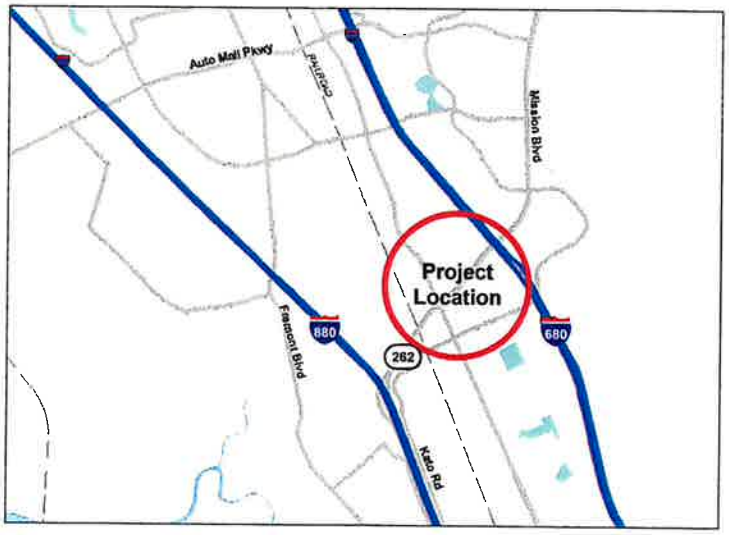
Rajappan&Meyer
CONSULTING ENGINEERS INC

Mission Boulevard (Route 262)
Express Lane Project Feasibility Study

Fremont, California



prepared for the

ALAMEDA COUNTY
CONGESTION MANAGEMENT AGENCY

prepared by

Rajappan & Meyer Consulting Engineers, Inc.
and TJKM Transportation Consultants

March 1998

R&M Rajappan&Meyer
CONSULTING ENGINEERS INC

March 16, 1998

Ms. Jean Hart
Deputy Director
Alameda County Congestion Management Agency
1333 Broadway Suite 220
Oakland, CA 94612

RE: Final Draft
Mission Boulevard (Route 262) Express Lanes Feasibility Study

Dear Jean:

I am pleased to submit our final Mission Boulevard Express Lanes Feasibility Study.

We have determined in this feasibility study that implementation of elevated express lanes on Mission Boulevard (Route 262) from the UPRR overhead to I-680 in either both directions, or in one direction (westbound), is indeed feasible and beneficial from a traffic operation standpoint. Implementation of two-direction elevated lanes would cost approximately $74 million. Implementation of westbound-only only elevated express lanes would cost the least, at approximately $ 47 million. Construction of either two-direction or one-direction elevated facilities would require approximately the same amount of right of way.

Further engineering studies are required to develop the design, provided additional coordination with the ongoing Route 262/I-880 Interchange Reconstruction Project, and to answer a number of technical and environmental questions.

It has been a pleasure conducting this study for the CMA.

Sincerely,

RAJAPPAN & MEYER CONSULTING ENGINEERS, INC.

Keith G. Meyer, P.E.
Vice President

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ACKNOWLEDGMENTS

Funding for this study was provided by the City of Milpitas.

Technical Study Team Members included:

Alameda County Congestion Management Agency	*Jean Hart –Project Manager*
Rajappan & Meyer Consulting Engineers, Inc.	*Keith Meyer – Study Manager* *Daniel Ho – Design Engineer*
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City of Fremont	*Allen Shelley*
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Alameda County Transportation Authority	*Christine Monsen*
Caltrans District 4	*Dianne Steinhauser* *Pat Pang* *Emily Landin-Lowe*
Parsons Brinckerhoff Quade & Douglas	*Gene McCarthy*
APEX Consultants	*Eileen Goodwin*

1. INTRODUCTION

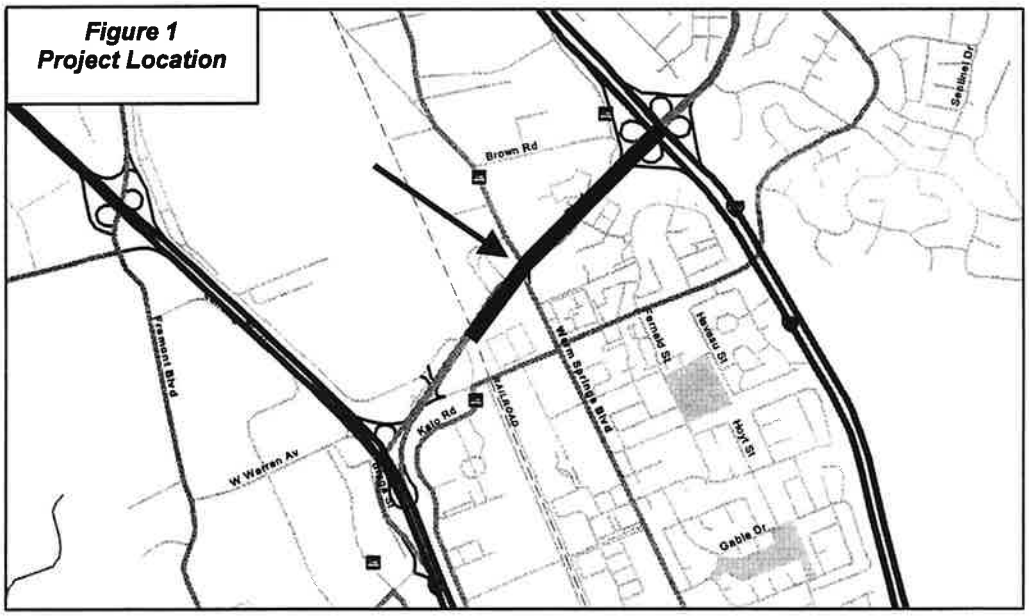
This study has been prepared to determine the feasibility of a short range, cost-effective solution to improving traffic congestion along Route 262 (Mission Boulevard) in the City of Fremont. The project has been undertaken by Rajappan & Meyer Consulting Engineers, Inc., under contract to TJKM Transportation Consultants and the Alameda County Congestion Management Agency. Funding for this study has been provided by the City of Milpitas. Coordination has been provided with Caltrans District 4, the City of Fremont, the Alameda County Transportation Authority, the City of Milpitas and the Santa Clara Valley Transportation Authority Congestion Management Program. This final report reflects comments received by the City of Fremont, the City of Milpitas and the Alameda County Congestion Management Agency.

2. PROJECT DESCRIPTION

The proposed project would provide for a near-term (5-10 year) improvement to Mission Boulevard (Route 262) between the UPRR overcrossing and I-680 in the City of Fremont. Long range planning studies conducted by Caltrans in the early 1990's on a cross-connector between I-680 and I-880 identified potential corridor freeway improvements costing over $500 million. The cross-connector project to date has focused on a freeway facility for the connection between I-680 and I-880, with attendant improvements to each connecting freeway.

The objective of this express lane study is to identify a less costly project that would improve peak period levels of service along Mission Boulevard through construction of a grade-separated facility for freeway-bound traffic. **Figure 1** shows the project location:

Figure 1
Project Location



Two alternatives have been considered in this feasibility study:

Alternative 1, would provide a two-way elevated facility with two through-lanes in each direction above Mission Boulevard.

Alternative 2, would provide a one-way westbound facility with two through lanes above Mission Boulevard. Eastbound Mission Boulevard would be widened to 4 through lanes at the surface level.

The focus of this improvement project is along Route 262, Mission Boulevard. No alternative routes (i.e., Route 237 or Montague Expressway) were explored in this study.

Also, no improvements at the I-680/Mission Boulevard Interchange are proposed in this study, although modification of the interchange would likely be required to gain the most efficiency for the Mission Boulevard Express Lanes. Improvements at this interchange are recommended to be explored in the next phase of work.

3. PROJECT OBJECTIVES

The purpose of the project is to provide near term relief to very congested peak period traffic conditions along Mission Boulevard. It is not necessarily intended to be the long-term solution to the cross-connection between the I-680 and I-880 corridors, since that project has been estimated to cost in excess of $500 million. The objectives of the near-term project include:

1. *To provide an affordable solution within the funding resources of the region.*
2. *To relieve existing congestion at signalized intersections along Mission Boulevard.*
3. *To provide "express-lanes" for through traffic between I-680 and I-880.*
4. *To accommodate at least Year 2010 forecasted traffic for both Mission Boulevard intersections and through traffic on the express lanes.*
5. *To minimize right-of-way acquisition.*
6. *To coordinate with concept designs underway at the I-880/Mission Boulevard Interchange by the Alameda County Transportation Authority and Caltrans.*
7. *To provide a design solution acceptable to both Caltrans and the City of Fremont.*

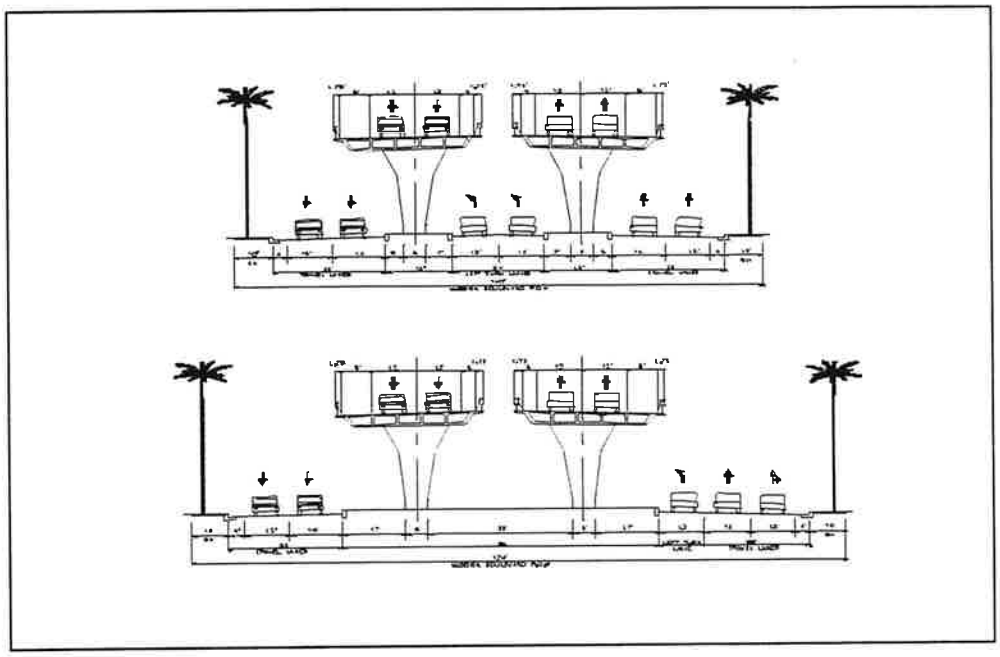
4. ALTERNATIVES

The project has several options for connection of each end and for movement of through traffic through the Mission Boulevard corridor. These are broken out into alternatives for through-traffic and treatments at each end, one at I-680, and the other at the UPRR overcrossing.

Elevated Traffic Express Lanes. Two alternatives for separation of through traffic have been considered in this evaluation:

Alternative 1, would provide a four-lane travel-way (two lanes in each direction), elevated above Mission Boulevard. A layout and profile for this project are provided in **Appendix A.** Typical sections for this facility are shown in **Figure 2.**

Figure 2
Cross Section for Two-Way Elevated Express Lanes



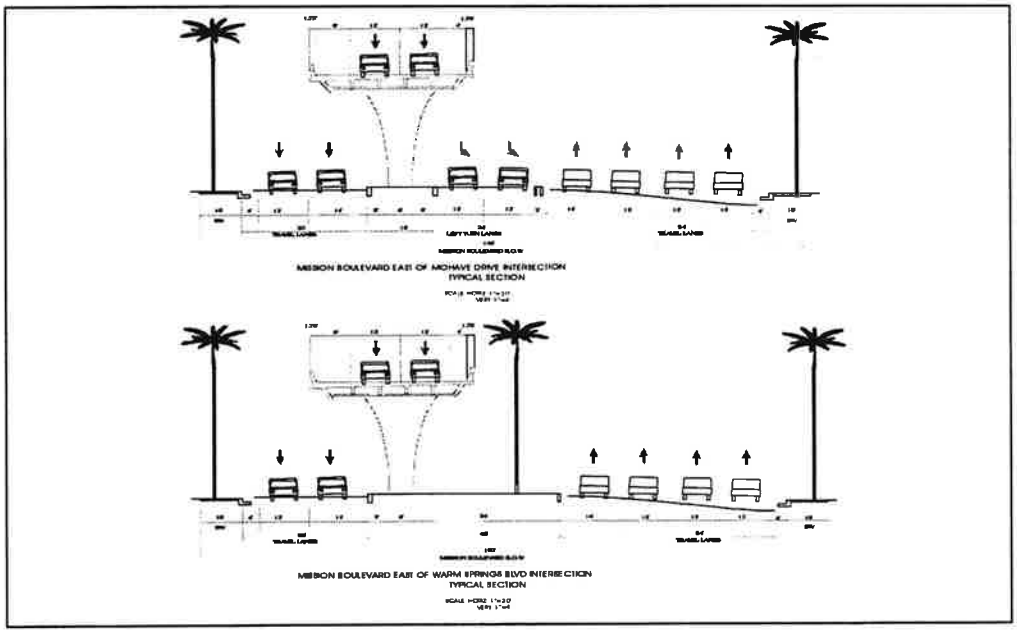
The elevated sections would meet design standards for typical direct connector ramps, with 4 ft. inside shoulders and 8 ft. outside shoulders. Several structural options were explored, including:

Option1 - Elevated on retained earth (with retaining wall or MSE panel).
Option 2 - Elevated on structure with a continuous section for all lanes.
Option 3 - Elevated on structure with independent structures for EB and WB directions.

The recommended section is Option 3, for several reasons. First, independent structures can be built separately (the westbound direction could be built first to solve the worst traffic problem). Second, independent structures would provide better appearance and allow light to penetrate between structures. Third, independent structures would provide easier construction staging due to less width. Option 1 is not recommended due to the bulky mass of retaining walls or MSE panel walls that would be viewed from the side. Option 2 is not recommended due to the large continuous structure, which would provide a bulky appearance and shadows.

Alternative 2, would provide a two-lane travel-way for westbound traffic only, elevated above Mission Boulevard and a four lane travel way for eastbound traffic at the surface level. A layout and profile for this project are provided in **Appendix B**. Typical sections for this facility are shown in **Figure 3**.

Figure 3
WB Elevated Express Lane Cross Sections



I-680 End Treatment. The east end of the project would require construction of partial direct ramps to and from Mission Boulevard east and the I-680 on and off ramps. Two options were explored:

Option 1 - Provide elevated ramps to and from right side of freeway ramps.
Option 2 - Provide elevated ramps to and from left side of freeway ramps.

In order to take advantage of favorable ramp grades, the express lane ramp from the SB I-680 off ramp is recommended to begin from the right side of the ramp, and stay elevated over traffic from WB Mission Boulevard. For traffic going to SB I-680, traffic from the EB Express Lanes is recommended to enter the ramp on the left side.

The four-quadrant full cloverleaf that exists at the I-680/Mission Boulevard Interchange is well-suited for the express lane concept, since no traffic signals exist within the interchange. Two concepts for terminating the express lanes on Mission Boulevard were explored, including:

Concept 1 - Begin/End ramps on inside of Mission Boulevard travel way.
Concept 1 - Begin/End ramps on outside of Mission Boulevard travel way.

Concept 1 would be the least expensive of the two ramp configurations, with traffic entering and exiting the express lanes from the inside (left) lanes of Mission Boulevard under I-680. Some problems may occur with weaving traffic between the loop ramps and the express lane ramps with this concept.

Concept 2 would partly mitigate this problem by placing the direct ramp connections to and from Mission Boulevard on the right side, thus minimizing weaving for the largest movements to and from the I-680 loops. This option would be more expensive.

West End Treatment. The connection with the Route 262 freeway section under the two UPRR tracks would be fairly straightforward, with express lane ramps ascending/descending at a 7% grade. Mission Boulevard access ramps would be single lane ramps. While the existing cross-section under the UPRR tracks would need to be widened, it is understood that this required widening would take place with the proposed I-880/Route 262 interchange reconstruction project.

The express lane project would connect directly with the proposed I-880/Mission Boulevard interchange reconstruction concept. This interchange reconstruction concept is shown in **Appendix C**. Further evaluation of the Kato Road ramp movements to and from Route 262 east area required, since the Kato Road ramps would not be able to access the express lanes.

An option of leaving the express lanes elevated over the UPRR tracks was explored, which would avoid the need to reconstruct the UPRR overcrossing. However, the profiles of the ramps are not favorable to connect with the future I-880/Route 262 interchange concept.

5. TRAFFIC FORECASTS AND OPERATIONS

Traffic Forecasts. Traffic forecasts were prepared by TJKM Transportation Consultants, based on the City of Fremont travel forecast model. Peak hour 2010 traffic volumes for the express lanes are forecasted to range from 2,250 vph to 2,500 vph, well within the capacity of the express lanes. Year 2010 traffic volumes traveling to and from Mission Boulevard are forecasted to range from 1,300 vph to 1,450 vph, well within a single lane ramp movement's capacity. Existing and Year 2010 intersection traffic forecasts are provided in **Appendix D** and summarized in **Tables 1 and 2**:

Table 1
Traffic Forecasts – Mission Blvd/Warm Springs

Movement		Existing Volumes		Year 2010 No Build		Year 2010 With Express Lanes	
		AM	PM	AM	PM	AM	PM
NB	Right	83	408	100	450	100	450
	Thru	317	802	400	600	400	600
	Left	504	334	500	400	500	400
SB	Right	439	197	450	300	450	300
	Thru	710	357	700	600	700	600
	Left	168	204	225	200	225	200
EB	Right	236	142	250	150	250	150
	Thru	785	1508	1225	2560	125	400
	Left	142	209	200	200	200	200
WB	Right	131	133	175	150	175	150
	Thru	2024	984	3000	1450	500	250
	Left	394	191	425	200	425	200

Source: TJKM Transportation Consultants, 1997

Table 2
Traffic Forecasts – Mission Blvd/Mohave Drive

Movement		Existing Volumes		Year 2010 No Build		Year 2010 With Express Lanes	
		AM	PM	AM	PM	AM	PM
NB	Right	140	252	175	250	175	250
	Thru	56	95	75	100	75	100
	Left	176	112	250	150	250	150
SB	Right	66	23	125	200	125	200
	Thru	56	114	75	150	75	150
	Left	129	206	150	200	150	200
EB	Right	54	95	50	150	50	150
	Thru	1021	2152	1475	3100	375	850
	Left	20	20	25	50	25	50
WB	Right	59	32	50	50	50	50
	Thru	2322	1005	3225	1450	725	250
	Left	221	197	225	200	225	200

Source: TJKM Transportation Consultants, 1997

Traffic Operations. Operations evaluations were conducted at signalized intersections for both alternatives. Desirable level of service for this facility is LOS D in the AM and PM peak hours. **Table 3** provides a description of levels of service.

Table 3
Level of Service Definitions

DESCRIPTION OF LEVEL OF SERVICE CONDITIONS					
	SIGNALIZED INTERSECTIONS		UNSIGNALIZED INTERSECTIONS		ROADWAY SEGMENTS
LEVEL OF SERVICE	AVERAGE STOPPED DELAY	DESCRIPTION	RESERVE CAPACITY	DESCRIPTION	DESCRIPTION
A	5 Seconds or less	Very low delay Most Vehicles arrive during Green phase and do not stop at all	Greater than 400 Vehicles per hour.	Little or no delay	Highest quality of service. Free-flow traffic conditions. Little or no restrictions on maneuverability or speed. No delay
B	Between 5 and 15 seconds	Low delay. More vehicles stop that for LOS A causing higher average delay	Between 300 and 399 vehicles per hour	Short traffic delays	Reasonably free-flowing conditions Low restrictions on maneuverability No delays
C	Between 15 and 25 seconds	Moderately delay. Some vehicles may wait for more that one signal cycle.	Between 200 and 299 vehicles per hour	Average traffic delays	Stable traffic flow, but less Freudian to select speed, change lanes, or pass. Minimal delay.
D	Between 25 and 40 seconds	Moderately high delay. Congestion becomes more noticeable. Many vehicles stop and many will wait through more that one cycle	Between 100 and 199 vehicles per hour	Long traffic delays	Borders on unstable flow. Freedom to maneuver is severely limited. Speeds tolerable but subject to sudden and considerable variation. Minimal delay
E	Between 40 and 60 seconds	High delay. Many more vehicles will wait through more than one signal cycle. Long queues on critical approaches.	Between 0 and 99 vehicles per hour	Very long traffic delays	At or near capacity. Unstable traffic flow with rapidly fluctuating speeds and flow rate. Low maneuverability and drive comfort. Significant delay.
F	Over 60 seconds	Very high delay. Demand exceeds capacity of intersection. Long queues form.	Less than 0 vehicles per hour	Failure-extreme congestion	Forced traffic flow. Speed and flow may drop to zero with high densities. Considerable delay.

For Alternative 1, with both directions of express traffic elevated above Mission Boulevard, local and express lane movements would operate at LOS D or better for 2010 traffic conditions.

The surface signalized intersections on Mission Boulevard would require two through lanes plus single or double left turn lanes for LOS D operation or better. Level of service comparisons with and without the elevated express lanes are shown in Table 4, as follows:

Table 4
V/C and Level of Service Comparisons – Alternative 1 – EB and WB Elevated Lanes

Intersection	Existing		Year 2010 No Express Lanes *		Year 2010 With Express Lanes	
	AM	PM	AM	PM	AM	PM
Mission Blvd./Warm Springs	0.86 D	0.78 C	1.06 F	1.00 E	0.77 C	0.71 C
Mission Blvd/Mohave Drive	.077 C	0.98 E	0.95 E	0.98 E	0.64 B	0.90 D

** Assumes implementation of the 3rd EB lane STIP project currently planned by the City of Fremont.*
Source: TJKM Transportation Consultants, 1997

The express lanes would operate at LOS C for both 2010 AM and PM conditions. The traffic operations analysis sheets from TJKM are also provided in **Appendix C** to this report.

For Alternative 2, with only the westbound direction elevated above Mission Boulevard, eastbound traffic would operate on four surface through-lanes, plus double left turn lanes. The dual-lane elevated express lanes would again operate at LOS C for both 2010 AM and PM conditions.

The surface signalized intersections on Mission Boulevard would require two westbound through lanes, four eastbound through lanes, plus single or double left turn lanes for LOS D operation or better. Level of service comparisons with and without the elevated express lanes are shown in **Table 5**, as follows:

Table 5
V/C and Level of Service Comparisons – Alternative 2 – WB Elevated Lane Only

Intersection	Existing		Year 2010 No Express Lanes *		Year 2010 With WB Express Lanes	
	AM	PM	AM	PM	AM	PM
Mission Blvd./Warm Springs	0.86 D	0.78 C	1.06 F	1.00 E	0.86 D	0.87 D
Mission Blvd/Mohave Drive	.077 C	0.98 E	0.95 E	0.98 E	0.77 C	0.84 D

** Assumes addition of 4th EB lane*
Source: TJKM Transportation Consultants, 1997

The traffic operations evaluations show that a combination of elevated in the westbound direction and four lanes in the eastbound direction would operate nearly as well as the two-direction elevated facility.

6. RIGHT OF WAY IMPACTS

Right of way impacts for each alternative are relatively minimal, with the one-direction express lanes requiring the least right of way.

Alternative 1. Due the overlapping nature of the cross section, with the express lanes cantilevered over one lane of Mission Boulevard, the construction of the express lanes would require minimal right of way impact for a facility of this type. The major impact would be on the south side of Mission Boulevard from Mohave to I-680 and on the north side of Mission Boulevard between Mohave to I-680, where two strips of commercial property would be required. The total right of way take for the proposed project would be approximately 54,000 square feet. No building relocations would be required. Utility relocations are expected to include PG&E facilities.

Alternative 2. Due the reduction in land required at the east end of the project for this alternative (since braided ramps are not required), less right of way would be required than Alternative 1. Again, the major impact would be on the south side of Mission Boulevard from Mohave to I-680 and on the north side of Mission Boulevard between Mohave to I-680, where two strips of commercial property would be required. The total right of way take for Alternative 2 would be approximately 45,000 square feet. No building relocations would be required. Utility relocations are expected to include PG&E facilities.

7. COST ESTIMATES

Implementation costs for each alternative would include construction of roadway widening, construction of elevated roadway on structure, provisions for braided ramps to access the east and west ends of the expressway, right of way, and local street reconstruction. Significant savings would be achieved with Alternative 2, due to reduction of structure costs. The estimated costs in 1998 dollars, using the ACTA cost estimating guide, are provided in **Appendix E**, and include the following:

Activity	*Alternative 1*	*Alternative 2*
PSR	$ 0.5 million	$ 0.5 million
Environmental Document/P.E.	$ 1.5 million	$ 1.5 million
Engineering	$ 6.4 million	$ 3.7 million
Construction Management	$ 6.4 million	$ 3.7 million
Construction	$ 50.7 million	$ 32.1 million
Right of Way	$ 1.6 million	$ 1.0 million
Project Reserve	$ 6.7 million	$ 4.3 million
TOTAL	$ 73.8 million	$ 46.8 million

8. POSSIBLE REVERSIBLE FACILITY

Due to the high directionality of the 2010 traffic volumes (65/35 split AM, 70/30 split PM). the project appears to have potential as a reversible facility. The facility would operate in the westbound direction in the morning and in the eastbound direction in the afternoon. As with all reversible facilities, attention must be given to appropriate and safe ramp termini at each end of the project. Construction of a two-lane reversible facility in the median are estimated to cost in the range of $60 million total, due to the addition of lane reversal facilities at either end. Reversible facilities may not be practical or possible to construct at the west end due to the undercrossing of the railroad. Further studies are recommended.

9. POSSIBLE HOV FACILITY

Preliminary HOV lane estimates by TJKM indicate that between 20 and 30 percent of all vehicles would carry two or more persons and utilize an HOV lane. Under these circumstances, between 500 and 750 high occupancy vehicles and 1,750 to 2,000 mixed flow vehicles would desire to operate on the expressway facility.

Given these estimates, it appears that use of the express lanes for HOV are not practical or beneficial, for the following reasons:

- The length of the connector is relatively short and the normal pay-off from HOV lanes probably wouldn't occur, even with future HOV lanes on both I-680 and I-880.
- It would be difficult to institute HOV lane transitions at either end of the project.
- The mixed flow volumes remaining would exceed the capacity of a single mixed flow lane, thus requiring three lanes in each direction.
- Current plans for the I-880/Route 262 Interchange Reconstruction Project do not include HOV lanes on Route 262.

10. IMPLEMENTATION ISSUES

A number of issues should be addressed in further traffic forecasting, engineering and environmental studies. These include:

Design Standards. A fundamental agreement must be reached with Caltrans that the express lanes are not a freeway facility, but are ramp I-680 ramp extensions. This design approach reduces the shoulder width to a point that the facility can mostly fit within the existing right of way. This concept is not unlike the northbound I-380 ramp connector from San Francisco International Airport. An advisory design exception would be required at the ramp entrance to southbound I-680, for less-than-standard merge taper (30:1).

I-680/Mission Boulevard Interchange. This interchange will be operating at capacity by the year 2010. Further demands would require reconstruction. Reconstruction of this interchange needs to be explored to provide a complete connection between I-680 and I-880.

Visual Impact. The construction of elevated express lanes would have significant impact to the viewshed along Mission Boulevard. The elevated concept would need to be fully explored with neighborhood and businesses during the environmental process.

Seismic Design. Mission Boulevard cuts across the Hayward Fault. As a result, the potential impact to an elevated structure would need to be developed in the next phase of design. Design elements would need to be established to ensure the structure would not fail during a major seismic event.

Noise Impacts. The express lanes would elevate primary traffic volumes to approximately 21 feet above the current grade of Mission Boulevard. Roadway noise may be increased to adjacent neighborhoods. Sound walls may be required along the structure to mitigate increased noise. Further visual impacts would occur due to sound-walls attached to the express lane structures. An allowance for sound walls have been included in the estimated costs for each alternative.

Local Community Acceptance. A public input program should be conducted in the next step of the project to determine the potential for public acceptance of the elevated structure and surface roadway improvements.

Coordination with I-880/Route 262 Reconstruction. Special coordination would be required with the final design configuration of the Route 262/I-880 Interchange Reconstruction Project, and specifically the Kato Road overcrossing and ramps to and from Route 262.

Regional Benefit. Prior studies have included Route 237 and Montague Expressway in Milpitas as alternative routes for the cross-connector project. The primary reason is that it is believed that traffic between I-680 and I-880 has significant origins and destinations in Santa Clara County, although the mix of traffic using Mission Boulevard is not certain. Origin-destination information would need to be verified to confirm the need and benefit, as well as to refine the traffic forecasts for design of the project.

11. IMPLEMENTATION

Implementation Schedule. Due to the unfunded nature of this project, the timeline for implementation is not possible to predict. If funds were made available, the implementation time frame could be much shorter than previous cross connector concepts. Given the focus of improvement on Mission Boulevard (instead of regionally), a reasonable, but aggressive, time frame for implementation of either Alternative 1 or Alternative 2 would be as follows:

Prepare Project Study Report	*1 year*
Prepare Environmental Document	*2 year*
Prepare Design Plans	*1 year*
Right of Way Acquisition	*1 year*
Construction	*2 years*
Total Time Frame	*7 years*

Next Steps. Since this project is on State Route 262, Caltrans would be the owner operator of the facility. This dictates that Caltrans' Project Development Procedures be followed to develop, design and environmentally clear the project. A Caltrans "Project Study Report" needs to be prepared as the next step, which would build on the efforts of this study and provide additional information on design, design exceptions, traffic operations, environmental impacts, right of way, hazardous materials, and structural elements.

The PSR could be prepared either by Caltrans or a consultant to a local agency. The determination of who leads the next step needs to be established and priorities set to conduct this work.

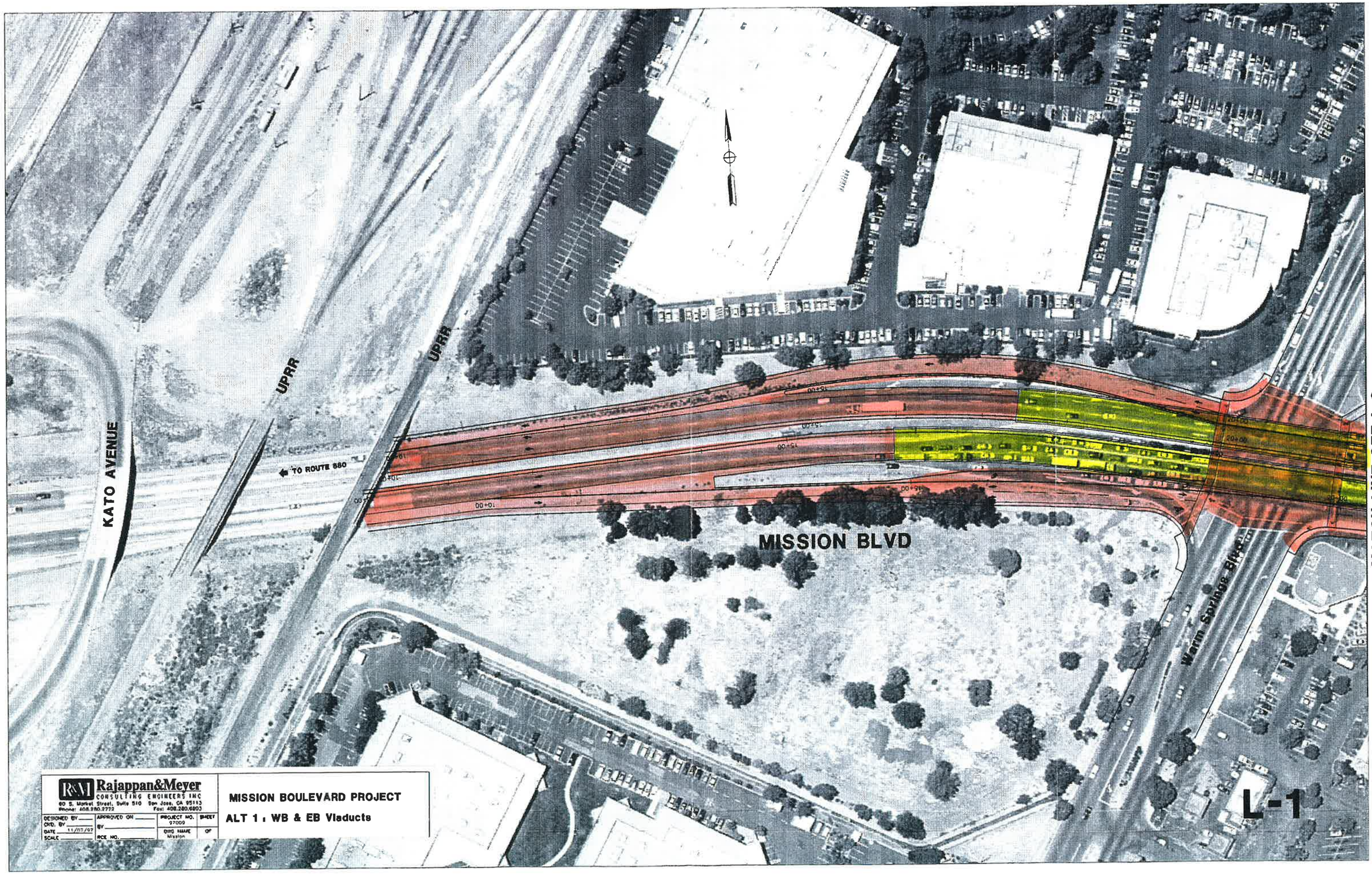
In addition, it is likely that a Federal "Major Investment Study" (MIS) would need to be conducted to determine the suitability of the project relative to other corridors and modes. This effort could be conducted concurrently with the PSR effort.

12. CONCLUSIONS

It is determined in this feasibility study that implementation of elevated express lanes on Mission Boulevard (Route 262) from the UPRR overhead to I-680 in either both directions, or in one direction (westbound) are indeed feasible and beneficial from a traffic operation standpoint. Provision of WB only express lanes would cost the least, at approximately $ 47 million. Construction of either two-way or one-way elevated facilities would require approximately the same amount of right of way.

Further engineering studies are required to develop the design, provided additional coordination with the ongoing Route 626/I-880 Interchange Reconstruction Project, and to answer a number of technical and environmental questions.

Appendix A
Dual Expressway Concept



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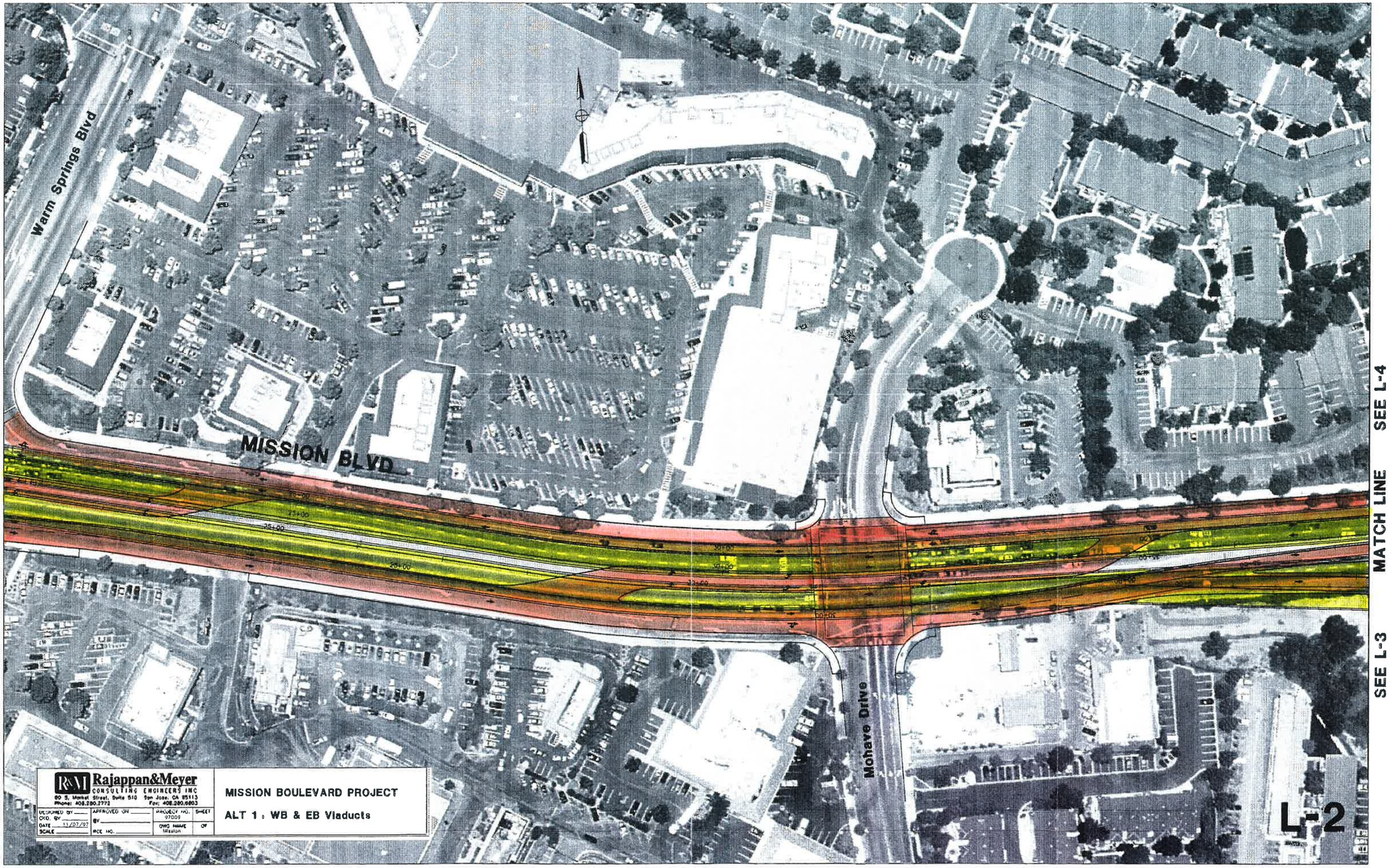
DESIGNED BY	APPROVED ON	PROJECT NO. 97009	SHEET
CKD. BY	BY	DWG NAME Mission	OF
DATE 11/07/97	RCE NO.		
SCALE			

MISSION BOULEVARD PROJECT

ALT 1 : WB & EB Viaducts



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DESIGNED BY ____ DWD. BY ____	APPROVED BY ____	PROJECT NO. 97009	SHEET
DATE 11/07/97	BY ____	DWG NAME Mission	OF
SCALE ____	RCE NO. ____		

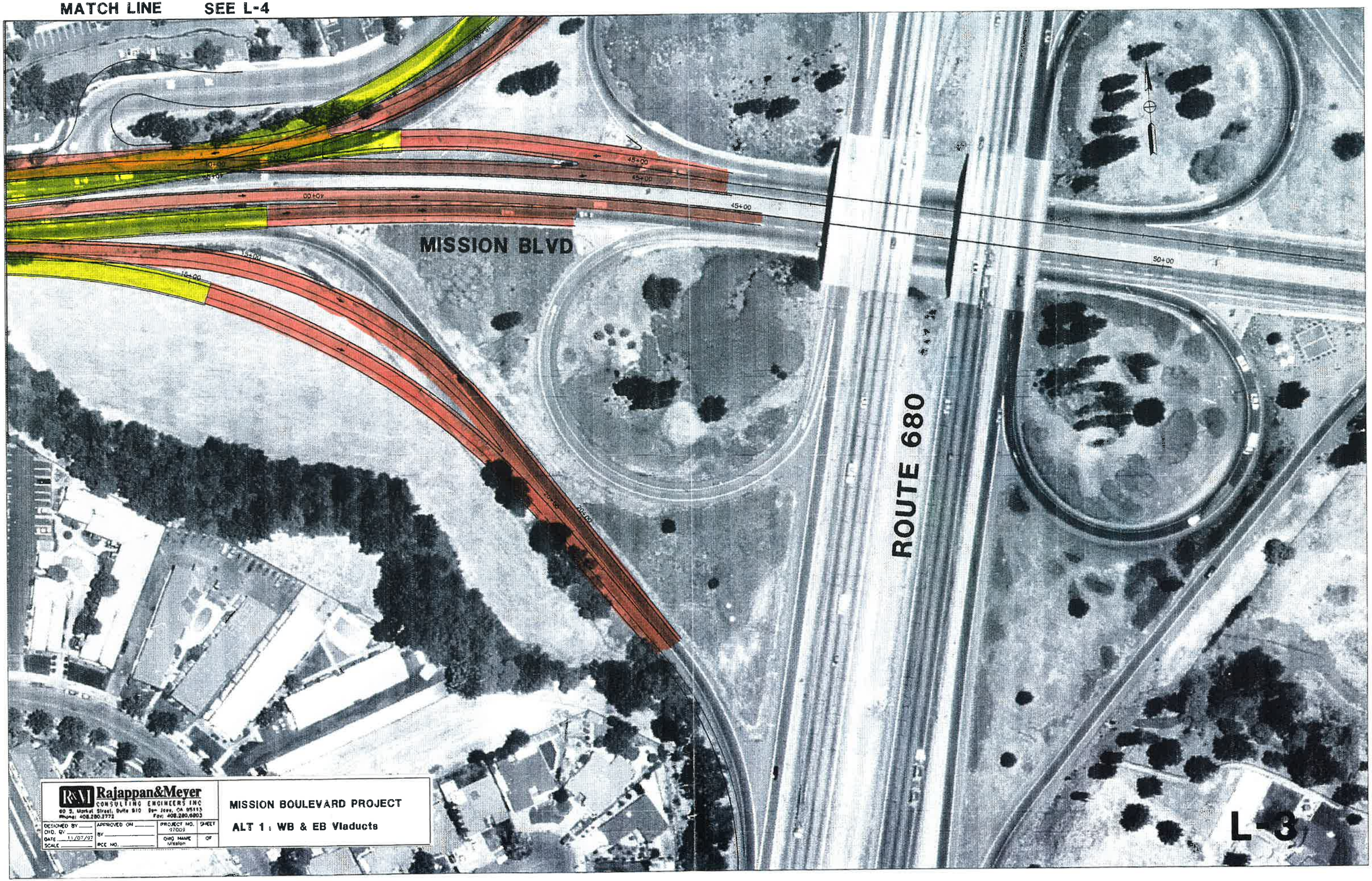
MISSION BOULEVARD PROJECT

ALT 1 : WB & EB Viaducts

MATCH LINE SEE L-4

SEE L-2

MATCH LINE



R&M Rajappan&Meyer CONSULTING ENGINEERS INC 60 S. Market Street, Suite 810 San Jose, CA 95113 Phone: 408.280.2772 Fax: 408.280.0803		MISSION BOULEVARD PROJECT	
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DATE 11/07/97 SCALE ___	RCE NO. ___	DWG NAME Mission	OF
ALT 1 : WB & EB Viaducts			

L-3

MATCH LINE SEE L-2

ROUTE 680

L-4

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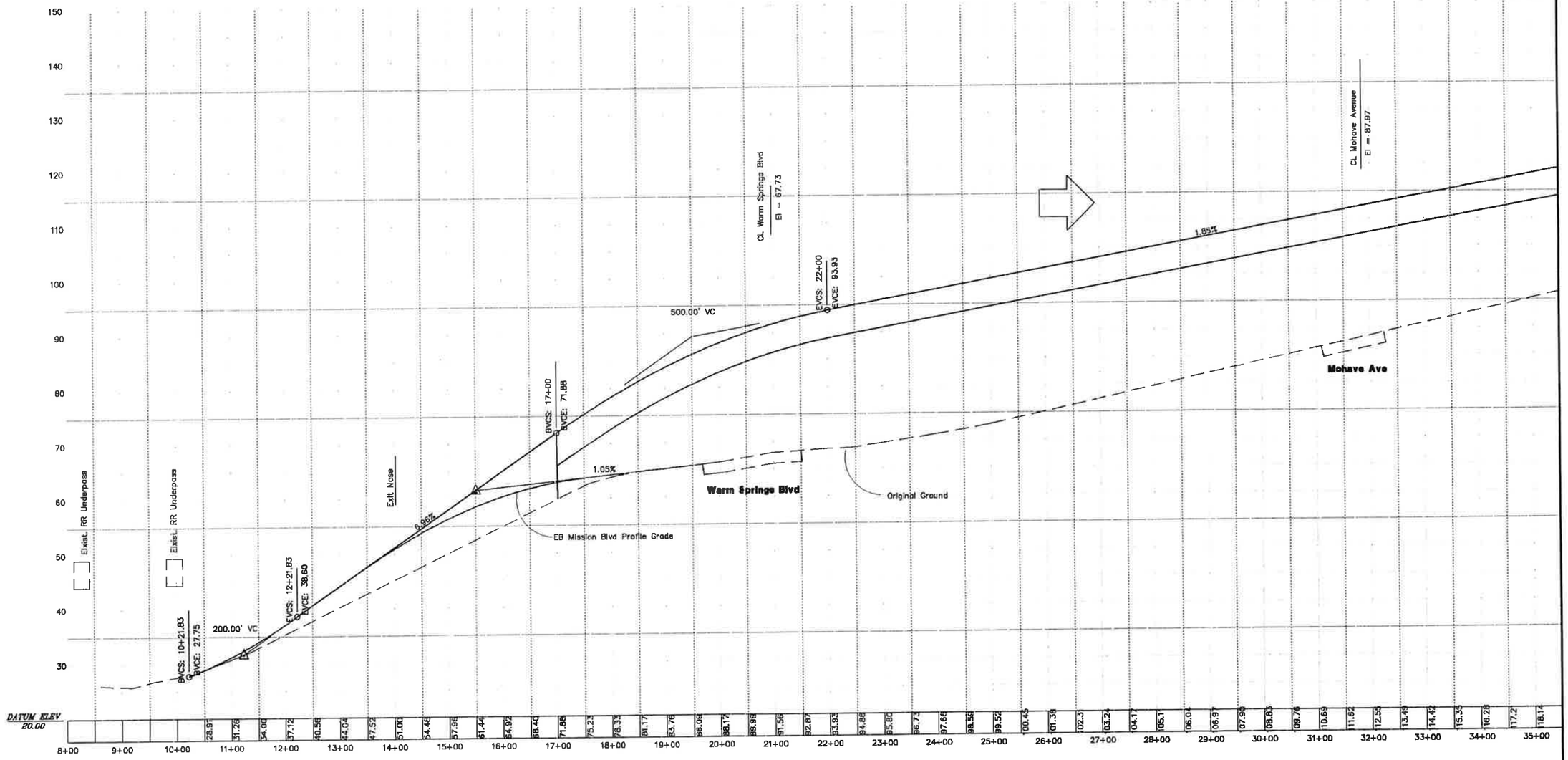
DESIGNED BY	APPROVED ON	PROJECT NO. 97009	SHEET
CKD. BY	BY	DWG NAME Mission	OF
DATE 11/07/97			
SCALE	PCE NO.		

MISSION BOULEVARD PROJECT

ALT 1 : WB & EB Viaducts

MATCH LINE SEE L-3



MATCH LINE

EB Route 262 Viaduct Profile

Scale: Horiz 1"=200'
Vert 1"=20'

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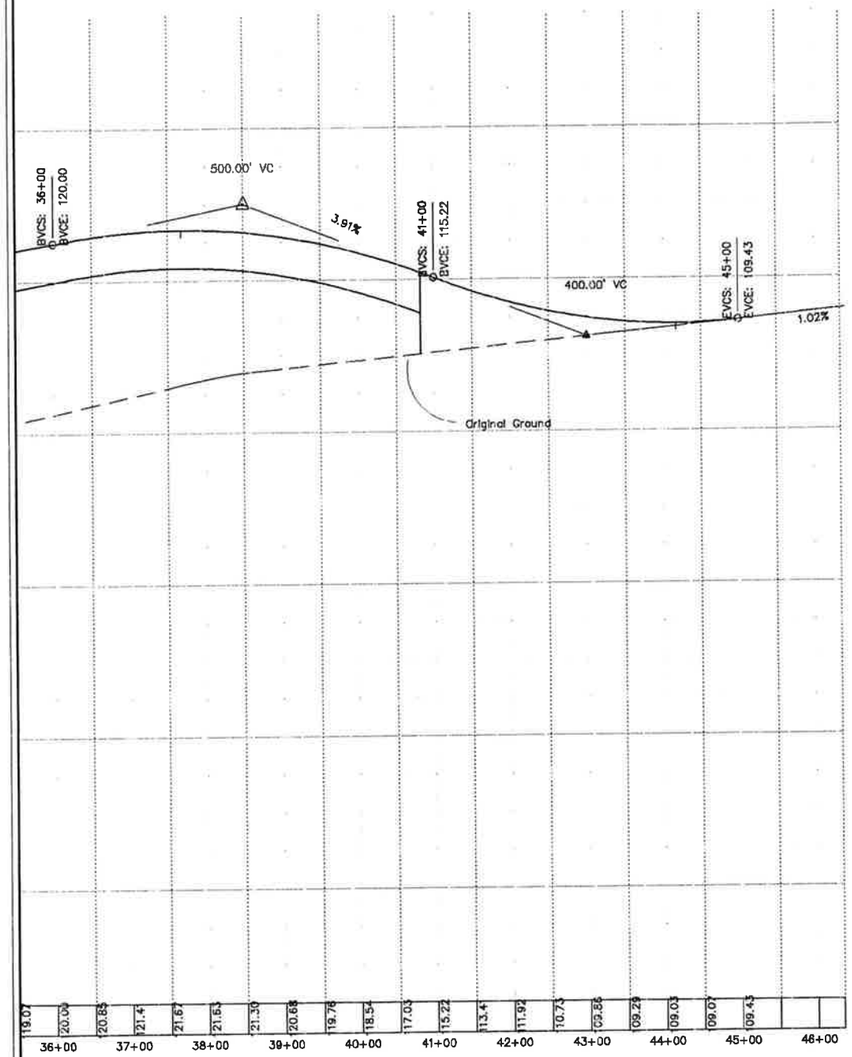
DESIGNED BY	APPROVED ON	PROJECT NO. 97009	SHEET
CKD. BY	BY		
DATE 11/07/97		DWG NAME Mission	OF
SCALE	RCE NO.		

MISSION BOULEVARD PROJECT

PROFILES

MATCH LINE



EB Route 262 Viaduct Profile

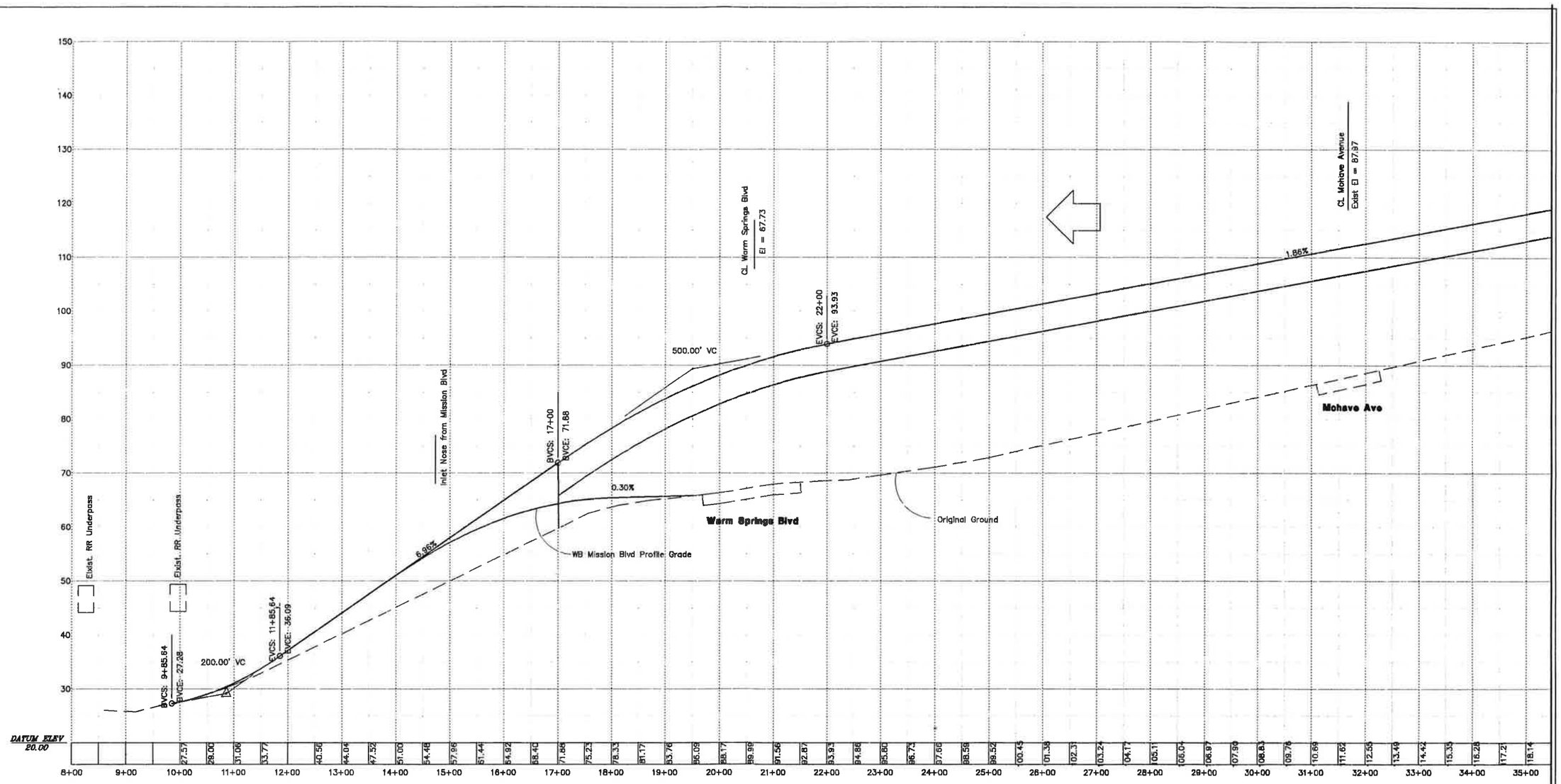
Scale: Horiz 1"=200'
Vert 1"=20'

Rajappan&Meyer
CONSULTING ENGINEERS INC
60 S. Market Street, Suite 510 San Jose, CA 95113
Phone: 408.280.2772 Fax: 408.280.6803

DESIGNED BY	APPROVED ON	PROJECT NO. 97009	SHEET
CKD. BY	BY		
DATE 11/07/97		DWG NAME Mission	OF
SCALE	RCE NO.		

MISSION BOULEVARD PROJECT

PROFILES



MATCH LINE

WB Route 262 Viaduct Profile

Scale: Horiz 1"=200'
Vert 1"=20'

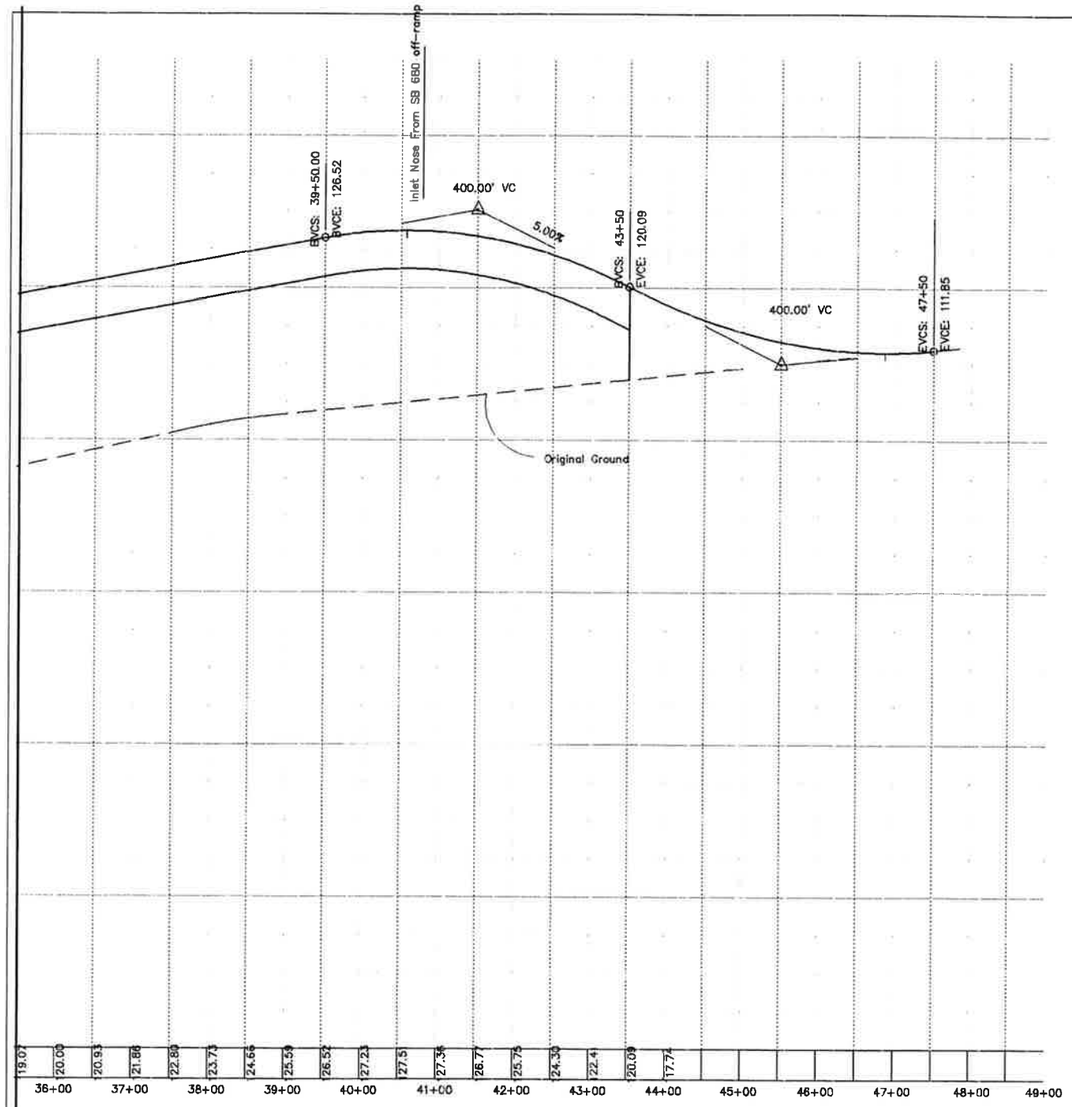
Rajappan&Meyer
CONSULTING ENGINEERS INC
60 S. Market Street, Suite 510 San Jose, CA 95113
Phone: 408.280.2772 Fax: 408.280.6803

DESIGNED BY	APPROVED ON	PROJECT NO. 97009	SHEET
CKD. BY	BY		
DATE 11/07/97	RCE NO.	DWG NAME Mission	OF
SCALE			

MISSION BOULEVARD PROJECT

PROFILES

MATCH LINE



WB Route 262 Viaduct Profile

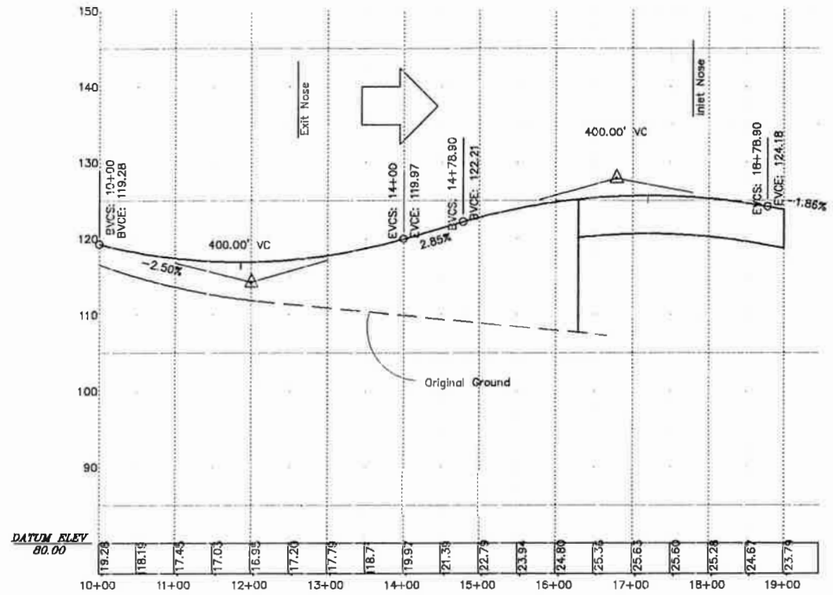
Scale: Horiz 1"=200'
Vert 1"=20'

Rajappan&Meyer
CONSULTING ENGINEERS INC
60 S. Market Street, Suite 510 San Jose, CA 95113
Phone: 408.280.2772 Fax: 408.280.6803

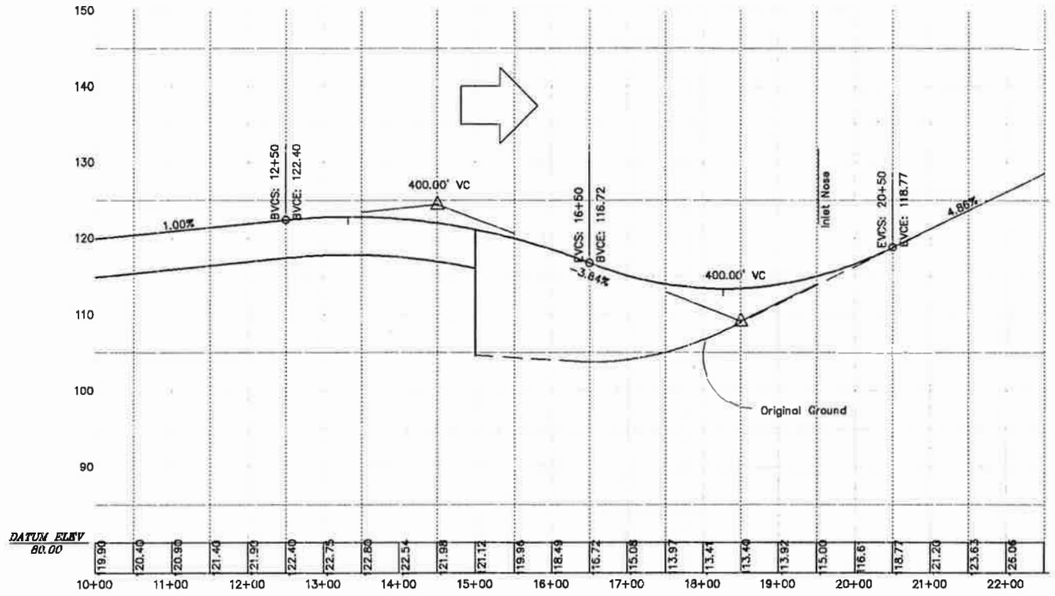
DESIGNED BY ____	APPROVED ON ____	PROJECT NO. 97009	SHEET
CKD. BY ____	BY ____		
DATE 11/07/97		DWG NAME Mission	OF
SCALE ____	RCE NO. ____		

MISSION BOULEVARD PROJECT

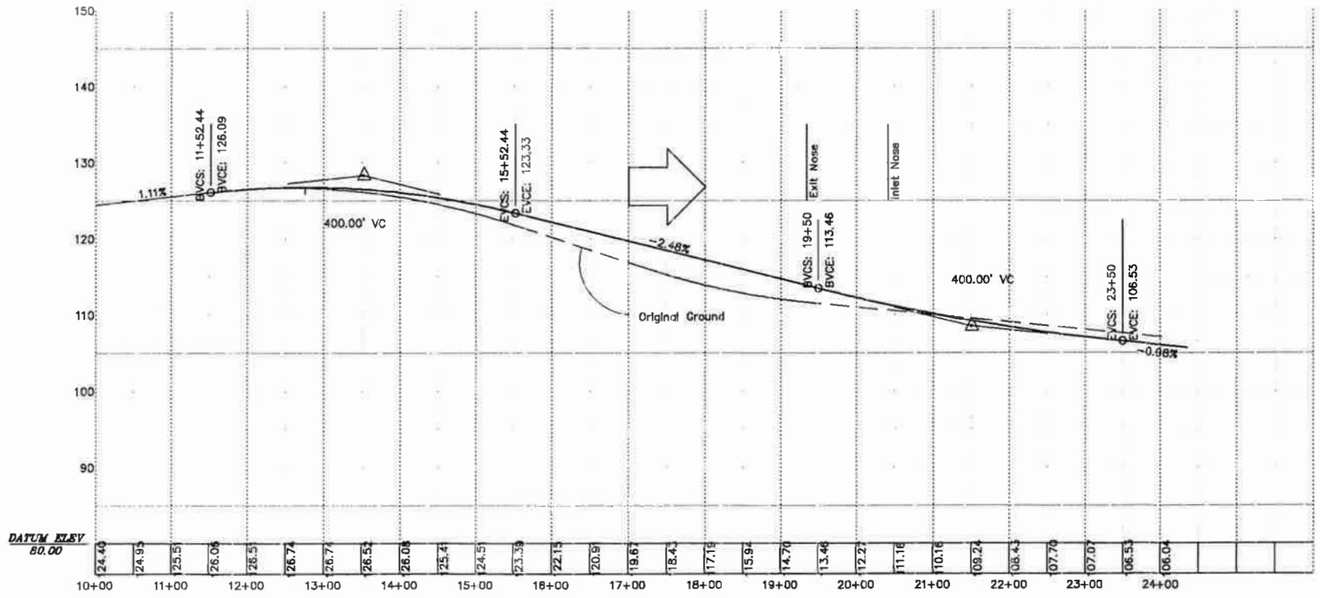
PROFILES



SB 680 Off-ramp to to WB Rte 262 Profile



EB Route 262 to SB 680 On-ramp Profile



SB 680 Off-ramp to WB Mission Blvd Profile

Scale: Horiz 1"=200'
Vert 1"=20'

Rajappan&Meyer
CONSULTING ENGINEERS INC
60 S. Market Street, Suite 510 San Jose, CA 95113
Phone: 408.280.2772 Fax: 408.280.6803

DESIGNED BY ____	APPROVED ON ____	PROJECT NO. 97009	SHEET
CKD. BY ____	BY ____	DWG NAME Mission	OF
DATE 11/07/97	RCE NO. ____		
SCALE ____			

MISSION BOULEVARD PROJECT

PROFILES

Appendix B
WB Expressway Concept

Rajappan&Meyer CONSULTING ENGINEERS INC 60 S. Market Street, Suite 510 San Jose, CA 95113 Phone: 408.280.2772 Fax: 408.280.6803			
DESIGNED BY ____ DWD. BY ____ DATE 11/07/97 SCALE ____	APPROVED ON ____ BY ____ PCE NO. ____	PROJECT NO. 97009 DWG NAME Mission	SHEET OF

MISSION BOULEVARD PROJECT

ALT 2 : WB Viaduct & EB 4-lane

L-1

MATCH LINE SEE L-1

SEE L-4

SEE L-3 MATCH LINE

Warm Springs Blvd

MISSION BLVD

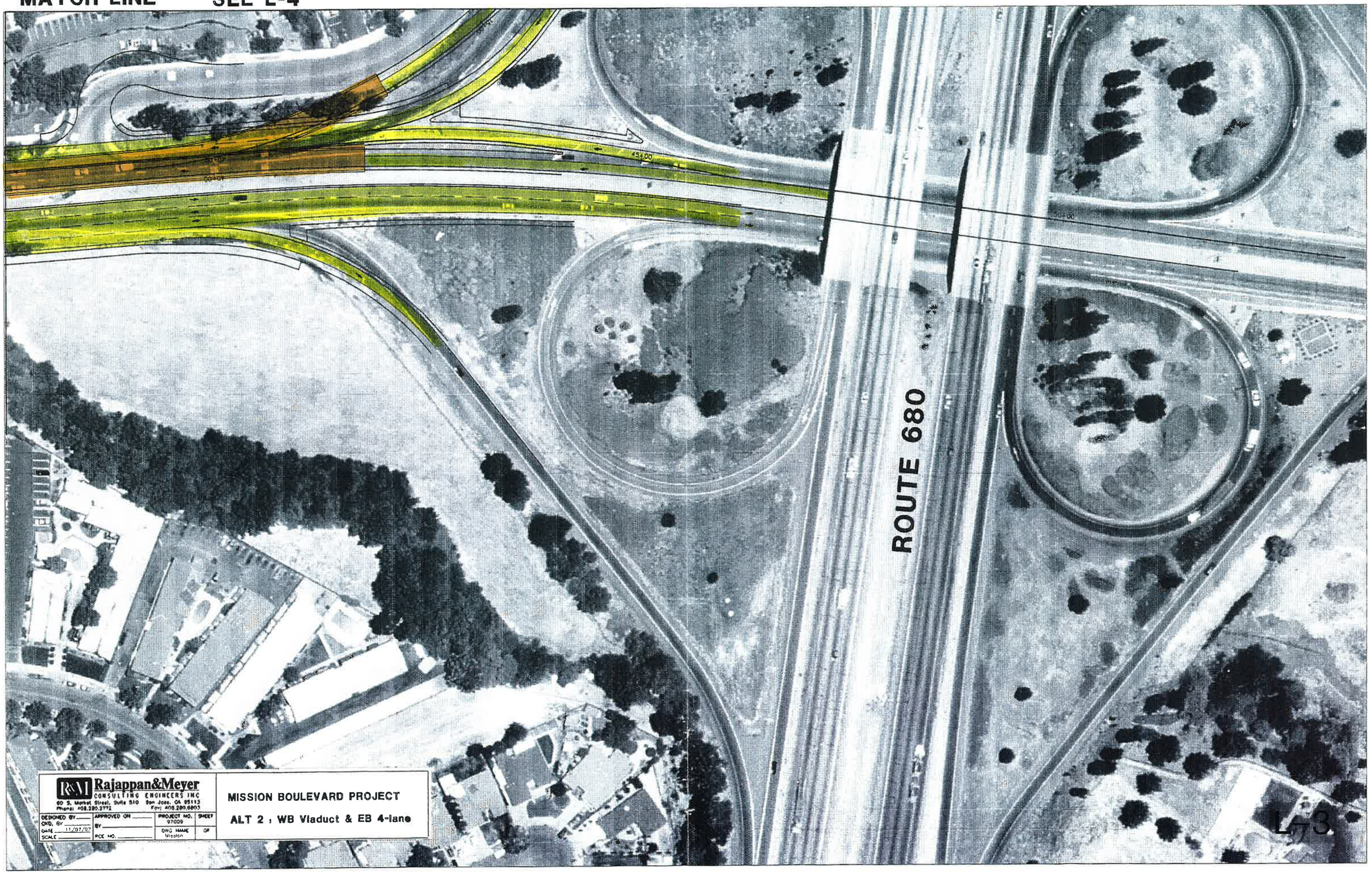
Mohave Drive

Rajappan&Meyer CONSULTING ENGINEERS INC 60 S. Market Street, Suite 510 San Jose, CA 95113 Phone: 408.280.2772 Fax: 408.280.6803	MISSION BOULEVARD PROJECT ALT 2 : WB Viaduct & EB 4-lane
DESIGNED BY — APPROVED ON — PROJECT NO. 97009 SHEET CKD. BY — BY — DATE 11/07/97 PCE NO. — DWG NAME Mission OF SCALE —	

L-2

MATCH LINE SEE L-4

SEE L-2 MATCH LINE

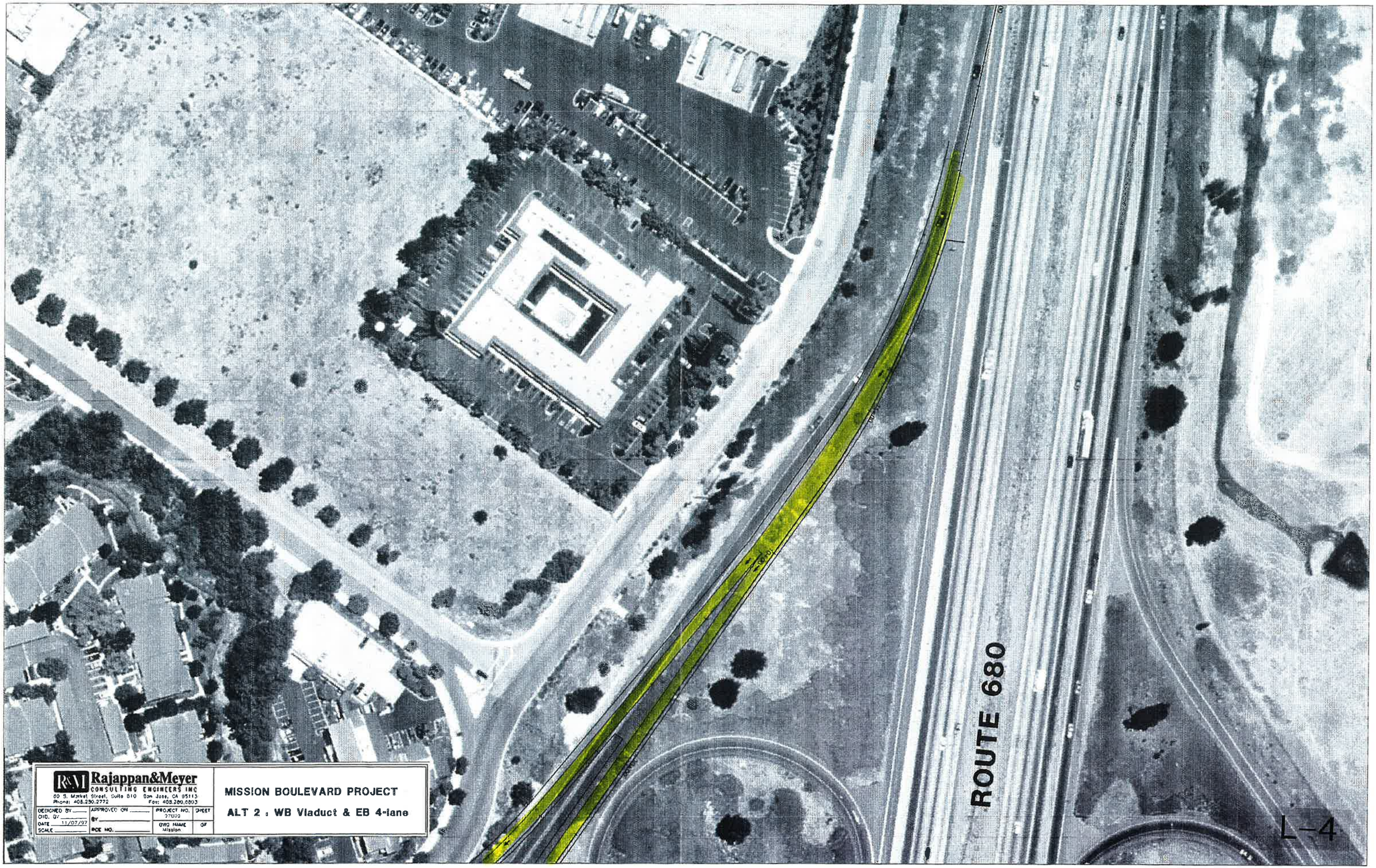


Rajappan&Meyer CONSULTING ENGINEERS INC 60 S. Market Street, Suite 510 San Jose, CA 95113 Phone: 408.280.3772 Fax: 408.280.6803			
DESIGNED BY ____	APPROVED ON ____	PROJECT NO. 97009	SHEET
CHD. BY ____	BY ____		
DATE 11/07/07	PCE NO. ____	DWG NAME Mission	OF
SCALE ____			

MISSION BOULEVARD PROJECT

ALT 2 : WB Viaduct & EB 4-lane

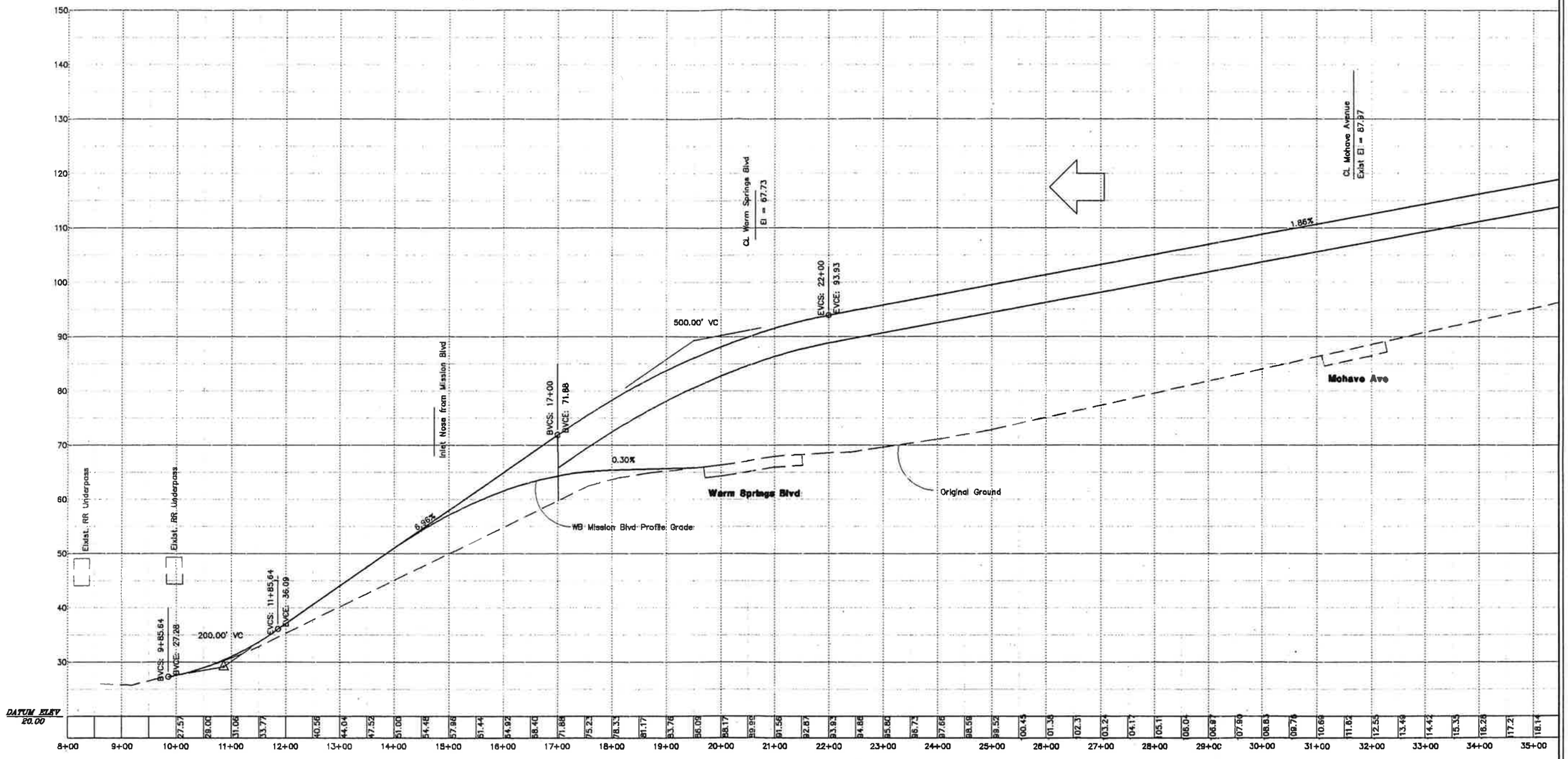
MATCH LINE SEE L-2



Rajappan&Meyer CONSULTING ENGINEERS INC	MISSION BOULEVARD PROJECT
60 S. Market Street, Suite 810 San Jose, CA 95113 Phone: 408.280.2772 Fax: 408.280.0803	ALT 2 : WB Viaduct & EB 4-lane
DESIGNED BY ___ APPROVED ON ___ CHD. BY ___ BY ___ DATE 11/07/97 SCALE ___ RCE NO. ___	PROJECT NO. 27000 SHEET OF DWG NAME Mission

L-4

MATCH LINE SEE L-3



WB Route 262 Viaduct Profile

Scale: Horiz 1"=200'
Vert 1"=20'

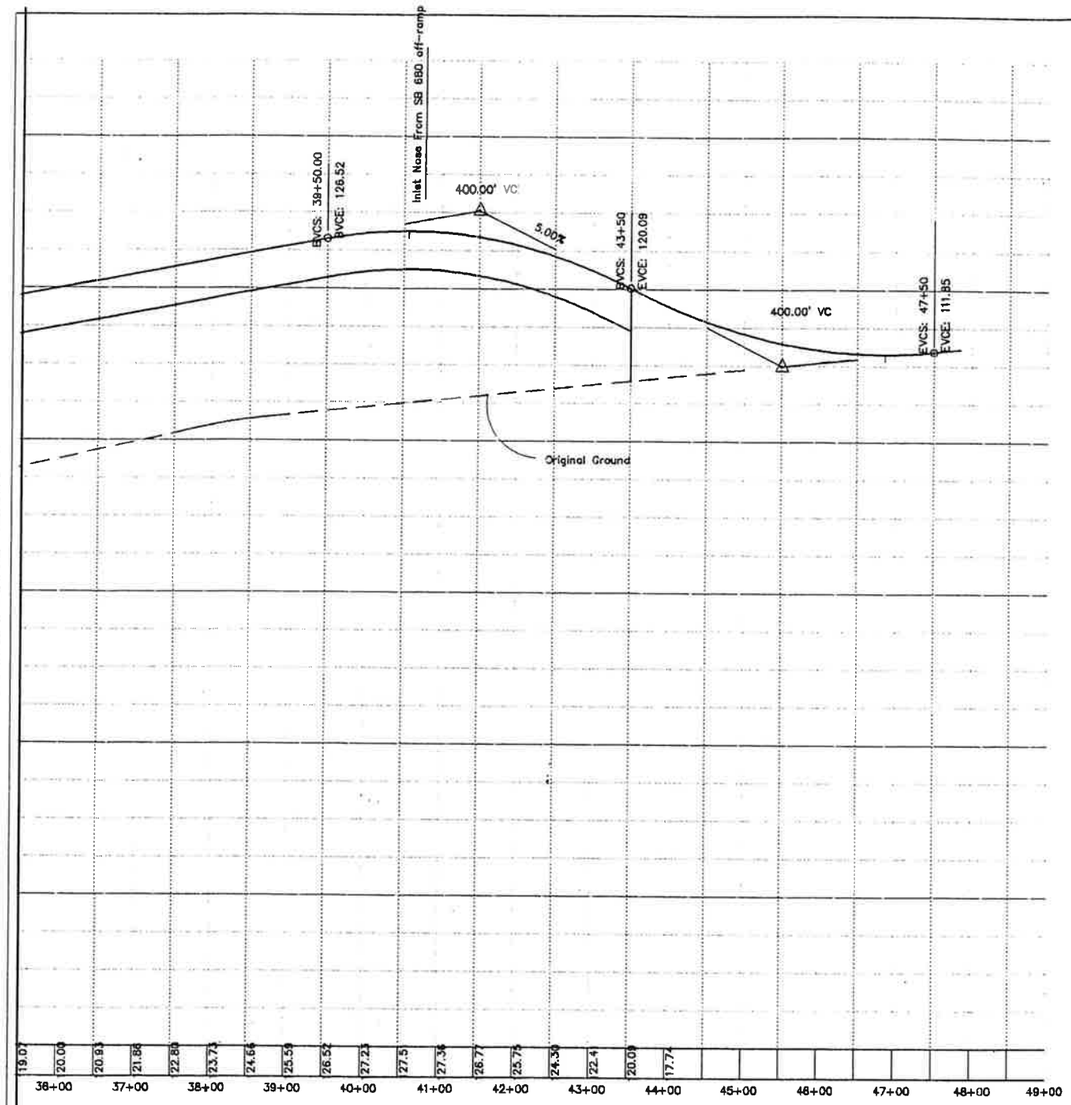
Rajappan&Meyer
CONSULTING ENGINEERS INC
60 S. Market Street, Suite 510 San Jose, CA 95113
Phone: 408.280.2772 Fax: 408.280.6803

DESIGNED BY ____	APPROVED ON ____	PROJECT NO. 97009	SHEET
CKD. BY ____	BY ____	DWG NAME Mission	OF
DATE 11/07/07	RCE NO. ____		
SCALE ____			

MISSION BOULEVARD PROJECT

PROFILES

MATCH LINE



WB Route 262 Viaduct Profile

Scale: Horiz 1"=200'
Vert 1"=20'

Rajappan&Meyer
CONSULTING ENGINEERS INC
60 S. Market Street, Suite 510 San Jose, CA 95113
Phone: 408.280.2772 Fax: 408.280.6803

DESIGNED BY ____	APPROVED ON ____	PROJECT NO. 97009	SHEET
CKD. BY ____	BY ____		
DATE 11/07/97		DWG NAME Mission	OF
SCALE ____	RCE NO. ____		

MISSION BOULEVARD PROJECT

PROFILES

CONCEPTUAL COST ESTIMATE

PROJECT NAME:	**MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE:	**CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880**
	WB BRIDGE $ EB 4-LANE OPTION

PROPONENT:	Congestion Management Agency	DATE:	26-Nov-97
DESIGN CONSULTANT:	R & M Consulting Engineers Inc.	BY:	DH
CONTRACT NO:	R & M 97009	REV:	0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
03	DRAINAGE DITCH 9'TOPx3'DEEP	LF	$224.00	$224.00		$0
03	DRAINAGE DITCH 4'TOPx2'DEEP	LF	$112.00	$112.00	2,000	$224,000
03	REINFORCED CONCRETE PIPE 18"	LF	$67.00	$67.00	2,000	$134,000
03	REINFORCED CONCRETE PIPE 24"	LF	$84.00	$84.00		$0
03	REINFORCED CONCRETE PIPE 36"	LF	$112.00	$112.00	3,500	$392,000
03	DRAINAGE STRUCTURES (CATCHBASINS, MANHOLES)	EA	$1,720.00	$1,720.00	70	$120,400
03	BOX CULVERTS	LF	$448.00	$448.00		$0
03	CLAY SEWER PIPE 6"	LF	$35.00	$35.00	500	$17,500
03	CLAY SEWER PIPE 12"	LF	$45.00	$45.00	6,000	$270,000
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
	TOTAL FOR ITEM 03 DRAINAGE					$1,157,900

CONCEPTUAL COST ESTIMATE

PROJECT NAME: MISSION BOULEVARD - EXPRESS LANE
TYPE OF ESTIMATE: CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880
WB BRIDGE $ EB 4-LANE OPTION

PROPONENT: Congestion Management Agency | DATE: 26-Nov-97
DESIGN CONSULTANT: R & M Consulting Engineers Inc. | BY: DH
CONTRACT NO: R & M 97009 | REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
04	ASPHALT CONCRETE PAVEMENT	SY	$41.50	$41.50	25,000	$1,037,500
04	PC CONCRETE PAVEMENT	SY	$47.50	$47.50		$0
04	STRIPING	LF	$0.45	$0.45	60,000	$27,000
04	MARKINGS	SF	$3.15	$3.15	5,000	$15,750
04	CURB & GUTTER	LF	$0.00	$15.00	15,000	$225,000
04	SIDEWALK	SF	$0.00	$5.00	27,000	$135,000
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
	TOTAL FOR ITEM 04 PAVEMENT					$1,440,250

CONCEPTUAL COST ESTIMATE

PROJECT NAME: MISSION BOULEVARD - EXPRESS LANE

TYPE OF ESTIMATE: CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880
WB BRIDGE $ EB 4-LANE OPTION

PROPONENT: Congestion Management Agency | DATE: 26-Nov-97

DESIGN CONSULTANT: R & M Consulting Engineers Inc. | BY: DH

CONTRACT NO: R & M 97009 | REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
05	BRIDGES	SF	$119.00	$120.00	105,500	$12,660,000
05	RETAINING WALLS-UNDER 5' HIGH	LF	$168.00	$168.00	800	$134,400
05	RETAINING WALLS-OVER 5' HIGH	LF	$504.00	$504.00	2,400	$1,209,600
05	SOUNDWALLS	LF	$224.00	$224.00	1,150	$257,600
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
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05			$0.00	$0.00		$0
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05			$0.00	$0.00		$0
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05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
TOTAL FOR ITEM 05 STRUCTURES						$14,261,600

CONCEPTUAL COST ESTIMATE

PROJECT NAME:	**MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE:	**CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880**
	WB BRIDGE $ EB 4-LANE OPTION

PROPONENT:	Congestion Management Agency	DATE:	26-Nov-97
DESIGN CONSULTANT:	R & M Consulting Engineers Inc.	BY:	DH
CONTRACT NO:	R & M 97009	REV:	0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
06	FENCING	LF	$18.00	$18.00	1,500	$27,000
06	CONCRETE BARRIER	LF	$80.00	$80.00	1,200	$96,000
06	METAL BEAM BARRIER	LF	$30.00	$30.00	1,000	$30,000
06	TRAFFIC SIGNALS	INT	$150,000.00	$150,000.00	2	$300,000
06	LIGHTING	MI	$166,000.00	$166,000.00	1	$166,000
06	SIGNING - ON RAMP	RMP	$4,700.00	$4,700.00	2	$9,400
06	SIGNING - OFF RAMP	RMP	$89,000.00	$89,000.00	1	$89,000
06	SIGNING - ADD ROADWAY	MI	$9,600.00	$9,600.00	1	$9,600
06	TRUSS SIGNS	EA	$38,000.00	$38,000.00	4	$152,000
06	ROAD SIDE SIGNS	EA	$356.00	$356.00	50	$17,800
06	LANDSCAPING	SF	$1.10	$15.00	92,000	$1,380,000
06	HAZARDOUS MATERIAL	LS	$0.00	$100,000.00	2	$200,000
06	ENVIRONMENTAL MITIGATION	LS	$0.00	$100,000.00	2	$200,000
06	IRRIGATION SYSTEM	LS	$0.00	$50,000.00	4	$200,000
06	RAMP METERING SYSTEM	EA	$0.00	$80,000.00	2	$160,000
06	RAMP METERING SYSTEM	EA	$0.00	$100,000.00		$0
06	RAMP METERING SYSTEM		$0.00	$250,000.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
	TOTAL FOR ITEM 06 MISCELLANEOUS					$3,036,800

CONCEPTUAL COST ESTIMATE

PROJECT NAME:	**MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE:	**CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880**
	WB BRIDGE $ EB 4-LANE OPTION

PROPONENT:	Congestion Management Agency	DATE:	26-Nov-97
DESIGN CONSULTANT:	R & M Consulting Engineers Inc.	BY:	DH
CONTRACT NO:	R & M 97009	REV:	0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
07	PG & E	LS	$0.00	$250,000.00	1	$250,000
07	PACIFIC BELL	LS	$0.00	$200,000.00	1	$200,000
07	RAILROAD COMPANIES	LS	$0.00	$0.00	1	$0
07	SEWER	LS	$0.00	$0.00	1	$0
07	EBMUD	LS	$0.00	$250,000.00	1	$250,000
07	BART	LS	$0.00	$0.00	1	$0
07	CABLE TV	LS	$0.00	$100,000.00	1	$100,000
07		LS	$0.00		1	$0
07						
07	MATERIAL FURNISHED BY OTHERS	LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
	TOTAL FOR ITEM 07 WORK BY OTHERS					$800,000

CONCEPTUAL COST ESTIMATE

PROJECT NAME: **MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE: **CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880 WB BRIDGE $ EB 4-LANE OPTION**

PROPONENT: Congestion Management Agency
DESIGN CONSULTANT: R & M Consulting Engineers Inc.
CONTRACT NO: R & M 97009

DATE: 26-Nov-97
BY: DH
REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
09	ENGINEERING STUDIES	%	4.0%	2.0%		$641,902
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	ENVIRONMENTAL STUDIES	%	5.0%	2.0%		$641,902
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	DESIGN ENGINEERING	%	10.0%	10.0%		$3,209,511
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	CONSTRUCTION ENGINEERING	%	3.0%	3.0%		$962,853
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	CONSTRUCTION STAKING	%	2.0%	2.0%		$641,902
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	CONSTRUCTION MANAGEMENT	%	10.0%	10.0%		$3,209,511
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	PROJECT MANAGEMENT	LS	$0.00	$50,000.00	1	$50,000
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	PUBLIC INFORMATION	LS	$0.00	$50,000.00	1	$50,000
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
	TOTAL FOR ITEM 09 ENGINEERING AND MANAGEMENT					$9,407,582

CONCEPTUAL COST ESTIMATE

PROJECT NAME: **MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE: **CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880**
WB BRIDGE $ EB 4-LANE OPTION

PROPONENT: Congestion Management Agency
DESIGN CONSULTANT: R & M Consulting Engineers Inc.
CONTRACT NO: R & M 97009

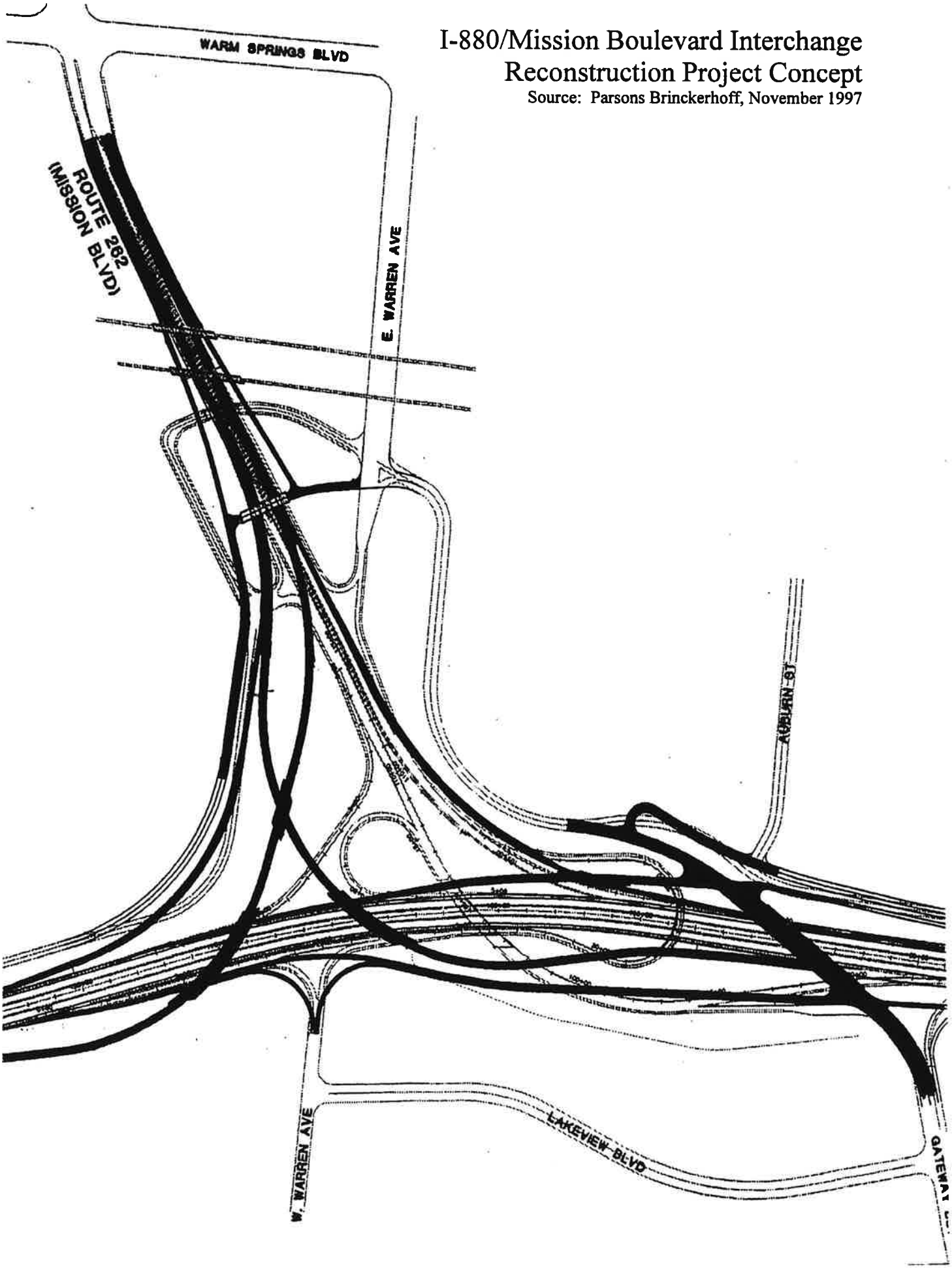
DATE: 26-Nov-97
BY: DH
REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
10	LAND COST :					
10	PARCEL NO. ______________	SF	$0.00	$20.00	34,000	$680,000
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	RELOCATIONS:					
10	PARCEL NO. ______________	LS	$0.00	$200,000.00	1	$200,000
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	ACQUISITION SERVICES	LS	$0.00	$20,000.00	1	$20,000
10	R.O.W. ENGINEERING	LS	$0.00	$150,000.00	1	$150,000
10	UTILITY RELOCATIONS	LS	$0.00	$0.00	1	$0
10	HAZARDOUS MATERIAL REMEDIATION	LS	$0.00	$0.00	1	$0
	SUBTOTAL					$1,050,000
10	CONTINGENCY	%	0.00%	0.00%		$0
	TOTAL FOR ITEM 10 LAND AND RIGHT-OF-WAY					$1,050,000

Appendix C
I-880/Mission Concept

I-880/Mission Boulevard Interchange Reconstruction Project Concept

Source: Parsons Brinckerhoff, November 1997



Appendix D
Traffic Study

TJKM Transportation Consultants

September 30, 1997

Mr. Keith Meyer, P.E.
Rajappan and Meyer
60 S. Market Street, Ste 510
San Jose, CA 95113

Re: Year 2010 Volumes on Route 262 in Fremont

Dear Mr. Meyer:

This is to present the revised findings of TJKM for the Rt. 262 (Mission Boulevard) traffic forecasts. The information in this letter supersedes the material in the letter of August 26, 1997 on the same subject. The purpose of our studies was to develop future year traffic volumes upon which to base a design for enhanced capacity for the Rt. 262 corridor between I-680 and I-880 in the City of Fremont.

In the first exercise, we utilized the existing City of Fremont MINUTP model to develop the year 2010 forecasts. This was thought to be the best model to develop intersection-level forecasts for the corridor. There are two existing signalized intersections in the portion of Mission Boulevard between I-680 and I-880 -- Mission Boulevard at Mohave Drive and Mission Boulevard at Warm Springs Boulevard. Since the earlier effort, we have obtained existing count information for the I-880/Rt. 262 interchange complex and have obtained forecasts from the Alameda County CMA model.

After comparing the previous forecasts with existing volumes and with forecasts obtained from the CMA model, we found it necessary to take information from both models and do manual adjustments to provide forecasts that are reasonable. Intersection counts obtained from the City indicate that Mission Boulevard/Mohave Drive currently operates at LOS E in the p.m. period while Mission Boulevard/Warm Springs Boulevard operates at LOS D in the p.m. Our observations, however, indicate that the intersections frequently are jammed so the calculated level of service ratings may be misleading. The existing ratings are attached.

We used the models to determine the amount of "through" traffic, defined in this case as traffic that travels from or beyond I-680 on the east to west of Warm Springs Boulevard. We also compared the forecasted "through" traffic with existing through traffic, which can be closely estimated from current counts. Figures 1 and 2 show all 2010 peak hour traffic in the Mission Boulevard corridor. The volumes include local traffic on Mission Boulevard as well as the through traffic during both the a.m. and p.m. periods. On the east end, the numbers indicate whether the trip uses I-680 north, I-680 south, or Mission Boulevard east of I-680. The results show peak directional volumes of 2,500 westbound in the morning and 2,250 eastbound in the evening. These volumes will work well with the proposed four-lane overhead connector, two in each direction, to serve through traffic.

The remaining volumes were evaluated to determine what at-grade local street system would be necessary to serve the two intersections and intervening land uses. With two lanes in each direction for through traffic on Mission Boulevard, including the use of the outer lane for right

turns at intersections, and separate left-turn lanes at the signalized intersections, both intersections will operate at LOS D or better during peak periods under 2010 volumes. At Warm Springs Boulevard, two left-turn lanes on Mission Boulevard are required in both directions of Mission Boulevard, while at Mohave Drive only one left-turn lane is required in each direction. Required lane patterns for the side streets do not exceed existing lanes and are indicated in the attached calculation sheets.

This exercise is intended to show the lane requirements for a proposed I-680/I-880 connector and to ensure that the local street system can function satisfactorily. We believe we have provided the required information. However, because the numbers are based on combinations of output from two very diverse models, coupled with hand adjustments and close comparison with existing patterns, the numbers cannot be considered as final. Perhaps the City of Fremont model which is under preparation will yield forecasts which require less adjustments. However, because of the process utilized and because the proposed four through lane concept would provide ample excess capacity, we are confident that the new numbers are "order of magnitude" results which are quite satisfactory to answer the questions at hand.

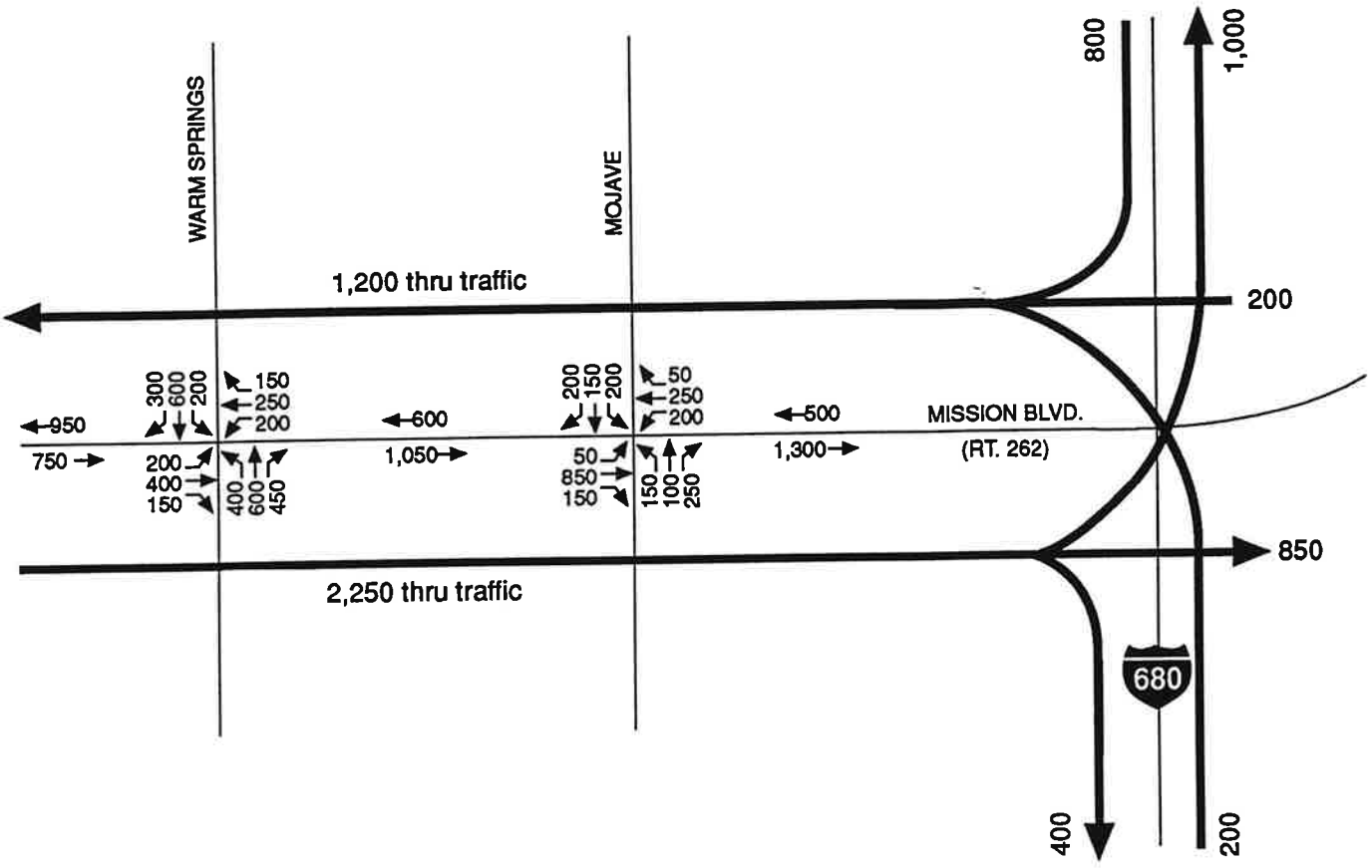
In summary, the proposed four-lane connector flyover provides sufficient capacity and the at-grade portion of the design requires two through lanes in each direction plus left-turn lanes at the two signalized intersections. Please let me know if additional information is required.

Very truly yours,

Chris D. Kinzel

Chris D. Kinzel, P.E.
President

rhm
Attachments
014-084l.3ck



Sources:
Fremont Model
CMA Model
TJKM

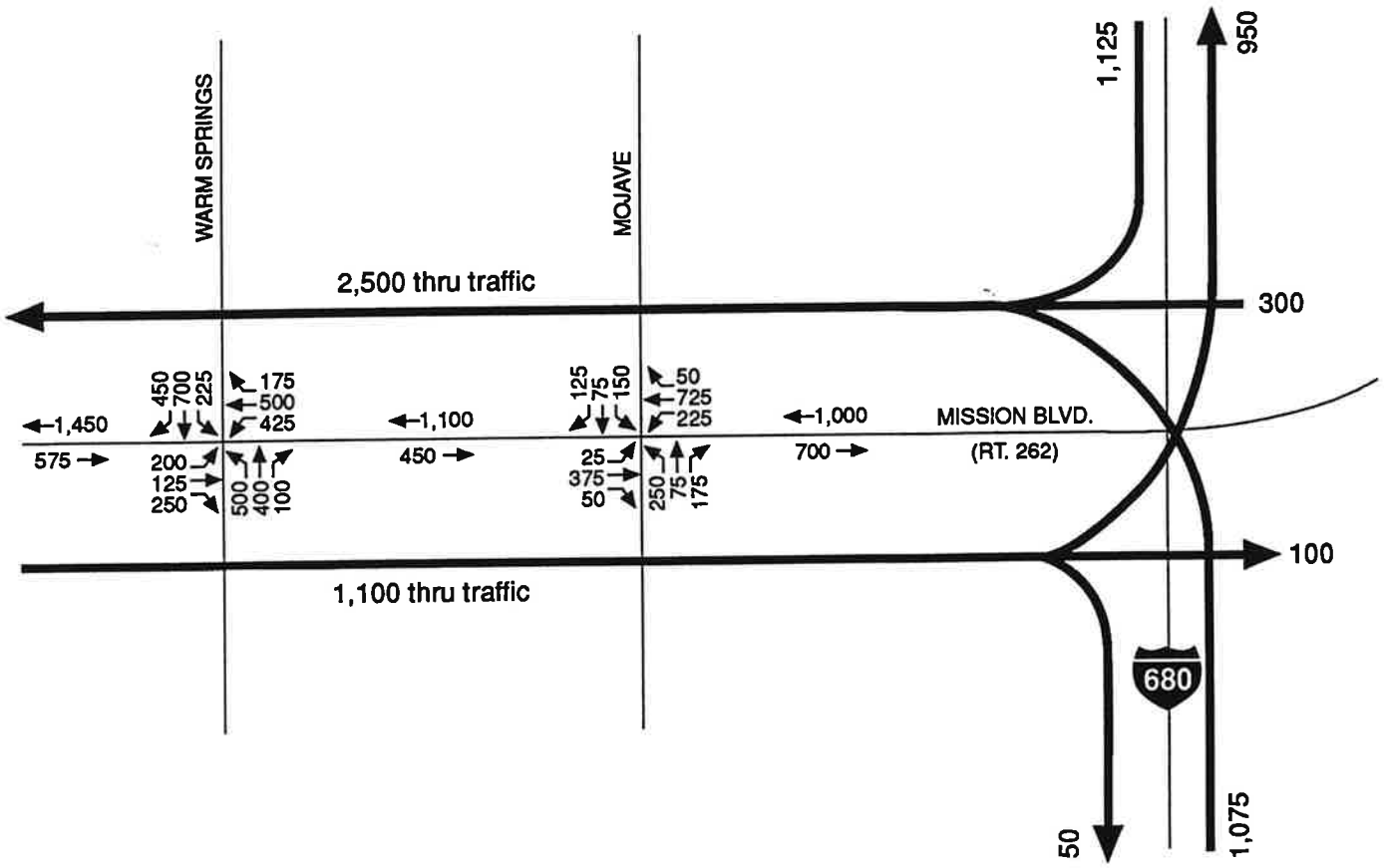
North
Not to Scale

Figure
1

PM Peak Hour Year 2010 Volumes on Route 262

TJKM

14-084 - 9/97 - CK



Sources:
Fremont Model
CMA Model
TJKM

North
Not to Scale

Figure 2

AM Peak Hour Year 2010 Volumes on Route 262

TJKM

LOS Software by TJKM Transportation Consultants

Condition: EXISTING (AM) 08/26/97

INTERSECTION 1 WARM SPRINGS BL/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD RIGHT THRU LEFT
439 710 168

LEFT 142 --- 2.0 1.0 2.0 2.0 1.0 --- 131 RIGHT
THRU 785 ---> 3.0 (NO. OF LANES) 3.0<--- 2024 THRU
RIGHT 236 --- 1.0 2.0 2.0 1.0 2.0 --- 394 LEFT

Split? N

STREET NAME: MISSION BLVD

N
W + E
S

504 317 83
LEFT THRU RIGHT Split? Y

SIG WARRANTS: Urb=Y, Rur=Y

STREET NAME: WARM SPRINGS BL

MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB RIGHT (R)	83	0 *	1620	0.0000	
THRU (T)	317	317	3500	0.0906	
LEFT (L)	504	504	3000	0.1680	0.1680
SB RIGHT (R)	439	341 *	1620	0.2105	0.2105
THRU (T)	710	710	3500	0.2029	
LEFT (L)	168	168	3000	0.0560	
EB RIGHT (R)	236	40 *	1620	0.0247	
THRU (T)	785	785	5250	0.1495	
LEFT (L)	142	142	3000	0.0473	0.0473
WB RIGHT (R)	131	26 *	1620	0.0160	
THRU (T)	2024	2024	5250	0.3855	0.3855
LEFT (L)	394	394	3000	0.1313	

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION: 0.81
ADJUSTMENT FOR LOST YELLOW TIME: 0.05
TOTAL VOLUME-TO-CAPACITY RATIO: 0.86
INTERSECTION LEVEL OF SERVICE: D

* ADJUSTED FOR RIGHT TURN ON RED
INT=EXIST.INT,VOL=EXIST.AMV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: EXISTING (PM) 08/26/97

INTERSECTION 1 WARM SPRINGS BL/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD RIGHT THRU LEFT
197 357 204

LEFT 209 --- 2.0 1.0 2.0 2.0 1.0 --- 133 RIGHT
THRU 1508 ---> 3.0 (NO. OF LANES) 3.0<--- 984 THRU
RIGHT 142 --- 1.0 2.0 2.0 1.0 2.0 --- 191 LEFT

Split? N

STREET NAME: MISSION BLVD

N
W + E
S

334 802 408
LEFT THRU RIGHT Split? Y

SIG WARRANTS: Urb=Y, Rur=Y

STREET NAME: WARM SPRINGS BL

MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB RIGHT (R)	408	296 *	1620	0.1827	
THRU (T)	802	802	3500	0.2291	0.2291
LEFT (L)	334	334	3000	0.1113	
SB RIGHT (R)	197	81 *	1620	0.0500	
THRU (T)	357	357	3500	0.1020	0.1020
LEFT (L)	204	204	3000	0.0680	
EB RIGHT (R)	142	0 *	1620	0.0000	
THRU (T)	1508	1508	5250	0.2872	0.2872
LEFT (L)	209	209	3000	0.0697	
WB RIGHT (R)	133	18 *	1620	0.0111	
THRU (T)	984	984	5250	0.1874	
LEFT (L)	191	191	3000	0.0637	0.0637

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION: 0.68
ADJUSTMENT FOR LOST YELLOW TIME: 0.10
TOTAL VOLUME-TO-CAPACITY RATIO: 0.78
INTERSECTION LEVEL OF SERVICE: C

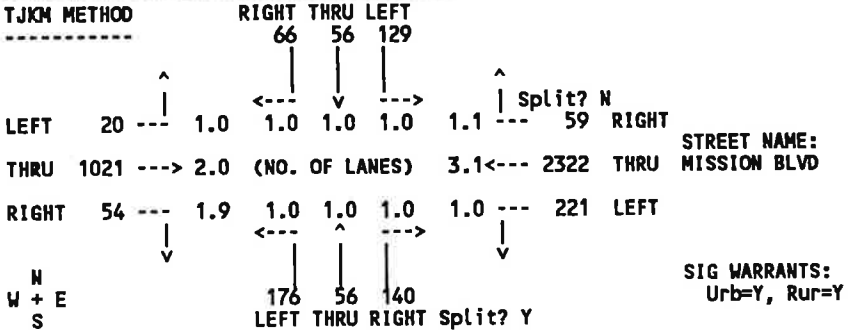
* ADJUSTED FOR RIGHT TURN ON RED
INT=EXIST.INT,VOL=EXIST.PMV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: EXISTING (AM) 08/26/97

INTERSECTION 2 MOHAVE DRIVE/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD



STREET NAME: MOHAVE DRIVE

	MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	140	0 *	1620	0.0000	
	THRU (T)	56	56	1750	0.0320	
	LEFT (L)	176	176	1620	0.1086	0.1086
SB	RIGHT (R)	66	0 *	1620	0.0000	
	THRU (T)	56	56	1750	0.0320	
	LEFT (L)	129	129	1620	0.0796	0.0796
EB	RIGHT (R)	54	54	1650	0.0327	
	THRU (T)	1021	1021	3500	0.2917	
	LEFT (L)	20	20	1620	0.0123	0.0123
WB	RIGHT (R)	59	59	1620	0.0364	
	THRU (T)	2322	2322	5120	0.4535	
	LEFT (L)	221	221	1620	0.1364	
	T + R		2381	5120	0.4650	0.4650

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION:	0.67
ADJUSTMENT FOR LOST YELLOW TIME:	0.10
TOTAL VOLUME-TO-CAPACITY RATIO:	0.77
INTERSECTION LEVEL OF SERVICE:	C

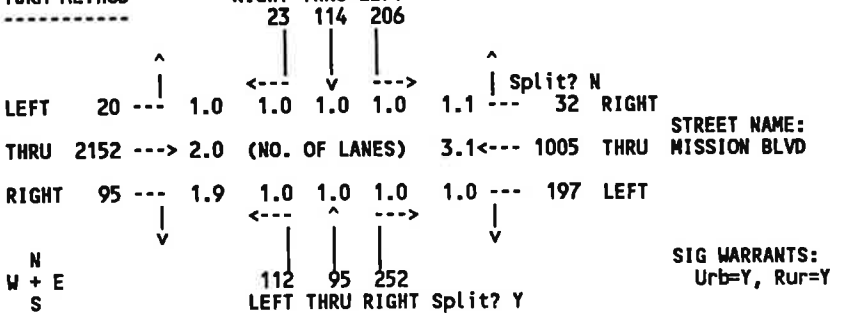
* ADJUSTED FOR RIGHT TURN ON RED
INT=EXIST.INT,VOL=EXIST.AMV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: EXISTING (PM) 08/26/97

INTERSECTION 2 MOHAVE DRIVE/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD



STREET NAME: MOHAVE DRIVE

	MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	252	94 *	1620	0.0580	
	THRU (T)	95	95	1750	0.0543	
	LEFT (L)	112	112	1620	0.0691	0.0691
SB	RIGHT (R)	23	0 *	1620	0.0000	
	THRU (T)	114	114	1750	0.0651	
	LEFT (L)	206	206	1620	0.1272	0.1272
EB	RIGHT (R)	95	95	1650	0.0576	
	THRU (T)	2152	2152	3500	0.6149	0.6149
	LEFT (L)	20	20	1620	0.0123	
WB	RIGHT (R)	32	32	1620	0.0198	
	THRU (T)	1005	1005	5120	0.1963	
	LEFT (L)	197	197	1620	0.1216	0.1216
	T + R		1037	5120	0.2025	

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION:	0.93
ADJUSTMENT FOR LOST YELLOW TIME:	0.05
TOTAL VOLUME-TO-CAPACITY RATIO:	0.98
INTERSECTION LEVEL OF SERVICE:	E

* ADJUSTED FOR RIGHT TURN ON RED
INT=EXIST.INT,VOL=EXIST.PMV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH CONNECTOR (AM) 09/30/97

INTERSECTION 1 WARM SPRINGS BL/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD

			RIGHT	THRU	LEFT				
			450	700	225				
LEFT	200	2.0	1.0	2.0	2.0	1.1	175	RIGHT	
THRU	125	2.1	(NO. OF LANES)			2.1	500	THRU	STREET NAME: MISSION BLVD
RIGHT	250	1.1	2.0	2.0	1.0	2.0	425	LEFT	
			500	400	100				
			LEFT	THRU	RIGHT	Split? Y			

Split? N

N
W + E
S

SIG WARRANTS: Urb=Y, Rur=Y

STREET NAME: WARM SPRINGS BL

	MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	100	0 *	1620	0.0000	
	THRU (T)	400	400	3500	0.1143	
	LEFT (L)	500	500	3000	0.1667	0.1667
SB	RIGHT (R)	450	336 *	1620	0.2074	0.2074
	THRU (T)	700	700	3500	0.2000	
	LEFT (L)	225	225	3000	0.0750	
EB	RIGHT (R)	250	250	1620	0.1543	0.1543
	THRU (T)	125	125	3370	0.0371	
	LEFT (L)	200	200	3000	0.0667	
	T + R		375	3370	0.1113	
WB	RIGHT (R)	175	175	1620	0.1080	
	THRU (T)	500	500	3370	0.1484	
	LEFT (L)	425	425	3000	0.1417	0.1417
	T + R		675	3370	0.2003	

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION:	0.67
ADJUSTMENT FOR LOST YELLOW TIME:	0.10
TOTAL VOLUME-TO-CAPACITY RATIO:	0.77
INTERSECTION LEVEL OF SERVICE:	C

* ADJUSTED FOR RIGHT TURN ON RED
INT=2010WC.INT,VOL=2010WCRE.AMV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH CONNECTOR (PM) 09/30/97

INTERSECTION 1 WARM SPRINGS BL/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD

			RIGHT	THRU	LEFT				
			300	600	200				
LEFT	200	2.0	1.0	2.0	2.0	1.1	150	RIGHT	
THRU	400	2.1	(NO. OF LANES)			2.1	250	THRU	STREET NAME: MISSION BLVD
RIGHT	150	1.1	2.0	2.0	1.0	2.0	200	LEFT	
			400	600	450				
			LEFT	THRU	RIGHT	Split? Y			

Split? N

N
W + E
S

SIG WARRANTS: Urb=Y, Rur=Y

STREET NAME: WARM SPRINGS BL

	MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	450	336 *	1620	0.2074	0.2074
	THRU (T)	600	600	3500	0.1714	
	LEFT (L)	400	400	3000	0.1333	
SB	RIGHT (R)	300	186 *	1620	0.1148	
	THRU (T)	600	600	3500	0.1714	0.1714
	LEFT (L)	200	200	3000	0.0667	
EB	RIGHT (R)	150	150	1620	0.0926	
	THRU (T)	400	400	3370	0.1187	
	LEFT (L)	200	200	3000	0.0667	
	T + R		550	3370	0.1632	0.1632
WB	RIGHT (R)	150	150	1620	0.0926	
	THRU (T)	250	250	3370	0.0742	
	LEFT (L)	200	200	3000	0.0667	0.0667
	T + R		400	3370	0.1187	

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION:	0.61
ADJUSTMENT FOR LOST YELLOW TIME:	0.10
TOTAL VOLUME-TO-CAPACITY RATIO:	0.71
INTERSECTION LEVEL OF SERVICE:	C

* ADJUSTED FOR RIGHT TURN ON RED
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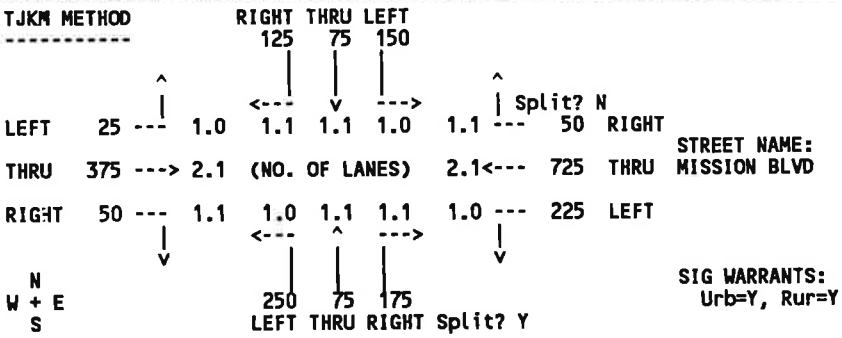
LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH CONNECTOR (AM) 09/30/97

INTERSECTION 2 MOHAVE DRIVE/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD



STREET NAME: MOHAVE DRIVE

MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB RIGHT (R)	175	175	1620	0.1080	
THRU (T)	75	75	1620	0.0463	
LEFT (L)	250	250	1620	0.1543	0.1543
T + R		250	1620	0.1543	
SB RIGHT (R)	125	125	1620	0.0772	
THRU (T)	75	75	1620	0.0463	
LEFT (L)	150	150	1620	0.0926	
T + R		200	1620	0.1235	0.1235
EB RIGHT (R)	50	50	1620	0.0309	
THRU (T)	375	375	3370	0.1113	
LEFT (L)	25	25	1620	0.0154	
T + R		425	3370	0.1261	0.1261
WB RIGHT (R)	50	50	1620	0.0309	
THRU (T)	725	725	3370	0.2151	
LEFT (L)	225	225	1620	0.1389	0.1389
T + R		775	3370	0.2300	

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION: 0.54
ADJUSTMENT FOR LOST YELLOW TIME: 0.10
TOTAL VOLUME-TO-CAPACITY RATIO: 0.64
INTERSECTION LEVEL OF SERVICE: B

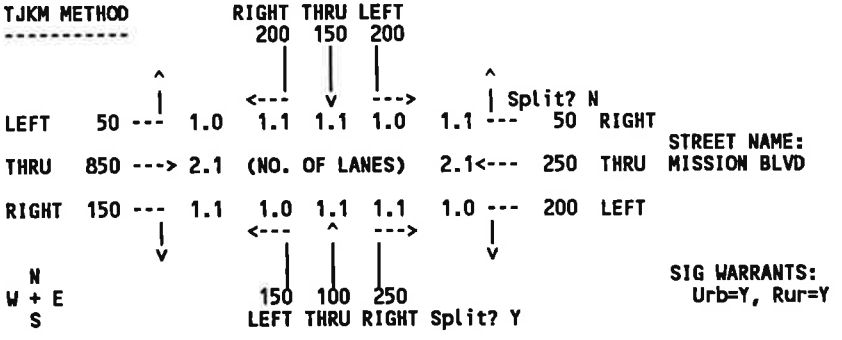
* ADJUSTED FOR RIGHT TURN ON RED
INT=2010WC.INT,VOL=2010WCRE.AMV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH CONNECTOR (PM) 09/30/97

INTERSECTION 2 MOHAVE DRIVE/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD



STREET NAME: MOHAVE DRIVE

MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB RIGHT (R)	250	250	1620	0.1543	
THRU (T)	100	100	1620	0.0617	
LEFT (L)	150	150	1620	0.0926	
T + R		350	1620	0.2160	0.2160
SB RIGHT (R)	200	200	1620	0.1235	
THRU (T)	150	150	1620	0.0926	
LEFT (L)	200	200	1620	0.1235	
T + R		350	1620	0.2160	0.2160
EB RIGHT (R)	150	150	1620	0.0926	
THRU (T)	850	850	3370	0.2522	
LEFT (L)	50	50	1620	0.0309	
T + R		1000	3370	0.2967	0.2967
WB RIGHT (R)	50	50	1620	0.0309	
THRU (T)	250	250	3370	0.0742	
LEFT (L)	200	200	1620	0.1235	0.1235
T + R		300	3370	0.0890	

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION: 0.85
ADJUSTMENT FOR LOST YELLOW TIME: 0.05
TOTAL VOLUME-TO-CAPACITY RATIO: 0.90
INTERSECTION LEVEL OF SERVICE: D

* ADJUSTED FOR RIGHT TURN ON RED
INT=2010WC.INT,VOL=2010WCRE.PMV,CAP=D:..FREMNEW.TAB

TJKM Transportation Consultants

MEMO

November 6, 1997 Project No.: 14-084

To: Keith Meyer, P.E.

From: Chris D. Kinzel

Subject: Additional Traffic Scenarios on Route 262 in Fremont

As you requested, TJKM ran additional level of service calculations for the two Mission Boulevard intersections with Warm Springs Boulevard and Mohave Drive. In all new scenarios, we used the 2010 volumes we compiled earlier based on our interpretation of both the Alameda County CMA model and the City of Fremont MINUTP model.

At the present time, there are three through lanes on Mission Boulevard at Warm Springs Boulevard in both the eastbound and westbound directions. At Mohave Drive, there are three westbound lanes and two eastbound lanes.

In order to examine the effects of additional lanes at both intersections, we calculated the intersection volume to capacity ratios with three through lanes in both directions and also with four through lanes in both directions. The results are as follows:

	Current Lanes		**Three Through Lanes**		**Four Through Lanes**	
	A.M	P.M.	A.M.	P.M.	A.M.	P.M.
Mission and Warm Springs	1.06 F	1.00 E	1.06 F	1.00 E	0.92 E	0.87 D
Mission and Mohave	0.95 E	1.28 F	0.95 E	0.98 E	0.82 D	0.84 D

Again, all evaluations are based on 2010 volumes. Please contact me if there are questions about this information. I have attached the calculation sheets.

\97proj\014-084m.3ck

4234 Hacienda Drive, Suite 101, Pleasanton, California 94588-2721

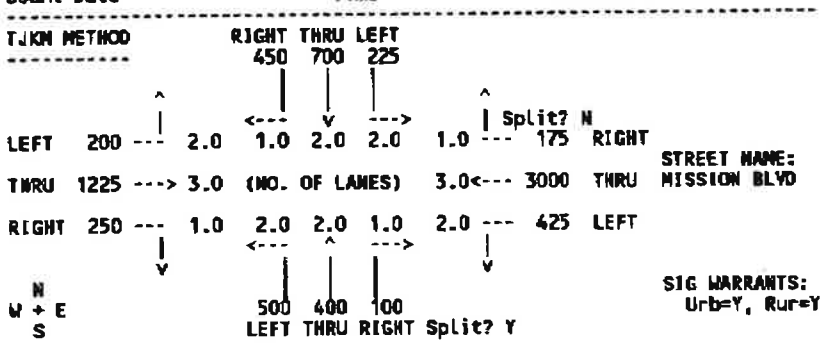
▪ Phone (510)463-0611 ▪ Fax (510)463-3690 ▪ e-mail tjkm@tjkm.com

LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH EXISTING LANE GEOMETRIES (AM) 11/05/97

INTERSECTION 1 WARM SPRINGS BL/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD



STREET NAME: WARM SPRINGS BL

	MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	100	0 *	1620	0.0000	
	THRU (T)	400	400	3500	0.1143	
	LEFT (L)	500	500	3000	0.1667	0.1667
SB	RIGHT (R)	450	336 *	1620	0.2074	0.2074
	THRU (T)	700	700	3500	0.2000	
	LEFT (L)	225	225	3000	0.0750	
EB	RIGHT (R)	250	55 *	1620	0.0340	
	THRU (T)	1225	1225	5250	0.2333	
	LEFT (L)	200	200	3000	0.0667	0.0667
WB	RIGHT (R)	175	54 *	1620	0.0333	
	THRU (T)	3000	3000	5250	0.5714	0.5714
	LEFT (L)	425	425	3000	0.1417	

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION:	1.01
ADJUSTMENT FOR LOST YELLOW TIME:	0.05
TOTAL VOLUME-TO-CAPACITY RATIO:	1.06
INTERSECTION LEVEL OF SERVICE:	F

* ADJUSTED FOR RIGHT TURN ON RED
INT=EXIST.INT,VOL=2010R11.ANV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH EXISTING LANE GEOMETRIES (PM) 11/05/97

INTERSECTION 1 WARM SPRINGS BL/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD

STREET NAME: WARM SPRINGS BL

	MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	450	336 *	1620	0.2074	0.2074
	THRU (T)	600	600	3500	0.1714	
	LEFT (L)	400	400	3000	0.1333	
SB	RIGHT (R)	300	186 *	1620	0.1148	
	THRU (T)	600	600	3500	0.1714	0.1714
	LEFT (L)	200	200	3000	0.0667	
EB	RIGHT (R)	150	0 *	1620	0.0000	
	THRU (T)	2650	2650	5250	0.5048	0.5048
	LEFT (L)	200	200	3000	0.0667	
WB	RIGHT (R)	150	36 *	1620	0.0222	
	THRU (T)	1450	1450	5250	0.2762	
	LEFT (L)	200	200	3000	0.0667	0.0667

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION:	0.95
ADJUSTMENT FOR LOST YELLOW TIME:	0.05
TOTAL VOLUME-TO-CAPACITY RATIO:	1.00
INTERSECTION LEVEL OF SERVICE:	E

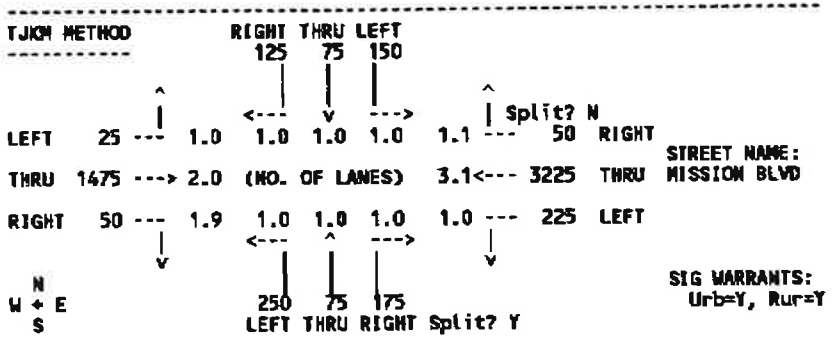
* ADJUSTED FOR RIGHT TURN ON RED
INT=EXIST.INT,VOL=2010R11.PMV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH EXISTING LANE GEOMETRIES (AM) 11/05/97

INTERSECTION 2 MOHAVE DRIVE/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD



STREET NAME: MOHAVE DRIVE

	MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	175	3 *	1620	0.0019	
	THRU (T)	75	75	1750	0.0429	
	LEFT (L)	250	250	1620	0.1543	0.1543
SB	RIGHT (R)	125	53 *	1620	0.0327	
	THRU (T)	75	75	1750	0.0429	
	LEFT (L)	150	150	1620	0.0926	0.0926
EB	RIGHT (R)	50	50	1650	0.0303	
	THRU (T)	1475	1475	3500	0.4214	
	LEFT (L)	25	25	1620	0.0154	0.0154
WB	RIGHT (R)	50	50	1620	0.0309	
	THRU (T)	3225	3225	5120	0.6299	
	LEFT (L)	225	225	1620	0.1389	
	T + R		3275	5120	0.6396	0.6396

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION: 0.90
ADJUSTMENT FOR LOST YELLOW TIME: 0.05
TOTAL VOLUME-TO-CAPACITY RATIO: 0.95
INTERSECTION LEVEL OF SERVICE: E

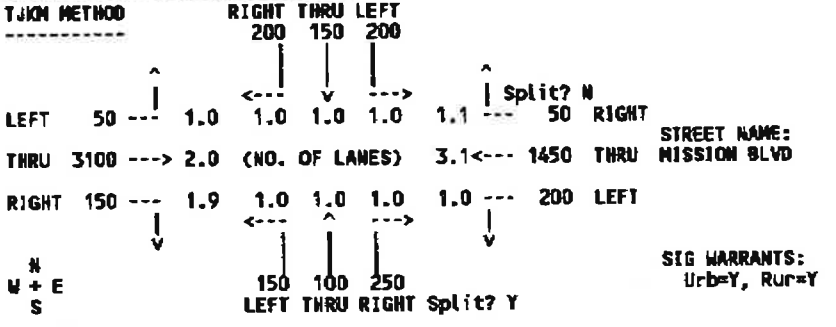
* ADJUSTED FOR RIGHT TURN ON RED
INT=EXIST.INT,VOL=2010R11.AMV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH EXISTING LANE GEOMETRIES (PM) 11/05/97

INTERSECTION 2 MOHAVE DRIVE/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD



STREET NAME: MOHAVE DRIVE

	MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	250	90 *	1620	0.0556	
	THRU (T)	100	100	1750	0.0571	
	LEFT (L)	150	150	1620	0.0926	0.0926
SB	RIGHT (R)	200	115 *	1620	0.0710	
	THRU (T)	150	150	1750	0.0857	
	LEFT (L)	200	200	1620	0.1235	0.1235
EB	RIGHT (R)	150	150	1650	0.0909	
	THRU (T)	3100	3100	3500	0.8857	0.8857
	LEFT (L)	50	50	1620	0.0309	
WB	RIGHT (R)	50	50	1620	0.0309	
	THRU (T)	1450	1450	5120	0.2832	
	LEFT (L)	200	200	1620	0.1235	0.1235
	T + R		1500	5120	0.2930	

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION: 1.23
ADJUSTMENT FOR LOST YELLOW TIME: 0.05
TOTAL VOLUME-TO-CAPACITY RATIO: 1.28
INTERSECTION LEVEL OF SERVICE: F

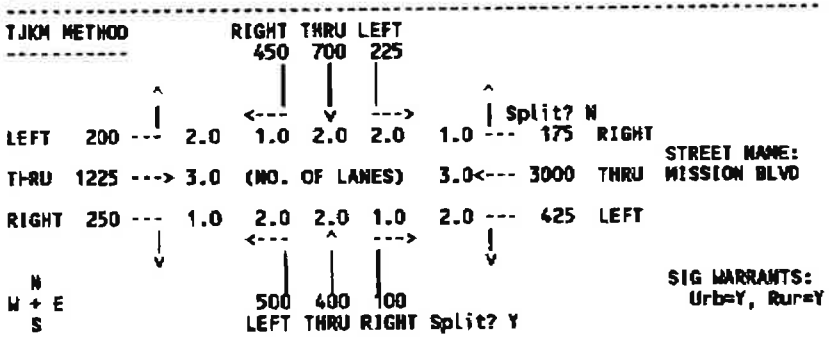
* ADJUSTED FOR RIGHT TURN ON RED
INT=EXIST.INT,VOL=2010R11.PMV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH NEAR-TERM LANE GEOMETRIES (AM) 11/05/97

INTERSECTION 1 WARM SPRINGS BL/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD



STREET NAME: WARM SPRINGS BL

	MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	100	0 *	1620	0.0000	
	THRU (T)	400	400	3500	0.1143	
	LEFT (L)	500	500	3000	0.1667	0.1667
SB	RIGHT (R)	450	336 *	1620	0.2074	0.2074
	THRU (T)	700	700	3500	0.2000	
	LEFT (L)	225	225	3000	0.0750	
EB	RIGHT (R)	250	55 *	1620	0.0340	
	THRU (T)	1225	1225	5250	0.2333	
	LEFT (L)	200	200	3000	0.0667	0.0667
WB	RIGHT (R)	175	54 *	1620	0.0333	
	THRU (T)	3000	3000	5250	0.5714	0.5714
	LEFT (L)	425	425	3000	0.1417	

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION:	1.01
ADJUSTMENT FOR LOST YELLOW TIME:	0.05
TOTAL VOLUME-TO-CAPACITY RATIO:	1.06
INTERSECTION LEVEL OF SERVICE:	F

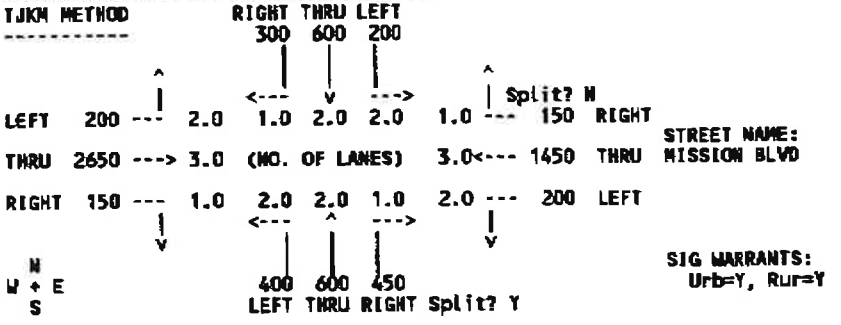
* ADJUSTED FOR RIGHT TURN ON RED
INT=2010R11.INT,VOL=2010R11.AMV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH NEAR-TERM LANE GEOMETRIES (PM) 11/05/97

INTERSECTION 1 WARM SPRINGS BL/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD



STREET NAME: WARM SPRINGS BL

	MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	450	336 *	1620	0.2074	0.2074
	THRU (T)	600	600	3500	0.1714	
	LEFT (L)	400	400	3000	0.1333	
SB	RIGHT (R)	300	186 *	1620	0.1148	
	THRU (T)	600	600	3500	0.1714	0.1714
	LEFT (L)	200	200	3000	0.0667	
EB	RIGHT (R)	150	0 *	1620	0.0000	
	THRU (T)	2650	2650	5250	0.5048	0.5048
	LEFT (L)	200	200	3000	0.0667	
WB	RIGHT (R)	150	36 *	1620	0.0222	
	THRU (T)	1450	1450	5250	0.2762	
	LEFT (L)	200	200	3000	0.0667	0.0667

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION:	0.95
ADJUSTMENT FOR LOST YELLOW TIME:	0.05
TOTAL VOLUME-TO-CAPACITY RATIO:	1.00
INTERSECTION LEVEL OF SERVICE:	E

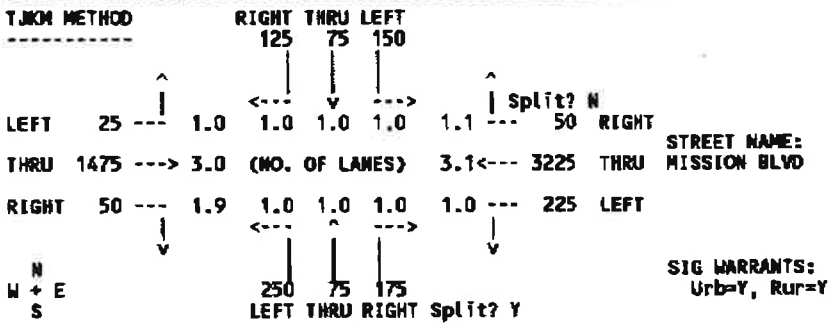
* ADJUSTED FOR RIGHT TURN ON RED
INT=2010R11.INT,VOL=2010R11.PMV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH NEAR-TERM LANE GEOMETRIES (AM) 11/05/97

INTERSECTION 2 MOHAVE DRIVE/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD



STREET NAME: MOHAVE DRIVE

MOVEMENT		ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	175	3 *	1620	0.0019	
	THRU (T)	75	75	1750	0.0429	
	LEFT (L)	250	250	1620	0.1543	0.1543
SB	RIGHT (R)	125	53 *	1620	0.0327	
	THRU (T)	75	75	1750	0.0429	
	LEFT (L)	150	150	1620	0.0926	0.0926
EB	RIGHT (R)	50	50	1650	0.0303	
	THRU (T)	1475	1475	5250	0.2810	
	LEFT (L)	25	25	1620	0.0154	0.0154
WB	RIGHT (R)	50	50	1620	0.0309	
	THRU (T)	3225	3225	5120	0.6299	
	LEFT (L)	225	225	1620	0.1389	
	T + R		3275	5120	0.6396	0.6396

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION:	0.90
ADJUSTMENT FOR LOST YELLOW TIME:	0.05
TOTAL VOLUME-TO-CAPACITY RATIO:	0.95
INTERSECTION LEVEL OF SERVICE:	E

* ADJUSTED FOR RIGHT TURN ON RED
INT=2010R11.INT,VOL=2010R11.AMV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH NEAR-TERM LANE GEOMETRIES (PM) 11/05/97

INTERSECTION 2 MOHAVE DRIVE/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD

STREET NAME: MOHAVE DRIVE

MOVEMENT		ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	250	90 *	1620	0.0556	
	THRU (T)	100	100	1750	0.0571	
	LEFT (L)	150	150	1620	0.0926	0.0926
SB	RIGHT (R)	200	115 *	1620	0.0710	
	THRU (T)	150	150	1750	0.0857	
	LEFT (L)	200	200	1620	0.1235	0.1235
EB	RIGHT (R)	150	150	1650	0.0909	
	THRU (T)	3100	3100	5250	0.5905	0.5905
	LEFT (L)	50	50	1620	0.0309	
WB	RIGHT (R)	50	50	1620	0.0309	
	THRU (T)	1450	1450	5120	0.2832	
	LEFT (L)	200	200	1620	0.1235	0.1235
	T + R		1500	5120	0.2930	

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION:	0.93
ADJUSTMENT FOR LOST YELLOW TIME:	0.05
TOTAL VOLUME-TO-CAPACITY RATIO:	0.98
INTERSECTION LEVEL OF SERVICE:	E

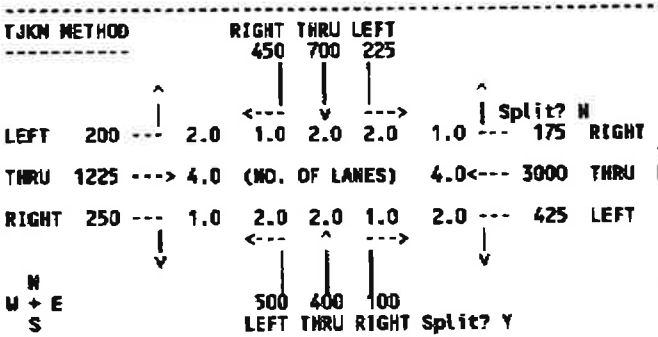
* ADJUSTED FOR RIGHT TURN ON RED
INT=2010R11.INT,VOL=2010R11.PMV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH LONG-TERM LANE GEOMETRIES (AM) 11/05/97

INTERSECTION 1 WARM SPRINGS BL/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD



STREET NAME: WARM SPRINGS BL

	MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	100	0 *	1620	0.0000	
	THRU (T)	400	400	3500	0.1143	
	LEFT (L)	500	500	3000	0.1667	0.1667
SB	RIGHT (R)	450	336 *	1620	0.2074	0.2074
	THRU (T)	700	700	3500	0.2000	
	LEFT (L)	225	225	3000	0.0750	
EB	RIGHT (R)	250	55 *	1620	0.0340	
	THRU (T)	1225	1225	7000	0.1750	
	LEFT (L)	200	200	3000	0.0667	0.0667
WB	RIGHT (R)	175	54 *	1620	0.0333	
	THRU (T)	3000	3000	7000	0.4286	0.4286
	LEFT (L)	425	425	3000	0.1417	

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION:	0.87
ADJUSTMENT FOR LOST YELLOW TIME:	0.05
TOTAL VOLUME-TO-CAPACITY RATIO:	0.92
INTERSECTION LEVEL OF SERVICE:	E

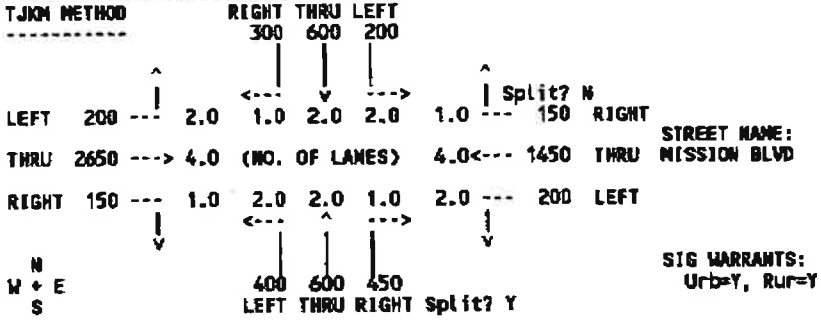
* ADJUSTED FOR RIGHT TURN ON RED
INT=2010R112.INT,VOL=2010R11.AMV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH LONG-TERM LANE GEOMETRIES (PM) 11/05/97

INTERSECTION 1 WARM SPRINGS BL/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

TJKM METHOD



STREET NAME: WARM SPRINGS BL

	MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	450	336 *	1620	0.2074	0.2074
	THRU (T)	600	600	3500	0.1714	
	LEFT (L)	400	400	3000	0.1333	
SB	RIGHT (R)	300	186 *	1620	0.1148	
	THRU (T)	600	600	3500	0.1714	0.1714
	LEFT (L)	200	200	3000	0.0667	
EB	RIGHT (R)	150	0 *	1620	0.0000	
	THRU (T)	2650	2650	7000	0.3786	0.3786
	LEFT (L)	200	200	3000	0.0667	
WB	RIGHT (R)	150	36 *	1620	0.0222	
	THRU (T)	1450	1450	7000	0.2071	
	LEFT (L)	200	200	3000	0.0667	0.0667

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION:	0.82
ADJUSTMENT FOR LOST YELLOW TIME:	0.05
TOTAL VOLUME-TO-CAPACITY RATIO:	0.87
INTERSECTION LEVEL OF SERVICE:	D

* ADJUSTED FOR RIGHT TURN ON RED
INT=2010R112.INT,VOL=2010R11.PNV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH LONG-TERM LANE GEOMETRIES (AM) 11/05/97

INTERSECTION 2 MOHAVE DRIVE/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

```
TJKM METHOD          RIGHT THRU LEFT
-----------           125   75  150
                 ^     |     |    |         ^
                 |    <---   v   --->       | Split? N
LEFT   25 ---   1.0   1.0  1.0  1.0   1.1 ---    50  RIGHT    STREET NAME:
THRU 1475 ---> 4.0   (NO. OF LANES)   4.1<--- 3225  THRU     MISSION BLVD
RIGHT  50 ---   1.9   1.0  1.0  1.0   1.0 ---   225  LEFT
                 |    <---   ^   --->       |
                 v     |     |    |         v                 SIG WARRANTS:
   N                                                            Urb=Y, Rur=Y
 W + E                250   75  175
   S                 LEFT THRU RIGHT Split? Y
```

STREET NAME: MOHAVE DRIVE

	MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	175	3 *	1620	0.0019	
	THRU (T)	75	75	1750	0.0429	
	LEFT (L)	250	250	1620	0.1543	0.1543
SB	RIGHT (R)	125	53 *	1620	0.0327	
	THRU (T)	75	75	1750	0.0429	
	LEFT (L)	150	150	1620	0.0926	0.0926
EB	RIGHT (R)	50	50	1650	0.0303	
	THRU (T)	1475	1475	7000	0.2107	
	LEFT (L)	25	25	1620	0.0154	0.0154
WB	RIGHT (R)	50	50	1620	0.0309	
	THRU (T)	3225	3225	6870	0.4694	
	LEFT (L)	225	225	1620	0.1389	
	T + R		3275	6870	0.4767	0.4767

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION:	0.74
ADJUSTMENT FOR LOST YELLOW TIME:	0.08
TOTAL VOLUME-TO-CAPACITY RATIO:	0.82
INTERSECTION LEVEL OF SERVICE:	D

* ADJUSTED FOR RIGHT TURN ON RED
INT=2010R112.INT,VOL=2010R11.AMV,CAP=D:..FREMNEW.TAB

LOS Software by TJKM Transportation Consultants

Condition: 2010 WITH LONG-TERM LANE GEOMETRIES (PM) 11/05/97

INTERSECTION 2 MOHAVE DRIVE/MISSION BLVD CITY OF FREMONT
Count Date Time Peak Hour

```
TJKM METHOD          RIGHT THRU LEFT
-----------           200  150  200
                 ^     |     |    |         ^
                 |    <---   v   --->       | Split? N
LEFT   50 ---   1.0   1.0  1.0  1.0   1.1 ---    50  RIGHT    STREET NAME:
THRU 3100 ---> 4.0   (NO. OF LANES)   4.1<--- 1450  THRU     MISSION BLVD
RIGHT 150 ---   1.9   1.0  1.0  1.0   1.0 ---   200  LEFT
                 |    <---   ^   --->       |
                 v     |     |    |         v                 SIG WARRANTS:
   N                                                            Urb=Y, Rur=Y
 W + E                150  100  250
   S                 LEFT THRU RIGHT Split? Y
```

STREET NAME: MOHAVE DRIVE

	MOVEMENT	ORIGINAL VOLUME	ADJUSTED VOLUME*	CAPACITY	V/C RATIO	CRITICAL V/C
NB	RIGHT (R)	250	90 *	1620	0.0556	
	THRU (T)	100	100	1750	0.0571	
	LEFT (L)	150	150	1620	0.0926	0.0926
SB	RIGHT (R)	200	115 *	1620	0.0710	
	THRU (T)	150	150	1750	0.0857	
	LEFT (L)	200	200	1620	0.1235	0.1235
EB	RIGHT (R)	150	150	1650	0.0909	
	THRU (T)	3100	3100	7000	0.4429	0.4429
	LEFT (L)	50	50	1620	0.0309	
WB	RIGHT (R)	50	50	1620	0.0309	
	THRU (T)	1450	1450	6870	0.2111	
	LEFT (L)	200	200	1620	0.1235	0.1235
	T + R		1500	6870	0.2183	

VOLUME-TO-CAPACITY RATIO FOR THE INTERSECTION:	0.78
ADJUSTMENT FOR LOST YELLOW TIME:	0.06
TOTAL VOLUME-TO-CAPACITY RATIO:	0.84
INTERSECTION LEVEL OF SERVICE:	D

* ADJUSTED FOR RIGHT TURN ON RED
INT=2010R112.INT,VOL=2010R11.PMV,CAP=D:..FREMNEW.TAB

TJKM Transportation Consultants

MEMO

February 6, 1998

Project No.: 14-084

To: Keith Meyer, P.E. FAX 408 280-6803

From: Chris D. Kinzel

Subject: I-680/I-880 Cross-Connector HOV Volumes

TJKM has evaluated the potential traffic demand for one HOV lane and one mixed-flow lane on a two-lane ramp connector between I-680 and I-880 on Rt. 262 in Fremont. We had earlier estimated a total a.m. peak hour directional demand of about 2,500 vehicles. Based on our I-680 studies, we estimate that between 20 percent and 30 percent of all vehicles will carry two or more persons and utilize an HOV lane. Under these circumstances there would be between 500 and 750 high-occupancy vehicles with 1,750 to 2,000 mixed-flow vehicles.

Given these numbers, it seem appropriate that both lanes be mixed-flow vehicles for the following reasons:

1. The length of the connector is relatively short and the normal pay-off from HOV lanes probably won't occur, even with HOV lanes on both of the connected freeways. Or, the incentive to carpool will be adequately established by HOV lanes on the other facilities, which have a greater ratio of mixed-flow to HOV lanes.

2. It will be difficult and costly to institute HOV lanes on the actual connectors with I-680 and I-880, reducing the effective length of the ramp connector HOV lanes.

3. There will be a significant lane imbalance between the HOV lane and the mixed-flow lane.

Although these reasons seem compelling, there is at least one important reason to consider either one HOV lane and one mixed-flow lane or even one HOV lane alone: if an HOV lane were added under a regional plan to achieve full HOV lane continuity over extended distances in order to strongly encourage HOV lane utilization, there would be justification to consider such a scheme for the Mission Boulevard (Rt. 262) corridor. Please let me know if there are questions on this material.

\97proj\14-084m.8ck

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Appendix E
Cost Estimate

CONCEPTUAL COST ESTIMATE SUMMARY

PROJECT NAME: **MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE: **CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880 BRIDGE OPTION**

PROPONENT: Congestion Management Agency
DESIGN CONSULTANT: R & M Consulting Engineers Inc.
CONTRACT NO: R & M 97009
DATE: 06-Nov-97
BY: DH
REV: 0

GROUP CODE	GROUP DESCRIPTION		TOTAL COSTS (98$)
01	ADVANCE WORK		$5,502,536
02	EARTHWORK		$315,000
03	DRAINAGE		$1,157,900
04	PAVEMENT		$2,096,750
05	STRUCTURES		$28,013,120
06	MISCELLANEOUS		$2,709,800
	TOTAL CONTRACT COST		$39,795,106
07	WORK BY OTHERS		$800,000
	SUBTOTAL		$40,595,106
08	CONTINGENCY	25.0%	$10,148,777
	TOTAL CONSTRUCTION COST		$50,743,883
09	ENGINEERING AND MANAGEMENT		$14,775,726
10	LAND AND RIGHT-OF-WAY		$1,570,000
	SUBTOTAL		$67,089,608
11	PROJECT RESERVE	10.0%	$6,708,961
	TOTAL COST		$73,798,569

CONCEPTUAL COST ESTIMATE

PROJECT NAME:	MISSION BOULEVARD - EXPRESS LANE		
TYPE OF ESTIMATE:	CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880 BRIDGE OPTION		
PROPONENT:	Congestion Management Agency	DATE:	06-Nov-97
DESIGN CONSULTANT:	R & M Consulting Engineers Inc.	BY:	DH
CONTRACT NO:	R & M 97009	REV:	0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
01	TEMPORARY WORK,DETOURS, ETC.	%	15.0%	3.0%		$1,038,133
01	MAINTENANCE OF UTILITIES	%	5.0%	2.0%		$692,089
01	MOBILIZATION	%	12.0%	10.0%		$3,460,444
01	CLEARING/GRUBBING	AC	$2,240.00	$2,240.00	8	$17,920
01	DEMOLITION - AC PAVEMENT	SY	$5.60	$5.60	20,000	$112,000
01	DEMOLITION - PCC PAVEMENT	SY	$39.20	$39.20		$0
01	DEMOLITION - CONCRETE	CY	$123.00	$123.00	650	$79,950
01	DEMOLITION - BUILDING	CF	$0.56	$0.56		$0
01	STORM WATER POLLUTION PREVENTI(	LS	$0.00	$20,000.00	1	$20,000
01	PROJECT SCHEDULES	LS	$0.00	$10,000.00	1	$10,000
01	CONSTRUCTION FIELD OFFICE	LS	$0.00	$2,000.00	24	$48,000
01	DEMOLITION BUILDING	SF	$0.00	$20.00	1,200	$24,000
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
	TOTAL FOR ITEM 01 ADVANCE WORK					$5,502,536

CONCEPTUAL COST ESTIMATE

PROJECT NAME: MISSION BOULEVARD - EXPRESS LANE
TYPE OF ESTIMATE: CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880
BRIDGE OPTION

PROPONENT: Congestion Management Agency
DESIGN CONSULTANT: R & M Consulting Engineers Inc.
CONTRACT NO: R & M 97009

DATE: 06-Nov-97
BY: DH
REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
02	ROADWAY EXCAVATION	CY	$9.00	$9.00	33,000	$297,000
02	IMPORTED BORROW	CY	$14.50	$14.50		$0
02	EROSION CONTROL	AC	$4,500.00	$4,500.00	4	$18,000
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
TOTAL FOR ITEM 02 EARTHWORK						$315,000

Form B-1

MISSION-A.xls

CONCEPTUAL COST ESTIMATE

PROJECT NAME: MISSION BOULEVARD - EXPRESS LANE
TYPE OF ESTIMATE: CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880
BRIDGE OPTION

PROPONENT: Congestion Management Agency
DESIGN CONSULTANT: R & M Consulting Engineers Inc.
CONTRACT NO: R & M 97009

DATE: 06-Nov-97
BY: DH
REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
03	DRAINAGE DITCH 9'TOPx3'DEEP	LF	$224.00	$224.00		$0
03	DRAINAGE DITCH 4'TOPx2'DEEP	LF	$112.00	$112.00	2,000	$224,000
03	REINFORCED CONCRETE PIPE 18"	LF	$67.00	$67.00	2,000	$134,000
03	REINFORCED CONCRETE PIPE 24"	LF	$84.00	$84.00		$0
03	REINFORCED CONCRETE PIPE 36"	LF	$112.00	$112.00	3,500	$392,000
03	DRAINAGE STRUCTURES (CATCHBASINS, MANHOLES)	EA	$1,720.00	$1,720.00	70	$120,400
03	BOX CULVERTS	LF	$448.00	$448.00		$0
03	CLAY SEWER PIPE 6"	LF	$35.00	$35.00	500	$17,500
03	CLAY SEWER PIPE 12"	LF	$45.00	$45.00	6,000	$270,000
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
TOTAL FOR ITEM 03 DRAINAGE						$1,157,900

CONCEPTUAL COST ESTIMATE

PROJECT NAME: MISSION BOULEVARD - EXPRESS LANE
TYPE OF ESTIMATE: CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880
BRIDGE OPTION

PROPONENT: Congestion Management Agency
DESIGN CONSULTANT: R & M Consulting Engineers Inc.
CONTRACT NO: R & M 97009

DATE: 06-Nov-97
BY: DH
REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
04	ASPHALT CONCRETE PAVEMENT	SY	$41.50	$41.50	41,000	$1,701,500
04	PC CONCRETE PAVEMENT	SY	$47.50	$47.50		$0
04	STRIPING	LF	$0.45	$0.45	60,000	$27,000
04	MARKINGS	SF	$3.15	$3.15	5,000	$15,750
04	CURB & GUTTER	LF	$0.00	$15.00	15,500	$232,500
04	SIDEWALK	SF	$0.00	$5.00	24,000	$120,000
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
	TOTAL FOR ITEM 04 PAVEMENT					$2,096,750

CONCEPTUAL COST ESTIMATE

PROJECT NAME:	**MISSION BOULEVARD - EXPRESS LANE**	
TYPE OF ESTIMATE:	**CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880**	
	BRIDGE OPTION	

PROPONENT:	Congestion Management Agency	DATE:	06-Nov-97
DESIGN CONSULTANT:	R & M Consulting Engineers Inc.	BY:	DH
CONTRACT NO:	R & M 97009	REV:	0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
05	BRIDGES	SF	$119.00	$120.00	215,000	$25,800,000
05	RETAINING WALLS-UNDER 5' HIGH	LF	$168.00	$168.00	2,340	$393,120
05	RETAINING WALLS-OVER 5' HIGH	LF	$504.00	$504.00	3,100	$1,562,400
05	SOUNDWALLS	LF	$224.00	$224.00	1,150	$257,600
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
TOTAL FOR ITEM 05 STRUCTURES						$28,013,120

CONCEPTUAL COST ESTIMATE

PROJECT NAME: MISSION BOULEVARD - EXPRESS LANE
TYPE OF ESTIMATE: CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880
BRIDGE OPTION

PROPONENT: Congestion Management Agency
DESIGN CONSULTANT: R & M Consulting Engineers Inc.
CONTRACT NO: R & M 97009

DATE: 06-Nov-97
BY: DH
REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
06	FENCING	LF	$18.00	$18.00	1,500	$27,000
06	CONCRETE BARRIER	LF	$80.00	$80.00	3,500	$280,000
06	METAL BEAM BARRIER	LF	$30.00	$30.00	2,000	$60,000
06	TRAFFIC SIGNALS	INT	$150,000.00	$150,000.00	2	$300,000
06	LIGHTING	MI	$166,000.00	$166,000.00	1	$166,000
06	SIGNING - ON RAMP	RMP	$4,700.00	$4,700.00	2	$9,400
06	SIGNING - OFF RAMP	RMP	$89,000.00	$89,000.00	2	$178,000
06	SIGNING - ADD ROADWAY	MI	$9,600.00	$9,600.00	1	$9,600
06	TRUSS SIGNS	EA	$38,000.00	$38,000.00	4	$152,000
06	ROAD SIDE SIGNS	EA	$356.00	$356.00	50	$17,800
06	LANDSCAPING	SF	$1.10	$5.00	150,000	$750,000
06	HAZARDOUS MATERIAL	LS	$0.00	$100,000.00	2	$200,000
06	ENVIRONMENTAL MITIGATION	LS	$0.00	$100,000.00	2	$200,000
06	IRRIGATION SYSTEM	LS	$0.00	$50,000.00	4	$200,000
06	RAMP METERING SYSTEM	EA	$0.00	$80,000.00	2	$160,000
06	RAMP METERING SYSTEM	EA	$0.00	$100,000.00		$0
06	RAMP METERING SYSTEM		$0.00	$250,000.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
TOTAL FOR ITEM 06 MISCELLANEOUS						$2,709,800

CONCEPTUAL COST ESTIMATE

PROJECT NAME: **MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE: **CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880**
BRIDGE OPTION

PROPONENT: Congestion Management Agency | DATE: 06-Nov-97
DESIGN CONSULTANT: R & M Consulting Engineers Inc. | BY: DH
CONTRACT NO: R & M 97009 | REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
07	PG & E	LS	$0.00	$250,000.00	1	$250,000
07	PACIFIC BELL	LS	$0.00	$200,000.00	1	$200,000
07	RAILROAD COMPANIES	LS	$0.00	$0.00	1	$0
07	SEWER	LS	$0.00	$0.00	1	$0
07	EBMUD	LS	$0.00	$250,000.00	1	$250,000
07	BART	LS	$0.00	$0.00	1	$0
07	CABLE TV	LS	$0.00	$100,000.00	1	$100,000
07		LS	$0.00		1	$0
07						
07	MATERIAL FURNISHED BY OTHERS	LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
	TOTAL FOR ITEM 07 WORK BY OTHERS					$800,000

CONCEPTUAL COST ESTIMATE

PROJECT NAME: **MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE: **CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880 BRIDGE OPTION**

PROPONENT: Congestion Management Agency
DESIGN CONSULTANT: R & M Consulting Engineers Inc.
CONTRACT NO: R & M 97009
DATE: 06-Nov-97
BY: DH
REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
09	ENGINEERING STUDIES	%	4.0%	2.0%		$1,014,878
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	ENVIRONMENTAL STUDIES	%	5.0%	2.0%		$1,014,878
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	DESIGN ENGINEERING	%	10.0%	10.0%		$5,074,388
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	CONSTRUCTION ENGINEERING	%	3.0%	3.0%		$1,522,316
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	CONSTRUCTION STAKING	%	2.0%	2.0%		$1,014,878
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	CONSTRUCTION MANAGEMENT	%	10.0%	10.0%		$5,074,388
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	PROJECT MANAGEMENT	LS	$0.00	$50,000.00	1	$50,000
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	PUBLIC INFORMATION	LS	$0.00	$10,000.00	1	$10,000
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
	TOTAL FOR ITEM 09 ENGINEERING AND MANAGEMENT					$14,775,726

CONCEPTUAL COST ESTIMATE

PROJECT NAME:	**MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE:	**CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880** **BRIDGE OPTION**

PROPONENT:	Congestion Management Agency	DATE:	06-Nov-97
DESIGN CONSULTANT:	R & M Consulting Engineers Inc.	BY:	DH
CONTRACT NO:	R & M 97009	REV:	0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
10	LAND COST :					
10	PARCEL NO. ____________	SF	$0.00	$20.00	60,000	$1,200,000
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	RELOCATIONS:					
10	PARCEL NO. ____________	LS	$0.00	$200,000.00	1	$200,000
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ____________	LS	$0.00	$0.00	1	$0
10	ACQUISITION SERVICES	LS	$0.00	$20,000.00	1	$20,000
10	R.O.W. ENGINEERING	LS	$0.00	$150,000.00	1	$150,000
10	UTILITY RELOCATIONS	LS	$0.00	$0.00	1	$0
10	HAZARDOUS MATERIAL REMEDIATION	LS	$0.00	$0.00	1	$0
	SUBTOTAL					$1,570,000
10	CONTINGENCY	%	0.00%	0.00%		$0
	TOTAL FOR ITEM 10 LAND AND RIGHT-OF-WAY					$1,570,000

Rajappan&Meyer
CONSULTING ENGINEERS INC

Rajappan & Meyer Consulting Engineers, Inc.
610 16th Street Suite 215, Oakland, CA 94612
(510) 986-1996 (510) 986-1997 fax

CONCEPTUAL COST ESTIMATE SUMMARY

PROJECT NAME: **MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE: **CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880 WB BRIDGE& EB 4-LANE OPTION**

PROPONENT:	Congestion Management Agency	DATE:	26-Nov-97
DESIGN CONSULTANT:	R & M Consulting Engineers Inc.	BY:	DH
CONTRACT NO:	R & M 97009	REV:	0

GROUP CODE	GROUP DESCRIPTION		TOTAL COSTS (98$)
01	ADVANCE WORK		$4,772,537
02	EARTHWORK		$207,000
03	DRAINAGE		$1,157,900
04	PAVEMENT		$1,440,250
05	STRUCTURES		$14,261,600
06	MISCELLANEOUS		$3,036,800
	TOTAL CONTRACT COST		$24,876,087
07	WORK BY OTHERS		$800,000
	SUBTOTAL		$25,676,087
08	CONTINGENCY	25.0%	$6,419,022
	TOTAL CONSTRUCTION COST		$32,095,109
09	ENGINEERING AND MANAGEMENT		$9,407,582
10	LAND AND RIGHT-OF-WAY		$1,050,000
	SUBTOTAL		$42,552,691
11	PROJECT RESERVE	10.0%	$4,255,269
	TOTAL COST		$46,807,960

CONCEPTUAL COST ESTIMATE

PROJECT NAME: MISSION BOULEVARD - EXPRESS LANE
TYPE OF ESTIMATE: CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880
WB BRIDGE & EB 4-LANE OPTION

PROPONENT: Congestion Management Agency
DESIGN CONSULTANT: R & M Consulting Engineers Inc.
CONTRACT NO: R & M 97009

DATE: 26-Nov-97
BY: DH
REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
01	TEMPORARY WORK,DETOURS, ETC.	%	15.0%	6.0%		$1,264,886
01	MAINTENANCE OF UTILITIES	%	5.0%	2.0%		$421,629
01	MOBILIZATION	%	12.0%	10.0%		$2,108,143
01	CLEARING/GRUBBING	AC	$2,240.00	$2,240.00	8	$17,920
01	DEMOLITION - AC PAVEMENT	SY	$5.60	$5.60	10,000	$56,000
01	DEMOLITION - PCC PAVEMENT	SY	$39.20	$39.20		$0
01	DEMOLITION - CONCRETE	CY	$123.00	$123.00	6,520	$801,960
01	DEMOLITION - BUILDING	CF	$0.56	$0.56	0	$0
01	STORM WATER POLLUTION PREVENTION PLAN	LS	$0.00	$20,000.00	1	$20,000
01	PROJECT SCHEDULES	LS	$0.00	$10,000.00	1	$10,000
01	CONSTRUCTION FIELD OFFICE	LS	$0.00	$2,000.00	24	$48,000
01	DEMOLITION BUILDING	SF	$0.00	$20.00	1,200	$24,000
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01			$0.00	$0.00		$0
01	TOTAL FOR ITEM 01 ADVANCE WORK					$4,772,537

Form B-1

alt2.xls

CONCEPTUAL COST ESTIMATE

PROJECT NAME:	**MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE:	**CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880** **WB BRIDGE $ EB 4-LANE OPTION**

PROPONENT:	Congestion Management Agency	DATE:	26-Nov-97
DESIGN CONSULTANT:	R & M Consulting Engineers Inc.	BY:	DH
CONTRACT NO:	R & M 97009	REV:	0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
02	ROADWAY EXCAVATION	CY	$9.00	$9.00	21,000	$189,000
02	IMPORTED BORROW	CY	$14.50	$14.50		$0
02	EROSION CONTROL	AC	$4,500.00	$4,500.00	4	$18,000
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
02			$0.00	$0.00		$0
	TOTAL FOR ITEM 02 EARTHWORK					$207,000

CONCEPTUAL COST ESTIMATE

PROJECT NAME:	**MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE:	**CONCEPTUAL - EXPRESS LANES FROM I-880 TO I-880** **WB BRIDGE $ EB 4-LANE OPTION**

PROPONENT:	Congestion Management Agency	DATE:	26-Nov-97
DESIGN CONSULTANT:	R & M Consulting Engineers Inc.	BY:	DH
CONTRACT NO:	R & M 97009	REV:	0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
03	DRAINAGE DITCH 9'TOPx3'DEEP	LF	$224.00	$224.00		$0
03	DRAINAGE DITCH 4'TOPx2'DEEP	LF	$112.00	$112.00	2,000	$224,000
03	REINFORCED CONCRETE PIPE 18"	LF	$67.00	$67.00	2,000	$134,000
03	REINFORCED CONCRETE PIPE 24"	LF	$84.00	$84.00		$0
03	REINFORCED CONCRETE PIPE 36"	LF	$112.00	$112.00	3,500	$392,000
03	DRAINAGE STRUCTURES (CATCHBASINS, MANHOLES)	EA	$1,720.00	$1,720.00	70	$120,400
03	BOX CULVERTS	LF	$448.00	$448.00		$0
03	CLAY SEWER PIPE 6"	LF	$35.00	$35.00	500	$17,500
03	CLAY SEWER PIPE 12"	LF	$45.00	$45.00	6,000	$270,000
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
03			$0.00	$0.00		$0
TOTAL FOR ITEM 03 DRAINAGE						$1,157,900

CONCEPTUAL COST ESTIMATE

PROJECT NAME: **MISSION BOULEVARD - EXPRESS LANE**

TYPE OF ESTIMATE: **CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880**
WB BRIDGE $ EB 4-LANE OPTION

PROPONENT: Congestion Management Agency

DESIGN CONSULTANT: R & M Consulting Engineers Inc.

CONTRACT NO: R & M 97009

DATE: 26-Nov-97

BY: DH

REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
04	ASPHALT CONCRETE PAVEMENT	SY	$41.50	$41.50	25,000	$1,037,500
04	PC CONCRETE PAVEMENT	SY	$47.50	$47.50		$0
04	STRIPING	LF	$0.45	$0.45	60,000	$27,000
04	MARKINGS	SF	$3.15	$3.15	5,000	$15,750
04	CURB & GUTTER	LF	$0.00	$15.00	15,000	$225,000
04	SIDEWALK	SF	$0.00	$5.00	27,000	$135,000
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
04			$0.00	$0.00		$0
	TOTAL FOR ITEM 04 PAVEMENT					$1,440,250

CONCEPTUAL COST ESTIMATE

PROJECT NAME: **MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE: **CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880**
WB BRIDGE $ EB 4-LANE OPTION

PROPONENT: Congestion Management Agency — DATE: 26-Nov-97
DESIGN CONSULTANT: R & M Consulting Engineers Inc. — BY: DH
CONTRACT NO: R & M 97009 — REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
05	BRIDGES	SF	$119.00	$120.00	105,500	$12,660,000
05	RETAINING WALLS-UNDER 5' HIGH	LF	$168.00	$168.00	800	$134,400
05	RETAINING WALLS-OVER 5' HIGH	LF	$504.00	$504.00	2,400	$1,209,600
05	SOUNDWALLS	LF	$224.00	$224.00	1,150	$257,600
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
05			$0.00	$0.00		$0
	TOTAL FOR ITEM 05 STRUCTURES					$14,261,600

CONCEPTUAL COST ESTIMATE

PROJECT NAME: MISSION BOULEVARD - EXPRESS LANE
TYPE OF ESTIMATE: CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880
WB BRIDGE $ EB 4-LANE OPTION

PROPONENT: Congestion Management Agency
DESIGN CONSULTANT: R & M Consulting Engineers Inc.
CONTRACT NO: R & M 97009

DATE: 26-Nov-97
BY: DH
REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
06	FENCING	LF	$18.00	$18.00	1,500	$27,000
06	CONCRETE BARRIER	LF	$80.00	$80.00	1,200	$96,000
06	METAL BEAM BARRIER	LF	$30.00	$30.00	1,000	$30,000
06	TRAFFIC SIGNALS	INT	$150,000.00	$150,000.00	2	$300,000
06	LIGHTING	MI	$166,000.00	$166,000.00	1	$166,000
06	SIGNING - ON RAMP	RMP	$4,700.00	$4,700.00	2	$9,400
06	SIGNING - OFF RAMP	RMP	$89,000.00	$89,000.00	1	$89,000
06	SIGNING - ADD ROADWAY	MI	$9,600.00	$9,600.00	1	$9,600
06	TRUSS SIGNS	EA	$38,000.00	$38,000.00	4	$152,000
06	ROAD SIDE SIGNS	EA	$356.00	$356.00	50	$17,800
06	LANDSCAPING	SF	$1.10	$15.00	92,000	$1,380,000
06	HAZARDOUS MATERIAL	LS	$0.00	$100,000.00	2	$200,000
06	ENVIRONMENTAL MITIGATION	LS	$0.00	$100,000.00	2	$200,000
06	IRRIGATION SYSTEM	LS	$0.00	$50,000.00	4	$200,000
06	RAMP METERING SYSTEM	EA	$0.00	$80,000.00	2	$160,000
06	RAMP METERING SYSTEM	EA	$0.00	$100,000.00		$0
06	RAMP METERING SYSTEM		$0.00	$250,000.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
06			$0.00	$0.00		$0
	TOTAL FOR ITEM 06 MISCELLANEOUS					$3,036,800

CONCEPTUAL COST ESTIMATE

PROJECT NAME: **MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE: **CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880**
WB BRIDGE $ EB 4-LANE OPTION

PROPONENT: Congestion Management Agency — DATE: 26-Nov-97
DESIGN CONSULTANT: R & M Consulting Engineers Inc. — BY: DH
CONTRACT NO: R & M 97009 — REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
07	PG & E	LS	$0.00	$250,000.00	1	$250,000
07	PACIFIC BELL	LS	$0.00	$200,000.00	1	$200,000
07	RAILROAD COMPANIES	LS	$0.00	$0.00	1	$0
07	SEWER	LS	$0.00	$0.00	1	$0
07	EBMUD	LS	$0.00	$250,000.00	1	$250,000
07	BART	LS	$0.00	$0.00	1	$0
07	CABLE TV	LS	$0.00	$100,000.00	1	$100,000
07		LS	$0.00		1	$0
07						
07	MATERIAL FURNISHED BY OTHERS	LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
07		LS	$0.00	$0.00	1	$0
	TOTAL FOR ITEM 07 WORK BY OTHERS					$800,000

CONCEPTUAL COST ESTIMATE

PROJECT NAME: **MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE: **CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880 WB BRIDGE $ EB 4-LANE OPTION**

PROPONENT: Congestion Management Agency DATE: 26-Nov-97
DESIGN CONSULTANT: R & M Consulting Engineers Inc. BY: DH
CONTRACT NO: R & M 97009 REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
09	ENGINEERING STUDIES	%	4.0%	2.0%		$641,902
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	ENVIRONMENTAL STUDIES	%	5.0%	2.0%		$641,902
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	DESIGN ENGINEERING	%	10.0%	10.0%		$3,209,511
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	CONSTRUCTION ENGINEERING	%	3.0%	3.0%		$962,853
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	CONSTRUCTION STAKING	%	2.0%	2.0%		$641,902
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	CONSTRUCTION MANAGEMENT	%	10.0%	10.0%		$3,209,511
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	PROJECT MANAGEMENT	LS	$0.00	$50,000.00	1	$50,000
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
09	PUBLIC INFORMATION	LS	$0.00	$50,000.00	1	$50,000
09		LS	$0.00	$0.00	1	$0
09		LS	$0.00	$0.00	1	$0
	TOTAL FOR ITEM 09 ENGINEERING AND MANAGEMENT					$9,407,582

CONCEPTUAL COST ESTIMATE

PROJECT NAME: **MISSION BOULEVARD - EXPRESS LANE**
TYPE OF ESTIMATE: **CONCEPTUAL - EXPRESS LANES FROM I-680 TO I-880**
WB BRIDGE $ EB 4-LANE OPTION

PROPONENT: Congestion Management Agency
DESIGN CONSULTANT: R & M Consulting Engineers Inc.
CONTRACT NO: R & M 97009

DATE: 26-Nov-97
BY: DH
REV: 0

GROUP CODE	ITEM DESCRIPTION	UNIT	GUIDE PRICE	PROPONENT PRICE	QUANTITY	TOTAL COST (1998$)
10	LAND COST :					
10	PARCEL NO. ______________	SF	$0.00	$20.00	34,000	$680,000
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	RELOCATIONS:					
10	PARCEL NO. ______________	LS	$0.00	$200,000.00	1	$200,000
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	PARCEL NO. ______________	LS	$0.00	$0.00	1	$0
10	ACQUISITION SERVICES	LS	$0.00	$20,000.00	1	$20,000
10	R.O.W. ENGINEERING	LS	$0.00	$150,000.00	1	$150,000
10	UTILITY RELOCATIONS	LS	$0.00	$0.00	1	$0
10	HAZARDOUS MATERIAL REMEDIATION	LS	$0.00	$0.00	1	$0
	SUBTOTAL					$1,050,000
10	CONTINGENCY	%	0.00%	0.00%		$0
	TOTAL FOR ITEM 10 LAND AND RIGHT-OF-WAY					$1,050,000