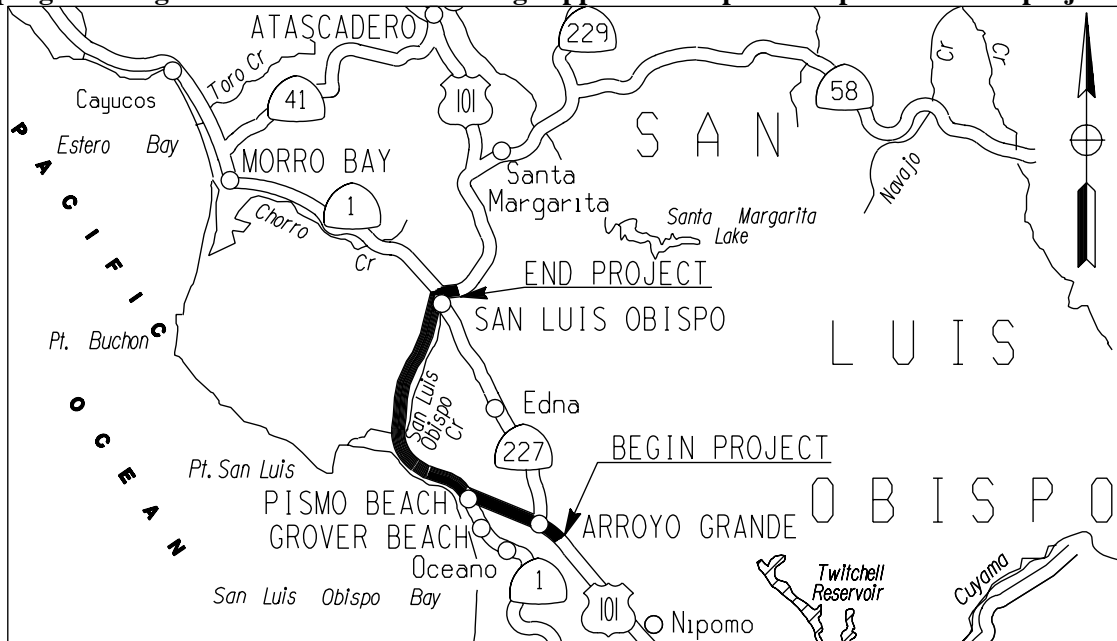


## PROJECT STUDY REPORT (Project Development Support)

This document can be used to program only the Engineering and Environmental Support for Project Approval and Environmental Document component. The remaining support and capital components of the project are preliminary estimates and are not suitable for programming purposes. Either a Supplement PSR or a Project Report will serve as the programming document for the remaining support and capital components of the project.



On Route 101 at various locations in San Luis Obispo County

From 0.4 kilometers South of El Campo Road near Arroyo Grande

To 0.1 kilometer North of San Luis Obispo Creek in San Luis Obispo

APPROVAL RECOMMENDED BY:

\_\_\_\_\_  
AMY DONATELLO  
PROJECT MANAGER

APPROVED BY:

\_\_\_\_\_  
R. GREGG ALBRIGHT  
DISTRICT DIRECTOR, DISTRICT 5

\_\_\_\_\_  
DATE

PROJECT SCOPE AND TECHNICAL DATA ARE VALID THROUGH: \_\_\_\_\_  
COST AND WORKPLAN MUST BE UPDATED PRIOR TO USE FOR PROGRAMMING

This Project Study Report (Project Development Support) has been prepared under the direction of the following registered civil engineer. The registered civil engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

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CHRISTOPHER L. GARDNER  
*REGISTERED CIVIL ENGINEER*

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DATE

## 1. Introduction

This State Transportation Improvement Program (STIP) candidate project proposes to improve the traffic operational characteristics of United States (US) Route 101 in San Luis Obispo County at the following seven locations:

- Location 1: KP 18.6/19.6(PM 11.6/12.2) At the intersection of El Campo Road near Arroyo Grande.
- Location 2: KP 20.6/21.2(PM 12.8/13.2) Southbound US Route 101 between SR 227/Grand Avenue and Fair Oaks Avenue in the City of Arroyo Grande.
- Location 3: KP 21.5/23.7 (PM 13.4/14.7) Southbound US Route 101 between Oak Park Boulevard in the City of Pismo Beach and Halcyon Road in the City of Arroyo Grande.
- Location 4: KP 25.1/25.9 (PM 15.6/16.1) Northbound US Route 101 between 4<sup>th</sup> Street and the northbound off-ramp to Price Street in the City of Pismo Beach.
- Location 5: KP 45.0/46.4 (PM 28.0/28.8) Northbound US Route 101 between Marsh Street and Broad Street in the City of San Luis Obispo.
- Location 6: KP 45.0/46.4 (PM 28.0/28.8) Southbound US Route 101 between Broad Street and Marsh Street in the City of San Luis Obispo.
- Location 7: KP 34.1 (PM 21.2) At the interchange of Avila Beach Drive near Shell Beach.

Each location is unique in range of alternatives. For a comprehensive explanation of alternatives, see the Alternative section of this report. The total capital cost (2005/2006 fiscal year) including escalated right of way capital, for all seven locations ranges from \$9.4 to \$32.1 Million. The project is a candidate for the STIP with funding from the Regional Improvement Program (20.20.075.600). The capital outlay support costs for completing the Project Approval and Environmental Document (PA&ED) phase is estimated at \$1.8 Million. The expected environmental document for the proposed project is an Initial Study with a Negative Declaration/Finding of No Significant Impact (ND/FONSI) and is expected to be completed in the 2010/2011 fiscal year. This project has been initially assigned the Project Development Category 3 since a revised Freeway Agreement would be required to reconfigure ramps as proposed in some alternatives.

## 2. Background

This project was initiated on October 16, 2002 by the San Luis Obispo Council of Governments (SLOCOG) as a result of a US Route 101 Major Investment Study (MIS) prepared by Korve Engineering on September 8, 1997. The MIS was commissioned to address the growing traffic demand on the US Route 101 corridor and to provide a comprehensive strategy to reduce traffic congestion by maximizing the efficiency of the existing facility.

Many improvements identified in the MIS were addressed in Phase 1 of the San Luis Obispo Operational Improvement project (EA 05-485621, 05-485611). This project is considered Phase 2 of the effort to implement the MIS strategy and improve traffic operations along US Route 101. The remaining measures identified in the MIS and not included with this project will be studied as part of other projects or programs. It should be noted that since this project consists of several locations, each having independent utility, a need may develop in the PA&ED phase where the project is split into multiple expenditure authorizations (EA). Separate EAs may simplify the environmental clearance of less constrained locations and could facilitate construction capital funding of select locations.

### **Existing Facility**

US Route 101 is the principal north-south highway serving San Luis Obispo County. US Route 101 begins at Interstate 5 in Los Angeles and extends north to the Oregon Border, closely paralleling the coastline at times. It connects the Central Coast to the Bay Area to the north and Los Angeles metropolitan area to the south. US Route 101 bisects the City of San Luis Obispo and provides vital access to the Five Cities Area (Shell Beach, Pismo Beach, Grover Beach, Arroyo Grande, and Oceano). It is an important multifunctional route that experiences its highest traffic volumes during weekday commute hours. Through the project limits, US Route 101 is typically a four-lane freeway, with the exception of the four-lane expressway segment at the at-grade intersection with El Campo Road near Arroyo Grande. The traffic lanes are a standard 3.6 meters (12 feet) in width. Outside shoulders are typically 2.4 meters (8 feet) and inside shoulders are 1.5 meters (5 feet). The median width varies between 11 meters (36 feet) to 14 meters (46 feet). During the 1950s, the route was incrementally converted from expressway to freeway. The existing land-use commitments, railroad line and natural barriers (i.e. coastal mountain topography, proximity to the coastline, rivers) complicated the design of the freeway. The route has a patchwork of ramps without a comprehensive frontage road and crossroad network. Consequently, local traffic is dependent upon the route to make short trips within the community. Furthermore, US Route 101 does not meet various current design standards within the project limits. Some ramp deficiencies are spacing, weaving length, geometrics and intersection terminus design, which can impede operational characteristics. The design speed of the facility is 100 km/h and the design vehicle is STAA truck. For a more specific description of the existing facility at each location, please see below.

**Location 1:** At the intersection of El Campo Road near Arroyo Grande.

During the morning commute hours, traffic volumes on US Route 101 are largest in the northbound direction at this unsignalized intersection location. Although there are existing northbound deceleration and acceleration lanes at El Campo Road, they are non-standard in length for the corresponding speed of the mainline. Often, vehicles come to a stop at the end of the acceleration lane because they do not have sufficient speed and room to weave into the through lane. The southbound direction does not have deceleration and acceleration lanes. During the afternoon commute, the slower speed of southbound US Route 101 traffic exiting to, or entering from El Campo Road causes spot congestion of southbound traffic north of the intersection. The southbound roadway at this location is situated on a high embankment with a 1:1.5 Vertical:Horizontal (V:H) side slope.

**Location 2:** Southbound US Route 101 between SR 227/Grand Avenue and Fair Oaks Avenue in the City of Arroyo Grande.

Traffic congestion associated with this segment of southbound US Route 101 is primarily due to the non-standard weaving length of the auxiliary lane. A 130 meter (427 foot) auxiliary lane resides on southbound US Route 101 between the on-ramp from SR 227/Grand Avenue and the off-ramp to Fair Oaks Avenue. Local traffic circulation is dependent upon the auxiliary lane because of the absence of a frontage road in the immediate area. El Camino Real, the frontage road that runs along the west side of southbound US Route 101 north of the planned work, changes to Barnett Street and currently terminates at Grand Avenue. Agricultural land-use commitments and Arroyo Grande Creek on the southbound side of the freeway have precluded the frontage road from being extended south. The southbound off-ramp to Fair Oaks Avenue is an isolated off-ramp and does not have a large storage capacity. The ramp intersection at Fair Oaks Avenue operates inefficiently because of non-standard geometrics. It is a four-way stop control intersection with a 22 meter (72 foot) offset between the opposing legs of Orchard Road and the off-ramp terminus. Arroyo Grande High School is located near the off-ramp. High school classes start during the morning peak hour, which places additional load on the off-ramp. Traffic can queue onto mainline because of the lack of storage capacity and inefficient ramp intersection. The two intersections for the southbound US Route 101 ramps and SR 227/Grand Avenue also cause inefficient traffic operation. The interchange is a tight diamond with signal control, however the two ramps termini are offset by 60 meters (197 feet) which necessitates the two intersections.

**Location 3:** Southbound US Route 101 between Oak Park Boulevard in the City of Pismo Beach and Halcyon Road in the City of Arroyo Grande.

Traffic congestion at this location is caused by large vehicles slowing on the southbound incline slightly after the southbound on-ramp from El Camino Real. The slower vehicles can reduce the efficiency of merging of traffic from the on ramp. The incline has a maximum grade of 5.75% and stretches for approximately 0.8 kilometers (0.5 miles). Congestion is also evident at the southbound off-ramp to Halcyon Road. The hook off-ramp has a non-standard deceleration length and traffic

can queue onto the mainline during the peak hours, reducing route capacity.

**Location 4:** Northbound US Route 101 between 4<sup>th</sup> Street and the northbound off-ramp to Price Street in the City of Pismo Beach.

This portion of northbound US Route 101 has three ramps within 0.87 kilometers (0.54 miles), which causes a decrease in route capacity. The interchange spacing of the James Way on-ramp to the adjacent interchanges is below current standards. The successive northbound on-ramps from 4<sup>th</sup> Street and James Way are spaced 440 meters (1444 feet) apart and essentially service the same area. A 425 meter (1394 foot) auxiliary lane connects the hook on-ramp from James Way to the off-ramp to Price Street. During the morning peak hour, long platoons of vehicles enter the 4<sup>th</sup> Street on-ramp from the signalized ramp intersection with 4<sup>th</sup> Street. The vehicle platoons are caused by the dual left-turn from northbound 4<sup>th</sup> Street merging down to one lane along the on-ramp. Additionally, there is a heavy local traffic demand on the northbound off-ramp to Price Street. Pismo Beach is divided by Pismo Creek as well as the Union Pacific Railroad. US Route 101, via the Pismo Creek Bridge and the Pismo Overhead, is the only route currently linking the two halves of the community. Compounding this problem, are the geometrics of the hook on-ramp from James Way. Vehicles enter the auxiliary lane at a substantially lower speed than mainline traffic.

**Locations 5 and 6:** US Route 101 between Marsh Street and Broad Street in the City of San Luis Obispo.

Interchange spacing is also non-standard at this location, which impairs the traffic operations of the route. The interchange at Broad Street and Marsh Street are spaced approximately 1.0 kilometers (0.6 miles) apart. The Broad Street interchange is comprised of four hook ramps with no cross road connecting either side of the freeway. The Marsh Street interchange has a trumpet configuration. Local traffic is heavy on the two interchanges because they both service downtown San Luis Obispo.

**Location 7:** At the interchange of Avila Beach Drive.

Avila Beach Drive interchange is situated to the north of Shell Beach in a more rural setting. Avila Beach Drive is the main road that connects the community of Avila Beach to US Route 101. It also connects to the termination of Shell Beach Road, the frontage road on the west side of the freeway that services the community of Shell Beach. During peak hours this interchange is widely used by commuters. This location was targeted in the MIS for a proposed park and ride lot.

### 3. Need and Purpose

Within the project limits, the US Route 101 corridor has several spot locations that currently experience congestion and operate at low Level of Service (LOS) during peak hour commutes. These operational deficiencies are located at weaving sections near interchanges and at the El Campo Road intersection. Weaving sections are segments of highway where vehicles entering and leaving the highway cross paths. Substantial operational inefficiency and loss of route capacity at these locations can be linked to non-standard design features. The general purpose of this project is operational improvements along the US Route 101 corridor. More specifically, the purpose is:

- Location 1 - to improve the traffic operation of the US Route 101 mainline movement through the intersection.
- Locations 2-6 - to improve the weaving operations of US Route 101 and thereby restoring lost route capacity.
- Location 2 - to improve the traffic operation of the southbound ramp intersections with SR 227/Grand Avenue.
- Location 7 - to reduce transportation demand on the US Route 101 corridor.

Note: The geometric design of new facilities should normally be based on estimated traffic 20 years after completion of construction. This project deviates from that standard and will be designed based upon the "current year" design period. Approval was granted by the District 5 Director and the Headquarters Project Development Coordinator on July 13, 2005.

**Traffic**

The existing mainline and ramp traffic volumes are listed in the tables below:

TABLE 1 – 2004 MAINLINE TRAFFIC VOLUMES

Location (Count Station)	Peak Hour (vehicles/hour)	Average Annual Daily Traffic (vehicles/day)
Location 1 (PM 12.52)	6,600	56,000
Location 2 (PM 13.17)	5,900	49,000
Location 3 (PM 13.75)	7,100	57,000
Location 4 (PM 15.58)	10,100	79,000
Location 5 & 6 (PM 28.09)	7,300	65,000

TABLE 2 – 2002/2003 RAMP TRAFFIC VOLUMES

Location Ramp	Average Daily Traffic (vehicles/day) [year]
Location 2	
SB off to Valley Rd (Fair Oaks Ave) (PM 12.930)	2,700 [2002]
SB on from SR 227/Grand Ave (PM 13.100)	5,150 [2002]
Location 3	
SB off to Brisco Rd (Halcyon Rd) (PM 13.680)	5,200 [2002]
SB on from El Camino Real (PM 14.776)	2,400 [2003]
Location 4	
NB on from Pismo Oaks (4 <sup>th</sup> Street) (PM 15.760)	6,900 [2002]
NB on from Five Cities Dr (James Way) (PM 16.020)	3,850 [2002]
NB off to South Price Street (PM 16.320)	6,900 [2003]
Location 5	
NB on from Marsh St (PM 28.182)	5,650 [2003]
NB off to Broad St (PM 28.690)	1,850 [2003]
Location 6	
SB off to Marsh St (PM 28.050)	3,200 [2003]
SB on from Broad St (PM 28.790)	2,700 [2003]

**Accident Rate**

The Traffic Accident Surveillance and Analysis System (TASAS) "Table B" indicates that at the six project locations on the mainline there were 100 collisions (0-fatal, 26-injury, 74-property damage only) reported within a three-year period. The accident rate breakdown for each location is as follows:

TABLE 3 – MAINLINE “TABLE B”  
 April 1, 2001 to March 31, 2004

Location	ACTUAL			STATE AVERAGE		
	Fatal	Fatal+Injury	Total	Fatal	Fatal+Injury	Total
Location 1 (PM 11.6/12.2)	0.0	0.06	0.46	0.022	0.46	1.01
Location 2 (SB PM 12.8/13.2)	0.0	0.39	1.74	0.010	0.32	0.87
Location 3 (SB PM 13.4/14.8)	0.0	0.17	0.57	0.010	0.33	0.90
Location 4 (NB PM 15.6/16.1)	0.0	0.16	0.74	0.012	0.40	1.09
Location 5 (NB PM 28.0/28.8)	0.0	0.21	0.46	0.013	0.42	1.14
Location 6 (SB PM 28.0/28.8)	0.0	0.09	0.43	0.013	0.42	1.14

Note - Rates are in accidents per million vehicle miles

At the intersection and eleven ramps located within the six project locations, 33 collisions (0-fatal, 11-injury, 22-property damage only) were reported during the same three-year period. The accident rate breakdown for each ramp/intersection is as follows:

TABLE 4 – RAMP / INTERSECTION “TABLE B”  
April 1, 2001 to March 31, 2004

Ramp/Intersection	ACTUAL			STATE AVERAGE		
	Fatal	Fatal+Injury	Total	Fatal	Fatal+Injury	Total
Location 1						
El Campo Rd	0.0	0.03	0.15	0.008	0.16	0.33
Location 2						
SB off to Valley Rd (Fair Oaks Ave)	0.0	0.39	0.39	0.005	0.61	1.50
SB on from SR 227/Grand Ave	0.0	0.64	0.85	0.002	0.32	0.80
Location 3						
SB off to Brisco Rd (Halcyon Rd)	0.0	0.22	1.52	0.005	0.39	1.15
SB on from El Camino Real	0.0	0.0	0.0	0.002	0.20	0.60
Location 4						
NB on from Pismo Oaks (4 <sup>th</sup> Street)	0.0	0.0	0.31	0.002	0.19	0.55
NB on from Five Cities Dr (James Way)	0.0	0.0	0.42	0.001	0.24	0.70
NB off to South Price Street	0.0	0.0	0.16	0.003	0.31	0.90
Location 5						
NB on from Marsh St	0.0	0.33	0.33	0.004	0.13	0.40
NB off to Broad St	0.0	0.55	1.66	0.005	0.39	1.15
Location 6						
SB off to Marsh St	0.0	0.28	0.83	0.004	0.26	0.90
SB on from Broad St	0.0	0.39	0.39	0.002	0.20	0.60

Note - Rates are in accidents per million vehicles

#### 4. Alternatives

It is noted that each of the locations includes at least one alternative that will conform to current design standards. Concurrence by the Project Development Coordinator for further study of the viable alternatives included in this PSR(PDS) does not constitute approval of any non-standard features identified currently or in the future. Separate documentation and approval(s) will be required as per Chapter 21 of the Project Development Procedure Manual.

All "build" alternatives will require a topographic survey, traffic analysis and preliminary design to be performed in order to fully assess the limits of construction and level of site impact. These should be accomplished early in the next phase of the project to allow for adequate coordination between the design and environmental planning departments. Rubberized Asphalt Concrete (RAC) was not recommended by the District Materials Laboratory for a couple of reasons. At issue is the construction of new RAC structural section next to existing non-RAC structural section creating lateral discontinuous joint problems. Since this project also contains small segments of work at different locations, cost and availability of RAC become prohibitive factors. Since some locations are located in a floodplain, any alternative proposed would be designed to not adversely affect the base floodplain. Floodplain evaluations would be required as part of the environmental assessment process. Other environmental studies will also be required during the next phase of the project. For a comprehensive list of all of the environmental studies required, refer to the Preliminary Environmental Analysis Report (Attachment H).

In addition to the specific improvements at each location mentioned below, Intelligent Transportation Systems (ITS) elements that are consistent with the Central Coast ITS Strategic Deployment Plan and Caltrans District 5 Ten-Year ITS Plan are proposed to be incorporated into the project. The proposed ITS elements are (3) Closed Circuit Television (CCTV) cameras, (21) Traffic Monitoring Stations (TMS) and (2) Highway Advisory Radios (HAR). Ramp metering technologies are also noted in the plan, but will be implemented on a case by case basis. Individual ramps will be evaluated for demand and potential diversion from adjacent ramps during the next stage of the project. CCTV camera systems are roadside electronic video systems, consisting of hardware and software components. CCTV systems are used to provide visual analysis of highways. Primary users of video information are Transportation Management Centers (TMC) operators and staff. Secondary users are the public, private entities, and other organizations which may have access to the video. The key functions or "Use Cases" provided by CCTV systems in this application are: Incident Verification, Response Coordination and Management, and Congestion Surveillance. TMS are electronic data acquisition systems used to collect and communicate real time traffic volumes, speeds and occupancy data along segments of highways. Detectors are used to continuously and automatically monitor the flow of traffic. The data is reported to the TMC every 20 to 30 seconds. Such data is used at the TMC to identify unexpected congestion, to determine the impact of incidents on traffic flow, and to inform travelers of current conditions. HAR is a low

powered radio station operated by Caltrans. Its purpose is to transmit localized traffic and road information to motorist on the State highway system. Each HAR station transmits voice messages over a surrounding area typically two to three miles from the station. Within the coverage area, extinguishable message signs can be installed along the highway to inform motorists when a message is being broadcast, and tell them the frequency to which they should tune their radio to listen. For the preliminary location of the proposed ITS elements refer to Attachment J.

Alternatives for each location will be considered as follows:

**Location 1:** At the intersection of El Campo Road near Arroyo Grande.

Alternative 1

The alternative that meets current design standards is to construct southbound deceleration and acceleration lanes and extend the northbound deceleration and acceleration lanes. The standard acceleration lanes and deceleration lanes will allow vehicles entering or leaving the highway to change speeds over a longer distance in a dedicated lane, reducing the impact on through traffic. Preliminary site investigations reveal that the southbound acceleration and deceleration lanes will require retaining walls to facilitate the wider roadway and to preclude right of way acquisition. The northbound deceleration and acceleration lanes can be accommodated in the median. Existing drainage systems will be modified due to the nature of the work. A separate PSR(PDS) (EA 05-0A360K) was prepared with a scope for constructing a new interchange at El Campo Road. Construction of an interchange is beyond the scope of this project and the MIS. The southbound features proposed in this alternative, specifically the retaining walls, do not benefit any of the five alternatives contained in the El Campo Road Interchange project. However, it is probable that the southbound deceleration and acceleration lanes would be utilize in a future six-lane facility. This alternative's capital cost, including escalated right of way, is estimated to range from \$2,600,000 to \$3,200,000.

Alternative 2

Another alternative is to extend the northbound deceleration and acceleration lanes, as proposed in Alternative 1, and construct the southbound deceleration and acceleration lanes without the use of retaining walls. The proposed southbound roadway embankment would be widened by adding additional embankment. The side slope along the southbound speed change lanes would be 1:2 V:H. Since the proposed 1:2 V:H embankment side slopes are steeper than the standard 1:4 V:H, an advisory design exception would be required. Right of way acquisition of two full parcels would also be required. One parcel includes a residential home. The project features in this alternative, including the right of way acquisition are compatible with Alternative 1 of the El Campo Road Interchange project and a future six-lane facility. This alternative's capital cost, including escalated right of way, is estimated to range from \$6,500,000 to \$6,900,000.

### Alternative 3

The minimum "build" alternative is to extend the northbound deceleration and acceleration lanes, as proposed in Alternative 1, and construct the southbound deceleration and acceleration lanes by adding a lane in the median. An additional lane in the median would allow the two southbound mainline lanes to be shifted to the inside. This would enable the existing outside lane to be the deceleration and acceleration lanes. Right of way acquisition and retaining walls would not be required, however, a concrete median barrier is needed. Furthermore, a mandatory design exception would be processed for a minimum 1.2 meter (4 foot) non-standard inside shoulder width and a 2.4 meter (8 foot) non-standard outside shoulder width. The project features in this alternative are compatible with a future six-lane facility but would not benefit the El Campo Road Interchange project. This alternative's capital cost, including escalated right of way, is estimated to range from \$2,000,000 to \$2,400,000.

The No-build alternative would not propose improvements. As traffic volumes along US Route 101 rise, the spot congestion at El Campo Road intersection would be expected to increase. This alternative would not meet the purpose and need of the project. However, this alternative would not construct features (i.e. retaining walls) that would be removed in the future by the proposed El Campo Road Interchange project. The general plan for the City of Arroyo Grande includes an interchange at El Campo Road. The proposed project is slated for construction in 2010, however, it does not have construction or right of way capital funding programmed. Funding for environmental and engineering studies also has not been secured. The work covered by this report at this location could be eliminated if the interchange improvements were programmed and the construction year followed closely behind the construction year of this project.

**Location 2:** Southbound US Route 101 between SR 227/Grand Avenue and Fair Oaks Avenue in the City of Arroyo Grande.

### Alternative 1

The alternative that meets current design standards is to close the southbound off-ramp to Fair Oaks Avenue and extend the auxiliary lane approximately 100 meters (328 feet). This would allow traffic entering southbound US Route 101 from the on-ramp at SR 227/Grand Avenue to obtain adequate speed before merging with mainline traffic. Modifications to the southbound US Route 101 ramp intersections with SR 227/Grand Avenue would also occur. The two ramp intersections would be combined into one. Because of the proximity of the Barnett Street and Grand Avenue intersection to the new ramp terminus intersection, Barnett Street access to Grand Avenue would be eliminated. A cul-de-sac on Barnett Street would adversely change the traffic patterns of the frontage road and impact the access to the businesses located on the corner of Grand Avenue and Barnett Street. Although these improvements would improve traffic operation on US Route 101 and at the southbound ramp intersection, local traffic circulation would be negatively impacted. Traffic on alternate routes could cause congestion on local streets. Community support for this alternative will likely not materialize because of these impacts.

Improvement to the southbound US Route 101 ramp intersections with SR 227/Grand Avenue are also targeted in the Brisco Road Interchange project (EA 0A3701). Coordination between the two projects will be required to avoid conflicts and redundant work. A hospital guide sign currently exists at the off-ramp to Fair Oaks Avenue terminus, however an advance sign does not appear on the mainline indicating that this exit should be used. The primary route to the same hospital is signed at the southbound off-ramp to Halcyon Road. Minor right of way acquisition of agricultural land would be required for reconstruction of the ramp intersection at SR 227/Grand Avenue. This alternative's capital cost, including escalated right of way, is estimated to range from \$1,000,000 to \$1,500,000.

#### Alternative 2

Another alternative is to construct a two-way frontage road between SR 227/Grand Avenue and Fair Oaks Avenue with new hook on and off-ramps. These ramps would replace the southbound off-ramp to SR 227/Grand Avenue, the southbound on-ramp from SR 227/Grand Avenue, and the southbound off-ramp to Fair Oaks Avenue. The hook ramps would have non-standard geometrics requiring advisory and mandatory design exceptions. Because the off-ramp exit nose is located just beyond the "closed-end" abutment of the SR 227/US 101 separation, an auxiliary lane would connect to the proposed hook off-ramp. The auxiliary lane would compensate for the non-standard decision sight distance and increase the storage capacity of the off-ramp. An additional lane and concrete barrier would be constructed in the median in conjunction with shifting the two mainline through lanes to the inside. This would enable the existing outside lane to be the auxiliary lane and to defer replacing the SR 227/US 101 separation until US 101 is upgraded to a six-lane facility. The auxiliary lane would extend south to the proposed auxiliary lane connecting the southbound on-ramp from Brisco Road (Halcyon Road) to the southbound off-ramp to SR 227/Grand Avenue (EA 05-485621). Constructing a frontage road would provide an additional local route for traffic and thereby reduce the demand on US Route 101. El Camino Real, the frontage road to the north, can be realigned in place of the off-ramp to SR 227/Grand Avenue. This will provide continuity to the frontage road network by containing it to one intersection on SR 227/Grand Avenue. On the south end, the frontage road would terminate at the intersection of Orchard Street and Fair Oaks Avenue. The proposed county right of way along the frontage road would have access control to preclude the construction of driveways or other local roads intersections associated with undesired future development of the agricultural land. The acquired right of way between the frontage roads and the hook ramps may be used for storm water basins. Two new bridges across Arroyo Grande Creek would be required for the proposed frontage road and the southbound off-ramp. There is concern with this alternative that the LOS for the connection between the two state routes may decrease. Headquarter Design Reviewers in the past have expressed reluctance in supporting hook ramps where a diamond interchange configuration may work. Furthermore, a mandatory design exception would be required for non-standard interchange spacing with the interchange at Brisco Road since the ramps are being relocated. Significant right of way acquisition of agricultural land would be required to facilitate the frontage road, hook ramps, and storm water treatment best

management practices (BMPs). Some Arroyo Grande city council members and members of the public have expressed opinions indicating that extensive right of way acquisition of the agricultural land would impact their decision to support improvements at this location. To minimize right of way acquisition, some advisory design exceptions [i.e. 1:2 (V:H) embankment side slopes] could be processed. Final determination of processing advisory design exceptions will be reserved until topographic surveys, preliminary design and environmental studies (i.e. Farmland Conversion Impact Rating) have been performed. This alternative's capital cost, including escalated right of way, is estimated to range from \$9,000,000 to \$10,000,000.

#### Alternative 3

The minimum "build" alternative is to install ramp meters on the southbound on-ramp from SR 227/Grand Avenue in conjunction with ramp modifications as described in Alternative 1. The modifications would include combining the two SR 227/Grand Avenue ramp intersections into one. The cul-de-sac of Barnett Street is not proposed, however, a mandatory design exception would be processed to perpetuate the existing condition of non-standard ramp intersection spacing to a local road intersection. Ramp metering would break up the platoon caused by the signalized intersection. The mainline weaving would improve, however, the weaving distance would remain the same. This alternative's capital cost, including escalated right of way, is estimated to range from \$1,200,000 to \$1,600,000.

The No-build alternative would not propose improvements. As traffic volumes along US Route 101 rise, the spot congestion at this location would be expected to increase. This alternative would not meet the purpose and need of the project.

#### Rejected Alternatives

Community input has often suggested re-aligning the off-ramp ramp terminus at Fair Oaks Avenue to align with Orchard Street. This configuration would simplify the intersection but would not improve its efficiency to an acceptable LOS, even with signalization. This alternative could increase the potential for wrong movements from Orchard Street to the off-ramp. Other alternatives include improving the efficiency of Fair Oaks Avenue by restricting turning movements at Orchard Street intersection or working with the administration at Arroyo Grande High School to stagger school start times. While all these alternatives improve traffic efficiency on Fair Oaks Avenue and at the ramp terminus, they do not adequately address mainline weaving deficiencies. Since these alternatives do not achieve the project objectives they are therefore rejected as unreasonable.

**Location 3:** Southbound US Route 101 between Oak Park Boulevard in the City of Pismo Beach and Halcyon Road in the City of Arroyo Grande.

#### Alternative 1

The alternative that meets current design standards is to construct a 1.7 kilometer (1.1 mile) southbound auxiliary lane from the on-ramp from El Camino Real to the off-ramp to Halcyon Road. This will allow more efficient merging for the on-ramp from

El Camino Real. Likewise, vehicles exiting the freeway at the off-ramp to Halcyon Road can weave over a greater length. During peak hours, the queue that currently extends onto the US Route 101 mainline from the off-ramp will be moved to the auxiliary lane, thus restoring lost route capacity. The auxiliary lane will require widening the roadway to the outside to preserve the median for future conversion to a six-lane facility. Due to the proximity of the frontage road, retaining walls will be constructed to facilitate the wider roadway. Existing drainage systems will be modified. A cooperative agreement with the San Luis Obispo County Flood Control and Water Conservation District may be required for highway drainage. Brisco Road Undercrossing will also require widening to accommodate the auxiliary lane. Coordination between this project and the Brisco Road interchange project will be ongoing to provide route consistency. The Oak Park Boulevard Overcrossing was reconstructed recently, and will allow the auxiliary lane to traverse underneath without structure modifications. This alternative's capital cost, including escalated right of way, is estimated to range from \$5,000,000 to \$6,100,000.

#### Alternative 2

The minimum "build" alternative is to construct a 300 meter (984 foot) auxiliary lane after the on-ramp from El Camino Real and a 300 meter (984) foot auxiliary lane prior to the off-ramp to Halcyon Road. This will achieve some of the benefits as described in the standard alternative, but with a relatively lower construction cost. The auxiliary lane after the on-ramp from El Camino Real will be constructed in the same manner as described in Alternative 1. The auxiliary lane prior to the off-ramp to Halcyon Road would be constructed by adding a lane in the median and shifting the two mainline lanes to the inside. Since there is a reduction in median width, concrete median barrier would be installed. A mandatory design exception would be processed for a 2.2 meter (7 foot) non-standard inside shoulder width. The median width would require an advisory design exception for a non-standard median width of 8.6 meters (28.2 feet). The additional lane in the median would enable the existing outside lane to be converted into an auxiliary lane and avoid the need for widening the Brisco Road Undercrossing. However, if in the future when the facility is converted to six-lanes, the outside auxiliary lane would revert to a through lane requiring structure widening or replacement to perpetuate the auxiliary lane. A short transition area facilitating the lane shift to the inside would require embankment widening and a retaining wall. Embankment side slopes in this area would be steepened to 1:2 V:H from the standard 1:4 V:H requiring an advisory design exception. The retaining wall would be designed to accommodate a future standard six-lane facility with auxiliary lanes within the existing right of way. This alternative's capital cost, including escalated right of way, is estimated to range from \$2,200,000 to \$2,900,000.

The No-build alternative would not propose improvements. As traffic volumes along US Route 101 rise, the spot congestion at this location would be expected to increase. This alternative would not meet the purpose and need of the project.

**Location 4:** Northbound US Route 101 between 4<sup>th</sup> Street and the northbound off-ramp to Price Street in the City of Pismo Beach.

#### Alternative 1

The alternative that meets current design standards is to close the northbound on-ramp from James Way and extend the auxiliary lane back to the on-ramp from 4<sup>th</sup> Street. The longer auxiliary lane would improve efficiency by providing 865 meters (2,838 feet) of weaving length between the on-ramp from 4<sup>th</sup> Street and the off-ramp to Price Street. The continuous auxiliary lane would also improve local traffic circulation by not requiring a vehicle entering the on-ramp at 4<sup>th</sup> Street to merge into mainline traffic only to diverge onto the off-ramp to Price Street. A local trip from one side of Pismo Beach, across the Union Pacific Railroad, to the other side could be accomplished strictly within the auxiliary lane. Some local residents and the Pismo Beach Fire Department have indicated that they would not support the closure of the James Way on-ramp. Residents are generally concerned with the loss of egress from their neighborhood and being rerouted to the 4<sup>th</sup> Street interchange. Furthermore, The 1990 Pismo Beach General Plan indicates that a new fire station was planned to be constructed in 1996 at the corner of James Way and Ventana Drive. However, lack of funding has prevented it from being built and no clear revised date has been set. The fire department contends that if the James Way on-ramp was closed, response time to Downtown Pismo Beach could increase by vehicles having to backtrack to the on-ramp from 4<sup>th</sup> Street. The out-of-direction travel is approximately 520 meters (1,706 feet). This alternative's capital cost, including escalated right of way, is estimated to range from \$1,000,000 to \$1,200,000.

#### Alternative 2

The minimum "build" alternative is to install ramp meters on the on-ramp from 4<sup>th</sup> Street in conjunction with widening the ramp. Ramp metering would break up the platoon caused by the signalized intersection. The mainline weaving would improve, however, the weaving distance would remain the same. This alternative's capital cost, including escalated right of way, is estimated to range from \$500,000 to \$800,000.

The No-build alternative would not propose improvements. As traffic volumes along US Route 101 rise, the spot congestion at this location would be expected to increase. This alternative would not meet the purpose and need of the project.

#### Rejected Alternative

Community input has suggested extending the auxiliary lane back to the on-ramp from 4<sup>th</sup> Street and relocating the on-ramp from James Way. The principle is to perpetuate the on-ramp from James Way for possible future use by the fire station and local residents. The on-ramp from James Way would merge with the auxiliary lane. However, the proximity of James Way (frontage road) to the freeway prevents the development of a hook ramp that meets geometric design standards. The ramp intersection would also require a mandatory design exception for non-standard access control and spacing to a local road intersection. Furthermore, the placement of the ramp interchange would require a mandatory design exception for interchange

spacing. The resulting non-standard weave length would operate inefficiently and not achieve the project objective. This alternative is therefore rejected as unreasonable.

**Location 5:** Northbound US Route 101 between Marsh Street and Broad Street in San Luis Obispo

Alternative 1

The alternative that meets current design standards is to connect the on-ramp from Marsh Street to the off-ramp to Broad Street with a 760 meter (2,493 foot) auxiliary lane added to the outside of the roadway. This alternative would be in conjunction with Alternative 1 at Location 6. A retaining wall would be added to facilitate the wider embankment and would be designed to accommodate a future standard six-lane facility with auxiliary lanes within the existing right of way. The retaining wall would be constructed at the edge of shoulder with a new sound wall on top resulting in no landscaping visible from the freeway. The existing sound wall that separates the freeway from a residential neighborhood along Brizzolara Street would be removed. Existing drainage systems will be modified due to the nature of the work. A cooperative agreement with the San Luis Obispo County Flood Control and Water Conservation District may be required for highway drainage. No modifications to the median would be required. This alternative's capital cost, including escalated right of way, is estimated to range from \$3,600,000 to \$4,500,000.

Alternative 2

The minimum "build" alternative is to construct an additional lane in the median and thereby, shift the two mainline lanes to the inside. This would enable the existing outside lane to be the auxiliary lane between the on-ramp from Marsh Street and the off-ramp to Broad Street. This alternative would be in conjunction with Alternative 2 at Location 6. Since there is a reduction in median width, concrete median barrier would be installed. A mandatory design exception would be processed for a non-standard 1.5 meter (5 foot) inside shoulder width and a 3.6 meter (12 foot) median width. This alternative would not require widening the roadway embankment to the outside thus preserving the existing sound wall and landscaping. However, if in the future when the facility is converted to six-lanes, the outside auxiliary lane would revert to a through lane. This future improvement would prompt widening to the outside to retain the auxiliary lane. Existing drainage systems will be modified due to the nature of the work. This alternative's capital cost, including escalated right of way, is estimated to range from \$1,400,000 to \$1,800,000.

The No-build alternative would not propose improvements. As traffic volumes along US Route 101 rise, the spot congestion at this location would be expected to increase. This alternative would not meet the purpose and need of the project.

**Location 6:** Southbound US Route 101 between Marsh Street and Broad Street in San Luis Obispo

## Alternative 1

The alternative that meets current design standards is to connect the on-ramp from Broad Street to the off-ramp to Marsh Street with a 1000 meter (3,280 foot) auxiliary lane added to the outside of the roadway. This alternative would be in conjunction with Alternative 1 at Location 5. Most of the wider roadway can be accomplished with embankment widening within the right of way. A retaining wall would be added near the off-ramp to Marsh Street and be designed to accommodate a future standard six-lane facility with auxiliary lanes. The retaining wall would be constructed at the edge of shoulder and cut into the hillside. Existing drainage systems will be modified due to the nature of the work. No modifications to the median would be required. This alternative's capital cost, including escalated right of way, is estimated to range from \$1,500,000 to \$2,000,000.

## Alternative 2

The minimum "build" alternative is to construct an additional lane in the median and shift the two mainline lanes to the inside. This would enable the existing outside lane to be the auxiliary lane between the on-ramp from Broad Street and the off-ramp to Marsh Street. This alternative would be in conjunction with Alternative 2 at Location 5. Since there is a reduction in median width, concrete median barrier would be installed. A mandatory design exception would be processed for a non-standard 1.5 meter (5 foot) inside shoulder width and a 3.6 meter (12 foot) median width. This alternative would not require widening the roadway embankment to the outside. If in the future, when the facility is converted to six-lanes, the outside auxiliary lane would revert to a through lane. This future improvement would prompt widening to the outside to retain the auxiliary lane. Existing drainage systems will be modified due to the nature of the work. This alternative's capital cost, including escalated right of way, is estimated to range from \$1,200,000 to \$1,700,000.

The No-build alternative would not propose improvements. As traffic volumes along US Route 101 rise, the spot congestion at this location would be expected to increase. This alternative would not meet the purpose and need of the project.

**Location 7:** At the interchange of Avila Beach Drive near Shell Beach

The alternative presented at this location is to construct a park and ride lot at the undeveloped southwest corner of Avila Beach Drive and Shell Beach Road. The park and ride lot would service commuters whose trips originate from both Avila Beach and northern Shell Beach. Expanding the park and ride lot system would result in less demand on the US Route 101 corridor as a whole, and for this location, specifically the Avila Beach Drive interchange. The parking lot would be designed to hold 20-60 vehicles depending on demand analysis. Pedestrian loading areas, bicycle parking and special parking for persons with disabilities would be incorporated. Coordination with San Luis Obispo Regional Transportation Authority would be required to determine if their intercity fixed route service could be expanded to have a station at the proposed park and ride. Caltrans District 5 is currently not taking ownership of

any new park and ride lots. Therefore, the park and ride lot will be owned and maintained by third party, possibly a San Luis Obispo local government agency. There is an element of project delivery risk associated with the development of a park and ride lot at only one location. If the owner of the parcel is uncooperative with the Department's right of way acquisition offers, the power of eminent domain may not be able to be exercised. This alternative's capital cost, including escalated right of way, is estimated to range from \$1,100,000 to \$1,400,000.

## 5. System and Regional Planning

US Route 101 is included in the Federal-aid Highway System of the United States Department of Transportation, Federal Highway Administration (FHWA). It is part of the National Highway System and functionally classified as a Principal Arterial within the project limits. It is on the Strategic Highway Corridor Network (STRAHNET). STRAHNET routes are identified by the United States Department of Defense as critical for supporting defense requirements and are mandatory components of the National Highway System. US Route 101 is part of the National Network that can accommodate longer trucks as defined by the Surface Transportation Assistance Act (STAA). US Route 101 is an Interregional Road System (IRRS) High Emphasis and Focus Route and is on the California Freeway and Expressway System. US Route 101 is also a State Highway Extra Legal Load (SHELL) Route. The route is an eligible Scenic Highway throughout San Luis Obispo County. The alternatives that contain proposed ramp metering are consistent with the Caltrans District 5 10-Year ITS Plan.

The 2001 US Route 101 Transportation Concept Report has established a LOS D for the peak hour in the 20-year planning horizon (2020). Recommended actions are presented in the report to achieve this goal. They include, but are not limited to the following:

- Implement ITS components from Central Coast ITS Strategic Deployment Plan
- Reduce demand by encouraging and improving alternative modes such as transit, vanpools and ridesharing.
- Construct system-wide operational improvements such as auxiliary lanes and interchange modifications.
- Ensure any improvements to the facility will accommodate a future six-lane facility.

This project is consistent with SLOCOG's *Vision 2025: 2005 Regional Transportation Plan* (RTP). The plan states in the executive summary, "VISION 2025 recognizes the eventual need for widening US 101 from the current four-lane configuration to a six-lane facility. However, given the current levels of highway service and constrained funding resources, the Plan recommends deferring six-laning beyond 2025 and devoting available funds toward operational improvements, parallel route development, transit investments and multimodal improvements." The proposed improvements are listed in Chapter 5: System Development of the RTP, however, they are not included in the financially constrained project list. The

improvements are included in the Reasonably Expected Revenue Scenario outlined in the RTP. Additionally, this project is consistent with the MIS adopted by SLOCOG, as it was the basis for the project's initiation.

Various projects are proposed along the US Route 101 corridor within the project limits. Refer to the Alternatives section of this report for the compatibility of the major projects to this proposed project.

Two freeway agreements between the State and local governments (Arroyo Grande, Pismo Beach) will need to be revised if the ramps are modified at locations 2 and 4. The May 1989 superseding freeway agreement with Arroyo Grande covers location 2 (Ramps at Fair Oaks Avenue, SR 227/ Grand Avenue). Location 4 (Ramps at 4<sup>th</sup> Street and James Way) is covered under the June 1989 superseding freeway agreement with Pismo Beach. This freeway agreement appears not to be consistent with the current ramp configurations at 4<sup>th</sup> Street and James Way, therefore the disposition of the freeway agreement should be addressed at the next phase of the project.

## 6. Environmental Determination and Environmental Issues

A Preliminary Environmental Analysis Report was completed in December of 2005. The expected environmental document for the proposed project is an Initial Study with a Negative Declaration/Findings of No Significant Impact (ND/FONSI). FHWA and the State of California Department of Transportation would act as lead agencies in the preparation of a joint California Environmental Quality Act (CEQA)/National Environmental Policy Act (NEPA) environmental document. The final environmental determination is projected to occur within 43 months from the start of environmental studies. The proposed project would require a 1601 Agreement with the California Department of Fish and Game for Location 2 (Arroyo Grande Creek). An agreement would be required if final design suggests the alteration of the streambed at Location 3 (Meadow Creek), 5 and 6 (San Luis Obispo Creek). While these creeks are in the vicinity of work, preliminary design avoids alteration of the streambed. Proposed work in streams and channels would also require permits to be in compliance with Section 401 and 404 of the Federal Clean Water Act. A Coastal Zone permit would be required for the locations within the coastal zone (Locations 1-4,7). Habitat for 21 plant species and seven animal species have the potential to exist within the project limits. Biological mitigation may be necessary for certain animal species. Visual resources mitigation would include aesthetics on structures, replacement planting of natural vegetation, tree replacement and irrigation system replacement. Hazardous waste remediation would include an aerially deposited lead analysis.

## 7. Right of Way

Right of way acquisition would be required for three project locations. Location 1 - Alternative 2 proposes acquisition of two full parcels of adjacent land. One parcel has a residence and would require relocation assistance. Location 2 has two alternatives that impact land adjacent to the freeway differently. Alternative 1 has a relatively small partial acquisition of three parcels at the corner of the ramp intersection with SR 227/Grand Avenue. One of these parcels is commercial while the other two parcels are agriculture land. This alternative also would involve minor acquisition of two commercial parcels to facilitate the cul-de-sac on Barnett Street. Alternative 2 proposes partial acquisition four parcels. One parcel is commercial and the other three parcels comprise a wide sliver of agricultural land. Local agencies and the community may not support an alternative that has extensive right of way acquisition of agricultural land. Location 7 proposes acquisition of approximately 0.4 hectares (1.0 acre) of vacant land at the southwest corner of Shell Beach Road and Avila Beach Drive. Although many of these parcels are zoned for agriculture they have the potential to be commercial and have been valued accordingly.

Extensive utility verification of “high and low risk” facilities will be required for the proposed project. The utility relocation has a preliminary estimate of \$183,000 (Fiscal Year 2014).

The total right of way capital cost is estimated at \$10,615,000 (Fiscal Year 2014). An 18-month lead-time has been established to conduct right of way activities.

8. Funding/Scheduling

**Capital Outlay Support Estimate for PA&ED**

Fiscal Year	STIP PY's/\$'s	
	PY's	1000 of \$'s
2006/07	3.00	376
2007/08	3.17	405
2008/09	3.16	412
2009/10	4.06	534
2010/11	0.62	83
<b>Total Support Cost</b>	14.01	1,810

**Capital Outlay Estimate**

Location/ Alternative	Range for Total Cost (1,000 of \$)	Location/ Alternative	Range for Total Cost (1,000 of \$)
<b>Location 1</b>		<b>Location 4</b>	
Alternative 1	\$2,600-\$3,200	Alternative 1	\$1,000-\$1,200
Alternative 2	\$6,500-\$6,900	Alternative 2	\$500-\$800
Alternative 3	\$2,000-\$2,400	<b>Location 5</b>	
<b>Location 2</b>		Alternative 1	\$3,600-\$4,500
Alternative 1	\$1,000-\$1,500	Alternative 2	\$1,400-\$1,800
Alternative 2	\$9,000-\$10,000	<b>Location 6</b>	
Alternative 3	\$1,200-\$1,600	Alternative 1	\$1,500-\$2,000
<b>Location 3</b>		Alternative 2	\$1,200-\$1,700
Alternative 1	\$5,000-\$6,100	<b>Location 7</b>	
Alternative 2	\$2,200-\$2,900	Alternative 1	\$1,100-\$1,400

Total Project Range: \$9,400,000 - \$32,100,000

The level of detail available to develop these capital cost estimates is only accurate to within the above ranges and are useful for long range planning purposes only. The capital costs should not be used to program or commit capital funds. The Project Report will serve as the appropriate document from which the remaining support and capital components of the project will be programmed.

Tentative Project Schedule

Milestone	Fiscal Year
Circulate Draft Project Report/ Draft Environmental Document	2009/10
Public Hearing	2009/10
PA&ED	2010/11
PS&E	2013/14
Construction Completion	2015/16

This schedule assumes PA&ED Support funding in the 2006 STIP. Only the "PA&ED" milestone is to be used for programming commitments. All other milestones are used to indicate relative time frames for planning purposes.

## 9. Programming Recommendation

It is recommended that the support cost for PA&ED for the project outlined in this PSR(PDS) be funded in the 2006 STIP from the Regional Improvement Program (20.10.075.600). Alternatives may be added or revised during the PA&ED phase as more information becomes available.

## 10. Risk Management Plan

The Risk Management Plan was prepared to assess, respond and monitor identified project risks that may occur throughout the life of the project, (See Attachment M). The Risk Management Plan is designed as a tool to help the Project Development Team and Project Sponsor in their decisions regarding project alternatives and objectives and encourages the project team to take appropriate measures to minimize adverse impacts to the project scope, schedule or cost. However, the Risk Management Plan cannot identify all risks in advance of occurrence for a project where some risks are unknown.

The current cost estimate and/or schedule does not include quantitative impacts to costs and/or schedule for the risks identified in the Risk Management Plan.

## 11. District Contacts

Project Manager:	Amy Donatello	(805)549-3398
Design Manager	Boris Ayaviri	(559)244-2854
Project Engineer	Chris Gardner	(559)244-2859
Environmental Manager	Larry Newland	(805)542-4603

## 12. Attachments

- A Vicinity Map
- B Location 1 Maps, Typical Cross Sections, PSR(PDS) Cost Estimates
- C Location 2 Maps, Typical Cross Sections, PSR(PDS) Cost Estimates
- D Location 3 Maps, Typical Cross Sections, PSR(PDS) Cost Estimates
- E Location 4 Maps, Typical Cross Sections, PSR(PDS) Cost Estimates
- F Locations 5 and 6 Maps, Typical Cross Sections, PSR(PDS) Cost Estimates
- G Location 7 Map, PSR(PDS) Cost Estimate
- H Preliminary Environmental Analysis Report
- I Right of Way Data Sheet
- J PDS Traffic Forecasting, Analysis and Operation Scoping Checklist
- K Traffic Management Plan Data Sheet/Checklist
- L Storm Water Data Sheet
- M Risk Management Plan
- N Support Cost Estimate Report (PA&ED Only)

cc: FHWA - Dominic Hoang  
HQ Division of Design - Design Report Routing  
HQ Transportation Programming - Ross Chittenden, Kurt Scherzinger  
HQ Environmental - Kelly Dunlap  
HQ Traffic Operations - Nagi Pagadala  
Project Manager – Amy Donatello  
Design Manager – Boris Ayaviri  
Resident Engineer – Held by Boris Ayaviri  
District Maintenance - Lance Gorman  
District Traffic Management - James Alessi  
Region Traffic Design - Hassan Marei  
District Traffic Operations - Paul McClintic  
Region Materials - Ron Sekhon  
Region Environmental - Christine Cox  
Surveys - Tama Gonzalez (electronic copy only), Nick Tatarian  
HQ DES/OPPM - Andrew T S Tan  
District Records - Victoria Pozuelo  
Region Records - Tami Cox