

*Final*

# **State Route (SR 46 E) Parallel Routes Study**

TRANSPORTATION



& PLANNING



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**Final**  
**State Route (SR 46 E) Parallel Routes Study**

**Prepared for the  
City of Paso Robles**

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## EXECUTIVE SUMMARY

This study evaluates the need for roadway improvements in the northern section of the City of Paso Robles. The City of Paso Robles is evaluating a number of roadway improvement projects that will provide improved local circulation access and reduce vehicle travel in the SR 46 East corridor to accommodate future growth over the next five years. **Figure 1** presents the key intersections that were evaluated in this study.

### ROADWAY IMPROVEMENT ALTERNATIVES

Seven roadway network alternatives designed to improve circulation in the north Paso Robles area were evaluated and are illustrated on **Figure 2**. These alternatives included:

1. Extend Wisteria Lane west to Dallons Road and east to Airport Road.
2. Extend Dry Creek Road west to River Road (with connections to Golden Hill Road and Buena Vista Road).
- 3a. Phase 1 - Provide a traffic signal at Union Road/SR 46 E with Union Road extension to Airport Road. Includes a second eastbound and westbound left-turn lane on SR 46E.
- 3b. Phase 2 - Grade separate Union Road at SR 46 E (with Union Road over SR 46 E) with an eastbound on- and off-ramp roundabout intersection on Union Road.
4. Grade separate and extend Airport Road south under SR 46 E. Vehicles would continue to access the existing at-grade Airport Road/SR 46 E intersection.
5. Combination of Alternatives 1, 2, 3a and 4
6. Combination of Alternatives 1, 2, 3b, and 4
7. Combination of Alternatives 1 and 3a

### INTERSECTION OPERATIONS

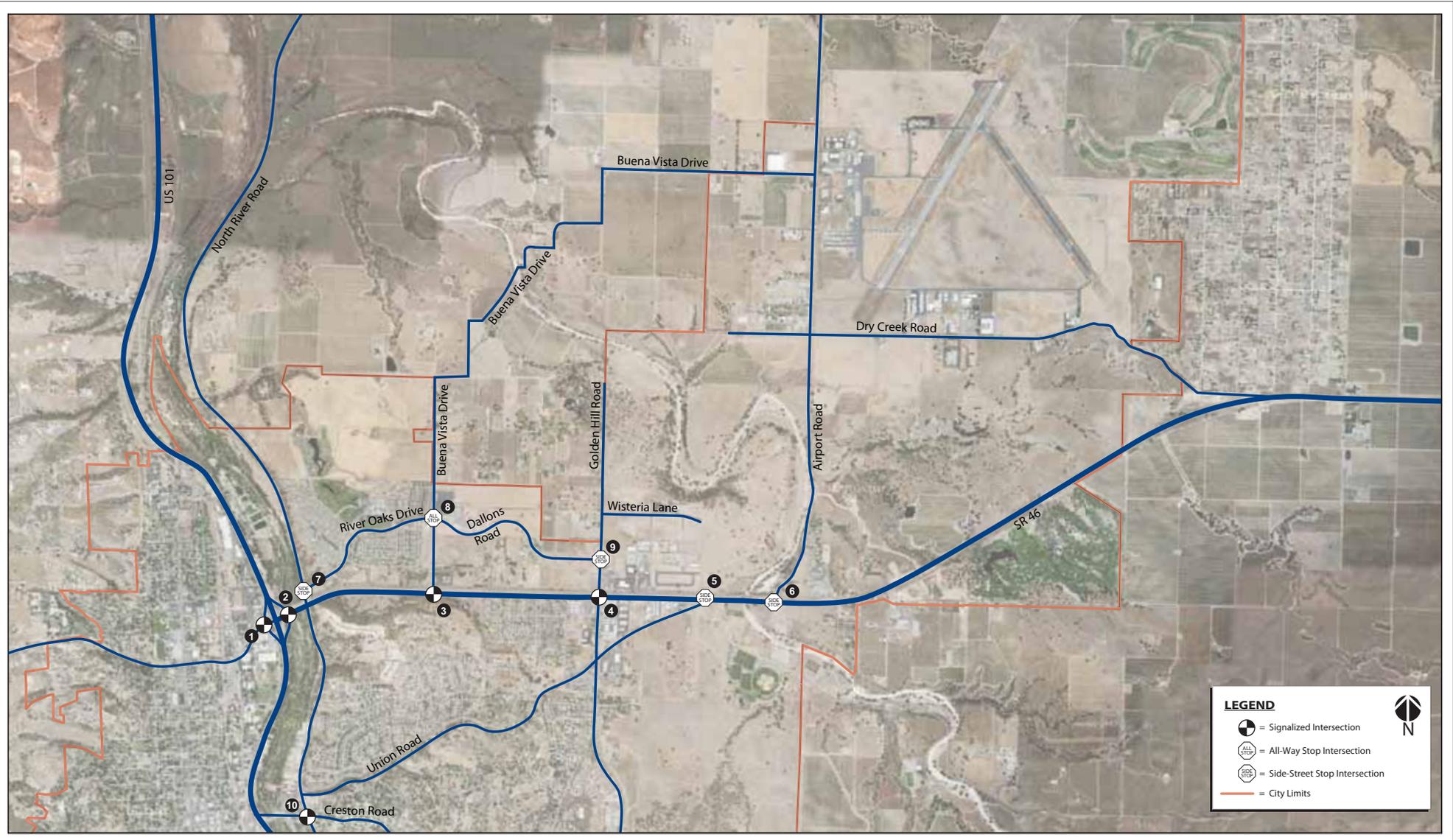
Intersection operations of 10 study intersections were evaluated under three scenarios: Existing, Baseline No Improvement (Year 2013), and Baseline plus each Alternative Conditions.

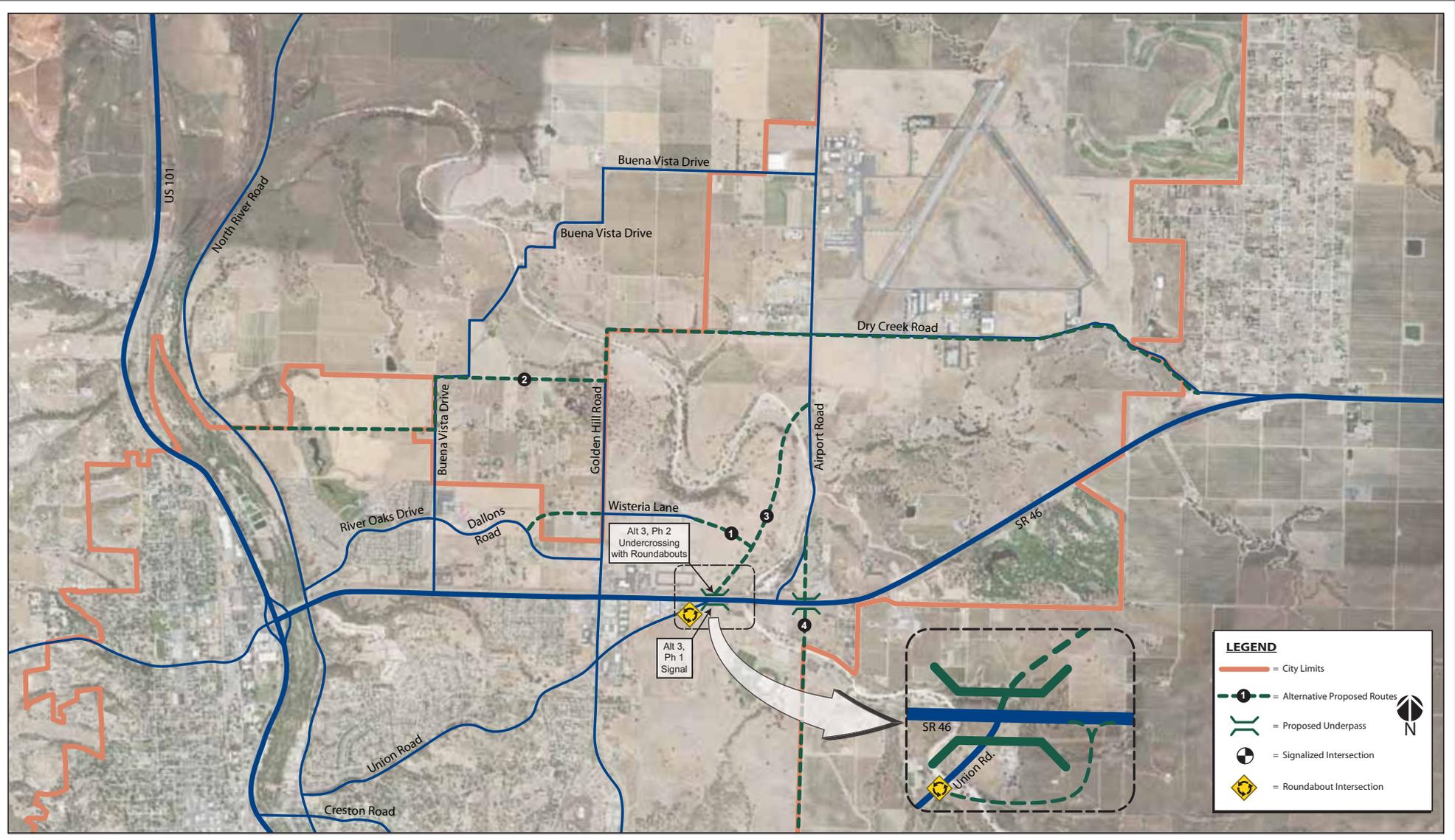
#### *Existing Conditions*

The intersection of SR 46E/Golden Hill Road is operating at LOS F with the other signalized intersections operating at LOS D or better. The side-street approach at the SR 46E intersections with Union Road and at Airport Road are operating at LOS E. The other unsignalized intersections are operating at LOS B or better.

#### *Baseline or Near-Term Conditions*

With the addition of traffic from approved & pending projects and a regional growth factor applied to the east-west through volumes on SR 46 E, the majority of the study intersections on SR 46 E are projected to degrade to LOS F.





**Baseline + Alternative 1 (Extend Wisteria Lane)**

This alternative would allow drivers to travel on local city streets between Buena Vista Drive and Airport Road without traveling on SR 46 E. This alternative only slightly improves operations for key intersections on SR 46 E because this alternative requires vehicles to travel on slower non-linear roadways. In addition, this alternative does not directly serve the future parcels near the airport which are primarily located on Dry Creek Road. The N. River Road/Creston Road intersection would degrade to LOS E during the PM peak-hour.

**Baseline + Alternative 2 (Extend Dry Creek Road to River Road)**

With this alternative, vehicles can travel on a continuous east-west roadway between North River Road and Airport Road with north-south connections at Buena Vista Drive and Golden Hill Road. Compared to Alternative 1, this connection leads directly to future parcels near the airport and adds more vehicles to the Buena Vista Drive and Golden Hill Road corridors. As a result, SR 46E operations are slightly worse compared to Alternative 1.

This alternative will not substantially reduce the eastbound SR 46E left-turn demand to Airport Road. Thus, additional improvements (e.g., Alternatives 3 or 4) would be required.

**Baseline + Alternative 3a (Traffic Signal With Union Road Extension)**

Construction of an at-grade traffic signal at SR 46 E/Union Road along with extension of Union Road north to Airport Road was evaluated as an interim improvement. This alternative also assumes that a second eastbound and westbound left-turn lane on SR 46 E will be provided. A signal at this location provides controlled ingress and egress between Union Road and SR 46 E, reduces delay for the side street approaches (Union Road), and provides a second access point to the north of SR 46 E area. With a signal, operations at this location would improve from LOS F to LOS D or better during both peak hours. Access restrictions at Airport Road may be required due to its close proximity.

**Baseline + Alternative 3b (Grade-Separation at Union Road/SR 46 E)**

The long-range alternative, grade separation of Union Road over SR 46 E with an eastbound roundabout on- and off-ramp intersection, produces the most significant shifts in travel patterns. Traffic that may otherwise use Airport Road is now expected to travel on the new Union Road extension to access points within the southern and downtown areas of the City. Although this alternative provides a new connection to the northeast portion of the City, the eastbound and southbound turning movements at SR 46E/Airport Road are projected to remain at LOS F operations. Vehicles making a westbound left-turn movement from SR 46E to Union Road would be diverted to Golden Hill Road further degrading operations at that location.

**Baseline + Alternative 4 (Grade-Separation at Airport Road/SR 46 E)**

This alternative is not expected to substantially shift travel patterns in the near-term scenario, without the full build-out of Chandler Ranch Area Specific Plan. Operating levels of the Airport Road at-grade intersection are expected to be at LOS F with side-street stop control. A traffic signal may improve operations at this location; however, heavy eastbound left-turns are expected to continue to use the at-grade intersection to access Airport Road. To further improve operations, a new interchange is required to the east (with closure of the SR 46E/Airport Road intersection) or a frontage road is needed along the south side of SR 46 E that connects Union Road with Airport Road.

#### **Baseline + Alternative 5 (Combination of Alternatives 1, 2, 3a, and 4)**

This alternative distributes some of the vehicular demand at SR 46 E/Airport Road to the other SR 46E intersections (Buena Vista Drive, Golden Hill Road, and Union Road) and to other local city intersections. As a result, the delays increase slightly at a few locations (SR 46E/Golden Hill Road, Golden Hill Road/Dallons Road, and N. River Road/Creston Road). However, the eastbound left-turn movement at SR 46E/Airport Road would continue to operate at unacceptable operations. The SR 46E/Union Road intersection is projected to operate at LOS D or better with a signal.

#### **Baseline + Alternative 6 (Combination of Alternatives 1, 2, 3b, and 4)**

Under this alternative, the grade separation of Union Road and SR 46E is paired with the Airport Road grade separation and Alternatives 1 & 2. This combination of improvements further encourages traffic in the north of SR 46 area to utilize the local north-south connections (Union Road and Airport Road) which reduces the number of vehicles traveling to and from west using the US 101SR 46 E interchange. As a result, the delays improve on SR 46E between US 101 and Golden Hill Road. However, two locations are still projected to operate at LOS F during one peak hour with this alternative. The southbound right-turn movement and eastbound left-turn movement at SR 46E/Airport Road would continue to operate at LOS F.

#### **Baseline + Alternative 7 (Combination of Alternatives 1 and 3a)**

This alternative would provide similar operations to the Baseline + Alternative 3a scenario. The traffic signal would provide LOS D operations at the SR 46E/Union Road intersection and the Wisteria Lane extension would allow some Airport Road vehicles to access Golden Hill Road and Buena Vista Drive without traveling on SR 46 E.

### **OVERALL DELAY COMPARISON**

A comparison of the change in intersection delay between Baseline Conditions and the various alternatives was conducted. The maximum change in delay at any signalized intersection ranges up to 30%.

In addition to evaluating the change in delay at each intersection, a corridor evaluation was also conducted for all intersections on SR 46 E between the US 101 southbound ramps and Golden Hill Road using a weighted approach (total intersection volumes multiplied by delay and divided by total volume). Alternative 6 which is a combination of Alternatives 1, 2, 3 Phase 2, and 4, shows the greatest decrease in delay through the corridor with a 15 percent reduction in the PM peak hour. Alternatives 2 & 5 show an increase in corridor delay during both peak hours which is attributed to the increased volumes and associated delays at the SR 46 E/Golden Hill Road intersection. The other two alternatives show relatively minor changes in SR 46E corridor delay.

### **CONCLUSIONS**

**Table ES-1** provides a ranking of the alternatives based on improvements to the local circulation, regional circulation, and delays through the SR 46E corridor. Alternatives are ranked from 1 (highest rating) to 7 (lowest rating). Alternative 6, combination of Alternatives 1 & 2 and grade separation at Union Road and Airport Road, ranks the highest based on operations throughout the entire corridor. If the City is only implementing one alternative at a time, Alternative 3, Phase 2 (Grade separation at Union Road), would be ranked first.

A separate review of these alternatives, based on constructability or financial costs, should be conducted outside of the scope of this report and may change how these alternatives are ranked.

**TABLE ES-1  
RANKING OF ALTERNATIVES<sup>1</sup>**

<b>Alternatives</b>	<b>Operational Benefit Ranking</b>
Alternative 1 (Extend Wisteria Lane)	5
Alternative 2 (Extend Dry Creek Road)	6
Alternative 3 Phase 1 (Traffic Signal at SR 46E/Union Road plus Union Road extension to Airport)	4
Alternative 3 Phase 2 (Grade Separate Union Road over SR 46E)	3
Alternative 4 (Grade Separate Airport Road under SR 46E)	7
Alternative 5 (Combination of Alts 1, 2, 3 Ph1, & 4)	2
Alternative 6 (Combination of Alts 1, 2, 3 Ph2, & 4)	1
Alternative 7 (Combination of Alts 1 & 3a)	4 <sup>2</sup>

<sup>1</sup> Alternatives are ranked from 1 (highest) to 7 (lowest) based on improvements to local and regional circulation and to SR 46E corridor delay.

<sup>2</sup> Alternative 7 estimated to have similar results as Alternative 3 Phase 1.

Source: Fehr & Peers, 2008.

## 1. INTRODUCTION

This study evaluates the need for roadway improvements in the northern section of the City of Paso Robles to support approved and proposed near-term development and to enhance operations along the SR 46 East corridor. The City of Paso Robles is evaluating a number of roadway improvement projects that will provide improved local circulation access and reduce vehicle travel in the SR 46 East corridor.

Existing and near-term conditions were evaluated with level of service (LOS) calculations for the key intersections along SR 46 E and local intersections along the future roadway improvement corridors. Long-range operations will be conducted as part of the planned update to the City's Circulation Element. The study intersections evaluated in this study are presented on **Figure 1** and include:

1. US 101/SR 46E Southbound Ramps
2. US 101/SR 46E Northbound Ramps
3. SR 46 E/Buena Vista Drive
4. SR 46 E/Golden Hill Road
5. SR 46 E/Union Road
6. SR 46 E/Airport Road
7. River Road/River Oaks Drive
8. Buena Vista Drive/Dallons Road
9. Golden Hill Road/Dallons Road
10. North River Road/Creston Road

The operations of the study intersections were evaluated during the morning (AM) and evening (PM) peak periods for the following scenarios:

- Scenario 1:** *Existing Conditions* – Existing volumes obtained from counts or previous traffic studies.
- Scenario 2:** *Baseline Near-Term Cumulative Conditions* – Scenario 1 volumes plus 2.2% inter-regional growth on SR 46 E plus traffic generated by the approved and pending developments in the study area that are expected to be built and occupied within the next five years. This scenario includes the planned improvements at the SR 46 E/US 101 interchange.
- Scenario 3:** *Baseline Plus Alternative 1 Near-Term Cumulative Conditions* – Scenario 2 volumes adjusted to reflect re-assignment of trips based on Alternative 1 (extend Wisteria Lane east to Airport Road).
- Scenario 4:** *Baseline Plus Alternative 2 Near-Term Cumulative Conditions* – Scenario 2 volumes adjusted to reflect re-assignment of trips based on Alternative 2 (extend Dry Creek Road west from Airport Road to North River).
- Scenario 5:** *Baseline Plus Alternative 3a Near-Term Cumulative Conditions* – Scenario 2 volumes adjusted to reflect re-assignment of trips based on Alternative 3a (traffic signal at SR 46E/Union Road).

- Scenario 6:** *Baseline Plus Alternative 3b Near-Term Cumulative Conditions* – Scenario 2 volumes adjusted to reflect re-assignment of trips based on Alternative 3b (Grade separate Union Road over SR 46 E with an eastbound on- and off-ramp roundabout intersection on Union Road).
- Scenario 7:** *Baseline Plus Alternative 4 Near-Term Cumulative Conditions* – Scenario 2 volumes adjusted to reflect re-assignment of trips based on Alternative 3b (Grade separate and extend Airport Road south under SR 46 E).
- Scenario 8:** *Baseline Plus Alternative 5 Near-Term Cumulative Conditions* – Scenario 2 volumes adjusted to reflect a combination of Alternatives (1 to 3a and 4).
- Scenario 9:** *Baseline Plus Alternative 6 Near-Term Cumulative Conditions* – Scenario 2 volumes adjusted to reflect a combination of Alternatives (1 to 3b and 4).
- Scenario 10:** *Baseline Plus Alternative 7 Near-Term Cumulative Conditions* – Scenario 2 volumes adjusted to reflect a combination of Alternatives 1 and 3a).

The remainder of this report is divided into three chapters. The existing transportation system and the current operating conditions of the study intersections are described in Chapter 2. Chapter 3 describes the near-term roadway network, including improvements planned as part of recently approved developments and the four alternatives identified as part of this study. The methods used to estimate the traffic added to the roadway network by the approved and pending projects and the evaluation of the proposed roadway improvements are presented in Chapter 4.

## 2. EXISTING CONDITIONS

This chapter describes the existing conditions of the roadway facilities, traffic volumes, and intersection operations. This chapter also includes a discussion of the methodology used to calculate levels of service (LOS) and the corresponding results.

### EXISTING ROADWAY NETWORK

The study location and the surrounding roadway network are presented on Figure 1. Regional access to Paso Robles is provided by US 101 and State Route 46 E (SR 46 E). Golden Hill Road, Union Road, Airport Road, Buena Vista Drive, River Road, and Dallons Road provide local access to the northern section of the city. Descriptions of these roadways are provided below.

*US Highway 101* is a regional facility that traverses San Luis Obispo County, continuing north to San Francisco and south to Los Angeles. Within the study area, US 101 is a four-lane freeway with an interchange at SR 46 E (East). The SR 46 (West) interchange is located approximately four miles to the south.

*State Route 46 E* is an east-west, four-lane highway between US 101 and Airport Road within the study area. East of Airport Road, SR 46 E contains two travel lanes. SR 46 E provides an east-west regional connection to I-5 in the Central Valley and to Bakersfield and Fresno (via SR 41). Between Jardine Road and US 101, two signalized intersections are located at Buena Vista Drive and Golden Hill Road.



View of westbound SR 46 E approaching Golden Hill Road



Buena Vista Drive looking south at Dallons Road

*Buena Vista Drive* is a north-south arterial roadway that extends north of SR 46 E and transitions east (north of Circle B Road) connecting to Airport Road. The River Oaks Phase 1 residential development and Cuesta College are located along Buena Vista Drive.

*River Road* is a two-lane roadway that parallels US 101 on the east side of Salinas River. According to the City of Paso Robles Circulation Element Map, River Road is designated as a collector street north of Navajo Avenue. South of Navajo Avenue, River Road is designated as an arterial road with four travel lanes.

*Dallons Road* is generally a two-lane collector roadway that is parallel to SR 46 E between Golden Hill Road and North River Road. Dallons Road is three lanes wide (two lanes westbound, one lane eastbound) east of its intersection with Buena Vista Drive. West of Buena Vista Drive, Dallons Road is designated as River Oaks Drive.

*Golden Hill Road* is a two-lane north-south arterial roadway. North of SR 46 E, Golden Hill Road is eighty (80) feet wide and narrows to approximately 32 feet. South of SR 46 E, Golden Hill Road continues past Union Road and terminates at its intersection with Creston Road.



View of Golden Hill Road looking northbound.



Golden Hill Road looking south at Dallons Road

*Union Road* is a two-lane arterial roadway that begins at River Road and continues in a north-east direction, crossing Golden Hill Road, and connecting to SR 46 East.

*Airport Road* is a north-south arterial roadway extending from SR 46 East past the Paso Robles Municipal Airport.

## EXISTING VOLUMES AND LANE CONFIGURATIONS

Year 2005 summertime weekday morning (AM) and weekday evening (PM) peak-hour traffic volumes at the SR 46 E study intersections were obtained from the *Draft SR 46 E/Airport Road PSR*. The peak hour represents the highest one-hour volumes during the weekday commute peak periods (7:00-9:00 AM and 4:00-6:00 PM). The volumes on SR 46 E represent unconstrained volumes, which assumes that sufficient capacity is available at the Highway 101/SR 46 E interchange and that traffic does not divert from SR 46 E to the side streets. Use of unconstrained volumes helps to illustrate the actual vehicle demand attempting to travel within the corridor during peak times.

New intersection counts were conducted at the following locations to supplement Year 2005 counts that were provided by Caltrans staff :

- Buena Vista Drive/Dallons Road (September 2006)
- Golden Hill Road/Dallons Road (September 2006)
- SR 46 E/Airport Road (January 2007)
- N. River Road/River Oaks Drive (January 2007)
- SR 46 E/Golden Hill Road (March 2007)

The Year 2005 volumes turning to/from SR 46 E to Golden Hill and Airport Road and at the Buena Vista Drive/Dallons Road and Golden Hill Road/Dallons Road intersections were adjusted to reflect the more recent traffic counts that were approximately 150 vehicles higher. Although the 2007 volumes show a decrease in through volumes on SR 46 E at Golden Hill Road, those lower volumes were not used in the analysis. Counts at N. River Road/Creston Road were conducted in 2008.

**Figure 3** presents the existing AM and PM peak-hour turning movement volumes at the study intersections. **Figure 4** presents the existing lane configurations and traffic control devices at each intersection. The new intersection counts and the Caltrans counts are located in **Appendix A**.

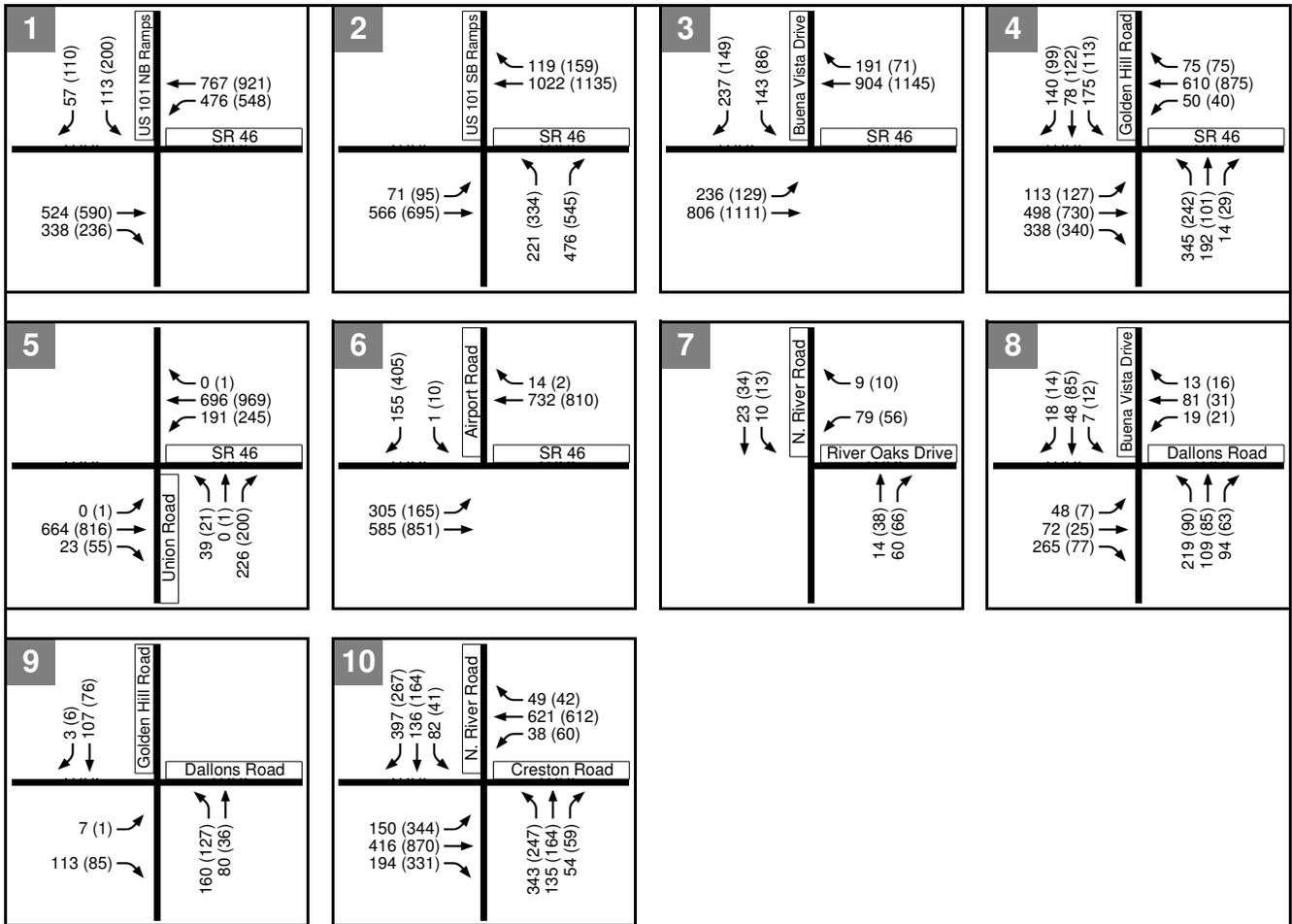
## LEVEL OF SERVICE METHODOLOGY

The quality of roadway facility operations are described with the term level of service (LOS). LOS is a qualitative description of traffic flow based on such factors as speed, travel time, delay, and freedom to maneuver. Six levels are defined, from LOS A with the best operating conditions to LOS F with the worst operating conditions. LOS E represents “at-capacity” operations. Two methodologies were used to evaluate the study intersections: one method for the signalized intersections and another method for the unsignalized intersections.

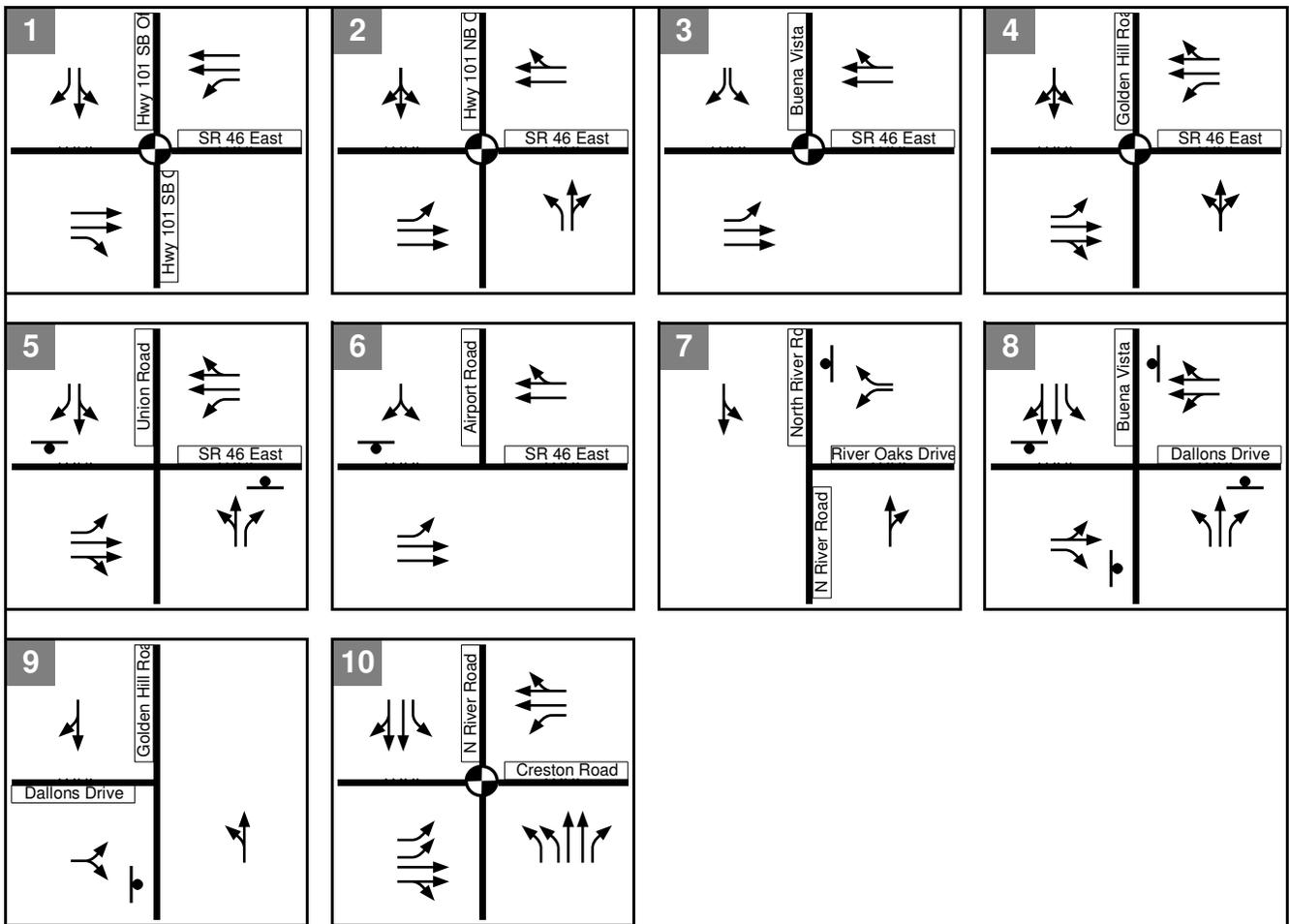
### *Intersection Level of Service Standards*

The City of Paso Robles Circulation Element identifies LOS D as the minimum acceptable level of service for intersections (i.e., LOS E and F are considered unacceptable operations). Caltrans has more stringent standards than the City. According to Caltrans’ Guide for Preparation of Traffic Studies (December 2002), “Caltrans endeavors to maintain a target LOS at the transition between LOS C and D on state highway facilities, however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. If an existing state highway facility is operating at less than the appropriate target LOS, the existing MOE should be maintained.”

For the purposes of this study, LOS C or better is considered acceptable on Caltrans facilities (e.g. US 101 and SR 46 E). While this threshold is more conservative from a traffic operations perspective and results in less average vehicle delay, application of this standard can result in wider roadways because additional lanes are needed, which negatively impacts other forms of travel including bicycling and walking.



**KEY:**  
 XX (YY) = AM (PM)  
 Peak Hour  
 Traffic  
 Volumes



**KEY:**

-  = Signalized Intersection
-  = Stop Sign

### Signalized Intersections

For signalized intersections, the LOS methodology described in Chapter 16 of the 2000 *Highway Capacity Manual (HCM)* published by the Transportation Research Board was applied. This methodology evaluates a signalized intersection's operations based on average control delay. Control delay represents delay caused by signal operation but does not account for delays caused by on-street parking, driveways, pedestrians, and other friction factors. The average control delay for signalized intersections is calculated using the SYNCHRO analysis software and is correlated to a LOS designation as shown in **Table 1**.

TABLE 1 SIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS		
Level of Service	Description of Operations	Average Control Delay (sec / veh)
A	Insignificant Delays: No approach phase is fully utilized and no vehicle waits longer than one red indication.	≤ 10
B	Minimal Delays: An occasional approach phase is fully utilized. Drivers begin to feel restricted.	> 10 to 20
C	Acceptable Delays: Major approach phase may become fully utilized. Most drivers feel somewhat restricted.	> 20 to 35
D	Tolerable Delays: Drivers may wait through no more than one red indication. Queues may develop but dissipate rapidly, without excessive delays.	> 35 to 55
E	Significant Delays: Volumes approaching capacity. Vehicles may wait through several signal cycles and long vehicle queues from upstream.	> 55 to 80
F	Excessive Delays: Represents conditions at capacity, with extremely long delays. Queues may block upstream intersections.	> 80

Source: *Highway Capacity Manual*, Transportation Research Board, 2000.

### Unsignalized Intersections

Operations of the unsignalized study intersections (e.g., stop-sign controlled) were evaluated using the methodology contained in Chapter 17 of the 2000 *HCM* and the TRAFFIX analysis software program. LOS ratings for stop-sign controlled intersections are based on the average control delay expressed in seconds per vehicle. At two-way or side street-controlled intersections, the control delay is calculated for each movement, not for the intersection as a whole. For approaches composed of a single lane, the control delay is computed as the average of all movements in that lane. For all-way stop-controlled locations, a weighted average delay for the entire intersection is presented. **Table 2** summarizes the relationship between delay and LOS for unsignalized intersections.

**TABLE 2  
UNSIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS  
USING AVERAGE CONTROL DELAY**

Level of Service	Description	Average Control Delay Per Vehicle (Seconds)
A	Little or no delay.	≤ 10.0
B	Short traffic delays.	10.1 to 15.0
C	Average traffic delays.	15.1 to 25.0
D	Long traffic delays.	25.1 to 35.0
E	Very long traffic delays.	35.1 to 50.0
F	Extreme traffic delays with intersection capacity exceeded.	> 50.0

Source: *Highway Capacity Manual*, Transportation Research Board, 2000.

## EXISTING LEVELS OF SERVICE

### *Intersections*

Existing intersection lane configurations and peak-hour turning movement volumes were used to calculate the LOS for the study intersections during AM and PM peak hours. The results of the LOS analysis for existing conditions are presented in **Table 3**. The corresponding calculation sheets are contained in **Appendix B**.

The US 101/SR 46E ramps intersections are operating at LOS C during the weekday AM and PM peak hours. The SR 46 E/Buena Vista Drive intersection operates at LOS B for both peak-hours, while the SR 46 E/Golden Hill Road intersection is operating at LOS F during the AM and PM peak hour.

The side-street movement or approaches at the unsignalized intersections on SR 46 E (at Union Road and at Airport Road) are operating at LOS E during one or both peak hours. This reflects vehicles waiting for extended periods until an adequate gap in traffic is available. The all-way stop intersection of Dallons Road/Buena Vista Drive and the side-street approaches at Dallons Road/Golden Hill Road and at N. River Road/River Oaks Drive intersections all operate at LOS B or better.

## FIELD OBSERVATIONS

Weekday AM and PM peak-hour field observations were completed in October 2006. Available Year 2005 traffic data was provided to Fehr & Peers after the traffic counts had been completed. Thus, observations during the traffic count collection period were not possible. The calculated levels of service were consistent with field observations and anecdotal information.

During the PM peak-hour, queuing in the westbound direction at SR 46 E-24<sup>th</sup> Street/US 101 SB Ramps was observed to occur through the SR 46 E/US 101 NB Ramp intersection.

**TABLE 3  
EXISTING INTERSECTION LEVELS OF SERVICE**

Intersection	Peak Hour <sup>1</sup>	Intersection Control	Delay <sup>2</sup>	LOS <sup>3</sup>
<b>Signalized Intersections</b>				
1. SR 46 E/US 101 SB Ramps	AM PM	Signal	21.9 30.4	C C
2. SR 46 E/US 101 NB Ramps	AM PM	Signal	31.5 33.0	C C
3. SR 46 E/Buena Vista Drive	AM PM	Signal	19.6 15.0	B B
4. SR 46 E/Golden Hill Road	AM PM	Signal	>150 91.1	F F
10. N. River Road/Creston Road	AM PM	Signal	30.4 35.5	C D
<b>Unsignalized Intersections</b>				
(Overall Delay=Worst Movement; delay by direction presented for worst movement or approach)				
5. SR 46 E/Union Road	AM PM	Side-Street Stop	27.1 41.9	D E
6. SR 46 E/Airport Road	AM PM	Side-Street Stop	14.0 46.6	B E
7. River Oaks Drive/N River Road <sup>4</sup>	AM PM	Side-Street Stop	9.7 9.7	A A
8. Buena Vista Drive/Dallons Road	AM PM	All-Way Stop	11.6 8.6	B A
9. Golden Hill Road/Dallons Road	AM PM	Side-Street Stop	10.7 9.5	B A

Notes: <sup>1</sup> AM = morning peak hour, PM = afternoon peak hour.

<sup>2</sup> Whole intersection weighted average control delay expressed in seconds per vehicle using methodology described in the 2000 HCM. For side street stop controlled intersections, total control delay for the worst movement is presented.

<sup>3</sup>LOS = Level of service. LOS calculations conducted using the SYNCHRO software, except for the Buena Vista Drive/Dallons intersection which was evaluated using the TRAFFIX software.

At the SR 46 E/Buena Vista Drive intersection, no significant queues were observed during the AM or PM peak hours. At the SR 46 E/Golden Hill Road intersection, queues of greater than 10 vehicles were observed northbound and southbound during the AM and PM peak-hours.

Delays at the unsignalized intersections were typically less than 35 seconds/vehicle. Queuing at the unsignalized intersections was minimal, typically under three (3) vehicles. Due to the low demand on the side streets and platooning effects from the upstream traffic signals, these intersections were typically observed to operate at acceptable levels of service. As noted above, the observations were conducted in Fall 2006 and not during Summer 2005 when traffic volumes are typically higher.

### 3. FUTURE ROADWAY IMPROVEMENTS

This chapter describes two groups of future improvements to the roadway network in the City of Paso Robles. The first group includes improvements that are planned and/or funded through a public agency or private development. The second group includes potential improvements proposed as part of the five alternatives evaluated in this study to improve SR 46 East corridor operations by improving local access and connectivity. Both groups of improvements are described below.

#### PLANNED IMPROVEMENTS

Improvements that are planned either by Caltrans or by the City of Paso Robles as part of recently approved development agreements are described in this section. These improvements are assumed to be in place under near-term conditions which is estimated as Year 2013 Conditions. The planned improvements are listed in **Table 4** and shown on **Figure 5**.

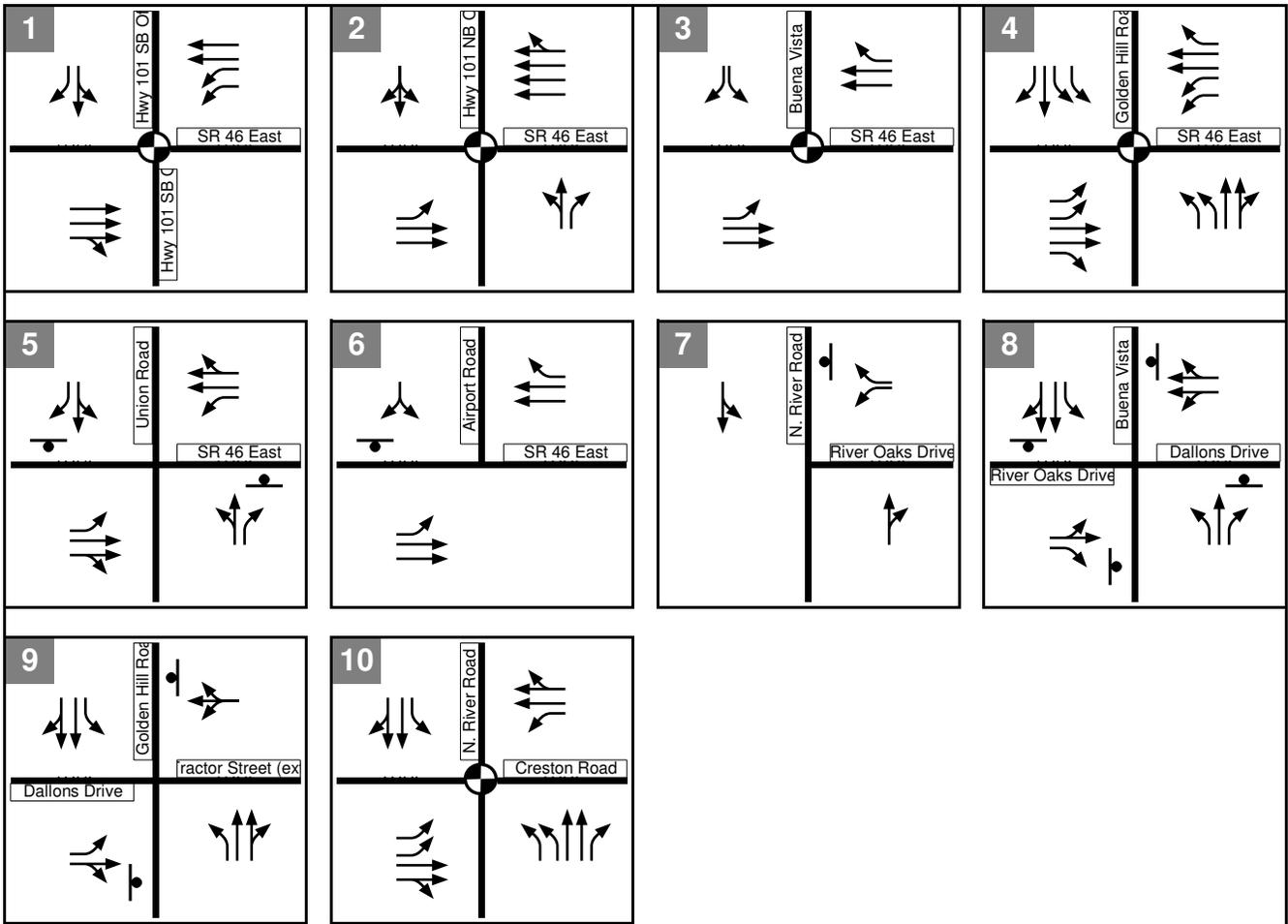
TABLE 4 PLANNED ROADWAY IMPROVEMENTS		
Location	Improvement	Source
US 101/SR 46 E Southbound Ramps	Add 2 <sup>nd</sup> westbound left-turn lane and 3 <sup>rd</sup> eastbound through lane	Caltrans
US 101/SR 46 E Northbound Ramps	Add 3 <sup>rd</sup> and 4 <sup>th</sup> westbound through lanes (both lanes leading into to westbound left-turn lanes at the 101/46 E southbound ramp intersection)	Caltrans
SR 46 E/Golden Hill Road	Widen the intersection to add a second left-turn lane on all approaches. Addition of a dedicated right-turn lane on the eastbound and westbound approaches. Widening of the northbound approach to provide one through lane and one shared through/right-turn lane and widening of the southbound approach to provide one through lane and one right-turn lane. Update signal phasing.	Golden Hill Retail Center Transportation Impact Analysis (2007)
SR 46 E/Airport Road	Widen SR 46 E to four lanes from Airport Road to Shandon	Caltrans

Source: Fehr & Peers, 2008.

#### FUTURE IMPROVEMENT ALTERNATIVES

Seven proposed improvement alternatives were developed in consultation with City of Paso Robles staff. The purpose of these improvements is to improve local connectivity and better distribute traffic throughout the northeast area of the City. The improvements are illustrated on **Figure 2** and summarized by the following seven alternatives:

1. Extend Wisteria Lane to Airport Road
2. Extend Dry Creek Road to River Road (with connections to Golden Hill Road and Buena Vista Road)
- 3a. Phase 1 - Provide a traffic signal at Union Road/SR 46 E with Union Road extension to Airport Road. Includes a second eastbound and westbound left-turn lane on SR 46E.



**KEY:**

-  = Signalized Intersection
-  = Stop Sign

- 3b. Phase 2 - Grade separate Union Road at SR 46 E (with Union Road over SR 46 E) with an eastbound on- and off-ramp roundabout intersection on Union Road.
4. Grade separate and extend Airport Road south under SR 46 E. Vehicles would continue to access the existing at-grade Airport Road/SR 46 E intersection.
5. Combination of Alternatives 1, 2, 3a and 4
6. Combination of Alternatives 1, 2, 3b, and 4
7. Combination of Alternatives 1 and 3a

These alternatives were evaluated under Near-Term Cumulative Year 2013 Conditions in the next chapter.

## 4. NEAR-TERM CUMULATIVE (YEAR 2013) CONDITIONS

Near-term cumulative conditions are assumed to represent a five-year time horizon or approximately Year 2013 conditions. The operations of the roadway network and study intersections were evaluated with each study alternative under Year 2013 conditions. The development of future traffic volumes and the resulting operations are presented in this chapter.

### BASELINE NEAR-TERM CUMULATIVE (2013) TRAFFIC ESTIMATES

Traffic estimates for Year 2013 include growth from both interregional and local traffic. Based on the interregional growth rates from the SLOCOG Regional Travel Demand Model, an annual growth rate of 2.2% was applied to the existing (2005) traffic volumes. The added growth was assigned through the SR 46 East corridor and added to the existing counts to establish the baseline Near-Term Cumulative traffic volumes.

A list of approved and pending projects and their anticipated development levels over the next five years was obtained from City staff. **Appendix C** contains the detailed list of projects.

Traffic generated by approved and pending projects in the study area was also assigned to the roadway network. The amount of traffic added to the roadway system was estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. The first step estimates the amount of traffic added to the roadway network. The second step estimates the direction of travel to and from the development area. The trips are assigned to specific street segments and intersection turning movements during the third step. The results of this process are described in the following sections.

#### ***Trip Generation***

The amount of traffic added to the surrounding roadway system by each of the projects was estimated by applying land use trip generation rates published in *Trip Generation* (Institute of Transportation Engineers, 7<sup>th</sup> Edition) to the size of each project. Where available, trip generation rates and estimates were obtained from their transportation impact analysis report. If a report was not available, the trip generation estimates were calculated by applying rates from ITE. **Appendix C** contains the trip generation estimates for each project.

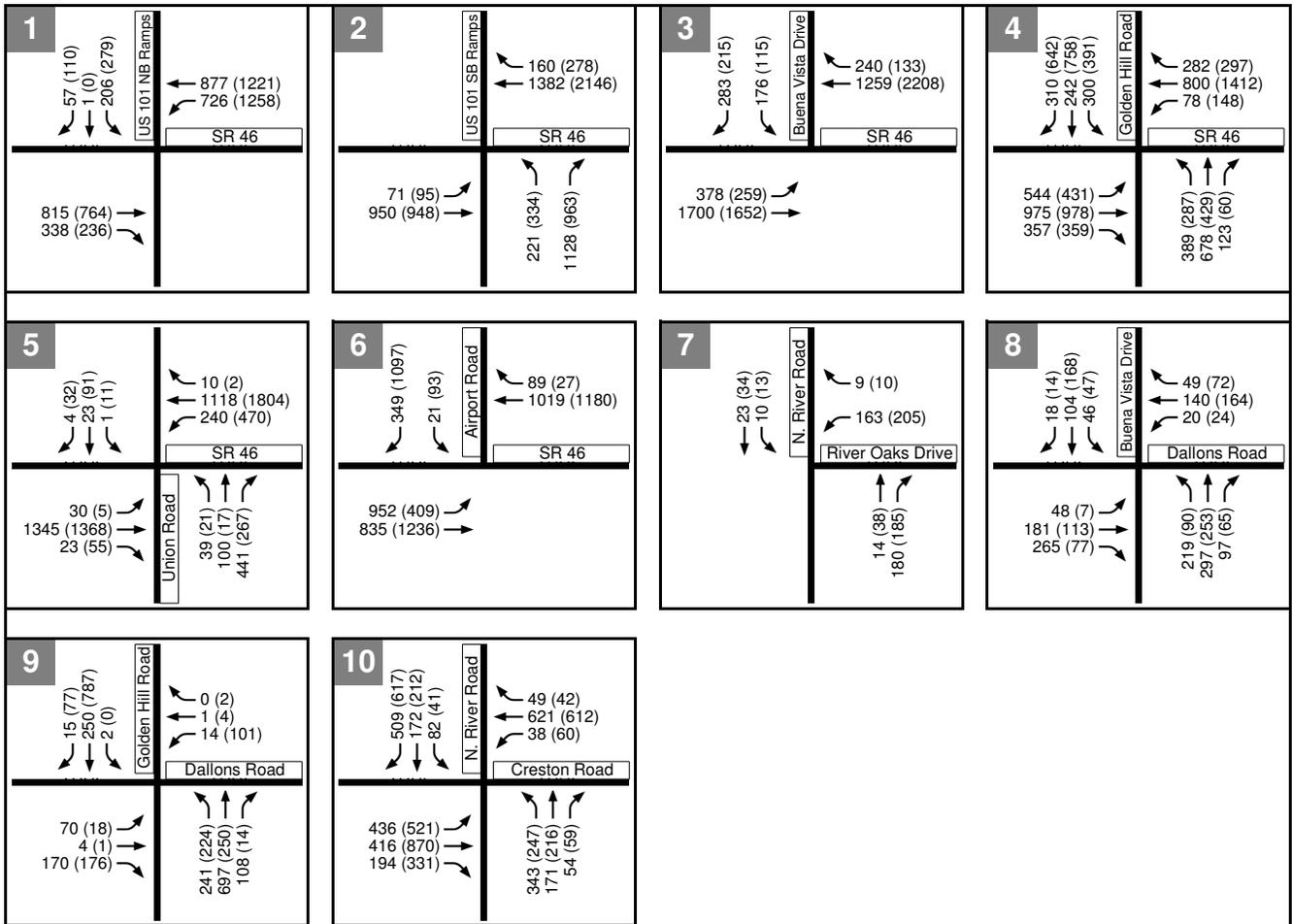
The list of near-term projects used for this study is more detailed and comprehensive than the list of near-term projects used in the Golden Hill Retail Center and Links Industrial traffic studies. Thus, the total trip estimates for approved and pending projects in this study are approximately 600 and 1,300 trips higher in the AM and PM peak hours, respectively.

#### ***Trip Distribution***

The directions of approach and departure for approved and pending project traffic were estimated based on the transportation impact analysis for the project, existing travel patterns in the area, previous studies, and the relative locations of complementary land uses.

#### ***Trip Assignment***

The approved and pending project trips were assigned to the roadway network based on the directions of approach and departure discussed above. The project trips were added to the baseline (existing counts plus interregional growth) to establish intersection volumes for Year 2013 Cumulative Conditions as shown on **Figure 6**.



**KEY:**  
 XX (YY) = AM (PM)  
 Peak Hour  
 Traffic  
 Volumes

## NEAR-TERM CUMULATIVE LEVELS OF SERVICE

Intersection levels of service were calculated with Year 2013 Cumulative volumes for the baseline “no improvement” scenario, and for the four alternatives. This section describes the operations of the intersections under each alternative. A discussion of the benefits and disadvantages of each alternative is also presented.

### ***Baseline “No Improvement” Scenario***

Intersection levels of service (LOS) were calculated with the planned roadway improvements listed in Table 4 to represent baseline near-term cumulative operations of the intersections. The results of the intersection LOS calculations under this scenario are presented in **Table 5**. The LOS calculation sheets are attached in **Appendix B**.

With the addition of traffic from approved and pending projects and a regional growth factor of 2.2 percent per year applied to the east-west through traffic on SR 46 E, the majority of the study intersections on SR 46 E are projected to degrade to LOS F. The intersections of N. River Road/River Road, Dallons Road/Buena Vista Drive, and N. River Road/Creston Road are projected to operate at LOS D or better.

### ***Baseline + Alternative 1 (Extend Wisteria Lane)***

The extension of Wisteria Lane east to Airport Road and west to Dallons Road would provide an east-west connection between Buena Vista Drive and Airport Road. This road would divert traffic from some sections of SR 46 E to a local city street(s) and allow local circulation to avoid using the state highway.

Traffic is expected to shift from the Golden Hill Road intersections with SR 46 E and Dallons Road and the Buena Vista Drive/SR 46 E intersection. For example, eastbound left-turn traffic at SR 46 E/Golden Hill Road and at SR 46 E/Airport Road could turn left at SR 46 E/Buena Vista Drive and utilize the new local roadway. Thus, the LOS under Alternative 1 at the SR 46 E/Buena Vista Drive and SR 46 E/Golden Hill Road intersections is projected to improve slightly because vehicles are shifted from the westbound approach, which has higher delays, to the southbound approach, which has lower delays.

The Golden Hill Road/Dallons Road intersection is still projected to operate at LOS F. To further improve peak-hour or off-peak operations, a traffic signal or roundabout is required at this location for all five alternatives. However, substantial queues on Golden Hill Road at Dallons Road are still anticipated during the peak hours.

At the SR 46E/Airport Road intersection, the delay for the southbound approach cannot be accurately determined as the calculated value becomes exponentially high. Thus, the results are presented as greater than 150 seconds of delay. However, the eastbound left-turn movement shows an improvement in delay.

The change in travel patterns would add traffic to the Dallons Road/Buena Vista Drive and the N. River Road/River Oaks Drive intersections. Operations at both of these intersections will degrade slightly, but will remain at LOS C or better with this alternative. The LOS at the N. River Road/Creston Road intersection also degrades slightly, as more vehicles are expected to use River Road to access the downtown and points in the southern area of the City. The operations of N. River Road/Creston Road is expected to degrade from LOS D to E during the PM peak hour.

**TABLE 5  
ALTERNATIVE COMPARISON INTERSECTION LEVELS OF SERVICE**

Intersection	Scenario	Peak Hour <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>
<b>Signalized Intersections</b>				
1. SR 46 E/ US 101 SB Ramps	Baseline	AM	20.8	C
		PM	45.0	D
	Alternative 1 (Wisteria ext.)	AM	21.1	C
		PM	44.7	D
	Alternative 2 (Dry Creek ext.)	AM	20.8	C
		PM	45.0	D
	Alternative 3a (Union signal)	AM	20.8	C
		PM	45.0	D
	Alternative 3b (Union Grade-Separation)	AM	20.8	C
		PM	45.0	D
Alternative 4 (Airport Grade-Separation)	AM	21.0	C	
	PM	46.4	D	
Alternative 5 (Alt 1 to 3a,4)	AM	20.8	C	
	PM	45.0	D	
Alternative 6 (Alt 1-2, 3b, 4)	AM	19.9	B	
	PM	45.2	D	
Alternative 7 (Alt 1 and 3a)	Similar Results To Alternative 3a			
2. SR 46 E/ US 101 NB Ramps	Baseline	AM	129.0	F
		PM	127.1	F
	Alternative 1 (Wisteria ext.)	AM	127.8	F
		PM	122.5	F
	Alternative 2 (Dry Creek ext.)	AM	129.0	F
		PM	127.1	F
	Alternative 3a (Union signal)	AM	129.0	F
		PM	127.1	F
	Alternative 3b (Union Grade-Separation)	AM	129.0	F
		PM	127.1	F
Alternative 4 (Airport Grade-Separation)	AM	132.0	F	
	PM	130.4	F	
Alternative 5 (Alt 1 to 3a,4)	AM	129.0	F	
	PM	127.1	F	
Alternative 6 (Alt 1-2, 3b, 4)	AM	123.3	F	
	PM	112.9	F	

**TABLE 5  
ALTERNATIVE COMPARISON INTERSECTION LEVELS OF SERVICE**

Intersection	Scenario	Peak Hour <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>
	Alternative 7 (Alt 1 and 3a)	Similar Results To Alternative 3a		
3. SR 46 E/ Buena Vista Drive	Baseline	AM	25.2	C
		PM	57.5	E
	Alternative 1 (Wisteria ext.)	AM	24.4	C
		PM	51.7	D
	Alternative 2 (Dry Creek ext.)	AM	31.1	C
		PM	60.5	E
	Alternative 3a (Union signal)	AM	25.2	C
		PM	57.5	E
	Alternative 3b (Union Grade-Separation)	AM	25.2	C
		PM	57.5	E
Alternative 4 (Airport Grade-Separation)	AM	25.8	C	
	PM	59.6	E	
Alternative 5 (Alt 1 to 3a,4)	AM	28.8	C	
	PM	59.3	E	
Alternative 6 (Alt 1-2, 3b, 4)	AM	22.6	C	
	PM	39.0	D	
	Alternative 7 (Alt 1 and 3a)	Similar Results To Alternative 3a		
4. SR 46 E/ Golden Hill Road	Baseline	AM	53.2	D
		PM	127.3	F
	Alternative 1 (Wisteria ext.)	AM	52.6	D
		PM	125.4	F
	Alternative 2 (Dry Creek ext.)	AM	64.3	E
		PM	146.5	F
	Alternative 3a (Union signal)	AM	53.2	D
		PM	127.3	F
	Alternative 3b (Union Grade-Separation)	AM	53.8	D
		PM	128.7	F
Alternative 4 (Airport Grade-Separation)	AM	47.7	D	
	PM	133.4	F	
Alternative 5 (Alt 1 to 3a,4)	AM	58.8	E	
	PM	137.0	F	
Alternative 6 (Alt 1-2, 3b, 4)	AM	48.6	D	
	PM	107.7	F	

**TABLE 5  
ALTERNATIVE COMPARISON INTERSECTION LEVELS OF SERVICE**

Intersection	Scenario	Peak Hour <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>
	Alternative 7 (Alt 1 and 3a)	Similar Results To Alternative 3a		
10. N. River Road/ Creston Road	Baseline	AM	33.8	C
		PM	46.4	D
	Alternative 1 (Wisteria ext.)	AM	33.1	C
		PM	52.2	D
	Alternative 2 (Dry Creek ext.)	AM	33.6	C
		PM	53.7	D
	Alternative 3a (Union signal)	AM	33.8	C
		PM	46.4	D
	Alternative 3b (Union Grade-Separation with roundabout)	AM	33.6	C
		PM	53.7	D
	Alternative 4 (Airport Grade-Separation)	AM	31.0	C
		PM	53.6	D
	Alternative 5 (Alt 1 to 3a, 4)	AM	33.6	C
		PM	53.7	D
	Alternative 6 (Alt 1-2, 3b, 4)	AM	33.6	C
		PM	53.7	D
	Alternative 7 (Alt 1 and 3a)	Similar Results To Alternative 3a		
<b>Unsignalized Intersections</b>				
(Overall Delay=Worst Movement; delay by direction presented for worst movement or approach)				
5. SR 46 E/ Union Road	Baseline	AM	>150	F
		PM	>150	F
	Alternative 1 (Wisteria ext.)	AM	>150	F
		PM	>150	F
	Alternative 2 (Dry Creek ext.)	AM	>150	F
		PM	>150	F
	Alternative 3a <sup>4</sup> (Union signal)	AM	25.1	C
		PM	43.2	D
	Alt 3b (Union Grade-Separation with roundabout)	AM	8.0	A
		PM	5.0	A
	Alternative 4 (Airport Grade-Separation)	AM	>150	F
		PM	>150	F
	Alternative 5 <sup>4</sup>	AM	20.4	C

**TABLE 5  
ALTERNATIVE COMPARISON INTERSECTION LEVELS OF SERVICE**

Intersection	Scenario	Peak Hour <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	
	(Alt 1 to 3a, 4)	PM	27.5	C	
	Alternative 6 (Alt 1-2, 3b, 4)	AM PM	5.0 5.0	A A	
	Alternative 7 (Alt 1 and 3a)	Similar Results To Alternative 3a			
	Baseline	AM PM	>150 >150	F F	
6. SR 46 E/ Airport Road	Alternative 1 (Wisteria ext.)	AM PM	>150 >150	F F	
	Alternative 2 (Dry Creek ext.)	AM PM	>150 >150	F F	
	Alternative 3a (Union signal)	AM PM	>150 >150	F F	
	Alternative 3b (Union Grade-Separation)	AM PM	>150 >150	F F	
	Alternative 4 (Airport Grade-Separation)	AM PM	> 150 >150	F F	
	Alternative 5 (Alt 1 to 3a, 4)	AM PM	> 150 >150	F F	
	Alternative 6 (Alt 1-2, 3b, 4)	AM PM	70.1 >150	F F	
	Alternative 7 (Alt 1 and 3a)	Similar Results To Alternative 3a			
	7. N. River Rd/ River Oaks Drive	Baseline	AM PM	10.8 11.8	B B
		Alternative 1 (Wisteria ext.)	AM PM	10.5 11.4	B B
Alternative 2 (Dry Creek ext.)		AM PM	11.7 15.2	B C	
Alternative 3a (Union signal)		AM PM	10.8 11.8	B B	
Alternative 3b (Union Grade-Separation)		AM PM	10.8 11.8	B B	
Alternative 4 (Airport Grade-Separation)		AM PM	10.8 11.8	B B	
Alternative 5		AM	11.3	B	
		AM			

**TABLE 5  
ALTERNATIVE COMPARISON INTERSECTION LEVELS OF SERVICE**

Intersection	Scenario	Peak Hour <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	
	(Alt 1 to 3a, 4)	PM	11.0	B	
	Alternative 6 (Alt 1-2, 3b, 4)	AM PM	10.8 11.8	B B	
	Alternative 7 (Alt 1 and 3a)	Similar Results To Alternative 3a			
	Baseline	AM PM	19.6 14.0	C B	
8. Dallons Rd/ Buena Vista Drive	Alternative 1 (Wisteria ext.)	AM PM	20.2 14.6	C B	
	Alternative 2 (Dry Creek ext.)	AM PM	22.0 15.8	C C	
	Alternative 3a (Union signal)	AM PM	19.6 14.0	C B	
	Alternative 3b (Union Grade-Separation)	AM PM	19.6 14.0	C B	
	Alternative 4 (Airport Grade-Separation)	AM PM	19.6 14.0	C B	
	Alternative 5 (Alt 1 to 3a, 4)	AM PM	19.6 14.0	C B	
	Alternative 6 (Alt 1-2, 3b, 4)	AM PM	19.6 14.0	C B	
	Alternative 7 (Alt 1 and 3a)	Similar Results To Alternative 3b			
	9. Dallons Rd/ Golden Hill Road	Baseline	AM PM	>150 >150	F F
		Alternative 1 (Wisteria ext.)	AM PM	145.8 >150	F F
Alternative 2 (Dry Creek ext.)		AM PM	>150 >150	F F	
Alternative 3a (Union signal)		AM PM	>150 >150	F F	
Alternative 3b (Union Grade-Separation)		AM PM	>150 >150	F F	
Alternative 4 (Airport Grade-Separation)		AM PM	>150 >150	F F	
Alternative 5		AM	>150	F	

**TABLE 5  
ALTERNATIVE COMPARISON INTERSECTION LEVELS OF SERVICE**

Intersection	Scenario	Peak Hour <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>
	(Alt 1 to 3a, 4)	PM	>150	F
	Alternative 6	AM	>150	F
	(Alt 1-2, 3b, 4)	PM	>150	F
	Alternative 7 (Alt 1 and 3a)	Similar Results To Alternative 3a		
Notes:	<sup>1</sup> AM = morning peak hour, PM = afternoon peak hour. <sup>2</sup> Whole intersection weighted average control delay expressed in seconds per vehicle using methodology described in the 2000 HCM. For side street stop controlled intersections, total control delay for the worst movement is presented. <sup>3</sup> LOS = Level of service. LOS calculations conducted using the SYNCHRO software for signalized and unsignalized intersections, except the Buena Vista Drive/Dallons intersection which was evaluated using the TRAFFIX software. <sup>4</sup> Intersection signalized.			

#### Benefits

- Provides a new east-west connection parallel to SR 46 E
- Allows better distribution of traffic amongst the Airport Road, Golden Hill Road, and Buena Vista Drive access points to SR 46 (via Dallons Drive and Wisteria Lane)
- Improves operations at SR 46 E/Airport, however, side-street movements will continue to operate at LOS F without further improvements (e.g., new interchange on SR 46 east of Airport Road or a frontage road along the south side of SR 46 E that connects Union Road with Airport Road)
- Slightly reduces turning movement volumes at SR 46 E/Golden Hill Road

#### Disadvantages

- Does not substantially reduce volumes or improve operations at SR 46 E/Golden Hill Road
- Increases in traffic through existing neighborhoods on River Oaks Drive
- May cause enough traffic to be diverted to local roads and cause additional congestion locally (e.g., Creston Road bridge)

#### **Baseline + Alternative 2 (Extend Dry Creek Road to River Road)**

With this alternative, vehicles have a continuous east-west roadway, approximately 5.3 miles in length, which allows travel from North River Road to Jardine Road (via Dry Creek Road). Connections to Buena Vista Drive and Golden Hill Road will be provided.

With this extension, more traffic is expected to use the SR 46 E/Buena Vista Drive intersection and the N. River Road corridor. The delay is expected to increase slightly at this location, but it is expected to continue to operate at generally the same levels of service as Baseline Conditions (LOS E during the PM peak hour). Spot improvements such as adding a second eastbound left-turn lane at SR 46 E/Buena Vista Drive may improve operating levels at this location. Additionally, more traffic is expected to shift to south on Golden Hill Road (as compared to Alternative 1), thus further degrading AM peak-hour operations to LOS E and exacerbating LOS F PM peak-hour operations at SR 46 E/Golden Hill Road. While operations at the N. River Road/Creston Road intersection degrade slightly, the intersection will continue to operate at LOS D or better.

#### *Benefits*

- Provides a new east-west connection that is parallel to SR 46 E
- Allows vehicles from the northeast corner of the City to bypass sections of SR 46 E by better distributing traffic amongst existing signals at Golden Hill Road and Buena Vista Drive, as well as N. River Road
- Improves operations at SR 46 E/Airport, however, side-street movements will continue to operate at LOS F without further improvements (e.g., new interchange on SR 46 east of Airport Road or a frontage road along the south side of SR 46 E that connects Union Road with Airport Road)

#### *Disadvantages*

- May add vehicles to the Golden Hill Road because of new access and could further degrade operations
- Increases number of vehicles on Buena Vista Drive which may require additional improvements such as a second eastbound left-turn at SR 46 E
- Increases in traffic through existing neighborhoods on River Oaks Drive due to new connection with Buena Vista Drive
- The east-west section from N. River Road to Buena Vista Road may not be utilized as frequently and will require right-of-way from existing land uses to construct
- May cause enough traffic to be diverted to local roads and cause additional congestion locally (e.g., Creston Road bridge)

#### **Baseline + Alternative 3a (Traffic Signal With Union Road Extension)**

Construction of an at-grade traffic signal at SR 46 E/Union Road with extension of Union Road north to Airport Road was evaluated as a Phase 1 improvement under Alternative 3. This improvement also assumes that the intersection will be widened to provide a second eastbound and westbound left-turn lane on SR 46. Fehr & Peers previously conducted a signal warrant analysis at this location and the results indicated that at least four (4) of the eight (8) warrants from the *Manual of Uniform Traffic Control Devices (MUTCD)* published by Federal Highway Administration were satisfied at this location.

With this improvement, eastbound vehicles that are making a left-turn at SR E/Airport Road have a controlled location at SR 46E/Union Road to make their left-turn movement. This will help to alleviate the eastbound left-turn demand at Airport Road, however, this movement is still projected to operate at LOS F. The SR 46E/Union Road signalized intersection is projected to operate at LOS D or better.

### *Benefits*

- Opportunities for side-street traffic (Union Road and Airport Road) to access SR 46 E at a controlled location
- Reduced delays for side-street approaches at SR 46E/Union Road and for the eastbound left-turn movement at SR 46E/Airport Road
- A second eastbound access point (assuming left-turns from Airport Road are still allowed) to the north of SR 46 E area

### *Disadvantages*

- LOS F operations at SR 46E/Airport Road
- Potential access restrictions at Airport Road due to its close proximity to Union Road

### **Baseline + Alternative 3b (Grade Separation of Union Road over SR 46E)**

This long-range alternative allows traffic to travel from Union Road to Airport Road without conflicting with east-west SR 46 E through traffic. The northern extension of Union Road to Airport Road with a standard street cross-section would be constructed as part of Phase 1. Eastbound traffic traveling on SR 46E will be able to access Union Road via an on- and off-ramp roundabout intersection. Westbound left-turn traffic onto Union Road from SR 46 E will be directed towards Golden Hill Road.

Phase 2 produces the most significant shifts in travel patterns. Some traffic that would otherwise use Airport Road is now expected to head south on the new Union Road extension to access points within the southern and downtown areas of the City. Operations at the SR 46 E/Union Road off-ramp roundabout intersection would be LOS A during both peak hours. Operations at SR 46 E/Airport Road are expected to continue to operate at LOS F with this alternative without further improvements.

### Benefits

- Allows vehicles and potentially bicyclists and pedestrians to access the north side of SR 46 E without conflicting with SR 46 E traffic
- Keeps local Paso Robles traffic off of SR 46 E
- Reduces traffic at the SR 46 E/US 101 interchange since this alternative will facilitate additional usage of Union Road and Creston Road bridge
- If eastbound left-turns to Airport Road are prohibited, this alternative can be designed to accommodate direct access to Airport Road
- Utilizes a portion of the Phase 1 improvement (northern extension of Union Road to Airport Road)

### Disadvantages

- May cause enough traffic to be diverted to local roads and cause additional congestion locally (e.g., Creston Road bridge)

- Additional right-of-way at Union Road may be required to accommodate ramps to maintain existing eastbound access from SR 46 E to/from Union Road

#### **Baseline + Alternative 4 (Grade Separation of Airport Road under SR 46E)**

The construction of an undercrossing at Airport Road/SR 46 E will provide a direct north-south connection between the proposed Chandler Ranch development and land uses on the north side of SR 46 E. This connection would also allow traffic to travel between the northeast and southeast portions of the city. Traffic on SR 46 E would continue to utilize the existing at-grade intersection at Airport Road.

This alternative is not expected to substantially shift travel patterns in the near-term scenario, without the full build-out of Chandler Ranch Area Specific Plan. Some traffic accessing the southeastern area of the City is expected to divert to the new undercrossing; however, traffic headed to Downtown Paso Robles is still expected to use Union Road or 24<sup>th</sup> Street via SR 46 E. The southbound right-turn and eastbound left-turn movements at the SR 46E/Airport Road intersection are expected to remain at LOS F during the AM or PM peak hour.

#### Benefits

- Provides a new southerly and direct connection to existing and future land uses on both sides of SR 46 E
- Provides a direct connection to the southeast portion of the city assuming that Airport Road is eventually extended south to Linne Road
- Allows vehicles and potentially bicyclists and pedestrians to access the north side of SR 46 E without conflicting with SR 46 E traffic
- The draft SR 46E/Airport Road PSR indicated this alternative is feasible with existing topography
- Reduces number of vehicles from the southeast area that currently travel north on Union Road to east on SR 46 E to Airport Road

#### Disadvantages

- Requires construction of the planned roadway system, as proposed for development of Chandler Ranch, to connect to existing streets (Gilead Lane, Sherwood Road, Linne Road)
- Will not significantly reduce vehicles on Union Road to SR 46 E to Airport Road as they are coming from downtown or from the southwest portions of the city and are not anticipated to divert to the Airport Road undercrossing
- Will not be heavily utilized until full buildout of Chandler Ranch. The undercrossing is estimated to serve 500 peak hour trips based on existing volumes and partial development of Chandler Ranch (144 residential units and 140,000 s.f. of non-residential space).
- Southbound right-turn and eastbound left-turn movements will continue to operate at LOS F without further improvements (e.g., new interchange on SR 46 east of Airport Road or a frontage road along the south side of SR 46 E that connects Union Road with Airport Road)

#### **Baseline + Alternative 5 (Combination of Alternatives 1, 2, 3a, and 4)**

This alternative evaluates the combination of the Alternatives 1 & 2 (Extension of Wisteria Lane and Dry Creek Road) plus the interim signal at SR 46 E/Union Road (Alternative 3a) and the grade separation of Airport Road under SR 46E (Alternative 4).

This alternative distributes some of the vehicular demand at SR 46 E/Airport Road to the other SR 46E intersections (Buena Vista Drive, Golden Hill Road, and Union Road) and to other local city intersections. As a result, the delays increase slightly at a few locations (SR 46E/Golden Hill Road, Golden Hill Road/Dallons Road, and N. River Road/Creston Road). However, the eastbound left-turn movement at SR 46E/Airport Road would continue to operate at unacceptable levels. The SR 46E/Union Road intersection is projected to operate at LOS D or better with a signal.

#### **Baseline + Alternative 6 (Combination of Alternatives 1, 2, 3b, and 4)**

Under this alternative, the grade separation of Union Road over SR 46E is paired with the Airport Road grade separation and Alternatives 1 & 2. This further encourages traffic in the north of SR 46 area to utilize the local north-south connections (Union Road and Airport Road), which reduces the amount of vehicles traveling west towards the US 101/SR 46E interchange. As a result, the delays improve on SR 46E between US 101 and Golden Hill Road, although two locations are still projected to operate at LOS F during one peak hour. The SR 46E/Union Road roundabout ramp intersections operate at acceptable levels of service and the southbound right-turn and eastbound left-turn movements at SR 46E/Airport Road are estimated to remain at LOS F.

#### **Baseline + Alternative 7 (Combination of Alternatives 1 and 3a)**

This alternative would provide similar operations to the Baseline + Alternative 3a scenario. The traffic signal would provide LOS D operations at SR 46E Union Road, and the Wisteria Lane extension would allow some Airport Road vehicles to access Golden Hill Road and Buena Vista Drive without traveling on SR 46 E.

### **OVERALL DELAY COMPARISON**

#### **By Intersection**

A comparison of the change in intersection delay between Baseline Conditions and the various alternatives is presented on **Figure 7**. The results with Alternative 7 would be similar to Alternative 3a scenario. As shown in **Figure 7**, the maximum change in delay at any signalized intersection ranges up to 30%. For several of the unsignalized side-street stop controlled intersections, the delays are substantial and cannot be accurately calculated by the SYNCHRO analysis software.

#### **SR 46 E Corridor**

In addition to evaluating the change in delay at each intersection, a corridor evaluation was also conducted using a weighted approach (total intersection volumes multiplied by delay and divided by total volume). The corridor included all intersections on SR 46 E between the US 101 southbound ramps and Golden Hill Road. The SR 46 E intersections at Union Road and Airport Road were excluded as the east-west through volumes on SR 46 E are not controlled and do not experience delay. Use of these volumes would skew the calculation results. The results of the weighted corridor delay are presented in **Table 6**.

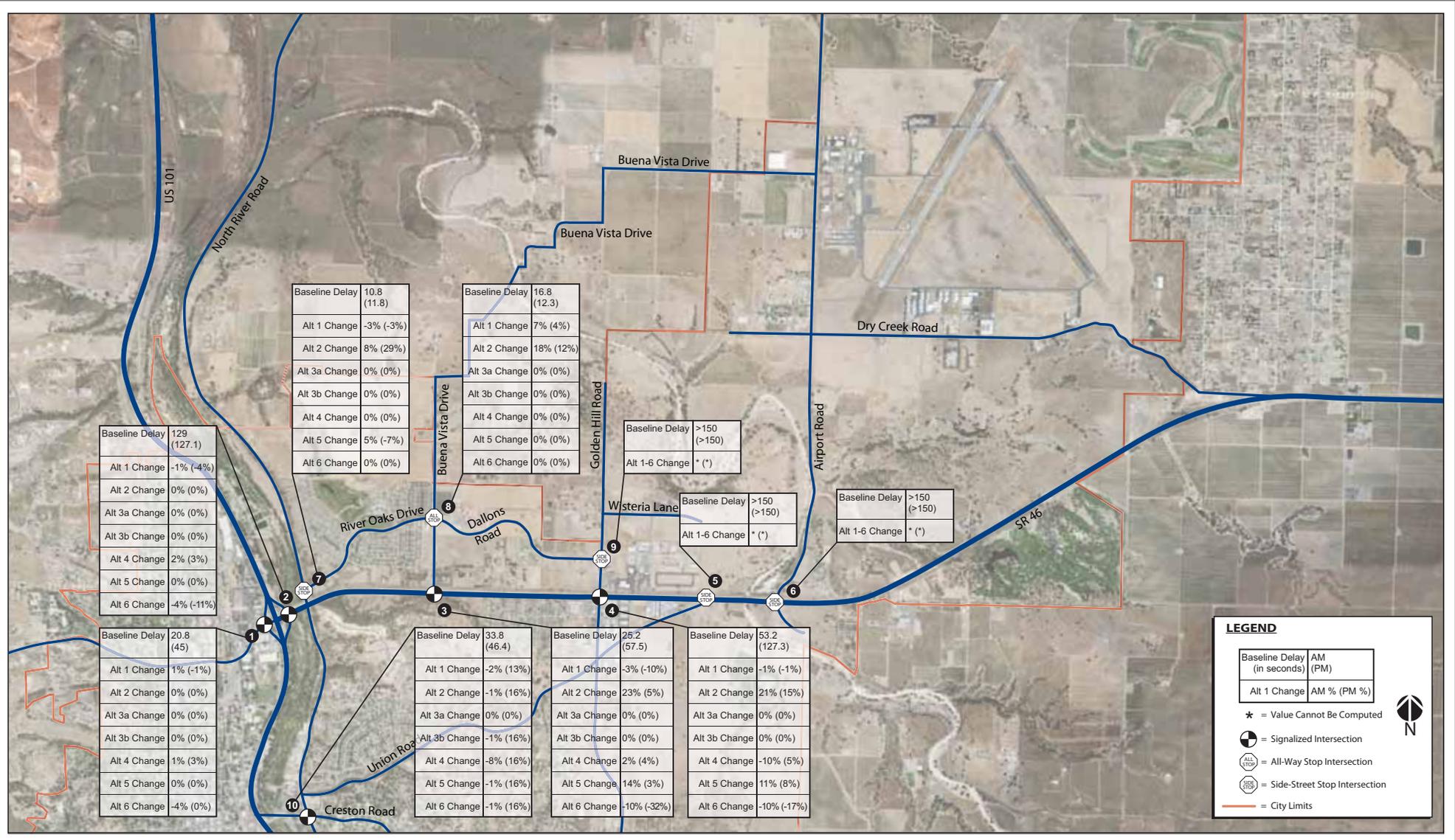
**TABLE 6  
WEIGHTED SR 46 E CORRIDOR DELAY<sup>1</sup>**

Scenario	Peak Hour	Weighted Delay <sup>2</sup>	Percentage Change over Baseline
Baseline	AM	59	-
	PM	95	-
Alternative 1	AM	58	-1%
	PM	91	-3%
Alternative 2	AM	64	+9%
	PM	101	+7%
Alternative 3, Phase 1	AM	59	0%
	PM	95	0%
Alternative 3, Phase 2	AM	59	0%
	PM	95	0%
Alternative 4	AM	58	-1%
	PM	98	+4%
Alternative 5	AM	61	+5%
	PM	98	+4%
Alternative 6	AM	55	-6%
	PM	80	-15%
Alternative 7	Similar results at Alt 3, Phase 1		

<sup>1</sup> SR 46 E intersections at Union Road and Airport Road are excluded from calculation as the east-west through volumes experience no delay.

<sup>2</sup> Weighted delay (total intersection volumes multiplied by delay and divided by total volume) for SR 46 intersections between US 101 SB Ramps to Golden Hill Road.

Source: Fehr & Peers, 2008.



Alternative 6 (which is a combination of Alternatives 1, 2, 3 Phase 2, and 4) shows the greatest decrease in delay through the corridor with a 15 percent reduction in the PM peak hour. Alternatives 2 & 5 show an increase in system delay during both peak hours which is attributed to the increased volumes and associated delays at the SR 46 E/Golden Hill Road intersection. The other two alternatives show relatively minor changes in SR 46E corridor delay.

## CONCLUSIONS

**Table 7** provides a ranking of the alternatives based on improvements to the local circulation, regional circulation, and delays through the SR 46E corridor. Alternatives are ranked from 1 (highest rating) to 7 (lowest rating). Alternative 6, combination of Alternatives 1 & 2 and grade separation at Union Road and Airport Road, ranks the highest based on operations throughout the entire corridor. If the City is only implementing one alternative at a time, Alternative 3, Phase 2 (Grade separation at Union Road), would be ranked first.

A separate review of these alternatives, based on constructability or financial costs, should be conducted outside of the scope of this report and may change how these alternatives are ranked.

<b>TABLE 7 RANKING OF ALTERNATIVES<sup>1</sup></b>	
<b>Alternatives</b>	<b>Operational Benefit Ranking</b>
Alternative 1 (Extend Wisteria Lane)	5
Alternative 2 (Extend Dry Creek Road)	6
Alternative 3 Phase 1 (Traffic Signal at SR 46E/Union Road plus Union Road extension to Airport)	4
Alternative 3 Phase 2 (Grade Separate Union Road over SR 46E)	3
Alternative 4 (Grade Separate Airport Road under SR 46E)	7
Alternative 5 (Combination of Alts 1, 2, 3 Ph1, & 4)	2
Alternative 6 (Combination of Alts 1, 2, 3 Ph2, & 4)	1
Alternative 7 (Combination of Alts 1 & 3a)	4 <sup>2</sup>
<sup>1</sup> Alternatives are ranked from 1 (highest) to 7 (lowest) based on improvements to local and regional circulation and to SR 46E corridor delay. <sup>2</sup> Alternative 7 estimated to have similar results as Alternative 3 Phase 1. Source: Fehr & Peers, 2008.	