Appendix K

Traffic Report for the SR-32 Widening Project Report/Environmental Document

TRAFFIC REPORT

FOR THE SR-32 WIDENING
PROJECT REPORT/ENVIRONMENTAL DOCUMENT

Prepared for

BCAG
Mark Thomas & Company

Prepared by

Fehr & Peers
Transportation Consultants

February 2, 2006

FEHR & PEERS
TRANSPORTATION CONSULTANTS

2990 Lava Ridge Court, Suite 200 Roseville, CA 95661 (916) 773-1900 Fax (916) 773-2015
www.fehrandpeers.com

TRAFFIC REPORT

FOR THE SR-32 WIDENING
PROJECT REPORT/ENVIRONMENTAL DOCUMENT

This report was prepared under my direction and responsible charge. I attest to the technical information contained herein and have judged the qualification of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

____

Jeff Clark, P.E. February 2, 2006
Registered Professional Civil Engineer
Fehr & Peers Associates, Inc.

RS05-2095

EXECUTIVE SUMMARY

BACKGROUND

This report analyzes proposed improvements for the State Route (SR) 32 corridor from the SR 99/SR 32 interchange to east of Yosemite Drive in Chico, California. The purpose of the project is to accommodate additional capacity needed because of approved and planned development on and near the SR 32 corridor between SR 99 and Yosemite Drive. The widening of SR 32 is consistent with the City's General Plan and will agree with Caltrans' Traffic Concept Report with its next update.

The study intersections were evaluated during the morning (AM), evening (PM), and Saturday midday (SAT) peak hours. For design year (future) conditions, identified improvements were compared to the SR 99 Auxiliary Lane study to ensure compatibility between projects.

All of the study intersections were reviewed to identify the most appropriate intersection controls. Multi-lane roundabouts were considered at the SR 32/Forest Avenue, SR 32/El Monte Avenue, SR-32/Bruce Road, and SR-32/Yosemite Drive intersections. However, the results indicated that traffic signals are the most appropriate method of intersection control.

The City of Chico desires bicycles and pedestrians traveling east-west in this area to use new facilities along Humboldt Avenue (paralleling SR 32 to the south) or existing multi-use paths along Big Chico Creek (paralleling SR 32 to the north). However, bicycles and pedestrians will be allowed to use the shoulders of SR 32, if desired. North-south pedestrian and bicycle travel will be accommodated at intersections through the study corridor.

METHODOLOGY

The traffic forecasts for the study area were developed using a combination of the City of Chico's T-MODEL travel demand forecasting (TDF) model, the BCAG TDF model, and projections developed in conjunction with the City's Nexus Study for improvements to the facility.

VISSIM, a detailed micro-simulation software, was used to evaluate corridor operations for this project. VISSIM was selected as it can accurately evaluate the corridor assuming roundabouts or signalized intersections.

The following scenarios were analyzed.

1. Existing Conditions
2. Build Year (2010) No Project Conditions
3. Year 2010 With Project Conditions
4. Design Year (2030) No Project Conditions
5. Design Year (2030) With Project Conditions

RESULTS AND RECOMMENDATIONS

The results indicate that:

- The proposed project will provide sufficient capacity to accommodate traffic from approved and planned development on and near the SR 32 corridor east of Fir Street to Yosemite Drive.
- The proposed project is consistent with the City's General Plan and will agree with Caltrans' Traffic Concept Report with its next update.
- The proposed project will help maintain and improve connectivity between the neighborhoods on either side of SR 32 by providing signalized access or improving existing signalized access for multiple modes of travel across SR 32 by providing ADA access, coordinated signals, and protected pedestrian movements.
- The proposed project is consistent with the SR 99/SR 32 Auxiliary Lane Study.
- Signals at all study intersections, with signal interconnect to coordinate signal timings, provide the lowest delays through the corridor[1].

Without the proposed project, congestion would increase and degrade the operation of SR 32 and SR 99 in the project area.

[1] Roundabouts were considered and eliminated from consideration at two locations by the PDT. Roundabouts were evaluated using detailed simulation analyses at the two remaining locations. However, given the relatively high northbound left-turn volume and eastbound through volume during the PM peak hour, signals provided lower delays than the roundabout alternative.

1. INTRODUCTION

BACKGROUND

This report analyzes proposed improvements for the State Route (SR) 32 corridor from SR 99 to east of Yosemite Drive in Chico, California.

Purpose & Need

The purpose of the proposed project is to accommodate additional capacity needed as a result of approved and planned development on and near the SR 32 corridor between SR 99 and Yosemite Drive. The widening of SR 32 is consistent with the City's General Plan and will agree with Caltrans' Traffic Concept Report with its next update.

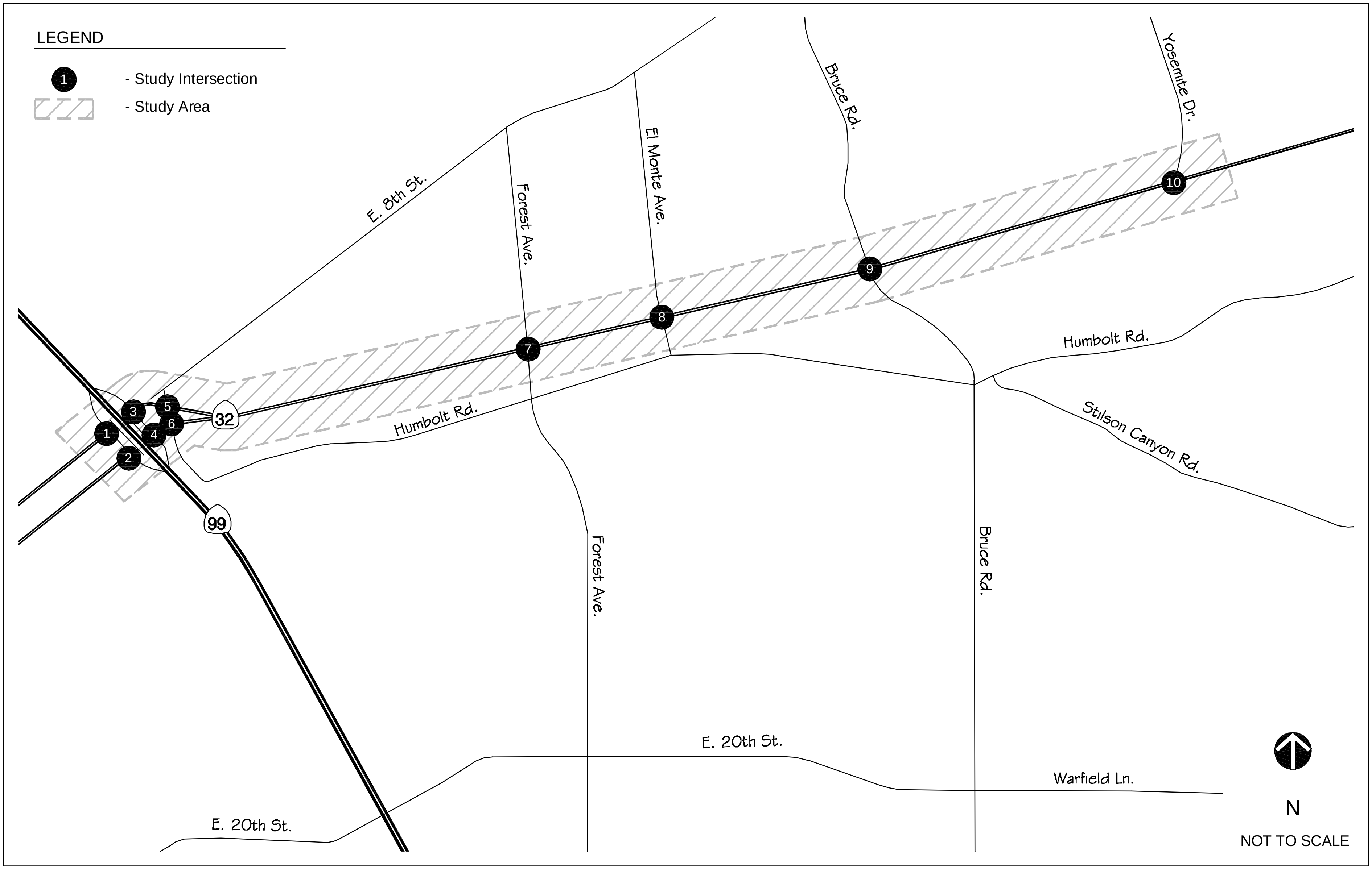
The project is needed because local growth in the area is anticipated to increase congestion due to inadequate capacity on SR 32. There are existing operational and safety concerns at the SR 99/SR 32 interchange. Therefore, the ramp terminal intersections and interchange couplets have included in the analysis. The proposed improvements will also help maintain and improve connectivity between the neighborhoods on either side of SR 32 by providing improved facilities.

Without the proposed project, the congestion and safety concerns would increase and substantially degrade the operations of SR 32 and SR 99 in the project area.

Project Description

The proposed project would widen and improve SR 32, beginning at SR 99 and extending east past Yosemite Drive where the roadway width would transition down from four lanes to two lanes. For the purposes of the traffic analysis, a lane drop/add was assumed at Yosemite Drive, which has less capacity than providing four through lanes through Yosemite Drive. The following other factors were assessed as part of the project:

- Both signals and roundabouts were considered at the SR 32/Forest Avenue, SR 32/El Monte Avenue, SR 32/Bruce Road, and SR 32 Yosemite Drive intersections to control conflicting turning movements.
- Although the study area includes analysis of operations the SR 99/SR 32 interchange and SR 32/Fir Street intersections, a detailed analysis of freeway ramp merge/diverge was not conducted as part of this study. The identified improvements at the interchange are consistent and compatible with the SR 99 Auxiliary Lane project.
- The proposed project will complete construction by Year 2010. Assuming a 20-year design life, the project should provide acceptable operations through Year 2030.
- If the project needs to be phased over time, the first phase should accommodate improvements from west of Fir Street to east of Bruce Road to remove the first capacity constraint (the need for four lanes on this segment, with improvements to Fir Street (which has long side-street delays)). Phase 2 should address improvements at the interchange (the next major constraint area), with the final phase occurring east of Bruce Road.



FEHR & PEERS
TRANSPORTATION CONSULTANTS
Feb 02, 2006 MJC
N:\PROJECTS\RS05\2095_SR_32\graphics\draft\fig01_study.dwg

STUDY AREA
FIGURE 1

Pedestrians and Bicycles

The City of Chico desires bicycles and pedestrians traveling east-west in this area to use new Class II bicycle facilities and sidewalks along Humboldt Avenue (paralleling SR 32 to the south) or existing multi-use paths along Big Chico Creek (paralleling SR 32 to the north). However, bicycles and pedestrians will be allowed to use the shoulders of SR 32, if desired. North-south pedestrian and bicycle travel will be accommodated at intersections through the study corridor.

OUTLINE

The remainder of this report is divided into the following five chapters.

- Chapter 2 – Traffic Analysis Methodology
- Chapter 3 – Existing Conditions Analysis
- Chapter 4 – Project Description
- Chapter 5 – 2010 Conditions Analysis
- Chapter 6 – 2030 Conditions Analysis

Following this introduction, Chapter 2 describes the analysis methodology and assumptions used in the travel demand forecasts and the traffic operations analysis. Chapter 3 covers the analysis of existing conditions. The fourth chapter describes the project alternatives, lists the planned projects in the study area, and outlines the scenarios analyzed under future conditions. The next two chapters (5 and 6) present the traffic analysis results of the project scenarios under 2010 and 2030 conditions.

2. TRAFFIC ANALYSIS METHODOLOGY

TRAVEL DEMAND FORECASTS

W-Trans recently developed forecasts for use in the City's Capital Improvement Program (CIP) and Nexus Study. These forecasts corresponded to Year 2010 and Year 2018 horizons and were developed using a manual assignment of trips from proposed and potential development throughout the study corridor. Fehr & Peers used the BCAG travel demand forecasting (TDF) model to estimate growth along SR 32 to extrapolate the 2018 forecasts developed by W-Trans to a Year 2030 analysis horizon.

Fehr & Peers also used a combination of the BCAG and the City's TDF models to develop Year 2018 and Year 2030 forecasts at the study intersections (we updated the BCAG model to reflect proposed development within the study corridor) independently from the W-Trans forecasting effort. We compared the resulting forecasts to the adjusted W-Trans forecasts (adjusted to a Year 2030 horizon). The adjusted W-Trans forecasts are within one percent (total) of the study peak hour forecasts at the study intersections and were used for this analysis.

The travel demand forecasts were reviewed and approved by Bill Davis at Caltrans' Forecasting Department prior to conducing any analyses.

TRAFFIC OPERATIONS ANALYSIS

The traffic operations analysis addressed intersection operations through the study corridor. Key assumptions related to this analysis are listed below.

- All analyses were conducted using procedures and methodologies that are consistent with the *Highway Capacity Manual* (Transportation Research Board, 2000). We applied these methodologies using VISSIM, a micro-simulation software program.
- The Highway Capacity Manual assigns level of service (LOS) based on average control delay. Because VISSIM does not measure control delay, we used total delay to determine LOS. This conservative approach is recommended in *Guidelines for Applying Traffic Microsimulation Modeling Software* (Caltrans, 2002) since the other components of delay are significantly less than control delay.
- For existing conditions, the traffic count data was entered in 15-minute intervals. For future conditions, the existing peak hour factor was applied to the hourly forecasts. All LOS analysis results are reported for the peak 15-minute interval.
- Based on information provided by Caltrans staff, a peak hour truck percentage of five percent was assumed for mainline SR 32 and the ramps from/to SR 99. A default of two percent was assumed for all other side-street approaches in the area.

The analysis methodology described above was used to measure AM and PM peak-hour traffic operations for the study intersections. The analysis results include a descriptive term known as level of service (LOS). LOS is a measure of traffic operating conditions, which varies from LOS A (the lowest delay) to LOS F (the highest delay). LOS E represents "at-capacity" operations.

Table 1 describes the LOS thresholds from the *HCM 2000* for intersections. The intersection LOS thresholds differ between signalized and stop-controlled intersections. The LOS is determined by the average control delay on an intersection-wide basis for signalized and all-way stop-controlled intersections and on the movement with the highest delay for minor-street stop-controlled intersections. Technical calculations used to determine LOS are contained in Appendix A.

TABLE 1 – INTERSECTION LEVEL OF SERVICE THRESHOLDS

Level of Service	Description	Average Control Delay[1]	
		Signal	Stop Control
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	$\leq$ 10	$\leq$ 10
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 10 to 20	> 10 to 15
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20 to 35	> 15 to 25
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35 to 55	> 25 to 35
E	Operations with high delay values indicating poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	> 55 to 80	> 35 to 50
F	Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	> 80	> 50

Note:
[1] Measured in seconds per vehicle
Source: *Highway Capacity Manual* (Transportation Research Board, 2000)

ANALYSIS EVALUATION CRITERIA

According to the City of Chico's General Plan, LOS D is considered the minimum LOS for intersections within the City, which includes the study area. The *State Route 32 Transportation Concept Report* (Caltrans District 3, 1996) shows LOS E as the Year 2015 concept LOS for the segment within the study area. Since the City's threshold is more conservative, LOS D was used as the analysis evaluation criteria for all study intersections.

3. EXISTING CONDITIONS ANALYSIS

STUDY AREA

The proposed project consists of widening SR 32 from the SR 99/SR 32 interchange to just east of Yosemite Drive. The study area, shown in Figure 1, includes the following study intersections.

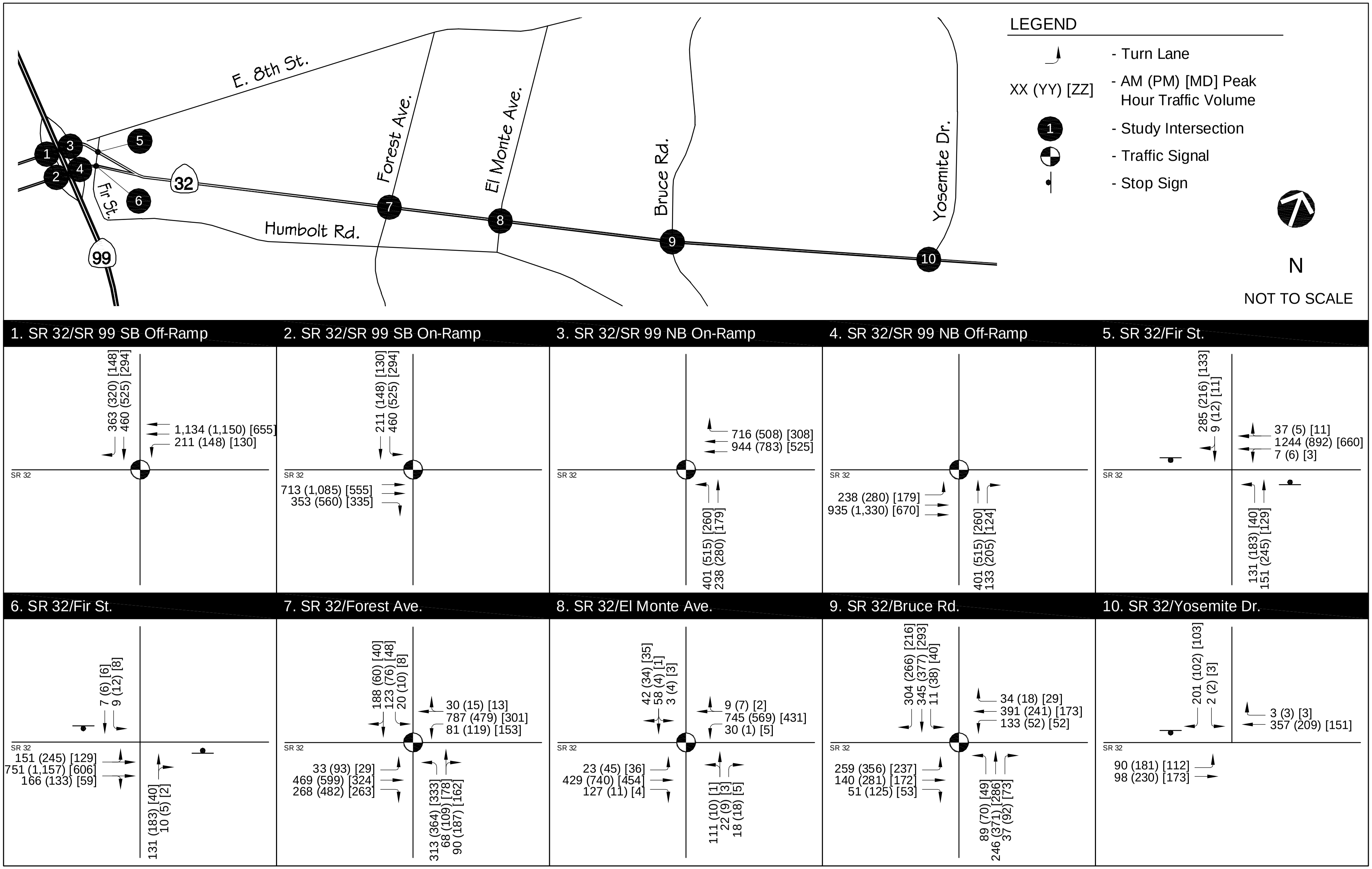
1. SR 99 Southbound Off-Ramp/SR 32 – signalized
2. SR 99 Southbound On-Ramp/SR 32 – signalized
3. SR 99 Northbound On-Ramp/SR 32 – signalized
4. SR 99 Northbound Off-Ramp/SR 32 – signalized
5. Fir Street/SR 32 – side-street stop-controlled
6. Fir Street/SR 32 – side-street stop-controlled
7. Forest Avenue/SR 32 – signalized
8. El Monte Avenue/SR 32 – signalized
9. Bruce Road/SR 32 – signalized
10. Yosemite Drive/SR 32 – side-street stop-controlled

SR 32 begins at Interstate 5 and extends east, through the City of Chico, and continues east and north toward Lake Almanor. Through the study area, SR 32 transitions from a one-way urban couplet (East 8th Street and East 9th Street) to a four-lane State highway to a rural two-lane State highway west of Forest Avenue. The Caltrans Transportation Concept Report for SR 32 (Caltrans, March 1997) identifies the ultimate facility within the project limits as a six-lane conventional highway (Segment 8, from Fir Street to Yosemite Drive). However, Caltrans and the City are working together to change the classification to a Conventional Highway with Access Control and identify the ultimate facility within the study area as a four-lane facility.

Traffic counts were conducted during the morning (7:00 to 9:00 AM), evening (4:00 to 6:00 PM), and Saturday afternoon (12:30 to 2:30 PM) peak periods at all study intersections. We balanced the raw turning movement volumes in the study area through the study corridor for incorporation into our simulation analysis. The existing balanced weekday AM, weekday PM, and Saturday midday (SAT) peak hour intersection counts are presented on Figure 2. Figure 1 also details the existing intersection geometrics and traffic control devices at the study intersections.

INTERSECTION OPERATIONS

The results of the LOS analysis at the study intersections are presented in Table 2. The results indicate that all of the intersections operate at an overall acceptable level. However, the minor street approach to the Fir Street/SR 32 (E. 8th Street) intersection operates at an unacceptable LOS F during the AM peak hour and the minor street approach to the Fir Street/SR 32 (E. 9th Street) intersection operates at an unacceptable LOS F during the PM peak hour.



FEHR & PEERS
TRANSPORTATION CONSULTANTS

Feb 02, 2006 MJC
N:\PROJECTS\RS05\2095_SR_32\graphics\draft\fig02_phtv_ex_con.dwg

PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - EXISTING CONDITIONS

FIGURE 2

TABLE 2 - EXISTING INTERSECTION LEVELS OF SERVICE				
Intersection	**Control**	**Peak Hour**	**Control Delay[1] (Seconds)**	**Level of Service**
SR 99 SB Offramp/ SR 32 (E. 8th Street)	Signal	AM PM Sat	18 14 9	B B A
SR 99 SB Onramp/ SR 32 (E. 9th Street)	Signal	AM PM Sat	11 12 8	B B A
SR 99 NB Onramp/ SR 32 (E. 8th Street)	Signal	AM PM Sat	7 7 6	A A A
SR 99 NB Offramp/ SR 32 (E. 9th Street)	Signal	AM PM Sat	12 14 9	B B A
Fir Street/SR 32 (E. 8th Street)	TWSC[2]	AM PM Sat	18 **(77)** 8 (18) 6 (10)	C **(F)** A (C) A (A)
Fir Street/SR 32 (E. 9th Street)	TWSC	AM PM Sat	3 (21) 8 **(64)** 1 (17)	A (C) A **(F)** A (B)
Forest Avenue/SR 32	Signal	AM PM Sat	49 36 18	D D B
El Monte Avenue/SR 32	Signal	AM PM Sat	29 7 9	C A A
Bruce Road/SR 32	Signal	AM PM Sat	30 26 18	C C B
Yosemite Drive/SR 32	TWSC	AM PM Sat	6 (16) 3 (9) 3 (8)	A (C) A (A) A (A)

Notes:
1 Average control delay calculated using the *Highway Capacity Manual (HCM)* (Transportation Research Board, 2000) methodology. Calculations were conducted using the VISSIM simulation analysis software at all intersections. At signalized intersections, average control delay is reported as the average for all movements. Control delay at a two-way stop controlled intersection is represented as XX (YY), where XX is equal to the average delay at the intersection overall, and (YY) is equal to the delay of the worst case approach and/or movement.
2 Two-way stop controlled intersection.
BOLD type indicates unacceptable operations.
Source: *Fehr & Peers, 2005*

ACCIDENT DATA ANALYSIS

Caltrans provided recent accident data at the SR 99/SR 32 interchange and SR 32 between SR 99 and Yosemite Drive (post miles 10.157 to 12.390 in Butte County). The Traffic Accident Surveillance and Analysis System (TASAS) provided data for the three-year period from April 1, 2001 through April 31, 2004.

A total of 63 accidents were reported in the study area during the three-year period. Twenty-nine accidents occurred at the interchange and 34 accidents occurred on SR 32. Table 3 summarizes the accident data. The accident data, provided by Caltrans, is in Appendix B.

TABLE 3 - ACCIDENT DATA SUMMARY: 2001-2004

Location	Number of Accidents
SR 99/ SR 32 Interchange	29
SR 32 Mainline	34
Total	***63***

Source*: Caltrans and Fehr & Peers, 2005*

Tables 4 and 5 summarize the accident rates for the interchange and SR 32 in the study area. The accident rates were calculated for the study segments and were compared to the state-wide averages for similar roadway segments throughout the state. Comparing the calculated rates to the average rates indicates that, during the three-year analysis period, the accident rates are above the statewide average for the SR 99 southbound on-ramp from SR 32 and the SR 99 northbound on-ramp from SR 32. Additionally, the Forest Avenue/SR 32 and Bruce Road/SR 32 intersections experience higher than average accident rates. There were no fatal accidents at the interchange or on SR 32.

TABLE 4 - ACCIDENT RATES FOR SR 99/SR 32 INTERCHANGE: 2001-2004

Location	Number of Accidents			Actual Accident Rate			Average Accident Rate		
	Total	Fatal	Injury	Fatal	Fatal + Injury	Total	Fatal	Fatal + Injury	Total
SR 99 Northbound Off Ramp to SR 32	4	0	1	0.000	0.15	0.59	0.006	0.35	0.90
SR 99 Southbound On Ramp from SR 32	9	0	3	0.000	**0.44**	**1.32**	0.003	0.17	0.45
SR 99 Northbound On Ramp from SR 32	14	0	5	0.000	**0.58**	**1.64**	0.003	0.17	0.45
SR 99 Southbound Off Ramp to SR 32	2	0	1	0.000	0.12	0.24	0.006	0.35	0.90

Source: *Caltrans and Fehr & Peers, 2005*
Bold entries indicate higher than average accident rates

Most accidents at the SR 99/SR 32 interchange were rear end collisions caused by speeding while accessing the interchange during congested conditions. Fourteen accidents occurred in a construction-repair zone. Most accidents at the SR 99 Southbound On-Ramp/9th Street intersection were broadside collisions between left turn vehicles and vehicles traveling straight (eastbound on 9th Street).

TABLE 5 - ACCIDENT RATES FOR SR 32 MAINLINE: 2001-2004									
	Number of Accidents			**Actual Accident Rate**			**Average Accident Rate**		
Location	**Total**	**Fatal**	**Injury**	**Fatal**	**Fatal + Injury**	**Total**	**Fatal**	**Fatal + Injury**	**Total**
SR 99 SB Offramp/ SR 32 (E. 8th Street)	6	0	4	0.000	**.23**	.34	.002	.19	.43
SR 99 SB Onramp/ SR 32 (E. 9th Street)	5	0	4	0.000	**.26**	.33	.002	.19	.43
SR 99 NB Onramp/ SR 32 (E. 8th Street)	1	0	0	0.000	.00	.10	.002	.09	.22
SR 99 NB Offramp/ SR 32 (E. 9th Street)	4	0	3	0.000	.14	.18	.002	.19	.43
Fir Street/SR 32 (E. 8th Street)	3	0	2	0.000	.14	.21	.002	.19	.43
Fir Street/SR 32 (E. 9th Street)	2	0	2	0.000	.14	.14	.002	.09	.22
Forest Avenue/SR 32	9	0	7	0.000	**.50**	**.64**	.002	.19	.43
El Monte Avenue/SR 32	1	0	1	0.000	.08	.08	.002	.09	.22
Bruce Road/SR 32	3	0	3	0.000	**.25**	.25	.003	.23	.58
Yosemite Drive/SR 32	0	0	0	0.000	.00	.00	.004	.14	.34

Source: *Caltrans and Fehr & Peers, 2005*
Bold entries indicate higher than average accident rates

Although SR 32 at Forest Avenue has an accident rate significantly higher than expected compared to the state-wide average accident rate, the intersection was modified in 2005 to provide protected left-turn phasing (it had permitted left-turn phasing prior to the improvements). Before the modifications, the left-turn vehicles did not yield the right of way to through vehicles when the signal was permissive, which resulted in broadside accidents. The accident concentration at this intersection may decrease due to the conversion to protected left turn phasing. Another intersection with an above average accident rate is SR 32 at Bruce Road. The accidents that occur at this intersection appear to be minor and include either broadside or rear-end collisions.

4. PROJECT DESCRIPTION

NO PROJECT ALTERNATIVE

For the No Project alternative, no improvements would be implemented through the corridor.

PROPOSED PROJECT ALTERNATIVE

The proposed project would widen SR 32, beginning at the SR 99/SR 32 interchange and extending east past Yosemite Drive where the roadway width would transition down from four lanes to two lanes.

From the west ramps at the interchange to the park-and ride lot, improvements consisting of adding turn lanes to the SR 99 ramps, reducing curb radii at the interchange, eliminating weave segments within the urban couplet, and the addition of a third eastbound and westbound travel lane through the interchange. At the Fir Street intersections, signals will be installed, and Fir Street will be converted to a one-way northbound facility between 8th Street and 9th Street. East of Fir Street, the widening will transition from six- to four-lanes and continue as four-lanes to east of Yosemite Drive, where it will transition back to a two-lane facility.

In addition, the south leg of the Yosemite Drive intersection will be constructed to provide access to the Oak Valley subdivision that was recently approved by the City of Chico. All intersections in the study area will be signalized and coordinated to maintain progression through the study corridor. Side streets will also be modified to provide adequate capacity for projected demands.

The Oak Valley EIR identified the need for a truck climbing lane east of Yosemite Avenue. Please note that this improvement is not included in our level of service considerations, a conservative assumption. However, given the grade of SR 32 in this location, the climbing lane would definitely provide improved operations on this grade.

ROUNDABOUT ALTERNATIVE

Due to the acknowledged interest in the community for roundabouts, they were considered at four of the study intersections affected by the widening effort. The following summarizes the results of our initial assessment.

SR 32/Forest Avenue -	Roundabout considered and included in roundabout alternative analysis.
SR 32/El Monte Avenue -	Roundabout dismissed from consideration due to existing volumes of school-age children walking or riding bicycles across SR 32 without assurances of crossing guards at this location.
SR 32/Bruce Road -	Roundabout considered and included in roundabout alternative analysis.
SR 32/Yosemite Drive -	Roundabout dismissed from consideration due to the steep grade of SR 32 (seven percent) and minor street approaches to the intersection.

Based on the initial assessment, the roundabout alternative evaluation assumed roundabout control at the SR 32/Forest Avenue and the SR 32/Bruce Road intersections and signal control at the other two intersections.

The operations of the two roundabouts were evaluated for Year 2030 Conditions assuming signal control at the other study intersections. The results of the VISSIM analysis show that, due to sufficiently high northbound left-turn volumes and eastbound through volumes at the study intersections, the roundabouts will not operate at an acceptable LOS D or better for design year conditions and traffic would back from one intersection into the next (the Proposed Project Alternative provided acceptable operations (LOS D or better) at all study intersections). Therefore, the Roundabout Alternative was dismissed from further consideration for this project.

ANALYSIS SCENARIOS

The following scenarios were analyzed for the traffic report.

1. Existing Conditions
   – Based on existing traffic volumes and field observations
2. Build Year (2010) No Project Conditions
   – Year 2010 volume projections consistent with the City's Nexus Study and existing lane configurations through the study corridor
3. 2010 With Project Conditions
   – All improvements consistent with the proposed project
4. Design Year (2030) No Project Conditions
   – Year 2030 projections and existing lane configurations at the intersections with the identified SR 99/SR 32/Fir Street improvements (which would have likely been implemented in conjunction with the SR 99 Auxiliary Lane Study)
5. 2030 With Project Conditions
   – All improvements consistent with the proposed project

5. 2010 CONDITIONS ANALYSIS

Year 2010 (Build Year) Conditions were evaluated for the No Project, With Project, and With Project with SR 99/SR 32/Fir Street Improvements scenarios. This chapter summarizes the results of our analyses.

The Year 2010 No Project and Year 2010 With Project volume projections and lane configuration are presented on Figure 3 and Figure 4, respectively.

INTERSECTION OPERATIONS

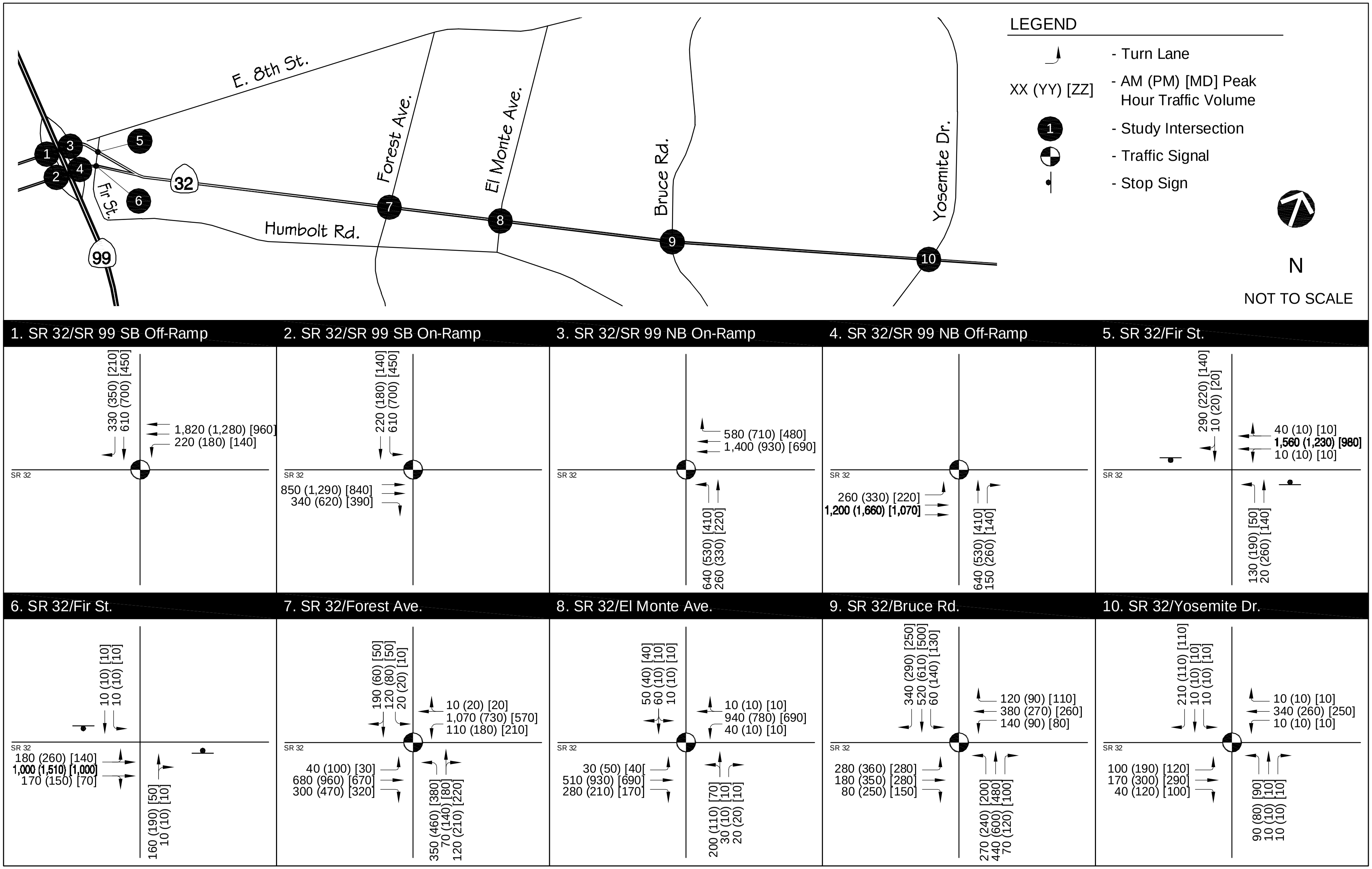
Table 6 shows the level of service and delay for the study intersections under Scenarios 2, 3, and 4 (see Appendix B for further details).

No Project Conditions

Under the No Project Condition scenario, the following intersections would operate at an unacceptable LOS E or LOS F during one or more of the peak hours:

- SR 99 Southbound Off-Ramp/SR 32 (E. 8th Street) – LOS E during the PM peak hour. Long delays at the intersection are associated with traffic spilling back from the two-lane segment of SR 32 through the interchange
- SR 99 Southbound On-Ramp/SR 32 (E. 9th Street) – LOS F during the PM peak hour. Long delays at the intersection are associated with traffic spilling back from the two-lane segment of SR 32 through the interchange
- Fir Street/SR 32 (E. 8th Street) – LOS F during the AM peak hour (based on overall intersection delay). Longest delayed approach operates at LOS F and LOS E during the AM and PM peak hours, respectively
- Fir Street/SR 32 (E. 9th Street) – LOS F and LOS E during the AM and PM peak hours, respectively (based on overall intersection delay). Longest delayed approach operates at LOS F during the AM and PM peak hours
- Forest Avenue/SR 32 – LOS E and LOS F during the AM and PM peak hours, respectively.
- Bruce Road/SR 32 – LOS F during the AM peak hour

The corridor experienced over 200 vehicle hours of delay during the AM and PM peak hours and more than 80 vehicle hours of delay during the SAT peak hour within the study area. Additional delay would occur outside of the study area due to long queues on certain approaches: for example, the northbound approach from Forest Avenue during the AM peak hour and the southbound SR 99 off-ramp during the PM peak hour. The VISSIM simulation also indicates that, due to limited capacity on the two lane segment, vehicle queuing will extend into the interchange and affect intersection operations (as reflected in the level of service results).

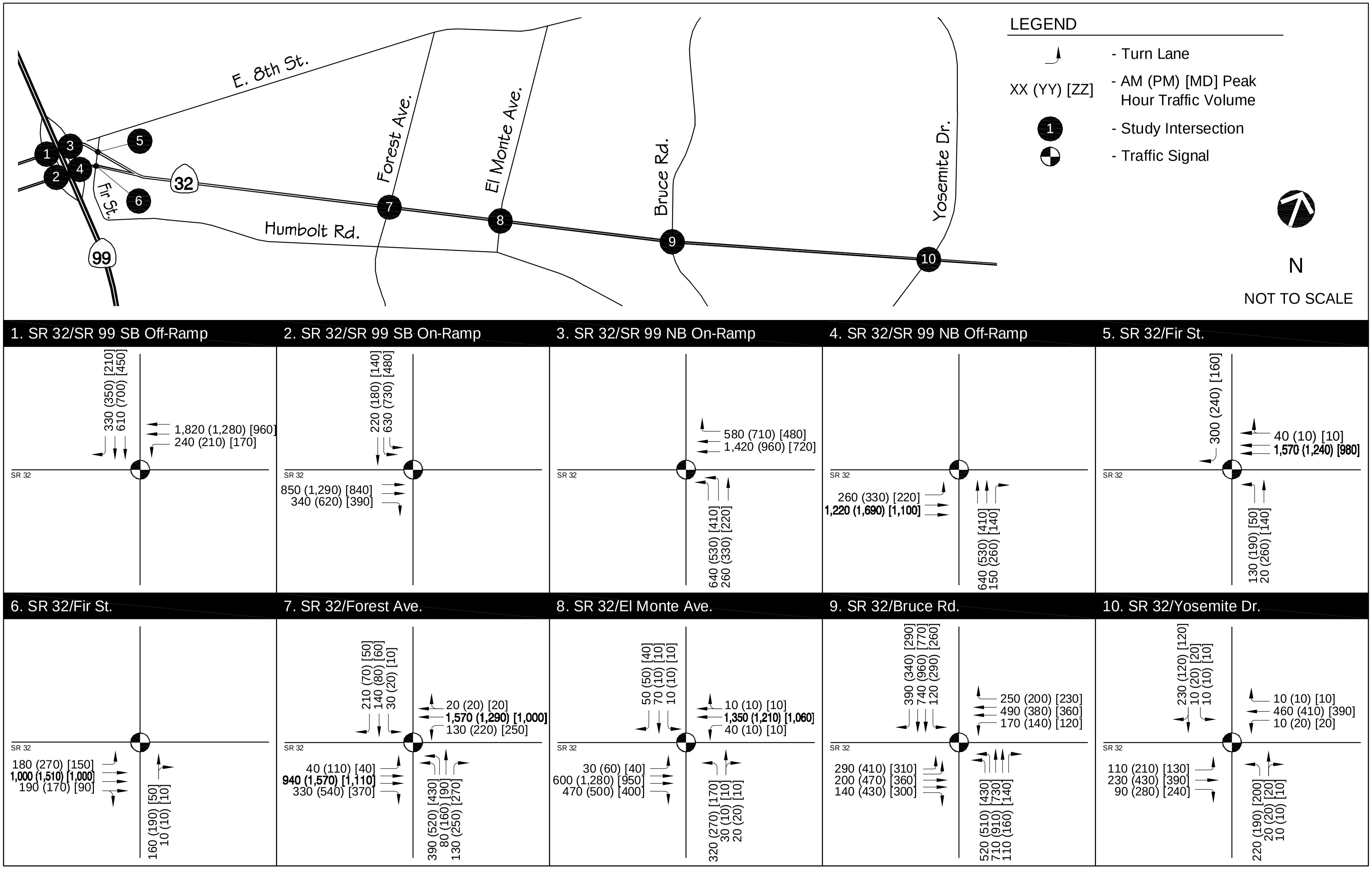


FEHR & PEERS
TRANSPORTATION CONSULTANTS

Feb 02, 2006 MJC
N:\PROJECTS\RS05\2095_SR_32\graphics\draft\fig03_phtv_2010_np_con.dwg

PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - CONSTRUCTION YEAR (2010) NO PROJECT CONDITIONS

FIGURE 3



FEHR & PEERS
TRANSPORTATION CONSULTANTS

Feb 02, 2006 MJC
N:\PROJECTS\RS05\2095_SR_32\graphics\draft\fig04_phtv_2010_pp_con.dwg

PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - CONSTRUCTION YEAR (2010) PLUS PROJECT CONDITIONS

FIGURE 4

TABLE 6 – INTERSECTION OPERATIONS FOR 2010 CONDITIONS

Intersection	No Project			With Project		
	AM	PM	SAT	AM	PM	SAT
SR 99 SB Offramp/SR 32 (E. 8th Street)	30 / C	**57 / E**	10 / A	16 / B	13 / B	12 / B
SR 99 SB Onramp/SR 32 (E. 9th Street)	16 / B	**86 / F**	11 / B	10 / A	18 / B	10 / A
SR 99 NB Onramp/SR 32 (E. 8th Street)	17 / B	12 / B	8 / A	7 / A	6 / A	7 / A
SR 99 NB Offramp/SR 32 (E. 9th Street)	34 / C	53 / D	11 / B	14 / B	12 / B	9 / A
Fir Street/SR 32 (E. 8th Street)	**84 / F** **(> 120) / (F)**	12 / B **(39) / (E)**	5 / A (13) / (B)	16 / B	14 / B	11 / B
Fir Street/SR 32 (E. 9th Street)	**55 / F** **(> 120) / (F)**	**44 / E** **(> 120) / (F)**	1 / A (16) / (C)	5 / A	6 / A	3 / A
Forest Avenue/SR 32	**79 / E**	**103 / F**	46 / D	21 / C	24 / C	22 / C
El Monte Avenue/SR 32	49 / D	17 / A	12 / A	17 / B	9 / A	8 / A
Bruce Road/SR 32	**95 / F**	53 / D	33 / C	22 / C	21 / C	18 / B
Yosemite Drive/SR 32	17 / B	15 / B	14 / B	18 / C	18 / C	15 / C
Vehicle Hours of Delay	***205***	***223***	***82***	***84***	***94***	***57***
Reduction in Vehicle Hours of Delay				***59%***	***58%***	***30%***

Notes: Level of service (LOS) and control delay (in seconds per vehicle) are reported. Bold and underline font indicate unacceptable LOS E or LOS F conditions. Average delays greater than two minutes per vehicle are not reported due to model insensitivity under extremely congested conditions.
XX (YY) = Average delay (longest delayed approach) at the intersection.
Source: Fehr & Peers, 2005

With Project Conditions

The results of the simulation analysis indicate that all intersections through the corridor would operate at an acceptable LOS C or better during all peak hours. Vehicle hours of delay would be further reduced by approximately 15% and 10% during the AM and PM peak hours, respectively (SAT vehicle hours of delay are equal to the With Project scenario described above).

6. 2030 CONDITIONS ANALYSIS

Year 2030 (Design Year) Conditions were evaluated for the No Project and With Project scenarios. This chapter summarizes the results of our analyses. The Year 2030 No Project and Year 2030 With Project volume projections and lane configuration are presented on Figure 5 and Figure 6, respectively.

The 2030 analysis incorporated the recommended SR 99/Fir Street/SR 32 improvements west of the proposed widening effort for the No Project and With Project scenarios as the improvements would have likely been incorporated as part of the SR 99 Auxiliary Lane project.

INTERSECTION OPERATIONS

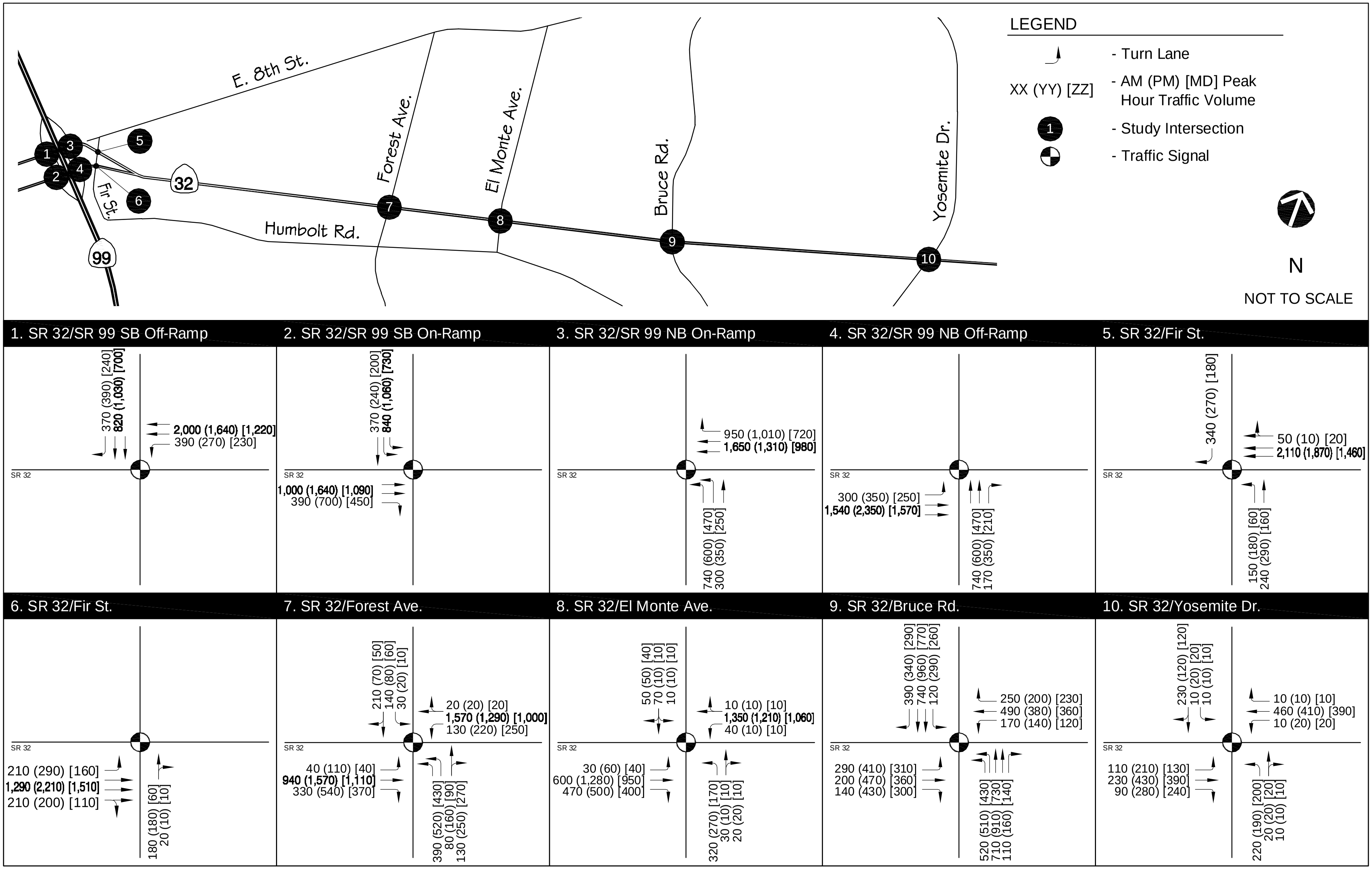
Table 7 shows the level of service and delay for the study intersections.

No Project Conditions

Under the No Project Condition scenario, the following intersections would operate at an unacceptable LOS E or LOS F during one or more of the peak hours:

- SR 99 Southbound Off-Ramp/SR 32 (E. 8th Street) – LOS F during the PM peak hour. Long delays at the intersection are associated with traffic spilling back from the two-lane segment of SR 32 through the interchange
- SR 99 Southbound On-Ramp/SR 32 (E. 9th Street) – LOS F during the PM peak hour. Long delays at the intersection are associated with traffic spilling back from the two-lane segment of SR 32 through the interchange
- Forest Avenue/SR 32 – LOS F during the AM, PM, and SAT peak hours
- El Monte Avenue/SR 32 – LOS F during the AM, PM, and SAT peak hours
- Bruce Road/SR 32 – LOS F during the AM, PM, and SAT peak hours
- Yosemite Drive/SR 32 – LOS F during the AM and PM peak hours

The corridor experienced over 400 vehicle hours of delay during the AM peak hour, almost 600 hours of delay during the PM peak hour, and more than 300 vehicle hours of delay during the SAT peak hour within the study area. Additional delay would occur outside of the study area due to long queues on certain approaches: for example, the northbound approach from Forest Avenue during the AM peak hour and the southbound SR 99 off-ramp during the PM peak hour. The simulation also indicates that, due to limited capacity on the two lane segment, eastbound vehicle queuing will extend into the interchange and affect intersection operations (as reflected in the level of service results).

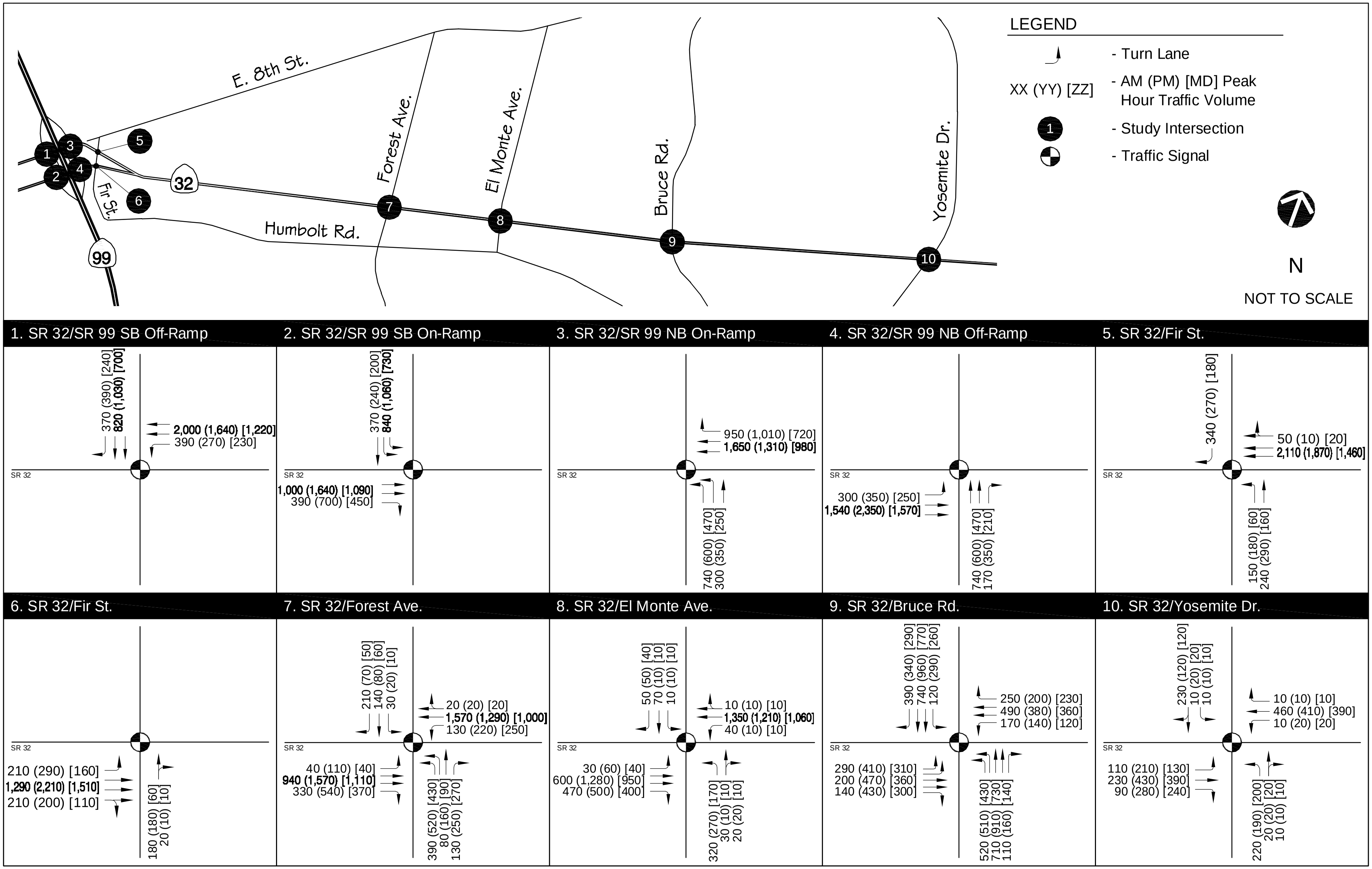


PEAK HOUR TRAFFIC VOLUMES
AND LANE CONFIGURATIONS -
DESIGN YEAR (2030) NO PROJECT CONDITIONS

FIGURE 5

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Feb 02, 2006 MJC
N:\PROJECTS\RS05\2095_SR_32\graphics\draft\fig05_phtv_2030_np_con.dwg



FEHR & PEERS
TRANSPORTATION CONSULTANTS

Feb 02, 2006 MJC
N:\PROJECTS\RS05\2095_SR_32\graphics\draft\fig06_phtv_2030_pp_con.dwg

PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - DESIGN YEAR (2030) PLUS PROJECT CONDITIONS

FIGURE 6

TABLE 7 – INTERSECTION OPERATIONS FOR 2030 CONDITIONS						
Intersection	No Project			With Project		
	AM	PM	SAT	AM	PM	SAT
SR 99 SB Offramp/ SR 32 (E. 8th Street)	26 / C	**<u>107 / F</u>**	14 / B	25 / C	17 / B	9 / A
SR 99 SB Onramp/ SR 32 (E. 9th Street)	11 / B	**<u>> 180 / F</u>**	11 / A	12 / B	50 / D	14 / B
SR 99 NB Onramp/ SR 32 (E. 8th Street)	7 / A	6 / A	6 / A	8 / A	6 / A	5 / A
SR 99 NB Offramp/ SR 32 (E. 9th Street)	16 / B	33 / C	10 / B	16 / B	15 / B	10 / A
Fir Street/SR 32 (E. 8th Street)	17 / B	14 / B	12 / B	24 / C	16 / B	14 / B
Fir Street/SR 32 (E. 9th Street)	4 / A	35 / C	3 / A	4 / A	5 / A	3 / A
Forest Avenue/SR 32	**<u>> 120 / F</u>**	**<u>> 120 / F</u>**	**<u>> 120 / F</u>**	27 / C	27 / C	22 / C
El Monte Avenue/SR 32	**<u>> 120 / F</u>**	**<u>> 120 / F</u>**	**<u>> 120 / F</u>**	22 / C	17 / A	11 / A
Bruce Road/SR 32	**<u>> 120 / F</u>**	**<u>> 120 / F</u>**	**<u>> 120 / F</u>**	28 / C	34 / C	25 / C
Yosemite Drive/SR 32	**<u>> 120 / F</u>**	**<u>59 / F</u>**	25 / D	23 / C	22 / C	19 / C
Vehicle Hours of Delay	***412***	***585***	***332***	***137***	***186***	***97***
Reduction in Vehicle Hours of Delay				***67%***	***68%***	***71%***

Notes: Level of service (LOS) and control delay (in seconds per vehicle) are reported. Bold and underline font indicate unacceptable LOS E or LOS F conditions. Average delays greater than two minutes per vehicle are not reported due to model insensitivity under extremely congested conditions.
Vehicle hours of delay is for the entire simulated roadway network.
Source: Fehr & Peers, 2005

With Project Conditions

With the proposed project all of the study intersections would operate at an acceptable level. The corridor would experience less than 200 vehicle hours of delay for all three analysis periods (AM, PM, SAT); approximately a 70% reduction compared to the No Project Condition scenario. Additionally, all intersections will operate at an acceptable LOS D or better during all peak hours.

QUEUING ANALYSIS

The simulation was reviewed for 2030 Conditions to ensure that turn lane lengths are sufficient such that queues do not spill out of the pocket and conflict with through traffic on SR 32. Please note that the identified queues represent expected maximum queue length, which is greater than the 95th percentile queue that is typically using for the design of turn pocket storage lengths. Additional length of 400 feet[2] should be provided

[2] Assumes partial deceleration accommodated in the through lane and a design speed of 55 MPH. Length includes tapers.

to turn lanes from SR 32 to accommodate deceleration consistent with Caltrans' design requirements. The results of the queuing analysis, based on queues experienced within the simulation, are presented in Table 8. The queuing reports are presented in the appendix.

TABLE 8 – QUEUES FOR 2030 WITH PROJECT CONDITIONS

Intersection	Turning Movement	AM	PM	SAT	Maximum for Design
Forest Avenue/SR 32	Northbound Left-Turn	175'	225'	200'	***225'***
	Northbound Right-Turn	100'	175'	125'	***175'***
	Southbound Left-Turn	100'	50'	50'	***100'***
	Southbound Right-Turn	400'	75'	50'	***400'***
	Eastbound Left-Turn	75'	150'	75'	***150'***
	Eastbound Right-Turn	100'	100'	100'	***100'***
	Westbound Left-Turn	150'	275'	250'	***275'***
El Monte Avenue/SR 32	Northbound Right-Turn	75'	50'	25'	***75'***
	Southbound Left-Turn	25'	25'	25'	***25'***
	Southbound Right-Turn	75'	50'	50'	***75'***
	Eastbound Left-Turn	50'	100'	75'	***100'***
	Eastbound Right-Turn	175'	75'	50'	***175'***
	Westbound Left-Turn	75'	25'	25'	***75'***
Bruce Road/SR 32	Northbound Left-Turn	225'	250'	175'	***250'***
	Northbound Right-Turn	50'	75'	75'	***75'***
	Southbound Left-Turn	125'	250'	225'	***250'***
	Southbound Right-Turn	225'	175'	125'	***225'***
	Eastbound Left-Turn	150'	200'	150'	***200'***
	Eastbound Right-Turn	100'	325'	175'	***325'***
	Westbound Left-Turn	175'	175'	125'	***175'***
	Westbound Right-Turn	100'	125'	100'	***125'***
Yosemite Drive/SR 32	Northbound Left-Turn	200'	175'	150'	***200'***
	Southbound Left-Turn	25'	25'	25'	***25'***
	Eastbound Left-Turn	100'	175'	125'	***175'***
	Westbound Left-Turn	25'	50'	50'	***50'***
	Westbound Right-Turn	25'	25'	25'	***25'***

Notes: ***XX*** = Maximum Queue
Queues rounded up to the closest 25' increment
Maximum queues represents the highest queues of all three peak hours
Source: Fehr & Peers, 2005

Appendix A

VISSIM Results

Appendix B

Accident Data