 251 | 271 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 1,300 | 1,381 | 198 | 208 | 408 | 428 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Urban | 46.9 | 52.33 | 5.43 | 1,720 | 1,828 | 265 | 279 | 509 | 535 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 1,780 | 1,880 | 271 | 283 | 510 | 533 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 1,483 | 1,572 | 217 | 228 | 425 | 447 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | | 45.1 | 45.93 | 0.83 | 1,483 | 1,563 | 236 | 246 | 522 | 545 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | | 44.01 | 45.1 | 1.09 | 1,517 | 1,608 | 271 | 285 | 687 | 722 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 1,700 | 1,785 | 381 | 396 | 867 | 902 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | | 41.6 | 43.9 41.6 | 2.3 1.33 | 1,583 | 1,659 | 318 | 331 | 706 | 734 | 50 50 | 55 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Los Angeles | Urban | 40.27 39.81 | 41.6 40.27 | 0.46 | 1,150 960 | 1,219 1,014 | 381 159 | 398 166 | 1,548 568 | 1,618 594 | 50 50 | 55 55 | 50 50 | 55 55 | 50 | 55 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 39.81 | 39.81 | 0.46 | 833 | 873 | 137 | 142 | 518 | 538 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 36.65 | 39.81 | 2.71 | 1,700 | 1,782 | 227 | 236 | 932 | 970 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 1,429 | 1,702 | 196 | 204 | 858 | 893 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.22 | 1,920 | 2.016 | 294 | 306 | 1,230 | 1,279 | 50 | 53 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 1,360 | 1,428 | 189 | 197 | 746 | 776 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 1,440 | 1,512 | 189 | 197 | 717 | 746 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 1,640 | 1,722 | 214 | 223 | 810 | 843 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 1,583 | 1,650 | 219 | 226 | 917 | 949 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 1,900 | 1,983 | 273 | 283 | 1,101 | 1,139 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 1,650 | 1,729 | 247 | 257 | 797 | 829 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 1,920 | 2,016 | 314 | 326 | 1,035 | 1,076 | 50 | 53 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 1,600 | 1,680 | 269 | 280 | 920 | 957 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 1,580 | 1,659 | 168 | 174 | 1,065 | 1,108 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 1,600 | 1,680 | 181 | 189 | 1,206 | 1,254 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 1,680 | 1,764 | 179 | 186 | 1,139 | 1,184 | 50 | 55 | 50 | 55 | 50 | 55 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 1,600 | 1,750 | 246 | 265 | 747 | 803 | 50 | 65 | 50 | 55 | 50 | 65 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 1,500 | 1,631 | 197 | 211 | 437 | 468 | 50 | 65 | 50 | 55 | 50 | 65 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 1,500 | 1,650 | 209 | 225 | 429 | 461 | 50 | 65 | 50 | 55 | 50 | 65 |

TABLE M2c. SECTION TRAVEL DATA - CONVENTIONAL LANES WITH ADDED LANE - BASE VOLUME Nighttime Off-Peak Period Vehicle Daytime Off-Peak Period Vehicle-Peak Period Vehicle-Miles of Nighttime Off-Peak Other Vehicle Daytime Off-Peak Period Vehicle eak Period Vehicle-Hours of City/Suburbar Post Mile of Segment County Travel, One Direction Hours of Travel, One Direction Hours of Travel, One Direction Travel, One Direction Miles of Travel, One Direction Miles of Travel, One Direction Rural Begin End Length (mi) Truck Other Veh. Truck Truck Other Veh. Truck Other Veh. Truck Truck Other Veh. Other Veh. Other Veh. -5: Sacramento Rural 29.87 34.65 4.78 321.2 1.297.2 29 4 118.8 261.2 1 054 9 16.061 84.319 1.471 7.722 13 060 68 567 I-5: Sacramento Urban 26.94 29.87 2.93 189.5 1,393.9 15.2 111.7 111.2 817.6 9,476 76,666 6,143 5.558 44.968 13.2 121.6 1.1 9.7 7.8 71.3 53 388 I-5: Sacramento Urban 26 69 26 94 0.25 662 6.689 536 3.923 25 53 1.16 58.8 357.8 96 58.5 133.6 813.1 2,941 19,679 481 3,219 6 682 44 718 I-5: Sacramento Urban 26.69 40.2 58.6 803.7 319 44,206 369.6 6.4 87.4 2,010 20,328 3.225 4.372 I-5: Sacramento Urban 24.51 1.02 60.1 491 4 10.7 87.9 154.8 1 266 5 3.003 27,030 537 4.833 7,740 Urban 23.1 4.51 1.41 69 658 -5: Sacramento I-5: Sacramento Urban 1.1 50.8 373.8 8.6 63.5 122.0 897.7 2,541 20.559 432 3,495 6.102 49,371 -5: Sacramento Urhan 19 16 2 84 143 1 7993 24 6 137 4 349 1 1 949 7 7 157 43 963 1 230 7 557 17 457 107 236 -5: Sacramento Urban 18.82 19 16 0.34 15.4 86.1 2.9 15.9 417 232.9 771 4.737 143 877 2.085 12.807 Urban 2.12 89.0 497.2 14.1 78.9 193.6 1,081.3 4,452 27,348 706 4,339 9,682 59,473 -5: Sacramento 16.7 18.82 75.3 11 9 163.7 5: Sacramento Urban 14.46 167 2.24 420.3 66.7 914.0 3,763 23,117 597 3,668 8,184 50,271 5: Sacramento Rural 14.46 14.46 650.7 1,501.6 414.8 957.3 1,103.5 2,546.5 32,535 97,605 20,742 62,226 55,173 165,519 Rural 40.45 49.79 9.34 412.5 1,004.7 129.8 316.1 578.6 1,409.3 20,623 65,305 6,489 20,547 28,929 91,607 -5: San Joaquin -5: San Joaquin Rural 28.56 40 45 11 89 1,093.9 2.817.0 88.2 227.1 1,005.7 2,589.9 54,694 183,106 4 410 14,763 50,284 168,343 21.8 1.188 303 5: San Joaquin Urban 28.56 0.22 23.8 68.4 1.9 5.5 62.9 3,762 96 1.092 3,459 3.54 7.510 Urban 24.8 28.34 424.8 1,222.9 47.4 136.5 377.4 1.086.4 21,240 67.260 2.371 18.869 59.750 I-5: San Joaquir Rural 14.34 10.46 1,087.8 2,381.7 121.5 265.9 966.4 2,115.7 54,392 154,808 6,073 17,284 48.319 137,524 I-5: San Joaquir 24.8 214.5 469.6 30.2 66.1 295.9 647.7 10,725 30,525 1,509 4,294 14,793 42,104 I-5: San Joaquir Rural 12.69 14.34 1.65 0.89 97.2 212.8 15.9 34 7 81.3 178.0 4 859 13 831 794 2 259 4 066 11 572 I-5: San Joaquin Rural 118 12 69 -5: San Joaquin Rural 11.8 184.1 403.0 49.3 107.9 380.2 832.5 9,204 26,196 2,464 7,013 19,012 54,111 628.5 1,243.3 244.6 483.8 698.2 1,381.1 31,427 80,813 12,231 31,450 34,910 89,769 I-5: Stanislaus Rural 28.06 28.06 Rural 32 45 32.45 1,129.3 2,126.7 439.5 827.7 1.254.4 2.362.4 56.463 138,237 21,974 53.798 62,721 153,558 -5: Merced Rural 1,074.9 1,929.2 1,902.3 3,414.4 148,860 53,743 125,401 95,117 I-5: Fresno 66.16 2.977.2 5.343.7 347.340 221.939 747.4 48,583 39,299 I-5: Kings 1.202.4 2.158.2 416.4 786.0 1.410.7 60.120 140.280 20.821 91.697 Rural 26.72 26.72 71.17 3,508.7 6,607.9 713.3 1.343.4 2,795.3 5,264.4 175,434 429,511 35,667 87,323 139,767 342,188 5: Kern Rural -5: Kern Rural 15.08 5 86 0.78 65.5 129.6 14.3 28.4 51.2 101.2 3,276 8,424 717 1,845 2,559 6,579 5: Kern Rural 10.35 15.08 4.73 476.8 943.1 87.0 172.1 230.9 456.6 23,839 61,301 4,350 11,185 11,543 29,682 I-5: Kern Rural 9 28 10.35 1.07 107.9 213.3 19.7 38.9 52.2 103.3 5.393 13.867 984 2,530 2,611 6.714 Rural 7 04 2.24 241.9 434 2 44.1 79.2 117.1 210.2 12.096 28 224 2 207 5.150 5.857 13.666 -5: Kern 9 28 -5: Kern Rural 6.41 7 04 0.63 63.5 125.6 11.6 22.9 30.7 60.8 3,175 8,165 579 1,490 1,537 3,953 2,483 11.304 -5: Kern 5.36 3.41 1.05 105.8 209.4 19.3 38.2 51.2 101.4 13.608 966 2,562 Rural 5,292 6.589 Rural 0.58 5.36 4.78 481.8 953.1 87.9 173.9 233.3 461.5 24.091 61.949 4.396 11.665 29.996 -5: Kern I-5: Kern Rural 0.58 58.5 115.6 10.7 21.1 28.3 56.0 2,923 7,517 533 1,372 1,415 3,640 3.85 436.6 908.0 73.8 153.5 217.2 451.8 21.830 59.020 3.691 9.978 10.862 29.369 -5: Los Angeles Rural 84.76 88.61 717.8 121 4 357.2 742 9 97 039 16 405 -5: Los Angeles Rural 78 43 84 76 6.33 1 492 9 252 4 35.891 6.068 17 860 48 287 112.2 393.2 330.3 1,157.4 33,188 151,192 25,560 16,515 I-5: Los Angeles Rural 69.65 78.43 8.78 663.8 2.326.0 5.611 75,234 1.55 123.7 405.6 20.9 68.6 61.5 201.8 6.185 1.046 4.457 3.077 13,120 I-5: Los Angeles Rural 68.1 9.65 26,366 Rural 65.43 2.67 201.9 707.3 34.1 119.6 100.4 352.0 10.093 45,977 1,706 7,773 5.022 22,879 -5: Los Angeles 94,366 15,953 10,308 I-5: Los Angeles Rural 59.95 65 43 5.48 414.3 1.451.8 70.0 245.4 206.2 722.4 20,714 3.502 46.957 370.6 11 832 16,274 85 440 -5: Los Angeles Rural 54 16 59 95 5 79 1 496 5 45 1 182 0 325.5 1 314 5 18 528 97.272 2.254 119.0 823.5 14.5 100.2 104.5 723.3 5,948 53,528 723 6,511 5,224 47,016 Rural 54.16 1.83 5: Los Angeles 5.43 560.4 4,584.9 57.6 471.4 359.4 2,940.6 28,019 252,169 2,881 25,927 17,970 161,734 Urban 46.9 -5: Los Angeles 2.33 I-5: Los Angeles Urban 46.6 46.9 0.3 28.8 265.1 2.9 26.9 17.9 164.7 1,442 14,578 146 1,481 896 9,057 Urban 71.6 59.5 44.5 363. 3,578 3.270 2,223 5: Los Angeles 79.8 733.3 81.0 559.0 3.989 40.333 440 4.452 3.041 30.745 -5: Los Angeles Urhan 45 1 45 93 0.83 8.8 60.8 -5: Los Angeles Urban 44 01 45 1 1.09 119.0 973.9 14.8 120.9 116.9 956.4 5,951 53,563 739 6,650 5,845 52,602 9.0 93.8 1.3 14.0 9.9 103.7 449 5,161 67 771 496 5,706 5: Los Angeles Urban 43.9 44.01 0.11 209.8 305.8 202.6 2.118.0 10.488 120,612 1 463 16.821 10.129 116.487 I-5: Los Angeles Urban 41.6 43.9 2.192.9 29.3 I-5: Los Angeles Urban 40.27 41.6 1.33 44.0 404.9 13.7 125.6 222.4 2.044.1 2,202 22,270 683 6,910 11,119 112,425 15.9 146 1 26 24 1 35.3 324 4 131 17.844 Urhan 39 81 40 27 0.46 795 8 037 1 328 1 765 -5: Los Angeles 33.5 14 4 150.5 2.5 25.7 350.7 720 8.280 123 1.414 1.677 19,286 5: Los Angeles Urban 0.45 2.71 I-5: Los Angeles Urban 36.65 39.36 221.1 2,311.9 24.6 257.3 339.6 3,550.5 11,057 127,153 1,230 14,149 16,981 195,280 0.22 1.191 I-5: Los Angeles Urban 36.43 36.65 17.6 184.0 2.1 21.7 29.6 309.5 880 10.120 104 1.480 17.025 16.1 28.9 302.5 1,137 1,447 I-5: Los Angeles Urban 36.22 36.43 0.21 175.0 2.0 20.7 806 9.274 99 16.637 -5: Los Angeles Urban 35 94 0.28 15.2 159.2 17.7 23.4 244.6 762 8.758 85 975 1.170 13.451 36.22 41.0 544.8 2,052 27,238 I-5: Los Angeles 29.16 35.94 6.78 390.5 4.082.8 429.1 5.695.1 19.526 224,554 23,599 313,231 Urban Urban 59.7 624.1 65.3 82.6 863.3 2,985 34,32 3,590 4,129 47,479 5: Los Angeles 6.2 I-5: Los Angeles Urban 22.78 28.25 5.47 363.8 4.393.4 41.8 505.5 589.9 7.125.2 18.188 241.637 2.092 27.800 29,497 391.886 0.5 33.3 401.6 3.8 46.2 53.9 651.3 1,663 22,088 191 2,541 2.696 35,821 I-5: Los Angeles Urban 22.28 22.78 Urban 110.2 1,152.6 8.6 90.0 73.2 765.7 5,512 63,392 430 4,949 3,662 42,114 I-5: Los Angeles 21 41 0.87 75.6 5,100 102.0 87 1 790.3 417 4 790 I-5: Los Angeles Urhan 20.58 21 41 0.83 1 106 5 8.3 58 644 3 780 43 469 3.37 345.1 3,607.7 29.0 303.1 273.0 2,853.7 17,254 198,426 1,450 16,671 13,648 156.951 I-5: Los Angeles Urban 17.21 0.58 23.5 245.8 1.7 17.4 34.3 359.1 1.176 13,518 956 1,717 19,750 I-5: Los Angeles Urban 16.9 7.21 0.31 83 I-5: Los Angeles Urban 14.16 2.74 210.4 2,200.0 15.9 166.3 343.6 3.591.9 10.522 120,998 796 9,149 17.179 197.556 I-5: Los Angeles Urban 13 78 14 16 0.38 30.6 320.4 22 22.7 45.0 470.5 1,532 17,620 109 1 249 2,250 25,880 CA 710: Los Angeles 1 979 5 152.5 785.4 1 270 3 5 537 3 98 976 560 864 7 623 43 196 63.516 359 925 Suburban 10.31 8 628 7 12 97 23 28 CA 710: Los Angeles Suburban 2.97 2.79 468.7 2.214.8 30.8 172.0 187.9 888.0 23,436 143,964 1.540 9,461 9.397 57,722

CA 710: LA

TOTAL

Suburban

4.96

10.18

5.22

751.7

25,633.1

3,276.6

91,721.3

49.1

5,271.0

253.0

14,861.6

295.4

21,765.4

1,287.6

87,633.6

37,584

1,281,653

212,976

5,586,341

2,456

263.550

13,917

912,542

14,770

1,088,269

83,697

5,221,226

TABLE M2d. VEHICLE OPERATING COSTS - CONVENTIONAL LANES WITH ADDED LANE - BASE VOLUME Nighttime Off-Peak Other Vehicle Daytime Off-Peak Period Vehicle Vehicle Operating Costs (\$) Peak Period Vehicle-Miles of City/Suburban Post Mile of Segment Nighttime Off-Peak County Travel, One Direction Miles of Travel, One Direction Miles of Travel, One Direction Peak Daytime Off-Peak Rural Beain End Length (mi) Truck Other Veh. Truck Other Veh. Truck Other Veh. Truck Other Veh. Other Veh. Other Veh. Truck Truck I-5: Sacramento Rural 29.87 34 65 4 78 16 061 84 319 1 471 7 722 13 060 68 567 28 364 27,404 2 59 2 510 23.065 22.28 Urban 26.94 2.93 9,476 76,666 759 6,143 5,558 44 968 16,734 24,917 1,341 1,997 9,81 14,61 5: Sacramento 29.87 0.25 662 6,689 53 536 388 3,923 1,168 2,174 174 1,27 Urban 26.69 685 5: Sacramento 6.94 5: Sacramento Urban 25.53 6.69 1.16 2.941 19.679 481 3,219 6,682 44.718 5,193 6,396 849 1.046 11,801 14.53 -5: Sacramento Urban 1.02 319 44.206 3.55 56 1.048 7.72 14.36 Urban 23.1 24.51 1.41 3,003 27,030 537 4,833 7,740 69,658 5,304 8,785 948 1,571 13,668 22.639 I-5: Sacramento I-5: Sacramento Urban 22 23.1 1.1 2,541 20,559 432 3,495 6,102 49,371 4.487 6,682 763 1.136 10,776 16.046 I-5: Sacramento Urban 2.84 7,157 43.963 1,230 7.557 17.457 107,236 12,63 14,288 2,173 2,456 30,829 34,852 Urban 18.82 19.16 0.34 771 4 737 143 877 2 085 12 807 1.362 1.539 252 285 3 682 4 16 -5: Sacramento I-5: Sacramento Urban 16.7 18.82 2.12 4.452 27,348 706 4,339 9,682 59,473 7,862 8,888 1,248 1.410 17.098 19,329 597 1,055 14.452 -5: Sacramento Urban 14.46 2.24 3,763 23,117 3,668 8,184 50,271 6.64 7,513 1,192 16,338 14.46 14.46 32.535 97.605 20,742 62,226 55,173 165.519 57.457 31,722 36.63 20,223 97.43 53.79 -5: Sacramento Rural 5: San Joaquin Rural 40.45 49.79 9.34 20,623 65,305 6,489 20,547 28,929 91,607 36,42 21,224 11,45 6,678 51,08 29,772 5: San Joaquir Rural 28.56 40.45 11.89 54,694 183,106 4,410 14,763 50,284 168,343 96,59 59,50 7,78 4,798 88,80 54,71 1.188 Urban 3.762 96 303 1.092 3.459 2.098 1.223 16 1.124 I-5: San Joaquin 28 34 28 56 0 22 99 1.929 Urban 24.8 28.34 3.54 21,240 67,260 2,371 7,510 18,869 59,750 37,510 21,860 4,188 2,441 33,322 19,419 I-5: San Joaquir I-5: San Joaquin 14.34 154.808 17.284 48.319 137.524 96.057 10.72 5.617 44.69 Rural 24.8 10.46 54.392 6.073 50.313 85.332 I-5: San Joaquin Rural 12 69 14 34 1.65 10 725 30.525 1 509 4 294 14 793 42 104 18 940 9.921 2.665 1 396 26 125 13 684 4,859 13,831 794 2,259 4,066 11,572 8,582 4,495 1,402 734 7,180 3,76 I-5: San Joaquin Rural 11.8 12.69 0.89 9,204 26,196 2,464 7,013 19,012 54,111 16,25 8,514 4,351 2,279 33,57 17,580 I-5: San Joaquin Rural 11.8 11.8 12,231 34,910 31 427 31 450 21 59 -5: Stanislaus Rural 28.06 28.06 80 813 89 769 55 50 26 264 10 221 61 652 29 17 I-5: Merced Rural 32.45 56,463 138,237 21,974 53,798 62,721 153,558 99.714 44,927 38,806 17,484 110.765 49.90 -5: Fresno Rural 66.16 148,860 347,340 53,743 125,401 95.117 221,939 262.88 112.886 94.91 40.75 167,977 72,130 66.16 I-5: Kings Rural 26.72 26.72 60,120 140 280 20.821 48 583 39 299 91 697 106.17 45 591 36.77 15 789 69 40 29.80 I-5: Kern Rural 15.86 87.03 71.17 175,434 429,511 35,667 87,323 139,767 342,188 309,818 139,591 62,989 28,380 246,830 111,21 -5: Kern Rural 15.08 15 86 0.78 3,276 8.424 717 1.845 2.559 6.579 5.78 2,738 1.267 599 4.519 2.13 -5: Kern Rural 10.35 5.08 4 73 23.839 61.301 4.350 11.185 11.543 29.682 42.10 19.923 7,682 3,635 20,38 9,647 Rural 1.07 5,393 984 2.611 9,524 4,507 1.73 4.61 2,182 5: Kern 9.28 10.35 13.867 2.530 6.714 822 5: Kern Rural 7.04 9.28 2.24 12.096 28.224 2.207 5.150 5.857 13,666 21.362 9.173 3.89 1.674 10.34 4,441 3,175 579 1 490 5: Kern Rural 6.41 7.04 8 165 1 537 3 953 5.60 2,654 1.02 484 2.71 1,28 -5: Kern Rural 5.36 3.41 1.05 5,292 13,608 966 2,483 2,562 6,589 9,346 4,423 1,705 807 4,52 2,141 Rural 24.091 11.304 11.665 42.545 20.133 7.763 3.674 20,600 9.749 I-5: Kern 0.58 5.36 4.78 61.949 4.396 29.996 Rural 2,923 7.517 533 1,372 1.415 3.640 5.16 2.443 94 446 1,183 5: Kern 0.58 2.50 I-5: Los Angeles Rural 84.76 3.85 21,830 59,020 3,691 9.978 10,862 29,369 38,551 19,182 6.51 3,243 19.18 9.54 88.61 I-5: Los Angeles Rural 78 43 84 76 6.33 35 891 97 039 6.068 16 405 17 860 48 287 63 384 31 538 10 716 5.332 31 540 15 693 Rura 69.65 8.78 33,188 151,192 5,611 25,560 16,515 75,234 58,61 49.137 9,90 8,307 29,165 24,45 5: Los Angeles 78.43 Rural 68.1 69.65 1.55 6,185 26,366 1,046 4,457 3,077 13,120 10,922 8,569 1,846 1,449 5,435 4,264 -5: Los Angeles 17 82 2 526 7,436 -5: Los Angeles Rural 65.43 68.1 2.67 10.093 45 977 1 706 7.773 5.022 22 879 14 943 3.01: 8 869 5: Los Angeles Rural 59.95 55.43 5.48 20,714 94,366 3,502 15,953 10,308 46,957 36,582 30,669 6,18 5,185 18,20 15,26 -5: Los Angeles Rural 54.16 9.95 5.79 18,528 97,272 2,254 11,832 16,274 85,440 32,721 31,613 3,980 3,846 28,740 27,76 I-5: Los Angeles Rural 52.33 54 16 1.83 5,948 53,528 723 6,511 5,224 47 016 10,50 17,396 1,278 2,116 9,226 15,280 I-5: Los Angeles Urban 46.9 52.33 5.43 28,019 252,169 2,881 25,927 17,970 161,734 49,482 81,955 8,426 31,73 52,56 Urhan 46.6 46.9 0.3 1,442 14,578 146 1,481 896 9,057 2,546 4,738 259 481 1,582 2,944 I-5: Los Angeles I-5: Los Angeles Urban 45 93 46 6 0.67 3,578 32,200 363 3,270 2,223 20,006 6,318 10.465 642 1.063 3,926 6,502 Urban 40.333 440 4.452 3,041 7,045 13,108 778 1,447 9.992 5: Los Angeles 45.93 0.83 3,989 30.745 5.37 I-5: Los Angeles Urban 44.01 45.1 1.09 5.951 53.563 739 6.650 5.845 52.602 10.510 17,408 1.305 2.161 10.322 17.096 I-5: Los Angeles Urban 43.9 44.01 0.11 449 5,161 67 771 496 5,706 79 1,677 251 876 1.85 Urban 43.9 2.3 10,488 120,612 1,463 16,821 10,129 116,487 18,52 39,199 2,58 5,467 17,889 37,85 -5: Los Angeles 1.33 Urban 40.27 41.6 683 11.119 112,425 7,238 1,207 2,246 19.63 I-5: Los Angeles 2,202 22,270 6.910 3,89 36,53 -5: Los Angeles Urban 39.81 40.27 0.46 795 8.037 131 1,328 1,765 17.844 1,404 2,612 232 432 3.117 5,799 I-5: Los Angeles Urban 0.45 720 8.280 123 1.414 1.677 19,286 1.27 21 460 2.96 6,26 39.36 39.81 I-5: Los Angeles Urban 36 65 39 36 2 71 11 057 127 153 1 230 14 149 16 981 195 280 19 526 41.325 2 173 4 598 29 988 63 466 Urban 36.43 0.22 880 10,120 104 1,191 1,480 17,025 1.554 3,289 183 387 2.614 5,533 I-5: Los Angeles 36.65 -5: Los Angeles Urban 806 99 1,137 1,447 16,637 1,424 3,014 5,407 36.43 0.21 9.274 370 36.22 85 150 317 762 8 758 975 1 170 1 345 2 846 -5: Los Angeles Urban 35.94 36.22 0.28 13 451 2.066 4 37 I-5: Los Angeles Urban 29.16 6.78 19,526 224,554 2,052 23,599 27,238 313,231 34,484 72,980 3,624 7,670 48,102 101,800 I-5: Los Angeles 0.91 2,985 34,325 312 3,590 4,129 5.27 11,156 55′ 1,167 7.29 15,43 Urban 29.16 5.47 18,188 241,637 2,092 27,800 29,497 391 886 32,120 78,532 3,695 9.035 52 09 127,363 I-5: Los Angeles Urban 22.78 28.25 1,663 191 2,541 2,696 35,821 7,178 4,762 11,642 I-5: Los Angeles Urban 22.28 22.78 0.5 22,088 2,936 338 826 Urhan 0.87 5.512 63 392 430 4 949 3 662 42 114 9 735 20 602 760 1.609 6 467 13.687 -5: Los Angeles 21 41 22 28 5.100 417 4.790 3.780 9.006 19.059 736 1.557 I-5: Los Angeles Urhan 20.58 21 41 0.83 58.644 43,469 6.675 14.12 Urban 3.37 17,254 198,426 1,450 16,671 13,648 156,951 30,471 64,488 2,560 5,418 24,102 51,009 I-5: Los Angeles 17.21 20.58 Urban 0.31 1.176 13.518 83 956 1.717 19,750 2.07 4.394 147 31 3.033 6.419 I-5: Los Angeles 17.21 2.74 Urban 14 16 10.522 796 9.149 17,179 197,556 18.58 39,324 1,405 2,973 30,338 -5: Los Angeles 16.9 120,998 64.20 Urban 13.78 14.16 0.38 1,532 17,620 109 1,249 2,250 25,880 2,706 5,726 192 406 3,974 8,41 5: Los Angeles CA 710: Los Angeles 98,976 560,864 7,623 43,196 63,516 359,925 174,79 13,462 14,039 116,970 Suburban 10.31 182,281 112,17 12.97 23.28 CA 710: Los Angeles Suburban 10.18 2.97 2.79 23,436 143.964 1.540 9.461 9.397 57,722 41.38 46.788 2,72 3.07 16.594 18.760

CA 710: LA

TOTAL

Suburban

4.96

10.18

5.22

37,584

1,281,653

212,976

5.586.341

2,456

263,550

13,917

912,542

14,770

1,088,269

83.697

5.221.226

66.37

2,263,413

69.217

1.815.561

4,33

465,431

4,523

296,576

26.084

1.921.894

27,20

1.696.89

TABLE M2e, TRAVEL TIME COST - CONVENTIONAL LANES WITH ADDED LANE - BASE VOLUME

| TABLE M2e. TRAVEL TIME COST - CONVENTIONAL LANES WITH | | | | | | | INI-Lui- Of Deel I | Period Vehicle-Hours of | Daytime Off-Peak Per | | | | Travel Time | 04- (6) | | |
|---|----------------|----------------|-----------------|----------------|--------------------|--------------------|--------------------|-------------------------|----------------------|--------------------|------------------|------------------|------------------|----------------|------------------|----------------|
| County | City/Suburban/ | Pos | st Mile of Segm | nent | | ne Direction | | ne Direction | Travel. One | | Pe | ak | Nighttime C | | Davtime (| Off-Peak |
| | Rural | Begin | End | Length (mi) | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 321.2 | 1,297.2 | 29.4 | 118.8 | 261.2 | 1,054.9 | 9,082 | 11,877 | 832 | 1,088 | 7,386 | 9,65 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 189.5 | 1,393.9 | 15.2 | 111.7 | 111.2 | 817.6 | 5,358 | 12,762 | 429 | 1,023 | 3,143 | 7,48 |
| I-5: Sacramento | Urban | 26.69 | 26.94 26.69 | 0.25 | 13.2 | 121.6 | 1.1 | 9.7 | 7.8 | 71.3 813.1 | 374 | 1,113 | 30 | 89 | 219 | 65 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 25.53 24.51 | 25.53 | 1.16 | 58.8 40.2 | 357.8 369.6 | 9.6 6.4 | 58.5 58.6 | 133.6 87.4 | 813.1 803.7 | 1,663 1,137 | 3,276 3,384 | 272 180 | 536 537 | 3,779 2.472 | 7,44 7,35 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 60.1 | 491.4 | 10.7 | 87.9 | 154.8 | 1.266.5 | 1,698 | 4,499 | 304 | 804 | 4,377 | 11,59 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 50.8 | 373.8 | 8.6 | 63.5 | 122.0 | 897.7 | 1,437 | 3,422 | 244 | 582 | 3,451 | 8,21 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 143.1 | 799.3 | 24.6 | 137.4 | 349.1 | 1,949.7 | 4,047 | 7,318 | 696 | 1,258 | 9,872 | 17,85 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 15.4 | 86.1 | 2.9 | 15.9 | 41.7 | 232.9 | 436 | 789 | 81 | 146 | 1,179 | 2,13 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 89.0 | 497.2 | 14.1 | 78.9 | 193.6 | 1,081.3 | 2,518 | 4,552 | 399 | 722 | 5,475 | 9,90 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 75.3 | 420.3 | 11.9 | 66.7 | 163.7 | 914.0 | 2,128 | 3,848 | 338 | 611 | 4,628 | 8,36 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 9.34 | 650.7 412.5 | 1,501.6 1.004.7 | 414.8 129.8 | 957.3 | 1,103.5 | 2,546.5 1.409.3 | 18,398 11.662 | 13,748 | 11,729 | 8,765 2.894 | 31,200 16.359 | 23,31 |
| I-5: San Joaquin I-5: San Joaquin | Rural | 40.45 28.56 | 49.79 40.45 | 11.89 | 1,093.9 | 2,817.0 | 88.2 | 316.1 227.1 | 578.6 1,005.7 | 2,589.9 | 30,929 | 9,199 25,791 | 3,669 2,494 | 2,894 | 28,435 | 12,90 23,71 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 23.8 | 68.4 | 1.9 | 5.5 | 21.8 | 62.9 | 672 | 626 | 2,494 | 50 | 618 | 57 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 424.8 | 1,222.9 | 47.4 | 136.5 | 377.4 | 1.086.4 | 12.011 | 11,196 | 1,341 | 1,250 | 10.670 | 9.94 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1,087.8 | 2,381.7 | 121.5 | 265.9 | 966.4 | 2,115.7 | 30,758 | 21,805 | 3,434 | 2,435 | 27,324 | 19,37 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 214.5 | 469.6 | 30.2 | 66.1 | 295.9 | 647.7 | 6,065 | 4,300 | 853 | 605 | 8,365 | 5,93 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 97.2 | 212.8 | 15.9 | 34.7 | 81.3 | 178.0 | 2,748 | 1,948 | 449 | 318 | 2,299 | 1,63 |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 184.1 | 403.0 | 49.3 | 107.9 | 380.2 | 832.5 | 5,205 | 3,690 | 1,393 | 988 | 10,751 | 7,62 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 32.45 | 628.5 | 1,243.3 | 244.6 439.5 | 483.8 827.7 | 698.2 | 1,381.1 | 17,772 31.929 | 11,383 19,471 | 6,916 12,426 | 4,430 7.578 | 19,741 35,468 | 12,64 21,62 |
| I-5: Merced I-5: Fresno | Rural Rural | 0 | 32.45 66.16 | 32.45 66.16 | 1,129.3 2.977.2 | 2,126.7 5,343.7 | 439.5 1.074.9 | 1,929.2 | 1,254.4 1,902.3 | 2,362.4 3.414.4 | 31,929 84,179 | 19,471 48,924 | 12,426 30.391 | 17,578 | 35,468 53,787 | 21,62 31,26 |
| I-5: Kings | Rural | o o | 26.72 | 26.72 | 1,202.4 | 2.158.2 | 416.4 | 747.4 | 786.0 | 1,410.7 | 33,997 | 19,759 | 11,774 | 6.843 | 22,223 | 12,91 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 3,508.7 | 6,607.9 | 713.3 | 1,343.4 | 2,795.3 | 5,264.4 | 99,206 | 60,498 | 20,169 | 12,300 | 79,036 | 48,19 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 65.5 | 129.6 | 14.3 | 28.4 | 51.2 | 101.2 | 1,853 | 1,187 | 406 | 260 | 1,447 | 92 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 476.8 | 943.1 | 87.0 | 172.1 | 230.9 | 456.6 | 13,481 | 8,634 | 2,460 | 1,576 | 6,527 | 4,18 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 107.9 | 213.3 | 19.7 | 38.9 | 52.2 | 103.3 | 3,050 | 1,953 | 556 | 356 | 1,477 | 94 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 241.9 | 434.2 | 44.1 | 79.2 | 117.1 | 210.2 | 6,840 | 3,975 | 1,248 | 725 | 3,312 | 1,92 |
| I-5: Kern I-5: Kern | Rural Rural | 6.41 5.36 | 7.04 6.41 | 0.63 1.05 | 63.5 105.8 | 125.6 209.4 | 11.6 19.3 | 22.9 38.2 | 30.7 51.2 | 60.8 101.4 | 1,796 2,993 | 1,150 1,917 | 328 546 | 210 350 | 869 1,449 | 55 92 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 481.8 | 953.1 | 87.9 | 173.9 | 233.3 | 461.5 | 13.623 | 8,726 | 2,486 | 1.592 | 6,596 | 4.22 |
| I-5: Kern | Rural | 0.50 | 0.58 | 0.58 | 58.5 | 115.6 | 10.7 | 21.1 | 28.3 | 56.0 | 1,653 | 1,059 | 302 | 193 | 800 | 51 |
| I-5: Los Angeles | Rural | 84.76 | 88.61 | 3.85 | 436.6 | 908.0 | 73.8 | 153.5 | 217.2 | 451.8 | 12,344 | 8,313 | 2,087 | 1,405 | 6,143 | 4,13 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 717.8 | 1,492.9 | 121.4 | 252.4 | 357.2 | 742.9 | 20,296 | 13,668 | 3,431 | 2,311 | 10,099 | 6,80 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 663.8 | 2,326.0 | 112.2 | 393.2 | 330.3 | 1,157.4 | 18,768 | 21,296 | 3,173 | 3,600 | 9,339 | 10,59 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 123.7 | 405.6 | 20.9 | 68.6 | 61.5 | 201.8 | 3,497 | 3,714 | 591 | 628 | 1,740 | 1,84 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 65.43 59.95 | 68.1 65.43 | 2.67 5.48 | 201.9 414.3 | 707.3 1,451.8 | 34.1 70.0 | 119.6 245.4 | 100.4 206.2 | 352.0 722.4 | 5,707 11,714 | 6,476 13,292 | 965 1,980 | 1,095 2,247 | 2,840 5,829 | 3,22 6,61 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 370.6 | 1,496.5 | 45.1 | 182.0 | 325.5 | 1,314.5 | 10,477 | 13,701 | 1,274 | 1,667 | 9,203 | 12,03 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 119.0 | 823.5 | 14.5 | 100.2 | 104.5 | 723.3 | 3,363 | 7,540 | 409 | 917 | 2,954 | 6,62 |
| I-5: Los Angeles | Urban | 46.9 | 52.33 | 5.43 | 560.4 | 4,584.9 | 57.6 | 471.4 | 359.4 | 2,940.6 | 15,844 | 41,977 | 1,629 | 4,316 | 10,162 | 26,92 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 28.8 | 265.1 | 2.9 | 26.9 | 17.9 | 164.7 | 815 | 2,427 | 83 | 246 | 507 | 1,50 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 71.6 | 585.5 | 7.3 | 59.5 | 44.5 | 363.7 | 2,023 | 5,360 | 205 | 544 | 1,257 | 3,33 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 79.8 | 733.3 | 8.8 | 81.0 | 60.8 | 559.0 | 2,256 | 6,714 | 249 | 741 | 1,719 | 5,11 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 44.01 43.9 | 45.1 44.01 | 1.09 0.11 | 119.0 9.0 | 973.9 93.8 | 14.8 1.3 | 120.9 14.0 | 116.9 9.9 | 956.4 103.7 | 3,365 254 | 8,916 859 | 418 38 | 1,107 128 | 3,305 281 | 8,75 95 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 209.8 | 2,192.9 | 29.3 | 305.8 | 202.6 | 2.118.0 | 5.931 | 20.078 | 827 | 2.800 | 5,728 | 19,39 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 44.0 | 404.9 | 13.7 | 125.6 | 222.4 | 2,044.1 | 1,245 | 3,707 | 386 | 1,150 | 6,288 | 18,71 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 15.9 | 146.1 | 2.6 | 24.1 | 35.3 | 324.4 | 449 | 1,338 | 74 | 221 | 998 | 2,97 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 14.4 | 150.5 | 2.5 | 25.7 | 33.5 | 350.7 | 407 | 1,378 | 70 | 235 | 948 | 3,21 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 221.1 | 2,311.9 | 24.6 | 257.3 | 339.6 | 3,550.5 | 6,252 | 21,166 | 696 | 2,355 | 9,602 | 32,50 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 17.6 | 184.0 | 2.1 | 21.7 | 29.6 | 309.5 | 498 | 1,685 | 59 56 | 198 | 837 | 2,83 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 36.22 35.94 | 36.43 36.22 | 0.21 0.28 | 16.1 15.2 | 175.0 159.2 | 2.0 | 20.7 17.7 | 28.9 23.4 | 302.5 244.6 | 456 431 | 1,602 1,458 | 56 48 | 189 162 | 818 661 | 2,77 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 390.5 | 4,082.8 | 41.0 | 429.1 | 544.8 | 5,695.1 | 11,042 | 37,380 | 1,160 | 3,928 | 15,402 | 52,14 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 59.7 | 624.1 | 6.2 | 65.3 | 82.6 | 863.3 | 1,688 | 5,714 | 177 | 598 | 2,335 | 7,90 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 363.8 | 4,393.4 | 41.8 | 505.5 | 589.9 | 7,125.2 | 10,285 | 40,224 | 1,183 | 4,628 | 16,680 | 65,23 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 33.3 | 401.6 | 3.8 | 46.2 | 53.9 | 651.3 | 940 | 3,677 | 108 | 423 | 1,525 | 5,96 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 110.2 | 1,152.6 | 8.6 | 90.0 | 73.2 | 765.7 | 3,117 | 10,552 | 243 | 824 | 2,071 | 7,01 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 102.0 | 1,106.5 | 8.3 | 87.1 | 75.6 | 790.3 | 2,884 | 10,131 | 236 | 797 | 2,138 | 7,23 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 17.21 16.9 | 20.58 17.21 | 3.37 0.31 | 345.1 23.5 | 3,607.7 245.8 | 29.0 1.7 | 303.1 17.4 | 273.0 34.3 | 2,853.7 359.1 | 9,757 665 | 33,031 2,250 | 820 47 | 2,775 159 | 7,718 971 | 26,12 3,28 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 23.5 | 245.8 | 1.7 | 17.4 | 34.3 | 359.1 3.591.9 | 5,950 | 2,250 | 47 | 1.523 | 9,714 | 3,28 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 30.6 | 320.4 | 2.2 | 22.7 | 45.0 | 470.5 | 866 | 2,933 | 430 | 208 | 1,273 | 4.30 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 1,979.5 | 8,628.7 | 152.5 | 785.4 | 1,270.3 | 5,537.3 | 55,970 | 79,000 | 4,311 | 7,191 | 35,918 | 50,69 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 468.7 | 2,214.8 | 30.8 | 172.0 | 187.9 | 888.0 | 13,253 | 20,278 | 871 | 1,575 | 5,314 | 8,13 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 751.7 | 3,276.6 | 49.1 | 253.0 | 295.4 | 1,287.6 | 21,253 | 29,999 | 1,389 | 2,317 | 8,352 | 11,78 |
| TOTAL | | | | | 25,633.1 | 91,721.3 | 5,271.0 | 14,861.6 | 21,765.4 | 87,633.6 | 724,759 | 839,757 | 149,034 | 136,066 | 615,403 | 802,33 |

TABLE M3. SUMMARY OF DAILY VEHICLE MILES FOR ADDED-CONVENTIONAL-LANE CONFIGURATION AT BASE VOLUMES

| Condition | Period of the Day | Daily Vel | nicle-Miles |
|------------------------------|--------------------|-----------|----------------|
| Condition | Fellod of the Day | Trucks | Other Vehicles |
| | Peak Period | 1,281,653 | 5,586,341 |
| Base Condition - Base Volume | Nighttime Off-Peak | 263,550 | 912,542 |
| | Daytime Off-Peak | 1,088,269 | 5,221,226 |
| TOTAL | | 2,633,471 | 11,720,109 |
| | • | • | • |
| Conventional Lanes including | Peak Period | 1,281,653 | 5,586,341 |
| added lane | Nighttime Off-Peak | 263,550 | 912,542 |
| | Daytime Off-Peak | 1,088,269 | 5,221,226 |
| TOTAL | | 2,633,471 | 11,720,109 |

TABLE M4. SUMMARY OF DAILY VEHICLE HOURS FOR ADDED-CONVENTIONAL-LANE CONFIGURATION AT BASE VOLUMES

| Condition | Period of the Day | Daily Vel | nicle-Hours |
|------------------------------|--------------------|-----------|----------------|
| Condition | Period of the Day | Trucks | Other Vehicles |
| | Peak Period | 25,633 | 95,243 |
| Base Condition - Base Volume | Nighttime Off-Peak | 5,271 | 14,675 |
| | Daytime Off-Peak | 21,765 | 87,711 |
| TOTAL | | 52,669 | 197,630 |
| | | | |
| Conventional Lanes including | Peak Period | 25,633 | 91,721 |
| added lane | Nighttime Off-Peak | 5,271 | 14,862 |
| auded latte | Daytime Off-Peak | 21,765 | 87,634 |
| TOTAL | | 52,669 | 194,217 |

TABLE M5. NON-AUTOMATED TRUCK VEHICLE OPERATIONS COSTS PER MILE

| | Non-Au | tomated |
|--|------------------------|-----------------------|
| Cost Category | Unit Cost (1998 \$ per | 2001-Equiv. Unit Cost |
| | mile) | (\$ per mile) |
| Driver Wages & Benefits | 0.39 | 0.41 |
| Other Wages and Benefits | 0.40 | 0.42 |
| Tires | 0.02 | 0.02 |
| Outside Maintenance | 0.05 | 0.05 |
| Fuel | 0.10 | 0.11 |
| Equipment Rents and Purchased Transportation | 0.40 | 0.42 |
| Insurance | 0.05 | 0.05 |
| Depreciation | 0.09 | 0.09 |
| Misc. | 0.18 | 0.19 |
| TOTAL | 1.68 | 1.77 |

TABLE M6. VEHICLE OPERATING COSTS (ADDED-CONVENTIONAL-LANE CONFIGURATION AND BASE VOLUME/CONDITION CONFIGURATION)

| TABLE MO. VERMOLE OF ENAMED GOOTS (ASSESSED GOAR | | 7 11 1 L C C C C C C C C C C C C C C C C | HORY MAD BAR | - 10E0IIIE, 00I | DITION COM 100 | 0111011 | | | |
|--|-----------|--|--------------|-----------------|----------------|----------------|---------------|----------------|---------------|
| Condition | Daily Ve | hicle-Miles | Unit Cos | t - 2001(\$) | Total Cost | per Day (\$) | EUA | C (\$) | EUATC (\$) |
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 2,633,471 | 11,720,109 | 1.77 | 0.325 | 4,650,739 | 3,809,035 | 1,697,519,582 | 1,390,297,906 | 3,087,817,488 |
| Conventional Lanes including added lane | 2,633,471 | 11,720,109 | 1.77 | 0.325 | 4,650,739 | 3,809,035 | 1,697,519,582 | 1,390,297,906 | 3,087,817,488 |

TABLE M7. TRAVEL TIME COSTS (ADDED-CONVENTIONAL-LANE CONFIGURATION AND BASE VOLUME/CONDITION CONFIGURATION)

| Condition | Daily Ve | hicle-Hours | Unit Cost | : - 2001(\$) | Total Cost | per Day (\$) | EUA | C (\$) | EUATC (\$) |
|---|----------|----------------|-----------|----------------|------------|----------------|-------------|----------------|---------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 52,669 | 197,630 | 28.27 | 9.16 | 1,489,196 | 1,809,401 | 543,556,672 | 660,431,429 | 1,203,988,101 |
| Conventional Lanes including added lane | 52,669 | 194,217 | 28.27 | 9.16 | 1,489,196 | 1,778,154 | 543,556,672 | 649,026,049 | 1,192,582,721 |

APPENDIX N

OVERVIEW OF TRANSFER TERMINAL DESIGN AND OPERATION

Author: Professor Randolph Hall, University of Southern California

Introduction

The information in this appendix was authored by Professor Randolph Hall of the University of Southern California.

OVERVIEW OF TRANSFER TERMINAL

The transfer terminal is designed to enable trailers to move between automated lanes and the manual roadway system. The underlying concept is that shuttle drivers transfer trailers to and from automated highway entrances/exits over relatively short distances. Automated lanes are used to move trailers over longer distances, between cities.

The tractors driven by shuttle drivers do not need to be automated. Thus, the number of tractors that need to be equipped for automation is limited to those traveling within and between terminals. However, a trucking fleet may elect to purchase automated tractors for their shuttle drivers, which can simplify the transfer process to some degree. However, an operational drawback can be increased waiting time for drivers at terminals, as they may not have the option of returning empty.

The following sections describe the processes followed by tractors as trailers are transferred, terminal functions and driver functions. Conceptual diagrams are also provided for the transfer terminal

Processes for Moving Trailers To, From and Within Transfer Terminal

Process Steps: Shuttle Driver

| Check-in | RFID verifies vehicle a | rrival, checks DB for authorization. |
|----------|-------------------------|--------------------------------------|
| | | |

Instruction sent to driver on drop-off location if applicable. Instruction sent to driver on pick-up location, if applicable.

Drop-off Driver positions trailer(s) in specified drop-off location.

Tractor is detached from trailer and leaves

Pick-up If applicable, driver is routed to storage location in yard for

trailer(s) pick-up. Tractor is attached to trailer(s) and leaves pick-up area. In some cases driver is first sent to tractor storage area to await arrival of inbound trailer(s).

Check-out RFID verifies that tractor is authorized to remove trailers.

Departure is recorded in DB, and driver leaves terminal.

Process Steps: Yard Driver Inbound

Assignment Driver is assigned task of retrieving specified automated

tractor/trailer combination from inbound area, and transferring trailer(s) to specified storage location(s) to await pick-up. Assignment is made via hand-held RF

device.

Positioning Driver walks to tractor/trailer(s), then drives

tractor/trailer(s) to storage location(s), and detaches trailer(s). Driver is then assigned to retrieve an outbound trailer, to drive to tractor storage area and wait, or to drive to tractor storage area and walk to next assignment.

Process Steps: Yard Driver Outbound Trailers

Assignment Driver is assigned task of attaching retrieving trailer(s)

from drop-off area to a specified tractor, and to position tractor/trailer combination for departure. Assignment is

made via hand-held RF device.

Positioning Driver retrieves specified tractor (may already be in tractor

at time of assignment) then drives to trailer(s) location. Trailer(s) attached to tractor, then drives trailer/tractor combination to departure lane. Driver steps out of vehicle, then checks hand-held device for next assignment, which may be to retrieve an inbound trailer/tractor, to walk to driver waiting area, or to walk to tractor storage area.

Process Steps: Linehaul Driver

Check-in RFID verifies platoon arrival, checks DB for authorization.

Driver readiness to assume manual control is verified, and control is transferred to driver. Driver is instructed to park

platoon in specified location within inbound area.

Drop-off Driver steps out of vehicle, and walks to driver waiting area

for break. After break, driver checks hand-held RF device for next assignment, which could be immediate. Otherwise

driver waits to be alerted for next assignment

Pick-up Upon assignment, driver walks to lead vehicle in platoon

and verifies operability of vehicle. Vehicle next verifies that driver is authorized to drive platoon, and verifies driver readiness. Driver engages vehicle and drives platoon to

check-out area.

Check-out Vehicle is checked to verify that it is authorized and ready

to enter automated highway, and that automated highway has suitable gap to accept platoon. Upon authorization, automation is engaged, and platoon enters highway.

Process Steps: Same Tractor for Shuttle and Linehaul

Check-in RFID verifies vehicle arrival, checks DB for authorization.

Instruction sent to driver on drop-off location within

outbound area.

Pickup: If shuttle driver will also be platoon driver, driver remains

in tractor and awaits platoon departure. Otherwise driver exits vehicle, and receives instruction to either: (a) wait for inbound arrival, or (b) walk to storage area to retrieve

tractor/trailer combination for return.

Check-out RFID verifies that tractor and trailers are authorized for

departure.

TERMINAL FUNCTIONS

Manual Check-In: Verify that manual vehicles are authorized for entering terminal, and communicate instructions to drivers.

Drop-off: Detach trailers from manual tractors to await transfer to automated tractors.

Trailer Storage: Store inbound trailers from automated highway to await pick-up by shuttle drivers using manually operated tractors.

Manual Check-Out: Verify that shuttle driver is authorized to remove trailers.

Outbound: Combine tractor/trailer combinations into platoons, and prepare for entry to automated highway.

Inbound: Separate tractor/trailer combinations from platoons, and prepare for trailer storage.

Tractor Storage: Provide a buffer for storage of tractors. When inbound volume exceeds outbound volume, tractors will accumulate in buffer, and some drivers will drop off tractors and walk back to inbound area to retrieve trailers. When outbound volume exceeds inbound volume, number of tractors will decline in buffer, and some drivers will walk from outbound area to tractor storage to retrieve tractors for outbound platoons. When total volume is light, some drivers will wait in tractor storage area for next assignment.

Driver Waiting: Break area for drivers, elevated above the inbound and outbound areas. Some drivers will wait for assignment during periods of light volume.

Automated Check-Out: Verification the driver and platoon are ready to enter automated highway.

Automated Check-Out: Verification that driver and platoon are ready to assume manual control.

DRIVER FUNCTIONS

Shuttle Driver: Manually operates tractors within metropolitan areas, to pick-up and deliver trailers to/from transfer terminal. Round-trip journeys would vary from about 30 minutes to 4 hours.

Yard Driver: Transfers trailers and automated tractors within terminal, while driving tractors in automated mode.

Linehaul Driver: Operates lead tractor in platoon while on automated highway, and while entering and exiting automated highway.

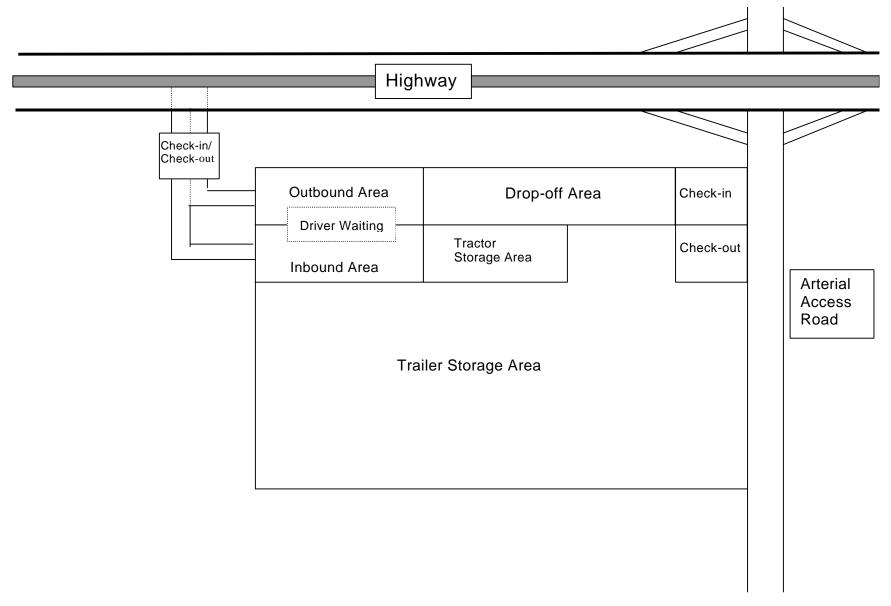


Figure 1. Conceptual Layout for Transfer Terminal

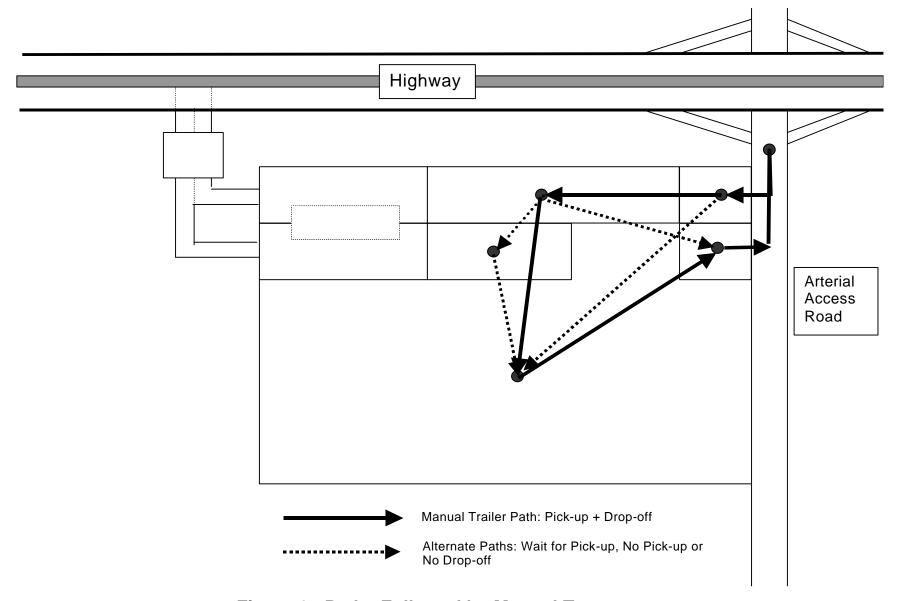


Figure 2. Paths Followed by Manual Tractors

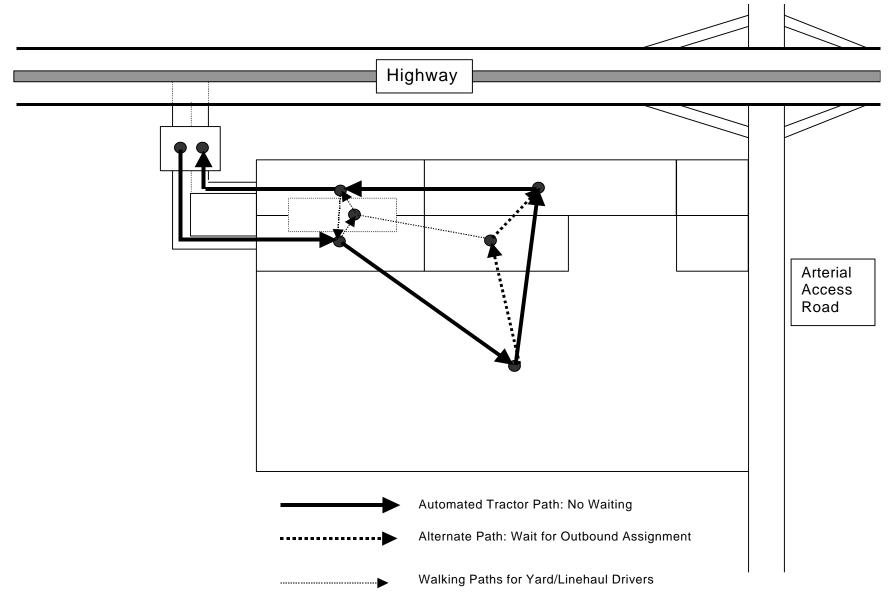


Figure 3. Paths Followed by Automated Tractors

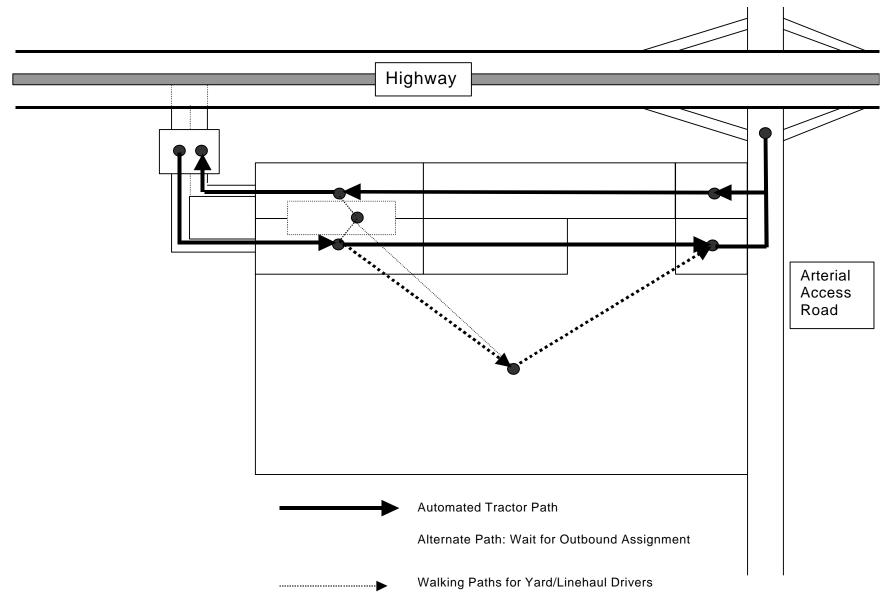


Figure 4. Vehicle Path When Shuttle Tractor is Capable of Automation

APPENDIX O

AHS PLANNING, DESIGN, CONSTRUCTION, REHABILITATION, AND MAINTENANCE COSTS

Methodologies

Costs for incremental planning, design, construction, and rehabilitation of the added AHS lane (having a 48-foot cross section) to the existing freeway configuration were calculated on a segment-by-segment basis, in a similar fashion to those for the added conventional freeway lane. The incremental cost is the cost of building and maintaining the AHS above the no-build option.

The costs for the AHS transfer terminals were allocated to the physical sections with which they are associated geographically.

Calculation methodologies for the costs in the tables presented here are outlined in the main report.

Results

Table O1 shows costs associated with planning, design, and construction of the AHS roadway area, barriers, as well as the magnetic strips used for automation. Table O2 shows costs associated with rehabilitation of the AHS roadway area.

In addition, Table O3 (also Table 10.2 in the main report) shows costs for AHS interchange construction, and Table O4 (also Table 10.3 in the main report) shows transfer terminal construction costs. Rehabilitation costs for AHS interchanges and terminals are shown in Tables O5 and O6 (also Tables 10.4 and 10.5 in the main report), respectively. Table O7 (also Table 10.6 in the main report) summarizes maintenance costs for the travel lanes, interchanges, and staging areas.

| TABLE 01. INCREMEN | NTAL CONSTR | | | | Conventional | | C STRIPS AI | | eeway Costs (\$) | Magr | netic Strip Costs (\$ | 5) | | Barrier C | Costs (\$) | T | Total Constru | ction Costs (\$) |
|--------------------------------------|----------------|----------------|----------------|----------------|------------------|--------------------------|--------------------------|------------------------------------|---------------------------------|--------------------|----------------------------|-------------------------|------------------|------------------|------------------------------|----------------------------|------------------------------------|----------------------------------|
| County | City/Suburban/ | | file of Segn | | Freeway Lanes | AHS Lane Placement | 2001-Unit | Total Cost | EUAC | 2001-Unit Cost per | Total Cost | EUAC | # of Barriers in | 2001-Unit Cost | Total Cost | EUAC | Total Cost | EUATC |
| | Rural | Begin | End | Length (mi) | in One Direction | | Cost | | | Lane Mile | | | One Direction | per Lane-Mile | | | | |
| I-5: Sacramento | Rural Urban | 29.87 26.94 | 34.65 29.87 | 4.78 2.93 | 3 | Median Median | 4,181,019 6.394.500 | 19,985,272 18,735,885 | 1,451,908 1,361,142 | 5,000 5,000 | 23,900 14.650 | 1,736 1,064 | 1.5 1.5 | 94,776 94,776 | 679,544 416.541 | 49,368 30,261 | 20,688,716 19,167,076 | 1,503,013 1,392,46 |
| I-5: Sacramento | Urban | 26.69 | | 0.25 | | Non-Median | 23,979,375 | 5.994.844 | 435.519 | 5,000 | 1,250 | 91 | 2.0 | 94,776 | 47.388 | | 6.043.482 | 439,052 |
| I-5: Sacramento | Urban | 25.53 | | 1.16 | | Non-Median | 23,979,375 | 27,816,075 | 2,020,808 | 5,000 | 5,800 | 421 | 2.0 | 94,776 | 219,880 | 15,974 | 28,041,755 | 2,037,203 |
| I-5: Sacramento | Urban | 24.51 | | 1.02 | | Non-Median | | 24,458,963 | 1,776,917 | 5,000 | 5,100 | 371 | 2.0 | 94,776 | 193,343 | 14,046 | 24,657,406 | 1,791,334 |
| I-5: Sacramento | Urban Urban | 23.1 | 24.51 | 1.41 | 5 | Non-Median Non-Median | 23,979,375 | 33,810,919 26,377,313 | 2,456,326 1,916,283 | 5,000 5,000 | 7,050 5,500 | 512 400 | 2.0 | 94,776 94,776 | 267,268 208,507 | 19,417 15,148 | 34,085,237 26,591,320 | 2,476,255 1,931,830 |
| I-5: Sacramento | Urban | 19.16 | | 2.84 | Ū | Non-Median | 23,979,375 | 26,377,313 68.101.425 | 1,916,283 4,947,494 | 5,000 | 5,500 14,200 | 1.032 | 2.0 | 94,776 | 538,328 | 15,148 | 26,591,320 68.653.953 | 1,931,830 |
| I-5: Sacramento | Urban | 18.82 | | 0.34 | | Non-Median | 23,979,375 | 8,152,988 | 592,306 | 5,000 | 1,700 | 124 | 2.0 | 94,776 | 64,448 | 4,682 | 8,219,135 | 597.111 |
| I-5: Sacramento | Urban | 16.7 | | 2.12 | 4 | Non-Median | 23,979,375 | 50,836,275 | 3,693,200 | 5,000 | 10,600 | 770 | 2.0 | 94,776 | 401,850 | | 51,248,725 | 3,723,164 |
| I-5: Sacramento | Urban | 14.46 | | 2.24 | 3 | Median | 6,394,500 | 14,323,680 | 1,040,600 | 5,000 | 11,200 | 814 | 1.5 | 94,776 | 318,447 | | 14,653,327 | 1,064,548 |
| I-5: Sacramento I-5: San Joaquin | Rural Rural | 0 40.45 | | 14.46 9.34 | 2 | Median Median | 4,181,019 4,181,019 | 60,457,538 39,050,720 | 4,392,174 2,836,992 | 5,000 5,000 | 72,300 46,700 | 5,253 3,393 | 1.5 1.5 | 94,776 94,776 | 2,055,691 1,327,812 | 149,344 96,464 | 62,585,530 40,425,231 | 4,546,771 2,936,849 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 3 | Median | 4,181,019 | 49.712.319 | 3,611,546 | 5,000 | 59,450 | 4,319 | 1.5 | 94,776 | 1,690,330 | 122.801 | 51,462,099 | 3,738,665 |
| I-5: San Joaquin | Urban | 28.34 | | 0.22 | 3 | Non-Median | 6,968,365 | 1,533,040 | 111,374 | 5,000 | 1,100 | 80 | 2.0 | 94,776 | 41,701 | 3,030 | 1,575,842 | 114,483 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 4 | Non-Median | 23,979,375 | 84,886,988 | 6,166,947 | 5,000 | 17,700 | 1,286 | 2.0 | 94,776 | 671,014 | | 85,575,702 | 6,216,982 |
| I-5: San Joaquin | Rural Rural | 14.34 | 24.8 14.34 | 10.46 1.65 | 3 5 | Median Median | 4,181,019 4,181,019 | 43,733,461 6.898.682 | 3,177,188 | 5,000 | 52,300 | 3,800 599 | 1.5 | 94,776 | 1,487,035 | 108,032 | 45,272,797 | 3,289,019 |
| I-5: San Joaquin I-5: San Joaquin | Rural | 11.8 | | 0.89 | 3 | Median | 4,181,019 | 3,721,107 | 501,182 270,334 | 5,000 5,000 | 8,250 4,450 | 323 | 1.5 1.5 | 94,776 94,776 | 234,571 126,526 | 17,041 9,192 | 7,141,502 3,852,083 | 518,822 279,850 |
| I-5: San Joaquin | Rural | 0 | | 11.8 | 2 | Median | 4,181,019 | 49,336,027 | 3,584,209 | 5,000 | 59,000 | 4,286 | 1.5 | 94,776 | 1,677,535 | | 51,072,562 | 3,710,366 |
| I-5: Stanislaus | Rural | 0 | | 28.06 | 2 | Median | 4,181,019 | 117,319,400 | 8,523,127 | 5,000 | 140,300 | 10,193 | 1.5 | 94,776 | 3,989,122 | 289,805 | 121,448,821 | 8,823,125 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 2 | Median | 4,181,019 | 135,674,074 | 9,856,574 | 5,000 | 162,250 | 11,787 | 1.5 | 94,776 | 4,613,222 | 335,146 | 140,449,546 | 10,203,507 |
| I-5: Fresno I-5: Kings | Rural Rural | 0 | | 66.16 26.72 | 2 | Median Median | 4,181,019 4,181,019 | 276,616,232 111,716,834 | 20,095,868 8,116,106 | 5,000 5,000 | 330,800 133,600 | 24,032 9.706 | 1.5 1.5 | 94,776 94,776 | 9,405,570 3,798,622 | 683,304 275,966 | 286,352,603 115,649,056 | 20,803,205 8,401,778 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 2 | Median | 4,181,019 | 297,563,139 | 21,617,638 | 5,000 | 355,850 | 25,852 | 1.5 | 94,776 | 10,117,812 | | 308,036,801 | 22,378,538 |
| I-5: Kern | Rural | 15.08 | | 0.78 | 4 | Median | 4,181,019 | 3,261,195 | 236,922 | 5,000 | 3,900 | 283 | 1.5 | 94,776 | 110,888 | 8,056 | 3,375,983 | 245,261 |
| I-5: Kern | Rural | 10.35 | | 4.73 | 4 | Non-Median | 6,968,365 | 32,960,368 | 2,394,535 | 5,000 | 23,650 | 1,718 | 2.0 | 94,776 | 896,581 | 65,136 | 33,880,599 | 2,461,389 |
| I-5: Kern | Rural | 9.28 7.04 | 10.35 9.28 | 1.07 2.24 | 4 | Median Non-Median | 4,181,019 6,968,365 | 4,473,691 15,609,138 | 325,009 1.133.987 | 5,000 5,000 | 5,350 11,200 | 389 814 | 1.5 2.0 | 94,776 94,776 | 152,115 424,596 | 11,051 30,846 | 4,631,156 16,044,935 | 336,448 1,165,647 |
| I-5: Kern | Rural | 6.41 | | 0.63 | 4 | Median | 4.181.019 | 2.634.042 | 191.360 | 5,000 | 3,150 | 229 | 1.5 | 94,776 | 424,590 89.563 | 6.507 | 2,726,755 | 1,165,647 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 4 | Non-Median | 6,968,365 | 7,316,784 | 531,556 | 5,000 | 5,250 | 381 | 2.0 | 94,776 | 199,030 | 14,459 | 7,521,063 | 546,397 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 4 | Non-Median | 6,968,365 | 33,308,787 | 2,419,847 | 5,000 | 23,900 | 1,736 | 2.0 | 94,776 | 906,059 | 65,824 | 34,238,745 | 2,487,408 |
| I-5: Kern | Rural Rural | 0 86.67 | 0.58 88.61 | 0.58 1.94 | 4 | Non-Median Non-Median | 6,968,365 6,968,365 | 4,041,652 13,518,629 | 293,622 982,114 | 5,000 | 2,900 | 211 705 | 2.0 | 94,776 | 109,940 | | 4,154,492 | 301,819 |
| I-5: Los Angeles I-5: Los Angeles | Rural | 86.13 | | 0.54 | 4 | Non-Median | 6,968,365 | 3.762.917 | 273,372 | 5,000 5,000 | 9,700 2,700 | 196 | 2.0 | 94,776 94,776 | 367,731 102,358 | 26,715 7,436 | 13,896,060 3,867,975 | 1,009,534 281,004 |
| I-5: Los Angeles | Rural | 84.76 | | 1.37 | 4 | Non-Median | 6,968,365 | 9,546,661 | 693,554 | 5,000 | 6,850 | 498 | 2.0 | 94,776 | 259,686 | 18,866 | 9,813,197 | 712,918 |
| I-5: Los Angeles | Rural | 78.43 | | 6.33 | 4 | Median | 4,181,019 | 26,465,852 | 1,922,715 | 5,000 | 31,650 | 2,299 | 1.5 | 94,776 | 899,898 | 65,377 | 27,397,400 | 1,990,391 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 69.65 68.1 | 78.43 69.65 | 8.78 1.55 | 4 | Non-Median Median | 6,968,365 4,181,019 | 61,182,248 6.480.580 | 4,444,824 470,807 | 5,000 5,000 | 43,900 7,750 | 3,189 563 | 2.0 1.5 | 94,776 94,776 | 1,664,267 220,354 | 120,907 | 62,890,415 6,708,684 | 4,568,920 487,379 |
| I-5: Los Angeles | Rural | 65.43 | | 2.67 | 4 | Non-Median | 6,968,365 | 18,605,536 | 1,351,672 | 5,000 | 13,350 | 970 | 2.0 | 94,776 | 220,354 506.104 | 36,768 | 19,124,989 | 1,389,410 |
| I-5: Los Angeles | Rural | 59.95 | | 5.48 | 4 | Median | 4,181,019 | 22,911,985 | 1,664,531 | 5,000 | 27,400 | 1,991 | 1.5 | 94,776 | 779,059 | 56,598 | 23,718,444 | 1,723,119 |
| I-5: Los Angeles | Rural | 54.16 | | 5.79 | | Non-Median | 6,968,365 | 40,346,836 | 2,931,154 | 5,000 | 28,950 | 2,103 | 2.0 | 94,776 | 1,097,506 | 79,733 | 41,473,292 | 3,012,989 |
| I-5: Los Angeles | Rural | 52.33 | | 1.83 | | Non-Median | 6,968,365 | 12,752,109 | 926,427 | 5,000 | 9,150 | 665 | 2.0 | 94,776 | 346,880 | 25,200 | 13,108,139 | 952,292 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 47.13 46.9 | | 5.2 0.23 | | Non-Median Non-Median | 23,979,375 23,979,375 | 124,692,750 5,515,256 | 9,058,793 400,677 | 5,000 5,000 | 26,000 1,150 | 1,889 84 | 2.0 2.0 | 94,776 94,776 | 985,670 43,597 | 71,608 | 125,704,420 5,560,003 | 9,132,289 403,928 |
| I-5: Los Angeles | Urban | 46.6 | | 0.23 | | Non-Median | 23,979,375 | 7.193.812 | 522,623 | 5,000 | 1,500 | 109 | 2.0 | 94,776 | 56.866 | 4,131 | 7,252,178 | 526,863 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | | Non-Median | 23,979,375 | 16,066,181 | 1,167,191 | 5,000 | 3,350 | 243 | 2.0 | 94,776 | 127,000 | 9,226 | 16,196,531 | 1,176,660 |
| I-5: Los Angeles | Urban | 45.1 | | 0.83 | 5 | Non-Median | 23,979,375 | 19,902,881 | 1,445,923 | 5,000 | 4,150 | 301 | 2.0 | 94,776 | 157,328 | 11,430 | 20,064,359 | 1,457,654 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 44.01 43.9 | | 1.09 0.11 | 5 4 | Non-Median Non-Median | 23,979,375 | 26,137,519 2.637,731 | 1,898,862 191,628 | 5,000 5,000 | 5,450 550 | 396 40 | 2.0 | 94,776 94,776 | 206,612 20,851 | 15,010 1,515 | 26,349,580 2,659,132 | 1,914,268 193,183 |
| I-5: Los Angeles | Urban | 43.9 | | 2.3 | | Non-Median | | 55,152,562 | 4,006,774 | 5,000 | 11,500 | 835 | 2.0 | 94,776 | 435.970 | 31,673 | 55,600,032 | 4,039,282 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 3 | Non-Median | | 31,892,569 | 2,316,960 | 5,000 | 6,650 | 483 | 2.0 | 94,776 | 252,104 | 18,315 | 32,151,323 | 2,335,759 |
| I-5: Los Angeles | Urban | 39.81 | | 0.46 | | Non-Median | 23,979,375 | 11,030,513 | 801,355 | 5,000 | 2,300 | 167 | 2.0 | 94,776 | 87,194 | 6,335 | 11,120,006 | 807,856 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 39.36 36.65 | | 0.45 2.71 | 5 5 | Non-Median Non-Median | 23,979,375 | 10,790,719 64,984,106 | 783,934 4.721.025 | 5,000 5,000 | 2,250 13,550 | 163 984 | 2.0 | 94,776 94,776 | 85,298 513.686 | 6,197 37,319 | 10,878,267 65,511,342 | 790,294 4,759,328 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 36.43 | | 0.22 | 6 | Median | 6.394.500 | 1,406,790 | 4,721,025 102,202 | 5,000 | 13,550 | 984 | 1.5 | 94,776 | 513,686 31,276 | 2,272 | 1,439,166 | 4,759,328 |
| I-5: Los Angeles | Urban | 36.22 | | 0.21 | 4 | Median | 6,394,500 | 1,342,845 | 97,556 | 5,000 | 1,050 | 76 | 1.5 | 94,776 | 29,854 | 2,169 | 1,373,749 | 99,801 |
| I-5: Los Angeles | Urban | 35.94 | | 0.28 | | | 23,979,375 | 6,714,225 | 487,781 | 5,000 | 1,400 | 102 | 2.0 | 94,776 | 53,075 | 3,856 | 6,768,700 | 491,739 |
| I-5: Los Angeles | Urban | 29.16 | | 6.78 | | Non-Median | 23,979,375 | 162,580,163 | 11,811,272 | 5,000 | 33,900 | 2,463 | 2.0 | 94,776 | 1,285,163 | 93,366 | 163,899,225 | 11,907,100 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 28.25 22.78 | 29.16 28.25 | 0.91 5.47 | 4 5 | Non-Median Non-Median | 23,979,375 | 21,821,231 131,167,181 | 1,585,289 9,529,153 | 5,000 5.000 | 4,550 27,350 | 331 1,987 | 2.0 | 94,776 94,776 | 172,492 1,036,849 | 12,531 75,326 | 21,998,274 132,231,381 | 1,598,151 9,606,466 |
| I-5: Los Angeles | Urban | 22.78 | | 0.5 | 4 | Non-Median | 23,979,375 | 11,989,688 | 9,329,133 871,038 | 5,000 | 2,500 | 1,987 | 2.0 | 94,776 | 94,776 | 6,885 | 12,086,964 | 878,105 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 5 | Non-Median | 23,979,375 | 20,862,056 | 1,515,606 | 5,000 | 4,350 | 316 | 2.0 | 94,776 | 164,910 | 11,981 | 21,031,316 | 1,527,902 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 4 | Non-Median | 23,979,375 | 19,902,881 | 1,445,923 | 5,000 | 4,150 | 301 | 2.0 | 94,776 | 157,328 | 11,430 | 20,064,359 | 1,457,654 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 17.21 16.9 | 20.58 17.21 | 3.37 0.31 | 4 | Non-Median Median | 23,979,375 6,394,500 | 80,810,494 1,982,295 | 5,870,794 144,012 | 5,000 5,000 | 16,850 1,550 | 1,224 113 | 2.0 1.5 | 94,776 94,776 | 638,790 44,071 | 46,407 3,202 | 81,466,134 2.027,916 | 5,918,426 147,326 |
| I-5: Los Angeles | Urban | 14.16 | | 2.74 | 4 | Non-Median | 23,979,375 | 65,703,488 | 4,773,287 | 5,000 | 13,700 | 995 | 2.0 | 94,776 | 519.372 | 3,202 | 66,236,560 | 4.812.014 |
| I-5: Los Angeles | Urban | 13.78 | | 0.38 | 4 | Median | 6,394,500 | 2,429,910 | 176,530 | 5,000 | 1,900 | 138 | 1.5 | 94,776 | 54,022 | 3,925 | 2,485,832 | 180,593 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 4 | Non-Median | 15,473,870 | 159,535,602 | 11,590,088 | 5,000 | 51,550 | 3,745 | 2.0 | 94,776 | 1,954,281 | 141,976 | 161,541,433 | 11,735,809 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 4 | Non-Median | 15,473,870 | 43,172,098 | 3,136,406 | 5,000 | 13,950 | 1,013 | 2.0 | 94,776 | 528,850 | 38,420 | 43,714,898 | 3,175,840 |
| TOTAL | Suburban | 4.96 | 10.18 | 5.22 | 3 | Non-Median | 15,473,870 | 80,773,602 3,084,183,353 | 5,868,114 224,062,563 | 5,000 | 26,100 2,090,050 | 1,896 151.840 | 2.0 | 94,776 | 989,461 64,451,471 | 71,883 4,682,329 | 81,789,164 3,150,724,874 | 5,941,894 228,896,73 2 |
| IUIAL | | | | | | | | 3,084,183,353 | 224,062,563 | | ∠,090,050 | 151,840 | | | 04,451,471 | 4,682,329 | 3,130,724,874 | 228,896,73 |

TABLE 02. INCREMENTAL REHABILITATION COSTS OF AHS LANE FOR ROADWAY SPACE Total Rehabilitation Costs (\$) Lane Rehabilitation Costs (\$) Magnetic Strips Rehabilitation Costs (\$) City/Suburban/I Post Mile of Seament AHS Lane County 2001-Unit Cost pe Magnetic Strip Replacement Unit Cost Total Cost of Magnetic Strip Total Cost per EUATC Placement Total Cost **EUAC** EUAC per Lane Mile in One Direction Begin End Length (m Lane Mile Placement per 10-Year Cycle Rehabilitation Cycle I-5: Sacramento Rural 29.87 34.65 Median 181 1 866,02 54 74 889 92 56,26 I-5: Sacramento Urban 9.87 2.93 Median 399,65 1,170,99 74,029 5,000 14,650 926 1,185,643 74,955 5: Sacramento Urban 26.69 26.94 0.25 Non-Median 1.278.90 5.00 1,25 320.97 20.29 Urban 25.53 Non-Median 1,278,90 1.483.524 93,78 5,000 5,800 367 1,489,324 94,154 I-5: Sacramento 26 69 1 16 Urban 1.278.90 1.304.47 5.000 5.10 322 1.309.578 82.790 I-5: Sacramento 24.51 25.53 1.02 Non-Median 82.46 5.000 7.05 446 5: Sacramento Urhan 23.1 24 51 1 41 Non-Median 1 278 90 1 803 249 114 000 1 810 299 114 445 Non-Median I-5: Sacramento Urban 23.1 1.1 1,278,900 1,406,790 88,936 5,000 5,500 348 1,412,290 89,284 Urban 14,20 898 3,646,276 230.51 5: Sacramento 19.16 2.84 Non-Median 1 278 90 3.632.07 434,82 1,700 107 436,526 27,597 Urban 0.34 1.278.90 27.48 5.000 I-5: Sacramento 18.82 19 16 Non-Median Urban 1.278.90 2.711.268 171.404 5.000 10.60 670 2.721.868 172.074 I-5: Sacramento 16.7 18.82 2.12 Non-Median -5: Sacramento Urhan 14 46 16.7 2 24 Median 399 65 895 230 56 596 5 000 11 200 708 906 430 57 304 165,62 4 571 181 17 2.619.82 5,000 72,300 2,692,127 170,194 I-5: Sacramento Rural 14 46 14 46 Median I-5: San Joaquin Rural 49.79 Median 181,178 1,692,19 106,97 5,000 46,70 2,952 1,738,89 109,93 Rural I-5: San Joaquin 28.56 40.45 11.89 Median 181.17 2.154.20 136.18 5,000 59,450 3,758 2.213.65 139,945 I-5: San Joaquin Urban 28.34 Non-Median 1,278,90 281,358 5,000 1,10 282,458 17.85 28.56 0.22 Urban 1.278.90 4.527.306 5.000 17,700 1.119 4.545,006 286,212 287.331 I-5: San Joaquin 24.8 28.34 3.54 Non-Median -5: San Joaquin Rural 14 34 24 8 10 46 Median 181 178 1 895 117 119 80 5 000 52 30 3 306 1 947 41 123 114 I-5: San Joaquir Rural 12.69 14.34 1.65 Median 181.17 298.94 18 89 8.25 522 307.19 19.42 Rural 181,178 161,248 10,194 5,000 4,450 281 165,698 10,475 -5: San Joaquin 0.89 Median Rural 11.8 Median 181 17 2 137 89 135 15 5.000 59.00 3.73 2 196 89 138,886 I-5: San Joaquin Rural 28.06 28.06 Median 181,178 5,083,841 321.396 5.000 140,300 8,870 5.224.141 330.265 I-5: Stanislaus I-5: Merced Rural 32.45 32.45 Median 181 17 5 879 21 371 678 5 000 162 25 10 257 6 041 460 381 935 Rural 181.17 757.788 5.000 330,800 20.913 12.317.503 778.70 11.986.70 -5: Fresno 36 16 66 16 Median I-5: Kings Rural Median 181,178 4,841,06 306,047 5,000 133,60 8,446 4,974,663 314,493 26.72 26.72 5: Kern Rural Median 181,17 12,894,40 815.17 5,000 355,85 22,496 13.250.25 837,66 Rural 145,218 I-5: Kern 15.08 15.86 0.78 Median 181.17 141.31 8.934 5,000 3,90 247 9,181 Rural 7,934,138 -5: Kern Non-Median 1.672.40 7.910.488 500.094 5.000 1.495 501.589 10.35 15.08 4.73 23.65 I-5: Kern Rural 9 28 10.35 1.07 Median 181 17 193 860 12 256 5 000 5.35 338 199 210 12 594 I-5: Kern Rural 7.04 9.28 2.24 Non-Median 1,672,40 3.746.19 236,83 5,000 11,20 708 3,757,39 237,53 I-5: Kern Rural 6.41 7.04 0.63 Median 181,178 114.14 7.21 5,000 3,150 199 117,292 7,415 I-5: Kern Rural 5.36 6.41 1.05 Non-Median 1,672,40 1,756,028 111.014 5,000 5,25 332 1,761,278 111.346 I-5: Kern Rural).58 4.78 Non-Median 1,672,408 7,994,109 505.380 5.000 23,900 1,511 8,018,009 506.891 5.36 183 I-5: Kern Rural 0.58 0.58 Non-Median 1.672.408 969,996 61.322 5.000 2.900 972.896 61.506 Rural 86.67 Non-Median 1.672.40 3.244.47 205.11 5.000 9.700 613 3.254.171 205.726 I-5: Los Angeles 38.61 1.94 I-5: Los Angeles Rural 86.13 36.67 0.54 Non-Median 1,672,408 903,100 57,093 5,000 2,700 171 905,800 57,264 Rural 86 13 1.37 Non-Median 1,672,40 2,291,199 144 84 5,000 6.850 433 2,298,049 145,280 5: Los Angeles Rural 78.43 34.76 Median 1.146.85 72.50 5,000 31.6 2,00 1.178.50 74.50 6.33 Rural 78.43 1.672.40 14.683.740 43,90 2,775 14.727.640 931.067 I-5: Los Angeles 69.65 8.78 Non-Median 928,292 5,000 Rural Median 5 000 -5: Los Angeles 68 1 39 65 1 55 181 17 280 825 17 75: 7 75 490 288 57 18 243 I-5: Los Angeles Rural 65.43 SR 1 2 67 Non-Median 1,672,40 4.465.32 282,294 5,000 13.35 844 4,478,679 283,138 I-5: Los Angeles Rural 59 95 5 43 5 48 Median 181 17 992,85 62 76 5,000 27.40 1.732 1,020,25 64 499 Non-Median 613,995 5: Los Angeles Rural 54.16 5.79 1.672.40 9.683.24 612.16 5.000 1.83 9.712.19 I-5: Los Angeles Rural 52.33 54.16 1.83 Non-Median 1,672,40 3,060,506 193,482 9,150 578 3,069,656 194,061 I-5: Los Angeles Urban 47.13 52.33 Non-Median 1.278.90 6.650.280 420,424 5.000 26.00 1.644 6.676.280 422.068 I-5: Los Angeles Urhan 46.9 47 13 0.23 Non-Median 1 278 900 294 147 18 596 5 000 1 150 73 295 297 18 668 I-5: Los Angeles Urban 46.6 46.9 0.3 Non-Median 1,278,90 383,670 24,25 5,000 1,500 95 385,170 24,350 I-5: Los Angeles Urban 45.93 46.6 0.67 Non-Median 1,278,900 856,863 54.170 5,000 3,350 212 860,213 54,382 I-5: Los Angeles Urban 0.83 Non-Median 1,278,90 1,061,48 67,10 5,000 4,150 262 1,065,63 67,369 Urban 44.01 Non-Median 1,278,90 1.394.001 88.127 5.000 5,450 345 1,399,451 88.472 I-5: Los Angeles 45.1 1.09 1,278,90 550 Urban 43.9 44.01 0.11 Non-Median 140.679 5.000 35 141,229 I-5: Los Angeles 8.894 8.928 I-5: Los Angeles Urban 41.6 43.9 2.3 Non-Median 1,278,900 2.941.47 185,957 5,000 11,50 727 2,952,970 186.684 -5: Los Angeles Urban 40 27 41 6 1.33 Non-Median 1,278,90 1.700.93 107 533 5.000 6.65 420 1.707.58 107.952 Urban 39.81 40.27 0.46 Non-Median 1,278,90 588,294 37,19 5,000 2,300 145 590,594 37,337 5: Los Angeles 5: Los Angeles Urban 39.36 0.45 Non-Median 1,278,90 575,50 5,000 142 577.75 36,52 Urban 2 71 Non-Median 1,278,90 3,465,819 13,55 857 3,479,369 I-5: Los Angeles 36.65 39.36 219.10 5.000 219.96 -5: Los Angeles Urhan 36 43 36 65 Median 399 65 87 924 5 558 5 000 1 100 70 89 024 5 628 I-5: Los Angeles Urban 36.22 36.43 0.21 Median 399,650 83,928 5,306 5,000 1,050 66 84.978 5,372 I-5: Los Angeles Urban 35.94 36.22 0.28 Non-Median 1,278,90 358,092 22,638 5,000 1 400 89 359,492 22,727 Non-Median 1,278,90 5,000 33,90 2,143 8,704,842 550,312 I-5: Los Angeles Urban 6.78 8,670,94 548.16 I-5: Los Angeles Urban 28.25 29.16 0.91 Non-Median 1.278.90 1,163,799 73,574 5,000 4,550 1.168.349 73,862 Urban 1,278,90 6,995,583 442,25 5,000 27,35 1,729 7,022,933 443,983 Non-Median I-5: Los Angeles 22.78 28.25 5.47 I-5: Los Angeles Urban 22.28 22.78 0.5 Non-Median 1,278,900 639,450 40,425 5,000 2,500 158 641,950 40.583 I-5: Los Angeles Urhan 21.41 22.28 0.87 Non-Median 1 278 90 1 112 643 70.340 5 000 4 35 275 1 116 993 70 615 -5: Los Angeles Urban 20.58 21.41 0.83 Non-Median 1,278,90 1.061.48 67 10 5.000 4.15 262 1,065,63 67.36 I-5: Los Angeles Urban 0.58 Non-Median 1,278,90 4,309,89 272,467 5,000 16,85 1,065 4,326,743 273,533 Urban Median 5.00 125,443 5: Los Angeles 16.9 Urban 14 16 Non-Median 1,278,90 3,504,186 221,53 5,000 13,700 866 3,517,886 222,397 169 274 I-5: Los Angeles Urban 5.000 1.90 I-5: Los Angeles 13.78 14.16 0.38 Median 181.17 68.84 4.35 120 70.747 4.47 A 710: Los Angeles Suburbar 12 97 23 28 Non-Median 1 475 65 15 213 991 961 814 5 000 51 55 3 259 15 265 541 965.07 Non-Median CA 710: Los Angeles Suburban 10.18 1.475.65 4.117.074 260,278 5,000 13.95 882 4,131,024 261,159 12.97 2.79 1,475,65 1 65 488 62 A 710: LA Suburban Non-Median 7.702.91 486.9 26.10 211,327,547 13,359,926 132,131 213,417,597 13,492,057 TOTAL

TABLE 03. INTERCHANGE CONSTRUCTION COSTS (\$) - AHS AND DEDICATED TRUCK LANE*

| Interchange | Interchange Type (Urban/Rural) | Unit Cost (1999) | Unit Cost (2001-Equiv.) | EUAC |
|---------------|-----------------------------------|---------------------|----------------------------|------------|
| Long Beach | Suburban** | 35,000,000 | | 2,632,470 |
| Commerce | Suburban** | 35,000,000 | 36,235,500 | 2,632,470 |
| Sylmar | Urban | 50,000,000 | 51,765,000 | 3,760,671 |
| Wheeler Ridge | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Lost Hills | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Coalinga | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Los Banos | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Vernalis | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Lathrop | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Sacramento | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| TOTAL | | | 269,178,000 | 19,555,489 |

^{*} Freeway costs in this study are assumed to correspond to the highest values in each range (see Table 10.2 in main report).

^{**}Suburban values are an average of the rural and urban high values.

TABLE 04. AHS TRANSFER TERMINAL CONSTRUCTION COSTS

| Interchange | Freeway | Interchange Type (Urban/Rural) | Terminal Square Footage | Land Cost (2001- Equiv. \$) | Pavement Unit Cost* (2001- Equiv. \$ per Sq. Ft) | Total Pavement Cost (\$) | Building Cost (\$) | Total One-Time Cost (\$) | 2001-Equiv. EUATC (\$) |
|---------------|---------|-----------------------------------|----------------------------|--------------------------------|---|-----------------------------|--------------------|-----------------------------|---------------------------|
| Long Beach | SR-710 | Suburban | 500000 | 12500000 | 48 | 23,844,515 | 500,000 | 36,844,515 | 2,674,912 |
| Commerce | SR-710 | Suburban | 500000 | 12500000 | 48 | 23,844,515 | 500,000 | 36,844,515 | 2,674,912 |
| Sylmar | I-5 | Urban | 500000 | 7500000 | 58 | 28,835,227 | 500,000 | 36,835,227 | 2,674,238 |
| Wheeler Ridge | I-5 | Rural | 500000 | 5000000 | 38 | 18,853,802 | 500,000 | 24,353,802 | 1,768,086 |
| Lost Hills | I-5 | Rural | 150000 | 750000 | 38 | 5,656,141 | 500,000 | 6,906,141 | 501,386 |
| Coalinga | I-5 | Rural | 150000 | 750000 | 38 | 5,656,141 | 500,000 | 6,906,141 | 501,386 |
| Los Banos | I-5 | Rural | 275000 | 1375000 | 38 | 10,369,591 | 500,000 | 12,244,591 | 888,957 |
| Vernalis | I-5 | Rural | 500000 | 2500000 | 38 | 18,853,802 | 500,000 | 21,853,802 | 1,586,586 |
| Lathrop | I-5 | Rural | 150000 | 2250000 | 38 | 5,656,141 | 500,000 | 8,406,141 | 610,286 |
| Sacramento | I-5 | Rural | 275000 | 4125000 | 38 | 10,369,591 | 500,000 | 14,994,591 | 1,088,607 |
| TOTAL | • | | 3500000 | 49250000 | | 151,939,467 | 5,000,000 | 206,189,467 | 14,969,355 |

TABLE O5. INTERCHANGE REHABILITATION COSTS* - AHS AND DEDICATED TRUCK LANE

| Interchange | Interchange Type | Unit Cost (2001-Equiv. \$) | Length (mi) | Total Cost (\$) | EUAC (\$) |
|---------------|---------------------|-------------------------------|-------------|-----------------|-----------|
| Long Beach | Suburban** | 1,475,654 | | 2,951,308 | 214,265 |
| Commerce | Suburban** | 1,475,654 | 2 | 2,951,308 | 214,265 |
| Sylmar | Urban | 1,278,900 | 2 | 2,557,800 | 185,696 |
| Wheeler Ridge | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Lost Hills | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Coalinga | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Los Banos | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Vernalis | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Lathrop | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Sacramento | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| TOTAL | | | 20 | 31,874,123 | 2,314,061 |

^{*} Freeway costs in this study are assumed to correspond to the highest values in each range (see Table 10.2 in main report).

TABLE 06. AHS TRANSFER TERMINAL REHABILITATION COSTS

| | Interchange | Pavement Unit | Terminal | | |
|---------------|---------------|--------------------|-----------|-----------------|-----------|
| Interchange | Type | Cost* (2001 \$ per | Square | Total Cost (\$) | EUAC (\$) |
| | (Urban/Rural) | Sq. Ft) | Footage | | |
| Long Beach | Suburban | 13 | 500,000 | 6,654,283 | 483,101 |
| Commerce | Suburban | 13 | 500,000 | 6,654,283 | 483,101 |
| Sylmar | Urban | 12 | 500,000 | 5,767,045 | 418,688 |
| Wheeler Ridge | Rural | 15 | 500,000 | 7,541,521 | 547,514 |
| Lost Hills | Rural | 15 | 150,000 | 2,262,456 | 164,254 |
| Coalinga | Rural | 15 | 150,000 | 2,262,456 | 164,254 |
| Los Banos | Rural | 15 | 275,000 | 4,147,837 | 301,133 |
| Vernalis | Rural | 15 | 500,000 | 7,541,521 | 547,514 |
| Lathrop | Rural | 15 | 150,000 | 2,262,456 | 164,254 |
| Sacramento | Rural | 15 | 275,000 | 4,147,837 | 301,133 |
| TOTAL | | | 3,500,000 | 49,241,696 | 3,574,947 |

^{**}Suburban values are an average of the rural and urban high values.

TABLE 07. SUMMARY OF AHS MAINTENANCE COSTS

| Cost Category | EUAC (2001- Equiv. EUAC) |
|---------------|-----------------------------|
| Travel Lane | 86,479 |
| Interchange | 4,138 |
| Staging Area | 11,428 |
| TOTAL | 102,045 |

APPENDIX P

AHS VEHICLE-HOURS AND VEHICLE-MILES, VEHICLE OPERATING COSTS, AND USER COSTS

Introduction

For the calculation of vehicle-miles, vehicle-hours, vehicle operations costs and system user costs for travel on the AHS, similar methodologies were used as for the added conventional lane, with some differences. Like the calculations for the added-conventional-lane scenario, the AHS calculations were carried out for a base condition (i.e. – the existing roadway conditions, without addition of a lane), and also for the added-AHS-lane condition. Unlike the added-conventional-lane scenario, the addition of an AHS lane diverts only truck traffic from the flow on the existing lanes, so analysis must be performed for the following conditions:

- Base condition (i.e. the existing roadway conditions, without addition of a lane)
- Vehicle-hours and -miles, and operations and user costs, for the added AHS lane
- Vehicle-hours and –miles, and operations and user costs, for the existing freeway lanes, with consideration for the diverted truck traffic due to the presence of the AHS lane.

To this end, calculations were performed for each of these conditions.

Calculations

Vehicle-Revenue-Miles and -Hours

Only those calculations pertinent to the AHS that differ in methodology from those described in Appendix M are discussed here. These calculations pertain to the percentage of trucks diverted onto the AHS lane, and from the regular traffic lanes, in the added-AHS-lane configuration (base condition methodologies are identical to those presented in Appendix M).

Vehicle-miles, vehicle-hours, vehicle operations costs, and vehicle maintenance costs were calculated for both the AHS lane and the existing lanes from which trucks were diverted. Table P2a shows the section volume data for the AHS lane. Truck AADT for each segment was approximated by Professor Randolph Hall of the University of Southern California.

From the Truck AADT recommended by Professor Hall, the percentage of total vehicles using the truck lane was found. (It is noteworthy that all vehicles using the truck lane are trucks.) This calculation was made by dividing the truck AADT in the AHS lane (from Table P2a) by the AADT (from Table P1a). The following sample calculation shows the procedure used to calculate the percentage of total vehicles using the truck lane, as shown in the first line of Table P2a:

1.3% = 500/40,000

where 500 is the estimated truck AADT on the AHS lane, and 40,000 is the one-directional AADT from Table P1a.

The truck proportion diverted (shown in Table P2a) represents the proportion of all trucks using the study system that were assumed to be diverted to the AHS lane, and was calculated by dividing the percentage of total vehicles using the truck lane by the total percentage of trucks on the segment. The following sample calculation shows the procedure used to calculate the truck proportion diverted to the truck lane, as shown in the first line of Table P2a:

```
0.08 = 1.3\% / 16\%
```

where 1.3% is the percentage of total vehicles using the truck lane, and 16% is total truck percentage on the segment (from Table P2a).

For the traffic volumes on the remaining conventional lanes (shown in Table P3a), the one-directional AADT is the difference of the total AADT (from Table P1a) and the AADT on the AHS lane (from Table P2a). The following sample calculation shows the procedure used to calculate the traffic volumes on the conventional lanes, as shown in the first line of Table P3a:

```
39,500 = 40,000 - 500
```

where 40,000 is the total one-directional AADT from Table P1a, and 500 is the AHS-lane AADT from Table P2a.

The one-directional truck AADT on the conventional lanes (shown in Table P3a) was calculated by multiplying the total segment AADT (from Table P1a) by the truck percentage on the segment (also from Table P1a), and then multiplying that product by the truck proportion diverted to the AHS lanes (shown in Table P2a). The following sample calculation shows the procedure used to calculate the one-directional truck AADT on the conventional lanes, as shown in the first line of Table P3a:

```
5,900 = 40,000 \times 16\% \times (1 - 0.08)
```

The "Truck % of Conventional Lanes AADT" column in Table P3a describes the total percentage of all conventional-lane traffic that is comprised of trucks. This value was calculated by dividing the AADT for the conventional lanes (both values appear in Table P3a).

Peak period flows for the conventional lanes (shown in Table P3a) consists of those trucks not diverted to the AHS lane, and of all non-truck vehicles, and were computed for each partition of the study section via the following formula:

```
Peak Period Flow (Conv. Lanes) = [Peak Period Flow (Base Condition) x
(1 – Truck Proportion Diverted)] x [Truck Percentage (Base Condition)] +
[Peak Period Flow (Base Condition)] x
[1 – Truck Percentage (Base Condition)]
```

The following sample calculation shows the procedure used to calculate the peak period flow on the conventional lanes, as shown in the first line of Table P3a:

$$3,456 = [3500 \times (1 - 0.08) \times 16\%] + 3500(1 - 16\%)$$

All other calculations are similar to those described in Appendix M.

Vehicle Operating Costs

Vehicle operating costs for the AHS were calculated in the same manner as were comparable costs for the system featuring an added conventional freeway lane; however, different unit costs for vehicle operations were used. For the AHS configuration, it was assumed for the AHS that a convoy of three trucks would be used and only one driver per convoy was necessary. Thus, the driver cost would amount to one-third of that of trucks not operating on the automated configuration. In addition, it has been estimated that the fuel cost would decrease because of convoy-related decreases in wind drag. The reduction that was used for this report amounts to 15 percent. This percentage is based upon research conducted within the PROMOTE-CHAUFFER project (1). The fuelconsumption reduction of two heavy-duty trucks driving at close spacing amounted to 6 percent for the lead truck and 17 to 21 percent for the trailing truck. Given the assumption that three-truck convoys would be used, a weighted average of these values resulted in a fuel reduction of about 15 percent – the value used for this evaluation. The cost for truck operation on the AHS lane, then, amounted to \$1.48 after reductions in costs to account for fewer drivers and fuel savings. Table P4 shows per-mile unit costs for automated truck operations. Unit costs for non-automated truck operations are assumed to be the same, whether the trucks are operating on a dedicated lane or in regular traffic.

User Costs

User cost calculations are discussed in Section 10.4.6 in the main report.

Results

The details for the calculations of vehicle-miles and vehicle-hours of travel, and also for operations and user costs, are shown in Tables P1a through P1e for the existing configuration of the freeway, Tables P2a through P2e for the added AHS lane, and Tables P3a through P3e for the existing conventional lanes with the added AHS lane in operation. Tables P1a through P3a show the flow rates, duration, and volumes for the various periods of the day for which analysis was conducted. The passenger-car equivalents and speeds are shown in Tables P1b through P3b. The vehicle-hours and – miles of travel calculations are presented in Tables P1c through P3c. Tables P1d through P3d show details of vehicle operating costs calculations, and Tables P1e through P3e show user cost calculations. Table P4 shows per-mile unit costs for automated truck operations.

Reference

1. Bonnet, C., Fritz, H. "Fuel Consumption Reduction Experienced by Two Promote-Chauffeur Trucks in Electronic Towbar Operation." ITS World Congress 2000. Torino, Italy.

TABLE P1a. SECTION VOLUME DATA - BASE CONDITION - BASE VOLUME - SEGMENTATION 48 FT. BASIS Peak Period Peak Period Nighttime Off-Nighttime Off-Nighttime Off-Peak Nighttime Off-Peak Daytime Off-Peak Conventional ruck AAD Daytime Off Daytime Off-Peak City/Suburbar Post Mile of Segment AHS Lane AADT (One County Truck % (One Period Flow, One Volume, One Peak Period Peak Period % Period Volume, One Period Flow, One Peak Period Period Volume, One Period Flow, One Freeway Lanes Direction End Length (mi) in One Direction Direction Duration Direction (vph irection (veh uration (hours AADT Direction (veh) Direction (vph) Duration Direction (veh) Direction (vph) I-5: Sacramento Rural 20.87 34.65 Median 40 000 16.0% 6.400 3 500 21 000 4 81% 1 023 1 31/ I-5: Sacramento Urban 26.94 29.87 2.93 Median 49.000 11.0% 5.390 6 4.900 29.400 4.81% 2.356 471 13 17.244 1.326 I-5: Sacramento Urban 26.69 26.94 0.25 Non-Median 49.000 9.0% 4.410 6 4.900 29,400 4.81% 2.356 471 13 17.244 1.326 I-5: Sacramento Urban 26.69 1.16 Non-Median 67.000 13.0% 8.710 6.500 19.500 4.76% 3.189 532 15 44.311 2.954 Urban 21,900 47,625 Non-Median 73.000 6.570 7.300 4.76% 3.475 3.175 I-5: Sacramento 24.51 25.53 1 02 9.0% 579 I-5: Sacramento Urban 23.1 24.51 1.41 Non-Median 80.000 10.0% 8.000 7.100 21,300 4.76% 3.808 635 15 54.892 3.659 I-5: Sacramento Urban Non-Median 75.000 11.0% 8.250 7,000 21.000 4.76% 3.570 595 15 50,430 3.362 I-5: Sacramento Urban 19.16 2.84 Non-Median 65,000 14.0% 9,100 6,000 18,000 4.76% 3,094 516 43,906 2,927 14.0% 16,200 4.76% 43,801 I-5: Sacramento Urban 19.16 0.34 Non-Median 63,000 8,820 5,400 2,999 500 2,920 5: Sacramente Urban 18 82 Non-Mediar 50.000 14.0% 7.000 5,000 15,000 4.76% 2 380 307 32 620 2 175 -5: Sacramento Urban 14 46 16.7 2 24 Median 40 000 14 0% 5.600 4 000 12.000 6 4 76% 1 904 317 15 26 096 1 740 19.13% I-5: Sacramento Rural 14.46 14.46 Median 30.000 25.0% 7.500 3 3.000 9.000 11 5.738 522 10 15.262 1.526 I-5: San Joaquin Rural 40.45 49.79 9.34 Median 25.000 24.0% 6.000 4 2.300 9.200 11.58% 2.895 362 12 12.905 1.075 Median Rural 4.03% 1.613 18.387 1.313 I-5: San Joaquin 28.56 40.45 11.89 40.000 23.0% 9.200 5 4.000 20.000 323 14 I-5: San Joaquin Urban 28.56 0.22 Non-Mediar 45.000 24.0% 10.800 4.500 22.500 4.03% 1.814 363 14 20.686 1.478 5.58% 1,586 I-5: San Joaquin Urban 50.000 5.000 2.791 24.8 28.34 3.54 Non-Mediar 24.0% 12.000 25.000 558 14 22,209 I-5: San Joaquin Rural 14.34 24.8 10.46 Median 10,400 4.000 20.000 5.58% 447 17,767 1.269 40.000 26.0% 2.233 14 14 I-5: San Joaquin Rural 12.69 14.34 1.65 Median 63,000 26.0% 16,380 5,000 25,000 5.58% 3,517 703 34,483 2,463 10,920 8.17% 3,430 17.570 1,352 42,000 13 -5: San Joaquin Rural 11.8 Median 10,000 26.0% 2,600 1.000 3,000 8.03% 803 1.557 161 16 6.197 387 Rural 28 N 28.06 Median 28.0% 2.800 1.000 4 000 15 57% 14 4 443 I-5: Merced Rural 32 45 Median 15,000 6,000 15.57% 2 335 389 6 665 32 45 29.0% 4.350 1 500 14 476 Median I-5: Fresno 4.500 18.05% Rural 66.16 66.16 15.000 30.0% 5 1.500 7.500 2.708 387 12 4.792 399 Median I-5: Kinas Rural 26.72 26.72 15.000 30.0% 4.500 1.500 7.500 17.32% 2.597 371 12 4.903 409 I-5: Kern Rural 15.86 87.03 71.17 Median 17.000 29.0% 4.930 1.700 8.500 10.17% 1.728 346 14 6.772 484 0.78 11,716 I-5: Kern Rural 15.08 15.86 Median 30.000 28.0% 8.400 3.000 15.000 10.95% 3.284 547 13 901 Rural 15.08 Non-Median 8,400 3,000 18,000 10.95% 3,284 547 8,716 726 I-5: Kern 4.73 30,000 28.0% Median 18,000 8,716 I-5: Kern Rural 30,000 28.0% 8,400 10.95% 726 Rural Non-Mediar 30,000 9,000 18,000 10.95% 8,716 I-5: Kern 2.24 3,284 Rural Median 28.0% 8 400 3,000 18,000 10.95% 8 716 726 l-5: Kern l-5: Kern Rural 6 41 1.05 Non-Median 30,000 28.0% 8 400 3,000 18 000 10.95% 3 284 547 12 8 716 726 I-5: Kern Rural 0.58 5.36 4 78 4 Non-Median 30 000 28.0% 8 400 6 3 000 18 000 10.95% 3 284 547 12 8 716 726 I-5: Kern Rural 0.58 0.58 4 Non-Median 30 000 28.0% 8 400 6 3 000 18 000 10.95% 3 284 547 12 8 716 726 I-5: Los Angeles Rural 86.67 88.61 1.94 4 Non-Median 35.000 27.0% 9.450 6 3.500 21,000 10.14% 3.550 592 12 10.450 871 86.67 3.550 871 I-5: Los Angeles Rural 86.13 0.54 Non-Median 35.000 27.0% 9.450 3.500 21.000 10.14% 592 12 10.450 84.76 86.13 1.37 Non-Median 9,450 10.14% 592 10,450 871 I-5: Los Angeles Rural 35,000 27.0% 3,500 21,000 12 Rural 84.76 Median 35,000 9,450 21,000 10.14% 592 10,450 871 5: Los Angeles 6.33 27.0% 5: Los Angeles Rural 78.43 Non-Median 18.0% 6,300 3,500 21,000 10.14% 10,450 5: Los Angeles Rural Median 19.0% 6.650 10 14% 11 950 35,000 -5: Los Angeles Rural 65 43 68.1 2.67 Non-Median 18.0% 6.300 6 3 500 21.000 10 14% 3.550 507 11 10.450 950 I-5: Los Angeles Rural 59 95 65 43 5 48 4 Median 35,000 18.0% 6.300 6 3.500 21 000 10 14% 3.550 507 11 10 450 950 I-5: Los Angeles Rural 54 16 59 95 5 79 4 Non-Median 40 000 16.0% 6.400 4 000 20.000 6.08% 2 433 487 14 17 567 1 255 I-5: Los Angeles Rural 52 33 54.16 1.83 4 Non-Median 65 000 10.0% 6.500 6.500 32,500 6.08% 3.953 791 14 28,547 2,039 I-5: Los Angeles Urban 47 13 52 33 5 2 Non-Median 90 000 10.0% 9 000 8 600 51 600 5.89% 5 474 1 095 13 32.926 2 533 51,600 5.89% 1,061 33,095 2,546 I-5: Los Angeles Urban 46.9 47.13 0.23 Non-Median 90,000 10.0% 9,000 6 8,600 5,305 13 Urban Non-Median 9.0% 8,280 6 53,400 5.89% 5,423 1,085 13 33,177 2,552 -5: Los Angeles 46.6 46.9 92,000 8,900 Non-Median 1,085 33,177 -5: Los Angeles Urban 0.67 92,000 10.0% 9,200 5.89% 13 45.93 46.6 6 8,900 53,400 5,423 2,552 5: Los Angeles Urban Non-Median 100,000 9.0% 9,000 53,400 5.89% 40,705 3,131 Non-Median -5: Los Angeles Urban 115,000 10.0% 11,500 9,100 54,600 5.89% 6,779 1,356 13 53,621 4,125 Non-Median 9.200 Urban 44 01 0.11 115.000 8.0% 6 8.500 51,000 6.62% 7 618 1 524 13 56 382 4 337 I-5: Los Angeles 43 Q I-5: Los Angeles Urban 41.6 43.9 23 Non-Median 120,000 8.0% 9.600 6 9.500 57 000 6.62% 7 949 1 590 13 55 051 4 235 I-5: Los Angeles Urban 40 27 41.6 Non-Median 117,000 9.0% 10.530 4 4.600 18,400 4.88% 5.710 1.142 15 92.890 6.193 1 33 -5: Los Angeles Urban 39.81 40.27 0.46 Non-Median 65,000 9.0% 5.850 4 4.800 19,200 4.88% 3,172 634 15 42,628 2,842 I-5: Los Angeles Urban 39.36 39.81 0.45 Non-Median 70,000 8.0% 5.600 4 5.000 20,000 4.88% 3.416 683 15 46.584 3,106 39.36 Non-Median 10,200 51,000 5,675 1,135 14 78,325 5,595 I-5: Los Angeles Urban 36.65 2.71 135,000 8.0% 10,800 4.20% I-5: Los Angeles Urban 36.43 36.65 0.22 Median 140,000 8.0% 11,200 10,000 50,000 4.20% 5,885 1,177 14 84,115 6,008 0.21 Median 11,200 1,177 5: Los Angeles Urban 36.43 140,000 8.0% 9,600 48,000 4.20% 5,885 14 86,115 6,151 36.22 5: Los Angeles Urban Non-Median 90,000 8.0% 7,200 6,800 34,000 4.20% 3.783 757 14 52,217 3,730 I-5: Los Angeles Urban 35.94 Non-Median 90.000 8.0% 7.200 36.000 4.20% 3.783 757 14 50.217 3.587 Urban 0.91 4 Non-Median 102,000 8.0% 8 160 8,200 41 000 4.20% 4 288 858 14 56 712 4.051 I-5: Los Angeles 29.16 I-5: Los Angeles Urban 5 47 Non-Median 130,000 7.0% 9 100 9.500 47.500 4.20% 5.465 1.093 14 77 035 5 503 22 78 I-5: Los Angeles Urban 22 28 22.78 0.5 4 Non-Median 130.000 7.0% 9.100 5 9.500 47 500 4.20% 5 465 1.093 14 77 035 5.503 I-5: Los Angeles Urhan 21 41 22 28 0.87 5 Non-Median 138,000 8.0% 11.040 8 9.900 79.200 4.48% 6.184 1.237 11 52,616 4.783 I-5: Los Angeles Urban 20.58 21.41 0.83 4 Non-Median 140.000 8.0% 11.200 8 9.600 80.000 4.48% 6,273 1.255 11 53,727 4.884 Non-Median 120,000 9.600 4.48% 1.075 11 50.623 I-5: Los Angeles Urban 20.58 3.37 4 8.0% 8 8.000 64.000 5,377 4.602 Median Urban 0.31 8.0% 47,400 13 I-5: Los Angeles 120,000 9,600 7,900 2.79% 3,350 670 69,250 5,327 Non-Median I-5: Los Angeles Urban 14.16 2.74 4 130,000 8.0% 10,400 6 8,000 48,000 2.79% 3,629 726 13 78,371 6,029 16.9 -5: Los Angeles Urban 14.16 0.38 Median 128.00 8.0% 10.240 8.400 50,400 2.79% 3.574 715 13 74.026 5.694 CA 710: Los Angeles Suburban 23.28 10.31 4 Non-Median 110,000 15.0% 16,500 8.000 64,000 4.48% 4,929 986 11 41,071 3,734 Non-Median 14.0% CA 710: Los Angeles Suburban 10.18 12.97 2.79 4 88,000 12,320 7,500 60,000 4.48% 3,943 789 11 24,057 2,187 4 96 Non-Median 70 000 15.0% 6.000 48 000 4 48% 627 11 18 863 CA 710: LA

| | City/Suburban | | A - BASE (| | Peak Period Flow, | Peak Period Passenger Car | Nighttime Off-Peak | Nighttime Off-Peak Period Passenger Car | Daytime Off-Peak | Daytime Off-Peak Passenger Car Equivalent | Peak Period | Speed (mph) | Nighttime Off-P | eak Speed (mph) | Daytime Off-F | Peak Speed(mph) |
|--------------------------------------|----------------|----------------|----------------|---------------|-----------------------------------|---|--|--|---|--|-------------|-------------|-----------------|-----------------|---------------|-----------------|
| County | /Rural | Begin | End | Length (mi) | One Direction per Lane (vphpl) | Equivalent Flow, One Direction (pcphpl) | Period Flow, One Direction per Lane (vphpl) | Equivalent Flow, One Direction per Lane (pcphpl) | Flow, One Direction per Lane (vphpl) | Flow, One Direction (pcphpl) | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 1,750 | 1,890 | 192 | 208 | 657 | 709 | 50 | 63 | 50 | 65 | 50 | 65 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 1,633 | 1,723 | 157 | 166 | 442 | 466 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 1,633 | 1,707 | 157 | 164 | 442 | 462 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 25.53 24.51 | 26.69 | 1.16 | 2,167 1.825 | 2,308 1.907 | 177 145 | 189 151 | 985 794 | 1,049 829 | 50 50 | 48 55 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.02 | 1,420 | 1,491 | 127 | 133 | 732 | 768 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 2,333 | 2,462 | 198 | 209 | 1,121 | 1,182 | 50 | 38 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 1,500 | 1,605 | 129 | 138 | 732 | 783 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 1,080 | 1,156 | 100 | 107 | 584 | 625 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 1,250 | 1,338 | 99 | 106 | 544 | 582 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 1,333 | 1,427 | 106 | 113 | 580 | 621 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Rural Rural | 0 40.45 | 14.46 49.79 | 14.46 9.34 | 1,500 1,150 | 1,688 1,288 | 261 181 | 293 203 | 763 538 | 859 602 | 50 50 | 64 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: San Joaquin I-5: San Joaquin | Rural | 28.56 | 49.79 | 11.89 | 1,333 | 1,487 | 108 | 120 | 438 | 488 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 1,500 | 1,680 | 121 | 135 | 493 | 552 | 50 | 65 | 50 | 55 | 50 | 55 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 1,250 | 1,400 | 140 | 156 | 397 | 444 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1,333 | 1,507 | 149 | 168 | 423 | 478 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 1,000 | 1,130 | 141 | 159 | 493 | 557 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 1,400 | 1,582 | 191 | 215 | 451 | 509 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin I-5: Stanislaus | Rural Rural | 0 | 11.8 28.06 | 11.8 28.06 | 500 500 | 565 570 | 80 130 | 91 148 | 194 159 | 219 181 | 50 50 | 65 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 750 | 859 | 195 | 223 | 238 | 273 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Fresno | Rural | ō | 66.16 | 66.16 | 750 | 863 | 193 | 222 | 200 | 230 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 750 | 863 | 186 | 213 | 204 | 235 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 850 | 973 | 173 | 198 | 242 | 277 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | | 15.08 | 15.86 | 0.78 | 750 | 855 | 137 | 156 | 225 | 257 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 10.35 | 15.08 10.35 | 4.73 | 750 750 | 855 855 | 137 137 | 156 156 | 182 182 | 207 207 | 50 50 | 65 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: Kern I-5: Kern | Rural | 9.28 7.04 | 9.28 | 2.24 | 750 750 | 863 | 137 | 156 | 182 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 750 | 855 | 137 | 156 | 182 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 750 | 855 | 137 | 156 | 182 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 750 | 855 | 137 | 156 | 182 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 750 | 855 | 137 | 156 | 182 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 875 | 993 | 148 | 168 | 218 | 247 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 1.37 | 875 | 993 | 148 148 | 168 | 218 | 247 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 84.76 78.43 | 86.13 84.76 | 6.33 | 875 875 | 993 993 | 148 | 168 168 | 218 218 | 247 247 | 50 50 | 65 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 875 | 954 | 127 | 138 | 237 | 259 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 875 | 958 | 127 | 139 | 237 | 260 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 875 | 954 | 127 | 138 | 237 | 259 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 875 | 954 | 127 | 138 | 237 | 259 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 1,000 | 1,080 | 122 | 131 | 314 | 339 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural Urban | 52.33 | 54.16 | 1.83 | 1,625 2.150 | 1,706 2,258 | 198 274 | 208 287 | 510 633 | 535 665 | 50 50 | 65 50 | 50 50 | 65 55 | 50 50 | 65 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 47.13 46.9 | 52.33 47.13 | 5.2 0.23 | 2,150 | 2,258 | 265 | 279 | 636 | 668 | 50 | 50 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.23 | 2,225 | 2,325 | 271 | 283 | 638 | 667 | 50 | 46 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 1,780 | 1,869 | 217 | 228 | 510 | 536 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 1,780 | 1,860 | 236 | 246 | 626 | 654 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 1,820 | 1,911 | 271 | 285 | 825 | 866 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 43.9 41.6 | 44.01 43.9 | 0.11 2.3 | 2,125 1.900 | 2,210 1.976 | 381 318 | 396 331 | 1,084 847 | 1,128 881 | 50 | 51 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Los Angeles | Urban Urban | 41.6 | 43.9 | 1.33 | 1,900 1,533 | 1,976 1,602 | 318 381 | 331 398 | 2,064 | 881 2,157 | 50 50 | 55 55 | 50 50 | 55 55 | 50 | 55 53 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 1,200 | 1,254 | 159 | 166 | 710 | 742 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 1,000 | 1,040 | 137 | 142 | 621 | 646 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 2,040 | 2,122 | 227 | 236 | 1,119 | 1,164 | 50 | 53 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 1,667 | 1,733 | 196 | 204 | 1,001 | 1,041 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 2,400 | 2,496 | 294 | 306 | 1,538 | 1,599 | 50 | 32 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban Urban | 35.94 | 36.22 | 0.28 | 1,700 1,800 | 1,768 | 189 189 | 197 197 | 932 897 | 970 933 | 50 | 55 55 | 50 | 55 55 | 50 | 55 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 29.16 28.25 | 35.94 29.16 | 6.78 0.91 | 2,050 | 1,872 2,132 | 214 | 223 | 1,013 | 1,053 | 50 50 | 55 53 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 1,900 | 1.967 | 219 | 226 | 1,101 | 1,139 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 2,375 | 2,458 | 273 | 283 | 1,376 | 1,424 | 50 | 40 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 1,980 | 2,059 | 247 | 257 | 957 | 995 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 2,400 | 2,496 | 314 | 326 | 1,221 | 1,270 | 50 | 40 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 2,000 | 2,080 | 269 | 280 | 1,151 | 1,197 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 1,975 | 2,054 | 168 | 174 | 1,332 | 1,385 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 14.16 | 16.9 | 2.74 0.38 | 2,000 | 2,080 2.184 | 181 179 | 189 186 | 1,507 1.424 | 1,567 1,481 | 50 50 | 54 52 | 50 50 | 55 55 | 50 50 | 55 55 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 2,100 | 2,164 | 246 | 265 | 933 | 1,461 | 50 | 52 59 | 50 | 65 | 50 | 65 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 1,875 | 2,006 | 197 | 211 | 547 | 585 | 50 | 61 | 50 | 65 | 50 | 65 |
| CA 710: LA | | 4.96 | 10.18 | 5.22 | 2,000 | 2,150 | 209 | 225 | 572 | 614 | 50 | 57 | 50 | 65 | 50 | 65 |

| TABLE P1c. SECTION | TRAVEL DAT | A - BASE | CONDITION | N - BASE VOL | .UME - SEGMEN | NTATION 48 F | Γ. BASIS | | | | | | | | | |
|---|----------------|----------------|----------------|----------------|----------------------|--------------------|--------------------------|----------------|------------------|-----------------------------|----------------------|-------------------|---------------------------|--------------------------|--------------------------|-------------------|
| | City/Suburban/ | | ost Mile of Se | | Peak Period Ve | hicle-Hours of | Nighttime Off-Pea | | | | | | Nighttime Off-Per | | Daytime Off-Peal | |
| County | Rural | Begin | End | Length (mi) | Travel, One Truck | Other Veh. | Hours of Travel Truck | Other Veh. | Truck | I, One Direction Other Veh. | Travel, One Truck | Other Veh. | Miles of Travel, Truck | One Direction Other Veh. | Miles of Travel Truck | Other Veh. |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 321.2 | 1.338.4 | 29.4 | 118.8 | 261.2 | 1.054.9 | 16.061 | 84.319 | 1,471 | 7.722 | 13.060 | 68.567 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 189.5 | 1,393.9 | 15.2 | 111.7 | 111.2 | 817.6 | 9,476 | 76,666 | 759 | 6,143 | 5,558 | 44,968 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 13.2 | 121.6 | 1.1 | 9.7 | 7.8 | 71.3 | 662 | 6,689 | 53 | 536 | 388 | 3,923 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 58.8 | 410.0 | 9.6 | 58.5 | 133.6 | 813.1 | 2,941 | 19,679 | 481 | 3,219 | 6,682 | 44,718 |
| I-5: Sacramento | Urban Urban | 24.51 | 25.53 | 1.02 | 40.2 60.1 | 369.6 491.4 | 6.4 10.7 | 58.6 87.9 | 87.4 154.8 | 803.7 1,266.5 | 2,010 3,003 | 20,328 | 319 537 | 3,225 4,833 | 4,372 7,740 | 44,206 69,658 |
| I-5: Sacramento I-5: Sacramento | Urban | 23.1 | 24.51 23.1 | 1.41 | 50.8 | 541.0 | 8.6 | 63.5 | 122.0 | 897.7 | 2,541 | 20,559 | 432 | 3,495 | 6,102 | 49,371 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 143.1 | 799.3 | 24.6 | 137.4 | 349.1 | 1,949,7 | 7,157 | 43,963 | 1,230 | 7,557 | 17,457 | 107,236 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 15.4 | 86.1 | 2.9 | 15.9 | 41.7 | 232.9 | 771 | 4,737 | 143 | 877 | 2,085 | 12,807 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 89.0 | 497.2 | 14.1 | 78.9 | 193.6 | 1,081.3 | 4,452 | 27,348 | 706 | 4,339 | 9,682 | 59,473 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 75.3 | 420.3 | 11.9 | 66.7 | 163.7 | 914.0 | 3,763 | 23,117 | 597 | 3,668 | 8,184 | 50,271 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 650.7 | 1,525.1 | 414.8 | 957.3 | 1,103.5 | 2,546.5 | 32,535 | 97,605 | 20,742 | 62,226 | 55,173 | 165,519 |
| I-5: San Joaquin | Rural Rural | 40.45 28.56 | 49.79 40.45 | 9.34 11.89 | 412.5 1,093.9 | 1,004.7 2,817.0 | 129.8 88.2 | 316.1 227.1 | 578.6 1.005.7 | 1,409.3 2,589.9 | 20,623 54,694 | 65,305 183,106 | 6,489 4,410 | 20,547 14,763 | 28,929 50,284 | 91,607 168,343 |
| I-5: San Joaquin I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 23.8 | 57.9 | 1.9 | 5.5 | 21.8 | 62.9 | 1.188 | 3.762 | 96 | 303 | 1.092 | 3.459 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 424.8 | 1,222.9 | 47.4 | 136.5 | 377.4 | 1,086.4 | 21,240 | 67,260 | 2,371 | 7,510 | 18,869 | 59,750 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1,087.8 | 2,381.7 | 121.5 | 265.9 | 966.4 | 2,115.7 | 54,392 | 154,808 | 6,073 | 17,284 | 48,319 | 137,524 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 214.5 | 469.6 | 30.2 | 66.1 | 295.9 | 647.7 | 10,725 | 30,525 | 1,509 | 4,294 | 14,793 | 42,104 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 97.2 | 212.8 | 15.9 | 34.7 | 81.3 | 178.0 | 4,859 | 13,831 | 794 | 2,259 | 4,066 | 11,572 |
| I-5: San Joaquin | Rural Rural | 0 | 11.8 | 11.8 | 184.1 628.5 | 403.0 1.243.3 | 49.3 244.6 | 107.9 483.8 | 380.2 698.2 | 832.5 1.381.1 | 9,204 31,427 | 26,196 80.813 | 2,464 12,231 | 7,013 31,450 | 19,012 34,910 | 54,111 89.769 |
| I-5: Stanislaus I-5: Merced | Rural | 0 | 28.06 32.45 | 28.06 32.45 | 1.129.3 | 1,243.3 2.126.7 | 439.5 | 483.8 827.7 | 1,254,4 | 1,381.1 2.362.4 | 31,427 56,463 | 138,237 | 12,231 21,974 | 31,450 53,798 | 34,910 62,721 | 89,769 153.558 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 2.977.2 | 5.343.7 | 1,074.9 | 1.929.2 | 1,902.3 | 3,414.4 | 148,860 | 347.340 | 53,743 | 125,401 | 95,117 | 221,939 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 1,202.4 | 2,158.2 | 416.4 | 747.4 | 786.0 | 1,410.7 | 60,120 | 140,280 | 20,821 | 48,583 | 39,299 | 91,697 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 3,508.7 | 6,607.9 | 713.3 | 1,343.4 | 2,795.3 | 5,264.4 | 175,434 | 429,511 | 35,667 | 87,323 | 139,767 | 342,188 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 65.5 | 129.6 | 14.3 | 28.4 | 51.2 | 101.2 | 3,276 | 8,424 | 717 | 1,845 | 2,559 | 6,579 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 476.8 | 943.1 | 87.0 | 172.1 | 230.9 | 456.6 | 23,839 | 61,301 | 4,350 | 11,185 | 11,543 | 29,682 |
| I-5: Kern I-5: Kern | Rural Rural | 9.28 7.04 | 10.35 9.28 | 1.07 2.24 | 107.9 241.9 | 213.3 434.2 | 19.7 44.1 | 38.9 79.2 | 52.2 117.1 | 103.3 210.2 | 5,393 12,096 | 13,867 28,224 | 984 2,207 | 2,530 5,150 | 2,611 5,857 | 6,714 13.666 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 63.5 | 125.6 | 11.6 | 22.9 | 30.7 | 60.8 | 3,175 | 8,165 | 579 | 1,490 | 1,537 | 3,953 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 105.8 | 209.4 | 19.3 | 38.2 | 51.2 | 101.4 | 5,292 | 13,608 | 966 | 2,483 | 2,562 | 6,589 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 481.8 | 953.1 | 87.9 | 173.9 | 233.3 | 461.5 | 24,091 | 61,949 | 4,396 | 11,304 | 11,665 | 29,996 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 58.5 | 115.6 | 10.7 | 21.1 | 28.3 | 56.0 | 2,923 | 7,517 | 533 | 1,372 | 1,415 | 3,640 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 220.0 | 457.5 | 37.2 | 77.4 | 109.5 | 227.7 | 11,000 | 29,740 | 1,860 | 5,028 | 5,474 | 14,799 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 61.2 | 127.4 | 10.4 | 21.5 | 30.5 | 63.4 | 3,062 | 8,278 | 518 | 1,400 | 1,524 | 4,119 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 84.76 78.43 | 86.13 84.76 | 1.37 6.33 | 155.4 717.8 | 323.1 1,492.9 | 26.3 121.4 | 54.6 252.4 | 77.3 357.2 | 160.8 742.9 | 7,768 35,891 | 21,002 97,039 | 1,313 6,068 | 3,551 16,405 | 3,865 17,860 | 10,451 48,287 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 663.8 | 2,326.0 | 112.2 | 393.2 | 330.3 | 1,157.4 | 33,188 | 151,192 | 5,611 | 25,560 | 16,515 | 75,234 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 123.7 | 405.6 | 20.9 | 68.6 | 61.5 | 201.8 | 6,185 | 26,366 | 1,046 | 4,457 | 3,077 | 13,120 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 201.9 | 707.3 | 34.1 | 119.6 | 100.4 | 352.0 | 10,093 | 45,977 | 1,706 | 7,773 | 5,022 | 22,879 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 414.3 | 1,451.8 | 70.0 | 245.4 | 206.2 | 722.4 | 20,714 | 94,366 | 3,502 | 15,953 | 10,308 | 46,957 |
| I-5: Los Angeles | Rural | 54.16 52.33 | 59.95 | 5.79 | 370.6 | 1,496.5 | 45.1 | 182.0 | 325.5 | 1,314.5 | 18,528 | 97,272 | 2,254 | 11,832 | 16,274 | 85,440 47,016 |
| I-5: Los Angeles I-5: Los Angeles | Rural Urban | 52.33 47.13 | 54.16 52.33 | 1.83 5.2 | 119.0 536.6 | 823.5 4,829.8 | 14.5 56.9 | 100.2 465.8 | 104.5 342.4 | 723.3 2,801.7 | 5,948 26,832 | 53,528 241,488 | 723 2,846 | 6,511 25,618 | 5,224 17,122 | 47,016 154,094 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 23.7 | 213.6 | 2.4 | 20.0 | 15.2 | 124.6 | 1,187 | 10,681 | 122 | 1,098 | 761 | 6,851 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 28.8 | 316.9 | 2.9 | 26.9 | 17.9 | 164.7 | 1,442 | 14,578 | 146 | 1,481 | 896 | 9,057 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 71.6 | 585.5 | 7.3 | 59.5 | 44.5 | 363.7 | 3,578 | 32,200 | 363 | 3,270 | 2,223 | 20,006 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 79.8 | 733.3 | 8.8 | 81.0 | 60.8 | 559.0 | 3,989 | 40,333 | 440 | 4,452 | 3,041 | 30,745 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 119.0 | 973.9 | 14.8 | 120.9 | 116.9 | 956.4 | 5,951 | 53,563 | 739 | 6,650 | 5,845 | 52,602 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 43.9 41.6 | 44.01 43.9 | 0.11 2.3 | 9.0 209.8 | 101.2 2,192.9 | 1.3 29.3 | 14.0 305.8 | 9.9 202.6 | 103.7 2,118.0 | 449 10,488 | 5,161 120,612 | 67 1,463 | 771 16,821 | 496 10,129 | 5,706 116,487 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 44.0 | 404.9 | 13.7 | 125.6 | 222.4 | 2,110.0 | 2,202 | 22,270 | 683 | 6,910 | 11,119 | 112,425 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 15.9 | 146.1 | 2.6 | 24.1 | 35.3 | 324.4 | 795 | 8,037 | 131 | 1,328 | 1,765 | 17,844 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 14.4 | 150.5 | 2.5 | 25.7 | 33.5 | 350.7 | 720 | 8,280 | 123 | 1,414 | 1,677 | 19,286 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 221.1 | 2,399.1 | 24.6 | 257.3 | 339.6 | 3,550.5 | 11,057 | 127,153 | 1,230 | 14,149 | 16,981 | 195,280 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 17.6 | 184.0 | 2.1 | 21.7 | 29.6 | 309.5 | 880 | 10,120 | 104 | 1,191 | 1,480 | 17,025 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 16.1 | 289.8 | 2.0 | 20.7 | 28.9 | 302.5 | 806 | 9,274 | 99 | 1,137 | 1,447 | 16,637 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 15.2 | 159.2 4,082.8 | 1.7 41.0 | 17.7 429.1 | 23.4 | 244.6 5,695.1 | 762 19,526 | 8,758 | 85 2,052 | 975 23,599 | 1,170 | 13,451 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 29.16 28.25 | 35.94 29.16 | 6.78 0.91 | 390.5 59.7 | 4,082.8 647.6 | 6.2 | 65.3 | 544.8 82.6 | 863.3 | 2,985 | 224,554 34,325 | 312 | 3,590 | 27,238 4,129 | 313,231 47,479 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 363.8 | 4,393.4 | 41.8 | 505.5 | 589.9 | 7,125.2 | 18,188 | 241,637 | 2,092 | 27,800 | 29,497 | 391,886 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 33.3 | 552.2 | 3.8 | 46.2 | 53.9 | 651.3 | 1,663 | 22,088 | 191 | 2,541 | 2,696 | 35,821 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 110.2 | 1,173.9 | 8.6 | 90.0 | 73.2 | 765.7 | 5,512 | 63,392 | 430 | 4,949 | 3,662 | 42,114 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 106.2 | 1,527.2 | 8.3 | 87.1 | 71.3 | 745.9 | 5,312 | 61,088 | 417 | 4,790 | 3,567 | 41,026 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 345.1 | 3,674.5 | 29.0 | 303.1 | 273.0 | 2,853.7 | 17,254 | 198,426 | 1,450 | 16,671 | 13,648 | 156,951 |
| I-5: Los Angeles | Urban Urban | 16.9 | 17.21 | 0.31 | 23.5 210.4 | 250.3 2,240.7 | 1.7 15.9 | 17.4 166.3 | 34.3 343.6 | 359.1 3,591.9 | 1,176 10,522 | 13,518 120,998 | 83 796 | 956 9,149 | 1,717 17,179 | 19,750 197,556 |
| I-5: Los Angeles | Urban | 14.16 13.78 | 16.9 14.16 | 2.74 0.38 | 30.6 | 338.8 | 2.2 | 22.7 | 343.6 45.0 | 3,591.9 470.5 | 1,532 | 17,620 | 109 | 1,249 | 2,250 | 25.880 |
| I-5: Los Angeles CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 1.979.5 | 9.506.2 | 152.5 | 664.6 | 1,270.3 | 5.537.3 | 98.976 | 560.864 | 7.623 | 43.196 | 63.516 | 359.925 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 468.7 | 2,360.1 | 30.8 | 145.6 | 187.9 | 888.0 | 23,436 | 143,964 | 1,540 | 9,461 | 9,397 | 57,722 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 751.7 | 3,736.4 | 49.1 | 214.1 | 295.4 | 1,287.6 | 37,584 | 212,976 | 2,456 | 13,917 | 14,770 | 83,697 |
| TOTAL | | | 1 | I | 25,637.3 | 94,944.0 | 5,272.7 | 14,689.8 | 21,759.4 | 87,651.9 | 1,281,866 | 5,588,784 | 263,637 | 913,331 | 1,087,968 | 5,217,993 |

TABLE P1d. VEHICLE OPERATING COSTS - BASE CONDITION - BASE VOLUME - SEGMENTATION 48 FT. BASIS Nighttime Off-Peak Period Vehicle Daytime Off-Peak Period Vehicle-Vehicle Operating Costs (\$) Peak Period Vehicle-Miles of City/Suburban Post Mile of Segment Nighttime Off-Peak Travel. One Direction Miles of Travel, One Direction Miles of Travel. One Direction Peak Daytime Off-Peak County Rural Begin End Length (n Truck Other Veh Truck Other Veh. I-5: Sacramento Rural 1.471 13.060 27.404 I-5: Sacramento Urban 26.94 29.87 2.93 9 476 76,666 759 6 143 5,558 44,968 16,734 24,917 1,341 1,997 9,815 14,614 -5: Sacramento Urhan 26.69 26.94 0.25 662 6 689 53 536 388 3 923 1 168 2 174 94 174 685 1 27 5: Sacramento Urban 25.53 26.69 1.16 2.941 19,679 481 3,219 6,682 44.718 5,193 6,396 849 1.046 11,801 14,533 5: Sacramento Urban 24.51 25.53 1.02 2,010 20,328 319 3.225 4.372 44.206 3.550 6,606 563 1.048 7.72 14.36 5: Sacramento Urban 1.41 3,003 27,030 537 4,833 7,740 69,658 5,304 8,785 948 1.571 13,668 22,63 23 24.51 2.541 1.136 23.1 20.559 432 3.495 6.102 49.371 4.487 6.682 763 10.776 16.04 I-5: Sacramento Urban 22 1.1 7,157 43,963 7,557 17,457 12,639 2,173 I-5: Sacramento Urban 19.16 2.84 1,230 107,236 14,288 2,456 30,829 34,85 5: Sacramento Urban 18.82 19.16 0.34 771 4,737 143 877 2,085 12,807 1,36 1,53 25 28 3,68 4,16 27.348 4.339 1.248 19,329 Urban 17 18.82 2.12 4.452 706 9.682 59,473 7.862 8.888 1.410 17.098 5: Sacramento -5: Sacramento Urhan 14 46 2 24 3.763 23 117 597 3.668 8 184 50 271 6 646 7.51: 1 055 1 192 14 452 16.33 5: Sacramento Rural 14 46 14 46 32 535 97.605 20.742 62,226 55 173 165 519 57 457 31.722 36.630 20,223 97 436 53 70 I-5: San Joaquin Rura 40.45 49.79 9.34 20,623 65,305 6,489 20,547 28,929 91,607 36,420 21,224 11,459 6,678 51,088 29,772 Rural 28.56 11.89 54.694 183,106 4.410 14.763 168.343 96.590 59.509 7.788 88.802 54.711 I-5: San Joaquin 40.45 50.284 4.798 1 188 1 092 -5: San Joaquin Urhan 28 34 28 56 0 22 3 762 96 303 3 459 2 098 1 223 169 99 1 929 1 124 -5: San Joaquin Urban 24.8 28.34 3.54 21,240 67,260 2,371 7,510 18,869 59,750 37,510 21,860 4,188 2,441 33,322 19,419 -5: San Joaquin Rural 14.34 10.46 54,392 154,808 6,073 17,284 48,319 137.524 96,05 50,31 10,725 5,617 85.33 44.69 1,509 18,940 9,921 I-5: San Joaquin Rural 12.69 14.34 1.65 10.725 30,525 4,294 14.793 42,104 2,665 1,396 26,125 13,684 Rural 4.859 13.831 4.066 8.58 I-5: San Joaquin 11.8 12.69 0.89 794 2.259 11.572 4.495 1.402 734 7.180 3.76 I-5: San Joaquin Rural 11.8 11.80 9 204 26 196 2 464 7.013 19.012 54 111 16 25 8 514 4 351 2 279 33 57 17 586 -5: Stanislaus Rural 28.06 28.06 31,427 80.813 12,231 31,450 34.910 89,769 55,50 26,264 21,599 10,221 61.652 29.17 99,714 44,92 38,806 5: Merced Rural 32.45 32.45 56,463 138,237 21.974 53.798 62,721 153,558 17,48 110.76 49.90 -5: Fresno Rural 66 16 66 16 148 860 347 340 53 743 125 401 95 117 221 939 262 88 112 886 94 911 40 755 167 977 72 13 I-5: Kings Rural 26.72 26.72 60,120 140,280 20,821 48,583 39,299 91,697 106,173 45,591 36,770 15,789 69,402 29,802 n -5: Kern Rural 429,511 35,667 87.323 342.188 309.81 62,98 28,380 111.21 15.08 1,845 2,559 1,267 I-5: Kern Rural 15.86 0.78 3.276 8.424 717 6.579 5.785 2.738 599 4.519 2.138 I-5: Kern Rural 10.35 15.08 4.73 23,839 61,301 4,350 11,185 11,543 29,682 42,100 19,923 7,682 3,635 20,385 9,647 -5: Kern Rural 9.28 10.35 1.07 5 393 13,867 984 2,530 2,611 6.714 9,524 4.50 1,738 4.611 2,182 12.096 5.150 5.857 13.666 21.362 3.898 4,441 -5: Kern Rural 7.04 9.28 2.24 28,224 2.207 9.17 1.674 10.343 5: Kern Rural 0.63 8,165 1,490 1,537 3.953 5,607 2.65 1,023 1,28 Rural 5.292 13.608 966 2.483 2.562 6.589 9.346 1.705 807 4.525 I-5: Kern 5.36 6.41 1.05 4.423 2.141 I-5: Kern Rural 0.58 5.36 4.78 24,091 61.949 4,396 11,304 11,665 29,996 42,545 20,133 7,763 3,674 20,600 9.749 7,517 1,415 5,162 942 446 5: Kern Rural 0.58 533 1,372 3.640 2,443 1.18 -5: Los Angeles Rural 86.67 88.61 1.94 11,000 29,740 1,860 5,028 5,474 14,799 19,426 9,666 3,284 1,634 9,666 4,81 Rural 0.54 3.062 8.278 1.400 1.524 5.40 2.690 914 2.69 1.33 -5: Los Angeles 86.13 86.67 518 4.119 455 3,551 13,718 2,319 1 37 7.768 21,002 10.451 1 154 3.39 -5: Los Angeles Rural 84.76 86.13 1.313 3.865 6.82 6.826 I-5: Los Angeles Rural 78.43 84.76 6.33 35.891 97,039 6.068 16,405 17,860 48,287 63,384 31,538 10,716 5.332 31,540 15,693 33,188 6.185 16,515 58.61 29,165 Rural 78.43 151.192 75,234 49.137 9.909 8.307 24.45 I-5: Los Angeles 69.65 8.78 5,611 25,560 13,120 68.1 26.366 1.046 8 569 1 846 -5: Los Angeles Rural 69 65 1 55 4 457 3.077 10 922 1 449 5 435 4 264 -5: Los Angeles Rural 65.43 68 1 2 67 10,093 45,977 1,706 7,773 5,022 22,879 17.82 14.94 3,013 2,526 8,869 7,436 15,953 46,957 36,582 6,185 5: Los Angeles Rural 59.95 65.43 5.48 20.714 94.366 3.502 10.308 30.669 5.18 18.20 15,26 54.16 18.528 2.254 11.832 16.274 32.721 27.768 Rural 59.95 5.79 97.272 85,440 31.613 3.980 3.846 28,740 I-5: Los Angeles I-5: Los Angeles Rural 52.33 54.16 1.83 5.948 53.528 723 6.511 5,224 47.016 10.503 17.396 1.278 2.116 9.226 15.280 47.13 241,488 2,846 17,122 154.094 47,386 78,484 5,027 30,237 26,832 25,618 50,08 Urban 46.9 47.13 0.23 1,187 10,681 122 1,098 761 6.851 2,096 3,471 215 357 1,344 I-5: Los Angeles 2.22 14,578 5: Los Angeles Urban 46.6 1,442 146 1.481 896 9.057 2,546 4.738 259 481 1.582 2.944 46.9 0.30 3,578 -5: Los Angeles Urhan 45 93 46.6 0.67 32 200 363 3 270 2 223 20.006 6.318 10 465 642 1.063 3 926 6.502 4,452 778 3.989 40,333 440 3,041 30,745 13,108 5,370 -5: Los Angeles Urban 45.1 45 93 0.83 7.04 1 447 9.99 I-5: Los Angeles Urban 44.01 1.09 5,951 53,563 739 6,650 5,845 52,602 10,51 17,408 1,305 2,161 10,322 17,096 I-5: Los Angeles Urban 43.9 44.01 0.11 449 5,161 67 771 496 5.706 793 1,677 118 251 876 1,854 10,488 120,612 1.463 16.821 10.129 116,487 18.52 39,199 2.583 5.467 17.889 37.85 5: Los Angeles Urban 41.6 43.9 2.30 -5: Los Angeles Urban 40 27 416 1.33 2,202 22,270 683 6.910 11.119 112,425 3.89 7,238 1,207 2,246 19.636 36.53 Urban 39.81 40.27 0.46 795 8,037 131 1,328 1,765 17,844 1,404 2,612 232 432 3,117 5,79 5: Los Angeles Urban 0.45 720 8,280 123 1,414 1,677 19,286 1,272 2,691 6,26 5: Los Angeles 39.36 39.81 2,962 Urban 36.65 39.36 2.71 11,057 127.153 1.230 14.149 16.981 195.280 19.526 41.325 2,173 4.598 29.988 63,466 I-5: Los Angeles I-5: Los Angeles Urban 36.43 36.65 0.22 880 10,120 104 1,191 1,480 17,025 1,554 3,289 183 387 2,614 5,53 175 5: Los Angeles Urban 36.43 0.21 806 9,274 1,137 1,447 16,637 1,424 3,014 370 5,40 Urban 35.94 0.28 762 8,758 85 975 1,170 13,451 1,345 2,846 150 317 2,066 4,372 -5: Los Angeles 36.22 23 599 3,624 29 16 19 526 224 554 2.052 34 484 72 980 7 67 101 80 5: Los Angeles Urhan 35 94 6 78 27.238 313 231 48 102 3.590 29 16 2.985 34.325 4 129 47 479 5.27 551 7 201 I-5: Los Angeles Urban 28 25 N 91 312 11 156 1 167 15.43 Urban 28.25 5.47 18,188 241,637 2,092 27,800 29,497 391,886 32,120 78,532 3,695 9,035 52,092 127,36 I-5: Los Angeles 22.78 -5: Los Angeles Urban 22.78 1.663 22.088 191 2.541 2.696 35,821 2.936 7.178 338 4,762 11,642 22.28 0.50826 5.512 430 760 Urban 21.41 0.87 63.392 4.949 3.662 42.114 9.735 20,602 1.609 6.467 13,687 -5: Los Angeles 22.28 -5: Los Angeles Urban 20.58 21 41 0.83 5.312 61 088 417 4 790 3,567 41 026 9.381 19.854 736 1.557 6.300 13 33 -5: Los Angeles Urban 17.21 20.58 3.37 17,254 198,426 1.450 16,671 13.648 156,951 30,47 64.488 2,560 5.418 24.10 51.00 17.21 1,176 13,518 956 19,750 4,394 147 I-5: Los Angeles Urban 0.31 83 1.717 2,076 3.033 6.41 10.522 9.149 17.179 18.581 1.405 I-5: Los Angeles Urban 14.16 16.9 2.74 120.998 796 197.556 39.324 2.973 30.338 64.206 I-5: Los Angeles Urhan 13 78 14 16 0.38 1.532 17 620 109 1 249 2 250 25 880 2 706 5 726 192 406 3 974 8 41 CA 710: Los Angeles Suburban 12.97 23.28 10.31 98,976 560,864 7,623 43,196 63,516 359,925 174,793 182,281 13,462 14,039 112,170 116,976 A 710: Los Angeles 10.18 23,436 143,964 1,540 9,461 9,397 57,722 41,388 46,78 3,075 16,594 18,76 Suburban 12.97 2.79 2.720 Suburban 10 18 5 22 37 584 13.917 14 770 83 697 66.37 69 21 4 523 27 20 4 96 212 976 2 456 4 337 26.084 CA 710: I A

1,281,866

5,588,784

263,637

913,331

1,087,968

5,217,993

2,263,788

1,816,355

465,586

296,833

1,921,364

1,695,848

TOTAL

| TABLE P1e . TRAVEL | TIME COST - F | RASE CON | IDITION - I | BASE VOLUI | ME - SEGMENT | ATION 48 ET B | 2124 | | | | | | | | | |
|--------------------------------------|-------------------------|----------------|----------------|---------------|-----------------|--------------------|-------------------|--------------------|-----------------|-------------------|------------------|------------------|----------------|----------------|-----------------|-----------------|
| TABLE PIE. TRAVEL | | | | | | ehicle-Hours of | Nighttime Off-Pea | ak Period Vehicle- | Daytime Off-Pea | k Period Vehicle- | | | Travel Time | e Costs (\$) | | |
| County | City/Suburban/ Rural | | t Mile of S | egment | Travel, On | | | I, One Direction | Hours of Trave | | Pe | ak | Nighttime | Off-Peak | Daytime (| |
| | | Begin | End | Length (mi) | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 321.2 | 1,338.4 | 29.4 | 118.8 | 261.2 | 1,054.9 | 9,082 | 12,254 | 832 | 1,088 | 7,386 | 9,658 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 26.94 26.69 | 29.87 26.94 | 2.93 0.25 | 189.5 13.2 | 1,393.9 121.6 | 15.2 1.1 | 111.7 9.7 | 111.2 7.8 | 817.6 71.3 | 5,358 374 | 12,762 1,113 | 429 30 | 1,023 | 3,143 219 | 7,485 653 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 58.8 | 410.0 | 9.6 | 58.5 | 133.6 | 813.1 | 1,663 | 3,754 | 272 | 536 | 3,779 | 7,444 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 40.2 | 369.6 | 6.4 | 58.6 | 87.4 | 803.7 | 1,137 | 3,384 | 180 | 537 | 2,472 | 7,359 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 60.1 | 491.4 | 10.7 | 87.9 | 154.8 | 1,266.5 | 1,698 | 4,499 | 304 | 804 | 4,377 | 11,596 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 50.8 | 541.0 | 8.6 | 63.5 | 122.0 | 897.7 | 1,437 | 4,953 | 244 | 582 | 3,451 | 8,218 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 143.1 | 799.3 | 24.6 | 137.4 | 349.1 | 1,949.7 | 4,047 | 7,318 | 696 | 1,258 | 9,872 | 17,851 |
| I-5: Sacramento | Urban | 18.82 16.7 | 19.16 | 0.34 | 15.4 | 86.1 497.2 | 2.9 | 15.9 | 41.7 | 232.9 | 436 | 789 | 81 | 146 | 1,179 | 2,132 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 14.46 | 18.82 16.7 | 2.12 2.24 | 89.0 75.3 | 497.2 | 14.1 11.9 | 78.9 66.7 | 193.6 163.7 | 1,081.3 914.0 | 2,518 2,128 | 4,552 3,848 | 399 338 | 722 611 | 5,475 4,628 | 9,900 8,368 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 650.7 | 1,525.1 | 414.8 | 957.3 | 1,103.5 | 2,546.5 | 18,398 | 13,963 | 11,729 | 8,765 | 31,200 | 23,314 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 412.5 | 1,004.7 | 129.8 | 316.1 | 578.6 | 1,409.3 | 11,662 | 9,199 | 3,669 | 2,894 | 16,359 | 12,903 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 1,093.9 | 2,817.0 | 88.2 | 227.1 | 1,005.7 | 2,589.9 | 30,929 | 25,791 | 2,494 | 2,079 | 28,435 | 23,712 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 23.8 | 57.9 | 1.9 | 5.5 | 21.8 | 62.9 | 672 | 530 | 54 | 50 | 618 | 576 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 424.8 | 1,222.9 | 47.4 | 136.5 | 377.4 | 1,086.4 | 12,011 | 11,196 | 1,341 | 1,250 | 10,670 | 9,946 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1,087.8 | 2,381.7 | 121.5 | 265.9 | 966.4 | 2,115.7 | 30,758 | 21,805 | 3,434 | 2,435 | 27,324 | 19,371 |
| I-5: San Joaquin I-5: San Joaquin | Rural Rural | 12.69 11.8 | 14.34 12.69 | 1.65 0.89 | 214.5 97.2 | 469.6 212.8 | 30.2 15.9 | 66.1 34.7 | 295.9 81.3 | 647.7 178.0 | 6,065 2,748 | 4,300 1,948 | 853 449 | 605 318 | 8,365 2,299 | 5,930 1,630 |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 184.1 | 403.0 | 49.3 | 107.9 | 380.2 | 832.5 | 5,205 | 3,690 | 1,393 | 988 | 10,751 | 7,622 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 628.5 | 1,243.3 | 244.6 | 483.8 | 698.2 | 1,381.1 | 17,772 | 11,383 | 6,916 | 4,430 | 19,741 | 12,644 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 1,129.3 | 2,126.7 | 439.5 | 827.7 | 1,254.4 | 2,362.4 | 31,929 | 19,471 | 12,426 | 7,578 | 35,468 | 21,629 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 2,977.2 | 5,343.7 | 1,074.9 | 1,929.2 | 1,902.3 | 3,414.4 | 84,179 | 48,924 | 30,391 | 17,663 | 53,787 | 31,261 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 1,202.4 | 2,158.2 | 416.4 | 747.4 | 786.0 | 1,410.7 | 33,997 | 19,759 | 11,774 | 6,843 | 22,223 | 12,916 |
| I-5: Kern | Rural | 15.86 15.08 | 87.03 15.86 | 71.17 0.78 | 3,508.7 65.5 | 6,607.9 | 713.3 14.3 | 1,343.4 | 2,795.3 51.2 | 5,264.4 101.2 | 99,206 | 60,498 | 20,169 406 | 12,300 | 79,036 1,447 | 48,199 927 |
| I-5: Kern I-5: Kern | Rural Rural | 10.35 | 15.86 | 4.73 | 476.8 | 129.6 943.1 | 14.3 87.0 | 28.4 172.1 | 230.9 | 456.6 | 1,853 13,481 | 1,187 8,634 | 2,460 | 260 1,576 | 6,527 | 4,181 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 107.9 | 213.3 | 19.7 | 38.9 | 52.2 | 103.3 | 3,050 | 1,953 | 556 | 356 | 1,477 | 946 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 241.9 | 434.2 | 44.1 | 79.2 | 117.1 | 210.2 | 6,840 | 3,975 | 1,248 | 725 | 3,312 | 1,925 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 63.5 | 125.6 | 11.6 | 22.9 | 30.7 | 60.8 | 1,796 | 1,150 | 328 | 210 | 869 | 557 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 105.8 | 209.4 | 19.3 | 38.2 | 51.2 | 101.4 | 2,993 | 1,917 | 546 | 350 | 1,449 | 928 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 481.8 | 953.1 | 87.9 | 173.9 | 233.3 | 461.5 | 13,623 | 8,726 | 2,486 | 1,592 | 6,596 | 4,225 |
| I-5: Kern | Rural Rural | 0 86.67 | 0.58 88.61 | 0.58 1.94 | 58.5 220.0 | 115.6 457.5 | 10.7 37.2 | 21.1 77.4 | 28.3 109.5 | 56.0 227.7 | 1,653 6,220 | 1,059 4,189 | 302 1.052 | 193 708 | 800 3.095 | 513 |
| I-5: Los Angeles I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 61.2 | 127.4 | 10.4 | 21.5 | 30.5 | 63.4 | 1,731 | 4,189 1.166 | 293 | 197 | 3,095 | 2,084 580 |
| I-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 155.4 | 323.1 | 26.3 | 54.6 | 77.3 | 160.8 | 4,393 | 2,958 | 743 | 500 | 2,186 | 1,472 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 717.8 | 1,492.9 | 121.4 | 252.4 | 357.2 | 742.9 | 20,296 | 13,668 | 3,431 | 2,311 | 10,099 | 6,801 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 663.8 | 2,326.0 | 112.2 | 393.2 | 330.3 | 1,157.4 | 18,768 | 21,296 | 3,173 | 3,600 | 9,339 | 10,597 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 123.7 | 405.6 | 20.9 | 68.6 | 61.5 | 201.8 | 3,497 | 3,714 | 591 | 628 | 1,740 | 1,848 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 201.9 | 707.3 | 34.1 | 119.6 | 100.4 | 352.0 | 5,707 | 6,476 | 965 | 1,095 | 2,840 | 3,223 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 59.95 54.16 | 65.43 59.95 | 5.48 5.79 | 414.3 370.6 | 1,451.8 1,496.5 | 70.0 45.1 | 245.4 182.0 | 206.2 325.5 | 722.4 1,314.5 | 11,714 10,477 | 13,292 13,701 | 1,980 1,274 | 2,247 1,667 | 5,829 9,203 | 6,614 12,035 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 119.0 | 823.5 | 14.5 | 100.2 | 104.5 | 723.3 | 3,363 | 7,540 | 409 | 917 | 2,954 | 6,622 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 536.6 | 4,829.8 | 56.9 | 465.8 | 342.4 | 2,801.7 | 15,173 | 44,219 | 1,610 | 4,264 | 9,682 | 25,651 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 23.7 | 213.6 | 2.4 | 20.0 | 15.2 | 124.6 | 671 | 1,956 | 69 | 183 | 430 | 1,140 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 28.8 | 316.9 | 2.9 | 26.9 | 17.9 | 164.7 | 815 | 2,902 | 83 | 246 | 507 | 1,508 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 71.6 | 585.5 | 7.3 | 59.5 | 44.5 | 363.7 | 2,023 | 5,360 | 205 | 544 | 1,257 | 3,330 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 79.8 | 733.3 | 8.8 | 81.0 | 60.8 | 559.0 | 2,256 | 6,714 | 249 | 741 | 1,719 | 5,118 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 44.01 43.9 | 45.1 44.01 | 1.09 0.11 | 119.0 9.0 | 973.9 101.2 | 14.8 1.3 | 120.9 14.0 | 116.9 9.9 | 956.4 103.7 | 3,365 254 | 8,916 927 | 418 38 | 1,107 128 | 3,305 281 | 8,756 950 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 209.8 | 2,192.9 | 29.3 | 305.8 | 202.6 | 2,118.0 | 5.931 | 20,078 | 827 | 2,800 | 5.728 | 19,391 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 44.0 | 404.9 | 13.7 | 125.6 | 222.4 | 2,121.2 | 1,245 | 3,707 | 386 | 1,150 | 6,288 | 19,421 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 15.9 | 146.1 | 2.6 | 24.1 | 35.3 | 324.4 | 449 | 1,338 | 74 | 221 | 998 | 2,970 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 14.4 | 150.5 | 2.5 | 25.7 | 33.5 | 350.7 | 407 | 1,378 | 70 | 235 | 948 | 3,210 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 221.1 | 2,399.1 | 24.6 | 257.3 | 339.6 | 3,550.5 | 6,252 | 21,965 | 696 | 2,355 | 9,602 | 32,507 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 17.6 | 184.0 | 2.1 | 21.7 | 29.6 28.9 | 309.5 | 498 456 | 1,685 | 59 56 | 198 189 | 837 818 | 2,834 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 36.22 35.94 | 36.43 36.22 | 0.21 | 16.1 15.2 | 289.8 159.2 | 2.0 1.7 | 20.7 17.7 | 28.9 | 302.5 244.6 | 456 | 2,653 1,458 | 56 48 | 189 | 818 661 | 2,770 2,239 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 390.5 | 4,082.8 | 41.0 | 429.1 | 544.8 | 5,695.1 | 11,042 | 37,380 | 1,160 | 3,928 | 15,402 | 52,142 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.70 | 59.7 | 647.6 | 6.2 | 65.3 | 82.6 | 863.3 | 1,688 | 5,930 | 1,100 | 598 | 2,335 | 7,904 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 363.8 | 4,393.4 | 41.8 | 505.5 | 589.9 | 7,125.2 | 10,285 | 40,224 | 1,183 | 4,628 | 16,680 | 65,235 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 33.3 | 552.2 | 3.8 | 46.2 | 53.9 | 651.3 | 940 | 5,056 | 108 | 423 | 1,525 | 5,963 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 110.2 | 1,173.9 | 8.6 | 90.0 | 73.2 | 765.7 | 3,117 | 10,748 | 243 | 824 | 2,071 | 7,010 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 106.2 | 1,527.2 | 8.3 | 87.1 | 71.3 | 745.9 | 3,004 | 13,982 | 236 | 797 | 2,017 | 6,829 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 17.21 16.9 | 20.58 17.21 | 3.37 0.31 | 345.1 23.5 | 3,674.5 250.3 | 29.0 1.7 | 303.1 17.4 | 273.0 34.3 | 2,853.7 359.1 | 9,757 665 | 33,642 2,292 | 820 47 | 2,775 159 | 7,718 971 | 26,127 3.288 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 23.5 | 2,240.7 | 15.9 | 166.3 | 34.3 | 3.59.1 | 5,950 | 20,515 | 47 | 1,523 | 9.714 | 32,886 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 30.6 | 338.8 | 2.2 | 22.7 | 45.0 | 470.5 | 866 | 3,102 | 61 | 208 | 1,273 | 4,308 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 1,979.5 | 9,506.2 | 152.5 | 664.6 | 1,270.3 | 5,537.3 | 55,970 | 87,034 | 4,311 | 6,084 | 35,918 | 50,697 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 468.7 | 2,360.1 | 30.8 | 145.6 | 187.9 | 888.0 | 13,253 | 21,608 | 871 | 1,333 | 5,314 | 8,130 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 751.7 | 3,736.4 | 49.1 | 214.1 | 295.4 | 1,287.6 | 21,253 | 34,209 | 1,389 | 1,960 | 8,352 | 11,789 |
| TOTAL | | 1 | 1 | 1 | 25,637.3 | 94,944.0 | 5,272.7 | 14,689.8 | 21,759.4 | 87,651.9 | 724,880 | 869,262 | 149,084 | 134,492 | 615,233 | 802,499 |

| TABLE P2a. SECTION | N VOLUME DAT | TA - AHS LA | NE - BAS | E VOLUME | | | | | | | | | | | | | | |
|--------------------------------------|----------------|----------------|----------------|----------------|----------------|------------------------|--------------------------|------------------|-------------------------|--------------------------|----------------------------|-------------------------------|-----------------------|---------------------------------------|-------------------------------------|-------------------------|---------------------------------------|--------------------------------------|
| County | City/Suburban/ | Pos | t Mile of Se | egment | Truck Lanes in | Truck | % of Total | Truck AADT | Peak Period Duration | Peak Period Flow, One | Peak Period Volume, One | Nighttime Off- Peak Period | Nighttime Off- | Nighttime Off-Peak | Nighttime Off-Peak | Daytime Off- | Daytime Off-Peak | Daytime Off-Peak Period Flow, One |
| County | Rural | Begin | End | Length (mi) | One Direction | Proportion Diverted | Veh. Using Truck Lane | in Truck Lane | (hours) | Direction (vph) | Direction (veh) | Duration (hours) | Peak Period % AADT | Period Volume, One Direction (veh) | Period Flow, One Direction (vph) | Peak Period Duration | Period Volume, One Direction (veh) | Direction (vph) |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 1 | 0.08 | 1.3% | 500 | 6 | 44 | 263 | 5 | 4.81% | 24 | 5 | 13 | 213 | 16 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 1 | 0.09 | 1.0% | 500 | 6 | 50 | 300 | 5 | 4.81% | 24 | 5 | 13 | 176 | 14 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 1 | 0.11 | 1.0% | 500 | 6 | 50 | 300 | 5 | 4.81% | 24 | 5 | 13 | 176 | 14 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 1 | 0.06 | 0.7% | 500 | 3 | 49 | 146 | 6 | 4.76% | 24 | 4 | 15 | 331 | 22 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 1 | 0.08 | 0.7% | 500 | 3 | 50 | 150 | 6 | 4.76% | 24 | 4 | 15 | 326 | 22 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 23.1 | 24.51 | 1.41 | 1 | 0.06 | 0.6% | 500 500 | 3 | 44 47 | 133 140 | 6 | 4.76% 4.76% | 24 24 | 4 | 15 15 | 343 336 | 23 22 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 1 | 0.05 | 0.8% | 500 | 3 | 46 | 138 | 6 | 4.76% | 24 | 4 | 15 | 338 | 23 |
| I-5: Sacramento | Urban | | 19.16 | 0.34 | 1 | 0.06 | 0.8% | 500 | 3 | 43 | 129 | 6 | 4.76% | 24 | 4 | 15 | 348 | 23 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 1 | 0.07 | 1.0% | 500 | 3 | 50 | 150 | 6 | 4.76% | 24 | 4 | 15 | 326 | 22 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 1 | 0.09 | 1.3% | 500 | 3 | 50 | 150 | 6 | 4.76% | 24 | 4 | 15 | 326 | 22 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 1 | 0.07 | 1.7% | 500 | 3 | 50 | 150 | 11 | 19.13% | 96 | 9 | 10 | 254 | 25 |
| I-5: San Joaquin I-5: San Joaquin | Rural Rural | 40.45 28.56 | 49.79 40.45 | 9.34 11.89 | 1 | 0.08 | 2.0% | 500 500 | 4 5 | 46 50 | 184 250 | 8 5 | 11.58% 4.03% | 58 20 | 7 | 12 14 | 258 230 | 22 16 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 1 | 0.05 | 1.1% | 500 | 5 | 50 | 250 | 5 | 4.03% | 20 | 4 | 14 | 230 | 16 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 1 | 0.04 | 1.0% | 500 | 5 | 50 | 250 | 5 | 5.58% | 28 | 6 | 14 | 222 | 16 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1 | 0.05 | 1.3% | 500 | 5 | 50 | 250 | 5 | 5.58% | 28 | 6 | 14 | 222 | 16 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 1 | 0.05 | 1.2% | 750 | 5 | 60 | 298 | 5 | 5.58% | 42 | 8 | 14 | 411 | 29 |
| I-5: San Joaquin | Rural | | 12.69 | 0.89 | 1 | 0.07 | 1.8% | 750 | 5 | 75 | 375 | 6 | 8.17% | 61 | 10 | 13 | 314 | 24 |
| | Rural | 0 | 11.8 | 11.8 | 1 | 0.29 | 7.5% | 750 | 3 | 75 | 225 | 5 | 8.03% | 60 | 12 | 16 | 465 | 29 |
| | Rural Rural | 0 | 28.06 32.45 | 28.06 32.45 | 1 | 0.63 | 17.5% 11.7% | 1,750 1,750 | 4 | 175 175 | 700 700 | 6 | 15.57% 15.57% | 272 272 | 45 45 | 14 14 | 778 778 | 56 56 |
| | Rural | 0 | 66.16 | 66.16 | 1 | 0.44 | 13.3% | 2.000 | 5 | 200 | 1,000 | 7 | 18.05% | 361 | 52 | 12 | 639 | 53 |
| | Rural | 0 | 26.72 | 26.72 | 1 | 0.44 | 13.3% | 2,000 | 5 | 200 | 1,000 | 7 | 17.32% | 346 | 49 | 12 | 654 | 54 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 1 | 0.41 | 11.8% | 2,000 | 5 | 200 | 1,000 | 5 | 10.17% | 203 | 41 | 14 | 797 | 57 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 1 | 0.24 | 6.7% | 2,000 | 5 | 200 | 1,000 | 6 | 10.95% | 219 | 36 | 13 | 781 | 60 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 1 | 0.36 | 10.0% | 3,000 | 6 | 300 | 1,800 | 6 | 10.95% | 328 | 55 | 12 | 872 | 73 |
| I-5: Kern I-5: Kern | Rural Rural | 9.28 7.04 | 10.35 9.28 | 1.07 2.24 | 1 | 0.36 | 10.0% 10.0% | 3,000 3,000 | 6 | 300 300 | 1,800 1,800 | 6 | 10.95% 10.95% | 328 328 | 55 55 | 12 12 | 872 872 | 73 73 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 1 | 0.36 | 10.0% | 3,000 | 6 | 300 | 1,800 | 6 | 10.95% | 328 | 55 | 12 | 872 | 73 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 1 | 0.36 | 10.0% | 3,000 | 6 | 300 | 1,800 | 6 | 10.95% | 328 | 55 | 12 | 872 | 73 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 1 | 0.36 | 10.0% | 3,000 | 6 | 300 | 1,800 | 6 | 10.95% | 328 | 55 | 12 | 872 | 73 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 1 | 0.36 | 10.0% | 3,000 | 6 | 300 | 1,800 | 6 | 10.95% | 328 | 55 | 12 | 872 | 73 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 1 | 0.32 | 8.6% | 3,000 | 6 | 300 | 1,800 | 6 | 10.14% | 304 | 51 | 12 | 896 | 75 |
| I-5: Los Angeles | Rural | | 86.67 | 0.54 | 1 | 0.32 | 8.6% | 3,000 | 6 | 300 300 | 1,800 1.800 | 6 | 10.14% 10.14% | 304 304 | 51 51 | 12 12 | 896 896 | 75 75 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 84.76 78.43 | 86.13 84.76 | 1.37 6.33 | 1 | 0.32 | 8.6% 8.6% | 3,000 | 6 | 300 | 1,800 | 6 | 10.14% | 304 | 51 | 12 | 896 | 75 75 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 1 | 0.32 | 8.6% | 3,000 | 6 | 300 | 1,800 | 7 | 10.14% | 304 | 43 | 11 | 896 | 81 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 1 | 0.45 | 8.6% | 3,000 | 6 | 300 | 1,800 | 7 | 10.14% | 304 | 43 | 11 | 896 | 81 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 1 | 0.48 | 8.6% | 3,000 | 6 | 300 | 1,800 | 7 | 10.14% | 304 | 43 | 11 | 896 | 81 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 1 | 0.48 | 8.6% | 3,000 | 6 | 300 | 1,800 | 7 | 10.14% | 304 | 43 | 11 | 896 | 81 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 1 | 0.47 | 7.5% 4.6% | 3,000 | 5 5 | 300 | 1,500 | 5 5 | 6.08% | 182 | 36 | 14 14 | 1,318 | 94 94 |
| I-5: Los Angeles I-5: Los Angeles | Rural Urban | 52.33 47.13 | 54.16 52.33 | 1.83 | 1 | 0.46 | 3.3% | 3,000 | 6 | 300 287 | 1,500 1,720 | 5 | 6.08% | 182 182 | 36 36 | 13 | 1,318 1,098 | 94 84 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 1 | 0.33 | 3.3% | 3,000 | 6 | 287 | 1,720 | 5 | 5.89% | 177 | 35 | 13 | 1,103 | 85 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.20 | 1 | 0.36 | 3.3% | 3,000 | 6 | 290 | 1,741 | 5 | 5.89% | 177 | 35 | 13 | 1,082 | 83 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 1 | 0.33 | 3.3% | 3,000 | 6 | 290 | 1,741 | 5 | 5.89% | 177 | 35 | 13 | 1,082 | 83 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 1 | 0.33 | 3.0% | 3,000 | 6 | 267 | 1,602 | 5 | 5.89% | 177 | 35 | 13 | 1,221 | 94 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 1 | 0.26 | 2.6% | 3,000 | 6 | 237 | 1,424 | 5 | 5.89% | 177 | 35 | 13 | 1,399 | 108 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 43.9 | 44.01 43.9 | 0.11 2.3 | 1 | 0.33 | 2.6% 1.7% | 3,000 2,000 | 6 | 222 158 | 1,330 950 | 5 5 | 6.62% 6.62% | 199 132 | 40 26 | 13 13 | 1,471 918 | 113 71 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 1 | 0.21 | 1.7% | 2,000 | 4 | 79 | 315 | 5 | 4.88% | 98 | 20 | 15 | 1.588 | 106 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 1 | 0.13 | 3.1% | 2,000 | 4 | 148 | 591 | 5 | 4.88% | 98 | 20 | 15 | 1,312 | 87 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 1 | 0.36 | 2.9% | 2,000 | 4 | 143 | 571 | 5 | 4.88% | 98 | 20 | 15 | 1,331 | 89 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 1 | 0.19 | 1.5% | 2,000 | 5 | 151 | 756 | 5 | 4.20% | 84 | 17 | 14 | 1,160 | 83 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 1 | 0.18 | 1.4% | 2,000 | 5 | 143 | 714 | 5 | 4.20% | 84 | 17 | 14 | 1,202 | 86 |
| I-5: Los Angeles | Urban | 36.22 35.94 | 36.43 | 0.21 | 1 | 0.18 | 1.4% | 2,000 | 5 5 | 137 151 | 686 | 5 | 4.20% | 84 84 | 17 17 | 14 14 | 1,230 | 88 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 35.94 29.16 | 36.22 35.94 | 6.78 | 1 | 0.28 0.28 | 2.2% | 2,000 2,000 | 5 | 151 160 | 756 800 | 5 5 | 4.20% 4.20% | 84 84 | 17 | 14 14 | 1,160 1,116 | 83 80 |
| I-5: Los Angeles | Rural | 28.25 | 29.16 | 0.70 | 1 | 0.25 | 2.0% | 2,000 | 5 | 161 | 804 | 5 | 4.20% | 84 | 17 | 14 | 1,112 | 79 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 1 | 0.22 | 1.5% | 2,000 | 5 | 146 | 731 | 5 | 4.20% | 84 | 17 | 14 | 1,185 | 85 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 1 | 0.22 | 1.5% | 2,000 | 5 | 146 | 731 | 5 | 4.20% | 84 | 17 | 14 | 1,185 | 85 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 1 | 0.18 | 1.4% | 2,000 | 8 | 143 | 1,148 | 5 | 4.48% | 90 | 18 | 11 | 763 | 69 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 1 | 0.18 | 1.4% | 2,000 | 8 | 137 | 1,097 | 5 | 4.48% | 90 | 18 | 11 | 813 | 74 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 17.21 16.9 | 20.58 17.21 | 3.37 0.31 | 1 | 0.21 0.21 | 1.7% 1.7% | 2,000 | 8 | 133 132 | 1,067 790 | 5 5 | 4.48% 2.79% | 90 56 | 18 11 | 11 13 | 844 1.154 | 77 89 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 1 | 0.21 | 1.7% | 2,000 | 6 | 132 | 790 738 | 5 | 2.79% | 56 56 | 11 | 13 | 1,154 | 93 |
| I-5: Los Angeles | Rural | 13.78 | 14.16 | 0.38 | 1 | 0.19 | 1.6% | 2,000 | 6 | 131 | 788 | 5 | 2.79% | 56 | 11 | 13 | 1,157 | 89 |
| | Suburban | 12.97 | 23.28 | 10.31 | 1 | 0.12 | 1.8% | 2,000 | 8 | 145 | 1,164 | 5 | 4.48% | 90 | 18 | 11 | 747 | 68 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 1 | 0.16 | 2.3% | 2,000 | 8 | 170 | 1,364 | 5 | 4.48% | 90 | 18 | 11 | 547 | 50 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 1 | 0.10 | 1.4% | 1,000 | 8 | 86 | 686 | 5 | 4.48% | 45 | 9 | 11 | 269 | 24 |

TABLE P2b. SECTION FLOW AND SPEED DATA - AHS LANE - BASE VOLUME Peak Period Flow, Peak Period Passenger Car Nighttime Off-Peak Period Nighttime Off-Peak Period Daytime Off-Peak Daytime Off-Peak Passenger Peak Period Nighttime Off-Peak Daytime Off-Peak City/Suburban, Post Mile of Segment County One Direction per Equivalent Flow, One Flow. One Direction per Passenger Car Equivalent Flow, One Direction pe Car Equivalent Flow, One Speed (mph) Speed (mph) Speed(mph) Rural Begin End Length (mi) Lane (vphpl) Direction (pcphpl) Lane (vphpl) Flow, One Direction per Lane Lane (vphpl) Direction (pcphpl) Truck Truck Truck I-5: Sacramento Rural I-5: Sacramento Urban 26.94 29.87 2.93 -5: Sacramento Urhan 26 69 26 94 I-5: Sacramento Urban 1.16 I-5: Sacramento Urban 24.51 25.53 1.02 23.1 .41 I-5: Sacramento Urban 24.51 Urban I-5: Sacramento 23.1 I-5: Sacramento Urhan 19 16 I-5: Sacramento Urban 18.82 19.16 0.34 I-5: Sacramento Urban 16.7 18.82 2.12 14.46 5: Sacramento Urban 2.24 I-5: Sacramento Rural 14 46 14 46 I-5: San Joaquin Rural 40.45 49.79 9 34 I-5: San Joaquin Rural 40.45 1.89 I-5: San Joaquin Urban 28.34 28.56 0.22 5: San Joaquin Urban 24 8 28 34 3 54 I-5: San Joaquin Rural 14 34 24.8 10 46 I-5: San Joaquin Rural 12.69 14.34 1.65 R I-5: San Joaquin Rural 11.8 0.89 12.69 Rural 11.8 11.8 I-5: San Joaquin -5: Stanislaus Rural 28.06 28.06 I-5: Merced Rural 32.45 32.45 I-5: Fresno Rural I-5: Kinas Rural 26.72 26.72 71 17 -5. Kern Rural 15.86 87 03 -5: Kern Rural 15.08 15.86 0.78 I-5: Kern Rural 15.08 1.73 -5: Kern Rural 9.28 1.07 -5: Kern Rural 7.04 9.28 2.24 6 41 -5: Kern Rural 7 04 0.63 I-5: Kern Rural 5.36 6.41 1.05 5: Kern Rural 4.78 I-5: Kern Rural 0.58 0.58 5: Los Angeles Rural 86 67 88 61 -5: Los Angeles Rural 86.13 86.67).54 I-5: Los Angeles Rural 84.76 86.13 1.37 -5: Los Angeles Rural 78.43 84.76 6.33 5: Los Angeles Rural 69.65 78.43 8.78 -5: Los Angeles Rural 68 1 69 65 1 55 Rural 65.43 2.67 5: Los Angeles Rural I-5: Los Angeles 59.95 65.43 5.48 I-5: Los Angeles Rural 54.16 59.95 5.79 -5: Los Angeles Rural 52 33 54 16 1 83 I-5: Los Angeles Urban 47.13 52.33 I-5: Los Angeles Urban 46.9 47 13 0.23 Urban 46.6 46.9 I-5: Los Angeles 0.3 I-5: Los Angeles Urban 45.93 46.6 0.67 45.1 5: Los Angeles Urban 45 93 0.83 5: Los Angeles Urban 44.01 .09 -5: Los Angeles Urban 43.9 .11 41.6 I-5: Los Angeles Urban 43.9 2.3 -5: Los Angeles Urhan 40.27 -5: Los Angeles Urban 39.81 40.27 0.46 Urban 39.36 39.81 I-5: Los Angeles Urban -5: Los Angeles 36.65 39.36 2.71 -5: Los Angeles Urban 36.43 36.65).22 5: Los Angeles Urban 36.22 36.43).21 5: Los Angeles Urban 35.94 36.22 0.28 I-5: Los Angeles Urban 29.16 35.94 6.78 I-5: Los Angeles Urban 28.25 29.16 0.91 5: Los Angeles Urban 22.78 5.47 Urban 22.78 -5: Los Angeles Urban 21.41 I-5: Los Angeles 0.87 Urban 20.58 I-5: Los Angeles 21.41 0.83 I-5: Los Angeles Urban 17.21 20.58 3.37 5: Los Angeles Urban 17.21 0.31 Urban 14.16 16.9 2.74 5: Los Angeles Urban 13.78 14.16 0.38 5: Los Angeles CA 710: Los Angeles Suburban 12.97 23.28 10.31 CA 710: Los Angeles Suburban 10.18 12.97 2.79

| County | City/Suburban/ | Po | st Mile of S | egment | Peak Period Vehicle- Hours of Travel, One | Peak Period Vehicle- Miles of Travel, One | Nighttime Off-Peak Period Vehicle-Hours | Nighttime Off-Peak Other Vehicle-Miles | Daytime Off-Peak Other Vehicle-Hours | Daytime Off-Peak Other Vehicle-Miles |
|--|----------------|-------|--------------|-------------|--|--|--|---|---|---|
| County | Rural | Begin | End | Length (mi) | Direction | Direction | of Travel, One Direction | of Travel, One Direction | of Travel, One Direction | of Travel, One Direction |
| -5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 17.9 | 1,255 | 1.6 | 115 | 14.6 | 1.020 |
| -5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 12.6 | 879 | 1.0 | 70 | 7.4 | 516 |
| -5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 1.1 | 75 | 0.1 | 6 | 0.6 | 44 |
| -5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 2.4 | 169 | 0.4 | 28 | 5.5 | 384 |
| -5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 2.2 | 153 | 0.3 | 24 | 4.8 | 333 |
| -5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 2.7 | 188 | 0.5 | 34 | 6.9 | 484 |
| -5: Sacramento | Urban | 22 | 23.1 | 1.1 | 2.2 | 154 | 0.4 | 26 | 5.3 | 370 |
| -5: Sacramento | Urban | 19.16 | 22 | 2.84 | 5.6 | 393 | 1.0 | 68 | 13.7 | 959 |
| -5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 0.6 | 44 | 0.1 | 8 | 1.7 | 118 |
| -5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 4.5 | 318 | 0.7 | 50 | 9.9 | 692 |
| -5: Sacramento | Urban | 14.46 | 16.7 | 2.12 | 4.8 | 336 | 0.8 | 53 | 10.4 | 731 |
| | | 0 | | 14.46 | 31.0 | 2,169 | 19.8 | 1,383 | 52.5 | 3,678 |
| -5: Sacramento | Rural | | 14.46 | | 24.6 | 1,719 | 7.7 | 541 | 34.4 | 2,411 |
| -5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | | | | | | |
| -5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 42.5 | 2,973 | 3.4 | 240 | 39.0 | 2,733 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 0.8 | 55 | 0.1 | 4 | 0.7 | 51 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 12.6 | 885 | 1.4 | 99 | 11.2 | 786 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 37.4 | 2,615 | 4.2 | 292 | 33.2 | 2,323 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 7.0 | 491 | 1.0 | 69 | 9.7 | 677 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 4.8 | 334 | 0.8 | 55 | 4.0 | 279 |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 37.9 | 2,655 | 10.2 | 711 | 78.3 | 5,484 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 280.6 | 19,642 | 109.2 | 7,644 | 311.7 | 21,819 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 324.5 | 22,715 | 126.3 | 8,840 | 360.5 | 25,232 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 945.1 | 66,160 | 341.2 | 23,886 | 603.9 | 42,274 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 381.7 | 26,720 | 132.2 | 9,254 | 249.5 | 17,466 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 1,016.7 | 71,170 | 206.7 | 14,469 | 810.0 | 56,701 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 11.1 | 780 | 2.4 | 171 | 8.7 | 609 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 121.6 | 8,514 | 22.2 | 1,554 | 58.9 | 4,122 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 27.5 | 1,926 | 5.0 | 351 | 13.3 | 933 |
| l-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 57.6 | 4,032 | 10.5 | 736 | 27.9 | 1,952 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 16.2 | 1,134 | 3.0 | 207 | 7.8 | 549 |
| l-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 27.0 | 1,890 | 4.9 | 345 | 13.1 | 915 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 122.9 | 8,604 | 22.4 | 1.570 | 59.5 | 4,166 |
| I-5: Kern | Rural | 0.00 | 0.58 | 0.58 | 14.9 | 1,044 | 2.7 | 190 | 7.2 | 506 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 49.9 | 3,492 | 8.4 | 590 | 24.8 | 1,738 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 13.9 | 972 | 2.3 | 164 | 6.9 | 484 |
| | Rural | 84.76 | 86.13 | 1.37 | | 2,466 | 6.0 | 417 | 17.5 | 1,227 |
| I-5: Los Angeles | Rural | | | | 35.2 162.8 | | 27.5 | 1,926 | 81.0 | |
| I-5: Los Angeles | | 78.43 | 84.76 | 6.33 | | 11,394 | | | | 5,670 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 225.8 | 15,804 | 38.2 | 2,672 | 112.3 | 7,864 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 39.9 | 2,790 | 6.7 | 472 | 19.8 | 1,388 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 68.7 | 4,806 | 11.6 | 813 | 34.2 | 2,391 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 140.9 | 9,864 | 23.8 | 1,668 | 70.1 | 4,908 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 124.1 | 8,685 | 15.1 | 1,056 | 109.0 | 7,629 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 39.2 | 2,745 | 4.8 | 334 | 34.4 | 2,411 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 127.8 | 8,944 | 13.6 | 949 | 81.5 | 5,707 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 5.7 | 396 | 0.6 | 41 | 3.6 | 254 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 7.5 | 522 | 0.8 | 53 | 4.6 | 325 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 16.7 | 1,167 | 1.7 | 118 | 10.4 | 725 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 19.0 | 1,330 | 2.1 | 147 | 14.5 | 1,014 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 22.2 | 1,553 | 2.8 | 193 | 21.8 | 1,525 |
| l-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 2.1 | 146 | 0.3 | 22 | 2.3 | 162 |
| -5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 31.2 | 2,185 | 4.4 | 305 | 30.1 | 2,110 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 6.0 | 418 | 1.9 | 130 | 30.2 | 2,112 |
| l-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 3.9 | 272 | 0.6 | 45 | 8.6 | 603 |
| l-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 3.7 | 257 | 0.6 | 44 | 8.6 | 599 |
| l-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 29.3 | 2,048 | 3.3 | 228 | 44.9 | 3,145 |
| l-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 2.2 | 157 | 0.3 | 18 | 3.8 | 264 |
| l-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 2.1 | 144 | 0.3 | 18 | 3.7 | 258 |
| -5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 3.0 | 212 | 0.3 | 24 | 4.6 | 325 |
| l-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 77.5 | 5,424 | 8.1 | 570 | 108.1 | 7,566 |
| l-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 10.5 | 732 | 1.1 | 77 | 14.5 | 1,012 |
| -5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 57.1 | 3,997 | 6.6 | 460 | 92.6 | 6,483 |
| -5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 5.2 | 365 | 0.6 | 42 | 8.5 | 593 |
| -5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 14.3 | 999 | 1.1 | 78 | 9.5 | 663 |
| -5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 13.0 | 911 | 1.1 | 74 | 9.6 | 675 |
| -5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 51.4 | 3,595 | 4.3 | 302 | 40.6 | 2,843 |
| -5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 3.5 | 245 | 0.2 | 17 | 5.1 | 358 |
| -5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 28.9 | 2,023 | 2.2 | 153 | 47.2 | 3,304 |
| | Urban | 13.78 | 14.16 | 0.38 | 4.3 | 2,023 | 0.3 | 21 | 6.3 | 440 |
| -5: Los Angeles CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 4.3 171.4 | 11.997 | 13.2 | 924 | 110.0 | 7.699 |
| | | | 12.97 | | 171.4 54.4 | | | | | |
| CA 710: Los Angeles | Suburban | 10.18 | | 2.79 | | 3,805 | 3.6 | 250 | 21.8 | 1,525 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 51.1 | 3,579 | 3.3 | 234 | 20.1 | 1,407 |
| TOTAL | | 1 | 1 | | 5,327.5 | 372,928 | 1,267.7 | 88,740 | 4,153.1 | 290,720 |

| County | City/Suburban/R | Pos | t Mile of Se | egment | Peak Period Vehicle-Miles | Nighttime Off-Peak Other Vehicle-Miles of Travel, | Daytime Off-Peak Other Vehicle-Miles of Travel, | Ve Peak | chicle Operating Cost Nighttime Off-Peak | |
|--------------------------------------|-----------------|----------------|----------------|---------------|---------------------------|--|--|-----------------|---|-----------------|
| County | ural | Begin | End | Length (mi) | of Travel, One Direction | One Direction | One Direction | Truck | Truck | Truck |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 1,255 | 115 | 1,020 | 1,855 | 170 | 1,50 |
| -5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 879 | 70 | 516 | 1,299 | 104 | 76: |
| -5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 75 | 6 | 44 | 111 | 9 | 65 |
| -5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 169 | 28 | 384 | 249 | 41 | 56 |
| -5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 153 | 24 | 333 | 226 | 36 | 49: |
| -5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 188 | 34 | 484 | 277 | 50 | 715 |
| -5: Sacramento | Urban | 22 | 23.1 | 1.1 | 154 | 26 | 370 | 228 | 39 | 54 |
| l-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 393 | 68 | 959 | 581 | 100 | 1,418 |
| l-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 44 318 | 8 | 118 | 65 470 | 12 75 | |
| -5: Sacramento | Urban | 16.7 | 18.82 16.7 | 2.12 | 336 | 50 53 | 692 731 | 470 | 75 | 1,02 |
| l-5: Sacramento | Urban Rural | 14.46 | 14.46 | 2.24 14.46 | 2.169 | 1,383 | 3.678 | 3.206 | 2.044 | 1,080 5,430 |
| l-5: Sacramento l-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 1,719 | 541 | 2,411 | 2,540 | 799 | 3,56 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 2,973 | 240 | 2,733 | 4,393 | 354 | 4,039 |
| l-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 55 | 4 | 51 | 4,333 | 7 | 7: |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 885 | 99 | 786 | 1,308 | 146 | 1,16 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 2,615 | 292 | 2,323 | 3,865 | 432 | 3,43 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 491 | 69 | 677 | 726 | 102 | 1,00 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 334 | 55 | 279 | 493 | 81 | 41: |
| l-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 2,655 | 711 | 5,484 | 3,924 | 1,051 | 8,10 |
| l-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 19,642 | 7,644 | 21,819 | 29,031 | 11,298 | 32,24 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 22,715 | 8,840 | 25,232 | 33,573 | 13,066 | 37,29 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 66,160 | 23,886 | 42,274 | 97,785 | 35,303 | 62,48 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 26,720 | 9,254 | 17,466 | 39,492 | 13,677 | 25,815 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 71,170 | 14,469 | 56,701 | 105,189 | 21,386 | 83,804 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 780 | 171 | 609 | 1,153 | 252 | 900 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 8,514 | 1,554 | 4,122 | 12,584 | 2,296 | 6,093 |
| l-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 1,926 | 351 | 933 | 2,847 | 519 | 1,378 |
| -5: Kern | Rural | 7.04 | 9.28 | 2.24 | 4,032 | 736 | 1,952 | 5,959 | 1,087 | 2,88 |
| l-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 1,134 | 207 | 549 | 1,676 | 306 | 81: |
| l-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 1,890 | 345 | 915 | 2,793 | 510 | 1,353 |
| l-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 8,604 | 1,570 | 4,166 | 12,717 | 2,320 | 6,157 |
| l-5: Kern | Rural | 0 | 0.58 | 0.58 | 1,044 | 190 | 506 | 1,543 | 282 | 747 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 3,492 | 590 | 1,738 | 5,161 | 873 | 2,568 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 972 | 164 | 484 | 1,437 | 243 | 715 |
| I-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 2,466 | 417 1,926 | 1,227 | 3,645 16,840 | 616 2,847 | 1,814 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 78.43 69.65 | 84.76 78.43 | 6.33 8.78 | 11,394 15,804 | 2,672 | 5,670 7,864 | 23,358 | 3,949 | 8,380 11,623 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 2,790 | 472 | 1,388 | 4,124 | 5,949 | 2,05 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 4,806 | 813 | 2,391 | 7,103 | 1,201 | 3,53 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 9.864 | 1,668 | 4,908 | 14,579 | 2,465 | 7,25 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 8,685 | 1,056 | 7,629 | 12,836 | 1,561 | 11.275 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 2,745 | 334 | 2,411 | 4,057 | 494 | 3,564 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 8,944 | 949 | 5,707 | 13,219 | 1,402 | 8,435 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 396 | 41 | 254 | 585 | 60 | 375 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 522 | 53 | 325 | 772 | 78 | 480 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 1,167 | 118 | 725 | 1,724 | 175 | 1,07 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 1,330 | 147 | 1,014 | 1,965 | 217 | 1,498 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 1,553 | 193 | 1,525 | 2,295 | 285 | 2,254 |
| l-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 146 | 22 | 162 | 216 | 32 | 23 |
| l-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 2,185 | 305 | 2,110 | 3,229 | 450 | 3,119 |
| l-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 418 | 130 | 2,112 | 618 | 192 | 3,12 |
| -5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 272 | 45 | 603 | 402 | 66 | 89: |
| -5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 257 | 44 | 599 | 380 | 65 | 88 |
| -5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 2,048 | 228 | 3,145 | 3,026 | 337 | 4,64 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 157 | 18 | 264 | 232 | 27 | 39 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 144 | 18 | 258 | 213 | 26 | 383 |
| -5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 212 | 24 570 | 325 | 313 8,017 | 35 | 48 11,18 |
| -5: Los Angeles -5: Los Angeles | Urban Urban | 29.16 28.25 | 35.94 29.16 | 6.78 0.91 | 5,424 732 | 570 77 | 7,566 1,012 | 1,081 | 842 113 | 11,18 |
| -5: Los Angeles -5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 3,997 | 460 | 6,483 | 5,908 | 680 | 9,58 |
| -5: Los Angeles | Urban | 22.78 | 22.78 | 0.5 | 365 | 42 | 593 | 5,908 | 62 | 9,56 |
| l-5: Los Angeles | Urban | 21.41 | 22.78 | 0.87 | 999 | 78 | 663 | 1,476 | 115 | 98 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 911 | 74 | 675 | 1,346 | 110 | 99 |
| -5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 3,595 | 302 | 2,843 | 5,313 | 446 | 4,20 |
| -5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 245 | 17 | 358 | 362 | 26 | 52 |
| -5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 2,023 | 153 | 3,304 | 2,991 | 226 | 4,88 |
| -5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 299 | 21 | 440 | 442 | 31 | 65 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 11,997 | 924 | 7,699 | 17,732 | 1,366 | 11,379 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 3,805 | 250 | 1,525 | 5.623 | 370 | 2.25 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 3,579 | 234 | 1,407 | 5,290 | 346 | 2,07 |
| TOTAL | | | | 1 | 372,928 | 88,740 | 290,720 | 551,188 | 131,157 | 429,68 |

| County | City/Suburban/ | | t Mile of S | | Peak Period Vehicle- Hours of Travel, One | Nighttime Off-Peak Period Vehicle-Hours of | Daytime Off-Peak Other Vehicle-Hours of | Peak | Travel Time Costs Nighttime Off-Peak | |
|--------------------------------------|----------------|---------------|----------------|-------------|--|---|--|--------------|---|--------------|
| | Rural | Begin | End | Length (mi) | | Travel, One Direction | Travel, One Direction | Truck | Truck | Truck |
| -5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 17.9 | 1.6 | 14.6 | 507 | 46 | 412 |
| -5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 12.6 | 1.0 | 7.4 | 355 | 28 | 208 |
| -5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 1.1 | 0.1 | 0.6 | 30 | 2 | 18 |
| -5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 2.4 | 0.4 | 5.5 | 68 | 11 | 155 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 2.2 | 0.3 | 4.8 | 62 | 10 | 134 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 2.7 | 0.5 | 6.9 | 76 | 14 | 195 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 2.2 | 0.4 | 5.3 | 62 | 11 | 149 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 5.6 | 1.0 | 13.7 | 159 | 27 | 387 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 0.6 | 0.1 | 1.7 | 18 | 3 | 48 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 4.5 | 0.7 | 9.9 10.4 | 128 | 20 | 279 295 |
| I-5: Sacramento I-5: Sacramento | Urban Rural | 14.46 | 16.7 14.46 | 14.46 | 4.8 31.0 | 19.8 | 10.4 52.5 | 136 876 | 559 | 1,486 |
| | Rural | 40.45 | 49.79 | 9.34 | 24.6 | 7.7 | 34.4 | 694 | 218 | 974 |
| I-5: San Joaquin I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 42.5 | 3.4 | 39.0 | 1,201 | 97 | 1,104 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 0.8 | 0.1 | 0.7 | 1,201 | 2 | 1,104 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 12.6 | 1.4 | 11.2 | 357 | 40 | 318 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 37.4 | 4.2 | 33.2 | 1,056 | 118 | 938 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 7.0 | 1.0 | 9.7 | 198 | 28 | 274 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 4.8 | 0.8 | 4.0 | 135 | 22 | 113 |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 37.9 | 10.2 | 78.3 | 1,072 | 287 | 2,215 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 280.6 | 109.2 | 311.7 | 7,934 | 3,088 | 8,813 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 324.5 | 126.3 | 360.5 | 9,175 | 3,571 | 10,192 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 945.1 | 341.2 | 603.9 | 26,723 | 9,648 | 17,075 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 381.7 | 132.2 | 249.5 | 10,793 | 3,738 | 7,055 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 1,016.7 | 206.7 | 810.0 | 28,747 | 5,844 | 22,902 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 11.1 | 2.4 | 8.7 | 315 | 69 | 246 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 121.6 | 22.2 | 58.9 | 3,439 | 627 | 1,665 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 27.5 | 5.0 | 13.3 | 778 | 142 | 377 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 57.6 | 10.5 | 27.9 | 1,629 | 297 | 789 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 16.2 | 3.0 | 7.8 | 458 | 84 | 222 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 27.0 | 4.9 | 13.1 | 763 | 139 | 370 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 122.9 | 22.4 | 59.5 | 3,475 | 634 | 1,683 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 14.9 | 2.7 | 7.2 | 422 | 77 | 204 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 49.9 | 8.4 | 24.8 | 1,410 | 238 | 702 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 13.9 | 2.3 | 6.9 | 393 | 66 | 195 |
| I-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 35.2 | 6.0 | 17.5 | 996 | 168 | 496 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 162.8 | 27.5 | 81.0 | 4,602 | 778 | 2,290 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 225.8 | 38.2 | 112.3 | 6,384 | 1,079 | 3,176 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 39.9 | 6.7 | 19.8 | 1,127 | 191 | 561 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 68.7 | 11.6 | 34.2 | 1,941 | 328 | 966 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 140.9 | 23.8 | 70.1 | 3,984 | 674 | 1,983 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 124.1 | 15.1 | 109.0 | 3,508 | 427 | 3,081 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 39.2 | 4.8 | 34.4 | 1,109 | 135 | 974 |
| I-5: Los Angeles | Urban | 47.13 46.9 | 52.33 47.13 | 5.2 0.23 | 127.8 | 13.6 0.6 | 81.5 | 3,613 160 | 383 16 | 2,305 102 |
| I-5: Los Angeles | Urban | | | | 5.7 | | 3.6 | | | |
| I-5: Los Angeles | Urban Urban | 46.6 45.93 | 46.9 46.6 | 0.3 0.67 | 7.5 16.7 | 0.8 1.7 | 4.6 10.4 | 211 471 | 21 48 | 131 293 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 45.93 | 45.93 | 0.67 | 19.0 | 2.1 | 10.4 | 537 | 48 59 | 409 |
| I-5: Los Angeles | Urban | 44.01 | 45.93 | 1.09 | 22.2 | 2.8 | 21.8 | 627 | 78 | 616 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 2.1 | 0.3 | 2.3 | 59 | 9 | 65 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 31.2 | 4.4 | 30.1 | 883 | 123 | 852 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 6.0 | 1.9 | 30.2 | 169 | 52 | 853 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 3.9 | 0.6 | 8.6 | 110 | 18 | 244 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 3.7 | 0.6 | 8.6 | 104 | 18 | 242 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 29.3 | 3.3 | 44.9 | 827 | 92 | 1,270 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 2.2 | 0.3 | 3.8 | 63 | 7 | 107 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 2.1 | 0.3 | 3.7 | 58 | 7 | 104 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 3.0 | 0.3 | 4.6 | 85 | 10 | 131 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 77.5 | 8.1 | 108.1 | 2,191 | 230 | 3,056 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 10.5 | 1.1 | 14.5 | 295 | 31 | 409 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 57.1 | 6.6 | 92.6 | 1,615 | 186 | 2,619 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 5.2 | 0.6 | 8.5 | 148 | 17 | 239 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 14.3 | 1.1 | 9.5 | 403 | 31 | 268 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 13.0 | 1.1 | 9.6 | 368 | 30 | 273 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 51.4 | 4.3 | 40.6 | 1,452 | 122 | 1,148 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 3.5 | 0.2 | 5.1 | 99 | 7 | 145 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 28.9 | 2.2 | 47.2 | 817 | 62 | 1,334 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 4.3 | 0.3 | 6.3 | 121 | 9 | 178 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 171.4 | 13.2 | 110.0 | 4,846 | 373 | 3,110 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 54.4 | 3.6 | 21.8 | 1,537 | 101 | 616 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 51.1 | 3.3 | 20.1 | 1,446 | 94 | 568 |
| TOTAL | | | 1 | 1 | 5,327.5 | 1,267.7 | 4,153.1 | 150,633 | 35,844 | 117,428 |

TABLE P3a. SECTION VOLUME DATA - REMAINING CONVENTIONAL LANES - BASE VOLUME - AHS LANE CASE eak Period Flow Peak Period Nighttime Off-Pea Nighttime Off-Nighttime Off-Pea Nighttime Off-Peak Daytime Off-Daytime Off-Peak Conventional ruck AAD Peak Period Daytime Off-Peak Perio City/Suburban Post Mile of Segment AADT (One Duration One Direction Volume, One Period Duration Peak Period % Period Volume, Period Flow, One Peak Period Period Volume, One County reeway Lane: (One Flow, One Direction Rural Direction) Begin End One Direction anes AADT Direction (hours) (dqv) Direction (veh (hours) AADT One Direction (veh Direction (vph) Duration Direction (veh) Length I-5: Sacramento Rural 34.65 39,500 14.94% 5,900 3,456 20,738 4.81% 1,899 380 13 16,863 1,297 466 : Sacramento Urban 10.08% 4,890 29,100 4.81% 4.81% I-5: Sacramento Urban 26.69 26.94 0.25 48,500 8.06% 3,910 4,850 29,100 2,332 466 13 17,068 1,313 5: Sacramento Urbar 66,500 12.35% 8.210 6.451 19,354 4.76% 3,166 528 43,980 2,932 4 7,250 21,750 4.76% 3,451 575 15 47,299 5: Sacramento Urbar 72,500 8.37% 6.070 3.153 5: Sacramento Urban 79,500 9.43% 7,500 7,056 4.76% 3,784 631 15 3,637 74,500 5: Sacramento Urban 10.40% 7,750 6,953 20,860 4.76% 3,546 591 15 50,094 3,340 4.76% 512 5: Sacramento Urban 2.84 64,500 13.33% 8,600 5,954 17,862 3,070 15 43,568 2,905 4.76% 496 15 I-5: Sacramento Urban 19.16 0.34 62,500 8,320 5,357 16,071 2,975 43,453 2,897 : Sacramento 49,500 13.13% 4.76% 393 15 Urban 6.500 4.950 14.850 32,294 5: Sacramento Urban 14 46 39,500 12.91% 5,100 3,950 11,850 4.76% 1,880 313 15 1,718 16.7 2.24 25,770 5: Sacramento Rural 14.46 29,500 23.73% 7,000 3 2.950 8,850 11 19.13% 5,642 513 10 15,008 1,501 -5: San Joaquin Rural 49.79 24,500 22.45% 5,500 2,254 9,016 11.58% 2,837 355 12 12,647 1,054 5: San Joaquin Rural 11.89 39,500 8,700 3,950 19,750 4.03% 318 14 18,158 1,297 40.45 22.03% 44,500 10,300 5: San Joaquin Urban 28.56 23.15% 4,450 22,250 4.03% 1,794 14 20,456 1,461 49,500 23.23% 11,500 4,950 24,750 5.58% 553 14 1.570 : San Joaquin Urban 2,763 Rural 10.46 39,500 9,900 3,950 19,750 5.58% 2,205 441 14 17,545 1,253 5: San Joaquin 14.34 24.8 25.06% Rural 25.11% 15,630 4 940 24,702 5.58% 3,475 695 14 34,072 5: San Joaquir 14 34 62,250 2.434 5: San Joaquin Rural 12.69 0.89 41.250 24.65% 10.170 4,125 20,625 8 17% 3,368 561 13 17.257 1,327 5: San Joaquin Rural 11.8 9,250 20.00% 1,850 925 2,775 8.03% 743 149 16 5,732 358 Rural 1,050 825 3,300 15.57% 1,284 14 5: Stanislaus 28.06 28.06 8,250 12.73% 214 3,666 262 19.62% 344 14 I-5: Merced Rural 32.45 32.45 13,250 2,600 1,325 5,300 15.57% 2,063 421 5: Fresno Rural 13,000 19.23% 2.500 1,300 6,500 18.05% 2,347 335 12 4,153 346 Rural 13,000 19.23% 6,500 17.32% 322 12 4,249 354 -5: Kinas 26.72 2.500 1.300 2.251 2,930 I-5: Kern Rural 87.03 71.17 15.000 19.53% 1,500 7.500 10.17% 1 525 305 14 5,975 427 l-5: Kern Rural 28.000 22.86% 6,400 2,800 14,000 10.95% 3.065 511 13 10.935 841 5,400 Rural 16,200 10.95% 2,956 493 7,844 I-5: Kern 15.08 4.73 27,000 20.00% 2,700 12 654 10.95% 493 7,844 654 I-5: Kern Rural 9.28 10.35 1.07 27,000 20.00% 5,400 2,700 16,200 2,956 12 Rural 10.95% 2,956 493 12 7,844 654 5: Kern 27.000 22.22% 6.000 2.700 16,200 Rural 10.95% 493 12 7,844 654 -5: Kern 7.04 4 27,000 20.00% 5.400 6 2.700 16,200 2.956 l-5: Kern Rural 5.36 6.41 1.05 4 27,000 20.00% 5.400 6 2,700 16,200 10.95% 2,956 493 12 7 844 654 -5: Kern Rural 4.78 4 27,000 20.00% 5,400 6 2.700 16,200 10.95% 2.956 493 12 7 844 654 5,400 10.95% Rural 2,700 2,956 493 7,844 -5: Kern 27,000 20.00% 16,200 12 654 5: Los Angeles Rural 88.61 1.94 32,000 20.16% 6,450 3,200 19,200 10.14% 3,246 541 12 9,554 796 10.14% 3,246 541 12 796 5: Los Angeles Rural 86.67 32.000 6.450 3,200 19,200 9,554 Rural 10.14% 3,246 541 12 9,554 796 5: Los Angeles 1.37 4 32.000 20.16% 6.450 6 3.200 19,200 Rural 84.76 4 6,450 6 3,200 19,200 10.14% 3,246 541 12 9,554 796 I-5: Los Angeles 78.43 6.33 32.000 20.16% 5: Los Angeles Rural 78.43 8.78 4 32,000 10.31% 3,300 6 3,200 19,200 10.14% 3.246 464 11 9.554 869 I-5: Los Angeles Rural 69.65 1.55 4 32,000 11 41% 3,650 6 3,200 19,200 10 14% 3,246 464 11 9,554 869 Rural 10.14% 464 11 5: Los Angeles 65.43 32,000 10.31% 3,300 3,200 19,200 3,246 9,554 869 4 10.31% 10.14% 3,246 464 11 9,554 869 5: Los Angeles Rural 65.43 5.48 3,300 19,200 5: Los Angeles Rural 5.79 4 37.000 9.19% 3.400 3,700 18,500 6.08% 2,250 450 14 16.250 1.161 Rural 54.16 1.83 4 62,000 5.65% 3,500 6,200 31,000 6.08% 3,771 754 14 1,945 -5: Los Angeles 52.33 5 27,229 5: Los Angeles Urbar 47.13 4 87.000 6.90% 6.000 6 49,880 6.08% 5,291 1.058 13 2,448 I-5: Los Angeles Urban 46.9 47.13 4 87.000 6.90% 6,000 6 8,313 49,880 5.89% 5,128 1,026 13 31,992 2,461 13 5: Los Angeles Urban 89,000 5.93% 5,280 51,659 5.89% 5,246 32,095 2,469 1,049 13 5: Los Angeles Urban 46.6 89,000 6,200 8,610 51,659 5.89% 5,246 32,095 2,469 Urban 0.83 97.000 6.19% 6,000 6 8.633 51.798 5.89% 5.718 1.144 39.484 3.037 : Los Angeles Urban 44.01 1.09 5 112,000 7 50% 8,500 6 8,863 53,176 5.89% 6,602 1,320 13 52,222 4.017 I-5: Los Angeles 45.1 5: Los Angeles Urbar 44.01 0.11 4 112,000 5.54% 6.200 6 8.278 49,670 6.62% 7,419 1.484 13 54.911 4.224 6.44% I-5: Los Angeles Urbar 43.9 118,000 7,600 6 9,342 56,050 6.62% 7,817 1,563 13 54,133 4.164 115,000 I-5: Los Angeles Urban 1.33 7.42% 8,530 4 18,085 4.88% 5,612 15 6,087 -5: Los Angeles Urban 40.27 63,000 6.11% 3,850 4,652 18,609 4.88% 3,074 615 15 41,316 2,754 0.45 68,000 4 4.857 4.88% 664 15 5: Los Angeles Urban 5.29% 3,600 19,429 45,253 133,000 6.62% 8,800 10,049 50,244 4.20% 5,591 1.118 14 77.165 5,512 I-5: Los Angeles Urbar 36.65 39.36 2.71 5: Los Angeles Urban 0.22 6 138,000 6.67% 9,200 9,857 49,286 4.20% 5,801 1,160 14 82,913 5,922 I-5: Los Angeles Urbar 36.43 4 138,000 6.67% 9.200 9,463 47,314 4.20% 5,801 1,160 14 84,885 6.063 14 I-5: Los Angeles Urban 4 88,000 5.91% 5,200 6,649 33,244 4.20% 3,699 740 3,647 4.20% 740 14 I-5: Los Angeles Urban 35.94 88,000 5.91% 5,200 7,040 35,200 3,699 49,101 3,507 4.20% 841 14 5: Los Angeles Urban 29.16 0.91 100,000 6.16% 6,160 8,039 40,196 4,204 55,600 I-5: Los Angeles Urban 28.25 5.47 9,354 46,769 4.20% 5,381 1,076 14 75,850 5.418 4 128,000 5.55% 7,100 5 9.354 46,769 4.20% 5.381 1,076 14 75,850 5.418 5: Los Angeles Urban I-5: Los Angeles Urban 21.41 22.28 0.87 136,000 6.65% 9,040 8 9,757 78,052 4.48% 6,094 1.219 11 51,854 4.714 I-5: Los Angeles Urban 21.41 4 138,000 6.67% 9,200 8 9.463 75,703 4 48% 6 184 1.237 11 56 113 5 101 118,000 4.48% 1,058 11 49,779 I-5: Los Angeles Urban 20.58 6.44% 7,600 7,867 62,933 5,288 4,525 118,000 13 5: Los Angeles Urban 17.21 6.44% 7,600 7,768 46,610 2.79% 3,294 659 5,238 16.9 2.74 6.56% 7,877 47,262 2.79% 3,574 715 13 77,165 -5: Los Angeles Urban 128,000 8,400 5,936 Urban 14.16 0.38 4 126,000 6.54% 8,240 6 8,269 49,613 2.79% 3,518 704 13 72,870 5,605 5: Los Angeles CA 710: Los Angeles Suburban 10.31 4 108,000 13.43% 14,500 8 7,855 62,836 4.48% 4,839 968 11 40,324 3.666 2.137 CA 710: Los Angeles Suburban 10 18 12 97 2 79 4 86.000 12.00% 10.320 8 7.330 58,636 4 48% 3,854 771 11 23.510

5.914

47.314

4 48%

3.092

618

11

18,594

1.690

CA 710: LA

Suburban 4.96

10 18

5.22

69.000

13.77%

9.500

| | FLOW AND SPEI | D DATA - | KEWAININ | IG CONVENT | IONAL LANES | | | | | Daystines Off Deals | | | I | | 1 | |
|--------------------------------------|-----------------|----------------|----------------|---------------|-------------------------------|--|--|--|--------------------------------|---|-------------|-------------|----------|-----------------------|----------|----------------------|
| County | City/Suburban/R | Pos | st Mile of Se | egment | Peak Period Flow, One | Peak Period Passenger Car Equivalent Flow, | Nighttime Off- Peak Period Flow, One | Nighttime Off-Peak Period Passenger Car Equivalent Flow, | Daytime Off- Peak Flow, One | Daytime Off-Peak Passenger Car Equivalent Flow, | Peak Period | Speed (mph) | | ff-Peak Speed nph) | | ff-Peak Spee mph) |
| County | ural | Begin | End | Length (mi) | Direction per Lane (vphpl) | One Direction (pcphpl) | Direction per Lane (vphpl) | One Direction per Lane (pcphpl) | Direction per Lane (vphpl) | One Direction (pcphpl) | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh |
| -5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 1,728 | 1,857 | 190 | 205 | 649 | 697 | 50 | 64 | 50 | 65 | 50 | 65 |
| -5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 1,617 | 1,698 | 155 | 164 | 438 | 460 | 50 | 55 | 50 | 55 | 50 | 55 |
| -5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 1,617 | 1,682 | 155 | 162 | 438 | 455 | 50 | 55 | 50 | 55 | 50 | 55 |
| -5: Sacramento | Urban Urban | 25.53 24.51 | 26.69 25.53 | 1.16 | 2,150 1,813 | 2,283 1,888 | 176 144 | 187 150 | 977 788 | 1,038 821 | 50 50 | 48 55 | 50 50 | 55 55 | 50 50 | 55 55 |
| l-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 1,411 | 1,478 | 126 | 132 | 727 | 762 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 2,318 | 2,438 | 197 | 208 | 1,113 | 1,171 | 50 | 44 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 1,488 | 1,588 | 128 | 137 | 726 | 775 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 1,071 | 1,143 | 99 | 106 | 579 | 618 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 1,238 | 1,319 | 98 | 105 112 | 538 | 574 610 | 50 50 | 55 | 50 | 55 | 50 | 55 55 |
| I-5: Sacramento I-5: Sacramento | Urban Rural | 14.46 | 16.7 14.46 | 2.24 14.46 | 1,317 1,475 | 1,402 1,650 | 104 256 | 112 289 | 573 750 | 610 839 | 50 | 55 65 | 50 50 | 55 65 | 50 50 | 65 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 1,127 | 1,254 | 177 | 199 | 527 | 586 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 1,317 | 1,462 | 106 | 118 | 432 | 480 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 1,483 | 1,655 | 120 | 134 | 487 | 543 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 1,238 | 1,381 | 138 | 155 | 393 | 438 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1,317 | 1,482 | 147 | 166 | 418 | 470 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 988 | 1,112 | 139 | 157 | 487 | 548 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 1,375 463 | 1,545 509 | 187 74 | 211 84 | 442 179 | 497 197 | 50 50 | 65 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: San Joaquin I-5: Stanislaus | Rural Rural | 0 | 11.8 28.06 | 11.8 28.06 | 463 | 439 | 107 | 122 | 179 | 139 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 663 | 728 | 172 | 197 | 210 | 231 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 650 | 713 | 168 | 193 | 173 | 190 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 650 | 713 | 161 | 185 | 177 | 194 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 750 | 823 | 152 | 175 | 213 | 234 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 700 | 780 | 128 | 146 | 210 | 234 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 675 | 743 | 123 | 140 | 163 | 180 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 675 675 | 743 | 123 | 140 142 | 163 | 180 | 50 | 65 | 50 | 65 65 | 50 50 | 65 |
| I-5: Kern I-5: Kern | Rural Rural | 7.04 6.41 | 9.28 7.04 | 2.24 0.63 | 675 | 750 743 | 123 123 | 142 | 163 163 | 182 180 | 50 50 | 65 65 | 50 50 | 65 | 50 | 65 65 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 675 | 743 | 123 | 140 | 163 | 180 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 675 | 743 | 123 | 140 | 163 | 180 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 675 | 743 | 123 | 140 | 163 | 180 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 800 | 881 | 135 | 154 | 199 | 219 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 800 | 881 | 135 | 154 | 199 | 219 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 800 | 881 | 135 | 154 | 199 | 219 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 800 | 881 | 135 | 154 | 199 | 219 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 69.65 68.1 | 78.43 69.65 | 8.78 1.55 | 800 800 | 841 846 | 116 116 | 126 127 | 217 217 | 228 230 | 50 50 | 65 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 800 | 841 | 116 | 126 | 217 | 228 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 800 | 841 | 116 | 126 | 217 | 228 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 925 | 968 | 113 | 122 | 290 | 304 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 1,550 | 1,594 | 189 | 198 | 486 | 500 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 2,078 | 2,150 | 265 | 278 | 612 | 633 | 50 | 53 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 2,078 | 2,150 | 256 | 269 | 615 | 636 | 50 | 53 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 46.6 45.93 | 46.9 46.6 | 0.3 0.67 | 2,152 1,722 | 2,216 1,782 | 262 210 | 274 220 | 617 494 | 636 511 | 50 50 | 52 55 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Los Angeles | Urban | 45.93 45.1 | 45.93 | 0.83 | 1,727 | 1,780 | 229 | 239 | 607 | 626 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 44.01 | 45.93 | 1.09 | 1,773 | 1,840 | 264 | 277 | 803 | 834 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 2,070 | 2,127 | 371 | 386 | 1,056 | 1,085 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 1,868 | 1,929 | 313 | 325 | 833 | 860 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 1,507 | 1,563 | 374 | 391 | 2,029 | 2,104 | 50 | 55 | 50 | 55 | 50 | 53 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 1,163 | 1,199 | 154 | 161 | 689 | 710 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 971 | 997 | 133 | 138 | 603 | 619 | 50 E0 | 55 | 50 50 | 55 | 50 | 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 36.65 36.43 | 39.36 36.65 | 2.71 0.22 | 2,010 1,643 | 2,076 1,698 | 224 193 | 233 201 | 1,102 987 | 1,139 1,020 | 50 50 | 53 55 | 50 | 55 55 | 50 50 | 55 55 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.22 | 2,366 | 2.445 | 290 | 302 | 1,516 | 1,566 | 50 | 40 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 1,662 | 1,711 | 185 | 192 | 912 | 939 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 1,760 | 1,812 | 185 | 192 | 877 | 903 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 2,010 | 2,072 | 210 | 219 | 993 | 1,023 | 50 | 53 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 1,871 | 1,923 | 215 | 223 | 1,084 | 1,114 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 2,338 | 2,403 | 269 | 278 | 1,354 | 1,392 | 50 | 45 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 1,951 | 2,016 | 244 | 254 | 943 1,275 | 974 | 50 | 54 45 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 20.58 17.21 | 21.41 20.58 | 0.83 3.37 | 2,366 1,967 | 2,445 2,030 | 309 264 | 322 275 | 1,275 | 1,318 1,168 | 50 50 | 45 54 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 1,942 | 2,005 | 165 | 171 | 1,310 | 1,352 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 1,969 | 2,034 | 179 | 186 | 1,484 | 1,533 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 2,067 | 2,135 | 176 | 183 | 1,401 | 1,447 | 50 | 53 | 50 | 55 | 50 | 55 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 1,964 | 2,095 | 242 | 260 | 916 | 978 | 50 | 60 | 50 | 65 | 50 | 65 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 1,832 | 1,942 | 193 | 206 | 534 | 566 | 50 | 63 | 50 | 65 | 50 | 65 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 1,971 | 2,107 | 206 | 222 | 563 | 602 | 50 | 57 | 50 | 65 | 50 | 65 |

| TABLE P3c. SECTION | TRAVEL DATA | - REMAII | NING CONV | ENTIONAL L | | | | | | | | | | | | |
|--------------------------------------|----------------|----------------|----------------|---------------------|--------------------------|---------------------|-------------------|---------------------|--------------------------|----------------------------|--------------------------|-----------------------------|------------------|--------------------------|--------------------------|----------------------------|
| 0 1 | City/Suburban/ | Po | ost Mile of Se | egment | | | Nighttime Off-Pea | | | eak Period Vehicle- | | | Nighttime Off-Pe | | | ak Period Vehicle- |
| County | Rural | | | | | Other Veh. | Hours of Travel | | | vel, One Direction | Travel, On | | | I, One Direction | | I, One Direction |
| I-5: Sacramento | Rural | Begin 29.87 | End 34.65 | Length (mi) 4.78 | Truck 296.1 | 1.317.5 | Truck 27.1 | Other Veh. 118.8 | Truck 240.8 | Other Veh. 1,054.9 | Truck 14.806 | Other Veh. 84,319 | Truck 1,356 | Other Veh. 7,722 | Truck 12,040 | Other Veh. 68.567 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 171.9 | 1,393.9 | 13.8 | 111.7 | 100.8 | 817.6 | 8.597 | 76,666 | 689 | 6,143 | 5.042 | 44.968 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 11.7 | 121.6 | 0.9 | 9.7 | 6.9 | 71.3 | 587 | 6,689 | 47 | 536 | 344 | 3,923 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 55.4 | 410.0 | 9.1 | 58.5 | 126.0 | 813.1 | 2,772 | 19,679 | 453 | 3,219 | 6,298 | 44,718 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 37.1 | 369.6 | 5.9 | 58.6 | 80.8 | 803.7 | 1,857 | 20,328 | 295 | 3,225 | 4,039 | 44,206 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 56.3 | 491.4 | 10.1 | 87.9 | 145.1 | 1,266.5 | 2,816 | 27,030 | 503 | 4,833 | 7,256 | 69,658 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 47.7 | 467.3 | 8.1 | 63.5 | 114.6 | 897.7 | 2,387 | 20,559 | 406 | 3,495 | 5,732 | 49,371 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 19.16 18.82 | 19.16 | 2.84 0.34 | 135.3 14.5 | 799.3 86.1 | 23.3 | 137.4 15.9 | 330.0 39.3 | 1,949.7 232.9 | 6,764 727 | 43,963 4,737 | 1,163 135 | 7,557 877 | 16,498 1,967 | 107,236 12,807 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 82.7 | 497.2 | 13.1 | 78.9 | 179.8 | 1,081.3 | 4,134 | 27,348 | 656 | 4,339 | 8,990 | 59,473 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 68.5 | 420.3 | 10.9 | 66.7 | 149.1 | 914.0 | 3,427 | 23,117 | 544 | 3,668 | 7,453 | 50,271 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 607.3 | 1,501.6 | 387.2 | 957.3 | 1,029.9 | 2,546.5 | 30,366 | 97,605 | 19,359 | 62,226 | 51,495 | 165,519 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 378.1 | 1,004.7 | 119.0 | 316.1 | 530.4 | 1,409.3 | 18,904 | 65,305 | 5,948 | 20,547 | 26,518 | 91,607 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 1,034.4 | 2,817.0 | 83.4 | 227.1 | 951.0 | 2,589.9 | 51,722 | 183,106 | 4,170 | 14,763 | 47,551 | 168,343 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 22.7 | 68.4 | 1.8 | 5.5 | 20.8 | 62.9 | 1,133 | 3,762 | 91 | 303 | 1,042 | 3,459 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 407.1 | 1,222.9 | 45.5 | 136.5 | 361.6 | 1,086.4 | 20,355 | 67,260 | 2,273 | 7,510 | 18,082 45,996 | 59,750 |
| I-5: San Joaquin | Rural Rural | 14.34 12.69 | 24.8 14.34 | 10.46 | 1,035.5 204.7 | 2,381.7 469.6 | 115.6 28.8 | 265.9 66.1 | 919.9 282.3 | 2,115.7 647.7 | 51,777 10,234 | 154,808 30,525 | 5,781 1,440 | 17,284 4,294 | 14,116 | 137,524 42,104 |
| I-5: San Joaquin I-5: San Joaquin | Rural | 11.8 | 12.69 | 1.65 0.89 | 90.5 | 212.8 | 14.8 | 34.7 | 75.7 | 178.0 | 4,526 | 13,831 | 739 | 2,259 | 3,787 | 11,572 |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 131.0 | 403.0 | 35.1 | 107.9 | 270.6 | 832.5 | 6,549 | 26,196 | 1,753 | 7,013 | 13,528 | 54,111 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 235.7 | 1,243.3 | 91.7 | 483.8 | 261.8 | 1,381.1 | 11,785 | 80,813 | 4,586 | 31,450 | 13,091 | 89,769 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 675.0 | 2,126.7 | 262.7 | 827.7 | 749.8 | 2,362.4 | 33,748 | 138,237 | 13,134 | 53,798 | 37,488 | 153,558 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 1,654.0 | 5,343.7 | 597.1 | 1,929.2 | 1,056.9 | 3,414.4 | 82,700 | 347,340 | 29,857 | 125,401 | 52,843 | 221,939 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 668.0 | 2,158.2 | 231.3 | 747.4 | 436.7 | 1,410.7 | 33,400 | 140,280 | 11,567 | 48,583 | 21,833 | 91,697 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 2,085.3 | 6,607.9 | 424.0 | 1,343.4 | 1,661.3 | 5,264.4 | 104,264 | 429,511 | 21,198 | 87,323 | 83,066 | 342,188 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 49.9 | 129.6 | 10.9 | 28.4 | 39.0 | 101.2 | 2,496 | 8,424 | 547 | 1,845 | 1,949 | 6,579 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 306.5 | 943.1 | 55.9 | 172.1 | 148.4 | 456.6 | 15,325 | 61,301 | 2,796 | 11,185 | 7,420 | 29,682 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 69.3 | 213.3 | 12.7 | 38.9 | 33.6 | 103.3 | 3,467 | 13,867 | 633 | 2,530 | 1,679 | 6,714 |
| I-5: Kern I-5: Kern | Rural Rural | 7.04 6.41 | 9.28 7.04 | 0.63 | 161.3 40.8 | 434.2 125.6 | 29.4 7.4 | 79.2 22.9 | 78.1 19.8 | 210.2 60.8 | 8,064 2,041 | 28,224 8,165 | 1,471 372 | 5,150 1,490 | 3,905 988 | 13,666 3,953 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 68.0 | 209.4 | 12.4 | 38.2 | 32.9 | 101.4 | 3,402 | 13,608 | 621 | 2,483 | 1.647 | 6,589 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 309.7 | 953.1 | 56.5 | 173.9 | 150.0 | 461.5 | 15,487 | 61,949 | 2,826 | 11,304 | 7,499 | 29,996 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 37.6 | 115.6 | 6.9 | 21.1 | 18.2 | 56.0 | 1,879 | 7,517 | 343 | 1,372 | 910 | 3,640 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 150.2 | 457.5 | 25.4 | 77.4 | 74.7 | 227.7 | 7,508 | 29,740 | 1,269 | 5,028 | 3,736 | 14,799 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 41.8 | 127.4 | 7.1 | 21.5 | 20.8 | 63.4 | 2,090 | 8,278 | 353 | 1,400 | 1,040 | 4,119 |
| I-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 106.0 | 323.1 | 17.9 | 54.6 | 52.8 | 160.8 | 5,302 | 21,002 | 896 | 3,551 | 2,638 | 10,451 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 489.9 | 1,492.9 | 82.8 | 252.4 | 243.8 | 742.9 | 24,497 | 97,039 | 4,141 | 16,405 | 12,190 | 48,287 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 347.7 | 2,326.0 | 58.8 | 393.2 | 173.0 | 1,157.4 | 17,384 | 151,192 | 2,939 | 25,560 | 8,651 | 75,234 |
| I-5: Los Angeles | Rural Rural | 68.1 65.43 | 69.65 68.1 | 1.55 2.67 | 67.9 105.7 | 405.6 707.3 | 11.5 17.9 | 68.6 119.6 | 33.8 52.6 | 201.8 352.0 | 3,395 5,287 | 26,366 45,977 | 574 894 | 4,457 7,773 | 1,689 2.631 | 13,120 22,879 |
| I-5: Los Angeles I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 217.0 | 1,451.8 | 36.7 | 245.4 | 108.0 | 722.4 | 10,850 | 94,366 | 1,834 | 15,953 | 5,399 | 46,957 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 196.9 | 1,496.5 | 23.9 | 182.0 | 172.9 | 1,314,5 | 9.843 | 97,272 | 1,197 | 11.832 | 8,646 | 85,440 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 64.1 | 823.5 | 7.8 | 100.2 | 56.3 | 723.3 | 3,203 | 53,528 | 390 | 6,511 | 2,813 | 47,016 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 357.8 | 4,556.4 | 38.0 | 465.8 | 228.3 | 2,801.7 | 17,888 | 241,488 | 1,898 | 25,618 | 11,414 | 154,094 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 15.8 | 201.5 | 1.6 | 20.0 | 10.1 | 124.6 | 791 | 10,681 | 81 | 1,098 | 507 | 6,851 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 18.4 | 280.3 | 1.9 | 26.9 | 11.4 | 164.7 | 919 | 14,578 | 93 | 1,481 | 571 | 9,057 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 48.2 | 585.5 | 4.9 | 59.5 | 30.0 | 363.7 | 2,411 | 32,200 | 245 | 3,270 | 1,498 | 20,006 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 53.2 | 733.3 | 5.9 | 81.0 | 40.5 | 559.0 | 2,659 | 40,333 | 294 | 4,452 | 2,027 | 30,745 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 0.11 | 88.0 6.0 | 973.9 95.6 | 10.9 0.9 | 120.9 14.0 | 86.4 6.7 | 956.4 103.7 | 4,399 302 | 53,563 5,161 | 546 45 | 6,650 771 | 4,320 334 | 52,602 5,706 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 43.9 41.6 | 44.01 43.9 | 2.3 | 166.1 | 2,192,9 | 23.2 | 305.8 | 160.4 | 2.118.0 | 8,303 | 120,612 | 1,158 | 16.821 | 8.019 | 116.487 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 35.7 | 404.9 | 11.1 | 125.6 | 180.1 | 2,121.2 | 1,784 | 22,270 | 554 | 6,910 | 9.007 | 112,425 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 10.5 | 146.1 | 1.7 | 24.1 | 23.2 | 324.4 | 523 | 8,037 | 86 | 1,328 | 1,161 | 17,844 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 9.3 | 150.5 | 1.6 | 25.7 | 21.6 | 350.7 | 463 | 8,280 | 79 | 1,414 | 1,078 | 19,286 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 180.2 | 2,399.1 | 20.0 | 257.3 | 276.7 | 3,550.5 | 9,009 | 127,153 | 1,002 | 14,149 | 13,836 | 195,280 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 14.5 | 184.0 | 1.7 | 21.7 | 24.3 | 309.5 | 723 | 10,120 | 85 | 1,191 | 1,216 | 17,025 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 13.2 | 231.8 | 1.6 | 20.7 | 23.8 | 302.5 | 662 | 9,274 | 81 | 1,137 | 1,188 | 16,637 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 11.0 | 159.2 | 1.2 | 17.7 | 16.9 | 244.6 | 550 | 8,758 | 61 | 975 | 845 | 13,451 |
| I-5: Los Angeles | Urban Urban | 29.16 28.25 | 35.94 29.16 | 6.78 0.91 | 282.0 45.1 | 4,082.8 647.6 | 29.6 4.7 | 429.1 65.3 | 393.4 62.3 | 5,695.1 863.3 | 14,102 2,253 | 224,554 34.325 | 1,482 236 | 23,599 3,590 | 19,672 3,117 | 313,231 47,479 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 28.25 | 28.25 | 5.47 | 283.8 | 4.393.4 | 32.7 | 505.5 | 460.3 | 7.125.2 | 2,253 14,190 | 241.637 | 1.633 | 3,590 27.800 | 23.014 | 391.886 |
| I-5: Los Angeles | Urban | 22.78 | 22.78 | 0.5 | 25.9 | 4,393.4 | 3.0 | 46.2 | 42.1 | 651.3 | 1,297 | 22,088 | 149 | 2.541 | 23,014 | 35.821 |
| I-5: Los Angeles | Urban | 21.41 | 22.78 | 0.87 | 90.3 | 1,173.9 | 7.0 | 90.0 | 60.0 | 765.7 | 4.514 | 63,392 | 352 | 4,949 | 2,999 | 42.114 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 83.8 | 1,303.2 | 6.8 | 87.1 | 62.1 | 790.3 | 4,189 | 58,644 | 342 | 4,790 | 3,105 | 43,469 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 273.2 | 3,674.5 | 23.0 | 303.1 | 216.1 | 2,853.7 | 13,660 | 198,426 | 1,148 | 16,671 | 10,805 | 156,951 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 18.6 | 250.3 | 1.3 | 17.4 | 27.2 | 359.1 | 931 | 13,518 | 66 | 956 | 1,360 | 19,750 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 170.0 | 2,240.7 | 12.9 | 166.3 | 277.5 | 3,591.9 | 8,498 | 120,998 | 643 | 9,149 | 13,875 | 197,556 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 24.7 | 332.4 | 1.7 | 22.7 | 36.2 | 470.5 | 1,233 | 17,620 | 87 | 1,249 | 1,811 | 25,880 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 1,739.6 | 9,347.7 | 134.0 | 664.6 | 1,116.3 | 5,537.3 | 86,979 | 560,864 | 6,699 | 43,196 | 55,817 | 359,925 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 392.6 | 2,285.1 | 25.8 44.4 | 145.6 214.1 | 157.4 | 888.0 | 19,631 | 143,964 | 1,290 | 9,461 | 7,871 | 57,722 |
| CA 710: LA TOTAL | Suburban | 4.96 | 10.18 | 5.22 | 680.1 18,174.5 | 3,736.4 93,925.7 | 3.498.0 | 214.1 14.689.8 | 267.3 15,949.2 | 1,287.6 87.696.4 | 34,005 908,725 | 212,976 5,586,341 | 2,222 174,898 | 13,917 913,331 | 13,363 797,461 | 83,697 5,220,436 |
| IUIAL | | 1 | | 1 | 10,174.5 | 93,923.7 | 3,490.0 | 14,009.0 | 10,949.2 | 01,090.4 | 900,725 | J,300,341 | 174,090 | 913,331 | 191,401 | 3,220,430 |

| TABLE P3d. VEHICLE | OPERATING CO | | | | | BASE VOLUME - A d Vehicle-Miles of | Nighttime Off-Pea | k Period Vehicle- | Daytime Off-De | ak Period Vehicle- | | , | /ehicle Oper | ating Costs (\$ | 1 | |
|---|-------------------|----------------|----------------|---------------------|-------------------|---------------------------------------|-------------------|-------------------|------------------|--------------------|-------------------|-------------------|------------------|------------------|------------------|------------------|
| Country | City/Suburban/ | Pos | st Mile of Se | gment | | One Direction | Miles of Travel | | | el. One Direction | Peal | | | Off-Peak | Daytime | Off-Peak |
| County | Rural | Begin | End | Langth (mi) | Truck | | | Other Veh. | | Other Veh. | Truck | Other Veh. | 9 | Other Veh. | | Other Veh. |
| I-5: Sacramento | Rural | 29.87 | 34.65 | Length (mi) 4.78 | 14,806 | Other Veh. 84,319 | Truck 1,356 | 7,722 | Truck 12,040 | 68,567 | 26,148 | 27,404 | Truck 2,395 | 2,510 | Truck 21,263 | 22,284 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 8,597 | 76,666 | 689 | 6,143 | 5,042 | 44,968 | 15,182 | 24,917 | 1,217 | 1,997 | 8,905 | 14,614 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 587 | 6,689 | 47 | 536 | 344 | 3,923 | 1.036 | 2,174 | 83 | 174 | 608 | 1,275 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 2,772 | 19,679 | 453 | 3,219 | 6,298 | 44,718 | 4,895 | 6,396 | 801 | 1,046 | 11,123 | 14,533 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 1,857 | 20,328 | 295 | 3,225 | 4,039 | 44,206 | 3,280 | 6,606 | 520 | 1,048 | 7,133 | 14,367 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 2,816 | 27,030 | 503 | 4,833 | 7,256 | 69,658 | 4,972 | 8,785 | 889 | 1,571 | 12,814 | 22,639 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 2,387 | 20,559 | 406 | 3,495 | 5,732 | 49,371 | 4,215 | 6,682 | 717 | 1,136 | 10,123 | 16,046 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 6,764 | 43,963 | 1,163 | 7,557 | 16,498 | 107,236 | 11,945 | 14,288 | 2,053 | 2,456 | 29,135 | 34,852 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 727 | 4,737 | 135 | 877 | 1,967 | 12,807 | 1,285 | 1,539 | 238 | 285 | 3,473 | 4,162 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 4,134 | 27,348 | 656 | 4,339 | 8,990 | 59,473 | 7,301 | 8,888 | 1,158 | 1,410 | 15,877 | 19,329 |
| I-5: Sacramento | Urban Rural | 14.46 | 16.7 14.46 | 2.24 14.46 | 3,427 30.366 | 23,117 97.605 | 544 19.359 | 3,668 62,226 | 7,453 51.495 | 50,271 165,519 | 6,052 53,627 | 7,513 31,722 | 960 34,188 | 1,192 20,223 | 13,162 90,941 | 16,338 53,794 |
| I-5: Sacramento I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 18.904 | 65,305 | 5,948 | 20,547 | 26,518 | 91,607 | 33,385 | 21,224 | 10.504 | 6,678 | 46,831 | 29,772 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 51,722 | 183,106 | 4,170 | 14,763 | 47,551 | 168,343 | 91,341 | 59,509 | 7,364 | 4,798 | 83,976 | 54,711 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 1,133 | 3,762 | 91 | 303 | 1,042 | 3,459 | 2.001 | 1,223 | 161 | 99 | 1.840 | 1,124 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 20,355 | 67,260 | 2,273 | 7,510 | 18,082 | 59,750 | 35,947 | 21,860 | 4,014 | 2,441 | 31,934 | 19,419 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 51,777 | 154,808 | 5,781 | 17,284 | 45,996 | 137,524 | 91,439 | 50,313 | 10,209 | 5,617 | 81,229 | 44,695 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 10,234 | 30,525 | 1,440 | 4,294 | 14,116 | 42,104 | 18,073 | 9,921 | 2,543 | 1,396 | 24,929 | 13,684 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 4,526 | 13,831 | 739 | 2,259 | 3,787 | 11,572 | 7,992 | 4,495 | 1,305 | 734 | 6,687 | 3,761 |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 6,549 | 26,196 | 1,753 | 7,013 | 13,528 | 54,111 | 11,566 | 8,514 | 3,096 | 2,279 | 23,890 | 17,586 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 11,785 | 80,813 | 4,586 | 31,450 | 13,091 | 89,769 | 20,813 | 26,264 | 8,100 | 10,221 | 23,119 | 29,175 |
| I-5: Merced | Rural | U | 32.45 | 32.45 | 33,748 | 138,237 | 13,134 | 53,798 | 37,488 | 153,558 | 59,599 | 44,927 | 23,194 | 17,484 | 66,205 | 49,906 |
| I-5: Fresno | Rural | 0 | 66.16 26.72 | 66.16 | 82,700 | 347,340 | 29,857 11,567 | 125,401 48,583 | 52,843 21,833 | 221,939 91,697 | 146,049 58,985 | 112,886 45,591 | 52,728 | 40,755 15,789 | 93,321 38,557 | 72,130 29,802 |
| I-5: Kings I-5: Kern | Rural Rural | 15.86 | 87.03 | 26.72 71.17 | 33,400 104,264 | 140,280 429,511 | 21,198 | 87,323 | 83,066 | 342,188 | 184,131 | 139,591 | 20,428 37,435 | 28,380 | 146,696 | 111,211 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 2.496 | 8.424 | 547 | 1.845 | 1,949 | 6.579 | 4,408 | 2.738 | 965 | 599 | 3,443 | 2,138 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 15.325 | 61.301 | 2.796 | 11.185 | 7,420 | 29.682 | 27.064 | 19,923 | 4.938 | 3,635 | 13,105 | 9,647 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 3,467 | 13,867 | 633 | 2,530 | 1,679 | 6,714 | 6,122 | 4,507 | 1,117 | 822 | 2,964 | 2,182 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 8,064 | 28,224 | 1,471 | 5,150 | 3,905 | 13,666 | 14,241 | 9,173 | 2,599 | 1,674 | 6,896 | 4,441 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 2,041 | 8,165 | 372 | 1,490 | 988 | 3,953 | 3,605 | 2,654 | 658 | 484 | 1,745 | |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 3,402 | 13,608 | 621 | 2,483 | 1,647 | 6,589 | 6,008 | 4,423 | 1,096 | 807 | 2,909 | 2,141 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 15,487 | 61,949 | 2,826 | 11,304 | 7,499 | 29,996 | 27,351 | 20,133 | 4,991 | 3,674 | 13,243 | 9,749 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 1,879 | 7,517 | 343 | 1,372 | 910 | 3,640 | 3,319 | 2,443 | 606 | 446 | 1,607 | 1,183 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 86.67 86.13 | 88.61 86.67 | 1.94 0.54 | 7,508 2,090 | 29,740 8,278 | 1,269 353 | 5,028 1,400 | 3,736 1,040 | 14,799 4,119 | 13,259 3,691 | 9,666 2,690 | 2,242 624 | 1,634 455 | 6,598 1,836 | 4,810 1,339 |
| I-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 5,302 | 21,002 | 896 | 3,551 | 2,638 | 10,451 | 9,363 | 6,826 | 1,583 | 1,154 | 4,659 | 3,397 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 24,497 | 97,039 | 4,141 | 16,405 | 12,190 | 48,287 | 43,262 | 31,538 | 7,314 | 5,332 | 21,528 | 15,693 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 17,384 | 151,192 | 2,939 | 25,560 | 8,651 | 75,234 | 30,701 | 49,137 | 5,190 | 8,307 | 15,277 | |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 3,395 | 26,366 | 574 | 4,457 | 1,689 | 13,120 | 5,995 | 8,569 | 1,013 | 1,449 | 2,983 | 4,264 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 5,287 | 45,977 | 894 | 7,773 | 2,631 | 22,879 | 9,336 | 14,943 | 1,578 | 2,526 | 4,646 | 7,436 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 10,850 | 94,366 | 1,834 | 15,953 | 5,399 | 46,957 | 19,162 | 30,669 | 3,240 | 5,185 | 9,535 | 15,261 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 9,843 | 97,272 | 1,197 | 11,832 | 8,646 | 85,440 | 17,383 | 31,613 | 2,114 | 3,846 | 15,268 | 27,768 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 3,203 | 53,528 | 390 | 6,511 | 2,813 | 47,016 | 5,656 | 17,396 | 688 | 2,116 | 4,968 | 15,280 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 17,888 | 241,488 | 1,898 | 25,618 | 11,414 | 154,094 | 31,590 | 78,484 | 3,351 | 8,326 | 20,158 | 50,081 |
| I-5: Los Angeles | Urban Urban | 46.9 46.6 | 47.13 46.9 | 0.23 | 791 919 | 10,681 14,578 | 81 93 | 1,098 1,481 | 507 571 | 6,851 9.057 | 1,397 1,624 | 3,471 4,738 | 144 165 | 357 481 | 896 1,009 | 2,226 2,944 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 2.411 | 32.200 | 245 | 3,270 | 1,498 | 20.006 | 4,258 | 10,465 | 432 | 1.063 | 2,645 | |
| I-5: Los Angeles | Urban | 45.93 | 45.93 | 0.83 | 2,659 | 40,333 | 294 | 4,452 | 2,027 | 30,745 | 4,236 | 13,108 | 518 | 1,447 | 3,580 | 9,992 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 4,399 | 53,563 | 546 | 6,650 | 4,320 | 52,602 | 7,768 | 17,408 | 965 | 2,161 | 7,629 | 17,096 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 302 | 5,161 | 45 | 771 | 334 | 5,706 | 534 | 1,677 | 80 | 251 | 590 | 1,854 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 8,303 | 120,612 | 1,158 | 16,821 | 8,019 | 116,487 | 14,663 | 39,199 | 2,045 | 5,467 | 14,162 | 37,858 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 1,784 | 22,270 | 554 | 6,910 | 9,007 | 112,425 | 3,151 | 7,238 | 978 | 2,246 | 15,907 | 36,538 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 523 | 8,037 | 86 | 1,328 | 1,161 | 17,844 | 924 | 2,612 | 153 | 432 | 2,051 | 5,799 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 463 | 8,280 | 79 | 1,414 | 1,078 | 19,286 | 817 | 2,691 | 140 | 460 | 1,904 | 6,268 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 36.65 36.43 | 39.36 36.65 | 2.71 0.22 | 9,009 723 | 127,153 10,120 | 1,002 85 | 14,149 1,191 | 13,836 1,216 | 195,280 17,025 | 15,910 1,277 | 41,325 3,289 | 1,770 150 | 4,598 387 | 24,435 2,148 | 63,466 5,533 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.22 | 662 | 9,274 | 81 | 1,191 | 1,216 | 16,637 | 1,277 | 3,289 | 143 | 387 | 2,148 | 5,533 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.21 | 550 | 9,274 8,758 | 61 | 975 | 845 | 13,451 | 971 | 2,846 | 108 | 317 | 1,492 | 4,372 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 14,102 | 224,554 | 1,482 | 23,599 | 19,672 | 313,231 | 24,905 | 72,980 | 2,617 | 7,670 | 34,740 | 101,800 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 2,253 | 34,325 | 236 | 3,590 | 3,117 | 47,479 | 3,979 | 11,156 | 416 | 1,167 | 5,504 | 15,431 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 14,190 | 241,637 | 1,633 | 27,800 | 23,014 | 391,886 | 25,060 | 78,532 | 2,883 | 9,035 | 40,643 | 127,363 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 1,297 | 22,088 | 149 | 2,541 | 2,104 | 35,821 | 2,291 | 7,178 | 264 | 826 | 3,715 | 11,642 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 4,514 | 63,392 | 352 | 4,949 | 2,999 | 42,114 | 7,971 | 20,602 | 622 | 1,609 | 5,296 | 13,687 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 4,189 | 58,644 | 342 | 4,790 | 3,105 | 43,469 | 7,398 | 19,059 | 604 | 1,557 | 5,483 | 14,127 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 13,660 | 198,426 | 1,148 | 16,671 | 10,805 | 156,951 | 24,123 | 64,488 | 2,027 | 5,418 | 19,081 | 51,009 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 931 | 13,518 | 66 | 956 | 1,360 | 19,750 | 1,643 | 4,394 | 116 | 311 | 2,401 | 6,419 |
| I-5: Los Angeles | Urban | 14.16 13.78 | 16.9 14.16 | 2.74 0.38 | 8,498 1,233 | 120,998 17,620 | 643 87 | 9,149 1,249 | 13,875 1.811 | 197,556 25,880 | 15,008 2,177 | 39,324 5,726 | 1,135 154 | 2,973 406 | 24,504 3,198 | 64,206 8,411 |
| I-5: Los Angeles CA 710: Los Angeles | Urban Suburban | 13.78 | 23.28 | 10.38 | 1,233 86,979 | 17,620 560,864 | 6,699 | 1,249 43,196 | 1,811 55,817 | 25,880 359,925 | 153,606 | 182,281 | 11,830 | 14,039 | 3,198 98,574 | 116,976 |
| CA 710. Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 19,631 | 143,964 | 1,290 | 9.461 | 7.871 | 57,722 | 34,669 | 46,788 | 2,278 | 3.075 | 13,901 | 18,760 |
| CA 710: LOS Angeles | Suburban | 4.96 | 10.18 | 5.22 | 34,005 | 212,976 | 2,222 | 13,917 | 13,363 | 83.697 | 60,052 | 69,217 | 3,924 | 4,523 | 23,600 | 27,201 |
| TOTAL | 222012011 | 1 | 1 | | 908,725 | 5,586,341 | 174,898 | 913,331 | 797,461 | 5,220,436 | 1,604,819 | | 308,871 | 296,833 | 1,408,324 | |
| | | | | | | | | | | | | | | | | |

| TABLE P3e. TRAVEL | | | | | | | Nighttime Off-Pea | k Period Vehicle | Daytime Off-Pea | k Period Vehicle | | | Travel Time | Costs (\$) | | |
|--------------------------------------|-----------------|----------------|----------------|----------------|------------------|--------------------|-------------------|------------------|-----------------|--------------------|------------------|------------------|----------------|-----------------|-----------------|------------------------------|
| County | City/Suburban/R | Pos | t Mile of Se | egment | | ne Direction | Hours of Travel | | | I, One Direction | Pe | ak | Nighttime | | Daytime | Off-Peak |
| County | ural | Begin | End | Length (mi) | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | | Other Veh. | Truck | Other Veh. |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 296.1 | 1,317.5 | 27.1 | 118.8 | 240.8 | 1,054.9 | 8,373 | 12,062 | 767 | 1,088 | 6,809 | 9,65 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 171.9 | 1,393.9 | 13.8 | 111.7 | 100.8 | 817.6 | 4,861 | 12,762 | 390 | 1,023 | 2,851 | 7,48 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 11.7 | 121.6 | 0.9 | 9.7 | 6.9 | 71.3 | 332 | 1,113 | 27 | 89 | 195 | 65 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 55.4 | 410.0 | 9.1 | 58.5 | 126.0 | 813.1 | 1,567 | 3,754 | 256 | 536 | 3,562 | 7,44 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 37.1 | 369.6 | 5.9 | 58.6 | 80.8 | 803.7 | 1,050 | 3,384 | 167 | 537 | 2,284 | 7,35 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 56.3 | 491.4 | 10.1 | 87.9 | 145.1 | 1,266.5 | 1,592 | 4,499 | 285 | 804 | 4,103 | 11,59 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 47.7 | 467.3 | 8.1 | 63.5 | 114.6 | 897.7 | 1,350 | 4,278 | 229 | 582 | 3,241 | 8,21 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 135.3 | 799.3 | 23.3 | 137.4 | 330.0 | 1,949.7 | 3,825 | 7,318 | 657 | 1,258 | 9,329 | 17,85 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 18.82 16.7 | 19.16 18.82 | 0.34 2.12 | 14.5 82.7 | 86.1 497.2 | 2.7 13.1 | 15.9 78.9 | 39.3 179.8 | 232.9 1,081.3 | 411 2,338 | 789 4,552 | 76 371 | 146 722 | 1,112 5,084 | 2,13 9,90 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.12 | 68.5 | 420.3 | 10.9 | 66.7 | 149.1 | 914.0 | 1,938 | 3,848 | 308 | 611 | 4,215 | 8,36 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 607.3 | 1,501.6 | 387.2 | 957.3 | 1.029.9 | 2,546.5 | 17,172 | 13,748 | 10,947 | 8,765 | 29,120 | 23,31 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 378.1 | 1,004.7 | 119.0 | 316.1 | 530.4 | 1,409.3 | 10,690 | 9,199 | 3,363 | 2,894 | 14,996 | 12.90 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 1,034.4 | 2,817.0 | 83.4 | 227.1 | 951.0 | 2,589.9 | 29,248 | 25,791 | 2,358 | 2,079 | 26,890 | 23,71 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 22.7 | 68.4 | 1.8 | 5.5 | 20.8 | 62.9 | 641 | 626 | 52 | 50 | 589 | 57 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 407.1 | 1,222.9 | 45.5 | 136.5 | 361.6 | 1,086.4 | 11,511 | 11,196 | 1,285 | 1,250 | 10,225 | 9,94 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1,035.5 | 2,381.7 | 115.6 | 265.9 | 919.9 | 2,115.7 | 29,279 | 21,805 | 3,269 | 2,435 | 26,010 | 19,37 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 204.7 | 469.6 | 28.8 | 66.1 | 282.3 | 647.7 | 5,787 | 4,300 | 814 | 605 | 7,982 | 5,93 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 90.5 | 212.8 | 14.8 | 34.7 | 75.7 | 178.0 | 2,559 | 1,948 | 418 | 318 | 2,141 | 1,63 |
| I-5: San Joaquin | Rural | U | 11.8 | 11.8 | 131.0 | 403.0 | 35.1 | 107.9 | 270.6 | 832.5 | 3,703 | 3,690 | 991 | 988 | 7,650 | 7,62 |
| I-5: Stanislaus | Rural Rural | 0 | 28.06 | 28.06 | 235.7 675.0 | 1,243.3 | 91.7 | 483.8 827.7 | 261.8 749.8 | 1,381.1 | 6,664 19,084 | 11,383 19.471 | 2,594 7.427 | 4,430 | 7,403 21,199 | 12,64 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | | 2,126.7 | 262.7 597.1 | 1.929.2 | 1.056.9 | 2,362.4 3.414.4 | , | | 16.884 | 7,578 17.663 | 29,882 | 21,62 |
| I-5: Fresno I-5: Kings | Rural | 0 | 66.16 26.72 | 66.16 26.72 | 1,654.0 668.0 | 5,343.7 2,158.2 | 231.3 | 747.4 | 436.7 | 3,414.4 1,410.7 | 46,766 18,887 | 48,924 19,759 | 6,541 | 6,843 | 12,346 | 31,26 ⁻ 12,910 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 2,085.3 | 6,607.9 | 424.0 | 1,343.4 | 1,661.3 | 5,264.4 | 58,960 | 60,498 | 11,987 | 12,300 | 46,973 | 48,199 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 49.9 | 129.6 | 10.9 | 28.4 | 39.0 | 101.2 | 1,411 | 1,187 | 309 | 260 | 1,102 | 92 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 306.5 | 943.1 | 55.9 | 172.1 | 148.4 | 456.6 | 8,666 | 8,634 | 1,581 | 1,576 | 4,196 | 4,18 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 69.3 | 213.3 | 12.7 | 38.9 | 33.6 | 103.3 | 1,960 | 1,953 | 358 | 356 | 949 | 94 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 161.3 | 434.2 | 29.4 | 79.2 | 78.1 | 210.2 | 4,560 | 3,975 | 832 | 725 | 2,208 | 1,92 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 40.8 | 125.6 | 7.4 | 22.9 | 19.8 | 60.8 | 1,154 | 1,150 | 211 | 210 | 559 | 55 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 68.0 | 209.4 | 12.4 | 38.2 | 32.9 | 101.4 | 1,924 | 1,917 | 351 | 350 | 931 | 928 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 309.7 | 953.1 | 56.5 | 173.9 | 150.0 | 461.5 | 8,758 | 8,726 | 1,598 | 1,592 | 4,241 | 4,22 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 37.6 | 115.6 | 6.9 | 21.1 | 18.2 | 56.0 | 1,063 | 1,059 | 194 | 193 | 515 | 513 |
| I-5: Los Angeles | Rural Rural | 86.67 86.13 | 88.61 86.67 | 1.94 0.54 | 150.2 41.8 | 457.5 127.4 | 25.4 7.1 | 77.4 21.5 | 74.7 20.8 | 227.7 63.4 | 4,246 1,182 | 4,189 1,166 | 718 200 | 708 197 | 2,113 588 | 2,084 580 |
| I-5: Los Angeles I-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 106.0 | 323.1 | 17.9 | 21.5 54.6 | 20.8 52.8 | 160.8 | 2,998 | 2,958 | 507 | 500 | 1,492 | 1,472 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 489.9 | 1,492,9 | 82.8 | 252.4 | 243.8 | 742.9 | 13.853 | 13,668 | 2,342 | 2.311 | 6,893 | 6,80 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 347.7 | 2,326.0 | 58.8 | 393.2 | 173.0 | 1,157.4 | 9,831 | 21,296 | 1,662 | 3,600 | 4,892 | 10,59 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 67.9 | 405.6 | 11.5 | 68.6 | 33.8 | 201.8 | 1,920 | 3,714 | 325 | 628 | 955 | 1,84 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 105.7 | 707.3 | 17.9 | 119.6 | 52.6 | 352.0 | 2,990 | 6,476 | 505 | 1,095 | 1,488 | 3,22 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 217.0 | 1,451.8 | 36.7 | 245.4 | 108.0 | 722.4 | 6,136 | 13,292 | 1,037 | 2,247 | 3,053 | 6,61 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 196.9 | 1,496.5 | 23.9 | 182.0 | 172.9 | 1,314.5 | 5,566 | 13,701 | 677 | 1,667 | 4,889 | 12,03 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 64.1 | 823.5 | 7.8 | 100.2 | 56.3 | 723.3 | 1,811 | 7,540 | 220 | 917 | 1,591 | 6,622 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 357.8 | 4,556.4 | 38.0 | 465.8 | 228.3 | 2,801.7 | 10,115 | 41,716 | 1,073 | 4,264 | 6,455 | 25,65 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 15.8 | 201.5 | 1.6 | 20.0 | 10.1 | 124.6 | 447 | 1,845 | 46 | 183 | 287 | 1,14 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 18.4 | 280.3 | 1.9 | 26.9 | 11.4 | 164.7 | 520 | 2,567 | 53 | 246 | 323 | 1,508 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 45.93 45.1 | 46.6 45.93 | 0.67 0.83 | 48.2 53.2 | 585.5 733.3 | 4.9 5.9 | 59.5 81.0 | 30.0 40.5 | 363.7 559.0 | 1,363 1,504 | 5,360 6.714 | 138 166 | 544 741 | 847 1,146 | 3,33 5,11 |
| I-5: Los Angeles | Urban | 44.01 | 45.93 | 1.09 | 88.0 | 973.9 | 10.9 | 120.9 | 86.4 | 956.4 | 2,488 | 8,916 | 309 | 1,107 | 2,443 | 8,75 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 6.0 | 95.6 | 0.9 | 14.0 | 6.7 | 103.7 | 2,400 | 875 | 26 | 1,107 | 2,443 189 | 95 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 166.1 | 2.192.9 | 23.2 | 305.8 | 160.4 | 2.118.0 | 4,695 | 20.078 | 655 | 2,800 | 4,535 | 19,39 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 35.7 | 404.9 | 11.1 | 125.6 | 180.1 | 2,121.2 | 1,009 | 3,707 | 313 | 1,150 | 5,093 | 19,42 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 10.5 | 146.1 | 1.7 | 24.1 | 23.2 | 324.4 | 296 | 1,338 | 49 | 221 | 657 | 2,97 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 9.3 | 150.5 | 1.6 | 25.7 | 21.6 | 350.7 | 262 | 1,378 | 45 | 235 | 610 | 3,21 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 180.2 | 2,399.1 | 20.0 | 257.3 | 276.7 | 3,550.5 | 5,095 | 21,965 | 567 | 2,355 | 7,824 | 32,50 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 14.5 | 184.0 | 1.7 | 21.7 | 24.3 | 309.5 | 409 | 1,685 | 48 | 198 | 688 | 2,83 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 13.2 | 231.8 | 1.6 | 20.7 | 23.8 | 302.5 | 375 | 2,123 | 46 | 189 | 672 | 2,77 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 11.0 | 159.2 | 1.2 | 17.7 | 16.9 | 244.6 | 311 | 1,458 | 35 | 162 | 478 | 2,23 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 282.0 | 4,082.8 | 29.6 | 429.1 | 393.4 | 5,695.1 | 7,975 | 37,380 | 838 | 3,928 | 11,124 | 52,14 |
| I-5: Los Angeles | Urban Urban | 28.25 | 29.16 28.25 | 0.91 5.47 | 45.1 283.8 | 647.6 4.393.4 | 4.7 32.7 | 65.3 505.5 | 62.3 460.3 | 863.3 7.125.2 | 1,274 8.025 | 5,930 40,224 | 133 923 | 598 4.628 | 1,762 13.014 | 7,90 65.23 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 22.78 | 28.25 | 0.5 | 283.8 | 4,393.4 | 32.7 | 505.5 46.2 | 460.3 42.1 | 7,125.2 651.3 | 8,025 734 | 40,224 4,494 | 923 | 4,628 | 13,014 | 5,96 |
| I-5: Los Angeles | Urban | 21.41 | 22.78 | 0.87 | 90.3 | 1,173.9 | 7.0 | 90.0 | 60.0 | 765.7 | 2,552 | 10.748 | 199 | 824 | 1,190 | 7,01 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 83.8 | 1,303.2 | 6.8 | 87.1 | 62.1 | 790.3 | 2,369 | 11,932 | 193 | 797 | 1,756 | 7,01 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 273.2 | 3,674.5 | 23.0 | 303.1 | 216.1 | 2,853.7 | 7,724 | 33,642 | 649 | 2,775 | 6,110 | 26,12 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 18.6 | 250.3 | 1.3 | 17.4 | 27.2 | 359.1 | 526 | 2,292 | 37 | 159 | 769 | 3,28 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 170.0 | 2,240.7 | 12.9 | 166.3 | 277.5 | 3,591.9 | 4,806 | 20,515 | 363 | 1,523 | 7,846 | 32,88 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 24.7 | 332.4 | 1.7 | 22.7 | 36.2 | 470.5 | 697 | 3,044 | 49 | 208 | 1,024 | 4,30 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 1,739.6 | 9,347.7 | 134.0 | 664.6 | 1,116.3 | 5,537.3 | 49,186 | 85,583 | 3,788 | 6,084 | 31,564 | 50,69 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 392.6 | 2,285.1 | 25.8 | 145.6 | 157.4 | 888.0 | 11,101 | 20,922 | 730 | 1,333 | 4,451 | 8,13 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 680.1 | 3,736.4 | 44.4 | 214.1 | 267.3 | 1,287.6 | 19,229 | 34,209 | 1,257 | 1,960 | 7,557 | 11,78 |
| TOTAL | 1 | | 1 | 1 | 18,174.5 | 93,925.7 | 3,498.0 | 14,689.8 | 15,949.2 | 87,696.4 | 513,873 | 859,938 | 98,903 | 134,492 | 450,954 | 802,90 |

TABLE P4. AUTOMATED AND NON-AUTOMATED TRUCK VEHICLE OPERATIONS COSTS PER MILE

| | Non-Au | tomated | Automated |
|--|------------------------|---------------------------|-----------------------|
| Cost Category | Unit Cost (1998 \$ per | 2001-Equiv. Unit Cost (\$ | 2001-Equiv. Unit Cost |
| | mile) | per mile) | (\$ per mile) |
| Driver Wages & Benefits | 0.389 | 0.408 | 0.136 |
| Other Wages and Benefits | 0.399 | 0.418 | 0.418 |
| Tires | 0.019 | 0.020 | 0.020 |
| Outside Maintenance | 0.052 | 0.055 | 0.055 |
| Fuel | 0.102 | 0.107 | 0.091 |
| Equipment Rents and Purchased Transportation | 0.404 | 0.424 | 0.424 |
| Insurance | 0.051 | 0.053 | 0.053 |
| Depreciation | 0.088 | 0.092 | 0.092 |
| Misc. | 0.18 | 0.189 | 0.189 |
| TOTAL | 1.684 | 1.766 | 1.478 |

APPENDIX Q DEDICATED TRUCK LANE PLANNING, DESIGN, CONSTRUCTION, AND REHABILITATION COSTS

Methodologies

Costs for incremental planning, design, construction, and rehabilitation of the added dedicated-truck lane (having a 48-foot cross section) were calculated on a segment-by-segment basis, in a similar fashion to those for the AHS lane. Cost calculations for the roadway surface are identical to those for the corresponding AHS system, since both systems have the same cross-sectional width. However, the dedicated truck system would not require construction or rehabilitation of the automation-related infrastructure of magnetic strips and transfer terminals. The incremental cost is the cost of building and maintaining the dedicated truck lane above the no-build option.

Calculation methodologies for the costs in the tables presented here are outlined in the main report.

Results

Tables 9.2 and 9.3 (in the main report) show unit costs for urban and rural sections. Table Q1 (in this appendix) shows costs associated with constructing the roadway area and barriers, itemized according to segment. Table Q2 shows costs for rehabilitation of the roadway area.

In addition, Table Q3 (also Table 10.2 in the main report) shows costs for interchange construction, and rehabilitation costs for interchanges are shown in Table Q4 (also Table 10.4 in the main report). Table Q5 (also Table 11.2 in the main report) summarizes maintenance costs for the travel lanes and interchanges.

| TABLE Q1. INCREME | NTAL CONSTR | UCTION COS | TS OF DED | ICATED TRU | | | | | | | | | | |
|--------------------------------------|----------------|----------------|----------------|--------------|--------------------------|---------------------------------|--------------------------|------------------------|-----------------------------------|----------------------------|--------------------|------------------|--------------------------|----------------------|
| | City/Suburban/ | Post I | Mile of Segn | nent | Dedicated | | Freeway Costs (\$ | 5) | | Barrier Co | osts (\$) | | Total Construc | ction Costs (\$) |
| County | Rural | Begin | End | Length (mi) | Lane Placement | 2001-Unit Cost per Lane Mile | Total Cost | EUAC | # of Barriers in One Direction | Unit Cost per Lane Mile | Total Cost | EUAC | Total Cost | EUATC |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | Median | 4.181.019 | 19.985.272 | 1,451,908 | 1.5 | 94.776 | 679,544 | 49,368 | 20,664,816 | 1,501,276 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | Median | 6,394,500 | 18,735,885 | 1,361,142 | 1.5 | 94,776 | 416,541 | 30,261 | 19,152,426 | 1,391,403 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | Non-Median | 23,979,375 | 5,994,844 | 435,519 | 2.0 | 94,776 | 47,388 | 3,443 | 6,042,232 | 438,962 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | Non-Median | 23,979,375 | 27,816,075 | 2,020,808 | 2.0 | 94,776 | 219,880 | 15,974 | 28,035,955 | 2,036,782 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | Non-Median | 23,979,375 | 24,458,963 | 1,776,917 | 2.0 | 94,776 | 193,343 | 14,046 | 24,652,306 | |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | Non-Median | 23,979,375 | 33,810,919 | 2,456,326 | 2.0 | 94,776 | 267,268 | 19,417 | 34,078,187 | 2,475,743 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | Non-Median | 23,979,375 | 26,377,313 | 1,916,283 | 2.0 | 94,776 | 208,507 | 15,148 | 26,585,820 | |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 19.16 18.82 | 22 19.16 | 2.84 0.34 | Non-Median Non-Median | 23,979,375 23,979,375 | 68,101,425 8,152,988 | 4,947,494 592,306 | 2.0 | 94,776 94,776 | 538,328 64,448 | 39,109 4,682 | 68,639,753 8,217,435 | |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | Non-Median | 23,979,375 | 50,836,275 | 3,693,200 | 2.0 | 94,776 | 401,850 | 29,194 | 51,238,125 | |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | Median | 6,394,500 | 14,323,680 | 1,040,600 | 1.5 | 94,776 | 318,447 | 23,135 | 14,642,127 | 1,063,735 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | Median | 4,181,019 | 60,457,538 | 4,392,174 | 1.5 | 94,776 | 2,055,691 | 149,344 | 62,513,230 | 4,541,518 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | Median | 4,181,019 | 39,050,720 | 2,836,992 | 1.5 | 94,776 | 1,327,812 | 96,464 | 40,378,531 | 2,933,456 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | Median | 4,181,019 | 49,712,319 | 3,611,546 | 1.5 | 94,776 | 1,690,330 | 122,801 | 51,402,649 | 3,734,346 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | Non-Median | 6,968,365 | 1,533,040 | 111,374 | 2.0 | 94,776 | 41,701 | 3,030 | 1,574,742 | 114,403 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | Non-Median | 23,979,375 | 84,886,988 | 6,166,947 | 2.0 | 94,776 | 671,014 | 48,748 | 85,558,002 | 6,215,696 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | Median | 4,181,019 | 43,733,461 | 3,177,188 | 1.5 | 94,776 | 1,487,035 | 108,032 | 45,220,497 | 3,285,220 |
| I-5: San Joaquin I-5: San Joaquin | Rural Rural | 12.69 11.8 | 14.34 12.69 | 1.65 0.89 | Median Median | 4,181,019 4,181,019 | 6,898,682 3,721,107 | 501,182 270,334 | 1.5 1.5 | 94,776 94,776 | 234,571 126,526 | 17,041 9,192 | 7,133,252 3,847,633 | 518,223 279,526 |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | Median | 4,181,019 | 49.336.027 | 3,584,209 | 1.5 | 94,776 | 1.677.535 | 121.871 | 51,013,562 | 3,706,080 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | Median | 4,181,019 | 117,319,400 | 8,523,127 | 1.5 | 94,776 | 3,989,122 | 289,805 | 121,308,521 | 8,812,932 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | Median | 4,181,019 | 135,674,074 | 9,856,574 | 1.5 | 94,776 | 4,613,222 | 335,146 | 140,287,296 | |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | Median | 4,181,019 | 276,616,232 | 20,095,868 | 1.5 | 94,776 | 9,405,570 | 683,304 | 286,021,803 | |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | Median | 4,181,019 | 111,716,834 | 8,116,106 | 1.5 | 94,776 | 3,798,622 | 275,966 | 115,515,456 | |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | Median | 4,181,019 | 297,563,139 | 21,617,638 | 1.5 | 94,776 | 10,117,812 | 735,048 | 307,680,951 | 22,352,686 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | Median | 4,181,019 | 3,261,195 | 236,922 | 1.5 | 94,776 | 110,888 | 8,056 | 3,372,083 | 244,978 |
| I-5: Kern | Rural Rural | 10.35 9.28 | 15.08 10.35 | 4.73 1.07 | Non-Median Median | 6,968,365 4,181,019 | 32,960,368 4,473,691 | 2,394,535 325,009 | 2.0 1.5 | 94,776 94,776 | 896,581 152,115 | 65,136 11,051 | 33,856,949 4,625,806 | |
| I-5: Kern I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | Non-Median | 6,968,365 | 15,609,138 | 1,133,987 | 2.0 | 94,776 | 424,596 | 30,846 | 16,033,735 | 1,164,833 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | Median | 4,181,019 | 2,634,042 | 191,360 | 1.5 | 94,776 | 89,563 | 6,507 | 2,723,605 | 197,867 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | Non-Median | 6,968,365 | 7,316,784 | 531,556 | 2.0 | 94,776 | 199,030 | 14,459 | 7,515,813 | 546,016 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | Non-Median | 6,968,365 | 33,308,787 | 2,419,847 | 2.0 | 94,776 | 906,059 | 65,824 | 34,214,845 | 2,485,671 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | Non-Median | 6,968,365 | 4,041,652 | 293,622 | 2.0 | 94,776 | 109,940 | 7,987 | 4,151,592 | 301,609 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | Non-Median | 6,968,365 | 13,518,629 | 982,114 | 2.0 | 94,776 | 367,731 | 26,715 | 13,886,360 | |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | Non-Median | 6,968,365 | 3,762,917 | 273,372 | 2.0 | 94,776 | 102,358 | 7,436 | 3,865,275 | 280,808 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 84.76 78.43 | 86.13 84.76 | 1.37 6.33 | Non-Median Median | 6,968,365 4,181,019 | 9,546,661 26,465,852 | 693,554 1,922,715 | 2.0 1.5 | 94,776 94,776 | 259,686 899,898 | 18,866 65,377 | 9,806,347 27,365,750 | 712,420 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | Non-Median | 6,968,365 | 61,182,248 | 4,444,824 | 2.0 | 94,776 | 1,664,267 | 120,907 | 62,846,515 | 4,565,731 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | Median | 4,181,019 | 6,480,580 | 470,807 | 1.5 | 94,776 | 220,354 | 16,008 | 6,700,934 | 486,816 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | Non-Median | 6,968,365 | 18,605,536 | 1,351,672 | 2.0 | 94,776 | 506,104 | 36,768 | 19,111,639 | |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | Median | 4,181,019 | 22,911,985 | 1,664,531 | 1.5 | 94,776 | 779,059 | 56,598 | 23,691,044 | |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | Non-Median | 6,968,365 | 40,346,836 | 2,931,154 | 2.0 | 94,776 | 1,097,506 | 79,733 | 41,444,342 | |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | Non-Median | 6,968,365 | 12,752,109 | 926,427 | 2.0 | 94,776 | 346,880 | 25,200 | 13,098,989 | |
| I-5: Los Angeles | Urban Urban | 47.13 46.9 | 52.33 47.13 | 5.2 0.23 | Non-Median Non-Median | 23,979,375 23,979,375 | 124,692,750 5.515,256 | 9,058,793 400,677 | 2.0 | 94,776 94,776 | 985,670 43,597 | 71,608 3,167 | 125,678,420 5.558.853 | 9,130,400 403,845 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.23 | Non-Median | 23,979,375 | 7,193,812 | 522,623 | 2.0 | 94,776 | 43,597 56.866 | 4,131 | 7,250,678 | 526.754 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | Non-Median | 23,979,375 | 16,066,181 | 1,167,191 | 2.0 | 94,776 | 127,000 | 9,226 | 16,193,181 | 1,176,417 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | Non-Median | 23,979,375 | 19,902,881 | 1,445,923 | 2.0 | 94,776 | 157,328 | 11,430 | 20,060,209 | |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | Non-Median | 23,979,375 | 26,137,519 | 1,898,862 | 2.0 | 94,776 | 206,612 | 15,010 | 26,344,130 | |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | Non-Median | 23,979,375 | 2,637,731 | 191,628 | 2.0 | 94,776 | 20,851 | 1,515 | 2,658,582 | 193,143 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | Non-Median | 23,979,375 | 55,152,562 | 4,006,774 | 2.0 | 94,776 | 435,970 | 31,673 | 55,588,532 | 4,038,446 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | Non-Median | 23,979,375 | 31,892,569 | 2,316,960 | 2.0 | 94,776 | 252,104 | 18,315 | 32,144,673 | 2,335,275 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | Non-Median | 23,979,375 | 11,030,513 | 801,355 | 2.0 | 94,776 | 87,194 | 6,335 | 11,117,706 | 807,689 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 39.36 36.65 | 39.81 39.36 | 0.45 2.71 | Non-Median Non-Median | 23,979,375 23,979,375 | 10,790,719 64,984,106 | 783,934 4,721,025 | 2.0 | 94,776 94,776 | 85,298 513,686 | 6,197 37,319 | 10,876,017 65,497,792 | 790,131 4,758,343 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | Median | 6,394,500 | 1,406,790 | 102,202 | 1.5 | 94,776 | 31,276 | 2,272 | 1,438,066 | 104,474 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.22 | Median | 6,394,500 | 1,342,845 | 97,556 | 1.5 | 94,776 | 29,854 | 2,169 | 1,372,699 | |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | Non-Median | 23,979,375 | 6,714,225 | 487,781 | 2.0 | 94,776 | 53,075 | 3,856 | 6,767,300 | |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | Non-Median | 23,979,375 | 162,580,163 | 11,811,272 | 2.0 | 94,776 | 1,285,163 | 93,366 | 163,865,325 | |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | Non-Median | 23,979,375 | 21,821,231 | 1,585,289 | 2.0 | 94,776 | 172,492 | 12,531 | 21,993,724 | |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | Non-Median | 23,979,375 | 131,167,181 | 9,529,153 | 2.0 | 94,776 | 1,036,849 | 75,326 | 132,204,031 | 9,604,479 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | Non-Median | 23,979,375 | 11,989,688 | 871,038 | 2.0 | 94,776 | 94,776 | 6,885 | 12,084,464 | 877,923 |
| I-5: Los Angeles | Urban Urban | 21.41 | 22.28 | 0.87 0.83 | Non-Median Non-Median | 23,979,375 23,979,375 | 20,862,056 19,902,881 | 1,515,606 1,445,923 | 2.0 | 94,776 94,776 | 164,910 157,328 | 11,981 11,430 | 21,026,966 20,060,209 | 1,527,586 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | Non-Median | 23,979,375 | 19,902,881 80,810,494 | 5,870,794 | 2.0 | 94,776 | 157,328 638,790 | 11,430 46,407 | 81,449,284 | 5,917,202 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | Median | 6,394,500 | 1,982,295 | 144,012 | 1.5 | 94,776 | 44,071 | 3,202 | 2,026,366 | 147,213 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | Non-Median | 23,979,375 | 65,703,488 | 4,773,287 | 2.0 | 94,776 | 519,372 | 37,732 | 66,222,860 | 4,811,019 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | Median | 6,394,500 | 2,429,910 | 176,530 | 1.5 | 94,776 | 54,022 | 3,925 | 2,483,932 | 180,455 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | Non-Median | 15,473,870 | 159,535,602 | 11,590,088 | 2.0 | 94,776 | 1,954,281 | 141,976 | 161,489,883 | 11,732,064 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | Non-Median | 15,473,870 | 43,172,098 | 3,136,406 | 2.0 | 94,776 | 528,850 | 38,420 | 43,700,948 | 3,174,826 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | Non-Median | 15,473,870 | 80,773,602 | 5,868,114 | 2.0 | 94,776 | 989,461 | 71,883 | 81,763,064 | |
| TOTAL | | I | 1 | 1 | l | | 3,084,183,353 | 224,062,563 | | | 64,451,471 | 4,682,329 | 3,148,634,824 | 228,744,893 |

TABLE Q2. INCREMENTAL REHABILITATION OF DEDICATED TRUCK LANE COSTS FOR ROADWAY SPACE

| Court | City/Suburban/R | | at Mile of Se | | Dedicated Lane | ROADWAY SPACE | Rehabilitation Costs (\$) | |
|------------------------------------|-----------------|----------------|----------------|---------------|--------------------------|---------------------------------|---------------------------|---------------|
| County | ural | Begin | End | Length (mi) | Placement | 2001-Unit Cost per Lane Mile | Total Cost | EUAC |
| -5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | Median | 181,178 | 866,028 | 54,74 |
| -5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | Median | 399,656 | 1,170,993 | 74,02 |
| -5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | Non-Median | 1,278,900 | 319,725 | 20,2 |
| -5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | Non-Median | 1,278,900 | 1,483,524 | 93,7 |
| -5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | Non-Median | 1,278,900 | 1,304,478 | 82,4 |
| -5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | Non-Median | 1,278,900 | 1,803,249 | 114,0 |
| -5: Sacramento | Urban | 22 | 23.1 | 1.1 | Non-Median | 1,278,900 | 1,406,790 | 88,9 |
| -5: Sacramento | Urban | 19.16 | 22 | 2.84 | Non-Median | 1,278,900 | 3,632,076 | 229,6 |
| -5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | Non-Median | 1,278,900 | 434,826 | 27,4 |
| -5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | Non-Median | 1,278,900 | 2,711,268 | 171,4 |
| -5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | Median | 399,656 | 895,230 | 56,5 |
| -5: Sacramento | Rural | 0 | 14.46 | 14.46 | Median | 181,178 | 2,619,827 | 165,6 |
| -5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | Median | 181,178 | 1,692,198 | 106,9 |
| -5: San Joaquin -5: San Joaquin | Rural Urban | 28.56 28.34 | 40.45 28.56 | 11.89 0.22 | Median Non-Median | 181,178 1,278,900 | 2,154,200 281,358 | 136,1 17,7 |
| -5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | Non-Median | 1,278,900 | 4,527,306 | 286,2 |
| -5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | Median | 181,178 | 1,895,117 | 119,8 |
| -5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | Median | 181,178 | 298,943 | 18,8 |
| -5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | Median | 181,178 | 161,248 | 10,1 |
| l-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | Median | 181,178 | 2,137,895 | 135,1 |
| l-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | Median | 181,178 | 5,083,841 | 321,3 |
| -5: Merced | Rural | 0 | 32.45 | 32.45 | Median | 181,178 | 5,879,210 | 371,6 |
| -5: Fresno | Rural | 0 | 66.16 | 66.16 | Median | 181.178 | 11,986,703 | 757.7 |
| -5: Kings | Rural | 0 | 26.72 | 26.72 | Median | 181,178 | 4,841,063 | 306,0 |
| l-5: Kern | Rural | 15.86 | 87.03 | 71.17 | Median | 181,178 | 12,894,403 | 815,1 |
| -5: Kern | Rural | 15.08 | 15.86 | 0.78 | Median | 181,178 | 141,318 | 8,9 |
| -5: Kern | Rural | 10.35 | 15.08 | 4.73 | Non-Median | 1,672,408 | 7,910,488 | 500,0 |
| l-5: Kern | Rural | 9.28 | 10.35 | 1.07 | Median | 181,178 | 193,860 | 12,2 |
| l-5: Kern | Rural | 7.04 | 9.28 | 2.24 | Non-Median | 1,672,408 | 3,746,193 | 236,8 |
| -5: Kern | Rural | 6.41 | 7.04 | 0.63 | Median | 181,178 | 114,142 | 7,2 |
| l-5: Kern | Rural | 5.36 | 6.41 | 1.05 | Non-Median | 1,672,408 | 1,756,028 | 111,0 |
| l-5: Kern | Rural | 0.58 | 5.36 | 4.78 | Non-Median | 1,672,408 | 7,994,109 | 505,3 |
| -5: Kern | Rural | 0 | 0.58 | 0.58 | Non-Median | 1,672,408 | 969,996 | 61,3 |
| l-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | Non-Median | 1,672,408 | 3,244,471 | 205,1 |
| l-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | Non-Median | 1,672,408 | 903,100 | 57,0 |
| l-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | Non-Median | 1,672,408 | 2,291,199 | 144,8 |
| l-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | Median | 181,178 | 1,146,854 | 72,5 |
| l-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | Non-Median | 1,672,408 | 14,683,740 | 928,2 |
| l-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | Median | 181,178 | 280,825 | 17,7 |
| l-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | Non-Median | 1,672,408 | 4,465,329 | 282,2 |
| l-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | Median | 181,178 | 992,853 | 62,7 |
| -5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | Non-Median | 1,672,408 | 9,683,241 | 612,1 |
| -5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | Non-Median | 1,672,408 | 3,060,506 | 193,4 |
| l-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | Non-Median | 1,278,900 | 6,650,280 | 420,4 |
| -5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | Non-Median | 1,278,900 | 294,147 | 18,5 |
| l-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | Non-Median | 1,278,900 | 383,670 | 24,2 |
| -5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | Non-Median | 1,278,900 | 856,863 | 54,1 |
| -5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | Non-Median | 1,278,900 | 1,061,487 | 67,1 |
| l-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | Non-Median | 1,278,900 | 1,394,001 | 88,1 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | Non-Median | 1,278,900 | 140,679 | 8,8 |
| -5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | Non-Median | 1,278,900 | 2,941,470 | 185,9 |
| -5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | Non-Median | 1,278,900 | 1,700,937 | 107,5 |
| -5: Los Angeles | Urban Urban | 39.81 | 40.27 39.81 | 0.46 | Non-Median Non-Median | 1,278,900 1,278,900 | 588,294 575,505 | 37,1 36,3 |
| -5: Los Angeles | Urban | 39.36 | | 0.45 2.71 | Non-Median | | 3,465,819 | |
| -5: Los Angeles -5: Los Angeles | Urban | 36.65 36.43 | 39.36 36.65 | 0.22 | | 1,278,900 399,656 | 3,465,819 87,924 | 219,1 5,5 |
| -5: Los Angeles -5: Los Angeles | Urban | 36.22 | 36.43 | 0.22 | Median Median | 399,656 | 87,924 83,928 | 5,5 |
| -5: Los Angeles -5: Los Angeles | Urban | 35.94 | 36.22 | 0.21 | Non-Median | 1,278,900 | 358,092 | 22,6 |
| -5: Los Angeles -5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | Non-Median | 1,278,900 | 8,670,942 | 548,1 |
| -5: Los Angeles -5: Los Angeles | Urban | 28.25 | 29.16 | 0.76 | Non-Median | 1,278,900 | 1,163,799 | 73,5 |
| -5: Los Angeles -5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | Non-Median | 1,278,900 | 6,995,583 | 442,2 |
| -5: Los Angeles | Urban | 22.78 | 22.78 | 0.5 | Non-Median | 1,278,900 | 639,450 | 442,2 |
| -5: Los Angeles | Urban | 21.41 | 22.78 | 0.87 | Non-Median | 1,278,900 | 1,112,643 | 70,3 |
| -5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | Non-Median | 1,278,900 | 1,061,487 | 67,1 |
| -5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | Non-Median | 1,278,900 | 4,309,893 | 272,4 |
| -5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | Median | 399,656 | 123,893 | 7,8 |
| -5: Los Angeles -5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | Non-Median | 1,278,900 | 3,504,186 | 221,5 |
| -5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | Median | 181,178 | 68,847 | 4,3 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | Non-Median | 1,475,654 | 15,213,991 | 961,8 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | Non-Median | 1,475,654 | 4,117,074 | 260,2 |
| CA 710: LOS Angeles | Suburban | 4.96 | 10.18 | 5.22 | Non-Median | 1,475,654 | 7,702,913 | 486,9 |
| | Capaiban | 1.00 | 10.10 | J | | 1, 770,004 | 211,327,547 | 13,359,9 |

| Interchange | Interchange Type | Unit Cost | Unit Cost | EUAC |
|---------------|------------------|------------|-------------|------------|
| | | | | |
| Long Beach | Suburban** | 35,000,000 | 36,235,500 | 2,632,470 |
| Commerce | Suburban** | 35,000,000 | 36,235,500 | 2,632,470 |
| Sylmar | Urban | 50,000,000 | 51,765,000 | 3,760,671 |
| Wheeler Ridge | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Lost Hills | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Coalinga | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Los Banos | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Vernalis | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Lathrop | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| Sacramento | Rural | 20,000,000 | 20,706,000 | 1,504,268 |
| TOTAL | | | 269,178,000 | 19,555,489 |

^{*} Freeway costs in this study are assumed to correspond to the highest values in each range (see Table 10.2 in main report).

TABLE Q4. DEDICATED LANE INTERCHANGE REHABILITATION COSTS (\$)

| Interchange | Interchange Type (Urban/Rural) | Unit Cost (2001) | Length (mi) | Total Cost | EUAC |
|---------------|--------------------------------------|---------------------|-------------|------------|-----------|
| Long Beach | Suburban** | 1,475,654 | 2 | 2,951,308 | 214,265 |
| Commerce | Suburban** | 1,475,654 | 2 | 2,951,308 | 214,265 |
| Sylmar | Urban | 1,278,900 | 2 | 2,557,800 | 185,696 |
| Wheeler Ridge | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Lost Hills | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Coalinga | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Los Banos | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Vernalis | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Lathrop | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| Sacramento | Rural | 1,672,408 | 2 | 3,344,815 | 242,834 |
| TOTAL | | | 20 | 31,874,123 | 2,314,061 |

TABLE Q5. SUMMARY OF DEDICATED-TRUCK-LANE MAINTENANCE COSTS (\$)

| Cost Category | EUAC |
|---------------|--------|
| Travel Lane | 86,479 |
| Interchange | 4,138 |
| TOTAL | 90,617 |

^{**}Suburban values are an average of the rural and urban high values.

APPENDIX R

DEDICATED TRUCK LANE VEHICLE-HOURS AND VEHICLE-MILES, VEHICLE OPERATING COSTS, AND USER COSTS

Methodologies

The calculation procedures for determining vehicle-revenue-miles, vehicle-revenue-hours, vehicle operating costs, and user travel-time costs for the dedicated-truck-lane option are similar to those presented in Appendix P, for the AHS lane. There is one notable exception: for the AHS lane, truck operations unit costs were reduced because the convoying ability of AHS vehicles would reduce costs related to drivers and fuel (see Appendix P). For the dedicated-truck-lane option, however, convoying capability is not available. Thus, unit costs for vehicle operations for trucks operating on the dedicated truck lane were assumed to be equal to those for trucks operating on the conventional freeway lanes (see Appendix M), or \$1.77 per vehicle-mile.

Results

The details for the calculations of vehicle-miles and vehicle-hours of travel, and also for operations and user costs, are shown in Tables R1a through R1e for the existing configuration of the freeway, Tables R2a through R2e for the added dedicated truck lane, and Tables R3a through R3e for the existing conventional lanes with the added dedicated truck lane in operation. Tables R1a through R3a show the flow rates, duration, and volumes for the various periods of the day for which analysis was conducted. The passenger-car equivalents and speeds are shown in Tables R1b through R3b. The vehicle-hours and –miles of travel calculations are presented in Tables R1c through R3c. Tables R1d through R3d show details of vehicle operating costs calculations, and Tables R1e through R3e show user cost calculations.

Table R1a. SECTION VOLUME DATA - BASE CONDITION - BASE VOLUME - SEGMENTATION 48 FT. BASIS Peak Period Peak Period Nighttime Off-Nighttime Off-Nighttime Off-Peak Nighttime Off-Peak Daytime Off-Peal Daytime Off-Peak Daytime Off-Pea Conventional ruck AAD City/Suburban Post Mile of Segment Dedicated Lane AADT (One County Truck % (One Period Flow, One Volume, One Peak Period Peak Period % Period Volume, One Period Flow, One Period Duration Period Volume, One Period Flow, On Freeway Lanes Direction) Begin End Length in One Direction Direction Duratio Direction (vph Direction (veh uration (hour AADT Direction (veh) Direction (vph) (hours) Direction (veh) Direction (vph) I-5: Sacramento Rural 20 87 34.65 4 78 Median 40.000 16.0% 6.400 3 500 21 000 4.81% 1 023 17 077 1 314 I-5: Sacramento Urban 26.94 29.87 2.93 Median 49.000 11.0% 5.390 4.900 29.400 4.81% 2.356 471 13 17.244 1.326 I-5: Sacramento Urban 26.69 26.94 0.25 Non-Median 49.000 9.0% 4.410 4.900 29,400 4.81% 2.356 471 13 17.244 1.326 532 I-5: Sacramento Urban 26.69 1 16 Non-Median 67.000 13.0% 8 710 6.500 19.500 4.76% 3.189 15 44.311 2.954 6,570 4.76% 579 47,625 Urban 1.02 Non-Median 9.0% 7.300 3.475 3.175 5: Sacramento 24.51 25.53 73.000 21.900 1.41 I-5: Sacramento Urban 23.1 24.51 Non-Median 80.000 10.0% 8.000 7.100 21.300 4.76% 3.808 635 15 54.892 3.659 I-5: Sacramento Urban Non-Median 75.000 11.0% 8.250 7.000 21.000 4.76% 3.570 595 15 50,430 3,362 23.1 I-5: Sacramento Urban 19.16 2.84 Non-Median 65.000 14.0% 9,100 6,000 18,000 4.76% 3,094 516 43,906 2,927 Non-Median 500 I-5: Sacramento Urban 19.16 0.34 63,000 14.0% 8,820 5,400 16,200 4.76% 2,920 5: Sacrament Urban 2 12 Non-Median 50,000 14.0% 7 000 5,000 15,000 4.76% 2 380 307 15 32 620 2 175 -5: Sacramento Urban 14.46 16.7 2 24 Median 40 000 14 0% 5 600 4 000 12.000 4 76% 1 904 317 15 26 006 1 740 I-5: Sacramento Rural 14.46 14.46 Median 30.000 25.0% 7.500 3 3.000 9.000 11 19.13% 5.738 522 10 15.262 1.526 I-5: San Joaquin Rural 40.45 49.79 9.34 Median 25.000 24.0% 6.000 4 2.300 9.200 11.58% 2.895 362 12 12.905 1.075 Rural Median 4.03% 18.387 I-5: San Joaquin 28.56 40.45 11.89 40.000 23.0% 9.200 4.000 20.000 1.613 323 14 1.313 I-5: San Joaquin Urban 28.56 0 22 Non-Median 45.000 24.0% 10.800 4.500 22.500 4.03% 1.814 363 14 20.686 1.478 5.000 5.58% 1.586 I-5: San Joaquin Urban 24.8 28.34 3.54 Non-Median 50.000 24.0% 12.000 25.000 2.791 558 14 22,209 I-5: San Joaquin Rural 14.34 10.46 Median 10,400 20.000 5.58% 2.233 17.767 1.269 24.8 40.000 26.0% 4.000 447 14 14 I-5: San Joaquin Rural 12.69 14.34 1.65 Median 63,000 26.0% 16,380 5,000 25,000 3,517 703 34,483 2,463 Media 10.920 8.17% 3.430 17.570 13 5: San Joaquin Rural 11.8 Mediar 10,000 26.0% 2,600 1.000 3,000 4.000 8.03% 15.57% 803 161 16 6.197 387 Rural 28.06 28.06 Median 10.000 28.0% 2.800 4 1.000 14 4 443 -5: Merced Rural Median 15 000 29.0% 1 500 15.57% 2 335 389 6 665 476 32 45 32 45 4.350 6.000 14 I-5: Fresno Median 15.000 1.500 Rural 66.16 66.16 30.0% 4.500 5 7.500 18.05% 2.708 387 12 4.792 399 I-5: Kinas Rural 26.72 26.72 Median 15.000 30.0% 4.500 1.500 7.500 17.32% 2.597 371 12 4.903 409 I-5: Kern Rural 15.86 87.03 71.17 Median 17,000 29.0% 4.930 1.700 8.500 10.17% 1.728 346 14 6.772 484 15.000 11.716 I-5: Kern Rural 15.08 15.86 0.78 Median 30.000 28.0% 8.400 3.000 10.95% 3.284 547 13 901 Rural Non-Mediar 8,400 18,000 10.95% 3,284 547 8,716 I-5: Kern 15.08 4.73 30,000 28.0% 3,000 726 18,000 Median 10.95% 547 Rural 30,000 28.0% 8,400 3,000 8,716 726 Rural Non-Median 10.95% 8,716 I-5: Kern 30.0% 9,000 18,000 547 l-5: Kern 6.41 Median 30,000 28.0% 8 400 3,000 18,000 10.95% 3 284 547 8 716 Rural l-5: Kern Rural 5.36 6 41 1.05 Non-Median 30,000 28.0% 8 400 3 000 18 000 10.95% 3 284 547 12 8 716 726 I-5: Kern Rural 0.58 5.36 4 78 4 Non-Median 30 000 28.0% 8 400 6 3 000 18 000 10 95% 3 284 547 12 8 716 726 I-5: Kern Rural 0.58 0.58 4 Non-Median 30 000 28.0% 8 400 3 000 18 000 10 95% 3 284 547 12 8 716 726 I-5: Los Angeles Rural 86.67 88.61 1.94 Non-Median 35.000 27.0% 9.450 3.500 21.000 10.14% 3.550 592 12 10.450 871 0.54 I-5: Los Angeles Rural 86.13 86.67 Non-Median 35.000 27.0% 9.450 3.500 21.000 10.14% 3.550 592 12 10.450 871 86.13 1.37 Non-Median 9,450 3,500 10.14% 3,550 592 10,450 871 I-5: Los Angeles Rural 84.76 35,000 27.0% 21,000 12 Rural Median 9,450 21,000 10.14% 592 871 5: Los Angeles 35,000 27.0% 3,500 5: Los Angeles Rural Non-Median 18.0% 6,300 21,000 10.14% 950 78.43 35,000 3,500 5: Los Angeles Rural Median 35,000 19.0% 6,650 10 14% 11 10.450 950 -5: Los Angeles Rural 65 43 68.1 Non-Median 35.000 18.0% 6.300 6 3 500 21.000 10 14% 3.550 507 11 10.450 950 I-5: Los Angeles Rural 59 95 65 43 5 48 4 Median 35,000 18.0% 6.300 6 3.500 21 000 10 14% 3 550 507 11 10 450 950 I-5: Los Angeles Rural 54 16 59 95 5.79 4 Non-Median 40 000 16.0% 6.400 4 000 20.000 6.08% 2 433 487 14 17 567 1 255 I-5: Los Angeles Rural 52 33 54.16 1.83 Non-Median 65 000 10.0% 6.500 6.500 32.500 6.08% 3.953 791 14 28.547 2,039 I-5: Los Angeles Urban 47 13 52 33 Non-Median 90.000 10.0% 9 000 8 600 51.600 5.89% 5 474 1 095 13 32 926 2.533 Non-Median 9,000 51,600 1,061 I-5: Los Angeles Urban 46.9 47.13 0.23 90,000 10.0% 8,600 5.89% 5,305 13 33,095 2,546 Urban Non-Median 9.0% 8,280 8,900 53,400 5.89% 5,423 1,085 13 33,177 2,552 -5: Los Angeles 46.6 46.9 92,000 Non-Median -5: Los Angeles Urban 46.6 10.0% 9,200 53,400 5,423 1,085 13 33,177 2,552 92,000 8,900 5.89% 5: Los Angeles Non-Median 100,000 9,000 8,900 53,400 1.179 40,705 3,131 Urban -5: Los Angeles Urban 1.09 Non-Median 115,000 10.0% 11,500 9,100 54,600 5.89% 1,356 13 4,125 115.000 8.0% Urban 43 Q 44.01 0.11 Non-Median 9.200 8.500 51,000 6.62% 7.618 1.524 13 56.382 4,337 I-5: Los Angeles 6 I-5: Los Angeles Urban 41.6 43.9 23 Non-Median 120 000 8.0% 9 600 6 9.500 57.000 6.62% 7 949 1 590 13 55 051 4 235 I-5: Los Angeles Urban 41.6 Non-Median 117,000 10.530 4.600 18,400 4.88% 5.710 1.142 15 92.890 6.193 40.27 1 33 9.0% -5: Los Angeles Urban 39.81 40.27 0.46 Non-Median 65.000 9.0% 5.850 4 4.800 19,200 4.88% 3,172 634 15 42.628 2,842 -5: Los Angeles Urban 39.36 39.81 0.45 Non-Median 70.000 8.0% 5.600 4 5.000 20,000 4.88% 3.416 683 15 46.584 3.106 1,135 2.71 Non-Median 10,800 5,675 5,595 I-5: Los Angeles Urban 36.65 39.36 135,000 8.0% 10,200 51,000 4.20% 14 78,325 I-5: Los Angeles Urban 36.43 36.65 0.22 Median 140,000 8.0% 11,200 10,000 50,000 4.20% 5,885 1,177 14 84,115 6,008 Median 1,177 5: Los Angeles Urban 36.43 140,000 8.0% 11,200 9,600 48,000 4.20% 5,885 14 86,115 6,151 5: Los Angeles Urban 0.28 Non-Median 90,000 8.0% 7,200 6,800 34,000 4.20% 3.783 757 14 52,217 3,730 I-5: Los Angeles Urban 35.94 Non-Median 8.0% 7.200 7.200 36,000 4.20% 3,783 757 14 50.217 3.587 Urban 0.01 Non-Median 102 000 8.0% 8 160 8.200 41.000 4 20% 4 288 858 14 56 712 4.051 I-5: Los Angeles 29.16 4 5 7.0% I-5: Los Angeles Urban 5 47 Non-Median 130 000 9 100 9.500 47.500 4.20% 5 465 1.093 14 77,035 5.503 28 25 I-5: Los Angeles Urban 22 28 22 78 0.5 Non-Median 130 000 7.0% 9 100 9.500 47.500 4.20% 5 465 1.093 14 77.035 5.503 I-5: Los Angeles Urhan 21 41 22 28 0.87 Non-Median 138.000 8.0% 11.040 8 9.900 79.200 4.48% 6.184 1.237 11 52.616 4.783 I-5: Los Angeles Urban 21.41 0.83 Non-Median 140.000 8.0% 11.200 9.600 80.000 4.48% 6.273 1,255 11 53,727 4.884 3.37 Non-Median 4.48% 5.377 11 I-5: Los Angeles Urban 20.58 4 120.000 8.0% 9.600 8.000 64.000 1.075 50.623 4.602 Median 7,900 47,400 2.79% 13 5,327 I-5: Los Angeles Urban 16.9 17.21 0.31 120,000 8.0% 9,600 3,350 670 69,250 48,000 I-5: Los Angeles Urban 14.16 16.9 2.74 Non-Media 130,000 8.0% 10,400 6 8,000 2.79% 3,629 726 13 78,371 6,029 -5: Los Angeles Urban 14.16 0.38 Median 128.000 10.240 8,400 50,400 2.79% 3.574 715 13 74,026 5,694 CA 710: Los Angeles Suburban 23.28 4 Non-Median 110,000 16,500 8 8.000 64,000 4.48% 4,929 986 11 41,071 3.734 CA 710: Los Angeles 10.18 12.97 2.79 4 Non-Median 88,000 14.0% 12,320 7,500 60,000 4.48% 3,943 789 11 24,057 2,187 Non-Median 70.000 15.0% 6.000 48 000 4 48% 627 11 18 863 1 715 CA 710: LA

| County | FLOW AND S | PEED DATA - BASE CONDITION - | | | BASE VOLUME - S | EGMENTATION 48 I | FT. BASIS | Nighttime Off-Peak | | | | | Nighttime Off-Peak Speed | | | |
|--|-------------------------|------------------------------|----------------|---------------|-----------------------------------|---|--|--|---|--|-------------------------|---------------|--------------------------|---------------|-----------------------------|---------------|
| | City/Suburbar /Rural | Post Mile of Segm | | egment | Peak Period Flow, | Passenger Car | Nighttime Off-Peak | Period Passenger Car | Daytime Off-Peak | Daytime Off-Peak Passenger Car Equivalent | Peak Period Speed (mph) | | (mph) | | Daytime Off-Peak Speed(mph) | |
| | | Begin | End | Length (mi) | One Direction per Lane (vphpl) | Equivalent Flow, One Direction (pcphpl) | Period Flow, One Direction per Lane (vphpl) | Equivalent Flow, One Direction per Lane (pcphpl) | Flow, One Direction per Lane (vphpl) | Flow, One Direction (pcphpl) | Truck | Other Vehicle | Truck | Other Vehicle | Truck | Other Vehicle |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 1,750 | 1,890 | 192 | 208 | 657 | 709 | 50 | 63 | 50 | 65 | 50 | 65 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 1,633 | 1,723 | 157 | 166 | 442 | 466 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 1,633 | 1,707 | 157 | 164 | 442 | 462 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 25.53 24.51 | 26.69 | 1.16 | 2,167 1.825 | 2,308 1,907 | 177 145 | 189 151 | 985 794 | 1,049 829 | 50 50 | 48 55 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.02 | 1,625 | 1,907 | 145 | 133 | 732 | 768 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 2,333 | 2,462 | 198 | 209 | 1,121 | 1,182 | 50 | 38 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 1,500 | 1,605 | 129 | 138 | 732 | 783 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 1,080 | 1,156 | 100 | 107 | 584 | 625 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 1,250 | 1,338 | 99 | 106 | 544 | 582 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 1,333 | 1,427 | 106 | 113 | 580 | 621 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento I-5: San Joaquin | Rural Rural | 0 40.45 | 14.46 49.79 | 14.46 9.34 | 1,500 1,150 | 1,688 1,288 | 261 181 | 293 203 | 763 538 | 859 602 | 50 50 | 64 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 1,333 | 1,487 | 108 | 120 | 438 | 488 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 1,500 | 1,680 | 121 | 135 | 493 | 552 | 50 | 65 | 50 | 55 | 50 | 55 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 1,250 | 1,400 | 140 | 156 | 397 | 444 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1,333 | 1,507 | 149 | 168 | 423 | 478 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 1,000 | 1,130 | 141 | 159 | 493 | 557 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 1,400 | 1,582 | 191 | 215 | 451 | 509 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin I-5: Stanislaus | Rural Rural | 0 | 11.8 28.06 | 11.8 28.06 | 500 500 | 565 570 | 80 130 | 91 148 | 194 159 | 219 181 | 50 50 | 65 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: Stanislaus I-5: Merced | Rural | 0 | 32.45 | 32.45 | 750 | 859 | 130 | 223 | 238 | 273 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 750 | 863 | 193 | 222 | 200 | 230 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 750 | 863 | 186 | 213 | 204 | 235 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 850 | 973 | 173 | 198 | 242 | 277 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 750 | 855 | 137 | 156 | 225 | 257 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 750 | 855 | 137 | 156 | 182 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern I-5: Kern | Rural Rural | 9.28 7.04 | 10.35 9.28 | 1.07 2.24 | 750 750 | 855 863 | 137 137 | 156 157 | 182 182 | 207 209 | 50 50 | 65 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 750 | 855 | 137 | 156 | 182 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 750 | 855 | 137 | 156 | 182 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 750 | 855 | 137 | 156 | 182 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 750 | 855 | 137 | 156 | 182 | 207 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 875 | 993 | 148 | 168 | 218 | 247 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural Rural | 86.13 84.76 | 86.67 86.13 | 0.54 1.37 | 875 875 | 993 | 148 148 | 168 | 218 218 | 247 247 | 50 50 | 65 | 50 50 | 65 | 50 | 65 |
| I-5: Los Angeles I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 875 875 | 993 993 | 148 | 168 168 | 218 | 247 | 50 | 65 65 | 50 | 65 65 | 50 50 | 65 65 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 875 | 954 | 127 | 138 | 237 | 259 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 875 | 958 | 127 | 139 | 237 | 260 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 875 | 954 | 127 | 138 | 237 | 259 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 875 | 954 | 127 | 138 | 237 | 259 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 1,000 | 1,080 | 122 | 131 | 314 | 339 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 1,625 | 1,706 | 198 | 208 | 510 | 535 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 47.13 46.9 | 52.33 47.13 | 5.2 0.23 | 2,150 2.150 | 2,258 2,258 | 274 265 | 287 279 | 633 636 | 665 668 | 50 50 | 50 50 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.23 | 2,150 | 2,325 | 271 | 283 | 638 | 667 | 50 | 46 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 1,780 | 1,869 | 217 | 228 | 510 | 536 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 1,780 | 1,860 | 236 | 246 | 626 | 654 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 1,820 | 1,911 | 271 | 285 | 825 | 866 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 2,125 | 2,210 | 381 | 396 | 1,084 | 1,128 | 50 | 51 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 41.6 40.27 | 43.9 41.6 | 2.3 1.33 | 1,900 1,533 | 1,976 1,602 | 318 381 | 331 398 | 847 2,064 | 881 2.157 | 50 50 | 55 55 | 50 50 | 55 55 | 50 50 | 55 53 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 1,200 | 1,002 | 159 | 166 | 710 | 742 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 1,000 | 1,040 | 137 | 142 | 621 | 646 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 2,040 | 2,122 | 227 | 236 | 1,119 | 1,164 | 50 | 53 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 1,667 | 1,733 | 196 | 204 | 1,001 | 1,041 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 2,400 | 2,496 | 294 | 306 | 1,538 | 1,599 | 50 | 32 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 1,700 | 1,768 | 189 | 197 | 932 | 970 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 29.16 28.25 | 35.94 29.16 | 6.78 0.91 | 1,800 2,050 | 1,872 2,132 | 189 214 | 197 223 | 897 1,013 | 933 1,053 | 50 50 | 55 53 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 28.25 | 28.25 | 5.47 | 1,900 | 1,967 | 214 | 223 | 1,013 | 1,053 | 50 | 53 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 22.78 | 22.78 | 0.5 | 2,375 | 2,458 | 273 | 283 | 1,376 | 1,424 | 50 | 40 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 1,980 | 2,059 | 247 | 257 | 957 | 995 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 2,400 | 2,496 | 314 | 326 | 1,221 | 1,270 | 50 | 40 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 2,000 | 2,080 | 269 | 280 | 1,151 | 1,197 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 1,975 | 2,054 | 168 | 174 | 1,332 | 1,385 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 2,000 | 2,080 | 181 | 189 | 1,507 | 1,567 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban Suburban | 13.78 12.97 | 14.16 23.28 | 0.38 10.31 | 2,100 2,000 | 2,184 2,150 | 179 246 | 186 265 | 1,424 933 | 1,481 1,003 | 50 50 | 52 59 | 50 50 | 55 65 | 50 50 | 55 65 |
| CA 710: Los Angeles CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 1.875 | 2,150 | 197 | 211 | 933 547 | 585 | 50 | 61 | 50 | 65 | 50 | 65 |
| CA 710: LOS Angeles | Suburban | | 10.18 | 5.22 | 2,000 | 2,150 | 209 | 225 | 572 | 614 | 50 | 57 | 50 | 65 | 50 | 65 |
| | Capaidail | | | | -,000 | -,100 | 200 | -40 | V12 | VIT | 50 | | 50 | | 5 | |

TABLE R1c. SECTION TRAVEL DATA - BASE CONDITION - BASE VOLUME - SEGMENTATION 48 FT. BASIS Nighttime Off-Peak Other Vehicle-Daytime Off-Peak Period Vehicle-Nighttime Off-Peak Period Vehicle-Daytime Off-Peak Period Vehicle-Peak Period Vehicle-Miles of eak Period Vehicle-Hours of City/Suburba Post Mile of Segment Travel, One Direction Hours of Travel, One Direction Hours of Travel, One Direction Travel, One Direction Miles of Travel, One Direction Miles of Travel, One Direction County n/Rural Begin End Length (mi) Truck Other Veh I-5: Sacramento Rural 29.87 4.78 1,338.4 16,061 84,319 1.471 13,060 68,567 34.65 321.2 29.4 118.8 261.2 1,054.9 Urban 26.94 29.87 2.93 189.5 1,393.9 15.2 1117 111.2 817.6 9.476 76,666 759 6.143 5,558 44.968 Urban 26.69 26.94 121.6 1.1 662 536 5: Sacramento Urban 25.53 58.8 410.0 9.6 58.5 133.6 813.1 2,941 19,679 481 3,219 6,682 44.718 -5: Sacramento 26.69 1.16 369.6 58.6 803.7 319 44,206 Urban 6.4 87.4 2,010 Sacramento 24.51 25.53 1.02 40.2 20.328 3.225 4.372 491.4 10.7 87.9 154.8 7.740 5: Sacramento Urban 23.1 24.51 1.41 60.1 1,266.5 3,003 27,030 537 4.833 69.658 -5: Sacramento Urhan 23.1 1 1 50.8 541.0 8.6 63.5 122.0 897 7 2.541 20.559 432 3.495 6 102 49 371 143.1 799.3 24.6 137.4 349.1 1.949.7 7.157 43.963 1,230 7.557 17.457 107.236 5: Sacramento Urban 2.84 Urban 15.4 86.1 2.9 15.9 41.7 232.9 771 4,737 143 877 2,085 12,807 5: Sacramento 18.82 0.34 Urban 89.0 497.2 14.1 78.9 193.6 1.081.3 4,452 27.348 706 4.339 -5: Sacramento 18 82 50,271 75.3 420.3 11.9 66.7 163.7 914.0 3.763 23,117 3,668 I-5: Sacramento Urban 14.46 16.7 2.24 597 8.184 14 46 957.3 32 535 55 173 Sacramento Rural 4 46 650.7 1 525 1 414 8 1 103 5 2 546 5 97 605 20 742 62 226 165 519 5: San Joaquin Rural 40.45 49.79 9.34 412.5 1.004.7 129.8 316.1 578.6 1.409.3 20,623 65,305 6,489 20.547 28,929 91.607 5: San Joaquin Rural 28.56 40.45 11.89 1,093.9 2,817.0 88.2 227.1 1.005.7 2.589.9 54.694 183 106 4 410 14.763 50,284 168 343 57.9 1.9 21.8 62.9 1,188 3,762 96 303 1,092 3.459 5: San Joaquin Urban 28.34 0.22 23.8 424.8 1,222.9 47.4 136.5 377.4 1,086.4 21,240 67,260 2,371 7,510 18,869 59,750 Urban 24.8 8.34 3.54 5: San Joaquin Rural 14.34 10.46 1.087.8 2.381.7 121.5 265.9 966.4 2.115.7 54.392 154.808 6.073 17.284 48.319 137.524 5: San Joaquin 24 8 10,725 42,104 I-5: San Joaquin Rural 12.69 14.34 1.65 214.5 469.6 30.2 66.1 295.9 647.7 30,525 1.509 4,294 14.793 5: San Joaquin Rural 11 8 12 69 0.89 97.2 212.8 15.9 34 7 81.3 178.0 4 859 13 831 794 2.259 4.066 11 572 184 1 107.0 54.111 Rural 11.8 403.0 493 380.2 26,196 2,464 -5: Stanislaus Rural 28.06 628.5 1,243.3 244.6 483.8 698.2 1,381.1 31,427 80,813 12,231 31,450 34,910 89,769 5: Merced Rural 1,129,3 2,126.7 439.5 827.7 1,254.4 2.362.4 56,463 138,237 21.974 53.798 62,721 153,558 -5: Fresno Rural 66.16 66.16 2,977.2 5,343.7 1,074.9 1,929.2 1,902.3 3,414.4 148,860 347,340 53,743 125,401 95,117 221,939 -5: Kinas Rural 26.72 26.72 1.202.4 2.158.2 416.4 747.4 786.0 1.410.7 60.120 140.280 20.821 48.583 39,299 91.697 Rural 71.17 713.3 1.343.4 2.795.3 5.264.4 175.434 87.323 139.767 I-5: Kern 15.86 87.03 3.508.7 6.607.9 429.511 35.667 342.188 I-5: Kern Rural 15.08 0.78 65.5 129 6 14.3 28.4 51.2 101 2 3.276 8 424 717 1 845 2 559 6.579 15.86 -5: Kern Rural 10.35 4.73 476.8 943.1 87.0 172.1 230.9 456.6 23,839 61,301 4.350 11.185 11 543 29.682 15.08 I-5: Kern Rural 9.28 10.35 1.07 107.9 213.3 19.7 38.9 52.2 103.3 5,393 13.867 984 2,530 2,611 6,714 Rural 2.24 241.9 434.2 44.1 79.2 117.1 210.2 12,096 5.150 13,666 -5: Kern 28,224 2.207 5.857 Rural 6.41 7.04 125.6 11.6 22.9 30.7 60.8 3,175 8.165 579 1.490 1,537 3.953 I-5: Kern 0.63 63.5 5: Kern Rural 5.36 3.41 .05 105.8 209.4 19.3 38.2 51.2 101.4 5.292 13,608 966 2.483 2.562 6.589 953.1 173.9 11.304 11.665 Rural 481.8 87.9 233.3 461.5 24.091 61.949 4.396 29.996 -5: Kern 0.58 5.36 4 78 Rural 0.58 58.5 115.6 10.7 21.1 28.3 56.0 2,923 7.517 533 1.372 1.415 3.640 -5: Kern 0.58 94 220.0 457.5 37.2 77.4 109.5 227.7 11,000 29,740 1,860 5,028 5,474 14,799 5: Los Angeles Rural 86.67 21.5 1,524 5: Los Angeles Rural 86.13 86.67).54 61.2 127.4 10.4 30.5 63.4 3,062 8,278 518 1,400 4.119 155.4 323.1 54.6 7,768 21.002 3.551 10,451 Rural 84.76 37 26.3 160.8 1.313 3.865 5: Los Angeles 77.3 35,891 16,405 717.8 1.492.9 121.4 252.4 357.2 742.9 97.039 6.068 17.860 48.287 Rural 78.43 84.76 6.33 -5: Los Angeles 33,188 6.185 75,234 13,120 -5: Los Angeles Rural 69.65 78.43 8.78 663.8 2 326 0 1122 393.2 330.3 1 157 4 151 192 5 611 25.560 16 515 68.6 201.8 26.366 3.077 Rural 123.7 405.6 20.9 61.5 1.046 4.457 5: Los Angeles 68 1 39 65 1 55 707.3 34.1 119.6 352.0 10,093 45,977 -5: Los Angeles Rural 65.43 2.67 201.9 100.4 1,706 7,773 5,022 22,879 1,451.8 70.0 245.4 20,714 15,953 5: Los Angeles 5.43 5.48 206.2 94,366 3.502 10.308 46.957 5: Los Angeles Rural 54.16 59.95 5.79 370.6 1,496.5 45.1 182.0 325.5 1,314.5 18,528 97,272 2,254 11,832 16,274 85,440 1.83 823.5 14.5 5.948 5: Los Angeles Rural 52.33 54.16 119.0 100.2 104.5 723.3 53.528 723 6.511 5,224 47.016 536.6 4,829.8 56.9 465.8 342.4 2,801.7 26,832 241,488 2,846 25,618 17,122 154,094 Urban 5: Los Angeles 47 13 52 33 52 -5: Los Angeles Urhan 46.9 47.13).23 23.7 213.6 24 20.0 15.2 124 6 1 187 10 681 122 1 098 761 6 851 5: Los Angeles Urban 46.6 46.9 28.8 316.9 2.9 26.9 17.9 164.7 1,442 14.578 146 1.481 896 9,057 45.93 71.6 585.5 7.3 59.5 44.5 3,578 5: Los Angeles Urban 46.6 0.67 363.7 32,200 363 3,270 2,223 20,006 5: Los Angeles Urban 5.93 0.83 79.8 733.3 8.8 81.0 60.8 559.0 3.989 40.333 440 4,452 3.041 30.745 -5: Los Angeles Urban 44.01 45.1 1.09 119.0 973.9 14.8 120.9 116.9 956.4 5,951 53,563 739 6,650 5,845 52,602 -5: Los Angeles Urban 43.9 44.01 0.11 9.0 101.2 1.3 14.0 9.9 103.7 449 5.161 67 771 496 5.706 29.3 305.8 2,118.0 10,488 120,612 16,821 10,129 116,487 209.8 202.6 1.463 -5: Los Angeles Urban 41 6 43 9 2.3 2.192.9 40.27 41.6 44.0 404.9 13.7 125.6 2,121.2 2,202 22,270 683 6,910 11.119 112,425 -5: Los Angeles Urban 1.33 222.4 5: Los Angeles Urban 39.81 40.27 0.46 15.9 146.1 2.6 24.1 35.3 324.4 795 8.037 131 1,328 1,765 17,844 -5: Los Angeles Urban 39.36 39.81 .45 14.4 150.5 2.5 25.7 33.5 350.7 720 8,280 123 1.414 1,677 19,286 16,981 Urban 2.71 221.1 2,399,1 24.6 257.3 339.6 3.550.5 11.057 127.153 1.230 14,149 195,280 5: Los Angeles 36.65 39.36 309.5 Urban 36 43 17.6 184.0 2.1 21.7 29.6 880 10,120 104 1,191 1,480 17,025 5. Los Angeles 36 65 Urban 16.1 289.8 2.0 20.7 302.5 806 1.137 1,447 16.637 -5: Los Angeles 36.22 36.43 0.21 28.9 9.274 99 159.2 17 17.7 1 170 -5: Los Angeles Urhan 35 94 86 22 128 15.2 23.4 244 6 762 8 758 85 975 13 451 29.16 390.5 41.0 429.1 544.8 5,695.1 19,526 23,599 313,231 5: Los Angeles Urban 35.94 6.78 4,082.8 224,554 2,052 27,238 59.7 647.6 65.3 82.6 863.3 2 985 34 325 312 3 590 47 479 5: Los Angeles 28 25 0.91 6.2 Urban 22 78 5 47 363.8 4,393.4 41.8 505.5 589.9 7,125.2 18,188 241.637 2,092 27,800 29,497 391,886 5: Los Angeles 28 25 552.2 46.2 Urban 33.3 3.8 53.9 651.3 1.663 22.088 191 35.821 -5: Los Angeles 22.28 22.78 2.541 2.696 Urhan 21 41 0.87 110.2 1 173 9 8.6 90.0 73.2 765.7 5.512 63 392 430 4 949 3 662 42 114 5. Los Angeles 22 28 -5: Los Angeles Urban 20.58 21.41 0.83 106.2 1,527.2 8.3 87.1 71.3 745.9 5,312 61,088 417 4.790 3,567 41,026 3.37 5: Los Angeles Urhan 17 21 0.58 345 1 3 674 5 29 0 303.1 273.0 2 853 7 17 254 198 426 1 450 16 671 13 648 156 951 250.3 1.7 17.4 34.3 359.1 1,176 13,518 83 956 1,717 19,750 5: Los Angeles Urban 16.9 17.21 0.31 23.5 210.4 2,240.7 15.9 343.6 10,522 9,149 197,556 5: Los Angeles 14.16 16.9 2.74 166.3 120,998 796 17,179 338.8 22.7 45.0 470.5 Urban 30.6 2.2 1.532 17.620 109 1,249 2,250 25,880 13.78 14.16 5: Los Angeles A 710: Los Angeles Suburban 12.97 23.28 10.31 1,979.5 9,506.2 152.5 664.6 1,270.3 5,537.3 98,976 560.864 7,623 43,196 63,516 359,925 A 710: Los Angeles Suburban 10 18 12 97 2 79 468.7 2 360 1 30.8 145.6 187 9 888.0 23 436 143 964 1 540 9 461 9 397 57 722 A 710: LA Suburban 4.96 10.18 5.22 751.7 3,736.4 49.1 214.1 295.4 1,287.6 37,584 212,976 2,456 13,917 14.770 83,697 TOTAL 25,637.3 94,944.0 5,272.7 14,689.8 21,759.4 87,651.9 1,281,866 5,588,784 263.637 913,331 1,087,968 5,217,993

TABLE R1d. VEHICLE OPERATING COSTS - BASE CONDITION - BASE VOLUME - SEGMENTATION 48 FT. BASIS Nighttime Off-Peak Period Vehicle-Daytime Off-Peak Period Vehicle-Vehicle Operating Costs (\$) Peak Period Vehicle-Hours City/Suburbar Post Mile of Segment of Travel. One Direction Hours of Travel, One Direction Hours of Travel. One Direction Peak Nighttime Off-Peak Daytime Off-Peak County Rural Begin End Length (m Truck Other Veh. Truck Other Veh Truck Other Veh Truck Other Veh. Truck Other Veh. Truck Other Veh. -5: Sacramento Rural 29.87 84,319 13,060 28.36 34.65 16.061 1,471 68.567 27.40 22.28 5: Sacramento Urban 26.94 29.87 9,476 76,666 759 6,143 5,558 44,968 16,73 24,91 1,34 1,997 9,815 14,614 2 93 5: Sacramento Urhan 26 69 26 94 0.25 662 6 689 53 536 388 3 923 1 168 2 17 174 685 1 275 3,219 840 5: Sacramento Urban 26 69 1 16 2 941 19 679 481 6.682 44 718 5.19 6 30 1 046 11 80 14.53 -5: Sacramento Urban 24.51 25.53 1.02 2,010 20,328 319 3,225 4,372 44,206 3,550 6,606 563 1,048 7,721 14,367 5: Sacramento Urban 23.1 24.51 1.41 3,003 27.030 537 4,833 7,740 69,658 5.304 948 1.57 13.66 22,639 5: Sacramento Urban 23.1 2,541 20.559 432 3,495 6.102 49,371 4,487 6,68 763 1.136 10.77 16,046 -5: Sacramento Urban 19.16 2.84 7.157 43.963 1.230 7.557 17.457 107,236 12.639 14.28 2.17 2.456 30.829 34.852 771 143 877 4,162 5: Sacramento Urban 18.82 19.16 0.34 4.737 2,085 12,807 1,362 1,53 285 3,682 Urban 16.7 18.82 4,452 27,348 706 4,339 9,682 59,473 7,862 8,88 1,248 1,410 17,098 19,329 5: Sacramento 1,05 14.46 597 3.668 8.184 6.646 1.192 14,45 16.33 5: Sacramento Urban 3.763 23,117 50.271 I-5: Sacramento Rural 32,535 97,605 20,742 62,226 55,173 165,519 57,457 31,72 36,63 20,223 97,436 53,794 14.46 14.46 -5: San Joaquin Rural 40.45 49.79 9.34 20,623 65,305 6,489 20,547 28,929 91,607 36,420 21,224 11.45 6,678 51,088 29,772 -5: San Joaquin Rural 28.56 40.45 11.89 54.694 183,106 4.410 14,763 50,284 168,343 96,590 59,50 7,78 4,798 88,802 54,711 28.34 1,092 16 1.124 5: San Joaquin Urban 28.56 1.188 3.762 96 303 3,459 2,098 1.22 1.929 5: San Joaquin Urhan 24.8 28 34 21 240 67 260 2.371 7 510 18 869 59 750 37.510 21.860 4.188 2 441 33 322 19,419 3 54 14.34 54.392 6.073 17.284 137.524 96.057 50.31 10.72 5.617 44.695 -5: San Joaquin Rural 24.8 10.46 154.808 48.319 85.332 Rural 14.34 1.65 10,725 30,525 1,509 4,294 14,793 42,104 18.940 9,92 2,66 1,396 26,125 13,684 -5: San Joaquin 12.69 794 4,066 5: San Joaquin Rural 4.859 13.831 2.259 11.572 8.58 4.49 1.40 734 3,761 Rural 7,013 19,012 16,254 8,514 4,35 17,586 5: San Joaquin 9,204 26.196 2.464 54.111 2,279 33.57 Rural 31.450 34.910 55.501 21.59 29.175 5: Stanislaus 28.06 28.06 31.427 80.813 12.231 89.769 26.264 10.221 61.652 -5: Merced Rural 32 45 32 45 56 463 138 237 21 974 53 798 62 721 153 558 99 714 44 92 38.80 17 484 110 765 49 906 5: Fresno Rural 66.16 66.16 148,860 347,340 53,743 125,401 95,117 221,939 262,888 112,88 94,91 40,755 167,977 72,130 5: Kinas Rural 26.72 60,120 140.280 20.82 91.697 106,173 15.78 69,402 29.80 35,667 -5: Kern Rural 15.86 87.03 71.17 175,434 429,511 87.323 139,767 342,188 309,81 139.59 62,98 28,380 246,830 111,211 -5: Kern Rural 15.08 15.86 0.78 3,276 8.424 717 1.845 2,559 6.579 5.785 2.73 1.26 599 4.519 2.138 5: Kern Rural 10.35 15.08 23,839 61.301 4 350 11 185 11 543 29 682 42,100 19,92 7,68 3,635 20,385 9,647 4 73 5: Kern Rural 9.28 10.35 1.07 5,393 13,867 984 2,530 2,611 6,714 9,524 4,50 1,73 822 4,611 2,182 5: Kern Rural 12,096 2,207 5,150 5,857 13,666 21,362 9.17 3,89 1,674 10,343 4,441 9.28 28,224 Rural 6.41 3.175 1.490 1.537 3.953 1,02 484 1,285 I-5: Kern 7.04 0.63 8.165 579 5,607 2,654 2.715 -5: Kern Rural 5.36 6.41 5,292 13,608 966 2,483 2,562 6,589 9,346 4,423 1,70 807 4,525 2,141 1.05 5: Kern Rural 0.58 5.36 4.78 24,091 61,949 4,396 11,304 11,665 29,996 42,545 20,133 7,76 3,674 20,600 9,749 Rural 0.58 7 517 533 1,372 1,415 3,640 5,162 2,44 942 446 2,500 1,183 5: Kern 2.923 Rural 5,028 5,474 19,426 3,28 1,634 4,810 86.67 11.000 29.740 1.860 14.799 9.66 9.666 5: Los Angeles 88.61 1.524 1 339 Rural 86 13 3.062 1 400 4 119 5 407 914 5: Los Angeles 86 67 0.548 278 518 2 69 455 2 691 5: Los Angeles Rural 84 76 86.13 1.37 7,768 21,002 1,313 3,551 3,865 10,451 13,718 6,826 2,319 1.154 6,826 3,397 63.384 5: Los Angeles Rural 78.43 84.76 35.891 97.039 6.068 16,405 17.860 48,287 5.332 31.54 15.693 5: Los Angeles Rural 69.65 78.43 8.78 33,188 151,192 5,611 25,560 16,515 75,234 58,611 49,137 9,909 8,307 29,165 24,451 5: Los Angeles Rural 68.1 69.65 1.55 6.185 26.366 1.046 4.457 3.077 13.120 10.922 8.56 1.84 1.449 5.435 4.264 -5: Los Angeles Rural 65.43 68.1 2 67 10.093 45 977 1.706 7.773 5.022 22.879 17.824 14.94 3.01 2.526 8 869 7.436 Rural 59.95 65.43 5 48 20,714 94,366 3 502 15,953 10,308 46,957 36,582 30,669 6,18 5,185 18,203 15,261 5: Los Angeles 3,98 27,768 5: Los Angeles Rura 18.528 85.440 3.846 52.33 5 948 53 528 723 6,511 5,224 47,016 10,503 17,396 1,278 2,116 9,226 15,280 5: Los Angeles 54 16 1.83 5: Los Angeles Urhan 17 122 47 13 52 33 52 26 832 241 488 2 846 25 618 154 094 47 386 78 484 5.02 8 326 30 237 50 081 5: Los Angeles Urban 46.9 17 13 0.23 1.187 10.681 122 1.098 761 6.851 2,096 3.471 21 357 1 344 2,226 481 -5: Los Angeles Urban 46.6 46.9 1,442 14.578 146 1,481 896 9,057 2,546 4,73 259 1.582 2,944 Urban 45.93 46.6 3,578 32.200 363 3,270 2,223 20,006 6,318 10,465 642 1,063 3,926 6,502 5: Los Angeles 0.67 Urban 45.1 45.93 3.989 40.333 440 4,452 3.041 30.745 7.045 13,10 778 1,447 5.370 9.992 5: Los Angeles 0.83 5: Los Angeles Urhan 44 01 45 1 1 09 5.951 53 563 739 6.650 5.845 52 602 10.510 17 40 1.30 2.161 10.322 17 096 Urban 43.9 44.01 0.11 449 5.161 67 771 496 5,706 79: 1.67 11 251 876 1,854 5: Los Angeles 116,487 18,522 5: Los Angeles Urban 41.6 43.9 10.488 120.612 1.463 16,821 10,129 39.199 2,583 5.467 17.889 37,858 -5: Los Angeles Urban 40.27 41.6 1.33 2,202 22,270 683 6,910 11,119 112,425 3,890 7,238 1,207 2,246 19,636 36,538 -5: Los Angeles Urhan 39.81 40 27 0.46 795 8 037 131 1 328 1 765 17 844 1 404 2.61 23 432 3 117 5 799 5: Los Angeles Urban 39.36 39.81 0.45 720 8.280 123 1 414 1.677 19,286 1.272 2,691 217 460 2 962 6,268 5: Los Angeles 11,057 127,153 1,230 14,149 16,98 19,526 4,598 63,466 -5: Los Angeles Urban 36.43 36.65 0.22 880 10.120 104 1,191 1.480 17,025 1,554 3,289 183 387 2.614 5,533 5: Los Angeles Urban 36.22 36.43 0.21 806 9.274 99 1.137 1.447 16.637 1.424 3,014 17 370 2.555 5.407 -5: Los Angeles 85 2 846 150 317 2.066 Urhan 35 94 36 22 28 762 8 758 975 1 170 13 451 1 345 4 372 -5: Los Angeles Urban 29.16 35.94 6.78 19,526 224,554 2.052 23,599 27,238 313,231 34,484 72,980 3,624 7.670 48.102 101,800 Urban 2,985 34,325 3,590 4,129 47,479 5,271 55 1.167 15.431 5: Los Angeles 29.16 0.91 312 7,291 I-5: Los Angeles Urban 22.78 28.25 5.47 18,188 241,637 2,092 27,800 29,497 391,886 32,120 78,53 3,695 9,035 52,092 127,363 5: Los Angeles Urhan 22 28 22 78 0.5 1 663 22 088 191 2 541 2 696 35 821 2 936 7.178 338 826 4 762 11 642 760 5: Los Angeles Urban 21.41 າ ຂ7 5.512 63,392 430 4 949 3,662 42.114 9.73 20,60 1,609 6.467 13,687 -5: Los Angeles Urban 20.58 21.41 5,312 61.088 417 4,790 3,567 41,026 9,381 19,854 736 1,557 6.300 13,333 Urban 17,254 198,426 1,450 16,671 156,951 2,560 51,009 5: Los Angeles 17.21 20.58 13.648 30.471 64,48 5.418 24,102 17 21 1 176 13 518 956 1 717 2 076 147 311 Urhan 16.9 0.31 83 19 750 4 394 3.033 6 419 5: Los Angeles 5: Los Angeles Urban 14 16 16.9 2 74 10.522 120,998 796 9.149 17,179 197,556 18 581 39.32 1 40 2,973 30,338 64,206 1,532 17,620 109 1,249 2,250 25,880 2,706 192 406 3,974 8,411 5: Los Angeles Urban 13.78 14.16 38 5,72 A 710: Los Angeles Suburban 12.97 10.31 98,976 560,864 7,623 43,196 63,516 359,925 174,793 182,28 13,462 14,039 112,170 116,976 41.388 4,33 CA 710: Los Angeles Suburban 10.18 12.97 2.79 23,436 143.964 1.540 9.461 9.397 57.722 46.78 3.075 16.594 18.760 Suburban 10.18 37,584 2,456 13,917 14,770 83,697 66,374 69,21 4,523 26,084 27,201 CA 710: LA 4.96 5 22 212 976 TOTAL 1.281.866 5.588.784 263.637 913.331 1.087.968 5,217,993 2.263.788 1.816.35 465,586 296,833 1.921.364 1.695.848

TABLE R1e. TRAVEL TIME COST - BASE CONDITION - BASE VOLUME - SEGMENTATION 48 FT.BASIS Nighttime Off-Peak Period Vehicle-Daytime Off-Peak Period Vehicle-Travel Time Costs (\$) Peak Period Vehicle-Hours of City/Suburbar Post Mile of Segment Daytime Off-Peak Travel. One Direction Hours of Travel. One Direction Hours of Travel, One Direction Peak Nighttime Off-Peak County Rural Begin End Truck Other Veh. -5: Sacramento Rural 29.87 34.65 4.78 321 1,338 261 9,082 12,254 832 1,088 7,386 9,658 119 5: Sacramento Urban 26.94 29.87 2.93 190 1,394 15 112 111 818 5,35 12,762 429 1,023 3,143 7,485 : Sacramento Urban 13 122 10 71 653 26.69 26.94 1.11: 25.53 59 10 59 134 813 3 779 Sacramento Urhan 26 69 1 16 410 1.66 3 754 272 536 7 444 180 5: Sacramento Urban 24.51 25.53 1.02 40 370 6 59 87 804 1,137 3,384 537 2,472 7,359 491 11 88 155 4.499 304 4.377 11.596 : Sacramento Urban 24.51 .41 60 1,267 1,698 804 5: Sacramento Urban 22 23.1 51 541 9 64 122 898 1,437 4,953 244 582 3,451 8,218 5: Sacramento Urban 19.16 2.84 143 799 25 137 349 1,950 4,047 7,318 696 1,258 9,872 17,851 19 16 5: Sacramento Urhan 18 82 34 15 86 16 42 233 436 789 81 146 1 179 2 132 5: Sacramento Urban 16.7 18.82 2.12 89 497 14 79 194 1,081 2,518 4.552 399 722 5,475 9.900 5: Sacramento Urban 4.46 75 420 12 67 164 914 2,12 3,848 611 4,628 8,368 Rural 14.46 14.46 651 1,525 415 957 1,103 2,546 18,398 13,963 11,729 8,765 31,200 23,314 5: Sacramento 5: San Joaquin 40 45 49 79 1 005 130 11 66 3 66 2 894 16 359 12 903 Rural 3.4 412 316 579 1 409 9 199 2,590 Rural 11 80 1.094 2,817 88 1.006 25.791 2.494 28.435 23.712 5: San Joaquin 28 56 40 45 30.92 2.079 Urban 28.56 24 576 5: San Joaquin 28.34 0.22 58 6 22 63 672 530 618 425 47 137 1,086 11,196 1,341 1,250 10,670 9,946 5: San Joaquin Urban 24.8 28.34 1,223 377 12,011 24.8 1.088 121 3,434 Rural 14.34 10.46 2.382 266 966 2.116 30.758 21.805 2.435 27.324 19.371 5: San Joaquin -5: San Joaquin Rural 12.69 14.34 1.65 215 470 30 66 296 648 6.065 4.300 853 605 8.365 5.930 11.8 0.89 97 213 16 35 81 178 2,748 1.948 449 318 2,299 1,630 5: San Joaquin Rural 12.69 5: San Joaquin Rural 11.8 11.8 184 403 49 108 380 832 5,20 3,690 1,393 988 10,751 7,622 5: Stanislaus Rural 28.06 28.06 629 1,243 245 484 698 1,381 17.77 4,430 19,741 12,644 32.45 1,129 2,127 439 828 1,254 2,362 31,929 12,426 35,468 21,629 5: Merced Rural 32.45 19.471 7.578 5: Fresno Rural 66 16 36 16 2 977 5 344 1 075 1 929 1 902 3 4 1 4 84 179 48 924 30 391 17 663 53.787 31 261 5: Kings Rural 26.72 26.72 1.202 2 158 116 7/17 786 1 /111 33.99 19.759 11 774 6.843 22,223 12.916 5: Kern Rural 87.03 1.17 3,509 6,608 713 1,343 2,795 5,264 99,206 60,498 20,169 12,300 79,036 48,199 15.86 5: Kern Rural 15.08 15.86 .78 66 130 14 51 101 1,853 1,187 406 260 1,447 927 28 5: Kern Rural 10.35 15.08 4.73 477 943 87 172 231 457 13,48 8.634 2,460 1,576 6.527 4.181 1 953 556 5. Kern Rural 9 28 10.35 1 07 108 213 20 39 52 103 3.050 356 1 477 946 5: Kern Rural 7.04 9.28 2.24 242 434 44 79 117 210 6,840 3.975 1,248 725 3,312 1,925 126 12 23 31 1,150 5: Kern Rural 6.41 7.04 64 61 1.796 328 210 869 557 5: Kern 106 209 19 546 1,449 928 Rural 5.36 6.41 38 101 2.993 1.917 350 Rural 5.36 4.78 482 953 88 174 233 461 13,62 8,726 2,486 1,592 6,596 4,225 5: Kern 5. Kern Rural 0.58 0.58 58 116 11 21 28 56 1,65 1,059 302 193 800 513 5: Los Angeles Rural 86 67 88.61 1 94 220 458 37 77 109 228 6,22 4,189 1,052 708 3,095 2,084 5: Los Angeles Rural 86.13 86.67 0.54 61 127 10 22 30 63 1.731 1.166 293 197 862 580 Rural 155 323 26 55 77 161 4.393 2.958 743 500 2.186 1.472 5: Los Angeles 84.76 86.13 .37 121 718 1.493 252 357 743 13,668 3.431 10.099 Rural 78.43 84.76 3.33 20.29 2.311 6.801 5: Los Angeles 5: Los Angeles Rural 69.65 78.43 8 78 664 2.326 112 393 330 1 157 18.768 21,296 3.173 3.600 9.339 5: Los Angeles Rural 68.1 69.65 55 124 406 21 69 62 202 3,49 3,714 59 628 1,740 1,848 34 120 5,707 6,476 2,840 5: Los Angeles Rural 65.43 68.1 2.67 202 707 100 352 965 1.095 3,223 414 1.452 70 11.714 13.292 1,980 5.829 5: Los Angeles Rural 59.95 65.43 5.48 245 206 722 2.247 6.614 371 5: Los Anaeles Rural 54 16 59 95 5 79 1 496 45 182 325 1 314 10 477 13 701 1.274 1 667 9 203 12 035 5: Los Angeles Rural 52.33 54.16 1 83 119 824 1/ 100 104 723 3.36 7,540 400 917 2,954 6,622 5: Los Angeles Urban 52.33 537 4,830 57 466 342 2,802 15,17 44,219 1,610 4,264 9,682 25,651 5: Los Angeles Urban 46.9 47.13 0.23 24 214 2 20 15 125 671 1,956 69 183 430 1,140 29 317 18 165 815 83 246 507 1.508 5: Los Angeles Urban 46.9 27 2.902 46.6 2 023 5: Los Angeles Urhan 45 93 46.6 0.67 72 585 59 44 364 5.360 205 544 1 257 3 330 5: Los Angeles Urban 45.93 0.83 80 733 81 61 559 2,25 6,714 249 741 1,719 5,118 Urban 119 974 15 121 117 956 3,36 8,916 418 1,107 3,305 8,756 5: Los Angeles 44.01 45.1 Urban 43.9 44.01 101 14 10 104 254 128 281 950 0.11 927 5: Los Angeles 210 2,193 29 306 203 2,118 827 2,800 5: Los Angeles Urban 41.6 43.9 2.3 5.93 5.728 5: Los Angeles Urban 40.27 41.6 1.33 44 405 14 126 222 2,121 1,245 3,707 386 1,150 6,288 19,421 5: Los Angeles Urban 39.81 40.27 0.46 16 146 3 24 35 324 449 1,338 221 998 2,970 407 5: Los Angeles Urban 39.81 1.37 3.210 25 257 3,551 696 2,355 : Los Angeles Urban 36.65 39.36 2.71 221 2,399 340 6,252 21,965 9,602 32,507 Urban 184 5: Los Anaeles 36.43 36.65).22 18 22 30 310 498 1.685 198 837 2.834 21 29 456 189 5: Los Angeles Urban 36 22 36.43) 21 16 290 302 2.653 56 818 2.770 Urban 35 94 36.22 15 159 18 245 431 1,458 48 162 661 2,239 5: Los Angeles .28 23 5: Los Angeles Urban 3.78 391 4,083 429 545 5,695 11,042 37,380 1,160 3,928 15,402 52,142 648 65 5.930 177 7.904 5: Los Angeles Urban 28.25 29.16 0.91 60 6 83 863 1,688 598 2,335 1 183 5: Los Angeles Urhan 22 78 28 25 5 47 364 4 393 42 505 590 7 125 10 285 40 224 4 628 16 680 65 235 552 54 651 5.963 5: Los Angeles Urban 22.78 33 4 46 940 5.056 108 423 1,52 5: Los Angeles Urban 21.41 22.28 0.87 110 1,174 9 90 73 766 3,117 10,748 243 824 2,071 7,010 106 71 746 5: Los Angeles Urban 20.58 21.41 0.83 1.527 87 3,004 13.982 236 820 797 2.017 6.829 20.58 345 3.675 29 303 273 2.854 9.757 7.718 17.21 3.37 33,642 2.775 26.127 5: Los Angeles Urban 24 250 17 34 359 159 5: Los Angeles Urban 16.9 17.21 0.31 665 2.292 47 971 3.288 5: Los Angeles Urbar 14.16 16.9 .74 210 2,241 16 166 344 3,592 5,950 20,515 450 1,523 9,714 32,886 13.78 14.16 38 31 339 23 45 471 866 3,102 208 1,273 4,308 5: Los Angeles Urbar Suburban 1,980 152 665 1,270 5,537 4,311 A 710: Los Angeles 12.97 23.28 0.31 9.506 55.97 87.034 6.084 35.91 50.697 Suburban 10.18 12.97 2.79 469 2,360 31 146 188 888 13,25 21.608 871 1.333 5,314 8.130 A 710: Los Angeles CA 710: LA Suburban 4.96 10.18 5.22 752 3,736 49 214 295 1,288 21,25 34,209 1,389 1,960 8,352 11.789

25,637

94,944

5,273

14.690

21,759

87,652

724,880

869,262

149,084

134,492

615.233

802,499

TOTAL

| TABLE R2a. SECTION | VOLUME DA | TA - DEDICA | ATED LAN | E - BASE VO | LUME | | | | | | | | | | | | | |
|--------------------------------------|----------------|----------------|----------------|---------------------|----------------|------------------------|--------------------------|------------------|--------------------|------------------------------|--------------------------------|---------------------------------|-----------------------|---------------------------------------|-------------------------------------|-------------------------|---------------------------------------|-------------------------------------|
| 0 | City/Suburban | Pos | st Mile of Se | gment | Truck Lanes in | Truck | % of Total | Truck AADT | Peak | Peak Period | Peak Period | Nighttime Off- | Nighttime Off- | Nighttime Off-Peak | Nighttime Off-Peak | Daytime Off- | Daytime Off-Peak | Daytime Off-Peak |
| County | Rural | | | | One Direction | Proportion Diverted | Veh. Using Truck Lane | in Truck Lane | Period Duration | Flow, One Direction (vph) | Volume, One Direction (veh) | Peak Period Duration (hours) | Peak Period % AADT | Period Volume, One Direction (veh) | Period Flow, One Direction (vph) | Peak Period Duration | Period Volume, One Direction (veh) | Period Flow, One Direction (vph) |
| I-5: Sacramento | Rural | Begin 29.87 | End 34.65 | Length (mi) 4.78 | 1 | 0.08 | 1.3% | 500 | 6 | A4 | 263 | 5 | 4.81% | 24 | 5 | 13 | 213 | 16 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 1 | 0.09 | 1.0% | 500 | 6 | 50 | 300 | 5 | 4.81% | 24 | 5 | 13 | 176 | 14 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 1 | 0.11 | 1.0% | 500 | 6 | 50 | 300 | 5 | 4.81% | 24 | 5 | 13 | 176 | 14 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 1 | 0.06 | 0.7% | 500 | 3 | 49 | 146 | 6 | 4.76% | 24 | 4 | 15 | 331 | 22 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 1 | 0.08 | 0.7% | 500 | 3 | 50 | 150 | 6 | 4.76% | 24 | 4 | 15 | 326 | 22 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 1 | 0.06 | 0.6% | 500 | 3 | 44 | 133 | 6 | 4.76% | 24 | 4 | 15 | 343 | 23 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 1 | 0.06 | 0.7% | 500 | 3 | 47 | 140 | 6 | 4.76% | 24 | 4 | 15 | 336 | 22 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 19.16 18.82 | 22 19.16 | 2.84 0.34 | 1 | 0.05 | 0.8% | 500 500 | 3 | 46 43 | 138 129 | 6 | 4.76% 4.76% | 24 24 | 4 | 15 15 | 338 348 | 23 |
| I-5: Sacramento | Urban | | 18.82 | 2.12 | 1 | 0.06 | 1.0% | 500 | 3 | 50 | 150 | 6 | 4.76% | 24 | 4 | 15 | 326 | 23 22 |
| I-5: Sacramento | Urban | | 16.7 | 2.12 | 1 | 0.09 | 1.3% | 500 | 3 | 50 | 150 | 6 | 4.76% | 24 | 4 | 15 | 326 | 22 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 1 | 0.07 | 1.7% | 500 | 3 | 50 | 150 | 11 | 19.13% | 96 | 9 | 10 | 254 | 25 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 1 | 0.08 | 2.0% | 500 | 4 | 46 | 184 | 8 | 11.58% | 58 | 7 | 12 | 258 | 22 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 1 | 0.05 | 1.3% | 500 | 5 | 50 | 250 | 5 | 4.03% | 20 | 4 | 14 | 230 | 16 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 1 | 0.05 | 1.1% | 500 | 5 | 50 | 250 | 5 | 4.03% | 20 | 4 | 14 | 230 | 16 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 1 | 0.04 | 1.0% | 500 | 5 | 50 | 250 | 5 | 5.58% | 28 | 6 | 14 | 222 | 16 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1 | 0.05 | 1.3% | 500 | 5 | 50 | 250 | 5 | 5.58% | 28 | 6 | 14 | 222 | 16 |
| I-5: San Joaquin | Rural Rural | 12.69 | 14.34 12.69 | 1.65 0.89 | 1 | 0.05 0.07 | 1.2% | 750 750 | 5 5 | 60 75 | 298 375 | <u>5</u> | 5.58% 8.17% | 42 61 | 8 10 | 14 13 | 411 314 | 29 24 |
| I-5: San Joaquin I-5: San Joaquin | Rural | 0 | 12.69 | 11.8 | 1 | 0.07 | 1.8% 7.5% | 750 750 | 3 | 75 75 | 375 225 | <u>6</u> 5 | 8.17% 8.03% | 60 | 10 12 | 13 16 | 314 465 | 29 |
| I-5: San Joaquin I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 1 | 0.29 | 17.5% | 1.750 | 4 | 75 175 | 700 | 6 | 8.03% 15.57% | 272 | 12 45 | 16 | 465 778 | 29 56 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 1 | 0.40 | 11.7% | 1,750 | 4 | 175 | 700 | 6 | 15.57% | 272 | 45 | 14 | 778 | 56 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 1 | 0.44 | 13.3% | 2,000 | 5 | 200 | 1,000 | 7 | 18.05% | 361 | 52 | 12 | 639 | 53 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 1 | 0.44 | 13.3% | 2,000 | 5 | 200 | 1,000 | 7 | 17.32% | 346 | 49 | 12 | 654 | 54 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 1 | 0.41 | 11.8% | 2,000 | 5 | 200 | 1,000 | 5 | 10.17% | 203 | 41 | 14 | 797 | 57 |
| I-5: Kern | Rural | | 15.86 | 0.78 | 1 | 0.24 | 6.7% | 2,000 | 5 | 200 | 1,000 | 6 | 10.95% | 219 | 36 | 13 | 781 | 60 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 1 | 0.36 | 10.0% | 3,000 | 6 | 300 | 1,800 | 6 | 10.95% | 328 | 55 | 12 | 872 | 73 |
| I-5: Kern | Rural | | 10.35 | 1.07 | 1 | 0.36 | 10.0% | 3,000 | 6 | 300 | 1,800 | 6 | 10.95% | 328 | 55 | 12 | 872 | 73 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 1 | 0.33 | 10.0% | 3,000 | 6 | 300 | 1,800 | 6 | 10.95% | 328 | 55 | 12 | 872 | 73 |
| I-5: Kern | Rural | 6.41 5.36 | 7.04 6.41 | 0.63 1.05 | 1 | 0.36 | 10.0% | 3,000 | 6 | 300 300 | 1,800 1,800 | 6 | 10.95% 10.95% | 328 328 | 55 55 | 12 12 | 872 872 | 73 73 |
| I-5: Kern I-5: Kern | Rural Rural | 0.58 | 5.36 | 4.78 | 1 | 0.36 | 10.0% | 3,000 | 6 | 300 | 1,800 | 6 | 10.95% | 328 | 55 55 | 12 | 872 | 73 |
| I-5: Kern | Rural | 0.36 | 0.58 | 0.58 | 1 | 0.36 | 10.0% | 3,000 | 6 | 300 | 1,800 | 6 | 10.95% | 328 | 55 | 12 | 872 | 73 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 1 | 0.32 | 8.6% | 3,000 | 6 | 300 | 1,800 | 6 | 10.14% | 304 | 51 | 12 | 896 | 75 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 1 | 0.32 | 8.6% | 3,000 | 6 | 300 | 1,800 | 6 | 10.14% | 304 | 51 | 12 | 896 | 75 |
| I-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 1 | 0.32 | 8.6% | 3,000 | 6 | 300 | 1,800 | 6 | 10.14% | 304 | 51 | 12 | 896 | 75 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 1 | 0.32 | 8.6% | 3,000 | 6 | 300 | 1,800 | 6 | 10.14% | 304 | 51 | 12 | 896 | 75 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 1 | 0.48 | 8.6% | 3,000 | 6 | 300 | 1,800 | 7 | 10.14% | 304 | 43 | 11 | 896 | 81 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 1 | 0.45 | 8.6% | 3,000 | 6 | 300 | 1,800 | 7 | 10.14% | 304 | 43 | 11 | 896 | 81 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 1 | 0.48 | 8.6% | 3,000 | 6 | 300 | 1,800 | 7 | 10.14% | 304 | 43 | 11 | 896 | 81 |
| I-5: Los Angeles | Rural Rural | 59.95 54.16 | 65.43 59.95 | 5.48 | 1 | 0.48 | 8.6% | 3,000 | 6 | 300 300 | 1,800 | 7 | 10.14% | 304 | 43 | 11 14 | 896 | 81 |
| I-5: Los Angeles I-5: Los Angeles | Rural | | 54.16 | 5.79 1.83 | 1 | 0.47 0.46 | 7.5% 4.6% | 3,000 3,000 | 5 5 | 300 | 1,500 1,500 | 5 5 | 6.08% 6.08% | 182 182 | 36 36 | 14 | 1,318 1,318 | 94 94 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 1 | 0.33 | 3.3% | 3,000 | 6 | 287 | 1,720 | 5 | 6.08% | 182 | 36 | 13 | 1,098 | 84 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 1 | 0.33 | 3.3% | 3,000 | 6 | 287 | 1,720 | 5 | 5.89% | 177 | 35 | 13 | 1,103 | 85 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 1 | 0.36 | 3.3% | 3,000 | 6 | 290 | 1,741 | 5 | 5.89% | 177 | 35 | 13 | 1,082 | 83 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 1 | 0.33 | 3.3% | 3,000 | 6 | 290 | 1,741 | 5 | 5.89% | 177 | 35 | 13 | 1,082 | 83 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 1 | 0.33 | 3.0% | 3,000 | 6 | 267 | 1,602 | 5 | 5.89% | 177 | 35 | 13 | 1,221 | 94 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 1 | 0.26 | 2.6% | 3,000 | 6 | 237 | 1,424 | 5 | 5.89% | 177 | 35 | 13 | 1,399 | 108 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 1 | 0.33 | 2.6% | 3,000 | 6 | 222 | 1,330 | 5 | 6.62% | 199 | 40 | 13 | 1,471 | 113 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 41.6 | 2.3 | 1 | 0.21 0.19 | 1.7% | 2,000 | 6 4 | 158 79 | 950 315 | 5 | 6.62% 4.88% | 132 98 | 26 20 | 13 15 | 918 1,588 | 71 106 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 40.27 39.81 | 41.6 | 1.33 0.46 | 1 | 0.19 | 3.1% | 2,000 | 4 | 148 | 591 | 5 5 | 4.88% | 98 | 20 | 15 | 1,588 | 106 87 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.46 | 1 | 0.34 | 2.9% | 2,000 | 4 | 143 | 571 | 5 | 4.88% | 98 | 20 | 15 | 1,331 | 89 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 1 | 0.19 | 1.5% | 2,000 | 5 | 151 | 756 | 5 | 4.20% | 84 | 17 | 14 | 1,160 | 83 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 1 | 0.18 | 1.4% | 2,000 | 5 | 143 | 714 | 5 | 4.20% | 84 | 17 | 14 | 1,202 | 86 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 1 | 0.18 | 1.4% | 2,000 | 5 | 137 | 686 | 5 | 4.20% | 84 | 17 | 14 | 1,230 | 88 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 1 | 0.28 | 2.2% | 2,000 | 5 | 151 | 756 | 5 | 4.20% | 84 | 17 | 14 | 1,160 | 83 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 1 | 0.28 | 2.2% | 2,000 | 5 | 160 | 800 | 5 | 4.20% | 84 | 17 | 14 | 1,116 | 80 |
| I-5: Los Angeles | Rural | 28.25 | 29.16 | 0.91 | 1 | 0.25 | 2.0% | 2,000 | 5 | 161 | 804 | 5 | 4.20% | 84 | 17 | 14 | 1,112 | 79 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 1 | 0.22 | 1.5% | 2,000 | 5 | 146 | 731 | 5 | 4.20% | 84 | 17 | 14 | 1,185 | 85 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 1 | 0.22 | 1.5% | 2,000 | 5 | 146 | 731 | 5 | 4.20% | 84 | 17 | 14 | 1,185 | 85 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 1 | 0.18 | 1.4% | 2,000 | 8 | 143 137 | 1,148 | 5 | 4.48% 4.48% | 90 | 18 | 11 | 763 | 69 74 |
| I-5: Los Angeles | Urban Urban | 20.58 17.21 | 21.41 | 0.83 3.37 | 1 4 | 0.18 0.21 | 1.4% | 2,000 | 8 | 137 | 1,097 1,067 | 5 | 4.48% 4.48% | 90 90 | 18 18 | 11 | 813 844 | 77 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 1 | 0.21 | 1.7% | 2,000 | 6 | 133 | 790 | 5 | 4.48% 2.79% | 90 56 | 18 | 13 | 1,154 | 89 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 1 | 0.21 | 1.7% | 2,000 | 6 | 123 | 738 | 5 | 2.79% | 56 | 11 | 13 | 1,154 | 93 |
| I-5: Los Angeles | Rural | 13.78 | 14.16 | 0.38 | i | 0.20 | 1.6% | 2,000 | 6 | 131 | 788 | 5 | 2.79% | 56 | 11 | 13 | 1,157 | 89 |
| CA 710: Los Angeles | Suburban | 12.97 | | 10.31 | 1 | 0.12 | 1.8% | 2,000 | 8 | 145 | 1,164 | 5 | 4.48% | 90 | 18 | 11 | 747 | 68 |
| CA 710: Los Angeles | Suburban | | 12.97 | 2.79 | 1 | 0.16 | 2.3% | 2,000 | 8 | 170 | 1,364 | 5 | 4.48% | 90 | 18 | 11 | 547 | 50 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 1 | 0.10 | 1.4% | 1,000 | 8 | 86 | 686 | 5 | 4.48% | 45 | 9 | 11 | 269 | 24 |
| | | • | | | • | | | | | | | | • | | | • | • | |

TABLE R2b. SECTION FLOW AND SPEED DATA - DEDICATED LANE - BASE VOLUME Peak Period Passenger Car Nighttime Off-Peak Period Nighttime Off-Peak Period Daytime Off-Peak Daytime Off-Peak Passenger Peak Period Nighttime Off-Peak Daytime Off-Peak Peak Period Flow, City/Suburban Post Mile of Segment County One Direction per Equivalent Flow, One Flow, One Direction per Lane Passenger Car Equivalent Flow, Flow, One Direction pe Car Equivalent Flow, One Speed (mph) Speed (mph) Speed(mph) Rural Begin End Length (mi) Lane (vphpl) Direction (pcphpl) (laday) One Direction per Lane (pcphpl) Lane (vphpl) Direction (pcphpl) Truck Truck Truck I-5: Sacramento Rural 29.87 34.65 4.78 I-5: Sacramento Urban 26.94 29.87 2.93 5: Sacramento Urban 5: Sacramento Urban 26.69 1.16 5: Sacramento Urban 24.51 1.02 I-5: Sacramento Urhan 23.1 24 51 1 41 I-5: Sacramento Urban 23.1 1.1 Urban 2.84 5: Sacramento Urban I-5: Sacramento 0.34 I-5: Sacramento Urban 16.7 18.82 2.12 50 75 22 50 50 50 5: Sacramento Urhan 14 46 16.7 2 24 I-5: Sacramento Rural 14 46 14.46 a I-5: San Joaquin Rural 40.45 49.79 9.34 5: San Joaquin Rural 28.56 40.45 11.89 I-5: San Joaquin Urban 28.34 28.56 0.22 I-5: San Joaquin Urban 3.54 24.8 28.34 I-5: San Joaquin Rural 14 34 24.8 10 46 I-5: San Joaquin Rural 12 69 14 34 1 65 I-5: San Joaquin Rural 11.8 12.69 0.89 I-5: San Joaquin Rural 11.8 I-5: Stanislaus Rural 28.06 -5: Merced Rural 32.45 32.45 I-5: Fresno Rural 66.16 66.16 I-5: Kinas Rural 26.72 I-5: Kern Rural 15.86 71.17 I-5: Kern Rural 15.08 15.86 0.78 I-5: Kern 4.73 Rural 1.07 I-5: Kern Rural 9.28 10.35 -5: Kern Rural 7 04 2 24 I-5: Kern Rural 6.41 I-5: Kern Rural 5.36 6.41 1.05 5: Kern Rural I-5: Kern Rural 0.58 0.58 -5: Los Angeles Rural 86.67 88.61 1.94 Rural 0.54 I-5: Los Angeles 86.13 86.67 I-5: Los Angeles Rural 84.76 86.13 1.37 -5: Los Angeles Rural 78.43 84.76 6.33 I-5: Los Angeles Rural 78.43 8.78 69.65 1.55 300 I-5: Los Angeles Rural 65 122 50 50 50 I-5: Los Angeles Rural 65 43 68 1 2 67 I-5: Los Angeles Rural 59.95 65.43 5.48 5 79 I-5: Los Angeles Rural 54 16 59 95 I-5: Los Angeles Rural 52.33 54.16 1.83 5: Los Angeles Urban 0.23 Urbar I-5: Los Angeles I-5: Los Angeles Urhan 46 6 46 9 0.3 I-5: Los Angeles Urban 45.93 46.6 0.67 I-5: Los Angeles Urban 0.83 I-5: Los Angeles Urban 44.01 1.09 5: Los Angeles Urban -5: Los Angeles Urban 41.6 Urban 40.27 41.6 1.33 I-5: Los Angeles I-5: Los Angeles Urhan 39.81 40 27 0.46 I-5: Los Angeles Urban 39.36 39.81 0.45 I-5: Los Angeles Urban 39.36 2.71 I-5: Los Angeles 36.43 36.65 Urban 0.22 Urban 36.22 36.43 I-5: Los Angeles 0.21 -5: Los Angeles Urban 35.94 36.22 0.28 I-5: Los Angeles Urban 29.16 35 94 6 78 I-5: Los Angeles Urban 28.25 29.16 0.91 5: Los Angeles Urban 5.47 I-5: Los Angeles Urban I-5: Los Angeles Urban 21.41 0.87 Urban 20.58 21.41 I-5: Los Angeles 0.83 -5: Los Angeles Urban 17.21 0.58 3.37 I-5: Los Angeles Urban 16.9 17.21 0.31 Urban 14.16 2.74 I-5: Los Angeles 5: Los Angeles Urban 0.38 CA 710: Los Angeles Suburbar 12.97 10.31 CA 710: Los Angeles Suburban 10.18 12.97 2.79 CA 710: LA Suburban 4 96 10 18 5 22

| | City/Suburban/ | Pos | st Mile of S | egment | Peak Period Vehicle- | Peak Period Vehicle- | Nighttime Off-Peak Period Vehicle-Hours | Nighttime Off-Peak Other Vehicle-Miles | Daytime Off-Peak Other Vehicle-Hours | Daytime Off-Peak Other Vehicle-Miles |
|--------------------------------------|----------------|----------------|----------------|--------------|-----------------------------------|-----------------------------------|--|---|---|---|
| County | Rural | Begin | End | Length (mi) | Hours of Travel, One Direction | Miles of Travel, One Direction | of Travel, One Direction | of Travel, One Direction | of Travel, One Direction | of Travel, One Direction |
| -5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 25.1 | 1,255 | 2.3 | 115 | 20.4 | 1,020 |
| -5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 17.6 | 879 | 1.4 | 70 | 10.3 | 516 |
| -5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 1.5 | 75 | 0.1 | 6 | 0.9 | 44 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 3.4 | 169 | 0.6 | 28 | 7.7 | 384 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 3.1 | 153 | 0.5 | 24 | 6.7 | 333 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 3.8 | 188 | 0.7 | 34 | 9.7 | 484 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 3.1 | 154 | 0.5 | 26 | 7.4 | 370 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 7.9 | 393 | 1.4 | 68 | 19.2 | 959 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 0.9 | 44 | 0.2 | 8 | 2.4 | 118 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 6.4 | 318 | 1.0 | 50 | 13.8 | 692 |
| I-5: Sacramento | Urban Rural | 14.46 | 16.7 14.46 | 14.46 | 6.7 43.4 | 336 2,169 | 27.7 | 53 1,383 | 14.6 73.6 | 731 3,678 |
| I-5: Sacramento I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 34.4 | 1,719 | 10.8 | 541 | 48.2 | 2,411 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 59.5 | 2.973 | 4.8 | 240 | 54.7 | 2,733 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 1.1 | 55 | 0.1 | 4 | 1.0 | 51 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 17.7 | 885 | 2.0 | 99 | 15.7 | 786 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 52.3 | 2,615 | 5.8 | 292 | 46.5 | 2,323 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 9.8 | 491 | 1.4 | 69 | 13.5 | 677 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 6.7 | 334 | 1.1 | 55 | 5.6 | 279 |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 53.1 | 2,655 | 14.2 | 711 | 109.7 | 5,484 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 392.8 | 19,642 | 152.9 | 7,644 | 436.4 | 21,819 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 454.3 | 22,715 | 176.8 | 8,840 | 504.6 | 25,232 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 1,323.2 | 66,160 | 477.7 | 23,886 | 845.5 | 42,274 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 534.4 | 26,720 | 185.1 | 9,254 | 349.3 | 17,466 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 1,423.4 | 71,170 | 289.4 | 14,469 | 1,134.0 | 56,701 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 15.6 | 780 | 3.4 | 171 | 12.2 | 609 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 170.3 38.5 | 8,514 | 31.1 7.0 | 1,554 351 | 82.4 18.7 | 4,122 933 |
| I-5: Kern I-5: Kern | Rural Rural | 9.28 7.04 | 10.35 9.28 | 1.07 2.24 | 80.6 | 1,926 4.032 | 14.7 | 736 | 39.0 | 1.952 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 22.7 | 1,134 | 4.1 | 207 | 11.0 | 549 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 37.8 | 1,890 | 6.9 | 345 | 18.3 | 915 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 172.1 | 8,604 | 31.4 | 1,570 | 83.3 | 4,166 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 20.9 | 1,044 | 3.8 | 190 | 10.1 | 506 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 69.8 | 3,492 | 11.8 | 590 | 34.8 | 1,738 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 19.4 | 972 | 3.3 | 164 | 9.7 | 484 |
| I-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 49.3 | 2,466 | 8.3 | 417 | 24.5 | 1,227 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 227.9 | 11,394 | 38.5 | 1,926 | 113.4 | 5,670 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 316.1 | 15,804 | 53.4 | 2,672 | 157.3 | 7,864 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 55.8 | 2,790 | 9.4 | 472 | 27.8 | 1,388 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 96.1 | 4,806 | 16.3 | 813 | 47.8 | 2,391 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 197.3 | 9,864 | 33.4 | 1,668 | 98.2 | 4,908 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 173.7 | 8,685 | 21.1 | 1,056 | 152.6 | 7,629 |
| I-5: Los Angeles I-5: Los Angeles | Rural Urban | 52.33 47.13 | 54.16 52.33 | 1.83 5.2 | 54.9 178.9 | 2,745 8,944 | 6.7 19.0 | 334 949 | 48.2 114.1 | 2,411 5,707 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 7.9 | 396 | 0.8 | 41 | 5.1 | 254 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.23 | 10.4 | 522 | 1.1 | 53 | 6.5 | 325 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 23.3 | 1,167 | 2.4 | 118 | 14.5 | 725 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 26.6 | 1,330 | 2.9 | 147 | 20.3 | 1,014 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 31.1 | 1,553 | 3.9 | 193 | 30.5 | 1,525 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 2.9 | 146 | 0.4 | 22 | 3.2 | 162 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 43.7 | 2,185 | 6.1 | 305 | 42.2 | 2,110 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 8.4 | 418 | 2.6 | 130 | 42.2 | 2,112 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 5.4 | 272 | 0.9 | 45 | 12.1 | 603 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 5.1 | 257 | 0.9 | 44 | 12.0 | 599 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 41.0 | 2,048 | 4.6 | 228 | 62.9 | 3,145 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 3.1 | 157 | 0.4 | 18 | 5.3 | 264 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 2.9 | 144 | 0.4 | 18 | 5.2 | 258 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 4.2 | 212 | 0.5 | 24 | 6.5 | 325 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 108.5 | 5,424 | 11.4 | 570 | 151.3 | 7,566 |
| -5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 5.47 | 14.6 79.9 | 732 | 1.5 9.2 | 77 460 | 20.2 | 1,012 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | | 79.9 | 3,997 365 | 0.8 | 42 | 129.7 11.9 | 6,483 593 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 21.41 | 22.78 22.28 | 0.5 0.87 | 20.0 | 999 | 1.6 | 78 | 13.3 | 663 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 18.2 | 911 | 1.5 | 74 | 13.5 | 675 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 71.9 | 3,595 | 6.0 | 302 | 56.9 | 2,843 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 4.9 | 245 | 0.3 | 17 | 7.2 | 358 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 40.5 | 2.023 | 3.1 | 153 | 66.1 | 3,304 |
| l-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 6.0 | 299 | 0.4 | 21 | 8.8 | 440 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 239.9 | 11,997 | 18.5 | 924 | 154.0 | 7,699 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 76.1 | 3,805 | 5.0 | 250 | 30.5 | 1,525 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 71.6 | 3,579 | 4.7 | 234 | 28.1 | 1,407 |
| Total | | | | | 7 458 6 | 372 928 | 1 774 8 | 88 740 | 5 814 4 | 290 720 |

| | City/Suburban/R | Pos | t Mile of S | eament | Peak Period Vehicle-Miles | Nighttime Off-Peak Other | Daytime Off-Peak Other | | ehicle Operating Cos | |
|--------------------------------------|-----------------|----------------|----------------|----------------|---------------------------|--------------------------|--------------------------|-------------------|----------------------|--------------|
| County | ural | | | - | of Travel, One Direction | Vehicle-Miles of Travel, | Vehicle-Miles of Travel, | Peak | Nighttime Off-Peak | |
| | 1 1 | Begin | End | Length (mi) | · · | One Direction | One Direction | Truck | Truck | Truck |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 1,255 | 115 | 1,020 | 2,216 | 203 | 1,80 |
| I-5: Sacramento | Urban | 26.94 26.69 | 29.87 26.94 | 2.93 0.25 | 879 75 | 70 6 | 516 44 | 1,552 132 | 124 11 | 9 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 25.53 | 26.69 | 1.16 | 169 | 28 | 384 | 298 | 49 | |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 153 | 24 | 333 | 270 | 43 | |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 188 | 34 | 484 | 331 | 59 | |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 154 | 26 | 370 | 272 | 46 | |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 393 | 68 | 959 | 694 | 119 | |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 44 | 8 | 118 | 77 | 14 | |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 318 | 50 | 692 | 562 | 89 | |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 336 | 53 | 731 | 593 | 94 | |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 2,169 | 1,383 | 3,678 | 3,830 | 2,442 | 6,4 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 1,719 | 541 | 2,411 | 3,035 | 955 | 4,2 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 2,973 | 240 | 2,733 | 5,249 | 423 | 4,8 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 55 | 4 | 51 | 97 | 8 | |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 885 | 99 | 786 | 1,563 | 175 | |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 2,615 | 292 | 2,323 | 4,618 | 516 | |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 491 | 69 | 677 | 867 | 122 | 1,1 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 334 | 55 | 279 | 589 | 96 | |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 2,655 | 711 | 5,484 | 4,689 | 1,255 | 9,6 |
| I-5: Stanislaus | Rural | - | 28.06 | 28.06 | 19,642 | 7,644 | 21,819 | 34,688 | 13,500 | 38,5 |
| I-5: Merced | Rural Rural | 0 | 32.45 | 32.45 66.16 | 22,715 | 8,840 | 25,232 | 40,115 | 15,612 42,183 | 44,5 |
| I-5: Fresno I-5: Kings | Rural | 0 | 66.16 26.72 | 26.72 | 66,160 26,720 | 23,886 9,254 | 42,274 17.466 | 116,839 47,188 | 42,183 16.342 | 74,6 30.8 |
| I-5: Kings I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 71,170 | 14,469 | 56,701 | 125,687 | 25,553 | 100,1 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 780 | 171 | 609 | 1,377 | 302 | 1,0 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 8,514 | 1,554 | 4,122 | 15,036 | 2,744 | 7,2 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 1,926 | 351 | 933 | 3,401 | 621 | 1,6 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 4,032 | 736 | 1,952 | 7,121 | 1,299 | 3,4 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 1,134 | 207 | 549 | 2,003 | 365 | 9 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 1,890 | 345 | 915 | 3,338 | 609 | 1,6 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 8,604 | 1,570 | 4,166 | 15,195 | 2,773 | 7,3 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 1,044 | 190 | 506 | 1,844 | 336 | 8 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 3,492 | 590 | 1,738 | 6,167 | 1,043 | 3,0 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 972 | 164 | 484 | 1,717 | 290 | 8 |
| I-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 2,466 | 417 | 1,227 | 4,355 | 736 | |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 11,394 | 1,926 | 5,670 | 20,122 | 3,402 | 10,0 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 15,804 | 2,672 | 7,864 | 27,910 | 4,718 | 13,8 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 2,790 | 472 | 1,388 | 4,927 | 833 | 2,4 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 4,806 | 813 | 2,391 | 8,487 | 1,435 | 4,2 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 9,864 | 1,668 | 4,908 | 17,420 | 2,945 | 8,6 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 54.16 | 5.79 | 8,685 | 1,056 334 | 7,629 | 15,338 4,848 | 1,866 | 13,4 |
| I-5: Los Angeles I-5: Los Angeles | Rural Urban | 52.33 47.13 | 52.33 | 1.83 5.2 | 2,745 8,944 | 949 | 2,411 5,707 | 15,795 | 590 1,676 | 4,2 10,0 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 396 | 41 | 254 | 699 | 72 | 4 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.23 | 522 | 53 | 325 | 923 | 94 | 5 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 1,167 | 118 | 725 | 2,060 | 209 | 1,2 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 1,330 | 147 | 1,014 | 2,348 | 259 | 1,7 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 1,553 | 193 | 1,525 | 2,742 | 340 | |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 146 | 22 | 162 | 258 | 39 | 2 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 2,185 | 305 | 2,110 | 3,859 | 538 | 3,7 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 418 | 130 | 2,112 | 739 | 229 | 3,7 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 272 | 45 | 603 | 480 | 79 | 1,0 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 257 | 44 | 599 | 454 | 78 | 1,0 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 2,048 | 228 | 3,145 | 3,616 | 402 | 5,5 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 157 | 18 | 264 | 278 | 33 | 4 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 144 | 18 | 258 | 254 | 31 | 4 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 212 | 24 | 325 | 374 | 42 | 5 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 5,424 | 570 | 7,566 | 9,579 | 1,007 | 13,3 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 732 | 77 | 1,012 | 1,292 | 135 | |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 22.78 22.28 | 28.25 22.78 | 5.47 0.5 | 3,997 365 | 460 42 | 6,483 593 | 7,059 645 | 812 74 | |
| I-5: Los Angeles | Urban | 21.41 | 22.78 | 0.87 | 999 | 78 | 663 | 1,764 | 138 | |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 911 | 74 | 675 | 1,764 | 131 | 1,1 |
| l-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 3,595 | 302 | 2,843 | 6,348 | 533 | 5,0 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 245 | 17 | 358 | 432 | 31 | 5,0 |
| -5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 2,023 | 153 | 3,304 | 3,573 | 270 | 5,8 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 299 | 21 | 440 | 528 | 37 | 7 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 11,997 | 924 | 7,699 | 21,187 | 1,632 | 13,5 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 3,805 | 250 | 1,525 | 6,719 | 442 | 2,6 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 3,579 | 234 | 1,407 | 6,321 | 413 | 2,4 |
| | | | | | | 88,740 | 290,720 | | 156.715 | |

| _ | City/Suburban/ | | Mile of Seg | SE VOLUMI | Peak Period Vehicle- | Nighttime Off-Peak | Daytime Off-Peak Other | | Travel Time Costs | |
|--|----------------------|----------------|----------------|---------------------|----------------------|-------------------------|-------------------------------|----------------|--------------------|-------|
| County | Rural | | | | Hours of Travel, One | Period Vehicle-Hours of | Vehicle-Hours of | Peak | Nighttime Off-Peak | |
| F. O | Rural | Begin 29.87 | End 34.65 | Length (mi) 4.78 | Direction 25.1 | Travel, One Direction | Travel, One Direction 20.4 | Truck | Truck | Truck |
| I-5: Sacramento I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 17.6 | 1.4 | 10.3 | 710 497 | 65 40 | |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 1.5 | 0.1 | 0.9 | 497 | 40 | 29. |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 3.4 | 0.6 | 7.7 | 95 | 16 | |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 3.1 | 0.5 | 6.7 | 87 | 14 | |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 3.8 | 0.7 | 9.7 | 106 | 19 | |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 3.1 | 0.5 | 7.4 | 87 | 15 | |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 7.9 | 1.4 | 19.2 | 222 | 38 | |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 0.9 | 0.2 | 2.4 | 25 | 5 | |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 6.4 | 1.0 | 13.8 | 180 | 29 | 39 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 6.7 | 1.1 | 14.6 | 190 | 30 | |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 43.4 | 27.7 | 73.6 | 1,227 | 782 | 2,08 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 34.4 | 10.8 | 48.2 | 972 | 306 | |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 59.5 | 4.8 | 54.7 | 1,681 | 136 | |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 1.1 | 0.1 | 1.0 | 31 | 3 | |
| I-5: San Joaquin | Urban | 24.8 | 28.34 24.8 | 3.54 | 17.7 | 2.0 | 15.7 | 500 1,479 | 56 | |
| I-5: San Joaquin | Rural Rural | 14.34 12.69 | 14.34 | 10.46 1.65 | 52.3 9.8 | 5.8 1.4 | 46.5 13.5 | 1,479 278 | 165 39 | |
| I-5: San Joaquin I-5: San Joaquin | Rural | 12.69 | 12.69 | 0.89 | 6.7 | 1.4 | 13.5 | 189 | 39 | 15 |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 53.1 | 14.2 | 109.7 | 1,501 | 402 | 3,10 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 392.8 | 152.9 | 436.4 | 11,107 | 4,323 | 12,33 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 454.3 | 176.8 | 504.6 | 12,845 | 4,999 | 14,26 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 1,323.2 | 477.7 | 845.5 | 37,413 | 13,507 | 23,90 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 534.4 | 185.1 | 349.3 | 15,110 | 5,233 | 9,87 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 1,423.4 | 289.4 | 1,134.0 | 40,246 | 8,182 | 32,06 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 15.6 | 3.4 | 12.2 | 441 | 97 | 34 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 170.3 | 31.1 | 82.4 | 4,815 | 878 | 2,33 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 38.5 | 7.0 | 18.7 | 1,089 | 199 | 52 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 80.6 | 14.7 | 39.0 | 2,280 | 416 | |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 22.7 | 4.1 | 11.0 | 641 | 117 | |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 37.8 | 6.9 | 18.3 | 1,069 | 195 | |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 172.1 | 31.4 | 83.3 | 4,865 | 888 | 2,35 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 20.9 | 3.8 | 10.1 | 590 | 108 | 28 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 69.8 | 11.8 | 34.8 | 1,975 | 334 | 98 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 86.13 | 0.54 1.37 | 19.4 49.3 | 3.3 8.3 | 9.7 24.5 | 550 1,394 | 93 236 | 27 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 84.76 78.43 | 84.76 | 6.33 | 227.9 | 38.5 | 113.4 | 6,443 | 1,089 | 3,20 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 316.1 | 53.4 | 157.3 | 8,937 | 1,511 | 4,44 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 55.8 | 9.4 | 27.8 | 1,578 | 267 | 78 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 96.1 | 16.3 | 47.8 | 2,718 | 459 | 1,35 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 197.3 | 33.4 | 98.2 | 5,578 | 943 | 2,77 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 173.7 | 21.1 | 152.6 | 4,911 | 597 | 4,31 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 54.9 | 6.7 | 48.2 | 1,552 | 189 | 1,36 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 178.9 | 19.0 | 114.1 | 5,058 | 537 | 3,22 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 7.9 | 0.8 | 5.1 | 224 | 23 | |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 10.4 | 1.1 | 6.5 | 295 | 30 | |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 23.3 | 2.4 | 14.5 | 660 | 67 | |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 26.6 | 2.9 | 20.3 | 752 | 83 | |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 31.1 | 3.9 | 30.5 | 878 | 109 | |
| I-5: Los Angeles | Urban | 43.9 41.6 | 44.01 | 0.11 | 2.9 | 0.4 | 3.2 | 83 | 12 | |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 41.6 | 43.9 41.6 | 2.3 1.33 | 43.7 8.4 | 6.1 2.6 | 42.2 42.2 | 1,236 237 | 172 73 | 1,19 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 5.4 | 0.9 | 12.1 | 154 | 25 | 34 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 5.1 | 0.9 | 12.0 | 145 | 25 | |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 41.0 | 4.6 | 62.9 | 1,158 | 129 | |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 3.1 | 0.4 | 5.3 | 89 | 10 | |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 2.9 | 0.4 | 5.2 | 81 | 10 | |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 4.2 | 0.5 | 6.5 | 120 | 13 | 18 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 108.5 | 11.4 | 151.3 | 3,067 | 322 | 4,27 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 14.6 | 1.5 | 20.2 | 414 | 43 | 57: |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 79.9 | 9.2 | 129.7 | 2,260 | 260 | 3,66 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 7.3 | 0.8 | 11.9 | 207 | 24 | |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 20.0 | 1.6 | 13.3 | 565 | 44 | |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 18.2 | 1.5 | 13.5 | 515 | 42 | |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 71.9 | 6.0 | 56.9 | 2,033 | 171 | |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 4.9 | 0.3 | 7.2 | 138 | 10 | |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 40.5 | 3.1 | 66.1 | 1,144 | 87 | |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 6.0 | 0.4 | 8.8 | 169 | 12 | 24 |
| CA 710: Los Angeles CA 710: Los Angeles | Suburban | 12.97 10.18 | 23.28 12.97 | 10.31 2.79 | 239.9 76.1 | 18.5 5.0 | 154.0 30.5 | 6,784 2,151 | 522 141 | 4,35 |
| | Suburban Suburban | 10.18 4.96 | 12.97 | 5.22 | 76.1 71.6 | 5.0 4.7 | 30.5 28.1 | 2,151 | 132 | 95 |
| CA 710: LA | Subulball | 4.90 | 10.16 | 5.22 | 7,458.6 | 1,774.8 | 5,814.4 | 2,024 | 50,181 | . 79 |

TABLE R3a, SECTION VOLUME DATA - REMAINING CONVENTIONAL LANES - BASE VOLUME - DEDICATED LANE CASE

| TABLE R3a. SECTION | N VOLUME DAT | A - REMAII | NING CONV | ENTIONAL L | LANES - BASE VO | DLUME - DED | | | | | | | | | | | | |
|-----------------------------------|----------------------|------------|----------------|---------------|-----------------|------------------|------------------|----------------|----------|-------------------|-----------------|------------------|------------------|---------------------|-------------------|--------------|--------------------|-------------------------|
| | City/Suburban/ | Pos | st Mile of Se | ament | Conventional | AADT (One | Truck % of | Truck AADT | Peak | Peak Period Flow, | Peak Period | Nighttime Off- | Nighttime Off- | Nighttime Off-Peak | Nighttime Off- | Daytime Off- | Daytime Off-Peak | Daytime Off-Peak Period |
| County | Rural | | | | Freeway Lanes | Direction) | Convention | (One | Period | One Direction | Volume, One | Peak Period | Peak Period % | Period Volume, | Peak Period Flow, | Peak Period | Period Volume, One | Flow, One Direction |
| | | Begin | End | Length (mi) | | | al Lanes | Direction) | Duration | (vph) | Direction (veh) | Duration (hours) | AADT | One Direction (veh) | One Direction | Duration | Direction (veh) | (vph) |
| -5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 2 | 39,500 | 14.94% | 5,900 | 6 | 3,456 | 20,738 | 5 | 4.81% | 1,899 | 380 | 13 | 16,863 | 1,297 |
| -5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 3 | 48,500 | 10.08% | 4,890 | 6 | 4,850 | 29,100 | 5 | 4.81% | 2,332 | 466 | 13 | 17,068 | 1,313 |
| -5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 3 | 48,500 | 8.06% | 3,910 | 6 | 4,850 | 29,100 | 5 | 4.81% | 2,332 | 466 | 13 | 17,068 | 1,313 |
| -5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 3 | 66,500 | 12.35% | 8,210 | 3 | 6,451 | 19,354 | 6 | 4.76% | 3,166 | 528 | 15 | 43,980 | 2,932 |
| -5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 4 | 72,500 | 8.37% | 6,070 | 3 | 7,250 | 21,750 | 6 | 4.76% | 3,451 | 575 | 15 | 47,299 | 3,153 |
| -5: Sacramento | Urban | 23.10 | 24.51 | 1.41 | 5 | 79,500 | 9.43% | 7,500 | 3 | 7,056 | 21,167 | 6 | 4.76% | 3,784 | 631 | 15 | 54,549 | 3,637 |
| -5: Sacramento | Urban | 22 | 23.10 | 1.10 | 3 | 74,500 | 10.40% | 7,750 | 3 | 6,953 | 20,860 | 6 | 4.76% | 3,546 | 591 | 15 | 50,094 | 3,340 |
| -5: Sacramento | Urban | 19.16 | 22 | 2.84 | 4 | 64,500 | 13.33% | 8,600 | 3 | 5,954 | 17,862 | 6 | 4.76% | 3,070 | 512 | 15 | 43,568 | 2,905 |
| -5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 5 | 62,500 | 13.31% | 8,320 | 3 | 5,357 | 16,071 | 6 | 4.76% | 2,975 | 496 | 15 | 43,453 | 2,897 |
| -5: Sacramento | Urban | 16.70 | 18.82 | 2.12 | 4 | 49,500 | 13.13% | 6,500 | 3 | 4,950 | 14,850 | 6 | 4.76% | 2,356 | 393 | 15 | 32,294 | 2,153 |
| -5: Sacramento | Urban | 14.46 | 16.70 | 2.24 | 3 | 39,500 | 12.91% | 5,100 | 3 | 3,950 | 11,850 | 6 | 4.76% | 1,880 | 313 | 15 | 25,770 | 1,718 |
| -5: Sacramento | Rural | 0 | 14.46 | 14.46 | 2 | 29,500 | 23.73% | 7,000 | 3 | 2,950 | 8,850 | 11 | 19.13% | 5,642 | 513 | 10 | 15,008 | 1,501 |
| -5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 2 | 24,500 | 22.45% | 5,500 | 4 | 2,254 | 9,016 | 8 | 11.58% | 2,837 | 355 | 12 | 12,647 | 1,054 |
| -5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 3 | 39,500 | 22.03% | 8,700 | 5 | 3,950 | 19,750 | 5 | 4.03% | 1,592 | 318 | 14 | 18,158 | 1,297 |
| -5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 3 | 44,500 | 23.15% | 10,300 | 5 | 4,450 | 22,250 | 5 | 4.03% | 1,794 | 359 | 14 | 20,456 | 1,461 |
| -5: San Joaquin | Urban | 24.80 | 28.34 | 3.54 | 4 | 49,500 | 23.23% | 11,500 | 5 | 4,950 | 24,750 | 5 | 5.58% | 2,763 | 553 | 14 | 21,987 | 1,570 |
| -5: San Joaquin | Rural | 14.34 | 24.80 | 10.46 | 3 | 39,500 | 25.06% | 9,900 | 5 | 3,950 | 19,750 | 5 | 5.58% | 2,205 | 441 | 14 | 17,545 | 1,253 |
| -5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 5 | 62,250 | 25.11% | 15,630 | 5 | 4,940 | 24,702 | 5 | 5.58% | 3,475 | 695 | 14 | 34,072 | 2,434 |
| -5: San Joaquin | Rural | 11.80 | 12.69 | 0.89 | 3 | 41,250 | 24.65% | 10,170 | 5 | 4,125 | 20,625 | 6 | 8.17% | 3,368 | 561 | 13 | 17,257 | 1,327 |
| -5: San Joaquin | Rural | 0 | 11.80 | 11.80 | 2 | 9,250 | 20.00% | 1,850 | 3 | 925 | 2,775 | 5 | 8.03% | 743 | 149 | 16 | 5,732 | 358 |
| -5: Stanislaus | Rural | U | 28.06 32.45 | 28.06 | 2 | 8,250 | 12.73% | 1,050 | 4 4 | 825 | 3,300 | 6 | 15.57% | 1,284 | 214 344 | 14 14 | 3,666 | 262 |
| -5: Merced | Rural | U | | 32.45 | 2 | 13,250 | 19.62% | 2,600 | | 1,325 | 5,300 | 6 7 | 15.57% | 2,063 | | | 5,887 | 421 |
| -5: Fresno | Rural | U | 66.16 | 66.16 | 2 | 13,000 | 19.23% | 2,500 | 5 | 1,300 | 6,500 | | 18.05% | 2,347 | 335 | 12 | 4,153 | 346 |
| -5: Kings | Rural | 15.86 | 26.72 | 26.72 | 2 | 13,000 15,000 | 19.23% | 2,500 | 5 | 1,300 | 6,500 | 7 5 | 17.32% 10.17% | 2,251 1.525 | 322 | 12 14 | 4,249 5,975 | 354 427 |
| l-5: Kern l-5: Kern | Rural Rural | 15.86 | 87.03 15.86 | 71.17 0.78 | 2 4 | 15,000 28,000 | 19.53% 22.86% | 2,930 6,400 | 5 | 1,500 2,800 | 7,500 14.000 | 5 6 | 10.17% 10.95% | 1,525 3.065 | 305 511 | 14 | 5,975 10.935 | 427 841 |
| -5: Kern -5: Kern | Rural | 10.35 | 15.08 | 4.73 | 4 | 27,000 | 20.00% | 5,400 | 6 | 2,700 | 16,200 | 6 | 10.95% | 2,956 | 493 | 12 | 7.844 | 654 |
| -5: Kem | Rural | 9.28 | 10.35 | 1.07 | 4 | 27,000 | 20.00% | 5,400 | 6 | 2,700 | 16,200 | 6 | 10.95% | 2,956 | 493 | 12 | 7,844 | 654 |
| -5: Kem | Rural | 7.04 | 9.28 | 2.24 | 4 | 27,000 | 22.22% | 6,000 | 6 | 2,700 | 16,200 | 6 | 10.95% | 2,956 | 493 | 12 | 7,844 | 654 |
| -5: Kern | Rural | 6.41 | 7.04 | 0.63 | 4 | 27,000 | 20.00% | 5,400 | 6 | 2,700 | 16,200 | 6 | 10.95% | 2,956 | 493 | 12 | 7,844 | 654 |
| -5. Kem | Rural | 5.36 | 6.41 | 1.05 | 4 | 27,000 | 20.00% | 5,400 | 6 | 2,700 | 16,200 | 6 | 10.95% | 2,956 | 493 | 12 | 7,844 | 654 |
| -5: Kern | Rural | 0.58 | 5.36 | 4.78 | 4 | 27,000 | 20.00% | 5,400 | 6 | 2,700 | 16,200 | 6 | 10.95% | 2,956 | 493 | 12 | 7,844 | 654 |
| -5. Kem | Rural | 0.30 | 0.58 | 0.58 | 4 | 27,000 | 20.00% | 5,400 | 6 | 2,700 | 16,200 | 6 | 10.95% | 2,956 | 493 | 12 | 7,844 | 654 |
| -5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 4 | 32,000 | 20.16% | 6,450 | 6 | 3,200 | 19,200 | 6 | 10.14% | 3,246 | 541 | 12 | 9,554 | 796 |
| -5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 4 | 32,000 | 20.16% | 6,450 | 6 | 3,200 | 19,200 | 6 | 10.14% | 3,246 | 541 | 12 | 9,554 | 796 |
| -5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 4 | 32,000 | 20.16% | 6,450 | 6 | 3,200 | 19,200 | 6 | 10.14% | 3,246 | 541 | 12 | 9,554 | 796 |
| -5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 4 | 32,000 | 20.16% | 6,450 | 6 | 3,200 | 19,200 | 6 | 10.14% | 3,246 | 541 | 12 | 9,554 | 796 |
| -5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 4 | 32,000 | 10.31% | 3,300 | 6 | 3,200 | 19,200 | 7 | 10.14% | 3,246 | 464 | 11 | 9.554 | 869 |
| -5: Los Angeles | Rural | 68.10 | 69.65 | 1.55 | 4 | 32,000 | 11.41% | 3,650 | 6 | 3,200 | 19,200 | 7 | 10.14% | 3,246 | 464 | 11 | 9,554 | 869 |
| -5: Los Angeles | Rural | 65.43 | 68.10 | 2.67 | 4 | 32,000 | 10.31% | 3,300 | 6 | 3,200 | 19,200 | 7 | 10.14% | 3,246 | 464 | 11 | 9,554 | 869 |
| -5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 4 | 32,000 | 10.31% | 3,300 | 6 | 3,200 | 19,200 | 7 | 10.14% | 3,246 | 464 | 11 | 9,554 | 869 |
| -5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 4 | 37,000 | 9.19% | 3,400 | 5 | 3,700 | 18,500 | 5 | 6.08% | 2,250 | 450 | 14 | 16,250 | 1,161 |
| -5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 4 | 62,000 | 5.65% | 3,500 | 5 | 6,200 | 31,000 | 5 | 6.08% | 3,771 | 754 | 14 | 27,229 | 1,945 |
| -5: Los Angeles | Urban | 47.13 | 52.33 | 5.20 | 4 | 87,000 | 6.90% | 6,000 | 6 | 8,313 | 49,880 | 5 | 6.08% | 5,291 | 1,058 | 13 | 31,829 | 2,448 |
| -5: Los Angeles | Urban | 46.90 | 47.13 | 0.23 | 4 | 87,000 | 6.90% | 6.000 | 6 | 8.313 | 49.880 | 5 | 5.89% | 5.128 | 1.026 | 13 | 31,992 | 2,461 |
| l-5: Los Angeles | Urban | 46.60 | 46.90 | 0.30 | 4 | 89,000 | 5.93% | 5,280 | 6 | 8,610 | 51,659 | 5 | 5.89% | 5,246 | 1,049 | 13 | 32,095 | 2,469 |
| -5: Los Angeles | Urban | 45.93 | 46.60 | 0.67 | 5 | 89,000 | 6.97% | 6,200 | 6 | 8,610 | 51,659 | 5 | 5.89% | 5,246 | 1,049 | 13 | 32,095 | 2,469 |
| -5: Los Angeles | Urban | 45.10 | 45.93 | 0.83 | 5 | 97,000 | 6.19% | 6,000 | 6 | 8,633 | 51,798 | 5 | 5.89% | 5,718 | 1,144 | 13 | 39,484 | 3,037 |
| -5: Los Angeles | Urban | 44.01 | 45.10 | 1.09 | 5 | 112,000 | 7.59% | 8,500 | 6 | 8,863 | 53,176 | 5 | 5.89% | 6,602 | 1,320 | 13 | 52,222 | 4,017 |
| -5: Los Angeles | Urban | 43.90 | 44.01 | 0.11 | 4 | 112,000 | 5.54% | 6,200 | 6 | 8,278 | 49,670 | 5 | 6.62% | 7,419 | 1,484 | 13 | 54,911 | 4,224 |
| -5: Los Angeles | Urban | 41.60 | 43.90 | 2.30 | 5 | 118,000 | 6.44% | 7,600 | 6 | 9,342 | 56,050 | 5 | 6.62% | 7,817 | 1,563 | 13 | 54,133 | 4,164 |
| -5: Los Angeles | Urban | 40.27 | 41.60 | 1.33 | 3 | 115,000 | 7.42% | 8,530 | 4 | 4,521 | 18,085 | 5 | 4.88% | 5,612 | 1,122 | 15 | 91,303 | 6,087 |
| -5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 4 | 63,000 | 6.11% | 3,850 | 4 | 4,652 | 18,609 | 5 | 4.88% | 3,074 | 615 | 15 | 41,316 | 2,754 |
| -5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 5 | 68,000 | 5.29% | 3,600 | 4 | 4,857 | 19,429 | 5 | 4.88% | 3,318 | 664 | 15 | 45,253 | 3,017 |
| -5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 5 | 133,000 | 6.62% | 8,800 | 5 | 10,049 | 50,244 | 5 | 4.20% | 5,591 | 1,118 | 14 | 77,165 | 5,512 |
| -5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 6 | 138,000 | 6.67% | 9,200 | 5 | 9,857 | 49,286 | 5 | 4.20% | 5,801 | 1,160 | 14 | 82,913 | 5,922 |
| -5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 4 | 138,000 | 6.67% | 9,200 | 5 | 9,463 | 47,314 | 5 | 4.20% | 5,801 | 1,160 | 14 | 84,885 | 6,063 |
| -5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 4 | 88,000 | 5.91% | 5,200 | 5 | 6,649 | 33,244 | 5 | 4.20% | 3,699 | 740 | 14 | 51,056 | 3,647 |
| -5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 4 | 88,000 | 5.91% | 5,200 | 5 | 7,040 | 35,200 | 5 | 4.20% | 3,699 | 740 | 14 | 49,101 | 3,507 |
| -5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 4 | 100,000 | 6.16% | 6,160 | 5 | 8,039 | 40,196 | 5 | 4.20% | 4,204 | 841 | 14 | 55,600 | 3,971 |
| -5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 5 | 128,000 | 5.55% | 7,100 | 5 | 9,354 | 46,769 | 5 | 4.20% | 5,381 | 1,076 | 14 | 75,850 | 5,418 |
| -5: Los Angeles | Urban | 22.28 | 22.78 | 0.50 | 4 | 128,000 | 5.55% | 7,100 | 5 | 9,354 | 46,769 | 5 | 4.20% | 5,381 | 1,076 | 14 | 75,850 | 5,418 |
| -5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 5 | 136,000 | 6.65% | 9,040 | 8 | 9,757 | 78,052 | 5 | 4.48% | 6,094 | 1,219 | 11 | 51,854 | 4,714 |
| -5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 4 | 138,000 | 6.67% | 9,200 | 8 | 9,463 | 75,703 | 5 | 4.48% | 6,184 | 1,237 | 11 | 56,113 | 5,101 |
| -5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 4 | 118,000 | 6.44% | 7,600 | 8 | 7,867 | 62,933 | 5 | 4.48% | 5,288 | 1,058 | 11 | 49,779 | 4,525 |
| -5: Los Angeles | Urban | 16.90 | 17.21 | 0.31 | 4 | 118,000 | 6.44% | 7,600 | 6 | 7,768 | 46,610 | 5 | 2.79% | 3,294 | 659 | 13 | 68,096 | 5,238 |
| -5: Los Angeles | Urban | 14.16 | 16.90 | 2.74 | 4 | 128,000 | 6.56% | 8,400 | 6 | 7,877 | 47,262 | 5 | 2.79% | 3,574 | 715 | 13 | 77,165 | 5,936 |
| -5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 4 | 126,000 | 6.54% | 8,240 | 6 | 8,269 | 49,613 | 5 | 2.79% | 3,518 | 704 | 13 | 72,870 | 5,605 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 4 | 108,000 | 13.43% | 14,500 | 8 | 7,855 | 62,836 | 5 | 4.48% | 4,839 | 968 | 11 | 40,324 | 3,666 |
| | | 10.18 | 12.97 | 2.79 | 4 | 86.000 | 12.00% | 10.320 | 8 | 7.330 | 58,636 | 5 | 4.48% | 3.854 | 771 | 11 | 23.510 | 2.137 |
| CA 710: Los Angeles CA 710: LA | Suburban Suburban | 4 96 | 10.18 | 5.22 | 3 | 69,000 | 13 77% | 9.500 | 8 | 5 914 | 47 314 | 5 | 4.48% | 3.092 | 618 | 11 | 18 594 | 1,690 |

| Table R3b. SECTION | FI OW AND SPE | ED DATA - | REMAINI | NG CONVENT | IONAL LANES | . BASE VOLUME . | DEDICATED I | ANE CASE | | | | | | | | |
|--------------------------------------|-----------------|----------------|----------------|----------------|----------------|-----------------------------------|-------------------------------|-------------------------|---------------------|-----------------------------------|-------------|----------------|--------------|---------------|----------|------------|
| Tubic Rob. OLOTION | LOW AND OF L | | st Mile of S | | Peak Period | Peak Period | Nighttime Off- | Nighttime Off- | | Daytime Off-Peak | Peak Period | Speed (mph) | Nighttime Of | ff-Peak Speed | Daytime | e Off-Peak |
| | City/Suburban/R | 1 108 | st wille of 3 | egment | Flow, One | Passenger Car | Peak Period | Peak Period | Peak Flow, | Passenger Car | reak reliou | Speed (IIIpii) | (m | nph) | Spee | ed(mph) |
| County | ural | | F | Learnin (as N | Direction per | Equivalent Flow, One Direction | Flow, One | Passenger Car | One Direction | Equivalent Flow, One Direction | T | Oth 1/- b | Tours. | Other Mak | T1- | 04 |
| | | Begin | End | Length (mi) | Lane (vphpl) | (pcphpl) | Direction per Lane (vphpl) | Equivalent Flow, One | per Lane (vphpl) | (pcphpl) | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 1,728 | 1,857 | 190 | 205 | 649 | 697 | 50 | 64 | 50 | 65 | 50 | 65 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 1,617 | 1,698 | 155 | 164 | 438 | 460 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 1,617 | 1,682 | 155 | 162 | 438 | 455 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 2,150 | 2,283 | 176 | 187 | 977 | 1,038 | 50 | 48 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 24.51 | 25.53 24.51 | 1.02 | 1,813 1,411 | 1,888 1,478 | 144 126 | 150 132 | 788 727 | 821 762 | 50 50 | 55 55 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 23.1 | 23.1 | 1.41 | 2,318 | 2,438 | 126 | 208 | 1,113 | 1,171 | 50 | 44 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 1,488 | 1,588 | 128 | 137 | 726 | 775 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 1,071 | 1,143 | 99 | 106 | 579 | 618 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 1,238 | 1,319 | 98 | 105 | 538 | 574 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 1,317 | 1,402 | 104 | 112 | 573 | 610 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 1,475 | 1,650 | 256 | 289 | 750 | 839 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin I-5: San Joaquin | Rural Rural | 40.45 28.56 | 49.79 40.45 | 9.34 11.89 | 1,127 1,317 | 1,254 1,462 | 177 106 | 199 118 | 527 432 | 586 480 | 50 50 | 65 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 1,483 | 1,655 | 120 | 134 | 487 | 543 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 1,238 | 1,381 | 138 | 155 | 393 | 438 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1,317 | 1,482 | 147 | 166 | 418 | 470 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 988 | 1,112 | 139 | 157 | 487 | 548 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 1,375 | 1,545 | 187 | 211 | 442 | 497 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 463 | 509 | 74 | 84 | 179 | 197 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Stanislaus I-5: Merced | Rural Rural | 0 | 28.06 32.45 | 28.06 32.45 | 413 663 | 439 728 | 107 172 | 122 197 | 131 210 | 139 231 | 50 50 | 65 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 650 | 713 | 168 | 197 | 173 | 190 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kings | Rural | n | 26.72 | 26.72 | 650 | 713 | 161 | 185 | 177 | 194 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 750 | 823 | 152 | 175 | 213 | 234 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 700 | 780 | 128 | 146 | 210 | 234 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 675 | 743 | 123 | 140 | 163 | 180 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 675 | 743 | 123 | 140 | 163 | 180 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 675 | 750 | 123 | 142 | 163 | 182 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 675 675 | 743 743 | 123 123 | 140 140 | 163 163 | 180 180 | 50 50 | 65 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: Kern I-5: Kern | Rural Rural | 5.36 0.58 | 6.41 5.36 | 1.05 4.78 | 675 | 743 | 123 | 140 | 163 | 180 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Kern | Rural | 0.56 | 0.58 | 0.58 | 675 | 743 | 123 | 140 | 163 | 180 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 800 | 881 | 135 | 154 | 199 | 219 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 800 | 881 | 135 | 154 | 199 | 219 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 800 | 881 | 135 | 154 | 199 | 219 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 800 | 881 | 135 | 154 | 199 | 219 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 800 | 841 | 116 116 | 126 | 217 | 228 230 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 68.1 65.43 | 69.65 68.1 | 1.55 2.67 | 800 800 | 846 841 | 116 | 127 126 | 217 217 | 228 | 50 50 | 65 65 | 50 50 | 65 65 | 50 50 | 65 65 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 800 | 841 | 116 | 126 | 217 | 228 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 925 | 968 | 113 | 122 | 290 | 304 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 1,550 | 1,594 | 189 | 198 | 486 | 500 | 50 | 65 | 50 | 65 | 50 | 65 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 2,078 | 2,150 | 265 | 278 | 612 | 633 | 50 | 53 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 2,078 | 2,150 | 256 | 269 | 615 | 636 | 50 | 53 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 2,152 | 2,216 | 262 | 274 | 617 | 636 | 50 | 52 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 45.93 45.1 | 46.6 45.93 | 0.67 0.83 | 1,722 1,727 | 1,782 1,780 | 210 229 | 220 239 | 494 607 | 511 626 | 50 50 | 55 55 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Los Angeles | Urban | 44.01 | 45.93 | 1.09 | 1,773 | 1,760 | 264 | 277 | 803 | 834 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 2,070 | 2,127 | 371 | 386 | 1,056 | 1,085 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 1,868 | 1,929 | 313 | 325 | 833 | 860 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 1,507 | 1,563 | 374 | 391 | 2,029 | 2,104 | 50 | 55 | 50 | 55 | 50 | 53 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 1,163 | 1,199 | 154 | 161 | 689 | 710 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 971 | 997 | 133 | 138 | 603 | 619 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 36.65 36.43 | 39.36 | 2.71 0.22 | 2,010 1,643 | 2,076 1,698 | 224 193 | 233 201 | 1,102 987 | 1,139 1,020 | 50 50 | 53 55 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 36.43 | 36.65 36.43 | 0.22 | 1,643 2,366 | 1,698 2,445 | 193 290 | 302 | 1,516 | 1,020 | 50 | 40 | 50 | 55 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.21 | 1,662 | 1,711 | 185 | 192 | 912 | 939 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 1,760 | 1,812 | 185 | 192 | 877 | 903 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 2,010 | 2,072 | 210 | 219 | 993 | 1,023 | 50 | 53 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 1,871 | 1,923 | 215 | 223 | 1,084 | 1,114 | 50 | 55 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 2,338 | 2,403 | 269 | 278 | 1,354 | 1,392 | 50 | 45 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 1,951 | 2,016 | 244 | 254 | 943 | 974 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 2,366 | 2,445 | 309 | 322 | 1,275 | 1,318 | 50 | 45 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban | 17.21 16.9 | 20.58 | 3.37 | 1,967 | 2,030 | 264 | 275 | 1,131 | 1,168 | 50 | 54 | 50 | 55 | 50 | 55 |
| I-5: Los Angeles | Urban Urban | 16.9 14.16 | 17.21 16.9 | 0.31 2.74 | 1,942 1,969 | 2,005 2,034 | 165 179 | 171 186 | 1,310 1,484 | 1,352 1,533 | 50 50 | 54 54 | 50 50 | 55 55 | 50 50 | 55 55 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 2,067 | 2,034 | 179 | 183 | 1,484 | 1,533 | 50 | 53 | 50 | 55 | 50 | 55 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 1.964 | 2,135 | 242 | 260 | 916 | 978 | 50 | 60 | 50 | 65 | 50 | 65 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 1,832 | 1,942 | 193 | 206 | 534 | 566 | 50 | 63 | 50 | 65 | 50 | 65 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 1,971 | 2,107 | 206 | 222 | 563 | 602 | 50 | 57 | 50 | 65 | 50 | 65 |
| | | | | | | | | | | | | | | | | |

| TABLE R3c. SECTION | TRAVEL DATA | - REMAIN | ING CONVI | ENTIONAL LA | NES - BASE V | OLUME - DEDI | CATED LANE CA | SE | | | | | | | | |
|--------------------------------------|----------------|----------------|----------------|---------------|---------------------|---------------------------|-------------------|--------------------------|-------------------------|------------------|------------------|-------------------|----------------|-----------------------------|---------------------|-------------------------|
| | City/Suburban/ | | st Mile of Se | | Peak Period V | ehicle-Hours of | Nighttime Off-Pea | k Period Vehicle- | Daytime Off-Pea | | | | | eak Other Vehicle- | | eriod Vehicle-Miles o |
| County | Rural | Begin | End | Length (mi) | Travel, On Truck | e Direction Other Veh. | Hours of Travel | One Direction Other Veh. | Hours of Trave Truck | Other Veh. | Travel, One | Other Veh. | Miles of Trave | I, One Direction Other Veh. | Travel, Or Truck | ne Direction Other Veh. |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 296.1 | 1,317.5 | 27.1 | 118.8 | 240.8 | 1,054.9 | 14,806 | 84,319 | 1,356 | 7,722 | 12,040 | 68,567 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 171.9 | 1,393.9 | 13.8 | 111.7 | 100.8 | 817.6 | 8,597 | 76,666 | 689 | 6,143 | 5,042 | 44,968 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 11.7 | 121.6 | 0.9 | 9.7 | 6.9 | 71.3 | 587 | 6,689 | 47 | 536 | 344 | 3,923 |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 25.53 24.51 | 26.69 25.53 | 1.16 | 55.4 37.1 | 410.0 369.6 | 9.1 5.9 | 58.5 58.6 | 126.0 80.8 | 813.1 803.7 | 2,772 1.857 | 19,679 20.328 | 453 295 | 3,219 3,225 | 6,298 4.039 | 44,718 44,206 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 56.3 | 491.4 | 10.1 | 87.9 | 145.1 | 1,266.5 | 2,816 | 27,030 | 503 | 4,833 | 7,256 | 69,658 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 47.7 | 467.3 | 8.1 | 63.5 | 114.6 | 897.7 | 2,387 | 20,559 | 406 | 3,495 | 5,732 | 49,371 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 135.3 | 799.3 | 23.3 | 137.4 | 330.0 | 1,949.7 | 6,764 | 43,963 | 1,163 | 7,557 | 16,498 | 107,236 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 14.5 | 86.1 | 2.7 | 15.9 | 39.3 | 232.9 | 727 | 4,737 | 135 | 877 | 1,967 | 12,807 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 82.7 | 497.2 | 13.1 | 78.9 | 179.8 | 1,081.3 | 4,134 | 27,348 | 656 | 4,339 | 8,990 | 59,473 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 68.5 | 420.3 1,501.6 | 10.9 387.2 | 66.7 957.3 | 149.1 1.029.9 | 914.0 2,546.5 | 3,427 | 23,117 97.605 | 544 19.359 | 3,668 | 7,453 51,495 | 50,271 165,519 |
| I-5: Sacramento I-5: San Joaquin | Rural Rural | 40.45 | 14.46 49.79 | 14.46 9.34 | 607.3 378.1 | 1,004.7 | 119.0 | 316.1 | 530.4 | 1,409.3 | 30,366 18,904 | 65,305 | 5.948 | 62,226 20,547 | 26,518 | 91.607 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 1,034.4 | 2,817.0 | 83.4 | 227.1 | 951.0 | 2,589.9 | 51,722 | 183,106 | 4,170 | 14,763 | 47,551 | 168,343 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 22.7 | 68.4 | 1.8 | 5.5 | 20.8 | 62.9 | 1,133 | 3,762 | 91 | 303 | 1,042 | 3,459 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 407.1 | 1,222.9 | 45.5 | 136.5 | 361.6 | 1,086.4 | 20,355 | 67,260 | 2,273 | 7,510 | 18,082 | 59,750 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1,035.5 | 2,381.7 | 115.6 | 265.9 | 919.9 | 2,115.7 | 51,777 | 154,808 | 5,781 | 17,284 | 45,996 | 137,524 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 204.7 | 469.6 | 28.8 | 66.1 | 282.3 | 647.7 | 10,234 | 30,525 | 1,440 | 4,294 | 14,116 | 42,104 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 90.5 | 212.8 | 14.8 | 34.7 | 75.7 | 178.0 | 4,526 | 13,831 | 739 | 2,259 | 3,787 | 11,572 |
| I-5: San Joaquin I-5: Stanislaus | Rural Rural | 0 | 11.8 28.06 | 11.8 28.06 | 131.0 235.7 | 403.0 1,243.3 | 35.1 91.7 | 107.9 483.8 | 270.6 261.8 | 832.5 1.381.1 | 6,549 11,785 | 26,196 80.813 | 1,753 4,586 | 7,013 31,450 | 13,528 13,091 | 54,111 89,769 |
| I-5: Merced | Rural | o o | 32.45 | 32.45 | 675.0 | 2,126.7 | 262.7 | 827.7 | 749.8 | 2,362.4 | 33,748 | 138,237 | 13,134 | 53,798 | 37,488 | 153,558 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 1,654.0 | 5,343.7 | 597.1 | 1,929.2 | 1,056.9 | 3,414.4 | 82,700 | 347,340 | 29,857 | 125,401 | 52,843 | 221,939 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 668.0 | 2,158.2 | 231.3 | 747.4 | 436.7 | 1,410.7 | 33,400 | 140,280 | 11,567 | 48,583 | 21,833 | 91,697 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 2,085.3 | 6,607.9 | 424.0 | 1,343.4 | 1,661.3 | 5,264.4 | 104,264 | 429,511 | 21,198 | 87,323 | 83,066 | 342,188 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 49.9 | 129.6 | 10.9 | 28.4 | 39.0 | 101.2 | 2,496 | 8,424 | 547 | 1,845 | 1,949 | 6,579 |
| I-5: Kern I-5: Kern | Rural | 10.35 | 15.08 10.35 | 4.73 1.07 | 306.5 69.3 | 943.1 213.3 | 55.9 12.7 | 172.1 | 148.4 33.6 | 456.6 103.3 | 15,325 | 61,301 | 2,796 633 | 11,185 | 7,420 1,679 | 29,682 6,714 |
| I-5: Kern | Rural Rural | 9.28 7.04 | 9.28 | 2.24 | 161.3 | 434.2 | 29.4 | 38.9 79.2 | 78.1 | 210.2 | 3,467 8,064 | 13,867 28,224 | 1,471 | 2,530 5,150 | 3,905 | 13,666 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 40.8 | 125.6 | 7.4 | 22.9 | 19.8 | 60.8 | 2,041 | 8,165 | 372 | 1,490 | 988 | 3,953 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 68.0 | 209.4 | 12.4 | 38.2 | 32.9 | 101.4 | 3,402 | 13,608 | 621 | 2,483 | 1,647 | 6,589 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 309.7 | 953.1 | 56.5 | 173.9 | 150.0 | 461.5 | 15,487 | 61,949 | 2,826 | 11,304 | 7,499 | 29,996 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 37.6 | 115.6 | 6.9 | 21.1 | 18.2 | 56.0 | 1,879 | 7,517 | 343 | 1,372 | 910 | 3,640 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 150.2 | 457.5 | 25.4 | 77.4 | 74.7 | 227.7 | 7,508 | 29,740 | 1,269 | 5,028 | 3,736 | 14,799 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 86.13 84.76 | 86.67 86.13 | 0.54 1.37 | 41.8 106.0 | 127.4 323.1 | 7.1 17.9 | 21.5 54.6 | 20.8 52.8 | 63.4 160.8 | 2,090 5,302 | 8,278 21,002 | 353 896 | 1,400 3,551 | 1,040 2,638 | 4,119 10,451 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 489.9 | 1,492.9 | 82.8 | 252.4 | 243.8 | 742.9 | 24.497 | 97.039 | 4.141 | 16,405 | 12.190 | 48.287 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 347.7 | 2,326.0 | 58.8 | 393.2 | 173.0 | 1,157.4 | 17,384 | 151,192 | 2,939 | 25,560 | 8,651 | 75,234 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 67.9 | 405.6 | 11.5 | 68.6 | 33.8 | 201.8 | 3,395 | 26,366 | 574 | 4,457 | 1,689 | 13,120 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 105.7 | 707.3 | 17.9 | 119.6 | 52.6 | 352.0 | 5,287 | 45,977 | 894 | 7,773 | 2,631 | 22,879 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 217.0 | 1,451.8 | 36.7 | 245.4 | 108.0 | 722.4 | 10,850 | 94,366 | 1,834 | 15,953 | 5,399 | 46,957 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 54.16 52.33 | 59.95 54.16 | 5.79 1.83 | 196.9 64.1 | 1,496.5 823.5 | 23.9 7.8 | 182.0 100.2 | 172.9 56.3 | 1,314.5 723.3 | 9,843 3,203 | 97,272 53,528 | 1,197 390 | 11,832 6.511 | 8,646 2,813 | 85,440 47,016 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 357.8 | 4,556.4 | 38.0 | 465.8 | 228.3 | 2,801.7 | 17,888 | 241,488 | 1,898 | 25,618 | 11,414 | 154,094 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 15.8 | 201.5 | 1.6 | 20.0 | 10.1 | 124.6 | 791 | 10,681 | 81 | 1.098 | 507 | 6,851 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 18.4 | 280.3 | 1.9 | 26.9 | 11.4 | 164.7 | 919 | 14,578 | 93 | 1,481 | 571 | 9,057 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 48.2 | 585.5 | 4.9 | 59.5 | 30.0 | 363.7 | 2,411 | 32,200 | 245 | 3,270 | 1,498 | 20,006 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 53.2 | 733.3 | 5.9 | 81.0 | 40.5 | 559.0 | 2,659 | 40,333 | 294 | 4,452 | 2,027 | 30,745 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 88.0 | 973.9 | 10.9 | 120.9 | 86.4 | 956.4 | 4,399 | 53,563 | 546 | 6,650 | 4,320 | 52,602 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 43.9 41.6 | 44.01 43.9 | 0.11 2.3 | 6.0 166.1 | 95.6 2,192.9 | 0.9 23.2 | 14.0 305.8 | 6.7 160.4 | 103.7 2,118.0 | 302 8,303 | 5,161 120,612 | 45 1,158 | 771 16,821 | 334 8,019 | 5,706 116,487 |
| I-5: Los Angeles | Urban | 40.27 | 43.9 | 1.33 | 35.7 | 404.9 | 11.1 | 125.6 | 180.1 | 2,116.0 | 1,784 | 22,270 | 554 | 6,910 | 9,007 | 112,425 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 10.5 | 146.1 | 1.7 | 24.1 | 23.2 | 324.4 | 523 | 8,037 | 86 | 1,328 | 1,161 | 17,844 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 9.3 | 150.5 | 1.6 | 25.7 | 21.6 | 350.7 | 463 | 8,280 | 79 | 1,414 | 1,078 | 19,286 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 180.2 | 2,399.1 | 20.0 | 257.3 | 276.7 | 3,550.5 | 9,009 | 127,153 | 1,002 | 14,149 | 13,836 | 195,280 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 14.5 | 184.0 | 1.7 | 21.7 | 24.3 | 309.5 | 723 | 10,120 | 85 | 1,191 | 1,216 | 17,025 |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 13.2 | 231.8 | 1.6 | 20.7 | 23.8 | 302.5 | 662 | 9,274 | 81 | 1,137 | 1,188 | 16,637 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 35.94 29.16 | 36.22 35.94 | 0.28 6.78 | 11.0 282.0 | 159.2 4,082.8 | 1.2 29.6 | 17.7 429.1 | 16.9 393.4 | 244.6 5,695.1 | 550 14,102 | 8,758 224,554 | 61 1,482 | 975 23.599 | 845 19,672 | 13,451 313,231 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.78 | 45.1 | 647.6 | 4.7 | 65.3 | 62.3 | 863.3 | 2.253 | 34.325 | 236 | 3,590 | 3.117 | 47.479 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 283.8 | 4,393.4 | 32.7 | 505.5 | 460.3 | 7,125.2 | 14,190 | 241,637 | 1,633 | 27,800 | 23,014 | 391,886 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 25.9 | 490.8 | 3.0 | 46.2 | 42.1 | 651.3 | 1,297 | 22,088 | 149 | 2,541 | 2,104 | 35,821 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 90.3 | 1,173.9 | 7.0 | 90.0 | 60.0 | 765.7 | 4,514 | 63,392 | 352 | 4,949 | 2,999 | 42,114 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 83.8 | 1,303.2 | 6.8 | 87.1 | 62.1 | 790.3 | 4,189 | 58,644 | 342 | 4,790 | 3,105 | 43,469 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 273.2 18.6 | 3,674.5 250.3 | 23.0 | 303.1 17.4 | 216.1 | 2,853.7 | 13,660 | 198,426 | 1,148 | 16,671 | 10,805 | 156,951 19,750 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 16.9 14.16 | 17.21 16.9 | 0.31 2.74 | 18.6 170.0 | 250.3 2,240.7 | 1.3 12.9 | 17.4 166.3 | 27.2 277.5 | 359.1 3,591.9 | 931 8,498 | 13,518 120,998 | 66 643 | 956 9,149 | 1,360 13,875 | 19,750 197,556 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 24.7 | 332.4 | 1.7 | 22.7 | 36.2 | 470.5 | 1,233 | 17.620 | 87 | 1,249 | 1.811 | 25.880 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 1,739.6 | 9,347.7 | 134.0 | 664.6 | 1,116.3 | 5,537.3 | 86,979 | 560,864 | 6,699 | 43,196 | 55,817 | 359,925 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 392.6 | 2,285.1 | 25.8 | 145.6 | 157.4 | 888.0 | 19,631 | 143,964 | 1,290 | 9,461 | 7,871 | 57,722 |
| CA 710: LA TOTAL | Suburban | 4.96 | 10.18 | 5.22 | 680.1 | 3,736.4 | 44.4 | 214.1 | 267.3 | 1,287.6 | 34,005 | 212,976 | 2,222 | 13,917 | 13,363 | 83,697 |
| | | | | | 18,174.5 | 93,925.7 | 3.498.0 | 14.689.8 | 15,949.2 | 87,696.4 | 908,725 | 5,586,341 | 174,898 | 913.331 | 797,461 | 5,220,436 |

| TABLE R3d. VEHICLE | OPERATING CO | OSTS - REI | MAINING (| CONVENTION | IAL LANES | - BASE VOLUME | - DEDICATED LA | NE CASE | | | | | | | | |
|--------------------------------------|----------------|----------------|----------------|---------------|------------------|--------------------|-------------------|--------------------|------------------|--------------------|------------------|------------------|-----------------|------------------|------------------|------------------|
| | City/Suburban/ | | t Mile of Se | | Peak Perio | d Vehicle-Miles of | Nighttime Off-Pea | ak Period Vehicle- | Daytime Off-Pe | ak Period Vehicle- | | | Vehicle Opera | ating Costs (\$) | | |
| County | Rural | | | | | One Direction | | , One Direction | | el, One Direction | Pe | | Nighttime | | Daytime (| |
| | | Begin | End | Length (mi) | Truck | Other Veh. | Truck | Other | Truck | Other Veh. | Truck | Other Veh. | | Other Veh. | Truck | Other Veh. |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 14,806 | 84,319 | 1,356 | 7,722 | 12,040 | 68,567 | 26,148 | 27,404 | 2,395 | 2,510 | 21,263 | 22,28 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 8,597 | 76,666 | 689 | 6,143 | 5,042 | 44,968 | 15,182 | 24,917 | 1,217 | 1,997 | 8,905 | 14,61 |
| I-5: Sacramento | Urban Urban | 26.69 25.53 | 26.94 26.69 | 0.25 1.16 | 587 2.772 | 6,689 19,679 | 47 453 | 536 3.219 | 344 6,298 | 3,923 44.718 | 1,036 4,895 | 2,174 6.396 | 83 801 | 174 1,046 | 608 11,123 | 1,27 14,53 |
| I-5: Sacramento I-5: Sacramento | | 24.51 | 25.53 | 1.02 | 1,857 | 20,328 | 295 | 3,225 | 4,039 | 44,718 | 3,280 | 6,606 | 520 | 1,048 | 7,133 | 14,36 |
| I-5: Sacramento | | 23.1 | 24.51 | 1.41 | 2,816 | 27,030 | 503 | 4,833 | 7,256 | 69,658 | 4,972 | 8,785 | 889 | 1,571 | 12,814 | 22,63 |
| I-5: Sacramento | | 22 | 23.1 | 1.1 | 2,387 | 20,559 | 406 | 3,495 | 5,732 | 49.371 | 4,215 | 6,682 | 717 | 1,136 | 10,123 | 16,04 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 6,764 | 43,963 | 1,163 | 7,557 | 16,498 | 107,236 | 11,945 | 14,288 | 2,053 | 2,456 | 29,135 | 34,85 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 727 | 4,737 | 135 | 877 | 1,967 | 12,807 | 1,285 | 1,539 | 238 | 285 | 3,473 | 4,16 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 4,134 | 27,348 | 656 | 4,339 | 8,990 | 59,473 | 7,301 | 8,888 | 1,158 | 1,410 | 15,877 | 19,32 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 3,427 | 23,117 | 544 | 3,668 | 7,453 | 50,271 | 6,052 | 7,513 | 960 | 1,192 | 13,162 | 16,33 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 30,366 | 97,605 | 19,359 | 62,226 | 51,495 | 165,519 | 53,627 | 31,722 | 34,188 | 20,223 | 90,941 | 53,79 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 18,904 | 65,305 | 5,948 | 20,547 | 26,518 | 91,607 | 33,385 | 21,224 | 10,504 | 6,678 | 46,831 | 29,77 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 51,722 | 183,106 | 4,170 | 14,763 | 47,551 | 168,343 | 91,341 | 59,509 | 7,364 | 4,798 | 83,976 | 54,71 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 1,133 | 3,762 | 91 | 303 | 1,042 | 3,459 | 2,001 | 1,223 | 161 | 99 | 1,840 | 1,12 |
| I-5: San Joaquin I-5: San Joaquin | Urban Rural | 24.8 14.34 | 28.34 24.8 | 3.54 10.46 | 20,355 51,777 | 67,260 154,808 | 2,273 5.781 | 7,510 17,284 | 18,082 45,996 | 59,750 137,524 | 35,947 91,439 | 21,860 50,313 | 4,014 10,209 | 2,441 5,617 | 31,934 81,229 | 19,419 44,69 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 10.234 | 30,525 | 1,440 | 4.294 | 14.116 | 42.104 | 18,073 | 9,921 | 2,543 | 1,396 | 24,929 | 13,684 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 4,526 | 13,831 | 739 | 2,259 | 3,787 | 11,572 | 7.992 | 4,495 | 1,305 | 734 | 6,687 | 3,76 |
| I-5: San Joaquin | | 0 | 11.8 | 11.8 | 6,549 | 26,196 | 1,753 | 7,013 | 13,528 | 54,111 | 11,566 | 8,514 | 3,096 | 2,279 | 23,890 | 17,58 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 11,785 | 80,813 | 4,586 | 31,450 | 13,091 | 89,769 | 20,813 | 26,264 | 8,100 | 10,221 | 23,119 | 29,175 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 33,748 | 138,237 | 13,134 | 53,798 | 37,488 | 153,558 | 59,599 | 44,927 | 23,194 | 17,484 | 66,205 | 49,90 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 82,700 | 347,340 | 29,857 | 125,401 | 52,843 | 221,939 | 146,049 | 112,886 | 52,728 | 40,755 | 93,321 | 72,130 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 33,400 | 140,280 | 11,567 | 48,583 | 21,833 | 91,697 | 58,985 | 45,591 | 20,428 | 15,789 | 38,557 | 29,802 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 104,264 | 429,511 | 21,198 | 87,323 | 83,066 | 342,188 | 184,131 | 139,591 | 37,435 | 28,380 | 146,696 | 111,211 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 2,496 | 8,424 | 547 | 1,845 | 1,949 | 6,579 | 4,408 | 2,738 | 965 | 599 | 3,443 | 2,138 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 15,325 | 61,301 | 2,796 | 11,185 | 7,420 | 29,682 | 27,064 | 19,923 | 4,938 | 3,635 | 13,105 | 9,647 |
| I-5: Kern I-5: Kern | Rural Rural | 9.28 7.04 | 10.35 9.28 | 1.07 2.24 | 3,467 8,064 | 13,867 28,224 | 633 1,471 | 2,530 5,150 | 1,679 3,905 | 6,714 13,666 | 6,122 14,241 | 4,507 9,173 | 1,117 2,599 | 822 1,674 | 2,964 6,896 | 2,182 4,441 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 2,041 | 8.165 | 372 | 1,490 | 988 | 3,953 | 3,605 | 2,654 | 658 | 484 | 1,745 | 1,285 |
| I-5: Kern | | 5.36 | 6.41 | 1.05 | 3,402 | 13,608 | 621 | 2,483 | 1,647 | 6,589 | 6,008 | 4,423 | 1,096 | 807 | 2,909 | 2,141 |
| I-5: Kern | | 0.58 | 5.36 | 4.78 | 15,487 | 61,949 | 2,826 | 11,304 | 7,499 | 29,996 | 27,351 | 20,133 | 4,991 | 3,674 | 13,243 | 9,749 |
| I-5: Kern | | 0 | 0.58 | 0.58 | 1,879 | 7,517 | 343 | 1,372 | 910 | 3,640 | 3,319 | 2,443 | 606 | 446 | 1,607 | 1,183 |
| I-5: Los Angeles | | 86.67 | 88.61 | 1.94 | 7,508 | 29,740 | 1,269 | 5,028 | 3,736 | 14,799 | 13,259 | 9,666 | 2,242 | 1,634 | 6,598 | 4,810 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 2,090 | 8,278 | 353 | 1,400 | 1,040 | 4,119 | 3,691 | 2,690 | 624 | 455 | 1,836 | 1,339 |
| I-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 5,302 | 21,002 | 896 | 3,551 | 2,638 | 10,451 | 9,363 | 6,826 | 1,583 | 1,154 | 4,659 | 3,397 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 24,497 | 97,039 | 4,141 | 16,405 | 12,190 | 48,287 | 43,262 | 31,538 | 7,314 | 5,332 | 21,528 | 15,693 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 17,384 | 151,192 | 2,939 | 25,560 | 8,651 | 75,234 | 30,701 | 49,137 | 5,190 | 8,307 | 15,277 | 24,451 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 3,395 | 26,366 | 574 | 4,457 | 1,689 | 13,120 | 5,995 | 8,569 | 1,013 | 1,449 | 2,983 | 4,264 |
| I-5: Los Angeles | | 65.43 59.95 | 68.1 | 2.67 | 5,287 | 45,977 | 894 1.834 | 7,773 | 2,631 | 22,879 46,957 | 9,336 | 14,943 | 1,578 | 2,526 | 4,646 9,535 | 7,436 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 54.16 | 65.43 59.95 | 5.48 5.79 | 10,850 9.843 | 94,366 97,272 | 1,834 | 15,953 11.832 | 5,399 8.646 | 46,957 85,440 | 19,162 17,383 | 30,669 31.613 | 3,240 2,114 | 5,185 3.846 | 15,268 | 15,26° 27,768 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 3,203 | 53,528 | 390 | 6.511 | 2,813 | 47.016 | 5,656 | 17.396 | 688 | 2.116 | 4.968 | 15,280 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 17,888 | 241,488 | 1,898 | 25,618 | 11,414 | 154,094 | 31,590 | 78,484 | 3,351 | 8,326 | 20,158 | 50,081 |
| I-5: Los Angeles | | 46.9 | 47.13 | 0.23 | 791 | 10,681 | 81 | 1,098 | 507 | 6,851 | 1,397 | 3,471 | 144 | 357 | 896 | 2,226 |
| I-5: Los Angeles | | 46.6 | 46.9 | 0.3 | 919 | 14,578 | 93 | 1,481 | 571 | 9,057 | 1,624 | 4,738 | 165 | 481 | 1,009 | 2,944 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 2,411 | 32,200 | 245 | 3,270 | 1,498 | 20,006 | 4,258 | 10,465 | 432 | 1,063 | 2,645 | 6,502 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 2,659 | 40,333 | 294 | 4,452 | 2,027 | 30,745 | 4,696 | 13,108 | 518 | 1,447 | 3,580 | 9,992 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 4,399 | 53,563 | 546 | 6,650 | 4,320 | 52,602 | 7,768 | 17,408 | 965 | 2,161 | 7,629 | 17,096 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 302 | 5,161 | 45 | 771 | 334 | 5,706 | 534 | 1,677 | 80 | 251 | 590 | 1,854 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 8,303 | 120,612 | 1,158 | 16,821 | 8,019 | 116,487 | 14,663 | 39,199 | 2,045 | 5,467 | 14,162 | 37,858 |
| I-5: Los Angeles | Urban | 40.27 39.81 | 41.6 40.27 | 1.33 | 1,784 523 | 22,270 8,037 | 554 86 | 6,910 1,328 | 9,007 1,161 | 112,425 17,844 | 3,151 924 | 7,238 2,612 | 978 153 | 2,246 432 | 15,907 2,051 | 36,538 5,799 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 39.81 | 39.81 | 0.46 | 463 | 8,037 | 79 | 1,328 | 1,161 | 17,844 | 924 817 | 2,612 | 153 | 432 | 1,904 | 6,268 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 9,009 | 127.153 | 1.002 | 1,414 | 13.836 | 19,266 | 15,910 | 41,325 | 1,770 | 4.598 | 24,435 | 63,466 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 723 | 10.120 | 85 | 1.191 | 1,216 | 17.025 | 1,277 | 3,289 | 150 | 387 | 2,148 | 5,533 |
| I-5: Los Angeles | | 36.22 | 36.43 | 0.21 | 662 | 9,274 | 81 | 1,137 | 1,188 | 16,637 | 1,170 | 3,014 | 143 | 370 | 2,099 | 5,40 |
| I-5: Los Angeles | | 35.94 | 36.22 | 0.28 | 550 | 8,758 | 61 | 975 | 845 | 13,451 | 971 | 2,846 | 108 | 317 | 1,492 | 4,37 |
| I-5: Los Angeles | | 29.16 | 35.94 | 6.78 | 14,102 | 224,554 | 1,482 | 23,599 | 19,672 | 313,231 | 24,905 | 72,980 | 2,617 | 7,670 | 34,740 | 101,80 |
| I-5: Los Angeles | | 28.25 | 29.16 | 0.91 | 2,253 | 34,325 | 236 | 3,590 | 3,117 | 47,479 | 3,979 | 11,156 | 416 | 1,167 | 5,504 | 15,43 |
| I-5: Los Angeles | | 22.78 | 28.25 | 5.47 | 14,190 | 241,637 | 1,633 | 27,800 | 23,014 | 391,886 | 25,060 | 78,532 | 2,883 | 9,035 | 40,643 | 127,36 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 1,297 | 22,088 | 149 | 2,541 | 2,104 | 35,821 | 2,291 | 7,178 | 264 | 826 | 3,715 | 11,64 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 4,514 | 63,392 | 352 | 4,949 | 2,999 | 42,114 | 7,971 | 20,602 | 622 | 1,609 | 5,296 | 13,68 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 4,189 | 58,644 | 342 | 4,790 | 3,105 | 43,469 | 7,398 | 19,059 | 604 | 1,557 | 5,483 | 14,12 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 13,660 | 198,426 | 1,148 | 16,671 | 10,805 | 156,951 | 24,123 | 64,488 | 2,027 | 5,418 | 19,081 | 51,00 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 16.9 | 0.31 | 931 8,498 | 13,518 120,998 | 66 643 | 956 9,149 | 1,360 13,875 | 19,750 197,556 | 1,643 15,008 | 4,394 39,324 | 116 1,135 | 311 2,973 | 2,401 24,504 | 6,419 64,20 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 14.16 | 14.16 | 0.38 | 1,233 | 120,998 | 87 | 1,249 | 1.811 | 25.880 | 2,177 | 5,726 | 1,135 | 2,973 406 | 3,198 | 8,41 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 86.979 | 560.864 | 6.699 | 43.196 | 55.817 | 359.925 | 153,606 | 182,281 | 11.830 | 14.039 | 98,574 | 116.97 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 19,631 | 143.964 | 1,290 | 9,461 | 7,871 | 57,722 | 34,669 | 46,788 | 2,278 | 3,075 | 13,901 | 18,76 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 34,005 | 212,976 | 2,222 | 13,917 | 13,363 | 83,697 | 60,052 | 69,217 | 3,924 | 4,523 | 23,600 | 27,20 |
| TOTAL | | | | | 908,725 | 5,586,341 | 174,898 | 913,331 | 797,461 | 5,220,436 | 1,604,819 | 1,815,561 | 308,871 | 296,833 | 1,408,324 | |

| TABLE R3e. TRAVEL | TIME COST - RI | EMAINING | CONVENT | TIONAL LAN | | | | | | | | | | | | |
|---|----------------|----------------|----------------|----------------|-----------------------------|--------------------|--|----------------|--------------------------------------|--------------------|-----------------|------------------|----------------|----------------|-----------------|------------------|
| County | City/Suburban/ | Post | t Mile of Se | gment | Peak Period V Travel, On | ehicle-Hours of | Nighttime Off-Peak Hours of Travel, | | Daytime Off-Peak Hours of Travel, | | De | eak | | e Costs (\$) | Daytime (| Off-Peak |
| County | Rural | Begin | End | Length (mi) | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 296.1 | 1,317.5 | 27.1 | 118.8 | 240.8 | 1,054.9 | 8,373 | 12,062 | 767 | 1,088 | 6,809 | 9,658 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 171.9 | 1,393.9 | 13.8 | 111.7 | 100.8 | 817.6 | 4,861 | 12,762 | 390 | 1,023 | 2,851 | 7,485 |
| I-5: Sacramento | Urban Urban | 26.69 25.53 | 26.94 26.69 | 0.25 1.16 | 11.7 55.4 | 121.6 410.0 | 0.9 9.1 | 9.7 58.5 | 6.9 126.0 | 71.3 813.1 | 332 1,567 | 1,113 3.754 | 27 256 | 89 536 | 195 3.562 | 653 7,444 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 37.1 | 369.6 | 5.9 | 58.6 | 80.8 | 803.7 | 1,050 | 3,754 | 167 | 537 | 2,284 | 7,444 |
| I-5: Sacramento | | 23.1 | 24.51 | 1.41 | 56.3 | 491.4 | 10.1 | 87.9 | 145.1 | 1,266.5 | 1,592 | 4,499 | 285 | 804 | 4,103 | 11,596 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 47.7 | 467.3 | 8.1 | 63.5 | 114.6 | 897.7 | 1,350 | 4,278 | 229 | 582 | 3,241 | 8,218 |
| I-5: Sacramento | | 19.16 | 22 | 2.84 | 135.3 | 799.3 | 23.3 | 137.4 | 330.0 | 1,949.7 | 3,825 | 7,318 | 657 | 1,258 | 9,329 | 17,851 |
| I-5: Sacramento I-5: Sacramento | | 18.82 16.7 | 19.16 18.82 | 0.34 2.12 | 14.5 82.7 | 86.1 497.2 | 2.7 13.1 | 15.9 78.9 | 39.3 179.8 | 232.9 1,081.3 | 2,338 | 789 4,552 | 76 371 | 146 722 | 1,112 5,084 | 2,132 9,900 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.12 | 68.5 | 420.3 | 10.9 | 66.7 | 149.1 | 914.0 | 1,938 | 3,848 | 308 | 611 | 4,215 | 8,368 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 607.3 | 1,501.6 | 387.2 | 957.3 | 1,029.9 | 2,546.5 | 17,172 | 13,748 | 10,947 | 8,765 | 29,120 | 23,314 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 378.1 | 1,004.7 | 119.0 | 316.1 | 530.4 | 1,409.3 | 10,690 | 9,199 | 3,363 | 2,894 | 14,996 | 12,903 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 1,034.4 | 2,817.0 | 83.4 | 227.1 | 951.0 | 2,589.9 | 29,248 | 25,791 | 2,358 | 2,079 | 26,890 | 23,712 |
| I-5: San Joaquin I-5: San Joaquin | Urban Urban | 28.34 24.8 | 28.56 28.34 | 0.22 3.54 | 22.7 407.1 | 68.4 1,222.9 | 1.8 45.5 | 5.5 136.5 | 20.8 361.6 | 62.9 1,086.4 | 641 11,511 | 626 11,196 | 52 1,285 | 50 1,250 | 589 10,225 | 576 9,946 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1,035.5 | 2,381.7 | 115.6 | 265.9 | 919.9 | 2,115.7 | 29,279 | 21,805 | 3,269 | 2,435 | 26.010 | 19,371 |
| I-5: San Joaquin | | 12.69 | 14.34 | 1.65 | 204.7 | 469.6 | 28.8 | 66.1 | 282.3 | 647.7 | 5,787 | 4,300 | 814 | 605 | 7,982 | 5,930 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 90.5 | 212.8 | 14.8 | 34.7 | 75.7 | 178.0 | 2,559 | 1,948 | 418 | 318 | 2,141 | 1,630 |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 131.0 | 403.0 | 35.1 | 107.9 | 270.6 | 832.5 | 3,703 | 3,690 | 991 | 988 | 7,650 | 7,622 |
| I-5: Stanislaus I-5: Merced | Rural Rural | 0 | 28.06 32.45 | 28.06 32.45 | 235.7 675.0 | 1,243.3 2,126.7 | 91.7 262.7 | 483.8 827.7 | 261.8 749.8 | 1,381.1 2.362.4 | 6,664 19,084 | 11,383 19,471 | 2,594 7,427 | 4,430 7,578 | 7,403 21,199 | 12,644 21,629 |
| I-5: Merced I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 1.654.0 | 5.343.7 | 262.7 597.1 | 1.929.2 | 1.056.9 | 3,414.4 | 46,766 | 48,924 | 16.884 | 17,663 | 21,199 | 31,629 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 668.0 | 2,158.2 | 231.3 | 747.4 | 436.7 | 1,410.7 | 18,887 | 19,759 | 6,541 | 6,843 | 12,346 | 12,916 |
| I-5: Kern | | 15.86 | 87.03 | 71.17 | 2,085.3 | 6,607.9 | 424.0 | 1,343.4 | 1,661.3 | 5,264.4 | 58,960 | 60,498 | 11,987 | 12,300 | 46,973 | 48,199 |
| I-5: Kern | | 15.08 | 15.86 | 0.78 | 49.9 | 129.6 | 10.9 | 28.4 | 39.0 | 101.2 | 1,411 | 1,187 | 309 | 260 | 1,102 | 927 |
| I-5: Kern I-5: Kern | | 10.35 9.28 | 15.08 10.35 | 4.73 1.07 | 306.5 69.3 | 943.1 213.3 | 55.9 12.7 | 172.1 38.9 | 148.4 33.6 | 456.6 103.3 | 8,666 1,960 | 8,634 1,953 | 1,581 358 | 1,576 356 | 4,196 949 | 4,181 946 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 161.3 | 434.2 | 29.4 | 79.2 | 78.1 | 210.2 | 4,560 | 3,975 | 832 | 725 | 2,208 | 1,925 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 40.8 | 125.6 | 7.4 | 22.9 | 19.8 | 60.8 | 1,154 | 1,150 | 211 | 210 | 559 | 557 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 68.0 | 209.4 | 12.4 | 38.2 | 32.9 | 101.4 | 1,924 | 1,917 | 351 | 350 | 931 | 928 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 309.7 | 953.1 | 56.5 | 173.9 | 150.0 | 461.5 | 8,758 | 8,726 | 1,598 | 1,592 | 4,241 | 4,225 |
| I-5: Kern I-5: Los Angeles | Rural Rural | 0 86.67 | 0.58 88.61 | 0.58 1.94 | 37.6 150.2 | 115.6 457.5 | 6.9 25.4 | 21.1 77.4 | 18.2 74.7 | 56.0 227.7 | 1,063 4,246 | 1,059 4,189 | 194 718 | 193 708 | 515 2,113 | 513 2,084 |
| I-5: Los Angeles | | 86.13 | 86.67 | 0.54 | 41.8 | 127.4 | 7.1 | 21.5 | 20.8 | 63.4 | 1,182 | 1,166 | 200 | 197 | 588 | 580 |
| I-5: Los Angeles | | 84.76 | 86.13 | 1.37 | 106.0 | 323.1 | 17.9 | 54.6 | 52.8 | 160.8 | 2,998 | 2,958 | 507 | 500 | 1,492 | 1,472 |
| I-5: Los Angeles | | 78.43 | 84.76 | 6.33 | 489.9 | 1,492.9 | 82.8 | 252.4 | 243.8 | 742.9 | 13,853 | 13,668 | 2,342 | 2,311 | 6,893 | 6,801 |
| I-5: Los Angeles | | 69.65 | 78.43 | 8.78 | 347.7 | 2,326.0 | 58.8 | 393.2 | 173.0 | 1,157.4 | 9,831 | 21,296 | 1,662 | 3,600 | 4,892 955 | 10,597 |
| I-5: Los Angeles I-5: Los Angeles | | 68.1 65.43 | 69.65 68.1 | 1.55 2.67 | 67.9 105.7 | 405.6 707.3 | 11.5 17.9 | 68.6 119.6 | 33.8 52.6 | 201.8 352.0 | 1,920 2,990 | 3,714 6,476 | 325 505 | 628 1,095 | 1,488 | 1,848 3,223 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 217.0 | 1,451.8 | 36.7 | 245.4 | 108.0 | 722.4 | 6,136 | 13,292 | 1,037 | 2,247 | 3,053 | 6,614 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 196.9 | 1,496.5 | 23.9 | 182.0 | 172.9 | 1,314.5 | 5,566 | 13,701 | 677 | 1,667 | 4,889 | 12,035 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 64.1 | 823.5 | 7.8 | 100.2 | 56.3 | 723.3 | 1,811 | 7,540 | 220 | 917 | 1,591 | 6,622 |
| I-5: Los Angeles I-5: Los Angeles | | 47.13 46.9 | 52.33 47.13 | 5.2 0.23 | 357.8 15.8 | 4,556.4 201.5 | 38.0 1.6 | 465.8 20.0 | 228.3 10.1 | 2,801.7 124.6 | 10,115 447 | 41,716 1.845 | 1,073 46 | 4,264 183 | 6,455 287 | 25,651 1,140 |
| I-5: Los Angeles | | 46.6 | 46.9 | 0.23 | 18.4 | 280.3 | 1.9 | 26.9 | 11.4 | 164.7 | 520 | 2,567 | 53 | 246 | 323 | 1,140 |
| I-5: Los Angeles | | 45.93 | 46.6 | 0.67 | 48.2 | 585.5 | 4.9 | 59.5 | 30.0 | 363.7 | 1,363 | 5,360 | 138 | 544 | 847 | 3,330 |
| I-5: Los Angeles | | 45.1 | 45.93 | 0.83 | 53.2 | 733.3 | 5.9 | 81.0 | 40.5 | 559.0 | 1,504 | 6,714 | 166 | 741 | 1,146 | 5,118 |
| I-5: Los Angeles | | 44.01 | 45.1 | 1.09 | 88.0 | 973.9 | 10.9 | 120.9 | 86.4 | 956.4 | 2,488 | 8,916 | 309 | 1,107 | 2,443 | 8,756 |
| I-5: Los Angeles | Urban Urban | 43.9 41.6 | 44.01 43.9 | 0.11 2.3 | 6.0 166.1 | 95.6 2,192.9 | 0.9 23.2 | 14.0 305.8 | 6.7 160.4 | 103.7 2,118.0 | 171 4,695 | 875 20,078 | 26 655 | 128 2,800 | 189 4,535 | 950 19,391 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 35.7 | 404.9 | 11.1 | 125.6 | 180.1 | 2,110.0 | 1,009 | 3,707 | 313 | 1,150 | 5,093 | 19,391 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 10.5 | 146.1 | 1.7 | 24.1 | 23.2 | 324.4 | 296 | 1,338 | 49 | 221 | 657 | 2,970 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 9.3 | 150.5 | 1.6 | 25.7 | 21.6 | 350.7 | 262 | 1,378 | 45 | 235 | 610 | 3,210 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 180.2 | 2,399.1 | 20.0 | 257.3 | 276.7 | 3,550.5 | 5,095 | 21,965 | 567 | 2,355 | 7,824 | 32,507 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 36.43 36.22 | 36.65 36.43 | 0.22 | 14.5 13.2 | 184.0 231.8 | 1.7 1.6 | 21.7 20.7 | 24.3 23.8 | 309.5 302.5 | 409 375 | 1,685 2,123 | 48 46 | 198 189 | 688 672 | 2,834 2,770 |
| I-5: Los Angeles | Urban | 35.94 | 36.43 | 0.21 | 11.0 | 159.2 | 1.0 | 17.7 | 16.9 | 244.6 | 3/5 | 1,458 | 35 | 162 | 478 | 2,770 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 282.0 | 4,082.8 | 29.6 | 429.1 | 393.4 | 5,695.1 | 7,975 | 37,380 | 838 | 3,928 | 11,124 | 52,142 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 45.1 | 647.6 | 4.7 | 65.3 | 62.3 | 863.3 | 1,274 | 5,930 | 133 | 598 | 1,762 | 7,904 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 283.8 | 4,393.4 | 32.7 | 505.5 | 460.3 | 7,125.2 | 8,025 | 40,224 | 923 | 4,628 | 13,014 | 65,235 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 22.28 21.41 | 22.78 22.28 | 0.5 0.87 | 25.9 90.3 | 490.8 1,173.9 | 3.0 7.0 | 46.2 90.0 | 42.1 60.0 | 651.3 765.7 | 734 2.552 | 4,494 10.748 | 84 199 | 423 824 | 1,190 1,696 | 5,963 7.010 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.87 | 83.8 | 1,173.9 | 6.8 | 90.0 87.1 | 62.1 | 790.3 | 2,369 | 11,932 | 199 | 797 | 1,756 | 7,010 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 273.2 | 3,674.5 | 23.0 | 303.1 | 216.1 | 2,853.7 | 7,724 | 33,642 | 649 | 2,775 | 6,110 | 26,127 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 18.6 | 250.3 | 1.3 | 17.4 | 27.2 | 359.1 | 526 | 2,292 | 37 | 159 | 769 | 3,288 |
| I-5: Los Angeles | | 14.16 | 16.9 | 2.74 | 170.0 | 2,240.7 | 12.9 | 166.3 | 277.5 | 3,591.9 | 4,806 | 20,515 | 363 | 1,523 | 7,846 | 32,886 |
| I-5: Los Angeles CA 710: Los Angeles | | 13.78 12.97 | 14.16 23.28 | 0.38 10.31 | 24.7 1,739.6 | 332.4 9,347.7 | 1.7 134.0 | 22.7 664.6 | 36.2 1,116.3 | 470.5 5,537.3 | 697 49,186 | 3,044 85,583 | 49 3,788 | 208 6,084 | 1,024 31,564 | 4,308 50,697 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 392.6 | 2,285.1 | 25.8 | 145.6 | 157.4 | 888.0 | 11,101 | 20,922 | 730 | 1,333 | 4,451 | 8,130 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 680.1 | 3,736.4 | 44.4 | 214.1 | 267.3 | 1,287.6 | 19,229 | 34,209 | 1,257 | 1,960 | 7,557 | 11,789 |
| TOTAL | | | | | 18,174.5 | 93,925.7 | 3,498.0 | 14,689.8 | 15,949.2 | 87,696.4 | 513,873 | 859,938 | 98,903 | 134,492 | 450,954 | 802,906 |

APPENDIX S

ADDED CONVENTIONAL FREEWAY LANE PLANNING, DESIGN, CONSTRUCTION, AND REHABILITATION COSTS AT VARIOUS VOLUMES

Introduction

This appendix shows supporting tables for the calculation of incremental planning, design, construction, and rehabilitation costs for the added-conventional-freeway-lane system for low-, medium-, and high-volume traffic conditions. The incremental cost is the cost of building and maintaining the added conventional freeway lane above the nobuild option.

Methodologies

In order to determine the effect of various volume levels on the relative costs associated with building and operating the added conventional freeway lane under study here, the road sections were sorted according to the passenger car per hour per lane (pcphpl) flow rates. The sections were then divided at a flow rate of 1000 and 2000 pcphpl, respectively. This resulted in having sections of road that represented flow rates designated as follows:

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"low" – flow rates between zero and 1000 "medium" – flow rates between 1000 and 2000 "high" – flow rates between 2000 and 2500.
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Although the sections of roadway in each of the categories were not contiguous, the result could be thought of as a simulated road section that is based on existing roadway conditions. The sections were sorted according to the existing roadway and base (existing) volumes and grouped together using the categories shown above. All ensuing calculations were based on these same sections — even though flow rates for individual sections may have changed after addition of extra lanes. The AHS transfer terminals were allocated to the physical sections with which they are associated geographically.

The procedures followed to calculate the costs were identical to the methodologies outlined in Chapters 9 through 11 of the main report.

Results

Details of the calculations are shown in S1 and S2 in this appendix.

| TABLE S1. INCREME | NTAL CONSTR | RUCTION | COSTS OF | CONVENTIO | NAL FREEW | AY FOR ROAD | OWAY SPACE AN | ID BARRIERS - BASED ON | VOLUME | | | | | | |
|--------------------------------------|----------------|----------------|----------------|---------------|------------------------|--------------------------|---------------------------------|---------------------------|-------------------------|-----------------------------------|---------------------------------|----------------------|-------------------|---------------------------|-----------------------|
| | City/Suburban | | st Mile of Se | | Convention | AHS Lane | | New Freeway Costs (\$) | | | | Costs (\$) | | Total Construc | tion Costs (\$) |
| County | Rural | Begin | End | Length (mi) | al Freeway Lanes in | Placement | 2001-Unit Cost per Lane Mile | Total Cost | EUAC | # of Barriers in One Direction | 2001-Unit Cost per Lane Mile | Total Cost | EUAC | Total Cost | EUATC |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 4 | Median | 3,654,000 | 767,340 | 55,746 | 0.5 | 94,776 | 9,951 | 723 | 777,291 | 56,46 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 4 | Non-Median | 13,702,500 | 11,373,075 | 826,242 | 0.0 | 94,776 | 0 | 0 | 11,373,075 | 826,242 |
| I-5: Sacramento | Urban | 22.00 | 23.10 | 1.10 | 3 | Non-Median | 13,702,500 | 15,072,750 | 1,095,019 | 0.0 | 94,776 | 0 | 0 | 15,072,750 | 1,095,019 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 22.28 46.60 | 22.78 46.90 | 0.50 | 4 | Non-Median Median | 13,702,500 3,654,000 | 6,851,250 1,096,200 | 497,736 79,638 | 0.0 | 94,776 94,776 | 14.216 | 1.033 | 6,851,250 1,110,416 | 497,730 80.67 |
| I-5: Los Angeles | Urban | 25.53 | 26.69 | 1.16 | 3 | Median | 3,654,000 | 4,238,640 | 307,933 | 0.5 | 94,776 | 54,970 | 3,994 | 4,293,610 | 311,92 |
| I-5: Los Angeles | Urban | 46.90 | 52.33 | 5.43 | 4 | Median | 3,654,000 | 19,841,220 | 1,441,443 | 0.5 | 94,776 | 257,317 | 18,694 | 20.098.537 | 1,460,13 |
| I-5: Los Angeles | Urban | 43.90 | 44.01 | 0.11 | 4 | Median | 3,654,000 | 401,940 | 29,201 | 0.5 | 94,776 | 5,213 | 379 | 407,153 | 29,579 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 4 | Median | 3,654,000 | 1,388,520 | 100,874 | 0.5 | 94,776 | 18,007 | 1,308 | 1,406,527 | 102,18 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 4 | Non-Median | 8,842,212 | 91,163,201 | 6,622,907 | 0.0 | 94,776 | 0 | 0 | 91,163,201 | 6,622,90 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 3 | Non-Median | 8,842,212 | 46,156,344 | 3,353,208 | 0.0 | 94,776 | 0 | 0 | 46,156,344 | 3,353,20 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 4 | Non-Median | 13,702,500 | 12,469,275 | 905,879 | 0.0 | 94,776 | 0 | 0 | 12,469,275 | 905,87 |
| I-5: Los Angeles | Urban Urban | 36.65 17.21 | 39.36 20.58 | 2.71 3.37 | 5 4 | Non-Median Non-Median | 13,702,500 13,702,500 | 37,133,775 46,177,425 | 2,697,728 3,354,740 | 0.0 | 94,776 94,776 | 0 | 0 | 37,133,775 46,177,425 | 2,697,72 3.354.74 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 14.16 | 16.90 | 2.74 | 4 | Non-Median | 13,702,500 | 46,177,425 37.544.850 | 3,354,740 2,727,592 | 0.0 | 94,776 | 0 | 0 | 37.544.850 | 3,354,74 2,727,59 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 5 | Non-Median | 13,702,500 | 11.921.175 | 866.060 | 0.0 | 94,776 | 0 | 0 | 11.921.175 | 866,06 |
| I-5: Los Angeles | Urban | 16.90 | 17.21 | 0.31 | 4 | Median | 3,654,000 | 1,132,740 | 82,292 | 0.5 | 94,776 | 14,690 | 1,067 | 1,147,430 | 83,36 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 4 | Non-Median | 8,842,212 | 24,669,770 | 1,792,232 | 0.0 | 94,776 | 0 | 0 | 24,669,770 | 1,792,23 |
| TOTAL | | | | 39.25 | | | , | 369,399,490 | 26,836,471 | | | 374,365 | 27,197 | 369,773,856 | 26,863,66 |
| _ | | | | | | | _ | | | _ | | | | | |
| I-5: Los Angeles | Urban | 41.60 | 43.90 | 2.30 | 5 | Non-Median | 13,702,500 | 31,515,750 | 2,289,585 | 0.0 | 94,776 | 0 | 0 | 31,515,750 | 2,289,58 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 5 | Non-Median | 13,702,500 | 74,952,675 | 5,445,230 | 0.0 | 94,776 | 0 | 0 | 74,952,675 | 5,445,23 |
| I-5: Los Angeles | Urban | 44.01 | 45.10 | 1.09 | 5 | Median | 3,654,000 | 3,982,860 | 289,350 | 0.5 | 94,776 | 51,653 | 3,753 | 4,034,513 | 293,10 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 4 | Median | 3,654,000 | 3,727,080 | 270,768 | 0.5 | 94,776 | 48,336 | 3,512 | 3,775,416 | 274,28 |
| I-5: Sacramento I-5: Los Angeles | Rural Urban | 29.87 | 34.65 35.94 | 4.78 6.78 | 4 | Median Non-Median | 2,389,154 13,702,500 | 11,420,155 92,902,950 | 829,662 6,749,298 | 0.5 0.0 | 94,776 94,776 | 226,515 | 16,456 | 11,646,670 92,902,950 | 846,11 6,749,29 |
| I-5: Los Angeles | Urban | 45.93 | 46.60 | 0.67 | 5 | Median | 3,654,000 | 2,448,180 | 177,858 | 0.5 | 94,776 | 31.750 | 2,307 | 2.479.930 | 180,16 |
| I-5: Los Angeles | Urban | 45.10 | 45.93 | 0.83 | 5 | Median | 3,654,000 | 3,032,820 | 220,331 | 0.5 | 94,776 | 39.332 | 2,857 | 3,072,152 | 223.18 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 4 | Non-Median | 13,702,500 | 3,836,700 | 278,732 | 0.0 | 94,776 | 0 | 0 | 3,836,700 | 278,73 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 6 | Median | 3,654,000 | 803,880 | 58,401 | 0.5 | 94,776 | 10,425 | 757 | 814,305 | 59,15 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 3 | Median | 3,654,000 | 10,706,220 | 777,795 | 0.5 | 94,776 | 138,847 | 10,087 | 10,845,067 | 787,88 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 3 | Median | 3,654,000 | 913,500 | 66,365 | 0.5 | 94,776 | 11,847 | 861 | 925,347 | 67,22 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 4 | Median | 2,389,154 | 4,372,152 | 317,632 | 0.5 | 94,776 | 86,720 | 6,300 | 4,458,872 | 323,93 |
| I-5: Sacramento | Rural | 0.00 | 14.46 28.56 | 14.46 | 3 | Median | 2,389,154 | 34,547,165 | 2,509,814 | 0.5 | 94,776 | 685,230 | 49,781 | 35,232,395 | 2,559,59 |
| I-5: San Joaquin I-5: Sacramento | Urban Urban | 28.34 19.16 | 22.00 | 0.22 2.84 | 4 | Median Non-Median | 3,654,000 13,702,500 | 803,880 38,915,100 | 58,401 2,827,140 | 0.5 | 94,776 94,776 | 10,425 | 757 | 814,305 38,915,100 | 59,158 2,827,140 |
| I-5: Los Angeles | Urban | 40.27 | 41.60 | 1.33 | 3 | Non-Median | 13,702,500 | 18.224.325 | 1.323.977 | 0.0 | 94,776 | 0 | 0 | 18 224 325 | 1,323,97 |
| I-5: San Joaquin | Rural | 11.80 | 12.69 | 0.89 | 3 | Median | 2,389,154 | 2,126,347 | 154,477 | 0.5 | 94,776 | 42,175 | 3,064 | 2,168,522 | 157,54 |
| I-5: San Joaquin | Rural | 14.34 | 24.80 | 10.46 | 3 | Median | 2,389,154 | 24,990,549 | 1,815,536 | 0.5 | 94,776 | 495,678 | 36,011 | 25,486,228 | 1,851,54 |
| I-5: Sacramento | Urban | 23.10 | 24.51 | 1.41 | 5 | Non-Median | 13,702,500 | 19,320,525 | 1,403,615 | 0.0 | 94,776 | 0 | 0 | 19,320,525 | 1,403,61 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 3 | Median | 2,389,154 | 28,407,039 | 2,063,740 | 0.5 | 94,776 | 563,443 | 40,934 | 28,970,483 | 2,104,67 |
| I-5: Sacramento | Urban | 14.46 | 16.70 | 2.24 | 3 | Median | 3,654,000 | 8,184,960 | 594,628 | 0.5 | 94,776 | 106,149 | 7,712 | 8,291,109 | 602,34 |
| I-5: San Joaquin | Urban | 24.80 | 28.34 | 3.54 | 4 | Median | 3,654,000 | 12,935,160 | 939,725 | 0.5 | 94,776 | 167,754 | 12,187 | 13,102,914 | 951,91 |
| I-5: Sacramento | Urban | 16.70 | 18.82 | 2.12 | 4 | Median | 3,654,000 | 7,746,480 | 562,773 | 0.5 | 94,776 | 100,463 | 7,298 | 7,846,943 | 570,07 |
| I-5: San Joaquin | Rural Urban | 40.45 39.81 | 49.79 40.27 | 9.34 0.46 | 2 | Median Non-Median | 2,389,154 13,702,500 | 22,314,697 6,303,150 | 1,621,138 457,917 | 0.5 0.0 | 94,776 94,776 | 442,604 | 32,155 | 22,757,301 6.303,150 | 1,653,29 457,91 |
| I-5: Los Angeles I-5: Sacramento | Urban | 18.82 | 19.16 | 0.46 | 5 | Non-Median | 13,702,500 | 4.658.850 | 338,460 | 0.0 | 94,776 | 0 | 0 | 4.658.850 | 338.46 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 5 | Median | 2,389,154 | 3,942,104 | 286,390 | 0.5 | 94,776 | 78.190 | 5,680 | 4,020,294 | 292,07 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 4 | Median | 2,389,154 | 13,833,201 | 1,004,967 | 0.5 | 94,776 | 274,377 | 19,933 | 14,107,577 | 1,024,90 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 5 | Non-Median | 13,702,500 | 6,166,125 | 447,962 | 0.0 | 94,776 | 0 | 0 | 6,166,125 | 447,96 |
| TOTAL | | | | 97.88 | | | | 498,034,578 | 36,181,670 | | | 3,611,913 | 262,402 | 501,646,492 | 36,444,07 |
| | | | | | | | | | | | | | | | |
| I-5: Los Angeles | Rural | 84.76 | 88.61 | 3.85 | 4 | Non-Median | 3,981,923 | 15,330,404 | 1,113,737 | 0.0 | 94,776 | 0 | 0 | 15,330,404 | 1,113,73 |
| I-5: Los Angeles | Rural | 78.43 15.86 | 84.76 87.03 | 6.33 | 2 | Median | 2,389,154 2,389,154 | 15,123,344 170.036.079 | 1,098,694 12,352,936 | 0.5 0.5 | 94,776 | 299,966 3.372,604 | 21,792 245.016 | 15,423,310 173.408.683 | 1,120,48 12,597,95 |
| I-5: Kern I-5: Los Angeles | Rural Rural | 15.86 68.10 | 87.03 69.65 | 71.17 1.55 | 4 | Median Median | 2,389,154 | 170,036,079 3,703,188 | 12,352,936 | 0.5 | 94,776 94,776 | 73,451 | 245,016 5.336 | 3,776,640 | 12,597,95 274.36 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 4 | Median | 2,389,154 | 20,976,771 | 1,523,940 | 0.5 | 94,776 | 416.067 | 30,227 | 21.392.837 | 1,554,16 |
| I-5: Los Angeles | Rural | 65.43 | 68.10 | 2.67 | 4 | Median | 2,389,154 | 6.379.041 | 463,430 | 0.5 | 94,776 | 126,526 | 9,192 | 6,505,567 | 472,62 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 4 | Median | 2,389,154 | 13,092,563 | 951,160 | 0.5 | 94,776 | 259,686 | 18,866 | 13,352,249 | 970,02 |
| I-5: Fresno | Rural | 0.00 | 66.16 | 66.16 | 2 | Median | 2,389,154 | 158,066,418 | 11,483,353 | 0.5 | 94,776 | 3,135,190 | 227,768 | 161,201,609 | 11,711,12 |
| I-5: Kings | Rural | 0.00 | 26.72 | 26.72 | 2 | Median | 2,389,154 | 63,838,191 | 4,637,775 | 0.5 | 94,776 | 1,266,207 | 91,989 | 65,104,398 | 4,729,76 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 4 | Median | 2,389,154 | 5,351,705 | 388,796 | 0.5 | 94,776 | 106,149 | 7,712 | 5,457,854 | 396,50 |
| I-5: Merced | Rural | 0.00 | 32.45 | 32.45 | 2 | Median | 2,389,154 | 77,528,042 | 5,632,328 | 0.5 | 94,776 | 1,537,741 | 111,715 | 79,065,783 | 5,744,04 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 4 | Median | 2,389,154 | 1,863,540 | 135,384 | 0.5 | 94,776 | 36,963 | 2,685 | 1,900,503 | 138,06 |
| I-5: Kern I-5: Kern | Rural Rural | 10.35 9.28 | 15.08 10.35 | 4.73 1.07 | 4 | Median Median | 2,389,154 2,389,154 | 11,300,698 2.556,395 | 820,983 185,719 | 0.5 0.5 | 94,776 94,776 | 224,145 50,705 | 16,284 3.684 | 11,524,843 2.607,100 | 837,26 189,40 |
| I-5: Kern I-5: Kern | Rural | 9.28 6.41 | 7.04 | 0.63 | 4 | Median | 2,389,154 2,389,154 | 2,556,395 1,505,167 | 185,719 109,349 | 0.5 | 94,776 | 29,854 | 2,169 | 2,607,100 1,535,021 | 189,40 111.51 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 4 | Median | 2,389,154 | 2,508,612 | 182,248 | 0.5 | 94,776 | 49,757 | 3,615 | 2,558,369 | 185,86 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 4 | Median | 2,389,154 | 11,420,155 | 829,662 | 0.5 | 94,776 | 226,515 | 16,456 | 11,646,670 | 846,11 |
| I-5: Kern | Rural | 0.00 | 0.58 | 0.58 | 4 | Median | 2,389,154 | 1,385,709 | 100,670 | 0.5 | 94,776 | 27,485 | 1,997 | 1,413,194 | 102,66 |
| I-5: Stanislaus | Rural | 0.00 | 28.06 | 28.06 | 2 | Median | 2,389,154 | 67,039,657 | 4,870,358 | 0.5 | 94,776 | 1,329,707 | 96,602 | 68,369,364 | 4,966,96 |
| I-5: San Joaquin | Rural | 0.00 | 11.80 | 11.80 | 2 | Median | 2,389,154 | 28,192,015 | 2,048,119 | 0.5 | 94,776 | 559,178 | 40,624 | 28,751,194 | 2,088,74 |
| TOTAL | | 1 | 1 | 280.88 | | | | 677,197,694 | 49,197,675 | I | 1 | 13,127,898 | 953,727 | 690,325,591 | 50,151,40 |

TABLE S2. INCREMENTAL REHABILITATION COSTS FOR ADDED CONVENTIONAL LANE - BASED ON VOLUME

| Control Cont | TABLE S2. INCREME | NTAL REHAL | BILITATION | COSTS F | OR ADDED | CONVENTIONAL I | ANE - BASE | | | (4) |
|--|-------------------|-------------|------------|-------------|----------|----------------|------------|-----------|----------------------|-----------|
| Section Control Cont | | Citv/Suburb | Post | Mile of Sec | ament | Conventional | Added Lane | | Rehabilitation Costs | (\$) |
| S. Los Angeles | County | , | | ` | | | Placement | | Total Cost | EUAC |
| S. Los Angeles | | | | | | | | | 47.050 | 2.222 |
| Separtemento | | | | | | | | | | |
| S. Los Angeles | | | | | | | | | | |
| -8. Los Angeles Urban 46.6 46.9 0.3 4 Median 228,375 284,911 6.74 -8. Sozramento Urban 45.5 26.869 1.16 3 Median 228,375 224,9107 7.83 -8. Los Angeles Urban 45.9 45.33 5.43 4 Median 228,375 224,9076 7.83 -8. Los Angeles Urban 45.9 45.33 5.43 4 Median 228,375 225,912 1.36 -8. Los Angeles Urban 45.9 42.88 10.31 4 Median 228,375 2.55 2.55 -8. Los Angeles Urban 45.9 42.88 10.31 4 Mon-Median 228,375 2.55 2.55 -8. Los Angeles Urban 22.5 25.16 0.91 4 Mon-Median 45.23 4.40 6.55 -8. Los Angeles Urban 22.5 25.16 0.91 4 Mon-Median 730,800 965,008 42.04 -8. Los Angeles Urban 20.5 25.16 0.91 4 Mon-Median 730,800 965,008 42.04 -8. Los Angeles Urban 20.5 25.16 0.91 4 Mon-Median 730,800 965,008 42.04 -8. Los Angeles Urban 20.5 25.8 3.37 4 Mon-Median 730,800 965,008 42.04 -8. Los Angeles Urban 17.21 20.58 3.37 4 Mon-Median 730,800 965,008 42.04 -8. Los Angeles Urban 17.21 20.58 3.37 4 Mon-Median 730,800 965,008 42.04 -8. Los Angeles Urban 17.21 20.58 3.37 4 Mon-Median 730,800 965,008 42.04 -8. Los Angeles Urban 17.21 20.58 3.37 4 Mon-Median 730,800 965,008 42.04 -8. Los Angeles Urban 17.21 20.31 4 Mon-Median 220,375 70.796 4 -8. Los Angeles Urban 10.18 17.21 0.31 4 Mon-Median 220,375 70.796 4 -8. Los Angeles Urban 16.8 12.97 70.91 4 Mon-Median 223,375 70.796 4 -8. Los Angeles Urban 46.8 5.2 5.3 10.2 4 Mondian 223,375 243,945 4 -8. Los Angeles Urban 46.8 5.2 5.3 10.2 4 Mondian 223,375 243,945 4 -8. Los Angeles Urban 46.8 5.2 5.3 10.2 4 Mondian 223,375 243,945 4 -8. Los Angeles Urban 46.8 5.3 5.9 5 Mon-Median 223,375 243,945 4 -8. Los Angeles Urban 45.3 4 5.9 5 Mondian 223,375 2 | | | | | | | | , | | |
| S. Sarcameron Urban 25.83 26.69 1.16 3 Median 229.375 224.076 16.775 | | | | | | | | | | |
| St. Los Angeles | | | | | | | | | | |
| 1-5 Los Angeles | | | | | | | | | | |
| 15_LOS Angeles Urban 13.78 | | | | | | | | | | |
| CA 710 Los Angeles Suburban 1 297 23.28 10.31 4 Non-Median 843,231 4,0165 278,266 2710 4 Non-Median 843,231 4,0165 278,266 2710 4 Non-Median 730,000 665,028 276,265 15. Los Angeles Urban 22.25 29.16 0.91 4 Non-Median 730,000 665,028 42.04 5.10 Angeles Urban 12.25 29.16 0.91 4 Non-Median 730,000 665,028 42.04 5.10 Angeles Urban 17.21 20.55 3.37 4 Non-Median 730,000 1800,666 125,265 5.10 Angeles Urban 17.21 20.55 3.37 4 Non-Median 730,000 2.462,766 125,000 Angeles Urban 17.21 20.55 3.37 4 Non-Median 730,000 2.462,766 125,000 Angeles Urban 16.9 17.21 20.55 3.37 4 Non-Median 730,000 2.462,766 125,000 Angeles Urban 16.9 17.21 20.51 4 Non-Median 83,000 2.462,766 125,000 Angeles Urban 16.9 17.21 20.31 4 Non-Median 22.83,77 70.796 4.47 Angeles Suburban 10.18 1272 279 4 Non-Median 83,331 2.32,814 148,73 TOTAL 1.55 10.00 Angeles Urban 16.9 14.6 43.9 2.3 5 Non-Median 730,000 1,860,840 14.65 15.10 Angeles Urban 27.78 22.55 5.47 5 Non-Median 730,000 1,860,840 14.65 15.10 Angeles Urban 41.6 41.0 1.61 1.00 5 Non-Median 730,000 1,860,840 15.73 15.10 Angeles Urban 41.6 1.1 1.00 5 Non-Median 730,000 3.874.76 252,71 15.10 Angeles Urban 41.0 1.40 11.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1 | | | | | | | | | | |
| CA-710 LA Suburban 4.96 10.18 5.22 3 Non-Median 843.231 4.401.665 22 276.25 5.16 Angeles Urban 9.65 5.25 2.5 9.16 0.91 4 Non-Median 7.30.000 650.22 42.04 1.55 Los Angeles Urban 10.18 12.21 2.55 5. 1.55 Angeles Urban 11.21 2.25 5.25 1.55 Non-Median 7.30.000 1.800.669 1.55.00 Angeles Urban 11.21 2.25 5.25 1.55 Non-Median 7.30.000 1.800.669 1.55.00 1.800.669 1.55.00 1.800.669 1.55.00 1.800.669 1.55.00 1.800.669 1.55.00 1.800.669 1.55.00 1.800.669 1.55.00 1.800.669 1.55.00 1.800.669 1.55.00 1.55.00 1.55.00 1.800.669 1.55.00 | | | | | | | | | | |
| 15. Los Angeles | | | | | | | | | | |
| | | | | | | | | | | |
| 15-Los Angeles | | | | | | | | , | | |
| 15-Los Angeles Urban 14-16 16-9 2-74 4 Non-Median 730,800 2,002.392 126,58 | | | | | | | | | | |
| 15. Los Angeles Urban 16.9 17.2 0.31 4 Median 730,800 635,786 40,19 | | | | | | | | | | |
| 15. Los Angeles | | | | | | | | | | |
| CA 710 Los Angeles Suburban 10,18 12,97 2,79 4 Non-Median 843,21 2,352,614 148,77 1692,65 | | | | | | | | | | 40,194 |
| 15-16.5 15-1 | | | | | | | | | | 4,476 |
| 1-5 Los Angeles | | Suburban | 10.18 | 12.97 | | 4 | Non-Median | | | 148,730 |
| | TOTAL | | | | 39.25 | | | 9,974,717 | 26,774,474 | 1,692,657 |
| | | | | | | | | | | |
| 15. Los Angeles | | | | | | | | | | 106,261 |
| 15-Sacramento Urban 2451 2553 1.02 4 Median 228,375 232,943 114,72 15-Sacramento Rural 29.87 34.65 4.78 2 Median 103,530 494,873 31.28 15-Los Angeles Urban 29.16 35.94 6.78 4 Norr-Median 730,800 4,954,824 313,23 15-Los Angeles Urban 45.1 45.93 0.83 5 Median 228,375 189,551 11.98 15-Los Angeles Urban 45.1 45.93 0.83 5 Median 228,375 189,551 11.98 15-Los Angeles Urban 35.94 36.22 0.28 4 Norr-Median 730,800 204,624 12.93 15-Los Angeles Urban 36.43 36.65 0.22 6 Median 228,375 699,139 42.30 15-Los Angeles Urban 36.43 36.65 0.22 6 Median 228,375 699,139 42.30 15-Los Angeles Urban 36.44 36.65 0.22 6 Median 228,375 699,139 42.30 15-Los Angeles Urban 26.99 26.94 0.25 3 Median 228,375 57,094 3.60 15-Los Angeles Rural 52.33 54.16 18.33 4 Median 103,530 189,460 11.97 15-Sacramento Urban 52.33 54.16 18.33 4 Median 103,530 1,97,044 94.64 15-San Joaquin Urban 19.16 22 2.94 4 Norr-Median 730,800 2,075,472 131,20 15-Sacramento Urban 19.16 22 2.94 4 Norr-Median 730,800 2,075,472 131,20 15-San Joaquin Rural 11.8 12.7 0.89 3 Median 103,530 97,1964 61.44 15-San Joaquin Rural 11.8 12.7 0.89 3 Median 103,530 97,1964 61.44 15-San Joaquin Rural 11.8 12.7 0.89 3 Median 103,530 97,1964 61.44 15-San Joaquin Rural 14.34 24.8 10.46 3 Median 103,530 97,1964 61.44 15-San Joaquin Rural 14.34 24.8 10.46 3 Median 103,530 97,1964 61.44 15-San Joaquin Rural 14.46 16.7 2.24 3 Median 103,530 97,1964 61.44 15-San Joaquin Rural 14.46 16.7 2.24 3 Median 103,530 97,1964 61.44 15-San Joaquin Rural 14.46 16.7 2.24 3 Median 103,530 97,68,29 61.46 15-San Joaquin Rural 14.46 16.7 2.24 3 Median 103,530 97,68,2 | | | | | | | | | | 252,717 |
| 1-5 Sacramento Rural 29.87 34.65 4.78 2 Median 103.530 494.873 31.28 -5 Los Angeles Urban 49.93 46.6 0.67 5 Median 228.375 153.011 9.67 -5 Los Angeles Urban 45.93 46.6 0.67 5 Median 228.375 189.561 11.89 -5 Los Angeles Urban 45.93 46.6 0.67 5 Median 228.375 189.561 11.89 -5 Los Angeles Urban 35.94 36.22 0.28 4 Non-Median 730.800 204.624 12.33 -5 Los Angeles Urban 36.94 36.22 0.28 4 Non-Median 228.375 50.242 3.17 -5 Sacramento Urban 26.94 29.87 2.93 3 Median 228.375 50.242 3.17 -5 Sacramento Urban 26.94 29.87 2.93 3 Median 228.375 57.094 3.60 -5 Sacramento Urban 26.94 29.87 2.93 3 Median 228.375 57.094 3.60 -5 Sacramento Urban 26.94 29.87 2.93 3 Median 228.375 57.094 3.40 -5 Sacramento Urban 26.94 29.87 2.93 3 Median 103.530 1.497.044 94.64 -5 San Joaquin Urban 25.33 41.66 1.83 4 Median 103.530 1.497.044 94.64 -5 San Joaquin Urban 28.34 25.66 0.22 3 Median 103.530 1.497.044 94.64 -5 San Joaquin Urban 40.27 41.6 1.33 3 Non-Median 730.800 2.076.472 131.70 -5 Sacramento Urban 40.27 41.6 1.33 3 Non-Median 730.800 77.964 51.45 -5 Sacramento Urban 40.27 41.6 1.33 3 Median 103.530 92.142 5.58 -5 Sacramento Urban 42.45 11.41 5 Non-Median 730.800 1.030.420 56.14 -5 Sacramento Urban 42.45 11.41 5 Non-Median 103.530 92.142 5.58 -5 Sacramento Urban 44.67 22.4 3 Median 103.530 1.309.072 77.82 -5 Sacramento Urban 44.66 44.45 11.89 3 Median 103.530 92.412 5.58 -5 Sacramento Urban 44.66 44.45 11.89 3 Median 103.530 1.309.072 77.82 -5 Sacramento Urban 44.66 44.45 44.45 44.45 44.45 44.45 44.45 44.45 44.45 44.45 44.45 44.45 44.45 44.45 44.45 44.45 | | | | | | | | | | 15,737 |
| 15 Los Angeles Urban 29,16 35,94 6,78 4 Non-Median 730,800 4,954,824 313,23 15 Los Angeles Urban 45,93 46,6 6,67 5 Median 228,375 153,011 9,67 15 Los Angeles Urban 45,1 45,93 0.83 5 Median 228,375 158,051 11,98 15 Los Angeles Urban 45,1 45,93 0.83 5 Median 228,375 158,051 11,98 15 Los Angeles Urban 35,94 36,22 0.28 4 Non-Median 730,800 204,624 12,98 15 Los Angeles Urban 35,94 36,65 0.22 6 Median 228,375 50,242 3,17 15 Sacramento Urban 26,94 29,87 29,3 3 Median 228,375 669,139 42,20 15 Sacramento Urban 26,94 20,25 3 Median 228,375 659,139 42,20 15 Sacramento Urban 26,96 26,94 0.25 3 Median 103,350 189,460 11,97 15 Sacramento Urban 26,96 26,94 0.25 3 Median 103,350 189,460 11,97 15 Sacramento Urban 28,34 28,56 0.22 3 Median 103,350 189,460 11,97 15 Sacramento Urban 28,34 28,56 0.22 3 Median 103,350 189,460 11,97 15 Sacramento Urban 19,16 22 2,84 4 Non-Median 730,800 2,075,472 131,20 15 Los Angeles Urban 19,16 22 2,84 4 Non-Median 730,800 2,075,472 131,20 15 Los Angeles Urban 19,16 22 2,84 4 Non-Median 730,800 2,075,472 131,20 15 Sacramento Urban 23,1 24,8 10,46 3 Median 103,350 1,082,924 88,46 5 Sacramento Urban 23,1 24,8 10,46 3 Median 103,350 1,082,924 88,46 5 Sacramento Urban 23,1 24,8 10,46 3 Median 103,350 1,082,924 88,46 5 Sacramento Urban 24,8 10,46 3 Median 103,350 1,082,924 88,46 5 Sacramento Urban 24,8 26,54 27,9 3,34 4 Median 228,375 511,560 32,34 25,58 Median 103,350 1,082,924 88,46 5 Sacramento Urban 24,8 26,54 27,9 34 Median 103,350 1,082,924 88,46 5 Sacramento Urban 24,8 26,54 27,9 34 Median 103,350 1,082,924 88,46 5 Sacramento | I-5: Sacramento | Urban | | 25.53 | | | Median | 228,375 | | 14,726 |
| 15-Los Angeles Urban 45.93 46.6 0.67 5 Median 228.375 153.011 9.67 | I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 2 | Median | | 494,873 | 31,285 |
| 15. Los Angeles | I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 4 | Non-Median | 730,800 | 4,954,824 | 313,239 |
| 15- Los Angeles | I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 5 | Median | 228,375 | 153,011 | 9,673 |
| 15-Los Angeles Urban 36.43 36.65 0.22 6 Modian 228,375 50,242 3.17 | I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 5 | | 228,375 | | 11,983 |
| 1-5: Sacramento | I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 4 | Non-Median | 730,800 | 204,624 | 12,936 |
| 1-5 Sacramento | I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 6 | Median | 228,375 | 50,242 | 3,176 |
| 1-5- Los Angeles Rural 52-33 54-16 1.83 4 Median 103.530 139.460 11.97 -5- Sacramento Rural 0 14.46 14.46 2 Median 103.530 139.460 34.46 -5- San Joaquin Urban 28.34 28.56 0.22 3 Median 228.375 50.242 3.17 -5- Sacramento Rural 19.16 22 2.84 4 Non-Median 730.800 2.075.472 131.20 -5- San Joaquin Rural 11.8 12.7 0.89 3 Median 103.530 92.142 5.82 -5- San Joaquin Rural 11.8 12.7 0.89 3 Median 103.530 92.142 5.82 -5- San Joaquin Rural 14.34 24.8 10.46 3 Median 103.530 92.142 5.82 -5- San Joaquin Rural 14.34 24.8 10.46 3 Median 103.530 1.093.0428 68.46 -5- Sacramento Urban 23.1 24.51 1.41 5 Non-Median 730.800 1.030.428 68.46 -5- Sacramento Urban 14.46 16.7 2.24 3 Median 228.375 511.560 32.34 -5- San Joaquin Urban 14.8 18.7 2.24 3 Median 228.375 511.560 32.34 -5- San Joaquin Urban 24.8 28.34 3.54 4 Median 228.375 808.448 51.10 -5- San Joaquin Urban 18.7 18.82 2.12 4 Median 228.375 494.155 30.60 -5- San Joaquin Rural 40.45 9.79 9.34 2 Median 228.375 494.155 30.60 -5- San Joaquin Rural 40.45 9.79 9.34 2 Median 228.375 494.155 30.60 -5- San Joaquin Rural 40.45 9.79 9.34 2 Median 228.375 494.155 30.60 -5- San Joaquin Rural 40.45 9.79 9.34 2 Median 279.3000 336.168 21.25 -5- San Joaquin Rural 40.45 9.79 9.34 2 Median 279.3000 336.168 21.25 -5- San Joaquin Rural 40.45 9.79 9.34 2 Median 103.530 9.69.910 51.13 -5- San Joaquin Rural 40.45 9.79 9.34 2 Median 103.530 394.70 51.70 -5- San Joaquin Rural 40.45 9.79 9.34 2 Median 103.530 394.70 51.70 -5- San Joaquin Rural 40.45 9.79 9.34 2 Median 103.530 9.99 9.99 9.99 9.99 9.99 9.99 9.99 9.99 9.99 9.99 9.99 9.9 | I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 3 | Median | 228,375 | 669,139 | 42,302 |
| 15- Seardmento | I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 3 | Median | 228,375 | 57,094 | 3,609 |
| 1-5: San Joaquin | I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 4 | Median | 103,530 | 189,460 | 11,977 |
| 15: Searamento Urban 19:16 22 2.84 4 Non-Median 730,800 2.075,472 131,20 | I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 2 | Median | 103,530 | 1,497,044 | 94,642 |
| 15: Los Angeles Urban 40:27 41:6 1.33 3 Non-Median 730,800 971,964 61,44 | I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 3 | Median | 228,375 | 50,242 | 3,176 |
| 15. San Joaquin Rural 11.8 12.7 0.98 3 Median 103.530 92.142 5.82 | I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 4 | Non-Median | 730,800 | 2,075,472 | 131,209 |
| F.S. San Joaquin | I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 3 | Non-Median | 730,800 | 971,964 | 61,447 |
| I-S: Sarcamento Urban 23.1 24.51 1.41 5 Non-Median 730.800 1,030.428 65.14 -S: San Joaquin Rural 28.56 40.45 11.89 3 Median 103.530 1,230.972 77.82 -S: Sacramento Urban 14.46 16.7 2.24 3 Median 228.375 511.560 32.34 -S: San Joaquin Urban 24.8 28.34 3.54 4 Median 228.375 808.448 51.10 -S: Sacramento Urban 16.7 18.82 2.12 4 Median 228.375 808.448 51.10 -S: San Joaquin Rural 40.45 49.79 9.34 2 Median 228.375 808.448 51.10 -S: San Joaquin Rural 40.45 49.79 9.34 2 Median 103.530 966.970 61.13 -S: Sacramento Urban 18.82 19.16 0.34 5 Non-Median 730.800 336.168 21.25 -S: Sacramento Urban 18.82 19.16 0.34 5 Non-Median 730.800 248.472 15.70 -S: San Joaquin Rural 12.69 14.34 1.65 5 Median 103.530 170.825 10.79 -S: Los Angeles Rural 41.65 59.5 57 4 Median 103.530 370.825 10.79 -S: Los Angeles Urban 39.36 39.81 0.45 5 Non-Median 730.800 338.860 20.79 -S: Los Angeles Rural 44.65 59.95 5.79 4 Median 103.530 378.860 20.79 -S: Los Angeles Rural 44.66 69.65 78.43 84.76 6.33 4 Median 103.530 379.297 232.60 -S: Los Angeles Rural 48.76 88.61 3.85 4 Non-Median 103.530 7,368.200 465.81 -S: Los Angeles Rural 69.65 78.43 84.76 6.33 4 Median 103.530 7,368.200 465.81 -S: Los Angeles Rural 69.65 78.43 8.78 4 Median 103.530 7,368.200 465.81 -S: Los Angeles Rural 69.65 78.43 8.78 4 Median 103.530 7,368.200 465.81 -S: Los Angeles Rural 69.65 78.43 5.48 4 Median 103.530 6.849.545 43.30 -S: Los Angeles Rural 69.65 78.43 5.48 4 Median 103.530 6.849.545 43.30 -S: Los Angeles Rural 69.65 78.43 5.48 4 Median 103.530 6.849.545 43.30 -S: Los Angeles Rural 69.65 78.43 5.48 4 Median 103.530 6.84 | I-5: San Joaquin | Rural | 11.8 | 12.7 | 0.89 | 3 | Median | 103,530 | 92,142 | 5,825 |
| F.S. San Joaquin Rural 28.56 40.45 11.89 3 Median 103.530 1,230.972 77,82 F.S. San Joaquin Urban 14.46 16.7 2.24 3 Median 228,375 511,560 32,34 F.S. San Joaquin Urban 14.46 16.7 18.82 2.12 4 Median 228,375 808,448 51,10 F.S. San Joaquin Rural 40.45 40.79 9.34 2 Median 103,530 966,970 61,13 F.S. Los Angeles Urban 39.81 40.27 0.46 4 Non-Median 730,800 336,168 21,25 F.S. San Joaquin Rural 40.45 40.79 9.34 2 Median 103,530 366,168 21,25 F.S. San Joaquin Rural 40.45 40.79 9.34 5 Non-Median 730,800 336,168 21,25 F.S. San Joaquin Rural 18.82 19.16 0.34 5 Non-Median 730,800 248,472 15,70 F.S. San Joaquin Rural 26.9 14.34 1.65 5 Median 103,530 170,825 10,79 F.S. Los Angeles Rural 54.16 59.95 5.79 4 Median 103,530 599,439 37,89 F.S. Los Angeles Rural 54.16 59.95 5.79 4 Median 103,530 599,439 37,89 F.F. Los Angeles Rural 84.76 88.61 3.85 4 Non-Median 730,800 328,860 20,79 F.F. Los Angeles Rural 84.76 88.61 3.85 4 Non-Median 730,800 328,860 20,79 F.F. Los Angeles Rural 55.69,698 1,618,88 F.F. Los Angeles Rural 68.65 78.43 84.76 6.33 4 Median 103,530 655,345 41,43 F.F. Los Angeles Rural 68.65 78.43 8.78 4 Median 103,530 908,993 57,46 F.F. Los Angeles Rural 68.65 78.43 8.78 4 Median 103,530 276,425 17,47 F.F. Los Angeles Rural 68.65 78.43 8.78 4 Median 103,530 276,425 17,47 F.F. Los Angeles Rural 68.65 78.43 8.78 4 Median 103,530 276,425 17,47 F.F. Los Angeles Rural 68.66 68.16 2 Median 103,530 3,59,549 3,59,549 F.F. Kerm Rural 7.04 9.28 2.24 4 Median 103,530 3,59,549 3,59,549 3,50 F.F. Kerm Rural 7.04 9.28 2.24 4 Median 103,530 3,59,549 3,50 F.F. Kerm Rural 10.35 15,08 4.78 4 Median 1 | I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | | Median | | | 68,461 |
| I-5: Sacramento | I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 5 | Non-Median | 730,800 | 1,030,428 | 65,143 |
| I-5: Sacramento | I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 3 | Median | 103,530 | 1,230,972 | 77,821 |
| F.S. San Joaquin | | Urban | | | | | Median | | | 32,340 |
| I-5: Sacramento | | Urban | | | | 4 | Median | | | 51,109 |
| Fee Los Angeles Urban 39.81 40.45 49.79 9.34 2 Median 103,530 966,970 61,13 | | | | | | | | | | 30,608 |
| -5: Los Angeles | | | | | | | | | | 61,131 |
| -5: Sacramento Urban 18.82 19.16 0.34 5 Non-Median 730,800 248,472 15,70 -5: San Joaquin Rural 12.69 14.34 1.65 5 Median 103,530 170,825 10,79 -5: Los Angeles Rural 54.16 59.95 5.79 4 Median 103,530 599,439 37,89 -5: Los Angeles Urban 39.36 39.81 0.45 5 Non-Median 730,800 328,860 20,79 -5: Los Angeles Rural 84.76 88.61 3.85 4 Non-Median 955,662 3,679,297 232,60 -5: Los Angeles Rural 78.43 84.76 6.33 4 Median 103,530 655,345 41,43 -5: Los Angeles Rural 15.86 87.03 71.17 2 Median 103,530 7,368,230 465,81 -5: Los Angeles Rural 88.1 69.65 1.55 4 Median 103,530 160,472 10,14 -5: Los Angeles Rural 68.4 69.65 1.55 4 Median 103,530 908,993 57,46 -5: Los Angeles Rural 66.4 68.10 2.67 4 Median 103,530 276,425 17,47 -5: Los Angeles Rural 65.4 68.10 2.67 4 Median 103,530 567,344 35,66 -5: Fresno Rural 0 66,16 66,16 2 Median 103,530 6,849,545 433,02 -5: Kings Rural 0 26,72 26,72 2 Median 103,530 3,359,549 212,38 -5: Kern Rural 15.08 15.86 0.78 4 Median 103,530 3,359,549 212,38 -5: Kern Rural 10,35 15.08 4.73 4 Median 103,530 3,359,549 212,38 -5: Kern Rural 15.08 15.86 0.78 4 Median 103,530 3,359,549 212,38 -5: Kern Rural 15.08 15.86 0.78 4 Median 103,530 6,753 5,10 -5: Kern Rural 15.08 15.86 0.78 4 Median 103,530 6,777 7,00 -5: Kern Rural 15.08 15.86 0.78 4 Median 103,530 6,773 5,10 -5: Kern Rural 15.08 15.86 0.78 4 Median 103,530 3,359,549 212,38 -5: Kern Rural 15.08 15.86 0.78 4 Median 103,530 3,359,549 212,38 -5: Kern Rural 15.86 0.78 4 Median 103,530 6,777 7,00 -5: Kern Rural 0.58 5.36 4.78 4 Median 103,530 6,00,47 7,20 -5: Kern Rural 0.58 5 | | | | | | | | | | 21,252 |
| - | | | | | | | | | | 15,708 |
| -5: Los Angeles | | | | | | | | | | |
| -5: Los Angeles | | | | | | | | | | |
| 1-5: Los Angeles Rural 84.76 88.61 3.85 4 Non-Median 955,662 3,679,297 232,600 -5: Los Angeles Rural 78.43 84.76 6.33 4 Median 103,530 655,345 41,43 -5: Los Angeles Rural 15.86 87.03 71.17 2 Median 103,530 7,368,230 465,81 -5: Los Angeles Rural 68.1 69.65 1.55 4 Median 103,530 160,472 10,14 -5: Los Angeles Rural 69.65 78.43 8.78 4 Median 103,530 90,893 57,46 -5: Los Angeles Rural 65.4 68.10 2.67 4 Median 103,530 276,425 17,47 -5: Los Angeles Rural 59.95 65.43 5.48 4 Median 103,530 567,344 35,86 -5: Fresno Rural 0 66.16 66.16 2 Median 103,530 6,849,545 433,02 -5: Kings Rural 0 26.72 26.72 2 Median 103,530 2,766,322 174,86 -5: Merced Rural 0 32.45 32.45 2 Median 103,530 3,359,549 212,38 -5: Kern Rural 15.08 15.86 0.78 4 Median 103,530 3,359,549 212,38 -5: Kern Rural 10.35 15.08 4.73 4 Median 103,530 3,359,549 30,95 -5: Kern Rural 6.41 7.04 0.63 4 Median 103,530 489,697 30,95 -5: Kern Rural 5.36 6.41 1.05 4 Median 103,530 494,873 31,28 -5: Kern Rural 5.36 6.41 1.05 4 Median 103,530 494,873 31,28 -5: Kern Rural 5.36 6.41 1.05 4 Median 103,530 494,873 31,28 -5: Kern Rural 5.36 6.41 1.05 4 Median 103,530 494,873 31,28 -5: Kern Rural 5.36 6.41 1.05 4 Median 103,530 494,873 31,28 -5: Kern Rural 5.36 6.41 1.05 4 Median 103,530 494,873 31,28 -5: Kern Rural 5.36 6.41 1.05 4 Median 103,530 494,873 31,28 -5: Kern Rural 5.36 6.41 1.05 4 Median 103,530 494,873 31,28 -5: Kern Rural 5.36 6.41 1.05 4 Median 103,530 494,873 31,28 -5: Kern Rural 5.36 6.41 1.05 4 Median 103,530 494,873 31,28 -5: Kern Rural 0 28.06 28.06 2 Median 103,530 1,2 | | | | | | | | | | |
| 1-5: Los Angeles Rural 84.76 88.61 3.85 4 Non-Median 955,662 3,679,297 232,60 1-5: Los Angeles Rural 78.43 84.76 6.33 4 Median 103,530 655,345 41,43 1-5: Los Angeles Rural 15.86 87.03 71.17 2 Median 103,530 7,368,230 465,81 1-5: Los Angeles Rural 68.1 69.65 1.55 4 Median 103,530 160,472 10,14 1-5: Los Angeles Rural 69.65 78.43 8.78 4 Median 103,530 908,993 57,46 1-5: Los Angeles Rural 65.4 68.10 2.67 4 Median 103,530 276,425 177,47 1-5: Los Angeles Rural 59.95 65.43 5.48 4 Median 103,530 276,425 177,47 1-5: Fresno Rural 59.95 65.43 5.48 4 Median 103,530 276,425 177,47 1-5: Fresno Rural 0 66.16 66.16 2 Median 103,530 6,849,545 433,02 1-5: Kings Rural 0 26.72 26.72 2 Median 103,530 2,766,322 174,88 1-5: Merced Rural 0 32.45 32.45 2 Median 103,530 231,907 14,66 1-5: Kern Rural 15.08 15.86 0.78 4 Median 103,530 80,753 5,10 1-5: Kern Rural 10.35 15.08 4.73 4 Median 103,530 489,697 30,95 1-5: Kern Rural 6.41 7.04 0.63 4 Median 103,530 108,707 6,87 1-5: Kern Rural 6.41 7.04 0.63 4 Median 103,530 108,707 6,87 1-5: Kern Rural 6.41 7.04 0.63 4 Median 103,530 108,707 6,87 1-5: Kern Rural 6.41 7.04 0.63 4 Median 103,530 108,707 6,87 1-5: Kern Rural 6.41 7.04 0.63 4 Median 103,530 494,873 31,28 1-5: Kern Rural 0.58 5.36 4.78 4 Median 103,530 494,873 31,28 1-5: Kern Rural 0.58 5.36 4.78 4 Median 103,530 494,873 31,28 1-5: Kern Rural 0.58 5.36 4.78 4 Median 103,530 494,873 31,28 1-5: Kern Rural 0.58 5.36 4.78 4 Median 103,530 494,873 31,28 1-5: Kern Rural 0.58 5.36 4.78 4 Median 103,530 494,873 31,28 1-5: Kern Rural 0 0.5 | TOTAL | | | | | | | . 55,550 | | 1,618,982 |
| -5: Los Angeles | | | | | | | | | | .,5.0,002 |
| -5: Los Angeles | I-5: Los Angeles | Rural | 84 76 | 88 61 | 3.85 | 4 | Non-Median | 955 662 | 3 679 207 | 232 602 |
| -5: Kern | | | | | | | | | | 41,430 |
| -5: Los Angeles | | | | | | | | | | |
| -5: Los Angeles | | | | | | | | | | 10,145 |
| -5: Los Angeles | | | | | | | | | | 57,466 |
| -5: Los Angeles | | | | | | | | | | |
| -5: Fresno | | | | | | | | | | |
| -5: Kings | | | | | | | | | | |
| I-5: Kern Rural 7.04 9.28 2.24 4 Median 103,530 231,907 14,66 I-5: Merced Rural 0 32.45 32.45 2 Median 103,530 3,359,549 212,38 I-5: Kern Rural 15.08 15.86 0.78 4 Median 103,530 80,753 5,10 I-5: Kern Rural 10.35 15.08 4.73 4 Median 103,530 489,697 30,95 I-5: Kern Rural 9.28 10.35 1.07 4 Median 103,530 110,777 7,00 I-5: Kern Rural 6.41 7.04 0.63 4 Median 103,530 65,224 4,12 I-5: Kern Rural 5.36 6.41 1.05 4 Median 103,530 108,707 6,87 I-5: Kern Rural 0.58 5.36 4.78 4 Median 103,530 494,873 31,28 I-5: Kern Rural 0.58 5.36 0.58 4 Median 103,530 60,047 3,79 I-5: Stanislaus Rural 0 28,06 28,06 2 Median 103,530 1,221,654 77,23 | | | | | | | | | | |
| I-5: Merced Rural 0 32.45 32.45 2 Median 103,530 3,359,549 212,38 I-5: Kern Rural 15.08 15.86 0.78 4 Median 103,530 80,753 5,10 I-5: Kern Rural 10.35 15.08 4.73 4 Median 103,530 489,697 30,95 I-5: Kern Rural 9.28 10.35 1.07 4 Median 103,530 110,777 7,00 I-5: Kern Rural 6.41 7.04 0.63 4 Median 103,530 65,224 4,12 I-5: Kern Rural 5.36 6.41 1.05 4 Median 103,530 108,707 6,87 I-5: Kern Rural 0.58 5.36 4.78 4 Median 103,530 494,873 31,28 I-5: Kern Rural 0 0.58 0.58 4 Median 103,530 60,047 3,79 I-5: Stanislaus </td <td></td> | | | | | | | | | | |
| -5: Kern | | | | | | | | | | |
| -5: Kern | | | | | | | | | | |
| I-5: Kern Rural 9.28 10.35 1.07 4 Median 103,530 110,777 7,00 I-5: Kern Rural 6.41 7.04 0.63 4 Median 103,530 65,224 4,12 I-5: Kern Rural 5.36 6.41 1.05 4 Median 103,530 108,707 6,87 I-5: Kern Rural 0.58 5.36 4.78 4 Median 103,530 494,873 31,28 I-5: Kern Rural 0 0.58 0.58 4 Median 103,530 60,047 3,79 I-5: Stanislaus Rural 0 28.06 28.06 2 Median 103,530 2,905,052 183,65 I-5: San Joaquin Rural 0 11.8 11.8 2 Median 103,530 1,221,654 77,23 | | | | | | | | | | |
| I-5: Kern Rural 6.41 7.04 0.63 4 Median 103,530 65,224 4,12 I-5: Kern Rural 5.36 6.41 1.05 4 Median 103,530 108,707 6,87 I-5: Kern Rural 0.58 5.36 4.78 4 Median 103,530 494,873 31,28 I-5: Kern Rural 0 0.58 0.58 4 Median 103,530 60,047 3,79 I-5: Stanislaus Rural 0 28.06 28.06 2 Median 103,530 2,905,052 183,65 I-5: San Joaquin Rural 0 11.8 11.8 2 Median 103,530 1,221,654 77,23 | | | | | | | | | | |
| -5: Kern Rural 5.36 6.41 1.05 4 Median 103,530 108,707 6,87 -5: Kern Rural 0.58 5.36 4.78 4 Median 103,530 494,873 31,28 -5: Kern Rural 0 0.58 0.58 4 Median 103,530 60,047 3,79 -5: Stanislaus Rural 0 28.06 28.06 2 Median 103,530 2,905,052 183,65 -5: San Joaquin Rural 0 11.8 11.8 2 Median 103,530 1,221,654 77,23 | | | | | | | | | | |
| I-5: Kern Rural 0.58 5.36 4.78 4 Median 103,530 494,873 31,28 I-5: Kern Rural 0 0.58 0.58 4 Median 103,530 60,047 3,79 I-5: Stanislaus Rural 0 28.06 28.06 2 Median 103,530 2,905,052 183,65 I-5: San Joaquin Rural 0 11.8 11.8 2 Median 103,530 1,221,654 77,23 | | | | | | | | | | 4,123 |
| I-5: Kern Rural 0 0.58 0.58 4 Median 103,530 60,047 3,79 I-5: Stanislaus Rural 0 28.06 28.06 2 Median 103,530 2,905,052 183,65 I-5: San Joaquin Rural 0 11.8 11.8 2 Median 103,530 1,221,654 77,23 | | | | | | | | | | 6,872 |
| I-5: Stanislaus Rural 0 28.06 28.06 2 Median 103,530 2,905,052 183,65 I-5: San Joaquin Rural 0 11.8 11.8 2 Median 103,530 1,221,654 77,23 | | | | | | | | | | 31,285 |
| I-5: San Joaquin Rural 0 11.8 11.8 2 Median 103,530 1,221,654 77,23 | | | | | | | | | | 3,796 |
| | | | | | | | | | | 183,655 |
| TOTAL 280.88 2,922,732 32,360,213 2,045,78 | | Rural | 0 | 11.8 | | 2 | Median | | | 77,232 |
| | TOTAL | | | | 280.88 | | | 2,922,732 | 32,360,213 | 2,045,782 |

APPENDIX T

ADDED CONVENTIONAL FREEWAY LANE VEHICLE-HOURS AND VEHICLE-MILES, VEHICLE OPERATING COSTS, AND USER COSTS AT VARIOUS VOLUMES

Introduction

This appendix shows supporting tables for the calculation of vehicle-miles, vehicle-hours, vehicle operating costs, and user travel time costs for low-, medium-, and high-volume traffic conditions for the added-conventional-lane configuration (these traffic conditions are described in Appendix S).

Methodologies

Sorting methodologies for the tables in this appendix are identical to those presented in Appendix S. Calculation methodologies for the tables shown here are identical to those for calculation of the corresponding values for the added-conventional-freeway-lane scenario at base volumes, which is presented in Appendix M. Values were summed for the low-, medium-, and high-volume conditions to determine a total cost for each type of segment.

Results

The vehicle-miles of travel and vehicle operating costs are shown in Table T1a for the existing freeway conditions (sorted by volume), and in Table T2a for the existing configuration plus an added conventional lane. Table T1b shows vehicle-hours of travel and user travel-time costs for the existing configuration (sorted by volume), and Table T2b shows vehicle-hours of travel and user travel-time costs for the existing configuration plus the added conventional lane, again sorted by volume.

| County I-5: Los Angeles I-5: Sacramento I-5: Sacramento I-5: Sacramento I-5: Los Angeles I-5: Sacramento I-5: Los Angeles I-5: Sacramento I-5: Los Angeles I-5: Los Angeles I-5: Los Angeles I-6: Los Angeles | City/Suburba n/Rural Urban | | t Mile of St End 36.43 21.41 22.78 46.9 52.33 44.01 14.16 23.28 10.18 29.16 39.36 20.58 16.9 22.28 17.21 17.91 | | Peak Period \ | | Nightime Off-Pe Miles of Travel Truck 99 417 432 191 146 481 2,881 67 109 7,623 2,456 312 1,230 | ak Other Vehicle- , One Direction Other Veh. 1,137 4,790 3,495 2,541 1,481 3,219 25,927 771 1,249 43,196 13,917 3,590 14,149 | | I, One Direction Other Veh. 16,637 43,469 49,371 35,821 9,057 44,718 161,734 5,706 25,880 359,925 | Peal Truck 1,424 9,006 4,487 2,936 2,546 5,193 49,482 793 2,706 174,793 | Other Veh. 3,014 19,059 6,682 7,178 4,738 6,396 81,955 1,677 5,726 | Vehicle Opera Nighttime Truck 175 736 763 338 259 849 5,087 118 | Off-Peak Other Veh. 370 1,557 1,136 826 481 1,046 8,426 251 406 | Daytime 0 Truck 2,555 6,675 10,776 4,762 1,582 11,801 31,736 876 3,974 | Off-Peak Other Veh. 5,407 14,127 16,046 11,642 2,944 14,533 52,564 1,854 8,411 |
|--|--|---|---|---|--|--|--|--|--|--|--|---|---|---|--|--|
| County I-5: Los Angeles I-5: Sacramento I-5: Sacramento I-5: Sacramento I-5: Los Angeles I-5: Sacramento I-5: Los Angeles I-5: Sacramento I-5: Los Angeles I-5: Los Angeles I-5: Los Angeles I-6: Los Angeles | n/Rural Urban | Begin 36.22 20.58 22 22.28 46.6 25.53 46.9 43.9 13.78 12.97 4.96 28.25 36.65 17.21 14.16 21.41 | End 36.43 21.41 23.1 22.78 46.9 26.69 52.33 44.01 14.16 23.28 10.18 29.16 39.36 20.58 16.9 22.28 17.21 | Length (mi) 0.21 0.83 1.1 0.5 0.3 1.16 5.43 0.11 0.38 10.31 5.22 0.91 2.71 3.37 2.74 0.87 | Truck 806 5,100 2,541 1,663 1,442 2,941 28,019 449 1,532 98,976 37,584 2,985 11,057 17,254 10,522 | Other Veh. 9,274 58,644 20,559 22,088 14,578 19,679 252,169 5,161 17,620 560,864 212,976 34,325 198,426 | Truck 99 417 432 191 146 481 2,881 67 109 7,623 2,456 312 1,230 1,450 | Other Veh. 1,137 4,790 3,495 2,541 1,481 3,219 25,927 771 1,249 43,196 13,917 3,590 | Truck 1,447 3,780 6,102 2,696 896 6,682 17,970 496 2,250 63,516 | Other Veh. 16,637 43,469 49,371 35,821 9,057 44,718 161,734 5,706 25,880 359,925 | Truck 1,424 9,006 4,487 2,936 2,546 5,193 49,482 793 2,706 | Other Veh. 3,014 19,059 6,682 7,178 4,738 6,396 81,955 1,677 | Truck 175 736 763 338 259 849 5,087 118 | Other Veh. 370 1,557 1,136 826 481 1,046 8,426 251 406 | Truck 2,555 6,675 10,776 4,762 1,582 11,801 31,736 876 3,974 | Other Veh. 5,407 14,127 16,046 11,642 2,944 14,533 52,564 1,854 |
| I-5: Los Angeles I-5: Sacramento I-5: Los Angeles | Urban | 36.22 20.58 22 22 22.28 46.6 25.53 46.9 43.9 13.78 12.97 4.96 28.25 36.65 17.21 14.16 21.41 | 36.43 21.41 23.1 22.78 46.9 26.69 52.33 44.01 14.16 23.28 10.18 29.16 39.36 20.58 16.9 22.28 17.21 | 0.21 0.83 1.1 0.5 0.3 0.1 1.16 5.43 0.11 0.38 10.31 5.22 0.91 2.71 3.37 2.74 0.87 | 806 5,100 2,541 1,663 1,442 2,941 28,019 449 1,532 98,976 37,584 2,985 11,057 17,254 10,522 | 9,274 58,644 20,559 22,088 14,578 19,679 252,169 5,161 17,620 560,864 212,976 34,325 127,153 198,426 | 99 417 432 191 146 481 2,881 67 109 7,623 2,456 312 1,230 1,450 | 1,137 4,790 3,495 2,541 1,481 3,219 25,927 771 1,249 43,196 13,917 3,590 | 1,447 3,780 6,102 2,696 896 6,682 17,970 496 2,250 63,516 | 16,637 43,469 49,371 35,821 9,057 44,718 161,734 5,706 25,880 359,925 | 1,424 9,006 4,487 2,936 2,546 5,193 49,482 793 2,706 | 3,014 19,059 6,682 7,178 4,738 6,396 81,955 1,677 | 175 736 763 338 259 849 5,087 118 | 370 1,557 1,136 826 481 1,046 8,426 251 406 | 2,555 6,675 10,776 4,762 1,582 11,801 31,736 876 3,974 | 5,407 14,127 16,046 11,642 2,944 14,533 52,564 1,854 |
| I-5: Los Angeles I-5: Sacramento I-5: Los Angeles | Urban | 20.58 22 22.28 46.6 25.53 46.9 43.9 13.78 12.97 4.96 28.25 36.65 17.21 14.16 11.41 | 21.41 23.1 22.78 46.9 26.69 52.33 44.01 14.16 23.12 39.36 20.58 16.9 22.28 17.21 | 0.83 1.1 0.5 0.3 1.16 5.43 0.11 0.38 10.31 5.22 0.91 2.71 3.37 2.74 | 5,100 2,541 1,663 1,442 2,941 28,019 449 1,532 98,976 37,584 2,985 11,057 17,254 10,522 | 58,644 20,559 22,088 14,578 19,679 252,169 5,161 17,620 560,864 212,976 34,325 127,153 198,426 | 417 432 191 146 481 67 109 7,623 2,456 312 1,230 1,450 | 4,790 3,495 2,541 1,481 3,219 25,927 771 1,249 43,196 13,917 3,590 | 3,780 6,102 2,696 896 6,682 17,970 496 2,250 63,516 | 43,469 49,371 35,821 9,057 44,718 161,734 5,706 25,880 359,925 | 9,006 4,487 2,936 2,546 5,193 49,482 793 2,706 | 19,059 6,682 7,178 4,738 6,396 81,955 1,677 | 736 763 338 259 849 5,087 118 | 1,557 1,136 826 481 1,046 8,426 251 406 | 6,675 10,776 4,762 1,582 11,801 31,736 876 3,974 | 14,127 16,046 11,642 2,944 14,533 52,564 1,854 |
| I-5: Sacramento I-5: Los Angeles I-6: Los Angeles CA 710: Los Angeles CA 710: Los Angeles I-5: Los Angeles | Urban Urban Urban Urban Urban Urban Urban Suburban Suburban Urban Urban Suburban Urban | 222 22.28 46.6 25.53 46.9 43.9 13.78 12.97 4.96 28.25 36.65 17.21 14.16 21.41 | 23.1 22.78 46.9 26.69 52.33 44.01 14.16 23.28 10.18 29.16 39.36 20.58 16.9 22.28 17.21 | 1.1 0.5 0.3 1.16 5.43 0.11 0.38 10.31 5.22 0.91 2.71 3.37 2.74 0.87 | 2,541 1,663 1,442 2,941 28,019 449 1,532 98,976 37,584 2,985 11,057 17,254 10,522 | 20,559 22,088 14,578 19,679 252,169 5,161 17,620 560,864 212,976 34,325 127,153 198,426 | 432 191 146 481 2,881 67 109 7,623 2,456 312 1,230 1,450 | 3,495 2,541 1,481 3,219 25,927 771 1,249 43,196 13,917 3,590 | 6,102 2,696 896 6,682 17,970 496 2,250 63,516 | 49,371 35,821 9,057 44,718 161,734 5,706 25,880 359,925 | 4,487 2,936 2,546 5,193 49,482 793 2,706 | 6,682 7,178 4,738 6,396 81,955 1,677 | 763 338 259 849 5,087 118 | 1,136 826 481 1,046 8,426 251 406 | 4,762 1,582 11,801 31,736 876 3,974 | 16,046 11,642 2,944 14,533 52,564 1,854 |
| I-5: Los Angeles I-5: Sacramento I-5: Los Angeles CA 710: Los Angeles CA 710: Los Angeles I-5: Los Angeles | Urban | 46.6 25.53 46.9 43.9 13.78 12.97 4.96 28.25 36.65 17.21 14.16 21.41 | 46.9 26.69 52.33 44.01 14.16 23.28 10.18 29.16 39.36 20.58 16.9 22.28 17.21 | 0.3 1.16 5.43 0.11 0.38 10.31 5.22 0.91 2.71 3.37 2.74 0.87 | 1,442 2,941 28,019 449 1,532 98,976 37,584 2,985 11,057 17,254 10,522 | 14,578 19,679 252,169 5,161 17,620 560,864 212,976 34,325 127,153 198,426 | 146 481 2,881 67 109 7,623 2,456 312 1,230 1,450 | 1,481 3,219 25,927 771 1,249 43,196 13,917 3,590 | 896 6,682 17,970 496 2,250 63,516 | 9,057 44,718 161,734 5,706 25,880 359,925 | 2,546 5,193 49,482 793 2,706 | 4,738 6,396 81,955 1,677 | 259 849 5,087 118 192 | 481 1,046 8,426 251 406 | 1,582 11,801 31,736 876 3,974 | 2,944 14,533 52,564 1,854 |
| I-5: Sacramento I-5: Los Angeles I-5: Los Angeles I-5: Los Angeles I-5: Los Angeles CA 710: Los Angeles CA 710: Los Angeles I-5: Los Angeles | Urban Urban Urban Urban Suburban Suburban Urban | 25.53 46.9 43.9 13.78 12.97 4.96 28.25 36.65 17.21 14.16 21.41 16.9 | 26.69 52.33 44.01 14.16 23.28 10.18 29.16 39.36 20.58 16.9 22.28 17.21 | 1.16 5.43 0.11 0.38 10.31 5.22 0.91 2.71 3.37 2.74 0.87 | 2,941 28,019 449 1,532 98,976 37,584 2,985 11,057 17,254 10,522 | 19,679 252,169 5,161 17,620 560,864 212,976 34,325 127,153 198,426 | 481 2,881 67 109 7,623 2,456 312 1,230 1,450 | 3,219 25,927 771 1,249 43,196 13,917 3,590 | 6,682 17,970 496 2,250 63,516 | 44,718 161,734 5,706 25,880 359,925 | 5,193 49,482 793 2,706 | 6,396 81,955 1,677 | 849 5,087 118 192 | 1,046 8,426 251 406 | 11,801 31,736 876 3,974 | 14,533 52,564 1,854 |
| I-5: Los Angeles I-5: Los Angeles I-5: Los Angeles I-5: Los Angeles CA 710: Los Angeles CA 710: Los Angeles I-5: Los Angeles TOTAL | Urban Urban Urban Suburban Suburban Urban | 46.9 43.9 13.78 12.97 4.96 28.25 36.65 17.21 14.16 21.41 16.9 | 52.33 44.01 14.16 23.28 10.18 29.16 39.36 20.58 16.9 22.28 17.21 | 5.43 0.11 0.38 10.31 5.22 0.91 2.71 3.37 2.74 0.87 | 28,019 449 1,532 98,976 37,584 2,985 11,057 17,254 10,522 | 252,169 5,161 17,620 560,864 212,976 34,325 127,153 198,426 | 2,881 67 109 7,623 2,456 312 1,230 1,450 | 25,927 771 1,249 43,196 13,917 3,590 | 17,970 496 2,250 63,516 | 161,734 5,706 25,880 359,925 | 49,482 793 2,706 | 81,955 1,677 | 5,087 118 192 | 8,426 251 406 | 31,736 876 3,974 | 52,564 1,854 |
| I-5: Los Angeles L-5: Los Angeles CA 710: Los Angeles CA 710: LA L-5: Los Angeles | Urban Urban Suburban Suburban Urban | 43.9 13.78 12.97 4.96 28.25 36.65 17.21 14.16 21.41 | 44.01 14.16 23.28 10.18 29.16 39.36 20.58 16.9 22.28 17.21 | 0.11 0.38 10.31 5.22 0.91 2.71 3.37 2.74 0.87 | 449 1,532 98,976 37,584 2,985 11,057 17,254 10,522 | 5,161 17,620 560,864 212,976 34,325 127,153 198,426 | 67 109 7,623 2,456 312 1,230 1,450 | 771 1,249 43,196 13,917 3,590 | 496 2,250 63,516 | 5,706 25,880 359,925 | 793 2,706 | 1,677 | 118 192 | 251 406 | 876 3,974 | 1,854 |
| I-5: Los Angeles CA 710: Los Angeles CA 710: Los Angeles I-5: Los Angeles | Urban Suburban Suburban Urban | 13.78 12.97 4.96 28.25 36.65 17.21 14.16 21.41 | 14.16 23.28 10.18 29.16 39.36 20.58 16.9 22.28 17.21 | 0.38 10.31 5.22 0.91 2.71 3.37 2.74 0.87 | 1,532 98,976 37,584 2,985 11,057 17,254 10,522 | 17,620 560,864 212,976 34,325 127,153 198,426 | 109 7,623 2,456 312 1,230 1,450 | 1,249 43,196 13,917 3,590 | 2,250 63,516 | 25,880 359,925 | 2,706 | | 192 | 406 | 3,974 | |
| CA 710: Los Angeles CA 710: LA I-5: Los Angeles TOTAL I-5: Los Angeles TOTAL I-5: Los Angeles | Suburban Suburban Urban | 12.97 4.96 28.25 36.65 17.21 14.16 21.41 | 23.28 10.18 29.16 39.36 20.58 16.9 22.28 17.21 | 10.31 5.22 0.91 2.71 3.37 2.74 0.87 | 98,976 37,584 2,985 11,057 17,254 10,522 | 560,864 212,976 34,325 127,153 198,426 | 7,623 2,456 312 1,230 1,450 | 43,196 13,917 3,590 | 63,516 | 359,925 | | 0,120 | | | | |
| CA 710: LA 1-5: Los Angeles | Suburban Urban | 4.96 28.25 36.65 17.21 14.16 21.41 | 10.18 29.16 39.36 20.58 16.9 22.28 17.21 | 5.22 0.91 2.71 3.37 2.74 0.87 | 37,584 2,985 11,057 17,254 10,522 | 212,976 34,325 127,153 198,426 | 2,456 312 1,230 1,450 | 13,917 3,590 | | | | 182,281 | 13,462 | 14,039 | 112,170 | 116,976 |
| I-5: Los Angeles TOTAL I-5: Los Angeles I-5: Los Angeles TOTAL I-5: Los Angeles | Urban Urban Urban Urban Urban Urban Urban Urban Urban | 36.65 17.21 14.16 21.41 16.9 | 39.36 20.58 16.9 22.28 17.21 | 2.71 3.37 2.74 0.87 | 11,057 17,254 10,522 | 127,153 198,426 | 1,230 1,450 | -, | | 83,697 | 66,374 | 69,217 | 4,337 | 4,523 | 26,084 | 27,201 |
| I-5: Los Angeles CA 710: Los Angeles TOTAL I-5: Los Angeles | Urban Urban Urban Urban Urban Urban Urban Urban | 17.21 14.16 21.41 16.9 | 20.58 16.9 22.28 17.21 | 3.37 2.74 0.87 | 17,254 10,522 | 198,426 | 1,450 | 1/11/0 | 4,129 | 47,479 | 5,271 | 11,156 | 551 | 1,167 | 7,291 | 15,431 |
| I-5: Los Angeles I-5: Los Angeles I-5: Los Angeles I-5: Los Angeles TOTAL I-5: Los Angeles I-5: Los Angeles | Urban Urban Urban Suburban | 14.16 21.41 16.9 | 16.9 22.28 17.21 | 2.74 0.87 | 10,522 | , | | , | 16,981 | 195,280 | 19,526 | 41,325 | 2,173 | 4,598 | 29,988 | 63,466 |
| I-5: Los Angeles I-5: Los Angeles CA 710: Los Angeles TOTAL I-5: Los Angeles I-5: Los Angeles | Urban Urban Suburban Urban | 21.41 16.9 | 22.28 17.21 | 0.87 | | 120,998 | | 16,671 | 13,648 | 156,951 | 30,471 | 64,488 | 2,560 | 5,418 | 24,102 | 51,009 |
| I-5: Los Angeles CA 710: Los Angeles TOTAL I-5: Los Angeles I-5: Los Angeles | Urban Suburban Urban | 16.9 | 17.21 | | | 63.392 | 796 430 | 9,149 4,949 | 17,179 3.662 | 197,556 42,114 | 18,581 9.735 | 39,324 20.602 | 1,405 760 | 2,973 1,609 | 30,338 6,467 | 64,206 13,687 |
| CA 710: Los Angeles TOTAL I-5: Los Angeles I-5: Los Angeles | Suburban Urban | | | | 1.176 | 13.518 | 83 | 956 | 1.717 | 19.750 | 2.076 | 4,394 | 147 | 311 | 3.033 | 6.419 |
| I-5: Los Angeles I-5: Los Angeles | | | | 2.79 | 23,436 | 143,964 | 1,540 | 9,461 | 9,397 | 57,722 | 41,388 | 46,788 | 2,720 | 3,075 | 16,594 | 18,760 |
| I-5: Los Angeles | | | | | 252,993 | 1,895,389 | 20,743 | 160,649 | 187,318 | 1,552,868 | 446,788 | 616,001 | 36,632 | 52,211 | 330,806 | 504,682 |
| I-5: Los Angeles | | 41.6 | 43.9 | 2.3 | 10,488 | 120,612 | 1,463 | 16,821 | 10,129 | 116,487 | 18,522 | 39,199 | 2,583 | 5,467 | 17,889 | 37,858 |
| | | 22.78 | 28.25 | 5.47 | 18,188 | 241,637 | 2,092 | 27,800 | 29,497 | 391,886 | 32,120 | 78,532 | 3,695 | 9,035 | 52,092 | 127,363 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 5,951 | 53,563 | 739 | 6,650 | 5,845 | 52,602 | 10,510 | 17,408 | 1,305 | 2,161 | 10,322 | 17,096 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 2,010 | 20,328 | 319 | 3,225 | 4,372 | 44,206 | 3,550 | 6,606 | 563 | 1,048 | 7,721 | 14,367 |
| I-5: Sacramento | | 29.87 | 34.65 | 4.78 | 16,061 | 84,319 | 1,471 | 7,722 | 13,060 | 68,567 | 28,364 | 27,404 | 2,597 | 2,510 | 23,065 | 22,284 |
| I-5: Los Angeles | | 29.16 | 35.94 | 6.78 | 19,526 | 224,554 | 2,052 | 23,599 | 27,238 | 313,231 | 34,484 | 72,980 | 3,624 | 7,670 | 48,102 | 101,800 |
| I-5: Los Angeles | | 45.93 45.1 | 46.6 45.93 | 0.67 0.83 | 3,578 | 32,200 40.333 | 363 440 | 3,270 4,452 | 2,223 3.041 | 20,006 30,745 | 6,318 7.045 | 10,465 13,108 | 642 778 | 1,063 1,447 | 3,926 5,370 | 6,502 9,992 |
| I-5: Los Angeles I-5: Los Angeles | | 35.94 | 36.22 | 0.83 | 3,989 762 | 40,333 8.758 | 440 85 | 4,452 975 | 3,041 1.170 | 30,745 13.451 | 1,045 | 13,108 | 150 | 317 | 2.066 | 9,992 4,372 |
| I-5: Los Angeles | | 36.43 | 36.65 | 0.28 | 880 | 10,120 | 104 | 1,191 | 1,480 | 17,025 | 1,554 | 3,289 | 183 | 387 | 2,614 | 5,533 |
| I-5: Sacramento | | 26.94 | 29.87 | 2.93 | 9,476 | 76,666 | 759 | 6,143 | 5,558 | 44,968 | 16,734 | 24,917 | 1,341 | 1,997 | 9,815 | 14,614 |
| I-5: Sacramento | | 26.69 | 26.94 | 0.25 | 662 | 6,689 | 53 | 536 | 388 | 3,923 | 1,168 | 2,174 | 94 | 174 | 685 | 1,275 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 5,947 | 53,528 | 723 | 6,511 | 5,224 | 47,016 | 10,503 | 17,396 | 1,278 | 2,116 | 9,226 | 15,280 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 32,535 | 97,605 | 20,742 | 62,226 | 55,173 | 165,519 | 57,457 | 31,722 | 36,630 | 20,223 | 97,436 | 53,794 |
| I-5: San Joaquin | | 28.34 | 28.56 | 0.22 | 1,188 7,157 | 3,762 43,963 | 96 1,230 | 303 7,557 | 1,092 17,457 | 3,459 107,236 | 2,098 12,639 | 1,223 14,288 | 169 2,173 | 99 2,456 | 1,929 30.829 | 1,124 34,852 |
| I-5: Sacramento I-5: Los Angeles | | 19.16 40.27 | 41.6 | 2.84 | 2,202 | 22,270 | 683 | 6,910 | 11,119 | 112,425 | 3,890 | 7,238 | 1,207 | 2,436 | 19,636 | 36,538 |
| I-5: San Joaquin | | 11.8 | 12.69 | 0.89 | 4.859 | 13,831 | 794 | 2,259 | 4.066 | 11.572 | 8,582 | 4,495 | 1,402 | 734 | 7,180 | 3,761 |
| I-5: San Joaquin | | 14.34 | 24.8 | 10.46 | 54,392 | 154,808 | 6,073 | 17,284 | 48,319 | 137,524 | 96,057 | 50,313 | 10,725 | 5,617 | 85,332 | 44,695 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 3,003 | 27,030 | 537 | 4,833 | 7,740 | 69,658 | 5,304 | 8,785 | 948 | 1,571 | 13,668 | 22,639 |
| I-5: San Joaquin | | 28.56 | 40.45 | 11.89 | 54,694 | 183,106 | 4,410 | 14,763 | 50,284 | 168,343 | 96,590 | 59,509 | 7,788 | 4,798 | 88,802 | 54,711 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 3,763 | 23,117 | 597 | 3,668 | 8,184 | 50,271 | 6,646 | 7,513 | 1,055 | 1,192 | 14,452 | 16,338 |
| I-5: San Joaquin I-5: Sacramento | Urban Urban | 24.8 16.7 | 28.34 18.82 | 3.54 2.12 | 21,240 4,452 | 67,260 27,348 | 2,371 706 | 7,510 4,339 | 18,869 9,682 | 59,750 59,473 | 37,510 7,862 | 21,860 8,888 | 4,188 1,248 | 2,441 1,410 | 33,322 17.098 | 19,419 19,329 |
| I-5: San Joaquin | | 40.45 | 49.79 | 9.34 | 20,623 | 65,305 | 6,489 | 20,547 | 28,929 | 91,607 | 36,420 | 21,224 | 11,459 | 6,678 | 51,088 | 29,772 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 795 | 8,037 | 131 | 1,328 | 1,765 | 17,844 | 1,404 | 2,612 | 232 | 432 | 3,117 | 5,799 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 771 | 4,737 | 143 | 877 | 2,085 | 12,807 | 1,362 | 1,539 | 252 | 285 | 3,682 | 4,162 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 10,725 | 30,525 | 1,509 | 4,294 | 14,793 | 42,104 | 18,940 | 9,921 | 2,665 | 1,396 | 26,125 | 13,684 |
| I-5: Los Angeles | | 54.16 | 59.95 | 5.79 | 18,528 | 97,272 | 2,254 | 11,832 | 16,274 | 85,440 | 32,721 | 31,613 | 3,980 | 3,846 | 28,740 | 27,768 |
| I-5: Los Angeles TOTAL | Urban | 39.36 | 39.81 | 0.45 | 720 339,166 | 8,280 1,851,561 | 123 59,552 | 1,414 | 1,677 | 19,286 2,378,430 | 1,272 598,970 | 2,691 601,757 | 217 105,169 | 460 91,273 | 2,962 718,291 | 6,268 772,990 |
| TOTAL | | | | + | 339,100 | 1,051,361 | 39,332 | 280,841 | 406,731 | 2,310,430 | 590,970 | 001,737 | 100,169 | 91,213 | 110,291 | 112,990 |
| I-5: Los Angeles | | 84.76 | 88.61 | 3.85 | 21,830 | 59,020 | 3,691 | 9,978 | 10,862 | 29,369 | 38,551 | 19,182 | 6,517 | 3,243 | 19,183 | 9,545 |
| I-5: Los Angeles | | 78.43 | 84.76 | 6.33 | 35,891 | 97,039 | 6,068 | 16,405 | 17,860 | 48,287 | 63,384 | 31,538 | 10,716 | 5,332 | 31,540 | 15,693 |
| I-5: Kern I-5: Los Angeles | Rural Rural | 15.86 68.1 | 87.03 69.65 | 71.17 1.55 | 175,434 6,185 | 429,511 26,366 | 35,667 1,046 | 87,323 4,457 | 139,767 3,077 | 342,188 13,120 | 309,818 10,922 | 139,591 8.569 | 62,989 1,846 | 28,380 1,449 | 246,830 5.435 | 111,211 4,264 |
| I-5: Los Angeles | | 69.65 | 78.43 | 8.78 | 33,188 | 151,192 | 5,611 | 25.560 | 16,515 | 75,234 | 58,611 | 49.137 | 9,909 | 8.307 | 29.165 | 24,451 |
| I-5: Los Angeles | | 65.43 | 68.1 | 2.67 | 10,093 | 45,977 | 1,706 | 7,773 | 5,022 | 22,879 | 17,824 | 14,943 | 3,013 | 2,526 | 8,869 | 7,436 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 20,714 | 94,366 | 3,502 | 15,953 | 10,308 | 46,957 | 36,582 | 30,669 | 6,185 | 5,185 | 18,203 | 15,261 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 148,860 | 347,340 | 53,743 | 125,401 | 95,117 | 221,939 | 262,888 | 112,886 | 94,911 | 40,755 | 167,977 | 72,130 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 60,120 | 140,280 | 20,821 | 48,583 | 39,299 | 91,697 | 106,173 | 45,591 | 36,770 | 15,789 | 69,402 | 29,802 |
| I-5: Kern I-5: Merced | Rural Rural | 7.04 | 9.28 32.45 | 2.24 32.45 | 12,096 56,463 | 28,224 138,237 | 2,207 21.974 | 5,150 53,798 | 5,857 62,721 | 13,666 153,558 | 21,362 99,714 | 9,173 44,927 | 3,898 38,806 | 1,674 17.484 | 10,343 110,765 | 4,441 49.906 |
| I-5: Merced I-5: Kern | Rural | 15.08 | 32.45 15.86 | 0.78 | 3,276 | 8,424 | 717 | 1,845 | 2,559 | 6,579 | 5,785 | 2,738 | 1,267 | 17,484 | 4,519 | 2,138 |
| I-5: Kern | | 10.35 | 15.08 | 4.73 | 23,839 | 61,301 | 4,350 | 11,185 | 11,543 | 29,682 | 42,100 | 19,923 | 7,682 | 3,635 | 20,385 | 9,647 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 5,393 | 13,867 | 984 | 2,530 | 2,611 | 6,714 | 9,524 | 4,507 | 1,738 | 822 | 4,611 | 2,182 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 3,175 | 8,165 | 579 | 1,490 | 1,537 | 3,953 | 5,607 | 2,654 | 1,023 | 484 | 2,715 | 1,285 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 5,292 | 13,608 | 966 | 2,483 | 2,562 | 6,589 | 9,346 | 4,423 | 1,705 | 807 | 4,525 | 2,141 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 24,091 | 61,949 | 4,396 | 11,304 | 11,665 | 29,996 | 42,545 | 20,133 | 7,763 | 3,674 | 20,600 | 9,749 |
| I-5: Kern | Rural | U . | 0.58 | 0.58 | 2,923 | 7,517 | 533 | 1,372 | 1,415 | 3,640 | 5,162 | 2,443 | 942 | 446 | 2,500 | 1,183 |
| I-5: Stanislaus I-5: San Joaquin | Rural Rural | n . | 28.06 11.8 | 28.06 11.8 | 31,427 9.204 | 80,813 26,196 | 12,231 2,464 | 31,450 7.013 | 34,910 19.012 | 89,769 54.111 | 55,501 16.254 | 26,264 8,514 | 21,599 4.351 | 10,221 2,279 | 61,652 33,575 | 29,175 17.586 |
| TOTAL | ivuidi | <u> </u> | 11.0 | 11.0 | 689.494 | 1,839,391 | 183,255 | 471.053 | 494.219 | 1,289,927 | 1.217.654 | 597.802 | 323.631 | 153.092 | 872.797 | 419.226 |

| TABLE T1b. TRAVEL T | IME COST - BA | SE CONDIT | ION - SI | EGMENTATION | | | | 5 | B : 0"5 | | | | | | | | |
|--------------------------------------|-------------------|----------------|----------------------|--------------|---|--------------------------|----------------------|------------------------------------|-------------------------|---|-------------------|--------------------------|----------------------------|------------------------|-------------------------|--------------------------|--|
| County | City/Suburban/R | Post | Post Mile of Segment | | Peak Period Vehicle-Hours of Trave One Direction | | | Period Vehicle-Hours One Direction | Daytime Off-Pea | ak Period Vehicle- el, One Direction | Б | eak eak | Travel Time C Nighttime | | Daytime (| Off-Peak | |
| County | ural | Begin | End | Length (mi) | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 16.1 | 289.8 | 2.0 | 20.7 | 28.9 | 302.5 | 456 | 2,653 | 56 | 189 | 818 | 2,770 | |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 102.0 | 1,832.6 | 8.3 | 87.1 | 75.6 | 790.3 | 2,884 | 16,779 | 236 | 797 | 2,138 | 7,236 | |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 50.8 | 541.0 | 8.6 | 63.5 | 122.0 | 897.7 | 1,437 940 | 4,953 | 244 108 | 582 423 | 3,451 | 8,218 | |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 22.28 46.6 | 22.78 46.9 | 0.5 | 33.3 28.8 | 552.2 316.9 | 3.8 2.9 | 46.2 26.9 | 53.9 17.9 | 651.3 164.7 | 940 815 | 5,056 2,902 | 108 | 423 246 | 1,525 507 | 5,963 1,508 | |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 58.8 | 410.0 | 9.6 | 58.5 | 133.6 | 813.1 | 1,663 | 3,754 | 272 | 536 | 3.779 | 7.444 | |
| I-5: Los Angeles | Urban | 46.9 | 52.33 | 5.43 | 560.4 | 5,043.4 | 57.6 | 471.4 | 359.4 | 2,940.6 | 15,844 | 46,175 | 1,629 | 4,316 | 10,162 | 26,923 | |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 9.0 | 101.2 | 1.3 | 14.0 | 9.9 | 103.7 | 254 | 927 | 38 | 128 | 281 | 950 | |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 30.6 | 338.8 | 2.2 | 22.7 | 45.0 | 470.5 | 866 | 3,102 | 61 | 208 | 1,273 | 4,308 | |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 1,979.5 | 9,506.2 | 152.5 | 664.6 214.1 | 1,270.3 | 5,537.3 | 55,970 | 87,034 | 4,311 | 6,084 | 35,918 | 50,697 | |
| CA 710: LA I-5: Los Angeles | Suburban Urban | 4.96 28.25 | 10.18 29.16 | 5.22 0.91 | 751.7 59.7 | 3,609.8 647.6 | 49.1 6.2 | 65.3 | 295.4 82.6 | 1,287.6 863.3 | 21,253 1,688 | 33,049 5,930 | 1,389 177 | 1,960 598 | 8,352 2,335 | 11,789 7,904 | |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 221.1 | 2,399,1 | 24.6 | 257.3 | 339.6 | 3,550,5 | 6,252 | 21.965 | 696 | 2.355 | 9,602 | 32.507 | |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 345.1 | 3,674.5 | 29.0 | 303.1 | 273.0 | 2,853.7 | 9,757 | 33,642 | 820 | 2,775 | 7,718 | 26,127 | |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 210.4 | 2,240.7 | 15.9 | 166.3 | 343.6 | 3,591.9 | 5,950 | 20,515 | 450 | 1,523 | 9,714 | 32,886 | |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 110.2 | 1,173.9 | 8.6 | 90.0 | 73.2 | 765.7 | 3,117 | 10,748 | 243 | 824 | 2,071 | 7,010 | |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 23.5 | 250.3 | 1.7 | 17.4 | 34.3 | 359.1 | 665 | 2,292 | 47 | 159 | 971 | 3,288 | |
| CA 710: Los Angeles TOTAL | Suburban | 10.18 | 12.97 | 2.79 | 468.7 5,059.9 | 2,440.1 35,368.3 | 30.8 414.9 | 145.6 2,734.7 | 187.9 3,746.4 | 888.0 26,831.6 | 13,253 143,065 | 22,340 323,815 | 871 11,730 | 1,333 25,037 | 5,314 105,926 | 8,130 245,65 7 | |
| IVIAL | | | | + | 3,033.3 | 33,300.3 | 717.3 | 2,134.1 | 3,140.4 | 20,031.0 | 1-5,005 | 323,013 | 11,730 | 25,037 | 103,920 | 2-13,037 | |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 209.8 | 2,233.6 | 29.3 | 305.8 | 202.6 | 2,118.0 | 5,931 | 20,449 | 827 | 2,800 | 5,728 | 19,391 | |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 363.8 | 4,393.4 | 41.8 | 505.5 | 589.9 | 7,125.2 | 10,285 | 40,224 | 1,183 | 4,628 | 16,680 | 65,235 | |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 119.0 | 973.9 | 14.8 | 120.9 | 116.9 | 956.4 | 3,365 | 8,916 | 418 | 1,107 | 3,305 | 8,756 | |
| I-5: Sacramento I-5: Sacramento | Urban Rural | 24.51 29.87 | 25.53 34.65 | 1.02 4.78 | 40.2 321.2 | 369.6 1,338.4 | 6.4 29.4 | 58.6 118.8 | 87.4 261.2 | 803.7 1,054.9 | 1,137 9,082 | 3,384 12,254 | 180 832 | 537 1,088 | 2,472 7,386 | 7,359 9,658 | |
| I-5: Sacramento | Urban | | 35.94 | 6.78 | 390.5 | 4,082.8 | 41.0 | 429.1 | 544.8 | 5,695.1 | 11,042 | 37,380 | 1,160 | 3,928 | 15,402 | 52,142 | |
| I-5: Los Angeles | Urban | | 46.6 | 0.67 | 71.6 | 585.5 | 7.3 | 59.5 | 44.5 | 363.7 | 2,023 | 5,360 | 205 | 544 | 1,257 | 3,330 | |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 79.8 | 733.3 | 8.8 | 81.0 | 60.8 | 559.0 | 2,256 | 6,714 | 249 | 741 | 1,719 | 5,118 | |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 15.2 | 159.2 | 1.7 | 17.7 | 23.4 | 244.6 | 431 | 1,458 | 48 | | 661 | 2,239 | |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 17.6 | 184.0 | 2.1 | 21.7 | 29.6 | 309.5 | 498 | 1,685 | 59 | | 837 | 2,834 | |
| I-5: Sacramento I-5: Sacramento | Urban Urban | 26.94 26.69 | 29.87 26.94 | 2.93 0.25 | 189.5 13.2 | 1,393.9 121.6 | 15.2 1.1 | 111.7 9.7 | 111.2 7.8 | 817.6 71.3 | 5,358 374 | 12,762 1,113 | 429 30 | 1,023 89 | 3,143 219 | 7,485 653 | |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 119.0 | 823.5 | 14.5 | 100.2 | 104.5 | 723.3 | 3,363 | 7,540 | 409 | 917 | 2,954 | 6,622 | |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 650.7 | 1,525.1 | 414.8 | 957.3 | 1,103.5 | 2,546.5 | 18,398 | 13,963 | 11,729 | 8,765 | 31,200 | 23,314 | |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 23.8 | 57.9 | 1.9 | 5.5 | 21.8 | 62.9 | 672 | 530 | 54 | 50 | 618 | 576 | |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 143.1 | 799.3 | 24.6 | 137.4 | 349.1 | 1,949.7 | 4,047 | 7,318 | 696 | 1,258 | 9,872 | 17,851 | |
| I-5: Los Angeles | Urban Rural | 40.27 11.8 | 41.6 12.69 | 1.33 0.89 | 44.0 97.2 | 404.9 212.8 | 13.7 15.9 | 125.6 34.7 | 222.4 81.3 | 2,121.2 178.0 | 1,245 2,748 | 3,707 1,948 | 386 449 | 1,150 318 | 6,288 2,299 | 19,421 1,630 | |
| I-5: San Joaquin I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1,087.8 | 2,381.7 | 121.5 | 265.9 | 966.4 | 2,115.7 | 30,758 | 21,805 | 3,434 | 2,435 | 27,324 | 19,371 | |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 60.1 | 491.4 | 10.7 | 87.9 | 154.8 | 1,266.5 | 1,698 | 4,499 | 304 | 804 | 4,377 | 11,596 | |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 1,093.9 | 2,817.0 | 88.2 | 227.1 | 1,005.7 | 2,589.9 | 30,929 | 25,791 | 2,494 | 2,079 | 28,435 | 23,712 | |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 75.3 | 420.3 | 11.9 | 66.7 | 163.7 | 914.0 | 2,128 | 3,848 | 338 | 611 | 4,628 | 8,368 | |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 424.8 | 1,222.9 | 47.4 | 136.5 | 377.4 | 1,086.4 | 12,011 | 11,196 | 1,341 | 1,250 | 10,670 | 9,946 | |
| I-5: Sacramento I-5: San Joaquin | Urban Rural | 16.7 40.45 | 18.82 49.79 | 2.12 9.34 | 89.0 412.5 | 497.2 1,004.7 | 14.1 129.8 | 78.9 316.1 | 193.6 578.6 | 1,081.3 1,409.3 | 2,518 11,662 | 4,552 9,199 | 399 3,669 | 722 2,894 | 5,475 16,359 | 9,900 12,903 | |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 15.9 | 146.1 | 2.6 | 24.1 | 35.3 | 324.4 | 449 | 1,338 | 74 | 2,094 | 998 | 2,970 | |
| I-5: Sacramento | Urban | | 19.16 | 0.34 | 15.4 | 86.1 | 2.9 | 15.9 | 41.7 | 232.9 | 436 | 789 | 81 | 146 | 1,179 | 2,132 | |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 214.5 | 469.6 | 30.2 | 66.1 | 295.9 | 647.7 | 6,065 | 4,300 | 853 | 605 | 8,365 | 5,930 | |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 370.6 | 1,496.5 | 45.1 | 182.0 | 325.5 | 1,314.5 | 10,477 | 13,701 | 1,274 | 1,667 | 9,203 | 12,035 | |
| I-5: Los Angeles TOTAL | Urban | 39.36 | 39.81 | 0.45 | 14.4 | 150.5 31,576.8 | 2.5 1,191.0 | 25.7 4,693.8 | 33.5 8,134.6 | 350.7 41,034.1 | 407 | 1,378 | 70 33,676 | 235 42,974 | 948 230,001 | 3,210 375,688 | |
| IUIAL | | | | + | 6,783.3 | 31,370.0 | 1,191.0 | 4,093.0 | 0,134.0 | 41,034.1 | 191,794 | 289,102 | 33,676 | 42,974 | 230,001 | 3/3,688 | |
| I-5: Los Angeles | Rural | 84.76 | 88.61 | 3.85 | 436.6 | 908.0 | 73.8 | 153.5 | 217.2 | 451.8 | 12,344 | 8,313 | 2,087 | 1,405 | 6,143 | 4,137 | |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 717.8 | 1,492.9 | 121.4 | 252.4 | 357.2 | 742.9 | 20,296 | 13,668 | 3,431 | 2,311 | 10,099 | 6,801 | |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 3,508.7 | 6,607.9 | 713.3 | 1,343.4 | 2,795.3 | 5,264.4 | 99,206 | 60,498 | 20,169 | 12,300 | 79,036 | 48,199 | |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 123.7 | 405.6 | 20.9 | 68.6 | 61.5 | 201.8 | 3,497 | 3,714 | 591 | 628 | 1,740 | 1,848 | |
| I-5: Los Angeles | Rural | 69.65 | 78.43 68.1 | 8.78 | 663.8 201.9 | 2,326.0 707.3 | 112.2 34.1 | 393.2 119.6 | 330.3 100.4 | 1,157.4 | 18,768 | 21,296 | 3,173 | 3,600 | 9,339 | 10,597 | |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 65.43 59.95 | 65.43 | 2.67 5.48 | 414.3 | 1,451.8 | 70.0 | 245.4 | 206.2 | 352.0 722.4 | 5,707 11,714 | 6,476 13,292 | 965 1,980 | 1,095 2,247 | 2,840 5,829 | 3,223 6,614 | |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 2,977.2 | 5,343.7 | 1,074.9 | 1,929.2 | 1,902.3 | 3,414.4 | 84,179 | 48,924 | 30,391 | 17,663 | 53,787 | 31,261 | |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 1,202.4 | 2,158.2 | 416.4 | 747.4 | 786.0 | 1,410.7 | 33,997 | 19,759 | 11,774 | 6,843 | 22,223 | 12,916 | |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 241.9 | 434.2 | 44.1 | 79.2 | 117.1 | 210.2 | 6,840 | 3,975 | 1,248 | 725 | 3,312 | 1,925 | |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 1,129.3 | 2,126.7 | 439.5 | 827.7 | 1,254.4 | 2,362.4 | 31,929 | 19,471 | 12,426 | 7,578 | 35,468 | 21,629 | |
| I-5: Kern | Rural | 15.08 10.35 | 15.86 15.08 | 0.78 4.73 | 65.5 476.8 | 129.6 943.1 | 14.3 87.0 | 28.4 172.1 | 51.2 230.9 | 101.2 456.6 | 1,853 13.481 | 1,187 8,634 | 406 2.460 | 260 1.576 | 1,447 6,527 | 927 4,181 | |
| I-5: Kern I-5: Kern | Rural Rural | 10.35 9.28 | 15.08 | 1.07 | 476.8 107.9 | 943.1 213.3 | 87.0 19.7 | 1/2.1 38.9 | 230.9 52.2 | 456.6 103.3 | 13,481 3,050 | 8,634 1,953 | 2,460 556 | 1,576 356 | 6,527 1,477 | 4,18 | |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 63.5 | 125.6 | 11.6 | 22.9 | 30.7 | 60.8 | 1,796 | 1,955 | 328 | 210 | 869 | 55 | |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 105.8 | 209.4 | 19.3 | 38.2 | 51.2 | 101.4 | 2,993 | 1,917 | 546 | 350 | 1,449 | 92 | |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 481.8 | 953.1 | 87.9 | 173.9 | 233.3 | 461.5 | 13,623 | 8,726 | 2,486 | 1,592 | 6,596 | 4,22 | |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 58.5 | 115.6 | 10.7 | 21.1 | 28.3 | 56.0 | 1,653 | 1,059 | 302 | 193 | 800 | 51 | |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 628.5 | 1,243.3 | 244.6 | 483.8 | 698.2 | 1,381.1 | 17,772 | 11,383 | 6,916 | 4,430 | 19,741 | 12,64 | |
| I-5: San Joaquin | Rural | U | 11.8 | 11.8 | 184.1 | 403.0 | 49.3 | 107.9 | 380.2 | 832.5 | 5,205 | 3,690 | 1,393 | 988 | 10,751 | 7,62 | |
| TOTAL | | | | | 13,789.9 | 28,298.3 | 3,665.1 | 7,247.0 | 9,884.4 | 19,845.0 | 389,901 | 259,086 | 103,629 | 66,350 | 279,475 | 181,69 | |

TABLE T2a. VEHICLE OPERATING COSTS - CONVENTIONAL LANES WITH ADDED LANE - BASED ON VOLUME Daytime Off-Peak Period Vehicle Nighttime Off-Peak Other Vehicle-Vehicle Operating Costs (\$) Peak Period Vehicle-Miles of City/Suburban Post Mile of Segment Travel, One Direction Miles of Travel, One Direction Miles of Travel, One Direction Peak Nighttime Off-Peak Daytime Off-Peak County Rural Begin End Length (m Truck Other Truck Other Truck Other Truck Other Truck Other Truck Other Urban 36.43 9,274 99 1,137 1,447 16,637 1,424 5,40 I-5: Los Angeles 36.22 806 I-5: Los Angeles Urban 21.41 0.83 5.100 58,644 417 4,790 3,780 43,469 9,00 19,059 736 1.557 6,675 14,12 I-5: Sacramento Urban 20.559 432 3,495 6.102 4,487 763 1.136 10.776 16,046 6.682 Urhan 22 28 22.78 0.5 1.663 22 088 191 2 541 2 696 35.821 2 936 7.178 338 826 11.642 I-5: Los Angeles 4 762 I-5: Los Angeles Urban 46.6 46.9 1.442 14,578 146 1,481 896 9.057 2,546 4,738 259 481 1.582 2,944 5 19 6.396 1 046 I-5: Sacramento Urhan 5 53 26.69 1 16 2 941 19 679 481 3 219 6 682 44 718 849 11 801 14 53 I-5: Los Angeles Urban 46.9 52.33 5.43 28,019 252,169 2,881 25,927 17,970 161,734 49,482 81,955 5,087 8,426 31,736 52,564 Urban .11 449 771 496 793 1,677 118 876 1,85 I-5: Los Angeles 5,161 67 5,706 251 17,620 406 Urban 3 78 14.16 1,532 109 1,249 25,880 2,706 192 3,974 8,411 38 2.250 5.726 I-5: Los Angeles CA 710: Los Angeles 98,976 560.864 7.623 43.196 359.925 174.79 182,281 13,462 14,039 116.97 Suburban 2.97 23.28 63.516 112.170 CA 710: LA Suburban 4.96 10.18 5.22 37,584 212,976 2,456 13.917 14.770 83,697 66,374 69,217 4,337 4,523 26,084 27,201 I-5: Los Angeles Urban 28 25 29.16 91 2.985 34.325 312 3.590 4.129 47,479 5,27 11.156 551 1.167 7,291 15.43 l-5: Los Angeles Urban 2.71 14,149 16,981 41,325 2,173 4,598 63,466 I-5: Los Angeles Urban 17.21 20.58 3.37 17,254 198,426 1,450 16,671 13,648 156,951 30,47 64,488 2,560 5.418 24,102 51,009 Urban 10.522 120,998 18.58 1.405 I-5: Los Angeles 4.16 16.9 2.74 796 9.149 17,179 197,556 39.324 2.973 30.338 64.20 5.512 430 9.73 63.392 4.949 3.662 42.114 20.602 760 1.609 6.467 13.68 I-5: Los Angeles Urhan 21 41 3 87 17.21 0.31 1 176 13.518 83 956 1.717 19.750 2.076 4.394 147 311 3.033 6 419 I-5: Los Angeles Urban 16.9 CA 710: Los Angele: Suburban 0.18 12.97 2.79 23,436 143,964 1,540 9,461 9.397 57,722 41.38 46.78 2,720 3.075 16,594 18,760 252,993 1,552,868 52,211 TOTAL 1.895.389 20.743 160.649 187,318 446.788 616,001 36.632 330,806 504,682 I-5: Los Angeles Urhan 41.6 43.9 10.488 120,612 1,463 16,821 10,129 116,487 18.522 39.199 2.583 5,467 17.889 37,858 I-5: Los Angeles Urban 22.78 28.25 5 47 18 188 241,637 2,092 27,800 29,497 391,886 32,120 78.532 3,695 9,035 52,092 127,36 5 951 53.563 739 6,650 5.845 52,602 10,510 17,408 1,305 2,161 10,322 17.09 I-5: Los Angeles Urban 44.01 45.1 1.09 3,55 I-5: Sacramento 25.53 2,010 20,328 319 3,225 4,372 44,206 6,606 563 1,048 7,72 14,36 Urban 24.51 Rural 4.78 16,061 84,319 1,471 7,722 13,060 28,364 27,404 2,510 23,065 22,284 I-5: Sacramento 9.87 34.65 68,567 224.554 2.052 23.599 27.238 7.670 101.800 I-5: Los Angeles Urban 29.16 35.94 6.78 19.526 313,231 34,484 72,980 3.624 48,102 363 I-5: Los Angeles Urhan 45 93 46.6 67 3.578 32,200 3.270 2.223 20.006 6.31 10.465 642 1.063 3.926 6.50 3 989 40.333 440 4 452 3 041 30 745 7.045 13 108 778 1 447 5.370 9.992 I-5: Los Angeles Urban 45.1 45.93 0.83 I-5: Los Angeles Urban 35 94 36.22 0.28 762 8,758 85 975 1,170 13,451 1.345 2.846 150 317 2,066 4,372 Urban 880 104 1,191 1,480 1,554 183 387 5,53 I-5: Los Angeles 36 43 36.65 0.22 I-5: Sacramento 9,476 76,666 759 6,143 5,558 44,968 16,734 24,917 1,341 1,997 9,815 14,614 Urban 26.94 29.87 2.93 53 536 388 3 923 662 6 689 1 168 174 685 1 275 I-5: Sacramento Urhan 26 69 26 94 25 2 174 I-5: Los Angeles Rural 52.33 54.16 1.83 5.947 53.528 723 6.511 5.224 47.016 10.50 17.396 1.278 2.116 9.226 15.280 20,742 14.46 14.46 32,535 97,605 57,457 36,630 53,794 I-5: Sacramento Rural 62,226 55,173 165,519 31,722 20,223 97,436 8 34 28.56 96 1,092 3,459 2,09 -5: San Joaquin Urban).22 1.22 1.92 1.12 I-5: Sacramento Urban 19.16 .84 7,157 43,963 1,230 7,557 17,457 107,236 12,63 14,288 2,173 2,456 30,829 34,85 I-5: Los Angeles Urban 40.27 41.6 1.33 2,202 22,270 683 6,910 11.119 112,425 3,89 7,238 1,207 2,246 19,63 36,53 I-5: San Joaquin Rural 11 8 12 69 0.89 4 859 13 831 794 2 259 4.066 11 572 8 583 4 495 1 402 734 7 180 3 761 I-5: San Joaquin Rural 14.34 24.8 10.46 54,392 154,808 6,073 17,284 48,319 137,524 96,057 50,313 10,725 5,617 85,332 44,695 I-5: Sacramento Urban 23.1 24 51 1 //1 3,003 27,030 537 4.833 7,740 69.658 5.30 8.785 948 1.571 13.668 22,63 14.763 I-5: San Joaquin Rural 28.56 40.45 11.89 54,694 183,106 4.410 50,284 168,343 96.59 59,509 7.788 4.798 88.802 54.71 Urban 14.46 3,763 23,117 597 3,668 8,184 6,646 7,513 1,055 1,192 14,452 16,338 I-5: Sacramento 16.7 2.24 50,271 21.240 I-5: San Joaquin Urban 24.8 28.34 3.54 67.260 2.371 7.510 18.869 59.750 37.51 21.860 4.188 2.441 33.322 19,419 I-5: Sacramento Urban 16.7 18 82 4 452 27.348 706 4 339 9.682 59,473 7.86 8 888 1 248 1 410 17 098 19 32 40.45 49.79 9.34 20,623 65,305 6,489 20,547 28,929 91.607 36,420 21,224 11.459 51.088 29,772 I-5: San Joaquir Rural 6,678 795 8,037 131 1,328 1,765 17,844 1,404 2,612 232 432 3,117 5,799 I-5: Los Angeles Urban 40.27 0.46 771 143 877 2,085 1,36 1,539 3,682 4,162 Urban 19 16 34 I-5: Sacramento I-5: San Joaquin Rural 12.69 14.34 1.65 10,725 30,525 1.509 4.294 14.793 42.104 18.940 9.921 2,665 1.396 26,125 13,684 2,254 123 11 832 85 440 I-5: Los Angeles Rural 54.16 59.95 5.79 18 528 97.272 16 274 32 72 31.613 3 980 3 846 28 740 27 76 8.280 1.414 1.677 19.286 1.27 2,691 217 6.26 720 2.962 I-5: Los Angeles Urban 9.36 39 81 1 45 460 339,166 1.851.561 59,552 280,841 406,731 2,378,430 598,970 601,757 105,169 91,273 718,291 772,990 TOTAL 38,55 Rural 21,830 59,020 3,691 9.978 10,862 29,369 19,182 6.517 3,243 19.183 9.545 I-5: Los Angeles 84.76 88.6 3.85 35.891 97.039 6.068 16,405 17.860 48,287 63.384 31.538 10.716 5.332 31.540 15.69 I-5: Los Angeles Rural 78.43 84.76 6.33 I-5: Kern Rural 15.86 87 03 175 434 429 511 35 667 87 323 139 767 342 188 309.81 139 591 62 989 28.380 246 830 111 211 Rural 1.55 6,185 26,366 1,046 4,457 3,077 13,120 10,922 8,569 1,846 1,449 5,435 4,264 I-5: Los Angeles 68.1 69.65 Rural 3.78 33,188 151,192 5,611 25,560 16,515 75,234 58.61 49.13 9.909 8 307 29.165 24,45 I-5: Los Angeles Rural 35.43 68.1 2.67 10,093 45,977 1,706 7,773 5,022 22,879 17,82 14,943 3,013 2,526 8,869 7,436 I-5: Los Angeles I-5: Los Angeles Rural 9.95 65.43 5.48 20,714 94.366 3.502 15,953 10,308 46.957 36,582 30.669 6,185 5,185 18.203 15,261 53.743 148,860 347,340 125,401 95,117 221.939 94,911 40.755 167,977 72.130 262.88 112.886 I-5: Fresno Rural 66.16 66.16 39,299 15,789 29.80 60.120 140.280 20.821 48.583 91.697 106.17 45.591 36.770 69.402 I-5: Kinas Rural 26.72 26.72 12,096 5,857 4,441 I-5: Kern Rural 9.28 2.24 28,224 2,207 5,150 13,666 21,36 9,173 3,898 1,674 10,343 I-5: Merced Rural 32.45 32.45 56,463 138,237 21,974 53,798 62,721 153,558 99,714 44,927 38,806 17,484 110,765 49,906 Rural 3,276 717 5,78 I-5: Kern 15.86 0.78 8,424 1.845 2.559 6.579 2.73 1.267 4.51 2.13 Rural 15.08 23,839 61,301 4,350 11,185 11,543 19,923 3,635 9,647 I-5: Kern 4.73 29.682 42,100 7.682 20.385 984 2,182 I-5: Kern Rural 28 10.35 1 07 5.393 13.867 2.530 2.611 6.714 9.52 4.507 1.738 822 4.61 579 1 490 1.537 3 175 8 165 3 953 5 607 2 654 1.023 484 1 285 I-5: Kern Rural 6.41 7.04 0.63 2 715 I-5: Kern Rural 6 41 1 05 5,292 13,608 966 2,483 2,562 6,589 9,346 4.42 1.705 807 4.525 2,141 24,091 61,949 4,396 11,304 42,545 20,13 7,763 3,674 9,749 I-5: Kern Rural 5.36 4.78 29,996 20,60 7,517 533 1,372 1,415 5,162 2,443 942 446 1,183 I-5: Kern Rural 0.58 0.58 2,923 3,640 2.500 21,599 29,175 31,427 80,813 12,231 31,450 34,910 89,769 26,264 10,221 61,652 28.06 I-5: Stanislaus Rural 28.0 I-5: San Joaquin Rural 11.8 11.8 9.204 26.196 2.464 7.013 19.012 54.111 16.254 8.514 4.351 2.279 33.575 17.586 TOTAL 689.494 1.839.391 183.255 471.053 494.219 1.289.927 1 217 654 597.802 323.631 153.092 872.797 419.226

TABLE T2b. TRAVEL TIME COST - CONVENTIONAL LANES WITH ADDED LANE - BASED ON VOLUME

| TABLE T2b. TRAVEL 1 | TIME COST - CO | NVENTIONAL | LANES WITI | H ADDED LAN | | | Nighttime Off Deals | Daviad Vahiala Haura of | Doutime Off Book Bo | riad Vahiala Haura of | | | Travel Tim | | | |
|--------------------------------------|-------------------|----------------|-----------------|---------------|-----------------|---------------------------------|---------------------|---|------------------------------------|--------------------------|-----------------|--------------------------|---------------|---------------------------|-------------------------|-----------------|
| County | City/Suburban/ | Pos | st Mile of Segr | nent | | ehicle-Hours of ne Direction | | Period Vehicle-Hours of ne Direction | Daytime Off-Peak Pe Travel, One | | P | 'eak | Nighttime | ne Costs (\$) Off-Peak | Daytime (| Off-Peak |
| - | Rural | Begin | End | Length (mi) | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 16.1 | 175.0 | 2.0 | 20.7 | 28.9 | 302.5 | 456 | 1,602 | 56 | 189 | 818 | 2,770 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 102.0 | 1,106.5 | 8.3 | 87.1 | 75.6 | 790.3 | 2,884 | 10,131 | 236 | 797 | 2,138 | 7,236 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 50.8 | 373.8 | 8.6 | 63.5 | 122.0 | 897.7 | 1,437 | 3,422 | 244 | 582 | 3,451 | 8,218 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 22.28 46.6 | 22.78 46.9 | 0.5 | 33.3 28.8 | 401.6 265.1 | 3.8 2.9 | 46.2 26.9 | 53.9 17.9 | 651.3 164.7 | 940 815 | 3,677 2,427 | 108 83 | 423 246 | 1,525 507 | 5,963 1,508 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 58.8 | 357.8 | 9.6 | 58.5 | 133.6 | 813.1 | 1,663 | 3,276 | 272 | 536 | 3,779 | 7,444 |
| I-5: Los Angeles | Urban | 46.9 | 52.33 | 5.43 | 560.4 | 4,584.9 | 57.6 | 471.4 | 359.4 | 2,940.6 | 15,844 | 41,977 | 1,629 | 4,316 | 10,162 | 26,923 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 9.0 | 93.8 | 1.3 | 14.0 | 9.9 | 103.7 | 254 | 859 | 38 | 128 | 281 | 950 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 30.6 | 320.4 | 2.2 | 22.7 | 45.0 | 470.5 | 866 | 2,933 | 61 | 208 | 1,273 | 4,308 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 1,979.5 | 8,628.7 | 152.5 | 785.4 | 1,270.3 | 5,537.3 | 55,970 | 79,000 | 4,311 | 7,191 | 35,918 | 50,697 |
| CA 710: LA I-5: Los Angeles | Suburban Urban | 4.96 28.25 | 10.18 29.16 | 5.22 0.91 | 751.7 59.7 | 3,276.6 624.1 | 49.1 6.2 | 253.0 65.3 | 295.4 82.6 | 1,287.6 863.3 | 21,253 1,688 | 29,999 5,714 | 1,389 177 | 2,317 598 | 8,352 2,335 | 11,789 7,904 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 221.1 | 2.311.9 | 24.6 | 257.3 | 339.6 | 3,550.5 | 6,252 | 21.166 | 696 | 2.355 | 9,602 | 32,507 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 345.1 | 3,607.7 | 29.0 | 303.1 | 273.0 | 2,853.7 | 9,757 | 33,031 | 820 | 2,775 | 7,718 | 26,127 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 210.4 | 2,200.0 | 15.9 | 166.3 | 343.6 | 3,591.9 | 5,950 | 20,142 | 450 | 1,523 | 9,714 | 32,886 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 110.2 | 1,152.6 | 8.6 | 90.0 | 73.2 | 765.7 | 3,117 | 10,552 | 243 | 824 | 2,071 | 7,010 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 23.5 | 245.8 | 1.7 | 17.4 | 34.3 | 359.1 | 665 | 2,250 | 47 | 159 | 971 | 3,288 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 468.7 | 2,214.8 31.940.9 | 30.8 414.9 | 172.0 | 187.9 3.746.4 | 888.0 26.831.6 | 13,253 | 20,278 292.436 | 871 11.730 | 1,575 | 5,314 105.926 | 8,130 |
| TOTAL | | | - | | 5,059.9 | 31,940.9 | 414.9 | 2,920.9 | 3,746.4 | 26,831.6 | 143,065 | 292,436 | 11,730 | 26,742 | 105,926 | 245,657 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 209.8 | 2.192.9 | 29.3 | 305.8 | 202.6 | 2.118.0 | 5,931 | 20.078 | 827 | 2.800 | 5,728 | 19,391 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 363.8 | 4,393.4 | 41.8 | 505.5 | 589.9 | 7,125.2 | 10,285 | 40,224 | 1,183 | 4,628 | 16,680 | 65,235 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 119.0 | 973.9 | 14.8 | 120.9 | 116.9 | 956.4 | 3,365 | 8,916 | 418 | 1,107 | 3,305 | 8,756 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 40.2 | 369.6 | 6.4 | 58.6 | 87.4 | 803.7 | 1,137 | 3,384 | 180 | | 2,472 | 7,359 |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 321.2 | 1,297.2 | 29.4 | 118.8 | 261.2 | 1,054.9 | 9,082 | 11,877 | 832 | | 7,386 | 9,658 |
| I-5: Los Angeles | Urban Urban | 29.16 45.93 | 35.94 46.6 | 6.78 0.67 | 390.5 71.6 | 4,082.8 585.5 | 41.0 7.3 | 429.1 59.5 | 544.8 44.5 | 5,695.1 363.7 | 11,042 2,023 | 37,380 | 1,160 205 | 3,928 | 15,402 1,257 | 52,142 3,330 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 45.93 | 45.93 | 0.83 | 79.8 | 733.3 | 8.8 | 81.0 | 60.8 | 559.0 | 2,023 | 5,360 6,714 | 249 | 544 741 | 1,719 | 5,118 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 15.2 | 159.2 | 1.7 | 17.7 | 23.4 | 244.6 | 431 | 1,458 | 48 | | 661 | 2,239 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 17.6 | 184.0 | 2.1 | 21.7 | 29.6 | 309.5 | 498 | 1,685 | 59 | 198 | 837 | 2,834 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 189.5 | 1,393.9 | 15.2 | 111.7 | 111.2 | 817.6 | 5,358 | 12,762 | 429 | 1,023 | 3,143 | 7,485 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 13.2 | 121.6 | 1.1 | 9.7 | 7.8 | 71.3 | 374 | 1,113 | 30 | | 219 | 653 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 119.0 | 823.5 | 14.5 | 100.2 | 104.5 | 723.3 | 3,363 | 7,540 13,748 | 409 | 917 | 2,954 | 6,622 |
| I-5: Sacramento I-5: San Joaquin | Rural Urban | 28.34 | 14.46 28.56 | 14.46 0.22 | 650.7 23.8 | 1,501.6 68.4 | 414.8 1.9 | 957.3 5.5 | 1,103.5 21.8 | 2,546.5 62.9 | 18,398 672 | 13,748 | 11,729 54 | 8,765 50 | 31,200 618 | 23,314 576 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 143.1 | 799.3 | 24.6 | 137.4 | 349.1 | 1,949.7 | 4.047 | 7.318 | 696 | 1.258 | 9.872 | 17.851 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 44.0 | 404.9 | 13.7 | 125.6 | 222.4 | 2.044.1 | 1,245 | 3,707 | 386 | 1,150 | 6,288 | 18,715 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 97.2 | 212.8 | 15.9 | 34.7 | 81.3 | 178.0 | 2,748 | 1,948 | 449 | 318 | 2,299 | 1,630 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1,087.8 | 2,381.7 | 121.5 | 265.9 | 966.4 | 2,115.7 | 30,758 | 21,805 | 3,434 | 2,435 | 27,324 | 19,371 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 60.1 | 491.4 | 10.7 | 87.9 | 154.8 | 1,266.5 | 1,698 | 4,499 | 304 | 804 | 4,377 | 11,596 |
| I-5: San Joaquin I-5: Sacramento | Rural Urban | 28.56 14.46 | 40.45 16.7 | 11.89 2.24 | 1,093.9 75.3 | 2,817.0 420.3 | 88.2 11.9 | 227.1 66.7 | 1,005.7 163.7 | 2,589.9 914.0 | 30,929 2,128 | 25,791 3.848 | 2,494 338 | 2,079 611 | 28,435 4,628 | 23,712 8.368 |
| I-5: Sacramento | Urban | 24.8 | 28.34 | 3.54 | 75.3 424.8 | 1,222.9 | 47.4 | 136.5 | 377.4 | 1.086.4 | 12.011 | 3,848 11.196 | 1.341 | 1,250 | 10.670 | 9,946 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 89.0 | 497.2 | 14.1 | 78.9 | 193.6 | 1,081.3 | 2,518 | 4.552 | 399 | 722 | 5.475 | 9,900 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 412.5 | 1,004.7 | 129.8 | 316.1 | 578.6 | 1,409.3 | 11,662 | 9,199 | 3,669 | 2,894 | 16,359 | 12,903 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 15.9 | 146.1 | 2.6 | 24.1 | 35.3 | 324.4 | 449 | 1,338 | 74 | 221 | 998 | 2,970 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 15.4 | 86.1 | 2.9 | 15.9 | 41.7 | 232.9 | 436 | 789 | 81 | 146 | 1,179 | 2,132 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 214.5 | 469.6 | 30.2 | 66.1 | 295.9 | 647.7 | 6,065 | 4,300 | 853 | 605 | 8,365 | 5,930 |
| I-5: Los Angeles I-5: Los Angeles | Rural Urban | 54.16 39.36 | 59.95 39.81 | 5.79 0.45 | 370.6 14.4 | 1,496.5 150.5 | 45.1 2.5 | 182.0 25.7 | 325.5 33.5 | 1,314.5 350.7 | 10,477 407 | 13,701 1,378 | 1,274 70 | 1,667 235 | 9,203 948 | 12,035 3,210 |
| TOTAL | Olbali | 33.30 | 35.01 | 0.43 | 6,783.3 | 31,482.1 | 1,191.0 | 4,693.8 | 8,134.6 | 40,956.9 | 191,794 | 288,235 | 33,676 | 42,974 | 230,001 | 374,982 |
| | İ | | | | | , | ., | ., | -, | , | , 1 0 4 | | | ,014 | | |
| I-5: Los Angeles | Rural | 84.76 | 88.61 | 3.85 | 436.6 | 908.0 | 73.8 | 153.5 | 217.2 | 451.8 | 12,344 | 8,313 | 2,087 | 1,405 | 6,143 | 4,137 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 717.8 | 1,492.9 | 121.4 | 252.4 | 357.2 | 742.9 | 20,296 | 13,668 | 3,431 | 2,311 | 10,099 | 6,801 |
| I-5: Kem | Rural | 15.86 | 87.03 | 71.17 | 3,508.7 | 6,607.9 | 713.3 | 1,343.4 | 2,795.3 | 5,264.4 | 99,206 | 60,498 | 20,169 | 12,300 | 79,036 | 48,199 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 68.1 69.65 | 69.65 78.43 | 1.55 8.78 | 123.7 663.8 | 405.6 2,326.0 | 20.9 112.2 | 68.6 393.2 | 61.5 330.3 | 201.8 1,157.4 | 3,497 18,768 | 3,714 21,296 | 591 3,173 | 628 3,600 | 1,740 9,339 | 1,848 10,597 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 201.9 | 707.3 | 34.1 | 119.6 | 100.4 | 352.0 | 5,707 | 6,476 | 965 | 1,095 | 2,840 | 3,223 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 414.3 | 1,451.8 | 70.0 | 245.4 | 206.2 | 722.4 | 11,714 | 13,292 | 1,980 | 2,247 | 5,829 | 6,614 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 2,977.2 | 5,343.7 | 1,074.9 | 1,929.2 | 1,902.3 | 3,414.4 | 84,179 | 48,924 | 30,391 | 17,663 | 53,787 | 31,26 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 1,202.4 | 2,158.2 | 416.4 | 747.4 | 786.0 | 1,410.7 | 33,997 | 19,759 | 11,774 | 6,843 | 22,223 | 12,916 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 241.9 | 434.2 | 44.1 | 79.2 | 117.1 | 210.2 | 6,840 | 3,975 | 1,248 | 725 | 3,312 | 1,925 |
| I-5: Merced I-5: Kern | Rural | 15.08 | 32.45 | 32.45 | 1,129.3 | 2,126.7 | 439.5 14.3 | 827.7 | 1,254.4 | 2,362.4 101.2 | 31,929 1.853 | 19,471 1,187 | 12,426 406 | 7,578 | 35,468 1.447 | 21,629 |
| I-5: Kern I-5: Kern | Rural Rural | 15.08 | 15.86 15.08 | 0.78 4.73 | 65.5 476.8 | 129.6 943.1 | 14.3 87.0 | 28.4 172.1 | 51.2 230.9 | 101.2 456.6 | 1,853 13,481 | 1,187 8.634 | 406 2.460 | 260 1.576 | 1,447 6,527 | 927 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 107.9 | 213.3 | 19.7 | 38.9 | 52.2 | 103.3 | 3,050 | 1,953 | 2,460 556 | 356 | 1,477 | 4,18 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 63.5 | 125.6 | 11.6 | 22.9 | 30.7 | 60.8 | 1,796 | 1,150 | 328 | 210 | 869 | 55 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 105.8 | 209.4 | 19.3 | 38.2 | 51.2 | 101.4 | 2,993 | 1,917 | 546 | 350 | 1,449 | 92 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 481.8 | 953.1 | 87.9 | 173.9 | 233.3 | 461.5 | 13,623 | 8,726 | 2,486 | 1,592 | 6,596 | 4,225 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 58.5 | 115.6 | 10.7 | 21.1 | 28.3 | 56.0 | 1,653 | 1,059 | 302 | 193 | 800 | 513 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 628.5 | 1,243.3 | 244.6 | 483.8 | 698.2 | 1,381.1 | 17,772 | 11,383 | 6,916 | 4,430 | 19,741 | 12,644 |
| I-5: San Joaquin | Rural | U | 11.8 | 11.8 | 184.1 | 403.0 | 49.3 | 107.9 | 380.2 | 832.5 | 5,205 | 3,690 | 1,393 | 988 | 10,751 | 7,622 |
| TOTAL | | | | 1 | 13,789.9 | 28,298.3 | 3,665.1 | 7,247.0 | 9,884.4 | 19,845.0 | 389,901 | 259,086 | 103,629 | 66,350 | 279,475 | 181,692 |

APPENDIX U

AHS PLANNING, DESIGN, CONSTRUCTION, AND REHABILITATION COSTS AT VARIOUS VOLUMES

Introduction

This appendix shows supporting tables for the calculation of incremental planning, design, construction, and rehabilitation costs for the AHS system for low-, medium-, and high-volume traffic conditions (these traffic conditions are described in Appendix S). The incremental cost is the cost of building and maintaining the AHS above the no-build option.

Methodologies

Sorting methodologies for the tables in this appendix are identical to those presented in Appendix S. Calculation methodologies for the tables shown here are identical to those for calculation of the corresponding costs for the added-conventional-freeway-lane scenario at base volumes, which is presented in the main report. Values were summed for the low-, medium-, and high-volume conditions to determine a total cost for each type of segment.

Results

The costs at low, medium, and high volume levels are shown in Table U1 and U2 for the AHS incremental construction costs (these include planning and design costs, implicitly) and rehabilitation costs, respectively.

| LS. Los Angeles LS: Los Angeles | Urban 2 Urban 2 Urban 4 Urban 2 Urban 2 Urban 4 Urban 4 Urban 4 Urban 4 Urban 4 Urban 1 Urban 1 | Begin 36.22 20.58 22 22.28 46.6 25.53 47.13 | 36.43 21.41 23.1 22.78 | Length (mi) 0.21 0.83 1.10 | 4 | AHS Lane Placement | 2001-Unit Cost | New Freeway Costs (\$ | FUAC | Mag 2001-Unit Cost per | netic Strip Costs (| | # of Barriers in | Barrier C | | | Total Construct | |
|--|--|--|---------------------------------|-------------------------------------|--|--------------------------|--|-----------------------------|-------------------------|---------------------------|----------------------------|-------------------------|--|------------------|-------------------------|-----------------------------|---------------------------|-------------------------|
| I-5: Los Angeles I-5: Los Angeles I-5: Sacramento I-5: Los Angeles I-5: Sacramento I-5: Los Angeles I-5: Sacramento I-5: Sacramento I-5: Los Angeles | Urban 2 Urban 2 Urban 2 Urban 2 Urban 2 Urban 4 Urban 4 Urban 4 Urban 4 Urban 4 Urban 4 Urban 1 Suburban 1 | 36.22 20.58 22 22.28 46.6 25.53 47.13 | 36.43 21.41 23.1 22.78 | 0.21 0.83 | in One Direction | | | | | | nor | | # 01 Damers in | | | | T-4-1 C : | |
| I-S. Los Angeles I-S. Sacramento I-S. Los Angeles I-S. Los Ang | Urban 2 Urban 2 Urban 4 Urban 2 Urban 2 Urban 2 Urban 4 Urban 4 Urban 4 Urban 4 Urban 4 Urban 5 Urban 1 | 36.22 20.58 22 22.28 46.6 25.53 47.13 | 36.43 21.41 23.1 22.78 | 0.21 0.83 | 4 | | | | EUAC | Lane Mile | Total Cost | EUAC | One Direction | per Lane Mile | Total Cost | EUAC | Total Cost | EUAC |
| I-S. Sacramento | Urban 2 Urban 4 Urban 2 Urban 2 Urban 4 Urban 4 Urban 4 Urban 4 Urban 4 Urban 4 Urban 1 Suburban 1 | 22 22.28 46.6 25.53 47.13 | 23.1 22.78 | | | Median | 6,394,500 | 1,342,845 | 97,556 | 5,000 | 1,050 | 76 | 1.5 | 94,776 | 29,854 | 2,169 | 1,373,749 | 99,80 |
| I-S: Los Angeles I-S: Los Angeles I-S: Los Angeles I-S: Sacramento I-S: Los Angeles I-S: Los Ang | Urban 2 Urban 4 Urban 2 Urban 4 Urban 4 Urban 4 Urban 4 Urban 1 Suburban 1 | 16.6 25.53 17.13 | 22.78 | | 4 | Non-Median | 23,979,375 | 19,902,881 | 1,445,923 | 5,000 | 4,150 | 301 | 2.0 | 94,776 | 157,328 | 11,430 | 20,064,359 | 1,457,654 |
| I-5: Los Angeles I-5: Sacramento I-5: Sacramento I-5: Los Angeles | Urban 4 Urban 2 Urban 4 Urban 4 Urban 4 Urban 1 Urban 1 Suburban 1 | 16.6 25.53 17.13 | | 0.50 | 4 | Non-Median Non-Median | 23,979,375 23,979,375 | 26,377,313 11,989,688 | 1,916,283 871,038 | 5,000 5,000 | 5,500 2,500 | 400 182 | | 94,776 94,776 | 208,507 94,776 | 15,148 6,885 | 26,591,320 12,086,964 | 1,931,830 878,105 |
| I-5: Los Angeles CA 710: Los Angeles I-5: Los Angeles | Urban 4 Urban 4 Urban 4 Urban 1 Suburban 1 | 17.13 | | 0.30 | 4 | Non-Median | 23,979,375 | 7,193,812 | 522,623 | 5,000 | 1,500 | 109 | | 94,776 | 56,866 | 4,131 | 7,252,178 | 526,863 |
| I-5: Los Angeles I-5: Los Angeles I-5: Los Angeles CA 710: Los Angeles S CA 710: LA S I-5: Los Angeles I-5: Los Angeles I-5: Los Angeles I-5: Los Angeles | Urban 4 Urban 4 Urban 1 Suburban 1 | | 26.69 | 1.16 | 3 | Non-Median | 23,979,375 | 27,816,075 | 2,020,808 | 5,000 | 5,800 | 421 | 2.0 | 94,776 | 219,880 | 15,974 | 28,041,755 | 2,037,203 |
| I-5: Los Angeles I-5: Los Angeles CA 710: Los Angeles S CA 710: LA S I-5: Los Angeles I-5: Los Angeles I-5: Los Angeles | Urban 4 Urban 1 Suburban 1 | | | 5.20 0.23 | 4 | Non-Median Non-Median | 23,979,375 23,979,375 | 124,692,750 5.515.256 | 9,058,793 400.677 | 5,000 5,000 | 26,000 1,150 | 1,889 | 2.0 | 94,776 94,776 | 985,670 43,597 | 71,608 3,167 | 125,704,420 5,560,003 | 9,132,289 |
| I-5: Los Angeles CA 710: Los Angeles S CA 710: LA S I-5: Los Angeles I-5: Los Angeles I-5: Los Angeles | Urban 1 Suburban 1 | 13.9 | 44.01 | 0.23 | 4 | Non-Median | 23,979,375 | 2,637,731 | 191,628 | 5,000 | 550 | 40 | | 94,776 | 20,851 | 1,515 | 2,659,132 | 193,183 |
| CA 710: LA S I-5: Los Angeles I-5: Los Angeles I-5: Los Angeles | | 13.78 | | 0.38 | 4 | Median | 6,394,500 | 2,429,910 | 176,530 | 5,000 | 1,900 | 138 | 1.5 | 94,776 | 54,022 | 3,925 | 2,485,832 | 180,593 |
| I-5: Los Angeles I-5: Los Angeles I-5: Los Angeles | Cubushan | 12.97 1.96 | 23.28 10.18 | 10.31 5.22 | 4 3 | Non-Median Non-Median | 15,473,870 15,473,870 | 159,535,602 80,773,602 | 11,590,088 5.868.114 | 5,000 5,000 | 51,550 26,100 | 3,745 1,896 | 2.0 | 94,776 94,776 | 1,954,281 989,461 | 141,976 71,883 | 161,541,433 81,789,164 | 11,735,809 5,941,894 |
| I-5: Los Angeles I-5: Los Angeles | | 28.25 | | 0.91 | 4 | Non-Median | 23.979.375 | 21.821.231 | 1.585.289 | 5,000 | 4.550 | 331 | 2.0 | 94,776 | 172,492 | 12,531 | 21,998,274 | 1,598,151 |
| | Urban 3 | 36.65 | 39.36 | 2.71 | 5 | Non-Median | 23,979,375 | 64,984,106 | 4,721,025 | 5,000 | 13,550 | 984 | 2.0 | 94,776 | 513,686 | 37,319 | 65,511,342 | 4,759,328 |
| | | 17.21 14.16 | | 3.37 2.74 | 4 | Non-Median Non-Median | 23,979,375 | 80,810,494 | 5,870,794 4,773,287 | 5,000 5,000 | 16,850 | 1,224 | | 94,776 94,776 | 638,790 | 46,407 | 81,466,134 | 5,918,426 |
| I-5: Los Angeles | | 14.16 | 22.28 | 0.87 | 5 | Non-Median | 23,979,375 | 65,703,488 20,862,056 | 1,515,606 | 5,000 | 13,700 4,350 | 995 316 | 2.0 | 94,776 | 519,372 164,910 | 37,732 11,981 | 66,236,560 21,031,316 | 4,812,014 1,527,902 |
| | Urban 1 | 16.9 | 17.21 | 0.31 | 4 | Median | 6,394,500 | 1,982,295 | 144,012 | 5,000 | 1,550 | 113 | 1.5 | 94,776 | 44,071 | 3,202 | 2,027,916 | 147,326 |
| | Suburban 1 | 10.18 | 12.01 | 2.79 | 4 | Non-Median | 15,473,870 | 43,172,098 | 3,136,406 | 5,000 | 13,950 | 1,013 | 2.0 | 94,776 | 528,850 | 38,420 | 43,714,898 | 3,175,840 |
| TOTAL | | | | 39.25 | | | | 769,543,233 | 55,906,478 | | 196,250 | 14,257 | | 1 | 7,397,267 | 537,403 | 777,136,750 | 56,458,139 |
| | | 11.6 | 43.9 | 2.30 | 5 | Non-Median | 23,979,375 | 55,152,562 | 4,006,774 | 5,000 | 11,500 | 835 | 2.0 | 94,776 | 435,970 | 31,673 | 55,600,032 | 4,039,282 |
| | - | 22.78 | | 5.47 | 5 | Non-Median | 23,979,375 | 131,167,181 | 9,529,153 | 5,000 | 27,350 | 1,987 | 2.0 | 94,776 | 1,036,849 | 75,326 | 132,231,381 | 9,606,466 |
| | | 14.01 24.51 | | 1.09 | 5 4 | Non-Median Non-Median | 23,979,375 23,979,375 | 26,137,519 24,458,963 | 1,898,862 1,776,917 | 5,000 5,000 | 5,450 5,100 | 396 371 | 2.0 | 94,776 94,776 | 206,612 193,343 | 15,010 14,046 | 26,349,580 24,657,406 | 1,914,268 |
| I-5: Sacramento | Rural 2 | 29.87 | | 4.78 | 2 | Median | 4,181,019 | 19,985,272 | 1,451,908 | 5,000 | 23,900 | 1,736 | 1.5 | 94,776 | 679,544 | 49,368 | 20,688,716 | 1,503,013 |
| | - | 29.16 | 00.0 | 6.78 | 4 | Non-Median | 23,979,375 | 162,580,163 | 11,811,272 | 5,000 | 33,900 | 2,463 | 2.0 | 94,776 | 1,285,163 | 93,366 | 163,899,225 | 11,907,100 |
| | | 15.93 15.1 | 46.6 45.93 | 0.67 | 5 5 | Non-Median Non-Median | 23,979,375 | 16,066,181 19,902,881 | 1,167,191 1 445 923 | 5,000 5,000 | 3,350 4,150 | 243 301 | 2.0 | 94,776 94,776 | 127,000 157,328 | 9,226 11,430 | 16,196,531 20,064,359 | 1,176,660 1,457,654 |
| | | 35.94 | | 0.03 | 4 | Non-Median | 23,979,375 | 6,714,225 | 487,781 | 5,000 | 1,400 | 102 | | 94,776 | 53,075 | 3,856 | 6,768,700 | 491,739 |
| | | 36.43 | 00.00 | 0.22 | 6 | Median | 6,394,500 | 1,406,790 | 102,202 | 5,000 | 1,100 | 80 | 1.5 | 94,776 | 31,276 | 2,272 | 1,439,166 | 104,554 |
| | | 26.94 | 29.87 26.94 | 2.93 0.25 | 3 | Median Non-Median | 6,394,500 23,979,375 | 18,735,885 5,994,844 | 1,361,142 435,519 | 5,000 5,000 | 14,650 1,250 | 1,064 91 | 1.5 2.0 | 94,776 94,776 | 416,541 47,388 | 30,261 3,443 | 19,167,076 6.043,482 | 1,392,467 439,052 |
| I-5: Los Angeles | Rural 5 | 52.33 | | 1.83 | 4 | Non-Median | 6,968,365 | 12,752,109 | 926,427 | 5,000 | 9,150 | 665 | 2.0 | 94,776 | 346,880 | 25,200 | 13,108,139 | 952,292 |
| | Rural (|) | 14.46 | 14.46 | 2 | Median | 4,181,019 | 60,457,538 | 4,392,174 | 5,000 | 72,300 | 5,253 | 1.5 | 94,776 | 2,055,691 | 149,344 | 62,585,530 | 4,546,771 |
| | | 28.34 19.16 | 28.56 | 0.22 2.84 | 3 4 | Non-Median Non-Median | 6,968,365 23,979,375 | 1,533,040 68,101,425 | 111,374 4,947,494 | 5,000 5,000 | 1,100 14,200 | 1,032 | 2.0 | 94,776 94,776 | 41,701 538,328 | 3,030 39,109 | 1,575,842 68,653,953 | 114,483 4,987,635 |
| | | 10.27 | | 1.33 | 3 | Non-Median | 23,979,375 | 31,892,569 | 2,316,960 | 5,000 | 6,650 | 483 | 2.0 | 94,776 | 252,104 | 18,315 | 32,151,323 | 2,335,759 |
| I-5: San Joaquin | Rural 1 | 11.8 | 12.69 | 0.89 | 3 | Median | 4,181,019 | 3,721,107 | 270,334 | 5,000 | 4,450 | 323 | 1.5 | 94,776 | 126,526 | 9,192 | 3,852,083 | 279,850 |
| I-5: San Joaquin I-5: Sacramento | | 14.34 | | 10.46 | 3 | Median Non-Median | 4,181,019 23,979,375 | 43,733,461 33,810,919 | 3,177,188 2,456,326 | 5,000 5,000 | 52,300 7.050 | 3,800 512 | 1.5 | 94,776 94,776 | 1,487,035 267,268 | 108,032 19,417 | 45,272,797 34.085.237 | 3,289,019 2,476,255 |
| I-5: San Joaquin | | 28.56 | | 11.89 | 3 | Median | 4,181,019 | 49,712,319 | 3,611,546 | 5,000 | 59,450 | 4,319 | 1.5 | 94,776 | 1,690,330 | 122,801 | 51,462,099 | 3,738,665 |
| I-5: Sacramento | Urban 1 | 14.46 | 16.7 | 2.24 | 3 | Median | 6,394,500 | 14,323,680 | 1,040,600 | 5,000 | 11,200 | 814 | 1.5 | 94,776 | 318,447 | 23,135 | 14,653,327 | 1,064,548 |
| | | 24.8 | 28.34 | 3.54 | 4 | Non-Median | 23,979,375 | 84,886,988 | 6,166,947 | 5,000 | 17,700 | 1,286 | 2.0 | 94,776 | 671,014 | 48,748 | 85,575,702 | 6,216,982 |
| I-5: Sacramento I-5: San Joaquin | | 16.7 10.45 | | 2.12 9.34 | 2 | Non-Median Median | 23,979,375 4,181,019 | 50,836,275 39,050,720 | 3,693,200 2,836,992 | 5,000 5,000 | 10,600 46,700 | 770 3,393 | 2.0 | 94,776 94,776 | 401,850 1,327,812 | 29,194 96,464 | 51,248,725 40,425,231 | 3,723,164 2,936,849 |
| | | 39.81 | | 0.46 | 4 | Non-Median | 23,979,375 | 11,030,513 | 801,355 | 5,000 | 2,300 | 167 | 2.0 | 94,776 | 87,194 | 6,335 | 11,120,006 | 807,856 |
| | | 18.82 | | 0.34 | 5 | Non-Median | 23,979,375 | 8,152,988 6,898,682 | 592,306 501.182 | 5,000 5,000 | 1,700 8,250 | 124 599 | | 94,776 94,776 | 64,448 234,571 | 4,682 17.041 | 8,219,135 7.141.502 | 597,111 518.822 |
| I-5: San Joaquin I-5: Los Angeles | | 12.69 54.16 | 14.34 59.95 | 1.65 5.79 | 5 4 | Median Non-Median | 4,181,019 6,968,365 | 6,898,682 40,346,836 | 2,931,154 | 5,000 | 28,950 | 2,103 | 1.5 | 94,776 | 1,097,506 | 79,733 | 7,141,502 41,473,292 | 3,012,989 |
| | | 39.36 | 39.81 | 0.45 | 5 | Non-Median | 23,979,375 | 10,790,719 | 783,934 | 5,000 | 2,250 | 163 | 2.0 | 94,776 | 85,298 | 6,197 | 10,878,267 | 790,294 |
| TOTAL | | | | 97.88 | | | | 1,060,334,350 | 77,032,136 | | 489,400 | 35,554 | | | 15,764,092 | 1,145,244 | 1,076,587,842 | 78,212,93 |
| I-5: Los Angeles | Rural 8 | 36.67 | 88.61 | 1.94 | 4 | Non-Median | 6,968,365 | 13,518,629 | 982,114 | 5,000 | 9,700 | 705 | 2.0 | 94,776 | 367,731 | 26,715 | 13,896,060 | 1,009,534 |
| I-5: Los Angeles | Rural 8 | 36.13 | 86.67 | 0.54 | 4 | Non-Median | 6,968,365 | 3,762,917 | 273,372 | 5,000 | 2,700 | 196 | 2.0 | 94,776 | 102,358 | 7,436 | 3,867,975 | 281,004 |
| I-5: Los Angeles | | 34.76 | | 1.37 | 4 | Non-Median | 6,968,365 | 9,546,661 | 693,554 | 5,000 | 6,850 | 498 | 2.0 | 94,776 | 259,686 | 18,866 | 9,813,197 | 712,918 |
| I-5: Los Angeles I-5: Kern | | 78.43 15.86 | | 6.33 71.17 | 2 | Median Median | 4,181,019 4,181,019 | 26,465,852 297,563,139 | 1,922,715 21,617,638 | 5,000 5,000 | 31,650 355,850 | 2,299 25,852 | 1.5 2 1.5 | 94,776 94,776 | 899,898 10,117,812 | 65,377 735,048 | 27,397,400 308,036,801 | 1,990,39° 22,378,53 |
| I-5: Los Angeles | | 88.1 | | 1.55 | 4 | Median | 4,181,019 | 6,480,580 | 470,807 | 5,000 | 7,750 | 25,652 | 1.5 | 94,776 | 220,354 | 16,008 | 6,708,684 | 487,379 |
| I-5: Los Angeles | Rural 6 | 9.65 | 78.43 | 8.78 | 4 | Non-Median | 6,968,365 | 61,182,248 | 4,444,824 | 5,000 | 43,900 | 3,189 | 2.0 | 94,776 | 1,664,267 | 120,907 | 62,890,415 | 4,568,920 |
| I-5: Los Angeles | Rural 6 | 55.43 | 68.1 | 2.67 | 4 | Non-Median | 6,968,365 | 18,605,536 | 1,351,672 | 5,000 | 13,350 | 970 | 2.0 | 94,776 | 506,104 | 36,768 | 19,124,989 | 1,389,410 |
| I-5: Los Angeles I-5: Fresno | Rural 5 | 59.95) | | 5.48 66.16 | 2 | Median Median | 4,181,019 4,181,019 | 22,911,985 276,616,232 | 1,664,531 20,095,868 | 5,000 5,000 | 27,400 330,800 | 1,991 24,032 | 1.5 | 94,776 94,776 | 779,059 9,405,570 | 56,598 683,304 | 23,718,444 286,352,603 | 1,723,119 20,803,20 |
| I-5: Kings | Rural (|) | 26.72 | 26.72 | 2 | Median | 4,181,019 | 111,716,834 | 8,116,106 | 5,000 | 133,600 | 9,706 | 1.5 | 94,776 | 3,798,622 | 275,966 | 115,649,056 | 8,401,77 |
| | | 7.04 | | 2.24 | 4 | Non-Median | 6,968,365 | 15,609,138 | 1,133,987 | 5,000 | 11,200 | 814 | | 94,776 | 424,596 | 30,846 | 16,044,935 | 1,165,64 |
| I-5: Merced I-5: Kern | Rural 0 | 15.08 | 32.45 15.86 | 32.45 0.78 | 2 4 | Median Median | 4,181,019 4,181,019 | 135,674,074 3,261,195 | 9,856,574 236,922 | 5,000 5,000 | 162,250 3,900 | 11,787 283 | 1.5 1.5 | 94,776 94,776 | 4,613,222 110,888 | 335,146 8.056 | 140,449,546 3.375,983 | 10,203,50 245,26 |
| I-5: Kern | Rural 1 | 10.35 | 15.08 | 4.73 | 4 | Non-Median | 6,968,365 | 32,960,368 | 2,394,535 | 5,000 | 23,650 | 1,718 | 2.0 | 94,776 | 896,581 | 65,136 | 33,880,599 | 2,461,38 |
| I-5: Kern | Rural 9 | 9.28 | 10.35 | 1.07 | 4 | Median | 4,181,019 | 4,473,691 | 325,009 | 5,000 | 5,350 | 389 | 1.5 | 94,776 | 152,115 | 11,051 | 4,631,156 | 336,44 |
| I-5: Kern | | 5.41 | | 1.05 | 4 | Median Non-Median | 4,181,019 6,968,365 | 2,634,042 7,316,784 | 191,360 531,556 | 5,000 5,000 | 3,150 5,250 | 229 381 | 1.5 | 94,776 94,776 | 89,563 199,030 | 6,507 14,459 | 2,726,755 7,521,063 | 198,09 546,39 |
| I-5: Kern | Rural (| 0.58 | 0 | 4.78 | 4 | Non-Median | 6,968,365 | 33,308,787 | 2,419,847 | 5,000 | 23,900 | 1,736 | 2.0 | 94,776 | 906,059 | 65,824 | 34,238,745 | 2,487,40 |
| I-5: Kern | Rural (|) | 0.58 | 0.58 | 4 | Non-Median | 6,968,365 | 4,041,652 | 293,622 | 5,000 | 2,900 | 211 | 2.0 | 94,776 | 109,940 | 7,987 | 4,154,492 | 301,81 |
| I-5: Stanislaus I-5: San Joaquin | Rural (|) | 28.06 11.8 | 28.06 11.80 | 2 | Median Median | 4,181,019 4,181,019 | 117,319,400 | 8,523,127 3,584,209 | 5,000 5,000 | 140,300 | 10,193 | 1.5 1.5 | 94,776 94,776 | 3,989,122 1,677,535 | 289,805 121.871 | 121,448,821 51,072,562 | 8,823,12 |
| TOTAL | ruial (| , | | 11.80 280.88 | | iviedian | 4,181,019 | 49,336,027 1,254,305,769 | 3,584,209 91,123,949 | 5,000 | 59,000 1.404.400 | 4,286 102.028 | 1.5 | 94,776 | 1,677,535 41,290,112 | 121,871 2,999,682 | 1,297,000,281 | 3,710,36 94.225.65 |

| TABLE UZ. INCREMEN | TAL REHABILITATION COSTS OF AHS LANE FOR City/Suburban/R Post Mile of Segment | | | | | | OLUME Rehabilitation cost (S | (3 | Magnetic | Strips Rehabilitation Costs (\$) | Total Rehabilitation Costs (\$) | | | |
|--------------------------------------|--|----------------|----------------|---------------|--------------------------|------------------------|------------------------------|----------------------------|----------------------------|----------------------------------|---------------------------------|------------------------------|--------------------------|--|
| County | City/Suburban/R | Pos | t Mile of Se | gment | AHS Lane | 2001-Unit Cost | | , | Magnetic Strip Replacement | Total Cost of Magnetic Strip | FUAC | Total Cost per | | |
| , | ural | Begin | End | Length (mi) | Placement | per Lane Mile | Total Cost | EUAC | Unit Cost per Lane Mile in | Placement per 10-Year Cycle | EUAC | Rehabilitation Cycle | EUATC | |
| -5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | Median | 399,656 | 83,928 | 5,306 | 5,000 | 1,050 | 66 | 84,978 | 5,37 | |
| -5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | Non-Median | 1,278,900 | 1,061,487 | 67,106 | 5,000 | 4,150 | 262 | 1,065,637 | 67,36 | |
| -5: Sacramento | Urban | 22 | 23.1 | 1.1 | Non-Median | 1,278,900 | 1,406,790 | 88,936 | 5,000 | 5,500 2,500 | 348 | 1,412,290 | 89,28 40.58 | |
| I-5: Los Angeles | Urban Urban | 22.28 46.6 | 22.78 46.9 | 0.5 | Non-Median Non-Median | 1,278,900 1,278,900 | 639,450 383.670 | 40,425 24,255 | 5,000 5,000 | 2,500 1,500 | 158 95 | 641,950 385,170 | 40,58 24.35 | |
| l-5: Los Angeles l-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | Non-Median | 1,278,900 | 1,483,524 | 93,787 | 5,000 | 5.800 | 367 | 1,489,324 | 24,35 94,15 | |
| l-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | Non-Median | 1,278,900 | 6,650,280 | 420,424 | 5,000 | 26,000 | 1,644 | 6,676,280 | 422,06 | |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | Non-Median | 1,278,900 | 294,147 | 18,596 | 5,000 | 1,150 | 73 | 295,297 | 18,66 | |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | Non-Median | 1,278,900 | 140,679 | 8,894 | 5,000 | 550 | 35 | 141,229 | 8,92 | |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | Median | 181,178 | 68,847 | 4,352 | 5,000 | 1,900 | 120 | 70,747 | 4,47 | |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | Non-Median | 1,475,654 | 15,213,991 | 961,814 | 5,000 | 51,550 | 3,259 | 15,265,541 | 965,07 | |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | Non-Median | 1,475,654 | 7,702,913 | 486,971 | 5,000 | 26,100 | 1,650 | 7,729,013 | 488,62 | |
| I-5: Los Angeles | Urban Urban | 28.25 36.65 | 29.16 39.36 | 0.91 2.71 | Non-Median Non-Median | 1,278,900 1,278,900 | 1,163,799 3,465,819 | 73,574 219,106 | 5,000 5.000 | 4,550 13.550 | 288 857 | 1,168,349 3,479,369 | 73,86 219.96 | |
| I-5: Los Angeles I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | Non-Median | 1,278,900 | 4,309,893 | 272,467 | 5,000 | 16,850 | 1,065 | 4,326,743 | 273,53 | |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | Non-Median | 1,278,900 | 3,504,186 | 221,531 | 5,000 | 13,700 | 866 | 3,517,886 | 222,39 | |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | Non-Median | 1,278,900 | 1,112,643 | 70,340 | 5,000 | 4.350 | 275 | 1.116.993 | 70.61 | |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | Median | 399,656 | 123,893 | 7,832 | 5,000 | 1,550 | 98 | 125,443 | 7,93 | |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | Non-Median | 1,475,654 | 4,117,074 | 260,278 | 5,000 | 13,950 | 882 | 4,131,024 | 261,15 | |
| TOTAL | | | | 39.25 | | | 52,927,014 | 3,345,995 | | 196,250 | 12,407 | 53,123,264 | 3,358,40 | |
| | | | | | | | | , | | | | | | |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | Non-Median | 1,278,900 | 2,941,470 | 185,957 442 254 | 5,000 | 11,500 27,350 | 727 | 2,952,970 | 186,68 | |
| I-5: Los Angeles | Urban Urban | 22.78 44.01 | 28.25 45.1 | 5.47 1.09 | Non-Median Non-Median | 1,278,900 1,278,900 | 6,995,583 1,394,001 | 442,254 88.127 | 5,000 5,000 | 27,350 5.450 | 1,729 345 | 7,022,933 1,399,451 | 443,98 88.47 | |
| I-5: Los Angeles I-5: Sacramento | Urban Urban | 24.51 | 45.1 25.53 | 1.09 | Non-Median Non-Median | 1,278,900 1,278,900 | 1,394,001 1,304,478 | 88,127 82,468 | 5,000 5,000 | 5,450 5,100 | 345 | 1,399,451 1,309,578 | 88,47 82,79 | |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | Median | 181.178 | 866,028 | 54,749 | 5,000 | 23,900 | 1,511 | 889.928 | 56,26 | |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | Non-Median | 1,278,900 | 8,670,942 | 548,169 | 5,000 | 33,900 | 2,143 | 8,704,842 | 550,31 | |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | Non-Median | 1,278,900 | 856,863 | 54,170 | 5,000 | 3,350 | 212 | 860,213 | 54,38 | |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | Non-Median | 1,278,900 | 1,061,487 | 67,106 | 5,000 | 4,150 | 262 | 1,065,637 | 67,36 | |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | Non-Median | 1,278,900 | 358,092 | 22,638 | 5,000 | 1,400 | 89 | 359,492 | 22,72 | |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | Median | 399,656 | 87,924 | 5,558 | 5,000 | 1,100 | 70 | 89,024 | 5,62 | |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | Median | 399,656 | 1,170,993 | 74,029 | 5,000 | 14,650 | 926 | 1,185,643 | 74,95 | |
| I-5: Sacramento | Urban Rural | 26.69 52.33 | 26.94 54.16 | 0.25 1.83 | Non-Median Non-Median | 1,278,900 1,672,408 | 319,725 3,060,506 | 20,213 193,482 | 5,000 5,000 | 1,250 9,150 | 79 578 | 320,975 3,069,656 | 20,29 194,06 | |
| I-5: Los Angeles I-5: Sacramento | Rural | 02.33 | 14.46 | 14.46 | Median | 1,672,408 | 2,619,827 | 165,623 | 5,000 | 72.300 | 4,571 | 2.692.127 | 170.19 | |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | Non-Median | 1,278,900 | 281,358 | 17,787 | 5,000 | 1,100 | 70 | 282,458 | 17,85 | |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | Non-Median | 1,278,900 | 3,632,076 | 229,616 | 5,000 | 14,200 | 898 | 3,646,276 | 230,51 | |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | Non-Median | 1,278,900 | 1,700,937 | 107,532 | 5,000 | 6,650 | 420 | 1,707,587 | 107,95 | |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | Median | 181,178 | 161,248 | 10,194 | 5,000 | 4,450 | 281 | 165,698 | 10,47 | |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | Median | 181,178 | 1,895,117 | 119,807 | 5,000 | 52,300 | 3,306 | 1,947,417 | 123,11 | |
| I-5: Sacramento | Urban Rural | 23.1 | 24.51 40.45 | 1.41 | Non-Median | 1,278,900 181,178 | 1,803,249 2,154,200 | 114,000 136,187 | 5,000 5.000 | 7,050 59,450 | 3.758 | 1,810,299 2,213,650 | 114,44 139.94 | |
| I-5: San Joaquin I-5: Sacramento | Urban | 28.56 14.46 | 40.45 16.7 | 11.89 | Median Median | 181,178 399,656 | 2,154,200 895,230 | 136,187 56,596 | 5,000 | 59,450 11,200 | 708 | 906,430 | 139,94 | |
| I-5: Sacramento | Urban | 24.8 | 28.34 | 3.54 | Non-Median | 1,278,900 | 4,527,306 | 286,212 | 5,000 | 17,700 | 1,119 | 4,545,006 | 287,33 | |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | Non-Median | 1,278,900 | 2,711,268 | 171,404 | 5,000 | 10.600 | 670 | 2,721,868 | 172.07 | |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | Median | 181,178 | 1,692,198 | 106,979 | 5,000 | 46,700 | 2,952 | 1,738,898 | 109,93 | |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | Non-Median | 1,278,900 | 588,294 | 37,191 | 5,000 | 2,300 | 145 | 590,594 | 37,33 | |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | Non-Median | 1,278,900 | 434,826 | 27,489 | 5,000 | 1,700 | 107 | 436,526 | 27,59 | |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | Median | 181,178 | 298,943 | 18,899 | 5,000 | 8,250 | 522 | 307,193 | 19,42 | |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | Non-Median | 1,672,408 | 9,683,241 | 612,165 | 5,000 | 28,950 | 1,830 | 9,712,191 | 613,99 | |
| I-5: Los Angeles TOTAL | Urban | 39.36 | 39.81 | 0.45 97.88 | Non-Median | 1,278,900 | 575,505 64.742.915 | 36,383 4.092.985 | 5,000 | 2,250 489.400 | 142 30.939 | 577,755 65,232,315 | 36,52 4,123,92 | |
| TOTAL | | | | 97.00 | | | 64,742,913 | 4,092,965 | | 469,400 | 30,939 | 65,232,313 | 4,123,92 | |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | Non-Median | 1,672,408 | 3,244,471 | 205,112 | 5,000 | 9.700 | 613 | 3,254,171 | 205,72 | |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | Non-Median | 1,672,408 | 903,100 | 57,093 | 5,000 | 2,700 | 171 | 905,800 | 57,26 | |
| I-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | Non-Median | 1,672,408 | 2,291,199 | 144,847 | 5,000 | 6,850 | 433 | 2,298,049 | 145,28 | |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | Median | 181,178 | 1,146,854 | 72,503 | 5,000 | 31,650 | 2,001 | 1,178,504 | 74,50 | |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | Median | 181,178 | 12,894,403 | 815,172 | 5,000 | 355,850 | 22,496 | 13,250,253 | 837,66 | |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | Median | 181,178 | 280,825 | 17,753 | 5,000 | 7,750 | 490 | 288,575 | 18,24 | |
| I-5: Los Angeles | Rural Rural | 69.65 65.43 | 78.43 68.1 | 8.78 | Non-Median | 1,672,408 1,672,408 | 14,683,740 4,465,329 | 928,292 282,294 | 5,000 5,000 | 43,900 13,350 | 2,775 844 | 14,727,640 4,478,679 | 931,06 283,13 | |
| I-5: Los Angeles I-5: Los Angeles | Rural | 59.95 | 68.1 65.43 | 2.67 5.48 | Non-Median Median | 1,672,408 | 4,465,329 992,853 | 62,767 | 5,000 | 13,350 27,400 | 1,732 | 1,020,253 | 283,13 | |
| l-5: Fresno | Rural | 0 | 66.16 | 66.16 | Median | 181,178 | 11.986.703 | 757,788 | 5,000 | 330.800 | 20.913 | 12,317,503 | 778.70 | |
| l-5: Kings | Rural | 0 | 26.72 | 26.72 | Median | 181,178 | 4,841,063 | 306,047 | 5,000 | 133,600 | 8,446 | 4,974,663 | 314,49 | |
| l-5: Kern | Rural | 7.04 | 9.28 | 2.24 | Non-Median | 1,672,408 | 3,746,193 | 236,831 | 5,000 | 11,200 | 708 | 3,757,393 | 237,53 | |
| l-5: Merced | Rural | 0 | 32.45 | 32.45 | Median | 181,178 | 5,879,210 | 371,678 | 5,000 | 162,250 | 10,257 | 6,041,460 | 381,93 | |
| l-5: Kern | Rural | 15.08 | 15.86 | 0.78 | Median | 181,178 | 141,318 | 8,934 | 5,000 | 3,900 | 247 | 145,218 | 9,18 | |
| -5: Kern | Rural | 10.35 | 15.08 | 4.73 | Non-Median | 1,672,408 | 7,910,488 | 500,094 | 5,000 | 23,650 | 1,495 | 7,934,138 | 501,58 | |
| l-5: Kern | Rural | 9.28 | 10.35 | 1.07 | Median | 181,178 | 193,860 | 12,256 | 5,000 | 5,350 | 338 | 199,210 | 12,59 | |
| -5: Kern | Rural | 6.41 | 7.04 | 0.63 | Median | 181,178 | 114,142 | 7,216 111,014 | 5,000 | 3,150 | 199 | 117,292 | 7,41 | |
| -5: Kern -5: Kern | Rural Rural | 5.36 0.58 | 6.41 5.36 | 1.05 4.78 | Non-Median Non-Median | 1,672,408 1,672,408 | 1,756,028 7,994,109 | 111,014 505,380 | 5,000 5,000 | 5,250 23,900 | 332 1,511 | 1,761,278 8,018,009 | 111,34 506,89 | |
| -5: Kern -5: Kern | Rural | 0.30 | 0.58 | 0.58 | Non-Median | 1,672,408 | 7,994,109 969,996 | 61,322 | 5,000 | 23,900 | 1,511 | 972.896 | 506,89 | |
| I-5: Kem | Rural | 0 | 28.06 | 28.06 | Median | 181,178 | 5,083,841 | 321.396 | 5,000 | 140.300 | 8,870 | 5,224,141 | 330,26 | |
| | | - | | 11.8 | Median | 181,178 | 2,137,895 | 135,156 | 5,000 | 59,000 | 3,730 | 2,196,895 | 138,88 | |
| l-5: San Joaquin | Rural | 0 | 11.8 | | | | | | | | | | [30.00 | |

APPENDIX V

AHS VEHICLE-HOURS AND VEHICLE-MILES, VEHICLE OPERATING COSTS, AND USER COSTS AT VARIOUS VOLUMES

Introduction

This appendix shows supporting tables for the calculation of vehicle-miles, vehicle-hours, vehicle operating costs, and user travel time costs for low-, medium-, and high-volume traffic conditions for the added-AHS-lane configuration (these traffic conditions are described in Appendix S).

Methodologies

Sorting methodologies for the tables in this appendix are identical to those presented in Appendix S. Calculation methodologies for the tables shown here are identical to those for calculation of the corresponding values for the added-conventional-freeway-lane scenario at base volumes, which is presented in Appendix M. Values were summed for the low-, medium-, and high-volume conditions to determine a total cost for each type of segment.

Results

The vehicle-miles of travel and vehicle operating costs are shown in Table V1a for the existing freeway conditions (sorted by volume), in Table V2a for the AHS lane, and Table V3a for the traffic remaining in the conventional lanes. Tables V1b, V2b, and V3b show vehicle-hours of travel and user travel-time costs for the existing configuration (sorted by volume), for the AHS lane, and for the traffic remaining on the conventional lanes, respectively.

TABLE V1a. VEHICLE OPERATING COSTS - BASE CONDITION - SEGMENTATION 48 FT. BASIS - BASED ON VOLUME Daytime Off-Peak Period Vehicle Vehicle Operating Costs (\$) eak Period Vehicle-Miles of Nighttime Off-Peak Period Vehicle City/Suburbar Post Mile of Segment County Travel, One Direction Miles of Travel, One Direction Miles of Travel, One Direction Peak Nighttime Off-Peak Daytime Off-Peak Rural Begin End Truck Other Veh. Truck Other Veh Truck Other Veh. Truck Other Veh. Length (r I-5: Los Angeles Urban 36.22 9,274 16,637 1,424 3,014 I-5: Los Angeles Urban 20.58 21.41 0.83 61,088 417 4,790 3,567 41,026 9,381 19,854 736 1,557 6,300 6,102 4,487 1,136 5: Sacramento Urban 2,541 20,559 432 3,495 49,371 6,682 763 10,776 -5: Los Angeles Urban 22.78 1,663 22,088 191 2,541 2,696 35,821 2,936 82 4,762 11,642 Urban 46.6 1.442 14.578 146 1.481 896 9,057 2,546 4.738 481 1.582 2,944 I-5: Los Angeles 46.9 259 Urban 26.69 1.16 2,941 19,679 481 3,219 6,682 44,718 5,193 6,396 849 1,046 11,801 14,53 47,386 Urban 47.13 26.832 241,488 2,846 25.618 17,122 154,094 78,484 5.027 8,326 30.237 50.081 I-5: Los Angeles Urhan 46.9 47 13 1 187 10 681 1.098 761 6.851 3 471 2.096 I-5: Los Angeles Urhan 43 9 44 01 0.11 449 5 161 67 771 496 5 706 793 1 677 118 251 876 1 854 14.16 1,532 17,620 1,249 25,880 406 3.974 8,411 I-5: Los Angeles Urban 13.78 0.38 109 2,250 2,706 5,726 192 CA 710: Los Angeles 12.97 98,976 560,864 7,623 43,196 63,516 359,925 174.793 182,281 13,462 14,039 112,170 116,976 Suburbar 23.28 CA 710: LA Suburbar 4.96 10.18 37,584 212,976 2,456 13,917 14,770 83,697 66,374 69,217 4,337 4,523 27,201 I-5: Los Angeles Urban 28.25 20 16 n a1 2,985 34,325 312 3,590 4,129 47,479 5,271 11.156 551 1.167 7,291 15.43 I-5: Los Angeles Urban 36.65 9.36 2.71 11.057 127,153 1,230 14,149 16.981 195,280 19.526 41,325 2,173 4,598 29.988 63,466 I-5: Los Angeles Urban 20.58 3.37 17,254 198.426 1.450 16.671 13.648 156.951 30,471 64,488 2.560 5,418 24.102 51.00 I-5: Los Angeles Urhan 14 16 16.9 2 74 10 522 120 998 796 9 149 17 179 197 556 18 581 39 324 1 405 2.973 30.338 64,206 I-5: Los Angeles Urhan 21 41 22 28 0.87 5 512 63 392 430 4 949 3 662 42 114 9 735 20.602 760 1.609 6 467 13 687 I-5: Los Angeles Urhan 16.9 17 21 0.31 1 176 13 518 83 956 1 717 19 750 2.076 4 394 147 311 3.033 6 419 57,722 **1.549.636** CA 710: Los Angeles Suburban 10.18 12 07 2.79 23.436 143 964 1 540 0.461 0 307 41 388 46 788 2.720 3.075 16 504 18 760 253,206 20.830 161.438 187.018 616,796 36.787 52.467 330.276 TOTAL 1.897.833 447,164 503,632 10.488 120,612 1,463 16,821 10,129 116.487 18.522 17.889 37,858 I-5: Los Angeles Urban 39,199 2,583 5,467 I-5: Los Angeles Urban 22.78 28.25 5.47 18,188 241,637 2,092 27,800 29,497 391,886 32,120 78,532 3,695 9,035 52,092 127,36 53,563 I-5: Los Angeles Urban 44.01 45.1 1.09 5,951 739 6.650 5,845 52,602 10,510 17.408 1,305 2,161 10.322 17.096 -5: Sacramento Urhan 24 51 25 53 1 02 2 010 20.328 319 3 225 4 372 44 206 3.550 6 606 563 1 048 7 721 14 367 16.061 84 319 I-5: Sacramento Rural 29 87 34 65 4 78 1 471 7 722 13 060 68 567 28 364 27 404 2 597 2 510 23 065 22 284 7.670 19.526 72.980 I-5: Los Angeles Urban 29.16 35.94 6.78 224.554 2.052 23.599 27.238 313,231 34,484 3.624 48.102 101.800 1.063 I-5: Los Angeles Urban 45.93 46.6 0.67 3.578 32,200 363 3.270 2.223 20.006 6.318 10.465 642 3.926 6.502 40,333 7,045 3.989 4,452 3.041 30.745 13,108 1,447 9.99 -5: Los Angeles Urban 45.1 5.93 440 Urban 35.94 0.28 762 8,758 85 975 1,170 13,451 1,345 2,846 150 317 2,066 4,372 I-5: Los Angeles 36.22 10.120 1.191 1.554 I-5: Los Angeles Urban 36.43 36.65 880 104 1.480 17,025 3,289 183 387 2,614 5.53 1,997 9,476 16.734 76,666 759 6.143 5.558 44.968 24.917 1.341 9.815 14.614 I-5: Sacramento Urban 26.94 29.87 2.93 662 6,689 1,168 174 1,275 I-5: Sacramento Urban 26.69 26.94 0.25 53 536 388 3,923 2,174 685 5.947 1.278 2.116 I-5: Los Angeles Rural 52.33 54.16 1.83 53.528 723 6.511 5.224 47.016 10.503 17.396 9.226 15.280 97.605 57.457 I-5: Sacramento Rural 14.46 14.46 32.535 20.742 62,226 55.173 165.519 31.722 36.630 20.223 97.436 53.794 I-5: San Joaquin Urban 28.34 28.56 0.22 1.188 3.762 96 303 1.092 3.459 2.098 1.223 169 99 1.929 1.124 7,157 43,963 7,557 17,457 107,236 14,288 2,456 Urban 19.16 1.230 12.639 2.173 30.829 34.852 -5: Sacramento I-5: Los Angeles Urban 40.27 1.33 2.202 22,270 683 6,910 11,119 112,425 3,890 7,238 1.207 2,246 19,636 36.538 Rural 4,859 13,831 794 4,066 8,582 4,495 734 I-5: San Joaquin 11.8 12.69 0.89 2.259 11.572 1,402 7.180 3.761 I-5: San Joaquin Rural 14.34 54,392 154,808 137,524 5,617 24.8 10.46 6,073 17,284 48,319 96,057 50,313 10,725 85,332 44,695 I-5: Sacramento Urban 23.1 24.51 1.41 27,030 4,833 7,740 69,658 5,304 8,785 1,571 13,668 3,003 537 22,63 Rural 28.56 54.694 183,106 4,410 14,763 50.284 168,343 96,590 4,798 88.802 -5: San Joaquin 40.45 3,763 3,668 7.513 14,452 Urban 14.46 23,117 8.184 50.271 6.646 1.055 1.192 16.338 I-5: Sacramento 16.7 2.24 597 I-5: San Joaquin Urban 24.8 28.34 3.54 21,240 67,260 2,371 7,510 18,869 59,750 37,510 21.860 4,188 2,441 33,322 19,419 I-5: Sacramento Urban 4,452 706 9,682 59,473 7,862 1.248 1,410 19.329 I-5: San Joaquin Rural 40 4 49.79 9.34 20,623 65,305 6,489 20,547 28,929 91,607 36,420 21,224 11,459 6,678 51,088 29.772 Urban 39.81 40.27 795 8,037 131 1 328 1,765 17 844 1,404 232 432 3 117 5,799 I-5: Los Angeles 0.46 I-5: Sacramento Urban 18.82 19.16 0.34 771 4,737 143 877 2,085 12,807 1,362 1,539 252 285 3,682 4,162 -5: San Joaquin Rural 12.69 14.34 .65 10,725 30,525 1,509 4,294 14,793 42,104 18,94 9,921 2,665 1,396 26,125 13,684 18,528 97,272 11,832 16,274 -5: Los Angeles Rural 54.16 5.79 2,254 85,440 32,721 31,613 3,980 3,846 28,740 27,768 1,414 460 -5: Los Angeles Urban 0.45 720 8,280 1,272 TOTAL 339,166 1,851,561 59,552 280,841 406,731 2,378,430 598,970 601,757 105,169 91,273 718,291 772,990 I-5: Los Angeles Rural 86.67 88.61 1.94 11,000 29,740 1,860 5,028 5,474 14,799 19,426 9,666 3,284 1,634 9,666 4,810 I-5: Los Angeles Rural 86.13 86.67 3,062 8.278 518 1,400 1.524 4.119 5.407 2.690 914 455 2.691 1.33 I-5: Los Angeles Rural 84 76 86.13 1.37 7.768 21,002 1.313 3,551 3,865 10.451 13 718 6.826 2,319 1 154 6.826 3,397 I-5: Los Angeles Rural 78.43 84.76 35,891 97,039 6,068 16,405 48,287 31,538 5,332 15.86 71.17 175,434 429,511 87,323 139,767 342,188 111,21 Rural 87.03 35,667 309,818 62,98 246,830 6,185 26,366 4,457 13,120 10,922 1,846 1,449 4,264 I-5: Los Angeles Rural 39.65 1.55 1,046 3,077 8,569 5,435 151,192 16,515 49,137 -5: Los Angeles Rural 69.65 8.78 33,188 5.611 25,560 75,234 58.611 9.909 8.307 29.165 24.45 I-5: Los Angeles Rural 65.43 10.093 45,977 1.706 22.879 17.824 14,943 2.526 8.869 7.43 I-5: Los Angeles Rural 59.95 65.43 5 48 20,714 94,366 3,502 15.953 10.308 46.957 36,582 30,669 6.185 5,185 18,203 15,261 Rural 66 16 66 16 148 860 347 340 53 743 125 401 95 117 221 939 262 888 112 886 94 911 40 755 167 977 72 130 I-5: Kinas Rural 26.72 26.72 60 120 140.280 20.821 48 583 39.299 91 697 106 173 45.591 36,770 15 789 69 402 29.802 I-5: Kern Rural 7 04 9 28 2 24 12 096 28.224 2 207 5 150 5.857 13 666 21 362 9 173 3.898 1 674 10.343 4 441 I-5: Merced Rural 32.45 32.45 56,463 138,237 21,974 53,798 62,721 153,558 99.714 44,927 38,806 17,484 110,765 49,906 I-5: Kern Rural 15.08 15.86 0.78 3,276 8,424 717 1.845 2,559 6,579 5,785 2,738 1,267 599 4.519 2,138 I-5: Kern Rural 10.35 15.08 4.73 23,839 61,301 4,350 11,185 11 5/13 29,682 42,100 19,923 7.68 3,635 20,385 9,647 9.524 1.738 2.182 I-5: Kern Rural 9.28 10.35 1.07 5.393 13.867 984 2.530 2.611 6.714 4.507 822 4.611 I-5: Kern Rural 6.41 7.04 0.63 3.175 8.165 579 1.490 1.537 3.953 5.607 2.654 1.023 484 2.715 1.285 I-5: Kern Rural 5.36 6.41 1.05 5.292 13.608 966 2.483 2.562 6.589 9.346 4.423 1.705 807 4.525 2.141 I-5: Kern Rural 0.58 5.36 4 78 24 091 61 949 4 396 11 304 11 665 29 996 42 545 20 133 7 763 3 674 20,600 9 749 I-5: Kern Rural 0.58 0.58 2 923 7 5 1 7 533 1 372 1 415 3 640 5 162 2 443 942 446 2 500 1 183 31 427 80.813 12 231 31 450 55 501 26 264 21 599 10 221 61 652 I-5: Stanislaus Rural 28.06 28.06 34 910 89 769 29 175

> 26,196 1.839.391

9.204

689.494

2,464 183.255 7,013 **471.053** 19.01:

494,219

54.111

1.289.927

16.254

1.217.654

8.514

597.802

4.351

323.631

2,279 **153.092** 33.575

872,797

17.586

419,226

I-5: San Joaquin

Rural

11.8

11.8

| TABLE V1b. TRAVEL T | | | | | | - BASED ON V | | ak Period Vehicle- | Doutime Off Box | ak Period Vehicle- | ı | | Travel Time | o Conto (©) | | | |
|--------------------------------------|----------------|--|--|---------------|------------------|--------------------------|----------------|------------------------|------------------|--------------------|-----------------------|------------------|---------------------|----------------|-----------------------|-------------------------|--|
| County | City/Suburban/ | Post Mile of Segment | | | . oak i oiloa i | e Direction | | ak Period Verlicie- | | el. One Direction | Pe | ak I | Nighttime | | Davtime | Off-Peak | |
| | Rural | Begin | End | Length (mi) | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | |
| -5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 16.1 | 289.8 | 2.0 | 20.7 | 28.9 | 302.5 | 456 | 2,653 | 56 | 189 | 818 | 2,770 | |
| -5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 106.2 | 1,527.2 | 8.3 | 87.1 | 71.3 | 745.9 | 3,004 | 13,982 | 236 | 797 | 2,017 | 6,829 | |
| -5: Sacramento | Urban | 22 | 23.1 | 1.1 | 50.8 | 541.0 | 8.6 | 63.5 | 122.0 | 897.7 | 1,437 | 4,953 | 244 | 582 | 3,451 | 8,218 | |
| -5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 33.3 | 552.2 | 3.8 | 46.2 | 53.9 | 651.3 | 940 | 5,056 | 108 | 423 | 1,525 | 5,963 | |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 28.8 | 316.9 | 2.9 | 26.9 | 17.9 | 164.7 | 815 | 2,902 | 83 | | 507 | 1,508 | |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 58.8 | 410.0 | 9.6 | 58.5 | 133.6 | 813.1 | 1,663 | 3,754 | 272 | 536 | 3,779 | 7,444 | |
| I-5: Los Angeles | Urban Urban | 47.13 46.9 | 52.33 47.13 | 0.23 | 536.6 23.7 | 4,829.8 213.6 | 56.9 2.4 | 465.8 20.0 | 342.4 15.2 | 2,801.7 124.6 | 15,173 671 | 44,219 1,956 | 1,610 69 | 4,264 | 9,682 | 25,651 1,140 | |
| I-5: Los Angeles I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.23 | 9.0 | 101.2 | 1.3 | 14.0 | 9.9 | 103.7 | 254 | 927 | 38 | 128 | 281 | 950 | |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 30.6 | 338.8 | 2.2 | 22.7 | 45.0 | 470.5 | 866 | 3,102 | 61 | 208 | 1,273 | 4,308 | |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 1.979.5 | 9,506.2 | 152.5 | 664.6 | 1,270,3 | 5,537,3 | 55.970 | 87.034 | 4.311 | 6.084 | 35,918 | 50.697 | |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 751.7 | 3,736.4 | 49.1 | 214.1 | 295.4 | 1,287.6 | 21,253 | 34,209 | 1,389 | 1,960 | 8,352 | 11,789 | |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 59.7 | 647.6 | 6.2 | 65.3 | 82.6 | 863.3 | 1,688 | 5,930 | 177 | 598 | 2,335 | 7,904 | |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 221.1 | 2,399.1 | 24.6 | 257.3 | 339.6 | 3,550.5 | 6,252 | 21,965 | 696 | 2,355 | 9,602 | 32,507 | |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 345.1 | 3,674.5 | 29.0 | 303.1 | 273.0 | 2,853.7 | 9,757 | 33,642 | 820 | 2,775 | 7,718 | 26,127 | |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 210.4 | 2,240.7 | 15.9 | 166.3 | 343.6 | 3,591.9 | 5,950 | 20,515 | 450 | 1,523 | 9,714 | 32,886 | |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 110.2 | 1,173.9 | 8.6 | 90.0 | 73.2 | 765.7 | 3,117 | 10,748 | 243 | 824 | 2,071 | 7,010 | |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 23.5 | 250.3 | 1.7 | 17.4 | 34.3 | 359.1 | 665 | 2,292 | 47 | 159 | 971 | 3,288 | |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 468.7 | 2,360.1 | 30.8 | 145.6 | 187.9 | 888.0 | 13,253 | 21,608 | 871 | 1,333 | 5,314 | 8,130 | |
| TOTAL | 1 | | 1 | 1 | 5,064.1 | 35,109.5 | 416.6 | 2,749.0 | 3,740.4 | 26,772.8 | 143,185 | 321,446 | 11,779 | 25,169 | 105,756 | 245,119 | |
| I E: Los Apartes | I John on | 41.6 | 42 C | 2.2 | 209.8 | 2 100 0 | 29.3 | 305.8 | 202.6 | 2,118.0 | F 004 | 20,078 | 007 | 2,800 | F 700 | 40.004 | |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 41.6 22.78 | 43.9 28.25 | 2.3 5.47 | 209.8 363.8 | 2,192.9 4,393.4 | 29.3 41.8 | 305.8 505.5 | 202.6 589.9 | 2,118.0 7,125.2 | 5,931 10,285 | 20,078 40,224 | 827 1,183 | 2,800 4,628 | 5,728 16,680 | 19,391 65,235 | |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 119.0 | 973.9 | 14.8 | 120.9 | 116.9 | 956.4 | 3.365 | 8,916 | 418 | 1,107 | 3.305 | 8.756 | |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.09 | 40.2 | 369.6 | 6.4 | 58.6 | 87.4 | 803.7 | 1,137 | 3,384 | 180 | | 2,472 | 7,359 | |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 321.2 | 1,338.4 | 29.4 | 118.8 | 261.2 | 1,054.9 | 9,082 | 12,254 | 832 | 1,088 | 7,386 | 9,658 | |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 390.5 | 4,082.8 | 41.0 | 429.1 | 544.8 | 5,695.1 | 11,042 | 37,380 | 1,160 | | 15,402 | 52,142 | |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 71.6 | 585.5 | 7.3 | 59.5 | 44.5 | 363.7 | 2,023 | 5,360 | 205 | 544 | 1,257 | 3,330 | |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 79.8 | 733.3 | 8.8 | 81.0 | 60.8 | 559.0 | 2,256 | 6,714 | 249 | 741 | 1,719 | 5,118 | |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 15.2 | 159.2 | 1.7 | 17.7 | 23.4 | 244.6 | 431 | 1,458 | 48 | 162 | 661 | 2,239 | |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 17.6 | 184.0 | 2.1 | 21.7 | 29.6 | 309.5 | 498 | 1,685 | 59 | 198 | 837 | 2,834 | |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 189.5 | 1,393.9 | 15.2 | 111.7 | 111.2 | 817.6 | 5,358 | 12,762 | 429 | | 3,143 | 7,485 | |
| -5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 13.2 | 121.6 | 1.1 | 9.7 | 7.8 | 71.3 | 374 | 1,113 | 30 | | 219 | 653 | |
| -5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 119.0 | 823.5 | 14.5 | 100.2 | 104.5 | 723.3 | 3,363 | 7,540 | 409 | | 2,954 | 6,622 | |
| I-5: Sacramento | Rural | 0 28.34 | 14.46 | 14.46 | 650.7 | 1,525.1 | 414.8 | 957.3 | 1,103.5 | 2,546.5 | 18,398 | 13,963 | 11,729 54 | 8,765 | 31,200 | 23,314 | |
| I-5: San Joaquin I-5: Sacramento | Urban Urban | 19.16 | 28.56 22 | 0.22 2.84 | 23.8 143.1 | 57.9 799.3 | 1.9 24.6 | 5.5 137.4 | 21.8 349.1 | 62.9 1,949.7 | 672 4,047 | 530 7,318 | 696 | 50 1,258 | 618 9,872 | 576 17,851 | |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 44.0 | 404.9 | 13.7 | 125.6 | 222.4 | 2,121.2 | 1,245 | 3,707 | 386 | 1,150 | 6,288 | 19,421 | |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 97.2 | 212.8 | 15.9 | 34.7 | 81.3 | 178.0 | 2,748 | 1,948 | 449 | | 2,299 | 1,630 | |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1.087.8 | 2.381.7 | 121.5 | 265.9 | 966.4 | 2,115.7 | 30,758 | 21.805 | 3,434 | 2,435 | 27.324 | 19.371 | |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 60.1 | 491.4 | 10.7 | 87.9 | 154.8 | 1,266.5 | 1,698 | 4,499 | 304 | 804 | 4,377 | 11,596 | |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 1.093.9 | 2,817.0 | 88.2 | 227.1 | 1,005.7 | 2,589.9 | 30,929 | 25,791 | 2,494 | 2,079 | 28,435 | 23,712 | |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 75.3 | 420.3 | 11.9 | 66.7 | 163.7 | 914.0 | 2,128 | 3,848 | 338 | 611 | 4,628 | 8,368 | |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 424.8 | 1,222.9 | 47.4 | 136.5 | 377.4 | 1,086.4 | 12,011 | 11,196 | 1,341 | 1,250 | 10,670 | 9,946 | |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 89.0 | 497.2 | 14.1 | 78.9 | 193.6 | 1,081.3 | 2,518 | 4,552 | 399 | 722 | 5,475 | 9,900 | |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 412.5 | 1,004.7 | 129.8 | 316.1 | 578.6 | 1,409.3 | 11,662 | 9,199 | 3,669 | | 16,359 | 12,903 | |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 15.9 | 146.1 | 2.6 | 24.1 | 35.3 | 324.4 | 449 | 1,338 | 74 | 221 | 998 | 2,970 | |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 15.4 | 86.1 | 2.9 | 15.9 | 41.7 | 232.9 | 436 | 789 | 81 | 146 | 1,179 | 2,132 | |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 214.5 | 469.6 | 30.2 | 66.1 | 295.9 | 647.7 | 6,065 | 4,300 | 853 | 605 | 8,365 | 5,930 | |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 370.6 | 1,496.5 | 45.1 | 182.0 | 325.5 | 1,314.5 | 10,477 | 13,701 | 1,274 | 1,667 | 9,203 | 12,035 | |
| I-5: Los Angeles TOTAL | Urban | 39.36 | 39.81 | 0.45 | 14.4 6,783.3 | 150.5 31,536.2 | 2.5 1,191.0 | 25.7 4,693.8 | 33.5 8,134.6 | 350.7 41,034.1 | 407 191,794 | 1,378 288,730 | 70 33,676 | 235 42,974 | 948 230,001 | 3,210 375,688 | |
| IOIAL | 1 | - | | + | 0,703.3 | 31,330.2 | 1,131.0 | 4,033.0 | 0,134.0 | 41,034.1 | 131,734 | 200,730 | 33,070 | 42,314 | 230,001 | 373,000 | |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 220.0 | 457.5 | 37.2 | 77.4 | 109.5 | 227.7 | 6,220 | 4,189 | 1,052 | 708 | 3,095 | 2,084 | |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 61.2 | 127.4 | 10.4 | 21.5 | 30.5 | 63.4 | 1,731 | 1,166 | 293 | 197 | 862 | 580 | |
| l-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 155.4 | 323.1 | 26.3 | 54.6 | 77.3 | 160.8 | 4,393 | 2,958 | 743 | 500 | 2,186 | 1,472 | |
| -5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 717.8 | 1,492.9 | 121.4 | 252.4 | 357.2 | 742.9 | 20,296 | 13,668 | 3,431 | 2,311 | 10,099 | 6,801 | |
| -5: Kern | Rural | 15.86 | 87.03 | 71.17 | 3,508.7 | 6,607.9 | 713.3 | 1,343.4 | 2,795.3 | 5,264.4 | 99,206 | 60,498 | 20,169 | | 79,036 | 48,199 | |
| -5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 123.7 | 405.6 | 20.9 | 68.6 | 61.5 | 201.8 | 3,497 | 3,714 | 591 | 628 | 1,740 | 1,848 | |
| -5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 663.8 | 2,326.0 | 112.2 | 393.2 | 330.3 | 1,157.4 | 18,768 | 21,296 | 3,173 | 3,600 | 9,339 | 10,597 | |
| -5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 201.9 | 707.3 | 34.1 | 119.6 | 100.4 | 352.0 | 5,707 | 6,476 | 965 | 1,095 | 2,840 | 3,223 | |
| -5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 414.3 | 1,451.8 | 70.0 | 245.4 | 206.2 | 722.4 | 11,714 | 13,292 | 1,980 | 2,247 | 5,829 | 6,614 | |
| -5: Fresno | Rural | U | 66.16 | 66.16 | 2,977.2 | 5,343.7 | 1,074.9 | 1,929.2 | 1,902.3 | 3,414.4 | 84,179 | 48,924 | 30,391 | 17,663 | 53,787 | 31,261 | |
| -5: Kings | Rural | 7.04 | 26.72 | 26.72 | 1,202.4 | 2,158.2 | 416.4 | 747.4 | 786.0 | 1,410.7 | 33,997 | 19,759 | 11,774 | 6,843 | 22,223 | 12,916 | |
| -5: Kern -5: Merced | Rural Rural | 7.04 | 9.28 32.45 | 2.24 32.45 | 241.9 1,129.3 | 434.2 2,126.7 | 44.1 439.5 | 79.2 827.7 | 117.1 1,254.4 | 210.2 2,362.4 | 6,840 31,929 | 3,975 19,471 | 1,248 12,426 | 725 7,578 | 3,312 35,468 | 1,925 21,629 | |
| -5: Kern | Rural | 15.08 | 15.86 | 0.78 | 65.5 | 129.6 | 14.3 | 28.4 | 51.2 | 101.2 | 1,853 | 1,187 | 406 | 260 | 1.447 | 927 | |
| -5: Kern | Rural | 10.35 | 15.08 | 4.73 | 476.8 | 943.1 | 87.0 | 172.1 | 230.9 | 456.6 | 13,481 | 8,634 | 2,460 | 1.576 | 6.527 | 4,181 | |
| -5: Kern | Rural | 9.28 | 10.35 | 1.07 | 107.9 | 213.3 | 19.7 | 38.9 | 52.2 | 103.3 | 3,050 | 1,953 | 556 | 356 | 1,477 | 946 | |
| -5: Kern | Rural | 6.41 | 7.04 | 0.63 | 63.5 | 125.6 | 11.6 | 22.9 | 30.7 | 60.8 | 1,796 | 1,150 | 328 | 210 | 869 | 557 | |
| -5: Kern | Rural | 5.36 | 6.41 | 1.05 | 105.8 | 209.4 | 19.3 | 38.2 | 51.2 | 101.4 | 2,993 | 1,917 | 546 | 350 | 1,449 | 928 | |
| -5: Kern | Rural | 0.58 | 5.36 | 4.78 | 481.8 | 953.1 | 87.9 | 173.9 | 233.3 | 461.5 | 13,623 | 8,726 | 2,486 | 1,592 | 6,596 | 4,225 | |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 58.5 | 115.6 | 10.7 | 21.1 | 28.3 | 56.0 | 1,653 | 1,059 | 302 | 193 | 800 | 513 | |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 628.5 | 1,243.3 | 244.6 | 483.8 | 698.2 | 1,381.1 | 17,772 | 11,383 | 6,916 | 4,430 | 19,741 | 12,644 | |
| -5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 184.1 | 403.0 | 49.3 | 107.9 | 380.2 | 832.5 | 5,205 | 3,690 | 1,393 | 988 | 10,751 | 7,622 | |
| TOTAL | | | | | 13,789.9 | 28,298.3 | 3,665.1 | 7,247.0 | 9,884.4 | 19,845.0 | 389,901 | 259,086 | 103,629 | 66,350 | 279,475 | 181,692 | |

TABLE V2a. VEHICLE OPERATING COSTS - AHS LANE - BASED ON VOLUME Nighttime Off-Peak Other Daytime Off-Peak Vehicle Operating Costs (\$) City/Suburban/R Post Mile of Segment eak Period Vehicle-Miles County Vehicle-Miles of Travel, Other Vehicle-Miles of Nighttime off-Peak Daytime off-Peak Peak ural of Travel, One Direction One Direction Travel, One Direction Begin Length (n I-5: Los Angeles Urban 36.43 144 18 382 21.41 0.83 I-5: Sacramento Urban 23.1 1.1 154 26 370 547 l-5: Los Angeles 22.78 365 593 540 62 876 -5: Los Angeles Urban 46.9 480 26.69 1.16 169 384 240 41 567 I-5: Los Angeles Urban 47.13 52.33 5.2 8,944 949 5,707 13,219 1,402 8,435 -5: Los Angeles Urban 46.9 47.13 396 585 60 375 -5: Los Angeles Urban 43.9 44.01 146 162 5: Los Angeles Urban 11,379 2,079 1,496 CA 710: Los Angeles Suburban Suburban 10.31 11.997 924 234 7,699 1,407 1.366 5,290 CA 710: LA 5: Los Angeles Urban 29.16 1,012 39.36 2,048 3,145 4,648 Urbar 228 5: Los Angeles 3,02 36.65 5: Los Angeles Urban 14.16 5: Los Angeles Urban 2,023 999 l-5: Los Angeles Urban 22.28 981 245 17 -5: Los Angeles CA 710: Los Angeles Suburban 10.18 12.97 2.79 3.80 5,623 **60,705** TOTAL 41,072 3,536 31,122 5,226 45,998 5: Los Angeles Urban 2,185 2,110 3,119 Urban 22.78 28.25 5.47 3.997 460 6,483 5.908 680 9,582 44.01 Urban 1,553 I-5: Los Angeles 45.1 1.09 193 1,525 285 2,254 2,29 I-5: Sacramento 24.51 25.53 333 492 Rural 115 1,855 170 34.65 1,508 I-5: Sacramento 29.87 4.78 1,255 1,020 I-5: Los Angeles 8,01 1,72 11,183 1,071 29.16 35.94 5,424 570 842 Urban 45.93 1,167 118 725 5: Los Angeles 46.6 45.93 36.22 1,498 480 0.83 1.330 147 1.96 Urban 5: Los Angeles 36.65 29.87 391 762 I-5: Los Angeles Urban 36.43 0.22 157 18 264 1,29 104 5: Sacramento 26.94 -5: Sacramento Urban 26.69 26.94 0.25 6 44 65 2,745 2,169 3,564 5,436 75 Rural 54.16 1.83 5: Los Angeles 52.33 3,678 Rural 14.46 14.46 1.383 3,206 2,044 Urban 28.34 28.56 I-5: San Joaquin 0.22 19.16 2.84 393 68 959 100 1.418 41.6 418 130 -5: Los Angeles Urban 40.27 1.33 2,112 279 618 192 3,121 11.8 12.69 2,615 2,323 3,433 Rural 14.34 10.46 292 3,865 432 5: San Joaquin 24.51 40.45 188 2,973 -5: Sacramento -5: San Joaquin Urban Rural 34 240 50 354 11.89 4,393 4,039 28.56 Urban 14.46 16.7 1,080 146 28.34 786 5: San Joaquin Urban 24.8 3.54 885 99 1,308 1,162 318 1,719 18.82 50 541 799 49.79 40.27 5: San Joaquin Rural 40.45 2,411 3,563 892 175 I-5: Los Angeles Urban 39.81 0.46 603 40: 19.16 44 Urban 18.82 118 5: Sacramento 14.34 59.95 Rural 491 677 1,001 -5: Los Angeles Rural 54.16 5.79 8,685 1,056 7,629 12,836 1,561 11,275 I-5: Los Angeles Urban 39.36 39.81 0.45 885 TOTAL 43,281 6,554 63,970 9,687 75,673 51,199 1,738 I-5: Los Angeles Rural 3,492 590 5,161 2,568 86.67 88.61 1.94 873 Rural 972 164 484 1,437 243 715 5: Los Angeles I-5: Los Angeles Rural 84.76 86.13 1.37 2,466 417 1,227 3,645 616 1,814 11,394 71,170 I-5: Kern Rural 15.86 87.03 71.17 14,469 56,701 105.189 21.386 83.804 Rural Rural 68.1 2,790 15,804 4,124 23,358 2,052 11,623 5: Los Angeles 8.78 2,672 7,864 3,949 I-5: Los Angeles 69.65 78.43 5: Los Angeles Rural 68.1 4,806 2,391 7,103 1,201 3,535 -5: Los Angeles Rural 59.95 65.43 5.48 9,864 1,668 4,908 14,579 2,465 Rural 66.16 66,160 23,886 97,785 62,481 -5: Kinas Rural 26.720 17,466 39.49 25.815 -5: Kern Rural 7.04 1.952 1,087 I-5: Merced Rural 32.45 32.45 22,715 8,840 25,232 33,573 13,066 37,294 Rural 780 8,514 1.554 5: Kern Rural 6.093 5: Kern Rural 519 10.35 1,926 2,847 1,378 I-5: Kern Rural 6.41 7.04 0.63 1.134 549 1.676 306 812 Rural -5: Kern 5.36 6.41 1.05 1,890 345 915 510 1,353 I-5: Kern Rural 0.58 5.36 4.78 8,604 4,166 6,157 Rural 1,044 5: Kern I-5: Stanislaus I-5: San Joaquin 28.06 11.8 32,248 8,106 Rural 0 28.06 19,642 7,644 21,819 29,03 11,298 Rural 11.8

288,574

78,649

208,399

426,513

116,244

308,015

TOTAL

| TABLE V2b. TRAVEL 1 | City/Suburban/ | | st Mile of S | | Peak Period Vehicle- | Nighttime Off-Peak | Daytime Off-Peak Other | | Travel Time Costs | |
|--------------------------------------|----------------|----------------|----------------|---------------|-----------------------------------|-------------------------|---|----------------|--------------------|---------------------------|
| County | Rural | | | <u> </u> | Hours of Travel, One Direction | Period Vehicle-Hours of | Vehicle-Hours of Travel, One Direction | Peak | Nighttime Off-Peak | Daytime Off-Peak Truck |
| I-5: Los Angeles | Urban | Begin 36.22 | End 36.43 | Length (mi) | 2 1 | Travel, One Direction | 3.7 | Truck 58 | Truck 7 | 1 ruck |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 13.0 | 1.1 | 9.6 | 368 | 30 | |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 2.2 | 0.4 | 5.3 | 62 | 11 | |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 5.2 | 0.6 | 8.5 | 148 | 17 | |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 7.5 | 0.8 | 4.6 | 211 | 21 | 13 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 2.4 | 0.4 | 5.5 | 68 | 11 | 15 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 127.8 | 13.6 | 81.5 | 3,613 | 383 | |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 46.9 43.9 | 47.13 44.01 | 0.23 | 5.7 2.1 | 0.6 0.3 | 3.6 2.3 | 160 59 | 16 9 | |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.11 | 4.3 | 0.3 | 6.3 | 121 | 9 | |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 171.4 | 13.2 | 110.0 | 4,846 | 373 | 3,11 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 51.1 | 3.3 | 20.1 | 1,446 | 94 | |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 10.5 | 1.1 | 14.5 | 295 | 31 | 40 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 29.3 | 3.3 | 44.9 | 827 | 92 | 1,27 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 51.4 | 4.3 | 40.6 | 1,452 | 122 | 1,14 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 28.9 | 2.2 | 47.2 | 817 | 62 | 1,33 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 21.41 16.9 | 22.28 17.21 | 0.87 | 14.3 3.5 | 1.1 0.2 | 9.5 5.1 | 403 99 | 31 7 | 26 14 |
| | Suburban | 10.18 | 12.97 | 2.79 | 54.4 | 3.6 | 21.8 | 1,537 | 101 | 61 |
| CA 710: Los Angeles TOTAL | Guburball | 10.10 | 12.31 | 2.13 | 586.7 | 50.5 | 444.6 | 16,590 | | |
| | | | | | | 00.0 | | . 0,000 | 1,420 | .2,01 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 31.2 | 4.4 | 30.1 | 883 | 123 | 85 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 57.1 | 6.6 | 92.6 | 1,615 | 186 | 2,61 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 22.2 | 2.8 | 21.8 | 627 | 78 | 61 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 2.2 | 0.3 | 4.8 | 62 | 10 | |
| I-5: Sacramento | Rural | 29.87 29.16 | 34.65 35.94 | 4.78 6.78 | 17.9 77.5 | 1.6 8.1 | 14.6 108.1 | 507 2.191 | 46 230 | |
| I-5: Los Angeles | Urban | 45.93 | 0.0.0 | 0.67 | 16.7 | 8.1 1.7 | 108.1 10.4 | 2,191 471 | 230 | 3,05 29 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 45.93 | 46.6 45.93 | 0.83 | 19.0 | 2.1 | 14.5 | 537 | 59 | |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.03 | 3.0 | 0.3 | 4.6 | 85 | 10 | |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 2.2 | 0.3 | 3.8 | 63 | 7 | 10 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 12.6 | 1.0 | 7.4 | 355 | 28 | 20 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 1.1 | 0.1 | 0.6 | 30 | 2 | |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 39.2 | 4.8 | 34.4 | 1,109 | 135 | 97- |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 31.0 | 19.8 | 52.5 | 876 | 559 | 1,48 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 0.8 | 0.1 | 0.7 | 22 | 2 | |
| I-5: Sacramento I-5: Los Angeles | Urban Urban | 19.16 40.27 | 22 41.6 | 2.84 1.33 | 5.6 6.0 | 1.0 1.9 | 13.7 30.2 | 159 169 | 27 52 | 38° 85° |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 4.8 | 0.8 | 4.0 | 135 | 22 | 11 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 37.4 | 4.2 | 33.2 | 1,056 | 118 | 93 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 2.7 | 0.5 | 6.9 | 76 | 14 | |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 42.5 | 3.4 | 39.0 | 1,201 | 97 | |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 4.8 | 0.8 | 10.4 | 136 | 22 | |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 12.6 | 1.4 | 11.2 | 357 | 40 | |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 4.5 | 0.7 | 9.9 | 128 | 20 | |
| I-5: San Joaquin | Rural Urban | 40.45 39.81 | 49.79 40.27 | 9.34 0.46 | 24.6 3.9 | 7.7 0.6 | 34.4 8.6 | 694 110 | 218 18 | 97 24 |
| I-5: Los Angeles I-5: Sacramento | Urban | 18.82 | 19.16 | 0.46 | 0.6 | 0.6 | 1.7 | 18 | 3 | 4 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 7.0 | 1.0 | 9.7 | 198 | 28 | |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 124.1 | 15.1 | 109.0 | 3,508 | 427 | 3,08 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 3.7 | 0.6 | 8.6 | 104 | 18 | 24 |
| TOTAL | | | | | 618.3 | 93.6 | 731.4 | 17,482 | 2,647 | 20,68 |
| | | ļ | 1 | | | | | | | |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 49.9 | 8.4 | 24.8 | 1,410 | 238 | 70 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 86.13 84.76 | 86.67 86.13 | 0.54 1.37 | 13.9 35.2 | 2.3 6.0 | 6.9 17.5 | 393 996 | 66 168 | 19 49 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 162.8 | 27.5 | 81.0 | 4,602 | 778 | 2,29 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 1,016.7 | 206.7 | 810.0 | 28,747 | 5,844 | 22,90 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 39.9 | 6.7 | 19.8 | 1,127 | 191 | 56 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 225.8 | 38.2 | 112.3 | 6,384 | 1,079 | 3,17 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 68.7 | 11.6 | 34.2 | 1,941 | 328 | 96 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 140.9 | 23.8 | 70.1 | 3,984 | 674 | 1,98 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 945.1 | 341.2 | 603.9 | 26,723 | 9,648 | 17,07 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 381.7 | 132.2 | 249.5 | 10,793 | 3,738 | 7,05 |
| I-5: Kern I-5: Merced | Rural Rural | 7.04 | 9.28 32.45 | 2.24 32.45 | 57.6 324.5 | 10.5 126.3 | 27.9 360.5 | 1,629 9,175 | 297 3,571 | 78 10,19 |
| I-5: Mercea I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 324.5 11.1 | 126.3 | 360.5 8.7 | 9,175 | 3,571 | 10,19 |
| I-5: Kern | Rural | 10.35 | 15.86 | 4.73 | 11.1 | 22.2 | 58.9 | 3,439 | 627 | 1,66 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 27.5 | 5.0 | 13.3 | 778 | 142 | 37 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 16.2 | 3.0 | 7.8 | 458 | 84 | 22 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 27.0 | 4.9 | 13.1 | 763 | 139 | 37 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 122.9 | 22.4 | 59.5 | 3,475 | 634 | 1,68 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 14.9 | 2.7 | 7.2 | 422 | 77 | 20 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 280.6 | 109.2 | 311.7 | 7,934 | 3,088 | 8,81 |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 37.9 | 10.2 | 78.3 | 1,072 | 287 | 2,21 |
| TOTAL | 1 | 1 | 1 | | 4,122.5 | 1,123.6 | 2,977.1 | 116,561 | 31,768 | 84,17 |

| TABLE V3a . VEHICLE O | PERATING COS | STS - REM | IAINING CO | NVENTIONA | AL LANES - A | HS LANE CASE - E | BASED ON VOLUME | | | | | | | | | |
|--------------------------------------|----------------|----------------------|----------------|--------------|-----------------|--------------------|-------------------|-------------------|------------------|--------------------|-------------------|------------------|-----------------|------------------|-------------------|------------------|
| | City/Suburban/ | Post Mile of Segment | | | Peak Period | d Vehicle-Miles of | Nighttime Off-Pea | k Period Vehicle- | | ak Period Vehicle- | | | | ating Costs (\$) | | |
| County | Rural | | | | | One Direction | Miles of Travel | | | el, One Direction | Pe | | Nighttime | | Daytime O | |
| L E. L A l | | Begin | End | Length (mi) | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. |
| I-5: Los Angeles | Urban Urban | 36.22 20.58 | 36.43 21.41 | 0.21 | 662 4,189 | 9,274 58,644 | 81 342 | 1,137 4,790 | 1,188 3,105 | 16,637 43,469 | 1,170 7,398 | 3,014 19,059 | 143 604 | 370 1,557 | 2,099 5,483 | 5,407 14,127 |
| I-5: Los Angeles I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 2,387 | 20,559 | 406 | 3,495 | 5,732 | 49,371 | 4,215 | 6,682 | 717 | 1,136 | 10,123 | 16,046 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 1,297 | 22,088 | 149 | 2,541 | 2,104 | 35,821 | 2,291 | 7,178 | 264 | 826 | 3,715 | 11,642 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 919 | 14,578 | 93 | 1,481 | 571 | 9,057 | 1,624 | 4,738 | 165 | 481 | 1,009 | 2,944 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 2,772 | 19,679 | 453 | 3,219 | 6,298 | 44,718 | 4,895 | 6,396 | 801 | 1,046 | 11,123 | 14,533 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 17,888 | 241,488 | 1,898 | 25,618 | 11,414 | 154,094 | 31,590 | 78,484 | 3,351 | 8,326 | 20,158 | 50,081 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 791 | 10,681 | 81 | 1,098 | 507 | 6,851 | 1,397 | 3,471 | 144 | 357 | 896 | 2,226 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 302 | 5,161 | 45 | 771 | 334 | 5,706 | 534 | 1,677 | 80 | 251 | 590 | 1,854 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 1,233 | 17,620 | 87 | 1,249 | 1,811 | 25,880 | 2,177 | 5,726 | 154 | 406 | 3,198 | 8,411 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 86,979 | 560,864 | 6,699 | 43,196 | 55,817 | 359,925 | 153,606 | 182,281 | 11,830 | 14,039 | 98,574 | 116,976 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 34,005 | 212,976 | 2,222 | 13,917 | 13,363 3,117 | 83,697 | 60,052 | 69,217 | | 4,523 | 23,600 | 27,201 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 28.25 36.65 | 29.16 39.36 | 0.91 2.71 | 2,253 9,009 | 34,325 127,153 | 236 1,002 | 3,590 14,149 | 13,836 | 47,479 195,280 | 3,979 15,910 | 11,156 41,325 | 416 1,770 | 1,167 4,598 | 5,504 24,435 | 15,431 63,466 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 13,660 | 198,426 | 1,148 | 16,671 | 10,805 | 156,951 | 24,123 | 64,488 | 2,027 | 5,418 | 19,081 | 51,009 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 8,498 | 120,998 | 643 | 9,149 | 13,875 | 197,556 | 15,008 | 39,324 | 1,135 | 2,973 | 24,504 | 64,206 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 4,514 | 63,392 | 352 | 4,949 | 2,999 | 42.114 | 7,971 | 20,602 | 622 | 1,609 | 5,296 | 13,687 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 931 | 13,518 | 66 | 956 | 1,360 | 19,750 | 1,643 | 4,394 | 116 | 311 | 2,401 | 6,419 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 19,631 | 143,964 | 1,290 | 9,461 | 7,871 | 57,722 | 34,669 | 46,788 | 2,278 | 3,075 | 13,901 | 18,760 |
| TOTAL | | | | | 211,921 | 1,895,389 | 17,294 | 161,438 | 156,109 | 1,552,079 | 374,255 | 616,001 | 30,542 | 52,467 | 275,690 | 504,426 |
| | | | 1 | | | | | | | | | | | | | |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 8,303 | 120,612 | 1,158 | 16,821 | 8,019 | 116,487 | 14,663 | 39,199 | 2,045 | 5,467 | 14,162 | 37,858 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 14,190 | 241,637 | 1,633 | 27,800 | 23,014 | 391,886 | 25,060 | 78,532 | 2,883 | 9,035 | 40,643 | 127,363 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 4,399 1,857 | 53,563 | 546 | 6,650 | 4,320 4,039 | 52,602 44,206 | 7,768 3,280 | 17,408 6,606 | 965 520 | 2,161 1,048 | 7,629 7,133 | 17,096 14,367 |
| I-5: Sacramento I-5: Sacramento | Urban Rural | 24.51 29.87 | 25.53 34.65 | 4.78 | 14,806 | 20,328 84,319 | 295 1,356 | 3,225 7,722 | 12,040 | 68,567 | 3,280 26,148 | 27,404 | 2,395 | 2,510 | 21,263 | 22,284 |
| I-5: Los Angeles | Urban | 29.87 | 35.94 | 6.78 | 14,102 | 224,554 | 1,482 | 23,599 | 19,672 | 313,231 | 24,905 | 72,980 | 2,395 | 7,670 | 34.740 | 101,800 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 2,411 | 32,200 | 245 | 3,270 | 1,498 | 20,006 | 4,258 | 10,465 | 432 | 1,063 | 2,645 | 6,502 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 2,659 | 40,333 | 294 | 4,452 | 2,027 | 30,745 | 4,696 | 13,108 | 518 | 1,447 | 3,580 | 9,992 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 550 | 8,758 | 61 | 975 | 845 | 13,451 | 971 | 2,846 | 108 | 317 | 1,492 | 4,372 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 723 | 10,120 | 85 | 1,191 | 1,216 | 17,025 | 1,277 | 3,289 | 150 | 387 | 2,148 | 5,533 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 8,597 | 76,666 | 689 | 6,143 | 5,042 | 44,968 | 15,182 | 24,917 | 1,217 | 1,997 | 8,905 | 14,614 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 587 | 6,689 | 47 | 536 | 344 | 3,923 | 1,036 | 2,174 | 83 | 174 | 608 | 1,275 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 3,203 | 53,528 | 390 | 6,511 | 2,813 | 47,016 | 5,656 | 17,396 | 688 | 2,116 | 4,968 | 15,280 |
| I-5: Sacramento | Rural | 28.34 | 14.46 | 14.46 | 30,366 | 97,605 3,762 | 19,359 | 62,226 303 | 51,495 | 165,519 3,459 | 53,627 | 31,722 1,223 | 34,188 | 20,223 | 90,941 1,840 | 53,794 |
| I-5: San Joaquin I-5: Sacramento | Urban Urban | 28.34 19.16 | 28.56 | 0.22 2.84 | 1,133 6,764 | 43,963 | 91 1,163 | 7,557 | 1,042 16,498 | 3,459 107.236 | 2,001 11,945 | 1,223 | 161 2,053 | 2,456 | 29,135 | 1,124 34,852 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 1.784 | 22,270 | 554 | 6,910 | 9.007 | 112,425 | 3,151 | 7,238 | 2,033 978 | 2,436 | 15.907 | 36,538 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 4,526 | 13,831 | 739 | 2,259 | 3,787 | 11,572 | 7,992 | 4,495 | 1,305 | 734 | 6,687 | 3,761 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 51,777 | 154,808 | 5,781 | 17,284 | 45,996 | 137,524 | 91,439 | 50,313 | 10,209 | 5,617 | 81,229 | 44,695 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 2,816 | 27,030 | 503 | 4,833 | 7,256 | 69,658 | 4,972 | 8,785 | 889 | 1,571 | 12,814 | 22,639 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 51,722 | 183,106 | 4,170 | 14,763 | 47,551 | 168,343 | 91,341 | 59,509 | 7,364 | 4,798 | 83,976 | 54,711 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 3,427 | 23,117 | 544 | 3,668 | 7,453 | 50,271 | 6,052 | 7,513 | 960 | 1,192 | 13,162 | 16,338 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 20,355 | 67,260 | 2,273 | 7,510 | 18,082 | 59,750 | 35,947 | 21,860 | 4,014 | 2,441 | 31,934 | 19,419 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 4,134 | 27,348 | 656 | 4,339 | 8,990 | 59,473 | 7,301 | 8,888 | 1,158 | 1,410 | 15,877 | 19,329 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 18,904 | 65,305 | 5,948 | 20,547 | 26,518 | 91,607 | 33,385 | 21,224 | 10,504 | 6,678 | 46,831 | 29,772 |
| I-5: Los Angeles I-5: Sacramento | Urban Urban | 39.81 18.82 | 40.27 19.16 | 0.46 | 523 727 | 8,037 4,737 | 86 135 | 1,328 877 | 1,161 1,967 | 17,844 12.807 | 924 1,285 | 2,612 1,539 | 153 238 | 432 285 | 2,051 3,473 | 5,799 4,162 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 10,234 | 30,525 | 1,440 | 4,294 | 14,116 | 42,104 | 18,073 | 9,921 | 2.543 | 1,396 | 24,929 | 13,684 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 9,843 | 97,272 | 1,197 | 11,832 | 8,646 | 85,440 | 17,383 | 31,613 | 2,114 | 3,846 | 15,268 | 27,768 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 463 | 8,280 | 79 | 1,414 | 1,078 | 19,286 | 817 | 2,691 | 140 | 460 | 1,904 | 6,268 |
| TOTAL | | | | | 295,884 | 1,851,561 | 52,997 | 280,841 | 355,532 | 2,378,430 | 522,535 | 601,757 | 93,594 | 91,273 | 627,873 | 772,990 |
| | | | | | | | | | | | | | | | | |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 7,508 | 29,740 | 1,269 | 5,028 | 3,736 | 14,799 | 13,259 | 9,666 | 2,242 | 1,634 | 6,598 | 4,810 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 2,090 | 8,278 | 353 | 1,400 | 1,040 | 4,119 | 3,691 | 2,690 | 624 | 455 | 1,836 | 1,339 |
| I-5: Los Angeles | Rural | 84.76 78.43 | 86.13 | 1.37 6.33 | 5,302 24,497 | 21,002 97,039 | 896 4,141 | 3,551 16,405 | 2,638 12,190 | 10,451 48,287 | 9,363 43,262 | 6,826 31,538 | 1,583 7,314 | 1,154 5,332 | 4,659 21,528 | 3,397 15,693 |
| I-5: Los Angeles I-5: Kern | Rural Rural | 78.43 15.86 | 84.76 87.03 | 71.17 | 104,264 | 97,039 429,511 | 4,141 21,198 | 16,405 87,323 | 12,190 83,066 | 48,287 342,188 | 43,262 184,131 | 139,591 | 7,314 37,435 | 5,332 28,380 | 21,528 146,696 | 15,693 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 3,395 | 26,366 | 574 | 4,457 | 1,689 | 13,120 | 5,995 | 8,569 | 1,013 | 1,449 | 2,983 | 4,264 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 17,384 | 151,192 | 2,939 | 25,560 | 8,651 | 75,234 | 30,701 | 49,137 | 5,190 | 8,307 | 15,277 | 24,451 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 5,287 | 45,977 | 894 | 7,773 | 2,631 | 22,879 | 9,336 | 14,943 | 1,578 | 2,526 | 4,646 | 7,436 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 10,850 | 94,366 | 1,834 | 15,953 | 5,399 | 46,957 | 19,162 | 30,669 | 3,240 | 5,185 | 9,535 | 15,261 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 82,700 | 347,340 | 29,857 | 125,401 | 52,843 | 221,939 | 146,049 | 112,886 | 52,728 | 40,755 | 93,321 | 72,130 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 33,400 | 140,280 | 11,567 | 48,583 | 21,833 | 91,697 | 58,985 | 45,591 | 20,428 | 15,789 | 38,557 | 29,802 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 8,064 | 28,224 | 1,471 | 5,150 | 3,905 | 13,666 | 14,241 | 9,173 | 2,599 | 1,674 | 6,896 | 4,441 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 33,748 | 138,237 | 13,134 | 53,798 | 37,488 | 153,558 | 59,599 | 44,927 | | 17,484 | 66,205 | 49,906 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 2,496 | 8,424 | 547 | 1,845 | 1,949 | 6,579 | 4,408 | 2,738 | | 599 | 3,443 | 2,138 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 15,325 | 61,301 | 2,796 | 11,185 | 7,420 | 29,682 | 27,064 | 19,923 | 4,938 | 3,635 | 13,105 | 9,647 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 3,467 | 13,867 | 633 | 2,530 | 1,679 | 6,714 | 6,122 | 4,507 | | 822 | 2,964 | 2,182 |
| I-5: Kern I-5: Kern | Rural Rural | 6.41 5.36 | 7.04 6.41 | 0.63 1.05 | 2,041 3,402 | 8,165 13,608 | 372 621 | 1,490 2,483 | 988 1,647 | 3,953 6,589 | 3,605 6,008 | 2,654 4,423 | 658 1,096 | 484 807 | 1,745 2,909 | 1,285 2,141 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 15,487 | 61,949 | 2,826 | 2,483 11,304 | 7,499 | 29,996 | 27,351 | 20,133 | 4,991 | 3,674 | 13,243 | 9,749 |
| I-5: Kern | Rural | 0.00 | 0.58 | 0.58 | 1,879 | 7,517 | 343 | 1,372 | 910 | 3,640 | 3,319 | 2,443 | 4,991 | 3,674 | 1,607 | 1,183 |
| | | - | 28.06 | 28.06 | 11,785 | 80,813 | 4,586 | 31,450 | 13,091 | 89,769 | 20,813 | 26,264 | 8,100 | 10,221 | 23,119 | 29,175 |
| | Rural | () | | | | | | | | | | | | | | |
| I-5: Stanislaus I-5: San Joaquin | Rural Rural | 0 | 11.8 | 11.8 | 6,549 | 26,196 | 1,753 | 7,013 | 13,528 | 54,111 | 11,566 | 8,514 | | 2,279 | 23,890 | 17,586 |

TABLE V3b. TRAVEL TIME COST - REMAINING CONVENTIONAL LANES - AHS LANE CASE - BASED ON VOLUME Nighttime Off-Peak Period Vehicle-Daytime Off-Peak Period Vehicle Travel Time Costs (\$) Peak Period Vehicle-Hours City/Suburbar Post Mile of Segment of Travel, One Direction Hours of Travel, One Direction Hours of Travel, One Direction Peak Nighttime Off-Peak Daytime Off-Peak County Rural Begin End Length (m Truck Truck Other Veh Truck Other Veh. Other Veh Truck Truck Other Veh. Truck I-5: Los Angeles Urban 36.43 0.21 13.2 231.8 1.6 23.8 302.5 672 36.22 20.7 I-5: Los Angeles 20.58 21.41 83.8 1,303.2 6.8 87.1 62.1 114.6 790.3 2,369 1,350 11.93 193 797 1,756 7,236 8,218 Urban 0.83 47.7 63.5 897.7 229 3,241 I-5: Sacramento Urban 23.1 467.3 8.1 4,278 582 Urban 25.9 490.8 3.0 46.2 651.3 734 1,190 5.963 I-5: Los Angeles 22.28 22.78 0.5 42.1 4.494 84 423 18.4 11.4 I-5: Los Angeles Urban 16.6 46.9 280.3 1.9 26.9 164.7 520 246 323 1.508 I-5: Sacramento Urhan 25 53 26 69 1 16 55.4 410.0 91 58.5 126.0 813 1 1 567 3 754 256 536 3 562 7 444 357.8 465.8 1,073 6,455 25 651 I-5: Los Angeles Urhan 47 13 52 33 4 556 4 38.0 228.3 2 801 7 10 115 41 716 4 264 I-5: Los Angeles Urban 46 Q 47.13 0.23 15.8 201.5 1.6 20.0 10.1 124.6 447 1,845 46 183 287 1,140 I-5: Los Angeles Urban 43 Q 44 01 0.11 6.0 95.6 0.9 14 0 6.7 103.7 171 87 128 189 950 I-5: Los Angeles Urban 3 78 14 16 24.7 3324 17 22.7 36.2 470.5 697 3.044 208 1,024 4.308 0.38 CA 710: Los Ange Suburban 23.28 10.31 1,739.6 9,347.7 134.0 664.6 1.116.3 5,537.3 49,186 85,583 3,788 6,084 31,564 50,697 CA 710: LA 4.96 680.1 3,736.4 44.4 214.1 7,557 11,789 Suburban 10.18 5.22 267.3 1,287.6 19,229 34,209 1,257 1.960 45.1 647.6 4.7 65.3 62.3 1,274 1.76 7,904 I-5: Los Angeles Urban 863.3 I-5: Los Angeles 39.36 180.2 20.0 257.3 276.7 3.550.5 5.095 21.965 567 2 355 7.824 32.507 Urban 36 65 2 71 2.399.1 273.2 649 I-5: Los Angeles Urban 3.674.5 303.1 7.724 33.64 6.110 26,127 17.21 20.58 23.0 216.1 2.853.7 2.77 I-5: Los Angeles 363 Urban 14.16 16.9 2.74 170.0 2,240.7 12.9 166.3 277.5 3,591.9 4,806 20,515 1,523 7,846 32,886 Urhan 90.3 1 173 9 7.0 765.7 2 552 10 748 199 1 696 7.010 I-5: Los Angeles 21 41 22 28 0.87 90.0 60.0 824 I-5: Los Angeles CA 710: Los Angeles 18.6 250.3 17.4 27.2 157.4 526 11.101 769 4.451 3,288 8,130 Urban 16.9 17.21 0.31 1.3 359.1 2,292 159 730 12.97 392.6 25.8 145.6 20.92 1.33 Suburban 888.0 TOTAL 4.238.4 34.125.0 345.9 2,749.0 3.122.2 26,817.3 119.839 312.432 9,780 25,169 88,278 245,526 I-5: Los Angeles Urban 166.1 305.8 160.4 2,118.0 4,695 28.25 I-5: Los Angeles Urban 22.78 5.47 283.8 4 303 4 32.7 505.5 460.3 7,125.2 8.025 40,224 923 4.628 13,014 65,235 I-5: Los Angeles Urban 44 01 45 1 1 09 88.0 973.9 10.9 120.9 86.4 956.4 2,488 8 916 309 1.10 2,443 8 756 I-5: Sacramento 24.51 37.1 369.6 5.9 58.6 80.8 1,050 3,38 167 767 2,284 Urban 803.7 7,359 Rural I-5: Sacramento 34.65 296.1 27.1 118.8 240.8 1,054.9 8.37 12.06 1.08 6,809 9,658 I-5: Los Angeles Urban 29.16 35.94 282.0 4,082.8 29.6 429.1 393.4 5,695.1 7,975 37,380 838 3,928 11,124 52,142 6.78 I-5: Los Angeles 46.6 48.2 585.5 4.9 30.0 363.7 1,363 138 847 Urban 0.67 5,36 3,330 I-5: Los Angeles Urban 45.93 0.83 53.2 733.3 5.9 81.0 40.5 559.0 1,504 6,714 166 741 1,146 5,118 I-5: Los Angeles Urban 36.22 11.0 159.2 17.7 16.9 244.6 311 1,458 162 478 0.28 I-5: Los Angeles Urban 36.43 36.65 0.22 14.5 184.0 1.7 21.7 24.3 309.5 409 1,685 198 688 2,834 171.9 1.393.9 13.8 111.7 817.6 71.3 4.861 390 1.023 2.851 7.485 I-5: Sacramento Urban 26.94 29.87 2.93 100.8 12,762 I-5: Sacramento 11.7 121.6 9.7 195 653 Urban 26.94 0.9 6.9 1.11 26.69 0.25 332 100.2 1 811 7 540 1 591 I-5: Los Angeles Rural 52 33 54 16 1.83 64.0 823.5 7.8 56.3 723.3 220 917 6.622 I-5: Sacramento Rural 14 46 14 46 607.3 1 501 6 387.2 957.3 1 029 9 2 546 5 17.172 13 748 10.947 8.765 29,120 23,314 I-5: San Joaquin Urban 8.34 28.56 22.7 68.4 1.8 5.5 20.8 62.9 641 62 589 576 0.22 I-5: Sacramento Urban 9.16 2.84 135.3 799.3 23.3 137.4 330.0 1,949.7 3.825 7,318 657 1.25 9.32 17,851 I-5: Los Angeles Urban 40.27 41.6 1.33 35.7 404.9 11.1 125.6 180.1 2,121.2 1,009 3,707 313 1,150 5,093 19,421 Rural 90.5 212.8 14.8 34.7 75.7 2,559 1.94 418 2,14 I-5: San Joaquin 178.0 1,630 115.6 265.9 19,371 I-5: San Joaquin Rural 14.34 24.8 10.46 1.035.5 2.381.7 919.9 2.115.7 29,279 21.80 3,269 2.43 26,010 I-5: Sacramento 24.51 491.4 10.1 87.9 1,266.5 Urban 56.3 285 2,079 I-5: San Joaquin Rural 1,034.4 83.4 227.1 951.0 2,589.9 25,79 26,890 23,712 2,817.0 29,248 68.5 914.0 I-5: Sacramento Urban 420.3 10.9 66.7 149.1 1.938 308 4.215 8.368 14.46 16.7 2.24 3.848 611 I-5: San Joaquin Urban 24.8 28.34 3.54 407.1 1,222.9 45.5 136.5 361.6 1,086.4 11,511 11,196 1,285 1,250 10,225 9.946 13.1 179.8 I-5: Sacramento Urban 16.7 18.82 2.12 82.7 497.2 78.9 1.081.3 2.338 4.552 371 722 5.084 9.900 378.1 119.0 316.1 530.4 3.363 I-5: San Joaquin Rural 49.79 9.34 1.004.7 10.690 9.199 2.894 14,996 12,903 40.45 1.409.3 24.1 15.9 23.2 39.3 1,338 657 1.112 I-5: Los Angeles Urban 39.81 0.46 10.5 146.1 1.7 324.4 296 2,970 14.5 27 76 146 I-5: Sacramento Urban 18 82 19 16 0.34 86 1 232 9 411 789 2 132 I-5: San Joaquin Rural 14.34 204.7 469.6 28.8 66.1 282.3 647.7 5,787 4,30 7,982 12.69 814 5,930 I-5: Los Angeles Rural 54.16 59.95 5.79 196.9 1,496.5 23.9 182.0 172.9 1,314.5 5,566 13,70 677 1,667 4.889 12,035 I-5: Los Angeles Urban 39.36 39.81 0.45 9.3 150.5 1.6 25.7 21.6 350.7 262 **167,319** 1.37 610 **201,049** 5,917.7 4,693.8 29,969 42,974 1,059.9 7,110.6 41,034.1 288,421 375,688 TOTAL 31,502.4 150.2 457.5 77.4 74.7 227.7 I-5: Los Angeles Rural 86.67 25.4 4,246 4.189 718 708 2,113 2,084 Rural I-5: Los Angeles 86.67 0.54 41.8 127.4 7.1 21.5 20.8 63.4 1,182 1,166 200 197 588 580 86.13 I-5: Los Angeles Rural 106.0 323.1 17.9 54.6 52.8 160.8 2.998 507 500 1,492 84.76 86.13 1.37 2.958 1.472 I-5: Los Angeles Rural 8 43 84.76 489.9 1,492.9 82.8 252.4 243.8 742.9 13,853 13,668 2,311 6,893 6,801 Rural 71.17 424.0 1,343.4 1,661.3 58,960 11,987 46,973 48,199 87.03 2.085.3 6.607.9 5.264.4 60.498 12.300 I-5: Kern 5.86 11.5 I-5: Los Angeles Rural 68 1 69 65 1 55 67.9 405.6 68.6 33.8 201.8 1 920 3 714 325 628 955 1 848 I-5: Los Angeles Rural 69.65 78.43 8.78 347.7 2,326.0 58.8 393.2 173.0 1,157.4 9,831 21,296 1,662 3,600 4,892 10,597 52.6 I-5: Los Angeles Rural 35 43 68 1 2 67 105.7 707.3 17 9 1196 352.0 2 990 6 476 505 1 095 1 488 3 223 I-5: Los Angeles Rural 59.95 65.43 5.48 217.0 1 451 8 36.7 245.4 108.0 722.4 6.136 13,292 1.03 2.24 3.053 6 614 I-5: Fresno Rural 66.16 66.16 1,654.0 5,343.7 597.1 1,929.2 1,056.9 3,414.4 46,766 48,92 16,884 17,663 29,882 31,261 I-5: Kings Rural 26.72 26.72 668.0 2,158.2 231.3 747.4 436.7 1,410.7 18,887 19,75 6,54 6,843 12,346 12,916 I-5: Kern Rural .04 9.28 2.24 161.3 434.2 29.4 79.2 78.1 210.2 4,560 3,97 832 2,208 1,925 I-5: Merced Rural 32.45 675.0 2,126.7 262.7 827.7 749.8 2,362.4 19,47 7,427 7,578 21,199 21,629 I-5: Kern Rural 15.86 0.78 49.9 129.6 10.9 28.4 39.0 101.2 1.411 1.187 309 260 1.102 927 1,581 358 I-5: Kern Rural 10.35 15.08 4.73 306.5 943.1 55.9 172.1 148.4 456.6 8,666 8,634 1,576 4,196 4,181 I-5: Kern Rural 10.35 1.07 69.3 12.7 38.9 33.6 103.3 1,960 1,95 356 949 946 Rural 7.4 22.9 19.8 1,154 1,150 211 559 557 I-5: Kern 7.04 0.63 40.8 125.6 60.8 210 6.41 I-5: Kern Rural 6.41 68.0 309.7 209.4 953.1 12.4 56.5 38.2 173.9 32.9 150.0 101.4 461.5 1,92 93 928 4,225 1,598 Rural 5.36 4.78 8,758 8,726 1,592 4,241 I-5: Kern 37.6 115.6 I-5: Kern Rural 0.58 0.58 6.9 21 1 18.2 56.0 1.063 1.059 194 193 515 513 483.8 7.403 I-5: Stanislaus Rural 28.06 28.06 235.7 91.7 261.8 1 381 1 11 38 2.594 4 430 12.644 1,243.3 6.664

I-5: San Joaquin

TOTAL

Rural

11.8

11.8

131.0

8,018.4

403.0

28.298.3

35.1

2,092.1

107.9

7,247.0

270.6

5,716.4

832.5

19,845.0

3 703

226,716

3 690

259,086

991

59,153

988

66,350

7 650

161.628

7 622

181,692

APPENDIX W

DEDICATED TRUCK LANE PLANNING, DESIGN, CONSTRUCTION, AND REHABILITATION COSTS AT VARIOUS VOLUMES

Introduction

This appendix shows supporting tables for the calculation of incremental planning, design, construction, and rehabilitation costs for the dedicated-truck-lane system for low-, medium-, and high-volume traffic conditions (these traffic conditions are described in Appendix S). The incremental cost is the cost of building and maintaining the dedicated truck lane above the no-build option.

Methodologies

Sorting methodologies for the tables in this appendix are identical to those presented in Appendix S. Calculation methodologies for the tables shown here are identical to those for calculation of the corresponding costs for the dedicated-truck-lane scenario at base volumes, which is presented in the main report. Values were summed for the low-, medium-, and high-volume conditions to determine a total cost for each type of segment.

Results

The costs at low, medium, and high volume levels are shown in Table W1 and W2 for the dedicated-truck-lane incremental construction costs (these include planning and design costs, implicitly) and rehabilitation costs, respectively.

TABLE W1. INCREMENTAL CONSTRUCTION COSTS OF DEDICATED TRUCK LANE FOR ROOADWAY SPACE AND BARRIERS - BASED ON VOLUME Barrier Costs (\$) Total Construction Costs (\$) Conventional New Freeway Costs (\$ City/Suburban Post Mile of Segment Dedicated Lan 2001-Unit Cost pe County reeway Lanes # of Barriers in One 2001-Unit Cost per EUAC Total Cost EUAC EUATC Total Cost Total Cost Rural Placement One Direction Lane Mile Direction Beain End Lenath (mi I-5: Los Angeles Urban 36.22 36.43 0.21 Median 6.394.500 1,342,84 97.55 94.77 29,85 2,169 1,372,699 99,725 19,902,88 Urban Non-Median 23,979,37 1,445,92 2.0 94.77 20.060.209 1,457,352 -5: Los Angeles 20.58 21.41 0.83 Urban Non-Median 23.979.375 26,377,31 1.916.28 94,776 208.50 15.148 26.585.820 1.931.431 I-5: Sacramento 23.1 1.1 2 94,776 877,923 526,754 I-5: Los Angeles Urban 2.78 0.5 Non-Median 23,979,37 11.989.6 871.03 2.0 94.77 6.88 12,084,464 I-5: Los Angeles Urban 46.6 46.9 0.3 4 Non-Median 23.979.375 7.193.81 522.62 2.0 56.866 4.13 7.250.678 I-5: Sacramento Urhan 25.53 26.69 1 16 Non-Median 23 979 375 27 816 07 2 020 808 94 776 219 880 15 97 28 035 955 2 036 782 2 I-5: Los Angeles 94 776 Urhan 47 13 52 33 Non-Median 23 979 379 124 692 75 9.058.79 985 67 71.60 125 678 420 9 130 400 I-5: Los Angeles Urban 46 Q 47.13 0.23 4 Non-Median 23,979,375 5,515,25 400.67 94,776 43.59 3,167 5,558,853 403.845 I-5: Los Angeles Urban 43 O 44.01 0.11 1 Non-Median 23.979.37 2,637,73 191 62 94,776 20,85 1.51 2.658.582 193,143 Median 94,776 54,02 I-5: Los Angeles Urban 13.78 14.16 0.38 6,394,50 2,429,91 176,53 3,92 2,483,932 180,455 CA 710: Los Angeles Suburban Non-Median 15,473,87 159.535.60 11.590.08 2.0 94,77 1.954.28 141.97 161.489.88 11,732,064 Non-Median 15,473,870 94,776 989,46 CA 710: LA Suburban 4.96 5.22 80,773,602 5.868.11 71.88 81.763.064 5.939.998 Urban Non-Median 21,821,23 94,776 172,49 -5: Los Angeles 9.16 23,979,37 21.993.72 Urhan Non-Median 64.984.10 94.776 513,686 37.31 I-5: Los Angeles 39.36 2.71 23.979.375 4.721.02 65,497,792 4.758.343 Urban Non-Median 5.870.79 94,770 638,790 46,40 81,449,284 5.917.202 I-5: Los Angeles 20.58 3.37 23.979.37 80.810.49 Urban 2.74 Non-Median 23.979.37 65.703.48 4,773,28 2.0 94,776 519,372 37,732 66.222.860 4.811.019 -5: Los Angeles 14.16 16.9 Urhan Non-Median 1 515 60 11 98 -5: Los Angeles 21 41 2 28 0.87 23 979 375 20.862.056 2.0 94 776 164 910 21 026 966 1 527 586 Urban 17.21 Median 6.394.500 1.5 94,776 3.20 2.026.366 I-5: Los Angeles 16.9 0.31 4 1.982.29 144.01 44.07 147.213 4 Non-Median 15.473.870 43.172.098 3.136.406 2.0 94.776 528.850 38.42 43,700,948 3.174.826 CA 710: Los Angeles Suburban 10.18 2.97 2.79 TOTAL 39.25 769.543.233 55.906.478 7,397,267 537,403 776.940.500 56,443,882 -5: Los Angeles Urban 43 Q Non-Median 23,979,375 55,152,56 4.006.774 94.776 435.97 31.67 55.588.53 4,038,446 2 I-5: Los Angeles Urban 22.78 28.25 5 47 5 Non-Median 23,979,375 131,167,18 9,529,153 94,776 1,036,849 75,326 132,204,031 9,604,479 2.0 I-5: Los Angeles Urban Non-Median 23,979,37 1,898,86 94,77 206,61 Urban Non-Median 24,458,96 1,776,9 94,770 193,34 14.04 24,652,306 1,790,963 -5: Sacramento I-5: Sacramento Rural 34.65 4.78 Median 4.181.01 19.985.27 1.451.90 1.5 94.77 679,54 49.36 20.664.816 1.501.276 I-5: Los Angeles Urban 6.78 Non-Median 23,979,37 162,580,16 11,811,27 2.0 94,770 1,285,16 93,36 163,865,32 11,904,637 29.16 5.94 -5: Los Angeles Urban Non-Median 1.167.19 94.77 127.00 1.176.417 45.93 16.066.18 9.22 I-5: Los Angeles Urban Non-Median 23.979.375 19.902.88 1,445,923 94,776 157,328 11,430 20.060,209 1,457,352 45.1 45.93 0.83 Non-Median 2.0 -5: Los Angeles Urban 35.94 0.28 23,979,37 6.714.22 487.78 94.77 53,07 3,85 6.767.300 491.637 94 776 Urhan Median 1 406 79 102 20 31 276 2 272 104 474 -5: Los Angeles 36 43 36 65 0 22 6 394 500 1 438 066 19,152,426 1.391.403 I-5: Sacramento Urban 26.94 29.87 2.93 Median 6.394.500 18.735.88 1.361.14 94,776 416.54 30.26 I-5: Sacramento 23.979.375 5.994.84 94.776 3.44 Urban 26.69 6.94 0.25 Non-Median 435.51 47.388 6.042.232 438.962 I-5: Los Angeles Rural 52 33 54 16 1.83 Non-Median 6 968 365 12 752 10 926 427 2.0 94 776 346 880 25 20 13 098 989 951 627 I-5: Sacramento Rural 14 46 14 46 Median 4 181 019 60 457 53 4 392 174 94 776 2 055 69 149 34 62 513 230 4 541 518 I-5: San Joaquin Urban 28 34 28.56 0.22 Non-Median 6,968,365 1,533,04 111 374 94.776 41 70 3.03 1 574 742 114 403 I-5: Sacramento Urban 2.84 1 Non-Median 23.979.3 68.101.4 4.947.494 94,776 538.32 39.10 68.639.75 4,986,603 I-5: Los Angeles Urban 40.27 41 6 1.33 Non-Median 23,979,37 31,892,56 2,316,96 94,776 252,104 18.31 32,144,673 2,335,275 I-5: San Joaquin Rural 12.69 0.89 Median 4.181.0 3,721,10 270.33 94.77 126.52 9.19 3.847.63 279.526 94,776 I-5: San Joaquin Rural 14.34 10.46 Median 4.181.01 43,733,46 3.177.18 1.487.03 108.03 45,220,497 3,285,220 -5: Sacramento 23,979,37 33,810,91 2,475,743 Urban 4.51 Non-Median 94,776 267,26 Rural 11.89 94,776 -5: San Joaquin Median 49.712.31 3.611.54 1,690,33 122,80 51,402,649 3.734.346 28.56 Urban Median I-5: Sacramento 14.46 14.323.68 1.040.60 94.77 318,44 14.642.127 1.063.735 2.24 6.394.500 23.13 -5: San Joaquin Urban 3.54 Non-Median 23.979.37 84.886.98 6.166.94 94,776 671.01 48.74 85.558.002 6.215.696 8.34 Non-Median 94.776 29.19 I-5: Sacramento Urban 16.7 8.82 2.12 4 23,979,375 50.836.27 3.693.20 2.0 401.850 51,238,125 3.722.394 I-5: San Joaquin Rural 39.050.72 94,776 1.327.81 96.46 40.378.531 40.45 49.79 9.34 Median 4.181.019 2.836.99 2.933.456 11,030,513 8,152,988 801,355 592,306 6,335 4,682 11.117.706 807,689 596,988 I-5: Los Angeles Urban 0.46 Non-Median 23,979,37 94.77 87.19 94,776 64.448 I-5: Sacramento Urban 18.82 19.16 0.34 5 Non-Median 23,979,37 8.217.435 I-5: San Joaquin Rural 12 69 14 34 1.65 Median 4 181 019 6 898 68 501 182 1.5 94 776 234 57 17 041 7 133 252 518 223 5 I-5: Los Angeles Rural 54.16 5.79 Non-Median 6,968,365 40,346,836 2,931,154 2.0 94,776 1,097,506 79,73 41,444,342 -5: Los Angeles Urban 39.36 39.81 0.45 Non-Median 23.979.37 10,790,71 783.93 94,776 85.29 6,197 10,876,017 790,131 TOTAL 97.88 1,060,334,350 77,032,136 15,764,092 1,145,244 1,076,098,442 78,177,381 I-5: Los Angeles Rural Non-Median 6.968.365 94,776 367.73 26,71 1.008.829 I-5: Los Angeles Rural 86.13 86.67 0.54 Non-Median 6,968,365 3,762,91 273,37 2.0 94,776 102,35 7,436 3,865,275 280,808 Rural Non-Median 6,968,365 9,546,66 693,55 94.77 259,686 18.86 9,806,347 712.42 -5: Los Angeles 34.76 86.13 Rural Median 94,776 899,898 65,377 1,988,092 I-5: Los Angeles 78.43 84.76 6.33 4.181.019 26,465,85 1.922.715 27.365.750 Rural Median 297,563,13 21,617,63 94,77 10,117,812 735,04 307,680,951 I-5: Kern 15.86 87.03 22.352.686 Rural 1.55 Median 4,181,019 6.480.58 470,807 1.5 94,776 220.35 16,00 6.700.934 486,816 -5: Los Angeles I-5: Los Angeles Rural 69.65 78.43 8.78 4 Non-Median 6.968.365 61.182.24 4,444,824 94,776 1.664.26 120.907 62.846.515 4.565.731 2.0 I-5: Los Angeles Rural 65.43 38.1 2.67 4 Non-Median 6.968.365 18,605,53 1.351.67 94.776 506,104 36,768 19.111.639 1.388.440 I-5: Los Angeles Rural 59 95 55 43 5 48 4 Median 4 181 019 22.911.98 1 664 531 94 776 779.05 56 59 23,691,044 1 721 129 I-5: Fresno Rural 66 16 66 16 Median 4 181 019 276 616 233 20 095 868 94 776 9 405 570 683 304 286 021 803 20,779,173 I-5: Kings Rural 26.72 Median 4,181,01 111.716.83 8,116,10 94,776 3,798,62 275,96 115.515.45 8,392,072 26.72 I-5: Kern Rural 4 Non-Median 6 968 36 15 600 1 1.133.98 94.77 424.59 30 84 16 033 73 1.164.833 I-5: Merced Rural 32.45 32.45 2 Median 4,181,019 135,674,07 9,856,574 94,776 4,613,222 335,146 140,287,296 10,191,719 -5: Kern Rural .86 Median 94,77 Rural 4.73 Non-Median 2,394,53 94,776 896,58 65,136 2,459,671 I-5: Kern 5.08 6,968,36 32,960,36 33,856,949 Rural I-5: Kern Median 4.181.01 4,473,69 325.00 94,776 152.11 11.05 4.625.806 336.060 -5: Kern Rural 0.63 Median 4,181,01 2,634,042 191,36 94,770 89,56 6,50 197,867 2,723,605 14,45 546,016 Rural 4 Non-Median 6.968.36 7,316,78 531.55 2.0 94.77 199.03 7 515 813 -5: Kern I-5: Kern Rural 0.58 5.36 4.78 Non-Median 6.968.365 33.308.78 2.419.847 2.0 94.776 906.059 65,824 34.214.845 2.485.671

4.041.65

117,319,400

1.254.305.769

293.62

8 523 12

91.123.949

94.776

94 776

94,776

109.940

3 989 122

1.677.53

41,290,112

7.98

289 805

2.999.682

4.151.592

121.308.521

1.295.595.881

301.609

8 812 932

3.706.080

94.123.631

Non-Median

Median

Median

6.968.369

4 181 019

4.181.01

4

Rural

Rural

Rural

-5: Kern

TOTAL

I-5: Stanislaus

I-5: San Joaquin

0.58

28.06

280.88

28.06

1.8

TABLE W2. INCREMENTAL REHABILITATION OF DEDICATED TRUCK LANE COSTS FOR ROADWAY SPACE - BASED ON VOLUME

| TABLE W2. INCREME | NTAL REHABILIT | TATION OF | DEDICATE | D TRUCK L | | ROADWAY SPA | CE - BASED ON VOL | | |
|---|-------------------|----------------|----------------|---------------|-----------------------------------|----------------------|---------------------------------|--------------------------|---------------------------------------|
| 0 | City/Suburban/Ru | Pos | t Mile of Se | gment | Conventional | Dedicated Lane | 0004 Heit Ocation | Rehabilitation Costs (\$ | 5) |
| County | ral | | | Length (mi) | Freeway Lanes in One Direction | Placement | 2001-Unit Cost per Lane Mile | Total Cost | EUAC |
| I-5: Los Angeles | Urban | Begin 36.22 | End 36.43 | 0.21 | 4 | Median | 399.656 | 83,928 | 5,306 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 4 | Non-Median | 1,278,900 | 1,061,487 | 67,106 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 3 | Non-Median | 1,278,900 | 1,406,790 | 88,936 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 4 | Non-Median | 1,278,900 | 639,450 | 40,425 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 4 | Non-Median | 1,278,900 | 383,670 | 24,255 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 3 | Non-Median | 1,278,900 | 1,483,524 | 93,787 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 4 | Non-Median | 1,278,900 | 6,650,280 | 420,424 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 4 | Non-Median | 1,278,900 | 294,147 | 18,596 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 4 | Non-Median | 1,278,900 | 140,679 | 8,894 |
| I-5: Los Angeles CA 710: Los Angeles | Urban Suburban | 13.78 12.97 | 14.16 23.28 | 0.38 10.31 | 4 | Median Non-Median | 181,178 1,475,654 | 68,847 15,213,991 | 4,352 961,814 |
| CA 710: LOS Arigeres | Suburban | 4.96 | 10.18 | 5.22 | 3 | Non-Median | 1,475,654 | 7,702,913 | 486,971 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 4 | Non-Median | 1,278,900 | 1,163,799 | 73,574 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 5 | Non-Median | 1,278,900 | 3,465,819 | 219,106 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 4 | Non-Median | 1,278,900 | 4,309,893 | 272,467 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 4 | Non-Median | 1,278,900 | 3,504,186 | 221,531 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 5 | Non-Median | 1,278,900 | 1,112,643 | 70,340 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 4 | Median | 399,656 | 123,893 | 7,832 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 4 | Non-Median | 1,475,654 | 4,117,074 | 260,278 |
| TOTAL | | | | 39.25 | | | | 52,927,014 | 3,345,995 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 5 | Non-Median | 1,278,900 | 2,941,470 | 185,957 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 2.3 5.47 | 5 | Non-Median | 1,278,900 | 6,995,583 | 442,254 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 5 | Non-Median | 1,278,900 | 1,394,001 | 88,127 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 4 | Non-Median | 1,278,900 | 1,304,478 | 82,468 |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 2 | Median | 181,178 | 866,028 | 54,749 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 4 | Non-Median | 1,278,900 | 8,670,942 | 548,169 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 5 | Non-Median | 1,278,900 | 856,863 | 54,170 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 5 | Non-Median | 1,278,900 | 1,061,487 | 67,106 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 4 | Non-Median | 1,278,900 | 358,092 | 22,638 |
| I-5: Los Angeles I-5: Sacramento | Urban Urban | 36.43 26.94 | 36.65 29.87 | 0.22 2.93 | 6 3 | Median Median | 399,656 399,656 | 87,924 1,170,993 | 5,558 74,029 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 3 | Non-Median | 1,278,900 | 319,725 | 20,213 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 4 | Non-Median | 1,672,408 | 3.060.506 | 193,482 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 2 | Median | 181,178 | 2,619,827 | 165,623 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 3 | Non-Median | 1,278,900 | 281,358 | 17,787 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 4 | Non-Median | 1,278,900 | 3,632,076 | 229,616 |
| I-5: Los Angeles | Urban | 40 | | 1 | 3 | Non-Median | 1,278,900 | 1,700,937 | 107,532 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 3 | Median | 181,178 | 161,248 | 10,194 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 3 | Median | 181,178 | 1,895,117 | 119,807 |
| I-5: Sacramento | Urban Rural | 23.1 | 24.51 | 1.41 | 5 3 | Non-Median Median | 1,278,900 | 1,803,249 2,154,200 | 114,000 136,187 |
| I-5: San Joaquin I-5: Sacramento | Urban | 28.56 14.46 | 40.45 16.7 | 11.89 2.24 | 3 | Median | 181,178 399,656 | 895,230 | 56,596 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 4 | Non-Median | 1,278,900 | 4,527,306 | 286,212 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 4 | Non-Median | 1,278,900 | 2,711,268 | 171,404 |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 2 | Median | 181,178 | 1,692,198 | 106,979 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 4 | Non-Median | 1,278,900 | 588,294 | 37,191 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 5 | Non-Median | 1,278,900 | 434,826 | 27,489 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 5 | Median | 181,178 | 298,943 | 18,899 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 4 | Non-Median | 1,672,408 | 9,683,241 | 612,165 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 5 | Non-Median | 1,278,900 | 575,505 | 36,383 |
| TOTAL | | | | 97.88 | | | | 64,742,915 | 4,092,985 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 4 | Non-Median | 1,672,408 | 3,244,471 | 205,112 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 4 | Non-Median | 1,672,408 | 903,100 | · · · · · · · · · · · · · · · · · · · |
| I-5: Los Angeles | Rural | | 86.13 | 1.37 | 4 | Non-Median | 1,672,408 | | |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 4 | Median | 181,178 | 1,146,854 | 72,503 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 2 | Median | 181,178 | 12,894,403 | 815,172 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 4 | Median | 181,178 | 280,825 | 17,753 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 4 | Non-Median | 1,672,408 | 14,683,740 | |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 4 | Non-Median Median | 1,672,408 | 4,465,329 | |
| I-5: Los Angeles I-5: Fresno | Rural Rural | 59.95 0 | 65.43 66.16 | 5.48 66.16 | 2 | Median Median | 181,178 181,178 | 992,853 11,986,703 | 62,767 757,788 |
| I-5: Fresno I-5: Kings | Rural | 0 | 26.72 | 26.72 | 2 | Median | 181,178 | 4,841,063 | |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 4 | Non-Median | 1,672,408 | 3,746,193 | |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 2 | Median | 181,178 | 5,879,210 | |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 4 | Median | 181,178 | 141,318 | |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 4 | Non-Median | 1,672,408 | 7,910,488 | |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 4 | Median | 181,178 | 193,860 | 12,256 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 4 | Median | 181,178 | 114,142 | 7,216 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 4 | Non-Median | 1,672,408 | 1,756,028 | |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 4 | Non-Median | 1,672,408 | 7,994,109 | |
| I-5: Kern | Rural | U | 0.58 | 0.58 | 4 | Non-Median | 1,672,408 | 969,996 | 61,322 |
| I-5: Stanislaus I-5: San Joaquin | Rural Rural | 0.0 | 28.06 11.8 | 28.06 11.8 | 2 2 | Median Median | 181,178 | 5,083,841 2,137,895 | 321,396 135,156 |
| TOTAL | ruidi | 0.0 | 11.0 | 280.88 | | iviedian | 181,178 | 93,657,618 | |
| IUIAL | | | | ∠0U.00 | l | | | 93,007,018 | 5,920,94 |

APPENDIX X

DEDICATED TRUCK LANE VEHICLE-HOURS AND VEHICLE-MILES, VEHICLE OPERATING COSTS, AND USER COSTS AT VARIOUS VOLUMES

Introduction

This appendix shows supporting tables for the calculation of vehicle-miles, vehicle-hours, vehicle operating costs, and user travel time costs for low-, medium-, and high-volume traffic conditions for the added-dedicated-truck-lane configuration (these traffic conditions are described in Appendix S).

Methodologies

Sorting methodologies for the tables in this appendix are identical to those presented in Appendix S. Calculation methodologies for the tables shown here are identical to those for calculation of the corresponding values for the added-dedicated-truck-lane scenario at base volumes, which is presented in Appendix M. Values were summed for the low-, medium-, and high-volume conditions to determine a total cost for each type of segment.

Results

The vehicle-miles of travel and vehicle operating costs are shown in Table X1a for the existing freeway conditions (sorted by volume), in Table X2a for the dedicated truck lane lane added to the existing configuration, and Table X3a for the traffic remaining in the conventional lanes. Tables X1b, X2b, and X3b show vehicle-hours of travel and user travel-time costs for the existing configuration (sorted by volume), for the dedicated truck lane, and for the traffic remaining on the conventional lanes, respectively.

| TABLE X1a. VEHICLE | OPERATING C | OSTS - BA | SE CONE | DITION - SEG | | | | | | | | | | | | |
|--------------------------------------|----------------|----------------|----------------|---------------|-----------------------------|---------------------------|------------------------|---------------------------------------|--------------------------------------|---------------------|--------------------------|--------------------------|------------------------|--------------------------------|---------------------------|----------------------|
| County | City/Suburban/ | Pos | t Mile of S | egment | Peak Period V Travel, On | | Nighttime Off-Per | ak Period Vehicle- , One Direction | Daytime Off-Peak Miles of Travel, | | Pea | | | ating Costs (\$) e Off-Peak | Davtime | Off-Peak |
| • • • • | Rural | Begin | End | Length (mi) | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 806 | 9,274 | 99 | 1,137 | 1,447 | 16,637 | 1,424 | 3,014 | 175 | | 2,555 | 5,407 |
| I-5: Los Angeles I-5: Sacramento | Urban Urban | 20.58 22 | 21.41 23.1 | 0.83 1.1 | 5,312 2,541 | 61,088 20,559 | 417 432 | 4,790 3,495 | 3,567 6,102 | 41,026 49,371 | 9,381 4,487 | 19,854 6,682 | 736 763 | | 6,300 10,776 | 13,333 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 1,663 | 22,088 | 191 | 2.541 | 2.696 | 35,821 | 2,936 | 7,178 | 338 | | 4.762 | 11,642 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 1,442 | 14,578 | 146 | 1,481 | 896 | 9,057 | 2,546 | 4,738 | 259 | | 1,582 | 2,944 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 2,941 | 19,679 | 481 | 3,219 | 6,682 | 44,718 | 5,193 | 6,396 | 849 | | 11,801 | 14,533 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 26,832 | 241,488 | 2,846 | 25,618 | 17,122 | 154,094 | 47,386 | 78,484 | 5,027 | | 30,237 | |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 46.9 43.9 | 47.13 44.01 | 0.23 | 1,187 449 | 10,681 5,161 | 122 67 | 1,098 771 | 761 496 | 6,851 5,706 | 2,096 793 | 3,471 1,677 | 215 118 | | 1,344 876 | |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 1,532 | 17,620 | 109 | 1,249 | 2,250 | 25,880 | 2,706 | 5,726 | 192 | | 3,974 | 8,411 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 98,976 | 560,864 | 7,623 | 43,196 | 63,516 | 359,925 | 174,793 | 182,281 | 13,462 | 14,039 | 112,170 | 116,976 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 37,584 | 212,976 | 2,456 | 13,917 | 14,770 | 83,697 | 66,374 | 69,217 | 4,337 | 4,523 | 26,084 | 27,201 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 28.25 36.65 | 29.16 39.36 | 0.91 2.71 | 2,985 11.057 | 34,325 127,153 | 312 1,230 | 3,590 14.149 | 4,129 16.981 | 47,479 195,280 | 5,271 19,526 | 11,156 41.325 | 551 2.173 | | 7,291 29,988 | 15,431 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 17,254 | 198,426 | 1,450 | 16,671 | 13,648 | 156,951 | 30,471 | 64.488 | 2,173 | 5,418 | 24,102 | 51,009 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 10,522 | 120,998 | 796 | 9,149 | 17,179 | 197,556 | 18,581 | 39,324 | 1,405 | | 30,338 | |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 5,512 | 63,392 | 430 | 4,949 | 3,662 | 42,114 | 9,735 | 20,602 | 760 | | 6,467 | |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 1,176 | 13,518 | 83 | 956 | 1,717 | 19,750 | 2,076 | 4,394 | 147 | | 3,033 | 6,419 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 23,436 253,206 | 143,964 1,897,833 | 1,540 20,830 | 9,461 161,438 | 9,397 187,018 | 57,722 1,549,636 | 41,388 447,164 | 46,788 616,796 | 2,720 36,787 | 3,075 52,467 | 16,594 330,27 6 | 18,760 503,632 |
| | | | | | | .,00.,000 | | | | .,0.0,000 | ,104 | | 55,101 | | | |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 10,488 | 120,612 | 1,463 | 16,821 | 10,129 | 116,487 | 18,522 | 39,199 | 2,583 | 5,467 | 17,889 | 37,858 |
| I-5: Los Angeles | Urban | 22.78 44.01 | 28.25 | 1.09 | 18,188 | 241,637 | 2,092 739 | 27,800 6.650 | 29,497 | 391,886 52,602 | 32,120 | 78,532 17,408 | 3,695 1,305 | 9,035 2,161 | 52,092 10.322 | 127,363 17,096 |
| I-5: Los Angeles I-5: Sacramento | Urban Urban | 44.01 24.51 | 45.1 25.53 | 1.09 | 5,951 2,010 | 53,563 20,328 | 739 319 | 6,650 3,225 | 5,845 4,372 | 52,602 44,206 | 10,510 3,550 | 17,408 6,606 | 1,305 563 | 2,161 1,048 | 10,322 7,721 | 17,096 |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 16,061 | 84,319 | 1,471 | 7,722 | 13,060 | 68,567 | 28,364 | 27,404 | 2,597 | 2,510 | 23,065 | 22,284 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 19,526 | 224,554 | 2,052 | 23,599 | 27,238 | 313,231 | 34,484 | 72,980 | 3,624 | 7,670 | 48,102 | 101,800 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 3,578 | 32,200 | 363 | 3,270 | 2,223 | 20,006 | 6,318 | 10,465 | 642 | | 3,926 | 6,502 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 45.1 35.94 | 45.93 36.22 | 0.83 0.28 | 3,989 762 | 40,333 8,758 | 440 85 | 4,452 975 | 3,041 1,170 | 30,745 13,451 | 7,045 1,345 | 13,108 2,846 | 778 150 | | 5,370 2,066 | 9,992 4,372 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 880 | 10,120 | 104 | 1,191 | 1,480 | 17,025 | 1,554 | 3,289 | 183 | | 2,000 | 5,533 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 9,476 | 76,666 | 759 | 6,143 | 5,558 | 44,968 | 16,734 | 24,917 | 1,341 | 1,997 | 9,815 | 14,614 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 662 | 6,689 | 53 | 536 | 388 | 3,923 | 1,168 | 2,174 | 94 | | 685 | 1,275 |
| I-5: Los Angeles I-5: Sacramento | Rural Rural | 52.33 | 54.16 14.46 | 1.83 14.46 | 5,947 32,535 | 53,528 97,605 | 723 20,742 | 6,511 62,226 | 5,224 55,173 | 47,016 165,519 | 10,503 57,457 | 17,396 31,722 | 1,278 36.630 | 2,116 20,223 | 9,226 97,436 | 5 15,280 5 53,794 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 1.188 | 3,762 | 96 | 303 | 1,092 | 3,459 | 2,098 | 1,223 | 169 | | 1,929 | |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 7,157 | 43,963 | 1,230 | 7,557 | 17,457 | 107,236 | 12,639 | 14,288 | 2,173 | | 30,829 | 34,852 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 2,202 | 22,270 | 683 | 6,910 | 11,119 | 112,425 | 3,890 | 7,238 | 1,207 | 2,246 | 19,636 | 36,538 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 4,859 | 13,831 | 794 | 2,259 | 4,066 | 11,572 | 8,582 | 4,495 | 1,402 | 734 | 7,180 | 3,761 |
| I-5: San Joaquin I-5: Sacramento | Rural Urban | 14.34 23.1 | 24.8 24.51 | 10.46 1.41 | 54,392 3,003 | 154,808 27,030 | 6,073 537 | 17,284 4,833 | 48,319 7,740 | 137,524 69,658 | 96,057 5,304 | 50,313 8,785 | 10,725 948 | 5,617 1,571 | 85,332 13,668 | 44,695 22,639 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 54,694 | 183,106 | 4.410 | 14,763 | 50,284 | 168,343 | 96,590 | 59,509 | 7,788 | 4,798 | 88,802 | 54,711 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 3,763 | 23,117 | 597 | 3,668 | 8,184 | 50,271 | 6,646 | 7,513 | 1,055 | | 14,452 | 16,338 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 21,240 | 67,260 | 2,371 | 7,510 | 18,869 | 59,750 | 37,510 | 21,860 | 4,188 | | 33,322 | 19,419 |
| I-5: Sacramento I-5: San Joaquin | Urban Rural | 16.7 40.45 | 18.82 49.79 | 2.12 9.34 | 4,452 20,623 | 27,348 65,305 | 706 6,489 | 4,339 20,547 | 9,682 28,929 | 59,473 91,607 | 7,862 36,420 | 8,888 21,224 | 1,248 11,459 | 1,410 6,678 | 17,098 51,088 | 19,329 29,772 |
| I-5: Los Angeles | Urban | 39.81 | 49.79 | 0.46 | 795 | 8.037 | 131 | 1,328 | 1,765 | 17.844 | 1,404 | 2,612 | 232 | | 3,117 | |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 771 | 4,737 | 143 | 877 | 2,085 | 12,807 | 1,362 | 1,539 | 252 | | 3,682 | 4,162 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 10,725 | 30,525 | 1,509 | 4,294 | 14,793 | 42,104 | 18,940 | 9,921 | 2,665 | | 26,125 | |
| I-5: Los Angeles | Rural | 54.16 | 59.95 39.81 | 5.79 | 18,528 720 | 97,272 | 2,254 123 | 11,832 | 16,274 | 85,440 19,286 | 32,721 | 31,613 2,691 | 3,980 217 | | 28,740 2,962 | 27,768 |
| I-5: Los Angeles TOTAL | Urban | 39.36 | 39.61 | 0.45 | 339,166 | 8,280 1,851,561 | 59,552 | 1,414 280,841 | 1,677 406,731 | 2,378,430 | 1,272 598,970 | 601,757 | 105,169 | | 718,291 | 6,268 772,990 |
| | <u> </u> | | | | | | | | | | | | | | | |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 11,000 | 29,740 | 1,860 | 5,028 | 5,474 | 14,799 | 19,426 | 9,666 | 3,284 | 1,634 | 9,666 | 4,810 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 86.13 84.76 | 86.67 86.13 | 0.54 1.37 | 3,062 7,768 | 8,278 21,002 | 518 1,313 | 1,400 3,551 | 1,524 3,865 | 4,119 10,451 | 5,407 13,718 | 2,690 6,826 | 914 2,319 | 455 1,154 | 2,691 6,826 | 1,339 3,397 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 35,891 | 97,039 | 6,068 | 16,405 | 17,860 | 48,287 | 63,384 | 31,538 | 10,716 | 5,332 | 31,540 | 15,693 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 175,434 | 429,511 | 35,667 | 87,323 | 139,767 | 342,188 | 309,818 | 139,591 | 62,989 | 28,380 | 246,830 | 111,211 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 6,185 | 26,366 | 1,046 | 4,457 | 3,077 | 13,120 | 10,922 | 8,569 | 1,846 | | 5,435 | 4,264 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 33,188 | 151,192 | 5,611 | 25,560 | 16,515 | 75,234 | 58,611 | 49,137 | 9,909 | 8,307 2,526 | 29,165 | 24,451 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 65.43 59.95 | 68.1 65.43 | 2.67 5.48 | 10,093 20,714 | 45,977 94,366 | 1,706 3,502 | 7,773 15,953 | 5,022 10,308 | 22,879 46,957 | 17,824 36,582 | 14,943 30,669 | 3,013 6,185 | 2,526 5,185 | 8,869 18,203 | 7,436 15,261 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 148,860 | 347,340 | 53,743 | 125,401 | 95,117 | 221,939 | 262,888 | 112,886 | 94,911 | 40,755 | 167,977 | |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 60,120 | 140,280 | 20,821 | 48,583 | 39,299 | 91,697 | 106,173 | 45,591 | 36,770 | 15,789 | 69,402 | 29,802 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 12,096 | 28,224 | 2,207 | 5,150 | 5,857 | 13,666 | 21,362 | 9,173 | 3,898 | 1,674 | 10,343 | 4,441 |
| I-5: Merced | Rural Rural | 0 15.08 | 32.45 15.86 | 32.45 0.78 | 56,463 | 138,237 8,424 | 21,974 717 | 53,798 1,845 | 62,721 2,559 | 153,558 6,579 | 99,714 5,785 | 44,927 2,738 | 38,806 1,267 | 17,484 599 | 110,765 4,519 | 49,906 |
| I-5: Kern I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 3,276 23.839 | 61.301 | 4.350 | 11.185 | 2,559 | 29.682 | 42,100 | 19.923 | 7,682 | 3.635 | 20.385 | 9,647 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 5,393 | 13,867 | 984 | 2,530 | 2,611 | 6,714 | 9,524 | 4,507 | 1,738 | | 4,611 | |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 3,175 | 8,165 | 579 | 1,490 | 1,537 | 3,953 | 5,607 | 2,654 | 1,023 | 484 | 2,715 | 1,285 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 5,292 | 13,608 | 966 | 2,483 | 2,562 | 6,589 | 9,346 | 4,423 | 1,705 | 807 | 4,525 | 2,141 |
| I-5: Kern I-5: Kern | Rural Rural | 0.58 | 5.36 0.58 | 4.78 0.58 | 24,091 2,923 | 61,949 7,517 | 4,396 533 | 11,304 1,372 | 11,665 1,415 | 29,996 3,640 | 42,545 5,162 | 20,133 2,443 | 7,763 942 | 3,674 446 | 20,600 | 9,749 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 31,427 | 80,813 | 12,231 | 31,450 | 34,910 | 89,769 | 55,501 | 26,264 | 21,599 | 10,221 | 61,652 | 29,175 |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 9,204 | 26,196 | 2,464 | 7,013 | 19,012 | 54,111 | 16,254 | 8,514 | 4,351 | 2,279 | 33,575 | 17,586 |
| TOTAL | | | | 1 | 689,494 | 1,839,391 | 183,255 | 471,053 | 494,219 | 1,289,927 | 1,217,654 | 597,802 | 323,631 | 153,092 | 872,797 | 419,226 |

| TABLE X1b. TRAVEL | | | | | | ehicle-Hours of | | ak Period Vehicle- | Daytime Off-Pe | ak Period Vehicle- | Travel Time Cost (\$) | | | | | |
|---|-------------------------|----------------|----------------|--|----------------|------------------|---------------|--------------------|----------------|--------------------|-----------------------|-----------------|----------------|--------------|------------------|-----------------|
| County | City/Suburban/ Rural | Pos | st Mile of S | egment | | ne Direction | | I, One Direction | | el, One Direction | Pea | ak | Nighttime Of | | Daytime Off- | f-Peak |
| , | Rurai | Begin | End | Length (mi) | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | | Other Veh. |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 16.1 | 289.8 | 2.0 | 20.7 | 28.9 | 302.5 | 456 | 2,653 | 56 | 189 | 818 | 2,770 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 106.2 | 1,527.2 | 8.3 | 87.1 | 71.3 | 745.9 | 3,004 | 13,982 | 236 | 797 | 2,017 | 6,829 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 50.8 | 541.0 | 8.6 | 63.5 | 122.0 | 897.7 | 1,437 | 4,953 | 244 | 582 | 3,451 | 8,218 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 33.3 | 552.2 | 3.8 | 46.2 | 53.9 | 651.3 | 940 | 5,056 | 108 | 423 | 1,525 | 5,963 |
| I-5: Los Angeles I-5: Sacramento | Urban Urban | 46.6 25.53 | 46.9 26.69 | 0.3 1.16 | 28.8 58.8 | 316.9 410.0 | 2.9 9.6 | 26.9 58.5 | 17.9 133.6 | 164.7 813.1 | 815 1,663 | 2,902 3,754 | 83 272 | 246 536 | 507 3,779 | 1,508 7,44 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 536.6 | 4,829.8 | 56.9 | 465.8 | 342.4 | 2,801.7 | 15.173 | 44.219 | 1,610 | 4,264 | 9,682 | 25,65 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 23.7 | 213.6 | 2.4 | 20.0 | 15.2 | 124.6 | 671 | 1,956 | 69 | 183 | 430 | 1,140 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 9.0 | 101.2 | 1.3 | 14.0 | 9.9 | 103.7 | 254 | 927 | 38 | 128 | 281 | 950 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 30.6 | 338.8 | 2.2 | 22.7 | 45.0 | 470.5 | 866 | 3,102 | 61 | 208 | 1,273 | 4,308 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 1,979.5 | 9,506.2 | 152.5 | 664.6 | 1,270.3 | 5,537.3 | 55,970 | 87,034 | 4,311 | 6,084 | 35,918 | 50,697 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 751.7 | 3,736.4 | 49.1 | 214.1 | 295.4 | 1,287.6 | 21,253 | 34,209 | 1,389 | 1,960 | 8,352 | 11,789 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 59.7 | 647.6 | 6.2 | 65.3 | 82.6 | 863.3 | 1,688 | 5,930 | 177 | 598 | 2,335 | 7,904 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 221.1 | 2,399.1 | 24.6 | 257.3 | 339.6 | 3,550.5 | 6,252 | 21,965 | 696 | 2,355 | 9,602 | 32,507 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 345.1 | 3,674.5 | 29.0 | 303.1 | 273.0 | 2,853.7 | 9,757 | 33,642 | 820 | 2,775 | 7,718 | 26,127 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 210.4 | 2,240.7 | 15.9 | 166.3 | 343.6 | 3,591.9 | 5,950 | 20,515 | 450 | 1,523 | 9,714 | 32,886 |
| I-5: Los Angeles | Urban Urban | 21.41 16.9 | 22.28 17.21 | 0.87 | 110.2 23.5 | 1,173.9 250.3 | 8.6 1.7 | 90.0 17.4 | 73.2 34.3 | 765.7 359.1 | 3,117 665 | 10,748 | 243 47 | 824 159 | 2,071 971 | 7,010 3,288 |
| I-5: Los Angeles CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 468.7 | 2,360.1 | 30.8 | 145.6 | 187.9 | 888.0 | 13,253 | 21,608 | 871 | 1,333 | 5,314 | 8,130 |
| TOTAL | Subulball | 10.10 | 12.91 | 2.19 | 5,064.1 | 35,109.5 | 416.6 | 2,749.0 | 3,740.4 | 26,772.8 | 143,185 | 321,446 | 11,779 | 25,169 | 105,756 | 245,119 |
| . VIAL | † | - | | | 0,004.1 | 55,105.5 | 710.0 | 2,143.0 | 5,140.4 | 20,112.0 | 145,105 | 321,440 | 11,779 | 20,103 | 100,700 | £40,118 |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 209.8 | 2,192.9 | 29.3 | 305.8 | 202.6 | 2,118.0 | 5,931 | 20,078 | 827 | 2,800 | 5,728 | 19,391 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 363.8 | 4,393.4 | 41.8 | 505.5 | 589.9 | 7,125.2 | 10,285 | 40,224 | 1,183 | 4,628 | 16,680 | 65,235 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 119.0 | 973.9 | 14.8 | 120.9 | 116.9 | 956.4 | 3,365 | 8,916 | 418 | 1,107 | 3,305 | 8,756 |
| I-5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 40.2 | 369.6 | 6.4 | 58.6 | 87.4 | 803.7 | 1,137 | 3,384 | 180 | 537 | 2,472 | 7,359 |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 321.2 | 1,338.4 | 29.4 | 118.8 | 261.2 | 1,054.9 | 9,082 | 12,254 | 832 | 1,088 | 7,386 | 9,658 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 390.5 | 4,082.8 | 41.0 | 429.1 | 544.8 | 5,695.1 | 11,042 | 37,380 | 1,160 | 3,928 | 15,402 | 52,142 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 71.6 | 585.5 | 7.3 | 59.5 | 44.5 | 363.7 | 2,023 | 5,360 | 205 | 544 | 1,257 | 3,330 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 79.8 | 733.3 | 8.8 | 81.0 | 60.8 | 559.0 | 2,256 | 6,714 | 249 | 741 | 1,719 | 5,118 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 15.2 | 159.2 | 1.7 | 17.7 | 23.4 | 244.6 | 431 | 1,458 | 48 | 162 | 661 | 2,239 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 17.6 | 184.0 | 2.1 | 21.7 | 29.6 | 309.5 | 498 | 1,685 | 59 | 198 | 837 | 2,834 |
| I-5: Sacramento I-5: Sacramento | Urban | 26.94 26.69 | 29.87 26.94 | 2.93 0.25 | 189.5 13.2 | 1,393.9 | 15.2 1.1 | 111.7 9.7 | 111.2 7.8 | 817.6 71.3 | 5,358 374 | 12,762 | 429 30 | 1,023 | 3,143 219 | 7,485 |
| | Urban Rural | 52.33 | 54.16 | 1.83 | 119.0 | 121.6 823.5 | 14.5 | 100.2 | 104.5 | 71.3 | 3.363 | 1,113 7,540 | 409 | 917 | 2.954 | 653 6,622 |
| I-5: Los Angeles I-5: Sacramento | Rural | 02.33 | 14.46 | 14.46 | 650.7 | 1,525.1 | 414.8 | 957.3 | 1,103.5 | 2,546.5 | 18,398 | 13,963 | 11,729 | 8,765 | 31,200 | 23,314 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 23.8 | 57.9 | 1.9 | 5.5 | 21.8 | 62.9 | 672 | 530 | 54 | 50 | 618 | 576 |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 143.1 | 799.3 | 24.6 | 137.4 | 349.1 | 1,949.7 | 4.047 | 7.318 | 696 | 1,258 | 9.872 | 17.851 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 44.0 | 404.9 | 13.7 | 125.6 | 222.4 | 2,121.2 | 1,245 | 3,707 | 386 | 1,150 | 6,288 | 19,421 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 97.2 | 212.8 | 15.9 | 34.7 | 81.3 | 178.0 | 2,748 | 1,948 | 449 | 318 | 2,299 | 1,630 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1,087.8 | 2,381.7 | 121.5 | 265.9 | 966.4 | 2,115.7 | 30,758 | 21,805 | 3,434 | 2,435 | 27,324 | 19,371 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 60.1 | 491.4 | 10.7 | 87.9 | 154.8 | 1,266.5 | 1,698 | 4,499 | 304 | 804 | 4,377 | 11,596 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 1,093.9 | 2,817.0 | 88.2 | 227.1 | 1,005.7 | 2,589.9 | 30,929 | 25,791 | 2,494 | 2,079 | 28,435 | 23,712 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 75.3 | 420.3 | 11.9 | 66.7 | 163.7 | 914.0 | 2,128 | 3,848 | 338 | 611 | 4,628 | 8,368 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 424.8 | 1,222.9 | 47.4 | 136.5 | 377.4 | 1,086.4 | 12,011 | 11,196 | 1,341 | 1,250 | 10,670 | 9,946 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 89.0 | 497.2 | 14.1 | 78.9 | 193.6 | 1,081.3 | 2,518 | 4,552 | 399 | 722 | 5,475 | 9,900 |
| I-5: San Joaquin | Rural Urban | 40.45 39.81 | 49.79 40.27 | 9.34 0.46 | 412.5 15.9 | 1,004.7 146.1 | 129.8 2.6 | 316.1 24.1 | 578.6 35.3 | 1,409.3 324.4 | 11,662 449 | 9,199 1,338 | 3,669 74 | 2,894 | 16,359 998 | 12,903 2,970 |
| I-5: Los Angeles I-5: Sacramento | Urban | 18.82 | 19.16 | 0.46 | 15.4 | 86.1 | 2.9 | 15.9 | 41.7 | 232.9 | 436 | 789 | 81 | 146 | 1,179 | 2,970 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 214.5 | 469.6 | 30.2 | 66.1 | 295.9 | 647.7 | 6,065 | 4,300 | 853 | 605 | 8,365 | 5,930 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 370.6 | 1.496.5 | 45.1 | 182.0 | 325.5 | 1,314,5 | 10,477 | 13.701 | 1,274 | 1.667 | 9,203 | 12.035 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 14.4 | 150.5 | 2.5 | 25.7 | 33.5 | 350.7 | 407 | 1.378 | 70 | 235 | 948 | 3,210 |
| TOTAL | | | | 1 | 6,783.3 | 31,536.2 | 1,191.0 | 4,693.8 | 8,134.6 | 41,034.1 | 191,794 | 288,730 | 33,676 | 42,974 | 230,001 | 375,688 |
| | | | | | | | | | | | | | | | | |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 220.0 | 457.5 | 37.2 | 77.4 | 109.5 | 227.7 | 6,220 | 4,189 | 1,052 | 708 | 3,095 | 2,084 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 61.2 | 127.4 | 10.4 | 21.5 | 30.5 | 63.4 | 1,731 | 1,166 | 293 | 197 | 862 | 580 |
| I-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 155.4 | 323.1 | 26.3 | 54.6 | 77.3 | 160.8 | 4,393 | 2,958 | 743 | 500 | 2,186 | 1,472 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 717.8 | 1,492.9 | 121.4 | 252.4 | 357.2 | 742.9 | 20,296 | 13,668 | 3,431 | 2,311 | 10,099 | 6,801 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 3,508.7 | 6,607.9 | 713.3 | 1,343.4 | 2,795.3 | 5,264.4 | 99,206 | 60,498 | 20,169 | 12,300 | 79,036 | 48,199 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 68.1 69.65 | 69.65 78.43 | 1.55 8.78 | 123.7 663.8 | 405.6 2,326.0 | 20.9 112.2 | 68.6 393.2 | 61.5 330.3 | 201.8 1,157.4 | 3,497 18,768 | 3,714 21,296 | 591 3,173 | 628 3,600 | 1,740 9,339 | 1,848 10,597 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 201.9 | 707.3 | 34.1 | 119.6 | 100.4 | 352.0 | 5,707 | 6,476 | 965 | 1,095 | 2,840 | 3,223 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 414.3 | 1,451.8 | 70.0 | 245.4 | 206.2 | 722.4 | 11.714 | 13.292 | 1.980 | 2,247 | 5.829 | 6,614 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 2,977.2 | 5,343.7 | 1,074.9 | 1,929.2 | 1,902.3 | 3,414.4 | 84,179 | 48,924 | 30,391 | 17,663 | 53,787 | 31,261 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 1,202.4 | 2,158.2 | 416.4 | 747.4 | 786.0 | 1,410.7 | 33,997 | 19,759 | 11,774 | 6,843 | 22,223 | 12,916 |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 241.9 | 434.2 | 44.1 | 79.2 | 117.1 | 210.2 | 6,840 | 3,975 | 1,248 | 725 | 3,312 | 1,925 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 1,129.3 | 2,126.7 | 439.5 | 827.7 | 1,254.4 | 2,362.4 | 31,929 | 19,471 | 12,426 | 7,578 | 35,468 | 21,629 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 65.5 | 129.6 | 14.3 | 28.4 | 51.2 | 101.2 | 1,853 | 1,187 | 406 | 260 | 1,447 | 927 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 476.8 | 943.1 | 87.0 | 172.1 | 230.9 | 456.6 | 13,481 | 8,634 | 2,460 | 1,576 | 6,527 | 4,181 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 107.9 | 213.3 | 19.7 | 38.9 | 52.2 | 103.3 | 3,050 | 1,953 | 556 | 356 | 1,477 | 946 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 63.5 | 125.6 | 11.6 | 22.9 | 30.7 | 60.8 | 1,796 | 1,150 | 328 | 210 | 869 | 557 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 105.8 | 209.4 | 19.3 | 38.2 | 51.2 | 101.4 | 2,993 | 1,917 | 546 | 350 | 1,449 | 928 |
| I-5: Kern | Rural | 0.58 | 5.36 0.58 | 4.78 | 481.8 58.5 | 953.1 | 87.9 | 173.9 | 233.3 | 461.5 | 13,623 | 8,726 | 2,486 | 1,592 | 6,596 | 4,225 |
| | | | | 0.58 | 58.5 | 115.6 | 10.7 | 21.1 | 28.3 | 56.0 | 1,653 | 1,059 | 302 | 193 | 800 | 513 |
| I-5: Kern | Rural | 0 | 0.00 | 0.00 | | | 244.6 | | | | | | | 4 420 | | |
| | Rural Rural | 0 | 28.06 11.8 | 28.06 11.8 | 628.5 184.1 | 1,243.3 403.0 | 244.6 49.3 | 483.8 107.9 | 698.2 380.2 | 1,381.1 832.5 | 17,772 5,205 | 11,383 3,690 | 6,916 1,393 | 4,430 988 | 19,741 10,751 | 12,644 7.622 |

| | | _ | | | | Nighttime Off-Peak Other | Daytime Off-Peak Other | V | ehicle Operating Cos | t (\$) |
|--------------------------------------|-----------------|----------------|----------------|---------------|---------------------------|--------------------------|--------------------------|----------------------|----------------------|-----------------------|
| County | City/Suburban/R | Pos | t Mile of Se | egment | Peak Period Vehicle-Miles | Vehicle-Miles of Travel, | Vehicle-Miles of Travel, | Peak | Nighttime Off-Peak | |
| | ural | Begin | End | Length (mi) | of Travel, One Direction | One Direction | One Direction | Truck | Truck | Truck |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 144 | 18 | 258 | 254 | 31 | 45 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 911 | 74 | 675 | 1,608 | 131 | 1,19 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 154 | 26 | 370 | 272 | 46 | |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 365 | 42 53 | 593 | 645 | 74 94 | 1,04 |
| I-5: Los Angeles I-5: Sacramento | Urban Urban | 46.6 25.53 | 46.9 26.69 | 0.3 1.16 | 522 169 | 28 | 325 384 | 923 298 | 49 | 57 67 |
| I-5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 8,944 | 949 | 5,707 | 15,795 | 1,676 | 10,07 |
| I-5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 396 | 41 | 254 | 699 | 72 | 44 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 146 | 22 | 162 | 258 | 39 | |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 299 | 21 | 440 | 528 | 37 | 77 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 11,997 | 924 | 7,699 | 21,187 | 1,632 | 13,59 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 3,579 | 234 | 1,407 | 6,321 | 413 | 2,48 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 732 | 77 | 1,012 | 1,292 | 135 402 | 1,78 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 36.65 17.21 | 39.36 20.58 | 2.71 3.37 | 2,048 3,595 | 228 302 | 3,145 2,843 | 3,616 6,348 | 533 | 5,55 5,02 |
| I-5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 2,023 | 153 | 3,304 | 3,573 | 270 | 5,83 |
| I-5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 999 | 78 | 663 | 1,764 | 138 | 1,17 |
| I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.31 | 245 | 17 | 358 | 432 | 31 | 63 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 3,805 | 250 | 1,525 | 6,719 | 442 | 2,69 |
| TOTAL | | | | | 41,072 | 3,536 | 31,122 | 72,534 | 6,245 | 54,96 |
| | <u> </u> | | | | | | ļ I | | | |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 2,185 | 305 | 2,110 | 3,859 | 538 | 3,72 |
| I-5: Los Angeles | Urban Urban | 22.78 44.01 | 28.25 45.1 | 5.47 1.09 | 3,997 1,553 | 460 193 | 6,483 1,525 | 7,059 2,742 | 812 340 | 11,44 2,69 |
| I-5: Los Angeles I-5: Sacramento | Urban | 24.51 | 25.53 | 1.09 | 1,553 | 193 | 333 | 2,742 | 43 | 2,69 |
| I-5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 1,255 | 115 | 1,020 | 2,216 | 203 | 1,80 |
| I-5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 5,424 | 570 | 7,566 | 9,579 | 1,007 | 13,36 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 1,167 | 118 | 725 | 2,060 | 209 | 1,28 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 1,330 | 147 | 1,014 | 2,348 | 259 | 1,79 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 212 | 24 | 325 | 374 | 42 | |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 157 | 18 | 264 | 278 | 33 | 46 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 879 75 | 70 | 516 44 | 1,552 | 124 | 910 |
| I-5: Sacramento I-5: Los Angeles | Urban Rural | 26.69 52.33 | 26.94 54.16 | 0.25 1.83 | 2,745 | 6 334 | 2,411 | 132 4,848 | 11 590 | 4,25 |
| I-5: Sacramento | Rural | 0 | 14.46 | 14.46 | 2,169 | 1,383 | 3,678 | 3,830 | 2,442 | 6,49 |
| I-5: San Joaquin | Urban | 28.34 | 28.56 | 0.22 | 55 | 4 | 51 | 97 | 8 | |
| I-5: Sacramento | Urban | 19.16 | 22 | 2.84 | 393 | 68 | 959 | 694 | 119 | 1,69 |
| I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 418 | 130 | 2,112 | 739 | 229 | 3,730 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 334 | 55 | 279 | 589 | 96 | 49: |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 2,615 | 292 | 2,323 | 4,618 | 516 | 4,10 |
| I-5: Sacramento I-5: San Joaquin | Urban Rural | 23.1 28.56 | 24.51 40.45 | 1.41 11.89 | 188 2,973 | 34 240 | 484 2,733 | 331 5,249 | 59 423 | 4,82 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 336 | 53 | 731 | 5,249 | 94 | 1,29 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 885 | 99 | 786 | 1,563 | 175 | 1,38 |
| I-5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 318 | 50 | 692 | 562 | 89 | |
| I-5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 1,719 | 541 | 2,411 | 3,035 | 955 | 4,25 |
| I-5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 272 | 45 | 603 | 480 | 79 | 1,06 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.34 | 44 | 8 | 118 | 77 | 14 | 20: |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 491 | 69 | 677 | 867 | 122 | 1,19 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 8,685 | 1,056 | 7,629 | 15,338 | 1,866 | 13,47 |
| I-5: Los Angeles TOTAL | Urban | 39.36 | 39.81 | 0.45 | 257 43,281 | 44 6,554 | 599 51,199 | 454 76,435 | 78 11,575 | 1,056 90,41 |
| IVIAL | | | 1 | 1 | 75,201 | 0,334 | 31,133 | 10,433 | 11,373 | 50,41 |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 3,492 | 590 | 1,738 | 6,167 | 1,043 | 3,069 |
| I-5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 972 | 164 | 484 | 1,717 | 290 | 85 |
| I-5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 2,466 | 417 | 1,227 | 4,355 | 736 | 2,16 |
| I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 11,394 | 1,926 | 5,670 | 20,122 | 3,402 | 10,01 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 71,170 | 14,469 | 56,701 | 125,687 | 25,553 | 100,13 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 2,790 | 472 | 1,388 | 4,927 | 833 | 2,45 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 69.65 65.43 | 78.43 68.1 | 8.78 2.67 | 15,804 4,806 | 2,672 813 | 7,864 2,391 | 27,910 8,487 | 4,718 1,435 | 13,88 4,22 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 9,864 | 1,668 | 4,908 | 17,420 | 2,945 | |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 66,160 | 23,886 | 42,274 | 116,839 | | 74,65 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 26,720 | 9,254 | 17,466 | 47,188 | | |
| I-5: Kern | Rural | 7.04 | 9.28 | 2.24 | 4,032 | 736 | 1,952 | 7,121 | 1,299 | 3,44 |
| I-5: Merced | Rural | 0 | 32.45 | 32.45 | 22,715 | 8,840 | 25,232 | 40,115 | | 44,56 |
| I-5: Kern | Rural | 15.08 | 15.86 | 0.78 | 780 | 171 | 609 | 1,377 | | 1,07 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 8,514 | 1,554 | 4,122 | 15,036 | 2,744 | |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 1,926 | 351 | 933 | 3,401 | 621 | 1,64 |
| I-5: Kern | Rural | 6.41 5.36 | 7.04 6.41 | 0.63 1.05 | 1,134 1,890 | 207 345 | 549 915 | 2,003 | 365 609 | 97 1,61 |
| I-5: Kern I-5: Kern | Rural Rural | 0.58 | 5.36 | 4.78 | 1,890 8,604 | 1,570 | 4,166 | 3,338 15,195 | | 7,35 |
| I-5: Kern | Rural | 0.56 | 0.58 | 0.58 | 1,044 | 1,570 | 506 | 1,844 | | |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 19,642 | 7,644 | 21,819 | 34,688 | 13,500 | |
| I-5: San Joaquin | Rural | 0 | 11.8 | 11.8 | 2,655 | 711 | 5,484 | 4,689 | | |
| TOTAL | | | 1 | 1 | 288,574 | 78,649 | 208,399 | 509,625 | | |

TABLE X2b. TRAVEL TIME COST - DEDICATED LANE - BASE VOLUME - BASED ON VOLUME Travel Time Cost (\$ Nighttime Off-Peak Davtime Off-Peak Othe City/Suburban/ Post Mile of Segment County Hours of Travel, One Period Vehicle-Hours of Vehicle-Hours of Peak Rural Direction Travel, One Direction Travel, One Direction Truck Length (mi 146 I-5: Los Angeles Urban 36.43 2.9 0.4 -5: Los Angeles Urban -5: Sacramento Urban 23.1 3.1 0.5 87 I-5: Los Angeles Urban 22.78 7.3 0.8 11.9 207 335 10.4 -5: Los Angeles Urban 46.6 46.9 6.5 184 Urban 26.69 1.16 16 217 178.9 47.13 I-5: Los Angeles Urban 52.33 19.0 114.1 5,058 537 3,227 47.13 5: Los Angeles Urban 0.23 224 -5: Los Angeles Urbar 44.01 249 Urban 5: Los Angeles CA 710: Los Angeles Suburban 12.97 23.28 10.18 239.9 71.6 18.5 154.0 6,784 522 132 4,354 795 CA 710: LA Suburban 4.96 28.1 2,02 Urban Urban 29.16 39.36 14.6 414 572 1,778 41.0 1,158 -5: Los Angeles I-5: Los Angeles Urban 20.58 3.37 71.9 6.0 56.9 2.033 171 1,608 40.5 1,144 Urban 14.16 16.9 2.74 66.1 87 1,868 -5: Los Angeles 3.1 I-5: Los Angeles Urban 21.41 22.28 0.87 20.0 1.6 565 44 37 Urban 17.21 202 16.9 4.9 0.3 5: Los Angeles CA 710: Los Angeles Suburbar 10 18 12.97 2 79 76.1 30.5 2.151 141 86 821.4 70.7 23,226 17,599 TOTAL 622.4 2,000 43.7 79.9 42.2 129.7 1,236 1,193 -5: Los Angeles Urban 6.1 Urban 22.78 28.25 5.47 9.2 2.260 260 109 3.666 Urban 87 44.01 1.09 31.1 3.9 30.5 862 5: Los Angeles Urban Rural 188 577 65 5: Sacramento 108.5 I-5: Los Angeles Urbar 29.16 35.94 6.78 11.4 151.3 3,067 322 4,278 -5: Los Angeles Urban 45.93 46.6 0.67 14.5 66 67 410 Urbar 45.93 0.83 26.6 29 20.3 573 4.2 3.1 17.6 184 35.94 0.5 120 -5: Los Angeles 6.5 13 Urban 36.22 0.28 -5: Los Angeles Urban 36.43 36.65 0.4 10 149 497 -5: Sacramento Urban 26.94 29.87 2.93 1.4 10.3 40 292 26.94 1.5 54.9 42 1,552 48.2 1,363 I-5: Los Angeles Rural 52.33 54.16 1.83 6.7 Rural 14.46 14.46 43.4 1,227 782 2,080 I-5: San Joaquin Urban 28.34 28.56 0.22 1.1 0.1 1.0 31 542 2.84 41.6 1.194 -5: Los Angeles Urban 40.27 1.33 8.4 2.6 42.2 237 73 Rural 6.7 52.3 189 158 I-5: San Joaquin 14.34 46.5 -5: San Joaquin 10.46 Urban 1.41 3.8 0.7 9.7 106 274 -5: San Joaquin Rural 40.45 11.89 59.5 4.8 54.7 1,681 136 1,545 Urbar 16.7 28.34 3.54 17.7 445 -5: San Joaquin Urban 24.8 15. 50 56 Urban Rural 18.82 49.79 6.4 34.4 1.0 13.8 48.2 180 972 29 306 391 1,363 5: Sacramento I-5: San Joaquin 40.45 5: Los Angeles Urban 39.81 40.27 0.46 0.9 154 341 I-5: Sacramento Urbar 19.16 0.34 0.9 67 Rural 5: San Joaquin I-5: Los Angeles Rural 54.16 59.95 5.79 173.7 21.1 152.6 4.911 597 4,314 Urban 39.36 39.81 0.45 Los Angeles 28,953 TOTAL 865.6 131.1 1.024.0 24.475 3.706 I-5: Los Angeles Rural 86.67 88.61 1.94 69.8 11.8 34.8 1.975 334 983 Rural I-5: Los Angeles 86.13 86.67 0.54 19.4 9.7 550 93 274 3.3 Rural Rural 84.76 78.43 49.3 227.9 8.3 38.5 24.5 113.4 1,394 6,443 694 3,206 86.13 1.37 1,089 5: Los Angeles -5: Kern Rural Rural 15.86 87.03 71 17 1,423.4 289 4 1,134.0 40,246 8,182 32,063 -5: Los Angeles 69.65 55.8 316.1 9.4 1,578 267 1,511 -5: Los Angeles 157.3 4.447 Rural 69.65 78.43 8.78 53.4 8.937 1,352 2,776 23,906 Rura 68.1 2.67 96.1 16.3 47.8 2,718 459 -5: Los Angeles 65.43 197.3 1,323.2 534.4 5: Los Angeles Rural 59.95 65.43 5.48 98.2 845.5 5,578 37,413 943 13,507 66.16 5: Fresno -5: Kings Rural 185.1 15,110 5,233 9,87 14.7 176.8 7.04 1,104 14,269 -5: Kern -5: Merced Rural 9.28 32.45 80.6 454.3 39.0 2,280 12,845 32.45 Rural 504.6 4,999 -5: Kern Rural 15.08 0.78 44 345 2.331 -5: Kern Rura 10.35 15.08 4 73 170.3 31 1 82 4 4 815 878 1.07 -5: Kern Rural 38.5 7.0 18.7 9.28 10.35 1,089 199 527 -5: Kern Rural 6.41 7.04 11.0 641 117 310 37.8 172.1 195 -5: Kern Rural 6.41 1.05 6.9 18.3 1.069 -5: Kern Rura 5.36 4.78 31.4 83.3 4,865 888 -5: Kern Rural 0.58 0.58 20.9 3.8 10.1 590 108 286 -5: Stanislaus Rural 28.06 28.06 392.8 152.9 436.4 11,107 4,323 12,338 53.1 **5,771.5** -5: San Joaquin Rural 11.8 11.8 14.2 109.7 1,501 402 3,10 TOTAL 1,573.0 4,168.0 163,185 44,475 117,847

| TABLE X3a. VEHICLE | OPERATING C | OSTS - RE | MAINING C | ONVENTION | | | | | T = = | | | | | | | |
|--------------------------------------|----------------|----------------|----------------|---------------|-----------------|-------------------------------------|-------------------|-----------------|-----------------|--|------------------|------------------|-----------------|-------------------------------|------------------|------------------|
| County | City/Suburban/ | Po | st Mile of Se | gment | | I Vehicle-Miles of One Direction | Nighttime Off-Pea | , One Direction | | eak Period Vehicle- el, One Direction | Pea | uk I | Vehicle Oper | rating Costs (\$) Off-Peak | Daytime C | off Dook |
| County | Rural | Begin | End | Length (mi) | Truck | Other Veh. | Truck | Other | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. | Truck | Other Veh. |
| I-5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 662 | 9,274 | 81 | 1,137 | 1,188 | 16,637 | 1,170 | 3,014 | 143 | 370 | 2,099 | 5,407 |
| I-5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 4,189 | 58,644 | 342 | 4,790 | 3,105 | 43,469 | 7,398 | 19,059 | 604 | 1,557 | 5,483 | 14,127 |
| I-5: Sacramento | Urban | 22 | 23.1 | 1.1 | 2,387 | 20,559 | 406 | 3,495 | 5,732 | 49,371 | 4,215 | 6,682 | 717 | 1,136 | 10,123 | 16,046 |
| I-5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 1,297 | 22,088 | 149 | 2,541 | 2,104 | 35,821 | 2,291 | 7,178 | 264 | 826 | 3,715 | 11,642 |
| I-5: Los Angeles | Urban | 46.6 | 46.9 | 0.3 | 919 | 14,578 | 93 | 1,481 | 571 | 9,057 | 1,624 | 4,738 | 165 | 481 | 1,009 | 2,944 |
| I-5: Sacramento | Urban | 25.53 | 26.69 | 1.16 | 2,772 | 19,679 | 453 | 3,219 | 6,298 | 44,718 | 4,895 | 6,396 | 801 | 1,046 | 11,123 | 14,533 |
| I-5: Los Angeles I-5: Los Angeles | Urban Urban | 47.13 46.9 | 52.33 47.13 | 5.2 0.23 | 17,888 791 | 241,488 10.681 | 1,898 81 | 25,618 1,098 | 11,414 507 | 154,094 6.851 | 31,590 1,397 | 78,484 3,471 | 3,351 144 | 8,326 357 | 20,158 896 | 50,081 2,226 |
| I-5: Los Angeles | Urban | 43.9 | 44.01 | 0.23 | 302 | 5,161 | 45 | 771 | 334 | 5,706 | 534 | 1,677 | 80 | 251 | 590 | 1,854 |
| I-5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 1,233 | 17,620 | 87 | 1,249 | 1,811 | 25,880 | 2,177 | 5,726 | 154 | 406 | 3,198 | 8,411 |
| CA 710: Los Angeles | Suburban | 12.97 | 23.28 | 10.31 | 86,979 | 560,864 | 6,699 | 43,196 | 55,817 | 359,925 | 153,606 | 182,281 | 11,830 | 14,039 | 98,574 | 116,976 |
| CA 710: LA | Suburban | 4.96 | 10.18 | 5.22 | 34,005 | 212,976 | 2,222 | 13,917 | 13,363 | 83,697 | 60,052 | 69,217 | 3,924 | 4,523 | 23,600 | 27,201 |
| I-5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 2,253 | 34,325 | 236 | 3,590 | 3,117 | 47,479 | 3,979 | 11,156 | 416 | 1,167 | 5,504 | 15,431 |
| I-5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 9,009 | 127,153 | 1,002 | 14,149 | 13,836 | 195,280 | 15,910 | 41,325 | 1,770 | 4,598 | 24,435 | 63,466 |
| I-5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 13,660 | 198,426 | 1,148 | 16,671 | 10,805 | 156,951 | 24,123 | 64,488 | 2,027 | 5,418 | 19,081 | 51,009 |
| I-5: Los Angeles | Urban Urban | 14.16 21.41 | 16.9 22.28 | 2.74 0.87 | 8,498 4,514 | 120,998 63,392 | 643 352 | 9,149 4,949 | 13,875 2,999 | 197,556 42,114 | 15,008 7,971 | 39,324 20,602 | 1,135 622 | 2,973 1,609 | 24,504 5,296 | 64,206 13,687 |
| I-5: Los Angeles I-5: Los Angeles | Urban | 16.9 | 17.21 | 0.87 | 931 | 13,518 | 66 | 956 | 1,360 | 19,750 | 1,643 | 4 394 | 116 | 311 | 2,401 | 6,419 |
| CA 710: Los Angeles | Suburban | 10.18 | 12.97 | 2.79 | 19,631 | 143,964 | 1,290 | 9,461 | 7,871 | 57,722 | 34,669 | 46,788 | 2,278 | 3,075 | 13,901 | 18,760 |
| TOTAL | Guburburi | 10.10 | 12.07 | 20 | 211,921 | 1,895,389 | 17,294 | 161,438 | 156,109 | 1,552,079 | 374,255 | 616,001 | 30,542 | 52,467 | 275,690 | 504,426 |
| | <u> </u> | | | | | | | | | | | | | | | |
| I-5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 8,303 | 120,612 | 1,158 | 16,821 | 8,019 | 116,487 | 14,663 | 39,199 | 2,045 | 5,467 | 14,162 | 37,858 |
| I-5: Los Angeles | Urban | 22.78 | 28.25 | 5.47 | 14,190 | 241,637 | 1,633 | 27,800 | 23,014 | 391,886 | 25,060 | 78,532 | 2,883 | 9,035 | 40,643 | 127,363 |
| I-5: Los Angeles | Urban | 44.01 | 45.1 | 1.09 | 4,399 | 53,563 | 546 | 6,650 | 4,320 | 52,602 | 7,768 | 17,408 | 965 | 2,161 | 7,629 | 17,096 |
| I-5: Sacramento I-5: Sacramento | Urban Rural | 24.51 29.87 | 25.53 34.65 | 1.02 4.78 | 1,857 14,806 | 20,328 84,319 | 295 1,356 | 3,225 7,722 | 4,039 12,040 | 44,206 68,567 | 3,280 26,148 | 6,606 27,404 | 520 2,395 | 1,048 2,510 | 7,133 21,263 | 14,367 22,284 |
| I-5: Sacramento I-5: Los Angeles | Urban | 29.87 | 35.94 | 6.78 | 14,806 | 84,319 224,554 | 1,356 | 23,599 | 12,040 | 313,231 | 26,148 | 72,980 | 2,395 | 2,510 7,670 | 21,263 34,740 | 101,800 |
| I-5: Los Angeles | Urban | 45.93 | 46.6 | 0.76 | 2,411 | 32,200 | 245 | 3,270 | 1,498 | 20,006 | 4,258 | 10.465 | 432 | 1,063 | 2.645 | 6,502 |
| I-5: Los Angeles | Urban | 45.1 | 45.93 | 0.83 | 2,659 | 40.333 | 294 | 4,452 | 2,027 | 30,745 | 4,696 | 13,108 | 518 | 1,447 | 3,580 | 9,992 |
| I-5: Los Angeles | Urban | 35.94 | 36.22 | 0.28 | 550 | 8,758 | 61 | 975 | 845 | 13,451 | 971 | 2,846 | 108 | 317 | 1,492 | 4,372 |
| I-5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 723 | 10,120 | 85 | 1,191 | 1,216 | 17,025 | 1,277 | 3,289 | 150 | 387 | 2,148 | 5,533 |
| I-5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 8,597 | 76,666 | 689 | 6,143 | 5,042 | 44,968 | 15,182 | 24,917 | 1,217 | 1,997 | 8,905 | 14,614 |
| I-5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 587 | 6,689 | 47 | 536 | 344 | 3,923 | 1,036 | 2,174 | 83 | 174 | 608 | 1,275 |
| I-5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 3,203 | 53,528 | 390 | 6,511 | 2,813 | 47,016 | 5,656 | 17,396 | 688 | 2,116 | 4,968 | 15,280 |
| I-5: Sacramento | Rural | 28.34 | 14.46 | 14.46 | 30,366 | 97,605 | 19,359 | 62,226 | 51,495 | 165,519 | 53,627 | 31,722 | 34,188 | 20,223 | 90,941 | 53,794 |
| I-5: San Joaquin I-5: Sacramento | Urban Urban | 19.16 | 28.56 22 | 0.22 2.84 | 1,133 6,764 | 3,762 43,963 | 91 1,163 | 303 7,557 | 1,042 16,498 | 3,459 107,236 | 2,001 11,945 | 1,223 14,288 | 161 2,053 | 2,456 | 1,840 29,135 | 1,124 34,852 |
| I-5: Sacramento I-5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 1,784 | 22,270 | 554 | 6,910 | 9.007 | 112,425 | 3,151 | 7,238 | 2,053 978 | 2,456 | 15,907 | 36,538 |
| I-5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 4,526 | 13,831 | 739 | 2,259 | 3,787 | 11,572 | 7,992 | 4,495 | 1,305 | 734 | 6,687 | 3,761 |
| I-5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 51,777 | 154,808 | 5,781 | 17,284 | 45,996 | 137,524 | 91,439 | 50,313 | 10,209 | 5,617 | 81,229 | 44,695 |
| I-5: Sacramento | Urban | 23.1 | 24.51 | 1.41 | 2,816 | 27,030 | 503 | 4,833 | 7,256 | 69,658 | 4,972 | 8,785 | 889 | 1,571 | 12,814 | 22,639 |
| I-5: San Joaquin | Rural | 28.56 | 40.45 | 11.89 | 51,722 | 183,106 | 4,170 | 14,763 | 47,551 | 168,343 | 91,341 | 59,509 | 7,364 | 4,798 | 83,976 | 54,711 |
| I-5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 3,427 | 23,117 | 544 | 3,668 | 7,453 | 50,271 | 6,052 | 7,513 | 960 | 1,192 | 13,162 | 16,338 |
| I-5: San Joaquin | Urban | 24.8 | 28.34 18.82 | 3.54 | 20,355 | 67,260 | 2,273 | 7,510 | 18,082 | 59,750 | 35,947 | 21,860 | 4,014 | 2,441 | 31,934 | 19,419 |
| I-5: Sacramento | Urban Rural | 16.7 40.45 | 18.82 49.79 | 2.12 9.34 | 4,134 18,904 | 27,348 65,305 | 656 5,948 | 4,339 20,547 | 8,990 26,518 | 59,473 91,607 | 7,301 33,385 | 8,888 21,224 | 1,158 10,504 | 1,410 6,678 | 15,877 46,831 | 19,329 29,772 |
| I-5: San Joaquin I-5: Los Angeles | Urban | 39.81 | 49.79 | 0.46 | 523 | 8,037 | 5,948 86 | 1,328 | 1.161 | 17,844 | 924 | 2,612 | 153 | 432 | 2,051 | 5,799 |
| I-5: Sacramento | Urban | 18.82 | 19.16 | 0.46 | 727 | 4.737 | 135 | 877 | 1,967 | 12.807 | 1,285 | 1,539 | 238 | 285 | 3,473 | 4,162 |
| I-5: San Joaquin | Rural | 12.69 | 14.34 | 1.65 | 10.234 | 30.525 | 1,440 | 4.294 | 14.116 | 42.104 | 18.073 | 9,921 | 2.543 | 1,396 | 24,929 | 13,684 |
| I-5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 9,843 | 97,272 | 1,197 | 11,832 | 8,646 | 85,440 | 17,383 | 31,613 | 2,114 | 3,846 | 15,268 | 27,768 |
| I-5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 463 | 8,280 | 79 | 1,414 | 1,078 | 19,286 | 817 | 2,691 | 140 | 460 | 1,904 | 6,268 |
| TOTAL | | | | | 295,884 | 1,851,561 | 52,997 | 280,841 | 355,532 | 2,378,430 | 522,535 | 601,757 | 93,594 | 91,273 | 627,873 | 772,990 |
| | <u> </u> | | 1 | | L | | L | | | | | | | | | |
| I-5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 7,508 | 29,740 | 1,269 | 5,028 | 3,736 | 14,799 | 13,259 | 9,666 | 2,242 | 1,634 | 6,598 | 4,810 |
| I-5: Los Angeles I-5: Los Angeles | Rural Rural | 86.13 84.76 | 86.67 86.13 | 0.54 1.37 | 2,090 5.302 | 8,278 21,002 | 353 896 | 1,400 3.551 | 1,040 2.638 | 4,119 10.451 | 3,691 9,363 | 2,690 6.826 | 624 1,583 | 455 1,154 | 1,836 4,659 | 1,339 3,397 |
| I-5: Los Angeles I-5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 5,302 24,497 | 97,039 | 4,141 | 3,551 16,405 | 12,190 | 10,451 48,287 | 43,262 | 31,538 | 7,314 | 1,154 5,332 | 4,659 21,528 | 15,693 |
| I-5: Kern | Rural | 15.86 | 87.03 | 71.17 | 104,264 | 429,511 | 21,198 | 87,323 | 83,066 | 342,188 | 184,131 | 139,591 | 37,435 | 28,380 | 146.696 | 111,211 |
| I-5: Los Angeles | Rural | 68.1 | 69.65 | 1.55 | 3,395 | 26,366 | 574 | 4,457 | 1,689 | 13,120 | 5,995 | 8,569 | 1,013 | 1,449 | 2,983 | 4,264 |
| I-5: Los Angeles | Rural | 69.65 | 78.43 | 8.78 | 17,384 | 151,192 | 2,939 | 25,560 | 8,651 | 75,234 | 30,701 | 49,137 | 5,190 | 8,307 | 15,277 | 24,451 |
| I-5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 5,287 | 45,977 | 894 | 7,773 | 2,631 | 22,879 | 9,336 | 14,943 | 1,578 | 2,526 | 4,646 | 7,436 |
| I-5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 10,850 | 94,366 | 1,834 | 15,953 | 5,399 | 46,957 | 19,162 | 30,669 | 3,240 | 5,185 | 9,535 | 15,261 |
| I-5: Fresno | Rural | 0 | 66.16 | 66.16 | 82,700 | 347,340 | 29,857 | 125,401 | 52,843 | 221,939 | 146,049 | 112,886 | 52,728 | 40,755 | 93,321 | 72,130 |
| I-5: Kings | Rural | 0 | 26.72 | 26.72 | 33,400 | 140,280 | 11,567 | 48,583 | 21,833 | 91,697 | 58,985 | 45,591 | 20,428 | 15,789 | 38,557 | 29,802 |
| I-5: Kern I-5: Merced | Rural Rural | 7.04 | 9.28 32.45 | 2.24 32.45 | 8,064 33,748 | 28,224 138,237 | 1,471 13.134 | 5,150 53.798 | 3,905 37,488 | 13,666 153,558 | 14,241 59,599 | 9,173 44,927 | 2,599 23,194 | 1,674 17,484 | 6,896 66,205 | 4,441 49,906 |
| I-5: Merced I-5: Kern | Rural | 15.08 | 32.45 15.86 | 32.45 0.78 | 2,496 | 138,237 8,424 | 13,134 547 | 53,798 1,845 | 37,488 1,949 | 153,558 6.579 | 59,599 4.408 | 2,738 | 23,194 965 | 17,484 599 | 66,205 3,443 | 49,906 2,138 |
| I-5: Kern | Rural | 10.35 | 15.08 | 4.73 | 15,325 | 61,301 | 2,796 | 1,845 | 7,420 | 29,682 | 27,064 | 19,923 | 4,938 | 3,635 | 13,105 | 9,647 |
| I-5: Kern | Rural | 9.28 | 10.35 | 1.07 | 3,467 | 13.867 | 633 | 2.530 | 1,679 | 6,714 | 6.122 | 4,507 | 1,117 | 822 | 2,964 | 2.182 |
| I-5: Kern | Rural | 6.41 | 7.04 | 0.63 | 2,041 | 8,165 | 372 | 1,490 | 988 | 3,953 | 3,605 | 2,654 | 658 | 484 | 1,745 | 1,285 |
| I-5: Kern | Rural | 5.36 | 6.41 | 1.05 | 3,402 | 13,608 | 621 | 2,483 | 1,647 | 6,589 | 6,008 | 4,423 | 1,096 | 807 | 2,909 | 2,141 |
| I-5: Kern | Rural | 0.58 | 5.36 | 4.78 | 15,487 | 61,949 | 2,826 | 11,304 | 7,499 | 29,996 | 27,351 | 20,133 | 4,991 | 3,674 | 13,243 | 9,749 |
| I-5: Kern | Rural | 0 | 0.58 | 0.58 | 1,879 | 7,517 | 343 | 1,372 | 910 | 3,640 | 3,319 | 2,443 | 606 | 446 | 1,607 | 1,183 |
| I-5: Stanislaus | Rural | 0 | 28.06 | 28.06 | 11,785 | 80,813 | 4,586 | 31,450 | 13,091 | 89,769 | 20,813 | 26,264 | 8,100 | 10,221 | 23,119 | 29,175 |
| I-5: San Joaquin | Rural | υ | 11.8 | 11.8 | 6,549 | 26,196 | 1,753 | 7,013 | 13,528 | 54,111 | 11,566 | 8,514 | 3,096 | 2,279 | 23,890 | 17,586 |
| TOTAL | 1 | 1 | | <u> </u> | 400,920 | 1,839,391 | 104,606 | 471,053 | 285,820 | 1,289,927 | 708,030 | 597,802 | 184,735 | 153,092 | 504,762 | 419,226 |

| TABLE X3b. TRAVEL | TIME COST - RI | EMAINING | CONVEN | TIONAL LANE | | | | | | | | | | | | |
|--|----------------------|----------------|----------------|---------------|------------------------|---------------------------|---------------------------|--------------------------|------------------------|------------------------------|-------------------------|--------------------------|----------------|-------------------------------|--------------------|----------------------------|
| 0 | City/Suburban/ | Post Mile | of Segmer | nt | | ehicle-Hours of | Nighttime Off-Peak | | | ak Period Vehicle- | Pe | | Travel Time | | D. C. | O" D l |
| County | Rural | Begin | End | Length (mi) | Travel, On | Other Veh. | Hours of Travel, Truck | One Direction Other Veh. | Truck | el, One Direction Other Veh. | Truck | Other Veh. | Nighttime (| Other Veh. | Daytime (Truck | Other Veh. |
| -5: Los Angeles | Urban | 36.22 | 36.43 | 0.21 | 13.2 | 231.8 | 1.6 | 20.7 | 23.8 | 302.5 | 375 | 2,123 | 46 | 189 | 672 | |
| -5: Los Angeles | Urban | 20.58 | 21.41 | 0.83 | 83.8 | 1,303.2 | 6.8 | 87.1 | 62.1 | 790.3 | 2,369 | 11,932 | 193 | 797 | 1,756 | 7,236 |
| -5: Sacramento | Urban | 22 | 23.1 | 1.1 | 47.7 | 467.3 | 8.1 | 63.5 | 114.6 | 897.7 | 1,350 | 4,278 | 229 | 582 | 3,241 | 8,218 |
| -5: Los Angeles | Urban | 22.28 | 22.78 | 0.5 | 25.9 | 490.8 | 3.0 | 46.2 | 42.1 | 651.3 | 734 | 4,494 | 84 | 423 | 1,190 | 5,963 |
| -5: Los Angeles -5: Sacramento | Urban Urban | 46.6 25.53 | 46.9 26.69 | 0.3 1.16 | 18.4 55.4 | 280.3 410.0 | 1.9 9.1 | 26.9 58.5 | 11.4 126.0 | 164.7 813.1 | 520 1,567 | 2,567 3,754 | 53 256 | 246 536 | 323 3,562 | 1,508 7,444 |
| -5: Los Angeles | Urban | 47.13 | 52.33 | 5.2 | 357.8 | 4,556.4 | 38.0 | 465.8 | 228.3 | 2,801.7 | 10.115 | 41,716 | 1.073 | 4.264 | 6,455 | 25,651 |
| -5: Los Angeles | Urban | 46.9 | 47.13 | 0.23 | 15.8 | 201.5 | 1.6 | 20.0 | 10.1 | 124.6 | 447 | 1,845 | 46 | 183 | 287 | |
| -5: Los Angeles | Urban | 43.9 | 44.01 | 0.11 | 6.0 | 95.6 | 0.9 | 14.0 | 6.7 | 103.7 | 171 | 875 | 26 | 128 | 189 | 950 |
| -5: Los Angeles | Urban | 13.78 | 14.16 | 0.38 | 24.7 | 332.4 | 1.7 | 22.7 | 36.2 | 470.5 | 697 | 3,044 | 49 | 208 | 1,024 | 4,308 |
| CA 710: Los Angeles CA 710: LA | Suburban Suburban | 12.97 4.96 | 23.28 10.18 | 10.31 5.22 | 1,739.6 680.1 | 9,347.7 3,736.4 | 134.0 44.4 | 664.6 214.1 | 1,116.3 267.3 | 5,537.3 1,287.6 | 49,186 19,229 | 85,583 34,209 | 3,788 1,257 | 6,084 1,960 | 31,564 7.557 | 50,697 11,789 |
| -5: Los Angeles | Urban | 28.25 | 29.16 | 0.91 | 45.1 | 647.6 | 44.4 | 65.3 | 62.3 | 863.3 | 19,229 | 5,930 | 1,257 | 1,960 | 1,762 | 7,904 |
| -5: Los Angeles | Urban | 36.65 | 39.36 | 2.71 | 180.2 | 2,399.1 | 20.0 | 257.3 | 276.7 | 3,550.5 | 5,095 | 21,965 | 567 | 2,355 | 7,824 | 32,507 |
| -5: Los Angeles | Urban | 17.21 | 20.58 | 3.37 | 273.2 | 3,674.5 | 23.0 | 303.1 | 216.1 | 2,853.7 | 7,724 | 33,642 | 649 | 2,775 | 6,110 | 26,127 |
| -5: Los Angeles | Urban | 14.16 | 16.9 | 2.74 | 170.0 | 2,240.7 | 12.9 | 166.3 | 277.5 | 3,591.9 | 4,806 | 20,515 | 363 | 1,523 | 7,846 | 32,886 |
| -5: Los Angeles | Urban | 21.41 | 22.28 | 0.87 | 90.3 18.6 | 1,173.9 | 7.0 1.3 | 90.0 | 60.0 | 765.7 359.1 | 2,552 | 10,748 | 199 | 824 | 1,696 769 | 7,010 |
| -5: Los Angeles CA 710: Los Angeles | Urban Suburban | 16.9 10.18 | 17.21 12.97 | 2.79 | 392.6 | 250.3 2,285.1 | 1.3 25.8 | 17.4 145.6 | 27.2 157.4 | 359.1 888.0 | 526 11,101 | 2,292 20,922 | 730 | 159 1,333 | 769 4,451 | 3,288 8,130 |
| TOTAL | Suburban | 10.10 | 12.37 | 2.13 | 4,238.4 | 34,125.0 | 345.9 | 2,749.0 | 3,122.2 | 26,817.3 | 119,839 | 312,432 | 9,780 | 25,169 | 88,278 | |
| | | | | | | | | | | | | | | | | |
| -5: Los Angeles | Urban | 41.6 | 43.9 | 2.3 | 166.1 | 2,192.9 | 23.2 | 305.8 | 160.4 | 2,118.0 | 4,695 | 20,078 | 655 | 2,800 | 4,535 | |
| -5: Los Angeles -5: Los Angeles | Urban Urban | 22.78 44.01 | 28.25 45.1 | 5.47 1.09 | 283.8 88.0 | 4,393.4 973.9 | 32.7 10.9 | 505.5 120.9 | 460.3 86.4 | 7,125.2 956.4 | 8,025 2,488 | 40,224 8,916 | 923 309 | 4,628 1,107 | 13,014 2,443 | 65,235 8,756 |
| -5: Sacramento | Urban | 24.51 | 25.53 | 1.02 | 37.1 | 369.6 | 5.9 | 58.6 | 80.8 | 803.7 | 1,050 | 3,384 | 167 | 537 | 2,443 | 7,359 |
| -5: Sacramento | Rural | 29.87 | 34.65 | 4.78 | 296.1 | 1,317.5 | 27.1 | 118.8 | 240.8 | 1,054.9 | 8,373 | 12,062 | 767 | 1,088 | 6,809 | 9,658 |
| -5: Los Angeles | Urban | 29.16 | 35.94 | 6.78 | 282.0 | 4,082.8 | 29.6 | 429.1 | 393.4 | 5,695.1 | 7,975 | 37,380 | 838 | 3,928 | 11,124 | 52,142 |
| -5: Los Angeles | Urban | 45.93 | 46.6 | 0.67 | 48.2 | 585.5 | 4.9 | 59.5 | 30.0 | 363.7 | 1,363 | 5,360 | 138 | 544 | 847 | |
| -5: Los Angeles -5: Los Angeles | Urban Urban | 45.1 35.94 | 45.93 36.22 | 0.83 0.28 | 53.2 11.0 | 733.3 159.2 | 5.9 1.2 | 81.0 17.7 | 40.5 16.9 | 559.0 244.6 | 1,504 311 | 6,714 1,458 | 166 35 | 741 162 | 1,146 478 | 5,118 |
| -5: Los Angeles | Urban | 36.43 | 36.65 | 0.22 | 14.5 | 184.0 | 1.7 | 21.7 | 24.3 | 309.5 | 409 | 1,685 | 48 | 198 | 688 | 2,239 2,834 |
| -5: Sacramento | Urban | 26.94 | 29.87 | 2.93 | 171.9 | 1,393.9 | 13.8 | 111.7 | 100.8 | 817.6 | 4,861 | 12,762 | 390 | 1,023 | 2,851 | |
| -5: Sacramento | Urban | 26.69 | 26.94 | 0.25 | 11.7 | 121.6 | 0.9 | 9.7 | 6.9 | 71.3 | 332 | 1,113 | 27 | 89 | 195 | 653 |
| -5: Los Angeles | Rural | 52.33 | 54.16 | 1.83 | 64.0 | 823.5 | 7.8 | 100.2 | 56.3 | 723.3 | 1,811 | 7,540 | 220 | 917 | 1,591 | |
| -5: Sacramento -5: San Joaquin | Rural Urban | 0 28.34 | 14.46 28.56 | 14.46 0.22 | 607.3 22.7 | 1,501.6 68.4 | 387.2 1.8 | 957.3 5.5 | 1,029.9 20.8 | 2,546.5 62.9 | 17,172 641 | 13,748 626 | 10,947 52 | 8,765 50 | 29,120 589 | 23,314 576 |
| -5: San Joaquin -5: Sacramento | Urban | 19.16 | 28.56 | 2.84 | 135.3 | 799.3 | 23.3 | 137.4 | 330.0 | 1,949.7 | 3,825 | 7,318 | 657 | 1,258 | 9,329 | 17,851 |
| -5: Los Angeles | Urban | 40.27 | 41.6 | 1.33 | 35.7 | 404.9 | 11.1 | 125.6 | 180.1 | 2,121.2 | 1,009 | 3,707 | 313 | 1,150 | 5,093 | 19,421 |
| -5: San Joaquin | Rural | 11.8 | 12.69 | 0.89 | 90.5 | 212.8 | 14.8 | 34.7 | 75.7 | 178.0 | 2,559 | 1,948 | 418 | 318 | 2,141 | 1,630 |
| -5: San Joaquin | Rural | 14.34 | 24.8 | 10.46 | 1,035.5 | 2,381.7 | 115.6 | 265.9 | 919.9 | 2,115.7 | 29,279 | 21,805 | 3,269 | 2,435 | 26,010 | 19,371 |
| -5: Sacramento | Urban Rural | 23.1 28.56 | 24.51 40.45 | 1.41 | 56.3 1.034.4 | 491.4 2.817.0 | 10.1 83.4 | 87.9 227.1 | 145.1 951.0 | 1,266.5 2,589.9 | 1,592 29,248 | 4,499 25,791 | 285 2,358 | 804 2,079 | 4,103 | 11,596 23,712 |
| -5: San Joaquin -5: Sacramento | Urban | 14.46 | 16.7 | 2.24 | 68.5 | 420.3 | 10.9 | 66.7 | 149.1 | 914.0 | 1,938 | 3,848 | 308 | 611 | 26,890 4,215 | 8,368 |
| -5: San Joaquin | Urban | 24.8 | 28.34 | 3.54 | 407.1 | 1,222.9 | 45.5 | 136.5 | 361.6 | 1,086.4 | 11,511 | 11,196 | 1,285 | 1,250 | 10,225 | 9,946 |
| -5: Sacramento | Urban | 16.7 | 18.82 | 2.12 | 82.7 | 497.2 | 13.1 | 78.9 | 179.8 | 1,081.3 | 2,338 | 4,552 | 371 | 722 | 5,084 | 9,900 |
| -5: San Joaquin | Rural | 40.45 | 49.79 | 9.34 | 378.1 | 1,004.7 | 119.0 | 316.1 | 530.4 | 1,409.3 | 10,690 | 9,199 | 3,363 | 2,894 | 14,996 | 12,903 |
| -5: Los Angeles | Urban | 39.81 | 40.27 | 0.46 | 10.5 | 146.1 | 1.7 | 24.1 | 23.2 | 324.4 | 296 | 1,338 | 49 | 221 | 657 | -, |
| -5: Sacramento -5: San Joaquin | Urban Rural | 18.82 12.69 | 19.16 14.34 | 0.34 1.65 | 14.5 204.7 | 86.1 469.6 | 2.7 28.8 | 15.9 66.1 | 39.3 282.3 | 232.9 647.7 | 411 5.787 | 789 4.300 | 76 814 | 146 605 | 1,112 7,982 | 2,132 5.930 |
| -5: Los Angeles | Rural | 54.16 | 59.95 | 5.79 | 196.9 | 1,496.5 | 23.9 | 182.0 | 172.9 | 1,314.5 | 5,566 | 13,701 | 677 | 1,667 | 4,889 | 12,035 |
| -5: Los Angeles | Urban | 39.36 | 39.81 | 0.45 | 9.3 | 150.5 | 1.6 | 25.7 | 21.6 | 350.7 | 262 | 1,378 | 45 | 235 | 610 | 3,210 |
| TOTAL | | | | | 5,917.7 | 31,502.4 | 1,059.9 | 4,693.8 | 7,110.6 | 41,034.1 | 167,319 | 288,421 | 29,969 | 42,974 | 201,049 | 375,688 |
| -5: Los Angeles | Rural | 86.67 | 88.61 | 1.94 | 150.2 | 457.5 | 25.4 | 77.4 | 74.7 | 227.7 | 4,246 | 4,189 | 718 | 708 | 2,113 | 2,084 |
| -5: Los Angeles -5: Los Angeles | Rural | 86.13 | 86.67 | 0.54 | 150.2 41.8 | 457.5 127.4 | 25.4 7.1 | 21.5 | 20.8 | 63.4 | 4,246 1,182 | 4,189 1,166 | 200 | 197 | 2,113 588 | 2,084 |
| -5: Los Angeles | Rural | 84.76 | 86.13 | 1.37 | 106.0 | 323.1 | 17.9 | 54.6 | 52.8 | 160.8 | 2,998 | 2,958 | 507 | 500 | 1,492 | 1,472 |
| -5: Los Angeles | Rural | 78.43 | 84.76 | 6.33 | 489.9 | 1,492.9 | 82.8 | 252.4 | 243.8 | 742.9 | 13,853 | 13,668 | 2,342 | 2,311 | 6,893 | 6,801 |
| -5: Kern | Rural | 15.86 | 87.03 | 71.17 | 2,085.3 | 6,607.9 | 424.0 | 1,343.4 | 1,661.3 | 5,264.4 | 58,960 | 60,498 | 11,987 | 12,300 | 46,973 | 48,199 |
| -5: Los Angeles -5: Los Angeles | Rural Rural | 68.1 69.65 | 69.65 78.43 | 1.55 8.78 | 67.9 347.7 | 405.6 2,326.0 | 11.5 58.8 | 68.6 393.2 | 33.8 173.0 | 201.8 1,157.4 | 1,920 9,831 | 3,714 21,296 | 325 1,662 | 628 3,600 | 955 4,892 | 1,848 10,597 |
| -5: Los Angeles -5: Los Angeles | Rural | 65.43 | 68.1 | 2.67 | 105.7 | 707.3 | 17.9 | 119.6 | 52.6 | 352.0 | 2,990 | 6,476 | 505 | 1,095 | 1,488 | 3,223 |
| -5: Los Angeles | Rural | 59.95 | 65.43 | 5.48 | 217.0 | 1,451.8 | 36.7 | 245.4 | 108.0 | 722.4 | 6,136 | 13,292 | 1,037 | 2,247 | 3,053 | 6,614 |
| -5: Fresno | Rural | 0 | 66.16 | 66.16 | 1,654.0 | 5,343.7 | 597.1 | 1,929.2 | 1,056.9 | 3,414.4 | 46,766 | 48,924 | 16,884 | 17,663 | 29,882 | 31,261 |
| -5: Kings | Rural | 0 | 26.72 | 26.72 | 668.0 | 2,158.2 | 231.3 | 747.4 | 436.7 | 1,410.7 | 18,887 | 19,759 | 6,541 | 6,843 | 12,346 | 12,916 |
| -5: Kern -5: Merced | Rural Rural | 7.04 | 9.28 32.45 | 2.24 32.45 | 161.3 675.0 | 434.2 2.126.7 | 29.4 262.7 | 79.2 827.7 | 78.1 749.8 | 210.2 2.362.4 | 4,560 19.084 | 3,975 19,471 | 832 7,427 | 725 7.578 | 2,208 21,199 | 1,925 21,629 |
| -5: Mercea | Rural | 15.08 | 15.86 | 0.78 | 49.9 | 129.6 | 10.9 | 28.4 | 39.0 | 101.2 | 19,084 | 1,187 | 309 | 260 | 1,102 | 927 |
| -5: Kern | Rural | 10.35 | 15.08 | 4.73 | 306.5 | 943.1 | 55.9 | 172.1 | 148.4 | 456.6 | 8,666 | 8,634 | 1,581 | 1,576 | 4,196 | 4,181 |
| -5: Kern | Rural | 9.28 | 10.35 | 1.07 | 69.3 | 213.3 | 12.7 | 38.9 | 33.6 | 103.3 | 1,960 | 1,953 | 358 | 356 | 949 | 946 |
| -5: Kern | Rural | 6.41 | 7.04 | 0.63 | 40.8 | 125.6 | 7.4 | 22.9 | 19.8 | 60.8 | 1,154 | 1,150 | 211 | 210 | 559 | 557 |
| -5: Kern | Rural | 5.36 | 6.41 | 1.05 | 68.0 | 209.4 | 12.4 | 38.2 | 32.9 | 101.4 | 1,924 | 1,917 | 351 | 350 | 931 | 928 |
| 5 I/ | | 0.58 | 5.36 | 4.78 | 309.7 | 953.1 | 56.5 | 173.9 | 150.0 | 461.5 | 8,758 | 8,726 | 1,598 194 | 1,592 | 4,241 | 4,225 513 |
| -5: Kern | Rural | 0 | 0.58 | 0.58 | 37.6 | 1156 | 60 | | 10.2 | 56.0 | | | | | | |
| -5: Kern -5: Kern -5: Stanislaus | Rural Rural | 0 | 0.58 28.06 | 0.58 28.06 | 37.6 235.7 | 115.6 1.243.3 | 6.9 91.7 | 21.1 483.8 | 18.2 261.8 | 56.0 1.381.1 | 1,063 6,664 | 1,059 11,383 | | 193 4.430 | 515 7.403 | |
| -5: Kern | Rural | 0 0 0 | | | 37.6 235.7 131.0 | 115.6 1,243.3 403.0 | 6.9 91.7 35.1 | 21.1 483.8 107.9 | 18.2 261.8 270.6 | 56.0 1,381.1 832.5 | 1,063 6,664 3,703 | 1,059 11,383 3,690 | 2,594 991 | 4,430 988 66,350 | 7,403 7,650 | 12,644 7,622 181,692 |

APPENDIX Y

INTERMEDIATE CALCULATION SUMMARY TABLES FOR VEHICLE-MILES AND VEHICLE-HOURS OF TRAVEL, AND USER COSTS

- The following summary tables are contained in this appendix:
- Table Y1a. Summary of Daily Vehicle-Miles Base Condition Base Volume Vs. Conventional Lanes with Added Conventional Lane High Volume
- Table Y1b. Vehicle Operating Costs Base Condition Base Volume Vs. Conventional Lanes with Added Conventional Lane High Volume
- Table Y1c. Summary of Daily Vehicle-Hours Base Condition Base Volume Vs. Conventional Lanes with Added Conventional Lane High Volume
- Table Y1d. Travel Time Costs Base Condition Base Volume Vs. Conventional Lanes with Added Conventional Lane High Volume
- Table Y1e. Incremental Cost Summary for Conventional Added Freeway Lane (\$) High Volume
- Table Y2a. Summary of Daily Vehicle-Miles Base Condition Base Volume Vs. Conventional Lanes with Added Conventional Lane Medium Volume
- Table Y2b. Vehicle Operating Costs Base Condition Base Volume Vs. Conventional Lanes with Added Conventional Lane Medium Volume
- Table Y2c. Summary of Daily Vehicle-Hours Base Condition Base Volume Vs. Conventional Lanes with Added Conventional Lane Medium Volume
- Table Y2d. Travel Time Costs Base Condition Base Volume Vs. Conventional Lanes with Added Conventional Lane Medium Volume
- Table Y2e. Incremental Cost Summary for Conventional Added Freeway Lane (\$) Medium Volume
- Table Y3a. Summary of Daily Vehicle-Miles Base Condition Base Volume Vs. Conventional Lanes with Added Conventional Lane Low Volume
- Table Y3b. Vehicle Operating Costs Base Condition Base Volume Vs. Conventional Lanes with Added Conventional Lane Low Volume
- Table Y3c. Summary of Daily Vehicle-Hours Base Condition Base Volume Vs. Conventional Lanes with Added Conventional Lane Low Volume
- Table Y3d. Travel Time Costs Base Condition Base Volume Vs. Conventional Lanes with Added Conventional Lane Low Volume
- Table Y3e. Incremental Cost Summary for Conventional Added Freeway Lane (\$) Low Volume
- Table Y4a. Summary of Daily Vehicle-Miles Base Condition Base Volume Vs. Conventional Lanes with Added AHS Lane High Volume
- Table Y4b. Vehicle Operating Costs Base Condition Base Volume Vs. Conventional Lanes with Added AHS Lane High Volume
- Table Y4c. Summary of Daily Vehicle-Hours Base Condition Base Volume Vs. Conventional Lanes with Added AHS Lane High Volume

- Table Y4d. Travel Time Costs Base Condition Base Volume Vs. Conventional Lanes with Added AHS Lane High Volume
- Table Y4e. Incremental Cost Summary for Added AHS Lane (\$) High Volume
- Table Y5a. Summary of Daily Vehicle-Miles Base Condition Base Volume Vs. Conventional Lanes With Added AHS Lane Medium Volume
- Table Y5b. Vehicle Operating Costs Base Condition Base Volume Vs. Conventional Lanes with Added AHS Lane Medium Volume
- Table Y5c. Summary of Daily Vehicle-Hours Base Condition Base Volume Vs. Conventional Lanes with Added AHS Lane Medium Volume
- Table Y5d. Travel Time Costs Base Condition Base Volume Vs. Conventional Lanes with Added AHS Lane Medium Volume
- Table Y5e. Incremental Cost Summary for Added AHS Lane (\$) Medium Volume
- Table Y6a. Summary of Daily Vehicle-Miles Base Condition Base Volume Vs. Conventional Lanes with Added AHS Lane Low Volume
- Table Y6b. Vehicle Operating Costs Base Condition Base Volume Vs. Conventional Lanes with Added AHS Lane Low Volume
- Table Y6c. Summary of Daily Vehicle-Hours Base Condition Base Volume Vs. Conventional Lanes with Added AHS Lane Low Volume
- Table Y6d. Travel Time Costs Base Condition Base Volume Vs. Conventional Lanes with Added AHS Lane Low Volume
- Table Y6e. Incremental Cost Summary for Added AHS Lane (\$) Low Volume
- Table Y7a. Summary of Vehicle-Miles Base Condition Base Volume Vs. Conventional Lanes with Added Dedicated Truck Lane High Volume
- Table Y7b. Vehicle Operating Costs Base Condition Base Volume Vs. Conventional Lanes with Added Dedicated Truck Lane High Volume
- Table Y7c. Summary of Daily Vehicle-Hours Base Condition Base Volume Vs. Conventional Lanes with Added Dedicated Truck Lane High Volume
- Table Y7d. Travel Time Costs Base Condition Base Volume Vs. Conventional Lanes with Added Dedicated Truck Lane High Volume
- Table Y7e. Incremental Cost Summary for Added Dedicated Truck Lane (\$) High Volume
- Table Y8a. Summary of Vehicle-Miles Base Condition Base Volume Vs. Conventional Lanes with Added Dedicated Truck Lane Medium Volume

- Table Y8b. Vehicle Operating Costs Base Condition Base Volume Vs. Conventional Lanes with Added Dedicated Truck Lane Medium Volume
- Table Y8c. Summary of Daily Vehicle-Hours Base Condition Base Volume Vs. Conventional Lanes with Added Dedicated Truck Lane Medium Volume
- Table Y8d. Travel Time Costs Base Condition Base Volume Vs. Conventional Lanes with Added Dedicated Truck Lane Medium Volume
- Table Y8e. Incremental Cost Summary for Added Dedicated Truck Lane (\$) Medium Volume
- Table Y9a. Summary of Vehicle-Miles Base Condition Base Volume Vs. Conventional Lanes with Added Dedicated Truck Lane Low Volume
- Table Y9b. Vehicle Operating Costs Base Condition Base Volume Vs. Conventional Lanes with Added Dedicated Truck Lane Low Volume
- Table Y9c. Summary of Daily Vehicle-Hours Base Condition Base Volume Vs. Conventional Lanes with Added Dedicated Truck Lane Low Volume
- Table Y9d. Travel Time Costs Base Condition Base Volume Vs. Conventional Lanes with Added Dedicated Truck Lane Low Volume
- Table Y9e. Incremental Cost Summary for Added Dedicated Truck Lane (\$) Low Volume

TABLE Y1a. SUMMARY OF DAILY VEHICLE-MILES - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED CONVENTIONAL LANE - HIGH VOLUME

| Condition | Period of the Day | Daily Veh | icle-Miles |
|----------------------|--------------------|-----------|----------------|
| Condition | Fellod of the Day | Trucks | Other Vehicles |
| Base Condition - | Peak Period | 252,993 | 1,895,389 |
| Base Volume | Nighttime Off-Peak | 20,743 | 160,649 |
| base volume | Daytime Off-Peak | 187,318 | 1,552,868 |
| TOTAL | | 461,054 | 3,608,906 |
| | | | |
| Conventional Lanes | Peak Period | 252,993 | 1,895,389 |
| including added lane | Nighttime Off-Peak | 20,743 | 160,649 |
| including added lane | Daytime Off-Peak | 187,318 | 1,552,868 |
| TOTAL | | 461,054 | 3,608,906 |

TABLE Y1b. VEHICLE OPERATING COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED CONVENTIONAL LANE - HIGH VOLUME

| Condition | Daily Vehicle-Miles | | Unit Cost - 2001(\$) | | Total Cost per Day (\$) | | EUAC (\$) | | EUATC (\$) |
|---|---------------------|----------------|----------------------|----------------|-------------------------|----------------|-------------|----------------|--------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 461,054 | 3,608,906 | 1.77 | 0.325 | 814,226 | 1,172,894 | 297,192,615 | 428,106,474 | 725,299,090 |
| Conventional Lanes including added lane | 461,054 | 3,608,906 | 1.77 | 0.325 | 814,226 | 1,172,894 | 297,192,615 | 428,106,474 | 725,299,090 |
| Cost Difference | | | | | 0 | 0 | 0 | 0 | 0 |

TABLE Y1c. SUMMARY OF DAILY VEHICLE-HOURS - BASE CONDITION - BASE VOLUME VS.CONVENTIONAL LANES WITH ADDED CONVENTIONAL LANE - HIGH VOLUME

| Condition | Period of the Day | Daily Vehi | cle-Hours |
|-----------------------|--------------------|------------|----------------|
| Condition | Fellod of the Day | Trucks | Other Vehicles |
| Base Condition - | Peak Period | 5,060 | 35,368 |
| Base Volume | Nighttime Off-Peak | 415 | 2,735 |
| base volume | Daytime Off-Peak | 3,746 | 26,832 |
| TOTAL | | 9,221 | 64,935 |
| | | | • |
| Conventional Lanes | Peak Period | 5,060 | 31,941 |
| including added lane | Nighttime Off-Peak | 415 | 2,921 |
| including added latte | Daytime Off-Peak | 3,746 | 26,832 |
| TOTAL | | 9,221 | 61,693 |

TABLE Y1d. TRAVEL TIME COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED CONVENTIONAL LANE - HIGH VOLUME

| Condition | Daily Vehicle-Hours | | Unit Cost - 2001(\$) | | Total Cost | per Day (\$) | EUA | C (\$) | EUATC (\$) |
|---|---------------------|----------------|----------------------|----------------|------------|----------------|------------|----------------|--------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 9,221 | 64,935 | 28.27 | 9.16 | 260,721 | 594,509 | 95,162,984 | 216,995,967 | 312,158,951 |
| Conventional Lanes including added lane | 9,221 | 61,693 | 28.27 | 9.16 | 260,721 | 564,835 | 95,162,984 | 206,164,926 | 301,327,911 |
| Cost Difference | | | | | 0 | -29,674 | 0 | -10,831,041 | -10,831,041 |

TABLE Y1e. INCREMENTAL COST SUMMARY FOR CONVENTIONAL ADDED FREEWAY LANE (\$) - HIGH VOLUME

| Cost Category | Incremental Cost (EUAC) |
|---|----------------------------|
| System Administration, Planning, Design | |
| and Construction | 26,863,668 |
| Rehabilitation | 1,692,657 |
| System Maintenance | 8,120 |
| Vehicle Operating | 0 |
| Travel Time | -10,831,041 |
| Total Incremental Cost | 17,733,404 |

TABLE Y2a. SUMMARY OF DAILY VEHICLE-MILES - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED CONVENTIONAL LANE - MEDIUM VOLUME

| Condition | Period of the Day | Daily Vehi | cle-Miles |
|-----------------------|--------------------|------------|----------------|
| Condition | Fellod of the Day | Trucks | Other Vehicles |
| Base Condition - | Peak Period | 339,166 | 1,851,561 |
| Base Volume | Nighttime Off-Peak | 59,552 | 280,841 |
| base volume | Daytime Off-Peak | 406,731 | 2,378,430 |
| TOTAL | | 805,448 | 4,510,832 |
| | | | |
| Conventional Lanes | Peak Period | 339,166 | 1,851,561 |
| including added lane | Nighttime Off-Peak | 59,552 | 280,841 |
| including added latte | Daytime Off-Peak | 406,731 | 2,378,430 |
| TOTAL | | 805,448 | 4,510,832 |

TABLE Y2b. VEHICLE OPERATING COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED CONVENTIONAL LANE - MEDIUM VOLUME

| Condition | | nicle-Miles | Unit Cost - 2001(\$) | | Total Cost per Day (\$) | | EUAC (\$) | | EUATC (\$) |
|--|---------|----------------|----------------------|----------------|-------------------------|----------------|-------------|----------------|---------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 805,448 | 4,510,832 | 1.77 | 0.325 | 1,422,430 | 1,466,020 | 519,186,966 | 535,097,434 | 1,054,284,400 |
| Other Conventional Lanes - Base Volume | 805,448 | 4,510,832 | 1.77 | 0.325 | 1,422,430 | 1,466,020 | 519,186,966 | 535,097,434 | 1,054,284,400 |
| Cost Difference | _ | | - | _ | 0 | 0 | 0 | 0 | 0 |

TABLE Y2c. SUMMARY OF DAILY VEHICLE-HOURS - BASE CONDITION - BASE VOLUME VS.CONVENTIONAL LANES WITH ADDED CONVENTIONAL LANE - MEDIUM VOLUME

| Condition | Period of the Day | Daily Vehicle-Hours | | | |
|-----------------------|--------------------|---------------------|----------------|--|--|
| Ooridition | T chod of the Day | Trucks | Other Vehicles | | |
| Base Condition - | Peak Period | 6,783 | 31,577 | | |
| Base Volume | Nighttime Off-Peak | 1,191 | 4,694 | | |
| base volume | Daytime Off-Peak | 8,135 | 41,034 | | |
| TOTAL | | 16,109 | 77,305 | | |
| | | | | | |
| Conventional Lanes | Peak Period | 6,783 | 31,482 | | |
| including added lane | Nighttime Off-Peak | 1,191 | 4,694 | | |
| including added larie | Daytime Off-Peak | 8,135 | 40,957 | | |
| TOTAL | | 16,109 | 77,133 | | |

TABLE Y2d. TRAVEL TIME COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED CONVENTIONAL LANE - MEDIUM VOLUME

| Condition | Daily Veh | ehicle-Hours Unit Cos | | t - 2001(\$) Total Cost pe | | t per Day (\$) EU/ | | C (\$) | EUATC (\$) |
|---|-----------|-----------------------|--------|----------------------------|---------|--------------------|-------------|----------------|--------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 16,109 | 77,305 | 28.27 | 9.16 | 455,471 | 707,764 | 166,247,001 | 258,334,035 | 424,581,036 |
| Conventional Lanes including added lane | 16,109 | 77,133 | 28.27 | 9.16 | 455,471 | 706,191 | 166,247,001 | 257,759,696 | 424,006,697 |
| Cost Difference | | | | | 0 | -1,574 | 0 | -574,339 | -574,339 |

TABLE Y2e. INCREMENTAL COST SUMMARY FOR CONVENTIONAL ADDED FREEWAY LANE (\$) - MEDIUM VOLUME

| Cost Category | Incremental Cost (EUAC) |
|---|----------------------------|
| System Administration, Planning, Design | |
| and Construction | 36,444,072 |
| Rehabilitation | 1,618,982 |
| System Maintenance | 20,250 |
| Vehicle Operating | 0 |
| Travel Time | -574,339 |
| Total Incremental Cost | 37,508,965 |

TABLE Y3a. SUMMARY OF DAILY VEHICLE-MILES - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED CONVENTIONAL LANE - LOW VOLUME

| Condition | Period of the Day | Daily Vehi | icle-Miles |
|-----------------------|--------------------|------------|----------------|
| Condition | Period of the Day | Trucks | Other Vehicles |
| Base Condition - | Peak Period | 689,494 | 1,839,391 |
| Base Volume | Nighttime Off-Peak | 183,255 | 471,053 |
| base volume | Daytime Off-Peak | 494,219 | 1,289,927 |
| TOTAL | | 1,366,969 | 3,600,371 |
| | | | |
| Conventional Lanes | Peak Period | 689,494 | 1,839,391 |
| including added lane | Nighttime Off-Peak | 183,255 | 471,053 |
| including added latte | Daytime Off-Peak | 494,219 | 1,289,927 |
| TOTAL | | 1,366,969 | 3,600,371 |

TABLE Y3b. VEHICLE OPERATING COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED CONVENTIONAL LANE - LOW VOLUME

| Condition | Daily Vel | nicle-Miles | Unit Cost | - 2001(\$) | Total Cost | per Day (\$) | EUA | C (\$) | EUATC (\$) |
|---|-----------|----------------|-----------|----------------|------------|----------------|-------------|----------------|---------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 1,366,969 | 3,600,371 | 1.77 | 0.325 | 2,414,082 | 1,170,121 | 881,140,001 | 427,093,998 | 1,308,233,999 |
| Conventional Lanes including added lane | 1,366,969 | 3,600,371 | 1.77 | 0.325 | 2,414,082 | 1,170,121 | 881,140,001 | 427,093,998 | 1,308,233,999 |
| Cost Difference | | | | | 0 | 0 | 0 | 0 | 0 |

TABLE Y3c. SUMMARY OF DAILY VEHICLE-HOURS - BASE CONDITION - BASE VOLUME VS.CONVENTIONAL LANES WITH ADDED CONVENTIONAL LANE - LOW VOLUME

| Condition | Period of the Day | Daily Vehicle-Hours | | | |
|----------------------|--------------------|---------------------|----------------|--|--|
| Condition | reliod of the Day | Trucks | Other Vehicles | | |
| Base Condition - | Peak Period | 13,790 | 28,298 | | |
| Base Volume | Nighttime Off-Peak | 3,665 | 7,247 | | |
| base volume | Daytime Off-Peak | 9,884 | 19,845 | | |
| TOTAL | | 27,339 | 55,390 | | |
| | | | | | |
| Conventional Lanes | Peak Period | 13,790 | 28,298 | | |
| | Nighttime Off-Peak | 3,665 | 7,247 | | |
| including added lane | Daytime Off-Peak | 9,884 | 19,845 | | |
| TOTAL | | 27,339 | 55,390 | | |

TABLE Y3d. TRAVEL TIME COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED CONVENTIONAL LANE - LOW VOLUME

| Condition | Daily Veh | icle-Hours | Unit Cost | - 2001(\$) | Total Cost | per Day (\$) | EUA | C (\$) | EUATC (\$) |
|---|-----------|----------------|-----------|----------------|------------|----------------|-------------|----------------|--------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 27,339 | 55,390 | 28.27 | 9.16 | 773,005 | 507,127 | 282,146,687 | 185,101,427 | 467,248,114 |
| Conventional Lanes including added lane | 27,339 | 55,390 | 28.27 | 9.16 | 773,005 | 507,127 | 282,146,687 | 185,101,427 | 467,248,114 |
| Cost Difference | | | | | 0 | 0 | 0 | 0 | 0 |

TABLE Y3e. INCREMENTAL COST SUMMARY FOR CONVENTIONAL ADDED FREEWAY LANE (\$) - LOW VOLUME

| Cost Category | Incremental Cost (EUAC) |
|---|----------------------------|
| System Administration, Planning, Design | |
| and Construction | 50,151,403 |
| Rehabilitation | 2,045,782 |
| System Maintenance | 58,109 |
| Vehicle Operating | 0 |
| Travel Time | 0 |
| Total Incremental Cost | 52,255,294 |

TABLE Y4a. SUMMARY OF DAILY VEHICLE-MILES - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED AHS LANE - HIGH VOLUME

| Condition | Period of the Day | Daily Ve | hicle-Miles |
|------------------------------|--------------------|----------|----------------|
| Condition | r enou or the day | Trucks | Other Vehicles |
| | Peak Period | 253,206 | 1,897,833 |
| Base Condition - Base Volume | Nighttime Off-Peak | 20,830 | 161,438 |
| | Daytime Off-Peak | 187,018 | 1,549,636 |
| TOTAL | | 461,054 | 3,608,906 |
| | | | |
| | Peak Period | 41,072 | 3,536 |
| AHS Lane - Base Volume | Nighttime Off-Peak | 3,536 | 31,122 |
| | Daytime Off-Peak | 31,122 | 60,705 |
| TOTAL | | 75,730 | 95,363 |
| | | | |
| | Peak Period | 211,921 | 1,895,389 |
| Remaining Conventional Lanes | Nighttime Off-Peak | 17,294 | 161,438 |
| | Daytime Off-Peak | 156,109 | 1,552,079 |
| TOTAL | | 385,324 | 3,608,906 |

TABLE Y4b. VEHICLE OPERATING COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED AHS LANE - HIGH VOLUME

| 0 19 | | Daily Vehicle-Miles | | 2001-Unit Cost (\$) | | Total Cost per Day (\$) | | EUAC (\$) | |
|--|--------|---------------------|--------|---------------------|---------|-------------------------|-------------|----------------|--------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 461054 | 3608906 | 1.77 | 0.325 | 814,226 | 1,172,894 | 297,192,615 | 428,106,474 | 725,299,090 |
| AHS Lane - Base Volume | 75730 | 95363 | 1.48 | 0 | 111,929 | 0 | 40,854,141 | 0 | 40,854,141 |
| Other Conventional Lanes - Base Volume | 385324 | 3608906 | 1.77 | 0.325 | 680,486 | 1,172,894 | 248,377,516 | 428,106,474 | 676,483,990 |
| Total - AHS Lane & Other Conventional | 461054 | 3704269 | | | 792415 | 1172894 | 289231657 | 428106474 | 717,338,131 |
| Cost Difference | | | | | -21,811 | 0 | -7,960,958 | 0 | -7,960,958 |

TABLE Y4c. SUMMARY OF DAILY VEHICLE-HOURS - BASE CONDITION - BASE VOLUME VS.CONVENTIONAL LANES WITH ADDED AHS LANE - HIGH VOLUME

| Condition | Period of the Day | Daily Vel | hicle-Hours |
|------------------------------|--------------------|-----------|----------------|
| Condition | reliod of the Day | Trucks | Other Vehicles |
| | Peak Period | 5,064 | 35,109 |
| Base Condition - Base Volume | Nighttime Off-Peak | 417 | 2,749 |
| | Daytime Off-Peak | 3,740 | 26,773 |
| TOTAL | | 9,221 | 64,631 |
| | | • | - |
| | Peak Period | 587 | 0 |
| AHS Lane - Base Volume | Nighttime Off-Peak | 51 | 0 |
| | Daytime Off-Peak | 445 | 0 |
| TOTAL | | 1,082 | 0 |
| | | | |
| | Peak Period | 4,238 | 34,125 |
| Remaining Conventional Lanes | Nighttime Off-Peak | 346 | 2,749 |
| | Daytime Off-Peak | 3,122 | 26,817 |
| TOTAL | | 7,706 | 63,691 |

Table Y4d. TRAVEL TIME COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED AHS LANE - HIGH VOLUME

| Condition Daily Vehicle-Hours | | 2001-Unit Cost (\$) T | | Total Cost per Day (\$) | | EUAC (\$) | | EUATC (\$) | |
|------------------------------------|--------|-----------------------|--------|-------------------------|---------|----------------|-------------|----------------|--------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 9,221 | 64,631 | 28.27 | 9.16 | 260,721 | 591,733 | 95,162,984 | 215,982,705 | 311,145,689 |
| AHS Lane - Base Volume | 1,082 | 0 | 28.27 | 0 | 10,196 | 0 | 3,721,645 | 0 | 3,721,645 |
| Remaining Conventional Lanes | 7,706 | 63,691 | 28.27 | 9.16 | 217,896 | 583,127 | 79,532,076 | 212,841,218 | 292,373,293 |
| Total - AHS and Conventional Lanes | 8,788 | 63,691 | | | 228,092 | 583,127 | 83,253,721 | 212,841,218 | 296,094,938 |
| Cost Difference | | | | | -32,628 | -8,607 | -11,909,263 | -3,141,488 | -15,050,751 |

TABLE Y4e. INCREMENTAL COST SUMMARY FOR ADDED AHS LANE (\$) - HIGH VOLUME

| 1 01171222271110 271112 | - (4) 111-111-1-1-111 |
|---|-------------------------|
| Cost Category | Incremental Cost (EUAC) |
| System Administration, Planning, Design and | 67,072,902 |
| Rehabilitation | 4,753,134 |
| System Maintenance | 12,213 |
| System Operating | 1,453 |
| Vehicle Operating | -7,960,958 |
| Travel Time | -15,050,751 |
| Total Incremental Cost | 48,827,992 |

TABLE Y5a. SUMMARY OF DAILY VEHICLE-MILES - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED AHS LANE - MEDIUM VOLUME

| Condition | Period of the Day | Daily Ve | hicle-Miles |
|------------------------------|--------------------|----------|----------------|
| Condition | Fellod of the Day | Trucks | Other Vehicles |
| | Peak Period | 339,166 | 1,851,561 |
| Base Condition - Base Volume | Nighttime Off-Peak | 59,552 | 280,841 |
| | Daytime Off-Peak | 406,731 | 2,378,430 |
| TOTAL | | 805,448 | 4,510,832 |
| | | - | |
| | Peak Period | 43,281 | 6,554 |
| AHS Lane - Base Volume | Nighttime Off-Peak | 6,554 | 51,199 |
| | Daytime Off-Peak | 51,199 | 63,970 |
| TOTAL | | 101,035 | 121,724 |
| | | - | |
| | Peak Period | 295,884 | 1,851,561 |
| Remaining Conventional Lanes | Nighttime Off-Peak | 52,997 | 280,841 |
| _ | Daytime Off-Peak | 355,532 | 2,378,430 |
| TOTAL | | 704,413 | 4,510,832 |

TABLE Y5b. VEHICLE OPERATING COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED AHS LANE - MEDIUM VOLUME

| Daily Vehicle-Miles | | 2001-Unit Cost (\$) | | Total Cost per Day (\$) | | EUA | EUATC (\$) | | |
|---------------------------------------|--------|---------------------|--------|-------------------------|-----------|----------------|-------------|----------------|---------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 805448 | 4510832 | 1.77 | 0.325 | 1,422,430 | 1,466,020 | 519,186,966 | 535,097,434 | 1,054,284,400 |
| AHS Lane - Base Volume | 101035 | 121724 | 1.48 | 0 | 149,330 | 0 | 54,505,456 | 0 | 54,505,456 |
| Remaining Conventional Lanes | 704413 | 4510832 | 1.77 | 0.325 | 1,244,001 | 1,466,020 | 454,060,417 | 535,097,434 | 989,157,851 |
| Total - AHS Lane & Other Conventional | 805448 | 4632556 | | | 1393331 | 1466020 | 508565872 | 535097434 | 1,043,663,307 |
| Cost Difference | | | | | -29,099 | 0 | -10,621,093 | 0 | -10,621,093 |

TABLE Y5c. SUMMARY OF DAILY VEHICLE-HOURS - BASE CONDITION - BASE VOLUME VS.CONVENTIONAL LANES WITH ADDED AHS LANE - MEDIUM VOLUME

| | | Daily Ve | hicle-Hours |
|------------------------------|--------------------|----------|----------------|
| Condition | Period of the Day | Trucks | Other Vehicles |
| | Peak Period | 6,783 | 31,536 |
| Base Condition - Base Volume | Nighttime Off-Peak | 1,191 | 4,694 |
| | Daytime Off-Peak | 8,135 | 41,034 |
| TOTAL | | 16,109 | 77,264 |
| | | | |
| | Peak Period | 618 | 0 |
| AHS Lane - Base Volume | Nighttime Off-Peak | 94 | 0 |
| | Daytime Off-Peak | 731 | 0 |
| TOTAL | | 1,443 | 0 |
| | | | |
| | Peak Period | 5,918 | 31,502 |
| Remaining Conventional Lanes | Nighttime Off-Peak | 1,060 | 4,694 |
| | Daytime Off-Peak | 7,111 | 41,034 |
| TOTAL | | 14,088 | 77,230 |

Table Y5d. TRAVEL TIME COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED AHS LANE - MEDIUM VOLUME

| Condition | Daily Vehicle-Hours | | 2001-Unit Cost (\$) | | Total Cost per Day (\$) | | EUAC (\$) | | EUATC (\$) |
|------------------------------------|---------------------|----------------|---------------------|----------------|-------------------------|----------------|-------------|----------------|--------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 16,109 | 77,264 | 28.27 | 9.16 | 455,471 | 707,393 | 166,247,001 | 258,198,326 | 424,445,327 |
| AHS Lane - Base Volume | 1,443 | 0 | 28.27 | 0 | 13,603 | 0 | 4,965,224 | 0 | 4,965,224 |
| Remaining Conventional Lanes | 14,088 | 77,230 | 28.27 | 9.16 | 398,337 | 707,083 | 145,393,062 | 258,085,200 | 403,478,261 |
| Total - AHS and Conventional Lanes | 15,532 | 77,230 | | | 411,941 | 707,083 | 150,358,285 | 258,085,200 | 408,443,485 |
| Cost Difference | | | | | -43,531 | -310 | -15,888,716 | -113,126 | -16,001,842 |

TABLE Y5e. INCREMENTAL COST SUMMARY FOR ADDED AHS LANE (\$) - MEDIUM VOLUME

| , , , , , , , , , , , , , , , , , , , | |
|---------------------------------------|-------------------------|
| Cost Category | Incremental Cost (EUAC) |
| System Administration, Planning, | |
| Design and Construction | 89,355,273 |
| Rehabilitation | 5,679,363 |
| System Maintenance | 24,511 |
| System Operating | 1,308 |
| Vehicle Operating | -10,621,093 |
| Travel Time | -16,001,842 |
| Total Incremental Cost | 68,437,520 |

TABLE Y6a. SUMMARY OF DAILY VEHICLE-MILES - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED AHS LANE - LOW VOLUME

| | | Daily Ve | hicle-Miles |
|------------------------------|--------------------|-----------|----------------|
| Condition | Period of the Day | Trucks | Other Vehicles |
| | Peak Period | 689,494 | 1,839,391 |
| Base Condition - Base Volume | Nighttime Off-Peak | 183,255 | 471,053 |
| | Daytime Off-Peak | 494,219 | 1,289,927 |
| TOTAL | | 1,366,969 | 3,600,371 |
| | - | | |
| | Peak Period | 288,574 | 78,649 |
| AHS Lane - Base Volume | Nighttime Off-Peak | 78,649 | 208,399 |
| | Daytime Off-Peak | 208,399 | 426,513 |
| TOTAL | | 575,623 | 713,562 |
| | | | • |
| | Peak Period | 400,920 | 1,839,391 |
| Remaining Conventional Lanes | Nighttime Off-Peak | 104,606 | 471,053 |
| | Daytime Off-Peak | 285,820 | 1,289,927 |
| TOTAL | | 791,347 | 3,600,371 |

TABLE Y6b. VEHICLE OPERATING COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED AHS LANE - LOW VOLUME

| Condition | Daily Vehicle-Miles | | 2001-Unit Cost (\$) | | Total Cost per Day (\$) | | EUAC (\$) | | EUATC (\$) |
|------------------------------------|---------------------|----------------|---------------------|----------------|-------------------------|----------------|-------------|----------------|---------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 1,366,969 | 3,600,371 | 1.77 | 0.325 | 2,414,082 | 1,170,121 | 881,140,001 | 427,093,998 | 1,308,233,999 |
| AHS Lane - Base Volume | 575,623 | 713,562 | 1.48 | 0 | 850,772 | 0 | 310,531,663 | 0 | 310,531,663 |
| Remaining Conventional Lanes | 791,347 | 3,600,371 | 1.77 | 0.325 | 1,397,527 | 1,170,121 | 510,097,224 | 427,093,998 | 937,191,222 |
| Total - AHS and Conventional Lanes | 1,366,969 | 4,313,933 | | | 2,248,298 | 1,170,121 | 820,628,888 | 427,093,998 | 1,247,722,886 |
| Cost Difference | | | | | -165,784 | 0 | -60,511,113 | 0 | -60,511,113 |

TABLE Y6c. SUMMARY OF DAILY VEHICLE-HOURS - BASE CONDITION - BASE VOLUME VS.CONVENTIONAL LANES WITH ADDED AHS LANE - LOW VOLUME

| | | Daily Vel | hicle-Hours |
|------------------------------|--------------------|-----------|----------------|
| Condition | Period of the Day | Trucks | Other Vehicles |
| | Peak Period | 13,790 | 28,298 |
| Base Condition - Base Volume | Nighttime Off-Peak | 3,665 | 7,247 |
| | Daytime Off-Peak | 9,884 | 19,845 |
| TOTAL | | 27,339 | 55,390 |
| | | | |
| | Peak Period | 4,122 | 0 |
| AHS Lane - Base Volume | Nighttime Off-Peak | 1,124 | 0 |
| | Daytime Off-Peak | 2,977 | 0 |
| TOTAL | | 8,223 | 0 |
| | | | |
| | Peak Period | 8,018 | 28,298 |
| Remaining Conventional Lanes | Nighttime Off-Peak | 2,092 | 7,247 |
| | Daytime Off-Peak | 5,716 | 19,845 |
| TOTAL | | 15,827 | 55,390 |

Table Y6d. TRAVEL TIME COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED AHS LANE - LOW VOLUME

| Condition Daily Vehicle-Hours | | 2001-Unit Cost (\$) Total Cost p | | per Day (\$) | EUAC (\$) | | EUATC (\$) | | |
|------------------------------------|--------|----------------------------------|--------|----------------|-----------|----------------|-------------|----------------|--------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 27,339 | 55,390 | 28.27 | 9.16 | 773,005 | 507,127 | 282,146,687 | 185,101,427 | 467,248,114 |
| AHS Lane - Base Volume | 8,223 | 0 | 28.27 | 0 | 77,502 | 0 | 28,288,162 | 0 | 28,288,162 |
| Remaining Conventional Lanes | 15,827 | 55,390 | 28.27 | 9.16 | 447,497 | 507,127 | 163,336,407 | 185,101,427 | 348,437,834 |
| Total - AHS and Conventional Lanes | 24,050 | 55,390 | | | 524,999 | 507,127 | 191,624,569 | 185,101,427 | 376,725,996 |
| Cost Difference | | | | | -248,006 | 0 | -90,522,118 | 0 | -90,522,118 |

TABLE Y6e. INCREMENTAL COST SUMMARY FOR ADDED AHS LANE (\$) - LOW VOLUME

| Cost Category | Incremental Cost (EUAC) |
|----------------------------------|-------------------------|
| System Administration, Planning, | |
| Design and Construction | 106,993,402 |
| Rehabilitation | 8,948,569 |
| System Maintenance | 65,321 |
| System Operating | 2,252 |
| Vehicle Operating | -60,511,113 |
| Travel Time | -90,522,118 |
| Total Incremental Cost | -35,023,688 |

TABLE Y7a. SUMMARY OF VEHICLE-MILES - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED DEDICATED TRUCK LANE - HIGH VOLUME

| Condition | Period of the Day | Daily Veh | icle-Miles |
|------------------------------|--------------------|-----------|------------|
| Condition | Fellod of the Day | Trucks | Other |
| | Peak Period | 253,206 | 1,897,833 |
| Base Condition - Base Volume | Nighttime Off-Peak | 20,830 | 161,438 |
| | Daytime Off-Peak | 187,018 | 1,549,636 |
| TOTAL | | 461,054 | 3,608,906 |
| | • | | |
| Dedicated Truck Lane - Base | Peak Period | 41,072 | 0 |
| Volume | Nighttime Off-Peak | 3,536 | 0 |
| Volume | Daytime Off-Peak | 31,122 | 0 |
| TOTAL | | 75,730 | 0 |
| | | | |
| | Peak Period | 211,921 | 1,895,389 |
| Remaining Conventional Lanes | Nighttime Off-Peak | 17,294 | 161,438 |
| | Daytime Off-Peak | 156,109 | 1,552,079 |
| TOTAL | | 385,324 | 3,608,906 |

TABLE Y7b. VEHICLE OPERATING COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED DEDICATED TRUCK LANE - HIGH VOLUME

| Condition | Daily \ | Daily Vehicle-Miles | | 2001-Unit Cost (\$) | | Total Cost per Day(\$) | | EUAC (\$) | |
|---|---------|---------------------|--------|---------------------|---------|------------------------|-------------|----------------|--------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 461,054 | 3,608,906 | 1.77 | 0.325 | 814,226 | 1,172,894 | 297,192,615 | 428,106,474 | 725,299,090 |
| Dedicated Lane - Base Volume | 75,730 | 0 | 1.77 | 0 | 133,740 | 0 | 48,815,099 | 0 | 48,815,099 |
| Remaining Conventional Lanes | 385,324 | 3,608,906 | 1.77 | 0.325 | 680,486 | 1,172,894 | 248,377,516 | 428,106,474 | 676,483,990 |
| Total - Dedicated Lane and Conventional Lanes | 461,054 | 3,608,906 | | | 814,226 | 1,172,894 | 297,192,615 | 428,106,474 | 725,299,090 |
| Cost Difference | | | | | 0 | 0 | 0 | 0 | 0 |

TABLE Y7c. SUMMARY OF DAILY VEHICLE-HOURS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED DEDICATED TRUCK LANE - HIGH VOLUME

| Condition | Daried of the Day | Daily Ve | ehicle-Hours |
|------------------------|--------------------|----------|----------------|
| Condition | Period of the Day | Trucks | Other Vehicles |
| Base Condition - Base | Peak Period | 5,064 | 35,109 |
| | Nighttime Off-Peak | 417 | 2,749 |
| Volume | Daytime Off-Peak | 3,740 | 26,773 |
| TOTAL | | 9,221 | 64,631 |
| | • | | • |
| Dedicated Truck Lane - | Peak Period | 821 | 0 |
| | Nighttime Off-Peak | 71 | 0 |
| Base Volume | Daytime Off-Peak | 622 | 0 |
| TOTAL | | 1,515 | 0 |
| | | | |
| Remaining Conventional | Peak Period | 4,238 | 34,125 |
| Remaining Conventional | Nighttime Off-Peak | 346 | 2,749 |
| Lanes | Daytime Off-Peak | 3,122 | 26,817 |
| TOTAL | | 7,706 | 63,691 |

TABLE Y7d. TRAVEL TIME COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED DEDICATED TRUCK LANE - HIGH VOLUME

| Condition | Daily Vehicle-Hours | | 2001-Unit Cost (\$) | | Total Cost per Day(\$) | | EUAC (\$) | | EUATC (\$) |
|---|---------------------|----------------|---------------------|----------------|------------------------|----------------|------------|----------------|--------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 9,221 | 64,631 | 28.27 | 9.16 | 260,721 | 591,733 | 95,162,984 | 215,982,705 | 311,145,689 |
| Dedicated Lane - Base Volume | 1,515 | 0 | 28.27 | 0 | 42,824 | 0 | 15,630,908 | 0 | 15,630,908 |
| Remaining Conventional Lanes | 7,706 | 63,691 | 28.27 | 9.16 | 217,896 | 583,127 | 79,532,076 | 212,841,218 | 292,373,293 |
| Total - Dedicated Lane and Conventional Lanes | 9,221 | 63,691 | | | 260,721 | 583,127 | 95,162,984 | 212,841,218 | 308,004,202 |
| Cost Difference | | | | | 0 | -8,607 | 0 | -3,141,488 | -3,141,488 |

TABLE Y7e. INCREMENTAL COST SUMMARY FOR ADDED DEDICATED TRUCK LANE (\$) - HIGH VOLUME

| <u> </u> | |
|----------------------------------|-------------------------|
| Cost Category | Incremental Cost (EUAC) |
| System Administration, Planning, | |
| Design and Construction | 61,708,821 |
| Rehabilitation | 3,774,525 |
| System Maintenance | 8,948 |
| Vehicle Operating | 0 |
| Travel Time | -3,141,488 |
| Total Incremental Cost | 62,350,806 |

TABLE Y8a. SUMMARY OF VEHICLE-MILES - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED DEDICATED TRUCK LANE - MEDIUM VOLUME

| Condition | Period of the Day | Daily Veh | icle-Miles |
|------------------------------|--------------------|-----------|------------|
| Condition | Period of the Day | Trucks | Other |
| | Peak Period | 339,166 | 1,851,561 |
| Base Condition - Base Volume | Nighttime Off-Peak | 59,552 | 280,841 |
| | Daytime Off-Peak | 406,731 | 2,378,430 |
| TOTAL | | 805,448 | 4,510,832 |
| | | | |
| Dedicated Truck Lane - Base | Peak Period | 43,281 | 0 |
| Volume | Nighttime Off-Peak | 6,554 | 0 |
| Volume | Daytime Off-Peak | 51,199 | 0 |
| TOTAL | | 101,035 | 0 |
| | | | |
| Demoisies Occupitation | Peak Period | 295,884 | 1,851,561 |
| Remaining Conventional Lanes | Nighttime Off-Peak | 52,997 | 280,841 |
| | Daytime Off-Peak | 355,532 | 2,378,430 |
| TOTAL | | 704,413 | 4,510,832 |

TABLE Y8b. VEHICLE OPERATING COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED DEDICATED TRUCK LANE - MEDIUM VOLUME

| | Daily Vehicle-Miles | | 2001-Unit Cost (\$) | | Total Cost per Day(\$) | | EUAC (\$) | | EUATC (\$) |
|---|---------------------|----------------|---------------------|----------------|------------------------|----------------|-------------|----------------|---------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 805,448 | 4,510,832 | 1.77 | 0.325 | 1,422,430 | 1,466,020 | 519,186,966 | 535,097,434 | 1,054,284,400 |
| Dedicated Lane - Base Volume | 101,035 | 0 | 1.77 | 0 | 178,429 | 0 | 65,126,549 | 0 | 65,126,549 |
| Remaining Conventional Lanes | 704,413 | 4,510,832 | 1.77 | 0.325 | 1,244,001 | 1,466,020 | 454,060,417 | 535,097,434 | 989,157,851 |
| Total - Dedicated Lane & Other Conventional Lanes | 805,448 | 4,510,832 | | | 1,422,430 | 1,466,020 | 519,186,966 | 535,097,434 | 1,054,284,400 |
| Cost Difference | | | | | 0 | 0 | 0 | 0 | 0 |

TABLE Y8c. SUMMARY OF DAILY VEHICLE-HOURS - BASE CONDITION - BASE VOLUME VS.CONVENTIONAL LANES WITH ADDED DEDICATED TRUCK LANE - MEDIUM VOLUME

| Condition | Daried of the Day | Daily Ve | ehicle-Hours |
|------------------------------|--------------------|----------|----------------|
| Condition | Period of the Day | Trucks | Other Vehicles |
| Base Condition Base | Peak Period | 6,783 | 31,536 |
| Base Condition - Base Volume | Nighttime Off-Peak | 1,191 | 4,694 |
| Volume | Daytime Off-Peak | 8,135 | 41,034 |
| TOTAL | | 16,109 | 77,264 |
| | | | |
| Dedicated Truck Lane - | Peak Period | 866 | 0 |
| Base Volume | Nighttime Off-Peak | 131 | 0 |
| base volume | Daytime Off-Peak | 1,024 | 0 |
| TOTAL | | 2,021 | 0 |
| | | | |
| Remaining Conventional | Peak Period | 5,918 | 31,502 |
| Lanes | Nighttime Off-Peak | 1,060 | 4,694 |
| | Daytime Off-Peak | 7,111 | 41,034 |
| TOTAL | | 14,088 | 77,230 |

TABLE Y8d. TRAVEL TIME COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED DEDICATED TRUCK LANE - MEDIUM VOLUME

| Condition | | Daily Vehicle-Hours | | 2001-Unit Cost (\$) | | Total Cost per Day(\$) | | EUAC (\$) | |
|---|--------|---------------------|--------|---------------------|---------|------------------------|-------------|----------------|--------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 16,109 | 77,264 | 28.27 | 9.16 | 455,471 | 707,393 | 166,247,001 | 258,198,326 | 424,445,327 |
| Dedicated Lane - Base Volume | 2,021 | 0 | 28.27 | 0 | 57,134 | 0 | 20,853,939 | 0 | 20,853,939 |
| Remaining Conventional Lanes | 14,088 | 77,230 | 28.27 | 9.16 | 398,337 | 707,083 | 145,393,062 | 258,085,200 | 403,478,261 |
| Total - Dedicated Lane and Conventional Lanes | 16,109 | 77,230 | | | 455,471 | 707,083 | 166,247,001 | 258,085,200 | 424,332,201 |
| Cost Difference | | | | | 0 | -310 | 0 | -113,126 | -113,126 |

TABLE Y8e. INCREMENTAL COST SUMMARY FOR ADDED DEDICATED TRUCK LANE (\$) - MEDIUM VOLUME

| Cost Category | Incremental Cost (EUAC) |
|----------------------------------|-------------------------|
| System Administration, Planning, | |
| Design and Construction | 84,946,588 |
| Rehabilitation | 4,764,349 |
| System Maintenance | 21,491 |
| Vehicle Operating | 0 |
| Travel Time | -113,126 |
| Total Incremental Cost | 89,619,302 |

TABLE Y9a. SUMMARY OF VEHICLE-MILES - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED DEDICATED TRUCK LANE - LOW VOLUME

| | | Daily Veh | icle-Miles |
|------------------------------|--------------------|-----------|------------|
| Condition | Period of the Day | Trucks | Other |
| | | TTUCKS | Vehicles |
| | Peak Period | 689,494 | 1,839,391 |
| Base Condition - Base Volume | Nighttime Off-Peak | 183,255 | 471,053 |
| | Daytime Off-Peak | 494,219 | 1,289,927 |
| TOTAL | | 1,366,969 | 3,600,371 |
| | | | |
| Dedicated Truck Lane - Base | Peak Period | 288,574 | 78,649 |
| Volume | Nighttime Off-Peak | 78,649 | 208,399 |
| Volume | Daytime Off-Peak | 208,399 | 509,625 |
| TOTAL | | 575,623 | 796,673 |
| | | | |
| | Peak Period | 400,920 | 1,839,391 |
| Remaining Conventional Lanes | Nighttime Off-Peak | 104,606 | 471,053 |
| | Daytime Off-Peak | 285,820 | 1,289,927 |
| TOTAL | | 791,347 | 3,600,371 |

TABLE Y9b. VEHICLE OPERATING COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED DEDICATED TRUCK LANE - LOW VOLUME

| Condition | Daily Vehicle-Miles | | 2001-Unit Cost (\$) | | Total Cost per Day(\$) | | EUAC (\$) | | EUATC (\$) |
|---|---------------------|----------------|---------------------|----------------|------------------------|----------------|-------------|----------------|---------------|
| Condition | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 1,366,969 | 3,600,371 | 1.77 | 0.325 | 2,414,082 | 1,170,121 | 881,140,001 | 427,093,998 | 1,308,233,999 |
| Dedicated Lane - Base Volume | 575,623 | 0 | 1.77 | 0 | 1,016,556 | 0 | 371,042,776 | 0 | 371,042,776 |
| Remaining Conventional Lanes | 791,347 | 3,600,371 | 1.77 | 0.325 | 1,397,527 | 1,170,121 | 510,097,224 | 427,093,998 | 937,191,222 |
| Total - Dedicated Lane and Conventional Lanes | 1,366,969 | 3,600,371 | | | 2,414,082 | 1,170,121 | 881,140,001 | 427,093,998 | 1,308,233,999 |
| Cost Difference | | | | | 0 | 0 | 0 | 0 | 0 |

TABLE Y9c. SUMMARY OF DAILY VEHICLE-HOURS - BASE CONDITION - BASE VOLUME VS.CONVENTIONAL LANES WITH ADDED DEDICATED TRUCK LANE - LOW VOLUME

| | | Daily Vehicle-Hours | | | |
|---------------------------------------|--------------------|---------------------|----------------|--|--|
| Condition | Period of the Day | Trucks | Other Vehicles | | |
| Base Condition - Base Volume | Peak Period | 13,790 | 28,298 | | |
| | Nighttime Off-Peak | 3,665 | 7,247 | | |
| | Daytime Off-Peak | 9,884 | 19,845 | | |
| TOTAL | | 27,339 | 55,390 | | |
| | | | | | |
| Dedicated Truck Lane - Base Volume | Peak Period | 5,771 | 0 | | |
| | Nighttime Off-Peak | 1,573 | 0 | | |
| | Daytime Off-Peak | 4,168 | 0 | | |
| TOTAL | | 11,512 | 0 | | |
| | | | • | | |
| Remaining Conventional Lanes | Peak Period | 8,018 | 28,298 | | |
| | Nighttime Off-Peak | 2,092 | 7,247 | | |
| | Daytime Off-Peak | 5,716 | 19,845 | | |
| TOTAL | | 15,827 | 55,390 | | |

TABLE Y9d. TRAVEL TIME COSTS - BASE CONDITION - BASE VOLUME VS. CONVENTIONAL LANES WITH ADDED DEDICATED TRUCK LANE - LOW VOLUME

| Condition | Daily Vehicle-Hours | | 2001-Unit Cost (\$) | | Total Cost per Day(\$) | | EUAC (\$) | | EUATC (\$) |
|---|---------------------|----------------|---------------------|----------------|------------------------|----------------|-------------|----------------|--------------|
| | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | Trucks | Other Vehicles | All Vehicles |
| Base Condition - Base Volume | 27,339 | 55,390 | 28.27 | 9.16 | 773,005 | 507,127 | 282,146,687 | 185,101,427 | 467,248,114 |
| Dedicated Lane - Base Volume | 11,512 | 0 | 28.27 | 0 | 325,508 | 0 | 118,810,280 | 0 | 118,810,280 |
| Remaining Conventional Lanes | 15,827 | 55,390 | 28.27 | 9.16 | 447,497 | 507,127 | 163,336,407 | 185,101,427 | 348,437,834 |
| Total - Dedicated Lane and Conventional Lanes | 27,339 | 55,390 | | | 773,005 | 507,127 | 282,146,687 | 185,101,427 | 467,248,114 |
| Cost Difference | | | | | 0 | 0 | 0 | 0 | 0 |

TABLE Y9e. INCREMENTAL COST SUMMARY FOR ADDED DEDICATED TRUCK LANE (\$) - LOW VOLUME

| Cost Category | Incremental Cost (EUAC) | | |
|----------------------------------|-------------------------|--|--|
| System Administration, Planning, | | | |
| Design and Construction | 101,644,972 | | |
| Rehabilitation | 7,135,113 | | |
| System Maintenance | 60,178 | | |
| Vehicle Operating | 0 | | |
| Travel Time | 0 | | |
| Total Incremental Cost | 108,840,264 | | |