Appendix G Response to Comments

This appendix contains the comments received during the public circulation and comment period (May 27, 2008 to July 11, 2008). The comments have been numbered (Comment Set #1, Comment Set #2 and so on) in the order that they were received; a Caltrans response follows each comment set. In this appendix, comments are divided into three groups, based on whom the comment came from: individual members of the public, property owners or their representatives, or a public agency. The Governor's Office of Planning and Research, State Clearinghouse closeout letter (dated June 24, 2008) is first, acknowledging this document's compliance with the State Clearinghouse requirements for environmental documents. No response was required for this letter.

Individuals:

- Comment Set #1 – Amy Salas
- Comment Set #2 – Penny Takier
- Comment Set #3 – Cheryl Crow
- Comment Set #4 – Michael Zappas
- Comment Set #5 – Robert Miller
- Comment Set #6 – Robert Polley
- Comment Set #8 – Bryce Dilger
- Comment Set #9 – Don Simoneau
- Comment Set #10 – Kim Simoneau
- Comment Set #11 – Captain Carl

Property Owner Representatives:

APN 009-631-011

- Comment Set #7 – Jeff Wagner, North Coast Engineering
- Comment Set #12 – INS and OUTS of ROUNDABOUTS
- Comment Set #13 – North Coast Engineering, Inc.
- Comment Set #14 – Ourston Roundabout Engineering
- Comment Set #15 – Carolyn Leach Consulting, LLC
- Comment Set #19 – Matteoni O'Laughlin & Hechtman Lawyers

APNs 040-031-001, 040-091-041

- Comment Set #16 – eda design professionals

Target Retail Center

- Comment Set #17 – Ellis Partners, LLC

Public Agency Comments:

- Comment Set #18 – San Luis Obispo Council of Governments (SLOCOG)
- Comment Set #20 – Air Pollution Control District
- Comment Set #21 – San Luis Obispo County Department of Planning and Building

Comment Set 14

Ourston Roundabout Engineering

July 12, 2008

Mr. Stephen Sahadi
Cenco, LLC
5940 Rocky Canyon Road
Atascadero, CA 93422

Dear Stephen:

Re: US 101/SR 46 West, Paso de Robles, San Luis Obispo County
Traffic Analysis of Roundabout Alternatives
Our Project Number 09044

Introduction

This correspondence provides our review and comments on the analysis of intersection alternatives as documented in the following two traffic reports:

1. Traffic Report - U.S. Highway 101/SR46W PA-ED, City of Paso Robles, Associated Transportation Engineers, Santa Barbara, November 2, 2006
2. Draft Project Report - U.S. Highway 101/SR46W PA-ED, City of Paso Robles, URS Corporation, May 8, 2008

In accordance with the terms of our assignment, we evaluated the analysis of the intersection alternatives in the URS and ATE traffic reports and documented a comparison total delay of the two alternative intersection combinations. In this regard, we identified two additional options not previously considered or rejected. We prepared analysis of the two roundabout options not identified previously but did not develop the layouts in any detail. One of the two additional alternatives accommodates all the legs (6) of the two west side intersections. A second additional alternative solution comprises two compact roundabouts on the west side of the interchange. The spacing narrowly splits the two intersections as they currently are but with greater efficiency potential using roundabouts. The results of these investigations are summarized in the following sections.

The detailed tabulation of our comparison of operational analyses for individual intersection delay and our supplemental RODEL analyses are appended as attachments numbered 2 to 5. Attachment # 1 presents several assumptions and identification of a few errors we discovered while examining the subject reports. In our analysis we corrected for those errors to present the most accurate comparison of alternatives. Although we have important comments on the conceptual roundabout designs that would impact the layouts fundamentally, we have not presented those in this initial commentary. Given time we will provide this analysis.

Comparison Methodology

14-1

The URS and ATE traffic reports evaluate the interchange area operations on the basis of each individual intersection's performance. In our opinion, the selection of one type of intersection or another should consider the overall interchange performance, not just each isolated intersection. Since drivers needing to use the interchange ramps will also pass through the adjacent frontage road intersections our method of comparing the alternative solutions uses combined intersection

5325 Wall Street, Suite 2305
Madison, WI 53718
Phone: (608) 249-4545
Fax: (608) 249-4402
www.ourston.com
mail@ourston.com

delay for the SR46 corridor west of Highway 101. For the alternatives being evaluated, the combined delay was calculated by multiplying the delay for each turning movement at each intersection times the volume of that turning movement, then the movement delay for each leg of that intersection is summed. The system delay is then the sum of the delay of each intersection. In this case, we only compared the west side ramp terminal (southbound) and the adjacent frontage road intersection because of the proposal to separate the two intersections more widely so that their individual operations do not overlap.

If only individual intersection performance is considered then the preferred intersection arrangement is going to favor reducing traffic in the off-ramp terminal intersection. But this will occur at the expense of drivers who will experience higher overall delay for the same two intersections combined. The total delay of the ramp terminal and the adjacent intersection for Alternative 2 would increase by 400 to 500 minutes cumulatively for the 2018 p.m. peak hour. Using incremental delay, Alternative 2 the southbound ramp terminal intersection volume is reduced from 2435 vehicles per hour to 2115 vehicles per hour at 2018. A corresponding decrease in ramp intersection delay is only 76 minutes for the peak hour at 2018. This insignificant difference is accomplished by moving Vine Street off the ramp terminal roundabout – a very costly undertaking with no overall benefit.

Our recommendation is to evaluate the alternative intersection solutions accounting for combined delay of both the ramp terminal and the adjacent frontage road intersection. Rarely, is it prudent to solve a ramp terminal congestion problem by causing more delay at an upstream intersection. Few agencies would make a policy of increasing system delay. Using roundabouts has certainly shown that this isn't necessary. Roundabouts can optimize the road network efficiency and the ramp terminals as well. This is being demonstrated with the proposed concept of combining intersections on the east side of the interchange.

Operational Comparison of Alternatives 1 and 2

Currently the SR46W traffic must use both the ramp terminal and the frontage road intersection. Alternative 1 allows Vine Street traffic to avoid additional delay by only needing to pass through one intersection en route to and from the interchange. However, Theatre Drive traffic does not have direct access to Vine Street with Alternative 1. Alternative 2 is the same as the existing condition except that intersection spacing is increased and the ramp terminal efficiency is improved with the use of a roundabout. A snapshot of each alternative is illustrated on the next page.

Cumulative delay is calculated by multiplying the incremental delay for each movement by the volume of that movement then summing the movements of each intersection to equal the total delay in the system. Combining the calculated traffic delay of both intersections in this analysis reveals Alternative 2 would be operationally inferior. The table on the following page compares the various analysis methods and adds our analysis method, 'ORE RODEL' a further verification of the expected cumulative delay associated with each alternative. The lower tabulated figures indicate reduced delay. Selection on this basis favors Alternative 1. As discussed, the technical analysis should consider total delay in determining the preferred intersection alternative, not just the isolated intersection delay.

14-2

5325 Wall Street, Suite 2305
Madison, WI 53718
Phone: (608) 249-4545
Fax: (608) 249-4402
www.ourston.com
mail@ourston.com

Alternative 1 – Theatre Drive Shifted West

Alternative 2 – Vine and Theatre Drive Shifted West

Intersection Alternatives	Time Period	Combined Intersection Delay - West Ramp Terminal & Adjacent Intersection (vehicle- minutes of delay)							
		Sidra		FHWA		RODEL		ORE RODEL	
		2018	2038	2018	2038	2018	2038	2018	2038
Alternative 1	AM	530	876	406	639	417	664	415	661
	PM	888	1925	700	1266	715	1363	714	1361
Alternative 2*	AM	NA	1141	NA	1014	NA	1036	NA	1044
	PM	1129	1757	1061	1666	1082	1813	1085	1870

*2018 AM Peak SYNCHRO Traffic Volumes were not available for Alternative 2.

14-3

In these results the differences between the various methods of analysis are not significant except with the Sidra analysis. In the p.m. peak hour the Sidra analysis shows favor to Alternative 2, but it is not consistent with the other three sets of figures. This is not surprising because we have seen research of in-service roundabouts where the Sidra analysis does not correlate well with the observed data at high entry volumes and at high circulating volumes. RODEL has been shown to be more reliable in that regard. In addition, RODEL can account for geometric variation whereas Sidra can only account for the number of lanes. Use of roundabouts has shown that geometry/capacity variation exists and that there are significant capacity benefits from manipulating several other geometric parameters, e.g. flare length and entry radius.

Operational Analysis of Alternatives 3 and 4

The use of roundabouts in the U.S. has grown to the extent that a variety of seemingly complex yet optimal intersection configurations have been shown to work here as well as in their country of origin, the British Isles. The photos shown on the next page are built examples of the kind of interchange configurations that are more efficient, safer and cost effective than traffic signals.

14-4

The pair of roundabouts in the example for Alternative 3 is projected to carry a combined traffic flow of 6,000 vehicles per hour, a significantly higher flow than the west side ramp terminal of the subject interchange. The six leg roundabout, Alternative 4, combines the frontage road and the ramp terminal into one roundabout as is proposed on the east side of the interchange. The Vail, Colorado example was designed by our firm and built in 1995. It won Public Works Project of the

5325 Wall Street, Suite 2305
Madison, WI 53718
Phone: (608) 249-4545
Fax: (608) 249-4402
www.ourston.com
mail@ourston.com

Year several years running. Prior to this solution, ramp traffic backed up I-70 for up to a mile. There is rarely excessive congestion there anymore and queues occasionally reach back to the gore of the ramp but not into the main-line. It carries up to 4,000 vehicles per hour, more than the 2018 projected traffic flow of 2,400 vehicles per hour proposed for the southbound ramp of the Highway 101/SR46W

Granted the use of either Alternative 3 or 4 at this site has not been thoroughly vetted for property impacts, our cursory review of traffic, space and circle location does not reveal any impediments to giving these alternatives further consideration. Alternative 2 has the highest property acquisition and construction costs. Alternative 1 has less construction and land acquisition cost than Alternative 2 and better yet, our Alternatives 3 and 4 have even lower land and construction costs.

Example of Alternative 3 – A pair of Roundabouts, Lee Road/M23 Michigan

Example of Alternative 4 – A Six Leg Roundabout West Vail/I-70 Interchange, North Roundabout

Comparison of Four Intersection Alternatives

A comparison of the operational analyses of all four alternatives, as shown below, reveals that the two new alternatives have superior efficiency potential. Again, the lower tabulated figures indicate reduced delay. Selection on this basis favors Alternative 4.

Intersection Alternatives	Time Period	Combined Intersection Delay - West Ramp Terminal & Adjacent Intersection (min.)							
		Sidra		FHWA		RODEL		ORE RODEL	
		2018	2038	2018	2038	2018	2038	2018	2038
Alternative 1	AM	530	876	406	639	417	664	415	661
	PM	888	1925	700	1266	715	1363	714	1361
Alternative 2*	AM	NA	1141	NA	1014	NA	1036	NA	1044
	PM	1129	1757	1061	1666	1082	1813	1085	1870
Alternative 3	AM	NA						133	240
	PM	NA						225	437
Alternative 4	AM	NA						92	164
	PM	NA						157	296

*2018 AM Peak SYNCHRO Traffic Volumes were not available for Alternative 2.

5325 Wall Street, Suite 2305
Madison, WI 53718
Phone: (608) 249-4545
Fax: (608) 249-4402
www.ourston.com
mail@ourston.com

With Alternative 3 the delay of a roundabout is less than a traffic signal. For Alternative 4 the delay is reduced by consolidating intersections.

The delay figures tabulated above for Alternatives 3 and 4 reflect refined geometric solutions that are optimized for delay reduction. Attachment #1 documents the geometric design assumptions that include longer flare lengths and adjusted circle sizes. Similar refinements to Alternatives 1 and 2 are possible but the superiority of Alternative 1 is unlikely to change.

Conclusion

Given our analysis of the two alternatives, we recommend that Alternative 1 receive preference because of its operational benefits and expected lower cost. If Alternative 1 is selected and a roundabout is placed at the proposed Theatre Drive intersection, it becomes a variation of Alternative 3. Alternative 4, further demonstrates the operational benefits of using one roundabout to consolidate operations of the two west side intersections. We recommend that the evaluation of alternative intersections consider the effects of combined intersection delay and include options, such as Alternative 3 and 4, not previously identified in the draft traffic report. 14-5

Yours truly,

OURSTON ROUNDABOUT ENGINEERING INC.

Mark Lenters, P.E.
President

Attch.

5325 Wall Street, Suite 2305
Madison, WI 53718
Phone: (608) 249-4545
Fax: (608) 249-4402
www.ourston.com
mail@ourston.com

Attachment #1

Roundabout Analysis Assumptions for Alternative Intersection

Alternative	Parameter	Rodel	ORE Rodel	
Alternative 1	ICD	67 m	70 m	
	E	9.0 m, 4.5 m, 5.0 m	7.95 m, 4.3 m	
	ℓ'	10 m	10 m	
	V	3.6 m, 4.0 m, 7.2 m	4.0 m, 7.4 m	
	Flow Ratio	0.91 / 1.10 / 0.91	0.75 / 1.125 / 0.75 (0.89 PHF)	
Alternative 2	ICD	67 m	55 m	
	E	9.0 m, 5.0 m	7.95 m, 4.3 m	
	ℓ'	10 m	10 m	
	V	3.7 m, 4.0 m, 7.4 m	4.0 m, 7.4 m	
	Flow Ratio	0.91 / 1.10 / 0.91	0.75 / 1.125 / 0.75 (0.89 PHF)	
Alternative 3	Intersection		**East Roundabout**	**West Roundabout**
	ICD		50 m	50 m
	E		7.95 m	7.95 m
	ℓ'		10 m (Vine & Theatre 1 lane to 2, SR 46 EB & WB 2 lanes)	50 m (Off ramp 1 lane to 2) 10 m (SR 46 EB 2 lanes) 20 m (SR 46 WB 1 lane to 2)
	V		4.0 m, 7.4 m	4.0 m, 7.4 m
	PHF		0.75 / 1.125 / 0.75	0.75 / 1.125 / 0.75 (0.89 PHF)
Alternative 4	ICD		70 m	
	E		4.3 m, 7.95 m	
	ℓ'		50 m (Off ramp 1 lane to 2) 30 m (Vine 1 lane) 10 m (SR 46 EB & Theatre 2 lanes) 20 m (SR 46 WB 1 lane to 2)	
	V		4.0 m, 7.4 m	
	PHF		0.75 / 1.125 / 0.75 (0.89 PHF)	

Configurations

Errors in the Traffic Report

Alternative 1

- 2018 AM Peak Period: SR 46 eastbound and SR 46 westbound Rodel delays were transposed in Traffic Report Table 4
- 2018 PM Peak Period: SR 46 eastbound and SR 46 westbound Rodel delays were transposed in Traffic Report Table 5
- 2038 AM Peak Period: SR 46 eastbound and SR 46 westbound Rodel delays were transposed in Traffic Report Table 8
- 2038 PM Peak Period: SR 46 eastbound and SR 46 westbound Rodel delays were transposed in Traffic Report Table 9

Alternative 2

- 2018 AM Peak Period Signalized Intersection: Volumes reported in the SYNCHRO analysis corresponded to 2038 AM Peak Period volumes. Did not have SYNCHRO analysis for 2018 AM Peak Period for signalized intersection.
- 2018 PM Peak Period Roundabout Intersection: SR 46 eastbound right turn traffic volume entered as 705 vehicles instead of 70 vehicles
- 2038 PM Peak Period Roundabout Intersection: SR 46 eastbound Rodel delay incorrectly reported as 4.2 seconds in Traffic Report Table 15. Based on Rodel output, correct delay is 3.6 seconds.

Attachment #2

Alternative 1 - U.S. 101 SB / SR 46W / Vine Street

- **2018 - A.M./P.M. Peak Period Volume and Delay**
- **ORE RODEL**
- **2038 - A.M./P.M. Peak Period Volume and Delay**
- **ORE RODEL**

5325 Wall Street, Suite 2305
Madison, WI 53718
Phone: (608) 249-4545
Fax: (608) 249-4402
www.ourston.com
mail@ourston.com

Alternative 1 - U.S. 101 SB / SR 46W / Vine Street
2018 - A.M. Peak Period Volume and Delay

Signalized Intersection

Leg	Turn	Turn Volume	Turn Delay (sec per veh)	Leg Volume	Avg. Leg Delay (sec per veh)	Total Leg Delay (s)
SR 46 EB	R	55	8.4	555	15.0	8312.0
	T	500	15.7			
Theatre Dr NB	R	210	16.3	245	16.3	3990.0
	L	35	16.2			
SR 46 WB	T	320	3.3	630	10.4	6574.0
	L	310	17.8			

Roundabout Intersection

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh)			
				Sidra	FHWA	Rodel	ORE Rodel
U.S. 101 SB Off	R1	10	480	7.5	2.7	3.6	3.8
	R2	295					
	L	175					
Vine St SB	R	105	150	12.3	5.5	5.4	5.0
	T	0					
	L	45					
SR 46 EB	R	50	710	6.5	2.9	2.4	2.6
	T	560					
	L	100					
SR 46 WB	R	35	525	5.4	2.5	3.6	3.1
	T	240					
	L	250					

*Based on Rodel output, SR 46 EB and SR 46 WB Rodel delays were transposed in Traffic Report Table 4.

Alternative 1 - U.S. 101 SB / SR 46W / Vine Street
2018 - A.M. Peak Period Delay (minutes)

Leg	Intersection*	Model			
		Sidra	FHWA	Rodel	ORE Rodel
U.S. 101 SB Off	Signal	NA			
	Roundabout	60.0	21.6	28.8	30.4
	Total	**60.0**	**21.6**	**28.8**	**30.4**
Vine St SB	Signal	NA			
	Roundabout	30.8	13.8	13.5	12.5
	Total	**30.8**	**13.8**	**13.5**	**12.5**
SR 46 EB	Signal	138.5	138.5	138.5	138.5
	Roundabout	76.9	34.3	28.4	30.8
	Total	**215.5**	**172.9**	**166.9**	**169.3**
SR 46 WB	Signal	109.6	109.6	109.6	109.6
	Roundabout	47.3	21.9	31.5	27.1
	Total	**156.8**	**131.4**	**141.1**	**136.7**
Theatre Dr NB	Signal	66.5	66.5	66.5	66.5
	Roundabout	NA			
	Total	**66.5**	**66.5**	**66.5**	**66.5**
Total System Delay (minutes)		**529.5**	**406.1**	**416.8**	**415.4**

*Signalized intersection modeled with SYNCHRO.

Alternative 1 - U.S. 101 SB / SR 46W / Vine Street
2018 - P.M. Peak Period Volume and Delay

Signalized Intersection

Leg	Turn	Turn Volume	Turn Delay (sec per veh)	Leg Volume	Avg. Leg Delay (sec per veh)	Total Leg Delay (s)
SR 46 EB	R	55	10.1	555	19.5	10805.5
	T	500	20.5			
Theatre Dr NB	R	465	18.8	540	18.6	10032.0
	L	75	17.2			
SR 46 WB	T	560	5	990	12.0	11916.0
	L	430	21.2			

Roundabout Intersection

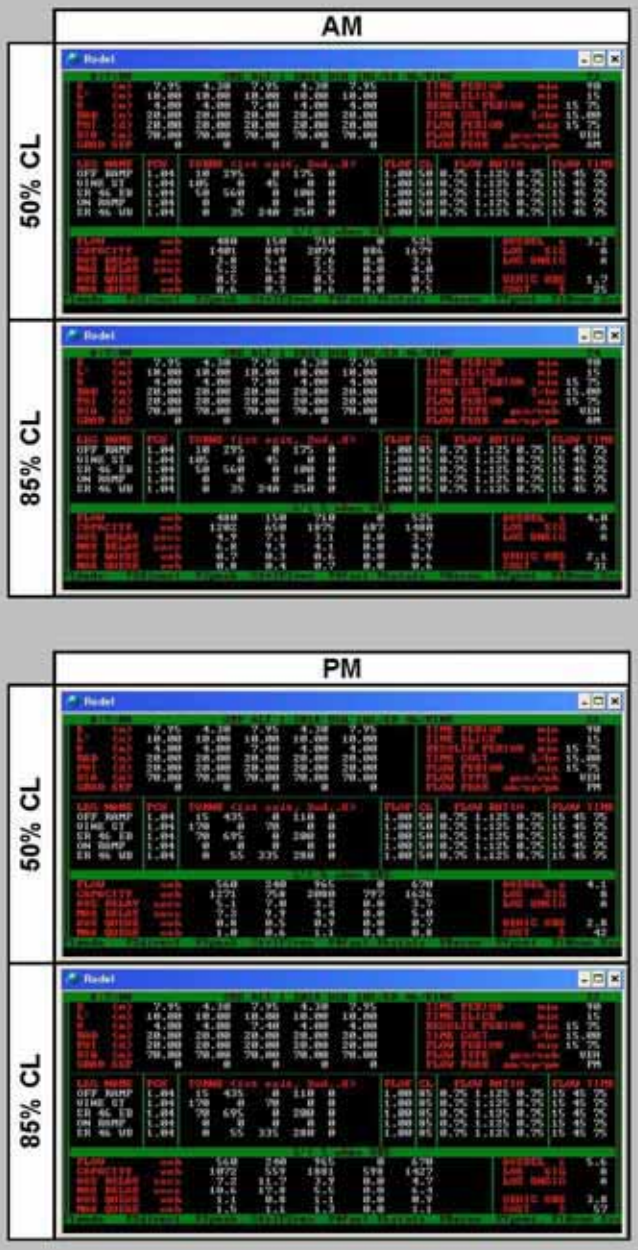
Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh)			
				Sidra	FHWA	Rodel	ORE Rodel
U.S. 101 SB Off	R1	15	560	8.5	3.4	4.8	5.1
	R2	435					
	L	110					
Vine St SB	R	170	240	16.5	7.5	7.2	7.0
	T	0					
	L	70					
SR 46 EB	R	70	965	8.4	3.7	3.0	3.2
	T	695					
	L	200					
SR 46 WB	R	55	670	5.5	2.9	4.2	3.7
	T	335					
	L	280					

*Based on Rodel output, SR 46 EB and SR 46 WB Rodel delays were transposed in Traffic Report Table 5.

Alternative 1 - U.S. 101 SB / SR 46W / Vine Street
2018 - P.M. Peak Period Delay (minutes)

Leg	Intersection*	Model			
		Sidra	FHWA	Rodel	ORE Rodel
U.S. 101 SB Off	Signal	NA			
	Roundabout	79.3	31.7	44.8	47.6
	Total	**79.3**	**31.7**	**44.8**	**47.6**
Vine St SB	Signal	NA			
	Roundabout	66.0	30.0	28.8	28.0
	Total	**66.0**	**30.0**	**28.8**	**28.0**
SR 46 EB	Signal	180.1	180.1	180.1	180.1
	Roundabout	135.1	59.5	48.3	51.5
	Total	**315.2**	**239.6**	**228.3**	**231.6**
SR 46 WB	Signal	198.6	198.6	198.6	198.6
	Roundabout	61.4	32.4	46.9	41.3
	Total	**260.0**	**231.0**	**245.5**	**239.9**
Theatre Dr NB	Signal	167.2	167.2	167.2	167.2
	Roundabout	NA			
	Total	**167.2**	**167.2**	**167.2**	**167.2**
Total System Delay (minutes)		**887.7**	**699.5**	**714.6**	**714.3**

*Signalized intersection modeled with SYNCHRO.



Ourston Roundabout Engineering

USH 101 / SR 46 / S VINE ST
PASO ROBLES, CA
2018 RODEL ANALYSIS ALT 1

EXHIBIT:

P:\00808.944 - SR46W- 101 Interchange\Traffic\Analysis\2018 Alt 1 ORE Analysis.xls 7/9/2008

Alternative 1 - U.S. 101 SB / SR 46W / Vine Street
2038 - A.M. Peak Period Volume and Delay

Signalized Intersection

Leg	Turn	Turn Volume	Turn Delay (sec per veh)	Leg Volume	Avg. Leg Delay (sec per veh)	Total Leg Delay (s)
SR 46 EB	R	105	8.3	710	17.3	12306.0
	T	605	18.9			
Theatre Dr NB	R	260	18.1	325	18.2	5902.0
	L	65	18.4			
SR 46 WB	T	510	4	855	11.5	9837.0
	L	345	22.6			

Roundabout Intersection

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh)			
				Sidra	FHWA	Rodel	ORE RODEL
U.S. 101 SB Off	R1	20	515	9.9	3.7	5.4	5.4
	R2	350					
	L	145					
Vine St SB	R	90	160	16.8	7.4	7.8	7.2
	T	0					
	L	70					
SR 46 EB	R	80	910	12.4	4.2	3.0	3.5
	T	730					
	L	100					
SR 46 WB	R	60	935	5.8	3.6	5.4	4.8
	T	410					
	L	465					

*Based on Rodel output, SR 46 EB and SR 46 WB Rodel delays were transposed in Traffic Report Table 8.

Alternative 1 - U.S. 101 SB / SR 46W / Vine Street
2038 - A.M. Peak Period Delay (minutes)

Leg	Intersection*	Model			
		Sidra	FHWA	Rodel	ORE Rodel
U.S. 101 SB Off	Signal	NA			
	Roundabout	85.0	31.8	46.4	46.4
	Total	**85.0**	**31.8**	**46.4**	**46.4**
Vine St SB	Signal	NA			
	Roundabout	44.8	19.7	20.8	19.2
	Total	**44.8**	**19.7**	**20.8**	**19.2**
SR 46 EB	Signal	205.1	205.1	205.1	205.1
	Roundabout	188.1	63.7	45.5	53.1
	Total	**393.2**	**268.8**	**250.6**	**258.2**
SR 46 WB	Signal	164.0	164.0	164.0	164.0
	Roundabout	90.4	56.1	84.2	74.8
	Total	**254.3**	**220.1**	**248.1**	**238.8**
Theatre Dr NB	Signal	98.4	98.4	98.4	98.4
	Roundabout	NA			
	Total	**98.4**	**98.4**	**98.4**	**98.4**
Total System Delay (minutes)		**875.6**	**638.7**	**664.2**	**660.9**

*Signalized intersection modeled with SYNCHRO.

Alternative 1 - U.S. 101 SB / SR 46W / Vine Street
2038 - P.M. Peak Period Volume and Delay

Signalized Intersection

Leg	Turn	Turn Volume	Turn Delay (sec per veh)	Leg Volume	Avg. Leg Delay (sec per veh)	Total Leg Delay (s)
SR 46 EB	R	95	11.3	700	26.4	18497.5
	T	605	28.8			
Theatre Dr NB	R	490	25.7	610	25.0	15245.0
	L	120	22.1			
SR 46 WB	T	750	6.9	1280	16.3	20810.0
	L	530	29.5			

Roundabout Intersection

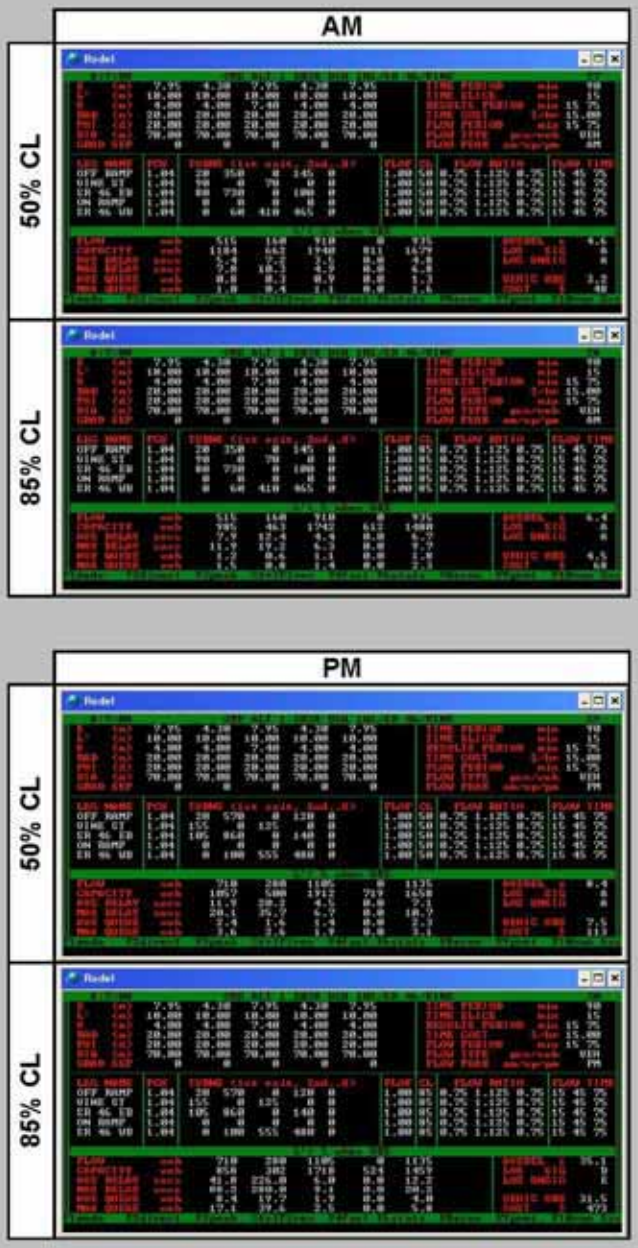
Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh)			
				Sidra	FHWA	Rodel	ORE RODEL
U.S. 101 SB Off	R1	20	710	17.6	6.5	10.8	11.9
	R2	570					
	L	120					
Vine St SB	R	155	280	61.1	17.2	19.2	20.2
	T	0					
	L	125					
SR 46 EB	R	105	1105	22.6	5.9	4.2	4.5
	T	860					
	L	140					
SR 46 WB	R	100	1135	5.6	4.8	8.4	7.1
	T	555					
	L	480					

*Based on Rodel output, SR 46 EB and SR 46 WB Rodel delays were transposed in Traffic Report Table 9.

Alternative 1 - U.S. 101 SB / SR 46W / Vine Street
2038 - P.M. Peak Period Delay (minutes)

Leg	Intersection*	Model			
		Sidra	FHWA	Rodel	ORE Rodel
U.S. 101 SB Off	Signal	NA			
	Roundabout	208.3	76.9	127.8	140.8
	Total	**208.3**	**76.9**	**127.8**	**140.8**
Vine St SB	Signal	NA			
	Roundabout	285.1	80.3	89.6	94.3
	Total	**285.1**	**80.3**	**89.6**	**94.3**
SR 46 EB	Signal	308.3	308.3	308.3	308.3
	Roundabout	416.2	108.7	77.4	82.9
	Total	**724.5**	**417.0**	**385.6**	**391.2**
SR 46 WB	Signal	346.8	346.8	346.8	346.8
	Roundabout	105.9	90.8	158.9	134.3
	Total	**452.8**	**437.6**	**505.7**	**481.1**
Theatre Dr NB	Signal	254.1	254.1	254.1	254.1
	Roundabout	NA			
	Total	**254.1**	**254.1**	**254.1**	**254.1**
Total System Delay (minutes)		**1924.8**	**1265.9**	**1362.9**	**1361.5**

*Signalized intersection modeled with SYNCHRO.



Ourston Roundabout Engineering

USH 101 / SR 46 / S VINE ST
PASO ROBLES, CA
2038 RODEL ANALYSIS ALT 1

EXHIBIT:

P:\00808 944 - SR46W- 101 Interchange\Traffic\Analysis\2038 Alt 1 ORE Analysis.xls 7/8/2008

Attachment #3

Alternative 2 - U.S. 101 SB / SR 46W / Vine Street

- **2018 - A.M./P.M. Peak Period Volume and Delay**
- **ORE RODEL**
- **2038 - A.M./P.M. Peak Period Volume and Delay**
- **ORE RODEL**

5325 Wall Street, Suite 2305
Madison, WI 53718
Phone: (608) 249-4545
Fax: (608) 249-4402
www.ourston.com
mail@ourston.com

Alternative 2 - U.S. 101 SB / SR 46W
2018 - P.M. Peak Period Volume and Delay (seconds per vehicle)

Signalized Intersection

Leg	Turn	Turn Volume	Turn Delay (sec per veh)	Leg Volume	Avg. Leg Delay (sec per veh)	Total Leg Delay (s)
Vine St SB	R	65	23.6	240	28.6	6854.0
	T	105	25.6			
	L	70	37.6			
SR 46 EB	R	55	15.2	555	34.4	19091.0
	T	450	26.6			
	L	50	125.7			
Theatre Dr NB	R	315	16.1	540	19.7	10659.0
	T	150	23.1			
	L	75	28.3			
SR 46 WB	R	70	11.0	890	23.4	20837.0
	T	495	17.1			
	L	325	35.7			

Roundabout Intersection

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh)			
				Sidra	FHWA	Rodel	ORE Rodel
U.S. 101 SB Off	R	500	610	5.8	3.1	4.7	5.1
	L	110					
SR 46 EB	R	70	835	4.7	3.1	2.6	2.8
	T	765					
SR 46 WB	T	390	670	4.2	2.6	3.6	3.3
	L	280					

*Based on revised Rodel by ORE accounting for corrected SR 46 EB right turn volume.

Alternative 2 - U.S. 101 SB / SR 46W
2018 - P.M. Peak Period Delay (minutes)

Leg	Intersection*	Model			
		Sidra	FHWA	Rodel	ORE Rodel
U.S. 101 SB Off	Signal	NA			
	Roundabout	59.0	31.5	47.8	51.9
	Total	**59.0**	**31.5**	**47.8**	**51.9**
Vine St SB	Signal	114.2	114.2	114.2	114.2
	Roundabout	NA			
	Total	**114.2**	**114.2**	**114.2**	**114.2**
SR 46 EB	Signal	318.2	318.2	318.2	318.2
	Roundabout	65.4	43.1	36.2	39.0
	Total	**383.6**	**361.3**	**354.4**	**357.2**
SR 46 WB	Signal	347.3	347.3	347.3	347.3
	Roundabout	46.9	29.0	40.2	36.9
	Total	**394.2**	**376.3**	**387.5**	**384.1**
Theatre Dr NB	Signal	177.7	177.7	177.7	177.7
	Roundabout	NA			
	Total	**177.7**	**177.7**	**177.7**	**177.7**
Total System Delay (minutes)		**1128.6**	**1061.0**	**1081.5**	**1085.0**

*Signalized intersection modeled with SYNCHRO.

PM

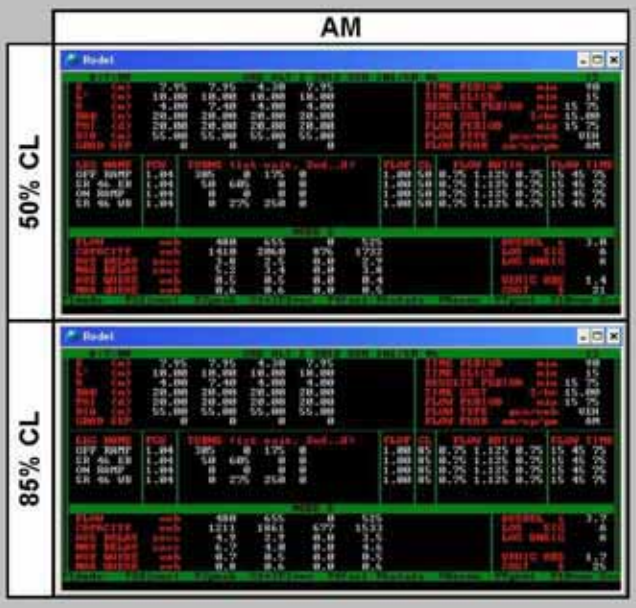
50% CL

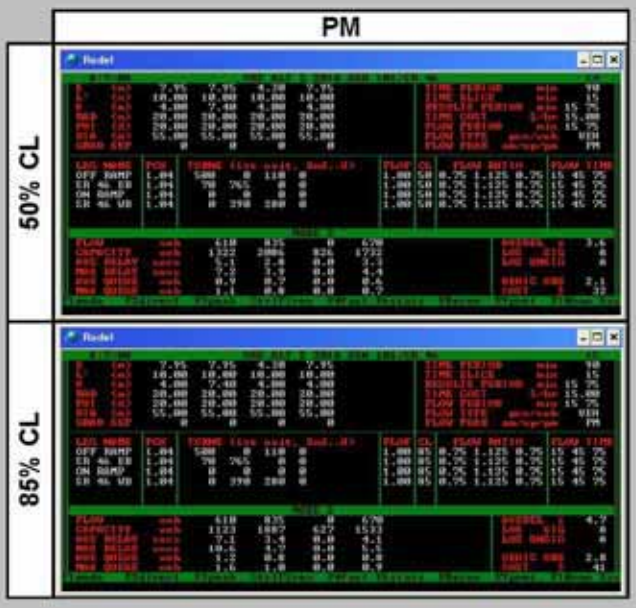
Ourston Roundabout Engineering

USH 101 / SR 46 / S VINE ST
PASO ROBLES, CA
2018 CORRECTED RODEL ANALYSIS ALT 2

EXHIBIT:

P:\2008\08 344 - SR46W- 101 Interchange\Traffic\Analysis\2018 Alt 2 CRE Analysis.xls 7/8/2008





Ourston Roundabout Engineering

USH 101 / SR 46 / S VINE ST
PASO ROBLES, CA
2018 RODEL ANALYSIS ALT 2

EXHIBIT:

P:\008808 944 - SR46W- 101 Interchange\Traffic\Analysis\2018 Alt 2 ORE Analysis.xls 7/8/2008

Alternative 2 - U.S. 101 SB / SR 46W
2038 - A.M. Peak Period Volume and Delay (seconds per vehicle)

Signalized Intersection

Leg	Turn	Turn Volume	Turn Delay (sec per veh)	Leg Volume	Avg. Leg Delay (sec per veh)	Total Leg Delay (s)
Vine St SB	R	30	29.4	160	32.6	5219.0
	T	60	31.1			
	L	70	35.3			
SR 46 EB	R	105	12.2	755	28.3	21338.5
	T	605	23.9			
	L	45	124.4			
Theatre Dr NB	R	205	21.9	325	25.2	8183.0
	T	55	29.1			
	L	65	32.2			
SR 46 WB	R	80	8.6	845	21.1	17810.5
	T	480	12.1			
	L	285	39.7			

Roundabout Intersection

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh)			
				Sidra	FHWA	Rodel	ORE Rodel
U.S. 101 SB Off	R	370	515	7.3	3.4	4.8	5.6
	L	145					
SR 46 EB	R	80	880	8.6	3.8	3.0	3.4
	T	800					
SR 46 WB	T	470	935	4.9	3.4	4.8	4.5
	L	465					

Alternative 2 - U.S. 101 SB / SR 46W
2038 - A.M. Peak Period Delay (minutes)

Leg	Intersection*	Model			
		Sidra	FHWA	Rodel	ORE Rodel
U.S. 101 SB Off	Signal	NA			
	Roundabout	62.7	29.2	41.2	48.1
	Total	**62.7**	**29.2**	**41.2**	**48.1**
Vine St SB	Signal	87.0	87.0	87.0	87.0
	Roundabout	NA			
	Total	**87.0**	**87.0**	**87.0**	**87.0**
SR 46 EB	Signal	355.6	355.6	355.6	355.6
	Roundabout	126.1	55.7	44.0	49.9
	Total	**481.8**	**411.4**	**399.6**	**405.5**
SR 46 WB	Signal	296.8	296.8	296.8	296.8
	Roundabout	76.4	53.0	74.8	70.1
	Total	**373.2**	**349.8**	**371.6**	**367.0**
Theatre Dr NB	Signal	136.4	136.4	136.4	136.4
	Roundabout	NA			
	Total	**136.4**	**136.4**	**136.4**	**136.4**
Total System Delay (minutes)		**1141.0**	**1013.8**	**1035.9**	**1043.9**

*Signalized intersection modeled with SYNCHRO.

Alternative 2 - U.S. 101 SB / SR 46W
2038 - P.M. Peak Period Volume and Delay (seconds per vehicle)

Signalized Intersection

Leg	Turn	Turn Volume	Turn Delay (sec per veh)	Leg Volume	Avg. Leg Delay (sec per veh)	Total Leg Delay (s)
Vine St SB	R	50	30.4	280	37.9	10600.0
	T	105	33.5			
	L	125	44.5			
SR 46 EB	R	95	15.8	700	35.8	25036.5
	T	565	33.5			
	L	40	115.2			
Theatre Dr NB	R	390	24.5	610	27.7	16887.0
	T	100	31.2			
	L	120	35.1			
SR 46 WB	R	120	10.4	1245	31.2	38888.0
	T	700	22.2			
	L	425	52.0			

Roundabout Intersection

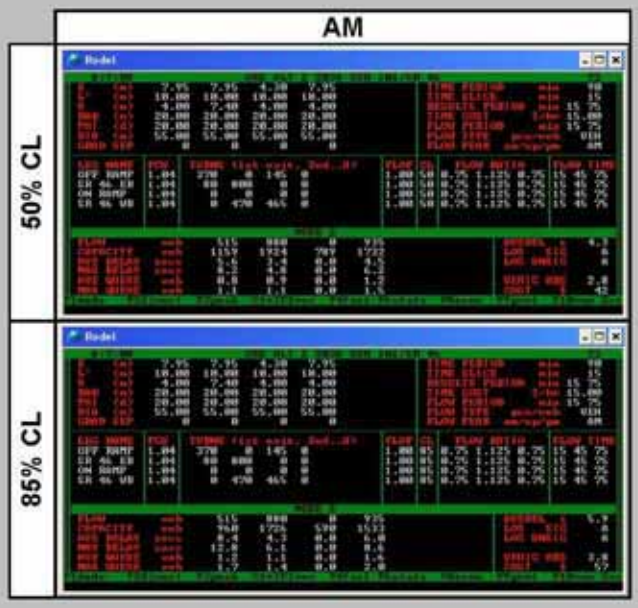
Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh)			
				Sidra	FHWA	Rodel	ORE Rodel
U.S. 101 SB Off	R	590	710	5.8	3.1	8.4	12.9
	L	120					
SR 46 EB	R	105	1090	4.7	3.1	3.6	4.3
	T	985					
SR 46 WB	T	655	1135	4.2	2.6	6.6	6.1
	L	480					

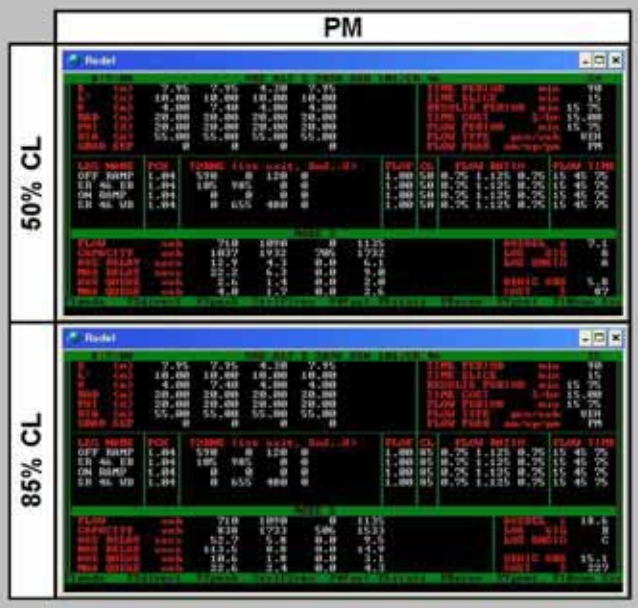
*Based on Rodel output, SR 46 EB Rodel delay was reported incorrectly in Traffic Report Table 15.

Alternative 2 - U.S. 101 SB / SR 46W
2038 - P.M. Peak Period Delay (minutes)

Leg	Intersection*	Model			
		Sidra	FHWA	Rodel	ORE Rodel
U.S. 101 SB Off	Signal	NA			
	Roundabout	68.6	36.7	99.4	152.7
	Total	**68.6**	**36.7**	**99.4**	**152.7**
Vine St SB	Signal	176.7	176.7	176.7	176.7
	Roundabout	NA			
	Total	**176.7**	**176.7**	**176.7**	**176.7**
SR 46 EB	Signal	417.3	417.3	417.3	417.3
	Roundabout	85.4	56.3	65.4	78.1
	Total	**502.7**	**473.6**	**482.7**	**495.4**
SR 46 WB	Signal	648.1	648.1	648.1	648.1
	Roundabout	79.5	49.2	124.9	115.4
	Total	**727.6**	**697.3**	**773.0**	**763.5**
Theatre Dr NB	Signal	281.5	281.5	281.5	281.5
	Roundabout	NA			
	Total	**281.5**	**281.5**	**281.5**	**281.5**
Total System Delay (minutes)		**1757.0**	**1665.7**	**1813.2**	**1869.7**

*Signalized intersection modeled with SYNCHRO.





Ourston Roundabout Engineering

USH 101 / SR 46 / S VINE ST
PASO ROBLES, CA
2038 RODEL ANALYSIS ALT 2

EXHIBIT:

P:\008908 944 - SR46W - 101 Interchange\Traffic\Analysis\2038 Alt 2 ORE Analysis.xls 7/8/2008

Attachment #4

Alternative 3 - Two Roundabout Option

- **2018 - A.M./P.M. Peak Period Volume and Delay**
- **ORE RODEL**
- **2038 - A.M./P.M. Peak Period Volume and Delay**
- **ORE RODEL**

5325 Wall Street, Suite 2305
Madison, WI 53718
Phone: (608) 249-4545
Fax: (608) 249-4402
www.ourston.com
mail@ourston.com

Alternative 3 - Two Roundabout Option
2018 - A.M. Peak Period Volume and Delay

West Roundabout Intersection
(Vine St / SR 46 / Theatre Dr)

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh) ORE Rodel
Vine St SB	R	35	150	2.8
	T	70		
	L	45		
SR 46 EB	R	55	555	2.3
	T	455		
	L	45		
Theatre Dr NB	R	155	245	3.1
	T	55		
	L	35		
SR 46 WB	R	45	570	2.1
	T	285		
	L	240		

East Roundabout Intersection
(U.S. 101 / SR 46)

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh) ORE Rodel
U.S. 101 SB Off	R	305	480	2.7
	L	175		
SR 46 EB	R	50	655	2.6
	T	605		
SR 46 WB	T	275	525	2.5
	L	250		

Alternative 3 - Two Roundabout Option
2018 - A.M. Peak Period Delay (minutes)

Leg	Intersection	Model ORE Rodel
U.S. 101 SB Off	West Rndbt	NA
	East Rndbt	21.6
	Total	**21.6**
Vine St SB	West Rndbt	7.0
	East Rndbt	NA
	Total	**7.0**
SR 46 EB	West Rndbt	21.3
	East Rndbt	28.4
	Total	**49.7**
SR 46 WB	West Rndbt	20.0
	East Rndbt	21.9
	Total	**41.8**
Theatre Dr NB	West Rndbt	12.7
	East Rndbt	NA
	Total	**12.7**
Total System Delay (minutes)		**132.7**

Alternative 3 - Two Roundabout Option
2018 - P.M. Peak Period Volume and Delay

West Roundabout Intersection
(Vine St / SR 46 / Theatre Dr)

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh) ORE Rodel
Vine St SB	R	65	240	3.9
	T	105		
	L	70		
SR 46 EB	R	55	555	2.5
	T	450		
	L	50		
Theatre Dr NB	R	315	540	4.3
	T	150		
	L	75		
SR 46 WB	R	70	890	2.8
	T	495		
	L	325		

East Roundabout Intersection
(U.S. 101 / SR 46)

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh) ORE Rodel
U.S. 101 SB Off	R	500	610	3.4
	L	110		
SR 46 EB	R	70	835	2.9
	T	765		
SR 46 WB	T	390	670	2.8
	L	280		

Alternative 3 - Two Roundabout Option
2018 - P.M. Peak Period Delay (minutes)

Leg	Intersection	Model ORE Rodel
U.S. 101 SB Off	West Rndbt	NA
	East Rndbt	34.6
	Total	**34.6**
Vine St SB	West Rndbt	15.6
	East Rndbt	NA
	Total	**15.6**
SR 46 EB	West Rndbt	23.1
	East Rndbt	40.4
	Total	**63.5**
SR 46 WB	West Rndbt	41.5
	East Rndbt	31.3
	Total	**72.8**
Theatre Dr NB	West Rndbt	38.7
	East Rndbt	NA
	Total	**38.7**
Total System Delay (minutes)		**225.2**

AM - VINE/SR46/THEATRE (WEST RNDBT)

50% CL

85% CL

AM - USH 101/SR46 (EAST RNDBT)

50% CL

85% CL

Ourston Roundabout Engineering	USH 101 / SR 46 / S VINE ST / THEATRE DR PASO ROBLES, CA 2018 AM RODEL ANALYSIS ALT 3	EXHIBIT:

P:\008908 944 - SR46W - 101 Interchange\Traffic\Analysis\2018 Alt 3 ORE Analysis.xls 7/10/2008

PM - VINE/SR46/THEATRE (WEST RNDBT)

50% CL

85% CL

PM - USH 101/SR46 (EAST RNDBT)

50% CL

85% CL

Ourston Roundabout Engineering	USH 101 / SR 46 / S VINE ST / THEATRE DR PASO ROBLES, CA 2018 PM RODEL ANALYSIS ALT 3	EXHIBIT:

P:\00808.944 - SR46W - 101 Interchange\Traffic\Analysis\2018 Alt 3 ORE Analysis.xls 7/10/2008

Alternative 3 - Two Roundabout Option
2038 - A.M. Peak Period Volume and Delay

West Roundabout Intersection
(Vine St / SR 46 / Theatre Dr)

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh) ORE Rodel
Vine St SB	R	30	160	3.4
	T	60		
	L	70		
SR 46 EB	R	105	755	2.7
	T	605		
	L	45		
Theatre Dr NB	R	205	325	3.7
	T	55		
	L	65		
SR 46 WB	R	80	845	2.5
	T	480		
	L	285		

East Roundabout Intersection
(U.S. 101 / SR 46)

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh) ORE Rodel
U.S. 101 SB Off	R	370	515	3.8
	L	145		
SR 46 EB	R	80	880	3.6
	T	800		
SR 46 WB	T	470	935	3.6
	L	465		

Alternative 3 - Two Roundabout Option
2038 - A.M. Peak Period Delay (minutes)

Leg	Intersection	Model ORE Rodel
U.S. 101 SB Off	West Rndbt	NA
	East Rndbt	32.6
	Total	**32.6**
Vine St SB	West Rndbt	9.1
	East Rndbt	NA
	Total	**9.1**
SR 46 EB	West Rndbt	34.0
	East Rndbt	52.8
	Total	**86.8**
SR 46 WB	West Rndbt	35.2
	East Rndbt	56.1
	Total	**91.3**
Theatre Dr NB	West Rndbt	20.0
	East Rndbt	NA
	Total	**20.0**
Total System Delay (minutes)		**239.8**

Alternative 3 - Two Roundabout Option
2038 - P.M. Peak Period Volume and Delay

West Roundabout Intersection
(Vine St / SR 46 / Theatre Dr)

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh) ORE Rodel
Vine St SB	R	50	280	5.5
	T	105		
	L	125		
SR 46 EB	R	95	705	3.1
	T	565		
	L	45		
Theatre Dr NB	R	390	610	5.5
	T	100		
	L	120		
SR 46 WB	R	120	1245	3.9
	T	700		
	L	425		

East Roundabout Intersection
(U.S. 101 / SR 46)

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh) ORE Rodel
U.S. 101 SB Off	R	590	710	6.0
	L	120		
SR 46 EB	R	105	1090	4.5
	T	985		
SR 46 WB	T	655	1140	4.5
	L	485		

Alternative 3 - Two Roundabout Option
2038 - P.M. Peak Period Delay (minutes)

Leg	Intersection	Model ORE Rodel
U.S. 101 SB Off	West Rndbt	NA
	East Rndbt	71.0
	Total	**71.0**
Vine St SB	West Rndbt	25.7
	East Rndbt	NA
	Total	**25.7**
SR 46 EB	West Rndbt	36.4
	East Rndbt	81.8
	Total	**118.2**
SR 46 WB	West Rndbt	80.9
	East Rndbt	85.5
	Total	**166.4**
Theatre Dr NB	West Rndbt	55.9
	East Rndbt	NA
	Total	**55.9**
Total System Delay (minutes)		**437.2**

AM - VINE/SR46/THEATRE (WEST RNDBT)

50% CL

85% CL

AM - USH 101/SR46 (EAST RNDBT)

50% CL

85% CL

Ourston Roundabout Engineering	USH 101 / SR 46 / S VINE ST / THEATRE DR PASO ROBLES, CA 2038 AM RODEL ANALYSIS ALT 3	EXHIBIT:

P:\008808 944 - SR46W - 101 Interchange\Traffic\Analysis\2038 Alt 3 ORE Analysis.xls 7/10/2008

PM - VINE/SR46/THEATRE (WEST RNDBT)

50% CL

85% CL

PM - USH 101/SR46 (EAST RNDBT)

50% CL

85% CL

Ourston Roundabout Engineering	USH 101 / SR 46 / S VINE ST / THEATRE DR PASO ROBLES, CA 2038 PM RODEL ANALYSIS ALT 3	EXHIBIT:

P:\2008\08 944 - SR46W - 101 Interchange\Traffic\Analysis\2038 Alt 3 ORE Analysis.xls 7/10/2008

Attachment #5

Alternative 4 - Six Leg Roundabout Option

- **2018 - P.M. Peak Period Volume and Delay**
- **ORE RODEL**
- **2038 - P.M. Peak Period Volume and Delay**
- **ORE RODEL**

5325 Wall Street, Suite 2305
Madison, WI 53718
Phone: (608) 249-4545
Fax: (608) 249-4402
www.ourston.com
mail@ourston.com

Alternative 4 - Six Leg Roundabout Option
2018 - A.M. Peak Period Volume and Delay

U.S. 101 / Vine St / SR 46 / Theatre Dr

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh) ORE Rodel
U.S. 101 SB Off	R1	25	480	2.7
	R2	150		
	R3	130		
	L	175		
Vine St SB	R	35	155	5.1
	T	70		
	L1	5		
	L2	45		
SR 46 EB	R1	55	555	2.7
	R2	35		
	T	420		
	L	45		
Theatre Dr NB	R1	10	245	2.3
	R2	145		
	T	55		
	L	35		
SR 46 WB	R	20	520	2.6
	T	135		
	L1	115		
	L2	250		

Alternative 4 - Six Leg Roundabout Option
2018 - A.M. Peak Period Delay (minutes)

Leg	Model ORE Rodel
U.S. 101 SB Off	21.6
Vine St SB	13.2
SR 46 EB	25.0
SR 46 WB	22.5
Theatre Dr NB	9.4
Total Delay (minutes)	**91.7**

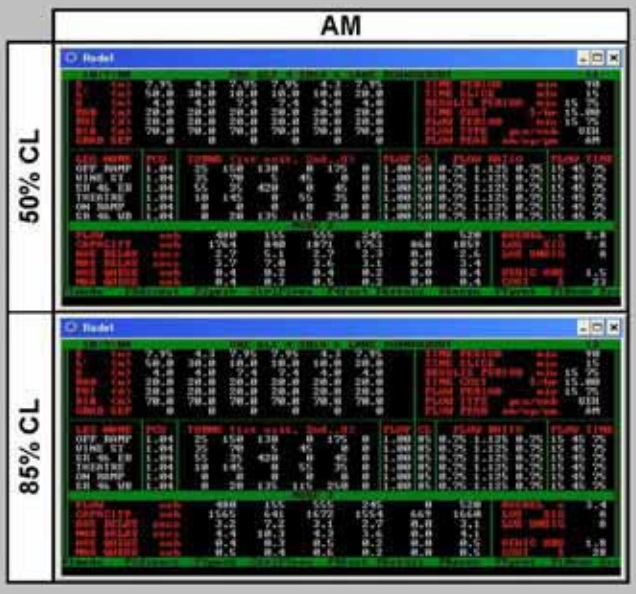
Alternative 4 - Six Leg Roundabout Option
2018 - P.M. Peak Period Volume and Delay

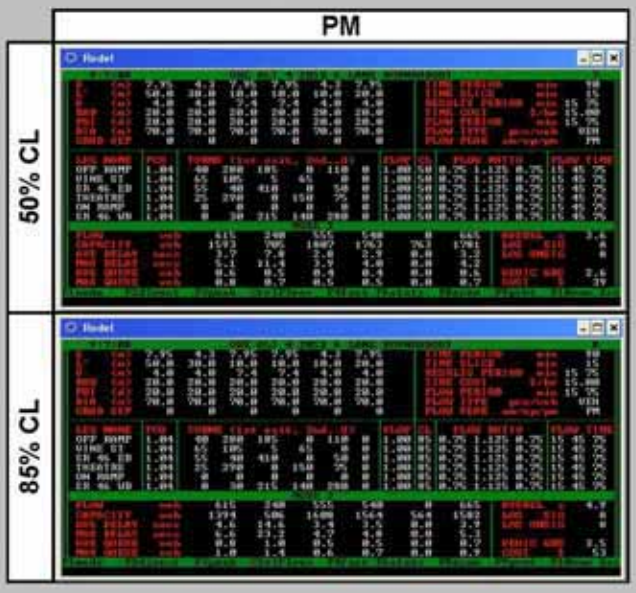
U.S. 101 / Vine St / SR 46 / Theatre Dr

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh) ORE Rodel
U.S. 101 SB Off	R1	40	615	3.7
	R2	280		
	R3	185		
	L	110		
Vine St SB	R	65	240	7.8
	T	105		
	L1	5		
	L2	65		
SR 46 EB	R1	55	555	2.8
	R2	40		
	T	410		
	L	50		
Theatre Dr NB	R1	25	540	2.9
	R2	290		
	T	150		
	L	75		
SR 46 WB	R	30	665	3.2
	T	215		
	L1	140		
	L2	280		

Alternative 4 - Six Leg Roundabout Option
2018 - P.M. Peak Period Delay (minutes)

Leg	Model ORE Rodel
U.S. 101 SB Off	37.9
Vine St SB	31.2
SR 46 EB	25.9
SR 46 WB	35.5
Theatre Dr NB	26.1
Total Delay (minutes)	**156.6**





Ourston Roundabout Engineering

USH 101 / SR 46 / VINE ST / THEATRE DR
PASO ROBLES, CA
2018 RODEL ANALYSIS ALT 4

EXHIBIT:

P:\2008\08 944 - SR46W - 101 Interchange\Traffic\Analysis\2018 Alt 4 ORE Analysis.xls 7/10/2008

Alternative 4 - Six Leg Roundabout Option
2038 - A.M. Peak Period Volume and Delay

U.S. 101 / Vine St / SR 46 / Theatre Dr

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh) ORE Rodel
U.S. 101 SB Off	R1	35	515	3.6
	R2	210		
	R3	125		
	L	145		
Vine St SB	R	30	160	3.4
	T	60		
	L1	5		
	L2	65		
SR 46 EB	R1	105	755	3.7
	R2	55		
	T	550		
	L	45		
Theatre Dr NB	R1	20	325	3.0
	R2	185		
	T	55		
	L	65		
SR 46 WB	R	45	935	3.9
	T	265		
	L1	160		
	L2	465		

Alternative 4 - Six Leg Roundabout Option
2038 - A.M. Peak Period Delay (minutes)

Leg	Model ORE Rodel
U.S. 101 SB Off	30.9
Vine St SB	9.1
SR 46 EB	46.6
SR 46 WB	60.8
Theatre Dr NB	16.3
Total Delay (minutes)	**163.6**

Alternative 4 - Six Leg Roundabout Option
2038 - P.M. Peak Period Volume and Delay

U.S. 101 / Vine St / SR 46 / Theatre Dr

Leg	Turn	Turn Volume	Leg Volume	Avg. Leg Delay (sec per veh) ORE Rodel
U.S. 101 SB Off	R1	55	705	6.2
	R2	330		
	R3	200		
	L	120		
Vine St SB	R	50	280	5.3
	T	105		
	L1	10		
	L2	115		
SR 46 EB	R1	95	700	4.2
	R2	55		
	T	510		
	L	40		
Theatre Dr NB	R1	40	610	4.0
	R2	350		
	T	100		
	L	120		
SR 46 WB	R	65	1145	5.7
	T	370		
	L1	225		
	L2	485		

Alternative 4 - Six Leg Roundabout Option
2038 - P.M. Peak Period Delay (minutes)

Leg	Model ORE Rodel
U.S. 101 SB Off	72.9
Vine St SB	24.7
SR 46 EB	49.0
SR 46 WB	108.8
Theatre Dr NB	40.7
Total Delay (minutes)	**296.0**

AM
50% CL
85% CL
PM
50% CL
85% CL
Ourston Roundabout Engineering
USH 101 / SR 46 / VINE ST / THEATRE DR
PASO ROBLES, CA
2038 RODEL ANALYSIS ALT 4
EXHIBIT:

Response to Comment 14-1:

The Ourston Roundabout Engineering (ORE) approach of total system delay comparison is not appropriate for use in this analysis. That methodology assumes equal priority is given to the local system movements as is given to the freeway interchange movements. The analysis in the project Traffic Study is appropriate because it takes into consideration the functional hierarchy of the different road segments.

The publication "American Association of State Highway Transportation Officials (AASHTO) Policy on the Geometric Design of Highways and Streets" provides guidance to state and local agencies, including Caltrans, and is the basis for national standards related to transportation design. Chapter 1 of that publication describes the role of functional class and hierarchy of movement. The AASHTO guidance is to preserve/prioritize the higher order facilities for the role and characteristics they play (US 101: intrastate and regional travel, high volume, high speeds, freight mobility, etc) and not have the higher order facilities be negatively affected by the operations or risk of lower order facilities (local access to commercial/retail trip generators), such as South Vine Street, if possible.

The west roundabout in Build Alternative 2 is consistent with the diagram of hierarchy of movement in Chapter 1 of the AASHTO policy. The highest order facility (US 101) and its transition (ramps) connect to the next order facility (State Route 46). Theatre Drive and South Vine Street represent, in this case, third order facilities compared to US highways and state routes. It is inappropriate and inconsistent with hierarchy objectives to bring a third order facility into a first order facility if that can be avoided. The analysis results support the AASHTO guidelines in that they show that including South Vine Street in the roundabout degrades the operations of the other higher order facilities connected to it.

The operational analysis and level of delay for either alternative were discussed in Section 2.1.6 Traffic and Transportation/Pedestrian and Bicycle Facilities" of the draft environmental document. This section shows a volume-to-capacity ratio of 0.85 or less and delays of between 3 and 23 seconds for the roundabout entry legs of Build Alternative 1 and volume to capacity ratio of 0.74 or less and delays of between 4 and 12 seconds for the roundabout entry legs of Build Alternative 2.

Even though the methodology proposed by ORE is not appropriate for this project, if it were applied to the design year of 2038 instead of the opening day year of 2018, the results would show that the total system (all three intersections) delay is less in Build Alternative 2 than in Build Alternative 1 by a range of approximately 70 to 580 minutes, depending on the model used during the p.m. peak hour. In particular, the west side roundabout shows a range of 120

to 630 minutes less delay in Build Alternative 2 than Build Alternative 1 during the p.m. peak.

Response to Comment 14-2:

Please see response to comment 14-1.

Response to Comment 14-3:

This comment includes statements of preference of one model type over another and a concluding statement that RODEL is more reliable than SIDRA. As discussed in detail in the Traffic Study for the project, the Traffic Study analysis used SIDRA, RODEL, and Federal Highway Administration methodology to study the roundabouts in this project. Findings were developed with a consideration of the results from each of these models rather than by use of a single model exclusively to capture the benefits of each model. RODEL allows geometry differences to be considered whereas SIDRA does not. However, one advantage of SIDRA over RODEL is that SIDRA will account for lane assignment of vehicles, while RODEL primarily accounts for total entry width rather than lane assignment. Given the closeness of the ramp terminal intersections, SIDRA was applied to consider individual lane distributions.

Response to Comment 14-4:

Build Alternatives 1 and 2 were developed with a consideration of the context (geographic constraints, traffic volumes and patterns, non-auto users, etc.) of this intersection.

Many alternatives were considered during the process of narrowing down the proposed alternatives. The remaining two were chosen as the ones that best fit the need and purpose of the project, fit the existing topography and improvements, and were the most cost effective.

With regard to the ORE-suggested Alternative 3, the ORE report does not report queues. Queuing is a performance measure that should be considered and reported given the possibility for interaction between the two roundabouts shown in Build Alternative 3.

With regard to the ORE-suggested Alternative 4, this alternative does not account for system hierarchy (see response to comment 14-1), which would prescribe separating local system movements from freeway system movements where possible. The reference to the I-70 roundabout and queuing is immaterial as the I-70 roundabout operates under a different set of volume, topographic, and geometric conditions.

Response to Comment 14-5:

It is agreed that Build Alternative 1 is less costly than Build Alternative 2, but the comment is in error when implying that Build Alternative 1 has greater operational benefits than Build Alternative 2. In addition to operational benefits, Alternative 2 was identified as the environmentally preferred alternative. Please see responses to comments 14-1, 14-3, and 14-4. See also response to comment 13-1 where operational analysis is discussed with a greater improvement of operations resulting from Build Alternative 2.