SAN MIGUEL
TRAFFIC CIRCULATION
STUDY

San Miguel, California

Prepared For

San Luis Obispo County
Department of Public Works
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By

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April 6, 2006

APPENDIX A
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This report has been prepared under the direction of the following Registered Person.

Registered Civil Engineer
# TABLE OF CONTENTS

1 INTRODUCTION ........................................................................................................... 1  

2 EXISTING CONDITIONS............................................................................................ 3  
   2.1 Roadway Inventory ............................................................................................. 3  
   2.2 Average Traffic Volumes .................................................................................. 3  
   2.3 Traffic Levels of Service ................................................................................... 4  
   2.4 Level of Service for Roadways ......................................................................... 4  
   2.5 Level of Service for Intersections .................................................................... 5  
   2.6 Existing Conditions Analysis .......................................................................... 6  

3 TRAVEL FORECASTS................................................................................................. 8  
   3.1 Trip Generation and Distribution of Cumulative (Future) Projects .................. 9  
   3.2 Cumulative Conditions Traffic Volumes ......................................................... 11  
   3.3 Cumulative Conditions LOS Analysis ............................................................. 11  

4 ROAD IMPACT FEE ................................................................................................. 14  
   4.1 Improvement Projects ...................................................................................... 14  
   4.2 Fair Share Contributions ................................................................................... 14
LIST OF FIGURES

1.1 LOCATION MAP
2.1 EXISTING PM PEAK HOUR TRAFFIC VOLUMES
3.1 TAZ MAP
3.2 CUMULATIVE CONDITIONS PM PEAK HOUR TRAFFIC VOLUMES
4.1 CUMULATIVE PROJECT LOCATION IN FEE AREA
4.2 LAND USE AND TAZ MAP

LIST OF TABLES

3.1: CUMULATIVE PROJECT TRIP GENERATION
3.2: EASTBOUND QUEUE LENGTHS ON RIVER ROAD
4.1: SAN MIGUEL FEE: COUNTY SHARE CALCULATIONS: RIVER ROAD
4.2: FEE AREA CUMULATIVE PROJECT TRIP GENERATION
4.3: SAN MIGUEL FEE CALCULATIONS FOR CUMULATIVE PROJECTS
LIST OF APPENDICES

A. LEVEL OF SERVICE DESCRIPTION – SIGNALIZED INTERSECTIONS

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

C. INTERSECTION LEVEL OF SERVICE CALCULATIONS AND PEAK HOUR SIGNAL WARRANT WORKSHEET - Existing Conditions

D. SAN MIGUEL BUILDOUT PLAN

E. CUMULATIVE CONDITIONS INTERSECTION AND SEGMENT – LEVEL OF SERVICE CALCULATIONS TRAFFIC ANALYSIS WORKSHEETS

F. WARRANTS ANALYSES WORKSHEETS

G. SIGNAL AND PREEMPTION COST ESTIMATES

H. RIVER ROAD COST ESTIMATES

I. RIVER ROAD PHOTOS

J. TYPICAL SECTIONS - RURAL
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.
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
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

<table>
<thead>
<tr>
<th>TRIP GENERATION RATES</th>
<th>ITE LAND USE CODE</th>
<th>PROJECT SIZE</th>
<th>DAILY TRIPS</th>
<th>AM PEAK HOUR</th>
<th>PM PEAK HOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL % PEAK OF</td>
<td>TOTAL % PEAK OF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HOUR ADT IN</td>
<td>HOUR ADT IN</td>
</tr>
<tr>
<td>Warehousing</td>
<td>150</td>
<td>50,000 sq. ft.</td>
<td>2,216</td>
<td>67 3% 34 33</td>
<td>136 6% 60 76</td>
</tr>
<tr>
<td>Single-Family Detached Housing (per unit)</td>
<td>210</td>
<td>9,577</td>
<td>6,862</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soccer Complex</td>
<td>488</td>
<td></td>
<td>71.33</td>
<td>1.40 2% 0.50 0.50</td>
<td>20.67 29% 0.69 0.31</td>
</tr>
<tr>
<td>Church</td>
<td>560</td>
<td></td>
<td>9.11</td>
<td>0.72 8% 0.54 0.46</td>
<td>0.66 7% 0.52 0.48</td>
</tr>
<tr>
<td>General Office Building</td>
<td>710</td>
<td></td>
<td>11.01</td>
<td>1.55 14% 0.88 0.12</td>
<td>1.48 14% 0.17 0.83</td>
</tr>
<tr>
<td>Specialty Retail Center</td>
<td>814</td>
<td></td>
<td>44.32</td>
<td>1.33 3% 0.50 0.50</td>
<td>2.71 6% 0.44 0.56</td>
</tr>
</tbody>
</table>

#### TRIPS

- **Local Commercial**
  - Downtown - Mission Street (per 1,000 sq. ft.)
  - Walking/Passby Trip Reduction (25%)
  - NET NEW TRIPS:

- **Regional/Tourist-Oriented Commercial**
  - S. of 10th & W. of 101 (per 1,000 sq. ft.)
  - S. of 10th & E. of 101 (per 1,000 sq. ft.)
  - Freeway Passby Trip Reduction (50%)
  - NET NEW TRIPS:

- **Industrial/Office**
  - Warehousing - North
  - Warehousing - South
  - Downtown - "N" Street (per 1,000 sq. ft.)
  - General Office Building - Mission Street
  - General Office Building - W. of Mission Street
  - SUBTOTAL:

- **Recreational**
  - Church
  - Soccer Complex
  - SUBTOTAL:

- **Residential**
  - E and W of Mission
  - SW of 101/10th Interchange
  - San Miguel Terrace area
  - S. of 11th Street
  - 11th Street to River Road
  - S. of Sewage Treatment Plant
  - N. of River Road
  - SUBTOTAL:

**NET NEW TOTAL:**

1,003 470 533

**Notes:**
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 permissible 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

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Peak Hour</th>
<th>Traffic Volume</th>
<th>Approach Capacity</th>
<th>95% Vehicle Queue (vehicles)</th>
<th>Available Storage (ft)</th>
<th>Queue Acceptable?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative</td>
<td>AM</td>
<td>303</td>
<td>555</td>
<td>4</td>
<td>100</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>299</td>
<td>431</td>
<td>7</td>
<td>175</td>
<td>180</td>
</tr>
</tbody>
</table>

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:

\[
Q_{95} \approx 900T \left[ \frac{V_t}{C_{m,t}} - 1 + \left( \frac{V_t}{C_{m,t}} - 1 \right)^2 + \frac{3600}{C_{m,t}} \left( \frac{V_t}{C_{m,t}} - 1 \right) \right]
\]

(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 River 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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing PM peak hour trips</td>
<td>155</td>
</tr>
<tr>
<td>Cumulative PM peak hour volume</td>
<td>225</td>
</tr>
<tr>
<td>County threshold per Drawing A-1 (c) (PM peak hour – assumed 10% of ADT)</td>
<td>100</td>
</tr>
<tr>
<td>“Existing PM peak hour deficiency”</td>
<td>55</td>
</tr>
<tr>
<td>Cumulative PM peak hour trips</td>
<td>70</td>
</tr>
<tr>
<td>Total PM peak hour trips that will pay for improvement</td>
<td>125</td>
</tr>
<tr>
<td>County share</td>
<td>44%</td>
</tr>
<tr>
<td>Cumulative project share</td>
<td>55%</td>
</tr>
<tr>
<td>Total cost for River Road widening</td>
<td>$751,719</td>
</tr>
<tr>
<td>County share (44%)</td>
<td>$330,757</td>
</tr>
<tr>
<td>Cumulative project share</td>
<td>$420,962</td>
</tr>
</tbody>
</table>

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 been included in the fee calculations.
Table 4.2: Fee Area Cumulative Project Trip Generation

<table>
<thead>
<tr>
<th>TRIP GENERATION RATES</th>
<th>ITE LAND USE CODE</th>
<th>PROJECT SIZE</th>
<th>DAILY TRIPS</th>
<th>AM PEAK HOUR TOTAL % PEAK OF HOUR</th>
<th>PM PEAK HOUR TOTAL % PEAK OF HOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warehouse</td>
<td>150</td>
<td>210</td>
<td>4.96</td>
<td>0.45 9% 0.82 0.18</td>
<td>0.47 9% 0.25 0.75</td>
</tr>
<tr>
<td>SF Detached Housing (per unit)</td>
<td>210</td>
<td>9.67</td>
<td>0.75 8% 0.25 0.75</td>
<td>1.01 11% 0.64 0.36</td>
<td></td>
</tr>
</tbody>
</table>

**TRIPS**

| Industrial/Office | Warehouse - North (TAZ 205) | 150 | 120,000 sq. ft. | 555 | 54 9% 44 10 | 56 9% 14 42 |
| Warehouse - South (TAZ 206) | 150 | 120,000 sq. ft. | 555 | 54 9% 44 10 | 56 9% 14 42 |
| **SUBTOTAL** | | | 1,110 | 108 9% 88 20 | 112 9% 28 64 |

| 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 208) | 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:
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 LIU 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

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission/14th-River signal improvement</td>
<td>$837,000</td>
</tr>
<tr>
<td>River Road widening (Cumulative project share only)</td>
<td>$420,962</td>
</tr>
<tr>
<td>Fee program updates (up to 2025)</td>
<td>$170,000</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$1,427,962</strong></td>
</tr>
</tbody>
</table>

Cost per cumulative trip (369 PM peak hour trips) $3,870
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)

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Control Delay (seconds / vehicle)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>&lt;10</td>
</tr>
<tr>
<td>B</td>
<td>10 - 20</td>
</tr>
<tr>
<td>C</td>
<td>20 - 35</td>
</tr>
<tr>
<td>D</td>
<td>35 - 55</td>
</tr>
<tr>
<td>E</td>
<td>55 - 80</td>
</tr>
<tr>
<td>F</td>
<td>&gt;80</td>
</tr>
</tbody>
</table>
APPENDIX B

LEVEL OF SERVICE DESCRIPTION – UN SIGNALIZED INTERSECTIONS WITH TWO-WAY STOP CONTROL
APPENDIX B

LEVEL OF SERVICE (LOS) DESCRIPTION
UN SIGNALIZED 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.

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

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Control Delay (seconds / vehicle)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0 - 10</td>
</tr>
<tr>
<td>B</td>
<td>&gt;10 - 15</td>
</tr>
<tr>
<td>C</td>
<td>&gt;15 - 25</td>
</tr>
<tr>
<td>D</td>
<td>&gt;25 - 35</td>
</tr>
<tr>
<td>E</td>
<td>&gt;35 - 50</td>
</tr>
<tr>
<td>F</td>
<td>&gt;50</td>
</tr>
</tbody>
</table>
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)

<table>
<thead>
<tr>
<th>Approach</th>
<th>North Bound</th>
<th>South Bound</th>
<th>East Bound</th>
<th>West Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movement</td>
<td>L - T - R</td>
<td>L - T - R</td>
<td>L - T - R</td>
<td>L - T - R</td>
</tr>
<tr>
<td>Control</td>
<td>Uncontrolled</td>
<td>Uncontrolled</td>
<td>Stop Sign</td>
<td>Stop Sign</td>
</tr>
<tr>
<td>Rights</td>
<td>Include</td>
<td>Include</td>
<td>Include</td>
<td>Include</td>
</tr>
<tr>
<td>Lanes</td>
<td>0 0 1 0 0</td>
<td>0 0 1 0 0</td>
<td>0 0 0 1 0</td>
<td>0 0 1 0 0</td>
</tr>
</tbody>
</table>

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 xxxx 4.1 xxxx xxxx xxxx 6.5 6.2 7.1 6.5 6.2
FollowUpTim: 2.2 xxxx xxxx xxxx 2.2 xxxx xxxx xxxx 4.0 3.3 3.5 4.0 3.3

Capacity Module:
Cntlfct Vol: 66 xxxx xxxx 111 xxxx xxxx xxxx 204 65 180 178 84
Potent Cap.: 1536 xxxx xxxx 1479 xxxx xxxx xxxx 693 999 782 716 975
Move Cap.: 1536 xxxx xxxx 1479 xxxx xxxx xxxx 686 999 772 709 975
Volume/Cap: 0.00 xxxx xxxx 0.01 xxxx xxxx xxxx 0.00 0.00 0.18 0.01 0.04

Level Of Service Module:
Queue: 0.0 xxxx xxxx 0.0 xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
Stopped Del: 7.3 xxxx xxxx xxxx 7.5 xxxx xxxx xxxx
LOS by Move: A A A A A A A A A A A A A A A A
Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT
Shared Cap.: xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
SharedQueue:xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
Shrd StpDel:xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
ApproachDel: xxxxxxxx xxxxxxxx 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 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 xxxx 4.1 xxxx xxxx xxxx 6.5 6.2 7.1 6.5 6.2
FollowUpTim: 2.2 xxxx xxxx 2.2 xxxx xxxx xxxx 4.0 3.3 3.5 4.0 3.3

Capacity Module:
Cnflict Vol: 41 xxxx xxxx 241 xxxx xxxx xxxx 361 40 279 273 153
Potent Cap.: 1568 xxxx xxxx 1326 xxxx xxxx xxxx 566 1031 673 634 893
Move Cap.: 1568 xxxx xxxx 1326 xxxx xxxx 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 xxxx 0.1 xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
Stopped Del: 7.3 xxxx xxxx 7.8 xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
LOS by Move: A * * A * * * * * * * A * B *
Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT
Shared Cap.: xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx 948 xxxx 692 xxxx
SharedQueue:xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx 0.0 xxxx 1.0 xxxx
Shrd StpDel:xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx 8.8 xxxx 12.0 xxxx
Shared LOS: * * * * * * * * A * B *
ApproachDel: xxxxxxx xxxxxxx 8.8 12.0
ApproachLOS: * * A B
# Two-Way Two-Lane Highway Segment Worksheet

## General Information
- Analyst: CL
- Agency or Company: Higgins Associates
- Date Performed: 3/6/2006
- Analysis Time Period: PM Peak Hour
- Project Description: 5-195 San Miguel Traffic Circulation Study

## Site Information
- Highway: River Road
- From/To: E. Cross Canyon/N. Martinez
- Jurisdiction: Existing
- Analysis Year: Existing

## Input Data

<table>
<thead>
<tr>
<th>Class I highway</th>
<th>Class II highway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terrain</td>
<td>Level</td>
</tr>
<tr>
<td>Rolling</td>
<td>Rolling</td>
</tr>
</tbody>
</table>

- Two-way hourly volume: 155 veh/h
- Directional split: 60 / 40
- Peak-hour factor, PHF: 6.0
- No-passing zone, P_T: 100
- Trucks and Buses, P_B: 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 (Exhibit 20-11): 0.970
- Two-way flow rate, v_p (pc/h): 225
- v_p * highest directional split proportion^2 (pc/h): 135

### Free-Flow Speed from Field Measurement

- Field Measured speed, S_FM: m/h
- Observed volume, V_t: veh/h
- Free-flow speed, FFS = S_FM + 0.00776(V_t / f_HV): m/h

### Estimated Free-Flow Speed
- Base free-flow speed, BFFS_FM: 45.0 m/h
- Adj. for lane width and shoulder width^3, f_LS (Exhibit 20-5): 5.3 m/h
- Adj. for access points, f_A (Exhibit 20-6): 1.0 m/h
- Free-flow speed, FFS (BFFS_FM * f_LS * f_A): 38.7 m/h

### Average travel speed, ATS (m/h)
- ATS = FFS - 0.00776 * v_p: 33.3 m/h

## 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 (Exhibit 20-11): 0.984
- Two-way flow rate, v_p (pc/h): 205
- v_p * highest directional split proportion^2 (pc/h): 123
- Base percent time-spent-following, BPTSF (%): 16.5
- Adj. for directional distribution and no-passing zone, f_mxp (%): 23.7
- Percent time-spent-following, PTSF (%): 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: 0.07
- Peak 15-min veh-miles of travel, VMT_{15} (veh-mi): 43
| Peak-hour vehicle-miles of travel, $VMT_{60}$ (veh-
mi) | $VMT_{60} = V^*L_1$ | 171 |
|-----------------------------------------------|----------------------|-----|
| Peak 15-min total travel time, $TT_{15}$ (veh-
h) | $TT_{15} = VMT_{15}/ATS$ | 1.3 |

**Notes**

1. If $V_p >= 3,200$ pch, terminate analysis-the LOS is F.
2. If highest directional split $V_p >= 1,700$ pch, terminated analysis-the LOS is F.
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]

<table>
<thead>
<tr>
<th>Approach: North Bound</th>
<th>South Bound</th>
<th>East Bound</th>
<th>West Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movement: L - T - R</td>
<td>L - T - R</td>
<td>L - T - R</td>
<td>L - T - R</td>
</tr>
<tr>
<td>Control: Uncontrolled</td>
<td>Uncontrolled</td>
<td>Stop Sign</td>
<td>Stop Sign</td>
</tr>
<tr>
<td>Rights: Include</td>
<td>Include</td>
<td>Include</td>
<td>Include</td>
</tr>
<tr>
<td>Lanes: 0 0 1 0 0</td>
<td>0 0 1 0 0</td>
<td>0 0 1 0 0</td>
<td>0 0 1 0 0</td>
</tr>
</tbody>
</table>

Volume Module: >> Count Date: 9 May 2005 << 7:00 - 8:00 AM

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3 54 49</td>
<td>1.00 1.00</td>
<td>3 54 49</td>
<td>2 11 50</td>
<td>0 0 0</td>
<td>5 65 99</td>
<td>1.00 1.00</td>
<td>0.93</td>
<td>5 70 106</td>
<td>0 0 0</td>
<td>5 70 106</td>
<td>Critical Gp: 4.1 xxxx xxxxx</td>
</tr>
</tbody>
</table>

FollowUpTim: 2.2 xxxx xxxxx

Capacity Module:

<table>
<thead>
<tr>
<th>Chflict Vol:</th>
<th>Potent Cap.:</th>
<th>Move Cap.:</th>
<th>Volume/Cap:</th>
<th>Level Of Service Module:</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 xxxx xxxxx</td>
<td>1518 xxxx xxxxx</td>
<td>1518 xxxx xxxxx</td>
<td>0.00 xxxx xxxxx</td>
<td>Queue: 0.0 xxxx xxxxx</td>
</tr>
</tbody>
</table>

Stopped Del: 7.4 xxxx xxxxx

LOS by Move: A * * A * * A * * A *

Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT

Shared Cap.: xxxxx xxxx xxxxx xxxx xxxx xxxx 590 xxxx xxxx 611 xxxx

SharedQueue: xxxx xxxx xxxx xxxx xxxx xxxx 0.2 xxxx xxxx 3.1 xxxx

Srhd StpDel: xxxx xxxx xxxx xxxx xxxx xxxx 11.6 xxxx xxxx 17.4 xxxx

Shared LOS: * * * * * * * * * * * * B * * C *

Approach Del: xxxxx xxxxx 11.6 17.4

Approach LOS: * * * * * * * * 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]

<table>
<thead>
<tr>
<th>Approach:</th>
<th>North Bound</th>
<th>South Bound</th>
<th>East Bound</th>
<th>West Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movement:</td>
<td>L - T - R</td>
<td>L - T - R</td>
<td>L - T - R</td>
<td>L - T - R</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control:</td>
<td>Uncontrolled</td>
<td>Uncontrolled</td>
<td>Stop Sign</td>
<td>Stop Sign</td>
</tr>
<tr>
<td>Rights:</td>
<td>Include</td>
<td>Include</td>
<td>Include</td>
<td>Include</td>
</tr>
<tr>
<td>Lanes:</td>
<td>0 0 1! 0 0</td>
<td>0 0 1! 0 0</td>
<td>0 0 1! 0 0</td>
<td>0 0 1! 0 0</td>
</tr>
</tbody>
</table>

**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 xxxx
- **FollowUpTim:** 2.2 xxxx xxxx
- **3.5 4.0 3.3**

**Capacity Module:**

- **Conflict Vol:** 65 xxxx xxxx
- **Potential Cap:** 1537 xxxx xxxx
- **Move Cap:** 1537 xxxx xxxx
- **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 xxxx
- **Stopped Del:** 7.4 xxxx xxxx
- **8.4 xxxx xxxx**
- **LOS by Move:** A * * A * * * * * * * *
- **Movement:** LT - LTR - RT
- **Shared Cap:**
  - xxxx xxxx xxxx
  - xxxxx xxxx xxxx
  - xxxx xxxx xxxx
  - xxxx xxxx xxxx
  - xxxx xxxx xxxx
- **SharedStor:**
  - 542 xxxx xxxx
  - 493 xxxx xxxx
  - 6.0 xxxx xxxx
- **Shared LOS:**
  - B * * D *
- **ApproachDel:**
  - xxxxxxx
  - 12.0 29.6
- **ApproachLOS:**
  - * B
  - D
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

**General Information**
- Analyst: CL
- Agency or Company: Higgins Associates
- Date Performed: 3/16/2006
- Analysis Time Period: PM Peak Hour

**Project Description:** 5-195 San Miguel Traffic Circulation Study

**Site Information**
- Highway: River Road
- FromTo: E. Cross Canyon/N. Martinez
- Jurisdiction: Cumulative

**Input Data**

![Diagram of two-lane highway segment with dimensions labeled: shoulder width, lane width, segment length L1, and directions of traffic indicated.]

- **Average Travel Speed**
  - Grade adjustment factor, \( f_g \) (Exhibit 20-7): 0.71
  - Passenger-car equivalents for trucks, \( E_T \) (Exhibit 20-9): 1.1
  - Passenger-car equivalents for RVs, \( E_R \) (Exhibit 20-9): 2.5
  - Heavy-vehicle adjustment factor, \( f_{HV} \): 0.970
  - Two-way flow rate, \( v_p \) (pc/h): 327
  - Two-way highest directional split proportion, \( f_{DHS} \): 196

- **Free-Flow Speed from Field Measurement**
  - Field measured speed, \( S_{FM} \) (mi/h): 45.0
  - Observed volume, \( V_f \) (veh/h): 5.3
  - Free-flow speed, \( FFS = S_{FM} + 0.00776(\sqrt{f_{HV}}) \) (mi/h): 4.1
  - Adj. for passing zones, \( f_{np} \) (mph): 32.0

- **Percent Time-Spent-Following**
  - Grade adjustment factor, \( f_g \) (Exhibit 20-8): 187
  - Passenger-car equivalents for trucks, \( E_T \) (Exhibit 20-10): 1.7
  - Passenger-car equivalents for RVs, \( E_R \) (Exhibit 20-10): 2.5
  - Heavy-vehicle adjustment factor, \( f_{HV} \): 0.984
  - Two-way flow rate, \( v_p \) (pc/h): 297
  - Two-way highest directional split proportion, \( f_{DHS} \): 178

- **Base percent time-spent-following, \( BPTS_F \): 23.0
- Adj. for directional distribution and no-passing, \( f_{dhp} \): 23.0
- Percent time-spent-following, \( PTS_F = BPTS_F + f_{dhp} \): 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 \( v/c \): 0.10
- Peak 15-min veh-miles of travel, \( VMT_{15} \) (veh-m): 82
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak-hour vehicle-miles of travel, VMT₁₆₀ (veh-mi)</td>
<td>248</td>
</tr>
<tr>
<td>VMT₁₆₀ = V'L₄</td>
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<tr>
<td>Peak 15-min total travel time, TT₁₅₅ (veh-h)</td>
<td>1.9</td>
</tr>
<tr>
<td>TT₁₅₅ = VMT₁₅₅/ATS</td>
<td></td>
</tr>
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</table>

**Notes**

1. If Vp ≥ 3,200 pch, terminate analysis—the LOS is F.
2. If highest directional split Vp ≥ 1,700 pch, terminated analysis—the LOS is F.
APPENDIX F

WARRANTS ANALYSES WORKSHEETS
CALTRANS PEAK HOUR VOLUME SIGNAL WARRANT (Rural Areas)

MINOR STREET (VPH)

HIGH VOLUME APPROACH

MAJOR STREET (VPH)

TOTAL OF BOTH APPROACHES

2 OR MORE LANES (MAJOR) & 2 OR MORE LANES (MINOR)

F

B, D, E

2 OR MORE LANES (MAJOR) & 1 LANE (MINOR)

OR 1 LANE (MAJOR) & 2 OR MORE LANES (MINOR)

1 LANE (MAJOR) & 1 LANE (MINOR)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Major Street</th>
<th>Minor Street</th>
<th>Warranted?</th>
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<tbody>
<tr>
<td></td>
<td>North/South</td>
<td>East/West</td>
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<tr>
<td>A. Existing AM</td>
<td>177</td>
<td>173</td>
<td>No</td>
</tr>
<tr>
<td>B. Existing PM</td>
<td>257</td>
<td>145</td>
<td>No</td>
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<tr>
<td>C. Exist+Proj AM</td>
<td>193</td>
<td>191</td>
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<tr>
<td>D. Exist+Proj PM</td>
<td>287</td>
<td>156</td>
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<tr>
<td>E. Cumulative AM</td>
<td>297</td>
<td>303</td>
<td>No</td>
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<tr>
<td>F. Cumulative PM</td>
<td>471</td>
<td>299</td>
<td>Yes</td>
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</table>

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.

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

<table>
<thead>
<tr>
<th>Minimum Requirements (Rural)</th>
<th>Existing AM</th>
<th>Existing PM</th>
<th>Existing+Project AM</th>
<th>Existing+Project PM</th>
<th>Cumulative AM</th>
<th>Cumulative PM</th>
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</thead>
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<tr>
<td>All Approaches (# of vehicles)</td>
<td>420</td>
<td>355</td>
<td>422</td>
<td>379</td>
<td>454</td>
<td>638</td>
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<tr>
<td>Both Approaches Minor Street (# of vehicles &amp; pedestrians)</td>
<td>170</td>
<td>178</td>
<td>155</td>
<td>196</td>
<td>167</td>
<td>341</td>
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<td>Warrant Satisfied? (with RT)</td>
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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

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>UNIT COST</th>
<th>LENGTH</th>
<th>WIDTH</th>
<th>DEPTH</th>
<th>QUANTITY</th>
<th>COST</th>
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<td>1a</td>
<td>Surfacing: base</td>
<td>SF</td>
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<tr>
<td>1b</td>
<td>Surfacing: pavement</td>
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<td>1c</td>
<td>Sidewalk: new</td>
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<td>1d</td>
<td>Sidewalk: replace</td>
<td>SF</td>
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<tr>
<td>1e</td>
<td>Curb and Gutter: new</td>
<td>LF</td>
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<tr>
<td>1f</td>
<td>Curb and Gutter: replace</td>
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<td>1g</td>
<td>Curb Ramps</td>
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<td>1h</td>
<td>Resurfacing</td>
<td>SF</td>
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<td>1i</td>
<td>Landscaped Median</td>
<td>SF</td>
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<td>1j</td>
<td>Hardscaped Median</td>
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<td>1k</td>
<td>Guard Rail</td>
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<td>Bike Path: base</td>
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<td>1m</td>
<td>Bike Path: pavement</td>
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<td>1n</td>
<td>Striping &amp; Pavement Markers</td>
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<td>1o</td>
<td>Electricians</td>
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<td>1p</td>
<td>Traffic Signal (base price): 3 legs/6 movements</td>
<td>EA</td>
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<td>1q</td>
<td>Traffic Signal (base price): 4 legs/8 movements</td>
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<tr>
<td></td>
<td>Additional cost per leg/movement</td>
<td>EA</td>
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<td>2</td>
<td>Earthwork</td>
<td>CF</td>
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<td>3</td>
<td>Signage (3% Item 1)</td>
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<td>4</td>
<td>Utilities (10% Item 1)</td>
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<td>Drainage (12% Items 1-2)</td>
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<td>6a</td>
<td>Bridge: new</td>
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<tr>
<td>6b</td>
<td>Bridge: widen</td>
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<td>7a</td>
<td>Retaining Wall: &lt;= 4 feet</td>
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<tr>
<td>7b</td>
<td>Retaining Wall: &gt; 4 feet</td>
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<td>8</td>
<td>Removal of Existing Pavement</td>
<td>SF</td>
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<tr>
<td>9</td>
<td>Removal of Existing Bridges</td>
<td>SF</td>
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<td>10a</td>
<td>Preemption</td>
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<td>25,000.00</td>
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<td>10b</td>
<td>Rail Road Signal Control Construction (estimate)</td>
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<td>200,000.00</td>
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<td><strong>1 - 10 Subtotal</strong></td>
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<td><strong>CONTINGENCIES</strong></td>
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<td>11</td>
<td>Construction Contingencies (20%)</td>
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<td>12</td>
<td>PE, PM, Environmental, Design, ROW, CA (55%)</td>
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<td><strong>17 SUBTOTAL</strong></td>
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<td><strong>1 - 17 PROJECT TOTAL</strong></td>
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<td><strong>TOTAL COST</strong></td>
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</table>
* Enter items specific to this project
** Project Administration contingency includes environmental clearance, outside agency review, permitting, right-of-way agent, and unforeseen conditions. Cost TBD/updated

Copy of 5-195 TIF4.xls Mission Signal
San Miguel TIF
3/21/2006
APPENDIX H

RIVER ROAD
COST ESTIMATES
<table>
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<th>Item</th>
<th>QTY</th>
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<th>Cost</th>
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<tbody>
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<td>Construction Signs</td>
<td>LS</td>
<td>LS</td>
<td>$2,000.00</td>
<td>$2,000</td>
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<td>Traffic Control</td>
<td>LS</td>
<td>LS</td>
<td>$4,000.00</td>
<td>$4,000</td>
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<td>Clearing and Grubbing</td>
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<td>Earthwork</td>
<td>8,076 CY</td>
<td>CY</td>
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<td>850 CY</td>
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<td>Metal Beam Guardrail</td>
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## Subsection Breakdowns

### Magdalena St. to Martinez St.

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<td>AC</td>
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<td>$1,950</td>
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<td>Metal Beam Guardrail</td>
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**Subtotal** $11,380

### Martinez St. to Oak St.

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<td>2200</td>
<td>CY</td>
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<td>$55,000</td>
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<tr>
<td>Class II AB</td>
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<td>CY</td>
<td>$50.00</td>
<td>$12,000</td>
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<tr>
<td>AC</td>
<td>60</td>
<td>Ton</td>
<td>$75.00</td>
<td>$4,500</td>
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<td>Culvert Extension</td>
<td>40</td>
<td>LF</td>
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<td>$20,000</td>
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**Subtotal** $100,360
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APPENDIX I

RIVER ROAD PHOTOS
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
2" Min. Type B" A.C. Typical

Class II or III Agg. Base Typical

Asphalt dike and paved shoulders to be installed where needed to control 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

TYPICAL SECTIONS
RURAL

A-1(c)