SAN MIGUEL
TRAFFIC CIRCULATION STUDY

San Miguel, California

Prepared For

San Luis Obispo County
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APPENDIX A

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1 INTRODUCTION

This Traffic Circulation Study addresses the need for capacity related transportation improvements in the unincorporated area of San Miguel and traffic impacts on San Miguel's infrastructure through cumulative conditions. This report includes the costs and potential funding mechanisms for these improvements including adopting a Road Impact Fee and partnering with the County and their Road Impact Fee Program.

San Miguel is located approximately eight miles north of Paso Robles in San Luis Obispo County and has a population of approximately 1,500. A location map of the study area is indicated in **Figure 1.1.**

The objective of the technical analysis was to define future projected capacity demands and the transportation improvements necessary to accommodate them. A key element of the study was to determine the necessary capital improvement program and develop impact fees to support the program. This is done per government Code Section 66000 for exacting mitigation fees. The focus of the circulation study is developed to identify and correct capacity deficiencies related to new development, as they are the only projects that Road Impact Fee monies can be applied to (the Government Code Section 66000).

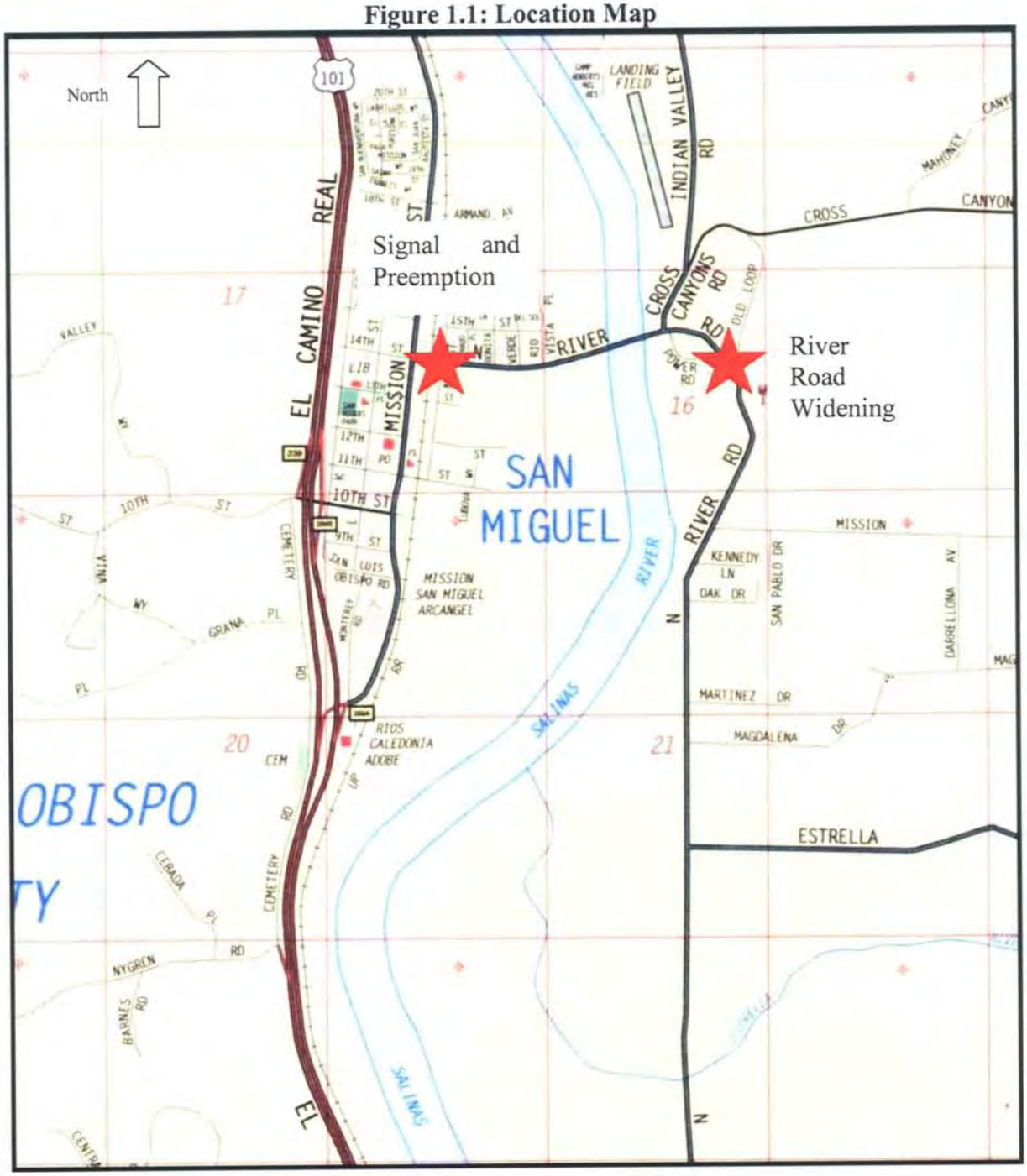
Other projects related to safety, bicycle, pedestrian, public transportation facilities and the existing roadway geometric deficiencies must be funded by other sources. As impact fee projects are developed, the roadway will be implemented to the current standard, incorporating bike paths as well as pedestrian paths where they are required by governing plans. There are several known large projects in San Miguel which have forced the need for the Traffic Impact Fee study. They are:

1. TR 2710
2. TR 2779
3. CO-04-0120
4. CO-02-0424
5. TR 2750
6. TR2723
7. TR 2647
8. TR 2527
9. TR 2637

These projects, together with vacant land in the area, were used to calculate the cumulative traffic at the two locations where improvements are required for cumulative conditions. The two improvement projects that have been identified include the following and are also indicated on **Figure 1.1**:

1. The implementation of a traffic signal and rail road preemption at the intersection of Mission Street / 14th Street – River Road
2. Widening of River Road south of Cross Canyons Road.

Figure 1.1: Location Map



2 EXISTING CONDITIONS

The chapter reviews the existing conditions on the roadways studied in the Community of San Miguel. Topics include an inventory of the road system, review of functional classifications, analysis of traffic volumes and operations, and a discussion of the existing deficiencies.

For transportation planning purposes, all major roadways are classified according to their traffic carrying requirements and access control. The San Luis Obispo County Public Works Department uses a system of four functional classes:

1. Principal arterials are designed to carry high traffic volumes with minimum interruptions.

2. Arterials carry regional traffic at high speeds, but access is permitted at cross streets. Access to abutting parcels is controlled by permitting for driveways and encouragement of shared access.

3. Collectors serve sub regional traffic movement and provide local access to abutting properties. They also serve to collect and distribute traffic within neighborhoods and allow direct access to adjacent parcels.

4. Minor roads provide direct to property and through traffic is discouraged.

2.1 Roadway Inventory

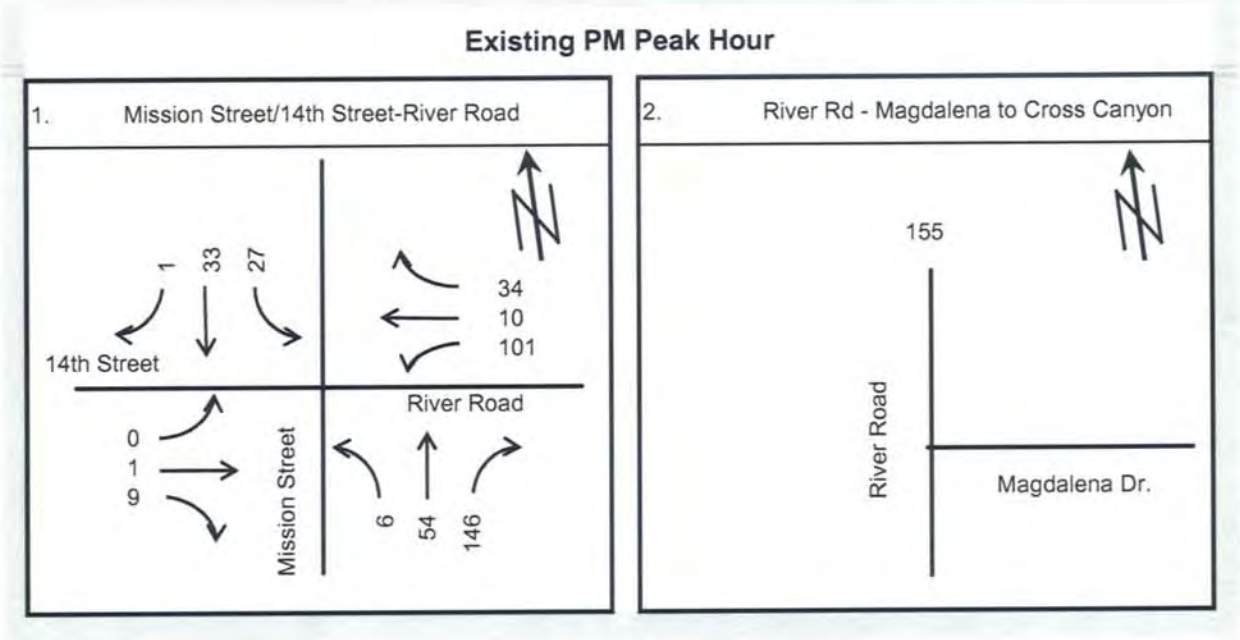
Regional and local streets in San Miguel are provided by Highway 101, Mission Street, River Road, Cross Canyons Road, Estrella Road and Indian Valley Road. Highway 101 is a four-lane freeway arterial that runs north–south through the study area. It is a limited access freeway that is accessed at two locations in the study area.

Mission Street in the south and 10th Street further north. Tenth Street also provides access to Mission Street. The Mission Street interchange provides southbound Highway 101 access and 10th Street northbound Highway 101 access.

2.2 Average Traffic Volumes

The most recent traffic counts were conducted during the morning and evening peak hours (7:00 to 9:00 AM and 4:00 to 6:00 PM) on May 9, 2005 at the Mission Street – 14th Street – River Road intersection, and on River Road at Martinez Drive intersection on June 13, 2005. From these counts AM and PM peak hour volumes were identified. These volumes are illustrated in **Figure 2.1**

Figure 2.1: Existing PM Peak Hour Traffic Volumes.



2.3 Traffic Levels of Service

Standards – The establishment of an acceptable Level of Service (LOS) for county maintained roads in San Luis Obispo County and subsequently San Miguel is important for balancing future development with practical road improvements in the community. To evaluate improvements, current road levels of service are compared to estimated future level of service and associated capacities.

2.4 Level of Service for Roadways

A brief description of each LOS criteria is provided below.

Under LOS A conditions, free-flow exists. Each individual driver is virtually unaffected by the presence of others in the traffic stream.

Under LOS B conditions, stable traffic flow exists. The individual drivers have the freedom to select a desired speed, but encounter a slight decline in the freedom to maneuver.

Under LOS C conditions, stable and acceptable traffic flow exists but speed and maneuverability are somewhat restricted due to higher traffic volumes. The individual driver will be significantly affected by the presence of others.

Under LOS D conditions, high density but stable flow will occur. The individual driver will experience a generally poorer level of comfort and convenience. Small increases in traffic flow will cause operational problems and restricted driver maneuverability.

Under LOS E conditions, speeds are reduced to low, but relatively uniform value. Individual driver's ability to maneuver becomes extremely difficult with high frustration. A traffic volume on the road is near capacity.

Under LOS F conditions, forced or breakdown flow has occurred. The individual driver is stopped for long periods due to conditions.

2.5 Level of Service for Intersections

Intersection traffic flow operations were evaluated using a level of service (LOS) concept, which is the county of San Luis Obispo standard. Intersections are rated based on a grading scale of "LOS A" through "LOS F", with "LOS A" representing free flowing conditions and "LOS F" representing forced flow conditions. The County of San Luis Obispo has established LOS C as the minimum acceptable LOS for overall intersection operations. **Appendix A** shows the relationship between vehicle delay and levels of service categories for signalized intersections.

Generally, LOS F operations on the minor street approach of two-way or one-way stop controlled intersections are considered the threshold warranting improvements.

For signalized intersections, average control delay per vehicle is utilized to define intersection level of service. Delay is dependent on a number of factors including the signal cycle length, the roadway capacity (number of travel lanes) provided on each intersection approach and the traffic demand. The TRAFFIX 7.7 software program was utilized to calculate signalized intersection levels of service.

At one and two-way stop controlled intersections, the operating efficiency of vehicle movements that must yield to through movements were analyzed. The level of service for vehicle movements on the controlled approaches is based on the distribution of gaps in the major street traffic stream and driver judgment in selecting gaps. **Appendix B** shows the relationship between the vehicle delay and level of service for two-way stop controlled intersections. The 2000 HCM calculates the level of service of the minor street approaches. Using this data, an overall intersection level of service was calculated. Both are reported in this study because traffic on the minor street approaches has the lowest priority of right-of-way at the intersection and is the most critical in terms of delay. The TRAFFIX 7.7 software program was utilized to calculate intersection levels of service for intersections that are one and two-way stop controlled.

2.6 Existing Conditions Analysis

Existing capacity deficiencies are identified when a road or intersection within the local study area falls below the county adopted level of service standard. Correction of a capacity deficiency could involve improvements to the deficient vicinity itself, or to parallel vicinity that can relieve excess traffic.

One reason that existing capacity deficiencies must be identified is because road impact fees can be used to improve existing geometric deficiencies unless they improve roadway capacity as well. In order for changes to these areas to be funded through the impact fee they must show an improvement to the capacity problem related to development.

The PM peak hour volumes on River Road between Magdalena Road and Cross Canyons Road is 155 vehicles, which is low and the operating LOS is B.

The analysis of the intersection of Mission Street / 14th Street – River Road and River Road between Cross Canyons Road and Martinez Drive indicate that no deficiencies exist in terms of levels of service, however, the nonstandard roadway cross section on River Road through the canyon is a matter of concern for the Public Works Department of the County of San Luis Obispo.

At this location, River Road curves northwesterly, as one proceeds from south to north, over a canyon that was filled in when the roadway was first built. Due to the steep drop to the bottom of the canyon on either side of River Road in this area, guard rails are currently in place on both sides of the roadway. River Road in this area, as well as further south towards Estrella and Martinez Drive, is narrow and has only sporadic sections with dirt shoulders.

River Road is only 20 feet wide, with one ten-foot level in each direction and no paved shoulders. There is also no shoulder striping along River Road. In some areas along River Road, there are dirt shoulders and turnouts however, in advance of the guardrail there is no shoulder along the southbound direction and only a one-foot unpaved shoulder northbound. Along the guardrail, there is a four-foot northbound unpaved shoulder and a one-foot southbound shoulder. As for the curve itself, because it is easily visible from both directions, however the design speed of the curve appears to be smaller than the prevailing speed along River Road in this area, requiring faster vehicles to slow down when passing through the curve.

The intersection of Mission Street/14th Street-River Road intersection currently operates at overall LOS A during both the AM and PM peak hours and LOS B on the worst approaches (east-west), which is within the County's standards. Thus there is no existing deficiency at this intersection. **Appendix C** indicates the LOS worksheets.

The Union Pacific Railroad rail crossing at River Road is currently controlled by flashing lights and gates. Field measurements performed in May 2005 found that the rail line is

located 180 feet east of the westbound stop bar on River Road. Assuming a vehicle length of 25 feet, this distance would provide enough storage for 7 passenger cars. The low cross traffic volumes along Mission Street lead to a 95th percentile, or design queue length of only one vehicle on westbound River Road under existing conditions, and will therefore not extend back to the railroad crossing. This matches observations at the intersection in May 2005, where the low traffic on Mission Street allowed vehicles on River Road to turn either left or right almost immediately after coming to a stop.

3 TRAVEL FORECASTS

Forecasts of future traffic volumes in San Miguel were prepared to serve as a basis for the evaluation of the capacity improvement needs. Forecasts were based on expected buildout of lots and current zoning regulations as well as cumulative projects in the area.

Additional growth is anticipated over the next 15 years within the greater San Miguel area. To estimate the future traffic growth, known cumulative projects and two San Luis Obispo County General Plan planning documents were utilized – the Salinas River Area Plan, last updated January 2, 1996, and the San Miguel Community Design Plan, adopted April 8, 2003. Both documents detail the land uses of parcels within San Miguel, as well as what specific types of uses are allowed within those areas. **Appendix D** contains the land use map for the San Miguel area. Based upon both documents, the following assumptions were utilized in quantifying the likely amount of growth in the area:

Residential: The San Luis Obispo County Department of Planning and Building anticipates a growth in housing in the greater San Miguel area of approximately 460 new dwelling units within San Miguel. These 460 units were then split up based upon the relative parcel sizes of the undeveloped residentially zoned areas within San Miguel.

Commercial: The estimated building sizes within the commercial areas were based upon the size of the parcels and a floor area ratio of 0.5 (central portion of town) and 0.25 (for the parcel southwest of the Highway 101/10th Street interchange).

The floor area ratio of 0.5 was chosen for the commercial areas in the core portion of town, in order to reflect the style of development currently present in that portion of town.

The floor area ratio of 0.25 was used for the parcel at the Highway 101/10th Street interchange in order to better reflect the development caveat for that parcel identified within the Salinas River Area Plan – the size of the development on that parcel will be based upon the amount of remaining capacity after considering buildout of the other commercial parcels within the area.

In addition, walking and pass-by trip reductions were taken on the commercial trip generation, to account for non-vehicle trips and trips made by existing traffic to those areas. The relatively compact size of San Miguel, as well as its isolation from other communities, would likely lead to a sizable amount of both pedestrian-based trips and pass-by trips by people already in the area.

Industrial/Office: The estimated building sizes were based upon the same methodology as the commercial areas, although floor area ratios of 0.5 were utilized for all of the uses. The Salinas River Area Plan guidelines limit the

uses within industrial areas to primarily office and warehousing; therefore, warehousing was assumed in the industrial areas north of River Road and south of 11th Street, and office space was assumed between River Road and 11th Street.

Recreational: The allowable uses within the undeveloped recreation space surrounding the Mission San Miguel Arcangel are limited to small-scale development of museums, churches, and other low-density developments that would be compatible with the adjacent Mission grounds. It was assumed that a new 20,000 square-foot church would be constructed adjacent to Highway 101. A one-field sports park was also assumed, to be located immediately east of the church and east of the railroad line.

The following known cumulative projects are included in the Cumulative Conditions traffic volume estimates:

1. TR 2710
2. TR 2779
3. CO-04-0120
4. CO-02-0424
5. TR 2750
6. TR2723
7. TR 2647
8. TR 2527
9. TR 2637

The cumulative project locations are indicated on San Miguel Traffic Analysis Zone (TAZ) Map – **Figure 4.2**.

3.1 Trip Generation and Distribution of Cumulative (Future) Projects

Future trips were estimated using trip generation rates from the Institute of Transportation Engineers publication *Trip Generation, Seventh Edition, 2003.* **Table 3.1** indicates the cumulative project trip generation. The future land uses were identified from the General Plan Buildout Land Use map as indicated in Figure 4.2 and field observations and estimates all the future land use developments in San Miguel.

Table 3.1 Cumulative Project Trip Generation

	ITE LAND USE CODE	PROJECT SIZE	DAILY TRIPS	AM PEAK HOUR TOTAL PEAK HOUR	AM % OF ADT	AM IN	AM OUT	PM PEAK HOUR TOTAL PEAK HOUR	PM % OF ADT	PM IN	PM OUT
TRIP GENERATION RATES [1]											
Warehousing	150		4.96	0.45	9%	0.82	0.18	0.47	9%	0.25	0.75
Single-Family Detached Housing (per unit)	210		9.57	0.75	8%	0.25	0.75	1.01	11%	0.64	0.36
Soccer Complex	488		71.33	1.40	2%	0.50	0.50	20.67	29%	0.69	0.31
Church	560		9.11	0.72	8%	0.54	0.46	0.66	7%	0.52	0.48
General Office Building	710		11.01	1.55	14%	0.88	0.12	1.49	14%	0.17	0.83
Specialty Retail Center	814		44.32	1.33	3%	0.50	0.50	2.71	6%	0.44	0.56
TRIPS											
Local Commercial											
Downtown - Mission Street (per 1,000 sq. ft.)	814	50,000 sq. ft.	2,216	67	3%	34	33	136	6%	60	76
Walking/Passby Trip Reduction (25%)			-554	-17		-9	-8	-34		-15	-19
NET NEW TRIPS:			1,662	50		25	25	102		45	57
Regional/Tourist-Oriented Commercial											
S. of 10th & W. of 101 (per 1,000 sq. ft.)	814	100,000 sq. ft.	4,432	133	3%	67	66	271	6%	119	152
S. of 10th & E. of 101 (per 1,000 sq. ft.)	814	50,000 sq. ft.	2,216	67	3%	34	33	136	6%	60	76
SUBTOTAL:			6,648	200	3%	101	99	407	6%	179	228
Freeway Passby Trip Reduction (50%)			-3,324	-100		-50	-50	-204		-102	-102
NET NEW TRIPS:			3,324	100		51	49	203		77	126
Industrial/Office											
Warehousing - North	150	120,000 sq. ft.	595	54	9%	44	10	56	9%	14	42
Warehousing - South	150	120,000 sq. ft.	595	54	9%	44	10	56	9%	14	42
Downtown - "N" Street (per 1,000 sq. ft.)	150	75,000 sq. ft.	372	34	9%	28	6	35	9%	9	26
General Office Building - Mission Street	710	60,000 sq. ft.	661	93	14%	82	11	89	13%	15	74
General Office Building - W. of Mission Street	710	10,000 sq. ft.	443	16	4%	14	2	15	3%	3	12
SUBTOTAL:			2,223	235	11%	198	37	236	11%	52	184
Recreational											
Church	560	20,000 sq. ft.	182	14	8%	8	6	13	7%	7	6
Soccer Complex	488	1 field	71	1	1%	1	0	21	30%	14	7
SUBTOTAL:			253	15		9	6	34		21	13
Residential											
E and W of Mission	210	120 Units	1,148	90	8%	23	67	121	11%	77	44
SW of 101/10th Interchange	210	40 Units	2,853	30	1%	8	22	40	1%	26	14
San Miguel Terrace area	210	43 Units	412	32	8%	8	24	43	10%	28	15
S. of 11th Street	210	60 Units	574	45	8%	11	34	61	11%	39	22
11th Street to River Road	210	50 Units	479	38	8%	10	28	51	11%	33	18
S. of Sewage Treatment Plant	210	50 Units	3,567	38	1%	10	28	51	1%	33	18
N. of River Road	210	60 Units	574	45	8%	11	34	61	11%	39	22
SUBTOTAL:		423 Units	9,607	318	3%	81	237	428	4%	275	153
NET NEW TOTAL:			**17,069**	**718**		**364**	**354**	**1,003**		**470**	**533**

Notes:

1. Trip generation rates from *Trip Generation*, 7th Edition, Institute of Transportation Engineers, 2003.
2. Potential building sizes estimated based upon rough square footage of parcels and floor area ratios between 0.25 and 0.5.
3. Potential number of residences estimated at approximately 460 units, based upon information provided by County of San Luis Obispo Department of Planning and Building representative.
4. Specific uses within the Industrial and Recreational land use areas are based upon permittable land uses per the San Luis Obispo County General Plan.
5. Residential unit breakdown by subarea based upon relative size of parcels, as well as restriction of amount of development on one parcel south of 11th Street.

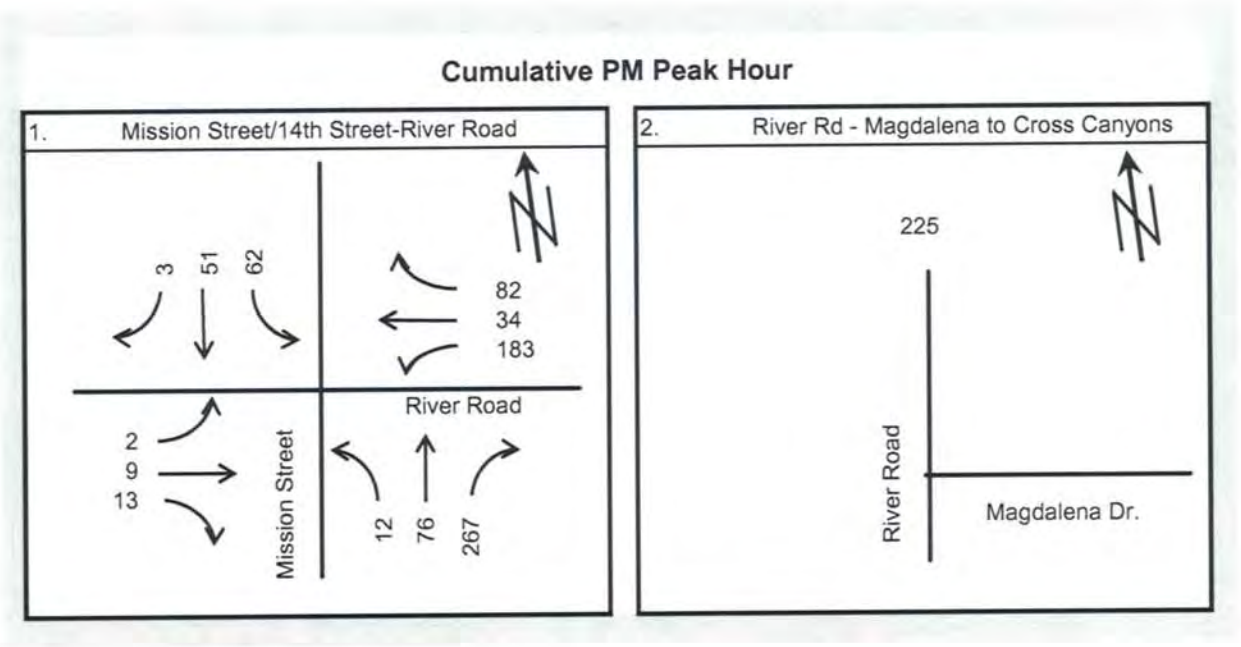
The cumulative projects traffic was distributed onto the area street network based upon existing travel patterns and adjacent land use in northern San Luis Obispo County including San Miguel and Paso Robles. The Plan Buildout/ Cumulative Conditions project trip distribution onto the study street network is indicated below.

To and from Highway 101 north	- 15%
To and from Highway 101	- 60%
River Road	- 15%
To and from the east - northern San Miguel	- 5%
Central / Southern – San Miguel	- 5%
Total	- 100%

3.2 Cumulative Conditions Traffic Volumes

The cumulative conditions analysis trips were added to the existing traffic at the study intersection and roadway segment. The cumulative volumes have been confirmed by County staff as appropriate for use in this study. The Cumulative Conditions Traffic volumes are indicated in **Figure 3.1**

Figure 3.1: Cumulative Conditions PM Peak Hour Traffic Volumes



3.3 Cumulative Conditions LOS Analysis

With the addition of the cumulative traffic the overall levels of service at the Mission/14th-River intersection would be LOS A during the AM peak hour and LOS B during the PM peak hour, with worst-approach levels of service of LOS C during the AM peak hour, and LOS D during the PM peak hour. No improvements would be required at the intersection due to levels of service. The LOS worksheets are attached in

Appendix E.

Westbound vehicle queues under Cumulative Conditions were also evaluated. As most of the new development within San Miguel would be concentrated east of the railroad tracks, cross traffic volumes along Mission Street would continue to remain rather low, thereby leading to relatively low delays and minimizing the vehicle queues on westbound River Road. **Table 3.2** indicates the expected queue lengths on the eastbound approach of River Road.

Table 3.2: Eastbound Queue Lengths on River Road

Scenario	Peak Hour	Traffic Volume	Approach Capacity	95% Vehicle Queue (vehicles)	95% Vehicle Queue (feet)	Available Storage (ft)	Queue Acceptable?
Cumulative	AM	303	555	4	100	180	Yes
	PM	299	431	7	175	180	Marginal

Notes:
1. Analysis time period (T) = 1 hours
2. 1 vehicle = 25 feet (est.)
3. "Traffic Volume" refers to total traffic (all movements) on westbound River Road at Mission Street during given peak period.
4. Approach Capacity taken from level of service calculations in Appendix B.
5. Vehicle queue (95th percentile) estimate based upon the following formula:

$$Q_{95} \approx 900T\left[\frac{v_x}{c_{m,x}} - 1 + \sqrt{\left(\frac{v_x}{c_{m,x}} - 1\right)^2 + \frac{\left(\frac{3600}{c_{m,x}}\right)\left(\frac{v_x}{c_{m,x}}\right)}{150T}}\right]\left(\frac{c_{m,x}}{3600}\right)$$

(Source: *Highway Capacity Manual* Transportation Research Board, 2000.)
6. 95% Vehicle Queue is the maximum queue length that has only a 5% probability of being exceeded.

Under Cumulative conditions, vehicle queues on westbound River Road would increase to 4 vehicles during the morning peak hour and 7 vehicles during the evening peak hour. The PM peak hour queue is marginal and an increase of one vehicle or the presence of a heavy vehicle (articulated truck) in the queue during the PM peak hour may result in a vehicle being trapped on the railway tracks.

As indicated in **Appendix F**, the intersection will exceed traffic signal and all-way stop control warrants for the evening peak hours. A traffic signal should also be installed because it will greatly improve the ability of River Road traffic to clear the railroad crossing when a train activates the crossing gates. The traffic signal will need to have railroad preemption. This will better accommodate pedestrian and bicycle traffic, which will increase substantially under cumulative conditions. For example, the existing elementary school, as well as much of the downtown area is west of Mission Street. It will also have a traffic calming effect on Mission Street, which is the core of the downtown and, currently, has relatively high traffic speeds although posted for 25 miles per hour. The resulting level of service under traffic signal control is LOS B. Much of the future residential development will be east of Mission Street along River Road.

Increased school age pedestrian traffic will be required to cross Mission Street at this intersection.

However, as for Existing Conditions, the San Luis Obispo County Public Works Department has expressed concerns regarding operations on a section of River Road just southeast of Cross Canyons Road. At this location, River Road curves northwesterly, as one proceeds from south to north, over a canyon that was filled in when the roadway was first built. Due to the steep drop to the bottom of the canyon on either side of Rive Road in this area, guardrail is currently in place on both sides of the roadway. River Road in this area, as well as further south towards Magdalena Drive, is narrow and has only sporadic sections with dirt shoulders. River Road is only 20 feet wide, with one 10-foot travel lane in each direction, and no paved shoulder. There is also no shoulder striping along River Road. In some areas along River Road, there are dirt shoulders and turnouts; however, in advance of the guardrail, there is no shoulder along the southbound direction and only a 1-foot unpaved shoulder northbound. Along the guardrail, there is a 4-foot northbound unpaved shoulder, and a 1-foot southbound shoulder. As for the curve itself, the curve is easily visible from both directions; however, the design speed of the curve appears to be smaller than the prevailing travel speed along River Road in this area, requiring faster vehicles to slow down when passing through the curve.

It is thus recommended to widen River Road to improve traffic operations along this section of roadway.

4 ROAD IMPACT FEE

The future improvements would incrementally add to the adverse operating conditions at the study intersection and segment as indicated in this report. The narrow roadway along River Road is an existing deficiency and the County would have to also contribute a fair share contribution towards the improvement. The share would be based on the existing traffic volumes along River Road. For fair share contributions, only the PM peak hour volumes are utilized. Required improvements will be funded through a San Miguel Road Impact Fee Program. Since the road improvement projects are located to the east of Mission Street, the Fee area defined to calculate the contributions would include projects to the east of the railway tracks. The Fee Area is indicated in **Figure 4.1** and the Land Use Map and TAZ map in **Figure 4.2**.

4.1 Improvement Projects

The two improvement projects identified in the study includes the signalization of the Mission Street / 14th Street-River Road intersection with preemption of the gates and traffic control at the Rail Road Crossing on River Road. Cost estimates have been prepared based on current (year 2006) cost data. The expected planning and implementation cost for the signal, with the preemption construction work is estimated at $837,000. **Appendix G** indicates the detail of the cost estimate and includes construction costs, construction contingencies (20%), design costs, environmental review costs, and other administrative costs (55%).

The estimate cost for widening River Road is $751,719. **Appendix H** indicates the detail of the cost estimates. **Appendix I** indicates the existing conditions and deficiencies along River Road. The cost includes construction costs, construction contingencies (20%), design costs, environmental review costs, and other administrative costs (55%).

4.2 Fair Share Contributions

To equitably share the cost of the improvements between the cumulative projects, a fair share distribution between the trip generations of the cumulative projects and existing traffic were used to calculate a cost per PM peak hour trip generated. The existing traffic volumes were used to calculate the County share for the River Road improvements because it is an existing deficiency and the cumulative traffic was used to calculate the cumulative project fair share contributions.

To calculate the County's share to the required River Road improvements, the typical roadway cross sections, Drawing A-1 (c), attached in Appendix J, was utilized. The cross section is the county standard for the River Road project and thus the lower threshold for this cross section, 1,000 vehicles per day is used as measure to determine the existing deficiency.

Based on the PM peak hour counts, the existing daily volume is approximately 1,550 (PM peak hour is 10% of daily volume) on River Road north of Martinez Drive. Thus the County share would be based on the number of daily trips in excess of 1,000, or 550 daily, or 55 PM peak hour trips.

The cumulative traffic on River Road is estimated to increase by 700 daily trips or 70 PM peak

hour trips. Thus the County of San Luis Obispo will contribute 44% ($330,757) towards the Fee Program for the River Road improvements. The remainder of the improvement for River Road and the full cost for the Mission Street/River Road signal will be borne by the cumulative projects i.e. $1,257,962. **Table 4.1** is a summary of the calculations for the County share on the River road project. Also included in the fee is the cost estimate of updating the fee study every year up to 2025. The cost calculation for the fee estimate is $15, 000 for the current study, $5,000 for each of four years and $25,000 every fifth year. Thus the total cost for maintaining the fee program is $170,000.

Table 4.1: San Miguel Fee: County Share Calculation- River Road Project

Existing PM peak hour trips	155 trips
Cumulative PM peak hour volume	225 trips
County threshold per Drawing A-1 (c) (PM peak hour – assumed 10% of ADT)	100 trips
"Existing PM peak hour deficiency"	55 trips
Cumulative PM peak hour trips	70 trips
Total PM peak hour trips that will pay for improvement	125 trips
County share	44%
Cumulative project share	55%
Total cost for River Road widening	$751,719
County share (44%)	$330,757
Cumulative project share	$420,962

The cumulative project trip generation within the fee area is indicated in **Table 4.2**. The table indicates that the cumulative projects would add 369 PM peak hour trips to the road network. The known cumulative residential projects are indicated on **Figure 4.1**. and the TAZ's on the Land Use map, **Figure 4.2**. The vacant areas for possible residential development are included in TAZ's 206, 207 and 304. Warehouse uses of 240,000 square feet alongside the railway tracks in TAZ 205 and 206 have also bee included in the fee calculations.

Table 4.2: Fee Area Cumulative Project Trip Generation

	ITE LAND USE CODE	PROJECT SIZE	DAILY TRIPS	AM PEAK HOUR TOTAL PEAK HOUR	AM % OF ADT	AM IN	AM OUT	PM PEAK HOUR TOTAL PEAK HOUR	PM % OF ADT	PM IN	PM OUT
TRIP GENERATION RATES [1]											
Warehousing	150		4.96	0.45	9%	0.82	0.18	0.47	9%	0.25	0.75
SF Detached Housing (per unit)	210		9.57	0.75	8%	0.25	0.75	1.01	11%	0.64	0.36
TRIPS											
Industrial/Office											
Warehousing - North (TAZ 205)	150	120,000 sq. ft.	595	54	9%	44	10	56	9%	14	42
Warehousing - South (TAZ 206)	150	120,000 sq. ft.	595	54	9%	44	10	56	9%	14	42
SUBTOTAL:			1,190	108	9%	88	20	112	9%	28	84
Residential											
TR 2710 (TAZ 207)	210	10 Units	96	8	8%	2	6	10	10%	6	4
TR 2779 (TAZ 207)	210	12 Units	115	9	8%	2	7	12	10%	8	4
CO 04-0120 (TAZ 304)	210	6 Units	57	5	9%	1	4	6	11%	4	2
CO 02-0424 (TAZ 304)	210	5 Units	48	4	8%	1	3	5	10%	3	2
TR 2750 (TAZ 205)	210	13 Units	124	10	8%	3	7	13	10%	8	5
TR 2723 (TAZ 304)	210	37 Units	354	28	8%	7	21	37	10%	24	13
TR 2647 (TAZ 302)	210	11 Units	105	8	8%	2	6	11	10%	7	4
TR 2527 (TAZ 207)	210	60 Units	574	45	8%	11	34	61	11%	39	22
TR 2637 (TAZ 206)	210	57 Units	545	43	8%	11	32	58	11%	37	21
Vacant land (TAZ 304)	210	10 Units	96	8	8%	2	6	10	10%	6	4
Vacant land (TAZ 206)	210	24 Units	230	18	8%	5	13	24	10%	15	9
Vacant land (TAZ 207)	210	10 Units	96	8	8%	2	6	10	10%	6	4
SUBTOTAL:		255 Units	2,440	194	8%	49	145	257	11%	163	94
NET NEW TOTAL:			**3,630**	**302**		**137**	**165**	**369**		**191**	**178**

Notes:
1. Trip generation rates from *Trip Generation*, 7th Edition, Institute of Transportation Engineers, 2003.
2. Potential building sizes estimated based upon rough square footage of parcels and floor area ratios between 0.25 and 0.5.
3. Potential number of residences estimated based upon LU information provided by County of San Luis Obispo Department of Planning and Building representative.

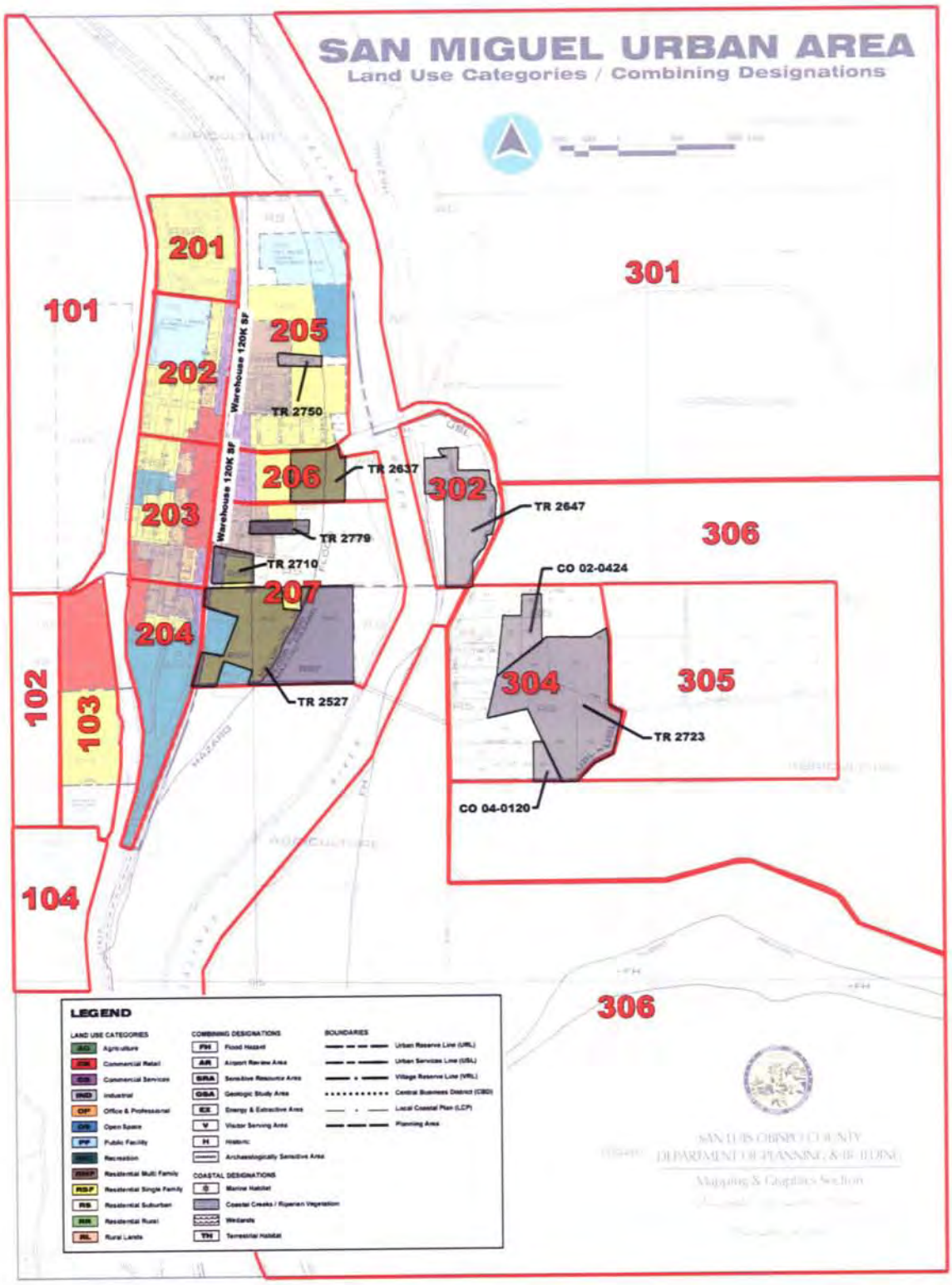
The cost per PM peak hour trip for the cumulative projects is thus $3,870. A summary of the cost calculations is indicated in **Table 4.3.**

Table 4.3: San Miguel Fee Calculations for Cumulative Projects

Project	**Cost**
Mission/14th-River signal improvement	$837,000
River Road widening (Cumulative project share only)	$420,962
Fee program updates (up to 2025)	$170,000
Total Cost	**$1,427,962**
Cost per cumulative trip (369 PM peak hour trips)	*$3,870*

Figure 4.1: Cumulative Project Location in Fee Area

Figure 4.2: Land Use and TAZ Map



APPENDIX A

LEVEL OF SERVICE DESCRIPTION –
SIGNALIZED INTERSECTION

APPENDIX A

LEVEL OF SERVICE (LOS) DESCRIPTION
SIGNALIZED INTERSECTIONS

The capacity of an urban street is related primarily to the signal timing and the geometric characteristics of the facility as well as to the composition of traffic on the facility. Geometrics are a fixed characteristic of a facility. Thus, while traffic composition may vary somewhat over time, the capacity of a facility is generally a stable value that can be significantly improved only by initiating geometric improvements. A traffic signal essentially allocates time among conflicting traffic movements that seek to use the same space. The way in which time is allocated significantly affects the operation and the capacity of the intersection and its approaches.

The methodology for signalized intersection is designed to consider individual intersection approaches and individual lane groups within approaches. A lane group consists of one or more lanes on an intersection approach. The outputs from application of the method described in the HCM 2000 are reported on the basis of each lane. For a given lane group at a signalized intersection, three indications are displayed: green, yellow and red. The red indication may include a short period during which all indications are red, referred to as an all-red interval and the yellow indication forms the change and clearance interval between two green phases.

The methodology for analyzing the capacity and level of service must consider a wide variety of prevailing conditions, including the amount and distribution of traffic movements, traffic composition, geometric characteristics, and details of intersection signalization. The methodology addresses the capacity, LOS, and other performance measures for lane groups and the intersection approaches and the LOS for the intersection as a whole.

Capacity is evaluated in terms of the ratio of demand flow rate to capacity (v/c ratio), whereas LOS is evaluated on the basis of control delay per vehicle (in seconds per vehicle). The methodology does not take into account the potential impact of downstream congestion on intersection operation, nor does the methodology detect and adjust for the impacts of turn-pocket overflows on through traffic and intersection operation.

LEVEL OF SERVICE (LOS) CRITERIA FOR SIGNALIZED INTERSECTIONS
(Reference Highway Capacity Manual 2000)

Level of Service	Control Delay (seconds / vehicle)
A	<10
B	>10 - 20
C	>20 - 35
D	>35 - 55
E	>55 - 80
F	>80

APPENDIX B

LEVEL OF SERVICE DESCRIPTION – UNSIGNALIZED INTERSECTIONS WITH TWO-WAY STOP CONTROL

APPENDIX B

LEVEL OF SERVICE (LOS) DESCRIPTION
UNSIGNALIZED INTERSECTIONS WITH TWO-WAY STOP CONTROL (TWSC)

TWSC intersections are widely used and stop signs are used to control vehicle movements at such intersections. At TWSC intersections, the stop-controlled approaches are referred to as the minor street approaches; they can be either public streets or private driveways. The intersection approaches that are not controlled by stop signs are referred to as the major street approaches. A three-leg intersection is considered to be a standard type of TWSC intersection if the single minor street approach (i.e. the stem of the T configuration) is controlled by a stop sign. Three-leg intersections where two of the three approaches are controlled by stop signs are a special form of unsignalized intersection control.

At TWSC intersections, drivers on the controlled approaches are required to select gaps in the major street flow through which to execute crossing or turning maneuvers on the basis of judgement. In the presence of a queue, each driver on the controlled approach must use some time to move into the front-of-queue position and prepare to evaluate gaps in the major street flow. Capacity analysis at TWSC intersections depends on a clear description and understanding of the interaction of drivers on the minor or stop-controlled approach with drivers on the major street. Both gap acceptance and empirical models have been developed to describe this interaction.

Thus, the capacity of the controlled legs is based on three factors:

- the distribution of gaps in the major street traffic stream,;
- driver judgement in selecting gaps through which to execute the desired maneuvers; and
- the follow-up time required by each driver in a queue.

The delay experienced by a motorist is made up of a number of factors that relate to control, geometrics, traffic and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions, in the absence of incident, control, traffic or geometric delay. Average control delay for any particular minor movement is a function of the capacity of the approach and the degree of saturation and referred to as level of service.

LEVEL OF SERVICE (LOS) CRITERIA FOR TWSC INTERSECTIONS
(Reference Highway Capacity Manual 2000)

Level of Service	Control Delay (seconds / vehicle)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	>50

APPENDIX C

EXISTING CONDITIONS INTERSECTION
AND SEGMENT
LEVEL OF SERVICE CALCULATIONS
TRAFFIX ANALYSIS WORKSHEETS

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #2041 Mission/14th-River

Average Delay (sec/veh): 5.7 Worst Case Level Of Service: B[10.8]

Approach:	North Bound			South Bound			East Bound						West Bound					
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Rights:	Include					Include					Include					Include				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	0	0	1	0	0	0	1!	0	0
Volume Module: >> Count Date: 9 May 2005 << 7:00 - 8:00 AM																				
Base Vol:	3	54	49			10	60	1			0	2	3			129	4	40		
Growth Adj:	1.00	1.00	1.00			1.00	1.00	1.00			1.00	1.00	1.00			1.00	1.00	1.00		
Initial Bse:	3	54	49			10	60	1			0	2	3			129	4	40		
User Adj:	1.00	1.00	1.00			1.00	1.00	1.00			1.00	1.00	1.00			1.00	1.00	1.00		
PHF Adj:	0.93	0.93	0.93			0.93	0.93	0.93			0.93	0.93	0.93			0.93	0.93	0.93		
PHF Volume:	3	58	53			11	65	1			0	2	3			139	4	43		
Reduct Vol:	0	0	0			0	0	0			0	0	0			0	0	0		
Final Vol.:	3	58	53			11	65	1			0	2	3			139	4	43		
Critical Gap Module:																				
Critical Gp:	4.1	xxxx	xxxxx			4.1	xxxx	xxxxx	xxxxx		6.5	6.2				7.1	6.5	6.2		
FollowUpTim:	2.2	xxxx	xxxxx			2.2	xxxx	xxxxx	xxxxx		4.0	3.3				3.5	4.0	3.3		
Capacity Module:																				
Cnflict Vol:	66	xxxx	xxxxx			111	xxxx	xxxxx			xxxx	204				65	180	178		
Potent Cap.:	1536	xxxx	xxxxx			1479	xxxx	xxxxx			xxxx	693				999	782	716		
Move Cap.:	1536	xxxx	xxxxx			1479	xxxx	xxxxx			xxxx	686				999	772	709		
Volume/Cap:	0.00	xxxx	xxxx			0.01	xxxx	xxxx			xxxx	0.00				0.00	0.18	0.01		
Level Of Service Module:																				
Queue:	0.0	xxxx	xxxxx			0.0	xxxx	xxxxx	xxxxx		xxxx	xxxxx				xxxxx	xxxx	xxxxx		
Stopped Del:	7.3	xxxx	xxxxx			7.5	xxxx	xxxxx	xxxxx		xxxx	xxxxx				xxxxx	xxxx	xxxxx		
LOS by Move:	A	*	*			A	*	*	*		*	*				*	*	*		
Movement:	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT
Shared Cap.:	xxxx	xxxx	xxxxx			xxxx	xxxx	xxxxx			xxxx	xxxx				845	xxxx	809		
SharedQueue:	xxxxx	xxxx	xxxxx			xxxxx	xxxx	xxxxx			xxxxx	xxxx				0.0	xxxxx	0.9		
Shrd StpDel:	xxxxx	xxxx	xxxxx			xxxxx	xxxx	xxxxx			xxxxx	xxxx				9.3	xxxxx	10.8		
Shared LOS:	*	*	*			*	*	*			*	*				A	*	B		
ApproachDel:	xxxxxx					xxxxxx					9.3						10.8			
ApproachLOS:	*					*					A						B			

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #2041 Mission/14th-River

Average Delay (sec/veh): 4.9 Worst Case Level Of Service: B[12.0]

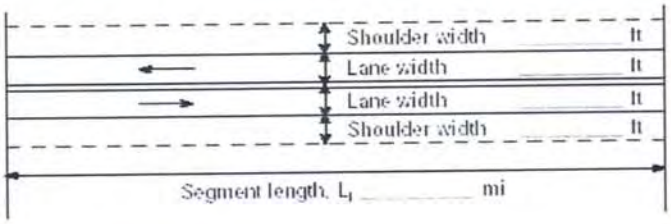
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 1!	0 0		0 0 1!	0 0		0 0 0	1 0		0 0 1!	0 0	
Volume Module: >> Count Date: 9 May 2005 << 4:30 - 5:30 PM												
Base Vol:	6	54	146	27	33	1	0	1	9	101	10	34
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	6	54	146	27	33	1	0	1	9	101	10	34
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
PHF Volume:	7	65	176	33	40	1	0	1	11	122	12	41
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Final Vol.:	7	65	176	33	40	1	0	1	11	122	12	41
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx	xxxxx	6.5	6.2	7.1	6.5	6.2
FollowUpTim:	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx	xxxxx	4.0	3.3	3.5	4.0	3.3
Capacity Module:												
Cnflict Vol:	41	xxxx	xxxxx	241	xxxx	xxxxx	xxxx	361	40	279	273	153
Potent Cap.:	1568	xxxx	xxxxx	1326	xxxx	xxxxx	xxxx	566	1031	673	634	893
Move Cap.:	1568	xxxx	xxxxx	1326	xxxx	xxxxx	xxxx	550	1031	650	615	893
Volume/Cap:	0.00	xxxx	xxxx	0.02	xxxx	xxxx	xxxx	0.00	0.01	0.19	0.02	0.05
Level Of Service Module:												
Queue:	0.0	xxxx	xxxxx	0.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Stopped Del:	7.3	xxxx	xxxxx	7.8	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	A	*	*	A	*	*	*	*	*	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	948	xxxx	692	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	0.0	xxxxx	1.0	xxxxx
Shrd StpDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	8.8	xxxxx	12.0	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	A	*	B	*
ApproachDel:	xxxxxx			xxxxxx			8.8			12.0		
ApproachLOS:	*			*			A			B		

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	CL	Highway	River Road
Agency or Company	Higgins Associates	From/To	E. Cross Canyon/N. Martinez
Date Performed	3/16/2006	Jurisdiction	
Analysis Time Period	PM Peak Hour	Analysis Year	Existing

Project Description: 5-195 San Miguel Traffic Circulation Study

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	155 veh/h
Directional split	60 / 40
Peak-hour factor, PHF	1.00
No-passing zone	100
% Trucks and Buses , P_T	2 %
% Recreational vehicles, P_R	1%
Access points/ *mi*	4

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.71
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	2.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.970
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	225
v_p * highest directional split proportion[2] (pc/h)	135

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	45.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	5.3 *mi/h*
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	1.0 *mi/h*
		Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	38.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	3.6
Average travel speed, ATS (*mi/h*) $ATS=FFS-0.00776v_p-f_{np}$	33.3

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	0.77
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.8
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.984
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	205
v_p * highest directional split proportion[2] (pc/h)	123
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	16.5
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	23.7
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	40.2

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	B
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.07
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*) $VMT_{15}=0.25L_t(V/PHF)$	43

Peak-hour vehicle-miles of travel, VMT_{60} (veh- *mi*) $VMT_{60}=V*L_t$	*171*
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	*1.3*
Notes	
1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.	

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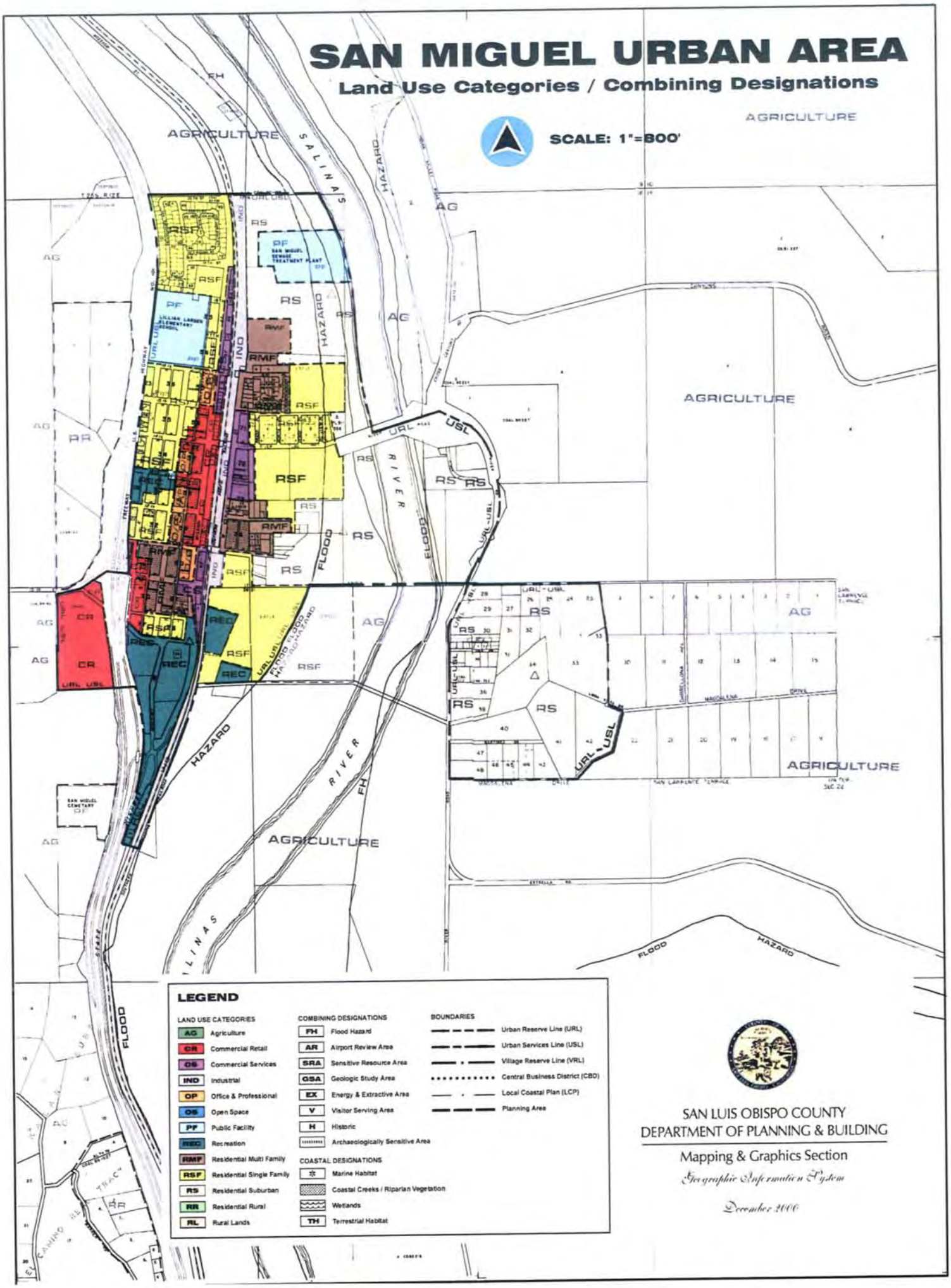
APPENDIX D

SAN MIGUEL BUILDOUT PLAN

SAN MIGUEL URBAN AREA

Land Use Categories / Combining Designations

SCALE: 1"=800'



LEGEND

LAND USE CATEGORIES

- AG — Agriculture
- CR — Commercial Retail
- CS — Commercial Services
- IND — Industrial
- OP — Office & Professional
- OS — Open Space
- PF — Public Facility
- REC — Recreation
- RMF — Residential Multi Family
- RSF — Residential Single Family
- RS — Residential Suburban
- RR — Residential Rural
- RL — Rural Lands

COMBINING DESIGNATIONS

- FH — Flood Hazard
- AR — Airport Review Area
- SRA — Sensitive Resource Area
- GSA — Geologic Study Area
- EX — Energy & Extractive Area
- V — Visitor Serving Area
- H — Historic
- Archaeologically Sensitive Area

COASTAL DESIGNATIONS

- Marine Habitat
- Coastal Creeks / Riparian Vegetation
- Wetlands
- TH — Terrestrial Habitat

BOUNDARIES

- Urban Reserve Line (URL)
- Urban Services Line (USL)
- Village Reserve Line (VRL)
- Central Business District (CBD)
- Local Coastal Plan (LCP)
- Planning Area

SAN LUIS OBISPO COUNTY
DEPARTMENT OF PLANNING & BUILDING

Mapping & Graphics Section

Geographic Information System

December 2000

APPENDIX E

CUMULATIVE CONDITIONS INTERSECTION
AND SEGMENT
LEVEL OF SERVICE CALCULATIONS
TRAFFIX ANALYSIS WORKSHEETS

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #2041 Mission/14th-River

Average Delay (sec/veh): 9.7 Worst Case Level Of Service: C[17.4]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 1!	0	0	0 0 1!	0	0	0 0 1!	0	0	0 0 1!	0	0
Volume Module: >> Count Date: 9 May 2005 << 7:00 - 8:00 AM												
Base Vol:	3	54	49	10	60	1	0	2	3	129	4	40
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	3	54	49	10	60	1	0	2	3	129	4	40
Added Vol:	2	11	50	44	12	1	2	25	6	95	6	29
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	5	65	99	54	72	2	2	27	9	224	10	69
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
PHF Volume:	5	70	106	58	77	2	2	29	10	241	11	74
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Final Vol.:	5	70	106	58	77	2	2	29	10	241	11	74
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx	7.1	6.5	6.2	7.1	6.5	6.2
FollowUpTim:	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx	3.5	4.0	3.3	3.5	4.0	3.3
Capacity Module:												
Cnflict Vol:	80	xxxx	xxxxx	176	xxxx	xxxxx	371	382	78	348	330	123
Potent Cap.:	1518	xxxx	xxxxx	1400	xxxx	xxxxx	586	551	982	607	590	928
Move Cap.:	1518	xxxx	xxxxx	1400	xxxx	xxxxx	512	526	982	555	562	928
Volume/Cap:	0.00	xxxx	xxxx	0.04	xxxx	xxxx	0.00	0.06	0.01	0.43	0.02	0.08
Level Of Service Module:												
Queue:	0.0	xxxx	xxxxx	0.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Stopped Del:	7.4	xxxx	xxxxx	7.7	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	A	*	*	A	*	*	*	*	*	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	590	xxxxx	xxxx	611	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	0.2	xxxxx	xxxxx	3.1	xxxxx
Shrd StpDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	11.6	xxxxx	xxxxx	17.4	xxxxx
Shared LOS:	*	*	*	*	*	*	*	B	*	*	C	*
ApproachDel:	xxxxxx			xxxxxx			11.6			17.4		
ApproachLOS:	*			*			B			C		

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #2041 Mission/14th-River

Average Delay (sec/veh): 12.3 Worst Case Level Of Service: D[29.6]

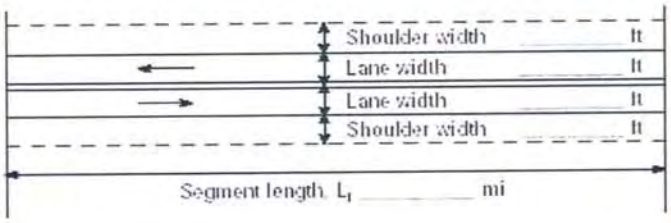
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 1! 0 0			0 0 1! 0 0			0 0 1! 0 0			0 0 1! 0 0		
Volume Module: >> Count Date: 9 May 2005 << 4:30 - 5:30 PM												
Base Vol:	6	54	146	27	33	1	0	1	9	101	10	34
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	6	54	146	27	33	1	0	1	9	101	10	34
Added Vol:	6	22	121	35	18	2	2	8	4	82	24	48
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	12	76	267	62	51	3	2	9	13	183	34	82
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
PHF Volume:	14	92	322	75	61	4	2	11	16	220	41	99
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Final Vol.:	14	92	322	75	61	4	2	11	16	220	41	99
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx	7.1	6.5	6.2	7.1	6.5	6.2
FollowUpTim:	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx	3.5	4.0	3.3	3.5	4.0	3.3
Capacity Module:												
Cnflict Vol:	65	xxxx	xxxxx	413	xxxx	xxxxx	564	655	63	507	496	252
Potent Cap.:	1537	xxxx	xxxxx	1146	xxxx	xxxxx	436	386	1001	476	475	786
Move Cap.:	1537	xxxx	xxxxx	1146	xxxx	xxxxx	334	356	1001	431	439	786
Volume/Cap:	0.01	xxxx	xxxx	0.07	xxxx	xxxx	0.01	0.03	0.02	0.51	0.09	0.13
Level Of Service Module:												
Queue:	0.0	xxxx	xxxxx	0.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Stopped Del:	7.4	xxxx	xxxxx	8.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	A	*	*	A	*	*	*	*	*	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	542	xxxxx	xxxx	493	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	0.2	xxxxx	xxxxx	6.0	xxxxx
Shrd StpDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	12.0	xxxxx	xxxxx	29.6	xxxxx
Shared LOS:	*	*	*	*	*	*	*	B	*	*	D	*
ApproachDel:	xxxxxx			xxxxxx			12.0			29.6		
ApproachLOS:	*			*			B			D		

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	CL	Highway	River Road
Agency or Company	Higgins Associates	From/To	E. Cross Canyon/N. Martinez
Date Performed	3/16/2006	Jurisdiction	
Analysis Time Period	PM Peak Hour	Analysis Year	Cumulative

Project Description: 5-195 San Miguel Traffic Circulation Study

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	225 veh/h
Directional split	60 / 40
Peak-hour factor, PHF	1.00
No-passing zone	100
% Trucks and Buses , P_T	2 %
% Recreational vehicles, P_R	1%
Access points/ *mi*	4

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.71
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	2.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.970
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	327
v_p * highest directional split proportion[2] (pc/h)	196

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	45.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	5.3 *mi/h*
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	1.0 *mi/h*
		Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	38.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	4.1
Average travel speed, ATS (*mi/h*) $ATS=FFS-0.00776v_p-f_{np}$	32.0

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	0.77
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.8
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.984
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	297
v_p * highest directional split proportion[2] (pc/h)	178
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	23.0
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	23.0
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	45.9

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	B
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.10
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*) $VMT_{15}=0.25L_t(V/PHF)$	62

Peak-hour vehicle-miles of travel, VMT_{60} (veh- *mi*) $VMT_{60}=V*L_t$	*248*
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	*1.9*
Notes	
1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.	

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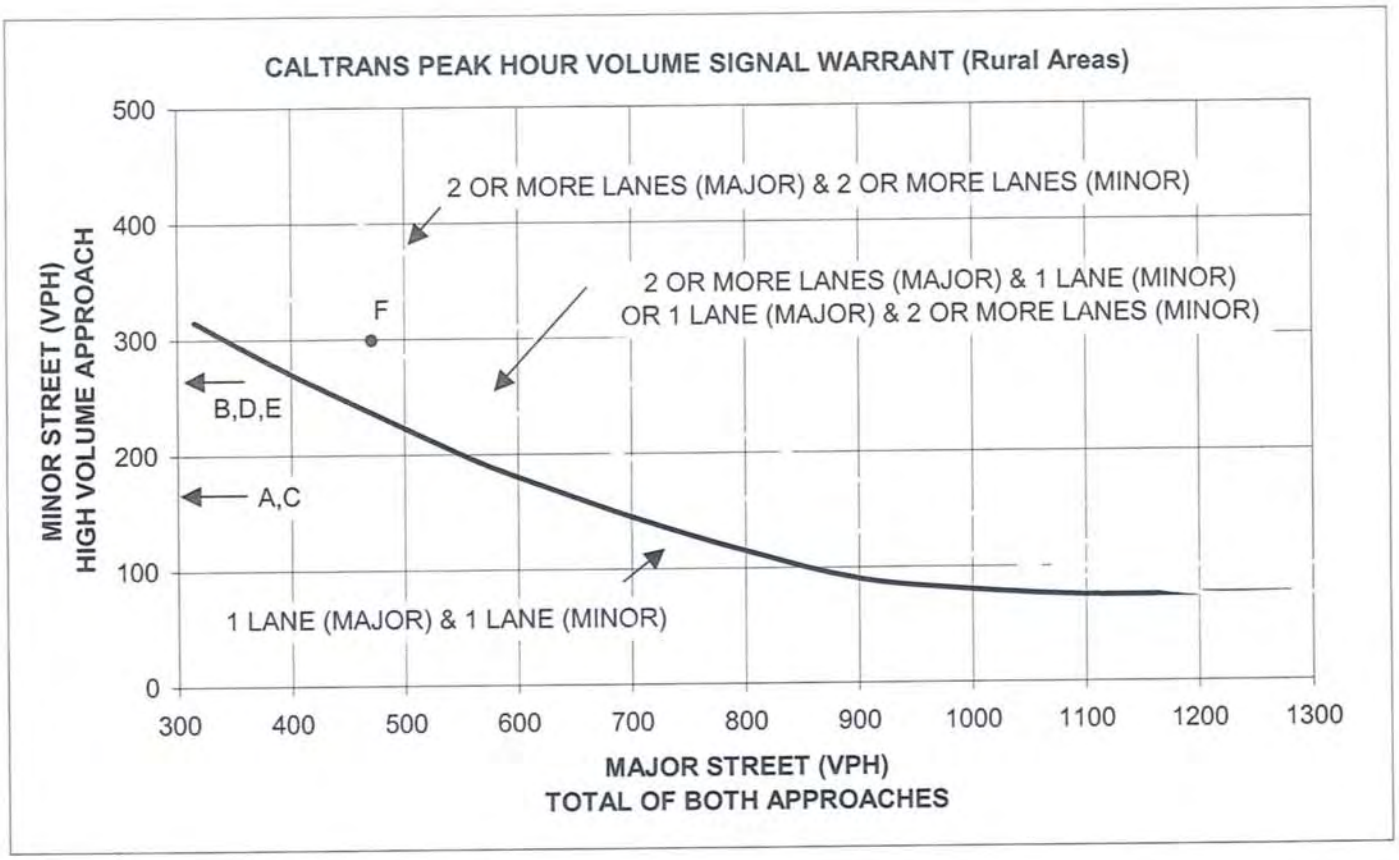
APPENDIX F

WARRANTS ANALYSES WORKSHEETS

Intersection of Mission Street & 14th Street-River Road



Scenario	Major Street	Minor Street	
	North/South	East/West	Warranted?
A. Existing AM	177	173	No
B. Existing PM	267	145	No
C. Exist+Proj AM	183	191	No
D. Exist+Proj PM	287	156	No
E. Cumulative AM	297	303	No
F. Cumulative PM	471	299	Yes

Notes:

1. 100 VPH applies as the lower threshold volume for a minor street approach with two or more lanes and 75 VPH applies as the lower threshold volume for a minor street approaching with one lane.

2. Bold line applies to intersection geometry.

Source: *Manual on Uniform Traffic Control Devices*, 2003 Edition.

Mission Street & 14th Street-River Road
Multiway Stop Sign Warrant
Analysis Worksheet

	Minimum Requirements (Rural)	Existing		Existing+Project		Cumulative	
		AM	PM	AM	PM	AM	PM
	Peak Hour Volume						
All Approaches (# of vehicles)	420	355	422	379	454	638	794
Both Approaches Minor Street (# of vehicles & pedestrians)	170	178	155	196	167	341	323
Warrant Satisfied? (with RT)		No	No	No	No	Yes	Yes

APPENDIX G

SIGNAL AND PREEMPTION COST ESTIMATES

Mission Street/14th Street- River Road Intersection and RailRoad Pre-emption

2006

PROJECT DESCRIPTION/NOTES:
ENTER NOTES SPECIFIC TO THIS PROJECT

	ITEM	UNIT	UNIT COST $	DIMENSIONS LENGTH ft	WIDTH ft	DEPTH ft	QUANTITY	COST $
	MATERIALS							
1a	Surfacing: base	SF					0 SF	0
1b	Surfacing: pavement	SF					0 SF	0
1c	Sidewalk: new	SF					0 SF	0
1d	Sidewalk: replace	SF					0 SF	0
1e	Curb and Gutter: new	LF					0 LF	0
1f	Curb and Gutter: replace	LF					0 LF	0
1g	Curb Ramps	EA					0 EA	0
1h	Resurfacing	SF					0 SF	0
1i	Landscaped Median	SF					0 SF	0
1j	Hardscaped Median	SF					0 SF	0
1k	Guard Rail	LF					0 LF	0
1l	Bike Path: base	SF					0 SF	0
1m	Bike Path: pavement	SF					0 SF	0
1n	Striping & Pavement Markers	LF					0 LF	0
1o	Electroliers	EA					0 EA	0
1p	Traffic Signal (base price): 3 legs/6 movements	EA	225,000.00				1 EA	225,000
	Additional cost per leg/movement	EA					0 EA	0
1q	Traffic Signal (base price): 4 legs/8 movements	EA					0 EA	0
	Additional cost per leg/movement	EA					0 EA	0
1	Subtotal							$ 225,000
2	Earthwork	CF					0 CF	0
3	Signing (3% Item 1)	LS						0
4	Utilities (10% Item 1)	LS						0
5	Drainage (12% Items 1 - 2)	LS						0
6a	Bridge: new	SF					0 SF	0
6b	Bridge: widen	SF					0 SF	0
7a	Retaining Wall: < = 4 feet	SF					0 SF	0
7b	Retaining Wall: > 4 feet	SF					0 SF	0
8	Removal of Existing Pavement	SF					0 SF	0
9	Removal of Existing Bridges	SF					0 SF	0
10a	Preemption	LS	25,000.00				1 LS	25,000
10b	Rail Road Signal Control Construction (estimate)	LS	200,000.00				1 LS	200,000
1 - 10	Subtotal							$ 450,000
	CONTINGENCIES							
11	Construction Contingencies (20%)	LS						90,000
12	PE, PM,Evironmental,Design, ROW, CA (55%)	LS						297,000
17	SUBTOTAL							$ 837,000
1 - 17	**PROJECT TOTAL**							**$ 837,000**
	OUTSIDE FUNDING							0
	TOTAL COST							**$ 837,000**

NOTES:

* Enter items specific to this project

** Project Administration contingency includes environmental clearance, outside agency overview, permitting, right-of-way agent, and unforeseen conditions. cost TBD/updated

APPENDIX H

RIVER ROAD
COST ESTIMATES

McCarthy Engineering - Preliminary Construction Cost Estimate

River Road Widening - San Miguel Area

Tract 2467 to Magdalena St.

Summary

Item	QTY	Unit	Unit Cost	Item Cost
Construction Signs	LS	LS	$2,000.00	$2,000
Traffic Control	LS	LS	$4,000.00	$4,000
Clearing and Grubbing	LS	LS	$5,000.00	$5,000
Earthwork	8,076	CY	$25.00	$201,900
Class II AB	850	CY	$50.00	$42,500
AC	240	Ton	$75.00	$18,000
Culvert Extension	100	LF	$500.00	$50,000
Metal Beam Guardrail	3000	LF	$25.00	$75,000
Striping	4550	LF	$1.00	$4,550
Signs	8	EA	$150.00	$1,200
			Subtotal	$404,150
			+20% Conting	$80,830
			Construction	$484,980
		Other contigencies (55%)		$266,739
			TOTAL:	**$751,719**

Subsection Breakdowns

Magdalena St. to Martinez St.

Item	QTY	Unit	Cost	Cost
Earthwork	116	CY	$25.00	$2,900
Class II AB	120	CY	$50.00	$6,000
AC	26	Ton	$75.00	$1,950
Culvert Extension	0	LF	$500.00	$0
Metal Beam Guardrail	0	LF	$25.00	$0
Striping	530	LF	$1.00	$530
Signs	0	EA	$150.00	$0
			Subtotal	$11,380

Martinez St. to Oak St.

Item	QTY	Unit	Cost	Cost
Earthwork	2200	CY	$25.00	$55,000
Class II AB	240	CY	$50.00	$12,000
AC	60	Ton	$75.00	$4,500
Culvert Extension	40	LF	$500.00	$20,000
Metal Beam Guardrail	300	LF	$25.00	$7,500
Striping	1060	LF	$1.00	$1,060
Signs	2	EA	$150.00	$300
			Subtotal	$100,360

Oak St. to Mission Ln.

Item	QTY	Unit	Cost	Cost
Earthwork	260	CY	$25.00	$6,500
Class II AB	240	CY	$50.00	$12,000
AC	60	Ton	$75.00	$4,500
Culvert Extension	0	LF	$500.00	$0
Metal Beam Guardrail	800	LF	$25.00	$20,000
Striping	1060	LF	$1.00	$1,060
Signs	2	EA	$150.00	$300
			Subtotal	$44,360

Mission Ln to TR 2647

Item	QTY	Unit	Cost	Cost
Earthwork	5500	CY	$25.00	$137,500
Class II AB	250	CY	$50.00	$12,500
AC	94	Ton	$75.00	$7,050
Culvert Extension	60	LF	$500.00	$30,000
Metal Beam Guardrail	1900	LF	$25.00	$47,500
Striping	1900	LF	$1.00	$1,900
Signs	4	EA	$150.00	$600
			Subtotal	$237,050

APPENDIX I

RIVER ROAD PHOTOS

RIVER ROAD PHOTOS- EXISTING CONDITION – SAN MIGUEL AREA
3/06

River Rd at Magdalena St. looking North. The existing paving is 20-22 feet wide for most of River Road through the project area. This section is fairly flat and would not require significant grading.

River Rd looking North from Martinez St. There is a culvert in the low point that would require extension and some fill. Some minor cuts at the edges would be needed along this section.

River Rd near Mission St. looking north. The Salinas River on the left creates a large downslope. All widening would need to be to the east on this section. However the area is relatively flat for most of the road section.

River Rd. looking north from Mission St. The pavement is 20-21 feet wide. The west side of the roadway falls off steeply. All widening needs to occur on the east side. The large fill area with an existing culvert can be seen in the distance past the caution sign.

River Rd. showing a closer detail of the large culvert fill area just south of proposed Tract 2467. Picture is looking north. Fill and culvert extensions are required, along with new guardrail.

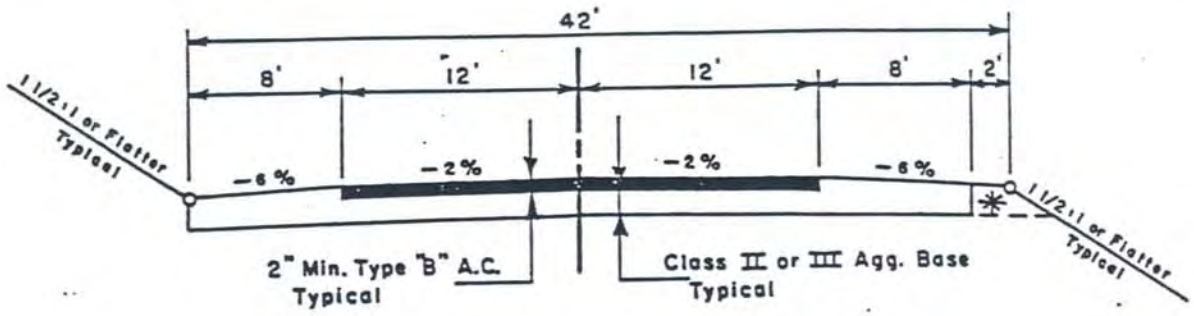
Widened section of River Road adjacent to TR 2467 and just before the intersection with Cross Canyon Rd. Picture is looking north.

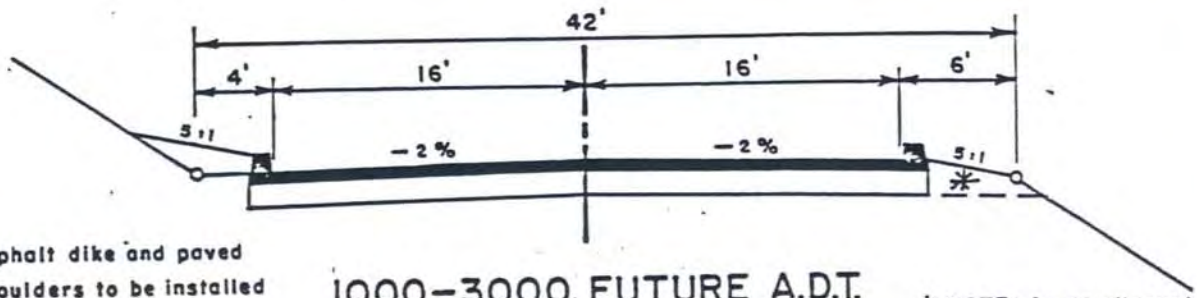
Widened street section on River Rd, done as part of the San Miguel Bridge project. Cross Canyon Dr. is just ahead on the right. Picture is looking north-west.

APPENDIX J

TYPICAL SECTIONS - RURAL

Revisions				Approvals		
Description	By	Approved	Date	County Engineer		6-8-84
				Recommended by Deputy Co. Eng.	Clinton Milne	6/7/84

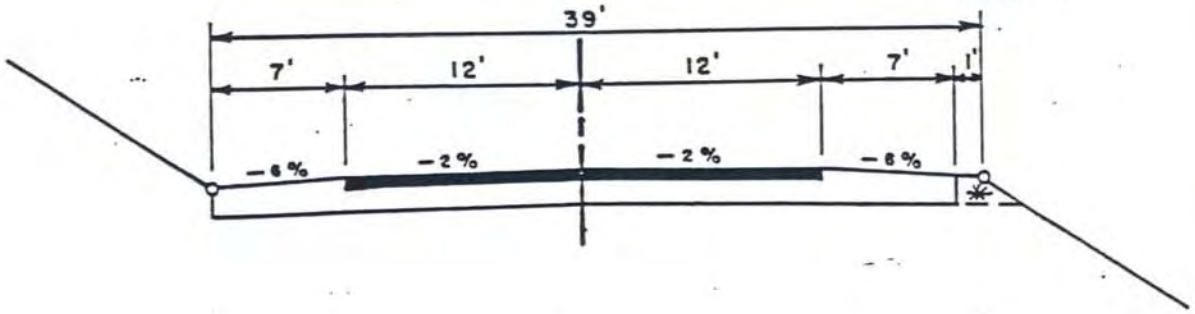


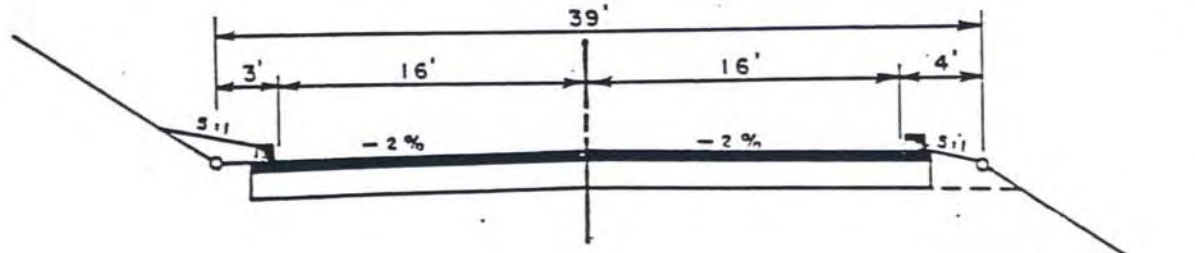


Asphalt dike and paved shoulders to be installed where needed to controll drainage or erosion

1000-3000 FUTURE A.D.T.
FLAT & ROLLING

*NOTE: As an alternate the choker can be eliminated and the agg. base carried to the hinge point





1000-3000 FUTURE A.D.T.
MOUNTAINOUS

Specification Ref.	COUNTY OF SAN LUIS OBISPO ENGINEERING DEPARTMENT	Scale NO SCALE
Drawn: Date:	# TYPICAL SECTIONS RURAL	Drawing No A-1(c)