I-680 / I-880 Corridor Study

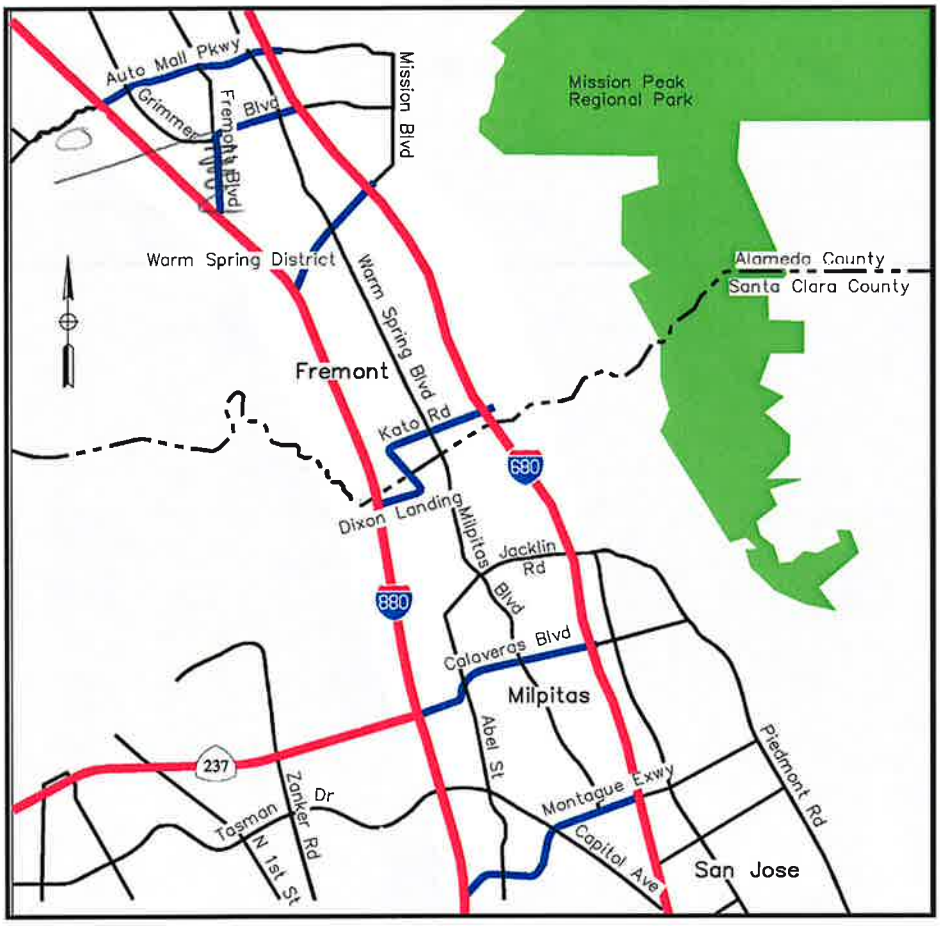

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Table of Contents

I. EXECUTIVE SUMMARY

This report documents the efforts of the I-680/I-880 Cross Connector Study. A summary of the work completed to date in refining the project objectives and developing and analyzing alternatives is followed by recommendations for short term and long term capital improvement projects along Study Area corridors.

This Study was initiated in the spring of 2001. The initial driving force behind this effort was the concern that the Sunol Grade commute traffic volumes headed to the "Golden Triangle" (area bounded by I-880, State Route 237 and Highway 101) would continue to increase. As a result of recent corridor studies on I-680 and I-880, improvements were/are underway for north and south I-680 (HOV lanes) and I-880 (Mission Blvd., Dixon Landing Road, Route 237 interchanges and associated widenings). Therefore, it was agreed by the funding agencies that this study would focus on looking for ways to improve the east-west mobility between the two freeways. Overall, this study assesses the ability of improvements to six east-west corridors to improve mobility throughout the Study Area.

The initial focus of the Study was to define a new cross connector freeway between I-680 and I-880, somewhere south of Auto Mall Parkway in Fremont and north of Montague Expressway in Milpitas. Initial discussions with the sponsoring and affected agencies resulted in the understanding by the agencies involved that one project would likely not be politically feasible, nor adequately relieve east-west congestion throughout the Study Area. An initial traffic analysis of existing conditions recognized that of the roughly 9,000 vehicles in the morning peak-hour commute that traverse from I-680 to I-880 and points west, only half originated from the Sunol Grade, while the other half originated south of Montague Expressway. Furthermore, "local trips," those that originate or end within the Study Area, contribute a significant percentage of the volume of traffic on existing "connectors," in the peak hours. The purpose of the Study was refined to develop a set of projects that, when combined, addresses the four key objectives listed below:

- Improve the commute from/to the Sunol Grade during the peak period (4,100 vehicles per hour in 2000).
- Improve the commute from/to I-680 south of Montague Expressway (southeast San Jose and other areas south) during the peak period (4,500 vehicles per hour in 2000).
- Provide improved HOV connectivity between the two freeways. Currently, Montague Expressway provides the only such connection between the two freeways.
- Relieve localized bottlenecks within the Study Area affecting the east-west commute.

As a result of a brainstorming session in July, 2001, roughly 100 ideas aimed at providing relief were identified and documented. After an initial screening process, which compared concepts with the key objectives and assessed major impacts and potential benefits, fifteen (15) alternatives remained under consideration for development in this Study. These alternatives were confined to the following six major corridors:

- Corridor A – Auto Mall Parkway
- Corridor B – Fremont Blvd. / Grimmer Blvd.
- Corridor C – Mission Boulevard
- Corridor D – Scott Creek Road / Dixon Landing Road

- Corridor E – Calaveras Blvd. / Route 237
- Corridor F – Montague Expressway

The alternatives under consideration were developed geometrically to assess feasibility, identify physical impacts, and determine order-of-magnitude project costs. Those alternatives considered physically feasible were modeled to assess traffic impacts. The model year for analysis and comparison in this Study is 2025. The traffic demand model used in the analysis was developed by the VTA for the Silicon Valley Rapid Transit Study and subsequently modified for this project. This model assumed projects planned and programmed at the beginning of the Study would be complete prior to improvements identified in the Study. Some of the key projects assumed complete in the base 2025 model include all phases of the I-880 / Mission Blvd. interchange, and the widening of Montague Expressway to eight lanes in the Study Area.

The overall results of the Study reflect the need and benefit of HOV connections between the two freeways and reflect benefits resulting from spreading, or balancing, the mixed flow usage among multiple corridors. Furthermore, a better balance between east-west roadway capacity and ramp capacity to and from the interchanges at I-680 and I-880 should result in a more consistent and dependable transportation system.

The following projects, which encompass all six corridors, are recommended to be pursued as a group (or program) of projects. Projects are listed proceeding from north to south.

- Widen Auto Mall Parkway to six lanes between the I-680 and I-880 freeways.
- Construct an HOV connection between the I-680 and I-880 freeways on an alignment following Fremont and Grimmer Avenues.
- Complete the planned Phase IA and IB improvements for the Mission Blvd./I-880 interchange. Construct the grade separation of Warren Avenue with the UPRR[1], and modify the I-680/Mission Blvd. interchange to operate as a partial cloverleaf.
- Extend Kato Road over I-880 to connect to the future Fremont Blvd. Extension.
- Widen Calaveras Blvd. to six lanes between Milpitas Blvd and Abel Street, and eight lanes between Abel Street and Abbott Street.
- Complete the widening of Montague Expressway[1] to eight lanes between the I-680 and I-880 freeways.

The net effect of the six projects would be the addition of six lanes of capacity in the Study Area in each direction with increased continuity between and beyond the freeways for both mixed flow and HOV trips. These improvements would result, during AM and PM peak hours combined, in an average increase in speed of five miles per hour throughout the Study Area during the peak hours in the year 2025 over the base model condition. Over 3,200 additional through trips (a 6.5% increase), over 9,600 additional vehicle miles traveled (a 13.0% increase), and an additional 10,200 person trips (an 8.1% increase) would be accommodated within and through the Study Area, with the proposed improvements in place, in the year 2025 during AM and PM peak hours, combined.

[1] The 2025 base model assumes all phases (IA, IB and II) of the Mission Blvd. / Warren Avenue / I-880 Interchange Complex, as defined by Caltrans, ACTIA and the City of Fremont, including the grade separation of Warren Avenue with the UPRR, as well as the widening of Montague Expressway to eight lanes, are constructed and operational prior to 2025, the analysis used in this Study. Phase IA of the I-880 / Mission Blvd. Interchange project is scheduled to begin construction in the spring of 2005. Portions of the Montague Expressway widening within the Study Area are currently being pursued by the County of Santa Clara and the City of Milpitas.

While each individual project provides benefits to commuters, it is important that all of the projects listed are accomplished to provide capacity and balance to the overall roadway network in the Study Area.

Two alternatives are considered feasible for the Fremont/Grimmer HOV connector – one at-grade on local streets and one elevated as a dedicated connector with no intermediate access. Determination of the alternative to be constructed will be based on future project development activities. This improvement has the potential to be an extension of the I-680 SMART Lane project currently under development. Future development of improvements on this corridor will require coordination with the SMART Lane project.

In addition to the six projects identified above, it is also recommended that the concept of an HOV connection between I-680 and I-880 along Calaveras Blvd. continue to be developed due to the significant potential this system reflected in the modeling studies.

The projected cost to develop the improvements on Auto Mall Parkway, Fremont Blvd./Grimmer Blvd., Kato Road and Calaveras Road, is $170 million if the at-grade alternative along Fremont/Grimmer is selected, or $335 million if the elevated HOV alternative is selected (in 2003 dollars). The current cost estimate to complete Phase IB (Mission Blvd. Widening east of Warm Springs Blvd.) and Phase 2 (Warren Avenue Grade Separation with UPRR) on Mission Blvd is $114 million and the estimated cost to complete the interchange improvements at I-680 and Mission Blvd. is $9 million. The total estimate for all of these improvements is therefore either $293 million or $458 million depending on the alternative chosen for the Fremont Blvd./Grimmer Blvd. corridor HOV connection. The previous study estimate to widen Montague Expressway to the "Plan Line" eight-lane facility, between I-680 and I-880 was $33.5 million (in 2003 dollars). Currently, the City of Milpitas and the County of Santa Clara are pursuing improvements to Montague Expressway within the Study Area.

It is recommended that the projects listed be pursued as a coordinated program by both counties and Caltrans to increase funding opportunities and ensure all elements are implemented in a timely manner.

II. INTRODUCTION

Alleviating traffic congestion along the two main north-south corridors in northern Santa Clara and southern Alameda counties, I-680 and I-880, is a primary goal of area agencies. To date, however, efforts to improve these transportation routes have focused on increasing capacity on these routes, leading to projects such as the addition of HOV lanes on I-680 and several interchange improvements on I-880 (e.g., Mission Boulevard, Dixon Landing Road, and Route 237). While these projects have resulted in clear benefits to traffic flow, they nonetheless address only one aspect of the problem, i.e., capacity issues along I-880 and I-680.

In a similar vein, previous analyses of east-west mobility between I-880 and I-680 centered on a single, linear solution to connect the two freeways. Difficulties of right-of-way acquisition, environmental/social community impacts, and exorbitant cost, however, have precluded the development of an optimal solution.

In 2001, the Valley Transportation Authority (VTA) and its partners, County of Santa Clara, the Alameda County Congestion Management Agency (ACCMA), the Alameda County Transportation Improvement Authority (ACTIA), the cities of Milpitas and Fremont, Caltrans and the Metropolitan Transportation Commission (MTC), agreed that a new approach was needed. The result was the implementation of a phased strategy to develop a cross connector improvement program. Phases I and II were geared towards idea generation. In Phase I – Process Definition, the partners agreed on ground rules and defined expectations for the Study. Phase II – Problem Definition established the specific goals and objectives for the program, developed a list of approximately one hundred potential projects and identified the criteria to be used in the evaluation of possible solutions. A "Brainstorming Summary" report summarizing the work of these phases was finalized in August 2002 (**Appendix J**).

This report summarizes the work done during Phase III – Conceptual Study. The current study differs from its predecessors in two ways: **First, it expands the focus from a single corridor concentration to an area analysis.** As shown in Figure 1, the Study Area is defined as the region bounded by I-880 to the west, I-680 to the east, Auto Mall Parkway (Fremont) to the north, and Montague Expressway (Milpitas/San Jose) to the south. **Second, rather than looking for a single solution to improve east-west mobility, the study adopts a programmatic approach to improving transportation within the Study Area.** The study evaluates potential incremental changes within the Study Area in various combinations in order to assess the ability of localized east-west improvements to improve movement throughout the Study Area and to maximize the benefit of those improvements already constructed or currently underway.

Drawing on Phase III recommendations, the final phase, Phase IV – Preliminary Design, will initiate the project development process for State facilities and corollary processes for non-state facilities.

The Phase II "Brainstorming Summary" report identified fifteen (15) improvements to be analyzed during the Conceptual study. The improvements fall within six east-west corridors inside the Study Area as follows:

CORRIDOR A – AUTO MALL PARKWAY

- A1 - Widen to Six (6) Lanes
- A2 - Grade Separate Osgood Rd. / Auto Mall Parkway

Corridor B – Fremont Blvd. / Grimmer Blvd.

- B1 - HOV Access / At-grade
- B2- HOV Access / New Freeway Connection (Parallel / Aerial)

Corridor C – Mission Blvd. (see Footnote, Page 2)

- C1 – Below Grade Freeway under Mission Blvd.
- C2 - Grade Separate Warm Springs Blvd. / Mission Blvd.

Corridor D - Scott Creek Road / Dixon Landing Road

- D1 - Widen Scott Creek Road, Milmont Drive and Dixon Landing Road
- D2 - HOV Movement from Scott Creek Road to I-880
- D3 - Extend Kato Road over I-880 to Future Fremont Blvd.

Corridor E - Calaveras Blvd. / Route 237

- E1 - Widen to Six (6) Lanes
- E2 - Grade Separate Abel Streeet / Calaveras Blvd. (I-680, I-880)
- E3 – Improve HOV Freeway between Freeways (I-680, I-880) and Existing HOV Lanes.

Corridor F - Montague Expressway

- F1 - Widen to Eight (8) Lanes Between Freeways
- F2 - Grade Separate Great Mall Parkway / Capitol Avenue / Montague Expressway / BART
- F3 – Improve HOV Access between Freeways (I-680, I-880) and Existing HOV Lanes

Analysis of the fifteen alternatives spanned a period of eighteen (18) months. Geometric layouts were developed for the majority of these alternatives in order to assess the feasibility of the alternative, assess impacts, and develop cost estimates. Multiple options were considered where necessary to explore opportunities and identify feasible options. The options considered for each alternative have been tabulated. Table C.1 in **Appendix C** lists the options for each alternative and identifies key elements considered. This table also summarizes reasons for eliminating certain options from further consideration.

The following sections summarize the efforts undertaken during the Conceptual Study and its subsequent findings. Section III, "Background," describes in greater detail the genesis of the study and the results of the Brainstorming phases. Section IV, "Need and Purpose," discusses conditions in the Study Area that have led to the need for programmatic improvements and outlines the objectives of the study. Section V, "Corridor Improvement Alternatives," reviews the fifteen specific alternatives identified during the brainstorming session, followed by an overview in Section VI, "Traffic Analysis," of the traffic analysis methods and evaluation criteria as applied to the alternatives. Section VII, "Alternatives Assessment," Section VIII, "Environmental Considerations," Section IX, "Cost Estimates," and Section X, "Funding Element," summarize key factors evaluated during the Study The results of the study and consequent recommendations are presented in Section XI, "Results and Recommendations," and a proposed implementation plan is outlined in Section XII, "Implementation Plan."

PROJECT STUDY AREA

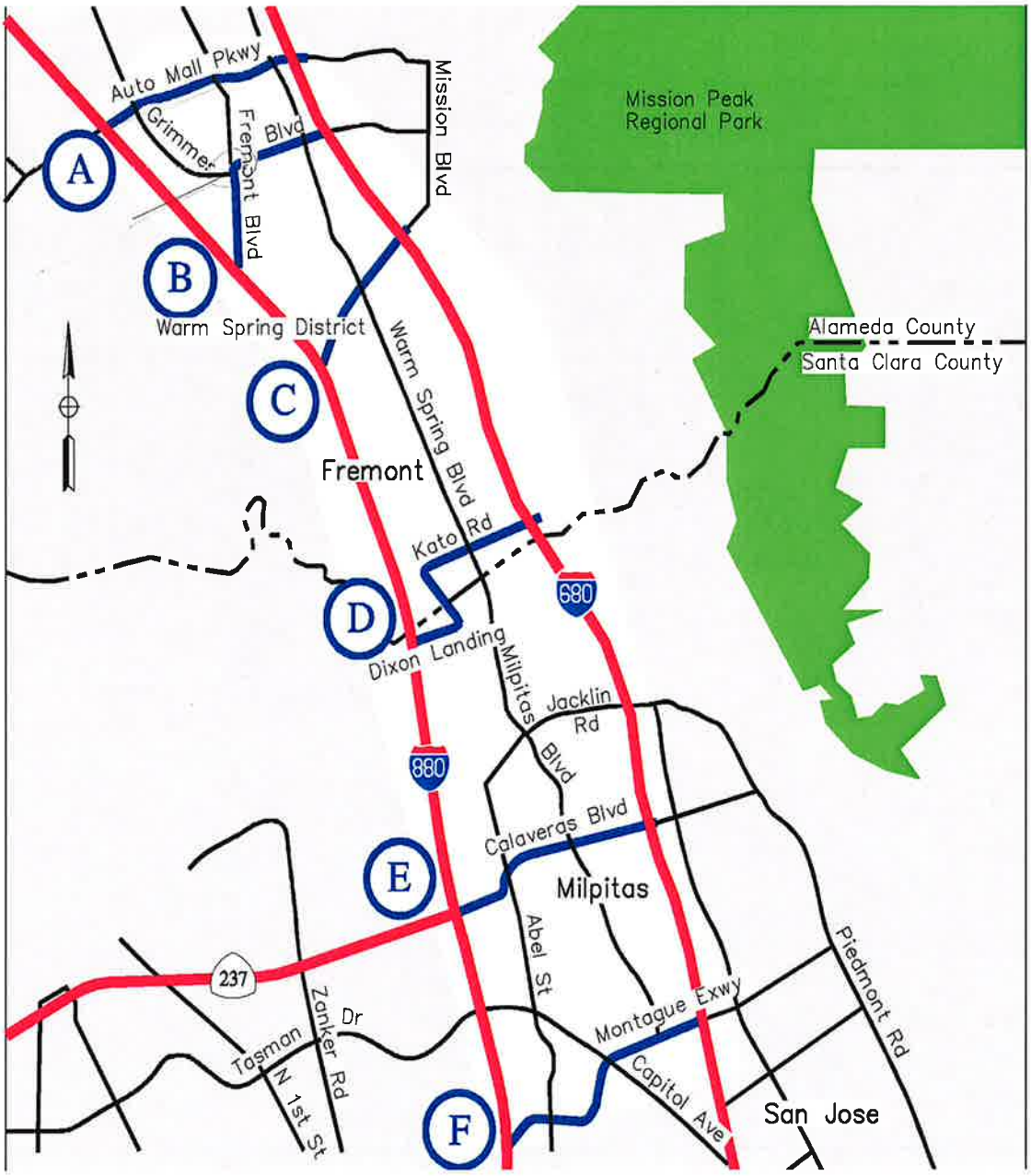


FIGURE 1

III. BACKGROUND

Interstates 680 and 880 serve as the main travel routes between Alameda County and Santa Clara County. Traffic along these parallel north-south routes has continued to increase over the last twenty years as more commuters travel to and from the Silicon Valley, primarily the "Golden Triangle" area bounded by Route 237, Route 101, and I-880. Increases in traffic volumes over the past 30 years are well documented from the Tri Valley area and the Central Valley in the north and have also occurred from the San Jose area to the south.

The project Study Area has five primary ingress/egress points. These are the freeways at the four corners of the Study Area boundary as well as Route 237 to the west. There are major movements to and from each quadrant at different times throughout the day. Currently, however, there are only two direct connections between I-680 and I-880 within the interior of the Study Area. These connectors are Route 262/Mission Blvd. in the City of Fremont and Route 237/Calaveras Blvd. in the City of Milpitas. For many years, these two routes have not been able to adequately handle the traffic volumes flowing east-west. As a result, numerous facilities (both east-west and north-south) within the Study Area routinely suffer from congestion.

The need for additional east-west connectivity within the Study Area has long been acknowledged. In the late 1970's, the South Bay Freeway route was designed with the intention of extending Route 237 to connect with I-680 near Mission Blvd. In 1990, Caltrans prepared a Project Study Report (PSR) investigating six (6) potential freeway connectors between I-680 and I-880. These alternatives ranged in cost from $211 million to $314 million.

Due to the high cost of the freeway alternatives in the Caltrans PSR, interim alternatives were also investigated that would alleviate congestion on the direct connectors, but at a much lower cost. In 1997, a study was performed for the Alameda County Congestion Management Agency. This Study, entitled "Mission Boulevard (Route 262) Express Lane Project Feasibility Study," focused on an overhead expressway route over the existing Mission Blvd. The Overhead Facility was rejected at this location due to its visual and physical impacts.

As described in the Introduction, this Study, initiated in early 2001, developed a new strategy for improving transportation and relieving congestion within the Project Study Area. Phase I – Process Definition brought together the Study team consisting of the consultant team and representatives of the partner agencies: the City of Fremont, the City of Milpitas, Caltrans, ACCMA, ACTIA, MTC, and VTA. Two groups were established: a Management Steering Committee (MSC) comprised of agency Directors and Managers, and a Technical Advisory Committee (TAC) composed of Senior Planners and Engineers. A Policy Advisory Committee (PAC) was proposed, but never officially formed. Rather, each agency was kept involved in the process through routine council or board updates. These multiple levels of agency participation facilitated the project development effort, offered guidance on the implementation of the study strategy, and provided the broader policy framework.

Moving into Phase II – Problem Definition, the consultant team, with review and guidance from the TAC, compiled data and performed preliminary analyses to better define the problem and to understand the existing system, capacity and demand within the Study Area. Data assembled and used in the initial analysis included origin/destination difficulties; General Plan level information; current projects (under construction, in design or being planned); and current traffic data, including initial characterization of traffic patterns. Using these analyses, the TAC initially identified eight

problems as the major causes of congestion within the Study Area. Of those, four were deemed "critical" and their solution became "key objectives" of the project. Any successful program of improvements to relieve congestion within the Study Area would need to directly support these key objectives:

- Of the 4,100 vehicles entering the Study Area from the Sunol Grade in the morning peak hour, 80 percent cross from I-680 to I-880 north of Scott Creek Road. Additional capacity is required to meet this demand.
- Of the 4,500 vehicles entering the Study Area from I-680 to the south, 50 percent cross from I-680 to I-880 south of Scott Creek Road. Additional capacity is required to meet this demand.
- There is a need for continuous HOV movements in the east-west direction throughout the Study Area. Additional HOV facilities are required to meet this need.
- Arterial streets operate poorly and are congested with only "internal," or local, demand. Major capacity/operational issues exist near interchanges. These localized bottlenecks require improvements to improve operations and increase capacity.

The need to define improvements to achieve these key objectives and relieve these congestion problems – capacity deficiencies, HOV needs, and arterial street congestion – provided the framework for the subsequent brainstorming session held in July, 2001. The objective of the session was to develop a list of potential projects/improvements that would address one or more of the four key objectives listed above. The brainstorming session resulted in the identification of almost one hundred alternatives. An iterative screening process was developed to limit the alternatives to a workable number of corridor improvements that could be taken into the Conceptual Design phase. (Details of the screening process can be found in the "Brainstorming Summary" report, **Appendix J.**) The result was the identification of the fifteen (15) improvements analyzed in the current Study.

IV. NEED AND PURPOSE

The Study Area is literally a crossroads in the Bay Area. The majority of trips to jobs in Silicon Valley that originate from the Tri-Valley area, the San Joaquin Valley, East San Jose, South San Jose, Morgan Hill or Gilroy pass through this area. There are several east-west routes in the Study Area, but few are continuous between the two north-south freeways. Within the approximate 8-mile north-south reach, I-680 has six interchanges (Auto Mall Parkway, Mission Blvd., Scott Creek Road, Jacklin Road, Calaveras Blvd. and Montague Expressway), and I-880 has seven interchanges (Auto Mall Parkway, Fremont Blvd., Mission Blvd., Dixon Landing Road, Calaveras Blvd., Tasman Drive and Montague Expressway). Only four of these roadways, Mission Blvd., Calaveras Blvd., Montague Expressway and Auto Mall Parkway are continuous between the freeways with Montague Expressway and Auto Mall Parkway being located at the extremities of the eight-mile long Study Area. As a result of this lack of east/west roadway continuity, a high proportion of east-west movements through the Study Area not only use I-680 and/or I-880 to continue their east-west trips, but also use north-south local roadways within the Study Area on east-west trips.

The following further defines the existing conditions and recent developments in the Study Area at the time of this Study:

- Due to the congested condition of this area, the peak hour spread has increased from two hours in 1990 to over five hours in 2001.
- Traffic volumes on the freeways have increased between 4 percent and 5 percent annually for the past twenty-eight years (doubling every fourteen to seventeen years).
- Outside the boundaries of the Study Area, the freeways "feeding" it (I-680, I-880) currently operate at or near capacity during the peak hour spreads in both the a.m. and p.m. hours. Current projects on these facilities may meet the current demand, but will not provide additional capacity. Thus the growth of traffic is expected to be more from local use than additional 'through trips,' unless the freeway capacity is increased outside the Study Area.
- Over half (55 percent) of the traffic on Study Area streets is "local", meaning the trips either originate or finish (or both) within the Study Area.
- Currently, the Study Area freeways (I-680 and I-880) operate below their theoretical capacity in the peak periods due to the relatively closely spaced interchanges and the associated high volume of merging and weaving.
- Arterial streets in the Study Area operate near capacity.
- The economy of Santa Clara County, and southern Alameda County, will continue to create more jobs than the available housing for workers in this area, so the additional workers must travel using I-880, I-680 and US 101. Since these routes are at or near capacity, the increase in commute capacity must be accomplished via more lanes, more people per vehicle, and/or increased transit options.
- Planning for the corridors outside of the Study Area shows a need for continuous HOV lanes to accommodate HOV traffic.
- The congestion on the surface streets is at times severe due to drivers accessing the interchanges. The resulting queues on local streets prevent easy access into and out of driveways on the access routes.
- Surface street congestion compromises emergency access.

- Drivers resort to using many local streets as shortcuts, increasing the demand for traffic calming in San Jose, Milpitas and Fremont.

The ACCMA traffic model for the year 2025 was used during the initial problem definition phase of the Study to develop the major east-west cross-town trip patterns in the project area. The following highlights the findings of this effort:

- The future demand for trips within, to and from the Study Area (internal trips, as previously discussed) is in itself great enough to completely use the capacity of all east-west surface streets without the through trip component.
- Trips via I-680 are apportioned 31 percent from Sunol Grade to the north, 34 percent from I-680/US 101 to the south, and 35 percent from east San Jose-Milpitas-Fremont. Morning trips originating west of the Study Area are apportioned as 22 percent coming from I-880, 26 percent coming from the south, and 52 percent coming from the west. Nearby communities to the east and west generate the highest traffic demands, not distant origins.
- The relocation of regional trip traffic onto a cross connector would relieve some of the localized problems due to congestion. Regional trip traffic accounts for approximately 45 percent of the existing traffic on local streets.
- Growth in trips to, from, and within the Study Area is expected to use all available surface street capacity by 2020, even if all through trips were removed to new facilities
- Demand for travel exiting the Study Area at the eastern boundary in the P.M. is distributed evenly to northbound I-680, east San Jose-Milpitas-Fremont, and southbound I-680/southbound US 101. At the western Study Area boundary, about half of all travel heads directly to the west, primarily via Route 237, with about a quarter of all travel heading north on I-880 and another quarter heading south on I-880.

These initial project efforts led to the identification of the four key objectives, as described in Section III, "Background." Though the solutions to the problems underlying these objectives are not necessarily exclusive of each other, it was agreed that a successful program to relieve congestion in the Study Area must address all four objectives.

The above discussion, coupled with the work performed in Phases I and II of this Study, has framed the need for this Study. In establishing the scope of work for the additional conceptual Study, the TAC agreed that the following assumptions would govern the Study:

- Given recent studies on and on-going improvements to I-680 and I-880, and recognizing the planned extension of BART along this corridor in the north-south direction, the goal of the Study is to identify and prioritize improvements to east-west facilities. These improvements should act to increase the value of the referenced north-south improvements.

- Adding significant capacity in either Fremont or Milpitas, without adding capacity in the other City, would result in unfavorable impacts. Improvements must be "balanced" to spread impacts and benefits throughout the Study Area.

The above assumptions, together with the four key objectives, provided the framework for the detailed investigation and evaluations described in the following sections.

V. CORRIDOR IMPROVEMENT ALTERNATIVES

As previously mentioned, fifteen (15) alternatives were originally selected for development and assessment following the Brainstorming and initial screening. Table C.1 in **Appendix C** identifies the options considered for each alternative, as well as additional alternatives resulting from the initial development and assessment work. The approach used to analyze the alternatives is summarized below, followed by the results of these efforts. Subsequent to the initial development process described in this section, the alternatives and options were further screened to eliminate approaches that were clearly infeasible, leaving ten alternatives/options to be more fully developed. More detailed assessments of impacts for these alternatives are included in Section VII, "Alternatives Assessment," of this report.

The investigation began with field visits along each of the six corridors where improvements were being considered. The corridors were photographed and key features identified and documented.

Aerial mapping was developed for each corridor for use in developing alternatives. Existing right-of-way and property line information based on record maps was added to the mapping. Utility research consisted of contacting the major utility owners and collecting available information including utility block maps from the cities. Drainage facilities and general drainage patterns were researched and identified on the base mapping.

Base maps reflecting the above information (aerial planimetrics, contours, utilities, drainage and right-of-way/property lines) were prepared for each corridor. These maps are provided in **Appendix B** of this report and were used in the development of the alternatives listed.

Structural "As-Built" plans were assembled for the major structures anticipated to require modification. Typical sections and conceptual general plans were created, where necessary, to more accurately assess the limits and costs of structure improvements, A list of structures, including the information assembled for each and the conceptual development work performed, is included in **Appendix L** of this report.

For discussion purposes in this report, alternatives refer to the basic corridor improvements. Options are variations of how to accomplish the particular alternative. For example, the alternative may be to widen the roadway, while one option would be to widen to the inside and a second option would be to widen to the outside.

Only preferred options for feasible alternatives have been developed for inclusion in this Report. In general, options and/or alternatives considered but rejected had conceptual plans prepared but not refined. Those options/alternatives for which geometric layout plans are included are identified in Table C.1.

The following paragraphs discuss the fifteen alternatives, and options thereof, that were considered in this Study. Initial development efforts focused on geometric viability of alternatives. Options not considered geometrically viable were removed from further consideration. Where multiple options were considered geometrically feasible, those considered to have the lower impacts (Right-of-way, buildings, utilities, etc.) were identified as preferred options for that particular alternative. A complete list of alternatives and options for those alternatives that are considered in this Study is included in Table C.1 in **Appendix C**.

In addition to the above considerations, the TAC also agreed on some general guidelines to be used in the screening process:

- Based on previous studies along Mission Blvd., at-grade or depressed alternatives, are more desirable than aerial structures, especially near residential neighborhoods or in retail areas.
- Relocation of residents should be avoided where possible.
- Pedestrian and bicycle facilities should be considered.

Corridor A – Auto Mall Parkway

Alternative A1 – Widen to Six (6) Lanes

This alternative would provide six continuous lanes (three each direction, eastbound and westbound) between I-680 and I-880. Currently, Auto Mall Parkway is six lanes near I-880, but four lanes between Fremont Blvd. and Osgood Road. The preferred option for this alternative is to widen primarily toward the median, maintaining the existing curb and gutter on the outside of the roadway. The basic option assessed in this report assumes the six lanes extend on the eastern side to/from the ramps at I-680. East of I-680, Auto Mall Parkway (Durham Road) would remain a four lane facility. The proposed widening is shown in Figure A-1 in **Appendix D**.

Alternative A1 was considered feasible and was analyzed for effectiveness in addressing the four key objectives.

Alternative A2 – Grade Separate Osgood Road / Auto Mall Parkway

As one of the most congested intersections in the Study Area, and in conjunction with the proposed widening of Auto Mall Parkway, this alternative would separate the east-west commute traffic on Auto Mall Parkway from the north-south Osgood Road traffic. Multiple options were considered, including an urban interchange configuration, a modified square loop option, and offset (to the south) ramps. With the very close proximity of Osgood Road to I-680 and the desire to accommodate all movements, all of the options considered resulted in either substandard, undesirable merges and weaving movements, or considerable right-of-way acquisition. The presence and proximity of numerous towers supporting high voltage electrical lines further complicated the efforts to develop feasible options for this alternative.

Though some of the options developed would provide the necessary movements with reasonable geometric features, the relatively high cost (over $30M) for such a localized improvement within the overall Study Area led to **Alternative A2** being removed from further consideration in this Study.

Corridor B – Fremont Blvd. / Grimmer Blvd.

Alternative B1 – Provide At-Grade HOV Lanes

This alternative would provide HOV lanes on the two surface streets between I-680 and I-880. The proposed HOV lanes would utilize the existing interchange at I-880. I-680 would be modified at Grimmer Blvd. to allow median ingress and egress on/off of I-680, terminating at a new signalized intersection at Grimmer Blvd. Access to I-680 could be provided to the north only, to accommodate the northeast/southwest movement, or to both north and south I-680, thus accommodating all four movements.

These multiple options for the at-grade HOV lanes were developed conceptually. The first option would create HOV lanes in the outside lanes on both Fremont Blvd. and Grimmer Blvd. In the north/east direction (north on Fremont Blvd., east on Grimmer Blvd.), a continuous HOV system is provided. In the west/south direction, however, the HOV lane becomes discontinuous through the left-turn movement from Grimmer Blvd. to Fremont Blvd. at the Fremont Blvd. / Grimmer Blvd. intersection.

The second option considered HOV lanes in the median lanes of both roadways. This option resulted in the same issue on the reverse direction – creating a discontinuity in the north/east route for the right-turn movement from Fremont Blvd. to Grimmer Blvd. This option (median HOV) also created a discontinuity and required a weave movement for HOV vehicles heading to southbound I-880 from southbound Fremont Blvd.

A third, hybrid, option was then developed with HOV lanes on the outside of Fremont Blvd. and in the median lanes of Grimmer Blvd. With this configuration, the HOV vehicle could maintain lane access through the intersection of Fremont Blvd. and Grimmer Blvd., taking advantage of the signalized intersection. This option, similar to Option 1, also utilizes the existing HOV on-ramps at I-880 most efficiently. This option is shown in Figure B-1 in **Appendix D**, and reflects access to I-680 in both directions.

The hybrid option for **Alternative B1** was considered the most viable of the three and was analyzed for effectiveness in addressing the four key objectives.

Alternative B2 – Provide Freeway Access between I-680 and I-880 following Fremont and Grimmer Boulevards

Three distinct options were considered for this alternative to provide a freeway connector between I-680 and I-880 along Fremont Blvd. and Grimmer Blvd. For all three options, the proposed geometry paralleled Fremont Blvd. and Grimmer Blvd. to the south and to the east of these existing facilities and ran entirely on a structure between the two existing freeways. The three options were 1) an HOV only, two-lane facility; 2) a mixed-flow four-lane facility only; and 3) a combination HOV and mixed-flow six-lane facility. For all three options, the ramps on the I-880 side would be coordinated with the existing ramps for the Fremont Blvd. interchange and on the I-680 side the ramps would be coordinated using collector-distributed roads as part of the Auto Mall Parkway interchange with I-680.

The two (2) alternatives that incorporated mixed-flow lanes resulted in significant right-of-way impacts along I-680 and I-880 due to the mixed-flow ramps being incorporated on the outside of the existing freeways. The HOV only facility (Option 1) has significantly fewer lateral impacts due to its ability to land in the medians of the two freeways without any new collector-distributor systems with the existing ramps. This option provides direct movements between the medians independent of the existing ramps from the two local roadways.

All three options appear to be geometrically feasible. It was decided to analyze both the HOV only aerial facility (Option 1) as well as the mixed-flow only facility (Option 2) for comparison of effectiveness in addressing the four key objectives.

The potential to provide interim access between the two freeways to the new connector was also considered. Specifically, the possibility of a ramp to access the future BART Warm Springs Station was developed conceptually. It was determined that this access was too close to I-680 to efficiently accommodate this additional movement and was not necessarily

desirable from a traffic standpoint. This option, therefore, was not developed or analyzed in future efforts.

Corridor C – Mission Boulevard

Alternative C1 – Tunnel under Mission Blvd.

Alternative C1 would create a below-grade freeway connection between the two freeways under the current Mission Blvd. alignment, tying into the existing two interchanges at I-680 and I-880 for Mission Blvd. Multiple options were developed for this alternative, including HOV only options, mixed-flow options, and a combined mixed-flow and HOV option. In addition, options for access to the below-grade facility from points east of I-680 and both northbound and southbound from and to I-680 were also considered. As a result of the increasing complexity of adding movements both north and south at I-680 and accommodating traffic coming to and from Mission Blvd., east of I-680, it was determined that the most feasible options were to eliminate access to any below-grade facility from points east of I-680. This would require vehicles originating within, or with destinations to, the existing Mission Blvd. facility in this area to utilize the surface element of Mission Blvd. Also, due to constructability issues and rapidly escalating cost issues, it was agreed that further analysis to determine their effectiveness in meeting the four key objectives would be limited to the HOV only option and the mixed-flow only option.

Alternative C2 – Grade Separate Warm Springs Blvd. / Mission Blvd.

This alternative would improve operations both east-west on Mission Blvd. and north-south along Warm Springs Blvd. The key initial element considered was the grade separation of these two facilities. This separation would eliminate the major bottleneck for both of these facilities in this area. Grade separation of these facilities is complicated, however, by the proposed improvements at the I-880 interchange, which will increase the number of traffic lanes on Mission Blvd. at this location. Several other factors also add complexities such as the Warren Avenue access, the Kato Road access in and around the project area, and the close proximity of Mohave Drive to the east of Warm Springs Blvd..

Three distinct geometric options were considered for the grade separation. In all cases, it was anticipated that Warm Springs Blvd. would cross over Mission Blvd. due to Mission Blvd's already depressed profile immediately west of the intersection. The three options considered were 1) to keep Warm Springs Blvd. at-grade and fully depress Mission Blvd.; 2) to keep the Mission Blvd. profile as designed for the I-880 interchange improvements and raise Warm Springs Blvd. above Mission Blvd.; or 3) to both raise Warm Springs Blvd. and depress Mission Blvd. Given the geometric constraints and the access issues associated with numerous driveways in the near vicinity of the intersection, it was determined that the most feasible option was the split profile option (Option 3). This profile creates some impact to both roadways and increases constructability issues, but minimizes access impacts to nearby properties.

In addition to the vertical geometrics of the two roadways and the access issues, the ability to accommodate all movements from this new grade separation directly to and from I-880 was considered in the various options. The I-880 interchange improvements, which will be under construction in the spring of 2005, will continue to provide full access to I-880 from Warm Springs Blvd. and will also create a full interchange with Warren Avenue. However, providing full access from Warm Springs Blvd. to I-880 via Mission Blvd. with a grade

separation at Warm Springs Blvd. results in additional impacts, expense and complexity. It was determined that the preferred grade separation option would eliminate movements to and from I-880 directly to Warm Springs Blvd. via Mission Blvd. Local traffic would be routed through the Warren Avenue interchange elements to access Warm Springs Blvd. This effectively separates east-west freeway traffic from current local north/south traffic in this project area and takes advantage of thc proposed improvements at I-880. In summary, the grade separation option that was considered for further review and development under this alternative was to grade separate Mission Blvd. and Warm Springs by raising Warm Springs and lowering Mission Blvd. and providing access from Warm Springs to and from I-880 exclusively via Warren Avenue.

In addition, a modification of the Mission Blvd./I-680 interchange is combined with this project. This modification would eliminate the northeast and southwest loop ramps. These movements would be accommodated instead through the widening and realignment of the northwest and southeast diagonal ramps. This modification improves operations on Mission Blvd. east of Mohave Drive.

As mentioned in Footnote (1) on Page 2, this Study originally assumed the Mission Blvd / I-880 Interchange Improvement projects, which includes Phases IA, IB and II in ACTIA's current planning documents, were built and operational in the year 2025. The base model was developed and analyses performed recognizing these improvements as existing conditions in the year 2025.

With the significant change in the availability of the funding since the beginning of this Study, Phase II, the Warren Avenue Grade Separation of the UPRR, is now an under-funded element of the interchange project. This Study recognizes the Warren Avenue Grade Separation as an essential element of improving the overall operations in the Mission Blvd. corridor. Despite the current funding scenario, the assumptions on which this Study originated, that among other projects, all phases of the I-880 / Mission Blvd. Interchange are constructed prior to any new improvements identified herein, remain unchanged.

Corridor D – Scott Creek Road / Dixon Landing Road

Alternative D1 – Widen Scott Creek Road, Milmont Drive and Dixon Landing Road

This alternative was planned to provide a new well-defined option for traversing between the two freeways via the three local streets listed above. Currently, a significant amount of traffic passes between the two existing freeways via Scott Creek Road, Milpitas Blvd., and Dixon Landing Road. In addition to the cross freeway traffic movements, there is a significant amount of north/south traffic also occurring on Milpitas Blvd. and Warm Springs Blvd. The idea was to separate the two distinct movements (local traffic vs. freeway-to-freeway traffic) by improving Milmont Drive and encouraging use of that facility for east-west traffic.

The initial development showed that it is possible to widen Scott Creek Road to six lanes between Warm Springs Blvd. and I-680 without acquiring additional right-of-way, that Milmont Drive could be widened to a four-lane facility without significant impacts, and that Dixon Landing Road, with the implementation of current plans, could facilitate this movement. This alternative was considered feasible and was included for further analysis of its effectiveness in achieving the four key objectives.

Alternative D2 – HOV Movement from Scott Creek Road to I-880

This alternative would create an HOV corridor between I-680 and I-880, primarily along Scott Creek Road and Kato Road, and would connect to I-880 either directly or through the new Dixon Landing interchange at I-880. Multiple options were developed and evaluated at the I-880 end of the corridor to bring HOV lanes either into the median of I-880 or to tie directly into the new ramp configurations which provide HOV bypass facilities at Dixon Landing Road. The primary target of this effort was Sunol Grade to Golden Triangle traffic (i.e. northeast / southwest movements only). Due to the close proximity between Kato Road and the new Dixon Landing interchange and constraints with the structure currently under construction, the options pursued were not considered feasible or viable from a geometric standpoint as proper merge lengths and lateral clearances could not be obtained within a reasonable framework. Therefore, **Alternative D2** was not considered viable and was not considered for future analysis.

Alternative D3 – Extend Kato Road over I-880 to (Future) Fremont Blvd.

The concept behind the extension of Kato Road to intersect with the future extension of Fremont Blvd., west of I-880 was to separate some of the local traffic heading to the existing and future industrial areas west of I-880 from the more regional traffic headed to more distant points. This alternative could be combined with the widening of Scott Creek Road east of Warm Springs Blvd. should the traffic volumes require. The alternative considered a four-lane facility from Fremont Blvd. to I-680. This alternative is complicated by the proposed BART extension through this area, which proposes to have BART run "at-grade" and depress Kato Road under the BART facility. Although the proximity of BART to I-880 and Warm Springs Blvd. requires the profile to vary greatly between Warm Springs Blvd. and the Fremont Blvd. extension, it was determined that this geometry could be developed to meet the agreed upon criteria.

Alternative D3 was considered feasible and recommended for further study in the next phase of the work. The extension of Kato Road over I-880 also requires that Kato Road, which currently curves just west of the UPRR (BART) line to run north/south parallel to I-880, be realigned to connect to the extension with a T-intersection. This T-intersection would be elevated due to the geometry constraints mentioned above.

Corridor E – Calaveras Blvd. / Route 237

Alternative E1 – Widen Calaveras Blvd. to Six (6) Lanes

This alternative would remove the bottleneck that currently exists on Calaveras Blvd. between Abel Street and Milpitas Blvd. West and east of these two roadways, respectively, Calaveras Blvd. is a minimum six-lane facility. Between these two facilities, Calaveras Blvd. currently has a reduced cross-section accommodating only four (4) lanes. The majority of this section of roadway is elevated and crosses over both Main Street in Milpitas and the Union Pacific railroad facilities, which will also accommodate the future BART line. Therefore, the majority of this widening would involve structures. **Alternative E1** was considered feasible and was recommended for analysis in the future phases of this Study.

Alternative E2 – Grade Separate Abel Street and Calaveras Blvd.

This alternative would separate the east/west movements on Calaveras Blvd. from the north/south movements on Abel Street. It might also provide a more direct route for people heading from northern Milpitas and southern Fremont to access Tasman Blvd. and the Golden Triangle area without entering the freeway or utilizing the already impacted Calaveras Blvd. Multiple options were pursued to grade separate Calaveras Blvd. from Abel Street by keeping Calaveras Blvd. elevated until it is west of both Abel Street and Berryessa Creek. The high density of residential and retail facilities in the area as well as the difficult geometry between Abel and Abbott Streets combined to create significant obstacles to developing a feasible alternative at this location. As a result of the physical constraints, and the recognition that the Kato Road extension provides many of the pursued benefits, **Alternative E2** was not considered feasible and was not pursued for further analysis.

Alternative E3 – HOV Freeway Connection from Route 237 to I-680

This alternative sought to create HOV connectivity and continuity between the Route 237 HOV facility west of I-880 and the I-680 HOV facility currently under development on I-680 north of Calaveras Blvd. The initial option looked at extending the Route 237 alignment directly east from I-880 as an elevated structure over Serra Street, the railroad and Los Coches Street before tying into I-680 near Calaveras Blvd. This option would functionally split the mid-town area of Milpitas which is currently under redevelopment and was not considered viable by the City of Milpitas.

A second option was developed with the HOV facility following the alignment of Calaveras Blvd. An on-street HOV facility would be added between Milpitas Blvd. and Town Center Drive with the remainder of the facility being an overhead aerial structure along the median of Calaveras Blvd.

The connectivity of any proposed HOV system along Calaveras Blvd. to the existing HOV system on Route 237 west of I-880 is complicated by the direct connector currently being constructed between Route 237 and I-880 to the north. The multiple structures involved at this interchange preclude a feasible option to provide ingress and egress directly to the proposed HOV system on Calaveras Blvd. from and to the existing system on Route 237. However, it is considered feasible to utilize the existing ramping systems at the I-880 / Route 237 interchange to accommodate HOV users of a proposed Calaveras Blvd. HOV system.

Despite its high cost and high impact, **Alternative E3** was considered feasible and was recommended for analysis in the future phases of this Study.

Corridor F – Montague Expressway

Alternative F1 – Widen to Eight (8) Lanes between Freeways

When this Study was initiated, it was anticipated that the widening of Montague Expressway between the two freeways would be completed by the year 2025. This stretch of Montague Expressway as well as sections west of the project Study Area, has been under review by the County and VTA in recent years. Widening of the Montague Expressway is considered very desirable. However, given the current fiscal situation in transportation, the ability to finance these improvements within the timeframe mentioned is now in jeopardy. Therefore, this Study recommends that the Montague Expressway improvements (Plan Line widening to

eight lanes) be pursued in coordination with the package being recommended in this Study. The modeling and analysis for this Cross Connector Study assume Montague Expressway has been widened according to the referenced Plan Line.

Alternative F2 – Grade Separate Great Mall Parkway / Capitol Avenue / Montague Expressway / BART

Alternative F2 examined the potential to grade separate Great Mall Parkway and Capital Avenue from Montague Expressway in addition to the eight-lane widening of Montague Expressway. This grade separation also has been studied and analyzed in previous reports by the County, the City of Milpitas and VTA. The feasibility of this grade separation was considered in conjunction with the proposed BART extension to San Jose. Impacts associated with the grade separation were also assessed. It was determined that this grade separation is feasible if Capital Avenue/Great Mall Parkway is elevated above Montague Expressway only. This configuration provides free flow conditions for Capital Avenue / Great Mall Parkway over Montague Expressway, but results in a signal on Montague Expressway at the ramp terminals. This improvement, located at the southern end of our Study Area, is considered regionally significant for north-eastern Santa Clara County. However, relative to the Study Area for this project this improvement reflects localized operational improvements. **Alternative F2,** therefore, was not considered for additional analysis for the purposes of this project Study.

Alternative F3 – HOV Access between I-680, I-880 and Montague Expressway

At the beginning of the Study, it was assumed that not only would Montague Expressway be an eight-lane facility by the year 2025, but that the HOV lanes would continue in operation along Montague Expressway. **Alternative F3** was focused on opportunities to improve access between the existing HOV lanes on Montague Expressway and I-880 and I-680. The focus of these options was the I-680 / Montague Expressway interchange. One surface option and one direct connection (freeway median to Expressway HOV lanes) option were developed. These were both considered feasible and were recommended for further analysis of their effectiveness in addressing the four key project objectives.

Conclusions

In summary, of the fifteen alternatives presented above, ten were determined to be feasible and were carried forward into the next phase for further analysis with respect to their effectiveness in achieving the four key project objectives:

Corridor A – Auto Mall Parkway

A1 – Widen to Six (6) Lanes

Corridor B – Fremont Blvd / Grimmer Blvd

B1 – Provide At-Grade HOV Lanes
B2 – Provide Freeway Access between I-680 and I-880 following Fremont Blvd. and Grimmer Blvd.

Corridor C – Mission Blvd

C1 – Tunnel under Mission Blvd.
C2 – Grade Separate Warm Springs Blvd. / Mission Blvd.

Corridor D – Scott Creek Road / Dixon Landing Road

D1 – Widen Scott Creek Road, Milmont Drive and Dixon Landing Road
D3 – Extend Kato Road over I-880 to (Future) Fremont Blvd.

Corridor E – Calaveras Blvd / Route 237

E1 – Widen Calaveras Blvd. to Six (6) Lanes
E3 – HOV Freeway Connection from Route 237 to I-680

Corridor F – Montague Expressway

F3 – HOV Access between I-680, I-880 and Montague Expressway

Following the identification of the ten feasible alternatives identified above, the next step was a detailed traffic analysis, using a spectrum of measuring tools, and an analysis of possible physical impacts such as right-of-way, utility, and construction issues, among others. Once the traffic and impact analyses were completed, the potential improvements were examined in aggregate to develop a program analysis. This exercise was conducted in order to identify which group of projects, when put together as a package, had the greatest benefit to the Study Area.

During this process, a more exhaustive investigation was made of the Mission Blvd. corridor due to the complexity of constructing new improvements in that corridor. Through the evaluation of potential improvements along the length of Mission Blvd., from I-880 to I-680, it became clear that reconfiguration of the I-680/Mission Blvd. Interchange alone could result in significant benefit, in terms of the four key objectives (See **Appendix E** – Traffic Analysis for the traffic data evaluating this alternative). This I-680 / Mission Blvd. Interchange improvement is therefore considered a part of **Alternative C2 – Grade Separate Warm Springs Blvd. / Mission Blvd.**

The criteria used to evaluate the alternatives are explained in Section VI, "Traffic Analysis," and the potential impacts of the various alternatives are discussed in Section VII, "Alternatives Assessment."

Throughout the process of analyzing and assessing the alternatives, TAC meetings were held monthly to review results, review the process, and agree upon future actions. Management Steering Committee (MSC) meetings were held and updates at public meetings were presented in order to keep city officials informed of progress and involved in the process. The individuals participating in the Management Steering Committee are listed in **Appendix I.** A list of meetings, dates and locations for TAC, MSC and public meetings is also included in **Appendix K.**

VI. TRAFFIC ANALYSIS

Existing Conditions

The year 2000 average daily traffic (ADT) is shown on **Figure 2** in this section. As discussed previously, the Study Area has experienced significant traffic congestion, delays and backups in the past two decades. Traffic growth in the I-680/I-880 freeway corridor has averaged between four and five percent per year over the past two decades. Assuming growth slows on freeways in the Study Area, in ten years at three percent annual growth, traffic will increase by 34 percent (and 80 percent in 20 years). If traffic growth does not slow and keeps pace with historical trends, traffic would increase by 60 percent in 10 years and 160 percent in 20 years.

Currently, the Study Area freeways (I-680 and I-880) operate below their theoretical capacity in the peak periods, primarily due to queuing and congestion on the freeways. Arterial streets in the Study Area also operate near capacity.

Select link model runs (a process to determine trip origins and destinations along a specific segment of a route) for the a.m. peak hour were utilized to determine where the traffic is coming from and going to within the Study Area. The select link modeling results indicated that approximately 12,100 total trips came into and through the Study Area from freeway locations northbound and southbound on I-880 and I-680. These trips were generally eastbound and westbound within the Study Area. The select link total volumes from the four freeway locations (12,100 vehicle trips) showed peak directional westbound flows of approximately 8,570 vehicles per hour. When other westbound traffic is added (e.g., local trips from origins in the Study Area rather than the freeways), the volume-to-capacity ratio exceeds 1.0, indicating that demand exceeds capacity, with the resulting congestion and level-of-service (LOS) F operations.

Further analysis of the model results showed that, of the 12,100 total trips, approximately half (5,445) were through trips that traverse the whole length between the two freeways (i.e., they started and ended beyond the Study Area boundaries). Approximately 80 percent of these through trips (4,700+) occurred to the north of Scott Creek Road. These through trips used Auto Mall Parkway, Mission Blvd. or Scott Creek Road. The result of the existing a.m. peak hour through trip patterns based on select link runs at four project gateway locations is shown on **Figure 3** in this section.

Many of these east-west through trips use major arterials or local streets to travel between the two north-south freeways (I-680 and I-880). These regionally based trips cause congestion on local street corridors as well as the freeways where merging and weaving occurs.

The near congested conditions on most of the Study Area roadways during the a.m. peak hour are also reflected in the average speed results of the micro-simulation runs depicted in **Figure 4**. The figure shows that the major traffic roadways in the Study Area are either very congested (16 to 30 mph conditions) or severely congested (0 to 15 mph). **Figure 5** reflects that in 2025, with only the currently programmed projects constructed, congestion worsens significantly. In terms of traffic operation, a 30 mph speed might be more acceptable on an arterial street as opposed to a freeway section. The details of the initial traffic analysis to define the existing conditions (Project Model Calibration) are contained in **Appendix E**.

Analysis Method

Existing traffic count data, origin-destination (O-D) surveys, travel time runs, field reviews, traffic modeling and other resources were used as the basis for the traffic Study. Peak hour count data were used in AIMSUN2 micro-simulation models to evaluate congestion and speed, and to ultimately identify the detailed causes of traffic congestion at problem locations. The field reviews and travel time runs enabled the calibration of the models so that model estimates of traffic performance closely matched the observed traffic conditions. The Alameda County Congestion Management Agency (ACCMA) model was used in the initial select link model runs discussed above to evaluate the general traffic flow patterns of freeway traffic in the Study Area, leading to the definition of the four key objectives.

The VTA regional travel demand model was the starting point for the modeling effort for this portion of the study. The model was calibrated for year 2000 conditions at the global and corridor level by VTA to counts collected by VTA and Caltrans in the modeling region for both the a.m. and p.m. peak periods. Details on the calibration process and results can be found in **Appendix E**.

Alternatives Analysis

Measures of Effectiveness

The Measures of Effectiveness (MOEs) are criteria used to evaluate the benefits of potential improvements. The MOEs for the Cross Connector Study were developed by the TAC and tailored to assess improvements' potential to help achieve the four key objectives identified in the Phase II Problem Definition process. In order to address the key objectives, proposed improvements must correspond to the following fundamental strategies:

- Pursue a program of projects that seeks to balance improvements in both the north and south portions of the Study Area in order to provide benefit to both Sunol Grade and south I-680 traffic.
- Promote increased transit and HOV use to minimize the need for added vehicle capacity (because I-880 and I-680 cannot accommodate additional vehicle trips – at least in the mixed flow lanes).
- Promote direct connections of east-west HOV improvements to the HOV lanes on I-680, I-880 and Route 237 to avoid the heavily congested mixed flow lanes on those freeways.
- Promote new local routes and improve major existing local facilities that avoid congested I-680 and I-880 segments.

The MOEs developed for the Cross Connector Study reflect the team's understanding of the base conditions and the optimal strategies to improve them. The team chose to limit the number of MOEs used to better recognize siginificant differences between the performances of the various alternatives and options analyzed.

The MOEs adopted for the Cross Connector Study are grouped under four categories: 1) descriptive, 2) performance, 3) derivative and 4) economic. Definitions for the terms utilized below can be found in as notes to the Table, Summary Measures of Effectiveness – Individual Alternatives Analysis" in **Appendix E**.

a. Descriptive MOEs:

- ***Change in Through Vehicle Trips by Corridor*** – One of the goals is to achieve capacity increases, so when there is a significant increase in vehicle trips in a corridor, it indicates an alternative that promotes new routes, with the best alternative having the highest increase.
- ***Change in HOV and Transit Trips by Corridor*** – This MOE is a direct indication of the successful promotion of increased transit and HOV use, with the best alternative having the highest increase. The transit mode split was not directly modeled as a result of HOV lane continuity at this level, so the current increase is just carpools.

b. Performance MOEs:

- ***Change in Vehicle Miles Traveled (VMT)*** and ***Speed in Mixed-Flow and HOV*** – The alternatives with the greatest increases in VMT and speeds are the best (both criteria should be met). These MOEs can be grouped as needed by mixed flow and HOV on surface, HOV and freeway facilities.
- ***Vehicle Hours of Travel (VHT) of Free Flow*** and ***VHT of Congested Flow*** – The alternatives with the lowest VHT of Congested Flow are best. They can be grouped by mixed flow and HOV on surface, HOV and freeway facilities.

c. Derivative MOEs:

- ***Percent Change in VMT / Percent Change in VHT*** – When an entire area is considered such as for this study, both VMT and VHT are impacted by an improvement. When VMT increases faster than VHT, this strongly indicates that more travelers are moving faster, even in the face of traffic growth. Such a circumstance suggests that capacity has been successfully added to the Study Area (without impacting the north-south freeways). A ratio of 1.1 suggests that no additional vehicle hours were realized, while 10% more vehicle miles were traveled. For this derivative, a value of 1.1 is considered a good benefit, and 1.2 is a very positive result.

d. Economic MOEs:

- ***Cost / Person Trip*** – A measure of the cost of constructing the improvements compared to each additional person trip realized during peak hours after the improvement is built. The lowest values are the best for this MOE. This is an expression of benefit/cost.

In summary, these critical MOEs can act as reliable indicators of the success or failure of an alternative. They serve the same purpose that Level of Service (LOS) does in traffic impact studies. They are relatively easy to understand, and positive changes can mean some significant benefits would be realized.

These MOEs were originally developed for each corridor, for each improvement, in both the a.m. and p.m. The detailed results can be found in **Appendix E**. In order to

more easily discern the differences between the alternatives, overall values for the entire Study Area, combining values from a.m. and p.m. peak periods were developed. These summary tables are presented and discussed in more detail in Section XI, "Results and Recommendations," of this report.

Alternatives Analyzed

The alternatives analyzed and for which MOEs were developed are:

Corridor A – Auto Mall Parkway

A1 - Widen to Six (6) Lanes

Corridor B – Fremont Boulevard / Grimmer Blvd.

B1 - Provide At-Grade HOV Lanes
B2 - Provide Aerial HOV Facility

Corridor C – Mission Blvd.

C1 - Tunnel under Mission Blvd.
C2 - Grade Separate Warm Springs Blvd. / Mission Blvd.

Corridor D – Scott Creek Road / Dixon Landing Road

D3 - Extend Kato Road over I-880 to (Future) Fremont Blvd.

Corridor E – Calaveras Blvd. / Route 237

E1 - Widen Calaveras Blvd. to Six (6) Lanes
E3 - HOV Freeway Connection from Route 237 to I-680

Corridor F – Montague Expressway

F3 – HOV Access between I-680, I-880 and Montague Expressway

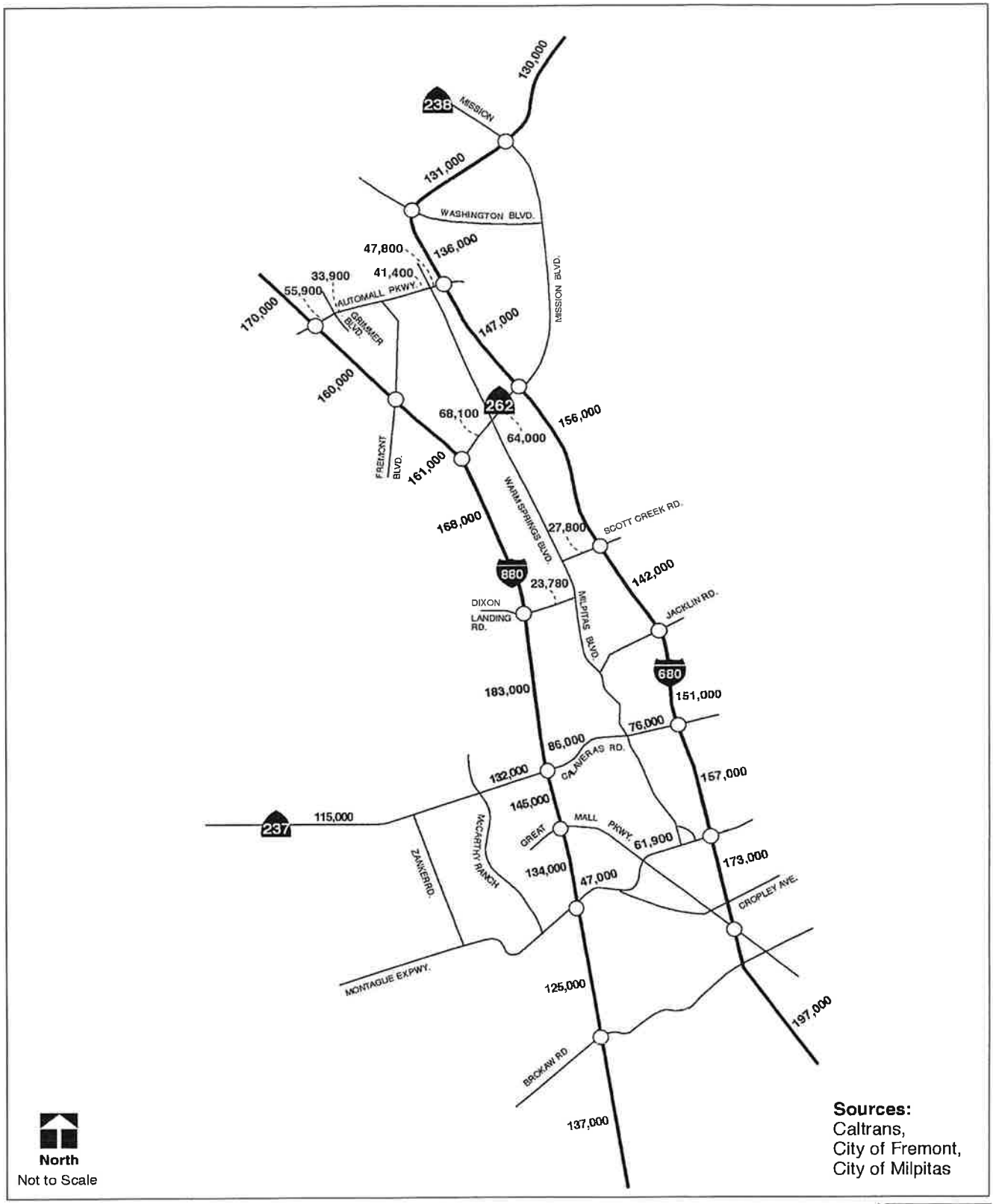
Of the feasible alternatives summarized in Section V, "Corridor Improvement Alternatives," of this Report, the only alternative for which traffic analysis was not performed was D1, "Widen Scott Creek Road, Milmont Drive and Dixon Landing Road." Based on the results of the above alternatives, it was determined that while alternative D1 may have some very localized value, it would not result in improvement to the overall regional congestion

The spreadsheet titled "Summary Measures of Effectiveness," included in **Appendix E,** shows the MOEs applied to the selected Study Area alternatives. Based on the results and recommendations of the Study committee, the project team recommended four short-term projects as shown on the table. The detailed MOEs for each project alternative are included in **Appendix E**.

The Difference Plots

Difference Plots were created to highlight the modified traffic patterns and potential benefits of each roadway alternative. The Difference Plots show the difference in the projected volumes between the proposed roadway alternatives to the future base network. The plot shows increases or decreases on roadways or major corridors due

to the proposed roadway project alternatives. It is a useful visual tool to depict the benefit or drawbacks of proposed roadway alternatives. The Difference Plots for all the alternatives are contained in **Appendix E**.



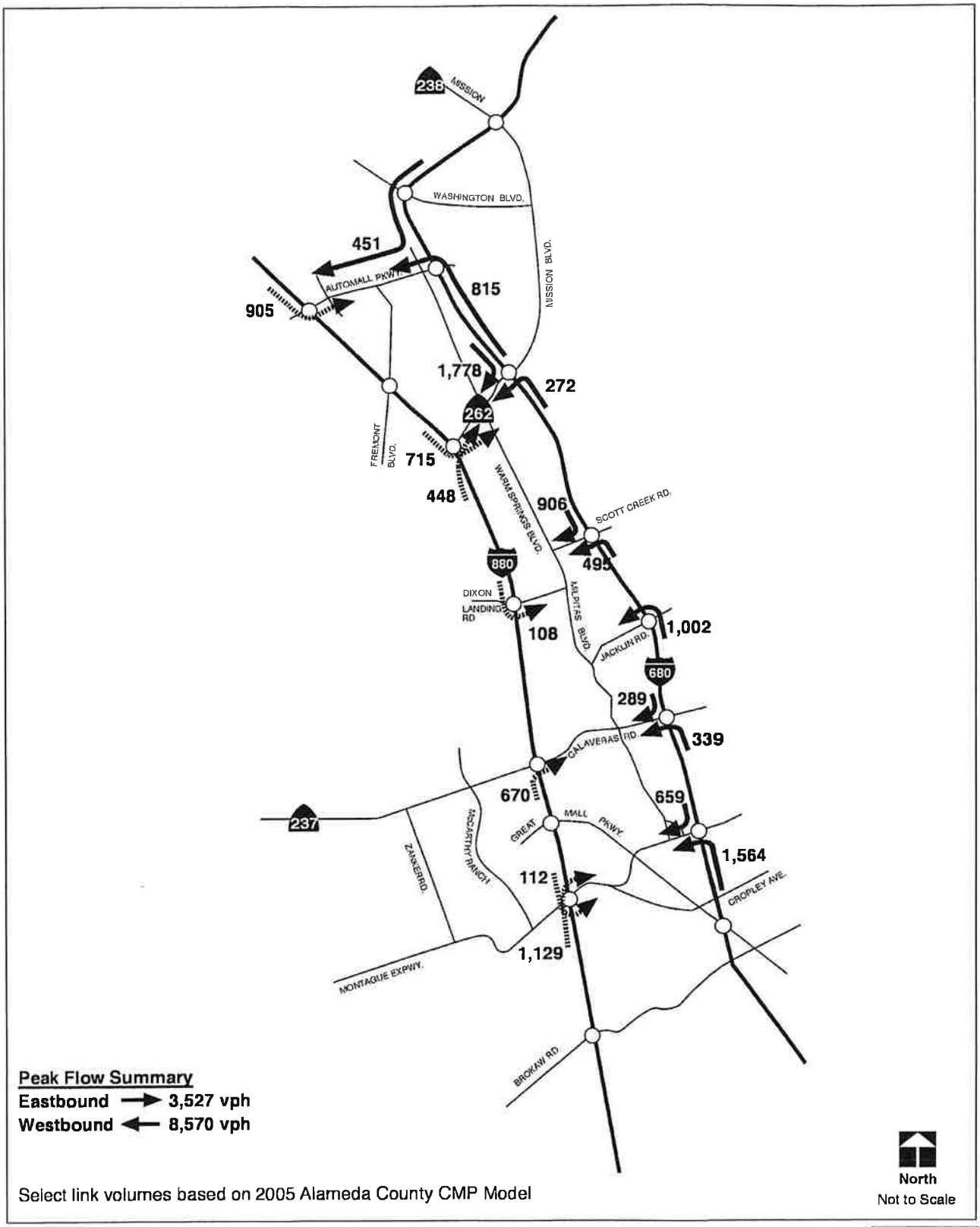
Route 680/880
Cross Connector Project

Average Daily Traffic Volumes (2,000)

Figure **2**

TJKM

142-038 - 7/01 - CT

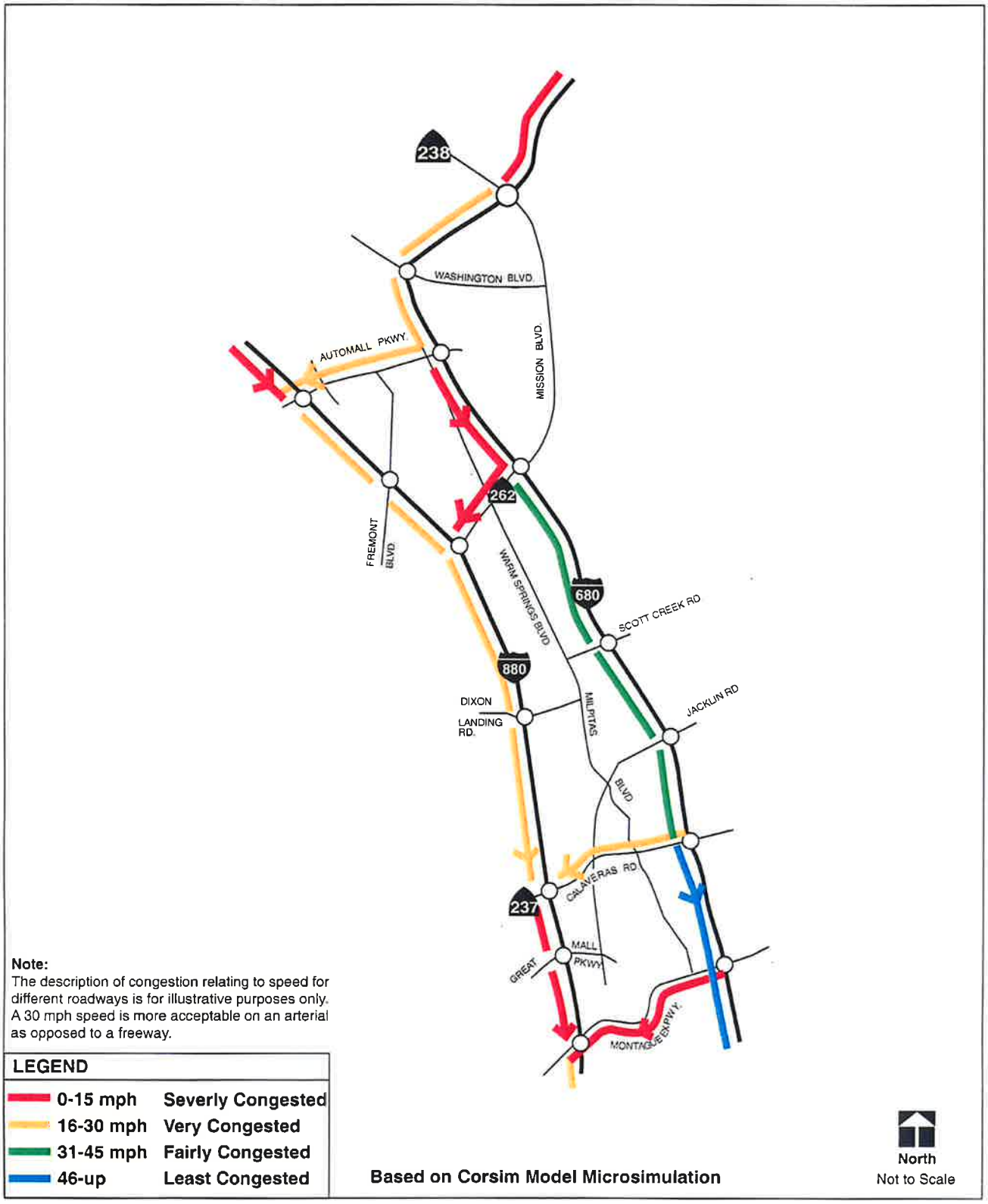


Route 680/880
Cross Connector Project

Existing Model AM Peak Hour Crosstown Trip Patterns

Figure **3**

142-038 - 2/18/04 - CT

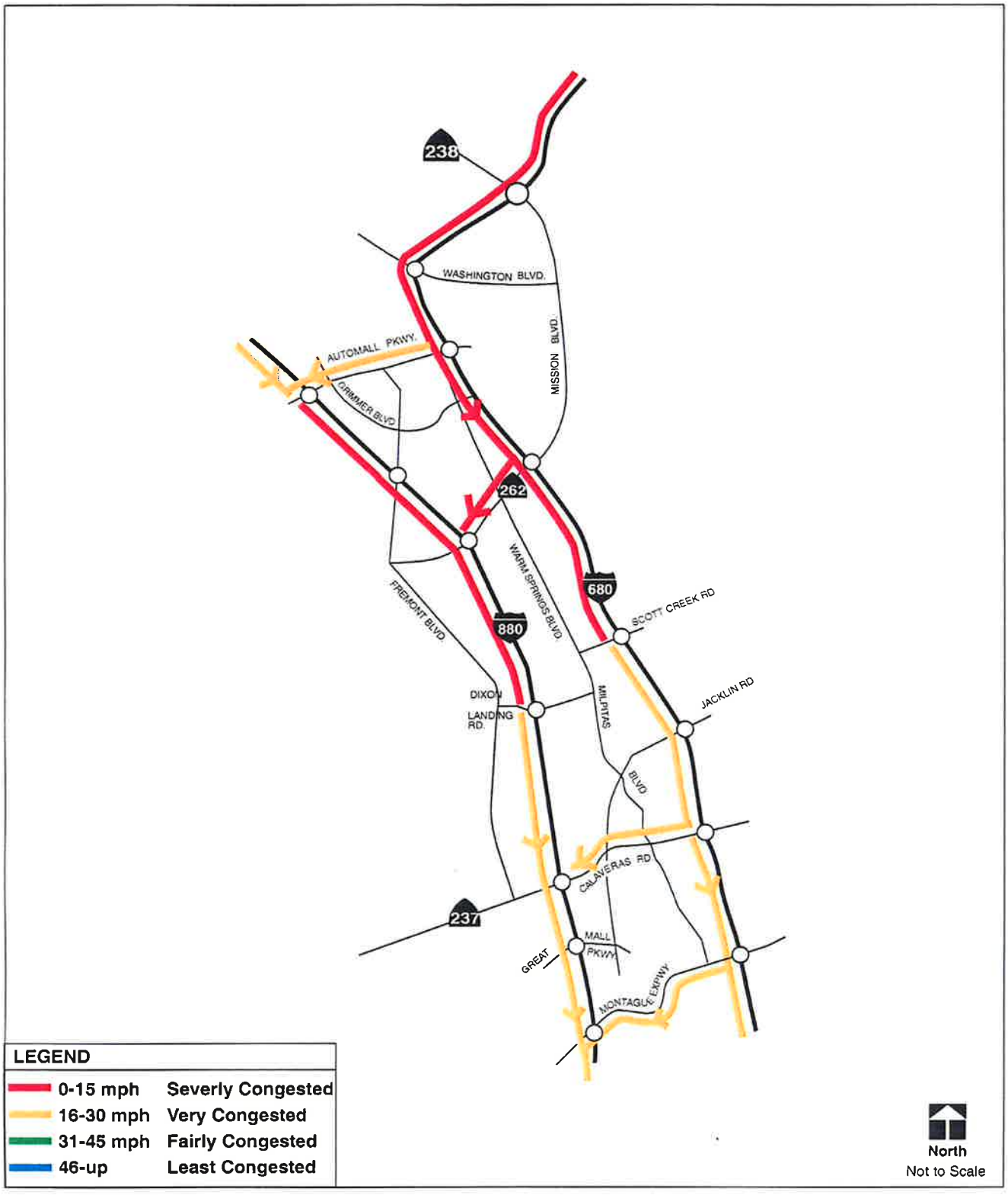


Route 680/880
Cross Connector Project

Existing AM Peak Period Model Output Average Speed (6 AM-8 AM) Average Speed (Westbound & Southbound)

Figure 4

142-039 - 3/11/05 - CT



Route 680/880
Cross Connector Project

2025 AM Peak Hour: Base Year Average Speed (Westbound and Southbound)

Figure **5**

142-039 - 2/9/05 - CT

VII. ALTERNATIVES ASSESSMENT

Those alternatives and options that were considered feasible from the initial development effort (Section V of this Report) were developed further in order to assess physical impacts and develop order of magnitude project cost estimates. The further developed alternatives were then analyzed using the traffic demand model to assess benefits. This section presents the results of the alternatives assessment effort. Physical impacts addressed include Right-of-Way, Utilities and Drainage, Structures and Constructability (Staging). This section also identifies major non-standard features of the proposed alternatives and presents order of magnitude project cost estimates for selected alternatives.

Geometric layouts for the alternatives discussed in this section are contained in **Appendix D.** Detailed cost estimating spreadsheets supporting the values presented in this section are contained in **Appendix G.**

CORRIDOR A – AUTO MALL PARKWAY

Alternative A1 - Widen to Six (6) Lanes (Grimmer Blvd to I-680)

Right-of-Way Impacts

Alternative A1 makes use of the existing median for much of the widening thus minimizing the right-of-way impact. Right-of-way acquisition will, however, be required at both the southwest and southeast corners of Auto Mall Parkway and Grimmer Blvd. to accommodate right-hand turn lanes to and from Auto Mall Parkway. Acquisition of right-of-way will also be required on the south side of Auto Mall Parkway between Technology and east of Fremont Blvd. and at the northeast, southeast and west corner of Auto Mall Parkway and Osgood Road. One (1) building on the southeast corner of Auto Mall Parkway and Fremont Blvd. may be impacted. All existing driveways will be maintained with little or no impact.

Utilities and Drainage Impacts

Alternative A1 will have a minor impact to existing utilities and drainage systems. A 36-inch asbestos cement pipe (ACP) inlet at the south-west corner of Auto Mall Parkway and Fremont Blvd. will need to be extended. Electrical utility boxes located at the south side of Auto Mall Parkway will require relocation. Existing electrical transmission towers will not be impacted by the widening, but may require some protection such as barriers or metal beamguard rails.

Structures

Bridge widening will be required at both the UPRR overcrossing and at the I-680 overcrossing. Widening of these structures is anticipated to be from 3.0 to 4.0 meters to the outside of the existing structure. The proposed system for widening will consist of PC/PS concrete box girders and column supports at the midpoint and in-line with the existing columns.

Constructability

Alternative A1 can be constructed in two (2) main stages. The use of one stage for widening on the inside and a second stage for outside widening would reduce the amount of traffic shifting. The existing lanes can be shifted away from the construction area and/or reduced lane widths can be utilized to provide construction clearance. Bridge widening may require reducing the number of lanes from two to one lane in each direction for short periods of time.

Non-Standard Features

The majority of the widening can be accomplished implementing current design standards. Within and near the I-680 interchange the close proximity of Osgood Road and the service station create less than desirable weave and merge distances, primarily in the eastbound direction.

Cost Estimate

The project cost for **Alternative A1** has been estimated at $21.6 million, including $13.9 million for Construction, $1.2 million for Right-of-Way Acquisitions, and $6.5 million for Engineering and Management.

CORRIDOR B – FREMONT BLVD. / GRIMMER BLVD.

Alternative B1 – HOV Access / At-Grade

Right-of-Way Impacts

Alternative B1, which widens the existing roadway, would require right-of-way acquisition on the east and west sides of Fremont Blvd. and on the north and south sides of Grimmer Blvd. An existing building at the northwest corner of Fremont Blvd. and Industrial Drive will most likely be impacted. All existing driveways will be maintained with some required modifications. Right-of-way could be reduced if a sidewalk is not provided on one or both sides. Currently, the east side of Fremont Blvd. does not have a sidewalk.

Utilities and Drainage

Major utility and drainage impacts for **Alternative B1** include a 48-inch RCP storm drain line which runs parallel to Fremont Blvd. and portions of Grimmer Blvd. The proposed roadway widening in these areas may require protecting or relocating the storm drain line. A 31-inch RCP storm drain line and an 8-inch sewer line that cross I-680 near the Grimmer Blvd. overcrossing will be impacted due to the proposed depressed HOV connection to I-680. In addition, overhead utility poles on the north side of Grimmer Blvd. will require relocation.

Structures

No structures are impacted on Fremont Blvd. for **Alternative B1**. Grimmer Blvd. passes under the UPRR, but the width of the opening (approximately 61.5 meters) can

accommodate the widening with some regrading of the existing slopes. At I-680 the next connection will require extensive retaining walls for the median ramps. It is also anticipated the northbound and southbound structures on I-680 will require modification in the form of widening to the outside to accommodate the mainline geometry shift, and some modification on the insides of the structures to accommodate the ramps. The amount of modification of these I-680 undercrossings will depend on the amount of design exceptions desired and approved for the ramps.

Constructability

Alternative B1 construction consists of four (4) main elements: Fremont Blvd. widening, Grimmer Blvd. widening, structural modifications of the I-680 overcrossing of Grimmer Blvd., and the construction of the retaining wall structures and lane realignment. Two (2) lanes in each direction can be maintained throughout construction.

Non-Standard Features

This alternative requires ingress and egress directly from/to median HOV lanes on I-680 to Grimmer Blvd. This configuration has been utilized in similar situations to allow more efficient HOV vehicle access to HOV lanes. Reduced shoulder widths on the single lane ramps are proposed to minimize impacts to the existing undercrossing structures (I-680 over Grimmer Blvd.) and to limit right of way impacts.

Current geometric standards are proposed for the widening of both Fremont and Grimmer Blvds to accommodate the HOV lanes. Utilization of HOV lanes on City streets, as proposed in this alternative, however, is currently an atypical application in Santa Clara and Alameda Counties. Furthermore, this alternative proposes to locate the HOV lanes in the median of Grimmer Blvd., while locating them on the outside lanes of Fremont Blvd. While this configuration was developed to efficiently work with both interchange freeways and allow smooth transition for HOV vehicles through the Fremont/Grimmer intersection, the proposed configuration is not common.

Cost Estimate

The cost for **Alternative B1** has been estimated at $53.2 million including $22.0 million for Construction, $21.0 million for Right-of-Way Acquisitions and $10.4 million for Engineering and Management

Alternative B2 – HOV Access / New Freeway Connection (Parallel / Aerial)

Right-of-Way Impacts

Alternative B2, which is assumed to be parallel and south of the existing roadways, will require right-of-way acquisition on the east and west sides of I-880 from Mission Blvd. to Fremont Blvd. for the addition of HOV lanes in the center of the Freeway. Right-of-way acquisition will be required parallel to both Fremont Blvd. and Grimmer Blvd. from I-880 to I-680 for the aerial HOV connection structure. Acquisition of right-of-way will also be required at the west side of I-680 from Grimmer Blvd. to Auto Mall Parkway for the addition of HOV lanes in the center of

the freeway. Removal of four (4) buildings north of Grimmer Blvd., with an additional three (3) more buildings at the northwest corner of Grimmer Blvd. and I-680, will be required. A fourth building will be partially impacted.

Utilities and Drainage Impacts

For **Alternative B2,** overhead power lines will be an issue at various locations. This alternative will also impact a 31-inch RCP storm drain line that crosses I-680 due to the proposed retaining wall structure for the aerial HOV connection to I-680.

Structures

No existing structures are anticipated to be impacted by **Alternative B2**. This alternative consists almost exclusively of a bridge (viaduct) between two freeways. At either end, retaining walls (likely MSE) to support the ramps are required in the freeway medians. A typical section of the proposed bridge structure and conceptual column spacing are identified in **Appendix D**.

Constructability

Alternative B2 also consists of three (3) main elements: Widening of both I-880 and I-680, construction of the retaining wall structures for the HOV connections, and construction of the Aerial Freeway structure. The construction of the new overhead bridge structure is proposed on a new alignment and would not require staging for traffic reasons. The new ramps on I-680 and I-880 would require basic two-stage construction, first to widen the freeways and secondly, to build the ramps in a wide median.

Non-Standard Features

The ramp configuration for this alternative, which is similar to alternative B1, employs median ramps to/from HOV lanes and proposes a cross section similar to that being constructed for the Route 85/101 direct HOV connector in Mountain View. This cross section has reduced shoulders and is sized to allow passage of vehicles should one vehicle become disabled on the ramp. The merge and lane widening required for the ramps on I-680 will likely require design exceptions to avoid replacing the Auto Mall Parkway Undercrossing Structure. Design speed for the connection, for the configuration shown on the plan, assumes this is a direct connector and is not to full freeway standards for design speed. The typical section for I-880 in the area of the proposed median ramps reflects substandard clearances from the Right-of-way to the shoulders.

Cost Estimate

The cost for **Alternative B2** has been estimated at $221.0 million including $90.3 million for Construction, $88.2 million for Right-of-Way Acquisitions and $42.7 million for Engineering and Management.

Corridor C – Mission Blvd.

Alternative C2 – Grade Separate Warm Springs Blvd. / Mission Blvd. and Interchange Improvements at I-680

Right-of-Way Impacts

Alternative C2 will require right-of-way acquisition on the north and south sides of Mission Blvd. from Warm Springs Blvd. to I-680 and at all four (4) quadrants of the intersection of Mission Blvd. and Warm Springs Blvd. A minimum of three (3) structures will be impacted, and access to a number of existing driveways will be lost, primarily in the area of the intersection of Mission Blvd. and Warm Springs Blvd. It appears that access to parcels can be modified to maintain current usage.

Utilities and Drainage Impacts

Impacted utilities and drainage are primarily located in two areas: 1) The intersection of Mission Blvd. and Warm Springs Blvd., and 2) The I-680 southbound off-ramp to Mission Blvd.

A 5-foot x 10-foot box culvert runs across Warm Springs Blvd. and connects to a 9-foot x 6-foot box culvert storm drain running parallel to Mission Blvd. This system will most likely be impacted by the proposed grade separation and required retaining walls. With the addition of retaining walls at all four (4) quadrants of this intersection, existing drainage patterns will be affected and will require modifications.

A 24-inch RCP storm drain line, a 10-inch VCP sewer line, a 30-inch water main, and a gas line will be impacted or require protection during construction due to the proposed realignment of the off-ramp.

These facilities are identified on the Conceptual Plans in **Appendix D**.

Structures

No existing structures will be directly impacted by the proposed project, though future detailed development of the project could recommend widening of the planned Kato Road structure over Mission Blvd., or similar nearby structures associated with the Warren Avenue/I-880 interchange elements.

The proposed grade separation with limited access to Mission Blvd. will require not only a new bridge for Warm Springs Blvd. over Mission Blvd., but also significant retaining walls to minimize right-of-way acquisition/impacts.

Constructability

The improvements near I-680 can be constructed using normal staging techniques. The modifications to the diagonal ramps can be constructed while maintaining the existing geometry. When the ramp connections are complete and ready for operation, the redundant loops can be obliterated.

The construction of the grade separation at Warm Springs Blvd./Mission Blvd. is complicated by the need to keep heavy existing traffic moving through the project area, the need to adjust profiles for both roadways, and a relatively confined space in which to accomplish these improvements. Detailed multiple stage construction sequencing will be required, as will additional temporary right-of-way for temporary facilities. Furthermore, it will likely be necessary to restrict turning movements between the two facilities for extended durations during construction. Reduction of lanes for extended periods may also be required.

Non-Standard Features

The merges and weaves with Mission Blvd. in this alternative would be non-standard due to inadequate space available. In particular, the distance between the Mohave Drive intersection and the ramps to the elevated intersection with Warm Springs are very short.

Ramp modifications proposed at I-680 can be accomplished implementing current design standards.

Cost Estimate

The cost for **Alternative C2** has been estimated at $61.9 million including $33.4 million for Construction, $12.9 million for Right-of-Way Acquisitions and $15.8 million for Engineering and Management.

Corridor D – Scott Creek Road / Dixon Landing Road

Alternative D3 – Extend Kato Road to Future Fremont Blvd. and Widen Scott Creek Road

For purposes of the discussion in this report, it is assumed that as part of this project, Scott Creek Road would be redefined to extend westerly to a new T-intersection with Fremont Blvd. east of I-880. Kato Road would then extend north and west from this intersection. Actual naming of roads will be determined by the City of Fremont as this project develops.

Right-of-Way Impacts

Alternative D3 will require right-of-way acquisition on the west side of Kato Road for the proposed new signalized intersection at Scott Creek Road (near I-880) and on the north and south sides of Scott Creek Road from Kato Road to Warm Springs Blvd. There is a potential loss of driveway access due to the proposed railroad grade separation as part of the Silicon Valley Rapid Transit (SVRT) project, but no access loss as a direct result of this project.

Utilities and Drainage Impacts

The realignment of Kato Road will require the relocation of an electrical tower located on the west side of Kato Road. Other major utility impacts include a 27-inch RCP storm drain, and gas and water mains that will need to re-routed due to the proposed depressing of Scott Creek Road under BART. Also, a 48-inch RCP storm

drain and an 18-inch water main may be impacted in the area of the Scott Creek Road widening. Depending on the timing of this project, a widening of the existing at-grade crossing of the UPRR could be required.

Structures

This improvement consists of a new local roadway overcrossing of I-880. Retaining walls associated with the approaches to the overcrossing, and the re-alignment of Kato Road to the New T-intersection east of I-880 will be required to minimize impacts. No existing structures will be impacted as a result of this project.

Constructability

For **Alternative D3**, the project can be separated into four (4) sections: Widening of Scott Creek Road, grade separation of BART / Scott Creek Road (by others), Kato Road re-alignment, and overpass connection to future Fremont Blvd. The widening of Scott Creek Road can be constructed in two (2) stages. Widening could be completed in the first stage without impacting the existing traffic lanes. The second stage would shift the traffic to the outer lanes while constructing the center median. Construction of the Scott Creek Road grade separation is being considered by BART, but no final determination has been made. For the purposes of this report, however, it is assumed that the grade separation of BART/Kato Road will be accomplished by others and that such a project will accommodate any road widening planned at this location.

The Kato Road re-alignment will require a minimum of two (2) phases. The first phase would shift traffic to the east side of Kato Road and reduce the number of travel lanes while constructing the retaining wall structure, the westerly one-half of the re-aligned Kato Road and the west end of Scott Creek Road. The second stage would shift the Kato Road traffic to the elevated portion while construction of the remaining portion of Kato Road is completed. The overpass connection to the future Fremont Blvd. can be constructed concurrently with the first phase of the Kato Road construction and would require two (2) main stages. The construction of the bridge abutments and retaining wall structure would take place during the first stage. The second stage would be for the superstructure construction and final roadway grading.

Non-Standard Features

The widening of Scott Creek Road and Kato Road can be accomplished implementing current horizontal geometric design standards. The profile of Kato Road, as it proceeds under the BART extension, over I-880 and connects to the extension of Fremont Blvd., may require consideration of a reduced design speed. Sight distance at the new T-intersection with the northerly portion of Kato Road will require attention to ensure safe operations at this location.

Cost Estimate

The cost for the extension of Kato Road to future Fremont Blvd. portion of **Alternative D3** has been estimated at $39.2 million, including $14.2 million for Construction, $19.0 million for Right-of-Way Acquisitions and $6.7 million for Engineering and Management.

Corridor E – Calaveras Blvd./Route 237

Alternative E1 - Widen to Six (6) Lanes

Right-of-Way Impacts

Alternative E1, which widens the existing roadway, would require right-of-way acquisition on the north side of Calaveras Blvd. from Abbott Avenue to Abel Street to accommodate the proposed auxiliary lane, and from Milpitas Blvd. to Town Center Drive to allow for a dual left-turn pocket (westbound to southbound) and to align the three through lanes. Right-of-way acquisition will also be required at the north side of Serra Avenue and the south side of Calaveras Blvd. from Serra Avenue to Abel Street.

Utilities and Drainage

For **Alternative E1,** the impact to existing utilities and drainage is primarily limited to storm drain piping and catch basins. Various storm drain RCP sizes from 12 inches to 48 inches run across areas of proposed roadway widening and may require extensions.

Structures

The widening of Calaveras Blvd. between Abel Street and Milpitas Blvd. involves the widening of structures over Main Street and the UPRR facilities. In each case, independent bridges exist for the westbound traffic and eastbound traffic. This report assumes the bridges will be widened. Should it be determined that replacement of structures is preferred, the associated costs and staging requirements would require modification.

The structures over Main Street are both super-elevated with independent profiles, creating a "sawtooth" effect in cross section. Widening thus requires the structures remain independent, and constructability and geometry must be coordinated.

The structures over the UPRR consist of two (2) CIP/PS concrete box girder bridges most recently retrofitted in 1995. Vertical clearance for these structures likely does not meet current UPRR requirements. Furthermore, the planned addition of a BART system under these structures could affect the decision to widen or replace the existing bridges.

In addition to the bridge widenings, retaining walls will be required to minimize right-of-way impacts at various locations.

Constructability

For **Alternative E1**, the roadway widening portion of the project can be constructed in one main stage since all widening is taking place on the outer sides of the roadway. Widening of the bridge will require two (2) main stages per bridge. Widening to one side of each bridge would be completed during the first stage of construction. The second stage would shift traffic to the completed section of the bridge while widening

the opposite side. Access to local businesses during construction will require attention, but should be manageable.

Non-Standard Features

The widening of Calaveras Boulevard can be accomplished implementing current horizontal geomctric dcsign standards. The proposed improvements would match the current vertical profile, with minor adjustments where structures require replacement to adhere to vertical clearance requirements. These profiles would require closer review to assess their conformance with current standards. Additional advisory exceptions may be required along this stretch of Calaveras Blvd. to document the existing conditions relative to current standards for access and lateral clearances on state highways.

Cost Estimates

The cost for **Alternative E1** has been estimated at $35.1 million including $19.2 million for Construction, $7.2 million for Right-of-Way Acquisitions and $9.1 million for Engineering and Management.

Alternative E3 – HOV Freeway

Right-of-Way Impacts

Alternative E3 will require significantly more right-of-way acquisition than E1 due to the proposed addition of HOV lanes in the median and the subsequent roadway widening. For this alternative, right-of-way acquisition is required in multiple locations on the north and south sides of Calaveras Blvd. from I-880 to I-680. Various buildings will be impacted, but the impact may be lessened by reducing the proposed cross sectional elements. Many of the existing driveways will require modifications to conform to the proposed widening.

Utilities and Drainage Impacts

For **Alternative E3,** overhead power lines will be an issue at various locations (see plan in **Appendix D**). This alternative will also impact RCP storm drain lines, 12-inch water mains and 6-inch gas lines which cross areas of proposed improvements at several locations. Footing locations for the elevated portion of the HOV structure will require close coordination with the existing utilities.

Structures

The widening of Calaveras Blvd. between Abel Street and Milpitas Blvd. consists primarily of widening the existing structures over Main Street and over the UPRR facilities.

Constructability

Alternative E3 can be constructed similarly to **Alternative E1** with a few exceptions. Construction of the retaining wall structures and the substructure for the

elevated freeway within the median should follow the widening stage and precede the final striping which opens up additional lanes. The final stage will be for the construction of the elevated freeway superstructure.

Non-Standard Features

The connection of the proposed HOV lanes with the existing Route 237 interchange would require a non-standard application of HOV lanes on off ramps and local roads through the interchange area. Lateral clearances would likely be non-standard near the existing columns that support the direct connectors.

The placement of the HOV lanes in the median of Calaveras Blvd. as it crosses Milpitas Boulevard is a non standard application of HOV lanes, similar to that proposed for alternative B1.

The proposed elevated sections of the HOV system reflect a reduced cross section similar to that discussed for previous HOV ramp systems.

Cost Estimate

The cost for **Alternative E3** has been estimated at $134.5 million including $78.9 million for Construction, $18.2 million for Right-of-Way Acquisitions and $37.3 million for Engineering and Management.

Corridor F – Montague Expressway

At the beginning of the Study, it was anticipated and assumed that by the year 2025 Montague Expressway between I-680 and I-880 would be an eight (8) lane facility with HOV lanes in both directions. The preliminary geometrical assessment work for the widening of Montague Expressway is well documented in multiple reports prepared by the Santa Clara County Roads and Airports Department. Specifically, "Montague Expressway Improvement Project – Final Technical Report," dated 1999, defines the impacts associated with the eight (8) lane widening and various intersection improvements. This information was subsequently reviewed and updated in the "Comprehensive County Expressway Planning Study," dated August 2003.

Per the referenced studies, the total estimated cost to widen Montague Expressway between I-680 and I-880, without any new grade separations, is $33.5 million.

This Study shows the HOV connectivity between the two freeways at the southern part of the Study Area is crucial to meeting the long-term critical needs defined by this Study. Currently, the County and the City of Milpitas are assessing the viability of the HOV facility with the current six-lanes on Montague Expressway. It is the recommendation of this report that, regardless of the short-term decisions on the HOV system on Montague Expressway, the HOV lanes be implemented on a trial basis as part of the eight-lane system. **Appendix D** contains a memorandum addressing options available to maintain HOV lanes on Montague Expressway by adding an additional auxiliary lane outside of the HOV lane as well as the potential for and the problems associated with moving the HOV lane to the median lanes of Montague Expressway. The County does not believe there are feasible options to maintain the HOV lanes and solve current operational issues short of freeway treatment of Montague Expressway, which would be inconsistent with the locally developed vision for Montague Expressway – "Multi-modal, pedestrian friendly arterial roadway in Milpitas east of I-

880" – as shown in the Expressway Planning Study, which includes discussion of expressway HOV operational improvement strategies in Section 5, "HOV System Element."

VIII. ENVIRONMENTAL CONSIDERATIONS

A preliminary environmental screening of the Study Area was performed during the Brainstorming phase of this Study. A subsequent effort focused on the six main corridors and those projects considered feasible. **Appendix F** contains the updated Environmental Screening Report. This Report identifies points of concern relative to Land Use, Biology, Cultural, Physical and Economic Constraints for each corridor.

The project would result in environmental impacts along all six corridors. The Auto Mall Parkway corridor would experience the least environmental impacts as a result of project implementation, and the Scott Creek Road/Dixon Landing Road corridor would likely experience the most environmental impacts. Because the Auto Mall Parkway corridor is currently highly developed, minimal biological impacts would occur along this corridor. Additionally, this corridor has a large center median on most of the alignment that would serve as the primary location for proposed street widening and grading, avoiding impacts on most of the existing structures that line the roadway. The Scott Creek Road/Dixon Landing Road contains a large area of San Francisco Bay tidal marsh and salt ponds. Additionally, residential uses represent much of the land uses along the corridor, and the Cedar Lawn Memorial Cemetery lies directly adjacent to the corridor. Following is additional information by issue area.

- **Biological Resources.** The Scott Creek Road/Dixon Landing Road corridor has the greatest potential to result in impacts on biological resources because the alignment includes San Francisco Bay tidal marsh and salt pond areas. Biological impacts on riparian species at creek crossings would occur in all corridors. The Calaveras Blvd./Route 237 corridor has the greatest potential to experience riparian impacts because it crosses five creeks/drainages. Vacant and undeveloped areas in all corridors are potential habitat for burrowing owls, a state-protected species.

- **Cultural Resources.** Cultural resources may exist within all six corridors because areas along the former San Francisco Bay shoreline and along I-680 are considered archaeologically sensitive, and because all six corridors cross or are adjacent to the UPRR route, which may have historical significance. The Scott Creek Road / Dixon Landing Road and Calaveras Blvd./Route 237 corridors cross the Hetch Hetchy aqueduct, which may also have historical significance.

- **Building Displacement or Disruption.** The Scott Creek Road/Dixon Landing Road corridor has the greatest potential to result in impacts on residential uses because approximately half of the corridor is lined with residences, and the Grimmer Blvd. / Fremont Blvd. corridor has the potential to experience the greatest loss of commercial uses because of project design. The Fremont Blvd./Grimmer Blvd., Calaveras Blvd./Route 237, and Montague Expressway corridors would have the least potential to result in impacts on residential uses because very little residential development exists along these roadways.

- **Community Facilities.** The Scott Creek Road/Dixon Landing Road corridor could affect the Cedar Lawn Memorial Cemetery, and the Calaveras Blvd./Route 237 corridor could affect the City of Milpitas Civic Center. It is likely, however, that each of these facilities could be avoided.

- **Visual Change.** The greatest visual change would occur along the Grimmer Blvd./Fremont Blvd. and Scott Creek Road corridors because development proposed under both of these alternatives includes new aerial roadway features where none currently exists.

- **Construction Impacts.** The extent of construction-related impacts (i.e., noise disturbances, dust, utility service disruption, and water quality impacts) is expected to be similar in all corridors. The Scott Creek Road/Dixon Landing Road corridor would have the greatest construction impacts on wildlife habitat, and the Fremont Blvd./Grimmer Blvd. corridor would have the fewest impacts on water quality because no riparian areas exist in this corridor.

IX. COST ESTIMATES

Order of Magnitude Cost Estimates were prepared using Caltrans Project Study Report (PSR) format for the alternatives considered feasible and discussed in Section VII of this report. The PSR estimates were later updated utilizing the VTA-developed format established in the latter part of 2003. **Appendix G** contains the detailed cost estimates. The following table summarizes the cost estimates for the feasible alternatives.

Table A – Project Cost Estimate

Alternative		Construction Costs	Right-of-way Costs	Design, Engineering & Management Costs	Total Estimated Project Costs Range (2003 $)
A1 - Widen to Six (6) Lanes (Grimmer Blvd to I-680)	*	$13,900,000	$1,200,000	$6,500,000	$20 - $25 million
B1 - HOV Access/At-Grade (Fremont Blvd./Grimmer Blvd.)	*	$22,000,000	$21,000,000	$10,400,000	$50 - $60 million
B2 - HOV Access/New Freeway Connection (Parallel/Aerial) (Fremont Blvd./Grimmer Blvd.)		$90,300,000	$88,200,000	$42,700,000	$220 - $225 million
C2 - Grade Separate Warm Springs Blvd./Mission Blvd. & Interchange Improvements at I-680		$33,400,000	$12,900,000	$15,800,000	$60 - $70 million
D3 - Extend Kato Road to Future Fremont Blvd. & Widen Scott Creek Road	*	$14,200,000	$19,000,000	$6,700,000	$35 - $45 million
E1 - Widen Calaveras Blvd to Six 6) Lanes (Abel Street to Milpitas Blvd.)	*	$19,200,000	$7,200,000	$9,100,000	$30 - $40 million
E3 - Calaveras HOV Freeway (Route 237 to I-680)		$78,900,000	$18,200,000	$37,300,000	$130 - $140 million
F3 - Montague HOV Access (I-880 and I-680 Interchanges)		$46,300,000	$22,300,000	$21,900,000	$90 - $95 million

* *Part of Alternative 1 Package*

X. FUNDING ELEMENT

Completion of the projects recommended in this Study is dependent on securing funding through Federal, State and local resources. Short-term funding levels are at their lowest level in several years. No new STIP funds are anticipated to be available for the next several years (FY 08/09 as currently projected), the final features of the federal transportation reauthorization bill are still under debate, and county sales tax revenues remain sluggish. Because of these short-term constraints, long-term planning for priority projects, such as those identified in this study, is critical. Because transportation funding and programming is a continuous process, interested parties should contact the Santa Clara County and Alameda county CMAs or the Metropolitan Transportation Commission (MTC) for current programming information.

Santa Clara County, through its Valley Transportation Plan 2030 (VTP 2030) process, is in the process of preparing an update to its long-range transportation plans. Alameda County is engaged in a similar exercise. Concurrently, MTC is developing the regional transportation plan for the nine-county Bay Area, called Transportation 2030 or T2030. Both the county and the regional planning efforts have a 25-year horizon. The projects and programs included in the county transportation plans will be submitted to MTC for inclusion in T2030. Any project that could have regional significance, particularly as it pertains to air quality, must be in the regional transportation plan to receive federal or state funding or move into construction or implementation.

As of July 2004, two of the alternatives from this Study are included in VTP 2030: the Calaveras Blvd. Widening project, with a forecasted cost of $32M; and the Montague Expressway Widening project, with a forecasted completion cost of $38.5M ($8.5 Million has been budgeted by the City of Milpitas to accomplish the widening between I-680 and Trade Zone Blvd.). An additional $7M is included in the plan for Environmental and Conceptual Engineering for the I-680/880 Cross-Connector Study. The latter funding will permit the County to proceed with initial engineering efforts so that key projects are ready for consideration as soon as funds become available.

In Alameda County, the Route 262 (Mission Blvd.) Widening project, from I-880 to Warm Springs Blvd. (Interchange Phase IB) is included in the Countywide Transportation Plan with a forecasted cost of $38.3 million. This project includes the reconstruction of the Route 262 / I-880 and Route 262 / Kato Road interchanges and the reconstruction of the UPRR underpasses. The Countywide Transportation Plan also identifies $52 million for the Route 262 / Warren Avenue / I-880 Interchange Improvements, including the Phase II UPRR grade separation. Both projects are listed as financially constrained elements. Finally, two precursor projects are included in the plan: (1) completion of the I-880 / Mission Blvd Interchange Improvements (Phase IA), and (2) the I-680 SMART Carpool Lane Demonstration project.

XI. RESULTS AND RECOMMENDATIONS

The following Table "B" summarizes the major model run results for the alternatives analyzed. Detailed model run results and volume difference plots are contained in **Appendix E.**

As depicted, the table reflects the projected change, in the year 2025, for the following MOEs:

- Change in Through Trips (Δ Thru Trips). These are trips that originate and end outside of the Study Area, and are generally considered more regional trips.
- Change in Vehicle Mile Traveled (Δ VMT). This is a measure of the total vehicle miles traveled within the Study Area during both the AM and PM peak hours.
- Change in Person Trips (Δ PT). Similar to VMT, this is a measure of the number of person trips that have all or some of the trip traveled within the Study Area during the peak hours. This measure not only measures an increase in vehicular trips, but reflects increased occupancy of vehicles expected due to each alternative.
- Change in Speed. This is measure of the overall average increase in speed throughout the Study Area during both the AM and PM peak hours as a result of each alternative.
- Change in Vehicle Miles Traveled in relation to the Change in Vehicle Hours Traveled. This is a "derivative" MOE defined in Section VI, "Traffic Analysis," of this Report. With multiple corridors and multiple travel patterns to assess within this large Study Area, it was agreed that single focus MOEs may not be sufficient to represent the changes in traffic patterns as a result of an alternative. This ratio is a normalized representation of additional miles traveled in relation to the time spent on the trip. This ratio is used to validate some of the single variable MOEs previously listed.

For each MOE listed, the alternative that resulted in the largest benefit is highlighted as the "Best" numeric value, as is the second "Best" numeric value. The cost to achieve these benefits is then considered, and the "higher value" alternative is also highlighted. For example, the greatest increases in speed (3.20 and 2.20 MPH) are recognized for two options to Alternative C1, the below grade Mission Blvd. However, the costs for these alternatives average from roughly $450 million to $900 million (see Appendix G). When compared to a 1.6 MPH increase anticipated for Alternative B1, which costs roughly $60 million, the higher value alternative is considered to be Alternative B1.

The table also includes results when the four recommended projects are modeled together. As shown, these projects would result in 3,200 new trips during the AM and PM peak hours, would result in roughly 10,200 additional person trips during that same time, and result in an average increase in speed of nearly five miles per hour within the Study Area.

Table B

Summary Measure of Effectiveness
Individual, Package of 4 Recommended Projects & Additional Alternatives Analysis
Summation of Data for a.m. and p.m. Peak Hours within Study Area

Alternative		Δ Thru Trips	Δ VMT	Δ PT	Δ Speed	Δ VMT (%) / Δ VHT (%)
Alt. #.	Description	(+ = good)	(+ = good)	(+ = good)	(+ = good)	(Higher = good)
BASE (Year 2025, projected total a.m. and p.m. Peak Hours)		50,185	74,209	125,926	12.5	1.00
Recommended Projects (see note 6)						
A1	Auto Mall (Widen to 6 lanes)	1,211	2899	2,621	1.10	1.09
B1	Fremont/Grimmer (At-grade HOV)	3,260	2,333	5,458	1.80	1.18
D3	Scott/Dixon (Kato Extend over 880)	2,583	5,776	6,191	1.00	1.08
E1	Calaveras (Widen to 6 Lanes)	-488	798	110	0.40	1.04
Package of 4 Recommended Projects		3,260	9,646	10,193	4.90	1.40
Additional Alternatives Analyzed						
B2	Fremont/Grimmer (Aerial HOV)	1,683	3,002	4,978	1.90	1.16
E3	Calaveras (Aerial HOV)	2,030	2,638	5,030	1.60	1.13
F3	Montague (680 Direct HOV)	562	2,709	2,967	0.30	1.03
C1	Mission (Below Grade Fwy, MF)	1,684	99	3,498	2.20	1.18
C1	Mission (Below Grade HOV)	332	263	3,206	3.20	1.26
C2	Mission (Grade Separation @ WSprings)	715	-605	-242	0.60	1.05

Legend

- "Best" numeric value for this measure
- Second "best" numeric value for this measure
- Higher 'Value' alternative considering cost

Table Notes:

1) *General - Δ(Change) reflects difference between baseline (projected existing conditions as of 2025) and projected data (with proposed improvement) throughout the Study Area. (For limits of Study Area, see Figure 1)*
2) *A Thru Trip is defined as a trip originating and ending outside the Project Study Area.*
3) *VMT = Vehicle MilesTraveled within the Project Study Area.*
4) *PT = Person Trips within the Project Study Area*
5) *VHT = Vehicle Hours Traveled with the Project Study Area*
6) *Results assume Warren Avenue grade separation and Montague Expressway Widening are complete.*

The following discussion further details the TAC's evaluation of the benefits, trade-offs and ultimate recommendations for a program of improvements within the Project Study Area that addresses all four objectives. Ultimately, it was agreed by the TAC, based on the results above and the evaluation process, that any package of improvements should include the following alternatives:

Corridor A – Auto Mall Parkway

Early assessments quickly narrowed down potential approaches to improving this corridor to **Alternative A1** – Widen to six (6) Lanes (Grimmer Blvd to I-680). Further analysis, using the traffic model, confirmed that this alternative would generate a significant benefit to traffic flow within the Corridor. Those results, coupled with a relatively low total project cost ($20 - $25 million) led to the conclusion that this project should be pursued as part of a package of improvements.

Corridor B – Fremont Blvd. / Grimmer Blvd.

For the Fremont Blvd./Grimmer Blvd. corridor, both Alternative B1 and Alternative B2 produced significant benefits as shown by the traffic model run results. Consequently, it is recommended that a separate Project Study Report be prepared to help clarify the pros and cons of the two HOV alternatives, and options thereof. The coordination of this project with the potential SMART Lane project on I-680, and/or other projects in the near future is necessary to determine which alternative best meets the needs of the traveling public in the near and long term.

The following highlights the basis for the decision not to recommend mixed flow lanes as part of a freeway connector in the Fremont Blvd./Grimmer Blvd. corridor.

- The proposed alignment for the Fremont Blvd./Grimmer Blvd. connection is in very close proximity to the I-880/Fremont Blvd. and I-680/Auto Mall Parkway interchanges. In addition to requiring design exceptions from Caltrans and/or creating "combined" interchanges, adding the additional single occupancy traffic volume from two mixed flow lanes in these areas to the current freeway volumes will exceed the capacity of the freeways at these locations, creating significant bottlenecks. The benefit gained by providing the mixed flow capacity east-west is therefore lost in the interchange areas.

- Mixed flow ramps would be located on the outside of the existing freeway system. The impacts to property due to the new ramps on I-880 and I-680 would require acquisition of residential homes, impact the local street systems, and result in significantly higher project costs. The significantly higher project costs are not justified by performance increases on other connector roadways within the Study Area.

- Alternatives that added mixed flow freeway lanes to a roadway corridor other than Fremont Blvd./Grimmer Blvd. were analyzed. Those alternatives improved the travel time on that corridor, but did not have a large effect on other roadways or overall person trips or travel time. The physical impact, and resulting costs, for adding new mixed flow facilities was significantly higher than for adding HOV facilities due to the required ramp configurations. However, the travel time through the Study Area is not significantly improved. A new mixed flow facility was analyzed along the Mission Blvd. corridor, where a new four-lane below-ground mixed flow alternative was modeled. The result was to shift the traffic from the existing at-grade Mission Blvd. to the new below grade facility. There was no significant improvement to other connector

roadways or to overall travel times through the Study Area. From these results, it was extrapolated that a mixed flow system at Fremont Blvd./Grimmer Blvd. would yield similar results.

- HOV facilities, connecting in general to the medians, avoid many of the impacts mixed flow options create.
- HOV alternatives consistently had a larger effect on modifying the traffic flow and in attracting more person trips through the corridor.

In summary, the recommendation of this Project Study is to pursue the development of an HOV connection, the design of which will need to be determined through the PSR process.

Corridor C – Mission Blvd.

In the course of the Study, it was recognized that the Warren Avenue grade separation with the UPRR, originally contemplated as Phase II of the I-880/Mission Blvd. interchange, and later as part of the BART extension, would not be part of either project. This grade separation is critical to the operations and capacity of the new interchange at Warren Avenue and I-880. The impacts of this grade separation, as well as the Warm Springs Blvd./Mission Blvd. grade separation and the I-680/Mission Blvd. interchange improvements, were further analyzed using microsimulation modeling techniques. The report in **Appendix E** provides a detailed summary of these analyses.

As a result of the above effort, the grade separation of Warm Springs Blvd. and Mission Blvd. is not recommended for further development. The following improvements are, however, recommended for this corridor:

- Grade separate Warren Avenue and the UPRR.
- Modify the I-680/Mission Blvd. interchange to a partial cloverleaf configuration.
- Construct correlated improvements at the Mission Blvd./Warm Springs Blvd. and Warren Avenue/Warm Springs Blvd. intersections to accommodate projected turning movements/improve operations.

The projected construction costs for this set of improvements is $18.4 million ($11.2 million for the Warren Avenue/UPRR grade separation, $6.7 M for the I-680/Mission Blvd. Interchange improvements, and $500,000 for the intersection improvements). These costs assume no additional right-of-way will be required. Assuming projected "soft" costs of 30%, the overall project costs with no right-of-way acquisition required are estimated at $23.9 million.

Note that some of the elements mentioned above are part of larger projects previously mentioned. The costs shown here reflect only the specific project elements listed.

Corridor D – Scott Creek Road / Dixon Landing Road

Of the three alternatives initially examined for this corridor, Alternatives D1 – Widen Scott Creek Road, Milmont Drive and Dixon Landing Road and D3 – Extend Kato Road over I-880 to (Future) Fremont Blvd. were selected for more detailed analysis. Alternative D1 was found to be of minor significant benefit to the Study Area and was subsequently eliminated. Alternative D3, however,

demonstrated significant benefits in the modeling exercise and, with an estimated total project cost of $35 - $45 million, is therefore recommended as part of the proposed package of improvements.

Corridor E – Calaveras Blvd. / Route 237

Of the two feasible alternatives for the Calaveras Blvd./Route 237 corridor, the stronger, based solely on the model run results, would appear to be Alternative E3 – Aerial HOV Connection. On the other hand, the benefits of this option were diminished by its high cost ($130 - $140 million) and high impact to the community. With a total project cost of $30 - $40 million and significantly less right-of-way impact, Alternative E1 – Widen to Six (6) Lanes was ultimately determined to be a more effective, appropriate short-term project and is, consequently, recommended as part of the proposed package of improvements.

In addition, this Study recommends that the agencies involved continue to pursue, as a long-term project, an HOV connection between I-680 and I-880 within the Calaveras Blvd. alignment. A connection from Route 237 to I-680 along Calaveras Blvd. would help redistribute HOV movements between the two north-south freeways and provide significant benefit to the HOV and bus transit users.

Corridor F – Montague Expressway

As noted in the discussion in Section VII, "Alternatives Assessment," the modeling and analysis for the Project Study assume that the improvements labeled as F1 – Widen to Eight (8) Lanes between Freeways have been completed. The justification and need for this project have been well documented, as noted in the earlier discussion.

With regard to Alternative F3 – HOV Access, a review of the model run results indicates that this is not the best investment for the corridor, a conclusion reinforced by project cost considerations. At the same time, however, HOV connectivity is critical to this Corridor. The recommendation, therefore, is that Alternative F1 be implemented, with HOV lanes incorporated into the eight-lane system on a trial basis. Total project cost for Alternative F1 is estimated at $38.5 million.

To summarize, as a result of the analysis performed through this Study, it is recommended that the three agencies that sponsored the Study, VTA, ACTIA and Caltrans, actively and jointly pursue the coordinated development of the following six (6) corridor improvements defined in this report as:

- Alternative A1 - Widen Auto Mall Parkway to Six (6) Lanes (Grimmer Blvd. to I-680)
- Alternative B1 or B2 - HOV Lanes in Fremont Blvd./Grimmer Blvd. Corridor
- Alternative C2 (Modified) – Complete the original planned improvements for the Mission Blvd./I-880 interchange and construct the grade separation of Warren Avenue at UPRR, and modify the I-680/Mission Blvd. interchange to operate as a partial cloverleaf.
- Alternative D3 - Extend Kato Road Over I-880 to Future Fremont Blvd and Widen Scott Creek Road
- Alternative E1 – Widen Calaveras Blvd. to Six (6) Lanes between Milpitas Blvd. and Abel Street and Add Auxiliary Lanes between Abel Street and Abbott Avenue
- Alternative F1 - Complete the Widening of Montague Expressway to Eight (8) Lanes Between I-680 and I-880.

Implementation of the recommended projects would result in a total peak hour (a.m. and p.m.) increase of 10,000 person trips, an increased average speed of 4 – 5 MPH, 700 additional peak hour HOV trips and a 40 percent increase in vehicle miles traveled during the peak hours.

Though some of the new freeway or major grade separated alternatives, such as C1 and F3, show some favorable results for specific MOEs, the cost-to-benefit ratios are very high, and the benefits reflected by the analyses are very localized in nature. The combination of projects recommended, on the other hand, has a generally lower initial cost and provides widespread benefits throughout the Study Area if implemented as a package or program of projects.

XII. IMPLEMENTATION PLAN

The implementation of the recommended projects needs to be based on a combination of the following project characteristics: 1) opportunities; 2) project benefits; 3) constraints and feasibility; and 4) impacts to the overall transportation infrastructure within the Study Area, especially the distribution of trips within the Study Area. The implementation plan assumes that the complete program of projects is being implemented.

It is anticipated that each stakeholder agency will embrace the recommended program of projects and pursue each improvement in an expeditious manner. In the event an opportunity presents itself to expedite one or more of the improvements identified, the local agency is expected to leverage that opportunity, regardless of any preferred implementation approach presented below.

The improvement provided by the individual projects, from a traffic operations standpoint, have been summarized in this Report.

The following discussion outlines individual project constraints and current feasibility issues and next steps for each of the recommended projects. Where appropriate, the distribution of trips within the Study Area is also discussed relative to implementation sequencing.

A1 – Widen Auto Mall Parkway (to Six Lanes)

This project has no regional constraints, nor does it adversely affect the balance or distribution of trips in the Study Area. Therefore, this project can and should be pursued independently as soon as funds become available.

B1 / B2 – HOV Connection on Fremont Blvd. / Grimmer Blvd.

The benefits of this connection are potentially augmented by the implementation of the "SMART" lane system on I-680, which is currently under consideration by the VTA and the Alameda County CMA. In addition, benefits would be maximized by complete implementation of planned HOV systems on both northbound and southbound I-680 and I-880 within the Project Study Area. Currently, HOV lanes exist only on southbound I-680 to Calaveras Blvd. and on portions of I-880 (northbound and southbound). There are no regional constraints associated with this project, assuming the HOV lanes on I-880, to be constructed with the I-88-/Mission Blvd interchange improvements, are completed as planned. Therefore, this project can be pursued on its own through the development of a Project Study Report (PSR), pending available funds.

C2 (Modified) – Mission Blvd. Corridor Improvements

Improvements in this corridor require the completion of the I-880 / Mission Blvd. Interchange reconstruction. Construction of the first phase of this project (Phase IA) will begin in spring of 2005. However, a second phase (Phase IB) of the project that would widen Mission Blvd. west of Warm Springs Blvd., replace the Union Pacific Railroad (UPRR) Bridge over Mission Blvd., and replace the ramp connections to Kato Road that will be removed in the project's first phase remains unfounded. The Mission Blvd. Widening is particularly critical to improving traffic flow in the corridor.

Another project that is critical to improving traffic flow in the corridor is a grade separation of the UPRR tracks crossing Warren Avenue (Interchange Phase II – now a local project). Frequent train

blockages at the crossing will discourage local traffic from using Warren Avenue to travel to and from the new I-880 / Warren Avenue Interchange. This new interchange will be completed with Phase IA of the I-880 / Mission Blvd. Interchange. If local traffic can be diverted from Mission Blvd., Mission Blvd. can better serve interregional trips traveling between I-680 and I-880. Furthermore, if a grade separation is ever built at Mission Blvd. and Warm Springs Blvd., Warren Avenue will have to accommodate some of the movements that will be eliminated at the intersection as a result of the grade separation. The Warren Avenue grade separation allows BART to remain at grade over Warren Avenue and facilitates the construction of a Kato Road grade separation for BART by allowing traffic to be detoured to Warren Avenue while Kato Road is closed during the construction of the Kato Road grade separation.

The VTA, ACTIA and the City of Fremont are currently working to secure UPRR cooperation on a construction phasing plan to complete the I-880 / Mission Blvd. Interchange (Phase IB), and build the Warren Avenue grade separation. The railroad is seeking assurance that the two projects can be completed within a reasonable timeframe. The three agencies are working to develop a funding plan that can provide this assurance.

D3 – Extend Kato Road to Future Fremont Blvd.

The 2025 modeling scenario under which Kato Road is extended assumes Fremont Blvd. has already been constructed southerly to connect with Dixon Landing Road. Currently, however, Fremont Blvd. is not continuous, ending north of the proposed Kato Road extension. While the preliminary development of the Kato Road extension can begin as soon as funding is available, this project will require the construction of the Fremont Blvd. project.

At this time, it is recommended that the City of Fremont incorporate the Kato Road extension into the General Plan at the next opportunity, regardless of when the next project development steps are taken. It is understood that the current property owner is actively pursuing development opportunities with the City. Amending the General Plan now will reduce the amount of future impacts when the Kato Road extension project is constructed.

E1 – Widen Calaveras Blvd. to Six Lanes

This is one of the City of Milpitas' top projects and is included in VTA's transportation plan, VTP 2030. The project has significant local benefit, no regional constraints, and does not adversely affect the regional distribution of traffic. Therefore, this project could proceed immediately once funding is available.

F1 – Widen Montague Expressway to Eight Lanes

This project, which also has significant local benefit and no regionally adverse ramifications, proposes to keep the HOV lanes in the 8-lane configuration pending further evaluation. This project has been environmentally cleared, engineered to a 10% level, and can be pursued immediately upon identification of available funds. Should it be desired to add additional auxiliary lanes as considered in this Study (10-lane section in places), some additional development may be required to pursue funding.

Recommended Implementation

The following implementation approach reflects the above considerations. It is anticipated that overlap may occur between the recommended projects depending on the availability of funds and the progress of the projects. It is expected that the sponsoring agencies will coordinate with the stakeholders involved in this study when developing any of the recommended projects.

Parallel improvements, to the extent possible, should be pursued for both the northern and southern portions of the Study Area. This will introduce flexibility in the transportation network system and maintain balance in the system by not overloading any one portion of the Study Area.

Corridor A – Auto Mall Parkway

Proceed with the widening of Auto Mall Parkway. This project removes current bottlenecks and relieves existing spillover traffic in local neighborhoods providing independent utility. This project will also provide added capacity for traffic diversion expected during construction of other corridor improvements.

The next step for this project is to develop a PSR Equivalent document to allow programming of the project followed by the development of Preliminary Engineering and Environmental documents, as well as final design and construction.

Corridor B – Fremont Blvd. / Grimmer Blvd.

The next step for this project is to prepare a PSR to refine the alternatives and allow programming of the project. The PSR should be performed in coordination with the I-680 SMART Lane project. Following completion of the PSR, the PA/ED and construction phases would follow.

The development of the PSR in parallel with the implementation of the I-680 Smart lane project will allow coordination of the two projects, which will likely influence the Fremont Blvd./Grimmer Blvd. alternative selection. Equally important, it will enable the two projects to be compatible with each other in the future. This project addresses the HOV connection between I-680 and I-880 in the northern end of the Study Area.

Corridor C – Mission Blvd.

The first action should be to develop the Warren Avenue grade separation further to allow aggressive pursuit of funding. The Warren Avenue grade separation should be pursued within the window defined by the construction of the I-880/Mission Blvd. interchange improvements and the construction of the BART extension. Early completion, i.e., completing construction concurrently with the I-880/Mission Blvd. project, would be optimal as this project will greatly enhance the value of the I-880/Mission Blvd. interchange.

The second project that should be pursued on this corridor is the improvement of the I-680 interchange to accommodate the increased capacity afforded by the I-880 interchange project and the Warren Avenue grade separation. Finally, intersection improvements on Warm Springs Blvd. should be completed by the time the above projects are constructed.

The next formal developmental step is to prepare a PSR for the interchange improvements at I-680. It is anticipated the grade separation and related improvements west of Warm Springs Blvd. would progress independently from the development of the I-680 interchange improvements.

Corridor D – Kato Road

It is recommended the City of Fremont work with the developers of the property west of I-880 in this area to tie the extension of Kato Road to the extension of Fremont Blvd. The Kato Road extension should not be constructed prior to the Calaveras Blvd. widening to minimize the anticipated impacts to McCarthy Blvd. This project will connect east Fremont and northern Santa Clara County to west Fremont via a route other than I-680 and/or I-880.

Preparation of a PSR is the next step at this location to allow programming of the project and formally establish a project footprint. Following the PSR and the preparation and approval of Project Approvals and the Environmental Document, it is recommended right-of-way acquisition be pursued, even if final design and construction were to lag.

Corridor E – Calaveras Blvd.

The widening of Calaveras Blvd. can be pursued as quickly as possible. Comparable to the benefits of widening Auto Mall Parkway, described above, the Calaveras Blvd. improvements will remove current bottlenecks and relieve existing spillover traffic in local neighborhoods providing independent utility. This project will also provide added capacity for traffic diversion expected during construction of other corridor improvements.

The next step for this project is preparation of the PSR to allow programming of the project. Coordination with the BART to San Jose project, and any future BART station possibilities, should occur throughout the PSR and subsequent PA/ED, final design and construction phases.

Corridor F – Montague Expressway

The project stakeholders should pursue the widening of Montague Expressway at the earliest time funding is available. This project improves one of the most used cross connectors in the Study Area, and is the highest priority project on the County Expressway system. In addition to the planned improvements, development of Montague Expressway widening should continue to pursue improved HOV operations, especially at the interchanges with I-680 and I-880.

Longer Term Considerations

This study highlighted significant potential benefits of additional HOV connectivity between the two freeways. Upon completion of the I-880/Mission Blvd. Interchange; the Warren Avenue Grade Separation; the Auto Mall Parkway widening; and the Calaveras Blvd. widening; it is recommended that longer term projects such as HOV lanes on Calaveras Blvd. be re-assessed.

SUMMARY

The following projects should be pursued as soon as funding is available:

- Grade separate Warren Avenue/UPRR (Begin with the next level of design development.)
- Widen Auto Mall Parkway, Calaveras Blvd. and Montague Expressway (Initiate PSR or PSR equivalent processes leading to environmental documents to clear the projects.)
- Prepare a PSR for the Fremont Blvd./Grimmer Blvd. corridor.
- Prepare a PSR for the Kato Road extension.
- Prepare a PSR for the Mission Blvd./I-680 interchange improvements.

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APPENDICES

A - Location Maps

B - Corridor Base Maps

C - Alternative Options Summary Matrix

D - Conceptual Plans

E - Traffic Analysis Results

F - Environmental Screening Report

G - Conceptual Cost Estimates

H - Design Criteria

I - TAC / MSC / PAB Rosters

J - Brainstorming Summary Report (under separate cover)

K - Agency / Public Meetings

L - Structures Summary Data

M – Responses to Comments