SMART CORRIDOR
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SMART CORRIDOR STATEWIDE STUDY

A Final Report for the

State of California
Department of Transportation

jhk & associates

Kaku Associates

JUNE 1990

ACKNOWLEDGEMENTS

This report has been prepared by JHK & Associates under contract with the California State Department of Transportation, Contract 51J587, entitled "Statewide Smart Corridor Study". The project was completed with the assistance of numerous representatives of public agencies. JHK & Associates wishes to specifically acknowledge the assistance of the following:

Caltrans Contract Manager
Mr. Wayne Henley

Caltrans Project Director
Mr. Peter Anderson

Project Steering Committee
Mr. Robert Zimowski, Caltrans Headquarters
Mr. James McCrank,Caltrans District 4
Mr. Steve Leung, Caltrans District 7
Mr. Anson Nordby, City of Los Angeles
Mr. James Helmer, City of San Jose
Mr. Paul Maxwell, Metropolitan Transportation Commission
Ms. Diane Perrine, Los Angeles County Transportation Commission

Caltrans District Representatives
Ms. Joan Pontius, District 3
Ms. Carol Pearce, District 3
Mr. Goro Endo, District 7
Mr. Terry Hobson, District 8
Mr. Joel Haven, District 11
Mr. Don Juge, District 12

Consultant Team
JHK & Associates
Kaku Associates
Burns-Gunther Associates
Marcia Mednick & Associates

DISCLAIMER

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY GEORGE DEUKMEJIAN, Governor

DEPARTMENT OF TRANSPORTATION
OFFICE OF THE DIRECTOR
P. O. BOX 942873
SACRAMENTO, CA 94273-0001
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June 15, 1990

Members, California Legislature
State Capitol
Sacramento, CA 95814

Dear Members:

Pursuant to Chapter 1427, Statutes of 1988 (AB 1239-Moore), the Department is pleased to transmit the following report "Smart Corridor Statewide Study". The statute requires the Department to study the feasibility of and provide preliminary costs for the application of Smart Corridor technologies in the Los Angeles, San Diego, Sacramento, and San Francisco Bay Area regions. The requirement for the In-Vehicle Motorist Information and Navigation System Demonstration included in the statute is being reported concurrently by the Department in a separate document.

A Smart Corridor is a cooperative effort of state, regional, and local traffic agencies involved in congestion relief. The corridor is one in which all facilities, including freeways and surface streets, are managed to minimize traffic congestion. This will be accomplished by integrating a number of existing and new technologies into a comprehensive traffic management system.

The report describes the process that was used by the consulting team and steering committee to identify possible corridor candidates. Each corridor was evaluated and those that had major apparent deficiencies were eliminated. The report provides an analysis and estimated costs (initial and 10-year operations and maintenance) associated with each corridor, the estimated benefits derived from savings in delay, and a cost-benefit ratio for each identified corridor. Also, for each identified corridor, a location map, evaluation summary, and brief narrative are provided.

Friday, May 18, 1990, the report was reviewed by the Departmental Transportation Advisory Committee (DTAC). Their comments and concerns are identified in their letter, located in the appendix. DTAC's concerns must be addressed when an individual corridor is studied for potential

implementation. Their concerns, however, are generally outside the scope of this preliminary report on potential areas for future development. Any need for policy statements on corridor implementation may ultimately take the form of state-local cooperative agreements.

Sincerely,

ROBERT K. BEST
Director

Enclosure

SMART CORRIDOR STATEWIDE STUDY

FINAL REPORT

Prepared for the:

State of California
Department of Transportation

Prepared by:

JHK & Associates
Kaku Associates
Burns-Gunther Associates
Marcia Mednick & Associates

June, 1990

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EXECUTIVE SUMMARY

This report is prepared pursuant to Chapter 1427, Statutes of 1988 (AB 1239 - Moore), a copy of which is provided in Appendix A. The project was conducted by JHK & Associates under contract to the California State Department of Transportation, Contract 51J587 and is entitled "The Smart Corridor Statewide Study". The purpose of the project is to identify combined freeway and surface street corridors where significant congestion exists and where "Smart Corridor" concepts will prove cost effective in reducing the congestion.

SMART CORRIDOR CONCEPTS

A "Smart Corridor" is one in which an agency's control and response decisions are made in concert with the actions of the other agencies involved in handling traffic congestion. Typically the agencies will include the California Department of Transportation (Caltrans), the California Highway Patrol (CHP), local emergency services providers, and local transportation departments. In addition to these "active" operators of transportation facilities, the planning and implementation of Smart Corridors will require direct involvement of the county transportation commissions. In fact, the coordinated planning and response is expected to be a major benefit of implementing Smart Corridor features.

A Smart Corridor is also one in which all facilities, including freeways and surface streets, are used at their maximum efficiency during both normal periods of congestion and when an incident has occurred. This will normally involve freeway surveillance and control, ramp metering, improved traffic signal control, incident detection and response, motorist service patrols, and other traffic management features.

Finally, a Smart Corridor actively involves the motorist by providing drivers with the information needed to make intelligent decisions on the best route to travel, given existing traffic conditions. The information is to be timely and accurate so that the driver makes the correct choice when planning a trip and in real time while driving through the corridor. In some cases, the motorists may delay trips, cancel trips, or use alternatives to their normal route. Motorist information opportunities include commercial radio and television, changeable message signs, highway advisory radio, telephone call-in, computer bulletin boards, etc. They also include more sophisticated elements such as in-vehicle navigation systems, special television messaging, and dedicated in-vehicle radio signalling.

AREAS OF THE STATE THAT WERE STUDIED

Assembly Bill 1239 identified the Los Angeles, San Diego, Sacramento and San Francisco Bay Area regions of California as the areas to be studied. In the Los Angeles region this includes the urbanized portions of Los Angeles, Ventura, San Bernardino, Riverside, and Orange Counties. This corresponds to Caltrans Districts 7, 8, and 12. The San Diego region covers the urbanized areas of San Diego County and is within Caltrans District 11.

The Sacramento region concentrated on the immediate area around the City of Sacramento and is within Caltrans District 3. For the San Francisco Bay Area region, the urbanized portions of San Francisco, San Mateo, Santa Clara, Santa Cruz, Alameda, Contra Costa, Marin, Sonoma, and Napa Counties were included. These counties comprise District 4 of Caltrans.

All freeways in the six Caltrans Districts noted above (District 3, 4, 7, 8, 11, and 12) were reviewed to assess the level of congestion and opportunities for implementing Smart Corridor techniques.

BACKGROUND, THE LOS ANGELES DEMONSTRATION PROJECT

The conceptual design phase of the project in Los Angeles, known as the Smart Corridor Demonstration Project, preceded this study. The design and implementation phases are ongoing. The project in Los Angeles evaluated the traffic surveillance and control technologies, incident management procedures, opportunities for improved motorist information, and procedures for coordinating the actions of the various responsible agencies to minimize the delays to motorists.

The Demonstration Project included a 12.5 mile section of the Santa Monica Freeway in Los Angeles, 5 parallel surface streets, and approximately 17 connector streets that tie the freeway and surface street network together. The Smart Corridor Demonstration Project was a cooperative effort, involving Caltrans, the CHP, Los Angeles Department of Transportation, Los Angeles Police Department, and the Los Angeles County Transportation Commission. The Southern California Rapid Transit District and the Automobile Club of Southern California also participated in the project.

The Demonstration Project identified several technologies and procedures which can be used to more effectively manage traffic. The improvements involve all of the operating agencies working cooperatively to manage daily and incident based congestion. The improvements, although costly, are expected to return $24 to $32 Million in road user benefits annually.

The results of the conceptual design phase of the Demonstration Project indicated that there is promise for improving traffic conditions using advanced traffic management and motorist information systems. The benefits are gained through applying a broad range of techniques in a complimentary manner.

PROJECT APPROACH

The process for this Statewide Smart Corridor Study, then, examined the areas where congestion exists and reviewed opportunities for balancing traffic across the available network using the technologies and procedures recommended in the Demonstration Project in Los Angeles.

Exhibit ES-1 provides an overview of the process used to define the potential corridors. As shown on the exhibit, two types of activities were undertaken in completing the project. The consulting team activities are shown on the block diagram on the left of the exhibit.

The challenge of the project was to complete a comprehensive review of over 1,000 miles of freeways in the heavily travelled corridors in California's major urban areas and maintain a consistent approach in their evaluation. To assist in completing the project quickly, the work was segmented into three regions: one covering the Sacramento and San Francisco Bay Area (Caltrans Districts 3 and 4); a second covering the more urbanized areas of Los Angeles, Ventura, San Bernardino and Riverside Counties (Caltrans Districts 7 and 8); and a third covering San Diego

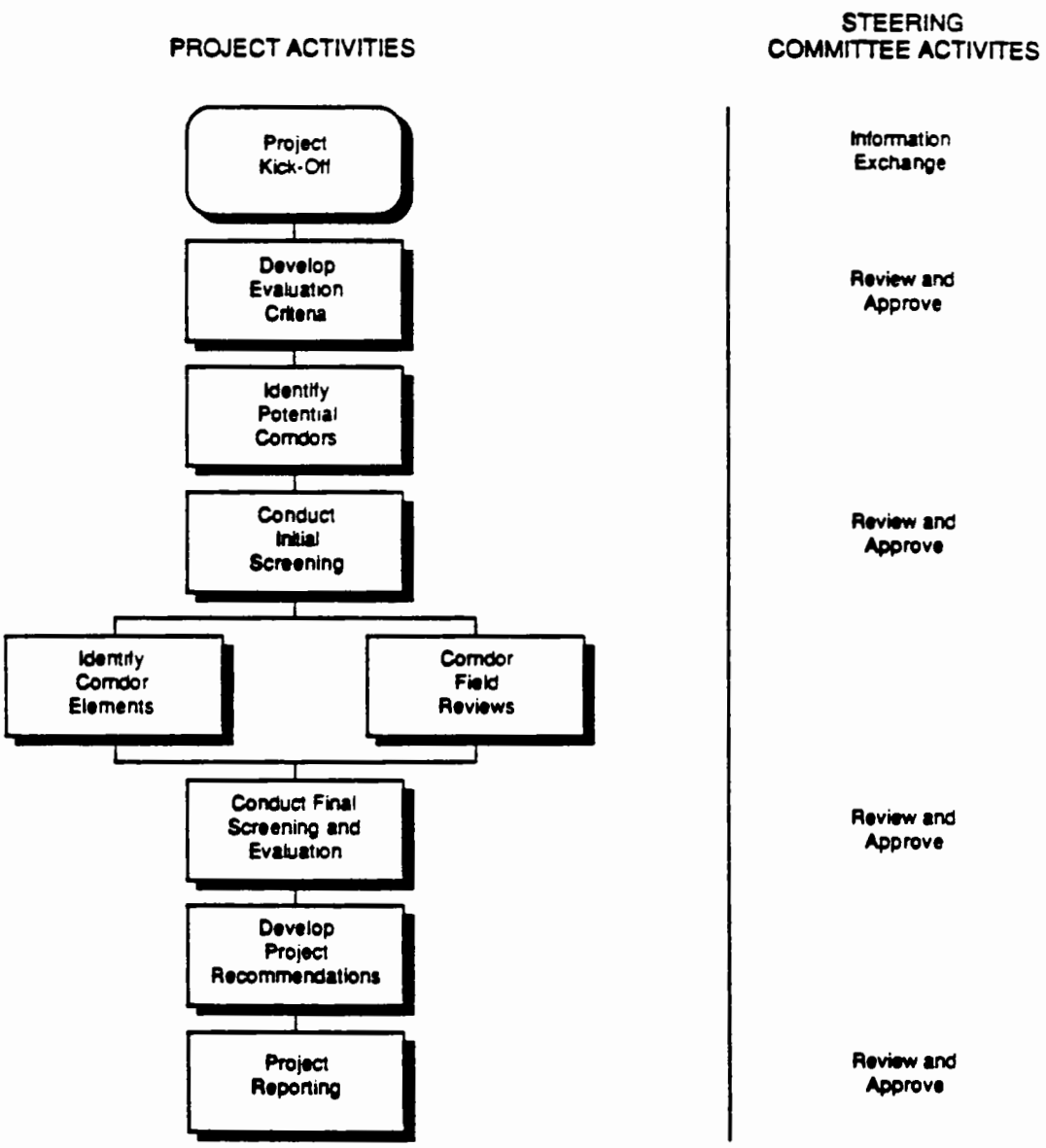

Exhibit ES-1

Overview of Project Activities

jhk & associates

and Orange Counties (Caltrans Districts 11 and 12). Region team leaders and technical staff were assigned to each region.

The teams for each of the three regions proceeded in parallel through the activities to points where major review was required. The regional leaders were then brought together, along with the Steering Committee, to insure that uniform approaches were being used. The entire team was also brought together to develop the overall program recommendations.

Consultant activities were initiated by a workshop with the Steering Committee and the development of corridor evaluation criteria. Potential corridors were then defined through a review of available data and through meetings with various representatives of the districts and local agencies. This was followed by an initial screening of the corridors.

After approval of the corridors, a more detailed evaluation was undertaken. This included estimating costs and benefits for applying Smart Corridor technologies in the corridors and corridor "drive throughs" to examine all alternate routes for environmental and land use compatibility. The corridors were then ranked to develop a program from the candidate projects.

A second set of activities were those undertaken by the Steering Committee appointed for this project. The committee included a representative of the Caltrans Headquarters office, selected Caltrans District staff, representatives from two transportation commissions, and representatives from two major cities that might be involved in future programs.

The committee served the strong role of providing a broad spectrum review of the consultant activities. The committee provided immediate feedback on the interim products of the study, as well as providing the needed perspective of several types of agencies that might ultimately be involved in a Statewide Smart Corridor program. Specific input from the committee was provided at the beginning of the project; after the corridor selection criteria were developed; when the initial corridor identification and screening was completed; after the final corridors were identified; and by reviewing the Draft Final Report for the project. Their assistance was an invaluable element in completing the project in the short time period available.

PROJECT CONCLUSIONS

The following represent the overall conclusions of the consultant team. In general, these conclusions have been reviewed and concurred in by the Steering Committee for the project. It is important to note that the conclusions are based primarily on existing conditions, modified to reflect known construction projects. Conclusions will need to be tempered by latest information as the projects move toward implementation, particularly in light of potential changes in funding programs.

Corridor Opportunities

There are several corridors throughout the State that will benefit from the application of Smart Corridor technologies. Exhibit ES-2 presents a summary of the analysis of potential corridors. As shown on the exhibit, over 120 corridors were initially considered and 39 were identified for final consideration. Of the 39, 16

Exhibit ES-2

CORRIDOR ANALYSIS SUMMARY

Caltrans District	Corridors Identified	Eliminated Initial Screening	Eliminated Final Screening	Program Categories				
				Corridors Final Evaluation *	Category 1	Category 2	Category 3 (Future)	Traffic Operations Centers
3 - Sacramento	7	4	0	3	0	1	2	1
4 - SF Bay Area	28	13	5	9	4	2	3	1
7 - Los Angeles	48	22	6	17	8	6	3	1
8 - San Bernardino/ Riverside	14	12	0	2	1	0	1	1
11 - San Diego	13	7	3	2	1	0	1	1
12 - Orange County	13	2	0	6	2	2	2	1
Totals	123	60	14	39	16	11	12	6

* Includes several corridors which were combined so totals do not match across to "Corridors Identified".

NOTES:

1. Category 1 Projects show a benefit cost ratio of over 3 to 1 and were in the top one-half of all corridors using the criteria and corridor scoring process.

2. Category 2 Projects show a benefit cost ratio between 1 to 1 and 3 to 1.

3. Category 3 Projects do not show a positive benefit cost ratio under current conditions but offer promise in the future as travel growth continues in the corridors.

offer the highest benefit/cost ratios and corridor rating (Category 1 with benefit/cost ratios over 3 to 1). An additional 11 offer positive benefit/cost under existing conditions and will be significantly more effective by the time they could be implemented, given normal travel growth (Category 2 with benefit/cost ratios between 1 to 1 and 3 to 1). The remaining 12 (Category 3, benefit/cost ratios less than 1 to 1) do not warrant immediate implementation, however, they are good candidates for future implementation.

As a final note regarding Exhibit ES-2, traffic operations centers, or TOC's, are shown for each of the districts. This reflects the fact that a traffic operations system (TOS)* uses the TOC to control the features in the field and to provide a center for coordinating responses to congestion. For Smart Corridor elements of a TOS to function, it is necessary for the "building block" of a TOC to be in place. All Caltrans districts covered by this project are in the process of implementing or upgrading a TOC, however, they are not funded for full implementation. Given this, the TOC's are shown for completeness.

Program Summary

Exhibit ES-3 provides a cost summary for the Statewide Smart Corridor program. Projects which offer immediate promise require an implementation program of approximately $414 Million.** In addition, the implemented projects would require a commitment to operations and maintenance. Simply, Smart Corridor applications of TOS/TOC components require active, continuing management of traffic and this requires resources. As shown on the exhibit, the ten year operations and maintenance costs for the immediate program are estimated at approximately $439 Million, exceeding the initial implementation costs.

At the same time, the project in Categories 1 and 2 are estimated to return a benefit of over $3.5 Billion in the ten year period. When compared to the total ten year costs of the corridors, an overall benefit/cost ratio of over 4 to 1 results. This is a conservative estimate of the returns which may be expected.

Although the Category 3 corridors also indicate an overall positive benefit/cost, this is caused by a single corridor that was moved into this category because of programmed construction. Without the one corridor, the net benefit/cost for this category is less than 1 to 1. It is important to note, however, that congestion is increasing in the corridors and they are likely to be warranted in the near future. With all categories considered, an implementation cost of $583 Million is estimated. This would result in a need for a 10 year operations and maintenance budget of $614 Million.

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* In all cases, the overall goal is to consider a coordinated traffic operations system or TOS. The TOC is the center through which operations of a TOS occurs. Generally, TOS/TOC is used together to describe the "system".

** All costs in 1990 dollars.

PROGRAM COST SUMMARY

	Capital and Implementation Costs (Costs in $ Millions)	Operations and Maintenance Costs (Costs in $ Millions)	10 Year Benefit (In $ Millions)
Traffic Operations Center	$24	$46	N/A
Category 1 Projects	$247	$243	$3,053
Category 2 Projects	$143	$150	$504
Subtotal Immediate Projects	$414	$439	$3,557
Category 3 (Future) Projects	$169	$175	$137
Total Program	$583	$614	$3,694
TOTAL 10 YEAR PROGRAM COST		**$1,197**	

NOTES:

1. Category 1 Projects show a benefit cost ratio of over 3 to 1 and were in the top one-half of all corridors using the criteria and corridor scoring process.

2. Category 2 Projects show a benefit cost ratio between 1 to 1 and 3 to 1.

3. Category 3 Projects do not show a positive benefit cost ratio under current conditions but offer promise in the future as travel growth continues in the corridors.

4. All costs are expressed in 1990 dollars.

5. Category 3 benefits do not include corridor 12-1.

A further breakdown of the corridors, showing their costs, benefits, and scoring is given on Exhibit ES-4. The District and Corridor reference numbers relate to segments shown on summary maps for each district. These maps are given as Exhibits ES-5 through ES-10. One map is provided for each district. The maps indicate all corridors considered, those eliminated in initial screening, those eliminated in final screening, and the corridor number and category rating of those corridors included in the final recommendations.

Agency Involvement

Another essential feature of the Smart Corridor concept is the cooperative response of all involved agencies. The technology applied to the problems will be of limited value if the agencies do not use it effectively. This means that a strong commitment of agencies such as Caltrans, the CHP, and local agencies is required if the program is to be successful.

A strong leadership role is required at the highest levels of the State and at each of the involved agencies to insure that the people responding at the operations level understand the mandate for cooperative problem solving. Simultaneously, a team spirit must be developed from the ground up to insure that the operations staff view the Smart Corridor program as assisting them in their mission of minimizing traffic congestion.

This commitment at all levels is evidenced by the emphasis being given to alleviating urban congestion in California. The Demonstration Project, and projects which may result through this Statewide study, are setting the stage for longer term intelligent vehicle and highway systems (IVHS) programs.

RANKING OF CORRIDORS BY CATEGORY

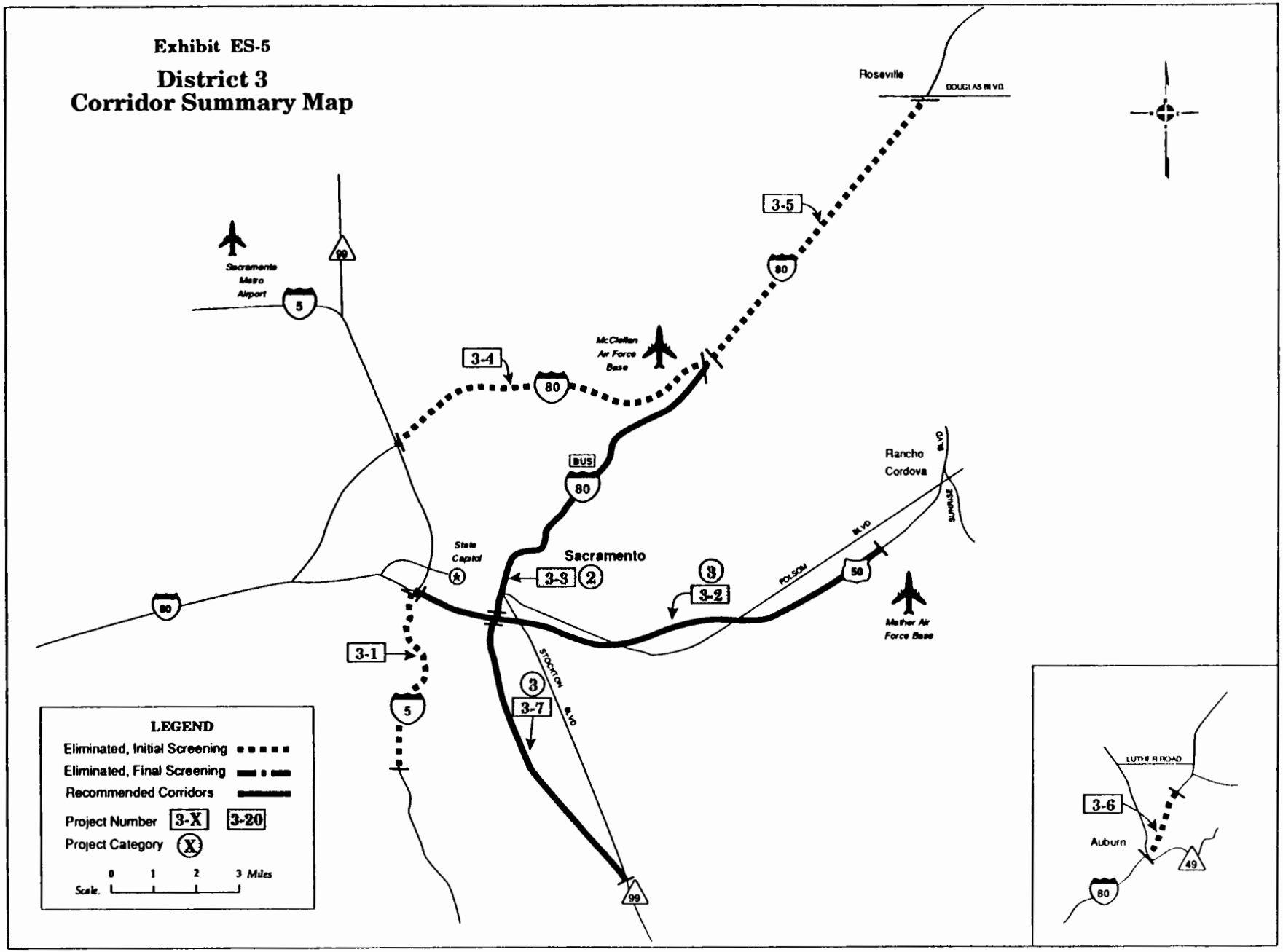
Exhibit ES-4

District				Initial Cost	10 Year O&M Cost	
TRAFFIC OPERATIONS CENTER COSTS						
3 - Sacramento				$2,308,500	$4,408,400	
4 - San Francisco Bay Area				$5,182,650	$10,332,400	
7 - Los Angeles				$5,304,150	$10,440,400	
8 - San Bernardino / Riverside				$2,308,500	$4,408,400	
11 - San Diego				$3,469,400	$6,160,400	
12 - Orange County				$5,000,400	$10,230,400	
Total TOC Costs				$23,573,600	$45,980,400	
Total Category Costs (1,2, & 3)				$559,283,744	$568,178,714	
Total Program Costs				$582,857,344	$614,159,114	
District/ Corridor	Description	B/C Ratio	Score	Initial Cost	10 Year O&M Cost	Annual Benefit
CATEGORY 1						
7 - 38	I-405 between I-110 and I-10	9.94	714	$17,443,904	$18,559,819	$35,773,200
4 - 15	Route 980 / 580 between Route 880 and Powell Street	9.01	783	$11,378,803	$10,771,306	$19,951,200
7 - 4	I-5 between I-605 & Route 60	8.96	766	$11,771,473	$12,289,720	$21,556,800
7 - 2b	Route 60 between I-5 & I-605	8.45	621	$11,043,590	$13,777,898	$20,977,200
7 - 40	I-405 between I-10 and US 101	8.27	721	$8,827,579	$11,391,877	$16,717,680
12 - 8	I-405 from Route 22 to I-5	8.06	668	$20,670,005	$21,707,850	$34,142,400
4 - 1	Route 101 between Blossom Hill Road and Route 237	7.75	606	$23,624,773	$20,342,946	$34,066,800
4 - 17	Route 80 between Powell Street and San Pablo Avenue	7.67	567	$8,858,819	$8,375,181	$13,212,000
11 - 2	I-8 from I-5 to I-15	5.71	711	$19,306,811	$17,590,421	$21,056,400
7 - 20	Route 91 between I-110 and Beach Boulevard	5.04	614	$16,656,839	$17,014,675	$16,984,800
4 - 22	Route 280 between Magdalena Avenue and Route 101	4.33	502	$24,535,076	$19,314,517	$18,997,200
7 - 27	I-110 between I-405 and I-10	3.93	731	$14,344,533	$14,788,942	$11,448,000
7 - 22	US 101 between Valley Circle Boulevard and I-5	3.88	784	$18,970,566	$18,882,103	$14,688,000
8 - 10	Route 91 between Maple Street & La Sierra Avenue	3.62	562	$7,631,399	$9,589,619	$6,231,600
12 - 4	Route 55 from I-405 to Route 91	3.41	600	$12,698,946	$13,459,805	$8,917,200
7 - 1	I-5, I-10, US 101 and I-110 (Downtown Los Angeles Ring)	3.03	610	$19,437,321	$15,425,355	$10,564,800
Total Category 1				$247,200,437	$243,282,034	$305,285,280

District/ Corridor	Description	B/C Ratio	Score	Initial Cost	10 Year O&M Cost	Annual Benefit
CATEGORY 2						
12 - 3	Route 22 from I-405 to Route 55	2.42	726	$12,800,108	$16,045,890	$6,991,200
7 - 21	US 101 between I-110 and Route 134	2.33	763	$12,797,669	$12,208,457	$5,819,400
7 - 34	I-210 between Route 134 and Route 30	2.23	468	$14,006,074	$14,054,519	$6,246,000
12 - 6	Route 91 from Imperial Highway to Beach Boulevard	2 04	585	$14,422,019	$16,625,315	$6,332,400
7 - 2a	I-10 between I-5 and I-605	1.70	530	$14,154,993	$15,230,686	$4,996,800
4 - 12	Route 880 between Route 237 and Decato Road	1.56	427	$12,794,176	$13,926,589	$4,161,600
4 - 13	Route 880 between Decato Road and Route 238	1.46	389	$12,434,671	$12,284,635	$3,614,400
7 - 43	I-605 between I-405 and I-5	1.45	484	$13,687,400	$14,278,125	$4,048,200
3 - 3	Route 51 between Route 50 and Route 80	1.42	426	$10,243,741	$10,911,913	$2,995,200
7 - 37	I 405 between I-605 and I-110	1.03	675	$15,722,016	$15,053,053	$3,178,800
7 - 6	I-5 between Route 110 and Route 134	1.03	516	$9,529,434	$9,561,479	$1,972,800
Total Category 2				$142,592,301	$150,180,661	$50,356,800
CATEGORY 3			(Future Projects)			
12 - 1	I-5 from Oso Parkway to Euclid	5.39	656	$21,787,680	$28,198,820	NA
7 - 44	I-605 between I-5 and I-10	0.90	498	$11,573,058	$13,074,822	$2,214,000
4 - 3	Route 99 between Route 237 and Route 92	0.83	307	$20,956,871	$20,442,573	$3,432,600
7 - 18	Route 60 between I-605 and Route 71	0.68	497	$14,052,665	$15,878,578	$1,976,400
7 - 41	I-405 between US 101 and I-5	0.63	468	$10,333,471	$10,335,639	$1,303,200
12 - 5	Route 57 from I-5 to Route 90	0.51	550	$11,139,046	$11,513,303	$1,144,800
8 - 1	I-10 between San Bernardino/ L.A. County Line & I-15	0.34	447	$10,191,041	$11,678,435	$741,600
4 - 14	Route 880 between Route 238 and Route 980	0.27	482	$13,362,171	$13,304,231	$720,000
3 - 2	Route 50 between I-5 and Mather Field Road	0.22	378	$13,808,828	$13,284,432	$595,800
11 - 7	I-5 from I-15 to I-8	0.21	476	$10,197,835	$9,907,492	$423,000
3 - 7	Route 99 between Stockton Boulevard and Route 50	0.21	445	$10,098,491	$9,325,391	$417,600
4 - 11	Route 17 / 880 between Lark Avenue and Route 237	0.20	448	$21,989,849	$17,772,303	$792,000
Total Category 3				$169,491,006	$174,716,019	$13,761,000

Exhibit ES-5

District 3
Corridor Summary Map



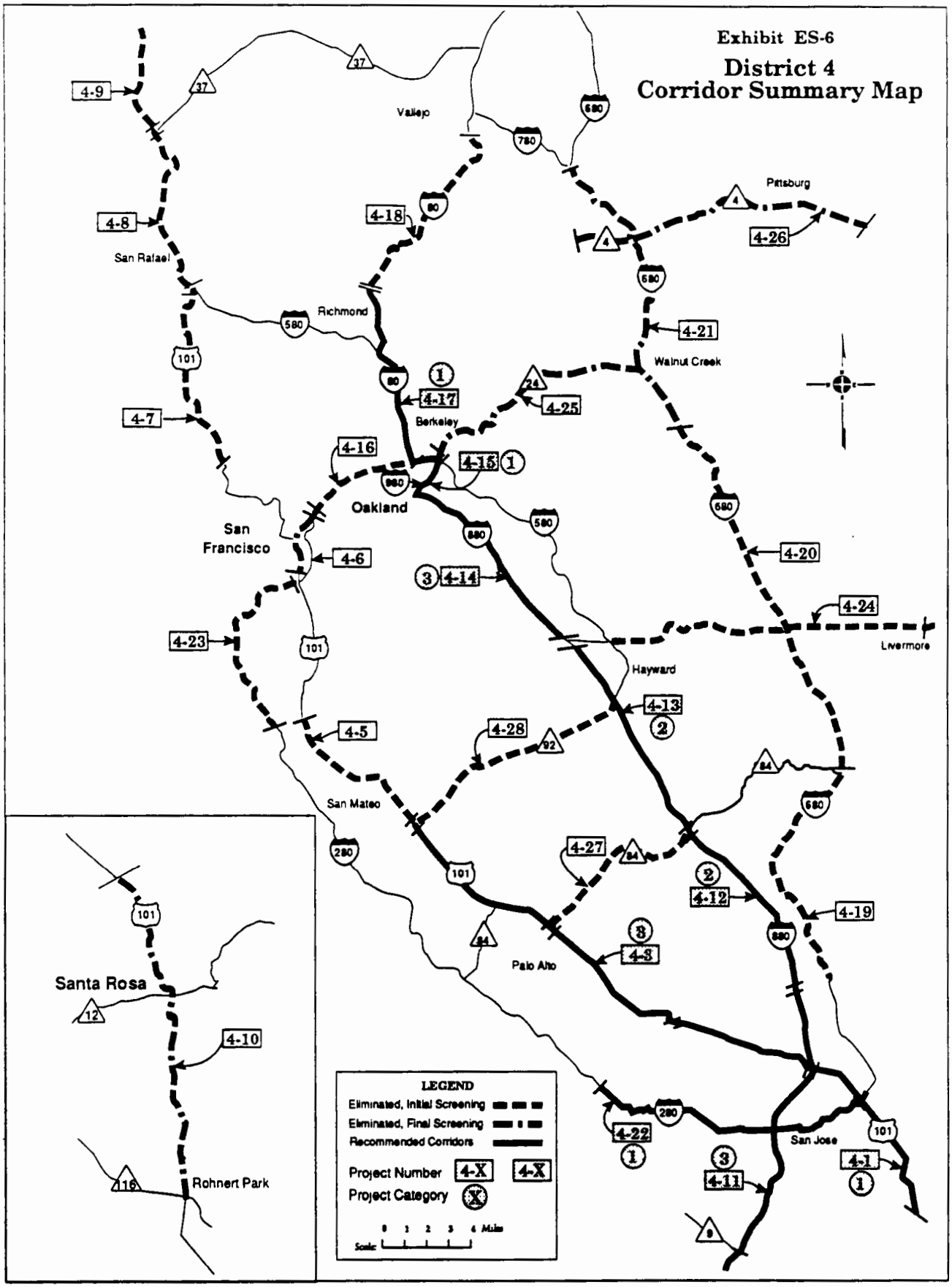


Exhibit ES-6
District 4
Corridor Summary Map
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Palo Alto
Hayward
Walnut Creek
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Livermore
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Project Category X
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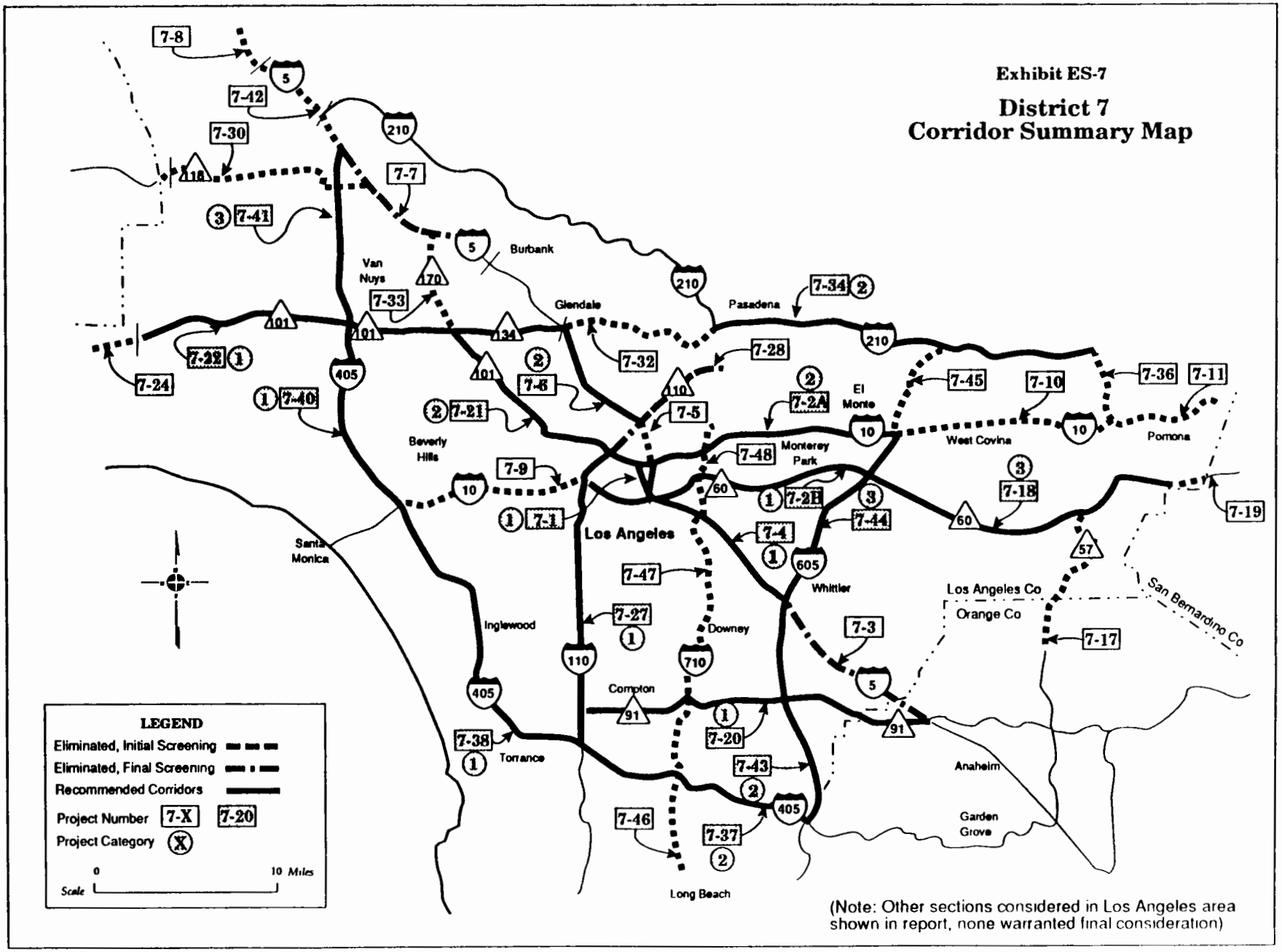
Exhibit ES-7
District 7
Corridor Summary Map
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Van Nuys
Glendale
Pasadena
El Monte
West Covina
Pomona
Beverly Hills
Monterey Park
Los Angeles
Santa Monica
Inglewood
Downey
Whittier
Compton
Torrance
Anaheim
Garden Grove
Long Beach
Los Angeles Co
Orange Co
San Bernardino Co
LEGEND
Eliminated, Initial Screening
Eliminated, Final Screening
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(Note: Other sections considered in Los Angeles area shown in report, none warranted final consideration)

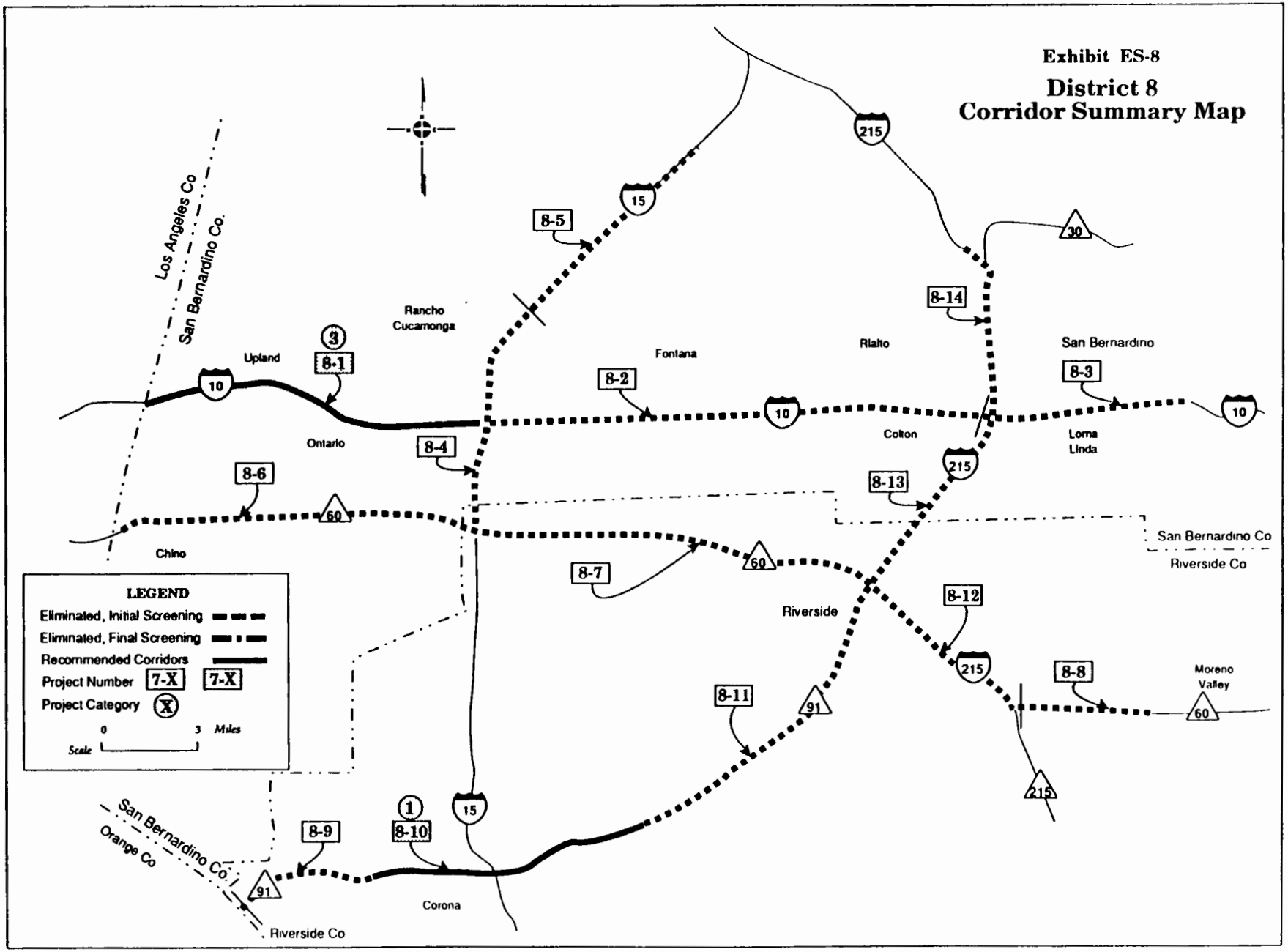
Exhibit ES-8
District 8
Corridor Summary Map
LEGEND
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Loma Linda
Chino
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Riverside Co
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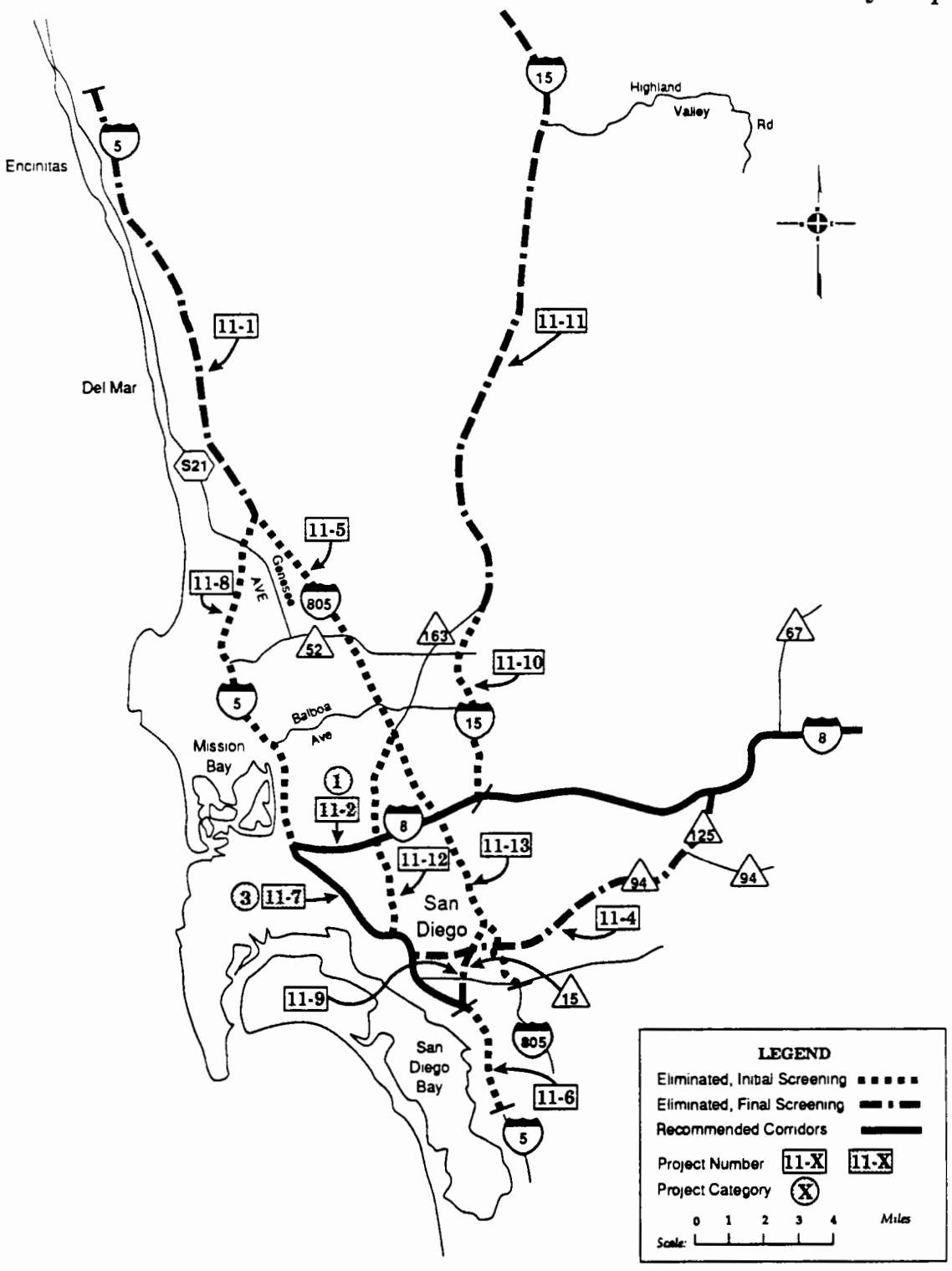
8-9
8-10
8-11
8-12
8-13
8-14
10
15
30
60
91
215

Exhibit ES-9

District 11
Corridor Summary Map



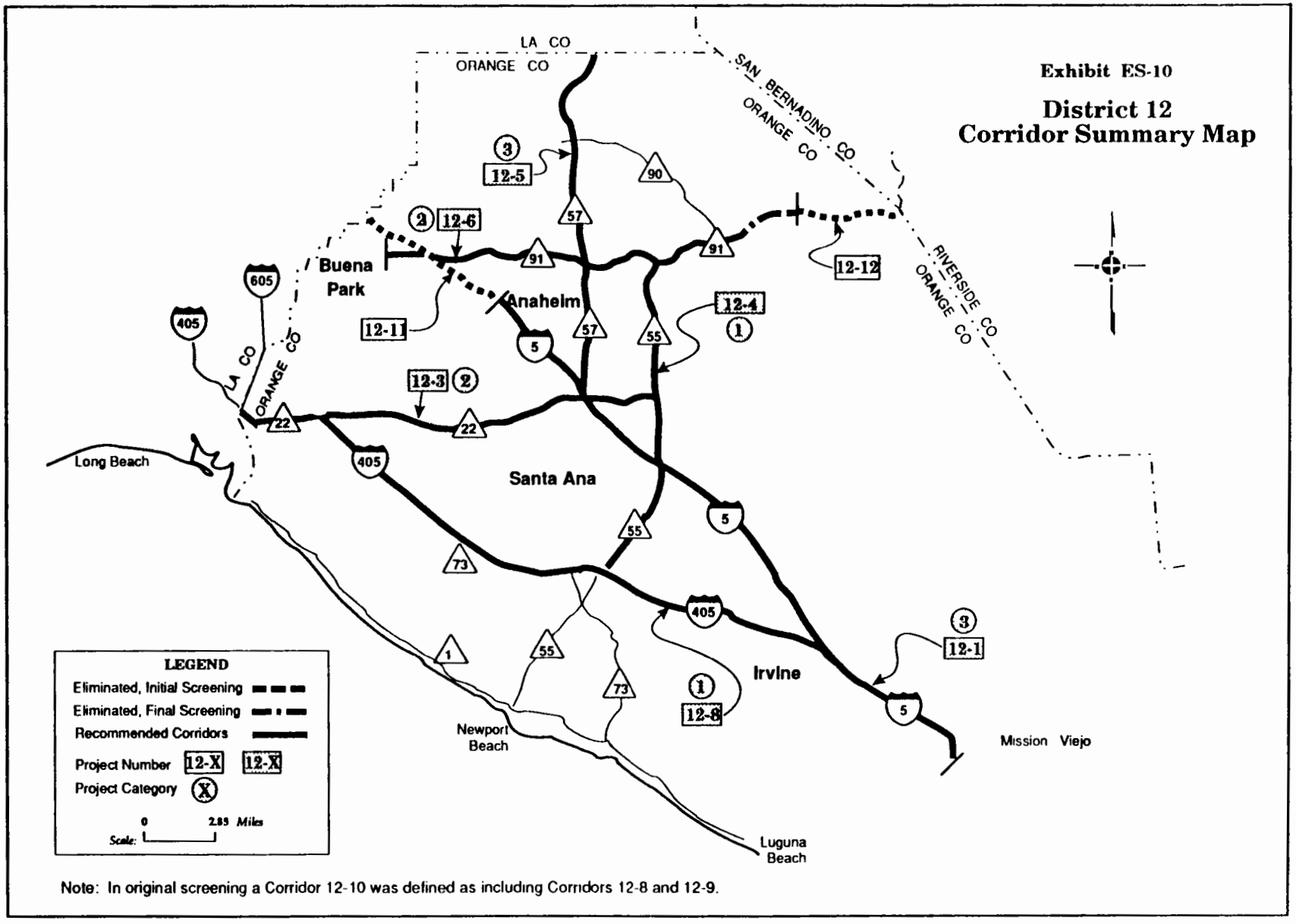


Exhibit ES-10
District 12
Corridor Summary Map
LA CO
ORANGE CO
SAN BERNADINO CO
ORANGE CO
RIVERSIDE CO
ORANGE CO
LA CO
ORANGE CO
Buena Park
Anaheim
Santa Ana
Irvine
Long Beach
Newport Beach
Mission Viejo
Luguna Beach
3 12-5
2 12-6
12-11
12-12
12-4 1
12-3 2
3 12-1
1 12-8
LEGEND
Eliminated, Initial Screening
Eliminated, Final Screening
Recommended Corridors
Project Number 12-X 12-X
Project Category X
0 2.85 Miles
Scale:
Note: In original screening a Corridor 12-10 was defined as including Corridors 12-8 and 12-9.

1. INTRODUCTION

This report presents the results of the Statewide Smart Corridor Study conducted by JHK & Associates under contract to the California Department of This report is prepared pursuant to Chapter 1427, Statutes of 1988 (AB 1239-Moore). A copy of the legislation is provided in Appendix A. This bill authorized the use of Petroleum Violation Escrow Account (PVEA) funds to assist in the development and implementation of "Smart Corridor" concepts on the Santa Monica Freeway and parallel surface streets in Los Angeles and mandated this study to determine the applicability of identified technologies to other urban areas in California.

A "Smart Corridor" is one in which an agency's control and response decisions are made in concert with the actions of the other agencies involved in handling traffic congestion. Typically the agencies will include the California Department of Transportation (Caltrans), the California Highway Patrol (CHP), local emergency services providers, and local transportation departments. In addition to these "active" operators of transportation facilities, the planning and implementation of Smart Corridors will require direct involvement of the county transportation commissions. In fact, the coordinated planning and response is expected to be a major benefit of implementing Smart Corridor features.

A Smart Corridor is also one in which all facilities, including freeways and surface streets, are used at their maximum efficiency during both normal periods of congestion and when an incident has occurred. This will normally involve freeway surveillance and control, ramp metering, improved traffic signal control, incident detection and response, motorist service patrols, and other traffic management features.

Finally, a Smart Corridor actively involves the motorist by providing drivers with the information needed to make intelligent decisions on the best route to travel, given existing traffic conditions. The information is to be timely and accurate so that the driver makes the correct choice when planning a trip and in real time while driving through the corridor. In some cases, the motorists may delay trips, cancel trips, or use alternatives to their normal route. Motorist information opportunities include commercial radio and television, changeable message signs,

highway advisory radio, telephone call-in, computer bulletin boards, etc. They also include more sophisticated elements such as in-vehicle navigation systems, special television messaging, and dedicated in-vehicle radio signalling.

AREAS OF THE STATE THAT WERE STUDIED

Assembly Bill 1239 identified the Los Angeles, San Diego, Sacramento and San Francisco Bay Area regions of California as the areas to be studied. In the Los Angeles region this included the urbanized portions of Los Angeles, Ventura, San Bernardino, Riverside, and Orange Counties. This corresponds to Caltrans Districts 7, 8, and 12. The San Diego region covered the urbanized areas of San Diego County and corresponded to Caltrans District 11.

The Sacramento region concentrated on the immediate area around the City of Sacramento and corresponds to Caltrans District 3. For the San Francisco Bay Area region, the urbanized portions of San Francisco, San Mateo, Santa Clara, Santa Cruz, Alameda, Contra Costa, Marin, Sonoma, and Napa Counties were included. These counties comprise District 4 of Caltrans.

All freeways in the six Caltrans Districts noted above (District 3, 4, 7, 8, 11, and 12) were reviewed to assess the level of congestion and opportunities for implementing Smart Corridor techniques.

BACKGROUND, THE LOS ANGELES DEMONSTRATION PROJECT

The conceptual design phase of the project in Los Angeles, known as the Smart Corridor Demonstration Project, preceded this study. The design and implementation phases are on-going. The project in Los Angeles evaluated the traffic surveillance and control technologies, incident management procedures, opportunities for improved motorist information, and procedures for coordinating the actions of the various responsible agencies to minimize the delays to motorists. The project examined a 12.5 mile section of the Santa Monica Freeway (Interstate 10) from the central business district of Los Angeles westerly to Santa Monica. This section, with daily traffic volumes as high as 310,000, is one of the most heavily travelled highways in the world.

The Demonstration Project also includes 5 parallel surface streets and approximately 17 connector streets that tie the freeway and surface street network together. The five parallel streets provide significant capacity, generally having 2 to 4 lanes in each direction of travel. The streets also are generally covered by peak hour parking restrictions, providing added capacity during these periods.

The Smart Corridor Demonstration Project was a cooperative effort, involving Caltrans, the CHP, Los Angeles Department of Transportation, Los Angeles Police Department, and the Los Angeles County Transportation Commission. The Southern California Rapid Transit District and the Automobile Club of Southern California also participated in the project.

The Demonstration Project identified several technologies and procedures which could be used to more effectively manage traffic. These are summarized on Exhibit 1-1, duplicated from the final report for the Demonstration Project. An overall improvement program totalling $50 Million was recommended by the project. The expected benefits from the Demonstration Project are summarized on Exhibit 1-2, also extracted from the final report.

As can be seen from the exhibits, a comprehensive set of improvements was identified. The improvements involve all of the operating agencies working cooperatively to manage daily and incident based congestion. The improvements, although costly, are expected to return $24 to $32 Million in road user benefits annually. This is a significant return given the initial cost.

Given the results of the conceptual design phase of the Demonstration Project, there is promise for improving traffic conditions using advanced traffic management and motorist information systems. The benefits are gained through applying a broad range of techniques in a complimentary manner. That is, essentially all features are needed to facilitate the close coordination of the agencies, to allow for response plans to be quickly implemented, and to provide the motorists with the timely information needed for intelligent decision making.

The process for this Statewide Smart Corridor Study, then, examined the areas where congestion exists and reviewed opportunities for balancing traffic across the available network using the technologies and procedures recommended in the Demonstration Project.

Exhibit 1-1

BASIC SYSTEM FUNCTIONS OF THE SMART CORRIDOR DEMONSTRATION PROJECT

SMART CORRIDOR SYSTEM (Smart Corridor Team Members)

- Operations Plans
- Decision Matrix/Expert System
- Public Information Elements

LOS ANGELES DEPARTMENT OF TRANSPORTATION (LADOT)

- Traffic Signal Control
- Surface Street Changeable Message Signs (CMS)
- Surface Street Highway Advisory Radio (HAR)
- Expert System for ATSAC System
- Surface Street Closed Circuit Television (CCTV)
- Surface Street Incident Response Team
- Traffic Engineering Improvements
- Intersection and Parking Control
- LADOT Communications Network
- Cooperative Public Information with Caltrans and CHP
- Operations Planning

CALTRANS

- Freeway Surveillance
- Ramp Metering
- Expert System for Caltrans
- Connector Metering
- Freeway Changeable Message Signs (CMS)
- Freeway Highway Advisory Radio (HAR)
- Freeway Closed Circuit Television (CCTV)
- Freeway Major Incident Management Team
- Caltrans Communications Network
- Accident/Enforcement Site Development
- Motorist Information System
  - FM/SCA Digital Radio
  - Teletext
  - Pathfinder
  - Cooperative Public Information with CHP and LADOT
- Central Database System
  - Dial-in Telephone
  - Computer Bulletin Board
  - Commercial Radio (feed through CHP system)
  - Commercial Television (video and graphics)
- Operations Planning
- Central Database System
- Smart Corridor Expert System and Decision Matrix

CALIFORNIA HIGHWAY PATROL

- Call Boxes
- Tow/Patrol Services
- Cellular Traffic Call-in
- Cooperative Public Information with Caltrans and LADOT
- Commercial Radio System Feed

LOS ANGELES COUNTY TRANSPORTATION COMMISSION

- Public Information Program
- Project Evaluation

Source: Smart Corridor Demonstration Project Conceptual Design Study, "Final Report", JHK & Associates, October, 1989.

Exhibit 1-2

SUMMARY OF SMART CORRIDOR DEMONSTRATION PROJECT IMPACTS

Overall Corridor Impacts

- Total travel time will be reduced by approximately 3.8 to 5.2 million vehicle hours per year (11 - 15%). Fuel consumption will decrease by approximately 1.3 million gallons per year (2.5%).
- Vehicle emissions will generally decrease; hydrocarbons: 300,000 kgs/yr (8%); carbon monoxide: 4 million kgs/yr (15%); nitrous oxides: little or no change.
- Intersection delay will be reduced nearly 2 million vehicle hours/yr (20%).
- The number of vehicles stopping at intersections will decrease by approximately 35%.
- Annual savings due to reduced travel time and fuel consumption will reach approximately $24-32.5 million.*

Individual Driver Impacts

- Average freeway speeds during peak commute periods will increase from 15-35 mph to 40-50 mph.
- The occurance of recurring stop-and-go freeway conditions will decrease substantially.
- The average freeway trip duration will decrease by nearly 12%.
- Average surface street speeds during peak commute periods will increase from 20 mph to 22 mph (11%).
- The average surface street trip duration will decrease by nearly 13%.

* Cost savings based on fuel costs of $1.00 gallon and time costs of $6.00/vehicle-hour. (Caltrans is currently using $8.00 per vehicle hour.)

Source: Smart Corridor Demonstration Project Conceptual Design Study, "Final Report", JHK & Associates, October, 1989.

ORGANIZATION OF THIS REPORT

In addition to these introductory comments, the report contains the following sections.

2. **Process Description**

   This section provides an overview of the process used by the consulting team and the project Steering Committee to complete the study.

3. **Analysis of Corridors**

   Included in this section are discussions of the corridors identified for consideration, a summary of those corridors that did not pass the screening processes, and a corridor by corridor review of those considered in the final program. For each final corridor, a location map, evaluation summary, and brief narrative are provided. The section is organized by Caltrans district.

4. **Program Recommendations**

   In this section, recommendations for the overall Statewide Smart Corridor program are provided. Corridors are grouped by priority, based primarily on the results of the evaluation matrices included in Section 3 and the relative benefit/cost ratios of the corridors. Costs are presented by priority category and for the overall program.

Appendices

Appendix material is provided covering the enabling legislation, the corridor rating process, and the costs for each corridor.

2. PROCESS DESCRIPTION

The project scope dictated an objective, consistent examination of potential corridors throughout the State. The identification and evaluation also needed to consider the significant variety of factors involved in applying improved traffic management and motorist information. Several of the factors are measureable, such as existing congestion, others are more judgmental, such as the impacts the project may have on existing land use. Given the magnitude of the potential projects, the process also needed to quickly identify those which should receive final consideration. Exhibit 2-1 provides an overview of the process used to define the recommended projects.

PROJECT APPROACH

As shown on the exhibit, there were two types of activities undertaken in completing the project. The activities undertaken by the consulting team are shown on the block diagram on the left of the exhibit and these activities are described below. A second set of activities were those undertaken by the Steering Committee appointed for this project. The members of the Steering Committee are shown on Exhibit 2-2. As can be seen, the committee included a representative of the Caltrans Headquarters office, selected Caltrans District staff, representatives from two transportation commissions, and representatives from two major cities that might be involved in future programs.

The committee served the strong role of providing a broad spectrum review of the consultant activities. The committee provided immediate feedback on the interim products of the study, as well as providing the needed perspective of several types of agencies that might ultimately be involved in a Statewide Smart Corridor program. Specific input from the committee was provided at the beginning of the project, after the corridor selection criteria were developed, when the initial corridor identification and screening was completed, after the final corridors were identified, and by reviewing the Final Report for the project. Their assistance was an invaluable element in completing the project in the short time period available.

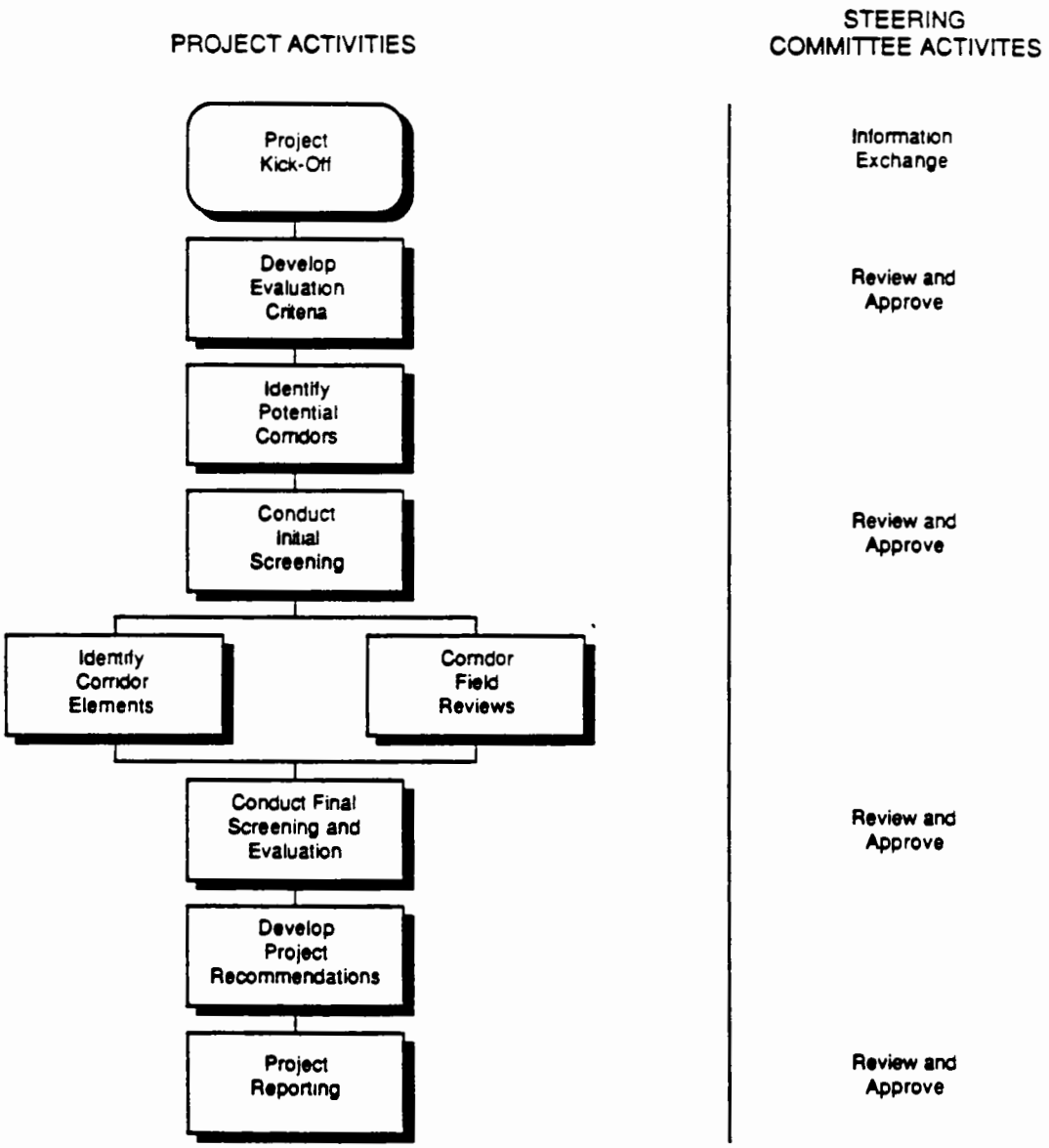


Exhibit 2.1

Overview of Project Activities

jhk & associates

Exhibit 2-2

STEERING COMMITTEE MEMBERS

NAME	AGENCY
Robert Zimowski	Caltrans Headquarters
James McCrank	Caltrans District 4
Steven Leung	Caltrans District 7
Anson Nordby	City of Los Angeles
James Helmer	City of San Jose
Paul Maxwell	Metropolitan Transportation Commission
Dianne Perrine	Los Angeles County Transportation Commission

CONSULTANT ACTIVITIES

The challenge of the project was to complete a comprehensive review of over 1000 miles of freeways in the heavily travelled corridors in California's major urban areas and maintain a consistent approach to evaluating the opportunities for traffic management and motorist information improvements. To assist in managing the project, the work was segmented into three regions: one covering the Sacramento and San Francisco Bay Areas (Caltrans Districts 3 and 4); a second covering the more urbanized areas of Los Angeles, Ventura, San Bernardino and Riverside Counties (Caltrans Districts 7 and 8); and a third covering San Diego and Orange Counties (Caltrans Districts 11 and 12). Region team leaders and technical staff were assigned to each region.

The teams for each of the three regions proceeded in parallel through the activities to points where major review was required. The regional leaders were then brought together, along with the Steering Committee, to insure that uniform approaches were being used. The entire team was also brought together to develop the overall program recommendations. The following summarizes the major consultant activities.

Develop Evaluation Criteria

To insure that the team maintained objectivity and consistency in the evaluation process, it was essential to develop uniform criteria against which corridors would be compared. Two sets of criteria were developed: one to initially screen the candidates which were identified; and the second for the more detailed evaluation. The criteria were documented in a working paper and reviewed and approved by the Steering Committee. The criteria developed for the project are shown on Exhibit 2-3. The criteria were weighted by the Steering Committee and consultant team at a later step in the process to assess their relative importance.

Identify Potential Corridors

A comprehensive review of congestion and traffic flow information was made to identify corridors that are currently congested. Interviews were conducted with members of the Steering Committee and with the District offices of Caltrans. Selected meetings were also held with transportation commissions in the regions. The data review and meetings resulted in a list of over 120 segments (generally 5 to 15 miles in length and 2 to 3 miles in width) that should be considered in the study.

Conduct Initial Screening

A two stage evaluation process was used as part of the project. The initial stage was to screen the entire list of candidate corridors to identify those that had major apparent deficiencies in terms of potential use of Smart Corridor technology. The initial screening criteria, shown on Exhibit 2-3, relate primarily to levels of congestion and the availability of alternate routes, with the logic that the worst problems should be addressed first and that there had to be an opportunity to do something about the congestion through use of alternative routes. Corridor width and length were also considered along with data availability. Corridors eliminated at this stage did not have documented congestion levels which would provide significant benefit if eliminated; that is, would not produce a positive benefit cost ratio, or no alternate routes with available capacity would be identified.

The screening process reduced the candidate list from the 120 identified to approximately 60 final candidates. The final list was reviewed and approved by the Steering Committee. Exhibits showing the lists by district, those eliminated during initial screening, and the reasons for eliminating the corridors are given in Appendix B.

Exhibit 2-3

PROJECT SELECTION CRITERIA

CRITERIA FOR INITIAL SCREENING

1. Satisfies Corridor Definition
2. Freeway Congestion/Capacity
3. Alternative Parallel Routes
4. Data Availability

CRITERIA FOR DETAILED EVALUATION

1. Freeway Congestion/Capacity
2. Surface Street Congestion/Capacity
3. In-Place Control Features
4. Accidents/Incidents
5. Number of Jurisdictions/Agencies
6. Local/Regional Commitment
7. Part of Potentially Larger System
8. Environmental Concerns
9. Land Use Compatibility
10. Data Availability
11. Cost
12. Benefit/Cost Analysis

Identify Corridor Elements

The elements to be used in the corridors were identified in parallel with the more detailed evaluations. The elements to be applied to the corridors were those identified for use in the "Smart Corridor Demonstration Project - Conceptual Design Study"[1.], which served as a forerunner to the Statewide project. The recommended elements include:

- o Freeway surveillance and incident detection
- o Ramp metering
- o Traffic signal control
- o Coordination of ramp meters and signals
- o Closed circuit television
- o Highway advisory radio
- o Changeable message signs
- o Improved motorist information through:
  - Commercial radio ties
  - Commercial television ties
  - Dial-in highway advisory telephone
  - Computer bulletin boards
  - Information feeds to new technology devices
- o Freeway service patrols
- o Incident management teams
- o Accident investigation sites
- o Coordinated Caltrans, CHP, and local agency response

Corridor Field Reviews

During the final evaluation, several potential alternate routes were identified for each of the corridors. Field reviews were made on each of the alternate routes to determine land use compatability, levels of existing congestion, route discontinuities and other features that would significantly affect the use of the alternates. The field reviews were also used to identify additional alternatives that were not apparent from the review of available information. The field reviews, although time consuming, proved invaluable in identifying "fatal flaws" in the alternatives.

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1. "Smart Corridor Demonstration Project - Conceptual Design Study", JHK & Associates for the City of Los Angeles, October, 1989.

Conduct Final Screening and Evaluation

Using the information collected from involved agencies and the field review data, a final screening was conducted. This screening further reduced the candidate corridors by 14, leaving 46 corridors for final evaluation.* An evaluation matrix was then developed using the criteria identified early in the project. The individual criteria were weighted by the Steering Committee and consultant team to assess the relative importance of the criteria. Each element in the matrix was then compared with the characteristics of the corridor and scored to reflect the corridors performance under each of the criteria. A rating scale of 0 to 10 was used for each of the criteria, with 10 indicating that the corridor fully satisfied the criteria and 0 indicating that the corridor satisfied none of the requirements of the given criteria. The process used to assign the 1 to 10 ratings is shown in Appendix D. The worksheet used in the final evaluation is shown on Exhibit 2-4. The final list of corridors and the weightings of the criteria were reviewed and approved by the Steering Committee. Completed work sheets for each of the corridors are provided in Section 3 of this report.

Develop Project Recommendations

Each of the corridors was rated using the factors of: rating from the evaluation matrix, cost, and benefit/cost. The corridors were grouped, primarily by estimated benefit/cost, to reflect their relative priority. Program level budgets were identified for each corridor and for each group of corridors.

A base program of providing traffic operations centers in each of the Caltrans Districts included in the study was developed. The reason for identifying this element is the simple conclusion that it is impractical to implement Smart Corridor technologies without a traffic operations center (TOC) to coordinate the day by day operation of the TOS systems. These TOS/TOC's are in various stages of planning and implementation now, and are considered integral to continuing the Smart Corridor program.

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* Several of the corridors were combined as part of the final analysis.

Exhibit 2-4

EVALUATION WORKSHEET

CORRIDOR EVALUATION SUMMARY

Corridor : [ ] Description : [ ]

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level			24	0	
2 Surface street capacity/congestion			21	0	
3 Local/Regional committment			13	0	
4 Land use compatibility			11	0	
5 Accident/Incident history			9	0	
6 Environmental			7	0	
7 Number of jurisdictions			6	0	
8 Part of larger system			4	0	
9 In-place control features			3	0	
10 Data availability			2	0	
			100	0	

Costs

Initial (Capital and Implementation)

10 Year Operations and Maintenance

Total $0

Annualized Cost $0

Benefits

Annual Benefit $0

Benefit/Cost Ratio

Project Report

The final step in the process is the documentation of project results. This report is the primary product of that effort. This final report is complemented by appendix data and earlier working papers.

The process proved effective in allowing the project to move quickly through the vast amount of information and corridor opportunities and identify those considered primary candidates for near term implementation. In all geographic areas studied, additional corridors have potential and/or will become more critical as travel demand increases, however the ones identified by the study process represent the more immediate problems and opportunities.

3. ANALYSIS OF CORRIDORS

This section provides summary information regarding the corridors considered in the project, identifies those that were considered for implementation, and reviews the major characteristics of the individual corridors. The corridor information is presented on a Caltrans district by district basis. An overview of all corridors for the district is given first, followed by information on each of the corridors considered during the final evaluation. The information for each corridor includes a narrative summary of the corridor, a network map, and the evaluation matrix. Three appendices support Section 3. Information on the corridors that were eliminated in the initial screening is summarized in Appendix B. Cost information shown on the evaluation matrix for each corridor is supported by an explanatory discussion and cost worksheets provided in Appendix C. The rating scales used in assessing the corridors against the criteria are given in Appendix D.

In evaluating the corridors, emphasis is placed on conditions existing today. Improvements to existing freeways or streets were evaluated only when funding was certain and programs well defined. As funding programs become more specifically developed for major reconstruction, priorities for TOC/TOC and Smart Corridor type improvements should be re-assessed. That is, each defined corridor will require a "preliminary engineering" phase prior to moving to final implementation. This will allow the results of proposed funding measures to be considered. Regardless, the levels of improvements identified for the corridors are expected to be warranted. Costs are also presented in 1990 dollars.

CALTRANS DISTRICT 3 - THE SACRAMENTO AREA

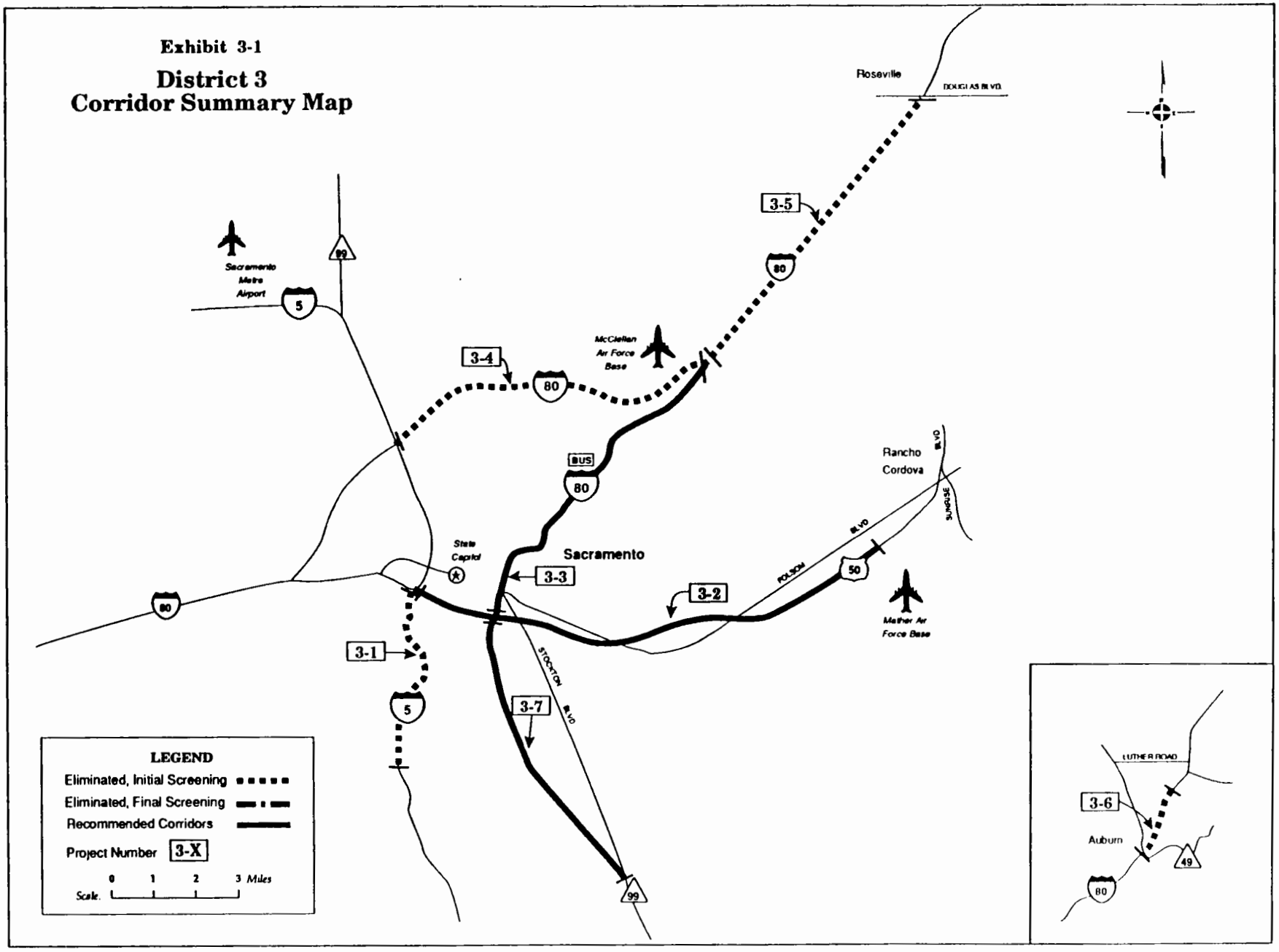
The initial review of traffic and congestion data and interviews with local staff resulted in the identification of 7 potential corridors for the application of Smart Corridor technology in the Sacramento Area. The corridors are shown on Exhibit 3-1. The first page of the exhibit shows all 7 corridors in graphic form and the second page summarizes information for the 3 final corridors. Of the 7 corridors, 6 are located in the immediate vicinity of Sacramento and 1 is located on Interstate 80 in the Auburn area.

During the initial screening process, 4 of the corridors were eliminated from detailed consideration. Three of the corridors (3-1, 3-5, and 3-6) were eliminated primarily because of the low existing delay levels. Although congestion is occurring, it is not of the level that compares with other candidate corridors. All of the corridors offer opportunities for future consideration but would not be a priority at this time. The fourth corridor (3-4) was eliminated primarily because of the lack of availability or continuity of alternate routes. As noted earlier, summary information as provided to the Steering Committee for discussion of the eliminated routes is included in Appendix B.

The remaining 3 corridors (3-2, 3-3, and 3-7) were included in the final evaluation and are discussed on following pages. As a note, all of the final corridors in the Sacramento area have relatively low delay when compared to others in the State. This will impact the priorities assigned to the corridors under this study which emphasizes immediate needs. Given the growth occurring in the Sacramento area, however, the corridors will become more critical in the near future and should continue to receive attention.

Exhibit 3-1

District 3
Corridor Summary Map



Corridor 3-2

This corridor covers an 11.6 mile section of State Route 50 between Interstate 5 and Mather Field Road. The corridor serves commuting traffic from developments east of Sacramento to the downtown area. The corridor also serves recreational traffic bound to the Lake Tahoe area. Mather Air Force Base, near the eastern end of the corridor is also a major traffic generator. Although Mather Air Force Base is scheduled for closure in 1993, it is likely that equivalent trips may be expected in the future. Growth is occurring in the corridor and travel demands may be expected to increase significantly in the corridor. Given the available parallel route, consideration was given to extending the corridor easterly, however, congestion levels did not warrant the extension.

Exhibit 3-2 shows the network included in the corridor. The primary alternate in the eastern portion of the corridor is Folsom Boulevard which was designated as Route 50 prior to construction of the freeway. This alternate route is extended across town to the west of Route 51 (Business 80) via the one-way couplet of P and Q Streets and connects with the I-5 freeway. A significant capacity restriction occurs on Folsom Boulevard in the vicinity of Sacramento State University where the street is reduced to one lane of travel in each direction as it passes under a railroad overcrossing. In addition, it is also reduced to one lane in each direction at its western terminus before joining Capitol Avenue.

Cost estimates have been made for construction to alleviate these capacity restrictions. In addition, secondary alternates have been identified which are considerably more circuitous but could be used for incident management purposes when additional capacity may be needed. This secondary alternate turns at Power Inn Road, opposite Howe Avenue, and uses a combination of Fruitridge Road, Stockton Boulevard, and Broadway to approach the western end of the corridor and tie into Routes 99, Business 80, and I-5. (Note Broadway between Stockton and 65th is residential and not a suitable alternative). Light rail transit is provided in the corridor and park and ride lots are provided at its present terminus at Butterfield Way and Power Inn Road. Both locations are adjacent to Folsom Road. Access to Route 99, southbound, can also be provided via the secondary alternate route. The connection to Route 99 is via Fruitridge Road. Routes north of Folsom Boulevard proved unsuitable because of residential developments east of the downtown area.

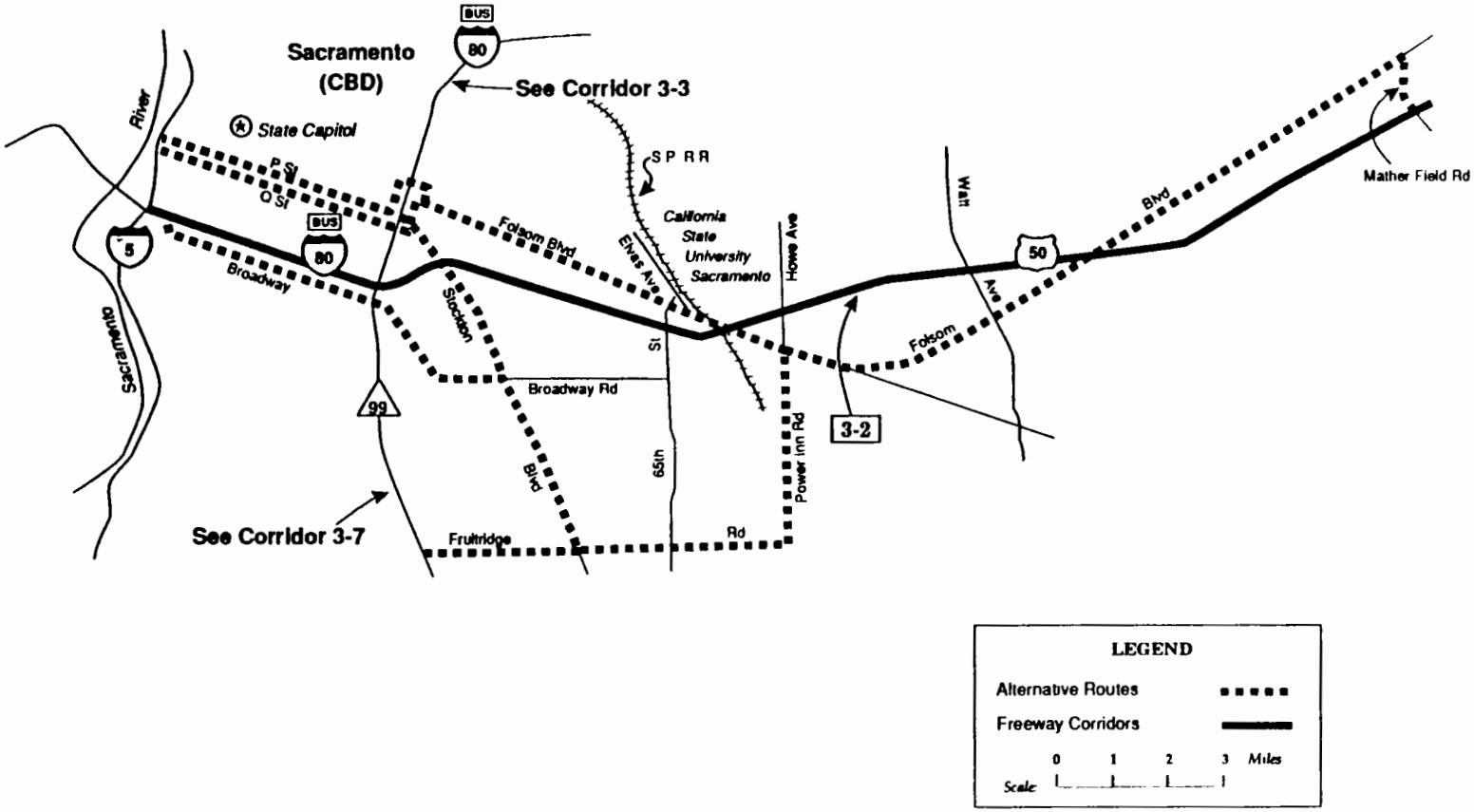
Exhibit 3-3 is a summary of the evaluation matrix for the corridor. As noted, the congestion level is not high, compared to other locations in the State. The accident history is also not severe, given overall conditions throughout the State. There is ramp metering in the corridor, with 13 on-ramps currently controlled. The effective operation of these ramp meters is one of the reasons that the existing congestion in the corridor is relatively low.

The local agencies were cooperative during the project and were supportive of the Smart Corridor concepts. The land use along the corridor is generally compatible with its use as an alternate route, where other more direct routes pass through significant sections of residential development.

The overall evaluation of the corridor is that it is suitable for use of Smart Corridor technologies, however, the low congestion levels and circuitous nature of the alternate reduces its priority. The corridor importance will increase as development continues.

Exhibit 3-2

District 3
Corridor 3-2 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-3

Corridor : 3-2 **Description :** Route 50 between I-5 and Mather Field Road

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	22	1	24	24	
2 Surface street capacity/congestion		2	21	42	
3 Local/Regional committment		7	13	91	
4 Land use compatibility		9	11	99	
5 Accident/Incident history	25	3	9	27	
6 Environmental		0	7	0	
7 Number of jurisdictions	2	8	6	48	City of Sacramento, Sacramento County
8 Part of larger system		6	4	24	
9 In-place control features		3	3	9	Existing Ramp Meters, Freeway Detection, Coord. Signals
10 Data availability		7	2	14	
			100	378	

Costs	
Initial (Capital and Implementation)	$13,808,828
10 Year Operations and Maintenance	$13,284,432
Total	$27,093,260
Annualized Cost	$2,709,326
Benefits	
Annual Benefit	$595,800
Benefit/Cost Ratio	0.22

Corridor 3-3

This corridor is a segment of Business 80 between U.S. Route 50 and Interstate 80. The segment is 8.9 miles in length and serves as a continuation of State Route 99 northerly toward the Lake Tahoe basin. The corridor serves commuter traffic from the downtown area of Sacramento heading toward the communities to the north and east of the City. The street network is shown on Exhibit 3-4.

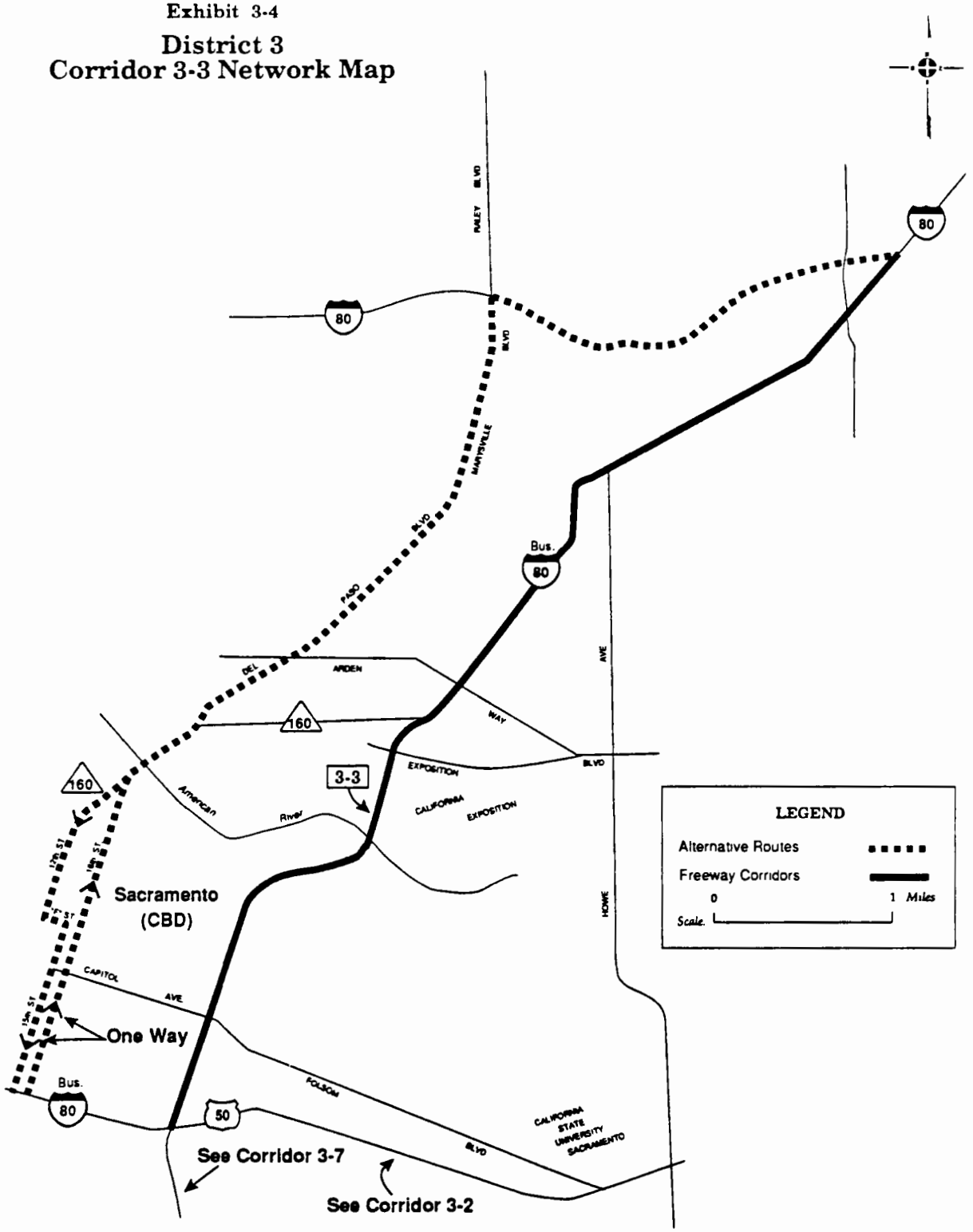
The primary alternate route lies to the west of the freeway. The alternate uses the one-way couplet of 12th or 15th and 16th Streets in the downtown area and then continues on Route 160, connecting with Del Paso Boulevard/Marysville Boulevard to the point where it connects with Interstate 80. The route generally has 2 to 3 lanes in each direction with speeds of 30 to 35 miles per hour. The alternate, outside of the downtown area, passes through commercial development and generally has on-street parking. The land use is generally compatible with the use of the route as an alternate.

The evaluation summary for the corridor is shown on Exhibit 3-5. The corridor is the most congested in the Sacramento area and has a moderate accident history. Ramp metering has been planned for the corridor, however, it is not currently funded. Although the local agencies (Sacramento City and County)are generally supportive of the corridor, concerns exist for any spill-over into residential areas, especially in the downtown section. This corridor crosses the American River and is constrained by the limited number of bridge crossings available.

The corridor offers promise under the Smart Corridor program, however, delay levels, compared to other corridors in the State will reduce the corridor's priority.

Exhibit 3-4

District 3
Corridor 3-3 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-5

Corridor : 3-3 **Description :** Business 80 between Route 50 and Route 80

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	65	2	24	48	
2 Surface street capacity/congestion		4	21	84	
3 Local/Regional committment		5	13	65	
4 Land use compatibility		8	11	88	
5 Accident/Incident history	50	5	9	45	
6 Environmental		1	7	7	
7 Number of jurisdictions	2	8	6	48	Sacramento City, Sacramento County
8 Part of larger system		6	4	24	
9 In-place control features		1	3	3	Coordinated Signals
10 Data availability		7	2	14	
			100	426	

Costs	
Initial (Capital and Implementation)	$10,243,741
10 Year Operations and Maintenance	$10,911,913
Total	$21,155,654
Annualized Cost	$2,115,565
Benefits	
Annual Benefit	$2,995,200
Benefit/Cost Ratio	1.42

Corridor 3-7

This corridor covers a 7.1 mile section of State Route 99 between Stockton Boulevard on the south, and State Route 50 near the central business district of Sacramento. The freeway is a major north-south route serving the San Joaquin Valley. Commute traffic is generated between the employment centers in Sacramento and the outlying communities south of the City. The corridor network is shown on Exhibit 3-6.

The primary alternatives for this corridor are Stockton Boulevard on the east and Franklin Boulevard on the west. Of the two, Stockton Boulevard is the primary because of route continuity problems at the northern end of Franklin Boulevard. Stockton Boulevard is a four lane street with left turn pockets. Speeds are in the range of 40 to 45 miles per hour until it approaches the downtown area where the speed becomes 30 miles per hour. Corridor access at the southern terminus is excellent, with a direct freeway connection. Stockton Boulevard, at the northern terminus, has freeway ramp connections with State Route 50 and Business Interstate 80.

Exhibit 3-7 provides a summary of the evaluation information for the corridor. The congestion level is relatively light given other conditions in the State and the overall accident history is moderate to low. The corridor appears to be supported by both of the agencies through which it passes-Sacramento City and County.

The land use along the corridor is generally compatible with its use as an alternate route. Commercial development dominates the corridor development. In the southern section (below Fruitridge Road), no parking is provided on the street. In the northern section, parking is provided and the development is more strip commercial in orientation. Ramp metering has been planned for this corridor, however, it is not currently budgeted.

Major residential development is occurring south of the corridor in the vicinity of Elk Grove. This development will increase the travel demand in the corridor since employment continues to be concentrated in Sacramento. The corridor is susceptible to improvement using Smart Corridor techniques, however, the relatively low level of congestion compared to other corridors in the State will reduce its immediate priority.

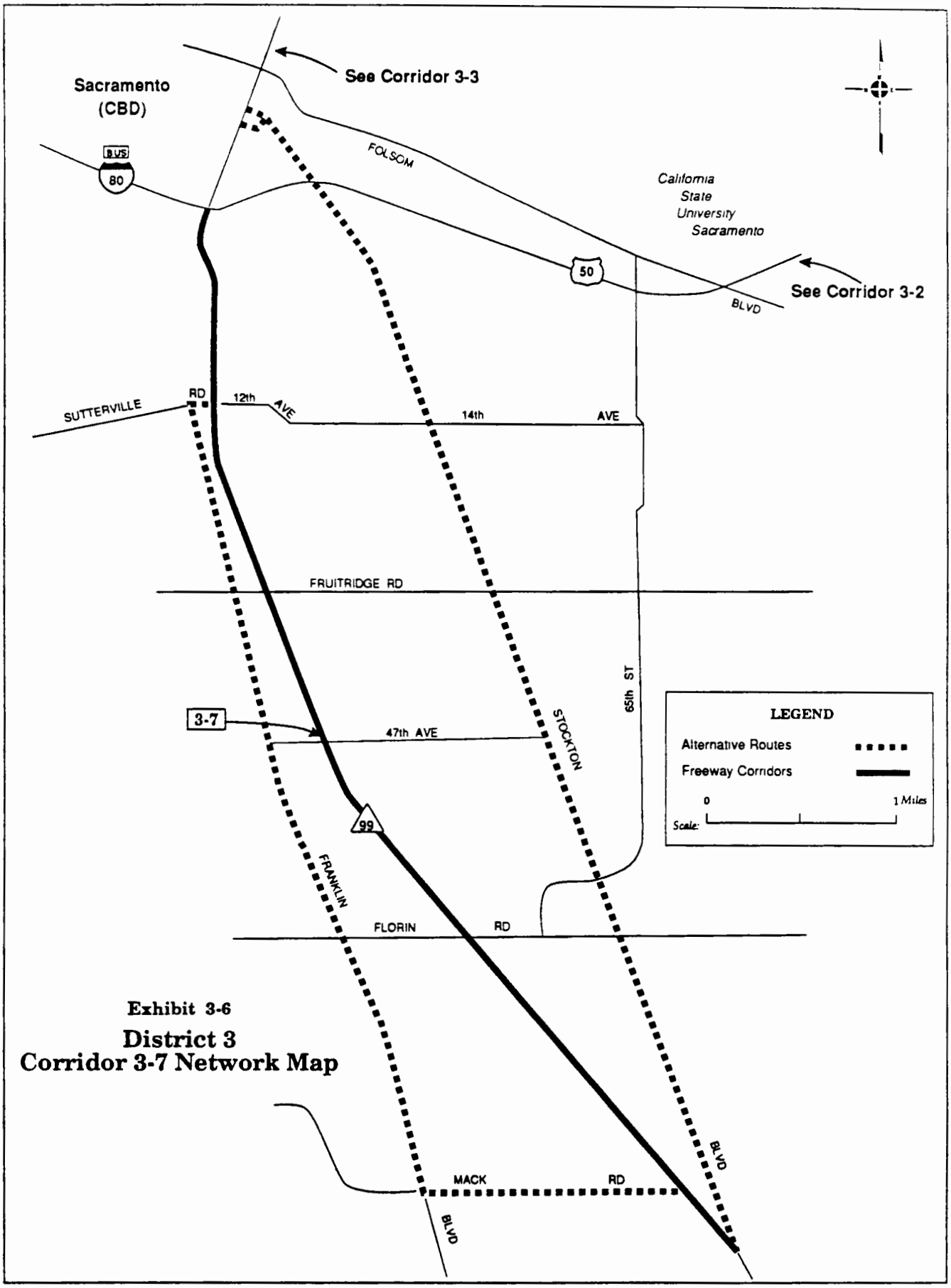


Exhibit 3-6

District 3
Corridor 3-7 Network Map

CORRIDOR EVALUATION SUMMARY

Exhibit 3-

Corridor : 3-7 Description : R

Criteria	Data Value	Corridor Rating	Weight	E
1 Freeway capacity/congestion level	25	1	24	
2 Surface street capacity/congestion		6	21	
3 Local/Regional committment		7	13	
4 Land use compatibility		8	11	
5 Accident/Incident history	25	3	9	
6 Environmental		0	7	
7 Number of jurisdictions	2	8	6	48
8 Part of larger system		6	4	24
9 In-place control features		1	3	3
10 Data availability		7	2	14
			100	445

Costs	
Initial (Capital and Implementation)	$10,098,491
10 Year Operations and Maintenance	$9,325,391
Total	$19,423,882
Annualized Cost	$1,942,388
Benefits	
Annual Benefit	$417,600
Benefit/Cost Ratio	0.21

CALTRANS DISTRICT 4 - THE SAN FRANCISCO BAY AREA REGION

Caltrans District 4 covers over 500 miles of freeway in Santa Clara, San Mateo, Santa Cruz, San Francisco, Marin, Sonoma, Napa, Contra Costa, and Alameda Counties. For this district, the corridor identification process identified 28 potential corridors for consideration under the Smart Corridor study. The corridors are shown graphically on the first sheet of Exhibit 3-8 with a summary of the final corridors provided on the second sheet.

The initial screening process resulted in the elimination of 13 of the corridors. Eight of these corridors were eliminated because the existing congestion levels are lower than the threshold set for final evaluation. One of these eight, Corridor 4-4, was ultimately reconsidered and included in the recommended program. Five corridors were eliminated because no suitable alternate corridors were identified at even the initial consideration level. A summary of the initial screening is shown in table format in Appendix B.

During the final analysis process, an additional 5 corridors were eliminated, resulting in 11 corridors being evaluated in the final rating process. In the final consideration, Corridors 4-1 and 4-2 were combined and are discussed as Corridor 4-1. Also, Corridors 4-3 and 4-4 were combined to form Corridor 4-3. Corridor 4-6, a section of State Route 101 in San Francisco, was eliminated because the alternate route was marginal and because major objection to the alternate route had been expressed by the local agency. Corridor 4-10, in the Santa Rosa area, was eliminated because a further review of the congestion indicated that it too did not meet the minimum levels identified for the project.

Corridor 4-21 on Interstate 680 in the Walnut Creek and Concord areas was also eliminated because no suitable alternate routes could be found and because the major reconstruction planned for the Route 680/24 interchange will greatly impact conditions in the corridor. Corridor 4-25 on Route 24 from Walnut Creek to Oakland was eliminated because closer review of the congestion characteristics indicated that essentially all delay is associated with the Caldecott Tunnel or at the 680/24 interchange. There are no substantive alternatives to the tunnel and the interchange is to be reconstructed. Finally, Corridor 4-26 on State Route 4 west of Pittsburg was eliminated because the congestion is associated with the grades at Pacheco Pass and no strong alternates exist. The problem is more susceptible to a construction solution than to Smart Corridor technologies.

The following is a review of the remaining corridors in the San Francisco Bay Area.

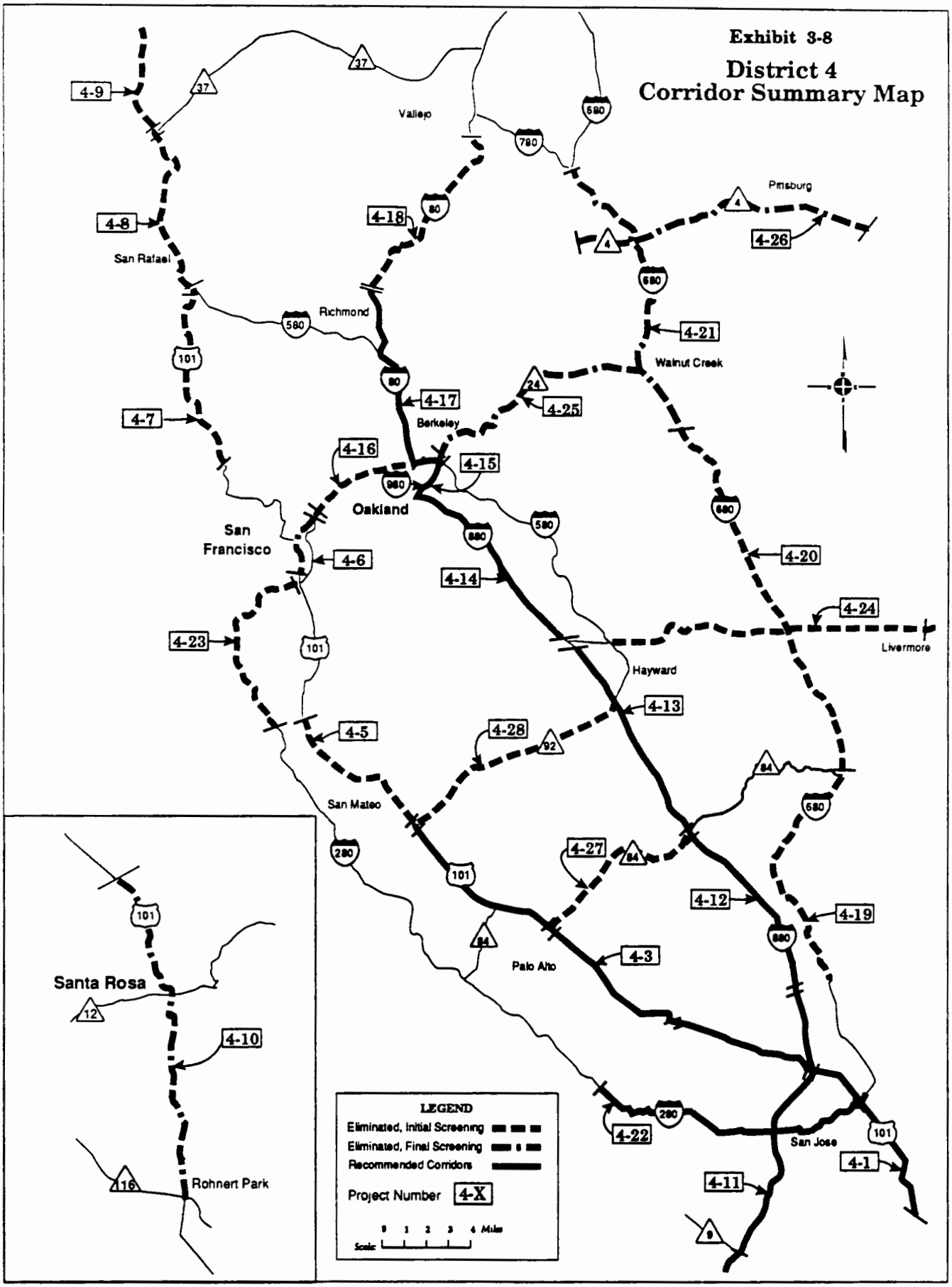


Exhibit 3-8
District 4
Corridor Summary Map
4-9
4-8
4-7
4-6
4-5
4-23
4-10
4-18
4-17
4-16
4-15
4-14
4-28
4-27
4-3
4-12
4-22
4-11
4-1
4-19
4-20
4-21
4-25
4-26
4-24
4-13
Vallejo
San Rafael
Richmond
Berkeley
Oakland
San Francisco
San Mateo
Palo Alto
Hayward
Walnut Creek
Pittsburg
Livermore
San Jose
Santa Rosa
Rohnert Park
LEGEND
Eliminated, Initial Screening
Eliminated, Final Screening
Recommended Corridors
Project Number 4-X
0 1 2 3 4 Miles
Scale:

Exhibit 3-8 (Continued)

District 4
Corridor Summary

District/ Corridor	Description	Distance (Miles)	B/C Ratio	Score	Initial Cost	10 Year O&M Cost	Combination of Corridors
4 - 1	Route 101 between Blossom Hill Road and Route 237	7.75	606	606	$23,624,773	$20,342,946	4-1, 4-2
4 - 3	Route 99 between Route 237 and Route 92	0.83	307	307	$20,956,871	$20,442,573	4-3, 4-4
4 - 11	Route 17 / 880 between Lark Avenue and Route 237	0.20	448	448	$21,989,849	$17,772,303	
4 - 12	Route 880 between Route 237 and Decato Road	1.56	427	427	$12,794,176	$13,926,589	
4 - 13	Route 880 between Decato Road and Route 238	1.46	389	389	$12,434,671	$12,284,635	
4 - 14	Route 880 between Route 238 and Route 980	0.27	482	482	$13,362,171	$13,304,231	
4 - 15	Route 980 / 580 between Route 880 and Powell Street	9.01	783	783	$11,378,803	$10,771,306	
4 - 17	Route 80 between Powell Street and San Pablo Avenue	7.67	567	567	$8,858,819	$8,375,181	
4 - 22	Route 280 between Magdalena Avenue and Route 101	4.33	502	502	$24,535,076	$19,314,517	
		Total District Costs			$149,935,209	$136,534,281	

Corridor 4-1

This corridor is a combination of Corridors 4-1 and 4-2 as earlier identified. The original two corridors were combined because of their direct connection and the use of similar alternatives to provide greater route continuity. Corridor 4-1 is now a 14.5 mile section of Route 101 between the Capitol Expressway in southern San Jose and Route 237 in Mountain View. The corridor network is shown on Exhibit 3-9.

The corridor is heavily congested, having the highest amount of total delay in District 4 and a relatively high delay per mile. This delay occurs despite the operation of 19 ramp metering sites in the corridor. The ramp meters are located in the northbound direction of Route 101 between the Capitol Expressway and the Lawrence Expressway. This corridor also includes a freeway connector meter at Interstate 680. In addition, Caltrans is developing projects to meter the southbound ramps from Route 237 to DeLaCruz Boulevard and from Stony Road to the Capitol Expressway. Caltrans is planning to provide a coordinated ramp metering operation in Santa Clara County and these locations will be included. The improvements are not funded at this time, except for the Route 237 to DeLaCruz metering.

The corridor includes several segments of alternative routes. Monterey Highway/Market Street are used in the southern portion of the corridor. These connect with Coleman Avenue and the Guadalupe Parkway north of the downtown area, with the parkway tieing back to Route 101. Coleman Avenue connects with several street segments to tie to the Central Expressway at De La Cruz Boulevard. Although several of the route segments are congested during peak periods, they do offer excess capacity during much of the day. Smart Corridor type improvements would be expected to increase available capacity. A specific bottleneck at the Central Expressway and De La Cruz Boulevard will need to be alleviated. The overall evaluation summary for the corridor is shown on Exhibit 3-10.

A secondary alternate is shown north and east of the corridor, using Interstate 680 and the Montague Expressway. The expressway section is congested in peak periods so the alternate is considered primarily for incident based conditions.

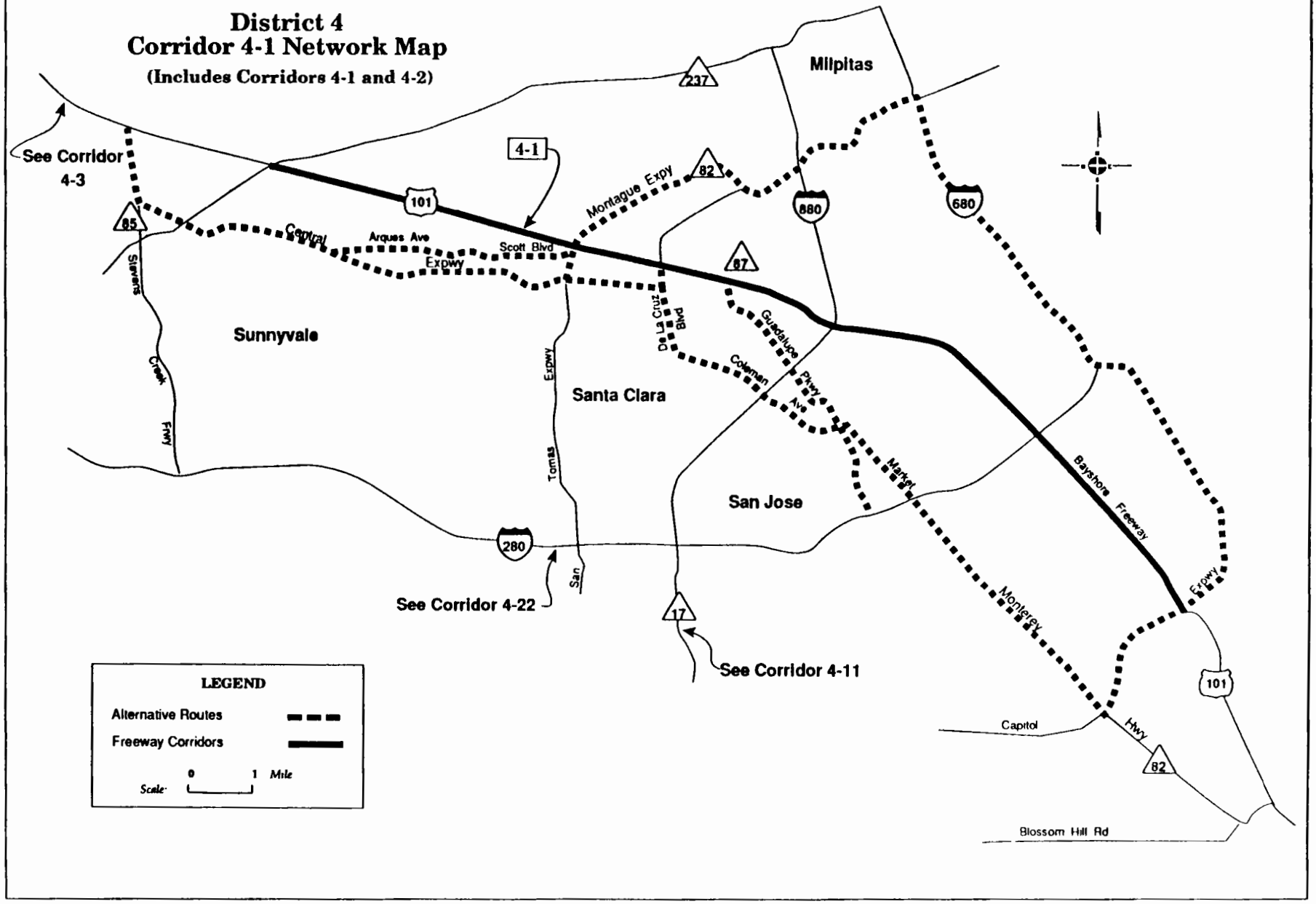
The City of San Jose is also in the process of implementing a computer controlled traffic signal system that would be available to assist in the corridor. One hundred intersections are included in a first phase, however, the central system will have the capacity to be expanded as needed for corridor operation. The City is strongly supportive of the Smart Corridor concept. Also, the Route Reliever Study conducted for the Metropolitan Transportation Commission identified the Central Expressway as a potential reliever route for Route 101, with the required improvement noted above. The land use along the corridor is generally compatible with the intended use, with minor conflicts as the corridor passes through the downtown area.

The corridor offers major promise as a Smart Corridor, with the most significant concern being the existing levels of congestion on the alternate routes.

Exhibit 3-9

District 4
Corridor 4-1 Network Map

(Includes Corridors 4-1 and 4-2)



CORRIDOR EVALUATION SUMMARY Exhibit 3-10

Corridor : 4-1 **Description :** Route 101 between Blossom Hill Road and Route 237

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	273	7	24	168	
2 Surface street capacity/congestion		1	21	21	
3 Local/Regional committment		10	13	130	San Jose is supportive of Smart Corridor Concepts
4 Land use compatibility		8	11	88	
5 Accident/Incident history	25	6	9	54	
6 Environmental		9	7	63	
7 Number of jurisdictions	4	2	6	12	San Jose, Santa Clara, Milpitas, Sunnyvale
8 Part of larger system		8	4	32	
9 In-place control features		6	3	18	Metered Ramps, Central I/S Control, Fwy. Det., Coord. Sig.
10 Data availability		10	2	20	
			100	606	

Costs	
Initial (Capital and Implementation)	$23,624,773
10 Year Operations and Maintenance	$20,342,946
Total	$43,967,719
Annualized Cost	$4,396,772
Benefits	
Annual Benefit	$34,066,800
Benefit/Cost Ratio	7.75

Corridor 4-3

This corridor is also a combination of two of the corridors originally defined for Route 101, Corridors 4-3 and 4-4. As noted, Corridor 4-4 was originally eliminated in the initial screening process, but reconsidered because of the route continuity with alternates for Corridor 4-3. The new corridor covers an 18.3 mile segment of route 101 between Routes 85 and 237 (at the northern end of Corridor 4.1) and Route 92 in San Mateo. The southern section of the corridor is heavily congested, however, major roadway improvements are being made with funding assistance from the local option sales tax program approved in Santa Clara County. The northern section is less congested, however, it was included in the corridor to provide a logical termination at the junction with Route 82 and the Hayward - San Mateo Bridge. The corridor has a moderate accident experience relative to other corridors in the State. The corridor network map is shown on Exhibit 3-11.

The Central Expressway extension from Corridor 4-1 is used to provide continuity at the southern end of the corridor. The primary alternative for the overall segment, however, is provided by Route 82, the El Camino Real. This route provides a direct tie between Route 92 and Route 85, with indirect access to Route 237. The alternate is designed for high volume flows and serves as a major arterial throughout the corridor. There are areas of heavy commercial concentration along the route, somewhat reducing its capacity to serve as an alternate. Careful monitoring will be required to insure that capacity is available during a period when diversion or short trip capturing is implemented.

Exhibit 3-12 provides an overall evaluation summary for the corridor. The corridor passes through 8 different political jurisdictions, adding a major complexity to any implementation effort. Although it is expected that several of the jurisdictions will be supportive, it is likely that there will be some resistance to using El Camino Real in a Smart Corridor program. As a practical matter, however, the route is the only real alternative, given areas with more sensitive land use and this may encourage the agencies to recognize its importance. The land use along Route 82 is generally commercial in nature and compatible with the arterial nature of the alternative.

In summary, the corridor is a candidate for the Smart Corridor program, with its priority being reduced by the relative level of congestion and the limited capacity available on the alternative.

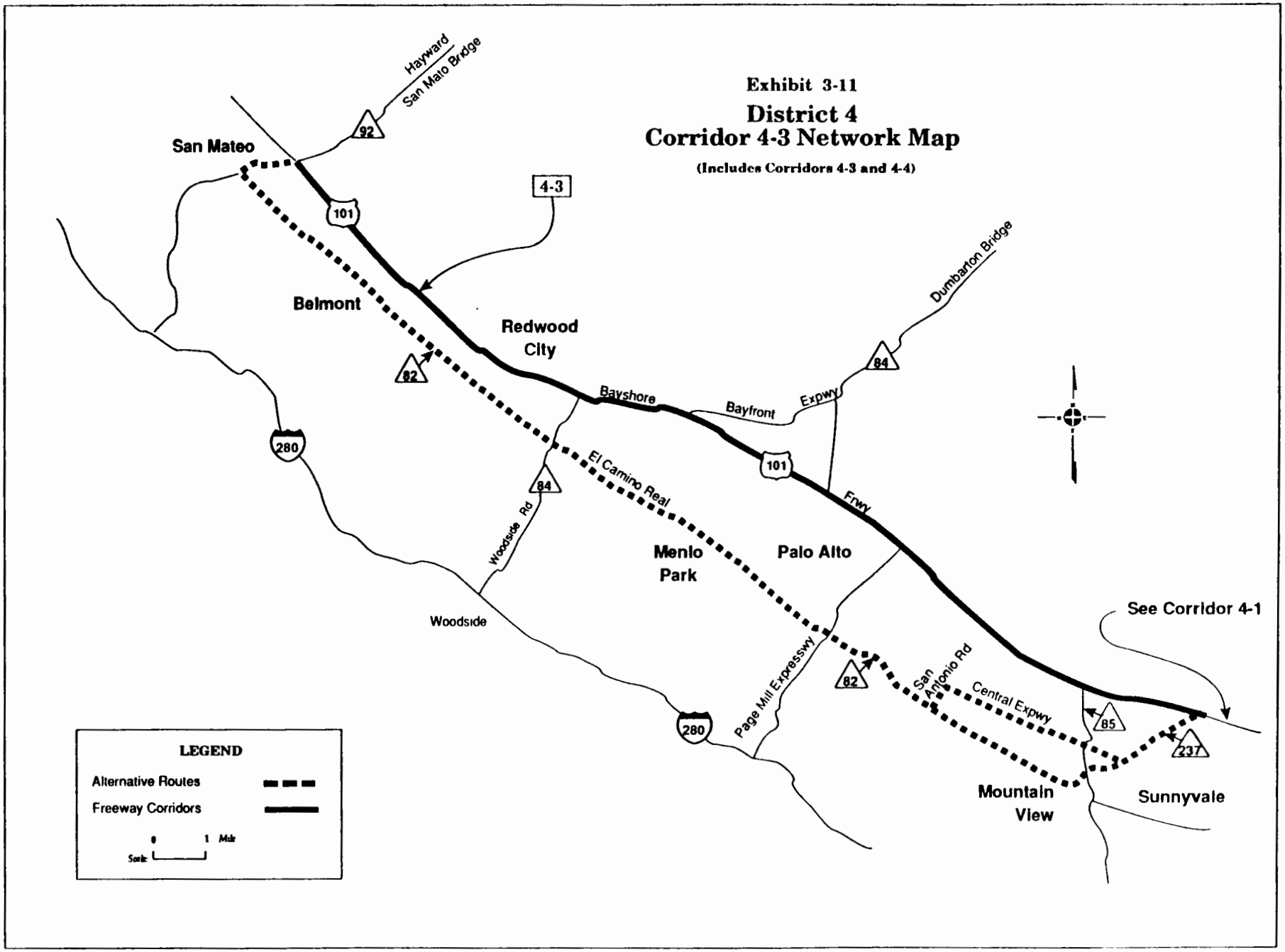


Exhibit 3-11
District 4
Corridor 4-3 Network Map
(Includes Corridors 4-3 and 4-4)
Hayward
San Mateo Bridge
92
San Mateo
101
4-3
Belmont
Redwood City
82
Dumbarton Bridge
84
Bayshore
Bayfront
Expwy
280
El Camino Real
101
Frwy
84
Woodside Rd
Menlo Park
Palo Alto
See Corridor 4-1
Woodside
Page Mill Expresswy
82
San Antonio Rd
Central Expwy
85
237
280
Mountain View
Sunnyvale
LEGEND
Alternative Routes
Freeway Corridors
0
1 Mile
Scale:

CORRIDOR EVALUATION SUMMARY Exhibit 3-12

Corridor : 4-3 **Description :** Route 99 between Route 237 and Route 92

	Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1	Freeway capacity/congestion level	97	2	24	48	
2	Surface street capacity/congestion		1	21	21	
3	Local/Regional committment		5	13	65	
4	Land use compatibility		8	11	88	
5	Accident/Incident history	40	4	9	36	
6	Environmental		0	7	0	
7	Number of jurisdictions	8	0	6	0	Sunnyvale, Mtn View, Palo Alto, Menlo Park, San Mateo, + 3
8	Part of larger system		8	4	32	
9	In-place control features		1	3	3	
10	Data availability		7	2	14	
				100	307	

Costs	
Initial (Capital and Implementation)	$20,956,871
10 Year Operations and Maintenance	$20,442,573
Total	$41,399,444
Annualized Cost	$4,139,944
Benefits	
Annual Benefit	$3,432,600
Benefit/Cost Ratio	0.83

Corridor 4-11

Corridor 4-11 includes 15.3 miles of Route 17 and Interstate 880 between Lark Avenue (north of Los Gatos) and Route 237 in Milpitas, with a majority of the mileage occurring in the City of San Jose. The network map for the corridor is shown on Exhibit 3-13. The corridor is congested during the peak periods, however ramp metering has mitigated significant portions of the commute period problems. The section includes ramp meters at 24 locations.

Two alternate routes are available in the corridor. Bascom Avenue parallels the freeway on the east side, providing access from the southern end of the corridor to downtown San Jose. On the west side of the freeway, a combination of San Tomas and Montague Expressways provide high level facilities for the length of the corridor. Winchester Boulevard supplements San Tomas Expressway in the southern portion of the corridor. Although the alternatives are of arterial and expressway standard, they are heavily travelled during peak periods. This is especially true for the Montague Expressway between Route 101 and Interstate 880. This requires careful monitoring of the facilities as part of the Smart Corridor project so that they are used only when capacity is available.

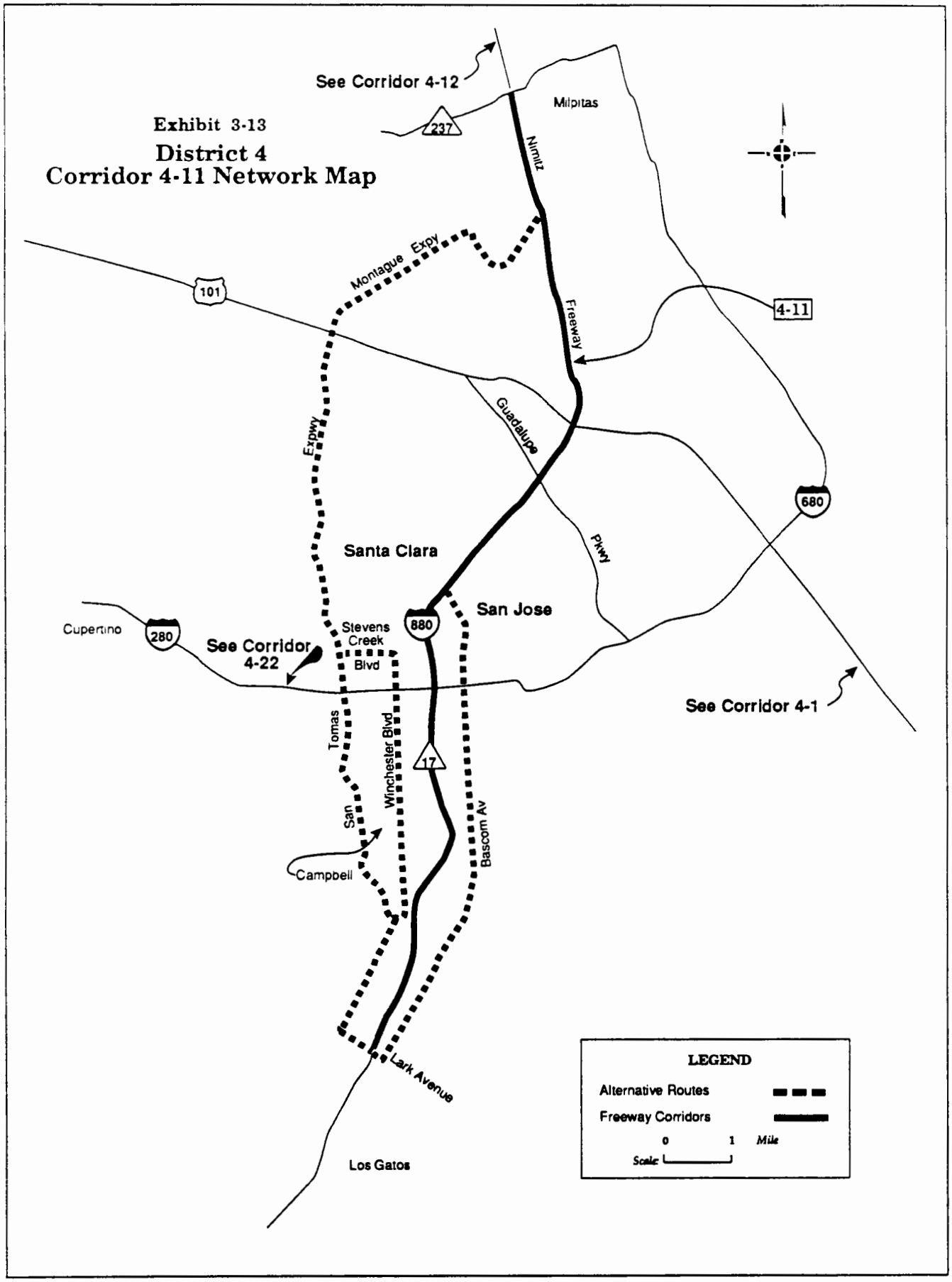
The summary evaluation matrix for the corridor is given on Exhibit 3-14. The corridor passes through 4 cities, resulting in added complexity during implementation. The land use along the alternatives is generally compatible with their use as major traffic carriers. There is strong commitment by the City of San Jose in support of the Smart Corridor program and this will ease the implementation problems , especially on the east side of the corridor, south of downtown San Jose. Although considered as one corridor, it may ultimately prove beneficial to separate the corridor along the length of the freeway into eastern and western portions and proceed with the eastern portion first.

The corridor, as noted, includes ramp metering. As with the metering on Route 101 (Corridor 4-1), the metering in Corridor 4-11 is to be coordinated by Caltrans. The City of San Jose signal system, currently under design, will also be expandable to handle the signals in its portion of the corridor.

The corridor presents opportunities for Smart Corridor technology, especially on the east side of the freeway. The relative congestion of the freeway will reduce the priority of the corridor, given other alternatives in the State.

Exhibit 3-13

District 4
Corridor 4-11 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-14

Corridor : 4-11 **Description :** Route 17/880 between Lark Avenue and Route 237

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	33	1	24	24	
2 Surface street capacity/congestion		4	21	84	
3 Local/Regional committment		10	13	130	San Jose is supportive of Smart Corridor Concepts
4 Land use compatibility		9	11	99	
5 Accident/Incident history	47	5	9	45	
6 Environmental		0	7	0	
7 Number of jurisdictions	5	0	6	0	Los Gatos, Campbell, San Jose, Santa Clara, Milpitas
8 Part of larger system		8	4	32	
9 In-place control features		6	3	18	Metered Ramps, Central I/S Control
10 Data availability		8	2	16	
			100	448	

Costs	
Initial (Capital and Implementation)	$21,989,849
10 Year Operations and Maintenance	$17,772,303
Total	$39,762,152
Annualized Cost	$3,976,215
Benefits	
Annual Benefit	$792,000
Benefit/Cost Ratio	0.20

Corridor 4-12

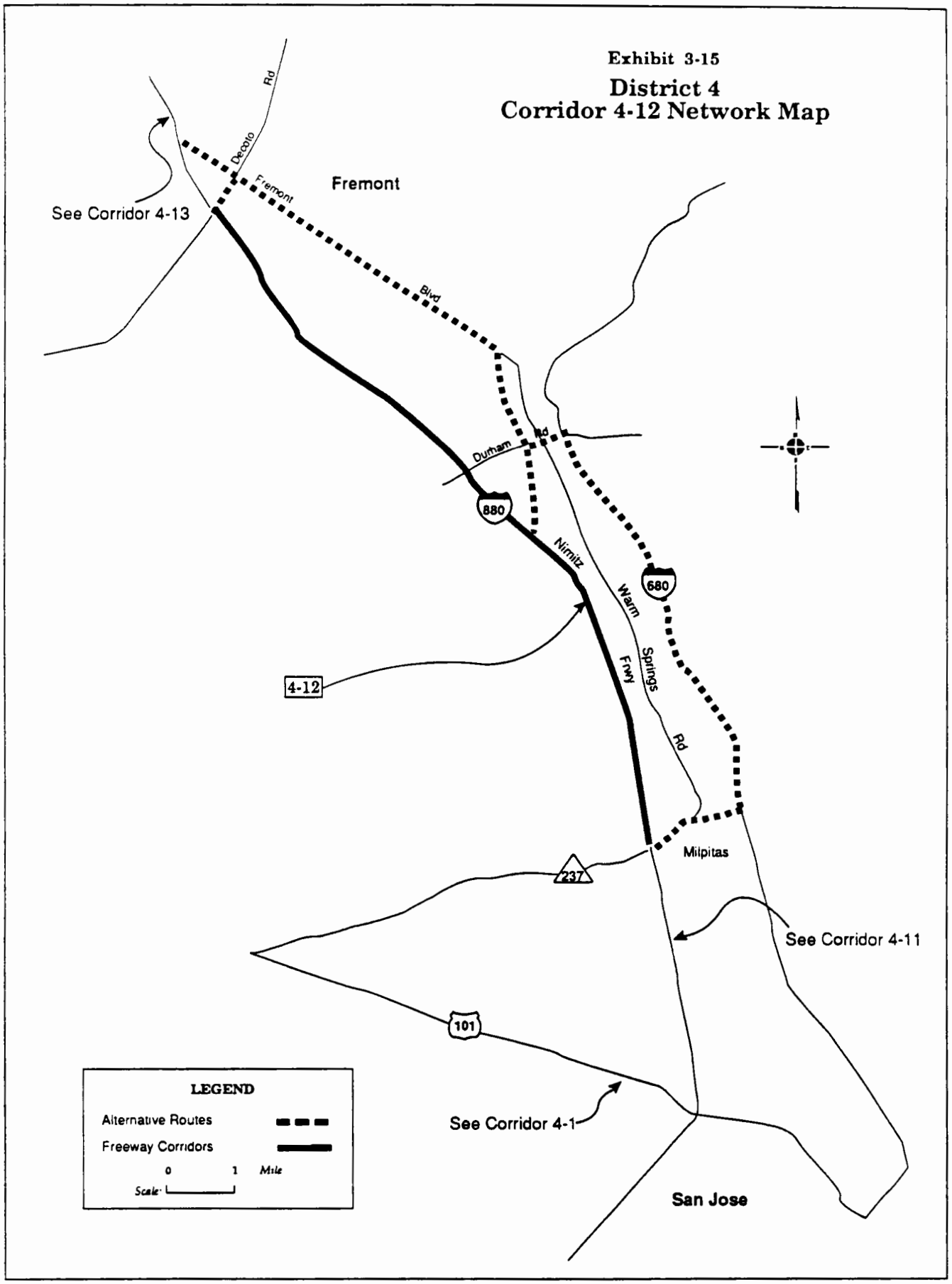
This corridor includes a 12.4 mile segment of Interstate 880 in Santa Clara and Alameda Counties. The corridor covers the section of Interstate 880 between Route 237 in Milpitas and Fremont Boulevard in the northern section of Fremont. The corridor is shown on Exhibit 3-15 and the evaluation summary is shown as Exhibit 3-16. The section is relatively congested and has a moderate accident history. Portions are being widened to provide added capacity. In the southern section of the corridor Route 237 and Interstate 680 serve as alternatives. None of the local parallel facilities provide capacity in this section, although Warm Springs Road will offer capacity when its development is completed. (Sections are currently only 2 lanes for both directions.)

In the area through the City of Fremont, Fremont Boulevard is recommended as an alternative route. The street is generally 4 lanes in width and offers potential for traffic balancing. There are minor sections where improvement is needed and where signalization is required. The land use adjacent to Fremont Boulevard is generally compatible with the arterial nature of an alternative route. Fremont Boulevard ties directly back into Interstate 880 just north of the limits of this corridor section. There are no freeway control features in place in the corridor at this time.

The corridor offers promise for Smart Corridor programs, especially when considering the short section of Interstate 680 as a feeder to the remainder of the corridor. The corridor is somewhat limited because of the capacity of the alternate routes.

Exhibit 3-15

District 4
Corridor 4-12 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-16

Corridor : 4-12 **Description :** Route 880 between Route 237 and Decato Road

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	150	4	24	96	
2 Surface street capacity/congestion		1	21	21	
3 Local/Regional committment		7	13	91	
4 Land use compatibility		9	11	99	
5 Accident/Incident history	30	3	9	27	
6 Environmental		1	7	7	
7 Number of jurisdictions	2	8	6	48	Fremont, Milpitas
8 Part of larger system		6	4	24	
9 In-place control features		0	3	0	
10 Data availability		7	2	14	
			100	427	

Costs	
Initial (Capital and Implementation)	$12,794,176
10 Year Operations and Maintenance	$13,926,589
Total	$26,720,765
Annualized Cost	$2,672,077
Benefits	
Annual Benefit	$4,161,600
Benefit/Cost Ratio	1.56

Corridor 4-13

Corridor 4-13 is a continuation of the corridors on Interstate 880. The corridor is a 10.4 mile section between Decoto Road and Route 238 in San Lorenzo. The corridor is shown on Exhibit 3-17. Route 238 serves as an extension to Interstate 580 which turns northerly to the east of the connector. Alternate routes include Mission Boulevard to the east and Hesperian/Union City Boulevard to the west. The alternate routes provide continuity throughout the corridor, however, there are segments with limited capacity during peak periods.

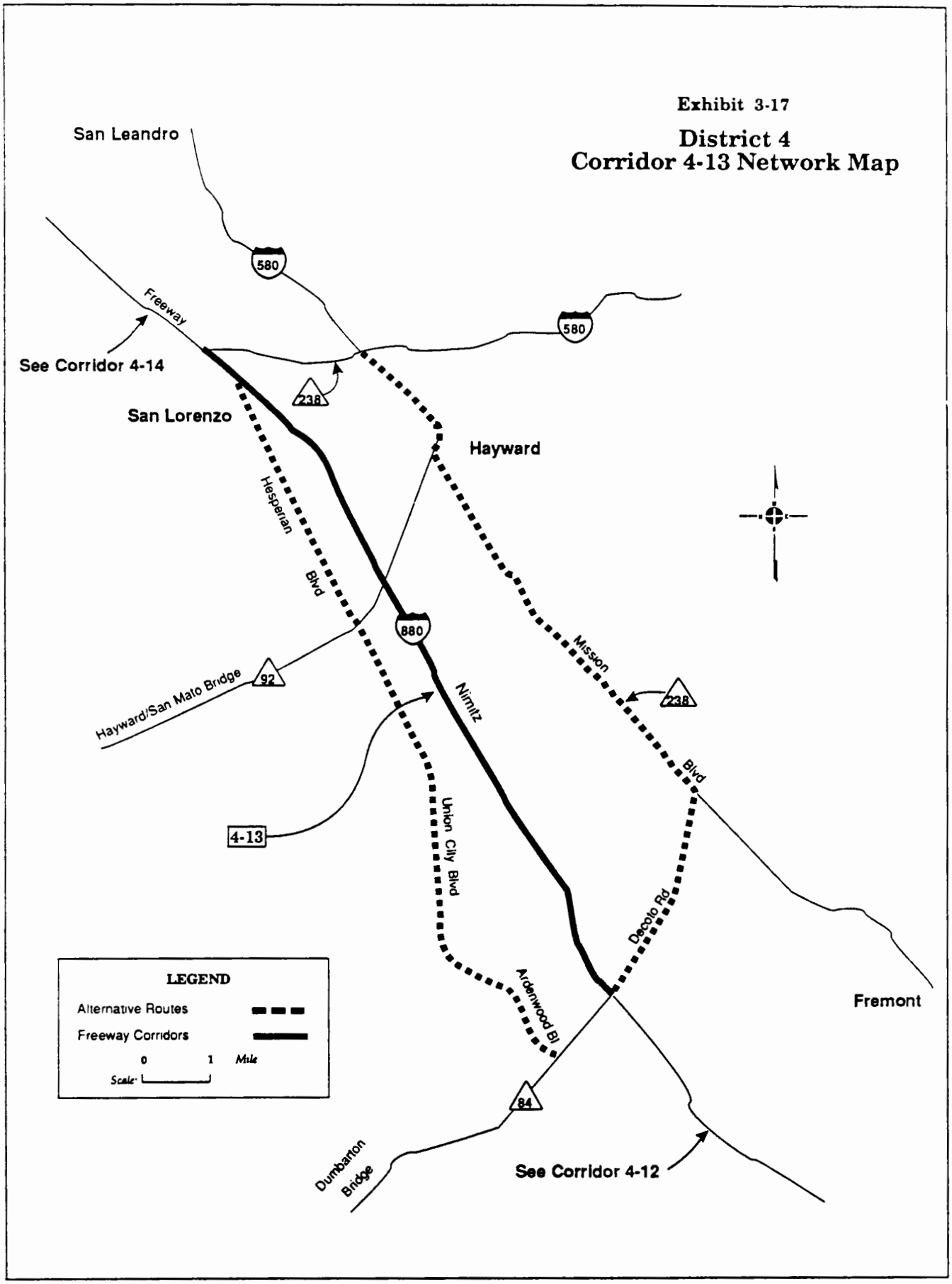
A summary of the corridor evaluation elements is given on Exhibit 3-18. The freeway section is moderately congested and experiences a relatively high accident history. It carries a large number of trucks, with truck percentages approaching 15 percent. Congestion is concentrated around the connections with Route 92 leading to the Hayward/San Mateo Bridge. The land use along the alternatives is generally compatible with their use as primary arterial streets. There are some constrictions in the older business districts, however, they do not negate the value of the route. The corridor passes through four cities and this will complicate its implementation. There does, however, appear to be support for the project. Elements of the corridor also appear in the Route Reliever Study completed by the Metropolitan Transportation Commission.

The corridor is within the limits of the "Cornerstone Project" for the District 4 TOC. This project, which is to be initiated in July, 1990, is to provide a complete freeway surveillance and control system in the corridor, including ramp metering. The design of the project is funded. However, complete implementation funding is not currently available. The designation of the corridor as a part of a Statewide Smart Corridor would compliment Caltrans efforts in implementing this important first element of the district-wide traffic operations center. Traffic signal improvements will be required along the alternate routes and minor geometric improvements may also be required.

The overall evaluation of the corridor is that it is a candidate for Smart Corridor technology. The priority of the corridor is somewhat reduced by the relative congestion levels, however, it is an important element of the District 4 TOC program.

Exhibit 3-17

District 4
Corridor 4-13 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-18

Corridor : 4-13 **Description :** Route 880 between Decato Road and Route 238

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	70	2	24	48	
2 Surface street capacity/congestion		2	21	42	
3 Local/Regional committment		7	13	91	
4 Land use compatibility		8	11	88	
5 Accident/Incident history	65	7	9	63	
6 Environmental		1	7	7	
7 Number of jurisdictions	4	2	6	12	San Lorenzo, Hayward, Union City, Fremont
8 Part of larger system		6	4	24	
9 In-place control features		0	3	0	
10 Data availability		7	2	14	
			100	389	

Costs	
Initial (Capital and Implementation)	$12,434,671
10 Year Operations and Maintenance	$12,284,635
Total	$24,719,306
Annualized Cost	$2,471,931
Benefits	
Annual Benefit	$3,614,400
Benefit/Cost Ratio	1.46

Corridor 4-14

Exhibit 3-19 shows the network for Corridor 4-14. The corridor includes approximately 11.1 miles of Interstate 880 between Route 238 (the connector to Interstate 580) and Interstate 980 in Oakland. This section is immediately north of Corridor 4-13. Interstate 880 in this area is heavily travelled, including serving heavy truck demands. The congestion level is not high when compared to other segments of freeways in California, but it does have a high accident rate which significantly increases the overall delay on the facility.

A primary alternate route, using Hesperian Boulevard as a connector to East 14th Street has been identified for the corridor. This street generally provides four lanes of travel, however, the service levels are not high. The route also passes through the commercial district of San Leandro and into the heart of downtown Oakland. One short section has two lanes in one direction and one lane in the other. This section is considered to be widened as part of the program because it is critical to the overall 11 mile corridor.

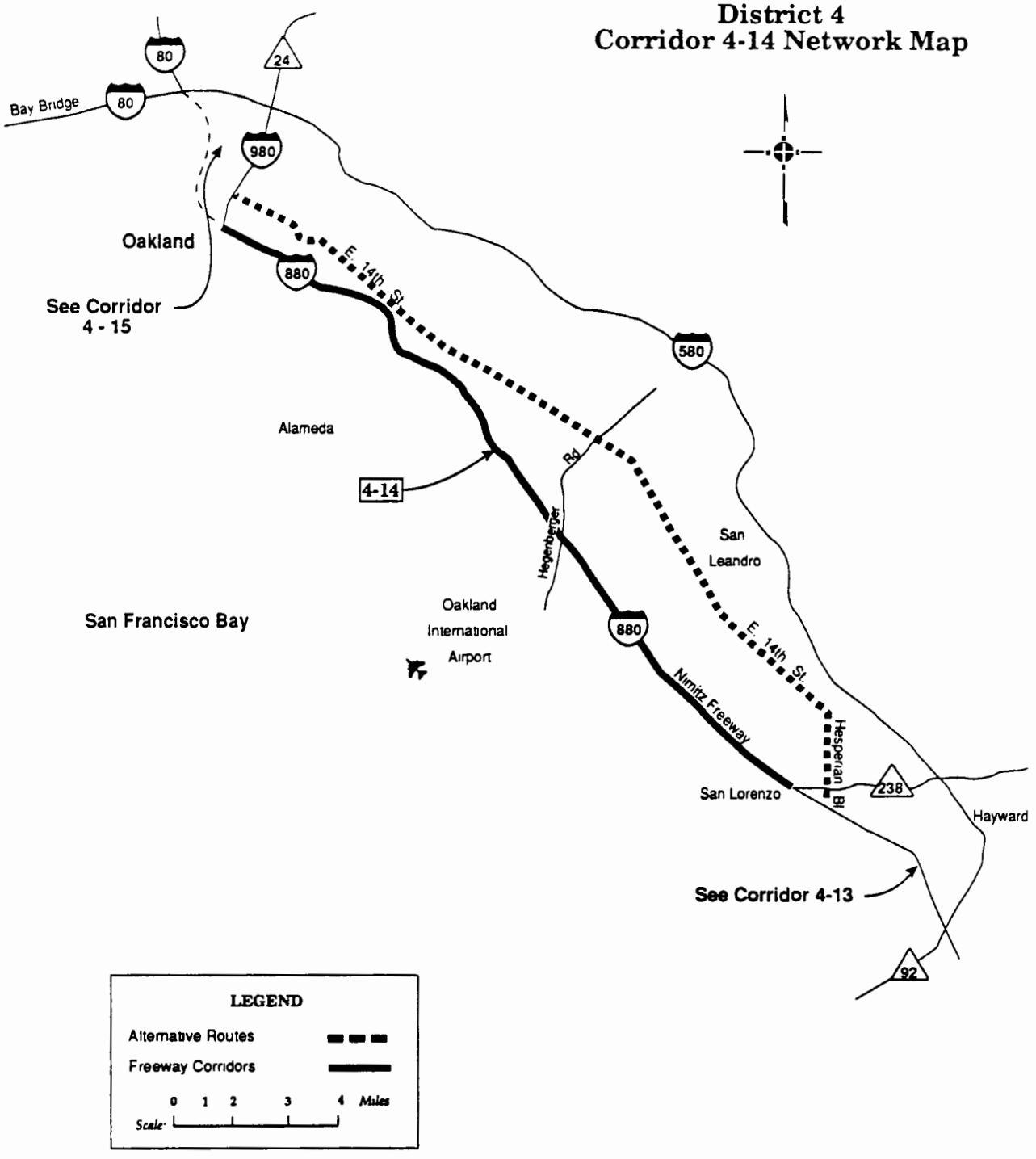
These general capacity factors somewhat reduce the capability of the corridor, however, good route continuity is provided and the land use is generally compatible with the arterial nature of the street. An assessment of the corridor is summarized on Exhibit 3-20.

The corridor passes through the Cities of Oakland and San Leandro and sections under the jurisdiction of Alameda County. There are no significant control features in place, however, the corridor is also included in the District 4 TOC Cornerstone Project referenced for Corridor 4-13. As such, it is planned to provide all aspects of freeway surveillance and control and applicable ramp metering within the five year implementation time frame. The overall budget is not, however, in place. Inclusion of the corridor in a Statewide program would directly compliment the Caltrans program. Improvements will be required throughout the alternate route to provide improved traffic signal operations.

The analysis shows that the overall corridor is susceptible to improvement using Smart Corridor technologies, especially with regard to incident based conditions, but much less than other candidates. Congestion is increasing rapidly in the corridor and capacity increases are being implemented with assistance from local option sales tax funding. The features of the Smart Corridor can be implemented as part of the improvement program, facilitating the implementation effort. Also, the alternate route elements may be viewed as complimentary to construction mitigation actions. The priority of the corridor will be reduced because of its current congestion levels compared to other corridors, however, the importance of the corridor at the District level and the high accident rate stress the need for the control measures mentioned above.

Exhibit 3-19

District 4
Corridor 4-14 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-20

Corridor : 4-14 **Description :** Route 880 between Route 238 and Route 980

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	48	1	24	24	
2 Surface street capacity/congestion		7	21	147	
3 Local/Regional committment		7	13	91	
4 Land use compatibility		7	11	77	
5 Accident/Incident history	76	8	9	72	Large truck volumes increase major incident rate
6 Environmental		0	7	0	
7 Number of jurisdictions	3	5	6	30	Oakland, San Leandro, San Lorenzo
8 Part of larger system		6	4	24	
9 In-place control features		1	3	3	Coordinated Signals
10 Data availability		7	2	14	
			100	482	

Costs	
Initial (Capital and Implementation)	$13,362,171
10 Year Operations and Maintenance	$13,304,231
Total	$26,666,402
Annualized Cost	$2,666,640
Benefits	
Annual Benefit	$720,000
Benefit/Cost Ratio	0.27

Corridor 4-15

This corridor is unique in that it represents the area in Oakland that provides access to the Bay Bridge and to Interstate 80 beyond the distribution structure. The corridor, shown on Exhibit 3-21, includes sections of Interstate 80, 580, and 980. The evaluation of the corridor is summarized on Exhibit 3-22. The corridor provides relief in the freeway segments that have been loaded by the loss of the section of Interstate 880 between the distribution structure and Interstate 980 - the Cypress Structure that collapsed as a result of the October 17, 1989 earthquake. The replacement of the Cypress structure is under review with significant controversy being experienced. The corridor could provide interim relief.

The segment is heavily congested because of the concentration of traffic on the Interstate 980/580 segments and the weaving problems which have developed. The congestion index for this section is the highest in District 4 and although the accident statistics show the history as moderate, they do not reflect the current conditions.

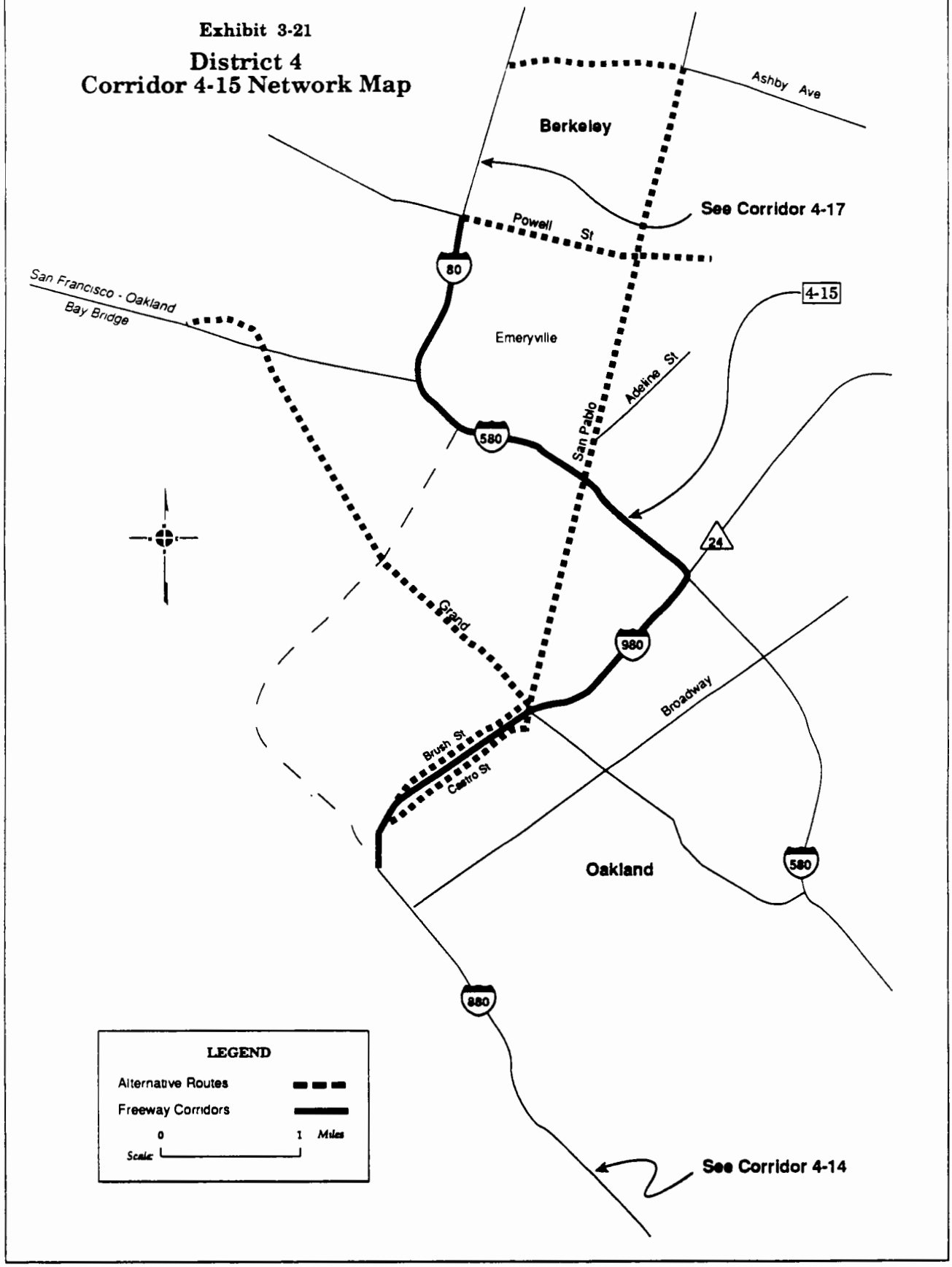
Alternate routes are available as shown on the exhibit. Grand Avenue provides access to and from the Bay Bridge and Oakland/Interstate 980. The connection provides a relief to the heavy merge problem on Interstate 580. Access to Interstate 980 is provided from the high capacity frontage roads. Access to Interstate 80 from the downtown Oakland area is also available using San Pablo Avenue and connections via Powell Street in Emeryville or Ashby Avenue in Berkeley, with Powell Street being the more likely.

The routes pass through the Cities of Oakland and Emeryville with the secondary connection in Berkeley. The adjacent land uses are compatible with the use of the alternate routes. Capacity restrictions exist, particularly at the Powell Avenue and Interstate 80 termination, however delays are not excessive. The use of San Pablo was suggested as part of the previously referenced Route Reliever study and is under consideration in a signal coordination study.

The corridor is also included in the Cornerstone Project phase of the District 4 TOC program. Any actions under a Smart Corridor program would be complimentary to the TOC project. The corridor is susceptible to improvement using Smart Corridor technologies and is a unique opportunity for testing the techniques in a confined area.

Exhibit 3-21

District 4
Corridor 4-15 Network Map



CORRIDOR EVALUATION SUMMARY

Exhibit 3-22

Corridor : 4-15

Route 980/580 between Route 880 and Powell street

Criteria	Weight	Extension	Comments
1 Freeway capac.	24	240	
2 Surface street ca	21	210	
3 Local/Regional co	3	91	
4 Land use compatibil		77	
5 Accident/Incident hist		45	
6 Environmental		35	
7 Number of jurisdictions		48	Oakland, Emeryville
8 Part of larger system		24	
9 In-place control features	3	3	Coordinated Signals
10 Data availability	2	10	
	100	783	

Costs	
Initial (Capital and Implementation)	$11,378,803
10 Year Operations and Maintenance	$10,771,306
Total	$22,150,109
Annualized Cost	$2,215,011
Benefits	
Annual Benefit	$19,951,200
Benefit/Cost Ratio	9.01

Corridor 4-17

Corridor 4-17 is a 7.2 mile section of Interstate 80 between the distribution structure/Interstate 580 and MacDonald Avenue in Richmond. The section is very congested and has an extremely high accident history. The corridor is scheduled for major reconstruction, including providing a high occupancy vehicle lane (HOV) in the southern section. The reconstruction has been programmed but is currently delayed because of funding and institutional difficulties. The corridor is shown on Exhibit 3-23 and the evaluation is summarized on Exhibit 3-24.

The alternate route for this corridor is San Pablo Avenue, as an extension of the alternate shown for Corridor 4-15. San Pablo interchanges directly with Interstate 80 to form the northern terminus of the corridor. At the southern end, access would be via Powell Street or as an extension of San Pablo to either Interstate 580 or 980. The land use along San Pablo Avenue is generally consistent with its use as an arterial street and it has been identified as a reliever route and as a route to be used as part of the construction mitigation plan.

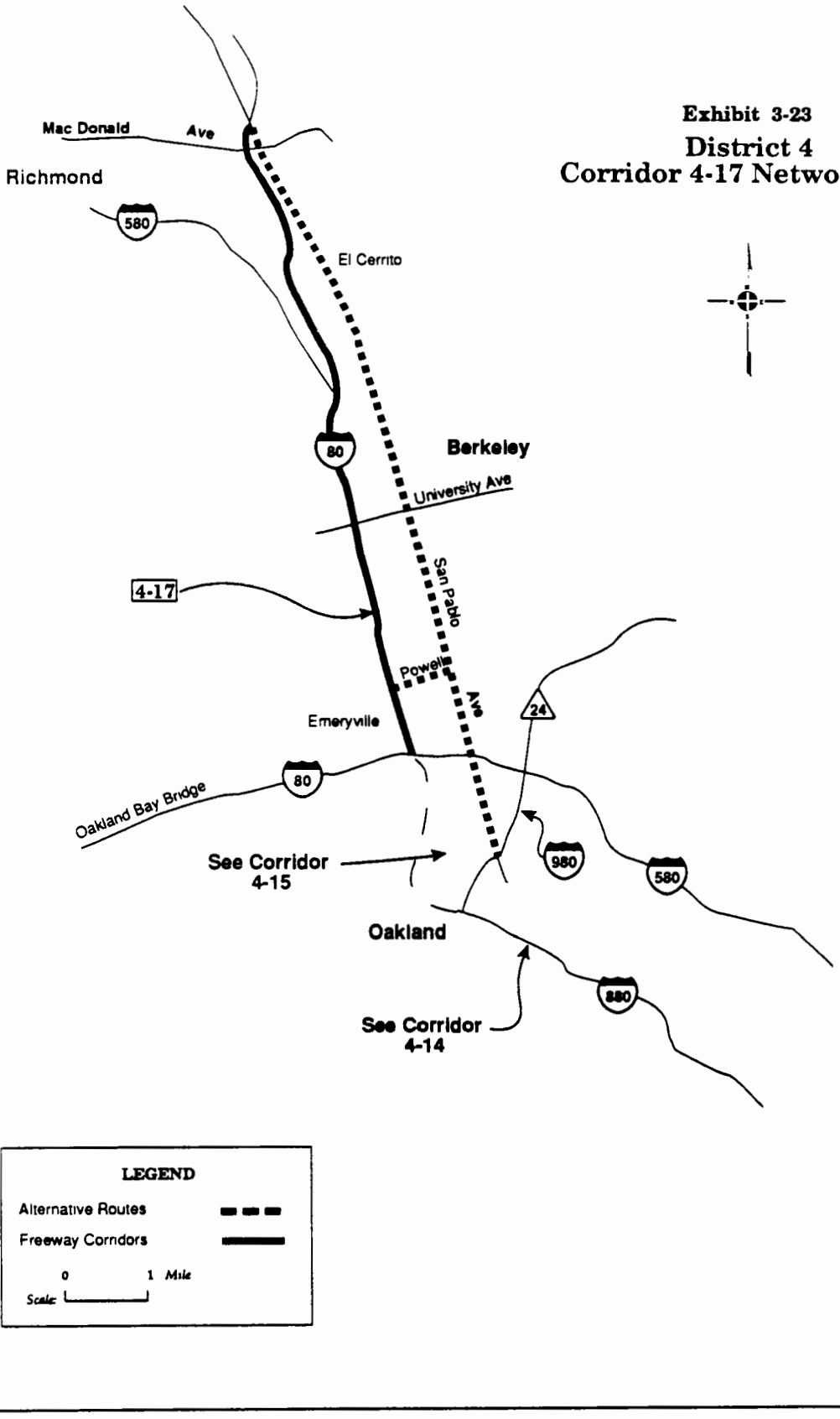
The street does pass through five cities and this significantly increases the difficulty in achieving coordination. This is especially of concern because the involved cities have not been receptive to several of the Caltrans projects proposed for the corridor. At the same time, recent cooperation has been seen in a project to improve signal operations along San Pablo Avenue.

The section of the corridor from the distribution structure/Interstate 580 to the point where Interstate 580 diverges toward the Richmond - San Rafael Bridge is also included in the District 4 TOC Cornerstone Project. This will provide all aspects of freeway surveillance and control for the corridor, however, full funding is not in-place. The Smart Corridor program would be supportive of the TOC project.

The overall opportunity presented by this corridor is very good. The significant problem is the acceptability of the route balancing concept inherent in a Smart Corridor concept. Unless agreement can be reached on the use of the alternate route, the corridor will be extremely difficult to implement.

Exhibit 3-23

District 4
Corridor 4-17 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-24

Corridor : 4-17 **Description :** Route 80 between Powell Street and San Pablo Avenue

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	474	10	24	240	
2 Surface street capacity/congestion		3	21	63	
3 Local/Regional committment		3	13	39	
4 Land use compatibility		7	11	77	
5 Accident/Incident history	102	10	9	90	
6 Environmental		3	7	21	
7 Number of jurisdictions	5	0	6	0	Oakland, Emeryville, Berkeley, El Cerrito, Richmond
8 Part of larger system		4	4	16	
9 In-place control features		1	3	3	
10 Data availability		9	2	18	
			100	567	

Costs

Initial (Capital and Implementation)	$8,858,819
10 Year Operations and Maintenance	$8,375,181
Total	$17,234,000
Annualized Cost	$1,723,400

Benefits

Annual Benefit	$13,212,000
Benefit/Cost Ratio	7.67

Corridor 4-22

This corridor covers a 15.5 mile section of Interstate 280 between Magdalena Avenue in Los Altos and Route 101 in San Jose. The corridor crosses, and interchanges with, Route 17. The corridor network is shown on Exhibit 3-25 and an evaluation summary is presented on Exhibit 3-26. The corridor is relatively heavily congested and has a moderate accident history.

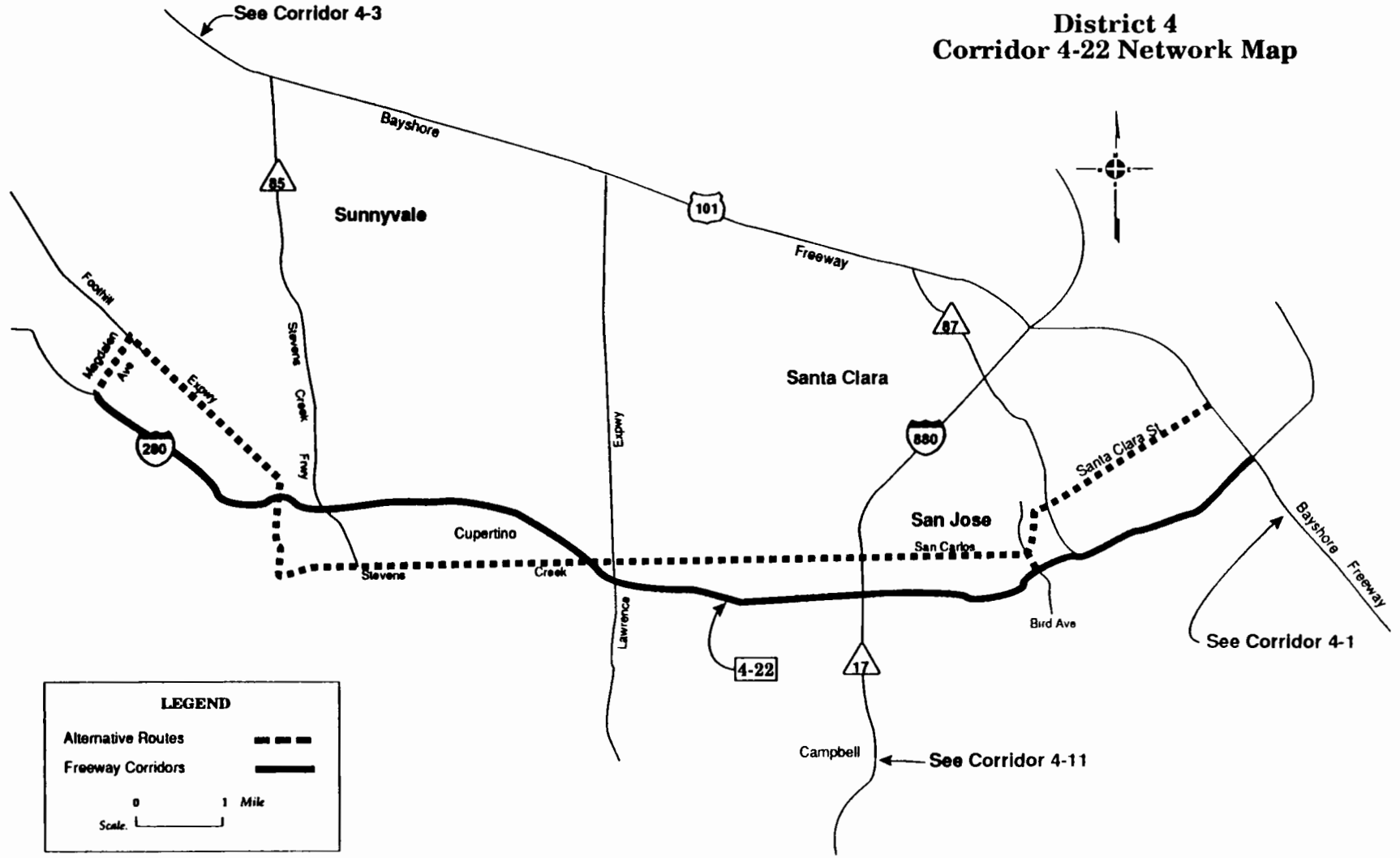
The alternate for the corridor uses Magdalena Avenue to the Foothill Expressway and then connects with Stevens Creek Boulevard. As the corridor approaches downtown San Jose, the route becomes San Carlos Avenue and then connects with Santa Clara Street. The primary alternative connects San Carlos Avenue with Bird Avenue to Interstate 280 to complete the route. San Carlos Avenue is a secondary alternative because of existing congestion and adjacent land use. The alternate provides generally good facilities, however, there are small areas of limited capacity. The land use is generally acceptable, however, there are some abutting residential uses. The residential areas are well designed and are protected from the arterial nature of the routes.

The route passes through four cities, adding to the complexity of implementing the corridor. Some resistance at the north-western end of the corridor may be expected. Five ramps are metered on the corridor and would be included in the Santa Clara coordinated ramp metering system when it is installed. Caltrans is currently developing a project to meter the southbound ramps between Magdalena Avenue and Winchester Boulevard. The City of San Jose is installing a computer controlled signal system and this would facilitate coordination of signals in their area.

The route is a candidate for Smart Corridor technology with its priority limited by the alternate routes and the current level of congestion.

Exhibit 3-25

District 4
Corridor 4-22 Network Map



Note: Primary alternate ends at Bird Avenue with only secondary use of Santa Clara St.

CORRIDOR EVALUATION SUMMARY Exhibit 3-26

Corridor : 4-22 **Description :** Route 280 between Magdalena Ave. and Route 101

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	215	5	24	120	
2 Surface street capacity/congestion		2	21	42	
3 Local/Regional committment		7	13	91	
4 Land use compatibility		9	11	99	
5 Accident/Incident history	54	5	9	45	
6 Environmental		5	7	35	
7 Number of jurisdictions	4	2	6	12	San Jose, Santa Clara, Cupertino, Los Altos
8 Part of larger system		6	4	24	
9 In-place control features		6	3	18	Metered ramps, Central I/S Control Coord. Sig., Fwy det.
10 Data availability		8	2	16	
			100	502	

Costs	
Initial (Capital and Implementation)	$24,535,076
10 Year Operations and Maintenance	$19,314,517
Total	$43,849,593
Annualized Cost	$4,384,959
Benefits	
Annual Benefit	$18,997,200
Benefit/Cost Ratio	4.33

CALTRANS DISTRICT 7 - LOS ANGELES AND VENTURA COUNTIES

The initial review of traffic and congestion data and interviews with local staff resulted in the identification of 48 potential corridors for the application of Smart Corridor technology in Los Angeles and Ventura Counties (44 in Los Angeles County and 4 in Ventura County). The 48 corridors are shown on Exhibit 3-27. All corridors are presented graphically on the first 3 sheets of the exhibit and the final corridors are summarized on the fourth sheet.

During the initial screening process, 22 of the corridors were eliminated from detailed consideration. Twenty-one of these corridors were eliminated due to either a relatively low level of existing delay (when compared to the other corridors throughout the State), a lack of any potential alternate routes, or a failure to satisfy corridor definition criteria regarding lengths and widths. One of the corridors (Corridor 7-9, the Santa Monica Freeway between the Harbor Freeway and Centinela Avenue) was eliminated from further consideration in this study since it is the Smart Corridor demonstration project. During review with the Steering Committee, three corridors were recommended for reconsideration (Corridors 7-16, 7-26, and 7-29). Information as provided to the Steering Committee which summarizes the reasons for elimination by corridor is included in Appendix B.

The 26 corridors (23 original plus 3 reconsidered) were included in the detailed evaluation process. Of these 26, 6 were eliminated as a result of further evaluation. Three of the six were those reconsidered (Corridors 7-16, 7-26 and 7-29) and they were again eliminated since further review of available delay data and field observations indicated that the existing level of delay in these corridors, when compared to the other corridors, is lower than the minimum required to pass the initial screening.

Corridor 7-3, the Santa Ana Freeway (I-5) between Route 91 and I-605, was eliminated due to a lack of suitable alternate routes to the north of the freeway coupled with the availability of the 91 and 605 freeways as an alternate triangular route. Diversion within this corridor is therefore better suited to a freeway TOC than a Smart Corridor. Corridor 7-7, the Golden State Freeway (I-5) between Sunland Boulevard and Roxford Street in the San Fernando Valley, was eliminated since the two potential alternate routes (San Fernando Road and Laurel Canyon Boulevard) would require significant capacity improvements along their length. Laurel Canyon Road also passes through sensitive residential areas. Corridor 7-28,

the Pasadena Freeway (Route 110) between I-5 and the freeway terminus in Pasadena, was eliminated due to the presence of sensitive land uses along each of the potential alternate routes.

Of the 20 corridors which survived both the initial screening and the detailed evaluation, seven were combined with adjacent corridors to form three new corridors (7-22, 7-23 and 7-31 combined into 7-22; 7-34 and 7-35 combined into 7-34; 7-38 and 7-39 combined into 7-38). The freeway corridor that included Interstate 10 and Route 60 just east of the downtown area (Corridor 7-2) was split into two corridors (7-2a and 7-2b), one for each of the two freeways. This was done to reflect the truly independent nature of their alternate route networks.

Thus, a total of 17 corridors are included in the final evaluation for District 7, each of which is discussed on the following pages.

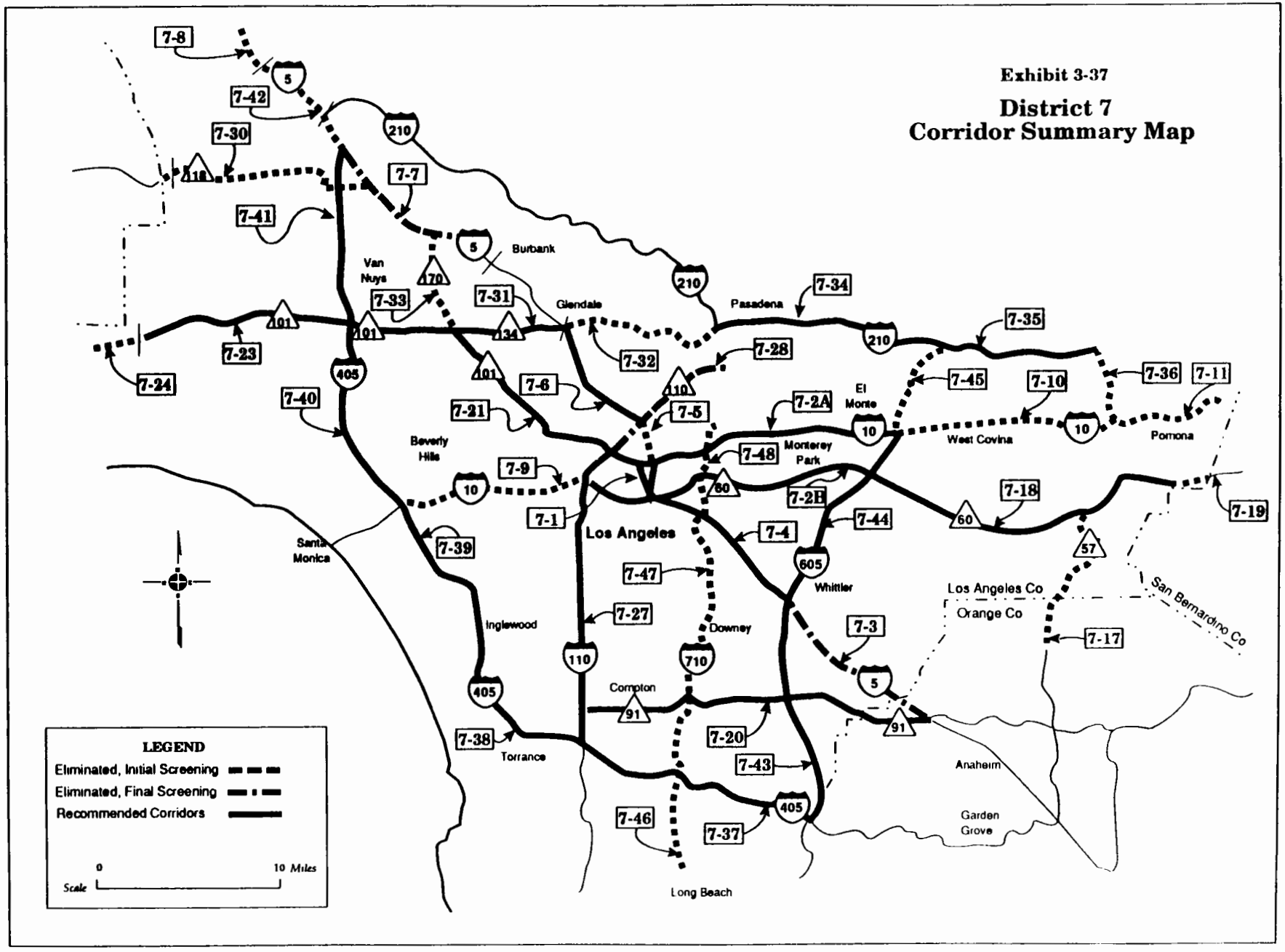


Exhibit 3-37
District 7
Corridor Summary Map
7-8
7-42
7-30
7-7
7-41
7-23
7-24
7-40
7-21
7-6
7-5
7-2A
7-48
7-2B
7-9
7-1
7-39
7-4
7-44
7-47
7-27
7-3
7-20
7-43
7-38
7-46
7-37
7-32
7-28
7-34
7-35
7-45
7-10
7-36
7-11
7-18
7-19
7-17
Van Nuys
Burbank
Glendale
Pasadena
El Monte
West Covina
Pomona
Beverly Hills
Monterey Park
Los Angeles
Santa Monica
Inglewood
Whittier
Downey
Compton
Torrance
Long Beach
Anaheim
Garden Grove
Los Angeles Co
Orange Co
San Bernardino Co
LEGEND
Eliminated, Initial Screening
Eliminated, Final Screening
Recommended Corridors
0
10 Miles
Scale

Exhibit 3-27 (Continued)

District 7
Corridor Summary Map

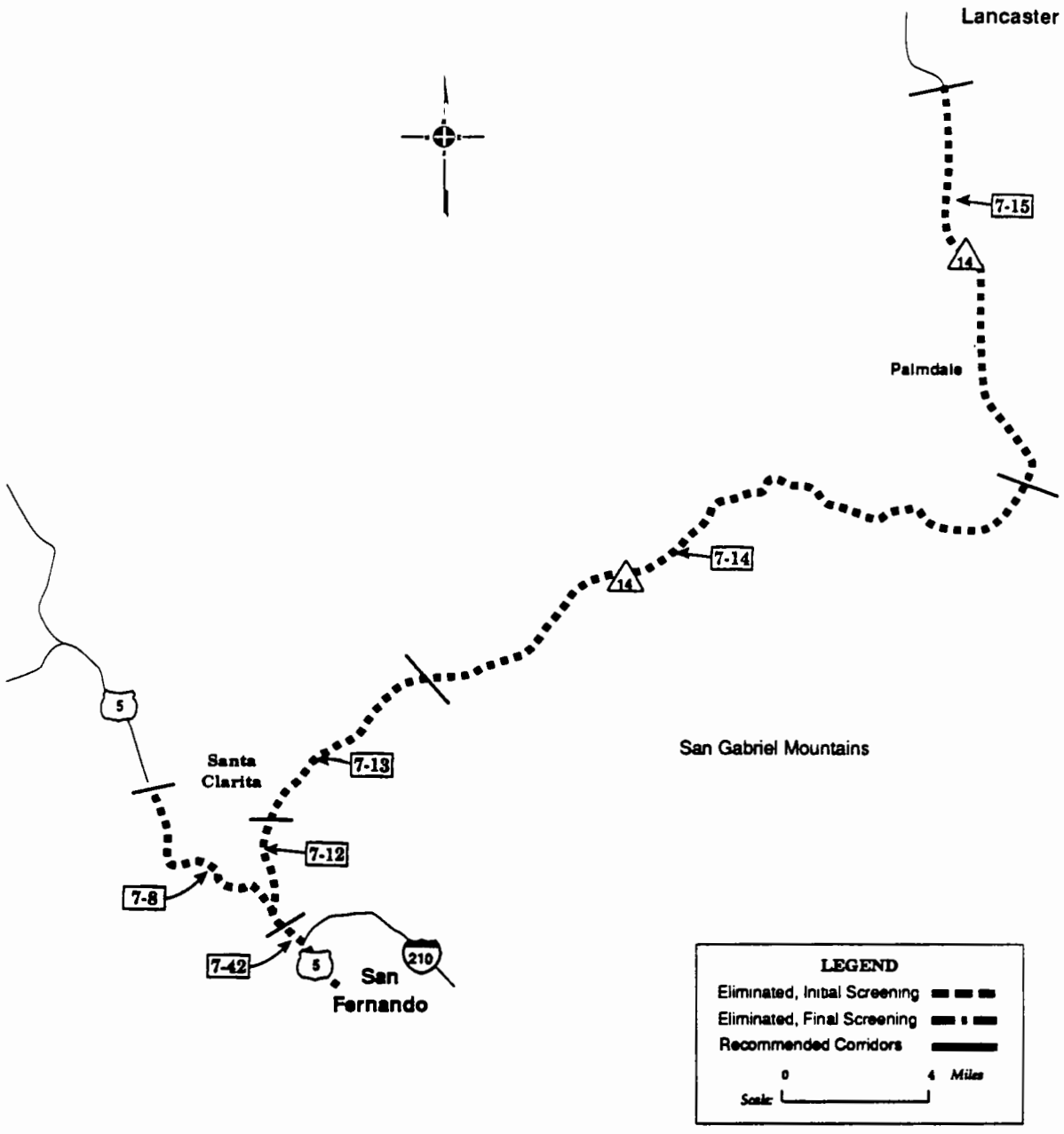


Exhibit 3-27 (Continued)

District 7
Corridor Summary Map

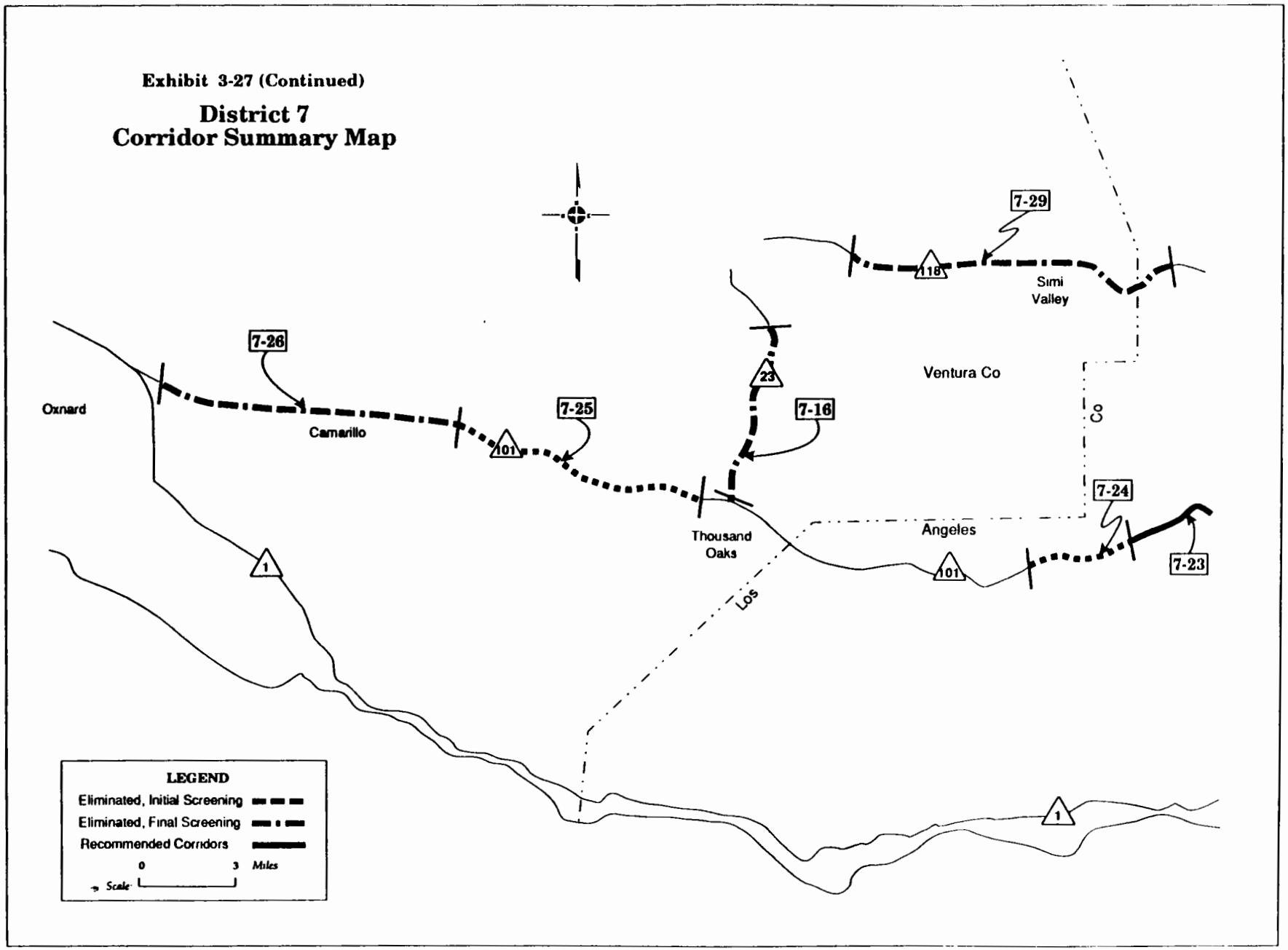


Exhibit 3-27 (Continued)

District 7
Corridor Summary

District/ Corridor	Description	Distance (Miles)	B/C Ratio	Score	Initial Cost	10 Year O&M Cost	Combination of Corridors
7 - 1	I-5, I-10, US 101 and I-110 (Downtown Los Angeles Ring)	10.4	3.03	610	$19,437,321	$15,425,355	
7 - 2a	I-10 between I-5 and I-605	12.8	1.70	530	$14,154,993	$15,230,686	Route 10 part of 7-2
7 - 2b	Route 60 between I-5 & I-605	11.7	8.45	621	$11,043,590	$13,777,898	Route 60 part of 7-2
7 - 4	I-5 between I-605 & Route 60	9.6	8.96	766	$11,771,473	$12,289,720	
7 - 6	I-5 between Route 110 and Route 134	6.7	1.03	516	$9,529,434	$9,561,479	
7 - 18	Route 60 between I-605 and Route 71	17.7	0.68	497	$14,052,665	$15,878,578	
7 - 20	Route 91 between I-10 and Beach Boulevard	17.0	5.04	614	$16,656,839	$17,014,675	
7 - 21	US 101 between I-110 and Route 134	10.2	2.33	763	$12,797,669	$12,208,457	
7 - 22	US 101 between Valley Circle Boulevard and I-5	21.6	3.88	784	$18,970,566	$18,882,103	7-22, 7-23, 7-31
7 - 27	I-110 between I-405 and I-10	12.6	3.93	731	$14,344,533	$14,788,942	
7 - 34	I-210 between Route 134 and Route 30	19.8	2.23	468	$14,006,074	$14,054,519	7-34, 7-35
7 - 37	I 405 between I-605 and I-110	13.0	1.03	675	$15,722,016	$15,053,053	
7 - 38	I-405 between I-110 and I-10	16.5	9.94	714	$17,443,904	$18,559,819	7-38, 7-39
7 - 40	I-405 between I-10 and US 101	9.9	8.27	721	$8,827,579	$11,391,877	
7 - 41	I-405 between US 101 and I-5	9.2	0.63	468	$10,333,471	$10,335,639	
7 - 43	I-605 between I-405 and I-5	11.3	1.45	484	$13,687,400	$14,278,125	
7 - 44	I-605 between I-5 and I-10	10.6	0.90	498	$11,573,058	$13,074,822	
		Total District Costs			$234,352,585	$241,805,747	

Corridor 7-1

Corridor 7-1 comprises the five freeways which ring downtown Los Angeles: the Golden State Freeway (I-5) between I-10 and Route 60; the Santa Monica Freeway (I-10) between I-110 and I-5/US 101; the San Bernardino Freeway (I-10) between US 101 and I-5; the Santa Ana Freeway (US 101) between I-110 and Route 60/I-10; and the Harbor Freeway (I-110) between I-10 and US 101. This corridor is contained entirely within the City of Los Angeles.

These freeways serve two primary purposes: carrying through traffic around the downtown area; and distributing traffic between the various radial freeways leading out from the downtown area and the downtown grid street system. As such, it is logical to consider the freeways together as a single loop system. Each of the major surface streets providing access between the freeway ring and downtown would be part of the Smart Corridor system.

Since this system would include a grid of both east-west and north-south streets, as well as a circular ring of freeways rather than a corridor, it is not possible to fully quantify the reductions in delay which may be achieved using the methods developed in this study (which are primarily directed at a linear corridor). However, it is believed that significant benefits would be achieved through implementation of Smart Corridor technologies to better manage traffic in the downtown Los Angeles area, and the corridor was therefore given a relatively high rating in the evaluation matrix for congestion relief.

Corridor 7-1 would serve as a necessary core of any potential larger system including freeways radiating out from the downtown area. It is therefore recommended that the downtown Smart "Ring" be implemented if one or more of the radial freeway corridors (Corridors 7-2a, 7-2b, 7-4, 7-21 or 7-27) are to be implemented.

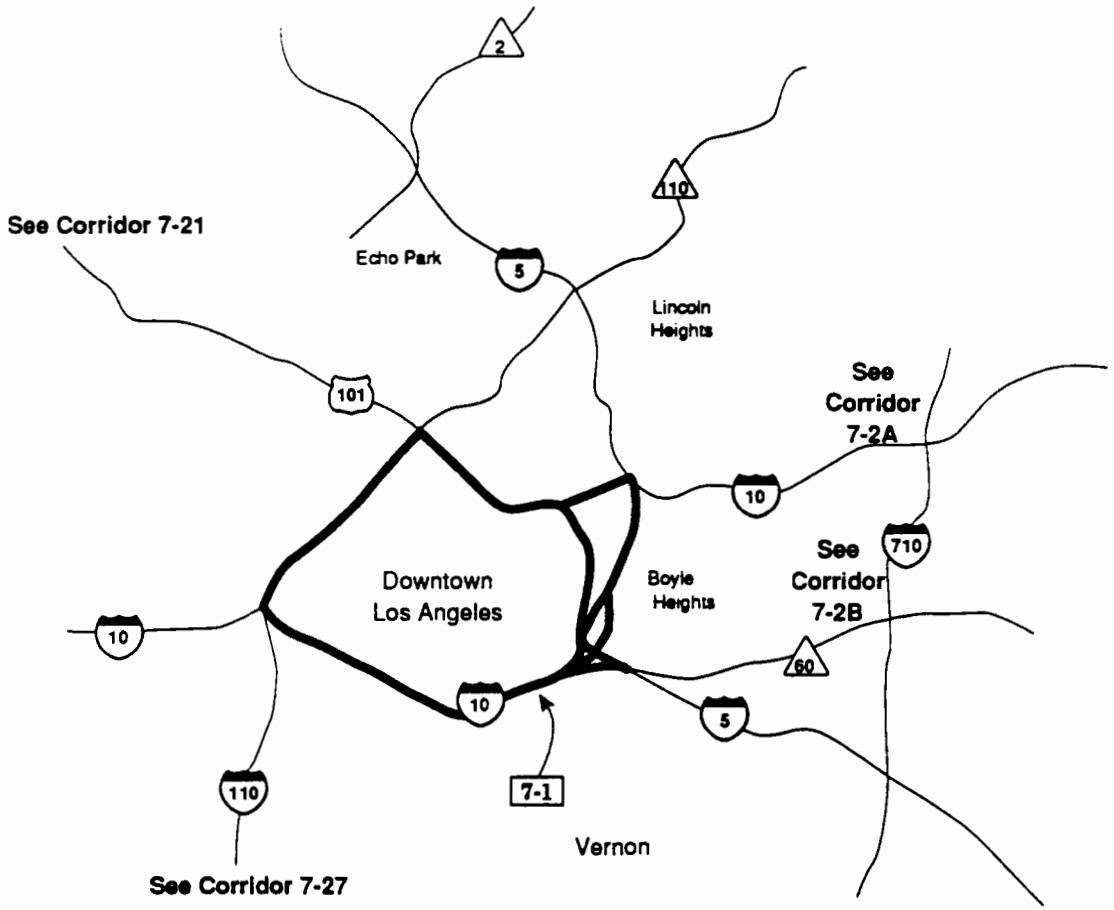
Many of the on-ramps around the ring of freeways are metered, and the area is controlled by the District 7 TOC. Also, the City of Los Angeles' ATSAC system of centralized signal control has recently been installed throughout much of the downtown area.

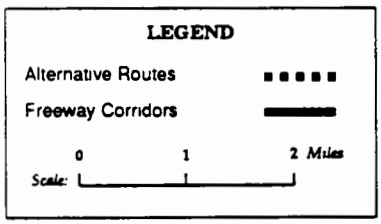
It is of interest to note that this corridor has the highest recorded accident rate of all the candidate corridors statewide, at an estimated value of 149 accidents per mile per year.

The corridor network is shown on Exhibit 3-28 and an evaluation summary is presented on Exhibit 3-29.

Exhibit 3-28

District 7
Corridor 7-1 Network Map





CORRIDOR EVALUATION SUMMARY Exhibit 3-29

Corridor : 7-1 **Description :** I-5,I-10,US 101& I-110 (Downtown Los Angeles Ring)

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	463	10	24	240	
2 Surface street capacity/congestion		0	21	0	
3 Local/Regional committment		10	13	130	
4 Land use compatibility		0	11	0	
5 Accident/Incident history	149	10	9	90	
6 Environmental		0	7	0	
7 Number of jurisdictions	1	10	6	60	City of Los Angeles
8 Part of larger system	6	10	4	40	
9 In-place control features		10	3	30	
10 Data availability		10	2	20	
			100	610	

Costs		
Initial (Capital and Implementation)	$19,437,321	
10 Year Operations and Maintenance	$15,425,355	
Total	$34,862,676	
Annualized Cost	$3,486,268	
Benefits		
Annual Benefit	$10,564,800	**
Benefit/Cost Ratio	3.03	

** Benefit Computed using historical results for similiar project rather than the computational process developed for other corridors, reflecting the unusual conditions of the "corridor".

Corridor 7-2a

Corridor 7-2a is the San Bernardino Freeway (I-10) between the Golden State Freeway (I-5) in Los Angeles and the San Gabriel River Freeway (I-605) in Baldwin Park. In the initial identification of candidate corridors, this section of I-10 was paired with the Pomona Freeway (Route 60) as a double freeway corridor (Corridor 7-2), due to the proximity of the two parallel freeways. However, through further development and review of the potential alternate routes during the detailed evaluation process it was determined that the two freeways would function as independent Smart Corridors, and Corridor 7-2 was divided into 7-2a and 7-2b.

The primary alternate routes for this corridor are Valley Boulevard on the north and Garvey Avenue on the south. Mission Road and Ramona Boulevard would serve as extensions of these routes at either end of the corridor. North Main Street could also serve as a connector between Valley Boulevard and the downtown Los Angeles area, although use of North Main Street to Alameda Street would require geometric improvements and repaving of Alameda Street and the North Main Street/Alameda Street intersection.

Corridor 7-2a connects with the downtown Los Angeles freeway loop (Corridor 7-1) on the west, and therefore could be part of a larger system serving the central Los Angeles area. Valley Boulevard also continues to the east as an alternate route for Route 60 in Corridor 7-18.

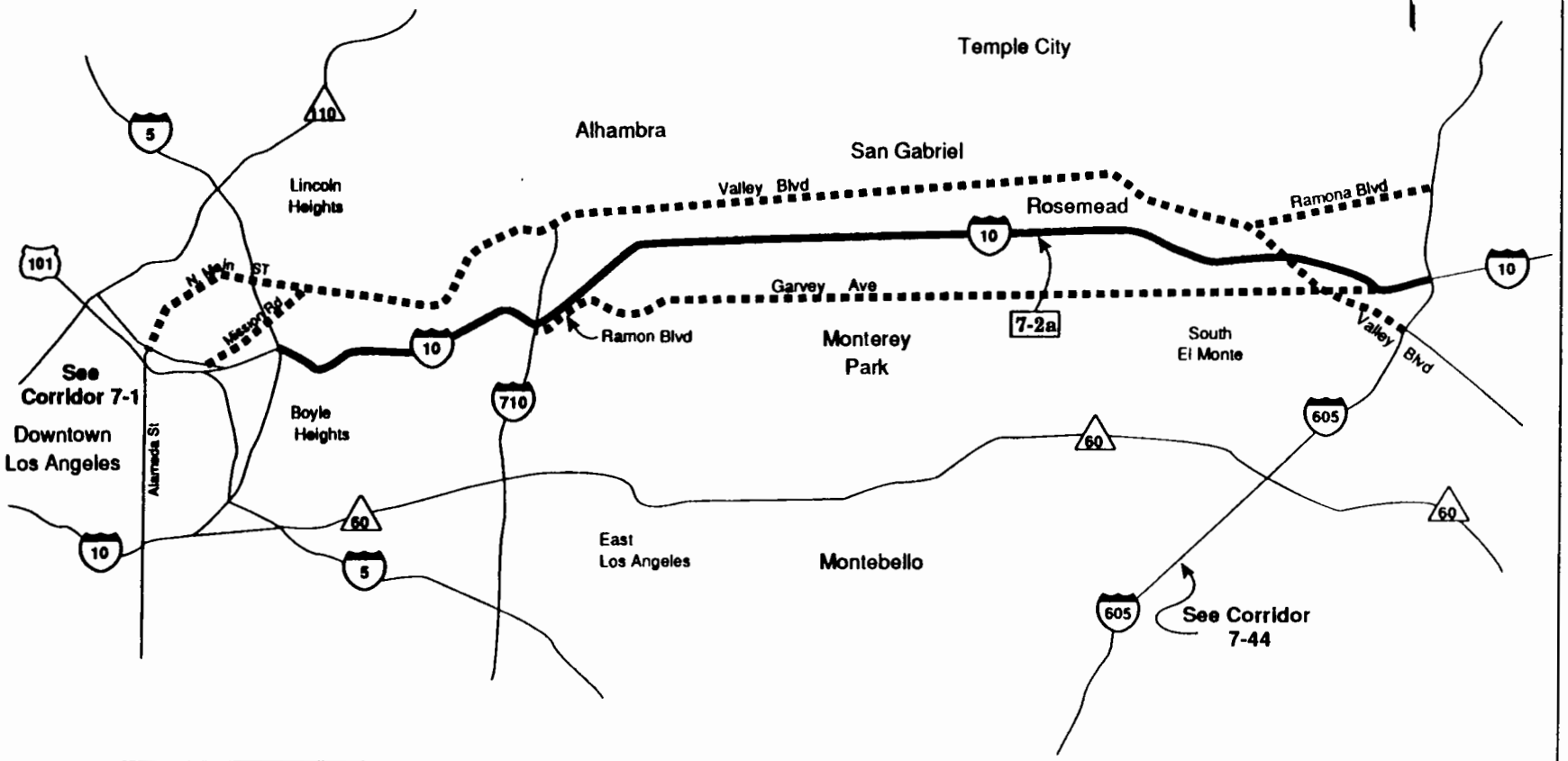
The on-ramps along this portion of I-10 are metered, and are controlled from the District 7 TOC.

High levels of activity and close signal spacing limit the available capacity along Garvey Avenue through the concentrated business district in Monterey Park.

The corridor network is shown on Exhibit 3-30 and an evaluation summary is presented on Exhibit 3-31.

Exhibit 3-30

District 7
Corridor 7-2A Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-31

Corridor : 7-2a **Description :** I-10 between I-5 & I-605

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	272	7	24	168	
2 Surface street capacity/congestion		4	21	84	
3 Local/Regional committment		5	13	65	High for LA in west, lower for cities in east
4 Land use compatibility		7	11	77	7 through Chinese business districts, 8 elsewhere
5 Accident/Incident history	66	7	9	63	
6 Environmental		1	7	7	
7 Number of jurisdictions	10	0	6	0	LA Co, Cities of LA, Alhambra, Rosemead + 6 others
8 Part of larger system		8	4	32	
9 In-place control features		6	3	18	
10 Data availability		8	2	16	
			100	530	

Costs	
Initial (Capital and Implementation)	$14,154,993
10 Year Operations and Maintenance	$15,230,686
Total	$29,385,679
Annualized Cost	$2,938,568
Benefits	
Annual Benefit	$4,996,800
Benefit/Cost Ratio	1.70

Corridor 7-2b

Corridor 7-2b is the Pomona Freeway (Route 60) between the Santa Ana Freeway (I-5) at the East Los Angeles interchange and the San Gabriel River Freeway (I-605) in the Whittier Narrows area. In the initial identification of candidate corridors, this section of Route 60 was paired with the San Bernardino Freeway (I-10) as a double freeway corridor (Corridor 7-2), due to the proximity of the two parallel freeways. However, through further development and review of the potential alternate routes during the detailed evaluation process it was determined that the two freeways would function as independent Smart Corridors, and Corridor 7-2 was divided into 7-2a and 7-2b.

The single suitable alternate route for the western portion of this corridor is 3rd Street/4th Street/3rd Street/Pomona Boulevard (a continuous route with name changes) between downtown Los Angeles and Route 60 in Montebello. This route would utilize the Pomona Boulevard/Via Campo freeway frontage roads at the eastern end of the route. The alternate route for the eastern portion of the corridor is Beverly Boulevard from Pomona Boulevard to I-605. Brooklyn Avenue and Whittier Boulevard were also evaluated as potential routes, but were eliminated from consideration due to land use sensitivity, particularly in the East Los Angeles business district along Whittier Boulevard.

Corridor 7-2b connects with the downtown Los Angeles freeway loop (Corridor 7-1) on the west, and therefore could be part of a larger system serving the central Los Angeles area. Route 60 also continues as Corridor 7-18 to the east.

The on-ramps along this portion of Route 60 are metered, and are controlled from the District 7 TOC.

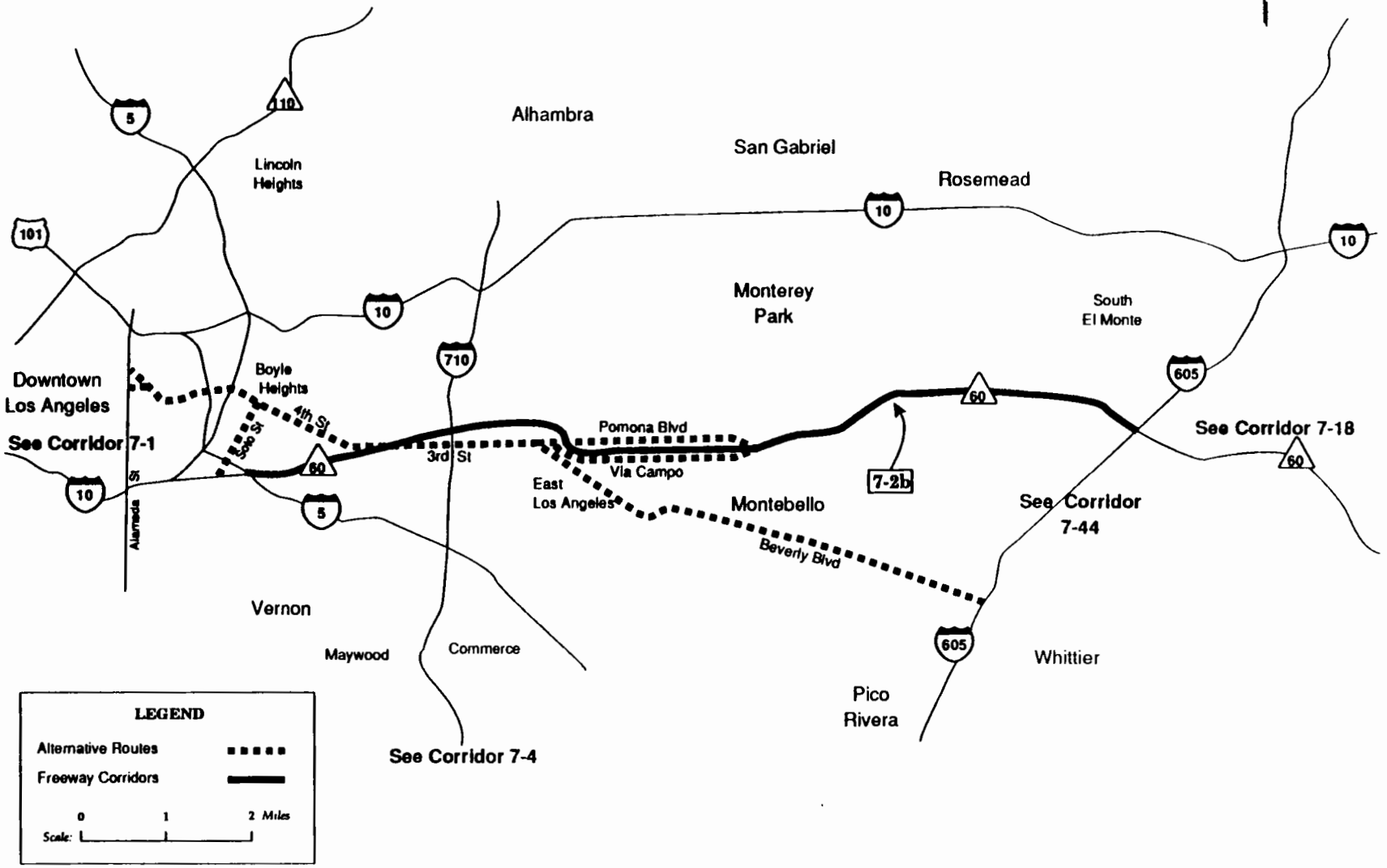
Use of Pomona and Beverly Boulevards as alternates to relieve freeway incidents during mid-day periods may be difficult due to the high number of funeral processions observed along these routes, which are escorted and typically preempt normal traffic flows. Use of these routes during morning and evening peak periods, however, is not expected to be significantly impacted by the funeral processions.

It is of interest to note that this corridor has the second highest recorded freeway delay of all the candidate corridors statewide, with an estimated 570 vehicle hours of delay per mile per day.

The corridor network is shown on Exhibit 3-32 and an evaluation summary is presented on Exhibit 3-33.

Exhibit 3-32

District 7
Corridor 7-2B Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-33

Corridor : 7-2b **Description :** Route 60 between I-5 & I-605

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	570	10	24	240	
2 Surface street capacity/congestion		3	21	63	
3 Local/Regional committment		6	13	78	High in LA City & Co, lower in Montebello & Pico Rivera
4 Land use compatibility		8	11	88	
5 Accident/Incident history	54	5	9	45	
6 Environmental		5	7	35	
7 Number of jurisdictions	5	0	6	0	LA Co, Cities of LA, Montebello, Pico Rivera, Whittier
8 Part of larger system		8	4	32	
9 In-place control features		8	3	24	
10 Data availability		8	2	16	
			100	621	

Costs	
Initial (Capital and Implementation)	$11,043,590
10 Year Operations and Maintenance	$13,777,898
Total	$24,821,488
Annualized Cost	$2,482,149
Benefits	
Annual Benefit	$20,977,200
Benefit/Cost Ratio	8.45

Corridor 7-4

Corridor 7-4 is the Santa Ana Freeway (I-5) between the San Gabriel River Freeway (I-605) in Downey and the Pomona Freeway (Route 60) at the East Los Angeles interchange in Los Angeles.

The primary alternate route for this corridor is Telegraph Road between I-605 and Olympic Boulevard. This route would continue into downtown Los Angeles via Olympic Boulevard. Geometric and signalization improvements may be required at the Telegraph Road/Olympic Boulevard intersection to facilitate the required turn in the route at this location. Similar improvements may also be required at the seven-way "mixmaster" intersection in the City of Commerce to improve flow along Telegraph as it jogs via Atlantic Boulevard through the intersection.

Washington Boulevard between Telegraph Road and Alameda Street would serve as a secondary alternate, although the Smart Corridor system would need to be designed to ensure that motorists do not continue into downtown Los Angeles via Washington Boulevard due to the presence of the Long Beach-Los Angeles light rail line along Washington west of Long Beach Boulevard. A third potential alternate is Florence Avenue between I-5 and I-710 in the Cities of Downey and Bell Gardens. Florence should only be used if needed, due to its distance from I-5 (greater than three miles) at its connection with I-710.

Corridor 7-4 connects with the downtown Los Angeles freeway loop (Corridor 7-1) on the west, and therefore could be part of a larger system serving the central Los Angeles area.

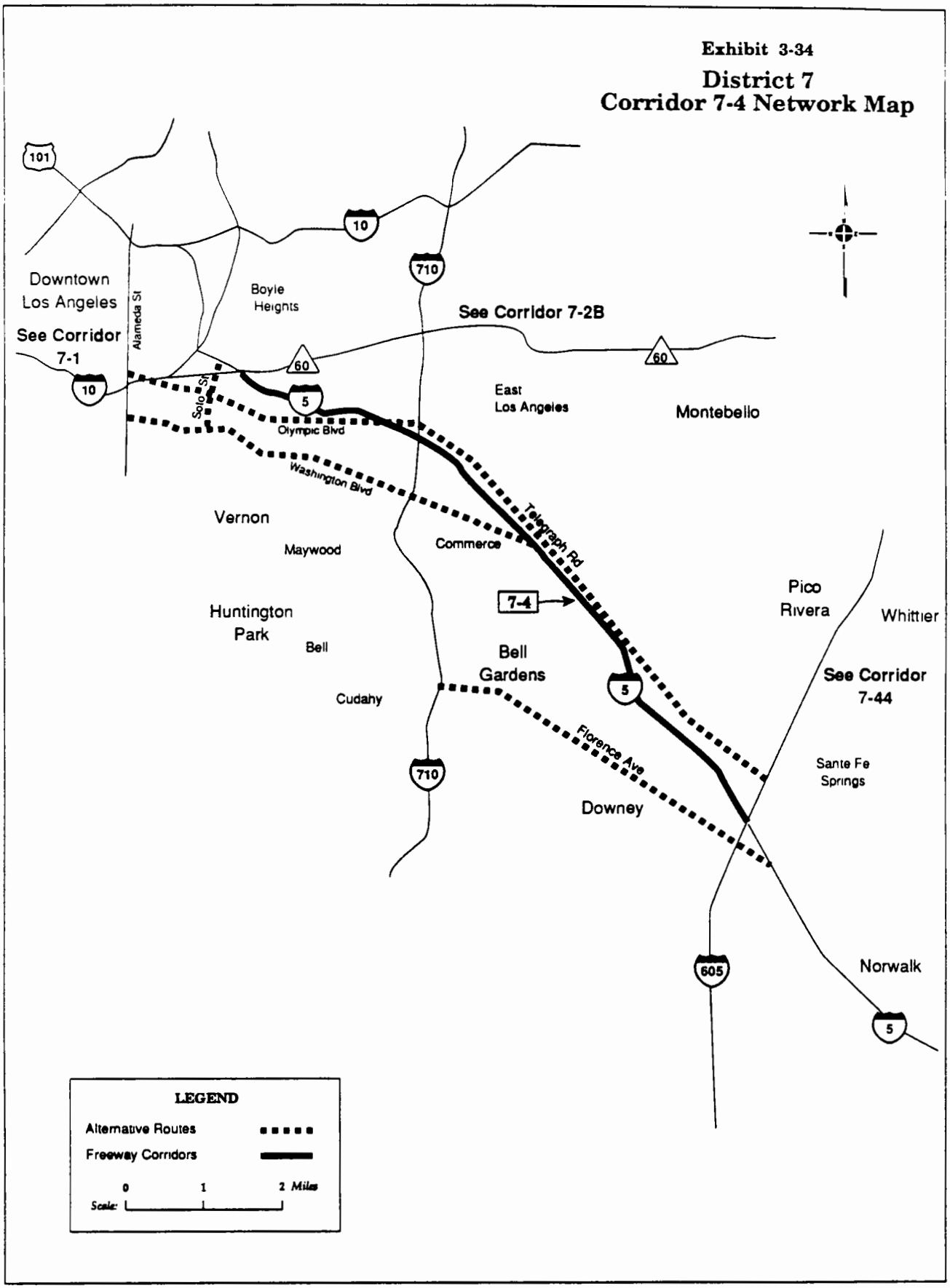
The on-ramps along this portion of I-5 are metered, and are controlled from the District 7 TOC.

It is of interest to note that this corridor has the second highest recorded accident rate of all the candidate corridors statewide, at an estimated value of 112 accidents per mile per year.

The corridor network is shown on Exhibit 3-34 and an evaluation summary is presented on Exhibit 3-35.

Exhibit 3-34

District 7
Corridor 7-4 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-35

Corridor : 7-4 **Description :** I-5 between I-605 & Route 60

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	311	8	24	192	
2 Surface street capacity/congestion		8	21	168	
3 Local/Regional committment		10	13	130	High for use of Telegraph & Washington; lower if Florence included
4 Land use compatibility		8	11	88	9 through industrial areas, 8 elsewhere
5 Accident/Incident history	112	10	9	90	
6 Environmental		5	7	35	
7 Number of jurisdictions	8	0	6	0	LA Co, Cities of LA, Downey, Montebello + 4 others
8 Part of larger system		8	4	32	
9 In-place control features		5	3	15	
10 Data availability		8	2	16	
			100	766	

Costs	
Initial (Capital and Implementation)	$11,771,473
10 Year Operations and Maintenance	$12,289,720
Total	$24,061,193
Annualized Cost	$2,406,119
Benefits	
Annual Benefit	$21,556,800
Benefit/Cost Ratio	8.96

Corridor 7-6

Corridor 7-6 is the Golden State Freeway (I-5) between the Pasadena Freeway (Route 110) and the Ventura Freeway (Route 134).

The primary alternate route for this corridor is San Fernando Road between North Broadway and Western Avenue. Avenue 26 would provide direct access between San Fernando Road and I-5 at the southern end of the corridor. Two additional routes would connect San Fernando Road through Chinatown into downtown Los Angeles: Pasadena Avenue to North Broadway; and Avenue 26 to Daly Street to North Main Street. Each of these connections into downtown Los Angeles requires turns and may therefore require geometric and signalization improvements at key intersections to facilitate the turns. Also, use of the Daly Street to North Main Street route would require geometric improvements and repaving of Alameda Street and the North Main Street/Alameda Street intersection. Furthermore, these routes pass through the Chinatown area and are typically congested during the evening peak period (particularly North Broadway).

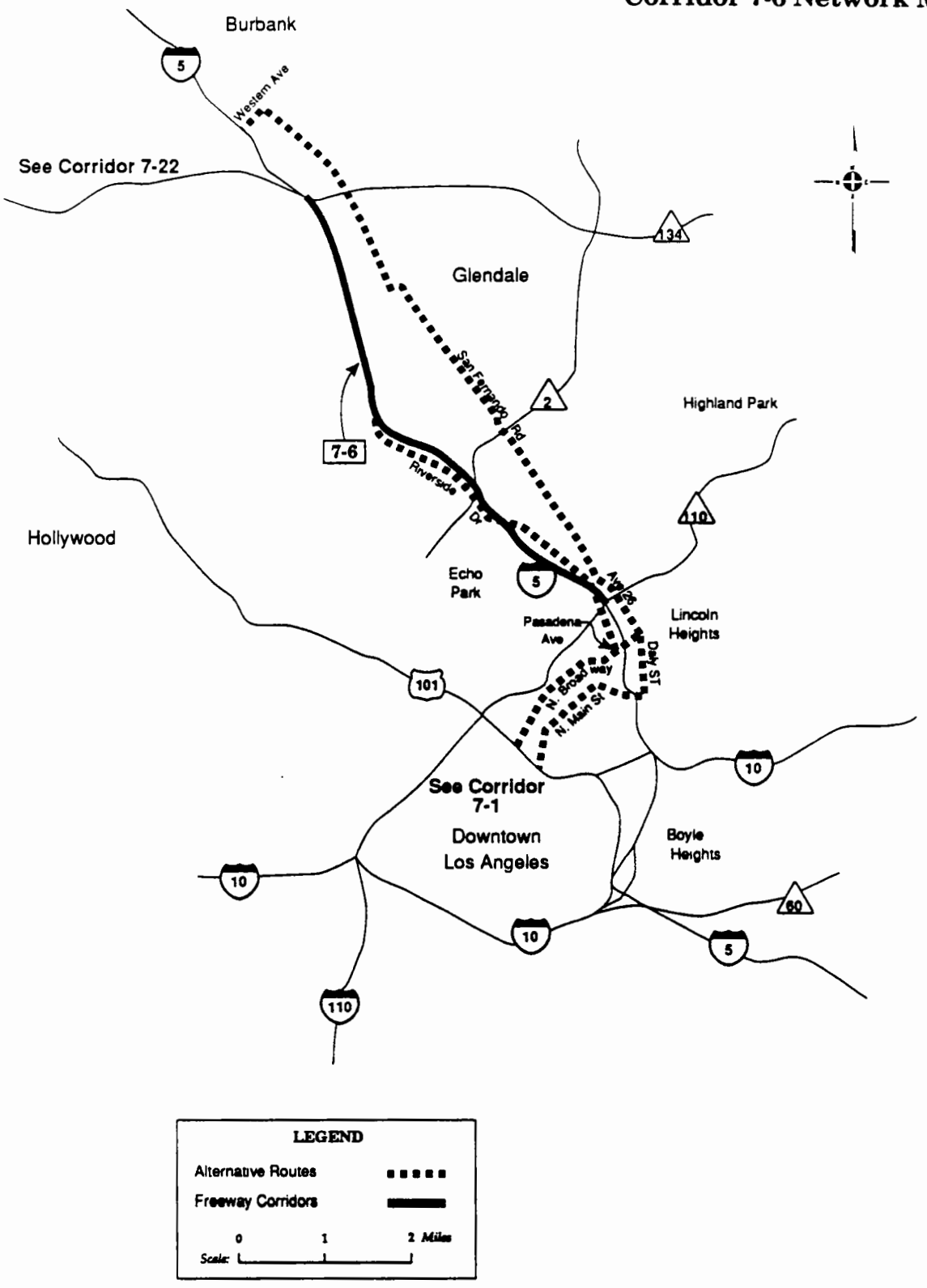
Riverside Drive would serve as a secondary alternate in the southern portion of the corridor only, between Figueroa Street and Los Feliz Boulevard, and thus is primarily suited only for localized freeway incident relief.

The on-ramps along this portion of I-5 are metered, and are controlled from the District 7 TOC.

The corridor network is shown on Exhibit 3-36 and an evaluation summary is presented on Exhibit 3-37.

Exhibit 3-36

District 7
Corridor 7-6 Network Map



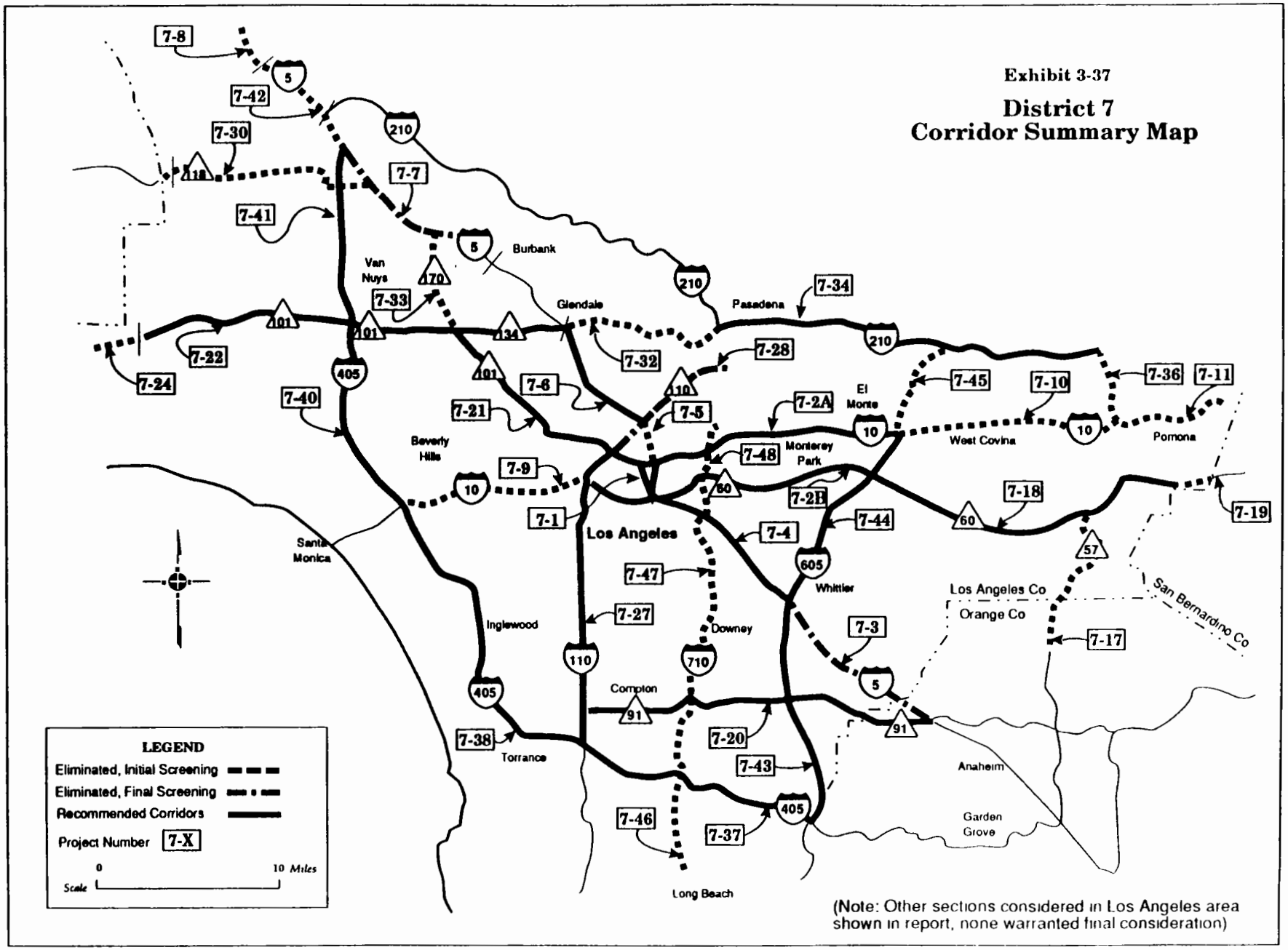


Exhibit 3-37
District 7
Corridor Summary Map
7-8
5
7-42
210
7-30
118
7-7
7-41
5
Burbank
Van Nuys
170
7-33
210
7-34
Pasadena
Glendale
101
101
134
7-32
7-28
210
7-22
7-24
405
101
7-6
110
7-5
7-2A
El Monte
7-45
7-10
7-36
7-11
7-40
7-21
Beverly Hills
10
10
West Covina
Pomona
7-48
Monterey Park
7-9
10
60
7-2B
7-18
7-1
Los Angeles
7-4
7-44
60
7-19
Santa Monica
605
57
7-47
Whittier
Los Angeles Co
Orange Co
San Bernardino Co
7-27
Inglewood
Downey
7-3
110
710
7-17
5
405
Compton
91
91
7-20
7-38
Torrance
7-43
Anaheim
405
7-46
7-37
Garden Grove
Long Beach
LEGEND
Eliminated, Initial Screening
Eliminated, Final Screening
Recommended Corridors
Project Number 7-X
0
10 Miles
Scale
(Note: Other sections considered in Los Angeles area shown in report, none warranted final consideration)

CORRIDOR EVALUATION SUMMARY Exhibit 3-37

Corridor : 7-6 **Description :** I-5 between Route 110 & Route 134

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	140	4	24	96	
2 Surface street capacity/congestion		1	21	21	
3 Local/Regional committment		10	13	130	
4 Land use compatibility		9	11	99	Primarily Industrial Area
5 Accident/Incident history	47	5	9	45	
6 Environmental		0	7	0	
7 Number of jurisdictions	2	8	6	48	Cities of Los Angeles and Glendale
8 Part of larger system		8	4	32	
9 In-place control features		9	3	27	
10 Data availability		9	2	18	
			100	516	

Costs	
Initial (Capital and Implementation)	$9,529,434
10 Year Operations and Maintenance	$9,561,479
Total	$19,090,913
Annualized Cost	$1,909,091
Benefits	
Annual Benefit	$1,972,800
Benefit/Cost Ratio	1.03

Corridor 7-18

Corridor 7-18 is the Pomona Freeway (Route 60) between the San Gabriel River Freeway (I-605) in the Whittier Narrows area and Route 71 in Pomona.

The primary alternate route for this corridor is Valley Boulevard, a very high capacity facility with limited direct access. Route 71, also a high capacity facility, would serve as the connector between Route 60 and Valley Boulevard at the eastern end of the corridor. Colima Road/Golden Springs Drive would serve as a good secondary alternate in the eastern half of the corridor between Azusa Avenue and Diamond Bar Boulevard. Each of these routes are excellent alternates, as the adjoining land uses are primarily industrial or commercial in the western portion of the corridor, and the eastern portion is either open space or buffered residential (setback or walled).

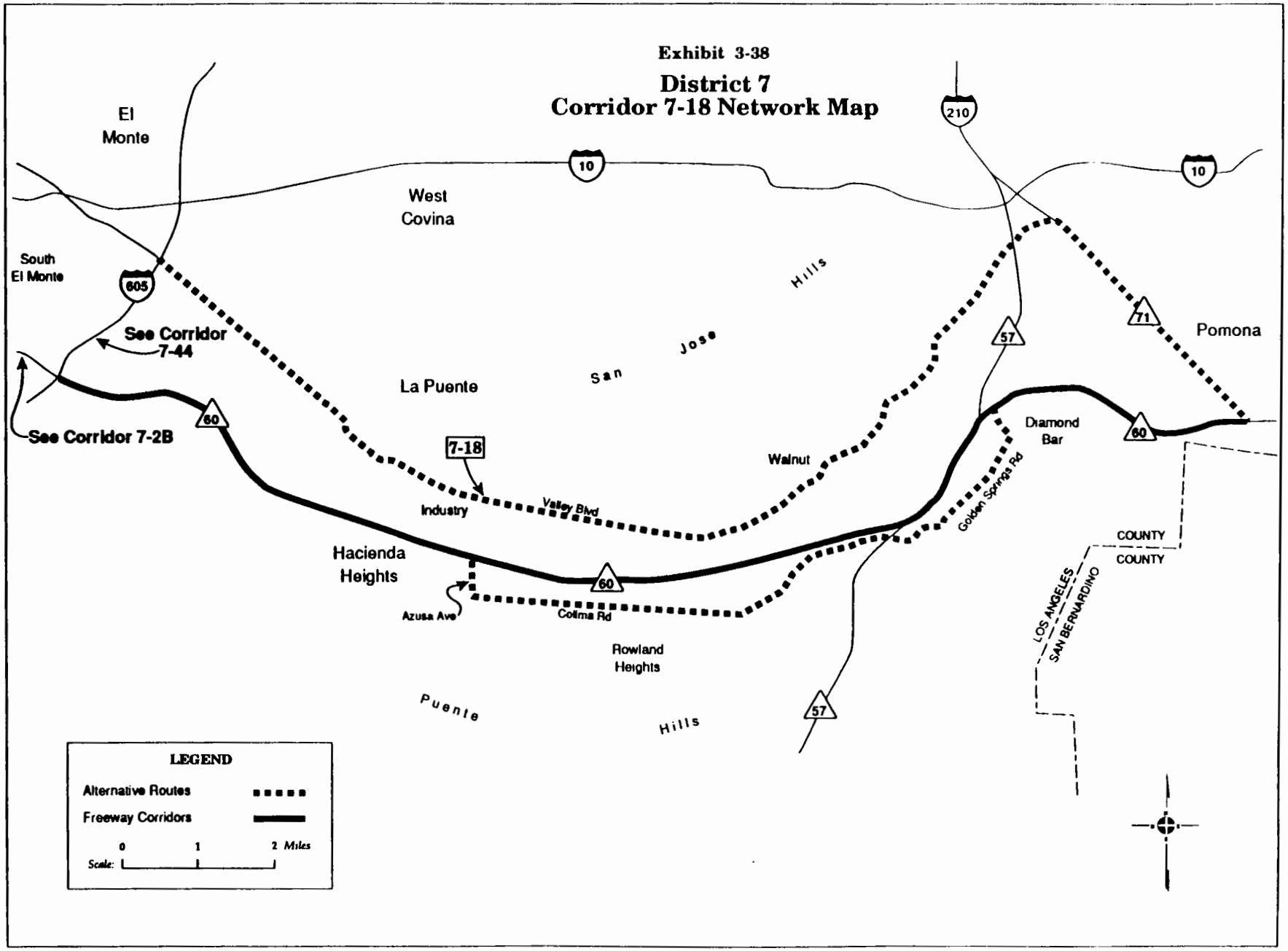
Route 60 continues as Corridor 7-2b to the west. Valley Boulevard also continues to the west as an alternate route for I-10 in Corridor 7-2a and to the east as Holt Avenue in Corridor 8-1 (in San Bernardino County).

The on-ramps along this portion of Route 60 are metered, and are controlled from the District 7 TOC.

The corridor network is shown on Exhibit 3-38 and an evaluation summary is presented on Exhibit 3-39.

Exhibit 3-38

District 7
Corridor 7-18 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-39

Corridor : 7-18 **Description :** Route 60 between I-605 & Route 71

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	233	6	24	144	
2 Surface street capacity/congestion		1	21	21	
3 Local/Regional committment		10	13	130	
4 Land use compatibility		10	11	110	Adjacent land uses typically buffered or no direct access
5 Accident/Incident history	46	5	9	45	
6 Environmental		0	7	0	
7 Number of jurisdictions	7	0	6	0	Diamond Bar, Industry, LA Co, La Puente, Pomona, Walnut, W. Covina
8 Part of larger system		6	4	24	
9 In-place control features		5	3	15	
10 Data availability		4	2	8	
			100	497	

Costs	
Initial (Capital and Implementation)	$14,052,665
10 Year Operations and Maintenance	$15,878,578
Total	$29,931,243
Annualized Cost	$2,993,124
Benefits	
Annual Benefit	$1,976,400
Benefit/Cost Ratio	0.66

Corridor 7-20

Corridor 7-20 is the Artesia Freeway (Route 91) between the Harbor Freeway (I-110) in Los Angeles and Beach Boulevard in Buena Park.

The alternate routes for this corridor are Alondra Boulevard, Artesia Boulevard and South Street/Orangethorpe Avenue. Artesia Boulevard is the primary alternate, paralleling the freeway throughout most of the corridor and utilizing the Artesia Street freeway frontage roads at the western end of the route. Use of the eastbound frontage road to continue eastward on Artesia Boulevard will require geometric improvements to facilitate the turns at the jog under the freeway where the eastbound frontage road terminates.

Alondra Boulevard is a suitable alternate in the middle and eastern portions of the corridor only, between I-710 and I-5. The section west of I-710 to I-110 was determined to be unsuitable due to close residential development in Compton, as well as potential conflicts with heavily used freight rail lines and the Long Beach-Los Angeles light rail line which cross Alondra. South Street/Orangethorpe Avenue is suitable east of Paramount to Beach Boulevard. Thus, three alternates are available between I-710 and Beach, while only one alternate (Artesia Boulevard) is available in the western section of the corridor between I-110 and I-710.

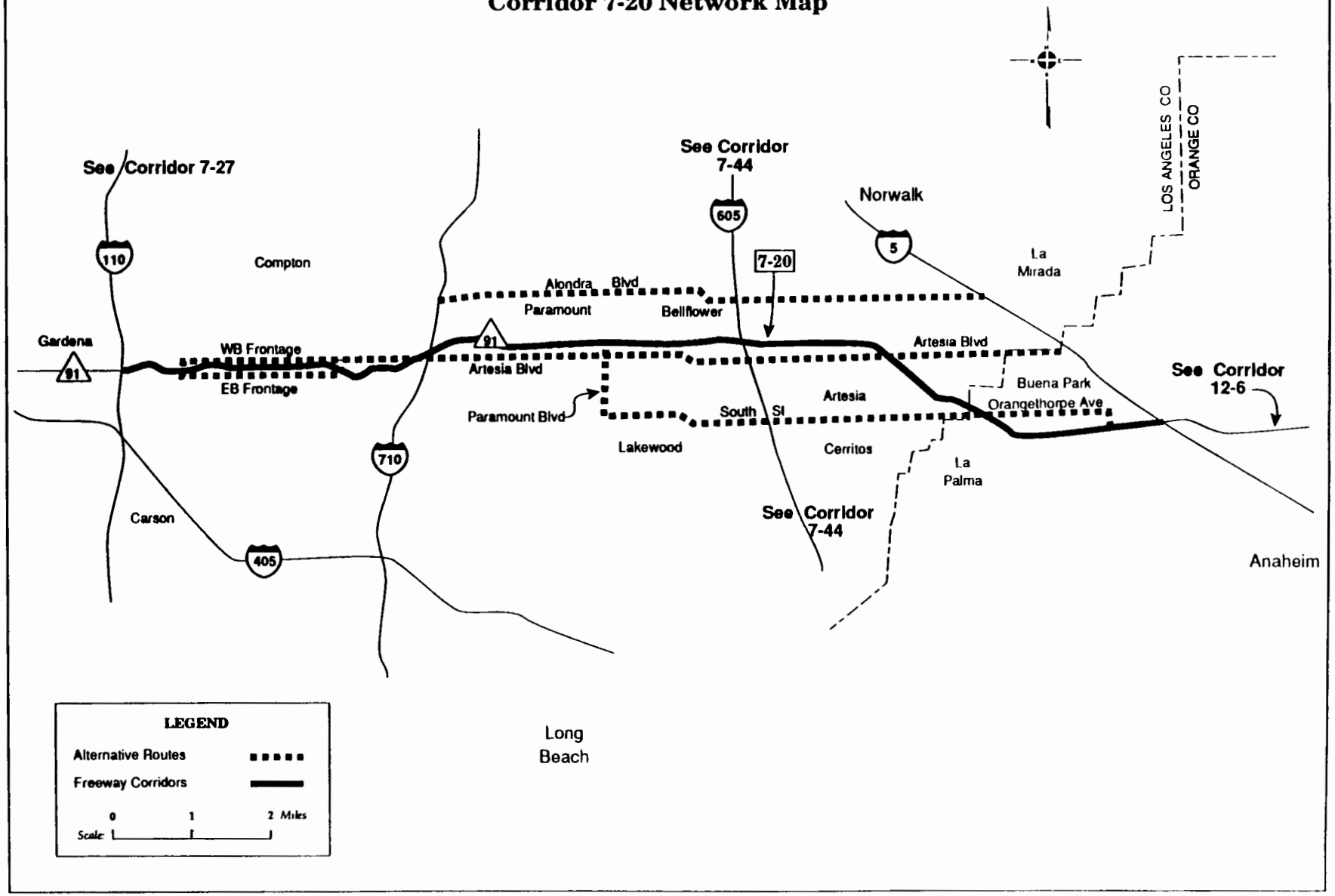
The easternmost three miles of Corridor 7-20 is in Orange County (District 12). Route 91 also continues as Corridor 12-6 to the east of Beach Boulevard.

The on-ramps along this portion of Route 91 are metered, and are controlled from the District 7 TOC.

The corridor network is shown on Exhibit 3-40 and an evaluation summary is presented on Exhibit 3-41.

Exhibit 3-40

District 7
Corridor 7-20 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-41

Corridor : 7-20 **Description :** Route 91 between I-110 & Beach Boulevard

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	384	10	24	240	
2 Surface street capacity/congestion		4	21	84	
3 Local/Regional committment		7	13	91	High for use of Artesia & South, low for use of Alondra
4 Land use compatibility		7	11	77	7 to 10 for Artesia, 5 to 9 for South, 7 to 9 for Alondra
5 Accident/Incident history	49	5	9	45	
6 Environmental		4	7	28	
7 Number of jurisdictions	15	0	6	0	LA Co, Cities of LA, Carson, Compton, Long Beach, + 9 others
8 Part of larger system		6	4	24	
9 In-place control features		5	3	15	
10 Data availability		5	2	10	
			100	614	

Costs	
Initial (Capital and Implementation)	$16,656,839
10 Year Operations and Maintenance	$17,014,675
Total	$33,671,514
Annualized Cost	$3,367,151
Benefits	
Annual Benefit	$16,984,800
Benefit/Cost Ratio	5.04

Corridor 7-21

Corridor 7-21 is the Hollywood Freeway (US 101) between the Harbor Freeway (I-110) and the Ventura Freeway (US 101/Route 134). This corridor is contained entirely within the City of Los Angeles.

The street system along this corridor can be divided into three distinctive parts. In the southeastern portion of the corridor (between I-110 and Vermont Avenue), the street system is somewhat curvilinear although the major streets generally parallel the freeway. Sunset Boulevard has been identified as the alternate route in this section.

Within the Hollywood area in the middle portion of the corridor, the street system is an east-west/north-south grid, while the freeway is on a southeast-northwest diagonal. In this section, Sunset Boulevard is the alternate route for east-west travel, while Cahuenga Boulevard and Highland Avenue are the alternate routes for north-south travel. Vine Street would also serve as a north-south connector between the freeway and Sunset Boulevard. Geometric and signalization improvements may be needed at the Sunset Boulevard/Hollywood Boulevard intersection, as a turn is required to remain on Sunset Boulevard. Highland Avenue is heavily congested during peak periods, but has a high capacity connection to and from the freeway to the north. Traffic generated by the Hollywood Bowl would require special consideration in the design and operation of a Smart Corridor system during the Hollywood Bowl season.

The northern part of the corridor is the Cahuenga Pass over the Santa Monica Mountains to the San Fernando Valley. In this section, the only alternates are Cahuenga Boulevard East and Cahuenga Boulevard West. Cahuenga Boulevard East is the continuation of Cahuenga Boulevard as a one-way northbound street over the pass, and would serve as the alternate for northbound travel. Cahuenga Boulevard West would serve as the alternate for southbound travel and connects directly with Highland Avenue in the middle portion of the corridor. In order to improve northbound capacity, Cahuenga Boulevard East would require pavement reconstruction in the section immediately north of the freeway, widening of the single lane portion over the pass, and restriping of the Cahuenga Boulevard East/Barham Boulevard intersection to facilitate through flows onto the freeway via the Universal City on-ramps.

Santa Monica Boulevard, Melrose Avenue and Beverly Boulevard were also evaluated as potential alternates in the Hollywood area, but were determined to be unsuitable due to tight geometrics and parking, and the resulting restricted capacity. Hollywood Boulevard was not considered as an alternate due to potential conflicts with upcoming Metro Rail construction.

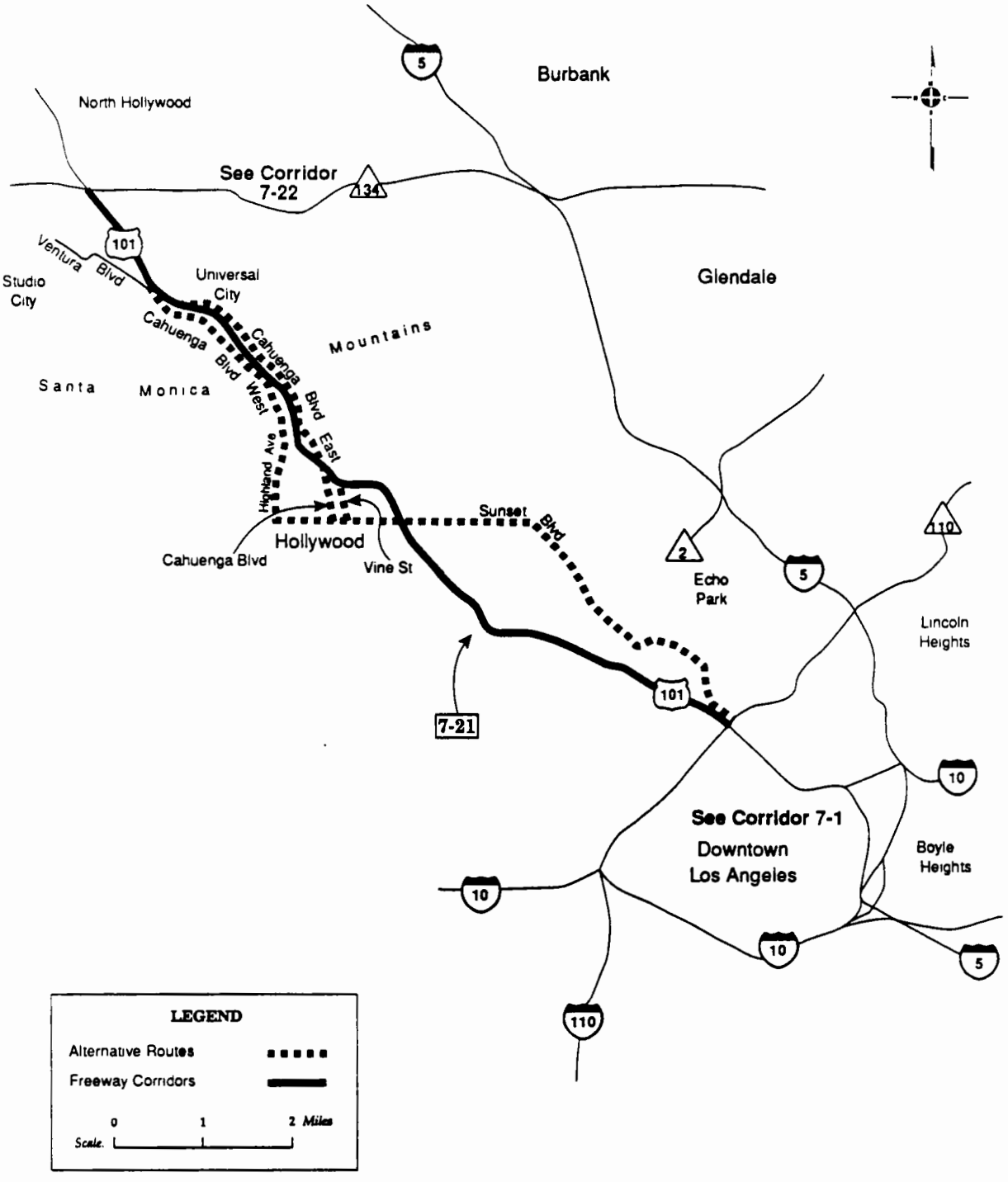
Corridor 7-21 connects with the downtown Los Angeles freeway loop (Corridor 7-1) on the southeast, and therefore could be part of a larger system serving the central Los Angeles area. Cahuenga Boulevard West also continues to the northwest as Ventura Boulevard in Corridor 7-22.

The on-ramps along this portion of US 101 are metered, and are controlled from the District 7 TOC.

The corridor network is shown on Exhibit 3-42 and an evaluation summary is presented on Exhibit 3-43.

Exhibit 3-42

District 7
Corridor 7-21 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-43

Corridor : 7-21 **Description :** US 101 between I-110 & Route 134

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	317	8	24	192	
2 Surface street capacity/congestion		6	21	126	
3 Local/Regional committment		10	13	130	
4 Land use compatibility		8	11	88	8 to 9 for Sunset & Highland, 7 to 8 for Cahuenga
5 Accident/Incident history	104	10	9	90	
6 Environmental		0	7	0	
7 Number of jurisdictions	1	10	6	60	City of Los Angeles
8 Part of larger system		8	4	32	
9 In-place control features		9	3	27	
10 Data availability		9	2	18	
			100	763	

Costs	
Initial (Capital and Implementation)	$12,797,669
10 Year Operations and Maintenance	$12,208,457
Total	$25,006,126
Annualized Cost	$2,500,613
Benefits	
Annual Benefit	$5,819,400
Benefit/Cost Ratio	2.33

Corridor 7-22

Corridor 7-22 is the Ventura Freeway (US 101/Route 134) between Valley Circle Boulevard at the west end of the San Fernando Valley and the Golden State Freeway (I-5) in Burbank. In the initial identification of candidate corridors, this section of the Ventura Freeway was treated as three separate corridors: Corridor 7-22 between the Hollywood Freeway (Route 170) and the San Diego Freeway (I-405); Corridor 7-23 between the San Diego Freeway and Valley Circle Boulevard; and Corridor 7-31 between the Hollywood Freeway and the Golden State Freeway. However, during the detailed evaluation process it was determined that the three corridors would function better as single corridor, and the three were combined into Corridor 7-22.

Victory Boulevard is the primary alternate, and is the single alternate which traverses the entire corridor. In the easternmost portion of the corridor between Route 170 and I-5, Victory is the only suitable alternate. In the middle portion of the corridor between I-405 and Route 170, Ventura Boulevard, Riverside Drive and Burbank Boulevard are secondary alternates. Ventura Boulevard and Burbank Boulevard are secondary alternates to the west of I-405. Due to the heavily commercial nature of the adjacent land uses and resulting congestion during business hours, Ventura Boulevard is likely to be suitable as an alternate during the morning peak period only.

Limited capacity at the US 101/Valley Circle interchange currently represents a bottleneck for use of Valley Circle Boulevard as a connector between Victory Boulevard and US 101. However, Caltrans is planning to reconstruct this interchange as part of ongoing Ventura Freeway improvements. Also, improved signing and signalization may be needed at the five-way Victory Boulevard/Burbank Boulevard intersection at the east end of the corridor to facilitate use of Burbank Boulevard as a connector to I-5.

Camarillo Street/Verdugo Avenue, Magnolia Boulevard and Burbank Boulevard were evaluated as alternates in the eastern portion of the corridor east of Route 170, but were determined to be unsuitable due to two-lane, poor capacity sections in the segments between Lankershim Boulevard and the Los Angeles/Burbank City line.

Victory Boulevard has been designated by the Cities of Los Angeles and Burbank for installation of the Los Angeles ATSAC system, while ATSAC has already been installed along Ventura Boulevard west of I-405 and is funded for installation east of I-405. The on-ramps along this portion of US 101 are metered, and are controlled from the District 7 TOC.

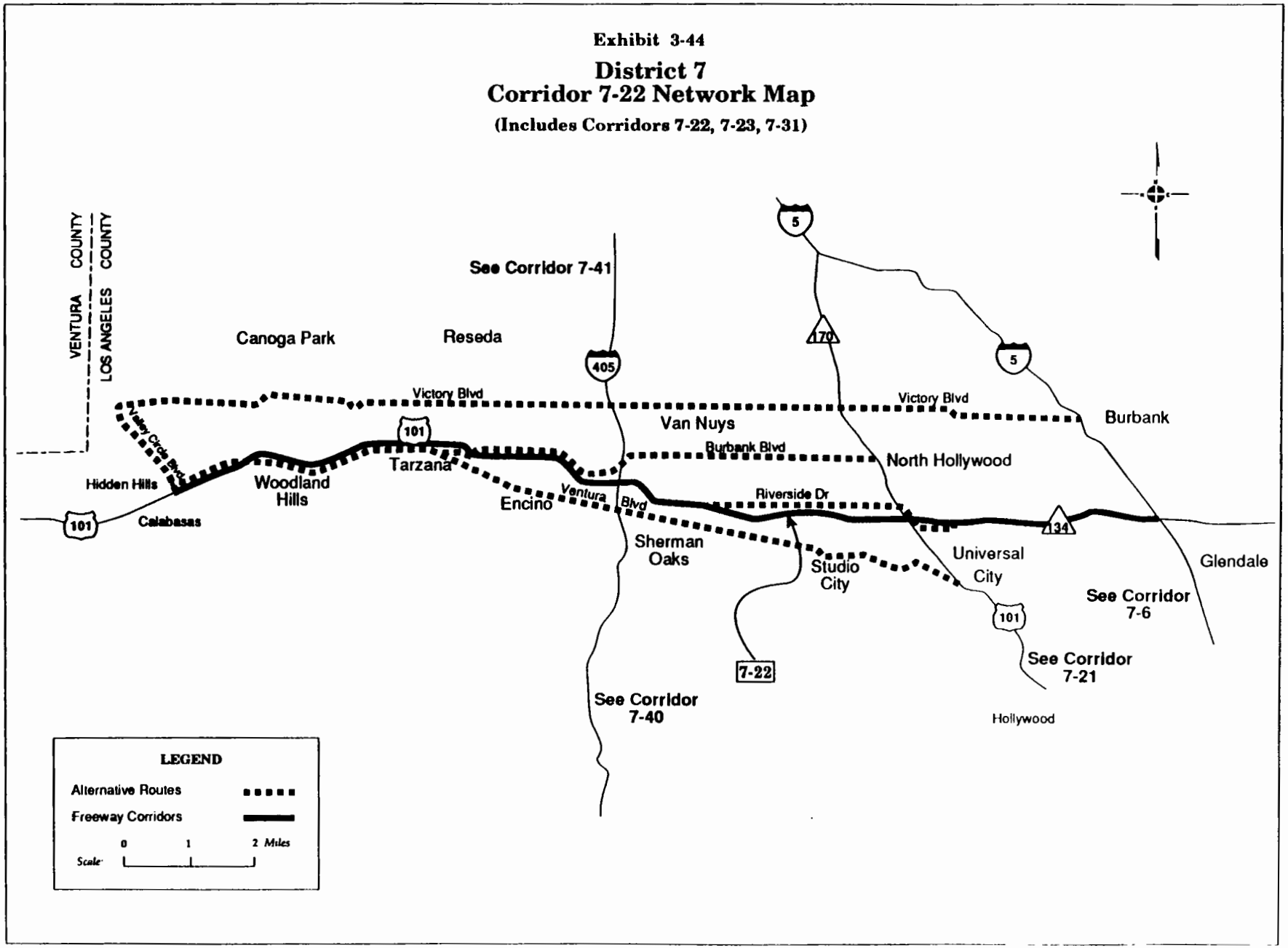
Ventura Boulevard continues to the southeast as Cahuenga Boulevard West in Corridor 7-21.

The corridor network is shown on Exhibit 3-44 and an evaluation summary is presented on Exhibit 3-45.

Exhibit 3-44

District 7
Corridor 7-22 Network Map

(Includes Corridors 7-22, 7-23, 7-31)



CORRIDOR EVALUATION SUMMARY Exhibit 3-45

Corridor : 7-22 **Description :** US 101 between Valley Circle Boulevard & I-5

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	432	10	24	240	
2 Surface street capacity/congestion		8	21	168	
3 Local/Regional committment		9	13	117	
4 Land use compatibility		6	11	66	8 to 9 for Victory, 3 to 5 for Burbank, 7 for Riverside & Ventura
5 Accident/Incident history	52	5	9	45	
6 Environmental		4	7	28	
7 Number of jurisdictions	2	8	6	48	Cities of Burbank and Los Angeles
8 Part of larger system		6	4	24	
9 In-place control features		10	3	30	
10 Data availability		9	2	18	
			100	784	

Costs	
Initial (Capital and Implementation)	$18,970,566
10 Year Operations and Maintenance	$18,882,103
Total	$37,852,669
Annualized Cost	$3,785,267
Benefits	
Annual Benefit	$14,688,000
Benefit/Cost Ratio	3.88

Corridor 7-27

Corridor 7-27 is the Harbor Freeway (I-110) between the San Diego Freeway (I-405) and the Santa Monica Freeway (I-10).

Three alternates have been identified: Broadway, Figueroa Street and Vermont Avenue. The Broadway and Figueroa Street alternates traverse the entire corridor. However, Vermont Avenue would be suitable as an alternate south of Florence Avenue only, due to a high level of pedestrian and parking activity and constrained capacity in the business district further to the north.

Broadway would require widening of the existing two-lane bottleneck in the vicinity of Imperial Boulevard and the Century Freeway construction. This improvement appears feasible without significantly impacting adjacent land uses. Main Street was also considered but not used given the other alternates.

The on-ramps along this portion of I-110 are metered, and are controlled from the District 7 TOC.

Corridor 7-27 connects with the downtown Los Angeles freeway loop (Corridor 7-1) on the north, and therefore could be part of a larger system serving the central Los Angeles area.

The corridor network is shown on Exhibit 3-46 and an evaluation summary is presented on Exhibit 3-47.

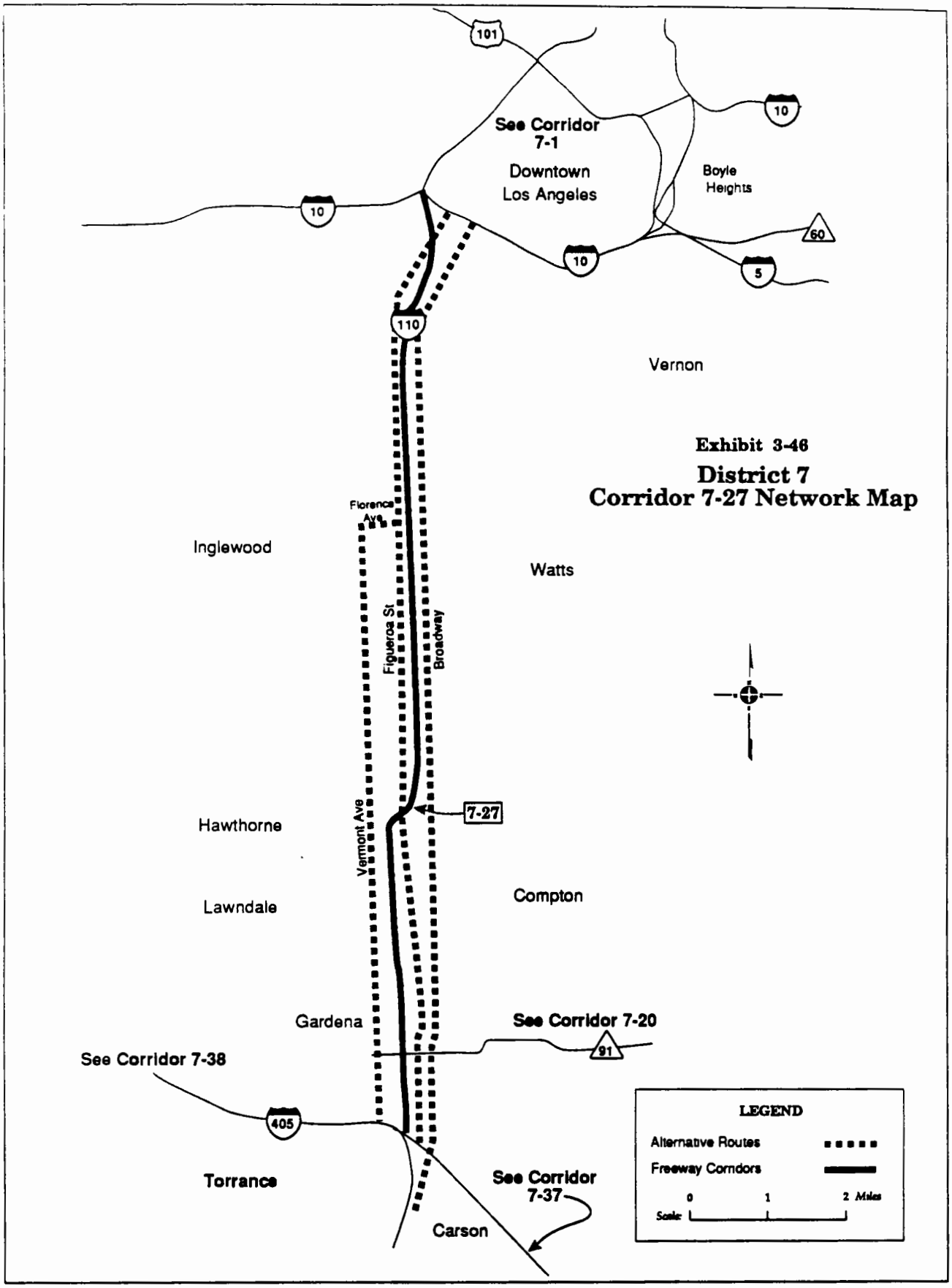


Exhibit 3-46

District 7
Corridor 7-27 Network Map

CORRIDOR EVALUATION SUMMARY Exhibit 3-47

Corridor : 7-27 **Description :** I-110 between I-405 & I-10

	Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1	Freeway capacity/congestion level	264	7	24	168	
2	Surface street capacity/congestion		9	21	189	
3	Local/Regional committment		8	13	104	High for use of Broadway & Figueroa, low for Vermont
4	Land use compatibility		8	11	88	9 for Broadway, 7 for Figueroa, 9 to 10 for Vermont
5	Accident/Incident history	76	8	9	72	
6	Environmental		3	7	21	
7	Number of jurisdictions	4	2	6	12	Carson, Gardena, LA City, LA County
8	Part of larger system		8	4	32	
9	In-place control features		9	3	27	
10	Data availability		9	2	18	
				100	731	

Costs	
Initial (Capital and Implementation)	$14,344,533
10 Year Operations and Maintenance	$14,788,942
Total	$29,133,475
Annualized Cost	$2,913,348
Benefits	
Annual Benefit	$11,448,000
Benefit/Cost Ratio	3.93

Corridor 7-34

Corridor 7-34 is the Foothill Freeway (I-210) between the Ventura Freeway (Route 134) in Pasadena and Route 30 in Glendora. In the initial identification of candidate corridors, this section of the Foothill Freeway was treated as two separate corridors: Corridor 7-34 between the Ventura Freeway and the San Gabriel River Freeway (I-605) and Corridor 7-35 between I-605 and the Route 30. However, during the detailed evaluation process it was determined that the two corridors would function better as single corridor, and the two were combined into Corridor 7-34.

The single alternate which traverses the entire corridor is Colorado Boulevard/Huntington Drive/Foothill Boulevard/Alosta Avenue/Foothill Boulevard (a continuous route with name changes). Walnut Street/Foothill Boulevard and Orange Grove Boulevard/Rosemead Boulevard are secondary alternates within the City of Pasadena in the westernmost portion of the corridor. Arrow Highway is an alternate for the eastern portion of the corridor between I-605 and I-210.

The Santa Anita Racetrack is located immediately adjacent to the Colorado Boulevard/Huntington Drive alternate in the City of Arcadia, and would require special consideration in operation of a Smart Corridor system during the racing season.

Sierra Madre Boulevard and Foothill Boulevard were evaluated as alternates for the middle portion of the corridor through the Cities of Sierra Madre and Monrovia, but were determined to be unsuitable due to two-lane, poor capacity sections and sensitive residential areas.

The on-ramps along this portion of I-210 are metered, and are controlled from the District 7 TOC.

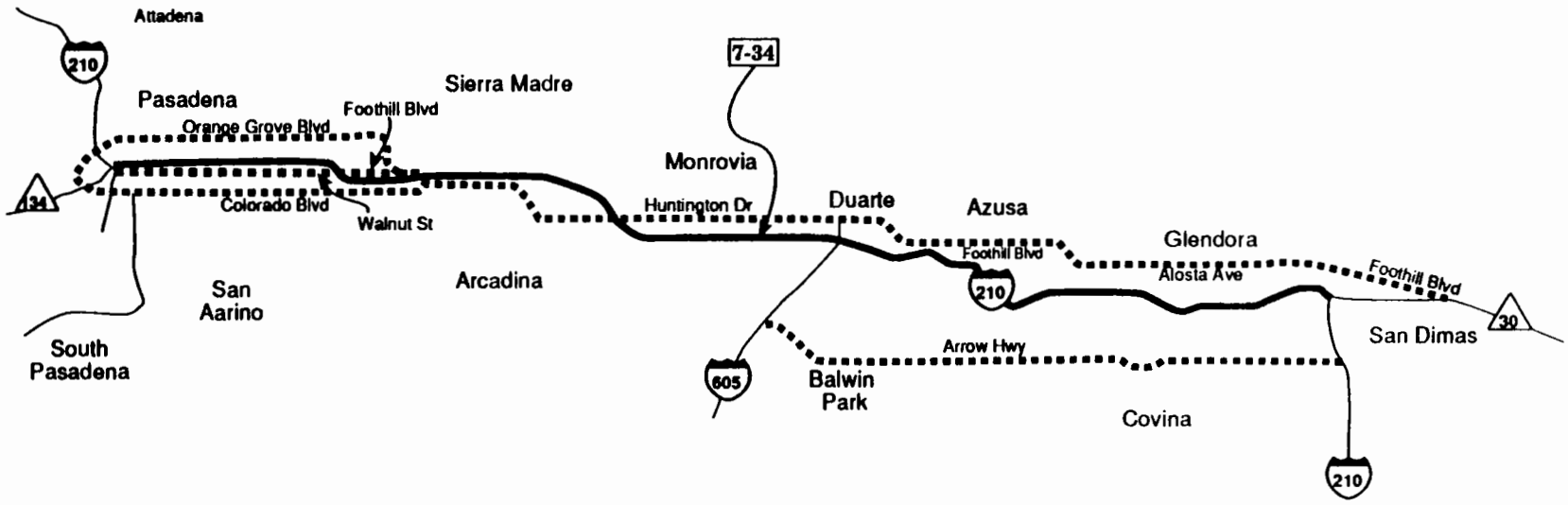
The City of Pasadena is currently installing a computer-based traffic signal system which would complement the Smart Corridor program. Pasadena also uses Highway Advisory Radio (HAR) as a motorist information element.

The network corridor is presented on Exhibit 3-48 and an evaluation summary is presented on Exhibit 3-49.

Exhibit 3-48

District 7
Corridor 7-34 Network Map

(Includes Corridors 7-34 and 7-35)



LEGEND

Alternative Routes

Freeway Corridors

Scale: 0 1 2 Miles

CORRIDOR EVALUATION SUMMARY Exhibit 3-49

Corridor : 7-34 **Description :** I-210 between Route 134 & Route 30

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	298	7	24	168	
2 Surface street capacity/congestion		5	21	105	
3 Local/Regional committment		5	13	65	
4 Land use compatibility		6	11	66	
5 Accident/Incident history	31	3	9	27	
6 Environmental		0	7	0	
7 Number of jurisdictions	11	0	6	0	LA Co, Cities of Glendale, Pasadena, Irwindale, Duarte, + 6 others
8 Part of larger system			4	0	Isolated Corridor
9 In-place control features		9	3	27	
10 Data availability		5	2	10	
			100	468	

Costs	
Initial (Capital and Implementation)	$14,006,074
10 Year Operations and Maintenance	$14,054,519
Total	$28,060,593
Annualized Cost	$2,806,059
Benefits	
Annual Benefit	$6,246,000
Benefit/Cost Ratio	2.23

Corridor 7-37

Corridor 7-37 is the San Diego Freeway (I-405) between the San Gabriel River Freeway (I-605) at the Los Angeles/Orange County line and the Harbor Freeway (I-110) in Carson.

The corridor must be considered in two sections for the purpose of planning alternate routes. In the eastern portion of the corridor (between I-605 and I-710 in the City of Long Beach), Willow Street and Spring Street are the primary alternates. The section of Spring Street through the industrial area between Cherry Avenue and Atlantic Avenue would require widening and geometric improvements to become suitable, although these improvements appear feasible without impacting adjacent land uses.

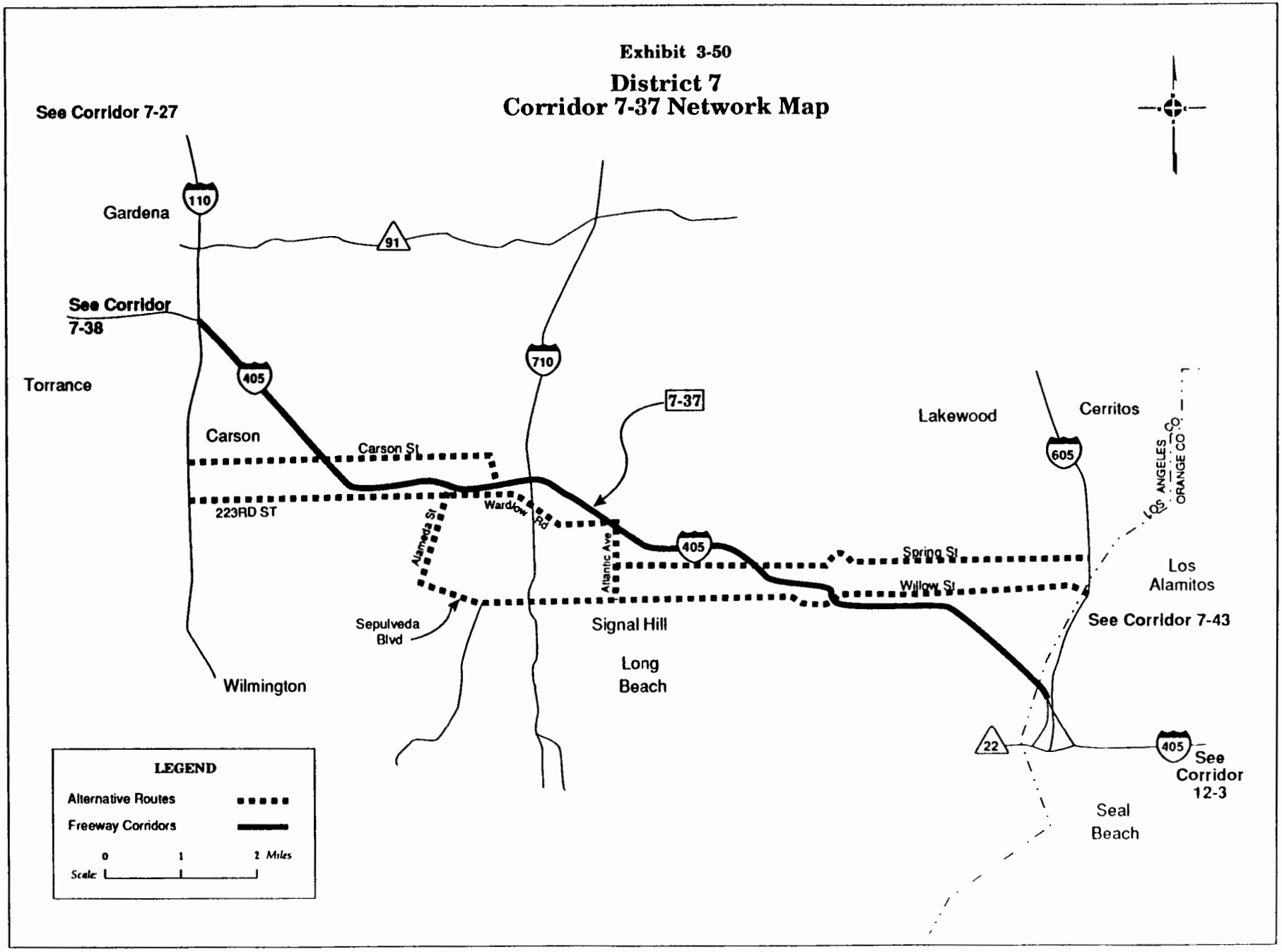
In the western portion of the corridor (between I-710 and I-110), Carson Street and 223rd Street/Wardlow Road are the alternate routes. The 223rd Street/Wardlow Road route would extend east of I-710 to provide a connection to Willow Street in the eastern portion of the corridor via Atlantic Avenue. Similarly, the Willow Street/Sepulveda Boulevard route would extend west of I-710 to provide a connection to 223rd Street and I-405 via Alameda Street. However, there is no continuous alternate route throughout the entire corridor.

The on-ramps along this portion of I-405 are metered, and are controlled from the District 7 TOC.

The network corridor is shown on Exhibit 3-50 and an evaluation summary is presented on Exhibit 3-51.

Exhibit 3-50

District 7
Corridor 7-37 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-51

Corridor : 7-37 **Description :** I-405 between I-605 & I-110

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	319	8	24	192	
2 Surface street capacity/congestion		9	21	189	
3 Local/Regional committment		7	13	91	
4 Land use compatibility		8	11	88	
5 Accident/Incident history	44	4	9	36	
6 Environmental		1	7	7	
7 Number of jurisdictions	6	0	6	0	LA Co, Cities of LA, Carson, Lakewood, Long Beach, Signal Hill
8 Part of larger system		6	4	24	
9 In-place control features		10	3	30	
10 Data availability		9	2	18	
			100	675	

Costs	
Initial (Capital and Implementation)	$15,722,016
10 Year Operations and Maintenance	$15,053,053
Total	$30,775,069
Annualized Cost	$3,077,507
Benefits	
Annual Benefit	$3,178,800
Benefit/Cost Ratio	1.03

Corridor 7-38

Corridor 7-38 is the San Diego Freeway (I-405) between the Harbor Freeway (I-110) in Carson and the Santa Monica Freeway (I-10) in West Los Angeles. In the initial identification of candidate corridors, this section of the San Diego Freeway was treated as two separate corridors: Corridor 7-38 between I-110 and Imperial Highway and Corridor 7-39 between Imperial Highway and I-10. However, during the detailed evaluation process it was determined that the two corridors would function better as single corridor, and the two were combined into Corridor 7-38.

The corridor must be considered in three sections for the purpose of planning alternate routes. In the southeastern portion of the corridor the freeway runs in an east-west orientation. Artesia Boulevard is the primary alternate in this section and 190th Street is a secondary alternate.

The freeway then turns northward through the South Bay curve and continues past Los Angeles International Airport to the Marina Freeway (Route 90). Hawthorne Boulevard/La Brea Avenue and Sepulveda Boulevard are the primary alternates in this section, while La Cienega Boulevard and Aviation Boulevard are secondary alternates. Slauson Boulevard would serve as an east-west connector from La Brea Avenue and La Cienega Boulevard to I-405 via the Marina Freeway. La Brea Avenue and La Cienega Boulevard could also continue northward across the Baldwin Hills to connect with the Santa Monica Freeway Smart Corridor Demonstration, as part of a larger system linking together the I-405 and I-10 Smart Corridors.

North of the Marina Freeway to the Santa Monica Freeway, Sepulveda Boulevard is the only suitable alternate. Centinela Avenue and Overland Avenue were evaluated as alternates for this portion of the corridor, but were determined to be unsuitable due to sections of poor capacity, particularly along Overland Avenue between Culver Boulevard and Palms Boulevard.

The on-ramps along I-405 in the corridor are metered, and are controlled from the District 7 TOC.

It is of interest to note that this corridor has the highest recorded freeway delay of all the candidate corridors statewide, with an estimated 712 vehicle hours of delay per mile per day.

The corridor network is shown on Exhibit 3-52 and an evaluation summary is presented on Exhibit 3-53.

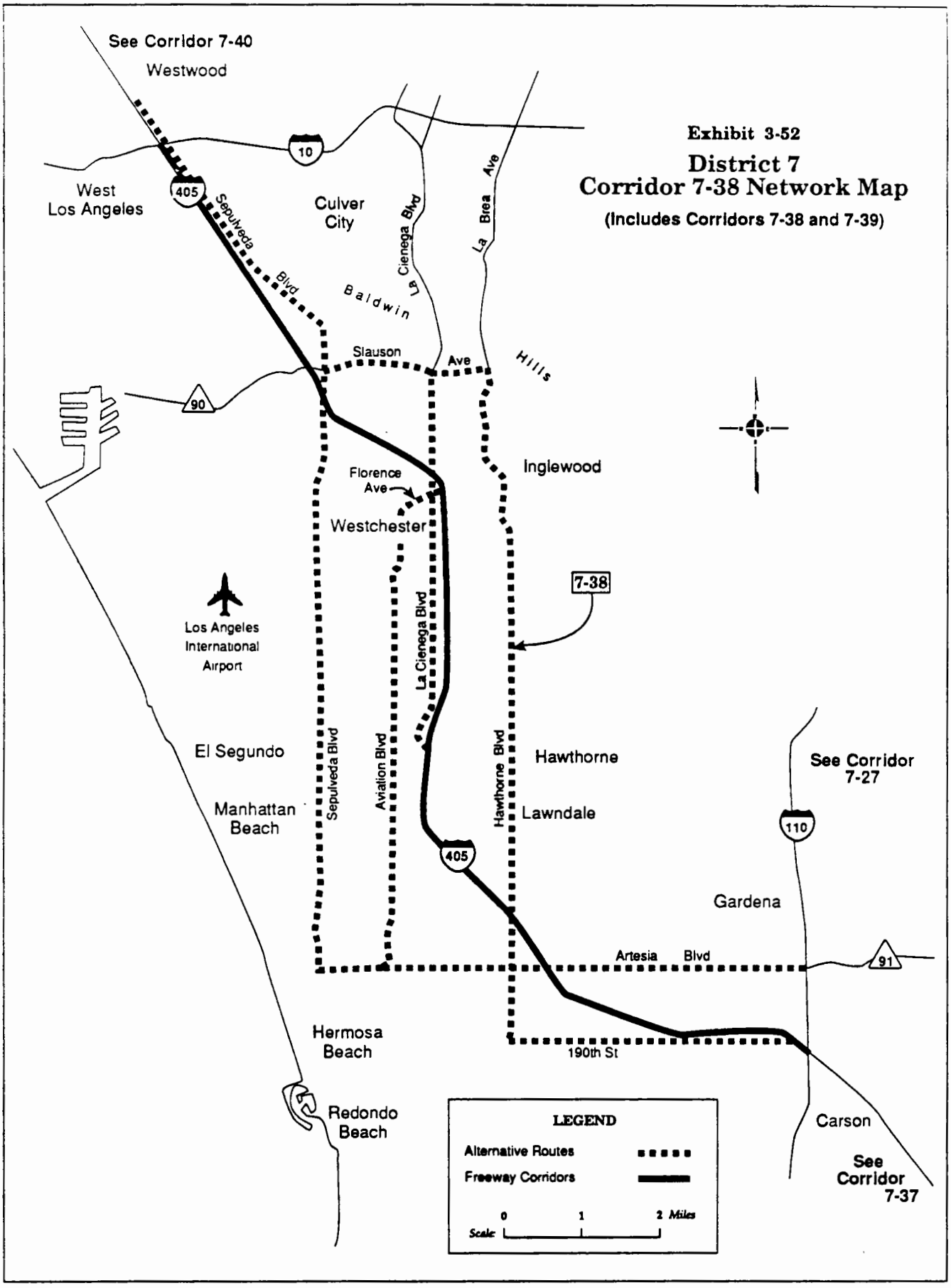


Exhibit 3-52

District 7
Corridor 7-38 Network Map

(Includes Corridors 7-38 and 7-39)

CORRIDOR EVALUATION SUMMARY Exhibit 3-53

Corridor : 7-38 **Description :** I-405 between I-110 & I-10

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	712	10	24	240	
2 Surface street capacity/congestion		4	21	84	
3 Local/Regional committment		8	13	104	High for all except Aviation & Sepulveda in South
4 Land use compatibility		9	11	99	
5 Accident/Incident history	58	6	9	54	
6 Environmental		10	7	70	
7 Number of jurisdictions	11	0	6	0	LA Co, Cities of LA, Gardena, Inglewood, Hawthorne + 6 others
8 Part of larger system		8	4	32	
9 In-place control features		7	3	21	
10 Data availability		5	2	10	
			100	714	

Costs	
Initial (Capital and Implementation)	$17,443,904
10 Year Operations and Maintenance	$18,559,819
Total	$36,003,723
Annualized Cost	$3,600,372
Benefits	
Annual Benefit	$35,773,200
Benefit/Cost Ratio	9.94

Corridor 7-40

Corridor 7-40 is the San Diego Freeway (I-405) between the Santa Monica Freeway (I-10) in West Los Angeles and the Ventura Freeway (US 101) in the San Fernando Valley.

The corridor can be considered in two sections. The southernmost portion of the corridor (south of Sunset Boulevard) heavily congested areas of West Los Angeles and Westwood. The northern part of the corridor is the Sepulveda Pass over the Santa Monica Mountains to the San Fernando Valley.

Sepulveda Boulevard is the only surface street which crosses Sepulveda Pass. It is therefore the only available alternate in this section, and is presently utilized as such. The three-lane Sepulveda Tunnel at the summit of the pass is presently a bottleneck, with two lanes southbound but only one lane northbound. It is recommended that, if this Smart Corridor is to be implemented, reversible lanes be implemented in the tunnel to provide two lanes southbound in the morning peak and two lanes northbound in the evening peak.

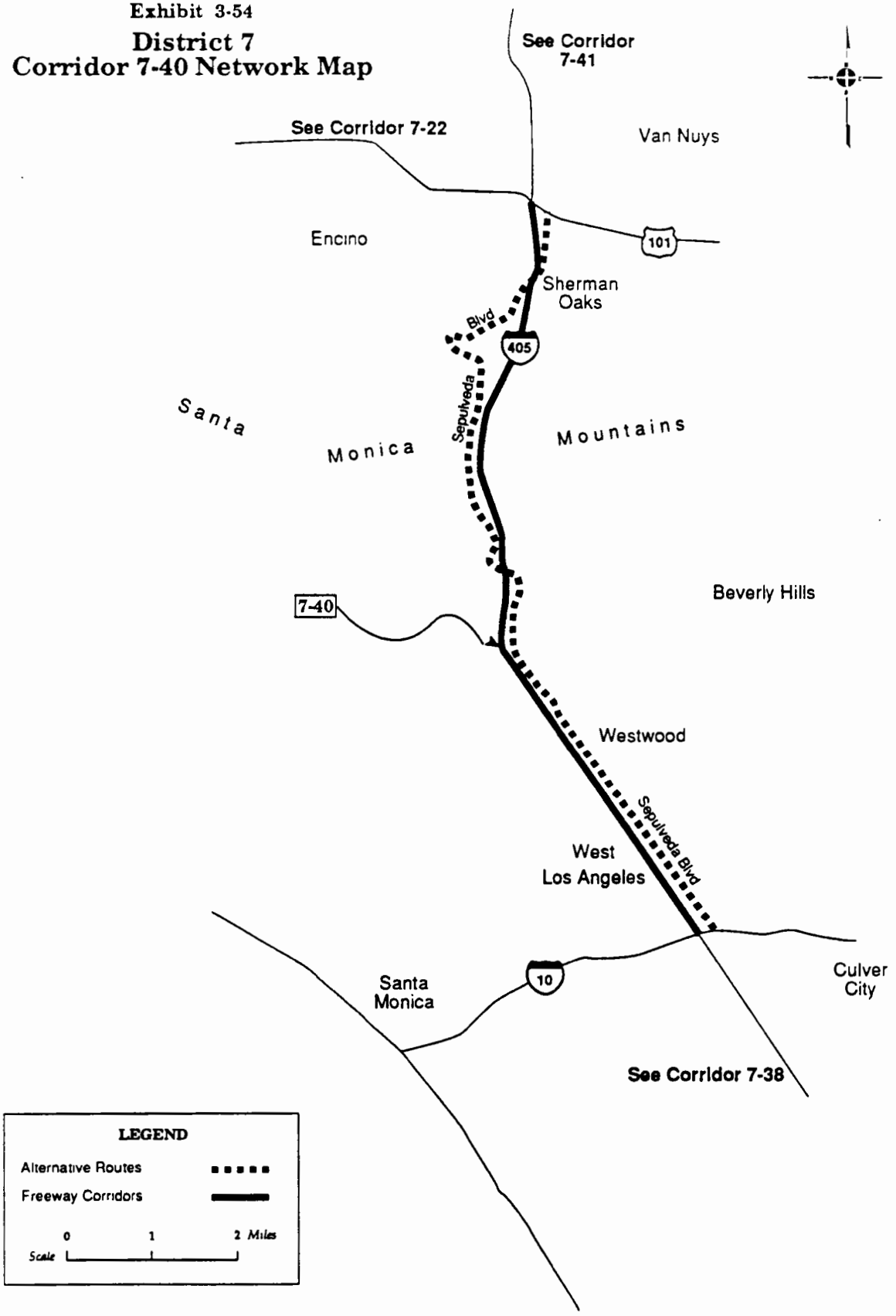
Sepulveda Boulevard is also the only alternate identified for the southern portion of the corridor in West Los Angeles, due to limited capacity along other parallel north-south streets. The high levels of congestion during peak periods along Sepulveda Boulevard at major cross streets such as Wilshire Boulevard, Santa Monica Boulevard and Olympic Boulevard, however, limit the available capacity in this section.

The on-ramps along I-405 in the corridor are metered, and are controlled from the District 7 TOC.

The corridor network is shown on Exhibit 3-54 and an evaluation summary is presented on Exhibit 3-55.

Exhibit 3-54

District 7
Corridor 7-40 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-55

Corridor : 7-40 **Description :** I-405 between I-10 & US 101

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	436	10	24	240	
2 Surface street capacity/congestion		2	21	42	
3 Local/Regional committment		10	13	130	
4 Land use compatibility		9	11	99	Commercial/Industrial in West LA, open space over Sepulveda Pass
5 Accident/Incident history	68	7	9	63	
6 Environmental		4	7	28	
7 Number of jurisdictions	2	8	6	48	LA City, LA County
8 Part of larger system		8	4	32	
9 In-place control features		9	3	27	
10 Data availability		6	2	12	
			100	721	

Costs	
Initial (Capital and Implementation)	$8,827,579
10 Year Operations and Maintenance	$11,391,877
Total	$20,219,456
Annualized Cost	$2,021,946
Benefits	
Annual Benefit	$16,717,680
Benefit/Cost Ratio	8.27

Corridor 7-41

Corridor 7-41 is the San Diego Freeway (I-405) between the Ventura Freeway (US 101) and the Golden State Freeway (I-5). This corridor is contained entirely within the City of Los Angeles.

Sepulveda Boulevard and Balboa Boulevard are both good alternate routes. Sepulveda Boulevard is an alternate throughout all but the northernmost mile of the corridor. Balboa Boulevard is an alternate not only throughout the corridor, but continuing north through the Knollwood area to connect with the Golden State Freeway and Antelope Valley Freeway (Route 14) via San Fernando Road and Sierra Highway.

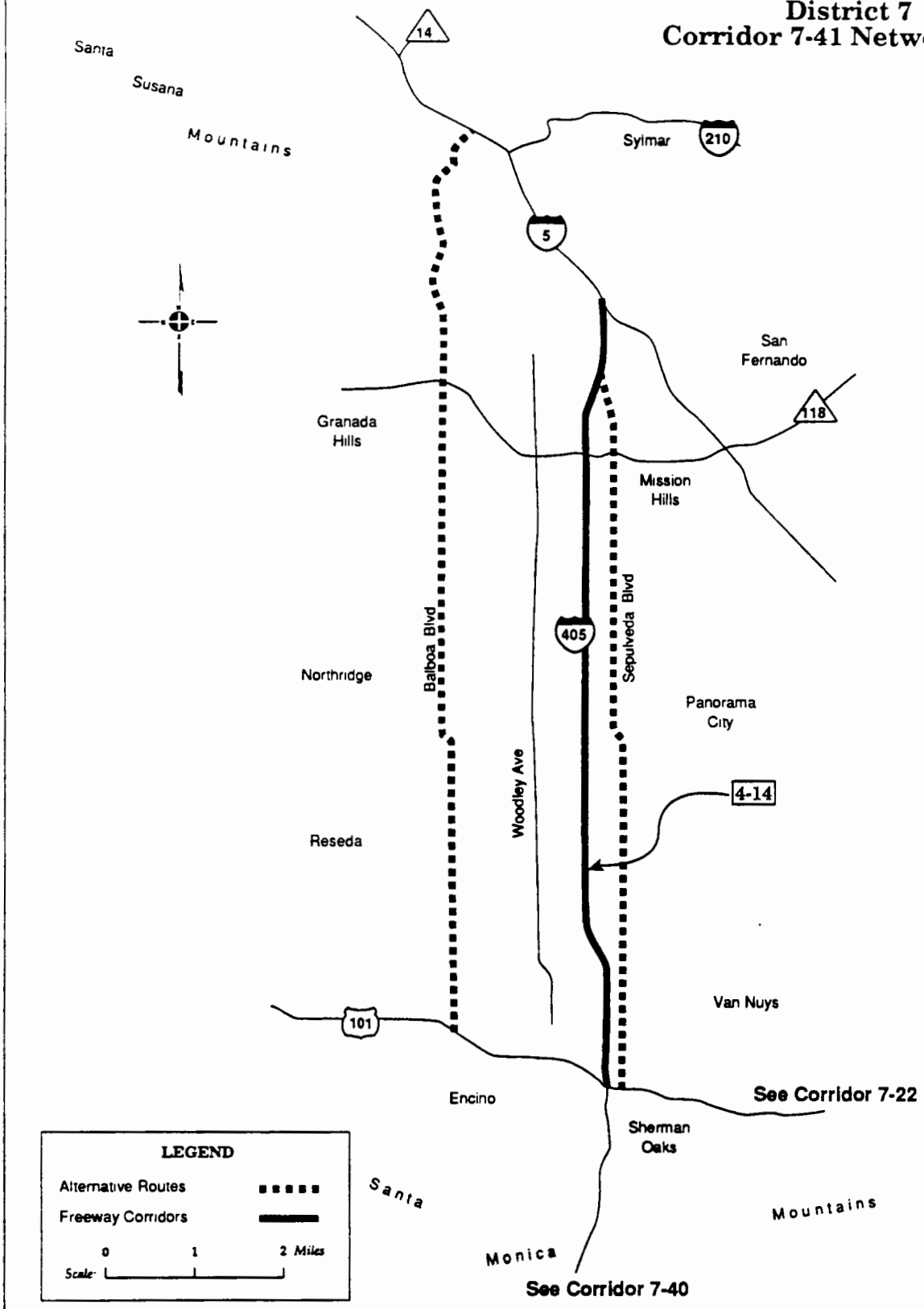
Use of Balboa Boulevard as an alternate to the north, however, will likely require improvements at the Balboa Boulevard/San Fernando Road, Balboa Boulevard/Foothill Boulevard and/or San Fernando/Sierra Highway intersections to eliminate bottlenecks caused by existing stop signs and to facilitate the necessary turning movements.

The on-ramps along I-405 in the corridor are metered, and are controlled from the District 7 TOC.

The corridor network is shown on Exhibit 3-56 and an evaluation summary is presented on Exhibit 3-57.

Exhibit 3-56

District 7
Corridor 7-41 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-57

Corridor : 7-41 **Description :** I-405 between US 101 & I-5

	Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1	Freeway capacity/congestion level	128	3	24	72	
2	Surface street capacity/congestion		1	21	21	
3	Local/Regional committment		10	13	130	
4	Land use compatibility		9	11	99	10 for Sepulveda, 9 for Balboa
5	Accident/Incident history	36	4	9	36	
6	Environmental		0	7	0	
7	Number of jurisdictions	1	10	6	60	City of Los Angeles
8	Part of larger system		6	4	24	
9	In-place control features		6	3	18	
10	Data availability		4	2	8	
				100	468	

Costs	
Initial (Capital and Implementation)	$10,333,471
10 Year Operations and Maintenance	$10,335,639
Total	$20,669,110
Annualized Cost	$2,066,911
Benefits	
Annual Benefit	$1,303,200
Benefit/Cost Ratio	0.63

Corridor 7-43

Corridor 7-43 is the San Gabriel River Freeway (I-605) between the San Diego Freeway (I-405) at the Los Angeles/Orange County line and the Santa Ana Freeway (I-5) in Downey.

Potential alternates for this corridor consist of Los Alamitos Boulevard/Norwalk Boulevard, Pioneer Boulevard and Studebaker Road. Bellflower Boulevard was investigated as an alternate, but was determined to be unsuitable due to severely restricted capacity in the Bellflower business district.

The on-ramps along I-605 in the corridor are metered, and are controlled from the District 7 TOC.

The corridor network is shown on Exhibit 3-58 and an evaluation summary is presented on Exhibit 3-59.

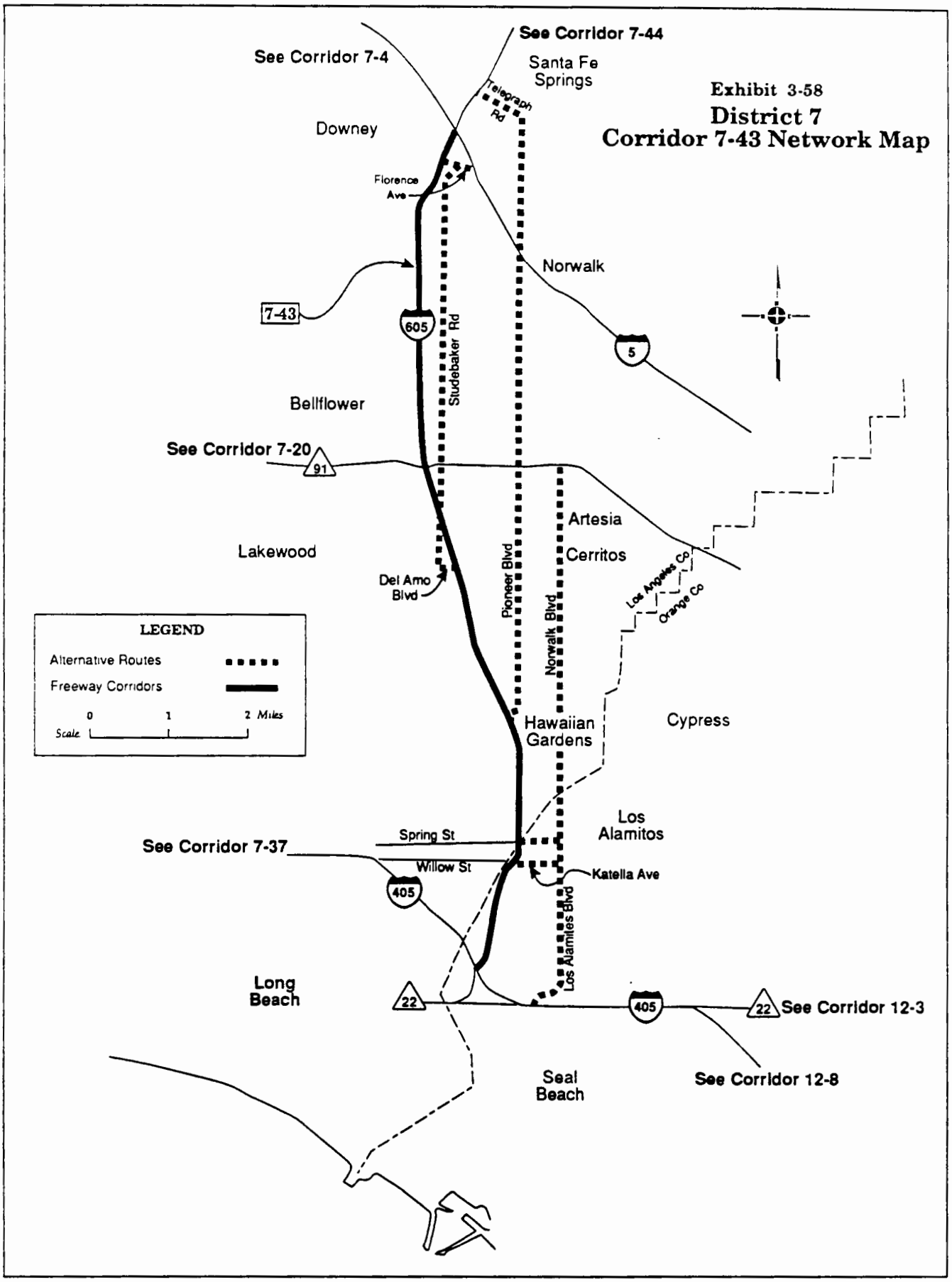


Exhibit 3-58
District 7
Corridor 7-43 Network Map
See Corridor 7-44
See Corridor 7-4
Santa Fe Springs
Telegraph Rd
Downey
Florence Ave
Norwalk
7-43
605
Studebaker Rd
5
Bellflower
See Corridor 7-20
91
Artesia
Lakewood
Cerritos
Del Amo Blvd
Pioneer Blvd
Norwalk Blvd
Los Angeles Co
Orange Co
LEGEND
Alternative Routes
Freeway Corridors
0 1 2 Miles
Scale
Hawaiian Gardens
Cypress
Los Alamitos
See Corridor 7-37
Spring St
Willow St
Katella Ave
405
Los Alamitos Blvd
Long Beach
22
405
22
See Corridor 12-3
Seal Beach
See Corridor 12-8

CORRIDOR EVALUATION SUMMARY Exhibit 3-59

Corridor : 7-43 **Description :** I-605 between I-405 & I-5

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	199	5	24	120	
2 Surface street capacity/congestion		7	21	147	
3 Local/Regional committment		5	13	65	
4 Land use compatibility		5	11	55	6 to 9 for Los Alamitos/Norwalk, 6 for Pioneer, 4 to 5 for Studebaker
5 Accident/Incident history	49	5	9	45	
6 Environmental		0	7	0	
7 Number of jurisdictions	11	0	6	0	Artesia, Long Beach, Lakewood, Norwalk, Paramount + 6 others
8 Part of larger system		6	4	24	
9 In-place control features		6	3	18	
10 Data availability		5	2	10	
			100	484	

Costs	
Initial (Capital and Implementation)	$13,687,400
10 Year Operations and Maintenance	$14,278,152
Total	$27,965,552
Annualized Cost	$2,796,555
Benefits	
Annual Benefit	$4,048,200
Benefit/Cost Ratio	1.45

Corridor 7-44

Corridor 7-44 is the San Gabriel River Freeway (I-605) between the Santa Ana Freeway (I-5) in Downey and the San Bernardino Freeway (I-10) in Baldwin Park.

Rosemead Boulevard is the primary alternate for the section of the corridor between I-5 and the Pomona Freeway (Route 60). For most of this section, Rosemead Boulevard is the only suitable alternate, as Norwalk Boulevard was investigated as an alternate but was determined to be unsuitable due to a two-lane section through a sensitive residential area in the Whittier area.

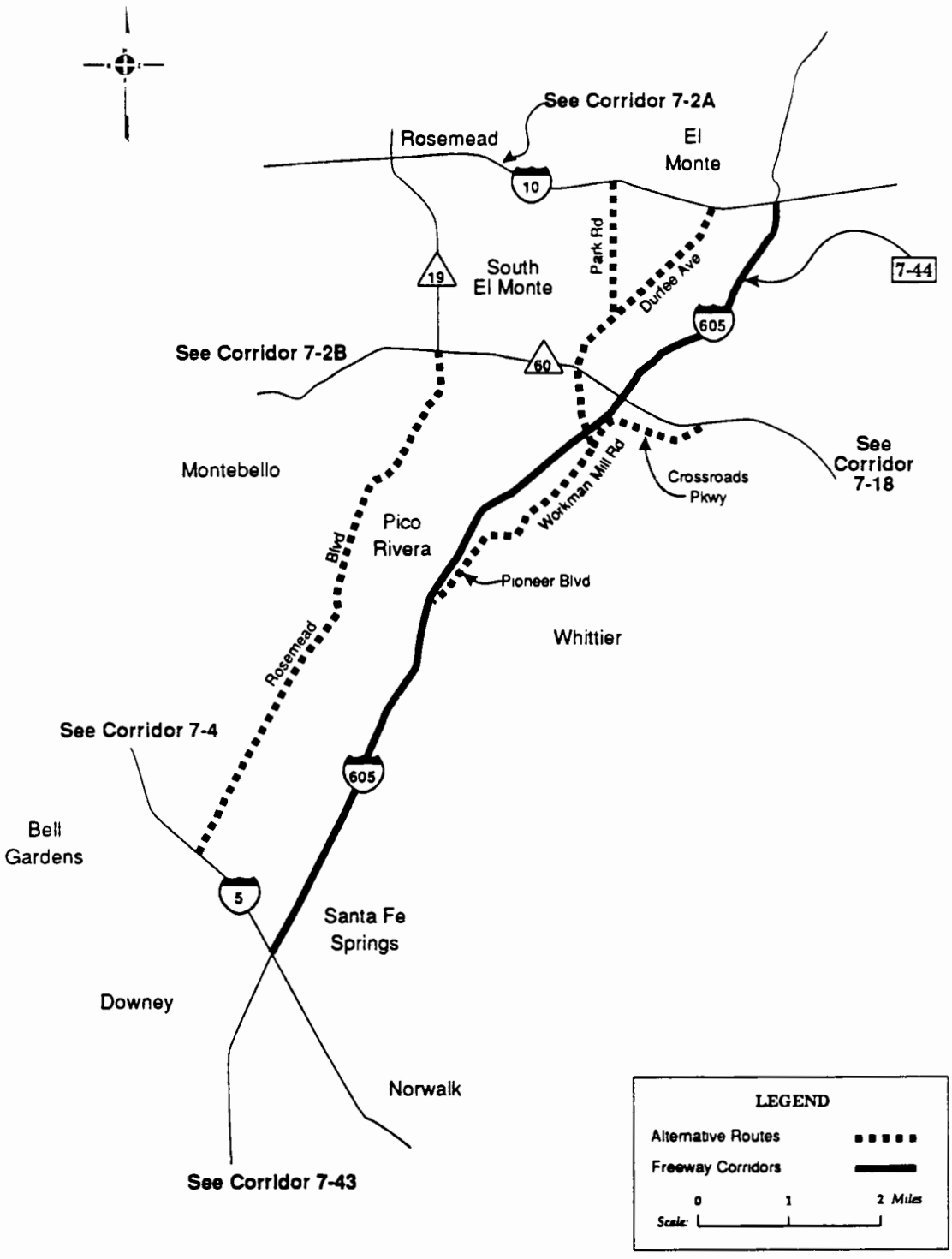
Between Beverly Boulevard and Route 60, Workman Mill Road is a high capacity alternate passing along the edge of the Puente Hills with little adjoining land uses. The Workman Mill route would continue to the north via Peck Road and Durfee Avenue as an alternate to I-605 to the end of the corridor at I-10. The Workman Mill alternate would connect with I-605 at Beverly Boulevard via Pioneer Boulevard (which would require geometric improvements) and would also connect with Route 60 to and from the east via Crossroads Parkway.

The on-ramps along I-605 in the corridor are metered, and are controlled from the District 7 TOC.

The network corridor is shown on Exhibit 3-60 and an evaluation summary is presented on Exhibit 3-61.

Exhibit 3-60

District 7
Corridor 7-44 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-61

Corridor : 7-44 **Description :** I-605 between I-5 & I-10

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	173	4	24	96	
2 Surface street capacity/congestion		6	21	126	
3 Local/Regional committment		8	13	104	
4 Land use compatibility		7	11	77	7 to 8 for Rosemead, 9 for Workman Mill, 7 to 9 for Peck & Durfee
5 Accident/Incident history	40	4	9	36	
6 Environmental		1	7	7	
7 Number of jurisdictions	8	0	6	0	Downey, El Monte, Industry, Pico Rivera + 4 others
8 Part of larger system		6	4	24	
9 In-place control features		6	3	18	
10 Data availability		5	2	10	
			100	498	

Costs	
Initial (Capital and Implementation)	$11,573,058
10 Year Operations and Maintenance	$13,074,822
Total	$24,647,880
Annualized Cost	$2,464,788
Benefits	
Annual Benefit	$2,214,000
Benefit/Cost Ratio	0.90

CALTRANS DISTRICT 8 - SAN BERNARDINO AND RIVERSIDE COUNTIES

The initial review of traffic and congestion data and interviews with local staff resulted in the identification of 14 potential corridors for the application of Smart Corridor technology in San Bernardino and Riverside Counties. The 14 corridors are shown on Exhibit 3-62 with the evaluation results summarized on the second page of the exhibit.

During the initial screening process, 12 of the corridors were eliminated from detailed consideration. Eleven of these corridors were eliminated primarily because of a relatively low existing delay levels. Although congestion is occurring, it is not of a level that compares with the other candidate corridors. These corridors offer opportunities for future consideration but would not be a priority at this time. Three of the corridors also lacked available or continuous alternate routes, while two did not satisfy corridor definition criteria regarding lengths and widths. Information as provided to the Steering Committee which summarizes the reasons for elimination by corridor is included in Appendix B.

The remaining 2 corridors were included in the final evaluation and are discussed on the following pages.

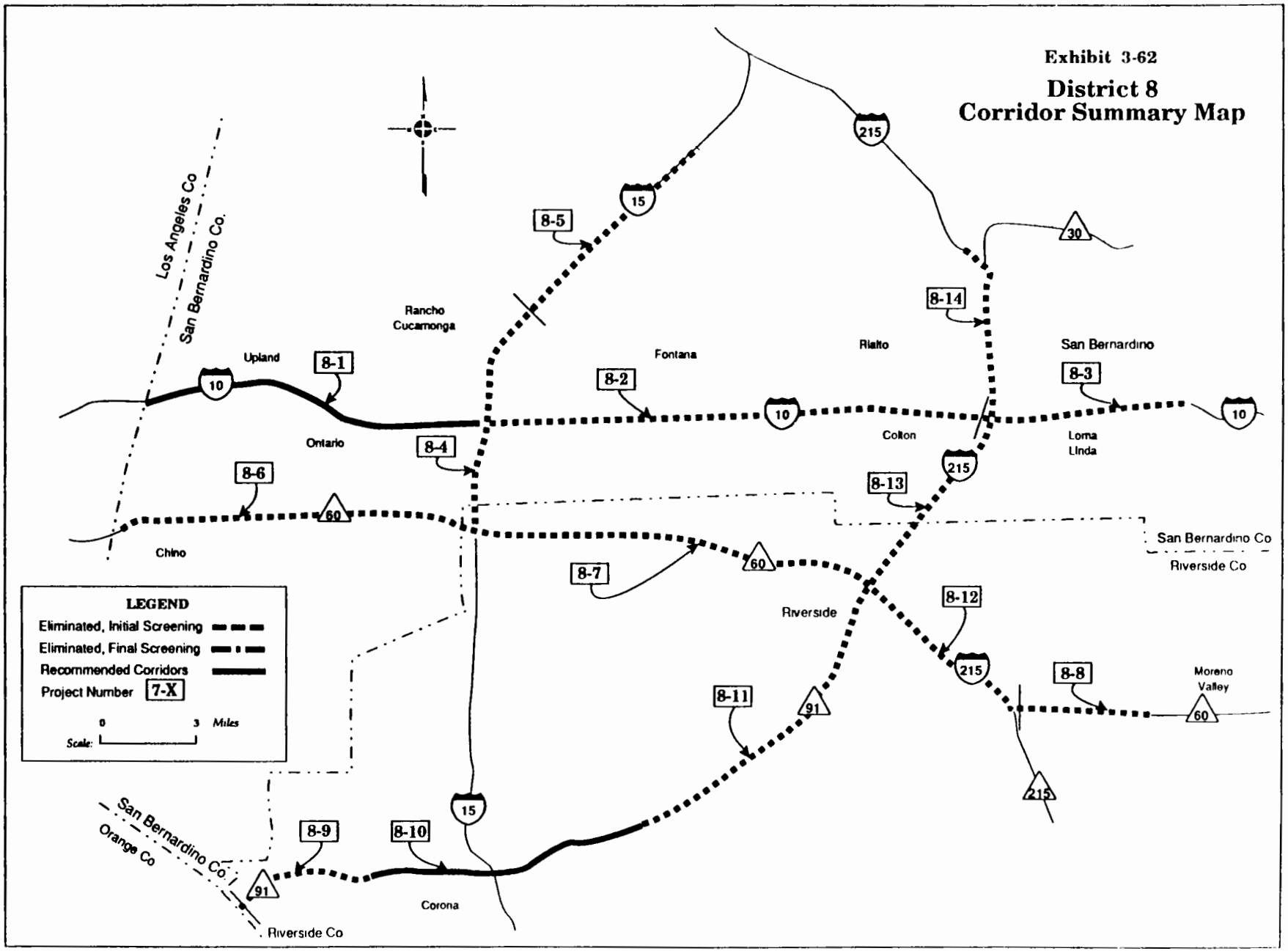


Exhibit 3-62
District 8
Corridor Summary Map
Los Angeles Co
San Bernardino Co.
Rancho Cucamonga
Upland
Ontario
Fontana
Rialto
San Bernardino
Colton
Loma Linda
Chino
Riverside
Corona
San Bernardino Co
Riverside Co
Orange Co
Moreno Valley
8-1
8-2
8-3
8-4
8-5
8-6
8-7
8-8
8-9
8-10
8-11
8-12
8-13
8-14
10
15
30
60
91
215
LEGEND
Eliminated, Initial Screening
Eliminated, Final Screening
Recommended Corridors
Project Number 7-X
0
3 Miles
Scale:

Exhibit 3-62 (Continued)

District 8
Corridor Summary

District/ Corridor	Description	Distance (Miles)	B/C Ratio	Score	Initial Cost	10 Year O&M Cost	Combination of Corridors
8 - 1	I-10 between San Bernardino/ L.A. County Line & I-15	9.9	0.34	447	$10,191,041	$11,678,435	
8 - 10	Route 91 between Maple Street & La Sierra Avenue	7.8	3.62	562	$7,631,399	$9,589,619	
		Total District Costs			$17,822,440	$21,268,054	

Corridor 8-1

Corridor 8-1 is the San Bernardino Freeway (I-10) between the San Bernardino/Los Angeles County line and I-15 in Ontario.

Two alternate routes have been identified for this corridor. Foothill Boulevard is to the north of the freeway and traverses the entire corridor. Holt Avenue is to the south of the freeway and encompasses the portion of the corridor between the County line and Archibald Avenue near Ontario International Airport. The Holt Avenue alternate would continue about four miles into Los Angeles County to the west, eventually utilizing the Route 71 freeway as a connector to I-10. Holt Avenue also continues to the west as Valley Boulevard in Corridor 7-18 (in Los Angeles County).

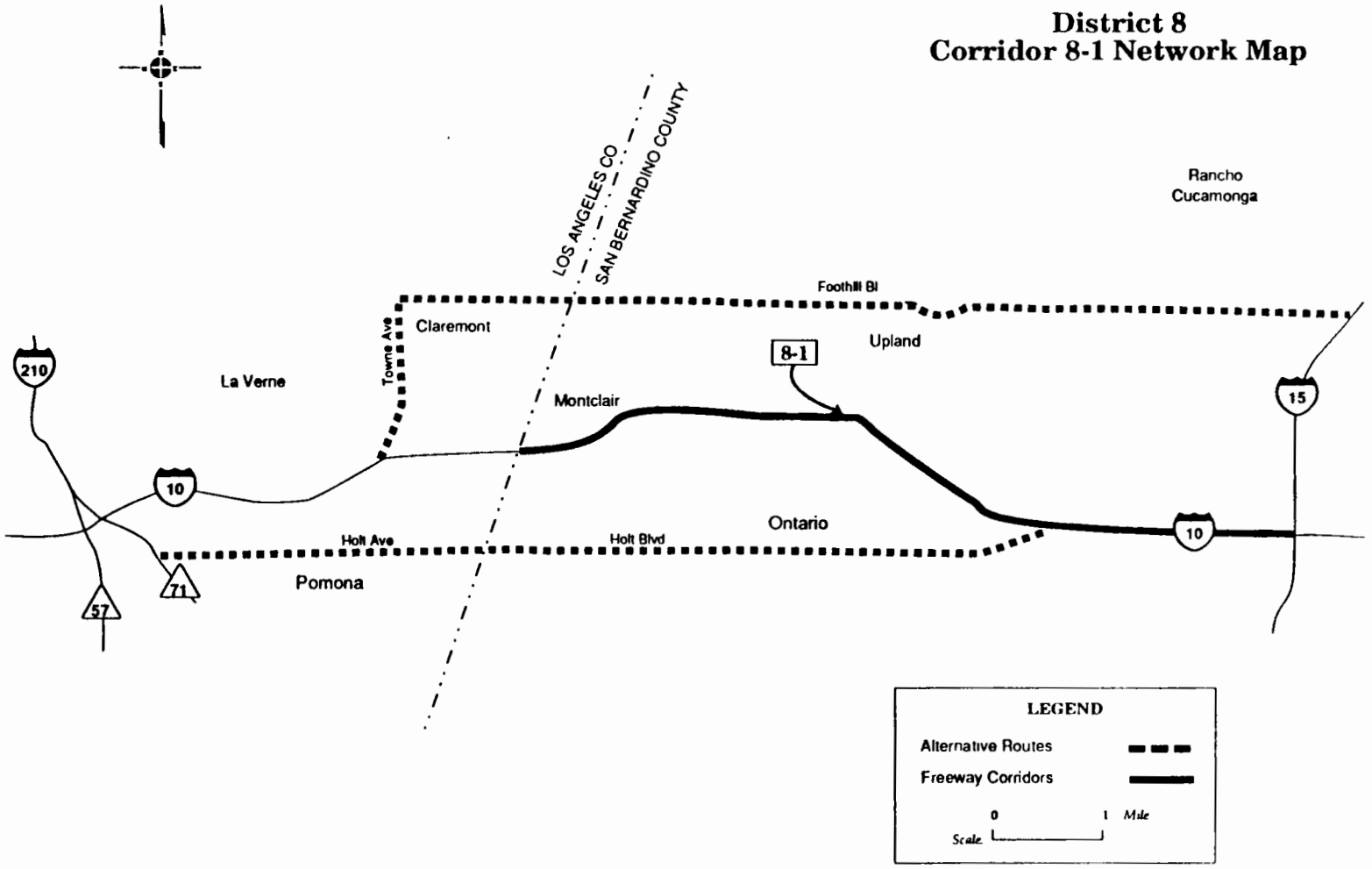
Arrow Highway was investigated as an alternate but was determined to be unsuitable due to two-lane, poor capacity sections and the sensitivity of adjacent residential uses within the Upland area.

None of the on-ramps within District 8 are currently controlled by ramp meters.

The corridor network is presented on Exhibit 3-63 and and evaluation summary is presented on Exhibit 3-64.

Exhibit 3-63

District 8
Corridor 8-1 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-64

Corridor : 8-1 **Description :** I-10 between SB/LA County line & I-15

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	206	5	24	120	
2 Surface street capacity/congestion		4	21	84	
3 Local/Regional committment		8	13	104	
4 Land use compatibility		8	11	88	9 for Foothill, 8 for Holt
5 Accident/Incident history	44	4	9	36	
6 Environmental		1	7	7	
7 Number of jurisdictions	6	0	6	0	Upland, Claremont, Montclair, Ontario, Pomona, Rancho Cucamonga
8 Part of larger system		0	4	0	Isolated Corridor
9 In-place control features		0	3	0	
10 Data availability		4	2	8	
			100	447	

Costs	
Initial (Capital and Implementation)	$10,191,041
10 Year Operations and Maintenance	$11,678,435
Total	$21,869,476
Annualized Cost	$2,186,948
Benefits	
Annual Benefit	$741,600
Benefit/Cost Ratio	0.34

Corridor 8-10

Corridor 8-10 is the Riverside Freeway (Route 91) between Maple Street and La Sierra Avenue in the Corona area.

The only potential alternate route for this corridor is 6th Street/Magnolia Avenue between its interchanges with Route 91 on either side of Corona. 6th Street/Magnolia Avenue generally provides good capacity, although the capacity is somewhat constrained through the downtown Corona business district.

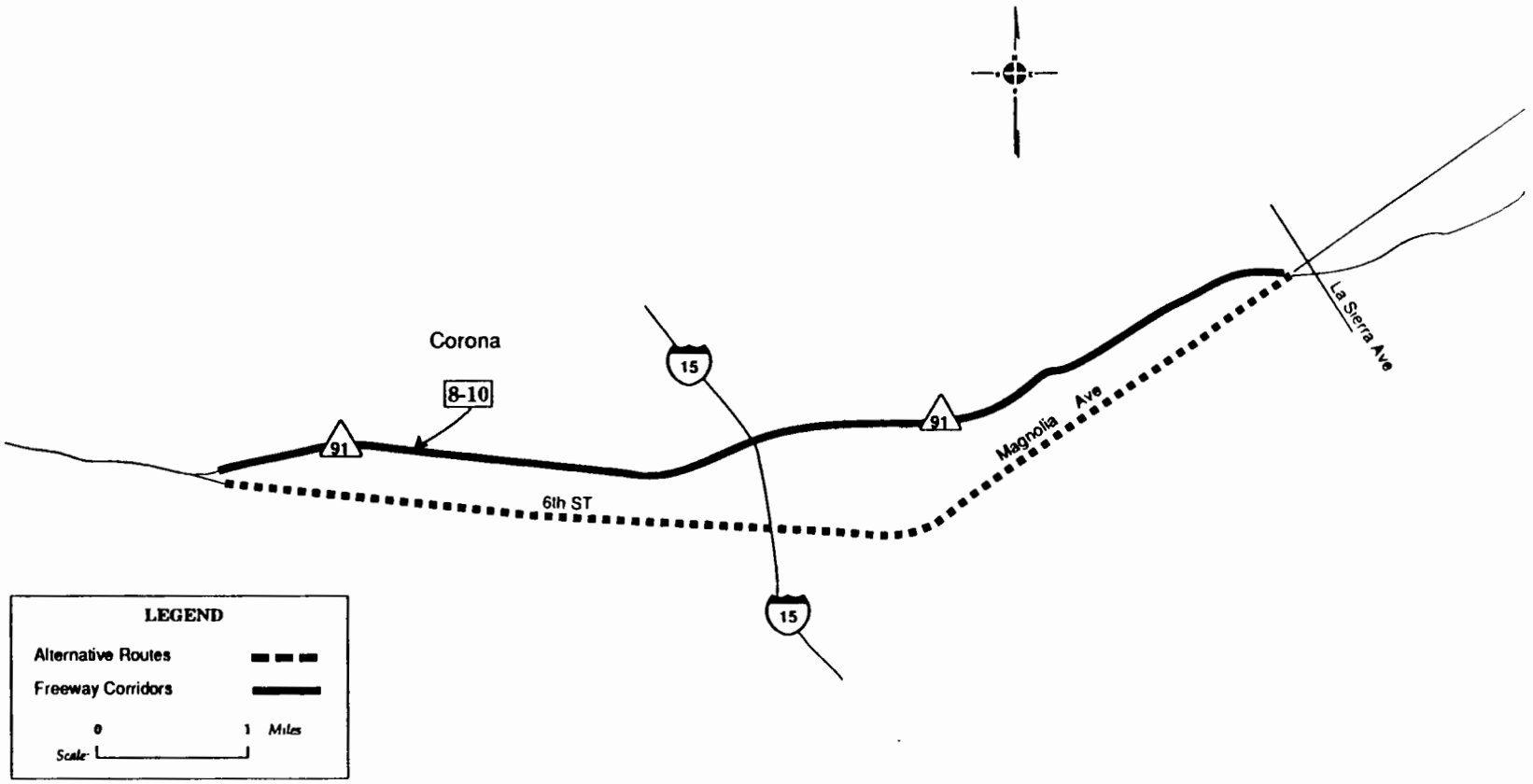
This route is currently used by motorists as an alternate to the Route 91 freeway, a situation which is already of concern to Corona area residents. Previous requests by local residents for freeway improvements to keep regional traffic on the freeway indicates that use of 6th Street/Magnolia Avenue as an alternate route as part of a Smart Corridor may meet with local resistance.

None of the on-ramps within District 8 are currently controlled by ramp meters.

The corridor network is shown on Exhibit 3-65 and an evaluation summary is presented on Exhibit 3-66.

Exhibit 3-65

District 8
Corridor 8-10 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-66

Corridor : 8-10 **Description :** Route 91 between Maple Street & La Sierra Avenue

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	460	10	24	240	
2 Surface street capacity/congestion		4	21	84	
3 Local/Regional committment		3	13	39	
4 Land use compatibility		7	11	77	Business district in central Corona
5 Accident/Incident history		7	9	63	
6 Environmental		3	7	21	
7 Number of jurisdictions	3	5	6	30	Corona, Riverside City, Riverside County
8 Part of larger system		0	4	0	Isolated Corridor
9 In-place control features		0	3	0	
10 Data availability		4	2	8	
			100	562	

Costs	
Initial (Capital and Implementation)	$7,631,399
10 Year Operations and Maintenance	$9,589,619
Total	$17,221,018
Annualized Cost	$1,722,102
Benefits	
Annual Benefit	$6,231,600
Benefit/Cost Ratio	3.62

CALTRANS DISTRICT 11 - THE SAN DIEGO AREA

Thirteen potential corridors were identified for the San Diego area. The corridors were developed through a review of the data and during interviews with Caltrans and local agency staff. The corridors are shown graphically on the first page of Exhibit 3-67 and a summary of the final corridors is shown on the second page of the exhibit. Seven of the corridors were eliminated during the initial screening process. Of the 7 corridors, 4 were eliminated because they did not experience sufficient congestion to warrant detailed review (Corridors 11-5, 11-6, 11-8, and 11-12).

Corridors 11-10 and 11-13 were eliminated because no adequate alternate routes were identified and Corridor 11-9 was eliminated because of its short length and the availability of other freeway routes to serve the short trip. This segment was seen to be an issue more associated with TOS/TOC operations than with Smart Corridor techniques.

During field reviews and more detailed examination of information, three additional corridors were eliminated. Corridor 11-1, the northern segment of Interstate 5, was eliminated because the only strong alternative route passes through several congested commercial/recreational areas with numerous signals and stop signs. The adjacent land use is also incompatible and strong opposition would be expected. This corridor may prove viable in the future.

Corridor 11-11, Interstate 15 north of San Diego, was also eliminated because of the lack of available alternatives. Although segments of the alternates were high capacity, there were critical missing links that precluded their use. Further, local disagreements on the links indicated strong institutional resistance to any use of the roads as alternates. This corridor may also prove viable when the institutional problems are resolved. Finally, Corridor 11-4, a section of State Route 94 was eliminated because of the lack of continuity of available alternates. Several streets were reviewed, however, none travelled the length of the corridor needed to support route balancing. Some of the routes passed through very active commercial areas with no off-street parking and heavy pedestrian demands. Another lacked a connection except via a two lane section passing through a residential area and over a railroad track. Simply, no good alternates existed.

The remaining three corridors, two along Interstate 8 and one along Interstate 5 offered promise and are considered in the final program. The two corridors on Interstate 8 (Corridor 11-2 and 11-3) were combined in the final evaluation because of their use of common alternatives and the availability of continuous routes.

Exhibit 3-67

District 11
Corridor Summary Map

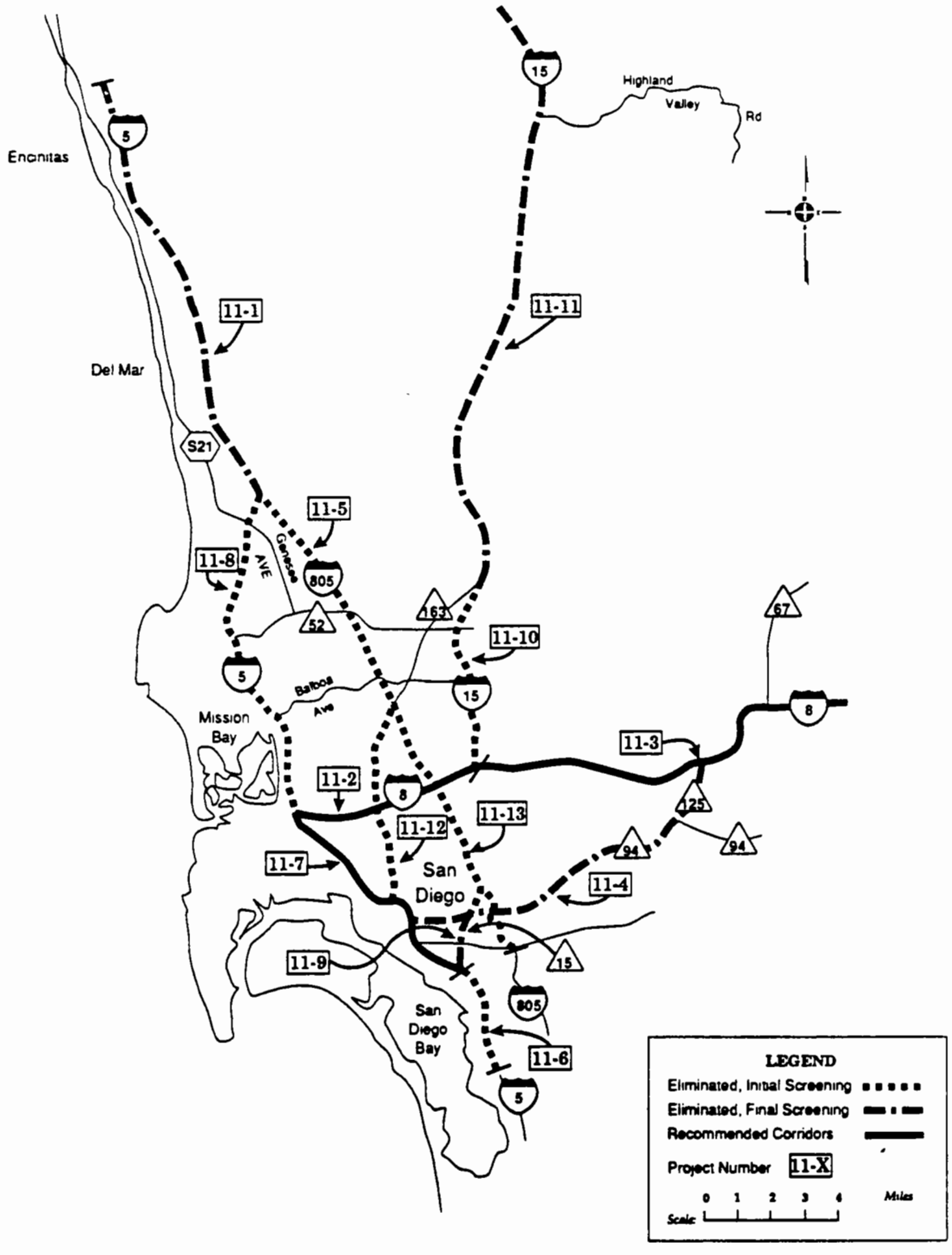


Exhibit 3-67 (Continued)

District 11
Corridor Summary

District/ Corridor	Description	Distance (Miles)	B/C Ratio	Score	Initial Cost	10 Year O&M Cost	Combination of Corridors
11 - 2	I-8 from I-5 to I-15	15.8	711	5.71	$19,306,811	$17,590,421	11-2, 11-3
11 - 7	I-5 from I-15 to I-8	7.5	476	0.21	$10,197,835	$9,907,492	
		Total District Costs			$29,504,646	$27,497,913	

Corridor 11-2

This corridor includes two corridors originally defined as Corridors 11-2 and 11-3 and is shown on Exhibit 3-68. The corridor covers a 15.8 mile segment of Interstate 8 between Interstate 5 and State Route 67. The corridor is located north of the downtown area of San Diego and serves the El Cajon and Santee areas. Interstate 8 carries an average daily traffic of approximately 200,000. The freeway has congested segments, however, much of the expected congestion has been mitigated by an effective ramp metering program.

Excellent alternatives exist throughout the corridor and provide continuity for longer trips as well as convenient freeway access for shorter diversions (i.e. Lake Murray Boulevard, Fletcher Avenue, University and Montezuma. Several segments of the alternatives are relatively high speed. The primary alternative north of the freeway is a combination of Friars Road and Mission Gorge Road. Both are relatively high speed and high capacity. There is a significant access problem at the west end of the corridor where Friars Road nears Interstate 5. An access ramp will need to be constructed from Taylor Street to Friars Road to facilitate the connection to the surface street network and to Interstate 8.

To the south of the freeway, El Cajon Boulevard and an extension on Washington Street provide good route continuity and service. Although El Cajon Boulevard passes through commercial areas, adequate capacity is available during much of the day. The alternate routes do pass by shopping areas and on the north by Jack Murphy Stadium. This would necessitate close monitoring of traffic conditions on the surface streets to insure that adequate capacity is available when any diversion is scheduled.

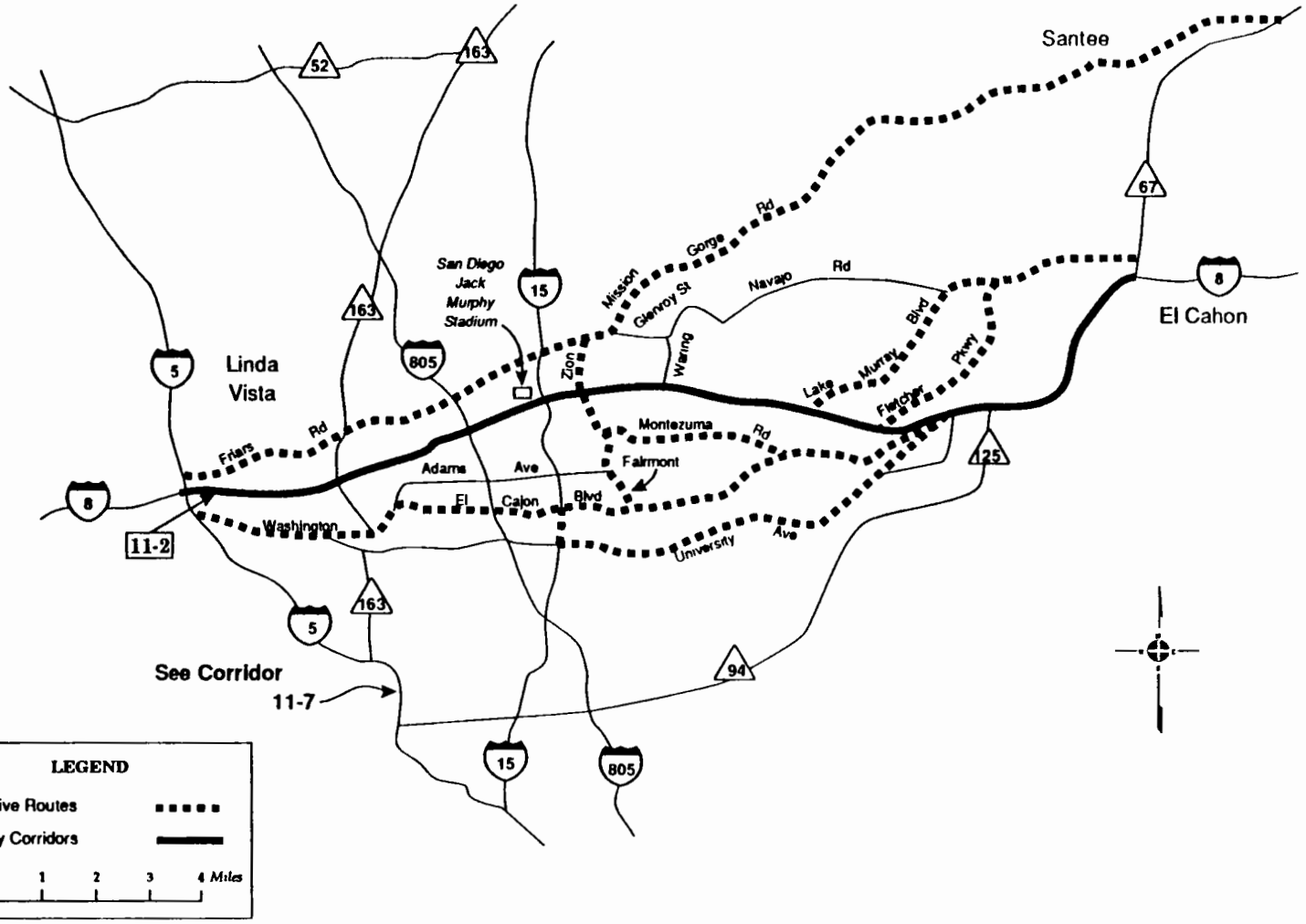
The land use surrounding the alternate routes that were finally selected for the corridor are relatively compatible with the anticipated use. All of the recommended alternatives are currently used as arterial routes and carry significant traffic at this time.

As noted, ramp metering is in place for much of the corridor. Caltrans is planning an upgrade of the system and the ultimate inclusion of full surveillance and control. The use of the corridor in a Smart Corridor project is consistent with the overall plan. Also, the City of San Diego has indicated strong support for the concepts and appears willing to expand its signal control system to support the program.

An evaluation summary is shown on Exhibit 3-69. The overall evaluation of Corridor 11-2 is that it is an excellent candidate for Smart Corridor technology. The priority of the corridor is somewhat reduced because of the level of congestion compared to other locations in the State.

Exhibit 3-68

District 11
Corridor 11-2 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-69

Corridor : 11-2 **Description :** I-8 from I-5 to I-15

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	163	4	24	96	
2 Surface street capacity/congestion		9	21	189	
3 Local/Regional committment		10	13	130	City of San Diego is supportive of Smart Corridor Concepts
4 Land use compatibility		8	11	88	
5 Accident/Incident history	63	6	9	54	
6 Environmental		5	7	35	
7 Number of jurisdictions	3	5	6	30	Cities of San Diego & Linda Vista, San Diego Co.
8 Part of larger system		4	4	16	
9 In-place control features		8	3	24	
10 Data availability		7	2	14	
			100	676	

Costs	
Initial (Capital and Implementation)	$19,306,811
10 Year Operations and Maintenance	$17,590,421
Total	$36,897,232
Annualized Cost	$3,689,723
Benefits	
Annual Benefit	$21,056,400
Benefit/Cost Ratio	5.71

Corridor 11-7

Corridor 11-7 covers the section of Interstate 5 in San Diego between Interstate 8 and the northern edge of National City. The freeway carries a daily volume of approximately 160,000. Interstate 5 provides access to the central business district from both the north and south, provides access to the San Diego-Coronado Bridge, and serves the large employment concentrations at the naval shipyard and near Lindberg Field. The freeway is not heavily congested at this time, as compared to other freeways in urban areas of California. The corridor network is shown on Exhibit 3-70 and the evaluation summary is shown as Exhibit 3-71.

Pacific Highway and an extension via Harbor Drive serves as an excellent alternate route for this corridor. The route runs from the northern end of the corridor to a direct connection with Interstate 5 at the southern end of the corridor. The northern connection with the freeway system is somewhat awkward because of a required left turn in the southbound direction. This connection would need to be improved as part of a project to allow a higher capacity movement. The improvement might also be coordinated with improved access to Friar's Road in Corridor 11-2 to provide route continuity to the east of Interstate 5.

The alternate route provides access to the central business district and continues to the heavy employment centers. It also passes by the newly constructed convention center. The heavy employment areas, especially the navy shipyard in the southern portion of the route, will reduce its effectiveness during shift changes. Also, some conflict with events at the convention center may be expected, however these generally occur off-peak.

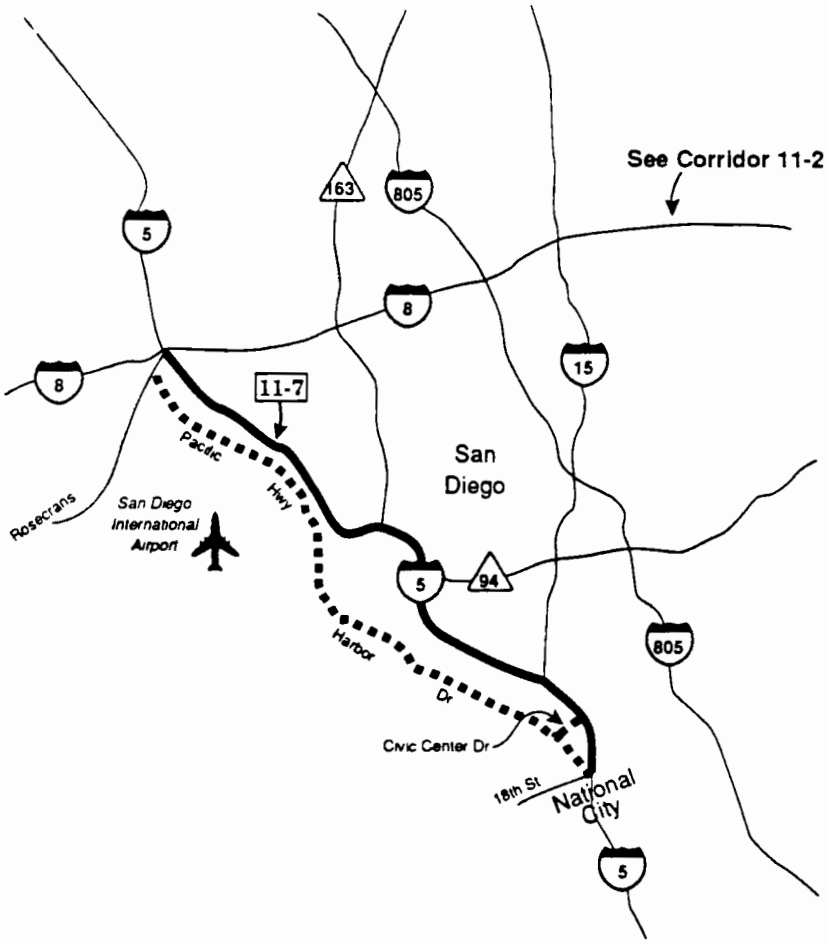
The land use surrounding the alternate route are not generally sensitive to its continued use as a major traffic carrier.

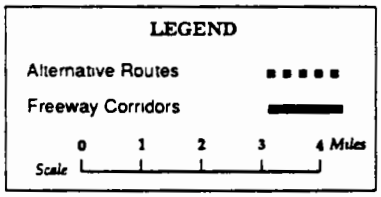
The City of San Diego has indicated support for the Smart Corridor concepts and this corridor is totally within their jurisdiction except for the ramps at the southern terminus. The central signal system for the City is available to control the signals on the alternate route.

The overall assessment of Corridor 11-7 is that it is a good candidate for improvement using Smart Corridor technology. The priority of the corridor is likely to be low, however, because of the limited congestion on the freeway.

Exhibit 3-70

District 11
Corridor 11-7 Network Map





CORRIDOR EVALUATION SUMMARY Exhibit 3-71

Corridor : 11-7 **Description :** I5 from I-15 to I-8

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	31	1	24	24	
2 Surface street capacity/congestion		3	21	63	
3 Local/Regional committment		9	13	117	City of San Diego supportive of Smart Corridor Concept
4 Land use compatibility		10	11	110	
5 Accident/Incident history	57	6	9	54	
6 Environmental		0	7	0	
7 Number of jurisdictions	1	10	6	60	City of San Diego
8 Part of larger system		4	4	16	
9 In-place control features		6	3	18	
10 Data availability		7	2	14	
			100	476	

Costs	
Initial (Capital and Implementation)	$10,197,835
10 Year Operations and Maintenance	$9,907,492
Total	$20,105,327
Annualized Cost	$2,010,533
Benefits	
Annual Benefit	$423,000
Benefit/Cost Ratio	0.21

CALTRANS DISTRICT 12 - ORANGE COUNTY

The initial review of the congestion and basic traffic data together with the data from the interviews with the local staff led to the identification of thirteen candidate corridors in the Orange County area. These corridors and summary information are shown in Exhibit 3-71.

As a result of the Level 1 analysis, two corridors were eliminated from further study. Neither Corridor 11 nor 12 had an availability of an alternate route or routes. In addition, the freeway delay on Interstate 5 from Euclid Street in Anaheim to the Los Angeles County line was below the defined thresholds on both a delay per mile and total delay basis.

No corridors were eliminated as a result of the field reviews of the corridors. With the exception of the two corridors eliminated in the initial screening, the dense, often grid-oriented, road network in Orange County provided candidate corridors with the potential of a number of alternate routes. The resulting corridor network therefore exhibits a high degree of overlap, i.e. alternate routes used in more than one corridor. This sharing of alternates between corridors is complemented by the local initiative in defining and implementing a network of "Super Streets".

Several corridors were combined as part of the District 12 final analysis. Corridor 12-1 includes corridors originally noted as 12-1, 12-2, and 12-13. Corridor 12-6 includes original Corridor 12-6 and the majority of Corridor 12-7. Corridor 12-8 includes 12-8 and 12-9. (This was originally shown as 12-10 in the material in Appendix B.)

In February 1989, Caltrans District 12 completed a report supporting the establishment of a Traffic Operations Center in the district, and identifying routes for the application of improved surveillance and control capabilities through the use of several of the technologies identified for use in Smart Corridors. Finally, cities such as Anaheim are working with Caltrans District 12 in aggressively pursuing funding for the application of Smart Corridor technologies in this area.

These factors emphasize the local support for the application of a network of cohesive Smart Corridor technologies in Orange County.

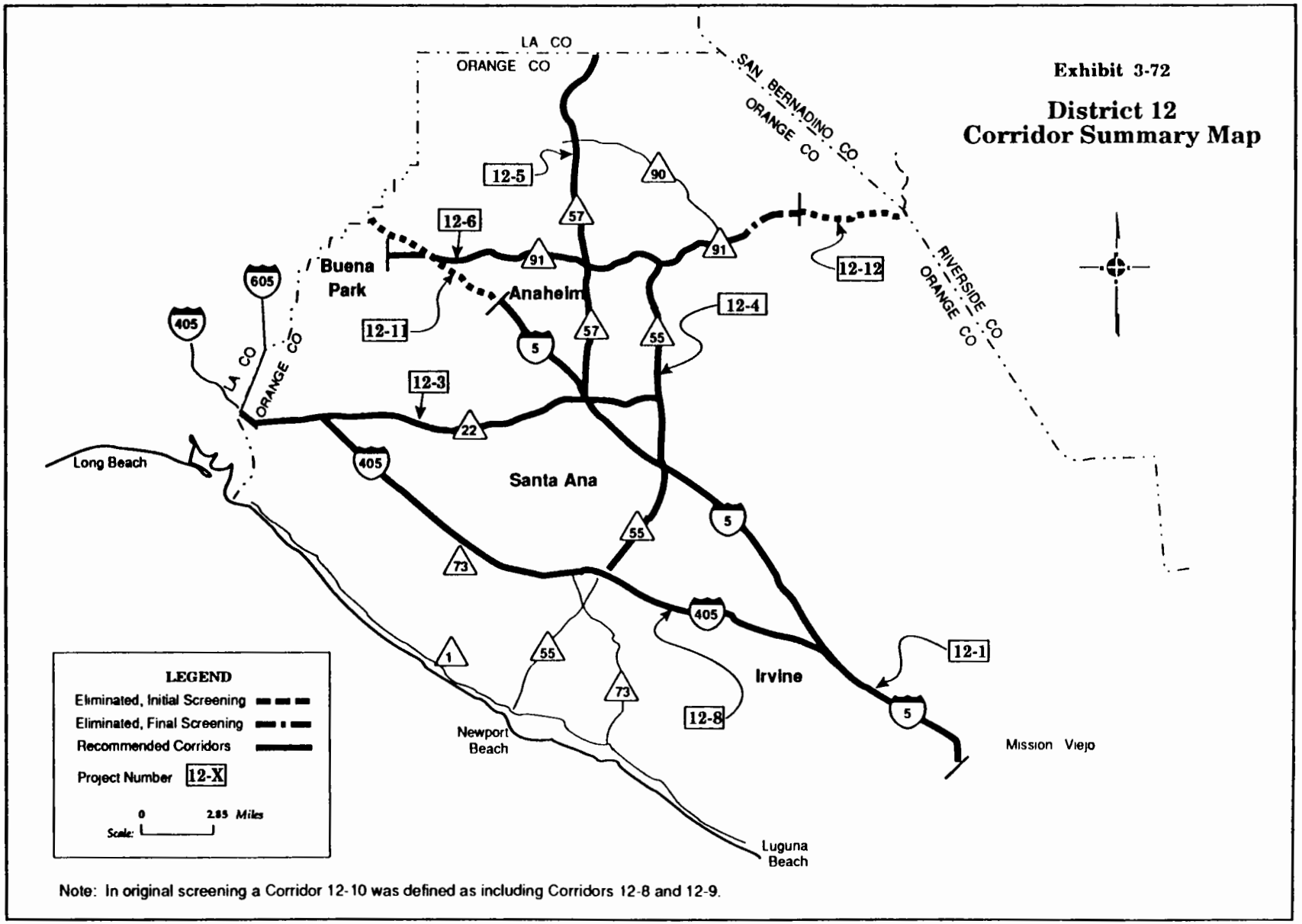


Exhibit 3-72
District 12
Corridor Summary Map
LA CO
ORANGE CO
SAN BERNADINO CO
ORANGE CO
RIVERSIDE CO
ORANGE CO
LA CO
ORANGE CO
12-5
12-6
12-11
12-12
12-4
12-3
12-1
12-8
Buena Park
Anaheim
Santa Ana
Irvine
Long Beach
Newport Beach
Mission Viejo
Luguna Beach
LEGEND
Eliminated, Initial Screening
Eliminated, Final Screening
Recommended Corridors
Project Number 12-X
0 2.85 Miles
Scale:
Note: In original screening a Corridor 12-10 was defined as including Corridors 12-8 and 12-9.

Exhibit 3-72 (Continued)

District 12
Corridor Summary

District/ Corridor	Description	Distance (Miles)	B/C Ratio	Score	Initial Cost	10 Year O&M Cost	Combination of Corridors
12 - 1	I-5 from Oso Parkway to Euclid	23.0	5.39	656	$21,787,680	$28,198,820	12-1, 12-2, 12-13
12 - 3	Route 22 from I-405 to Route 55	15.0	2.42	726	$12,800,108	$16,045,890	
12 - 4	Route 55 from I-405 to Route 91	11.8	3.41	600	$12,698,946	$13,459,805	12-4A, 12-4B
12 - 5	Route 57 from I-5 to Route 90	11.7	0.51	550	$11,139,046	$11,513,303	12-5A, 12-5B
12 - 6	Route 91 from Imperial Highway to Beach Boulevard	12.6	2.04	585	$14,422,019	$16,625,315	12-6, 12-7
12 - 8	I-405 from Route 22 to I-5	20.5	8.06	668	$20,670,005	$21,707,850	12-8, 12-9
		Total District Costs			$93,517,804	$107,550,983	

Corridor 12-1

The Corridor identified as 12-1 in the final analysis is a combination of the original corridors 12-1, 12-2 and 12-13 and is detailed in Exhibit 3-73. Corridors 12-1 and 12-2 were a logical combination due to the sharing of common alternates such as Irvine Boulevard, Irvine Center Drive and Alton and Moulton Parkways in Irvine and Tustin. The latter streets feed directly on to the Santa Ana alternates of First Street and Edinger, hence the inclusion of Corridor 12-13 into the grouping.

Interstate 5 from Route 55 south runs through an area experiencing tremendous growth in both residential and commercial development. The alternates in Irvine and Tustin are located for the most part in residential areas. This is mitigated to some extent along both Irvine Boulevard and Trabuco where the residential areas are behind separating walls. However, Alton Parkway is more open and therefore sensitive to intrusion. Alton Parkway, Moulton Parkway and Irvine Boulevard are all good, high capacity alternates.

Further north, First Street/Bolsa Avenue, which is defined as a Super Street, would improve as an alternate with local widening, but the study analysis does not assume this to have been done. Similarly, the excess capacity of Edinger is limited by the section from Pacific to Fairview, but this could be alleviated by peak hour parking restrictions.

The northern section of this corridor is dependent upon Euclid and Harbor Boulevard as the alternates; Harbor is in the Super Streets program. The original corridor definition used Glassell as a north-south alternate to the East of I-5 with Chapman and Lincoln as feeders in what was termed an X-Y alternate during the study to differentiate the configuration from a simple parallel alternate.

Chapman was ruled out as an alternate during the field analysis as the section which lies in the downtown area of Orange renders it unsuitable as is the case for Glassell. The other east-west route, Lincoln, has sections of poor capacity and so the whole network of X-Y alternates in this area was eliminated.

Harbor has excellent excess capacity with the exception of the area at the intersection of Westminster. This would likely be alleviated by local improvements such as parking restrictions and signal timings.

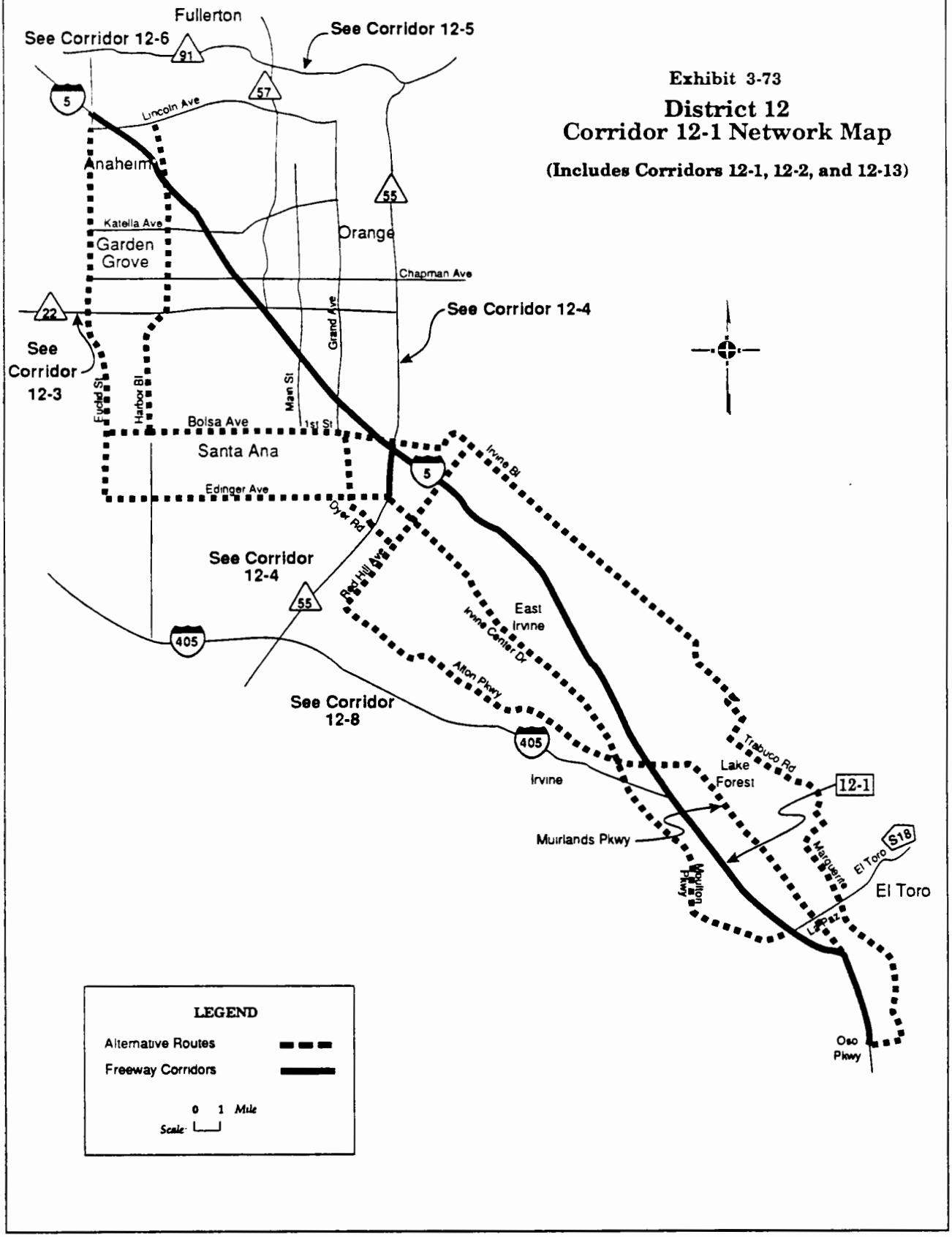
Finally, Euclid Street is a suitable alternate given the improvements to the street which are currently underway at its intersection with Interstate 5. Ramp metering is in place along this section of the Interstate.

The evaluation analysis presented in Exhibit 3-74 shows this to be a good candidate for Smart Corridor technologies. However, the currently planned improvements on Interstate 5, including adding a lane and major ramp reconstruction will significantly reduce the current levels of congestion. This in turn reduces the potential benefit and causes the priority of the corridor to be reduced.

Exhibit 3-73

District 12
Corridor 12-1 Network Map

(Includes Corridors 12-1, 12-2, and 12-13)



CORRIDOR EVALUATION SUMMARY Exhibit 3-74

Corridor : 12-1 **Description :** I-5 from Oso Parkway to Euclid

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	307	8	24	192	Interstate widening programmed
2 Surface street capacity/congestion		4	21	84	
3 Local/Regional committment		7	13	91	OCTC Super Streets program effective
4 Land use compatibility		8	11	88	
5 Accident/Incident history	59	6	9	54	
6 Environmental		7	7	49	
7 Number of jurisdictions	6	2	6	12	Orange Co., Irvine, Tustin, Orange, Santa Ana, Garden Grove
8 Part of larger system		10	4	40	
9 In-place control features		10	3	30	
10 Data availability		8	2	16	
			100	656	

Costs	
Initial (Capital and Implementation)	$21,787,680
10 Year Operations and Maintenance	$28,198,820
Total	$49,986,500
Annualized Cost	$4,998,650
Benefits	
Annual Benefit	$26,964,000
Benefit/Cost Ratio	5.39

Corridor 12-3

This corridor includes the section of Route 22, the Garden Grove Freeway, between Interstate 605 and Route 55. The route traverses the jurisdictions of the cities of Seal Beach, Westminster, Garden Grove, Santa Ana and Orange. The corridor network is shown in Exhibit 3-75.

The originally defined alternates included Chapman to the North to act as a route between Beach Boulevard and Tustin in to the North of Route 22. This was eliminated due to its downtown Orange section as stated in the analysis of corridor 12-1.

The remaining alternate in the north is Garden Grove which is in general, a good capacity route. However, marks against it as an alternate are poor connection to Route 22 in the East and the indication of its strong community value by the high level of civic design encountered. The delay analysis showed Garden Grove to offer little capacity during peak hours and so the analysis presented excludes Garden Grove as an alternate.

Bolsa Avenue/First Street is an alternate used also in Corridor 12-1 and so the same comments apply. Parallel to the Super Street of Bolsa Avenue is Westminster which is a good capacity facility running, for the most part, through an environmentally insensitive area and so provides a good alternate.

The north-south connectors are Tustin to the East and Bolsa Chica and Seal Beach to the West. All are good capacity alternates and it is interesting to note that Bolsa Chica is in the Super Streets program.

The evaluation analysis presented in Exhibit 3-76 shows this to be a good candidate to benefit from the application of Smart Corridor technologies.

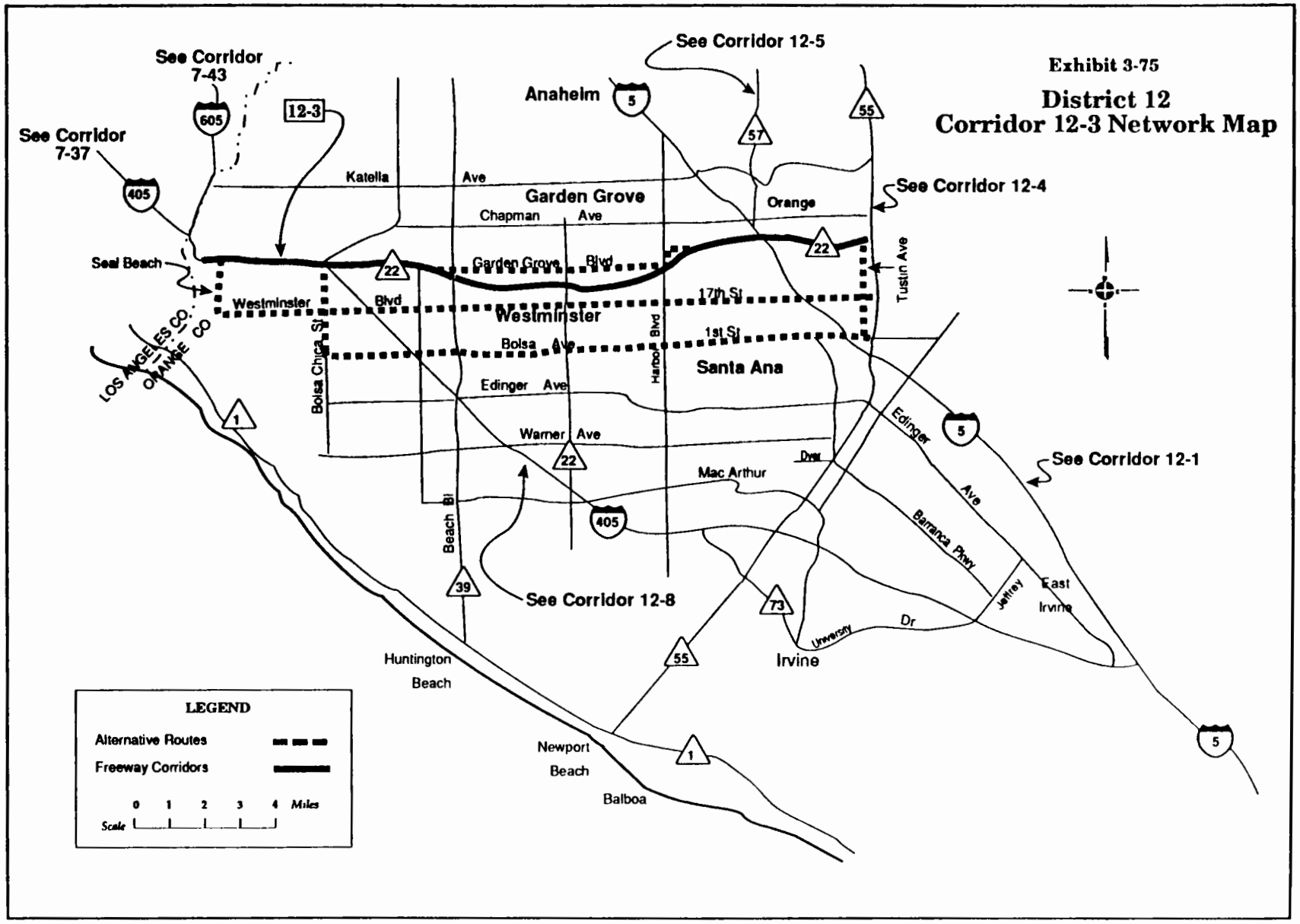


Exhibit 3-75
District 12
Corridor 12-3 Network Map
See Corridor 7-43
See Corridor 7-37
See Corridor 12-5
See Corridor 12-4
See Corridor 12-1
See Corridor 12-8
12-3
Anaheim
Garden Grove
Westminster
Santa Ana
Huntington Beach
Newport Beach
Balboa
Irvine
East Irvine
Seal Beach
Katella Ave
Chapman Ave
Garden Grove Blvd
Westminster Blvd
17th St
1st St
Bolsa Ave
Edinger Ave
Warner Ave
Mac Arthur
Orange
Tustin Ave
Bolsa Chica St
Harbor Blvd
Beach Bl
Barranca Pkwy
Jeffrey
University Dr
Dyer
LOS ANGELES CO. — ORANGE CO
LEGEND
Alternative Routes
Freeway Corridors
0 1 2 3 4 Miles
Scale

CORRIDOR EVALUATION SUMMARY Exhibit 3-76

Corridor : 12-3 **Description :** Route 22 from I-405 to Route 55

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	331	8	24	192	
2 Surface street capacity/congestion		10	21	210	
3 Local/Regional committment		8	13	104	OCTC Super Streets program effective
4 Land use compatibility		9	11	99	
5 Accident/Incident history	59	6	9	54	
6 Environmental		2	7	14	
7 Number of jurisdictions	6	0	6	0	Orange, Santa Ana, Garden Grove, Stanton, Westminster, Seal Beach
8 Part of larger system		4	4	16	
9 In-place control features		7	3	21	
10 Data availability		8	2	16	
			100	726	

Costs	
Initial (Capital and Implementation)	$12,800,108
10 Year Operations and Maintenance	$16,045,890
Total	$28,845,998
Annualized Cost	$2,884,600
Benefits	
Annual Benefit	$6,991,200
Benefit/Cost Ratio	2.42

Corridor 12-4

Corridor 12-4 comprises Route 55 between I-405 to the South and Route 91 to the north. This is shown in Exhibit 3-77, together with the proposed alternates Tustin and Red Hill.

The original definition of the corridor included Glassell, the northern extension of Grand, as an alternate in addition to Tustin in the northern section of the corridor. The field analysis ruled out Glassell due to its crossing the downtown area of Orange. This leaves Tustin as the only alternate in this section. Tustin is already heavily used and the delay analysis confirmed the field expectation of a limited degree of excess capacity from Katella Avenue northwards. This limits the benefits to be expected from the corridor.

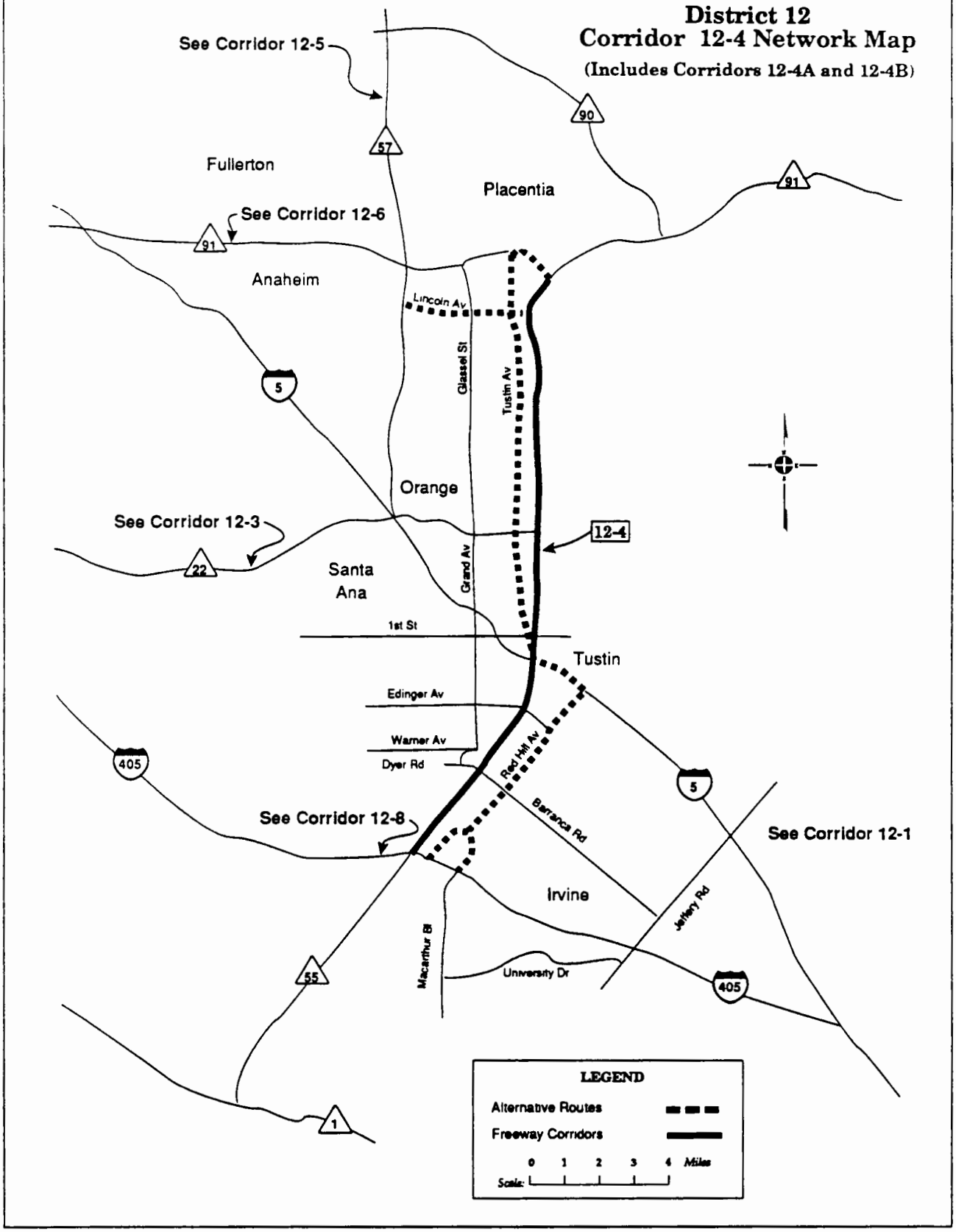
To the south, however, Red Hill is a high capacity facility enjoying good signal synchronization and so providing significant excess capacity. The multiple jurisdictions along its length is a complicating factor, but there is already a program in effect to improve interjurisdictional signal coordination between Irvine and Tustin which should prove to be a mitigating factor.

Exhibit 3-78 presents the evaluation of corridor 12-4.

Exhibit 3-77

District 12
Corridor 12-4 Network Map

(Includes Corridors 12-4A and 12-4B)



CORRIDOR EVALUATION SUMMARY Exhibit 3-78

Corridor : 12-4 **Description :** Route 55 from I-405 to Route 91

	Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1	Freeway capacity/congestion level	307	8	24	192	
2	Surface street capacity/congestion		3	21	63	
3	Local/Regional committment		8	13	104	OCTC Super Streets program effective
4	Land use compatibility		9	11	99	
5	Accident/Incident history	59	6	9	54	
6	Environmental		2	7	14	
7	Number of jurisdictions	6	2	6	12	Costa Mesa, Irvine, Tustin, Santa Ana, Orange, Anaheim
8	Part of larger system		7	4	28	
9	In-place control features		6	3	18	
10	Data availability		8	2	16	
				100	600	

Costs	
Initial (Capital and Implementation)	$12,698,946
10 Year Operations and Maintenance	$13,459,805
Total	$26,158,751
Annualized Cost	$2,615,875
Benefits	
Annual Benefit	$8,917,200
Benefit/Cost Ratio	3.41

Corridor 12-5

Corridor 12-5 comprises Route 57 between Route 22 in the south to Route 90 in the north. Exhibit 3-79 shows the corridor network with its single alternate of State College to the West of the freeway.

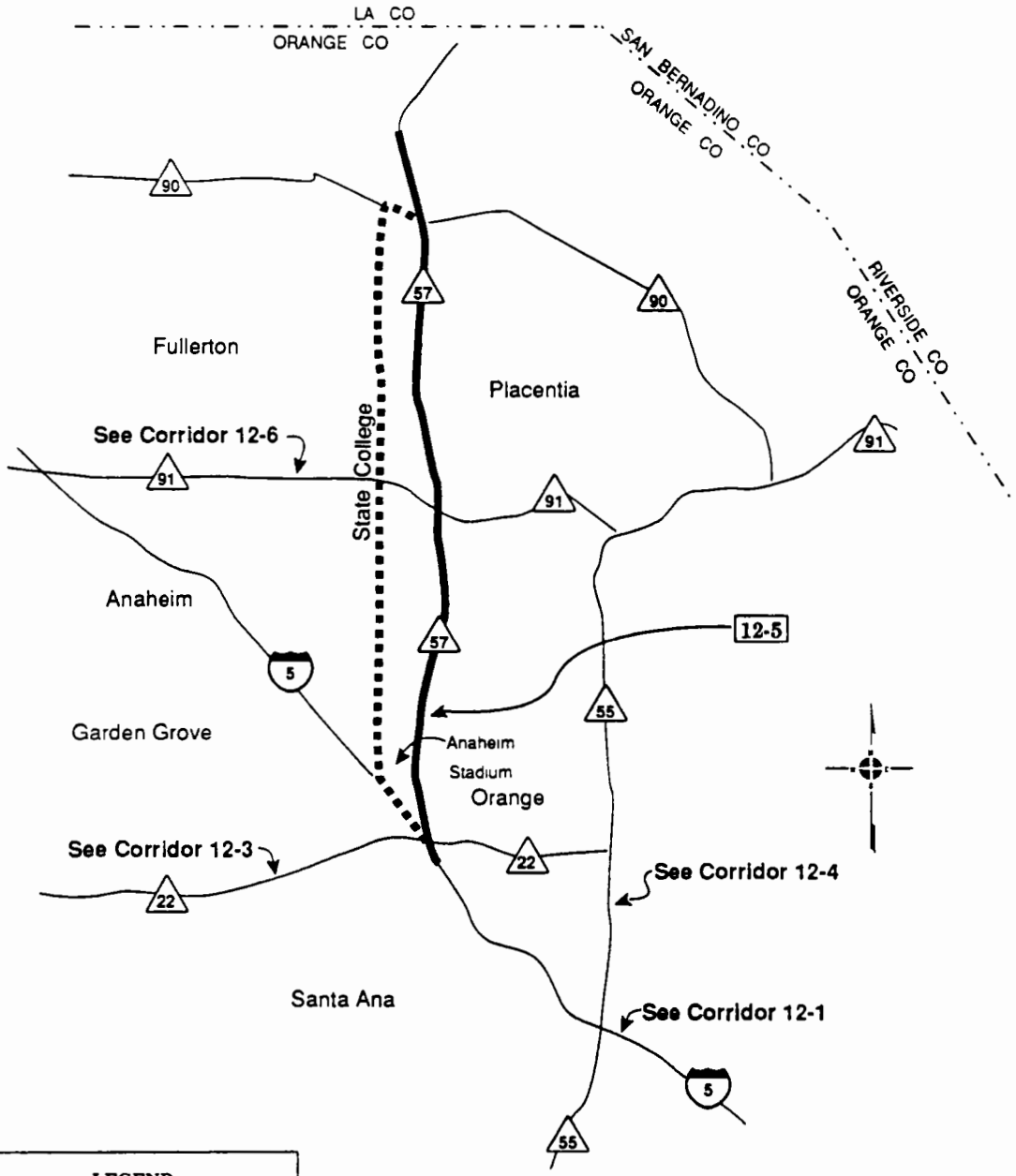
State College is defined as being part of the Super Streets program in Orange County and has emerged as a good capacity alternate route. Some land use conflict exists as State College does cross through some residential and park areas.

Despite State College displaying a limited degree of excess capacity during the peak hours, the benefits provided to Route 57, as shown by the delay analysis, render this a good Smart Corridor application. The City of Anaheim has already recognized this and is attempting to secure funding for such a project.

The evaluation of corridor 12-4 is presented in Exhibit 3-80.

Exhibit 3-79

District 12
Corridor 12-5 Network Map



CORRIDOR EVALUATION SUMMARY Exhibit 3-80

Corridor : 12-5 **Description :** Route 57 from I-5 to Route 90

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	274	7	24	168	
2 Surface street capacity/congestion		1	21	21	
3 Local/Regional committment		10	13	130	Strong support from Anaheim
4 Land use compatibility		7	11	77	
5 Accident/Incident history	46	5	9	45	
6 Environmental		0	7	0	
7 Number of jurisdictions	7	5	6	30	Orange, Santa Ana, Anaheim, Placentia, Fullerton, Brea, Orange Co.
8 Part of larger system		8	4	32	
9 In-place control features		9	3	27	
10 Data availability		10	2	20	
			100	550	

Costs	
Initial (Capital and Implementation)	$11,139,046
10 Year Operations and Maintenance	$11,513,303
Total	$22,652,349
Annualized Cost	$2,265,235
Benefits	
Annual Benefit	$1,144,800
Benefit/Cost Ratio	0.51

Corridor 12-6

Exhibit 3-81 shows Corridor 12-6 which includes Route 91 from Beach Boulevard to Route 90 (Imperial Highway). The corridor includes the original Corridor 12-6 and a portion of Corridor 12-7. The northerly alternates are Orangethorpe and La Palma while the southerly equivalents are Lincoln and La Palma (La Palma crosses Route 91).

While Orangethorpe has pockets of residential and strong commercial development, in general it is a good capacity facility, especially in the east. A further drawback is the number of jurisdictions along its length. It has a good connection to Route 91 at its east end. La Palma, on the other hand, while providing a good alternate facility between Beach and Gilbert and to the east of Route 57, narrows to a single lane over I-5. It then goes through residential and commercial areas between I-5 and Route 57.

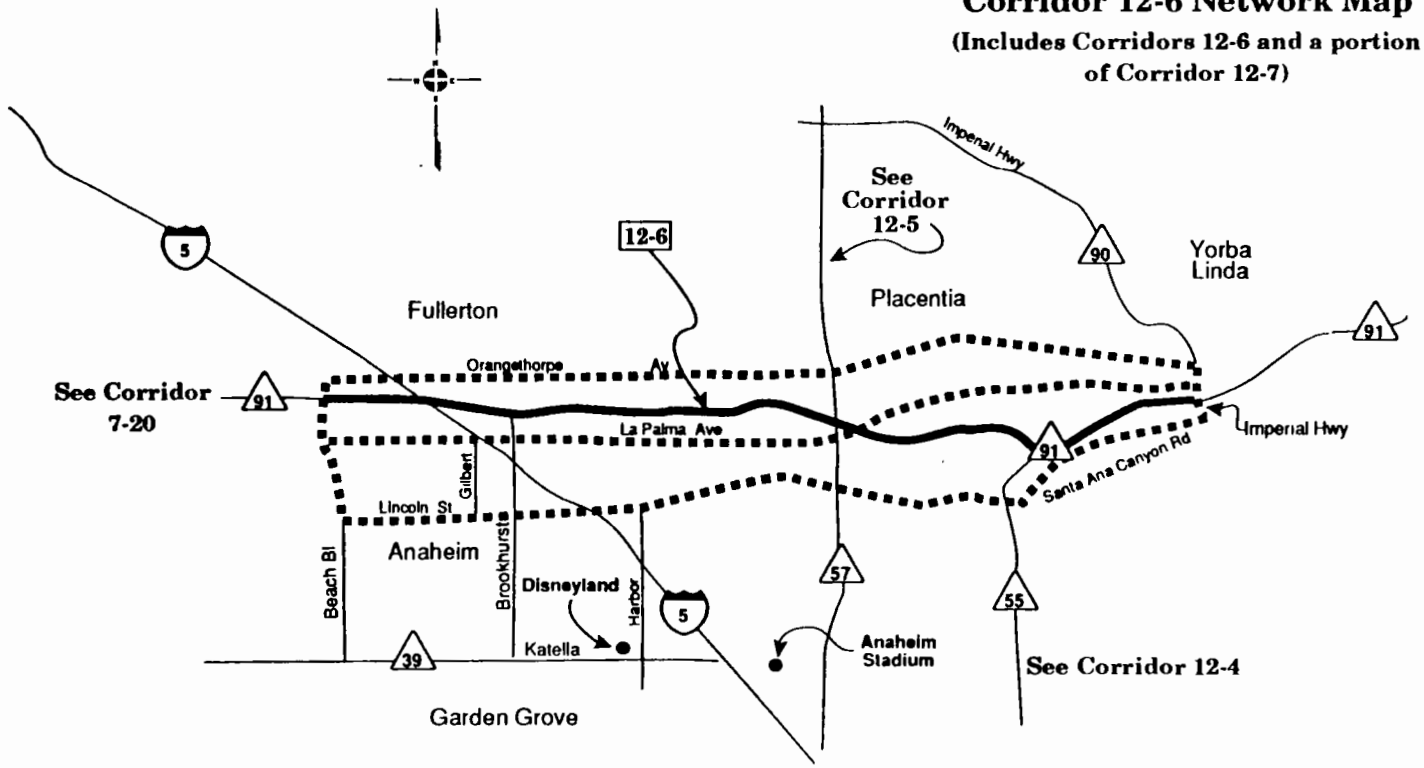
Further to the south, Lincoln provides a good alternate except in some restricted capacity areas such as between Brookhurst and I-5 which limits its use as an alternate. To the east of Route 55, Santa Ana Canyon provides a good alternate facility with the exception of a section of single lane road prior to it broadening on its approach to the Imperial Highway. The delay analysis reflects the the existing situation.

The evaluation presented in Exhibit 3-82 shows that benefits are to be achieved from applying Smart Corridor technologies in this corridor under the existing circumstances but they are limited by the poorer sections of Lincoln and Santa Ana Canyon.

Exhibit 3-81

District 12
Corridor 12-6 Network Map

(Includes Corridors 12-6 and a portion of Corridor 12-7)



CORRIDOR EVALUATION SUMMARY Exhibit 3-82

Corridor : 12-6 **Description :** Route 91 from Imperial Highway to Beach Boulevard

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	244	6	24	144	
2 Surface street capacity/congestion		3	21	63	
3 Local/Regional committment		10	13	130	Strong support from Anaheim
4 Land use compatibility		7	11	77	
5 Accident/Incident history	53	5	9	45	
6 Environmental		2	7	14	
7 Number of jurisdictions	5	5	6	30	Buena Park, Anaheim, Fullerton, Orange, Placentia
8 Part of larger system		8	4	32	
9 In-place control features		10	3	30	
10 Data availability		10	2	20	
			100	585	

Costs	
Initial (Capital and Implementation)	$14,422,019
10 Year Operations and Maintenance	$16,625,315
Total	$31,047,334
Annualized Cost	$3,104,733
Benefits	
Annual Benefit	$6,332,400
Benefit/Cost Ratio	2.04

Corridor 12-8

The final Corridor network derived around Interstate 405 between I-5 and Route 22 is depicted in Exhibit 12-8. This is made up of the original corridors 12-8 and 12-9. (This corridor was also originally labeled Corridor 12-10 in the initial screening process.)

For the final analysis, it was decided to combine the two corridors 12-8 and 12-9 primarily because of the way that 12-8's northerly alternates depended upon the alternates defined for use in corridor 12-9 to return to the freeway, I-405. Similarly, the alternates for 12-8 formed part of the X-Y network of alternates used in the section of I-405 to the north of the freeway.

The northern-most alternates of Bolsa/First Avenue and Edinger have already been dealt with under Corridor 12-1 as has the north-south connector Bolsa Chica (see Corridor 12-3). All are good quality alternates. For this corridor, they are supplemented with another designated Super Street, Warner Avenue. Warner, in general, provides a good alternate which can be readily improved by improving signal coordination in Huntington Beach, Fountain Valley and Santa Ana sections. The intersection at Beach is also problematic but would benefit from split optimization. Ideally, local widening is needed to overcome the problem of narrow lanes. This is likely to emerge from the Super Streets program.

Finally to the North of I-405, MacArthur would benefit from widening at Hyland where it meets and becomes Talbert Avenue. A consistent, good design standard is apparent along Talbert Avenue which provides a link to another Super Street acting as a north-south connector, Beach Boulevard.

The equivalent alternates in the southern section of the corridor are Irvine Center Drive and Barranca Parkway to the north and University Drive to the south. Irvine Center Drive is a designated Super Street and is currently undergoing improvement from Gateway to Sand Canyon. It passes through a region of multi-family and commercial developments but overall does not present incompatible land-use problems. This may not be the case for Barranca Parkway which, while being a good high capacity facility passes through potentially sensitive community developments.

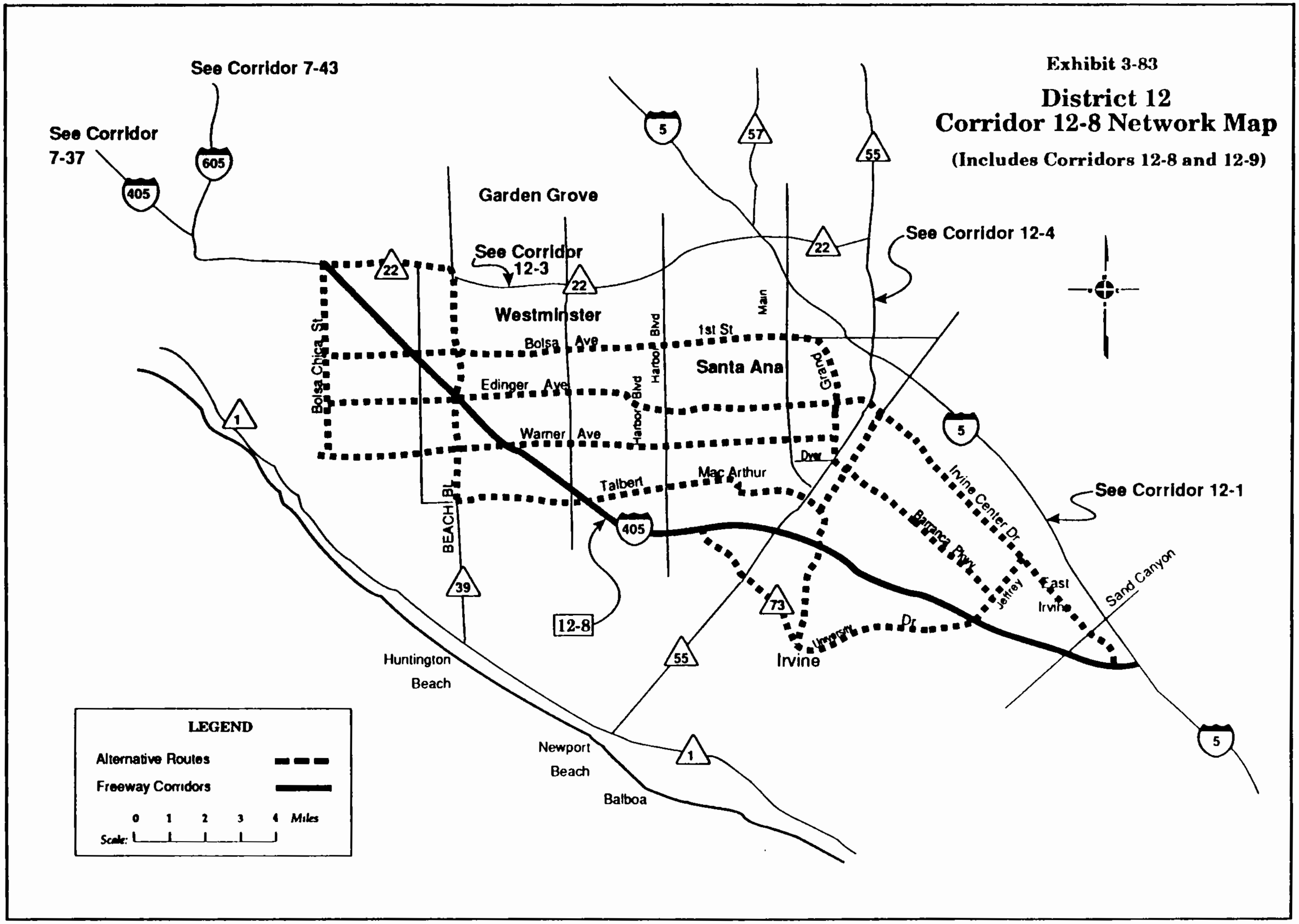
Finally, to the south of I-405 in the southern section of the corridor, University provides a good capacity alternate but can deliver only a limited amount of excess capacity during peak periods. It is bordered by a Regional Park and so presents only limited land-use compatibility problems.

The evaluation presented in Exhibit 3-84 confirms that Corridor 12-8 is a prime candidate for receiving benefits from the application of Smart Corridor technologies. It clearly could work effectively together with Corridors 12-3 and 12-4 in providing a Smart Network in the southern part of Orange County.

Exhibit 3-83

District 12 Corridor 12-8 Network Map

(Includes Corridors 12-8 and 12-9)



CORRIDOR EVALUATION SUMMARY Exhibit 3-84

Corridor : 12-8 **Description :** I-405 from Route 22 to I-5

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	263	7	24	168	
2 Surface street capacity/congestion		8	21	168	
3 Local/Regional committment		7	13	91	
4 Land use compatibility		7	11	77	
5 Accident/Incident history	38	4	9	36	
6 Environmental		9	7	63	
7 Number of jurisdictions	8	0	6	0	Westminster, Huntington Beach, Fountain Valley, Santa Ana + 4 others
8 Part of larger system		6	4	24	
9 In-place control features		9	3	27	
10 Data availability		7	2	14	
			100	668	

Costs	
Initial (Capital and Implementation)	$20,670,005
10 Year Operations and Maintenance	$21,707,850
Total	$42,377,855
Annualized Cost	$4,237,786
Benefits	
Annual Benefit	$34,142,400
Benefit/Cost Ratio	8.06

4. PROGRAM CONCLUSIONS

The discussions of potential Statewide Smart Corridors in the earlier sections of this report were based on a Caltrans district by district and corridor by corridor review. The purpose of this section is to place all of the final corridors into a Statewide perspective and to develop program level conclusions for candidate projects. The information used in the evaluation is that which was presented for the individual corridors discussed in Section 3.

CORRIDOR DEVELOPMENT

The project included a process of identifying corridors, performing an initial screening, and then conducting a more complete evaluation of the final corridors. The identification process used levels of congestion and availability of alternate routes as the primary method for assessing the potential of the corridor. The final evaluation used these factors and others to determine the expected effectiveness of the corridors. Exhibit 4-1 provides a summary of the results of the identification and screening process.

As shown on the exhibit, 123 corridors were identified, with 60 being eliminated by the initial screening process. An additional 14 were eliminated during a second review of the corridors, with the remaining being carried through the full evaluation process. Several of the final corridors were combined to provide logical projects, resulting in 39 complete corridors being included in the evaluation process.

CORRIDOR EVALUATION

Two primary elements were considered in developing corridor priorities. First, the relative effectiveness of the potential improvements in light of implementation and operations and maintenance costs were considered. This "relative effectiveness" is expressed in terms of the benefit to cost ratio developed for the corridors. The costs were developed using the assumptions and cost factors noted in Appendix C. Both benefits and costs are expressed in terms of 1990 dollars.

Benefit Estimates

Benefits were estimated for each corridor based on an estimated delay savings for both recurring and incident based delays. The estimates considered the

Exhibit 4-1

CORRIDOR ANALYSIS SUMMARY

Caltrans District	Corridors Identified	Eliminated Initial Screening	Eliminated Final Screening	Program Categories				
				Corridors Final Evaluation *	Category 1	Category 2	Category 3 (Future)	Traffic Operations Centers
3 - Sacramento	7	4	0	3	0	1	2	1
4 - SF Bay Area	28	13	5	9	4	2	3	1
7 - Los Angeles	48	22	6	17	8	6	3	1
8 - San Bernardino/ Riverside	14	12	0	2	1	0	1	1
11 - San Diego	13	7	3	2	1	0	1	1
12 - Orange County	13	2	0	6	2	2	2	1
Totals	123	60	14	39	16	11	12	6

* Includes several corridors which were combined so totals do not match across to "Corridors Identified".

NOTES:

1. Category 1 Projects show a benefit cost ratio of over 3 to 1 and were in the top one-half of all corridors using the criteria and corridor scoring process.

2. Category 2 Projects show a benefit cost ratio between 1 to 1 and 3 to 1.

3. Category 3 Projects do not show a positive benefit cost ratio under current conditions but offer promise in the future as travel growth continues in the corridors.

reductions in delay which might be attained on the freeway segment as well as any travel time changes which might occur on surface streets. Delays on the surface streets might be reduced overall, given Smart Corridor improvements, or might be increased slightly if traffic diversion offset the improvements. Benefits also included delay savings from quicker response to, and handling of, accidents or incidents. The delay savings were then converted to a dollar benefit using $8.00 per hour, which is consistent with current Caltrans estimating procedures. The results of ranking the corridors by benefit/cost ratio are shown on Exhibit 4-2.

Corridor Score

The second major consideration in the evaluation was the "score" developed for each of the corridors. This score reflects the process described briefly in Section 2 and supplemented by information in Appendix D. Briefly, each corridor was evaluated against criteria set at the beginning of the project and approved by the Steering Committee. The criteria included measures of congestion, available alternate routes, land use compatibility, accident history, and other performance and institutional factors. The possible score was 1000 and the final analysis of corridors resulted in the range from a high of 784 to a lower limit of 307. The results of ranking the corridors by evaluation score are shown on Exhibit 4-3.

PROGRAM IDENTIFICATION

The consultant team felt that the strongest measure for final categorizing of the corridors is the benefit/cost factor. This factor most closely tracks the expected results of implementing the projects. Also, the secondary screening eliminated those projects which had major problems with regard to any of the land use or institutional factors. At the same time, the corridor scoring process was important and reflected a broad range of evaluation issues. The corridor scores, then, need to be included in developing the broad categories in the program.

Corridor Ranking by Benefit/Cost Ratio

Exhibit 4-2

Rank	District	Corridor	B/C Ratio	Score	Initial Cost	10 Year O&M Cost	Annual Benefit
1	7	38	9.94	714	$17,443,904	$18,559,819	$35,773,200
2	4	15	9.01	783	$11,378,803	$10,771,306	$19,951,200
3	7	4	8.96	766	$11,771,473	$12,289,720	$21,556,800
4	7	2b	8.45	621	$11,043,590	$13,777,898	$20,977,200
5	7	40	8.27	721	$8,827,579	$11,391,877	$16,717,680
6	12	8	8.06	668	$20,670,005	$21,707,850	$34,142,400
7	4	1	7.75	606	$23,624,773	$20,342,946	$34,066,800
8	4	17	7.67	567	$8,858,819	$8,375,181	$13,212,000
9	11	2	5.71	676	$19,306,811	$17,590,421	$21,056,400
10	12	1	5.39	656	$21,787,680	$28,198,820	$26,964,000
11	7	20	5.04	614	$16,656,839	$17,014,675	$16,984,800
12	4	22	4.33	502	$24,535,076	$19,314,517	$18,997,200
13	7	27	3.93	731	$14,344,533	$14,788,942	$11,448,000
14	7	22	3.88	784	$18,970,566	$18,882,103	$14,688,000
15	8	10	3.62	562	$7,631,399	$9,589,619	$6,231,600
16	12	4	3.41	600	$12,698,946	$13,459,805	$8,917,200
17	7	1	3.03	610	$19,437,321	$15,425,355	$10,564,800
18	12	3	2.42	726	$12,800,108	$16,045,890	$6,991,200
19	7	21	2.33	763	$12,797,669	$12,208,457	$5,819,400
20	7	34	2.23	468	$14,006,074	$14,054,519	$6,246,000
21	12	6	2.04	585	$14,422,019	$16,625,315	$6,332,400
22	7	2a	1.70	530	$14,154,993	$15,230,686	$4,996,800
23	4	12	1.56	427	$12,794,176	$13,926,589	$4,161,600
24	4	13	1.46	389	$12,434,671	$12,284,635	$3,614,400
25	7	43	1.45	484	$13,687,400	$14,278,125	$4,048,200
26	3	3	1.42	426	$10,243,741	$10,911,913	$2,995,200
27	7	37	1.03	675	$15,722,016	$15,053,053	$3,178,800
28	7	6	1.03	516	$9,529,434	$9,561,479	$1,972,800
29	7	44	0.90	498	$11,573,058	$13,074,822	$2,214,000
30	4	3	0.83	307	$20,956,871	$20,442,573	$3,432,600
31	7	18	0.68	497	$14,052,665	$15,878,578	$1,976,400
32	7	41	0.63	468	$10,333,471	$10,335,639	$1,303,200
33	12	5	0.51	550	$11,139,046	$11,513,303	$1,144,800
34	8	1	0.34	447	$10,191,041	$11,678,435	$741,600
35	4	14	0.27	482	$13,362,171	$13,304,231	$720,000
36	3	2	0.22	378	$13,808,828	$13,284,432	$595,800
37	11	7	0.21	476	$10,197,835	$9,907,492	$423,000
38	3	7	0.21	445	$10,098,491	$9,325,391	$417,600
39	4	11	0.20	448	$21,989,849	$17,772,303	$792,000
Total Category Costs (1,2 & 3)					**$559,283,744**	**$568,178,714**	**$396,367,080**

Corridor Ranking by Score

Exhibit 4-3

Dist-Corr	B/C Ratio	Score	Initial Cost	10 Year O&M Cost	Annual Benefit
7 - 22	3.88	784	$18,970,566	$18,882,103	$14,688,000
4 - 15	9.01	783	$11,378,803	$10,771,306	$19,951,200
7 - 4	8.96	766	$11,771,473	$12,289,720	$21,556,800
7 - 21	2.33	763	$12,797,669	$12,208,457	$5,819,400
7 - 27	3.93	731	$14,344,533	$14,788,942	$11,448,000
12 - 3	2.42	726	$12,800,108	$16,045,890	$6,991,200
7 - 40	8.27	721	$8,827,579	$11,391,877	$16,717,680
7 - 38	9.94	714	$17,443,904	$18,559,819	$35,773,200
11 - 2	5.71	676	$19,306,811	$17,590,421	$21,056,400
7 - 37	1.03	675	$15,722,016	$15,053,053	$3,178,800
12 - 8	8.06	668	$20,670,005	$21,707,850	$34,142,400
12 - 1	5.39	656	$21,787,680	$28,198,820	$26,964,000
7 - 2b	8.45	621	$11,043,590	$13,777,898	$20,977,200
7 - 20	5.04	614	$16,656,839	$17,014,675	$16,984,800
7 - 1	3.03	610	$19,437,321	$15,425,355	$10,564,800
4 - 1	7.75	606	$23,624,773	$20,342,946	$34,066,800
12 - 4	3.41	600	$12,698,946	$13,459,805	$8,917,200
12 - 6	2.04	585	$14,422,019	$16,625,315	$6,332,400
4 - 17	7.67	567	$8,858,819	$8,375,181	$13,212,000
8 - 10	3.62	562	$7,631,399	$9,589,619	$6,231,600
12 - 5	0.51	550	$11,139,046	$11,513,303	$1,144,800
7 - 2a	1.70	530	$14,154,993	$15,230,686	$4,996,800
7 - 6	1.03	516	$9,529,434	$9,561,479	$1,972,800
4 - 22	4.33	502	$24,535,076	$19,314,517	$18,997,200
7 - 44	0.90	498	$11,573,058	$13,074,822	$2,214,000
7 - 18	0.68	497	$14,052,665	$15,878,578	$1,976,400
7 - 43	1.45	484	$13,687,400	$14,278,125	$4,048,200
4 - 14	0.27	482	$13,362,171	$13,304,231	$720,000
11 - 7	0.21	476	$10,197,835	$9,907,492	$423,000
7 - 34	2.23	468	$14,006,074	$14,054,519	$6,246,000
7 - 41	0.63	468	$10,333,471	$10,335,639	$1,303,200
4 - 11	0.20	448	$21,989,849	$17,772,303	$792,000
8 - 1	0.34	447	$10,191,041	$11,678,435	$741,600
3 - 7	0.21	445	$10,098,491	$9,325,391	$417,600
4 - 12	1.56	427	$12,794,176	$13,926,589	$4,161,600
3 - 3	1.42	426	$10,243,741	$10,911,913	$2,995,200
4 - 13	1.46	389	$12,434,671	$12,284,635	$3,614,400
3 - 2	0.22	378	$13,808,828	$13,284,432	$595,800
4 - 3	0.83	307	$20,956,871	$20,442,573	$3,432,600
Total Category Costs (1,2 & 3)			**$559,283,744**	**$568,178,714**	**$396,367,080**

Exhibit 4-4 shows the categorization recommended by the consultant team. The TOC projects are shown at the top of the categorization to indicate their inherent requirement if Smart Corridor elements of an overall TOS/TOC* system are to be implemented. All of the Caltrans districts covered by this Statewide review are currently developing programs to install or upgrade their TOC element of the TOS/TOC. The projects are at various levels of funding and implementation and are shown in the Smart Corridor program for completeness.

Category 1

Those corridors noted as "Category 1" offer the greatest return on investment, given existing conditions, and all deal with significant congestion problems. The category includes corridors with a benefit/cost ratio of greater than 3 to 1 and a corridor score over 500. The category includes 16 of the final 39 corridors. The breakpoint was selected, somewhat arbitrarily, to reflect projects with substantial return and scoring above the mid-point of the corridor scoring process.

The process is, by the nature of a feasibility study, is somewhat imprecise so small differences in values cannot be seen as significant. It is the teams strong belief that all of the projects in Category 1 offer significant promise under existing conditions and that they will continue to be highly warranted under expected travel growth.

Category 2

Eleven corridors have been identified in Category 2. This category also reflects projects which will offer significant benefit under existing conditions. The majority offer a return of over 1.4 to 1 under the benefit/cost analysis. All deal with congestion which exists and which may be expected to increase significantly in the near future.

The consultant team is comfortable in concluding that the corridors will benefit from the application of Smart Corridor technologies and that the benefit will exceed the cost. The team, therefore, recommends that they be included in program considerations.

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* The complete traffic operations system (TOS) for the freeway element includes many of the features defined for Smart Corridor projects. The traffic operations center (TOC) is the facility and staff that provide control and coordination of the field elements of the TOS. The complete system is often referred to as the TOS/TOC.

RANKING OF CORRIDORS BY CATEGORY

Exhibit 4-4

District		Initial Cost	10 Year O&M Cost	
TRAFFIC OPERATIONS CENTER COSTS				
3 - Sacramento		$2,308,500	$4,408,400	
4 - San Francisco Bay Area		$5,182,650	$10,332,400	
7 - Los Angeles		$5,304,150	$10,440,400	
8 - San Bernardino / Riverside		$2,308,500	$4,408,400	
11 - San Diego		$3,469,400	$6,160,400	
12 - Orange County		$5,000,400	$10,230,400	
Total TOC Costs		$23,573,600	$45,980,400	
Total Category Costs (1,2, & 3)		$559,283,744	$568,178,714	
Total Program Costs		$582,857,344	$614,159,114	

District/ Corridor	Description	B/C Ratio	Score	Initial Cost	10 Year O&M Cost	Annual Benefit
CATEGORY 1						
7 - 38	I-405 between I-110 and I-10	9.94	714	$17,443,904	$18,559,819	$35,773,200
4 - 15	Route 980 / 580 between Route 880 and Powell Street	9.01	783	$11,378,803	$10,771,306	$19,951,200
7 - 4	I-5 between I-605 & Route 60	8.96	766	$11,771,473	$12,289,720	$21,556,800
7 - 2b	Route 60 between I-5 & I-605	8.45	621	$11,043,590	$13,777,898	$20,977,200
7 - 40	I-405 between I-10 and US 101	8.27	721	$8,827,579	$11,391,877	$16,717,680
12 - 8	I-405 from Route 22 to I-5	8.06	668	$20,670,005	$21,707,850	$34,142,400
4 - 1	Route 101 between Blossom Hill Road and Route 237	7.75	606	$23,624,773	$20,342,946	$34,066,800
4 - 17	Route 80 between Powell Street and San Pablo Avenue	7.67	567	$8,858,819	$8,375,181	$13,212,000
11 - 2	I-8 from I-5 to I-15	5.71	711	$19,306,811	$17,590,421	$21,056,400
7 - 20	Route 91 between I-110 and Beach Boulevard	5.04	614	$16,656,839	$17,014,675	$16,984,800
4 - 22	Route 280 between Magdalena Avenue and Route 101	4.33	502	$24,535,076	$19,314,517	$18,997,200
7 - 27	I-110 between I-405 and I-10	3.93	731	$14,344,533	$14,788,942	$11,448,000
7 - 22	US 101 between Valley Circle Boulevard and I-5	3.88	784	$18,970,566	$18,882,103	$14,688,000
8 - 10	Route 91 between Maple Street & La Sierra Avenue	3.62	562	$7,631,399	$9,589,619	$6,231,600
12 - 4	Route 55 from I-405 to Route 91	3.41	600	$12,698,946	$13,459,805	$8,917,200
7 - 1	I-5, I-10, US 101 and I-110 (Downtown Los Angeles Ring)	3.03	610	$19,437,321	$15,425,355	$10,564,800
Total Category 1				$247,200,437	$243,282,034	$305,285,280

District/ Corridor	Description	B/C Ratio	Score	Initial Cost	10 Year O&M Cost	Annual Benefit
CATEGORY 2						
12 - 3	Route 22 from I-405 to Route 55	2.42	726	$12,800,108	$16,045,890	$6,991,200
7 - 21	US 101 between I-110 and Route 134	2.33	763	$12,797,669	$12,208,457	$5,819,400
7 - 34	I-210 between Route 134 and Route 30	2.23	468	$14,006,074	$14,054,519	$6,246,000
12 - 6	Route 91 from Imperial Highway to Beach Boulevard	2.04	585	$14,422,019	$16,625,315	$6,332,400
7 - 2a	I-10 between I-5 and I-605	1.70	530	$14,154,993	$15,230,686	$4,996,800
4 - 12	Route 880 between Route 237 and Decato Road	1.56	427	$12,794,176	$13,926,589	$4,161,600
4 - 13	Route 880 between Decato Road and Route 238	1.46	389	$12,434,671	$12,284,635	$3,614,400
7 - 43	I-605 between I-405 and I-5	1.45	484	$13,687,400	$14,278,125	$4,048,200
3 - 3	Route 51 between Route 50 and Route 80	1.42	426	$10,243,741	$10,911,913	$2,995,200
7 - 37	I 405 between I-605 and I-110	1.03	675	$15,722,016	$15,053,053	$3,178,800
7 - 6	I-5 between Route 110 and Route 134	1.03	516	$9,529,434	$9,561,479	$1,972,800
Total Category 2				$142,592,301	$150,180,661	$50,356,800
CATEGORY 3			(Future Projects)			
12 - 1	I-5 from Oso Parkway to Euclid	5.39	656	$21,787,680	$28,198,820	NA
7 - 44	I-605 between I-5 and I-10	0.90	498	$11,573,058	$13,074,822	$2,214,000
4 - 3	Route 99 between Route 237 and Route 92	0.83	307	$20,956,871	$20,442,573	$3,432,600
7 - 18	Route 60 between I-605 and Route 71	0.68	497	$14,052,665	$15,878,578	$1,976,400
7 - 41	I-405 between US 101 and I-5	0.63	468	$10,333,471	$10,335,639	$1,303,200
12 - 5	Route 57 from I-5 to Route 90	0.51	550	$11,139,046	$11,513,303	$1,144,800
8 - 1	I-10 between San Bernardino/ L.A. County Line & I-15	0.34	447	$10,191,041	$11,678,435	$741,600
4 - 14	Route 880 between Route 238 and Route 980	0.27	482	$13,362,171	$13,304,231	$720,000
3 - 2	Route 50 between I-5 and Mather Field Road	0.22	378	$13,808,828	$13,284,432	$595,800
11 - 7	I-5 from I-15 to I-8	0.21	476	$10,197,835	$9,907,492	$423,000
3 - 7	Route 99 between Stockton Boulevard and Route 50	0.21	445	$10,098,491	$9,325,391	$417,600
4 - 11	Route 17 / 880 between Lark Avenue and Route 237	0.20	448	$21,989,849	$17,772,303	$792,000
Total Category 3				$169,491,006	$174,716,019	$13,761,000

Category 3

This category includes those projects which are not yet to the point where immediate implementation will result in a direct benefit which exceeds cost. The category does, however, include several projects in areas where high growth is being experienced. Given this growth and the fact that congestion increases very quickly once the corridor becomes saturated, these corridors are likely to offer promise by the time a program might be developed and funded. For that reason, it is suggested that they be retained during the programming process.

One obvious anomaly exists in this category. Corridor 12-1 is shown and has a high benefit/cost ratio. Current improvements in the corridor are expected to reduce the ratio significantly and it was therefore moved to this lower category. The project is expected to be warranted, however its need for immediate action is being reduced.

Program Summary

Exhibit 4-5 presents a summary of the program developed as a result of this project. The total implementation costs for the priority element of the program is approximately $414 Million. An additional ten year cost for operations and maintenance of the corridors is shown as $435 Million. These operating and maintenance costs must be considered directly when constructing the program. It is simply imperative that the resources be made available for this. Smart Corridor and TOS/TOC type projects require active, continuing commitments of staff and resources if they are to be effective over time.

The estimated benefits for the priority projects is over $3.5 Billion for the same ten year period. This is a conservative estimate. Using the combined implementation and operations/maintenance costs of approximately $850 Million, this results in a benefit/cost ratio of over 4 to 1 for the overall program.

The longer term program requires a total investment of approximately $1.2 Billion for both implementation and operations and maintenance costs. It is estimated that the entire program will be warranted given the travel demand increases currently being experienced.

The project included in the program and their designated categories are shown on Exhibits 4-6 through 4-11.

Exhibit 4-5

PROGRAM COST SUMMARY

	Capital and Implementation Costs (Costs in $ Millions)	Operations and Maintenance Costs (Costs in $ Millions)	10 Year Benefit (In $ Millions)
Traffic Operations Center	$24	$46	N/A
Category 1 Projects	$247	$243	$3,053
Category 2 Projects	$143	$150	$504
Subtotal Immediate Projects	$414	$439	$3,557
Category 3 (Future) Projects	$169	$175	$137
Total Program	$583	$614	$3,694
TOTAL 10 YEAR PROGRAM COST		**$1,197**	

NOTES:

1. Category 1 Projects show a benefit cost ratio of over 3 to 1 and were in the top one-half of all corridors using the criteria and corridor scoring process.

2. Category 2 Projects show a benefit cost ratio between 1 to 1 and 3 to 1.

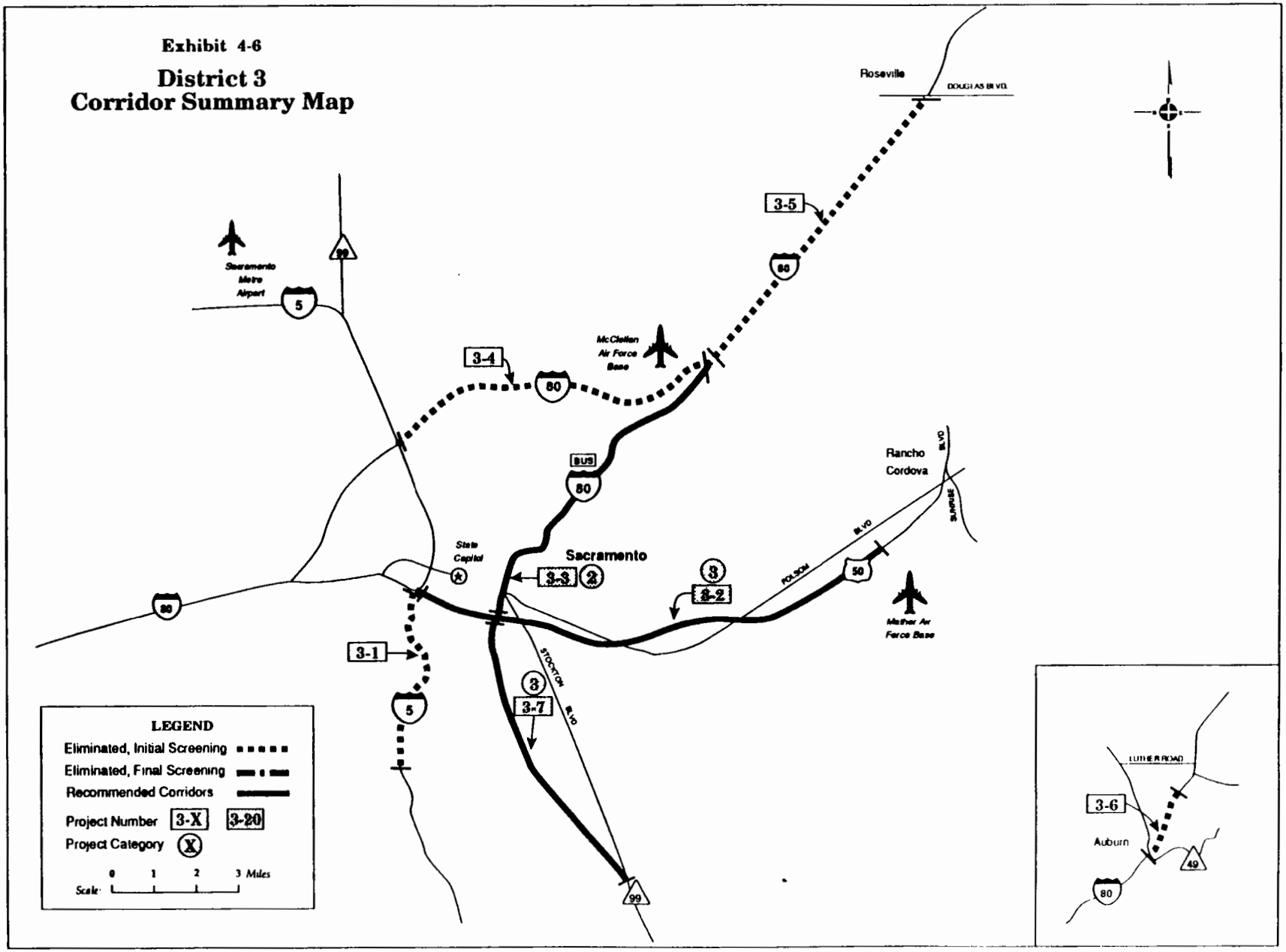
3. Category 3 Projects do not show a positive benefit cost ratio under current conditions but offer promise in the future as travel growth continues in the corridors.

4. All costs are expressed in 1990 dollars.

5. Category 3 benefits do not include corridor 12-1.

Exhibit 4-6

District 3
Corridor Summary Map



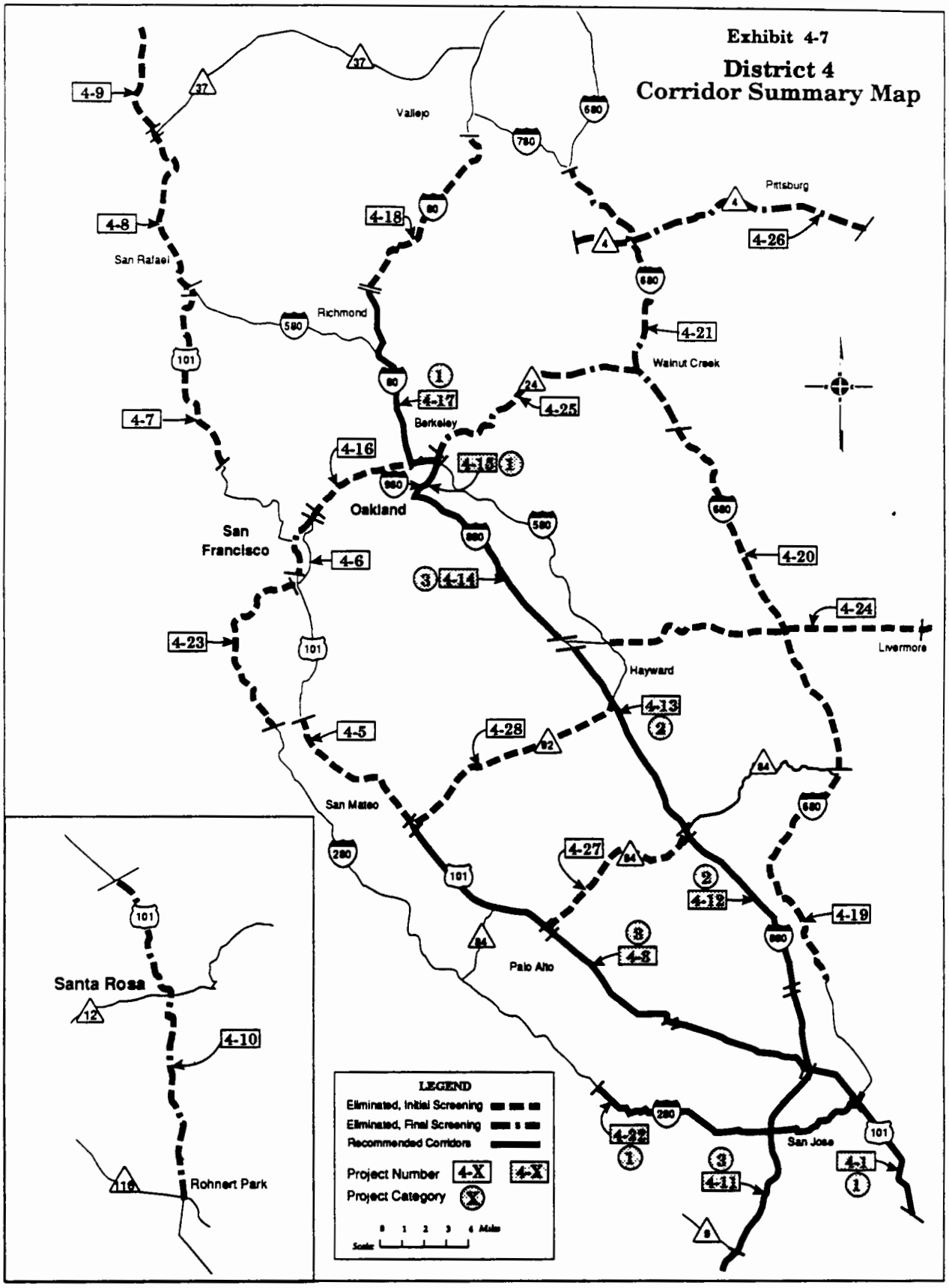
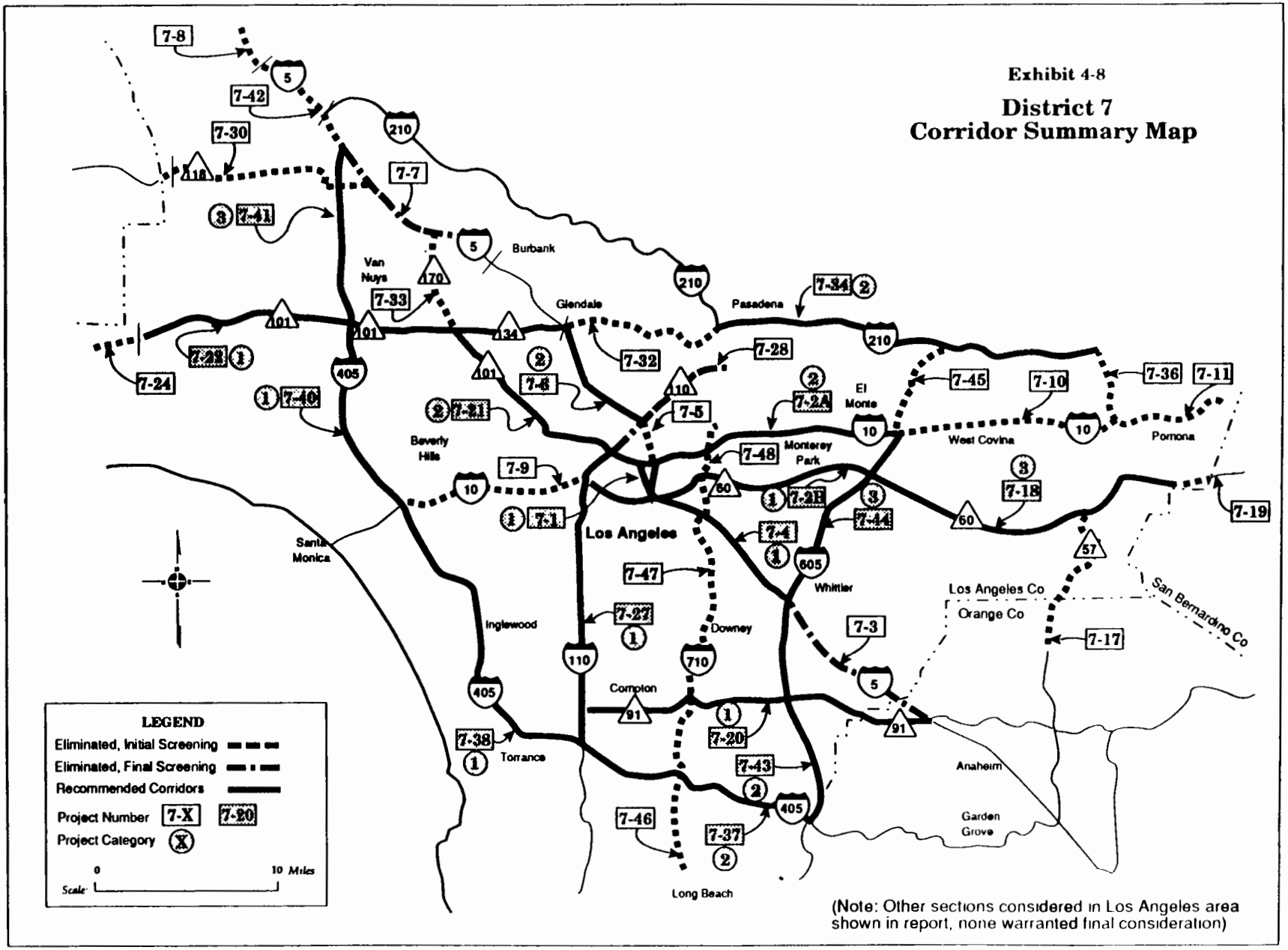


Exhibit 4-7
District 4
Corridor Summary Map
4-9
4-8
4-7
4-6
4-5
4-23
4-16
4-18
4-17
4-25
4-26
4-21
4-20
4-24
4-14
4-13
4-28
4-27
4-12
4-19
4-8
4-22
4-11
4-1
4-10
Vallejo
San Rafael
Richmond
Berkeley
Oakland
San Francisco
Pittsburg
Walnut Creek
Livermore
Hayward
San Mateo
Palo Alto
San Jose
Santa Rosa
Rohnert Park
LEGEND
Eliminated, Initial Screening
Eliminated, Final Screening
Recommended Corridors
Project Number 4-X
Project Category X
0 1 2 3 4 Miles

Exhibit 4-8

District 7
Corridor Summary Map



(Note: Other sections considered in Los Angeles area shown in report, none warranted final consideration)

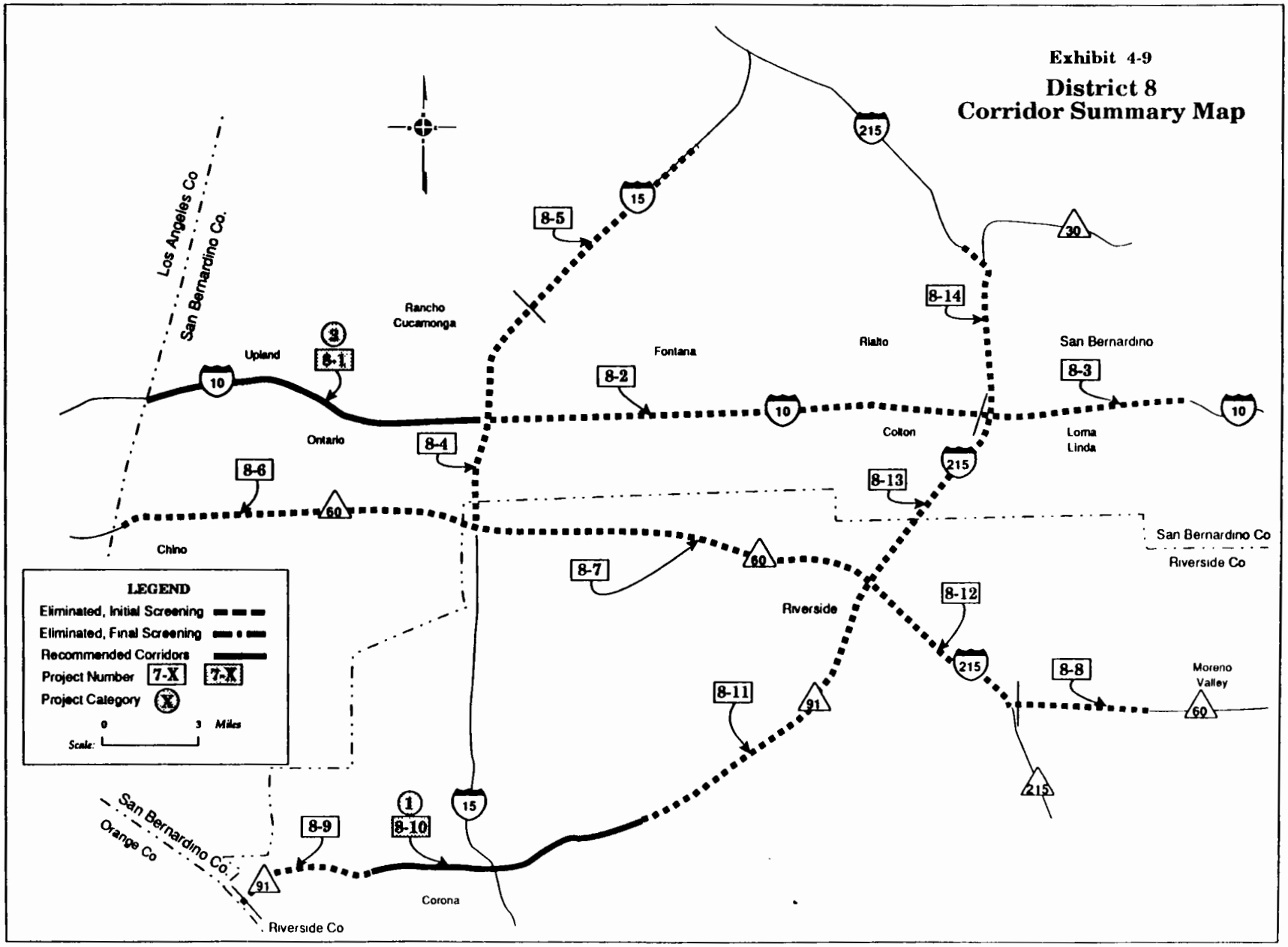
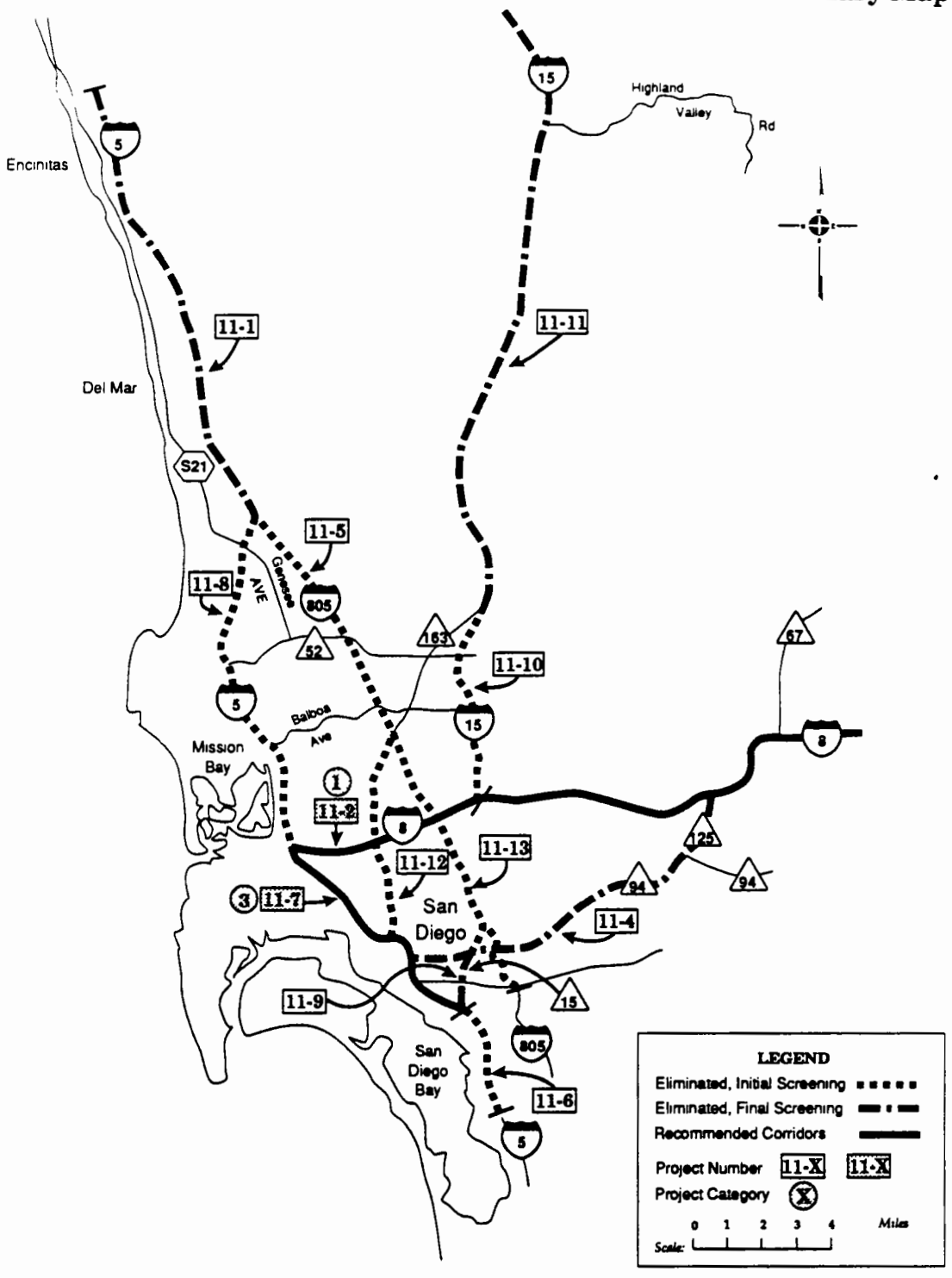


Exhibit 4-9
District 8
Corridor Summary Map
Los Angeles Co
San Bernardino Co.
Rancho Cucamonga
Upland
Fontana
Rialto
San Bernardino
Ontario
Colton
Loma Linda
Chino
Riverside
San Bernardino Co
Riverside Co
Moreno Valley
Corona
San Bernardino Co
Orange Co
Riverside Co
8-1
8-2
8-3
8-4
8-5
8-6
8-7
8-8
8-9
8-10
8-11
8-12
8-13
8-14
LEGEND
Eliminated, Initial Screening
Eliminated, Final Screening
Recommended Corridors
Project Number 7-X 7-X
Project Category X
0 3 Miles
Scale:

Exhibit 4-10

District 11
Corridor Summary Map



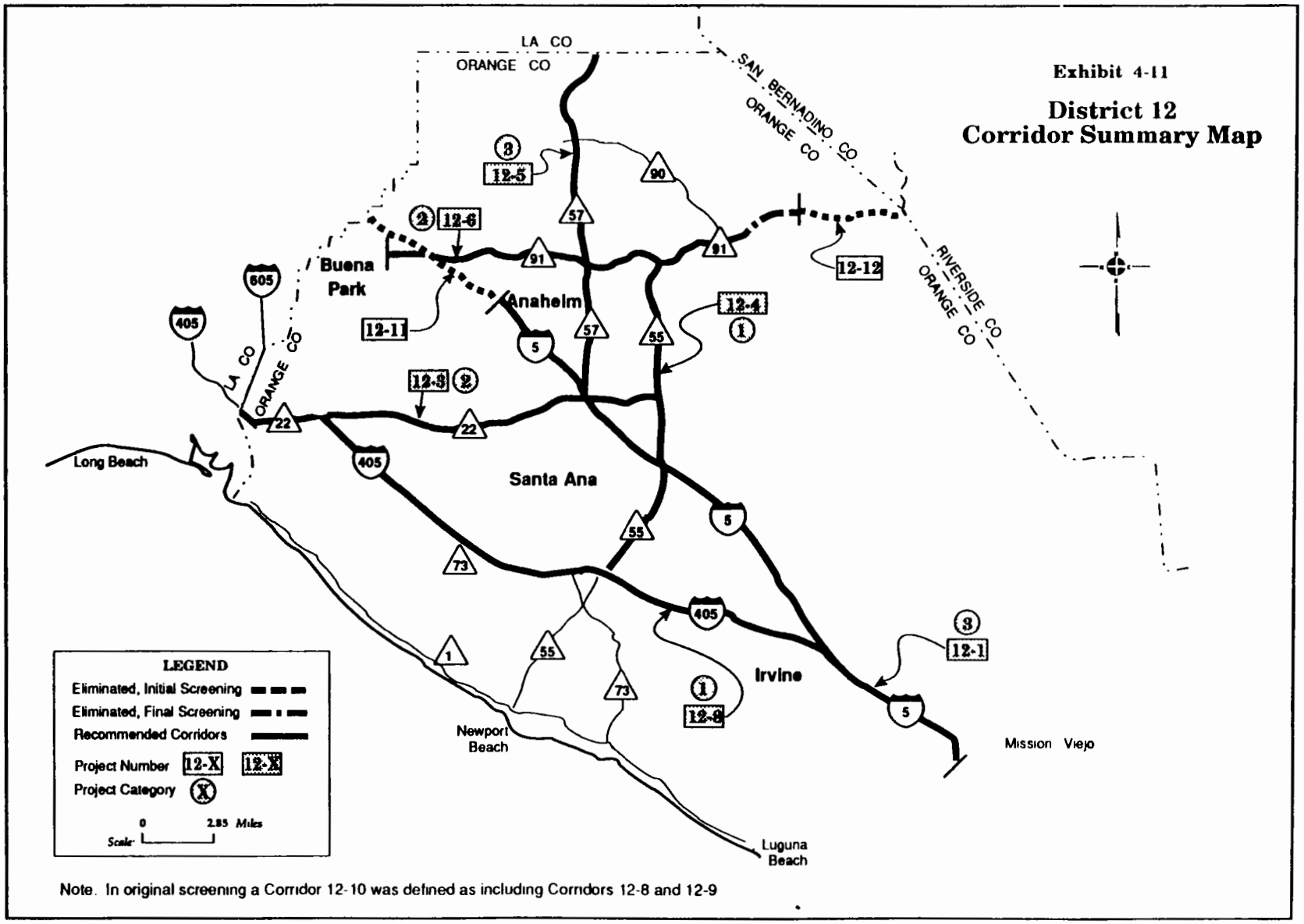


Exhibit 4-11
District 12
Corridor Summary Map
LA CO
ORANGE CO
SAN BERNADINO CO
ORANGE CO
RIVERSIDE CO
ORANGE CO
LA CO
ORANGE CO
Buena Park
Anaheim
Santa Ana
Irvine
Long Beach
Newport Beach
Mission Viejo
Luguna Beach
12-5
12-6
12-11
12-12
12-4
12-3
12-1
12-8
LEGEND
Eliminated, Initial Screening
Eliminated, Final Screening
Recommended Corridors
Project Number 12-X
Project Category X
0 2.85 Miles
Scale:
Note. In original screening a Corridor 12-10 was defined as including Corridors 12-8 and 12-9

APPENDIX A

TEXT OF ASSEMBLY BILL NO. 1239
(Chapter 1427)

Assembly Bill No. 1239

CHAPTER 1427

An act to add Chapter 5.7 (commencing with Section 25470) to Division 15 of the Public Resources Code, relating to transportation, making an appropriation therefor, and declaring the urgency thereof, to take effect immediately.

[Approved by Governor September 26, 1988. Filed with Secretary of State September 27, 1988.]

LEGISLATIVE COUNSEL'S DIGEST

AB 1239, Moore. Transportation: appropriation.

Under existing law, the Department of Transportation is authorized to establish ridesharing programs and to establish preferential lanes for buses and carpool vehicles as pilot projects.

This bill would specify the elements of a Smart Corridor Telecommunications Demonstration Project and would require the Los Angeles County Transportation Commission to coordinate the project from any funds appropriated by the state for that purpose on a specified portion of the Santa Monica Freeway, thereby imposing a state-mandated local program. The bill would require the commission to consult with local and state traffic and law enforcement agencies to coordinate the project with existing plans and programs.

The bill would require the department to conduct feasibility studies of, and to provide preliminary costs for, application of smart corridor technologies to other specified geographic areas and for an in-vehicle motorist information and navigation system.

The department would be required to report to the Legislature by June 30,1990, on the feasibility studies and demonstrations.

The bill would, to the extent permitted by federal law, appropriate $5,000,000 of petroleum violation escrow funds received by the state to the department for allocation to the commission to carry out the project.

The bill would declare that it is to take effect immediately as an urgency statute.

Appropriation: yes.

The people of the State of California do enact as follows:

SECTION 1. Chapter 5.7 (commencing with Section 25470) is added to Division 15 of the Public Resources Code, to read:

CHAPTER 5.7. SMART CORRIDOR TELECOMMUNICATIONS DEMONSTRATION PROJECT

25470. The Legislature finds and declares all of the following:

(a) By 1995, vehicle miles of travel on state highways will increase by 30 percent to 130 billion miles statewide, thereby placing an enormous demand on the state highway and local road systems.

(b) Congestion caused by growing motorist traffic results in increased energy consumption, substantial environmental costs, a significant cost burden on motor transport carriers and others moving goods, and lost productivity at the workplace.

(c) A number of metropolitan areas in California will not meet federal air quality standards of the Environmental Protection Agency and, as a consequence, will face sanctions which could reduce the amount of federal funding available to the state.

(d) Because of the immense fiscal and environmental impacts associated with new freeway construction, few, if any, new freeways will be built in our urban centers over the next 20 years.

(e) In lieu of additional freeway and road construction, transportation planners have to look to alternative and innovative means to address present and future traffic problems, including the use of telecommunications and computer systems to increase roadway efficiency and reduce commuter demand.

(f) Traffic congestion can be mitigated by providing commuters with up-to-the-minute information regarding traffic conditions and alternatives which will allow them to reach their destination in a timely and safe manner.

(g) Traffic flow can be enhanced through better coordination and management among public agencies of construction and maintenance activities.

(h) The application of telecommunications and computer systems to reduce traffic tieups and improve free-flow conditions on our state highway and local road systems will also produce significant energy savings to consumers, a goal consistent with the Legislature's intent to use petroleum violation escrow funds to provide restitution to energy users who were overcharged by oil companies that violated federal oil price control regulations.

25471. The Smart Corridor Telecommunications Demonstration Project is comprised of the following elements:

(a) A linked traffic monitoring network of traffic monitoring devices placed in freeway lanes, surface street travel lanes, turn lanes, and onramps to continuously monitor traffic speeds and volumes to identify congestion and traffic incidents.

(b) An interactive signal control system to allow central control personnel or systems to override regular signal cycles in order to expedite traffic flow of congested freeways and surface street intersections and to facilitate the diversion of traffic around congested areas.

(c) A traffic information management system providing commuter access to current traffic information through phone links, radio and television, home computers, terminals in office buildings, in-vehicle motorist information systems, and via computer-activated changeable message signs placed on freeways, at onramps, at downtown parking garages, and on major arterials which parallel the freeway system.

(d) An improved emergency response system to accelerate the dispatch of emergency vehicles, traffic control officers, and signal maintenance crews, thus reducing the time needed to clear an incident.

(e) Tow service to reduce congestion caused by delays in removing stalled or damaged cars from the freeway in accordance with plans developed by the Department of the California Highway Patrol in consultation with the Department of Transportation.

(f) A joint-agency data base system to coordinate construction and maintenance which impact traffic flow in the corridor.

25472. (a) In order to take full advantage of computerized traffic control equipment already in place, the Smart Corridor Telecommunications Demonstration Project shall be coordinated by the Los Angeles County Transportation Commission from any funds appropriated by the state for that purpose in the corridor of the Santa Monica Freeway (Interstate 10), bounded on the west by the San Diego Freeway (Interstate 405), on the north by Olympic Boulevard, on the east by Soto Street, and on the south by Washington Boulevard between the San Diego Freeway and La Cienega Boulevard and Adams Boulevard between La Cienega Boulevard and Soto Street. The commission shall consult with local and state traffic and law enforcement agencies on all aspects of the Smart Corridor Telecommunications Demonstration Project in order to provide necessary and productive coordination of the project with existing plans and programs.

(b) The Los Angeles County Transportation Commission shall make every effort to make preliminary and final results of the demonstration project available to other interested parties and jurisdictions for possible application throughout the state. At the conclusion of the demonstration project, the commission shall provide the Legislature with a final report which shall cover the following areas:

(1) Effect of the demonstration project on average speeds, vehicle delay, and travel times in the corridor, including local arterials.

(2) Effect of the demonstration project on response time to traffic incidents in the corridor.

(3) Effect of the demonstration project on accident rates in the corridor.

(4) Elements of the demonstration project which can be applied in other urban areas.

25473. The Department of Transportation, in coordination with

appropriate regional and local agencies, shall study the feasibility of, and provide preliminary costs for, the application of smart corridor technologies, as described in Section 25471, in other corridors in the Los Angeles, San Diego, Sacramento, and San Francisco Bay Area regions and for the conduct of an in-vehicle motorist information and navigation system demonstration. The department shall report to the Legislature on its findings of the feasibility studies and progress on the in-vehicle demonstration by June 30, 1990.

SEC. 2. Notwithstanding Sections 13340 and 16361 of the Government Code and to the extent permitted by federal law, in lieu of any funds appropriated in Item 2660-112-853 of the Budget Act of 1988, the sum of six million five hundred thousand dollars ($6,500,000) of the money in the Federal Trust Fund, created by Section 16360 of the Government Code, received by the state either from federal oil overcharge funds in the Petroleum Violations Escrow Account, as defined by either Section 155 of the Further Continuing Appropriations Act of 1983 (P.L. 97-377) or by any other federal law, or from federal oil overcharge funds available pursuant to court judgments, is hereby appropriated to the Department of Transportation for allocation to the Los Angeles County Transportation Commission for carrying out the Smart Corridor Telecommunications Demonstration Project pursuant to Chapter 5.7 (commencing with Section 25470) of Division 15 of the Public Resources Code.

SEC. 3. Funds appropriated by this act from the Petroleum Violation Escrow Account shall be dispersed by the State Controller, subject to approval by the Director of Finance as to which court judgment or federal agency order is the proper source of those funds.

SEC. 4. This act is an urgency statute necessary for the immediate preservation of the public peace, health, or safety within the meaning of Article IV of the Constitution and shall go into immediate effect. The facts constituting the necessity are:

In order that the needed demonstration program proposed by this act to test the viability of new electronic technologies to help alleviate the massive overcrowding on our freeways and local streets and roads, and thereby smooth traffic flow and conserve energy be implemented as soon as possible, it is necessary that this act take effect immediately.

O

APPENDIX B
INITIAL SCREENING WORKSHEETS

Corridor Description and Screening Check List

District: 3

	Corridor Number	Route Number	Corridor Description	County	Postmiles	Length (Miles)	Capacity Adequacy Range	Delay (Veh-Hrs per Day)	Delay (per Mile)	Corridor Definition		Minimum Freeway Delay		Alt Route Avail.	Preferred Corridor	Reasons for Rejection(4)
										Length	Width	Total	Per Mi.			
	1	5	43rd Ave to Rte 50	SAC	18.65-22.57	3.91	82	0	0	N	Y	N	N	Y	N	a,c
(1)	2	50	I-5 to Mather Field	SAC	L0.35-R9.51	11.64	62-76	331	28.4	Y	Y	Y	N	Y	Y	---
	3	51	Rte 50/99 to I-80	SAC	0 0-8.86	8.86	56-109	551	62.2	Y	Y	Y	N	Y	Y	---
	4	80	Rte 5 to Rte 51	SAC	M2.55-R10.99	8.16	71-82	255	31.3	Y	N	Y	N	N	N	b,c
	5	80	Rte 51 to Douglas Blvd	SAC/PLA	R10.99-1.98	8.86	63-80	33	3.7	Y	Y	N	N	Y	N	a
(2)	6	80	Rte 49 to Auburn E. City Limits	PLA	17.54-18.58	1.04	74	---	---	N	N	N	N	N	N	a,b,c
(3)	7	99	Stockton Blvd to Rte 50/51	SAC	17.24-R24.35	7.11	76-82	232	32.6	Y	Y	Y	N	Y	Y	---

Notes:

(1) Original corridor length has been reduced by eliminating segment between Route 84 and I-5.

(2) Corridor is outside Sacramento metropolitan limits, is currently being widened and no delay information is available.

(3) Original corridor length has been reduced by eliminating segment between Sheldon Road and Stockton Boulevard.

(4) Reasons for Rejection: a = Minimum Freeway Delay, b = Availability of Alternate Routes, and c = Corridor Definition (Length and Width).

EXHIBIT A-1

Notes on Individual Corridors — District: 3

Corridor Number	Route Number	Corridor Description	Comments
1	5	43rd Ave to Rte 50	No delay reported and does not satisfy minimum corridor length criteria.
2	50	I-5 to Mather Field	Moderate delay (331 veh. hrs.), has some ramp metering in place, and excellent alternate routes.
3	51	Rte 50/99 to I-80	Highest delay (551 veh. hrs.) in Sacramento area and good alternate routes.
4	80	Rte 5 to Rte 51	Moderate delay (255 veh. hrs.) but no alternate routes within corridor definition limits.
5	80	Rte 51 to Douglas Blvd	Low delay (33 veh. hrs.) but future growth in area may impact this corridor.
6	80	Rte 49 to Auburn E. City Limits	No delay data available, does not satisfy corridor length criteria, and is currently being widened.
7	99	Stockton Blvd to Jct 50/51	Moderate delay (232 veh. hrs.), good alternate routes, and may be impacted by future growth.

EXHIBIT A-2

Corridor Description and Screening Check List

District: 4

Corridor Number	Route Number	Corridor Description	County	Postmiles	Length (Miles)	Capacity Adequacy Range	Delay (Veh-Hrs per Day)	Delay (per Mile)	Corridor Definition		Minimum Freeway Delay		Alt. Route Avail	Preferred Corridor	Reasons for Rejection(1)
									Length	Width	Total	Per Mi.			
1	101	Blossom Hill Rd. (G10) to Rte. 880	SCL	R28.6-38.3	10.2	19-56	2096	205.4	Y		Y	Y	Y	Y	---
2	101	Rte. 880 to Rte. 237	SCL	38.3-46.1	7.9	54-55	2766	350.1	Y		Y	Y	Y	Y	---
3	101	Rte. 237 to Rte. 84 west	SCL/SM	46.1-5.4	11.8	54-63	1907	161.6	Y		Y	Y	Y	Y	---
4	101	Rte. 84 to Rte. 92	SM	5.4-11.9	6.5	58	27	4.2	Y		N	N	Y	N	a
5	101	Rte. 92 to Rte.380	SM	11.9-R20.7	8.8	48-53	6	0.7	Y		N	N	Y	N	a
6	101	Third St. to Franklin St.	SF	0.8-5.1	4.3	49-80	1544	359.0	Y		Y	Y	Y	Y	---
7	101	GG Bridge to Rte. 580	MRN	0.0-9.9	9.9	47-69	225	22.7	Y		Y	N	N	N	a,b
8	101	Rte. 580 to Rte. 37	MRN	9.9-19.1	9.1	51	1014	111.4	Y		Y	Y	N	N	b
9	101	Rte. 37 to north of Atherton Ave.	MRN	19.1-R23.3	4.2	68	1267	301.6	Y		Y	Y	N	N	b
10	101	Rte. 116 West to River Road	SON	12.7-24.9	12.2	44-66	2	0.2	Y		N	N	Y	Y	---
11	17/880	Rte. 9 to Rte. 237	SCL	7.1-8.4	15.3	45-58	440	28.8	Y		Y	N	Y	Y	---
12	880	Rte. 237 to Rte. 84 (Decoto Rd.)	SCL/ALA	8.4-10.3	12.4	33-52	1829	147.5	Y		Y	Y	Y	Y	---
13	880	Rte. 84 to Rte. 238	ALA	10.3-20.7	10.4	35-51	732	70.4	Y		Y	N	Y	Y	---
14	880	Rte. 238 to Rte. 980	ALA	20.7-31.8	11.1	44-50	523	47.1	Y		Y	N	Y	Y	---
15	880/580/980	980 to 580 to 24 to 880 (Oakland Loop)	ALA	---	6.4	46-49	1536	240.0	Y		Y	Y	Y	Y	---
16	80	Rte. 101 to Rte. 580/880 (SFOBB)	SF/ALA	4.0-3.2	8.1	15-67	6257	772.4	Y		Y	Y	N	N	b
17	80/580	Rte. 880 to Hilltop Dr.	ALA/CC	3.2-6.0	10.8	45-62	3746	346.8	Y		Y	Y	Y	Y	---
18	80	Hilltop Dr. to Dist. 10 boundary	CC/SOL	6.0-0.9	9.1	45-64	130	14.3	Y		N	N	Y	N	a
19	880	Rte. 237 to Rte. 238	SCL/ALA	M7.7-R6.4	8.8	62-77	0	0	Y		N	N	N	N	a
20	880	Rte. 84 E to Stone Valley Rd.	ALA/CC	R6.4-R10.4	20.4	48-82	0	0	N		N	N	Y	N	a,c
21	680	Stone Valley Rd. to Dist. 10 Bdry.	CC/SOL	R10.4-0.7	16.3	46-84	2271	139.3	Y		Y	Y	Y	Y	---
22	280	Rte. 101/680 to Magdalena Ave.	SCL	R0.0-14.1	15.5	42-79	3333	215.0	Y		Y	Y	Y	Y	---
23	280	Rte. 380 to Rte. 101	SM/SF	R21.0-R4.3	10.8	43-80	466	43.1	Y		Y	N	Y	N	a
24	580	N. Livermore Blvd. to Rte. 238	ALA	12.5-30.9	18.4	45-78	55	3.0	N		N	N	Y	N	a,c
25	24	Rte. 580/980 to Rte. 680	ALA/CC	R1.9-9.1	13.5	20-81	697	51.6	Y		Y	N	Y	Y	---
26	4	Alhambra Ave., Martinez to G St., Antioch	CC	R8.6-27.3	18.1	52-58	840	46.4	N		Y	N	Y	Y	---
27	84	Rte. 101 to Rte. 880 (Dumbarton Br.)	SM/ALA	R25.8-R6.0	9.8	76-84	2488	259.1	Y		Y	Y	N	N	b
28	92	Rte. 101 to Rte. 880 (San Mateo Br.)	SM/ALA	T12.1-6.4	13.1	49-61	1035	79.0	Y		Y	N	N	N	b

Notes:

(1) Reasons for Rejection: a = Minimum Freeway Delay, b = Availability of Alternate Routes, and c = Corridor Definition (Length and Width).

EXHIBIT A-3

Notes on Individual Corridors — District: 4

Corridor Number	Route Number	Corridor Description	Comments
1	101	Blossom Hill Rd. (G10) to Rte 880	Large delays (2100 Veh. Hrs) even with some metering in use.
2	101	Rte. 880 to Rte. 237	Large delays (2800 Veh. Hrs.) even with N/B ramp metering in operation
3	101	Rte. 237 to Rte. 84 west	1900 Veh Hrs. of delay Ramp metering is planned for this area.
4	101	Rte. 84 to Rte. 92	Small measured delays.
5	101	Rte. 92 to Rte.380	Small measured delays.
6	101	Third St to Franklin St.	While less than the minimum length criterion, these are logical limits.
7	101	GG Bridge to Rte. 580	No suitable alternate routes available.
8	101	Rte. 580 to Rte. 37	No suitable alternate routes available.
9	101	Rte. 37 to north of Atherton Ave.	No suitable alternate routes available.
10	101	Rte. 116 West to River Road	Local knowledge indicates delay should be checked. Will obtain new data from Caltrans.
11	17/880	Rte. 9 to Rte. 237	This corridor has ramp metering in both directions and should not be disqualified because of reduced delay from existing features.
12	880	Rte. 237 to Rte. 84 (Decoto Rd.)	Substantial delays (1800 Veh. Hrs.).
13	880	Rte. 84 to Rte. 238	While below the delay/mile threshold, these corridors have very high
14	880	Rte. 238 to Rte. 980	truck traffic with high potential for incident management. They are part of the District 4 "Cornerstone" project for a TOC.
15	880/580/980	980 to 580 to 24 to 880 (Oakland Loop)	High delays on 580 & 880. 980 is a freeway alternate route.
16	80	Rte. 101 to Rte. 580/880 (SFOBB)	The SFOBB is a major link with much delay (6300 Veh. Hrs.) but alternate routes are too far away to support the Smart Corridor concept.
17	80/580	Rte. 880 to Hilltop Dr.	High present delay (3700 Veh. Hrs.). Near term widening is planned.
18	80	Hilltop Dr. to Dist. 10 boundary	Insufficient delay.
19	880	Rte. 237 to Rte. 238	Rejected since no measurable delay was found.
20	880	Rte. 84 E to Stone Valley Rd.	Rejected since no measurable delay was found.
21	880	Stone Valley Rd. to Dist. 10 Bdry.	This corridor will be analyzed in more detail in smaller segments.
22	280	Rte. 101/880 to Magdalena Ave.	Ramp metering exists in one direction for part of this corridor.
23	280	Rte. 380 to Rte. 101	Insufficient delay.
24	580	N. Livermore Blvd. to Rte 238	Insufficient delay and marginal alternate routes.
25	24	Rte 580/980 to Rte. 880	This corridor will be investigated in smaller segments.
26	4	Alhambra Ave., Martinez to G St., Antioch	This corridor will be investigated in smaller segments.
27	84	Rte 101 to Rte 880 (Dumbarton Br.)	Rejected for the same reason as the Bay Bridge (No. 16).
28	92	Rte. 101 to Rte. 880 (san Mateo Br.)	Rejected for the same reason as the Bay Bridge (No 16)

EXHIBIT A-4

Corridor Description and Screening Check List District: 7

Corridor Number	Route Number	Corridor Description	Postmiles	Length	Capacity Adequacy Range	Delay (Veh-hrs per day)	Delay per Mile	Corridor Definition		Minimum Freeway Delay		Alt Route Avail	Preferred Corridor(2)	Reason for Rejection(3)
								Length	Width	Total	Per Mi			
1	5	Rte 60 to Rte 10	16.5-18.5	2.0	76	761	381	N	Y	Y	Y	Y	Y	---
1	10	Rte 110 to Rte 101	14.8-18.4	3.6	63	1561	434	N	Y	Y	Y	Y	Y	---
1	101	Rte 10 to Rte 110	0.0-1.6	1.6	61-84	861	538	N	Y	Y	Y	Y	Y	---
1	110	Rte 10 to Rte 101	21.4-23.7	2.3	59	1219	272	N	Y	Y	Y	Y	Y	---
2	10	Rte 101 to Rte 605	0.0-31.2	13.4	79-104	3641	272	Y	Y	Y	Y	Y	Y	---
2	60	Rte 10 to Rte 605	0.0-11.7	11.7	84-97	6665	104	Y	Y	Y	Y	Y	Y	---
3	5	Rte 91 to Rte 605	42.1-6.9	9.1	75-78	949	104	Y	Y	Y	Y	Y	Y	---
4	5	Rte 605 to Rte 60	6.9-16.5	9.6	75-76	2989	311	Y	Y	Y	Y	Y	Y	---
5	5	Rte 10 to Rte 110	18.5-16.5	2.0	76	871	436	N	Y	Y	Y	Y	N	c
6	5	Rte 110 to Rte 134	20.4-27.1	6.7	69-82	940	140	Y	Y	Y	Y	Y	Y	---
7	5	Sunland Bl to Roxford St	33.7-42.7	9.0	84-98	928	103	Y	Y	Y	Y	Y	Y	---
8	5	Rte 14 to Valencia Bl	45.6-52.5	6.9	62-65	0	0	Y	Y	N	N	N	N	a,b
9	10	Centinela Av to Rte 110	4.2-14.8	10.6	63-101	2822	266	Y	Y	Y	Y	Y	N	d
10	10	Rte 605 to Rte 57	31.2-42.4	11.2	79-95	740	66	Y	Y	Y	N	Y	N	a
11	10	Rte 57 to San Bern County	42.4-48.3	5.9	78	379	64	Y	Y	N	N	Y	N	a
12	14	Rte 5 to San Fernando Rd	24.8-27.1	2.3	68-111	0	0	N	Y	N	N	Y	N *	a,c
13	14	San Fernando Rd to Sand Cyn	27.1-33.4	6.3	59-77	527	84	Y	Y	Y	N	Y	N *	a
14	14	Sand Cyn to Pearblossom Hwy	33.4-52.2	18.8	59	0	0	N	N	N	N	Y	N *	a,c
15	14	Pearblossom Hwy to Ave K	52.2-66.7	14.5	67-99	0	0	Y	Y	N	N	Y	N *	a
16	23	Rte 101 to Olsen Rd	3.3-8.2	4.9	74	(1)	(1)	Y	Y	(1)	(1)	Y	N **	a
17	57	Imperial Hwy to Rte 60	19.9-4.5	7.1	78-88	522	74	Y	Y	Y	N	Y	N *	a
18	60	Rte 605 to Rte 57N	11.7-25.5	13.8	83-106	3217	233	Y	Y	Y	Y	Y	Y	---
19	60	Rte 57 to San Bern County	25.5-30.5	5.0	70-84	2273	455	Y	Y	Y	Y	N	N	b
20	91	Rte 110 to Orange County	6.3-20.7	14.4	35-95	5525	384	Y	Y	Y	Y	Y	Y	---
21	101	Rte 110 to Rte 134	1.6-11.8	10.2	76-102	3233	317	Y	Y	Y	Y	Y	Y	---
22	101	Rte 170 to Rte 405	11.8-17.2	5.4	76	4003	741	Y	Y	Y	Y	Y	Y	---
23	101	Rte 405 to Ptwy Calabasas	17.2-28.3	11.1	71-85	4479	404	Y	Y	Y	Y	Y	Y	---

EXHIBIT A-5

Corridor Description and Screening Check List — District: 7

Corridor Number	Route Number	Corridor Description	Postmiles	Length	Capacity Adequacy Range	Delay (Veh-hrs per day)	Delay per Mile	Corridor Definition		Minimum Freeway Delay		Alt Route Avail	Preferred Corridor(2)	Reason for Rejection(3)
								Length	Width	Total	Per Mi			
24	101	Pky Calab. to Las Virgenes Rd	28.3-31.1	2.8	80	270	96	N	Y	N	N	N	N	a,b,c
25	101	Moorpark Rd to Pleasant Vly	4.1-12.3	8.2	65-80	(1)	(1)	Y	Y	(1)	(1)	N	N	b
26	101	Pleasant Vly to Rte 1	12.3-22.7	9.6	80-82	(1)	(1)	Y	Y	(1)	(1)	Y	N **	a
27	110	Rte 405 to Rte 10	8.8-21.4	12.6	67-86	3328	264	Y	Y	Y	Y	Y	Y	---
28	110	Rte 101 to end	23.7-33.2	9.5	42-156	1343	141	Y	Y	Y	Y	Y	Y	---
29	118	Madera Rd to Kuehner Dr	23.4-30.5	7.1	77	(1)	(1)	Y	Y	(1)	(1)	Y	N **	a
30	118	Rte 27 to Rte 5	1.8-11.5	9.7	46-97	469	50	Y	Y	N	N	Y	N *	a
31	134	Rte 170 to Rte 5	0.0-5.1	5.1	75	849	166	Y	Y	Y	Y	Y	Y	---
32	134	Rte 5 to Rte 210	5.1-13.3	8.2	75	340	41	Y	Y	N	N	Y	N	a
33	170	Rte 101 to Rte 5	14.5-20.1	5.6	72-127	416	74	Y	Y	N	N	Y	N	a
34	210	Rte 134 to Rte 605	25.0-36.4	11.8	75-84	3470	294	Y	Y	Y	Y	Y	Y	---
35	210	Rte 605 to Rte 30	36.4-44.4	8.0	76-89	2436	305	Y	Y	Y	Y	Y	Y	---
36	210	Rte 30 to Rte 10	44.4-48.5	4.1	51	0	0	N	Y	N	N	Y	N	a,c
37	405	Rte 605 to Rte 110	24.0-13.0	13.0	64-90	4151	319	Y	Y	Y	Y	Y	Y	---
38	405	Rte 110 to Imperial Hwy	13.0-21.2	8.2	82	6881	839	Y	Y	Y	Y	Y	Y	---
39	405	Imperial Hwy to Rte 10	21.2-29.5	8.3	70-82	4869	587	Y	Y	Y	Y	Y	Y	---
40	405	Rte 10 to Rte 101	29.5-39.4	9.9	64-70	4319	436	Y	Y	Y	Y	Y	Y	---
41	405	Rte 101 to Rte 118	39.4-46.9	7.5	63-117	958	128	Y	Y	Y	Y	Y	Y	---
42	405/5	Rte 118 to Rte 14	46.9-45.6	5.6	63-101	0	0	Y	Y	N	N	Y	N *	a
43	605	Rte 405 to Rte 5	0.0-9.8	11.3	74	2249	199	Y	Y	Y	Y	Y	Y	---
44	605	Rte 5 to Rte 10	9.6-20.2	10.6	71	1832	173	Y	Y	Y	Y	Y	Y	---
45	605	Rte 10 to Rte 210	20.2-26.0	5.8	58-70	200	34	Y	Y	N	N	Y	N	a
46	710	Ocean Bl to Rte 91	6.8-13.0	6.2	75-76	0	0	Y	Y	N	N	Y	N	a
47	710	Rte 91 to Rte 5	13.0-23.3	10.3	75-93	763	74	Y	Y	Y	N	Y	N	a
48	710	Rte 5 to Valley Bl	23.3-27.5	4.2	83-89	0	0	N	Y	N	N	Y	N	a,c

Notes:

(1) No delay data currently available for this corridor.

(2) * indicates corridor is located in area of high growth and is potential candidate for future consideration,
** indicates a final decision on corridor status will be make when delay data is available.

(3) Reasons for Rejection: a = Minimum Freeway Delay, b = Availability of Alternate Routes, c = Corridor Definition (Length and Width), and d = This corridor is the demonstration project and will not be considered further in this study.

EXHIBIT A-5 (CONTINUED)

Corridor Description and Screening Check List — District: 8

Corridor Number	Route Number	Corridor Description	Postmiles	Length	Capacity Adequacy Range	Delay (Veh-Hrs per day)	Delay (per Mile)	Corridor Definition		Minimum Freeway Delay		All Route Avail	Preferred Corridor(1)	Reason for Rejection(2)
								Length	Width	Total	Per Mi.			
1	10	LA County to Rte 15	0.0-9.9	9.9	61-68	2040	206	Y	Y	Y	Y	Y	Y	---
2	10	Rte 15 to Rte 215	9.9-24.2	14.3	78-85	0	0	Y	Y	N	N	Y	N *	a
3	10	Rte 215 to Tenn St (Rte 30)	24.2-29.8	5.6	75-78	150	27	Y	Y	N	N	Y	N *	a
4	15	Rte 60 to Rte 66	51.5-5.3	6.1	70-162	0	0	Y	Y	N	N	Y	N *	a
5	15	Rte 66 to Sierra Ave	5.3-12.9	7.6	70	0	0	Y	Y	N	N	N	N	a,b
6	60	LA County to Rte 15	0.0-0.5	10.5	60-72	756	72	Y	Y	Y	N	Y	N *	a
7	60	Rte 15 to Rte 91	0.5-12.2	11.7	44-133	0	0	Y	Y	N	N	Y	N *	a
8	60	Rte 215 to Perris Bl	12.2-16.4	4.2	44-65	25	6	N	Y	N	N	Y	N	a,c
9	91	Orange Cnty to Maple St	0-4.2	4.2	53	1308	311	N	Y	Y	Y	N	N	b,c
10	91	Maple St to La Sierra Ave	4.2-12.0	7.8	55-63	3587	460	Y	Y	Y	Y	Y	Y	---
11	91	La Sierra Ave to Rte 60	12.0-21.7	9.7	51-59	153	16	Y	Y	N	N	Y	N *	a
12	215	Rte 60 to Rte 91	38.3-43.3	5.0	50	37	7	Y	Y	N	N	N	N	a,b
13	215	Rte 60 to Rte 10	43.3-4.1	6.1	50-62	0	0	Y	Y	N	N	Y	N *	a
14	215	Rte 10 to Rte 30	4.1-9.4	5.3	57-94	329	62	Y	Y	N	N	Y	N *	a

Notes:

(1) * indicates corridor is located in high growth area and is potential candidate for future consideration.

(2) Reasons for Rejection: a = Minimum Freeway Delay, b = Availability of Alternate Routes, and c = Corridor Definition (Length and Width).

EXHIBIT A-6

Corridor Description and Screening Check List

District: 11

Corridor Number	Route Number	Corridor Description	Length (Miles)	Postmile	Capacity Adequacy Range	Delay (Veh-Hrs per Day)	Delay (per Mile)	Corridor Definition		Minimum Freeway Delay		Alt Routes Avail.	Pref. Corri-dor	Reasons for Rejection(1)
								Length	Width	Total	Per Mi.			
1	5	Genesee Ave to Encinitas Bl	11.8	29.71-41.51	54-90	1160	98	Y	Y	Y	N	Y	Y	---
2	8	I-5 to I-15	5.7	L2.38-5.64	39-53	912	160	Y	Y	Y	Y	Y	Y	---
3	8	I-15 to Rte 67	10.1	5.64-15.80	42-79	1661	164	Y	N	Y	Y	Y	Y	---
4	94/125	I-5 to I-8	10.6	1.42-T10.11 L13.22-15.46	47-84	750	71	Y	Y	Y	N	Y	Y	---
5	805	Balboa Ave (274) to I-5(N)	6.8	21.65-28.50	72-114	10	1	Y	-	N	N	N	N	a,b
6	5	L St to I-15	5.9	6.81-R12.65	71-87	115	19	Y	-	N	N	Y	N	a
7	5	I-15 to I-8	7.5	R12.65-R20.07	59-104	235	31	Y	Y	Y	N	Y	Y	---
8	5	I-8 to Genesee Av	10.7	R20.07-29.71	71-96	0	0	Y	-	N	N	Y	N	a
9	15	I-5 to I-805	2.8	R0.00-R3.37	68-82	360	129	N	-	Y	Y	Y	N	c
10	15	I-8 to Rte 163	6.1	R6.13-M12.12	67-129	1310	215	Y	Y	Y	Y	N	N	b
11	15	Rte 163 to Highland Valley Rd	13.9	M12.12-M26.03	40-81	230	17	Y	N	Y	N	Y	Y	---
12	163	I-5 to I-805	6.2	0.89-7.04	57-118	335	54	Y	-	Y	N	Y	N	a
13	805	Imperial Ave to Balboa Ave	9.4	12.34-21.65	66-101	1086	116	Y	-	Y	Y	N	N	b

Notes:

(1) Reasons for Rejection: a = Minimum Freeway Delay, b = Availability of Alternate Routes, and c = Corridor Definition (Length and Width).

EXHIBIT A-7

Notes on Individual Corridors — District: 11

Corridor Number	Route Number	Corridor Description	Comments
1	5	Genesee Ave to Encinitas Bl	Marginal delay per mile (98 veh.hrs.).
2	8	I-5 to I-15	Good alternative routes available. Portions of some routes beyond 1.5-mile limit.
3	8	I-15 to Rte 67	Good alternative routes available. Portions of some routes beyond 1.5-mile limit.
4	94/125	I-5 to I-8	Marginal delay per mile (71 veh. hrs.). Shares some alternative routes with corridors 2 and 3.
5	805	Balboa Ave (274) to I-5(N)	Small measured delays. No good alternative routes available.
6	5	L St to I-15	Measured delay below threshold values.
7	5	I-15 to I-8	Low delay per mile (31 veh. hrs.), but future growth expected.
8	5	I-8 to Genesee Av	Small measured delays.
9	15	I-5 to I-805	Segment is only 2.8 miles. I-15 north of I-805 is not a freeway at this time.
10	15	I-8 to Rte 163	Significant delays, but no alternative routes available. Other freeways may be used as alternatives, but considered a TOC application.
11	15	Rte 163 to Highland Valley Rd	Low delay per mile (17 veh. hrs.), but future growth expected. Portions of some routes beyond 1.5-mile limit.
12	163	I-5 to I-805	Delay per mile below threshold.
13	805	Imperial Ave to Balboa Ave	No alternative routes available. Other freeways may be used as alternatives between Rte 94 and I-5 (N), but considered a TOC application.

Corridor Description and Screening Check List

District: 12

Corridor Number	Route Number	Corridor Description	Length (Miles)	Postmile	Capacity Adequacy Range	Delay (Veh-Hrs per Day)	Delay (per Mile)	Corridor Definition		Minimum Freeway Delay		Alt Routes Avail.	Pref. Corridor	Reasons for Rejection(1)
								Length	Width	Total	Per Mi.			
1	5	La Paz Rd to Rte 133	6.6	16.49-23.09	48-79	1245	189	Y	Y	Y	Y	Y	Y	---
2	5	Rte 133 to Rte 55	7.2	23.09-30.26	76-79	3105	431	Y	Y	Y	Y	Y	Y	---
3	22	I-405/605 to Rte 55	15.0	0.66-13.16 20.75-23.28	60-88	4966	331	Y	Y	Y	Y	Y	Y	---
4A	55	I-405 to I-5	4.4	R5.99-10.45	55-56	1636	372	N	Y	Y	Y	Y	Y	---
4B	55	I-5 to Rte 91	7.4	10.45-17.88	74-79	3333	450	Y	Y	Y	Y	Y	Y	---
5A	57	I-5 to Rte 90	9.2	10.67-19.86	65-80	2524	274	Y	Y	Y	Y	Y	Y	---
5B	57	Rte 90 to LA Co line	2.7	19.86-22.55	66-79	422	156	Y	Y	Y	Y	Y	Y	---
6	91	Beach Bl (39) to Rte 57	7.1	R2.67-6.12	57-80	2214	312	Y	Y	Y	Y	Y	Y	---
7	91	Rte 57 to Weir Canyon Rd	8.4	6.12-14.46	66-95	1572	187	Y	Y	Y	Y	Y	Y	---
8	405	I-5 to Rte 73	10.0	0.23-10.28	72-107	3078	308	Y	Y	Y	Y	Y	Y	---
9	405	Rte 55 to Rte 22 (E)	12.0	8.74-20.75	74-106	2946	246	Y	N	Y	Y	Y	Y	---
10	405	Rte 5 to Rte 22 (E)	20.5	0.23-20.75	72-107	5393	263	N	N	Y	Y	Y	Y	---
11	5	Euclid St to LA Co line	4.9	39.49-44.38	77-88	134	27	Y	-	Y	N	N	N	a,b
12	91	Weir Cyn Rd to RIV Co line	4.4	14.46-18.90	72	1313	298	N	-	Y	Y	N	N	b
13	5	Rte 55 to Euclid St	9.2	30.26-39.49	67-69	2704	294	Y	Y	Y	Y	Y	Y	---

Notes:

(1) Reasons for Rejection: a = Minimum Freeway Delay, b = Availability of Alternate Routes, and c = Corridor Definition (Length and Width).

EXHIBIT A-9

Notes on Individual Corridors — District: 12

Corridor Number	Route Number	Corridor Description	Comments
1	5	La Paz Rd to Rte 133	Total delay and delay per mile above threshold values (200 veh. hrs. and 100 veh. hrs./mile) but lower than other preferred corridors in District 12.
2	5	Rte 133 to Rte 55	High delay per mile (431 veh. hrs.).
3	22	I-405/605 to Rte 55	Good parallel routes.
4A	55	I-405 to I-5	Slightly shorter than 5-mile minimum. Could be combined with corridor 4B.
4B	55	I-5 to Rte 91	High delay per mile (450 veh. hrs.).
5A	57	I-5 to Rte 90	One good parallel route.
5B	57	Rte 90 to LA Co line	This corridor is to be considered part of corridor 7-30 in District 7.
6	91	Beach Bl (39) to Rte 57	Good paralell routes. Could be combined with corridor 7.
7	91	Rte 57 to Weir Canyon Rd	Total delay and delay per mile above threshold values (200 veh. hrs. and 100 veh. hrs./mile) but lower than other preferred corridors in District 12.
8	405	I-5 to Rte 73	High delay (3078 veh. hrs.) and delay per mile (308 veh. hrs.).
9	405	Rte 55 to Rte 22 (E)	Corridor is southeast to northwest. Alternate routes combine east-west and north-south arterials. Some alternate routes beyond 1.5-mile limit.
10	405	Rte 5 to Rte 22 (E)	Corridors 8 and 9 combined result in 20-mile corridor.
11	5	Euclid St to LA Co line	Small measured delays.
12	91	Weir Cyn Rd to RIV Co line	No good alternative routes available.
13	5	Rte 55 to Euclid St	Corridor is southeast to northwest. Alternate routes combine east-west and north-south arterials.

EXHIBIT A-10

APPENDIX C
COST WORKSHEET SUMMARIES

Cost Summary worksheets are provided for each of the corridors and for each traffic operations center (TOC) category. A discussion of cost estimating procedures is included after the summary sheets and detailed worksheet forms are also attached. Detailed estimates for each corridor are provided as a separate workbook.

TRAFFIC OPERATIONS CENTER COSTS

District : 3 | Corridor Element : Freeway Central

Item		Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS						
Equipment						
Freeway System						
Type (one only):	Large		Medium		Small	1
Central Computer		piece	1	$200,000	$200,000	
Workstations		piece	2	$20,000	$40,000	
Large scale projector		piece	1	$50,000	$50,000	
SC Node processor		piece	1	$20,000	$20,000	
SC Database	1					
Database Server		piece	1	$20,000	$20,000	
Workstations		piece		$20,000		
Expert System	1					
ES processor		piece	2	$20,000	$40,000	
CMS related	1					
CMS control hardware		piece	1	$3,000	$3,000	
CCTV related	1					
Central Control and monitors		piece	1	$50,000	$50,000	
Commercial TV	1					
Interface equipment		piece	1	$25,000	$25,000	
Commercial Radio	1					
Interface equipment		piece	1	$11,000	$11,000	
Motorist Information	1					
Interface equipment		piece	1	$50,000	$50,000	
HAT system	1		1	$60,000	$60,000	
CAD interface	1					
Workstation		piece	1	$20,000	$20,000	
SC system link		piece	1	$18,000	$18,000	
Traffic Control System	1					
Central Computer		piece	1	$50,000	$50,000	
Workstations		piece	2	$20,000	$40,000	
Communications		piece	1	$30,000	$30,000	
Sub-total equipment						$727,000

TRAFFIC OPERATIONS CENTER COSTS

District : 3 **Corridor Element :** **Freeway Central**

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
Control Room Facility					
Construction					$400,000
Software					
Freeway System	piece	1	$150,000	$150,000	
SC interface (freeway)	piece	1	$50,000	$50,000	
SC database	piece	1	$20,000	$20,000	
SC database (freeway)	piece	1	$11,000	$11,000	
Expert system (base)	piece	1	$20,000	$20,000	
Expert system (freeway)	piece	1	$46,000	$46,000	
CCTV SC interface	piece	1	$50,000	$50,000	
CMS	piece	1	$75,000	$75,000	
TXT	piece	1	$75,000	$75,000	
SC database (CAD)	piece	1	$11,000	$11,000	
Traffic Control System	piece	1	$75,000	$75,000	
Sub-total Software					$583,000
Total Capital Cost per District					$1,710,000

TRAFFIC OPERATIONS CENTER COSTS

District : 3 **Corridor Element :** Freeway Central

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
IMPLEMENTATION COSTS					
Design	% of capital		10%	$171,000	
Integration	% of capital		10%	$171,000	
Contingency	% of capital		15%	$256,500	
Total Implementation costs					$598,500
OPERATIONAL COSTS	**Staffing**	**Labor $**	**Overhead %**	**Extension $**	
Personnel Costs per District					
Supervisor	1	$50,000	1.08	$104,000	
Operator	4	$30,000	1.08	$249,600	
Total Operations Cost					$353,600
MAINTENANCE COSTS (per annum)			**failure rate (%)**		
Equipment	% of equipment		10%	$72,700	
Sub-total Maintenance costs				$72,700	
Contingency as % of maintenance costs			20%	$14,540	
Total Maintenance costs					$87,240

CORRIDOR COST SUMMARY

Corridor : 3-2

Freeway Miles	12.0
Surface Street Miles	14.0
Number of Freeway Lanes	6
Number of Ramps	12
Number of Freeway Connectors	3
Number of Full Matrix Signs	7
Number of Intersections	4

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	78	$86,385	$125,385	$58,793		$10,366	$103,662
CCTV	Cameras	12	$252,600	$379,200	$139,020		$30,312	$303,120
Tow Services	Freeway miles	12	$161,280	$161,280		$580,770	$442,368	$10,231,380
Accident Investigation Sites	Sites	12		$363,000	$145,200			
Incident Management Teams	Freeway miles	12	$23,625	$23,625		$22,500	$22,680	$451,800
Trunk Communications	Freeway miles	12						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$600,000	$1,800,000	$720,000		$14,400	$144,000
CMS (Trailblazers)	No of Trailblazers	22	$300,300	$636,900	$284,790		$18,018	$180,180
CMS (Full Matrix)	No of Full Matrix	7	$762,650	$1,079,050	$507,885		$45,759	$457,590
Ramp Metering	No of Ramps	12	$240,000	$1,092,000	$485,800		$40,800	$408,000
Connector Metering	No of Connectors	3	$255,000	$630,000	$302,500		$43,350	$433,500
Freeway Detectors	Detectors	72		$144,000	$57,600		$17,280	$172,800
Signal Installation	Intersections	4	$32,000	$152,000	$60,800		$3,840	$38,400
Geometric Improvements								
1	Minor Street Improvements			$500,000				
2	Widening Folsom Rd. under S.P.R.R			$3,300,000				
3								
Totals				$10,836,440	$2,972,388	$603,270	$725,173	$13,284,432

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$13,808,828	$13,284,432

CORRIDOR COST SUMMARY

Corridor : 3-3

Freeway Miles	9.0
Surface Street Miles	10.0
Number of Freeway Lanes	6
Number of Ramps	18
Number of Freeway Connectors	2
Number of Full Matrix Signs	6
Number of Intersections	34

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	57	$63,128	$91,628	$42,964		$7,575	$75,753
CCTV	Cameras	9	$189,450	$284,400	$104,265		$22,734	$227,340
Tow Services	Freeway miles	9	$120,960	$120,960		$472,770	$331,776	$8,045,460
Accident Investigation Sites	Sites	9		$272,250	$108,900			
Incident Management Teams	Freeway miles	9	$23,625	$23,625		$22,500	$17,010	$395,100
Trunk Communications	Freeway miles	9						
Hub Costs			$150,000	$225,000	$105,000		$18,000	$180,000
Cable Costs			$450,000	$1,350,000	$540,000		$10,800	$108,000
CMS (Trailblazers)	No of Trailblazers	16	$218,400	$463,200	$207,120		$13,104	$131,040
CMS (Full Matrix)	No of Full Matrix	6	$653,700	$924,900	$435,330		$39,222	$392,220
Ramp Metering	No of Ramps	18	$360,000	$1,638,000	$716,200		$61,200	$612,000
Connector Metering	No of Connectors	2	$170,000	$420,000	$210,000		$28,900	$289,000
Freeway Detectors	Detectors	54		$108,000	$43,200		$12,960	$129,600
Signal Installation	Intersections	34	$272,000	$1,292,000	$516,800		$32,640	$326,400
Geometric Improvements								
	1 _____							
	2 _____							
	3 _____							
Totals				$7,213,963	$3,029,779	$495,270	$595,921	$10,911,913

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$10,243,741	$10,911,913

CORRIDOR COST SUMMARY

Corridor : 3-7

Freeway Miles	7.1
Surface Street Miles	16.0
Number of Freeway Lanes	4
Number of Ramps	16
Number of Freeway Connectors	2
Number of Full Matrix Signs	4
Number of Intersections	50

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	69	$76,418	$110,918	$52,009		$9,170	$91,701
CCTV	Cameras	7	$147,350	$221,200	$81,095		$17,682	$176,820
Tow Services	Freeway miles	7	$94,080	$94,080		$400,770	$258,048	$6,588,180
Accident Investigation Sites	Sites	7		$211,750	$84,700			
Incident Management Teams	Freeway miles	7	$23,625	$23,625		$22,500	$13,230	$357,300
Trunk Communications	Freeway miles	7						
Hub Costs			$150,000	$225,000	$105,000		$18,000	$180,000
Cable Costs			$350,000	$1,050,000	$420,000		$8,400	$84,000
CMS (Trailblazers)	No of Trailblazers	25	$341,250	$723,750	$323,625		$20,475	$204,750
CMS (Full Matrix)	No of Full Matrix	4	$435,800	$616,600	$290,220		$26,148	$261,480
Ramp Metering	No of Ramps	16	$320,000	$1,456,000	$639,400		$54,400	$544,000
Connector Metering	No of Connectors	2	$170,000	$420,000	$210,000		$28,900	$289,000
Freeway Detectors	Detectors	28.4		$56,800	$22,720		$6,816	$68,160
Signal Installation	Intersections	50	$400,000	$1,900,000	$760,000		$48,000	$480,000
Geometric Improvements								
1								
2								
3								
Totals				$7,109,723	$2,988,769	$423,270	$509,269	$9,325,391

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$10,098,491	$9,325,391

TRAFFIC OPERATIONS CENTER COSTS

District : 4 | Corridor Element : Freeway Central

Item		Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS						
Equipment						
Freeway System						
Type (one only):	Large 1		Medium		Small	
Central Computer		piece	3	$200,000	$600,000	
Workstations		piece	6	$20,000	$120,000	
Large scale projector		piece	3	$50,000	$150,000	
SC Node processor		piece	3	$20,000	$60,000	
SC Database	1					
Database Server		piece	1	$110,000	$110,000	
Workstations		piece	2	$20,000	$40,000	
Expert System	1					
ES processor		piece	2	$20,000	$40,000	
CMS related	1					
CMS control hardware		piece	1	$3,000	$3,000	
CCTV related	1					
Central Control and monitors		piece	1	$50,000	$50,000	
Commercial TV	1					
Interface equipment		piece	1	$25,000	$25,000	
Commercial Radio	1					
Interface equipment		piece	1	$11,000	$11,000	
Motorist Information	1					
Interface equipment		piece	1	$50,000	$50,000	
HAT system	1		1	$140,000	$140,000	
CAD interface	1					
Workstation		piece	1	$20,000	$20,000	
SC system link		piece	1	$18,000	$18,000	
Traffic Control System	1					
Central Computer		piece	1	$150,000	$150,000	
Workstations		piece	2	$20,000	$40,000	
Communications		piece	1	$50,000	$50,000	
Sub-total equipment						$1,677,000

TRAFFIC OPERATIONS CENTER COSTS

District : 4 **Corridor Element :** **Freeway Central**

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
Control Room Facility					
Construction					$1,400,000
Software					
Freeway System	piece	1	$150,000	$150,000	
SC interface (freeway)	piece	1	$50,000	$50,000	
SC database	piece	1	$80,000	$80,000	
SC database (freeway)	piece	1	$11,000	$11,000	
Expert system (base)	piece	1	$64,000	$64,000	
Expert system (freeway)	piece	1	$46,000	$46,000	
CCTV SC interface	piece	1	$50,000	$50,000	
CMS	piece	1	$75,000	$75,000	
TXT	piece	1	$75,000	$75,000	
SC database (CAD)	piece	1	$11,000	$11,000	
Traffic Control System	piece	1	$150,000	$150,000	
Sub-total Software					$762,000
Total Capital Cost per District					$3,839,000

TRAFFIC OPERATIONS CENTER COSTS

District : 4 **Corridor Element :** Freeway Central

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
IMPLEMENTATION COSTS					
Design	% of capital		10%	$383,900	
Integration	% of capital		10%	$383,900	
Contingency	% of capital		15%	$575,850	
Total Implementation costs					$1,343,650
OPERATIONAL COSTS	**Staffing**	**Labor $**	**Overhead %**	**Extension $**	
Personnel Costs per District					
Supervisor	2	$50,000	1.08	$208,000	
Operator	10	$30,000	1.08	$624,000	
Total Operations Cost					$832,000
MAINTENANCE COSTS (per annum)			**failure rate (%)**		
Equipment	% of equipment		10%	$167,700	
Sub-total Maintenance costs				$167,700	
Contingency as % of maintenance costs			20%	$33,540	
Total Maintenance costs					$201,240

CORRIDOR COST SUMMARY

Corridor : 4-1

Freeway Miles	18.0
Surface Street Miles	40.0
Number of Freeway Lanes	5
Number of Ramps	25
Number of Freeway Connectors	4
Number of Full Matrix Signs	12
Number of Intersections	100

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	174	$192,705	$279,705	$131,153		$23,125	$231,246
CCTV	Cameras	18	$378,900	$568,800	$208,530		$45,468	$454,680
Tow Services	Freeway miles	18	$241,920	$241,920		$796,770	$663,552	$14,603,220
Accident Investigation Sites	Sites	18		$544,500	$217,800			
Incident Management Teams	Freeway miles	18	$23,625	$23,625		$22,500	$34,020	$565,200
Trunk Communications	Freeway miles	18						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$900,000	$2,700,000	$1,080,000		$21,600	$216,000
CMS (Trailblazers)	No of Trailblazers	64	$873,600	$1,852,800	$828,480		$52,416	$524,160
CMS (Full Matrix)	No of Full Matrix	12	$1,307,400	$1,849,800	$870,660		$78,444	$784,440
Ramp Metering	No of Ramps	25	$500,000	$2,275,000	$985,000		$85,000	$850,000
Connector Metering	No of Connectors	4	$340,000	$840,000	$395,000		$57,800	$578,000
Freeway Detectors	Detectors	90		$180,000	$72,000		$21,600	$216,000
Signal Installation	Intersections	100	$800,000	$3,800,000	$1,520,000		$96,000	$960,000
Geometric Improvements								
1	Route 82 to route 87 improvement			$500,000				
2	De la Cruz Boulevard - widening			$1,000,000				
3								
Totals				$17,106,150	$6,518,623	$819,270	$1,215,025	$20,342,946

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$23,624,773	$20,342,946

CORRIDOR COST SUMMARY

Corridor : 4-3

Freeway Miles	18.3
Surface Street Miles	21.0
Number of Freeway Lanes	8
Number of Ramps	27
Number of Freeway Connectors	6
Number of Full Matrix Signs	15
Number of Intersections	73

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	117	$129,578	$188,078	$88,189		$15,549	$155,493
CCTV	Cameras	18	$378,900	$568,800	$208,530		$45,468	$454,680
Tow Services	Freeway miles	18	$241,920	$241,920		$796,770	$663,552	$14,603,220
Accident Investigation Sites	Sites	18		$544,500	$217,800			
Incident Management Teams	Freeway miles	18	$23,625	$23,625		$22,500	$34,020	$565,200
Trunk Communications	Freeway miles	18						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$900,000	$2,700,000	$1,080,000		$21,600	$216,000
CMS (Trailblazers)	No of Trailblazers	33	$450,450	$955,350	$427,185		$27,027	$270,270
CMS (Full Matrix)	No of Full Matrix	15	$1,634,250	$2,312,250	$1,088,325		$98,055	$980,550
Ramp Metering	No of Ramps	27	$540,000	$2,457,000	$1,061,800		$91,800	$918,000
Connector Metering	No of Connectors	6	$510,000	$1,260,000	$580,000		$86,700	$867,000
Freeway Detectors	Detectors	146.4		$292,800	$117,120		$35,136	$351,360
Signal Installation	Intersections	73	$584,000	$2,774,000	$1,109,600		$70,080	$700,800
Geometric Improvements								
1								
2								
3								
Totals				$14,768,323	$6,188,549	$819,270	$1,224,987	$20,442,573

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$20,956,871	$20,442,573

CORRIDOR COST SUMMARY

Corridor : 4-11

Freeway Miles	14.0
Surface Street Miles	35.0
Number of Freeway Lanes	6
Number of Ramps	26
Number of Freeway Connectors	11
Number of Full Matrix Signs	10
Number of Intersections	76

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	147	$162,803	$236,303	$110,801		$19,536	$195,363
CCTV	Cameras	14	$294,700	$442,400	$162,190		$35,364	$353,640
Tow Services	Freeway miles	14	$188,160	$188,160		$652,770	$516,096	$11,688,600
Accident Investigation Sites	Sites	14		$423,500	$169,400			
Incident Management Teams	Freeway miles	14	$23,625	$23,625		$22,500	$26,460	$489,600
Trunk Communications	Freeway miles	14						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$700,000	$2,100,000	$840,000		$16,800	$168,000
CMS (Trailblazers)	No of Trailblazers	56	$764,400	$1,621,200	$724,920		$45,864	$458,640
CMS (Full Matrix)	No of Full Matrix	10	$1,089,500	$1,541,500	$725,550		$65,370	$653,700
Ramp Metering	No of Ramps	26	$520,000	$2,366,000	$1,023,400		$88,400	$884,000
Connector Metering	No of Connectors	11	$935,000	$2,310,000	$1,042,500		$158,950	$1,589,500
Freeway Detectors	Detectors	84		$168,000	$67,200		$20,160	$201,600
Signal Installation	Intersections	76	$608,000	$2,888,000	$1,155,200		$72,960	$729,600
Geometric Improvements								
	1 Lark - widening 2 to 4 lanes			$1,000,000				
	2							
	3							
Totals				$15,758,688	$6,231,161	$675,270	$1,101,960	$17,772,303

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$21,989,849	$17,772,303

CORRIDOR COST SUMMARY

Corridor : 4-12

Freeway Miles	12.4
Surface Street Miles	15.2
Number of Freeway Lanes	8
Number of Ramps	13
Number of Freeway Connectors	3
Number of Full Matrix Signs	10
Number of Intersections	38

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	81	$89,708	$130,208	$61,054		$10,765	$107,649
CCTV	Cameras	12	$252,600	$379,200	$139,020		$30,312	$303,120
Tow Services	Freeway miles	12	$161,280	$161,280		$580,770	$442,368	$10,231,380
Accident Investigation Sites	Sites	12		$363,000	$145,200			
Incident Management Teams	Freeway miles	12	$23,625	$23,625		$22,500	$22,680	$451,800
Trunk Communications	Freeway miles	12						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$600,000	$1,800,000	$720,000		$14,400	$144,000
CMS (Trailblazers)	No of Trailblazers	24	$327,600	$694,800	$310,680		$19,656	$196,560
CMS (Full Matrix)	No of Full Matrix	10	$1,089,500	$1,541,500	$725,550		$65,370	$653,700
Ramp Metering	No of Ramps	13	$260,000	$1,183,000	$524,200		$44,200	$442,000
Connector Metering	No of Connectors	3	$255,000	$630,000	$302,500		$43,350	$433,500
Freeway Detectors	Detectors	99.2		$198,400	$79,360		$23,808	$238,080
Signal Installation	Intersections	38	$304,000	$1,444,000	$577,600		$36,480	$364,800
Geometric Improvements								
	1 _____							
	2 _____							
	3 _____							
Totals				$8,999,013	$3,795,164	$603,270	$789,389	$13,926,589

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$12,794,176	$13,926,589

CORRIDOR COST SUMMARY

Corridor : 4-13

Freeway Miles	10.4
Surface Street Miles	25.0
Number of Freeway Lanes	6
Number of Ramps	19
Number of Freeway Connectors	3
Number of Full Matrix Signs	9
Number of Intersections	27

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	105	$116,288	$168,788	$79,144		$13,955	$139,545
CCTV	Cameras	10	$210,500	$316,000	$115,850		$25,260	$252,600
Tow Services	Freeway miles	10	$134,400	$134,400		$508,770	$368,640	$8,774,100
Accident Investigation Sites	Sites	10		$302,500	$121,000			
Incident Management Teams	Freeway miles	10	$23,625	$23,625		$22,500	$18,900	$414,000
Trunk Communications	Freeway miles	10						
Hub Costs			$150,000	$225,000	$105,000		$18,000	$180,000
Cable Costs			$500,000	$1,500,000	$600,000		$12,000	$120,000
CMS (Trailblazers)	No of Trailblazers	40	$546,000	$1,158,000	$517,800		$32,760	$327,600
CMS (Full Matrix)	No of Full Matrix	9	$980,550	$1,387,350	$652,995		$58,833	$588,330
Ramp Metering	No of Ramps	19	$380,000	$1,729,000	$754,600		$64,600	$646,000
Connector Metering	No of Connectors	3	$255,000	$630,000	$302,500		$43,350	$433,500
Freeway Detectors	Detectors	62.4		$124,800	$49,920		$14,976	$149,760
Signal Installation	Intersections	27	$216,000	$1,026,000	$410,400		$25,920	$259,200
Geometric Improvements								
	1							
	2							
	3							
Totals				$8,725,463	$3,709,209	$531,270	$697,194	$12,284,635

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$12,434,671	$12,284,635

CORRIDOR COST SUMMARY

Corridor : 4-14

Freeway Miles	11.1
Surface Street Miles	12.0
Number of Freeway Lanes	8
Number of Ramps	25
Number of Freeway Connectors	2
Number of Full Matrix Signs	10
Number of Intersections	36

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	69	$76,418	$110,918	$52,009		$9,170	$91,701
CCTV	Cameras	11	$231,550	$347,600	$127,435		$27,786	$277,860
Tow Services	Freeway miles	11	$147,840	$147,840		$544,770	$405,504	$9,502,740
Accident Investigation Sites	Sites	11		$332,750	$133,100			
Incident Management Teams	Freeway miles	11	$23,625	$23,625		$22,500	$20,790	$432,900
Trunk Communications	Freeway miles	11						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$550,000	$1,650,000	$660,000		$13,200	$132,000
CMS (Trailblazers)	No of Trailblazers	19	$259,350	$550,050	$245,955		$15,561	$155,610
CMS (Full Matrix)	No of Full Matrix	10	$1,089,500	$1,541,500	$725,550		$65,370	$653,700
Ramp Metering	No of Ramps	25	$500,000	$2,275,000	$985,000		$85,000	$850,000
Connector Metering	No of Connectors	2	$170,000	$420,000	$210,000		$28,900	$289,000
Freeway Detectors	Detectors	88.8		$177,600	$71,040		$21,312	$213,120
Signal Installation	Intersections	36	$288,000	$1,368,000	$547,200		$34,560	$345,600
Geometric Improvements								
1								
2								
3								
Totals				$9,394,883	$3,967,289	$567,270	$763,153	$13,304,231

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$13,362,171	$13,304,231

CORRIDOR COST SUMMARY

Corridor : 4-15

Freeway Miles	8.0
Surface Street Miles	10.0
Number of Freeway Lanes	6
Number of Ramps	4
Number of Freeway Connectors	9
Number of Full Matrix Signs	10
Number of Intersections	20

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	54	$59,805	$86,805	$40,703		$7,177	$71,766
CCTV	Cameras	8	$168,400	$252,800	$92,680		$20,208	$202,080
Tow Services	Freeway miles	8	$107,520	$107,520		$436,770	$294,912	$7,316,820
Accident Investigation Sites	Sites	8		$242,000	$96,800			
Incident Management Teams	Freeway miles	8	$23,625	$23,625		$22,500	$15,120	$376,200
Trunk Communications	Freeway miles	8						
Hub Costs			$150,000	$225,000	$105,000		$18,000	$180,000
Cable Costs			$400,000	$1,200,000	$480,000		$9,600	$96,000
CMS (Trailblazers)	No of Trailblazers	16	$218,400	$463,200	$207,120		$13,104	$131,040
CMS (Full Matrix)	No of Full Matrix	10	$1,089,500	$1,541,500	$725,550		$65,370	$653,700
Ramp Metering	No of Ramps	4	$80,000	$364,000	$178,600		$13,600	$136,000
Connector Metering	No of Connectors	9	$765,000	$1,890,000	$857,500		$130,050	$1,300,500
Freeway Detectors	Detectors	48		$96,000	$38,400		$11,520	$115,200
Signal Installation	Intersections	20	$160,000	$760,000	$304,000		$19,200	$192,000
Geometric Improvements								
1	Route 185 widening 2 to 4 lanes			$1,000,000				
2								
3								
Totals				$8,252,450	$3,126,353	$459,270	$617,861	$10,771,306

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$11,378,803	$10,771,306

CORRIDOR COST SUMMARY

Corridor : 4-17

Freeway Miles	6.1
Surface Street Miles	7.0
Number of Freeway Lanes	6
Number of Ramps	22
Number of Freeway Connectors	1
Number of Full Matrix Signs	6
Number of Intersections	27

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	39	$43,193	$62,693	$29,396		$5,183	$51,831
CCTV	Cameras	6	$126,300	$189,600	$69,510		$15,156	$151,560
Tow Services	Freeway miles	6	$80,640	$80,640		$364,770	$221,184	$5,859,540
Accident Investigation Sites	Sites	6		$181,500	$72,600			
Incident Management Teams	Freeway miles	6	$23,625	$23,625		$22,500	$11,340	$338,400
Trunk Communications	Freeway miles	6						
Hub Costs			$150,000	$225,000	$105,000		$18,000	$180,000
Cable Costs			$300,000	$900,000	$360,000		$7,200	$72,000
CMS (Trailblazers)	No of Trailblazers	11	$150,150	$318,450	$142,395		$9,009	$90,090
CMS (Full Matrix)	No of Full Matrix	6	$653,700	$924,900	$435,330		$39,222	$392,220
Ramp Metering	No of Ramps	22	$440,000	$2,002,000	$869,800		$74,800	$748,000
Connector Metering	No of Connectors	1	$85,000	$210,000	$117,500		$14,450	$144,500
Freeway Detectors	Detectors	36.6		$73,200	$29,280		$8,784	$87,840
Signal Installation	Intersections	27	$216,000	$1,026,000	$410,400		$25,920	$259,200
Geometric Improvements								
1								
2								
3								
Totals				$6,217,608	$2,641,211	$387,270	$450,248	$8,375,181

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$8,858,819	$8,375,181

CORRIDOR COST SUMMARY

Corridor : 4-22

Freeway Miles	16.0
Surface Street Miles	35.0
Number of Freeway Lanes	8
Number of Ramps	37
Number of Freeway Connectors	6
Number of Full Matrix Signs	12
Number of Intersections	84

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	153	$169,448	$245,948	$115,324		$20,334	$203,337
CCTV	Cameras	16	$336,800	$505,600	$185,360		$40,416	$404,160
Tow Services	Freeway miles	16	$215,040	$215,040		$724,770	$589,824	$13,145,940
Accident Investigation Sites	Sites	16		$484,000	$193,600			
Incident Management Teams	Freeway miles	16	$23,625	$23,625		$22,500	$30,240	$527,400
Trunk Communications	Freeway miles	16						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$800,000	$2,400,000	$960,000		$19,200	$192,000
CMS (Trailblazers)	No of Trailblazers	56	$764,400	$1,621,200	$724,920		$45,864	$458,640
CMS (Full Matrix)	No of Full Matrix	12	$1,307,400	$1,849,800	$870,660		$78,444	$784,440
Ramp Metering	No of Ramps	37	$740,000	$3,367,000	$1,445,800		$125,800	$1,258,000
Connector Metering	No of Connectors	6	$510,000	$1,260,000	$580,000		$86,700	$867,000
Freeway Detectors	Detectors	128		$256,000	$102,400		$30,720	$307,200
Signal Installation	Intersections	84	$672,000	$3,192,000	$1,276,800		$80,640	$806,400
Geometric Improvements								
	1 Rebuilding Foothills/Stevens Creek Intersection			$1,000,000				
	2 Stevens Creek widening			$1,000,000				
	3							
Totals				$17,870,213	$6,664,864	$747,270	$1,184,182	$19,314,517

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$24,535,076	$19,314,517

TRAFFIC OPERATIONS CENTER COSTS

District : 7 | Corridor Element : Freeway Central

Item		Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS						
Equipment						
Freeway System						
Type (one only):	Large 1	Medium		Small		
Central Computer		piece	3	$200,000	$600,000	
Workstations		piece	6	$20,000	$120,000	
Large scale projector		piece	3	$50,000	$150,000	
SC Node processor		piece	3	$20,000	$60,000	
SC Database	1					
Database Server		piece	1	$110,000	$110,000	
Workstations		piece	2	$20,000	$40,000	
Expert System	1					
ES processor		piece	2	$20,000	$40,000	
CMS related	1					
CMS control hardware		piece	1	$3,000	$3,000	
CCTV related	1					
Central Control and monitors		piece	1	$50,000	$50,000	
Commercial TV	1					
Interface equipment		piece	1	$25,000	$25,000	
Commercial Radio	1					
Interface equipment		piece	1	$11,000	$11,000	
Motorist Information	1					
Interface equipment		piece	1	$50,000	$50,000	
HAT system	1		1	$140,000	$140,000	
CAD interface	1					
Workstation		piece	1	$20,000	$20,000	
SC system link		piece	1	$18,000	$18,000	
Traffic Control System	1					
Central Computer		piece	1	$150,000	$150,000	
Workstations		piece	4	$20,000	$80,000	
Communications		piece	2	$50,000	$100,000	
Sub-total equipment						$1,767,000

TRAFFIC OPERATIONS CENTER COSTS

District : 7 Corridor Element : Freeway Central

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
Control Room Facility					
Construction					$1,400,000
Software					
Freeway System	piece	1	$150,000	$150,000	
SC interface (freeway)	piece	1	$50,000	$50,000	
SC database	piece	1	$80,000	$80,000	
SC database (freeway)	piece	1	$11,000	$11,000	
Expert system (base)	piece	1	$64,000	$64,000	
Expert system (freeway)	piece	1	$46,000	$46,000	
CCTV SC interface	piece	1	$50,000	$50,000	
CMS	piece	1	$75,000	$75,000	
TXT	piece	1	$75,000	$75,000	
SC database (CAD)	piece	1	$11,000	$11,000	
Traffic Control System	piece	1	$150,000	$150,000	
Sub-total Software					$762,000
Total Capital Cost per District					$3,929,000

TRAFFIC OPERATIONS CENTER COSTS

District : 7 | Corridor Element : Freeway Central

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
IMPLEMENTATION COSTS					
Design	% of capital		10%	$392,900	
Integration	% of capital		10%	$392,900	
Contingency	% of capital		15%	$589,350	
Total Implementation costs					$1,375,150
OPERATIONAL COSTS	**Staffing**		**Labor $**	**Overhead %**	**Extension $**	
Personnel Costs per District						
Supervisor	2		$50,000	1.08	$208,000	
Operator	10		$30,000	1.08	$624,000	
Total Operations Cost						$832,000
MAINTENANCE COSTS (per annum)				**failure rate (%)**		
Equipment	% of equipment			10%	$176,700	
Sub-total Maintenance costs					$176,700	
Contingency	as % of maintenance costs			20%	$35,340	
Total Maintenance costs						$212,040

CORRIDOR COST SUMMARY

Corridor : 7-1

Freeway Miles	10.0
Surface Street Miles	25.0
Number of Freeway Lanes	6
Number of Ramps	20
Number of Freeway Connectors	20
Number of Full Matrix Signs	23
Number of Intersections	

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	105	$116,288	$168,788	$79,144		$13,955	$139,545
CCTV	Cameras	10	$210,500	$316,000	$115,850		$25,260	$252,600
Tow Services	Freeway miles	10	$134,400	$134,400		$508,770	$368,640	$8,774,100
Accident Investigation Sites	Sites	10		$302,500	$121,000			
Incident Management Teams	Freeway miles	10	$23,625	$23,625		$22,500	$18,900	$414,000
Trunk Communications	Freeway miles	10						
Hub Costs			$150,000	$225,000	$105,000		$18,000	$180,000
Cable Costs			$500,000	$1,500,000	$600,000		$12,000	$120,000
CMS (Trailblazers)	No of Trailblazers	40	$546,000	$1,158,000	$517,800		$32,760	$327,600
CMS (Full Matrix)	No of Full Matrix	23	$2,505,850	$3,545,450	$1,668,765		$150,351	$1,503,510
Ramp Metering	No of Ramps	20	$400,000	$1,820,000	$793,000		$68,000	$680,000
Connector Metering	No of Connectors	20	$1,700,000	$4,200,000	$1,875,000		$289,000	$2,890,000
Freeway Detectors	Detectors	60		$120,000	$48,000		$14,400	$144,000
Signal Installation	Intersections							
Geometric Improvements								
1								
2								
3								
Totals				$13,513,763	$5,923,559	$531,270	$1,011,266	$15,425,355

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$19,437,321	$15,425,355

CORRIDOR COST SUMMARY

Corridor : 7-2a

Freeway Miles	13.4
Surface Street Miles	25.0
Number of Freeway Lanes	8
Number of Ramps	5
Number of Freeway Connectors	7
Number of Full Matrix Signs	10
Number of Intersections	40

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	114	$126,255	$183,255	$85,928		$15,151	$151,506
CCTV	Cameras	13	$273,650	$410,800	$150,605		$32,838	$328,380
Tow Services	Freeway miles	13	$174,720	$174,720		$616,770	$479,232	$10,960,020
Accident Investigation Sites	Sites	13		$393,250	$157,300			
Incident Management Teams	Freeway miles	13	$23,625	$23,625		$22,500	$24,570	$470,700
Trunk Communications	Freeway miles	13						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$650,000	$1,950,000	$780,000		$15,600	$156,000
CMS (Trailblazers)	No of Trailblazers	40	$546,000	$1,158,000	$517,800		$32,760	$327,600
CMS (Full Matrix)	No of Full Matrix	10	$1,089,500	$1,541,500	$725,550		$65,370	$653,700
Ramp Metering	No of Ramps	5	$100,000	$455,000	$217,000		$17,000	$170,000
Connector Metering	No of Connectors	7	$595,000	$1,470,000	$672,500		$101,150	$1,011,500
Freeway Detectors	Detectors	107.2		$214,400	$85,760		$25,728	$257,280
Signal Installation	Intersections	40	$320,000	$1,520,000	$608,000		$38,400	$384,000
Geometric Improvements								
1								
2								
3								
Totals				$9,944,550	$4,210,443	$639,270	$883,799	$15,230,686

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$14,154,993	$15,230,686

CORRIDOR COST SUMMARY

Corridor : 7-2b

Freeway Miles	12.0
Surface Street Miles	12.0
Number of Freeway Lanes	8
Number of Ramps	5
Number of Freeway Connectors	6
Number of Full Matrix Signs	10
Number of Intersections	12

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	72	$79,740	$115,740	$54,270		$9,569	$95,688
CCTV	Cameras	12	$252,600	$379,200	$139,020		$30,312	$303,120
Tow Services	Freeway miles	12	$161,280	$161,280		$580,770	$442,368	$10,231,380
Accident Investigation Sites	Sites	12		$363,000	$145,200			
Incident Management Teams	Freeway miles	12	$23,625	$23,625		$22,500	$22,680	$451,800
Trunk Communications	Freeway miles	12						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$600,000	$1,800,000	$720,000		$14,400	$144,000
CMS (Trailblazers)	No of Trailblazers	19	$259,350	$550,050	$245,955		$15,561	$155,610
CMS (Full Matrix)	No of Full Matrix	10	$1,089,500	$1,541,500	$725,550		$65,370	$653,700
Ramp Metering	No of Ramps	5	$100,000	$455,000	$217,000		$17,000	$170,000
Connector Metering	No of Connectors	6	$510,000	$1,260,000	$580,000		$86,700	$867,000
Freeway Detectors	Detectors	96		$192,000	$76,800		$23,040	$230,400
Signal Installation	Intersections	12	$96,000	$456,000	$182,400		$11,520	$115,200
Geometric Improvements								
1								
2								
3								
Totals				$7,747,395	$3,296,195	$603,270	$774,520	$13,777,898

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$11,043,590	$13,777,898

CORRIDOR COST SUMMARY

Corridor : 7-4

Freeway Miles	10.0
Surface Street Miles	20.0
Number of Freeway Lanes	8
Number of Ramps	4
Number of Freeway Connectors	6
Number of Full Matrix Signs	9
Number of Intersections	40

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	90	$99,675	$144,675	$67,838		$11,961	$119,610
CCTV	Cameras	10	$210,500	$316,000	$115,850		$25,260	$252,600
Tow Services	Freeway miles	10	$134,400	$134,400		$508,770	$368,640	$8,774,100
Accident Investigation Sites	Sites	10		$302,500	$121,000			
Incident Management Teams	Freeway miles	10	$23,625	$23,625		$22,500	$18,900	$414,000
Trunk Communications	Freeway miles	10						
Hub Costs			$150,000	$225,000	$105,000		$18,000	$180,000
Cable Costs			$500,000	$1,500,000	$600,000		$12,000	$120,000
CMS (Trailblazers)	No of Trailblazers	32	$436,800	$926,400	$414,240		$26,208	$262,080
CMS (Full Matrix)	No of Full Matrix	9	$980,550	$1,387,350	$652,995		$58,833	$588,330
Ramp Metering	No of Ramps	4	$80,000	$364,000	$178,600		$13,600	$136,000
Connector Metering	No of Connectors	6	$510,000	$1,260,000	$580,000		$86,700	$867,000
Freeway Detectors	Detectors	80		$160,000	$64,000		$19,200	$192,000
Signal Installation	Intersections	40	$320,000	$1,520,000	$608,000		$38,400	$384,000
Geometric Improvements								
1								
2								
3								
Totals				$8,263,950	$3,507,523	$531,270	$697,702	$12,289,720

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$11,771,473	$12,289,720

CORRIDOR COST SUMMARY

Corridor : 7-6

Freeway Miles	7.0
Surface Street Miles	10.0
Number of Freeway Lanes	8
Number of Ramps	2
Number of Freeway Connectors	6
Number of Full Matrix Signs	8
Number of Intersections	40

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	51	$56,483	$81,983	$38,441		$6,778	$67,779
CCTV	Cameras	7	$147,350	$221,200	$81,095		$17,682	$176,820
Tow Services	Freeway miles	7	$94,080	$94,080		$400,770	$258,048	$6,588,180
Accident Investigation Sites	Sites	7		$211,750	$84,700			
Incident Management Teams	Freeway miles	7	$23,625	$23,625		$22,500	$13,230	$357,300
Trunk Communications	Freeway miles	7						
Hub Costs			$150,000	$225,000	$105,000		$18,000	$180,000
Cable Costs			$350,000	$1,050,000	$420,000		$8,400	$84,000
CMS (Trailblazers)	No of Trailblazers	16	$218,400	$463,200	$207,120		$13,104	$131,040
CMS (Full Matrix)	No of Full Matrix	8	$871,600	$1,233,200	$580,440		$52,296	$522,960
Ramp Metering	No of Ramps	2	$40,000	$182,000	$101,800		$6,800	$68,000
Connector Metering	No of Connectors	6	$510,000	$1,260,000	$580,000		$86,700	$867,000
Freeway Detectors	Detectors	56		$112,000	$44,800		$13,440	$134,400
Signal Installation	Intersections	40	$320,000	$1,520,000	$608,000		$38,400	$384,000
Geometric Improvements								
1								
2								
3								
Totals				$6,678,038	$2,851,396	$423,270	$532,878	$9,561,479

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$9,529,434	$9,561,479

CORRIDOR COST SUMMARY

Corridor : 7-18

Freeway Miles	14.0
Surface Street Miles	30.0
Number of Freeway Lanes	8
Number of Ramps	7
Number of Freeway Connectors	6
Number of Full Matrix Signs	9
Number of Intersections	30

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	132	$146,190	$212,190	$99,495		$17,543	$175,428
CCTV	Cameras	14	$294,700	$442,400	$162,190		$35,364	$353,640
Tow Services	Freeway miles	14	$188,160	$188,160		$652,770	$516,096	$11,688,660
Accident Investigation Sites	Sites	14		$423,500	$169,400			
Incident Management Teams	Freeway miles	14	$23,625	$23,625		$22,500	$26,460	$489,600
Trunk Communications	Freeway miles	14						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$700,000	$2,100,000	$840,000		$16,800	$168,000
CMS (Trailblazers)	No of Trailblazers	48	$655,200	$1,389,600	$621,360		$39,312	$393,120
CMS (Full Matrix)	No of Full Matrix	9	$980,550	$1,387,350	$652,995		$58,833	$588,330
Ramp Metering	No of Ramps	7	$140,000	$637,000	$293,800		$23,800	$238,000
Connector Metering	No of Connectors	6	$510,000	$1,260,000	$580,000		$86,700	$867,000
Freeway Detectors	Detectors	112		$224,000	$89,600		$26,880	$268,800
Signal Installation	Intersections	30	$240,000	$1,140,000	$456,000		$28,800	$288,000
Geometric Improvements								
	1 _____							
	2 _____							
	3 _____							
Totals				$9,877,825	$4,174,840	$675,270	$912,588	$15,878,578

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$14,052,665	$15,878,578

CORRIDOR COST SUMMARY

Corridor : 7-20

Freeway Miles	15.0
Surface Street Miles	30.0
Number of Freeway Lanes	8
Number of Ramps	1
Number of Freeway Connectors	6
Number of Full Matrix Signs	12
Number of Intersections	65

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	135	$149,513	$217,013	$101,756		$17,942	$179,415
CCTV	Cameras	15	$315,750	$474,000	$173,775		$37,890	$378,900
Tow Services	Freeway miles	15	$201,600	$201,600		$688,770	$552,960	$12,417,300
Accident Investigation Sites	Sites	15		$453,750	$181,500			
Incident Management Teams	Freeway miles	15	$23,625	$23,625		$22,500	$28,350	$508,500
Trunk Communications	Freeway miles	15						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$750,000	$2,250,000	$900,000		$18,000	$180,000
CMS (Trailblazers)	No of Trailblazers	48	$655,200	$1,389,600	$621,360		$39,312	$393,120
CMS (Full Matrix)	No of Full Matrix	12	$1,307,400	$1,849,800	$870,660		$78,444	$784,440
Ramp Metering	No of Ramps	1	$20,000	$91,000	$63,400		$3,400	$34,000
Connector Metering	No of Connectors	6	$510,000	$1,260,000	$580,000		$86,700	$867,000
Freeway Detectors	Detectors	120		$240,000	$96,000		$28,800	$288,000
Signal Installation	Intersections	65	$520,000	$2,470,000	$988,000		$62,400	$624,000
Geometric Improvements								
1	Arteria Street frontage road turns			$500,000				
2								
3								
Totals				$11,870,388	$4,786,451	$711,270	$990,198	$17,014,675

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$16,656,839	$17,014,675

CORRIDOR COST SUMMARY

Corridor : 7-21

Freeway Miles	10.2
Surface Street Miles	11.0
Number of Freeway Lanes	8
Number of Ramps	18
Number of Freeway Connectors	4
Number of Full Matrix Signs	8
Number of Intersections	35

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	63	$69,773	$101,273	$47,486		$8,373	$83,727
CCTV	Cameras	10	$210,500	$316,000	$115,850		$25,260	$252,600
Tow Services	Freeway miles	10	$134,400	$134,400		$508,770	$368,640	$8,774,100
Accident Investigation Sites	Sites	10		$302,500	$121,000			
Incident Management Teams	Freeway miles	10	$23,625	$23,625		$22,500	$18,900	$414,000
Trunk Communications	Freeway miles	10						
Hub Costs			$150,000	$225,000	$105,000		$18,000	$180,000
Cable Costs			$500,000	$1,500,000	$600,000		$12,000	$120,000
CMS (Trailblazers)	No of Trailblazers	17	$232,050	$492,150	$220,065		$13,923	$139,230
CMS (Full Matrix)	No of Full Matrix	8	$871,600	$1,233,200	$580,440		$52,296	$522,960
Ramp Metering	No of Ramps	18	$360,000	$1,638,000	$716,200		$61,200	$612,000
Connector Metering	No of Connectors	4	$340,000	$840,000	$395,000		$57,800	$578,000
Freeway Detectors	Detectors	81.6		$163,200	$65,280		$19,584	$195,840
Signal Installation	Intersections	35	$280,000	$1,330,000	$532,000		$33,600	$336,000
Geometric Improvements								
1	Cahuenga Boulevard East - widening			$1,000,000				
2								
3								
Totals				$9,299,348	$3,498,321	$531,270	$689,576	$12,208,457

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$12,797,669	$12,208,457

CORRIDOR COST SUMMARY

Corridor : 7-22

Freeway Miles	17.0
Surface Street Miles	42.0
Number of Freeway Lanes	8
Number of Ramps	18
Number of Freeway Connectors	2
Number of Full Matrix Signs	12
Number of Intersections	70

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	177	$196,028	$284,528	$133,414		$23,523	$235,233
CCTV	Cameras	17	$357,850	$537,200	$196,945		$42,942	$429,420
Tow Services	Freeway miles	17	$228,480	$228,480		$760,770	$626,688	$13,874,580
Accident Investigation Sites	Sites	17		$514,250	$205,700			
Incident Management Teams	Freeway miles	17	$23,625	$23,625		$22,500	$32,130	$546,300
Trunk Communications	Freeway miles	17						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$850,000	$2,550,000	$1,020,000		$20,400	$204,000
CMS (Trailblazers)	No of Trailblazers	67	$914,550	$1,939,650	$867,315		$54,873	$548,730
CMS (Full Matrix)	No of Full Matrix	12	$1,307,400	$1,849,800	$870,660		$78,444	$784,440
Ramp Metering	No of Ramps	18	$360,000	$1,638,000	$716,200		$61,200	$612,000
Connector Metering	No of Connectors	2	$170,000	$420,000	$210,000		$28,900	$289,000
Freeway Detectors	Detectors	136		$272,000	$108,800		$32,640	$326,400
Signal Installation	Intersections	70	$560,000	$2,660,000	$1,064,000		$67,200	$672,000
Geometric Improvements								
1								
2								
3								
Totals				$13,367,533	$5,603,034	$783,270	$1,104,940	$18,882,103

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$18,970,566	$18,882,103

CORRIDOR COST SUMMARY

Corridor : 7-27

Freeway Miles	13.0
Surface Street Miles	33.0
Number of Freeway Lanes	8
Number of Ramps	5
Number of Freeway Connectors	4
Number of Full Matrix Signs	8
Number of Intersections	40

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	138	$152,835	$221,835	$104,018		$18,340	$183,402
CCTV	Cameras	13	$273,650	$410,800	$150,605		$32,838	$328,380
Tow Services	Freeway miles	13	$174,720	$174,720		$616,770	$479,232	$10,960,020
Accident Investigation Sites	Sites	13		$393,250	$157,300			
Incident Management Teams	Freeway miles	13	$23,625	$23,625		$22,500	$24,570	$470,700
Trunk Communications	Freeway miles	13						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$650,000	$1,950,000	$780,000		$15,600	$156,000
CMS (Trailblazers)	No of Trailblazers	52	$709,800	$1,505,400	$673,140		$42,588	$425,880
CMS (Full Matrix)	No of Full Matrix	8	$871,600	$1,233,200	$580,440		$52,296	$522,960
Ramp Metering	No of Ramps	5	$100,000	$455,000	$217,000		$17,000	$170,000
Connector Metering	No of Connectors	4	$340,000	$840,000	$395,000		$57,800	$578,000
Freeway Detectors	Detectors	104		$208,000	$83,200		$24,960	$249,600
Signal Installation	Intersections	40	$320,000	$1,520,000	$608,000		$38,400	$384,000
Geometric Improvements								
1	Broadway widening			$1,000,000				
2								
3								
Totals				$10,385,830	$3,958,703	$639,270	$839,624	$14,788,942

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$14,344,533	$14,788,942

CORRIDOR COST SUMMARY

Corridor : 7-34

Freeway Miles	12.0
Surface Street Miles	25.0
Number of Freeway Lanes	8
Number of Ramps	10
Number of Freeway Connectors	2
Number of Full Matrix Signs	10
Number of Intersections	60

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	111	$122,933	$178,433	$83,666		$14,752	$147,519
CCTV	Cameras	12	$252,600	$379,200	$139,020		$30,312	$303,120
Tow Services	Freeway miles	12	$161,280	$161,280		$580,770	$442,368	$10,231,380
Accident Investigation Sites	Sites	12		$363,000	$145,200			
Incident Management Teams	Freeway miles	12	$23,625	$23,625		$22,500	$22,680	$451,800
Trunk Communications	Freeway miles	12						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$600,000	$1,800,000	$720,000		$14,400	$144,000
CMS (Trailblazers)	No of Trailblazers	40	$546,000	$1,158,000	$517,800		$32,760	$327,600
CMS (Full Matrix)	No of Full Matrix	10	$1,089,500	$1,541,500	$725,550		$65,370	$653,700
Ramp Metering	No of Ramps	10	$200,000	$910,000	$409,000		$34,000	$340,000
Connector Metering	No of Connectors	2	$170,000	$420,000	$210,000		$28,900	$289,000
Freeway Detectors	Detectors	96		$192,000	$76,800		$23,040	$230,400
Signal Installation	Intersections	60	$480,000	$2,280,000	$912,000		$57,600	$576,000
Geometric Improvements								
1								
2								
3								
Totals				$9,857,038	$4,149,036	$603,270	$802,182	$14,054,519

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$14,006,074	$14,054,519

CORRIDOR COST SUMMARY

Corridor : 7-37

Freeway Miles	13.0
Surface Street Miles	26.0
Number of Freeway Lanes	8
Number of Ramps	2
Number of Freeway Connectors	4
Number of Full Matrix Signs	11
Number of Intersections	70

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	117	$129,578	$188,078	$88,189		$15,549	$155,493
CCTV	Cameras	13	$273,650	$410,800	$150,605		$32,838	$328,380
Tow Services	Freeway miles	13	$174,720	$174,720		$616,770	$479,232	$10,960,020
Accident Investigation Sites	Sites	13		$393,250	$157,300			
Incident Management Teams	Freeway miles	13	$23,625	$23,625		$22,500	$24,570	$470,700
Trunk Communications	Freeway miles	13						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$650,000	$1,950,000	$780,000		$15,600	$156,000
CMS (Trailblazers)	No of Trailblazers	41	$559,650	$1,186,950	$530,745		$33,579	$335,790
CMS (Full Matrix)	No of Full Matrix	11	$1,198,450	$1,695,650	$798,105		$71,907	$719,070
Ramp Metering	No of Ramps	2	$40,000	$182,000	$101,800		$6,800	$68,000
Connector Metering	No of Connectors	4	$340,000	$840,000	$395,000		$57,800	$578,000
Freeway Detectors	Detectors	104		$208,000	$83,200		$24,960	$249,600
Signal Installation	Intersections	70	$560,000	$2,660,000	$1,064,000		$67,200	$672,000
Geometric Improvements								
1	Spring Street widening			$1,000,000				
2								
3								
Totals				$11,363,073	$4,358,944	$639,270	$866,035	$15,053,053

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$15,722,016	$15,053,053

CORRIDOR COST SUMMARY

Corridor : 7-38

Freeway Miles	17.0
Surface Street Miles	40.0
Number of Freeway Lanes	8
Number of Ramps	2
Number of Freeway Connectors	4
Number of Full Matrix Signs	10
Number of Intersections	80

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	171	$189,383	$274,883	$128,891		$22,726	$227,259
CCTV	Cameras	17	$357,850	$537,200	$196,945		$42,942	$429,420
Tow Services	Freeway miles	17	$228,480	$228,480		$760,770	$626,688	$13,874,580
Accident Investigation Sites	Sites	17		$514,250	$205,700			
Incident Management Teams	Freeway miles	17	$23,625	$23,625		$22,500	$32,130	$546,300
Trunk Communications	Freeway miles	17						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$850,000	$2,550,000	$1,020,000		$20,400	$204,000
CMS (Trailblazers)	No of Trailblazers	64	$873,600	$1,852,800	$828,480		$52,416	$524,160
CMS (Full Matrix)	No of Full Matrix	10	$1,089,500	$1,541,500	$725,550		$65,370	$653,700
Ramp Metering	No of Ramps	2	$40,000	$182,000	$101,800		$6,800	$68,000
Connector Metering	No of Connectors	4	$340,000	$840,000	$395,000		$57,800	$578,000
Freeway Detectors	Detectors	136		$272,000	$108,800		$32,640	$326,400
Signal Installation	Intersections	80	$640,000	$3,040,000	$1,216,000		$76,800	$768,000
Geometric Improvements								
1								
2								
3								
Totals				$12,306,738	$5,137,166	$783,270	$1,072,712	$18,559,819

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$17,443,904	$18,559,819

CORRIDOR COST SUMMARY

Corridor : 7-40

Freeway Miles	10.0
Surface Street Miles	11.0
Number of Freeway Lanes	8
Number of Ramps	5
Number of Freeway Connectors	4
Number of Full Matrix Signs	6
Number of Intersections	10

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	63	$69,773	$101,273	$47,486		$8,373	$83,727
CCTV	Cameras	10	$210,500	$316,000	$115,850		$25,260	$252,600
Tow Services	Freeway miles	10	$134,400	$134,400		$508,770	$368,640	$8,774,100
Accident Investigation Sites	Sites	10		$302,500	$121,000			
Incident Management Teams	Freeway miles	10	$23,625	$23,625		$22,500	$18,900	$414,000
Trunk Communications	Freeway miles	10						
Hub Costs			$150,000	$225,000	$105,000		$18,000	$180,000
Cable Costs			$500,000	$1,500,000	$600,000		$12,000	$120,000
CMS (Trailblazers)	No of Trailblazers	17	$232,050	$492,150	$220,065		$13,923	$139,230
CMS (Full Matrix)	No of Full Matrix	6	$653,700	$924,900	$435,330		$39,222	$392,220
Ramp Metering	No of Ramps	5	$100,000	$455,000	$217,000		$17,000	$170,000
Connector Metering	No of Connectors	4	$340,000	$840,000	$395,000		$57,800	$578,000
Freeway Detectors	Detectors	80		$160,000	$64,000		$19,200	$192,000
Signal Installation	Intersections	10	$80,000	$380,000	$152,000		$9,600	$96,000
Geometric Improvements								
1	Reversible Lanes System			$500,000				
2								
3								
Totals				$6,354,848	$2,472,731	$531,270	$607,918	$11,391,877

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$8,827,579	$11,391,877

CORRIDOR COST SUMMARY

Corridor : 7-41

Freeway Miles	8.0
Surface Street Miles	19.0
Number of Freeway Lanes	8
Number of Ramps	7
Number of Freeway Connectors	4
Number of Full Matrix Signs	7
Number of Intersections	40

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	81	$89,708	$130,208	$61,054		$10,765	$107,649
CCTV	Cameras	8	$168,400	$252,800	$92,680		$20,208	$202,080
Tow Services	Freeway miles	8	$107,520	$107,520		$436,770	$294,912	$7,316,820
Accident Investigation Sites	Sites	8		$242,000	$96,800			
Incident Management Teams	Freeway miles	8	$23,625	$23,625		$22,500	$15,120	$376,200
Trunk Communications	Freeway miles	8						
Hub Costs			$150,000	$225,000	$105,000		$18,000	$180,000
Cable Costs			$400,000	$1,200,000	$480,000		$9,600	$96,000
CMS (Trailblazers)	No of Trailblazers	30	$409,500	$868,500	$388,350		$24,570	$245,700
CMS (Full Matrix)	No of Full Matrix	7	$762,650	$1,079,050	$507,885		$45,759	$457,590
Ramp Metering	No of Ramps	7	$140,000	$637,000	$293,800		$23,800	$238,000
Connector Metering	No of Connectors	4	$340,000	$840,000	$395,000		$57,800	$578,000
Freeway Detectors	Detectors	64		$128,000	$51,200		$15,360	$153,600
Signal Installation	Intersections	40	$320,000	$1,520,000	$608,000		$38,400	$384,000
Geometric Improvements								
1								
2								
3								
Totals				$7,253,703	$3,079,769	$459,270	$574,294	$10,335,639

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$10,333,471	$10,335,639

CORRIDOR COST SUMMARY

Corridor : 7-43

Freeway Miles	12.0
Surface Street Miles	24.0
Number of Freeway Lanes	8
Number of Ramps	3
Number of Freeway Connectors	6
Number of Full Matrix Signs	10
Number of Intersections	50

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	108	$119,610	$173,610	$81,405		$14,353	$143,532
CCTV	Cameras	12	$252,600	$379,200	$139,020		$30,312	$303,120
Tow Services	Freeway miles	12	$161,280	$161,280		$580,770	$442,368	$10,231,380
Accident Investigation Sites	Sites	12		$363,000	$145,200			
Incident Management Teams	Freeway miles	12	$23,625	$23,625		$22,500	$22,680	$451,800
Trunk Communications	Freeway miles	12						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$600,000	$1,800,000	$720,000		$14,400	$144,000
CMS (Trailblazers)	No of Trailblazers	38	$518,700	$1,100,100	$491,910		$31,122	$311,220
CMS (Full Matrix)	No of Full Matrix	10	$1,089,500	$1,541,500	$725,550		$65,370	$653,700
Ramp Metering	No of Ramps	3	$60,000	$273,000	$140,200		$10,200	$102,000
Connector Metering	No of Connectors	6	$510,000	$1,260,000	$580,000		$86,700	$867,000
Freeway Detectors	Detectors	96		$192,000	$76,800		$23,040	$230,400
Signal Installation	Intersections	50	$400,000	$1,900,000	$760,000		$48,000	$480,000
Geometric Improvements								
1								
2								
3								
Totals				$9,617,315	$4,070,085	$603,270	$824,545	$14,278,152

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$13,687,400	$14,278,152

CORRIDOR COST SUMMARY

Corridor : 7-44

Freeway Miles	11.0
Surface Street Miles	15.0
Number of Freeway Lanes	6
Number of Ramps	3
Number of Freeway Connectors	6
Number of Full Matrix Signs	10
Number of Intersections	30

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	78	$86,385	$125,385	$58,793		$10,366	$103,662
CCTV	Cameras	11	$231,550	$347,600	$127,435		$27,786	$277,860
Tow Services	Freeway miles	11	$147,840	$147,840		$544,770	$405,504	$9,502,740
Accident Investigation Sites	Sites	11		$332,750	$133,100			
Incident Management Teams	Freeway miles	11	$23,625	$23,625		$22,500	$20,790	$432,900
Trunk Communications	Freeway miles	11						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$550,000	$1,650,000	$660,000		$13,200	$132,000
CMS (Trailblazers)	No of Trailblazers	24	$327,600	$694,800	$310,680		$19,656	$196,560
CMS (Full Matrix)	No of Full Matrix	10	$1,089,500	$1,541,500	$725,550		$65,370	$653,700
Ramp Metering	No of Ramps	3	$60,000	$273,000	$140,200		$10,200	$102,000
Connector Metering	No of Connectors	6	$510,000	$1,260,000	$580,000		$86,700	$867,000
Freeway Detectors	Detectors	66		$132,000	$52,800		$15,840	$158,400
Signal Installation	Intersections	30	$240,000	$1,140,000	$456,000		$28,800	$288,000
Geometric Improvements								
1								
2								
3								
Totals				$8,118,500	$3,454,558	$567,270	$740,212	$13,074,822

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$11,573,058	$13,074,822

TRAFFIC OPERATIONS CENTER COSTS

District : 8 Corridor Element : Freeway Central

Item		Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS						
Equipment						
Freeway System						
Type (one only):	Large		Medium		Small	1
Central Computer		piece	1	$200,000	$200,000	
Workstations		piece	2	$20,000	$40,000	
Large scale projector		piece	1	$50,000	$50,000	
SC Node processor		piece	1	$20,000	$20,000	
SC Database	1					
Database Server		piece	1	$20,000	$20,000	
Workstations		piece		$20,000		
Expert System	1					
ES processor		piece	2	$20,000	$40,000	
CMS related	1					
CMS control hardware		piece	1	$3,000	$3,000	
CCTV related	1					
Central Control and monitors		piece	1	$50,000	$50,000	
Commercial TV	1					
Interface equipment		piece	1	$25,000	$25,000	
Commercial Radio	1					
Interface equipment		piece	1	$11,000	$11,000	
Motorist Information	1					
Interface equipment		piece	1	$50,000	$50,000	
HAT system	1		1	$60,000	$60,000	
CAD interface	1					
Workstation		piece	1	$20,000	$20,000	
SC system link		piece	1	$18,000	$18,000	
Traffic Control System	1					
Central Computer		piece	1	$50,000	$50,000	
Workstations		piece	2	$20,000	$40,000	
Communications		piece	1	$30,000	$30,000	
Sub-total equipment						$727,000

TRAFFIC OPERATIONS CENTER COSTS

District : 8 | Corridor Element : Freeway Central

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
Control Room Facility					
Construction					$400,000
Software					
Freeway System	piece	1	$150,000	$150,000	
SC interface (freeway)	piece	1	$50,000	$50,000	
SC database	piece	1	$20,000	$20,000	
SC database (freeway)	piece	1	$11,000	$11,000	
Expert system (base)	piece	1	$20,000	$20,000	
Expert system (freeway)	piece	1	$46,000	$46,000	
CCTV SC interface	piece	1	$50,000	$50,000	
CMS	piece	1	$75,000	$75,000	
TXT	piece	1	$75,000	$75,000	
SC database (CAD)	piece	1	$11,000	$11,000	
Traffic Control System	piece	1	$75,000	$75,000	
Sub-total Software					$583,000
Total Capital Cost per District					$1,710,000

TRAFFIC OPERATIONS CENTER COSTS

District : 8 | Corridor Element : Freeway Central

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
IMPLEMENTATION COSTS					
Design	% of capital		10%	$171,000	
Integration	% of capital		10%	$171,000	
Contingency	% of capital		15%	$256,500	
Total Implementation costs					$598,500
OPERATIONAL COSTS	**Staffing**		**Labor $**	**Overhead %**	**Extension $**
Personnel Costs per District					
Supervisor	1		$50,000	1.08	$104,000
Operator	4		$30,000	1.08	$249,600
Total Operations Cost					$353,600
MAINTENANCE COSTS (per annum)					
				failure rate (%)	
Equipment	% of equipment			10%	$72,700
Sub-total Maintenance costs					$72,700
Contingency	as % of maintenance costs			20%	$14,540
Total Maintenance costs					$87,240

TRAFFIC OPERATIONS CENTER COSTS

District : 8 Corridor Element : Freeway Central

Item		Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS						
Equipment						
Freeway System						
Type (one only):	Large		Medium		Small	1
Central Computer		piece	1	$200,000	$200,000	
Workstations		piece	2	$20,000	$40,000	
Large scale projector		piece	1	$50,000	$50,000	
SC Node processor		piece	1	$20,000	$20,000	
SC Database	1					
Database Server		piece	1	$20,000	$20,000	
Workstations		piece	0	$20,000	$0	
Expert System	1					
ES processor		piece	2	$20,000	$40,000	
CMS related	1					
CMS control hardware		piece	1	$3,000	$3,000	
CCTV related	1					
Central Control and monitors		piece	1	$50,000	$50,000	
Commercial TV	1					
Interface equipment		piece	1	$25,000	$25,000	
Commercial Radio	1					
Interface equipment		piece	1	$11,000	$11,000	
Motorist Information	1					
Interface equipment		piece	1	$50,000	$50,000	
HAT system	1		1	$60,000	$60,000	
CAD interface	1					
Workstation		piece	1	$20,000	$20,000	
SC system link		piece	1	$18,000	$18,000	
Traffic Control System	1					
Central Computer		piece	1	$50,000	$50,000	
Workstations		piece	2	$20,000	$40,000	
Communications		piece	1	$30,000	$30,000	

TRAFFIC OPERATIONS CENTER COSTS

District : 8 Corridor Element : Freeway Central

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
Sub-total equipment					$727,000
Control Room Facility					
Construction					$400,000
Software					
Freeway System	piece	1	$150,000	$150,000	
SC interface (freeway)	piece	1	$50,000	$50,000	
SC database	piece	1	$20,000	$20,000	
SC database (freeway)	piece	1	$11,000	$11,000	
Expert system (base)	piece	1	$20,000	$20,000	
Expert system (freeway)	piece	1	$46,000	$46,000	
CCTV SC interface	piece	1	$50,000	$50,000	
CMS	piece	1	$75,000	$75,000	
TXT	piece	1	$75,000	$75,000	
SC database (CAD)	piece	1	$11,000	$11,000	
Traffic Control System	piece	1	$75,000	$75,000	
Sub-total Software					$583,000
Total Capital Cost per District					$1,710,000

TRAFFIC OPERATIONS CENTER COSTS

District : 8	Corridor Element :		Freeway Central		
Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
IMPLEMENTATION COSTS					
Design	% of capital		10%	$171,000	
Integration	% of capital		10%	$171,000	
Contingency	% of capital		15%	$256,500	
				$0	
Total Implementation costs					$598,500
OPERATIONAL COSTS	Staffing	Labor $	Overhead	Extension $	
Personnel Costs per District					
Supervisor	1	$50,000	1.08	$104,000	
Operator	4	$30,000	1.08	$249,600	
Total Operations Cost					$353,600
MAINTENANCE COSTS (per annum)					
			failure rate (%)		
Equipment	% of equipment		10%	$72,700	
Sub-total Maintenance costs				$72,700	
Contingency					
	as % of maintenance costs		20%	$14,540	
Total Maintenance costs					$87,240

CORRIDOR COST SUMMARY

Corridor : 8-10

Freeway Miles	8.0
Surface Street Miles	9.0
Number of Freeway Lanes	8
Number of Ramps	10
Number of Freeway Connectors	2
Number of Full Matrix Signs	4
Number of Intersections	20

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	51	$56,483	$81,983	$38,441		$6,778	$67,779
CCTV	Cameras	8	$168,400	$252,800	$92,680		$20,208	$202,080
Tow Services	Freeway miles	8	$107,520	$107,520		$436,770	$294,912	$7,316,820
Accident Investigation Sites	Sites	8		$242,000	$96,800			
Incident Management Teams	Freeway miles	8	$23,625	$23,625		$22,500	$15,120	$376,200
Trunk Communications	Freeway miles	8						
Hub Costs			$150,000	$225,000	$105,000		$18,000	$180,000
Cable Costs			$400,000	$1,200,000	$480,000		$9,600	$96,000
CMS (Trailblazers)	No of Trailblazers	14	$191,100	$405,300	$181,230		$11,466	$114,660
CMS (Full Matrix)	No of Full Matrix	4	$435,800	$616,600	$290,220		$26,148	$261,480
Ramp Metering	No of Ramps	10	$200,000	$910,000	$409,000		$34,000	$340,000
Connector Metering	No of Connectors	2	$170,000	$420,000	$210,000		$28,900	$289,000
Freeway Detectors	Detectors	64		$128,000	$51,200		$15,360	$153,600
Signal Installation	Intersections	20	$160,000	$760,000	$304,000		$19,200	$192,000
Geometric Improvements								
1								
2								
3								
Totals				$5,372,828	$2,258,571	$459,270	$499,692	$9,589,619

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$7,631,399	$9,589,619

CORRIDOR COST SUMMARY

Corridor : 8-1

Freeway Miles	10.0
Surface Street Miles	25.0
Number of Freeway Lanes	8
Number of Ramps	10
Number of Freeway Connectors	2
Number of Full Matrix Signs	7
Number of Intersections	20

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	105	$116,288	$168,788	$79,144		$13,955	$139,545
CCTV	Cameras	10	$210,500	$316,000	$115,850		$25,260	$252,600
Tow Services	Freeway miles	10	$134,400	$134,400		$508,770	$368,640	$8,774,100
Accident Investigation Sites	Sites	10		$302,500	$121,000			
Incident Management Teams	Freeway miles	10	$23,625	$23,625		$22,500	$18,900	$414,000
Trunk Communications	Freeway miles	10						
Hub Costs			$150,000	$225,000	$105,000		$18,000	$180,000
Cable Costs			$500,000	$1,500,000	$600,000		$12,000	$120,000
CMS (Trailblazers)	No of Trailblazers	40	$546,000	$1,158,000	$517,800		$32,760	$327,600
CMS (Full Matrix)	No of Full Matrix	7	$762,650	$1,079,050	$507,885		$45,759	$457,590
Ramp Metering	No of Ramps	10	$200,000	$910,000	$409,000		$34,000	$340,000
Connector Metering	No of Connectors	2	$170,000	$420,000	$210,000		$28,900	$289,000
Freeway Detectors	Detectors	80		$160,000	$64,000		$19,200	$192,000
Signal Installation	Intersections	20	$160,000	$760,000	$304,000		$19,200	$192,000
Geometric Improvements								
1								
2								
3								
Totals				$7,157,363	$3,033,679	$531,270	$636,574	$11,678,435

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$10,191,041	$11,678,435

TRAFFIC OPERATIONS CENTER COSTS

District : 11 Corridor Element : Freeway Central

Item		Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS						
Equipment						
Freeway System						
Type (one only):	Large		Medium	1	Small	
Central Computer		piece	2	$200,000	$400,000	
Workstations		piece	4	$20,000	$80,000	
Large scale projector		piece	2	$50,000	$100,000	
SC Node processor		piece	2	$20,000	$40,000	
SC Database	1					
Database Server		piece	1	$70,000	$70,000	
Workstations		piece	1	$20,000	$20,000	
Expert System	1					
ES processor		piece	2	$20,000	$40,000	
CMS related	1					
CMS control hardware		piece	1	$3,000	$3,000	
CCTV related	1					
Central Control and monitors		piece	1	$50,000	$50,000	
Commercial TV	1					
Interface equipment		piece	1	$25,000	$25,000	
Commercial Radio	1					
Interface equipment		piece	1	$11,000	$11,000	
Motorist Information	1					
Interface equipment		piece	1	$50,000	$50,000	
HAT system	1		1	$100,000	$100,000	
CAD interface	1					
Workstation		piece	1	$20,000	$20,000	
SC system link		piece	1	$18,000	$18,000	
Traffic Control System	1					
Central Computer		piece	1	$50,000	$50,000	
Workstations		piece	2	$20,000	$40,000	
Communications		piece	1	$30,000	$30,000	

TRAFFIC OPERATIONS CENTER COSTS

District : 11 Corridor Element : Freeway Central

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
Sub-total equipment					$1,147,000
Control Room Facility					
Construction					$800,000
Software					
Freeway System	piece	1	$150,000	$150,000	
SC interface (freeway)	piece	1	$50,000	$50,000	
SC database	piece	1	$40,000	$40,000	
SC database (freeway)	piece	1	$11,000	$11,000	
Expert system (base)	piece	1	$40,000	$40,000	
Expert system (freeway)	piece	1	$46,000	$46,000	
CCTV SC interface	piece	1	$50,000	$50,000	
CMS	piece	1	$75,000	$75,000	
TXT	piece	1	$75,000	$75,000	
SC database (CAD)	piece	1	$11,000	$11,000	
Traffic Control System	piece	1	$75,000	$75,000	
Sub-total Software					$623,000
Total Capital Cost per District					$2,570,000

TRAFFIC OPERATIONS CENTER COSTS

District : 11 Corridor Element : Freeway Central

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
IMPLEMENTATION COSTS					
Design	% of capital		10%	$257,000	
Integration	% of capital		10%	$257,000	
Contingency	% of capital		15%	$385,500	
Total Implementation costs					$899,500
OPERATIONAL COSTS	Staffing	Labor $	Overhead %	Extension $	
Personnel Costs per District					
Supervisor	1	$50,000	1.08	$104,000	
Operator	6	$30,000	1.08	$374,400	
Total Operations Cost					$478,400
MAINTENANCE COSTS (per annum)			failure rate (%)		
Equipment	% of equipment		10%	$114,700	
Sub-total Maintenance costs				$114,700	
Contingency as % of maintenance costs			20%	$22,940	
Total Maintenance costs					$137,640

CORRIDOR COST SUMMARY

Corridor : 11-2

Freeway Miles	15.8
Surface Street Miles	48.0
Number of Freeway Lanes	8
Number of Ramps	6
Number of Freeway Connectors	7
Number of Full Matrix Signs	14
Number of Intersections	43

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	189	$209,318	$303,818	$142,459		$25,118	$251,181
CCTV	Cameras	15	$336,800	$505,600	$185,360		$40,416	$404,160
Tow Services	Freeway miles	15	$215,040	$215,040		$688,770	$552,960	$12,417,300
Accident Investigation Sites	Sites	15		$484,000	$193,600			
Incident Management Teams	Freeway miles	15	$23,625	$23,625		$22,500	$28,350	$508,500
Trunk Communications	Freeway miles	15						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$750,000	$2,250,000	$900,000		$18,000	$180,000
CMS (Trailblazers)	No of Trailblazers	76	$1,037,400	$2,200,200	$983,820		$62,244	$622,440
CMS (Full Matrix)	No of Full Matrix	14	$1,525,300	$2,158,100	$1,015,770		$91,518	$915,180
Ramp Metering	No of Ramps	6	$120,000	$546,000	$255,400		$20,400	$204,000
Connector Metering	No of Connectors	7	$595,000	$1,470,000	$672,500		$101,150	$1,011,500
Freeway Detectors	Detectors	126.4		$252,800	$101,120		$30,336	$303,360
Signal Installation	Intersections	43	$344,000	$1,634,000	$653,600		$41,280	$412,800
Geometric Improvements								
	1 I-8 access from Friars Rd.			$1,500,000				
	2							
	3							
Totals				$13,993,183	$5,313,629	$711,270	$1,047,772	$17,590,421

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$19,306,811	$17,590,421

CORRIDOR COST SUMMARY

Corridor : 11-7

Freeway Miles	8.0
Surface Street Miles	8.0
Number of Freeway Lanes	8
Number of Ramps	26
Number of Freeway Connectors	1
Number of Full Matrix Signs	6
Number of Intersections	

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	48	$53,160	$77,160	$36,180		$6,379	$63,792
CCTV	Cameras	8	$168,400	$252,800	$92,680		$20,208	$202,080
Tow Services	Freeway miles	8	$107,520	$107,520		$436,770	$294,912	$7,316,820
Accident Investigation Sites	Sites	8		$242,000	$96,800			
Incident Management Teams	Freeway miles	8	$23,625	$23,625		$22,500	$15,120	$376,200
Trunk Communications	Freeway miles	8						
Hub Costs			$150,000	$225,000	$105,000		$18,000	$180,000
Cable Costs			$400,000	$1,200,000	$480,000		$9,600	$96,000
CMS (Trailblazers)	No of Trailblazers	12	$163,800	$347,400	$155,340		$9,828	$98,280
CMS (Full Matrix)	No of Full Matrix	6	$653,700	$924,900	$435,330		$39,222	$392,220
Ramp Metering	No of Ramps	26	$520,000	$2,366,000	$1,023,400		$88,400	$884,000
Connector Metering	No of Connectors	1	$85,000	$210,000	$117,500		$14,450	$144,500
Freeway Detectors	Detectors	64		$128,000	$51,200		$15,360	$153,600
Signal Installation	Intersections							
Geometric Improvements								
	1 Rosencrans to Pacific Coast Highway Connector			$1,500,000				
	2							
	3							
Totals				$7,604,405	$2,593,430	$459,270	$531,479	$9,907,492

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$10,197,835	$9,907,492

TRAFFIC OPERATIONS CENTER COSTS

District : 12 Corridor Element : Freeway Central

Item		Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS						
Equipment						
Freeway System						
Type (one only):	Large 1		Medium		Small	
Central Computer		piece	3	$200,000	$600,000	
Workstations		piece	6	$20,000	$120,000	
Large scale projector		piece	3	$50,000	$150,000	
SC Node processor		piece	3	$20,000	$60,000	
SC Database	1					
Database Server		piece	1	$110,000	$110,000	
Workstations		piece	2	$20,000	$40,000	
Expert System	1					
ES processor		piece	2	$20,000	$40,000	
CMS related	1					
CMS control hardware		piece	1	$3,000	$3,000	
CCTV related	1					
Central Control and monitors		piece	1	$50,000	$50,000	
Commercial TV	1					
Interface equipment		piece	1	$25,000	$25,000	
Commercial Radio	1					
Interface equipment		piece	1	$11,000	$11,000	
Motorist Information	1					
Interface equipment		piece	1	$50,000	$50,000	
HAT system	1		1	$140,000	$140,000	
CAD interface	1					
Workstation		piece	1	$20,000	$20,000	
SC system link		piece	1	$18,000	$18,000	
Traffic Control System	1					
Central Computer		piece	1	$75,000	$75,000	
Workstations		piece	2	$20,000	$40,000	
Communications		piece	1	$40,000	$40,000	
Sub-total equipment						$1,592,000

TRAFFIC OPERATIONS CENTER COSTS

District : 12 | Corridor Element : Freeway Central

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
Control Room Facility					
Construction					$1,400,000
Software					
Freeway System	piece	1	$150,000	$150,000	
SC interface (freeway)	piece	1	$50,000	$50,000	
SC database	piece	1	$80,000	$80,000	
SC database (freeway)	piece	1	$11,000	$11,000	
Expert system (base)	piece	1	$64,000	$64,000	
Expert system (freeway)	piece	1	$46,000	$46,000	
CCTV SC interface	piece	1	$50,000	$50,000	
CMS	piece	1	$75,000	$75,000	
TXT	piece	1	$75,000	$75,000	
SC database (CAD)	piece	1	$11,000	$11,000	
Traffic Control System	piece	1	$100,000	$100,000	
Sub-total Software					$712,000
Total Capital Cost per District					$3,704,000

TRAFFIC OPERATIONS CENTER COSTS

District : 12 | Corridor Element : Freeway Central

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
IMPLEMENTATION COSTS					
Design	% of capital		10%	$370,400	
Integration	% of capital		10%	$370,400	
Contingency	% of capital		15%	$555,600	
Total Implementation costs					$1,296,400
OPERATIONAL COSTS	Staffing		Labor $	Overhead %	Extension $
Personnel Costs per District					
Supervisor		2	$50,000	1.08	$208,000
Operator		10	$30,000	1.08	$624,000
Total Operations Cost					$832,000
MAINTENANCE COSTS (per annum)				failure rate (%)	
Equipment	% of equipment			10%	$159,200
Sub-total Maintenance costs					$159,200
Contingency	as % of maintenance costs			20%	$31,840
Total Maintenance costs					$191,040

CORRIDOR COST SUMMARY

Corridor : 12-1

Freeway Miles	28.0
Surface Street Miles	72.0
Number of Freeway Lanes	6
Number of Ramps	5
Number of Freeway Connectors	9
Number of Full Matrix Signs	11
Number of Intersections	4

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	300	$332,250	$482,250	$226,125		$39,870	$398,700
CCTV	Cameras	28	$589,400	$884,800	$324,380		$70,728	$707,280
Tow Services	Freeway miles	28	$376,320	$376,320		$1,156,770	$1,032,192	$21,889,620
Accident Investigation Sites	Sites	28		$847,000	$338,800			
Incident Management Teams	Freeway miles	28	$23,625	$23,625		$22,500	$52,920	$754,200
Trunk Communications	Freeway miles	28						
Hub Costs			$450,000	$675,000	$315,000		$54,000	$540,000
Cable Costs			$1,400,000	$4,200,000	$1,680,000		$33,600	$336,000
CMS (Trailblazers)	No of Trailblazers	115	$1,569,750	$3,329,250	$1,488,675		$94,185	$941,850
CMS (Full Matrix)	No of Full Matrix	11	$1,198,450	$1,695,650	$798,105		$71,907	$719,070
Ramp Metering	No of Ramps	5	$100,000	$455,000	$217,000		$17,000	$170,000
Connector Metering	No of Connectors	9	$765,000	$1,890,000	$857,500		$130,050	$1,300,500
Freeway Detectors	Detectors	168		$336,000	$134,400		$40,320	$403,200
Signal Installation	Intersections	4	$32,000	$152,000	$60,800		$3,840	$38,400
Geometric Improvements								
1								
2								
3								
Totals				$15,346,895	$6,440,785	$1,179,270	$1,640,612	$28,198,820

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$21,787,680	$28,198,820

CORRIDOR COST SUMMARY

Corridor : 12-3

Freeway Miles	15.0
Surface Street Miles	35.0
Number of Freeway Lanes	6
Number of Ramps	
Number of Freeway Connectors	3
Number of Full Matrix Signs	10
Number of Intersections	25

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	150	$166,125	$241,125	$113,063		$19,935	$199,150
CCTV	Cameras	15	$315,750	$474,000	$173,775		$37,890	$378,900
Tow Services	Freeway miles	15	$201,600	$201,600		$688,770	$552,960	$12,417,300
Accident Investigation Sites	Sites	15		$453,750	$181,500			
Incident Management Teams	Freeway miles	15	$23,625	$23,625		$22,500	$28,350	$508,500
Trunk Communications	Freeway miles	15						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$750,000	$2,250,000	$900,000		$18,000	$180,000
CMS (Trailblazers)	No of Trailblazers	56	$764,400	$1,621,200	$724,920		$45,864	$458,640
CMS (Full Matrix)	No of Full Matrix	10	$1,089,500	$1,541,500	$725,550		$65,370	$653,700
Ramp Metering	No of Ramps							
Connector Metering	No of Connectors	3	$255,000	$630,000	$302,500		$43,350	$433,500
Freeway Detectors	Detectors	90		$180,000	$72,000		$21,600	$216,000
Signal Installation	Intersections	25	$200,000	$950,000	$380,000		$24,000	$240,000
Geometric Improvements								
1								
2								
3								
Totals				$9,016,800	$3,783,308	$711,270	$893,319	$16,015,890

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$12,800,108	$16,045,890

CORRIDOR COST SUMMARY

Corridor : 12-4

Freeway Miles	11.8
Surface Street Miles	24.0
Number of Freeway Lanes	6
Number of Ramps	20
Number of Freeway Connectors	6
Number of Full Matrix Signs	8
Number of Intersections	4

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	105	$116,288	$168,788	$79,144		$13,955	$139,545
CCTV	Cameras	11	$252,600	$379,200	$139,020		$30,312	$303,120
Tow Services	Freeway miles	11	$161,280	$161,280		$544,770	$405,504	$9,502,740
Accident Investigation Sites	Sites	11		$363,000	$145,200			
Incident Management Teams	Freeway miles	11	$23,625	$23,625		$22,500	$20,790	$132,900
Trunk Communications	Freeway miles	11						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$550,000	$1,650,000	$660,000		$13,200	$132,000
CMS (Trailblazers)	No of Trailblazers	38	$518,700	$1,100,100	$491,910		$31,122	$311,220
CMS (Full Matrix)	No of Full Matrix	8	$871,600	$1,233,200	$580,440		$52,296	$522,960
Ramp Metering	No of Ramps	20	$400,000	$1,820,000	$793,000		$68,000	$680,000
Connector Metering	No of Connectors	6	$510,000	$1,260,000	$580,000		$86,700	$867,000
Freeway Detectors	Detectors	70.8		$141,600	$56,640		$16,992	$169,920
Signal Installation	Intersections	4	$32,000	$152,000	$60,800		$3,840	$38,400
Geometric Improvements								
	1 _____							
	2 _____							
	3 _____							
Totals				$8,902,793	$3,796,154	$567,270	$778,711	$13,459,805

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$12,698,946	$13,459,805

CORRIDOR COST SUMMARY

Corridor : 12-5

Freeway Miles	9.2
Surface Street Miles	10.0
Number of Freeway Lanes	8
Number of Ramps	19
Number of Freeway Connectors	5
Number of Full Matrix Signs	11
Number of Intersections	9

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	57	$63,128	$91,628	$42,964		$7,575	$75,753
CCTV	Cameras	9	$189,450	$284,400	$104,265		$22,734	$227,340
Tow Services	Freeway miles	9	$120,960	$120,960		$472,770	$331,776	$8,045,460
Accident Investigation Sites	Sites	9		$272,250	$108,900			
Incident Management Teams	Freeway miles	9	$23,625	$23,625		$22,500	$17,010	$395,100
Trunk Communications	Freeway miles	9						
Hub Costs			$150,000	$225,000	$105,000		$18,000	$180,000
Cable Costs			$450,000	$1,350,000	$540,000		$10,800	$108,000
CMS (Trailblazers)	No of Trailblazers	16	$218,400	$463,200	$207,120		$13,104	$131,040
CMS (Full Matrix)	No of Full Matrix	11	$1,198,450	$1,695,650	$798,105		$71,907	$719,070
Ramp Metering	No of Ramps	19	$380,000	$1,729,000	$754,600		$64,600	$646,000
Connector Metering	No of Connectors	5	$425,000	$1,050,000	$487,500		$72,250	$722,500
Freeway Detectors	Detectors	73.6		$147,200	$58,880		$17,664	$176,640
Signal Installation	Intersections	9	$72,000	$342,000	$136,800		$8,640	$86,400
Geometric Improvements								
1								
2								
3								
Totals				$7,794,913	$3,344,134	$495,270	$656,060	$11,513,303

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$11,139,046	$11,513,303

CORRIDOR COST SUMMARY

Corridor : 12-6

Freeway Miles	15.5
Surface Street Miles	50.0
Number of Freeway Lanes	6
Number of Ramps	4
Number of Freeway Connectors	5
Number of Full Matrix Signs	10
Number of Intersections	11

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	195	$215,963	$313,463	$146,981		$25,916	$259,155
CCTV	Cameras	15	$336,800	$505,600	$185,360		$40,416	$404,160
Tow Services	Freeway miles	15	$215,040	$215,040		$688,770	$552,960	$12,417,300
Accident Investigation Sites	Sites	15		$484,000	$193,600			
Incident Management Teams	Freeway miles	15	$23,625	$23,625		$22,500	$28,350	$508,500
Trunk Communications	Freeway miles	15						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$750,000	$2,250,000	$900,000		$18,000	$180,000
CMS (Trailblazers)	No of Trailblazers	80	$1,092,000	$2,316,000	$1,035,600		$65,520	$655,200
CMS (Full Matrix)	No of Full Matrix	10	$1,089,500	$1,541,500	$725,550		$65,370	$653,700
Ramp Metering	No of Ramps	4	$80,000	$364,000	$178,600		$13,600	$136,000
Connector Metering	No of Connectors	5	$425,000	$1,050,000	$487,500		$72,250	$722,500
Freeway Detectors	Detectors	93		$186,000	$74,400		$22,320	$223,200
Signal Installation	Intersections	11	$88,000	$418,000	$167,200		$10,560	$105,600
Geometric Improvements								
1								
2								
3								
Totals				$10,117,228	$4,304,791	$711,270	$951,262	$16,625,315

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$14,422,019	$16,625,315

CORRIDOR COST SUMMARY

Corridor : 12-8

Freeway Miles	20.0
Surface Street Miles	80.0
Number of Freeway Lanes	9
Number of Ramps	
Number of Freeway Connectors	6
Number of Full Matrix Signs	9
Number of Intersections	63

Corridor Element		Data	Equipment $	Capital $	Implement. $	Operations $	Maintenance $	10 year O&M $
Highway Advisory Radio	Transmitters	300	$332,250	$482,250	$226,125		$39,870	$398,700
CCTV	Cameras	20	$421,000	$632,000	$231,700		$50,520	$505,200
Tow Services	Freeway miles	20	$268,800	$268,800		$868,770	$737,280	$16,060,500
Accident Investigation Sites	Sites	20		$605,000	$242,000			
Incident Management Teams	Freeway miles	20	$23,625	$23,625		$22,500	$37,800	$603,000
Trunk Communications	Freeway miles	20						
Hub Costs			$300,000	$450,000	$210,000		$36,000	$360,000
Cable Costs			$1,000,000	$3,000,000	$1,200,000		$24,000	$240,000
CMS (Trailblazers)	No of Trailblazers	128	$1,747,200	$3,705,600	$1,656,960		$104,832	$1,048,320
CMS (Full Matrix)	No of Full Matrix	9	$980,550	$1,387,350	$652,995		$58,833	$588,330
Ramp Metering	No of Ramps							
Connector Metering	No of Connectors	6	$510,000	$1,260,000	$580,000		$86,700	$867,000
Freeway Detectors	Detectors	180		$360,000	$144,000		$43,200	$432,000
Signal Installation	Intersections	63	$504,000	$2,394,000	$957,600		$60,480	$604,800
Geometric Improvements								
	1							
	2							
	3							
Totals				$14,568,625	$6,101,380	$891,270	$1,279,515	$21,707,850

	Initial Costs	10 Year O & M
CORRIDOR TOTAL	$20,670,005	$21,707,850

CORRIDOR ELEMENTS

The following is a brief description of the procedures used in developing the corridor element costs. The procedures were used to prepare the corridor costs presented in Section 3 and the cost summary worksheets included in this Appendix. The costs were based upon the technology and item costs previously derived in the Santa Monica Smart Corridor Study. Detailed cost build-ups for the individual items follow.

1. **Highway Advisory Radio (HAR)**

Criteria:	Compulsory
Coverage:	100% of freeway and alternative routes
Assumptions:	Low power (100 milliwatt) transmitter coverage is 1800 feet (approximately 3/mile).
Calculations:	Number of transmitters required was calculated by summing the arterial and freeway length in miles, and multiplying by 3.

2. **Closed Circuit Television (CCTV)**

Criteria:	Compulsory
Coverage:	50% of freeway and a portion of the surface streets
Assumptions:	Adequate coverage can be obtained with cameras placed every one mile.
Calculations:	Number of cameras required was based on the total length of freeway in miles and calculated on a case-by-case basis.

3. **Tow Services**

Criteria:	Compulsory
Coverage:	100% of freeway
Assumptions:	For those areas where tow services already exist, the congestion and increase in demand through Smart Corridors is such that a relative increase in service is warranted. Freeway coverage for each tow service unit is 5 miles.
Calculations:	Number of tow vehicles and operators required was calculated by equating to the total length of the freeway in miles and dividing by 5.

4. **Accident Investigation Sites (AIS)**

Criteria:	Compulsory
Coverage:	100% of freeway
Assumptions:	Spacing should not exceed one mile.
Calculations:	Number of sites required was calculated by equating to the total length of the freeway in miles.

5. **Incident Management Teams (IMT)**

Criteria:	Compulsory
Coverage:	100% of freeway
Assumptions:	For those areas where Incident Management Teams already exist, the congestion and increased demand through Smart

Corridors is such that a relative increase in service is warranted. Freeway coverage per each IMT is 5 miles.

Calculations: Number of Incident Management Teams required was calculated by equating to the total length of the freeway in miles and dividing by 5.

6. **Trunk Communications**

Criteria: Compulsory
Coverage: 100% of freeway
Assumptions: Communication equipment is needed throughout the entire freeway length.
Calculations: The cost build-up for each of the required elements is based on the length of the freeway in miles.

7. **Changeable Message Signs (CMS) - Trailblazers**

Criteria: Compulsory
Coverage: 100% of alternate routes
Assumptions: Placement of Trailblazers (TB) should be at every decision point, not to exceed 1 ½ mile separation.
Calculations: Number of Trailblazers was calculated by summing the arterial lengths in miles, and multiplying by 1.6. This allows for a 10% increase in the number of signs, to accommodate those decision points which occur at less than the maximum sign separation.

8. **Changeable Message Signs (CMS) - Full Matrix LED**

Criteria: Compulsory
Coverage: 100% of freeway
Assumptions: Placement of CMS - FM should be placed prior to entering the corridor, and a minimum of 1 mile prior to a designated diversion route exit ramp. Signs should also have a maximum spacing of 1 mile.
Calculations: Using the above criteria, CMS placements were manually calculated for each corridor.

9. **Ramp Metering**

Criteria: Compulsory
Coverage: 100% of freeway on-ramps
Assumptions: All ramps within a Smart Corridor will be metered.
Calculations: Number of unmetered sites was obtained from Caltrans data or through personal knowledge of each corridor.

10. **Connector Metering**

Criteria: Compulsory at all freeway connectors
Coverage: 100% of non-mainline traffic
Assumptions: Metering will be implemented for all incoming lanes of traffic.
Calculations: Using these criteria, the number of metering sites was calculated for each corridor on a base-by-case basis.

11. **Freeway Detectors**

Criteria:	Compulsory
Coverage:	100% of freeway
Assumptions:	Freeway detector placements were calculated for a minimum of 1 per mile.
Calculations:	The number of detectors was equated to the product of the freeway length in miles times the average number of lanes.

12. **Signal Installation**

Criteria:	Compulsory for alternate routes
Coverage:	100% of intersections affecting corridor
Assumptions:	All signals within a Smart Corridor will be coordinated through a central computer.
Calculations:	The number of uncontrolled (meaning central computer) intersections was estimated from the data collected, and from notes obtained in the drive-through portion of this study.

13. **Geometric Improvements**

These improvements were handled on a case-by-case basis, and were generally categorized as being either:

a) minor @ $ 500,000
b) medium @ $1,000,000
c) large @ $1,500,000

14. **Traffic Operations Center Costs**

In addition to developing costs by each corridor element, a cost has been estimated for a Traffic Operations Center (TOC) for each Caltrans District. This section explains the assumptions made in deriving these costs.

Freeway System

Although it is not expected that a generic TOC can be defined which economically satisfies the needs of all the districts, tailoring a TOC specifically for each of the districts is beyond the scope of this analysis. An approach was developed by defining three types of TOC: large, medium, and small. The districts were categorized according to such factors as the number of corridors in the area and the extent of the Smart Corridor coverage.

The eventual classifications were:

Large:	Districts 4, 7, 12
Medium:	District 11
Small:	Districts 3, 8

This classification is important as it determines the cost of many of the following TOC elements, including:

Central Computer
Estimated in $200,000 increments to reflect system size:
Large, 3; Medium, 2; Small, 1.

Number of Workstations
2 per computer system increment

Large Scale Projector
1 per system increment

Smart Corridor Node Processor
This provides an interface to other system databases: 1 per system increment

Smart Corridor Database

Database Server/Workstations
Large: multi-user super-micro computer base e.g. DEC Microvax 3000 series; 2 workstations

Medium: limited-user super-micro e.g. DEC Microvax 2000 series; 1 workstation

Small: PC workstation e.g. Sun 386i

Expert System Processors

Per system, two workstations for run-time workstation-based (as compared to SC server based) versions of Expert Systems have been included in the cost.

System Interface

A number of external system interfaces have been defined. Costs have been derived from the Santa Monica Smart Corridor Demonstration Project Conceptual Design.

Traffic Control System

An inherent requirement of the Smart Corridor control philosophy is that traffic signals on the alternate routes are under some form of central control. While many of the city jurisdictions do have central traffic control systems, intersections were identified which currently are operating either isolated or under an arterial master system.

It was not seen as reasonable to budget a centralized system for every jurisdiction not currently operating one; in many corridors only a small number of intersections in such a jurisdiction would need to be under central control.

To allow for this, it has been assumed that those intersections not currently under the control of a central system would be interconnected under a project furnished system or a coordinated closed loop system. The size of the relevant system is determined by the total number of such intersections lying on corridor alternate routes. The impact of system size on central traffic control system hardware, software and central-based communications equipment is shown in the table below.

No. of Intersections	System Costs Hardware	Software	Central Communications
50-100	$50,000	$75,000	$30,000
100-250	$75,000	$100,000	$40,000
250 (+)	$110,000	$150,000	$50,000

Control Room Facility

This is also dependent upon system size and has been estimated as follows:

Large:	$1,400,000
Medium:	800,000
Small:	400,000

Software

There are many application software packages which must be budgeted for. The cost for these various packages have been derived from the Santa Monica Demonstration Project work. All costs are allocated independently of the system size with the exception of those packages whose price is dependent upon the type of computer to be used. These are as follows:

Smart Corridor database and central Expert System:
Commercially available software is priced according to host computer.

Traffic Control System software (see above).

Operational Costs

With respect to TOC staffing levels, the following forms the basis for the cost estimates:

	System Size Large	Medium	Small
Operational days/week	7	5	5
Shifts	3	3	2
Supervisors	2	1	1
Operators	10	6	4

Note: The methods for calculating other implementation, operational and maintenance costs are dervied from the Santa Monica Smart Corridor Conceptual Design Study.

Corridor Element : Highway Advisory Radio

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS					
Equipment					
Low power transmitter	piece	1	$850	$850	
Dial-up player	piece	0.05	$2,650	$133	
Decoder controller	piece	0.05	$1,150	$58	
Enclosure	piece	0.05	$1,350	$68	
Sub-total Equipment	piece			$1,108	
Installation	piece	1	$500	$500	
Total Capital Cost per transmitter					$1,608
IMPLEMENTATION COSTS					
PS&E	% of capital		15%		
Construction Engineering	% of capital		10%		
Contingency	% of capital		15%		
Implementation Costs	% of capital				40%
Spare Parts	% of equipment		10%		
Implementation Costs	% of equipment				10%
Software	piece		N/A		
OPERATIONAL COSTS					
Not Applicable					
MAINTENANCE COSTS (per annum)					
			failure rate (%)		
Transmitter	% of equipment		10%		
sub-total	% of equipment			10%	
Contingency					
as % of maintenance costs		20%			
as % of equipment costs				2%	
Maintenance Costs	% of equipment				12%

Corridor Element : CCTV

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS					
Equipment					
Camera	piece	1	$10,000	$10,000	
Mounting Poles	piece	1	$7,900	$7,900	
Controller	piece	1	$3,150	$3,150	
Sub-total Equipment				$21,050	
Installation					
Camera	piece	1	$550	$550	
Mounting Poles	piece	1	$7,900	$7,900	
Controller	piece	1	$2,100	$2,100	
Sub-total Installation				$10,550	$31,600
IMPLEMENTATION COSTS					
PS&E	% of capital		5%		
Construction Engineering	% of capital		10%		
Contingency	% of capital		15%		
Implementation Costs	% of capital				30%
Spare Parts	% of equipment		10%		
Implementation Costs	% of equipment				10%
Software			N/A		
OPERATIONAL COSTS					
Not Applicable					
MAINTENANCE COSTS (per annum)					
			failure rate (%)		
Equipment	% of equipment		10%		
sub-total				10%	
Contingency					
as % of maintenance costs		20%			
as % of equipment costs				2%	
Maintenance Costs					12%

Corridor Element : Freeway Tow services

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS					
Equipment					
Lift tow truck	vehicle	2	$33,600	$67,200	
Sub-total Equipment	per freeway 5 mile			$67,200	
Installation	N/A				
Total Capital Cost per five mile section of freeway					$67,200
IMPLEMENTATION COSTS					
Not Applicable					
OPERATIONAL COSTS		Staffing	Labor+Ohd $	Extension $	
Personnel per corridor					
Supervisor		1	$102,600	$102,600	
Office assistant		1	$46,170	$46,170	
Personnel costs per corridor					$148,770
Personnel per 5 mile section of freeway					
Vehicle operators		4	$45,000	$180,000	
Personnel costs per 5 mile section of freeway					$180,000
MAINTENANCE COSTS (per annum)		Quantity	Unit Cost $	Extension $	
Vehicle operational and maintenance per 5 mile section of freeway		2	$76,800	$153,600	
Contingency			20%	$30,720	
Total Maintenance costs per 5 mile section of freeway					$184,320

Corridor Element : Accident Investigation Sites

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS					
(Based upon one AIS per mile of freeway)					
Grading /paving	sq.ft	1000	$10	$10,000	
Cut and fill or reinforcement	per site	1	$5,000	$5,000	
Lighting (4 per site)	per site	1	$10,000	$10,000	
Signing	per site	1	$2,000	$2,000	
Telephones: 1 pay/1 call box	per site	1	$2,000	$2,000	
Barriers and Glare shields	ft	50	$25	$1,250	
Total Capital Cost per mile of freeway					$30,250
IMPLEMENTATION COSTS					
PS&E	% of capital		15%		
Construction Engineering	% of capital		10%		
Contingency	% of capital		15%		
Implementation Costs	**% of capital**				40%
Spare Parts	% of equipment		N/A		
Implementation Costs	**% of equipment**				
Software			N/A		
OPERATIONAL COSTS					
Not Applicable					
MAINTENANCE COSTS (per annum)					
Not Applicable					

Corridor Element : Incident Management Teams

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS					
Equipment					
CM Sign truck	vehicle	0.25	$73,500	$18,375	
Fully equipped sedan	vehicle	0.25	$21,000	$5,250	
Sub-total Equipment per corridor				$23,625	
Installation	N/A				
Total Capital Cost per corridor					$23,625
IMPLEMENTATION COSTS					
Not Applicable					
OPERATIONAL COSTS		Staffing	Labor+Ohd $	Extension $	
Personnel costs per corridor					
Vehicle operators		0.5	$45,000	$22,500	
Total Operational costs per corridor					$22,500
MAINTENANCE COSTS (per annum)		Quantity	Unit Cost $	Extension $	
Vehicle operational and maintenance					
per 5 mile section of freeway		0.5	$15,750	$7,875	
Contingency			20%	$1,575	
Total Maintenance costs per 5 mile section of freeway					$9,450

Corridor Element : Trunk Communications

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS					
Equipment					
Hub	piece	1	$150,000	$150,000	
Cable	per mile	1	$50,000	$50,000	
Installation					
Hub installation	piece	1	$75,000	$75,000	
Conduit	per mile	1	$100,000	$100,000	
IMPLEMENTATION COSTS					
PS&E	% of capital		15%		
Construction Engineering	% of capital		10%		
Contingency	% of capital		15%		
Implementation Costs	**% of capital**				40%
Spare Parts	**% of equipment**		10%		
Implementation Costs	**% of equipment**				10%
Software	**N/A**				
OPERATIONAL COSTS					
Not Applicable					
MAINTENANCE COSTS (per annum)			failure rate (%)		
Equipment	**% of equipment**		10%		
Contingency					
as % of maintenance costs		20%			
as % of equipment costs			2%		
Maintenance Costs	**% of equipment**				12%
Cable	**% of equipment**		2%		
Contingency					
as % of maintenance costs		20%			
as % of equipment costs			0.4%		
Maintenance Costs	**% of cable**				2.4%

Corridor Element : Changeable Message Signs : Trailblazers

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS					
Equipment					
Trailblazer	piece	1	$9,450	$9,450	
Mounting Poles	piece	1	$1,050	$1,050	
Type 170 controllers	piece	1	$3,150	$3,150	
Sub-total Equipment					$13,650
Installation					
Trailblazer	piece	1	$4,725	$4,750	
Mounting Poles	piece	1	$788	$800	
Type 170 controllers	piece	1	$2,100	$2,100	
Sub-total Installation					$7,650
Total Capital Cost					$28,950
IMPLEMENTATION COSTS					
PS&E	% of capital		15%		
Construction Engineering	% of capital		10%		
Contingency	% of capital		15%		
Implementation Costs	% of capital				40%
Spare Parts	% of equipment		10%		
Implementation Costs	% of equipment				10%
Software	piece		N/A		
OPERATIONAL COSTS					
Not Applicable					
MAINTENANCE COSTS (per annum)					
			failure rate (%)		
Equipment	% of equipment			5%	
Contingency					
as % of maintenance costs		20%			
as % of equipment costs				1%	
Maintenance Costs	% of equipment				6%

Corridor Element : Changeable Message Signs : Full Matrix

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS					
Equipment					
Full Matrix LED Cluster	piece	1	$100,000	$100,000	
Mounting Poles	piece	1	$5,800	$5,800	
Type 170 controllers	piece	1	$3,150	$3,150	
Sub-total Equipment					$108,950
Installation					
Trailblazer	piece	1	$15,750	$15,750	
Mounting Poles	piece	1	$4,750	$4,750	
Type 170 controllers	piece	1	$2,100	$2,100	
Sub-total Installation					$22,600
Total Capital Cost per sign					$154,150
IMPLEMENTATION COSTS					
PS&E	% of capital		15%		
Construction Engineering	% of capital		10%		
Contingency	% of capital		15%		
Implementation Costs	% of capital				40%
Spare Parts	% of equipment		10%		
Implementation Costs	% of equipment				10%
Software	piece		N/A		
OPERATIONAL COSTS					
Not Applicable					
MAINTENANCE COSTS (per annum)					
			failure rate (%)		
Equipment	% of equipment		5%		
Contingency					
as % of maintenance costs		20%			
as % of equipment costs			1%		
Maintenance Costs	% of equipment				6%

Corridor Element : Ramp Metering

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS					
Equipment					
Ramp Meter Station	piece	1	$20,000	$20,000	
Sub-total equipment				$20,000	
Installation					
Ramp Meter Station	piece	1	$10,000	$10,000	
Detectors	per ramp	11	$1,000	$11,000	
Ramp Reconstruction (based upon reconstruction cost of $100,000 at 50% of ramps)	per ramp	1	$50,000	$50,000	
Total Capital Cost per ramp					$91,000
IMPLEMENTATION COSTS					
PS&E	% of capital		15%		
Construction Engineering	% of capital		10%		
Contingency	% of capital		15%		
Implementation Costs	**% of capital**				40%
Spare Parts	% of equipment		10%		
Implementation Costs	**% of equipment**				10%
Integration					$25,000
OPERATIONAL COSTS					
Not Applicable					
MAINTENANCE COSTS (per annum)					
			failure rate (%)		
Equipment	% of equipment			10%	
Knockdown	% of equipment			5%	
Contingency					
as % of maintenance costs		20%			
as % of equipment costs				2%	
Maintenance Costs	**% of equipment**				17%

Corridor Element : Freeway Connector Metering

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS					
Equipment					
Connector Meter Station	piece	1	$85,000	$85,000	
Sub-total Equipment				$85,000	
Installation					
Connector Meter Station	piece	1	$25,000	$25,000	
Ramp Reconstruction		1	$100,000	$100,000	
Total Capital Cost per ramp					$210,000
IMPLEMENTATION COSTS					
PS&E	% of capital		15%		
Construction Engineering	% of capital		10%		
Contingency	% of capital		15%		
Implementation Costs	% of capital				40%
Spare Parts	% of equipment		10%		
Implementation Costs	% of equipment				10%
Integration					$25,000
OPERATIONAL COSTS					
Not Applicable					
MAINTENANCE COSTS (per annum)					
			failure rate (%)		
Equipment	% of equipment			10%	
Knockdown	% of equipment			5%	
Contingency					
as % of maintenance costs		20%			
as % of equipment costs				2%	
Maintenance Costs	% of equipment				17%

Corridor Element : Freeway Detection

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS					
Equipment					
Detectors (supply and installation)	per lane per mile	2	$1,000	$2,000	
Total Capital Cost per lane per mile					$2,000
IMPLEMENTATION COSTS					
PS&E	% of capital		15%		
Construction Engineering	% of capital		10%		
Contingency	% of capital		15%		
Implementation Costs	**% of capital**				40%
Spare Parts	N/A				
Implementation Costs	N/A				
Software	N/A				
OPERATIONAL COSTS					
Not Applicable					
MAINTENANCE COSTS (per annum)					
			failure rate (%)		
Detector Maintenance	% of capital		10%		
Contingency					
as % of maintenance costs		20%			
as % of equipment costs			2%		
Maintenance Costs	**% of capital**				12%

Corridor Element : Traffic Signals Related : Signal Installations

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS					
Intersections to be added to the TOC Traffic Control System					
Equipment					
Replacement Controller	piece	1	$8,000	$8,000	
Sub-total Equipment				$8,000	
Installation					
Controller	piece	1	$2,000	$2,000	
Detectors	piece	8	$1,000	$8,000	
Interconnect	piece	1	$20,000	$20,000	
Total Capital Cost per Controller					$38,000
IMPLEMENTATION COSTS					
PS&E	% of capital		15%		
Construction Engineering	% of capital		10%		
Contingency	% of capital		15%		
Implementation Costs	**% of capital**				40%
OPERATIONAL COSTS					
Not Applicable					
MAINTENANCE COSTS (per annum)					
			failure rate (%)		
Equipment	% of equipment		10%		
	% of equipment				
	% of equipment				
sub-total	% of equipment			10%	
Contingency					
as % of maintenance costs		20%			
as % of equipment costs				2%	
Maintenance Costs	**% of equipment**				12%

Corridor Element : Traffic Signals Related : Central

Item		Unit	Quantity	Unit Cost $	Extension $	Totals $
CAPITAL COSTS						
Equipment						
Signal Systems	1					
Central Computer		piece	1	$200,000	$200,000	
Workstations		piece	2	$20,000	$40,000	
SC Database links	1					
Central Computer		piece	1	$110,000	$110,000	
Workstations		piece	2	$20,000	$40,000	
Expert System	1					
ES processor		piece	1	$20,000	$20,000	
CMS central	1					
CMS control hardware		piece	1	$3,000	$3,000	
CCTV central	1					
Central Control and monitors		piece	1	$50,000	$50,000	
Communications						
SC system link			1	$18,000	$18,000	
comprises 2x(remote bridge+modems)						
sub-total equipment		piece			$481,000	
Software						
Signal System		piece	1	$150,000	$150,000	
SC interface		piece	1	$50,000	$50,000	
SC database (signals)		piece	1	$80,000	$80,000	
Expert system (signals)		piece	1	$46,000	$46,000	
CMS		piece	1	$75,000	$75,000	
sub-total software						$401,000
Total Capital Cost per Corridor						$882,000

Corridor Element : Traffic Signals Related : Central

Item	Unit	Quantity	Unit Cost $	Extension $	Totals $
IMPLEMENTATION COSTS					
Design	% of capital		10%		
Integration	% of capital		10%		
Contingency	% of capital		15%		
Total Implementation costs	% of capital				35%
OPERATIONAL COSTS					
Not Applicable					
MAINTENANCE COSTS (per annum)					
Equipment	% of equipment		10%		
sub-total Maintenance costs				10%	
Contingency					
as % of maintenance costs			20%		
as % of equipment				2%	
Total Maintenance costs					12%

APPENDIX D
EVALUATION MATRIX RATING SCALES

APPENDIX C EVALUATION MATRIX RATING SCALES

The following is a brief description of the procedures used to develop the internal ratings for each criteria used in the evaluation matrix for each corridor. The procedures were used to prepare the evaluation matrices shown with the individual corridors in Section 3 of the report. For each of the criteria, a rating factor of 0 to 10 is used. Ten indicates that the corridor fully meets the criteria and 0 indicates that the corridor offers no value under the criteria. As indicated in the report, the rating is multiplied by the weight of the criteria and all values are summed to determine a corridor's "score".

1. **Freeway Capacity/Congestion Level** (Weighting Factor 24)

   This criteria measures the level of the existing problem in the corridor. The assumption is that the worst congestion should receive the highest priority. For this project, corridors with levels of existing congestion above 400 vehicle hours per mile per day were rated as 10. The other corridors were then ranked relative to these levels, for example, if a corridor had 200 hours of congestion, it received a rating of "5". All rating are rounded to the nearest whole number.

2. **Surface Street Capacity/Congestion** (Weighting Factor 21)

   This criteria measures the availability of alternate routes to provide relief to freeway congestion during peak periods. The greater the ability of the alternates to relieve the congestion on the freeway, the greater the value of the corridor under this criteria. A rating of 10 was given to corridors where the alternatives provided sufficient excess capacity to relieve current congestion and provide a freeway speed of approximately 55 miles per hour. This was identified as having excess capacity equal to a given percentage of the freeway flow. Lower percentages were then scaled to that factor to provide a rating of 0 to 10. It is noted that several corridors can receive a 10 under this criteria.

3. **Local/Regional Commitment** (Weighting Factor 13)

   This criteria is to measure the likelihood of the Smart Corridor project being supported in a given corridor. The premise is that corridors likely to be accepted should receive higher priority. The rating is principally a judgemental value representing the history of improvement projects in a given area. The value reflects the consultant team's opinion, after discussion with local representatives, with Steering Committee members, and with others with experience in dealing with the involved agencies. Where it was felt that the local/regional agencies would be highly supportive of the project, the corridor received a 10. Where it was felt that significant opposition would occur, the corridors were rated relatively lower under this criteria.

4. **Land Use Compatibility** (Weighting Factor 11)

This criteria assesses the potential impact of corridor improvements on the land use through which it passes. Where the land use was totally incompatible, such as dense concentrations of residences close to a street, the corridor was eliminated. For those where the problem was not seen as "fatal", relative values were assigned based on review of information and from a drive through of the alternates. The drive throughs included specialty consultants dealing with environmental, land use, and institutional issues. At the end of driving a segment, notes and maps were reviewed and a value assigned. Where the land use was totally compatible, a 10 was given. Values were then scaled downward for the routes where some level of incompatibility exists but where they are not seen as insurmountable.

5. **Accident/Incident History** (Weighting Factor 9)

This criteria measures the level of accident problem currently existing within a corridor. The assumption, as with congestion level, is that it is important to place priority on solving the worst problems first. To develop the ratings, a 10 was assigned to freeway corridors with over 100 accidents per mile per year. The other corridors were then rated relative to that value.

6. **Environmental** (Weighting Factor 7)

This criteria is to measure the expected positive benefit of the corridor project on air quality and other environmental factors. The most closely related factor that has been estimated in the project is delay savings during congestion, since this directly impacts fuel consumption and emissions. The corridor which provided the greatest overall delay reduction was rated as 10 and the other corridors were rated on a relative basis.

7. **Number of Jurisdictions** (Weighting Factor 6)

This measures the complexity of implementing a corridor project, on the assumption that the greater the number of involved agencies, the greater the complexity. A corridor entirely in one political jurisdiction was rated as 10, in two as 8, in three as 5, in four as 2, and five or more as 0.

8. **Part of a Larger System** (Weighting Factor 4)

There is some benefit associated with the proximity of corridors. The availability of adjacent corridors allows control and information strategies to encompass a larger area and to provide additional opportunities for alternate route selection. The rating for this criteria are: totally isolated corridor, 0; adjacent to one other corridor, 4; adjacent to two other corridors, 6; adjacent to one other corridor that is included within a major corridor control system, 8; and, adjacent to two other corridors that are included within a major corridor control system, 10.

9. **In-place Control Features** (Weighting Factor 3)

This measures the benefit of having existing systems in place to support the implementation of surveillance and control as part of the corridor project.

Point values were assigned as follows: 3 for having a traffic operations center in place, 3 for having a central intersection control system in place, 1 for having ramp metering, 1 for having the signals in the corridor operating under coordinated control, 1 for having changeable message signs in place, and 1 for having freeway detection. The items in-place were checked and summed to develop a total of a maximum of 10.

10. **Data Availability** (Weighting Factor 2)

The availability of good information for planning and implementing surveillance and control and motorist information will expedite the implementation process for a corridor. Ratings from 10 to 0 were assigned to each corridor reflecting the judgement of the consulting team after having collected the information needed to complete this study.

COSTS

Costs are also shown on the evaluation table. The costs indicate complete implementation costs and estimated 10 year operations and maintenance costs. The implementation costs and the 10 year operations and maintenance costs were summed and then divided by 10 to develop an average annual cost for use in the benefit/cost calculation.

BENEFIT/COST

The benefits for each corridor were estimated using delay savings for recurring congestion and factored for incident based congestion. These were converted to dollar benefits by multiplying annual delay savings in hours by a rate of $7.20 per hour, which is consistent with Caltrans computations. The annual benefit value is then divided by the annual cost value to determine the benefit/cost ratio.

A copy of the form used to develop corridor ratings is attached as Exhibit C-1 for reference.

14-Mar-90\esumbase\evaluation summary base

CORRIDOR EVALUATION SUMMARY

Corridor : [ ] Description : [ ]

Criteria	Data Value	Corridor Rating	Weight	Extension	Comments
1 Freeway capacity/congestion level	0	0	24	0	
2 Surface street capacity/congestion	0	0	21	0	
3 Local/Regional committment	0	0	13	0	
4 Land use compatibility	0	0	11	0	
5 Accident/Incident history	0	0	9	0	
6 Environmental	0	0	7	0	
7 Number of jurisdictions	0	0	6	0	
8 Part of larger system	0	0	4	0	
9 In-place control features	0	0	3	0	
10 Data availability	0	0	2	0	
			100	0	

Costs	
Initial (Capital and Implementation)	
10 Year Operations and Maintenance	
Total	0
Annualized Cost	0
Benefits	
Annual Benefit	0
Benefit/Cost Ratio	ERR

APPENDIX E

DEPARTMENTAL TRANSPORTATION ADVISORY COMMITTEE COMMENTS

DEPARTMENTAL TRANSPORTATION ADVISORY COMMITTEE
1130 K Street (4th floor)
P. O. Box 942874
Sacramento, CA 94274-0001
(916) 445-5860
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June 6, 1990

Mr. Robert K. Best
Director of Transportation
Department of Transportation
1120 N Street
Sacramento, CA 95814

Dear Mr. Best:

At its meeting of May 18, 1990, the Departmental Transportation Advisory Committee reviewed the Smart Corridor Statewide Study (Chapter 1427, Statutes of 1988).

Following a staff presentation and discussion, the Committee noted the following:

1) The report, while lengthy and repetitious, does not include a statement of policy or make recommendations regarding implementation.

2) Affected cities and counties were not adequately consulted during the corridor selection process.

3) The report does not address the issue of truck traffic on alternative surface street routes.

4) The report does not address aesthetic and environmental mitigation measures such as landscaping and soundwalls on alternative surface street routes.

5) Increased pavement maintenance costs due to additional traffic on the alternative routes are not identified in the report.

6) The only benefits identified are those of delay savings. Other benefits and disbenefits should be considered.

7) Although current research into corridor management fills an important niche, corridor management should be considered only a step towards system management.

The Committee appreciates the opportunity to comment on this significant report and strongly supports improved street and highway system management. However, the Committee was disturbed by the lack of attention to institutional issues, particularly potential conflicts between state and local agencies.

The Committee recommends transmittal of the report to the Legislature with appropriate comments regarding the context in which the report was prepared and including these issues that will be addressed in future research and analysis.

Sincerely,

A. Keith Gilbert, Chairman
Departmental Transportation
Advisory Committee