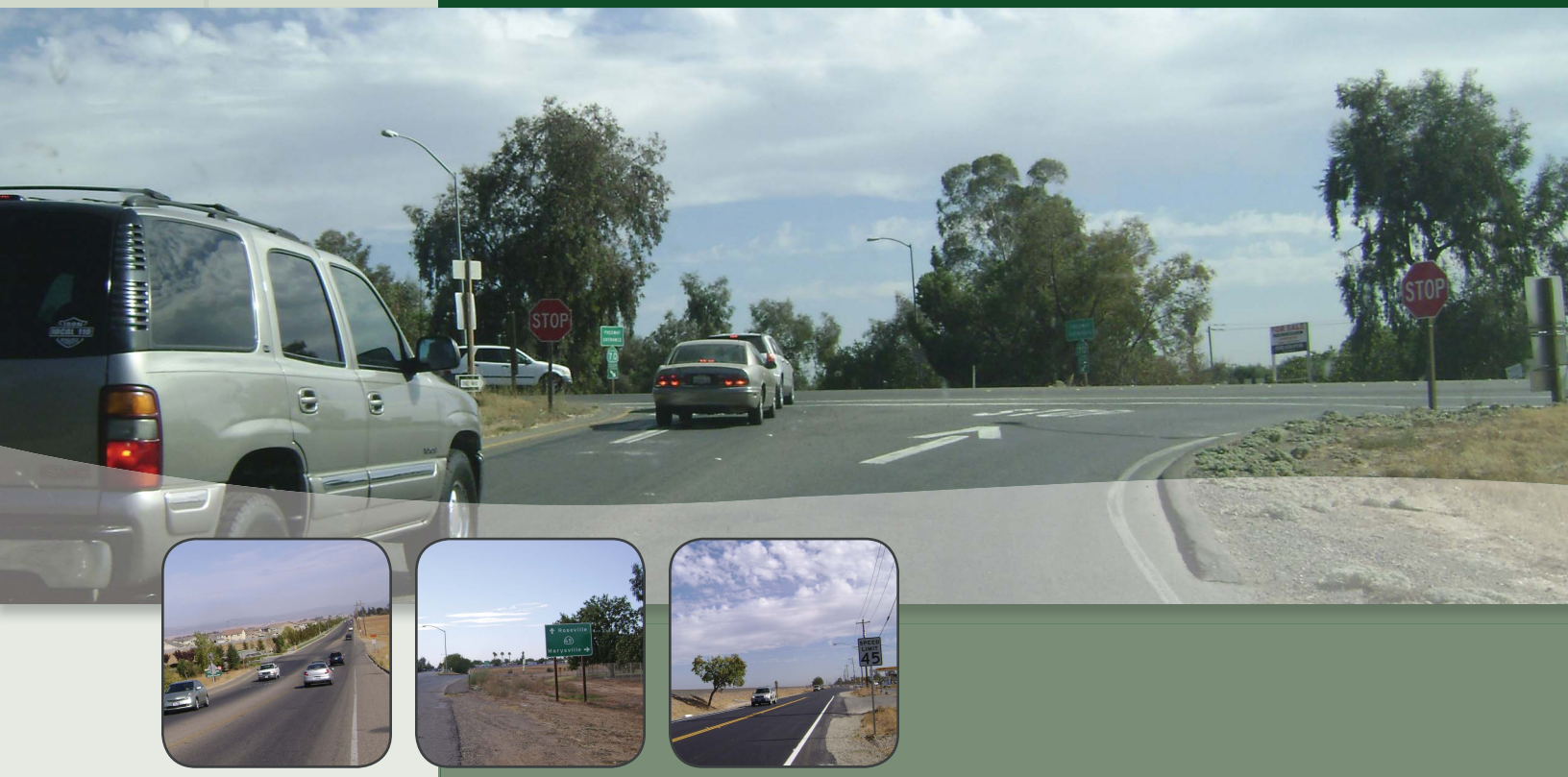
Final Traffic Report

STATE ROUTES 65/70/YUBA RIVER PARKWAY INTERCHANGE PROJECT STUDY REPORT



Submitted by:

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December 17, 2008

RS08-2548

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FOR THE STATE ROUTE 65 / 70 /YUBA RIVER PARKWAY INTERCHANGE PROJECT STUDY REPORT

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.

12/17/08

John Gard, P.E. Date
Registered Professional Traffic Engineer
Fehr & Peers

1. INTRODUCTION

PURPOSE

This study analyzes existing and future traffic conditions in the vicinity of the proposed Yuba River Parkway, which is a proposed four- to six-lane expressway that would extend from State Routes (SR) 65 and 70 northerly to SR 20. This facility would provide traffic relief to SR 70 and SR 20 through Marysville and improved access to existing and planned development in this portion of Yuba County.

This report addresses traffic operations on freeways and at interchanges located near the southern terminus of Yuba River Parkway. A separate traffic analysis was previously prepared for the Project Study Report for the northern terminus.

STUDY AREA

The project development team (PDT) agreed that the following freeway segments and interchanges (including ramp junctions) would be studied under existing and design year conditions:

- SR 70 from south of McGowan Parkway to north of Erle Road
- SR 65 from south of McGowan Parkway to SR 70
- SR 70/Erle Road interchange
- SR 65/McGowan Parkway interchange
- SR 65/70 interchange

ANALYSIS METHODOLOGY

Intersection Operations

The interchange ramp terminal intersections were analyzed using procedures and methodologies that are consistent with the *Highway Capacity Manual* (Transportation Research Board, 2000). The SimTraffic micro-simulation software package was used to evaluate vehicle delay and queuing at these intersections under design year conditions. SimTraffic was selected for use as it considers the effects of signal coordination, closely spaced intersections, lane changing, and vehicle queuing on traffic operations. Per standard practice, 11 SimTraffic runs were conducted for each scenario, outliers were omitted, and the results were averaged to yield the findings.

Freeway Operations

The SR 65 and SR 70 mainline segments and ramp junctions (merge/diverge) were analyzed using techniques from the *Highway Capacity Manual.* Weaving sections were analyzed using the Leisch methodology, as specified in the *Highway Design Manual* (Caltrans, 2006). The PDT agreed that the segment of northbound SR 70 from SR 65 to the Lindhurst Avenue off-ramp should be analyzed as a weaving section based on the lane change required when traveling from SR 70 to the off-ramp at Lindhurst Avenue.

Appendix A of this report contains the average control delay ranges for intersections and vehicle density ranges for freeway facilities associated with each level of service (LOS) category.

REPORT ORGANIZATION

The remainder of this report consists of the following chapters:

- Chapter 2 (Existing Conditions) – documents current traffic levels, operations, and accident history in the study area.
- Chapter 3 (Project Alternatives) – identifies the various roadway system alternatives selected for analysis.
- Chapter 4 (Design Year (2030) Traffic Forecasts) – describes the analysis methodology used to develop the design year traffic forecasts and presents the forecasts for each project alternative.
- Chapter 5 (Design Year Traffic Operations Analysis) – presents the results of the traffic operations analysis of the screened project alternatives under design year conditions.

2. EXISTING CONDITIONS

This chapter describes existing transportation conditions in the study area.

ROADWAY SYSTEM

The following describes the key roadway facilities in the study area:

SR 70 is a north-south freeway/highway that begins at SR 99 in Sutter County and extends through the study area to Marysville and beyond. Within the study area it is a four-lane freeway with a posted speed limit of 65 miles per hour (mph).

SR 65 is a north-south freeway/highway that begins at I-80 in Placer County and extends into the study area, terminating at SR 70. Within the study area, it is a four-lane freeway with a posted speed limit of 65 mph.

Erle Road is an east-west street that begins west of SR 70, extending across the freeway and adjacent railroad tracks as a two-lane arterial. It continues easterly with a posted speed limit of 55 mph, eventually terminating at Beale Air Force Base.

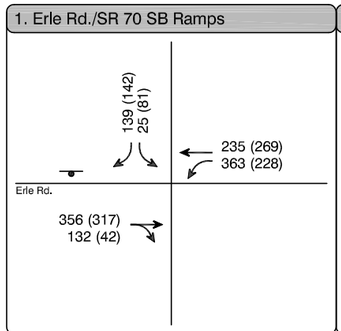
Lindhurst Avenue is a north-south street that begins at an off-ramp from SR 70 northbound (north of SR 65), and continues as a two-lane arterial with a posted speed limit of 45 mph to Erle Road. It continues northerly to North Beale Road.

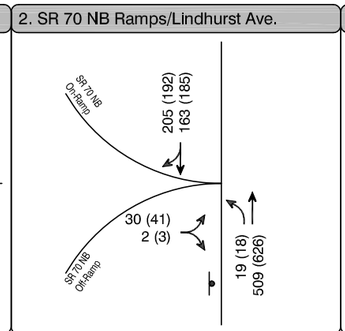
McGowan Parkway is a two-lane east-west street, which begins at Arboga Road and extends easterly, terminating just east of SR 65 at Rancho Road. It has a posted speed limit of 35 mph.

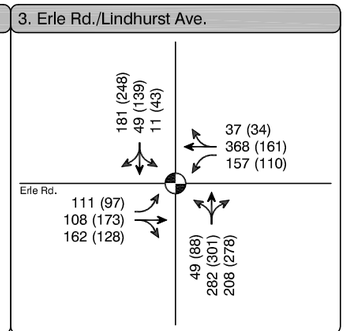
TRAFFIC VOLUMES

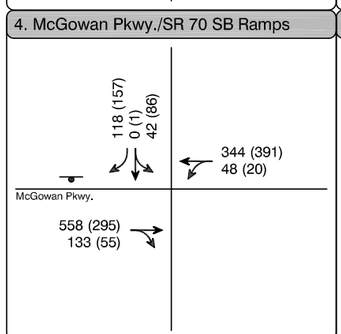
Traffic counts were collected at all study facilities in 2007. With reductions in travel resulting from unemployment, home foreclosures, and reduced levels of construction activity, the 2007 counts are considered valid for representing "existing conditions." Counts conducted in 2008 would likely show similar or slightly lower volumes than those observed in 2007.

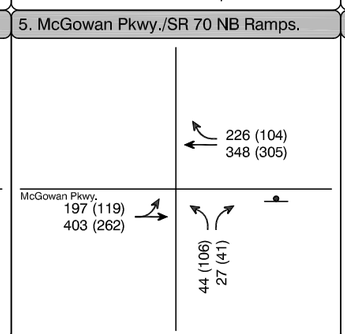
Figure 1 presents the existing volumes. This figure also details the existing intersection geometrics and traffic control devices at the study intersections. Truck traffic represents a considerable amount of total traffic on certain State facilities and County roads. Trucks haul a variety of goods, including aggregate, timber, and agricultural products. Counts by Fehr & Peers in 2006-2007 revealed that trucks represent eight percent of total AM peak hour traffic on SR 70 across the Yuba River and 21 percent of total traffic on Lindhurst Avenue south of Erle Road. Truck traffic at these locations during the PM peak hour was about two percent of total traffic.

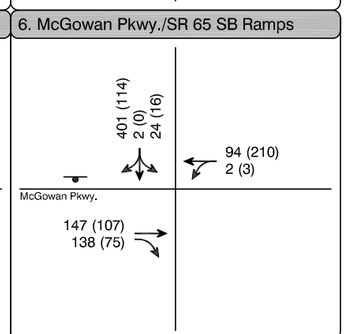


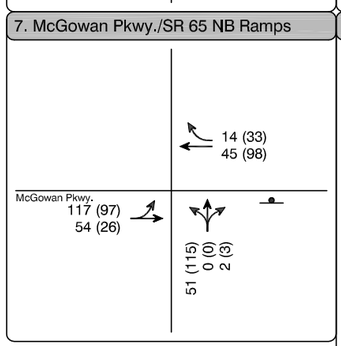


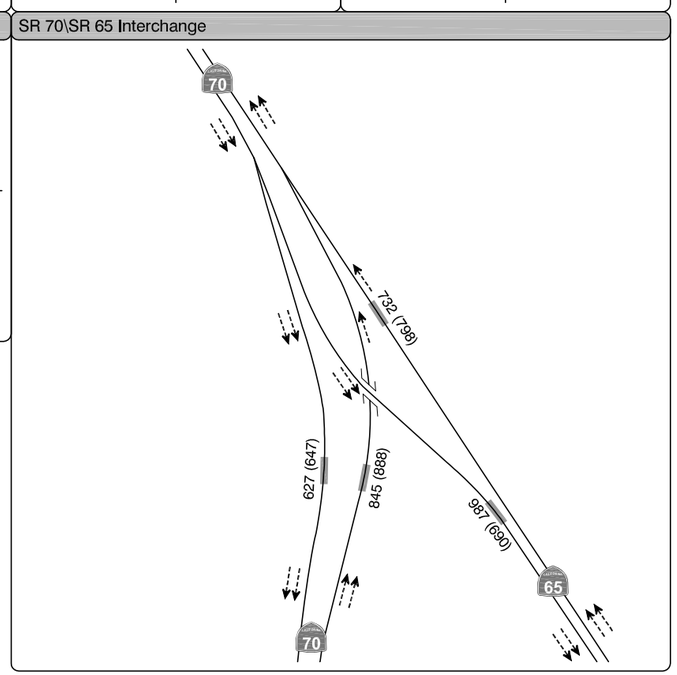












LEGEND

- Turn Lane
- Freeway Lane
- AM (PM) Peak Hour Traffic Volume
- Study Intersection
- Traffic Signal
- Stop Sign

N

NOT TO SCALE

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Oct 02, 2008 CEC
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PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - EXISTING CONDITIONS

FIGURE 1

TRAFFIC OPERATIONS

Table 1 presents the results of the LOS analysis (refer to Appendix A for technical calculations).

TABLE 1: INTERSECTION OPERATIONS – EXISTING CONDITIONS

Intersection	Traffic Control	Period	Average Delay[1]	Level of Service[1]
1. Erle Rd. / SR-70 SB Ramps	Minor Street Stop	AM Peak Hour	>150 sec/veh [2]	F
		PM Peak Hour	117 sec/veh	F
2. Lindhurst Ave. / SR-70 NB Ramps	Minor Street Stop	AM Peak Hour	21 sec/veh	C
		PM Peak Hour	35 sec/veh	D
3. Erle Rd. / Lindhurst Avenue	Traffic Signal	AM Peak Hour	55 sec/veh	D
		PM Peak Hour	79 sec/veh	E
4. McGowan Pkwy. / SR-65 SB Ramps	Minor Street Stop	AM Peak Hour	26 sec/veh	D
		PM Peak Hour	11 sec/veh	B
5. McGowan Pkwy. / SR-65 NB Ramps	Minor Street Stop	AM Peak Hour	15 sec/veh	B
		PM Peak Hour	15 sec/veh	B

Notes:
1. For signalized intersections, LOS is based on average delay of all vehicles passing through the intersection. For minor-street stop intersections, reported delay and LOS is for worst movement.
2. Traffic volumes are near limit of permitted inputs in software program. A delay estimate is not provided due to lack of precision in the estimate.

Source: Fehr & Peers, 2008

This table indicates that the stop-controlled southbound SR 70 off-ramp at Erle Road currently operates at LOS F during both peak hours. The adjacent signalized Erle Road/Lindhurst Avenue intersection currently operates at LOS D during the AM peak hour and LOS E during the PM peak hour.

Operations are generally better at the lesser traveled SR 65/McGowan Parkway interchange. However, during the AM peak hour, the stop-controlled southbound SR 70 off-ramp operates at LOS D.

Table 2 displays the existing operation of the mainline segments of SR 65 and SR 70 in the study area (refer to Appendix A for technical calculations). As shown and confirmed by field observations, all study segments currently operate at LOS B or better during peak hours.

TABLE 2: FREEWAY MAINLINE OPERATIONS – EXISTING CONDITIONS

Mainline Segment	Direction	AM Peak Hour		PM Peak Hour	
		Density[1]	LOS[2]	Density[1]	LOS[2]
1. SR-70 North of Erle Rd.	Northbound	15.6	B	13.6	B
	Southbound	12.2	B	16.2	B
2. SR-70 South of Erle Rd.	Northbound	13.8	B	12.1	B
	Southbound	15.2	B	16.8	B
3. SR-70 between SR-65 & McGowan Pkwy.	Northbound	8.7	A	7.6	A
	Southbound	5.6	A	6.9	A
4. SR-70 South of McGowan Pkwy.	Northbound	5.1	A	7.0	A
	Southbound	5.7	A	5.1	A
5. SR-65 between SR-70 & McGowan Pkwy.	Northbound	6.3	A	6.8	A
	Southbound	9.7	A	5.9	A
6. SR-65 South of McGowan Pkwy.	Northbound	5.7	A	6.7	A
	Southbound	6.8	A	5.5	A

Notes:
1. Density = passenger vehicles per hour per lane per mile
2. LOS = Level of Service

Source: Fehr & Peers, 2008

Table 3 displays the results of the freeway ramp junction merge/diverge analysis for existing AM and PM peak hour conditions (refer to Appendix A for technical calculations). As shown, all merge/diverge movements currently operate at LOS C or better.

TABLE 3: RAMP JUNCTION ANALYSIS – EXISTING CONDITIONS

Ramp Location	Ramp Type	AM Peak Hour		PM Peak Hour	
		Density[1]	LOS[2]	Density[1]	LOS[2]
1. SR-70 Northbound / Lindhurst Ave.	Off-ramp	18.7	B	16.9	B
	On-ramp	18.7	B	17.3	B
2. SR-70 Southbound / Erle Rd.	Off-ramp	15.2	B	19.7	B
	On-ramp	18.2	B	18.8	B
3. SR-70 Northbound / McGowan Pkwy.	Off-ramp	8.4	A	10.5	B
	On-ramp	10.5	B	9.9	A
4. SR-70 Southbound / McGowan Pkwy.	Off-ramp	8.7	A	10.2	B
	On-ramp	8.7	A	7.8	A
5. SR-65 Northbound / McGowan Pkwy.	Off-ramp	6.1	A	7.3	A
	On-ramp	8.9	A	9.3	A
6. SR-65 Southbound / McGowan Pkwy.	Off-ramp	13.7	B	9.5	A
	On-ramp	9.3	A	7.9	A
7. SR-70 to SR-65	Interchange Diverge	9.3	A	7.7	A

Notes:
1. Density = passenger vehicles per hour per lane per mile
2. LOS = Level of Service

Source: Fehr & Peers, 2008

ACCIDENT HISTORY

Fehr & Peers obtained summary accident data from Caltrans for the three-year period beginning January 1, 2005, through December 31, 2007, for the segments of SR 65 and SR 70 within the study area. Table 4 summarizes the accident history.

TABLE 4: SR 70 AND SR 65 ACCIDENT HISTORY (JANUARY 2005 THROUGH DECEMBER 2007)

Location	Accidents				Accident Rate	
	Total	With Fatalities	With Injuries	Involving Multiple Vehicles	Actual Accident Rate[1]	Average Accident Rate[2]
SR 70 – Feather River Blvd. to McGowan Pkwy. (4.04 mi.)	125	4	42	70	0.75	0.80
SR 65 – SR 70 to McGowan Pkwy. (1.15 mi.)	6	0	1	4	0.25	0.57

Note: [1] Per million vehicle miles

[2] Average accident rate based on similar facilities per million vehicle miles

Source: *Caltrans District 3 TASAS Table B*, January 2005 through December 2007

Table 4 shows accident history for the study segments of SR 70 and SR 65 over the three-year period between January 2005 and December 2007.

On SR 70 between Feather River Boulevard and McGowan Parkway, the actual accident rate is below the average accident rate for similar facilities. The four accidents with fatalities resulted in nine persons killed. The 42 accidents with injuries resulted in 73 persons injured. Seventy-two of the 125 accidents occurred in the northbound direction; the remaining 53 occurred in the southbound direction. Forty-one of the 125 accidents were rear end collisions, while 55 of the 125 accidents were hit object collisions.

On SR 65 between SR 70 and McGowan Parkway, the actual accident rate is below the average accident rate for similar facilities. The area had no accidents with fatalities; the one accident with injuries resulted in three persons injured. Two of the six accidents were rear end collisions, while another two of the six were overturned vehicle collisions.

TABLE 5: SR 65 / MCGOWAN PARKWAY INTERCHANGE ACCIDENT HISTORY (JANUARY 2005 THROUGH DECEMBER 2007)

Location	Accidents				Accident Rate	
	Total	With Fatalities	With Injuries	Involving Multiple Vehicles	Actual Accident Rate[1]	Average Accident Rate[2]
SR 65 / McGowan Pkwy. NB Off-Ramp	0	0	0	0	0.00	1.50
SR 65 / McGowan Pkwy. NB On-Ramp	0	0	0	0	0.00	0.80
SR 65 / McGowan Pkwy. SB Off-Ramp	1	0	0	1	0.51	1.50
SR 65 / McGowan Pkwy. SB On-Ramp	0	0	0	0	0.00	0.80

Note: [1] Per million vehicle miles

[2] Average accident rate based on similar facilities per million vehicle miles

Source: *Caltrans District 3 TASAS Table B*, January 2005 through December 2007

Table 5 shows accident history for the SR 65/McGowan Parkway interchange over the three-year period between January 2005 and December 2007, with one accident occurring in the past three years.

At all ramps of the SR 65/McGowan Parkway interchange, the actual accident rate is below the average accident rate for similar facilities. The one accident on the southbound off-ramp was a rear end collision that occurred between 7:00 AM and 8:00 AM.

TABLE 6: SR 70 / ERLE ROAD INTERCHANGE ACCIDENT HISTORY (JANUARY 2005 THROUGH DECEMBER 2007)

Location	Accidents				Accident Rate	
	Total	With Fatalities	With Injuries	Involving Multiple Vehicles	Actual Accident Rate[1]	Average Accident Rate[2]
SR 70 / Lindhurst Ave. NB Off-Ramp	2	0	0	0	4.48	1.50
SR 70 / Lindhurst Ave. NB On-Ramp	0	0	0	0	0	0.80
SR 70 / Erle Rd. SB Off-Ramp	2	0	1	2	0.62	1.50
SR 70 / Erle Rd. SB On-Ramp	8	0	2	3	2.07	0.80

Note: [1] Per million vehicle miles

[2] Average accident rate based on similar facilities per million vehicle miles

Source: *Caltrans District 3 TASAS Table B*, January 2005 through December 2007

Table 6 shows accident history for the SR 70/Erle Road interchange over the three-year period between January 2005 and December 2007, where 12 accidents occurred in the past three years.

Two accidents occurred at the SR 70/Lindhurst Avenue northbound off-ramp, where the actual accident rate is above the average accident rate for similar facilities. One accident occurred at night, while the other accident occurred in wet conditions. The primary collision factors for these two accidents were classified as “speeding” and “other violations”.

A total of 10 accidents occurred at the SR 70/Erle Road ramps. At the SR 70 southbound off-ramp to Erle Road, the actual accident rate is below the average accident rate for similar facilities. At the SR 70 southbound on-ramp from Erle Road, the actual accident rate is above the average accident rate for similar facilities. Speeding was ruled as the primary collision factor for five of the 10 accidents at these ramps. Four of the 10 accidents resulted in overturned vehicles. Three of the 10 accidents were rear end collisions. Of the 14 vehicles involved in the 10 accidents, four of the vehicles were trucks with one or more trailers; two of the vehicles had spilled loads. Four of the 10 accidents occurred on the ramps themselves, and another four occurred within the intersection of Erle Road.

3. PROJECT ALTERNATIVES

This chapter describes the six project alternatives that were identified in the early stages of this study. This section also explains why three of these alternatives were excluded from the detailed traffic operations analysis.

PRELIMINARY ALTERNATIVES

In February 2008, the PDT identified the following six alternatives for Yuba River Parkway and associated infrastructure improvements:

- Alternative 1 (No Build) – Yuba River Parkway does not connect to SR 65/70. No connection is made to SR 65/McGowan Parkway. No improvements at SR 70/Erle Road.
- Alternative 2 – Same as Alternative 1 but with improvements at SR 70/Erle Road.
- Alternative 3 – Yuba River Parkway does not connect to SR 65/70, but has a connection to SR 65/McGowan Parkway. Improvements are assumed at SR 70/Erle Road and SR 65/McGowan Parkway.
- Alternative 4 – SR 70/Yuba River Parkway connection is made (no direct connector ramps to/from SR 65). Frontage road connection is made to SR 65/McGowan Parkway. Improvements assumed at SR 70/Erle Road and SR 65/McGowan Parkway.
- Alternative 5 – SR 65/70/Yuba River Pkwy connection is made (including direct connector ramps to/from SR 65). No frontage road connection is made to SR 65/McGowan Parkway. Improvements assumed at SR 70/Erle Road.
- Alternative 6 – Same as Alternative 5 but with connection to SR 65/McGowan Parkway.

All alternatives assumed that Yuba River Parkway has four lanes from SR 20 to North Beale Road and six lanes south of North Beale Road. All alternatives also assumed that McGowan Parkway will remain as two lanes between SR 65 and 70.

The PDT decided to focus on Alternatives 1, 3, and 4 for the detailed traffic operations analysis. Alternative 2 was removed because it did not represent a true “no build” condition. Alternatives 5 and 6 were removed because direct connector ramps between Yuba River Parkway and SR 65 had several major drawbacks as is discussed in the Project Study Report.

Page 16 makes reference to Alternatives 3a and 4a, which are identical to Alternatives 3 and 4 described above. The notation changed slightly due to the addition of Alternatives 3b and 4b which are described in detail on page 17.

4. DESIGN YEAR (2030) TRAFFIC FORECASTS

This chapter describes the assumptions and methodology used to develop design year (2030) traffic forecasts for the study area.

LAND USE ASSUMPTIONS

PDT members met in February 2008 to develop a set of "design year (2030)" land use assumptions that would be entered into the Tri-County Travel Demand Model. Meeting participants agreed on a number of land use changes to represent a design year land use scenario. A key assumption was that new development would first occur in approved Specific Plans instead of plans without entitlements. The only exception was the proposed Woodbury Specific Plan (located along the Yuba River Parkway alignment), where the PDT assumed about 80 percent of build-out of the plan contemplated in 2007.

Appendix B includes a spreadsheet that displays the design year and build-out land use assumptions by area. As shown, the 2030 land use dataset shows an increase of 25,500 dwelling units over the base year model. This is about 5,500 units more than the Department of Finance residential absorption forecast for Yuba County (including incorporated cities) over the next 20 years. This increase is due primarily to the inclusion of 5,000 dwelling units in the Woodbury Specific Plan.

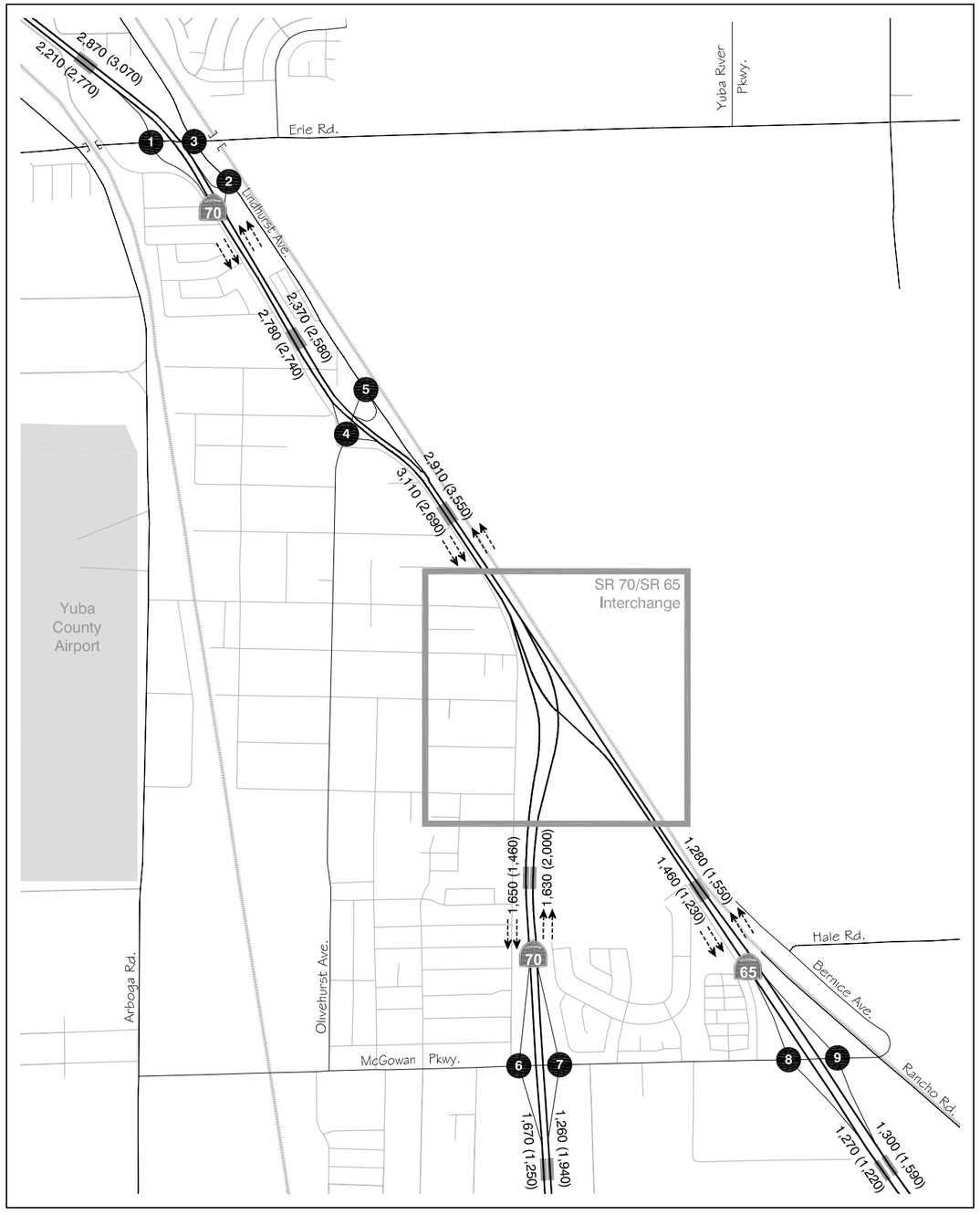
Meeting participants attempted to identify a year associated with "build-out". Year 2050 was recognized as an approximate timeframe that could represent this condition given that 40 to 50 percent of the total land use is assumed to absorb by 2030.

TRAFFIC FORECASTING METHODOLOGY

Traffic forecasts were developed using the "difference method" forecasting procedure. This method adds the increment in traffic growth between the base year and future year versions of the traffic model to existing volumes. An adjustment procedure was also utilized to develop traffic forecasts on Yuba River Parkway. This was necessary because over- or under-predictions of traffic by the base year model on the parallel segment of SR 70 could otherwise translate into inaccurate predictions on Yuba River Parkway, which will divert traffic away from SR 70.

TRAFFIC FORECASTS

Design year traffic forecasts were developed for weekday AM and PM peak hour conditions for Alternatives 1, 3, and 4 described in the previous chapter. These forecasts are illustrated on Figures 2, 3, and 4, respectively.



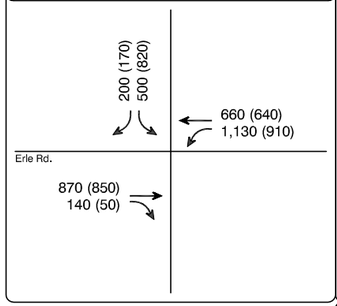
LEGEND

- Turn Movement
- Freeway Lane
- AM (PM) Peak Hour Traffic Volume
- Study Intersection

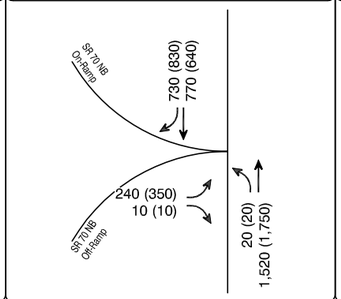
N

NOT TO SCALE

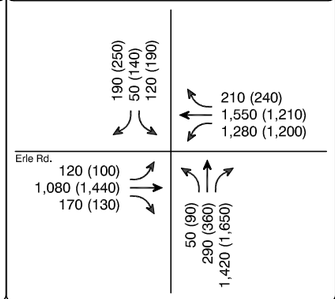
1. Erle Rd./SR 70 SB Ramps



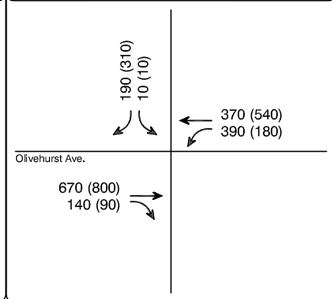
2. SR 70 NB Ramps/Lindhurst Ave.



3. Erle Rd./Lindhurst Ave.



4. Olivehurst Ave./SR 70 SB Ramps



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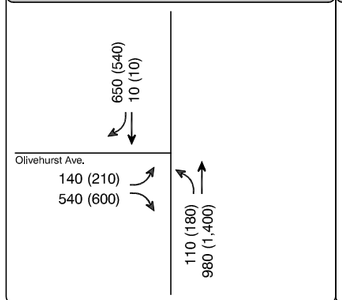
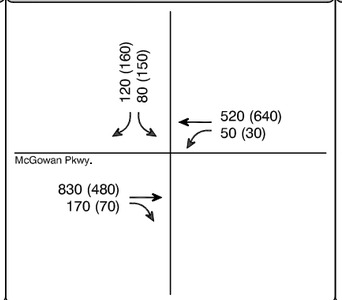


6. McGowan Pkwy./SR 70 SB Ramps



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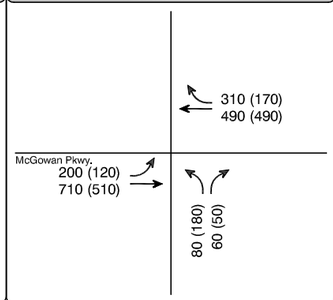

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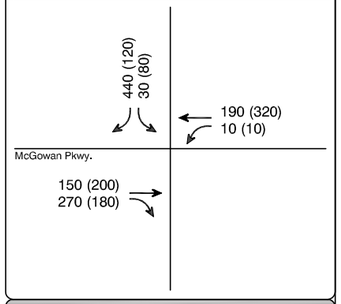

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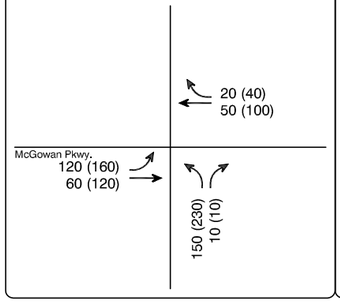
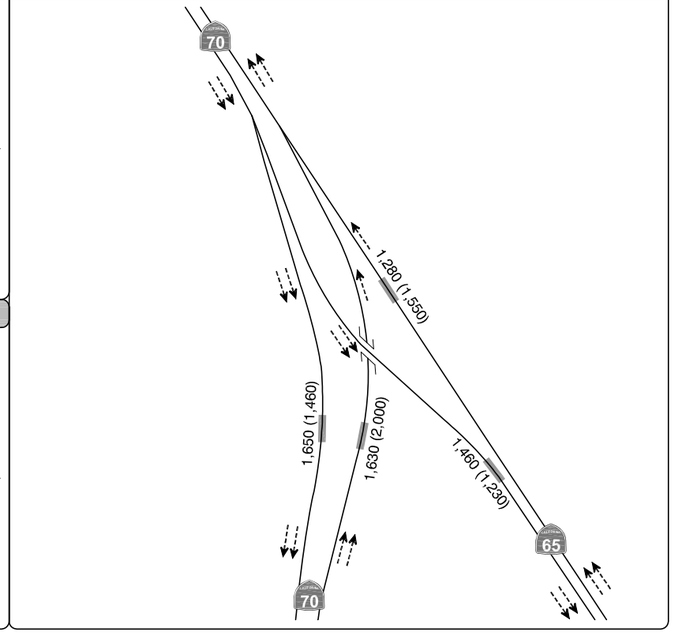


SR 70/SR 65 Interchange



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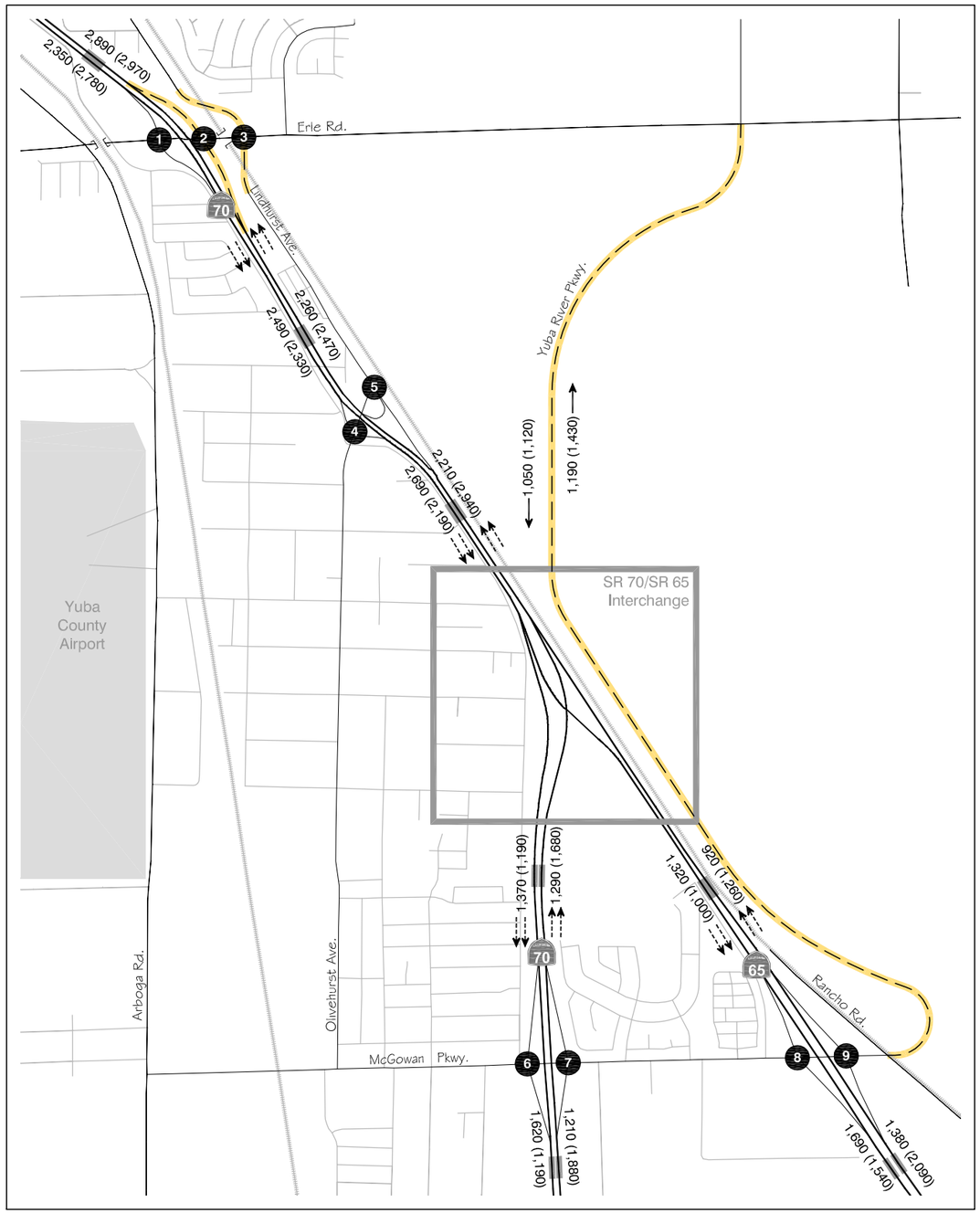
PEAK HOUR TRAFFIC VOLUMES - DESIGN YEAR (2030) ALTERNATIVE 1

FIGURE 2



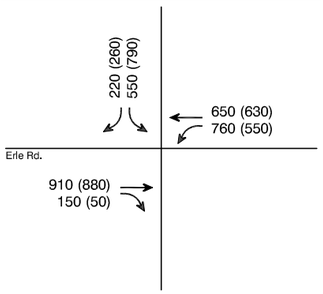
LEGEND

- Turn Movement
- Freeway Lane
- Alternative 3A Improvement
- AM (PM) Peak Hour Traffic Volume
- 1 Study Intersection

N

NOT TO SCALE

1. Erle Rd./SR 70 SB Ramps



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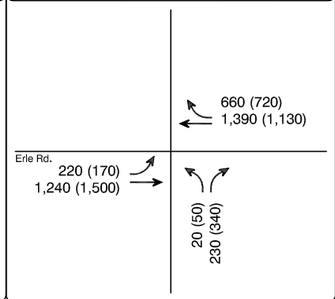
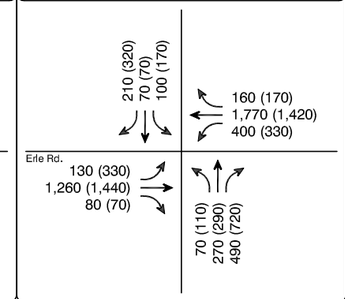
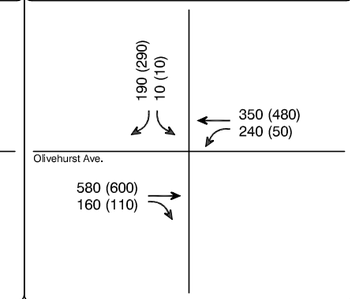


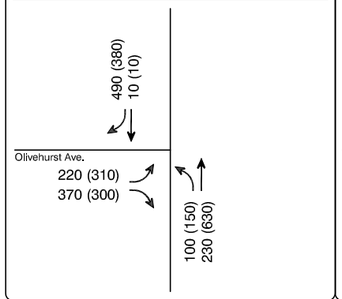
3. Erle Rd./Lindhurst Ave.



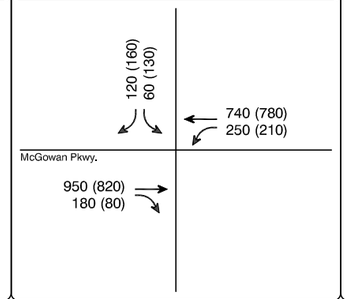
4. Olivehurst Ave./SR 70 SB Ramps



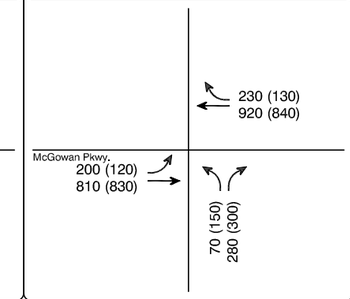
5. Olivehurst Ave./SR 70 NB Ramps



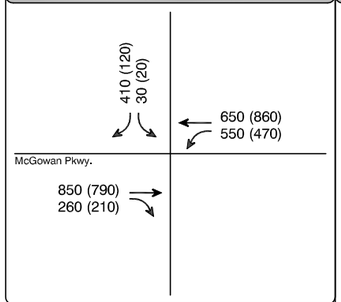
6. McGowan Pkwy./SR 70 SB Ramps



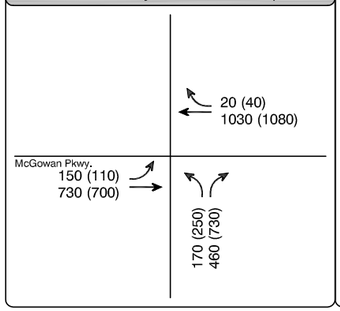
7. McGowan Pkwy./SR 70 NB Ramps.



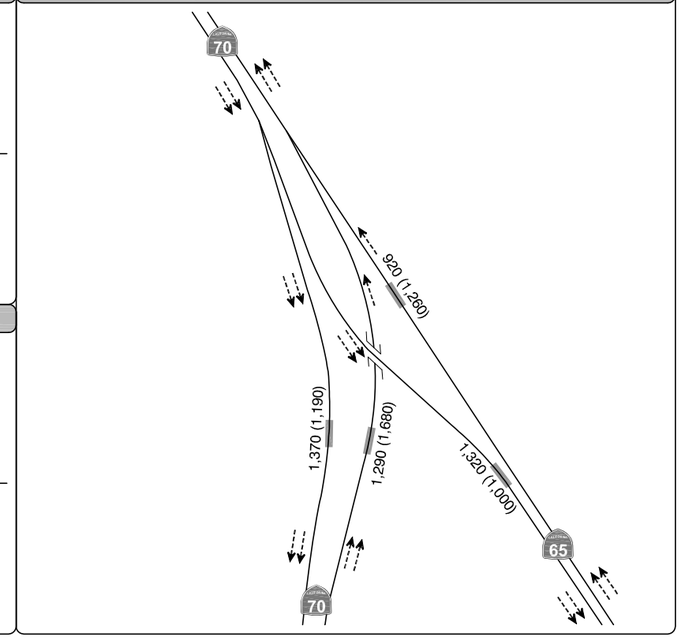
8. McGowan Pkwy./SR 65 SB Ramps



9. McGowan Pkwy./SR 65 NB Ramps



SR 70/SR 65 Interchange



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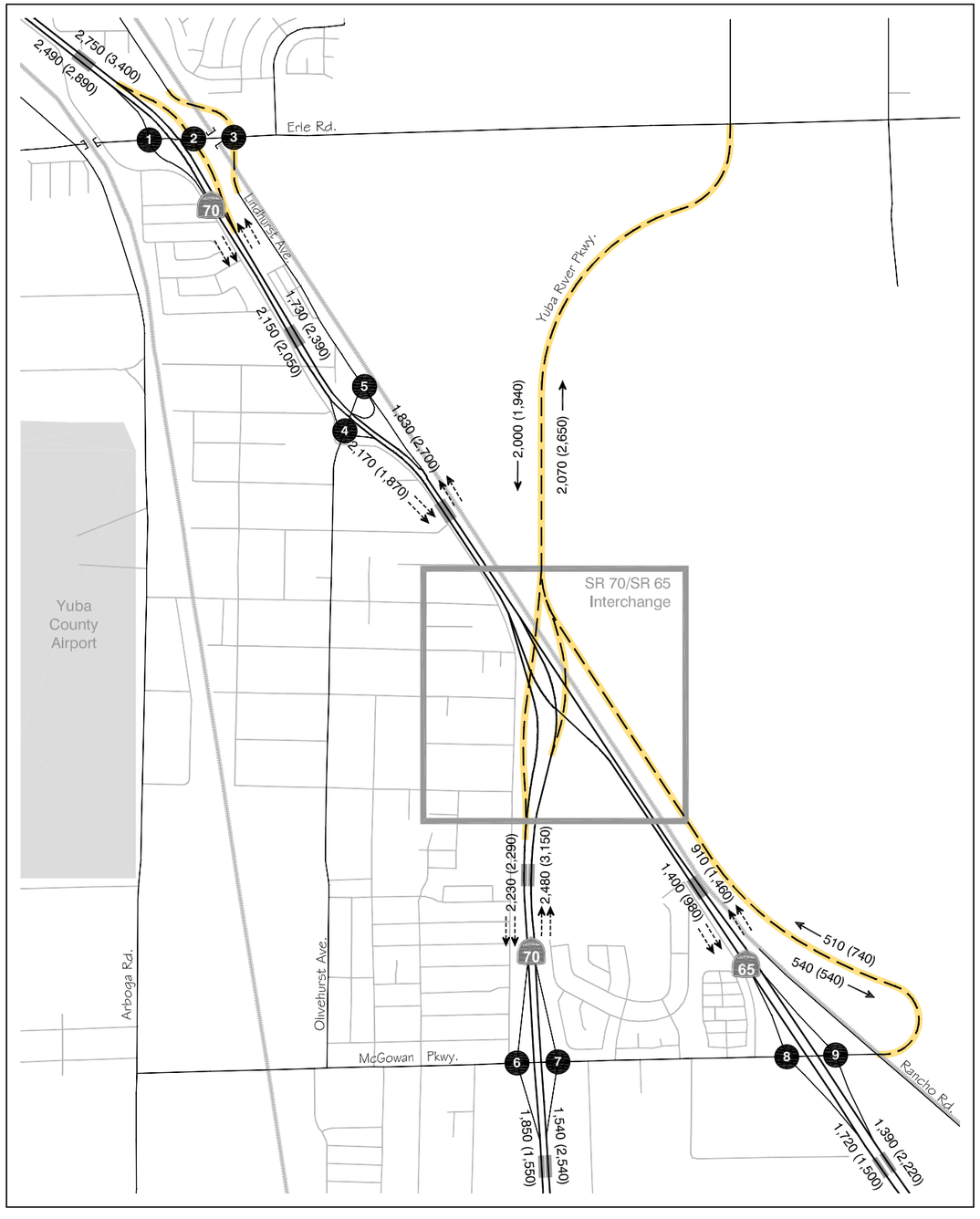
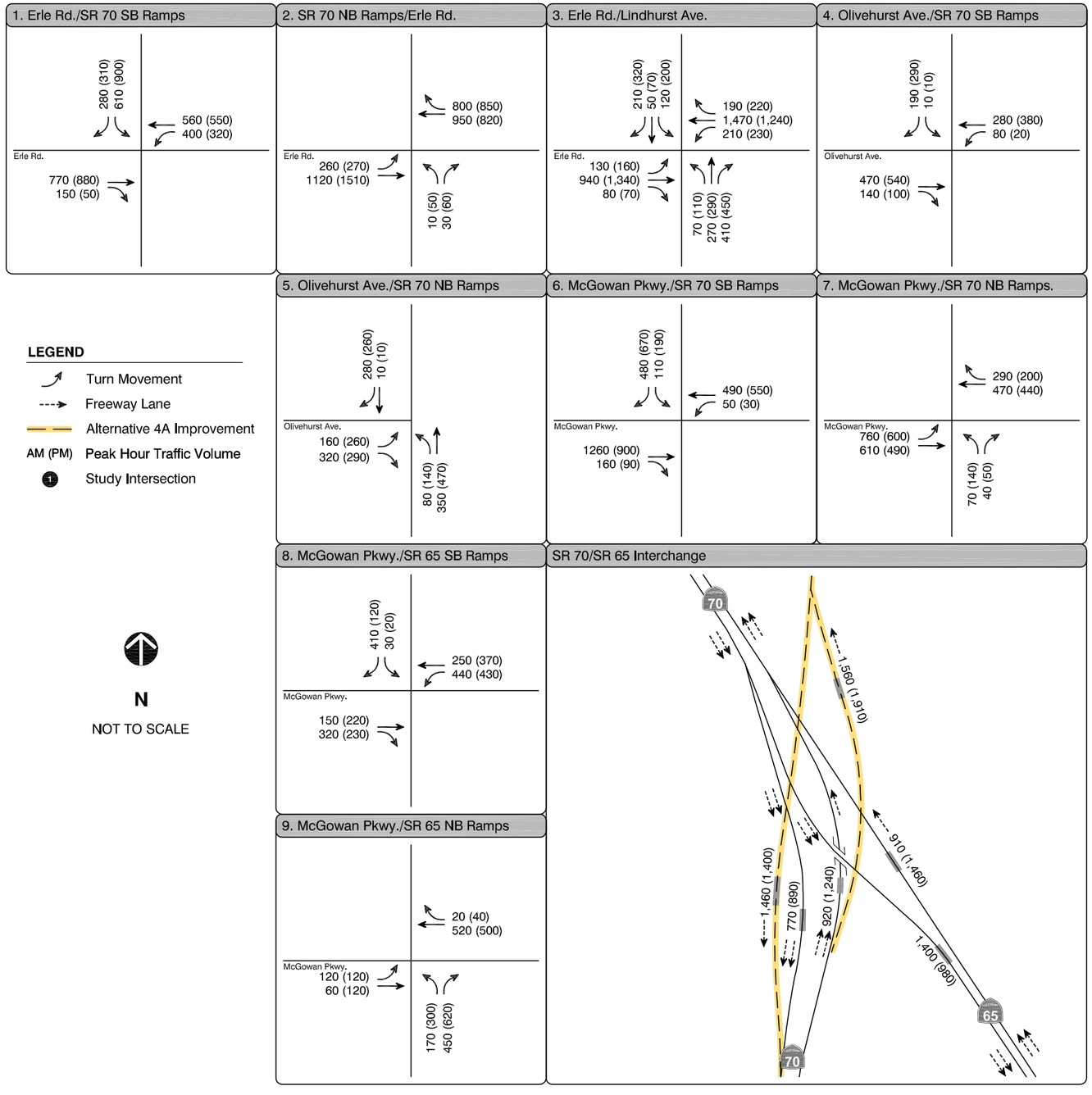
PEAK HOUR TRAFFIC VOLUMES - DESIGN YEAR (2030) ALTERNATIVE 3A

FIGURE 3





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Oct 02, 2008 CEC
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PEAK HOUR TRAFFIC VOLUMES - DESIGN YEAR (2030) ALTERNATIVE 4A

FIGURE 4

Traffic forecasts were developed for all study intersections, freeway ramps, and mainline segments for each alternative. This includes Yuba River Parkway and its direct connector ramps to SR 70 (part of Alternative 4).

At the request of Caltrans, forecasts were also developed for informational purposes at the SR 70/McGowan Parkway and SR 70/Olivehurst Avenue interchanges (analysis of these facilities is not included in this report).

Table 7 compares the traffic forecasts on the segments of Yuba River Parkway and SR 70 north of the SR 65/70 interchange under design year conditions for Alternatives 1, 3a, and 4a. This table illustrates the traffic diversion from SR 70 to Yuba River Parkway. A greater amount of diversion occurs when the direct connector ramps are constructed (i.e., Alternative 4a.).

Another conclusion from Table 7 is that construction of Yuba River Parkway induces more north-south travel in the corridor. To illustrate, northbound PM peak hour travel on SR 70 and Yuba River Parkway combined increases from 3,550 vehicles under Alternative 1, to 4,370 vehicles under Alternative 3a, to 5,350 vehicles under Alternative 4a. The travel demand model is sensitive to the additional accessibility provided by Yuba River Parkway, and as a result, reassigns some trip origins and destinations to take advantage of the improved access to the non-residential uses in the Woodbury Specific Plan.

TABLE 7: TRAFFIC FORECASTS ON SR 70 AND YUBA RIVER PARKWAY – DESIGN YEAR CONDITIONS

Facility	AM (PM) Peak Hour					
	Southbound			Northbound		
	Alt.1	Alt. 3a	Alt. 4a	Alt.1	Alt. 3a	Alt. 4a
SR 70 north of the SR 65/70 Interchange	3,110 (2,690)	2,690 (2,190)	2,170 (1,870)	2,910 (3,550)	2,210 (2,940)	1,830 (2,700)
Yuba River Parkway north of the SR 65/70 Interchange	N/A	1,050 (1,120)	2,000 (1,940)	N/A	1,190 (1,430)	2,070 (2,650)

Source: Fehr & Peers, 2008

Olivehurst Avenue to Yuba River Parkway Overcrossing Concept

Caltrans requested that Fehr & Peers test the benefits of a new overcrossing of SR 70 and the railroad tracks that would begin at Olivehurst Avenue (just south of SR 70) and extend easterly into the Woodbury Specific Plan area, terminating at Yuba River Parkway.

Fehr & Peers developed design year forecasts for this connection under Alternatives 3 and 4. Thus, Alternatives 3a and 4a represent conditions without this overcrossing, while Alternatives 3b and 4b represent conditions with this overcrossing. The Project Study Report addresses this improvement in greater detail. Appendix C of this report displays the design year traffic forecasts under Alternatives 3b and 4b for informational purposes. The traffic operations analysis in the following chapter for the SR 70/Erle Road interchange evaluated conditions under Alternative 3b. A detailed analysis of Alternative 4b was deemed unnecessary by the PDT.

Appendix D contains the build-out traffic forecasts for Alternatives 1, 3a, and 4a for informational purposes. Given that the build-out condition is more than 40 years away, the PDT decided that analysis of this condition and sizing of infrastructure to support it would not be reasonable at this time.

5. DESIGN YEAR TRAFFIC OPERATIONS ANALYSIS

This chapter evaluates traffic operations in the study area under design year (2030) conditions. This chapter also presents a discussion of how the alternatives affect certain County roads.

INTERSECTION OPERATIONS

This section presents the operations analysis results at the SR 70/Erle Road and SR 65/McGowan Parkway interchange ramp terminal intersections.

SR 70/Erle Road Interchange

Three separate design options (Options A – C) were initially identified for this interchange. These options, which are illustrated on Figure 5, were analyzed using the design year traffic forecasts for Alternatives 3a, 3b, and 4a. Option A represents the "constrained geometry" option in which Erle Road has a six-lane cross-section. Option B is the "unconstrained geometry" option, in which Erle Road has an eight-lane cross-section. Option C is similar to the constrained option, with the addition of a grade-separated ramp from westbound Erle Road (diverging from Erle Road prior to Lindhurst Avenue) to northbound SR 70.

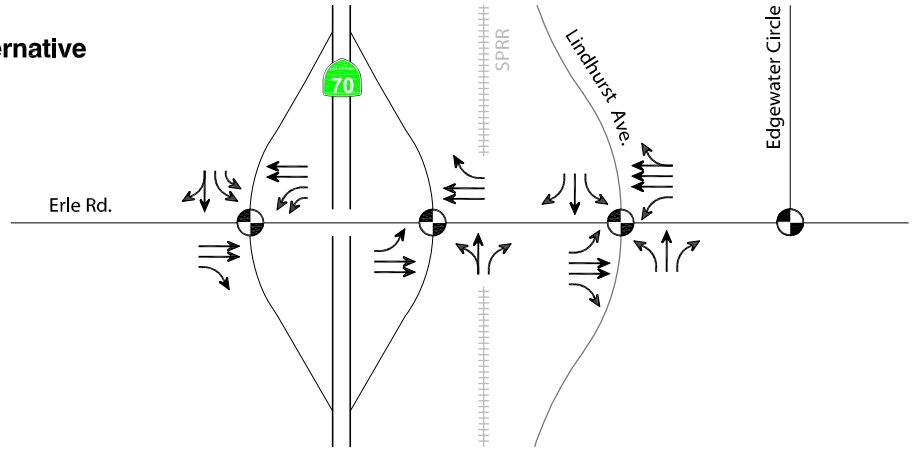
Given the heavy projected traffic volumes and close spacing of intersections, a SimTraffic micro-simulation model was used to evaluate these options. The model results showed that all possible combinations of Alternatives 3a, 3b, and 4a with Options A, B, and C produced LOS E or worse operating conditions at one or more intersections. Appendix E summarizes the results of these model runs.

While reviewing traffic operations, the need for another option to provide greater capacity became apparent. Option D is similar to Option C, but also includes a westbound loop on-ramp from Erle Road onto southbound SR 70. Some other minor changes in lane geometrics were also assumed. Since Option D relocates the southbound off-ramp intersection further to the west on Erle Road, the Erle Road/Chestnut Road intersection was included in the analysis.

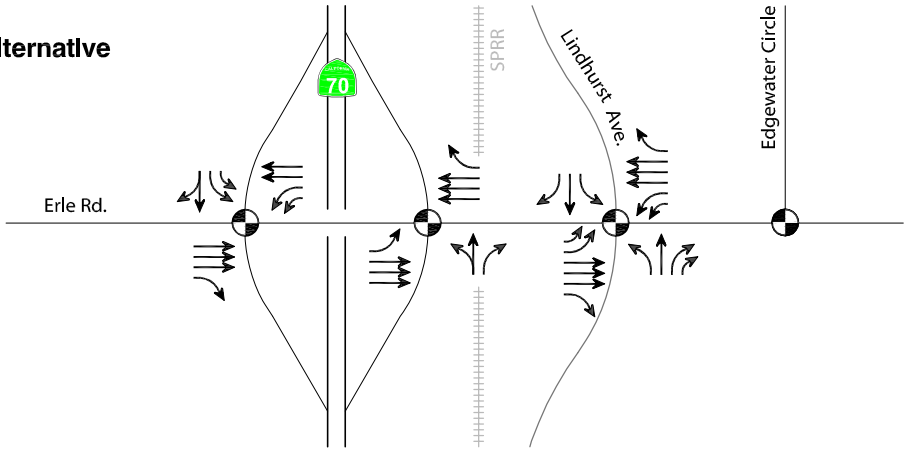
Option D was analyzed using the design year traffic forecasts for Alternatives 3a, 3b, and 4a. These forecasts are shown on Figure 6. The vacant parcel in the northeast quadrant of the Erle Road/Chestnut Road intersection was assumed to be developed with 125,000 square feet of retail space (accessed entirely from Chestnut Road) based on the available remaining acreage after the reconfigured ramps are constructed.

Table 8 summarizes the traffic operations results (refer to Appendix E for technical calculations) at the SR 70/Erle Road interchange with geometric Option D.

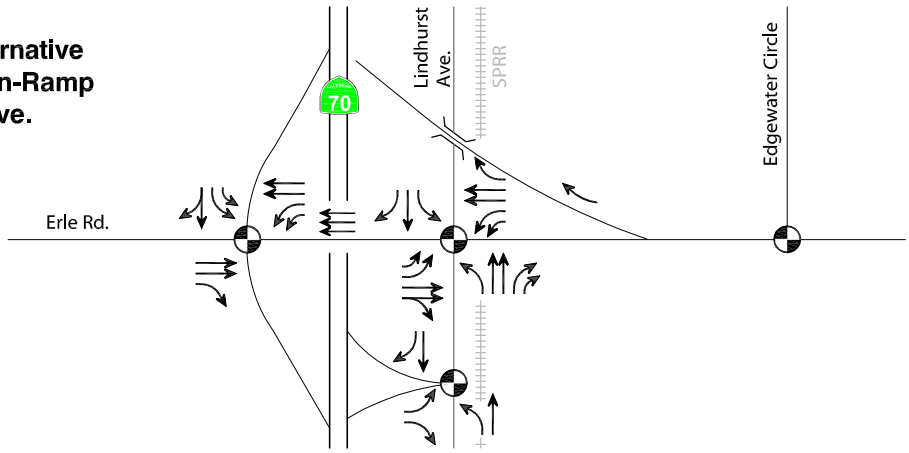
OPTION A:
Constrained Alternative



OPTION B:
Unconstrained Alternative



OPTION C:
Constrained Alternative with NB SR 70 On-Ramp over Lindhurst Ave.



LEGEND

Turn Lane

Traffic Signal

N

NOT TO SCALE

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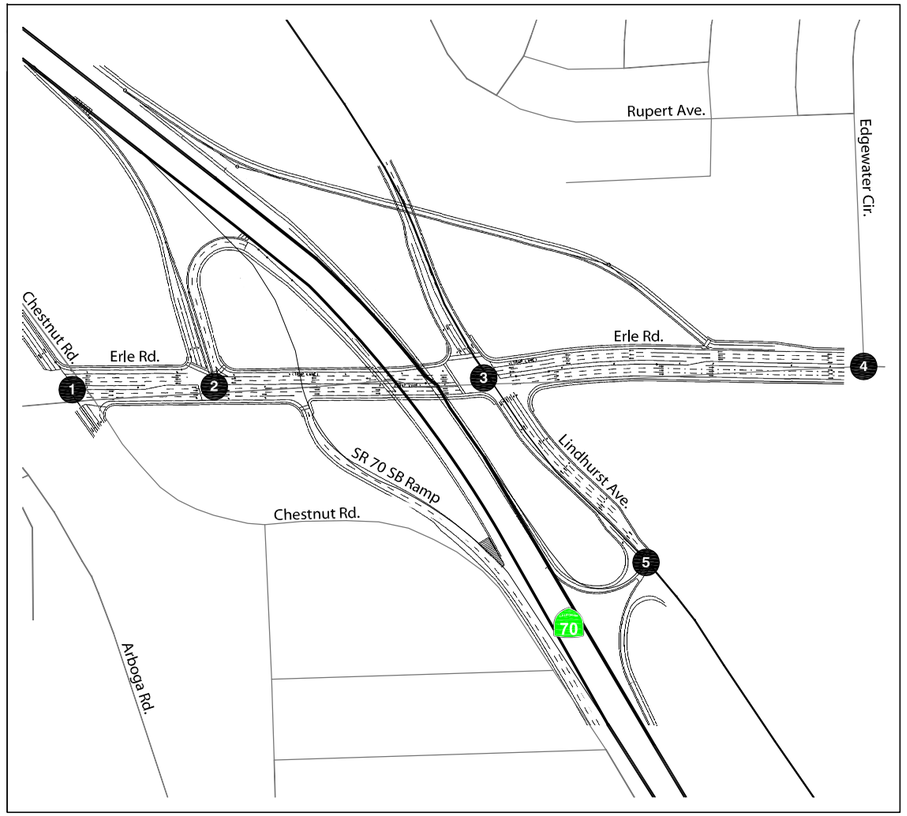
SR 70/ERLE ROAD PRELIMINARY INTERCHANGE DESIGN ALTERNATIVES

FIGURE 5



LEGEND

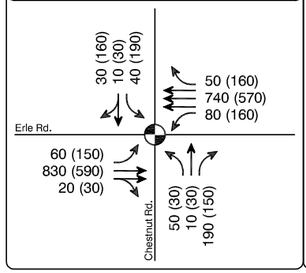
- Turn Lane
- AM (PM) Peak Hour Traffic Volume
- 1 Study Intersection
- Traffic Signal

N

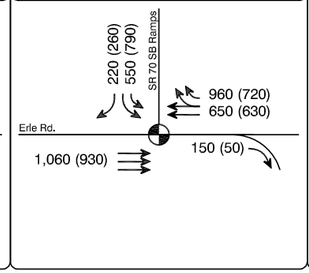
NOT TO SCALE

ALTERNATIVE 3A FORECASTS

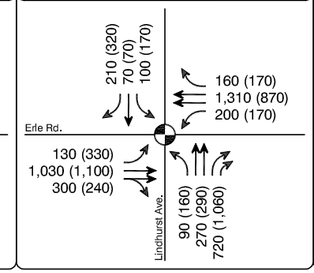
1. Erle Rd./Chestnut Rd.



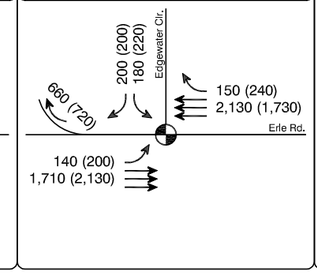
2. Erle Rd./SR 70 SB Ramps



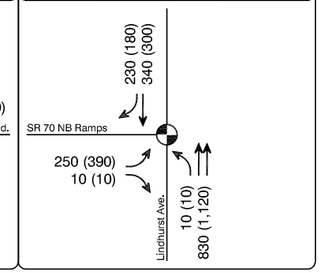
3. Erle Rd./Lindhurst Ave.



4. Erle Rd./Edgewater Cir.

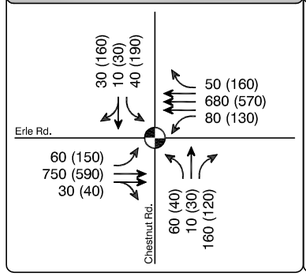


5. SR 70 NB Ramps/Lindhurst Ave.

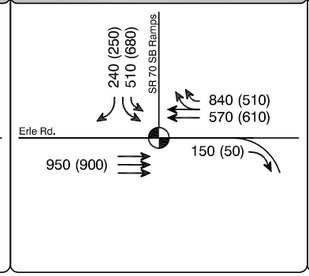


ALTERNATIVE 3B FORECASTS

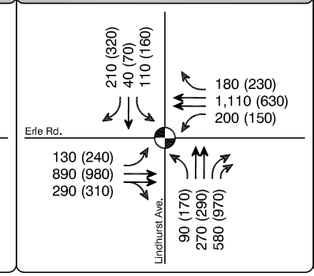
1. Erle Rd./Chestnut Rd.



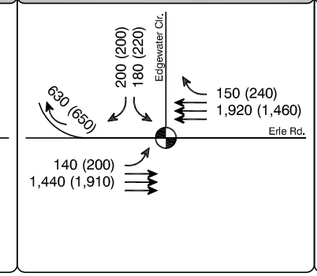
2. Erle Rd./SR 70 SB Ramps



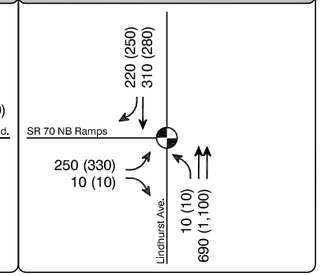
3. Erle Rd./Lindhurst Ave.



4. Erle Rd./Edgewater Cir.

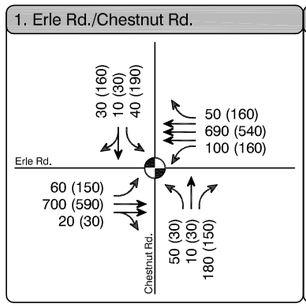


5. SR 70 NB Ramps/Lindhurst Ave.

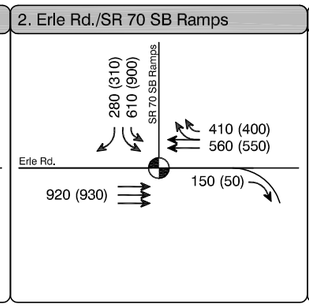


ALTERNATIVE 4A FORECASTS

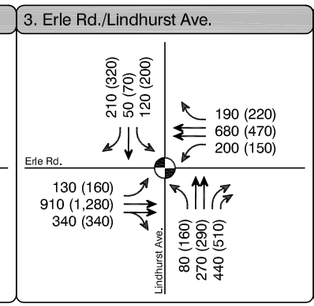
1. Erle Rd./Chestnut Rd.



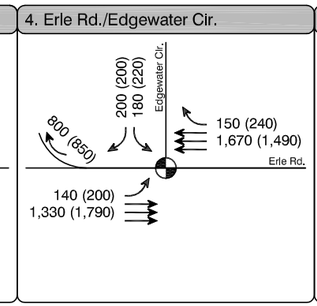
2. Erle Rd./SR 70 SB Ramps



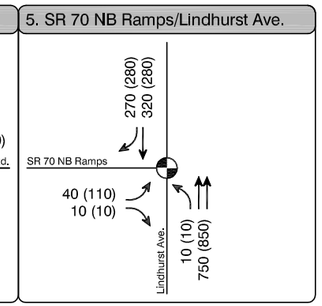
3. Erle Rd./Lindhurst Ave.



4. Erle Rd./Edgewater Cir.



5. SR 70 NB Ramps/Lindhurst Ave.



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SR 70/ERLE ROAD INTERCHANGE PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - DESIGN YEAR (2030) CONDITIONS OPTION D

FIGURE 6

TABLE 8: SR 70/ERLE ROAD RAMP INTERSECTION OPERATIONS – DESIGN YEAR (2030) CONDITIONS

Intersection		SR 70/Erle Road – Option D		
		Alt. 3A Delay – LOS[1]	**Alt. 3B Delay - LOS[1]**	**Alt. 4A Delay - LOS[1]**
1. Erle Rd. / Chestnut Rd.	AM Peak Hour	19 – B	18 – B	19 – B
	PM Peak Hour	48 – D	25 – C	31 – C
2. Erle Rd. / SR-70 SB Ramps	AM Peak Hour	23 – C	19 – B	23 – C
	PM Peak Hour	35 – D	22 – C	30 – C
3. Erle Rd. / Lindhurst Ave.	AM Peak Hour	37 – D	28 – C	28 – C
	PM Peak Hour	50 – D	33 – C	49 – D
4. Erle Rd. / Edgewater Circle	AM Peak Hour	35 – C	22 – C	25 – C
	PM Peak Hour	32 – C	28 – C	38 – D
5. SR-70 NB Ramps / Lindhurst Ave.	AM Peak Hour	11 – B	10 – B	7 – A
	PM Peak Hour	49 – D	19 – B	9 – A
Average[2]	AM Peak Hour	25 – C	19 – B	20 – B/C
	PM Peak Hour	43 – D	25 – C	31 – C

Notes:
1. LOS = Level of service
2. Average delay (weighted evenly) in seconds per vehicle for the five study intersections

Source: Fehr & Peers, 2008

Under geometric Option D, Alternatives 3a, 3b, and 4a each result in LOS D or better operations. Since Caltrans staff indicated that the design criterion for this interchange is LOS D, the Option D configuration would operate acceptably.

The delay at each intersection was averaged and tabulated for each alternative in Table 8. Alternative 3b provides one overall service level improvement when compared to Alternative 3a. The average delay for Alternative 4a is slightly greater than for Alternative 3b. This is due in part to increased traffic between SR 70 to/from the north and Erle Road to/from the east. The direct connector ramps between SR 70 and Yuba River Parkway shift away traffic that would otherwise be on Erle Road. The travel demand model is then assigning more trips (to/from the north) to Erle Road in response to the available capacity.

SR 65/McGowan Parkway Interchange

This interchange was analyzed under design year conditions for Alternatives 1, 3a, and 4a. Alternative 3b was not analyzed because it is being considered primarily as a means to improve operations at the SR 70/Erle Road interchange. The SR 65 / McGowan Parkway Interchange was analyzed using the interchange design shown in Figure 7.

Alternative 1 assumes the existing geometrics and lane configurations. Alternatives 3a and 4a assume traffic signals are installed at both ramp intersections, the McGowan Parkway overcrossing is widened to a four-lane cross-section, and McGowan Parkway is widened to four lanes east of the interchange. In addition, a traffic signal is assumed in place at the McGowan Parkway/Olive Avenue intersection, which is located about 200 feet west of the interchange.

Operations were analyzed using SimTraffic. Table 9 summarizes the results (refer to Appendix E for technical calculations).

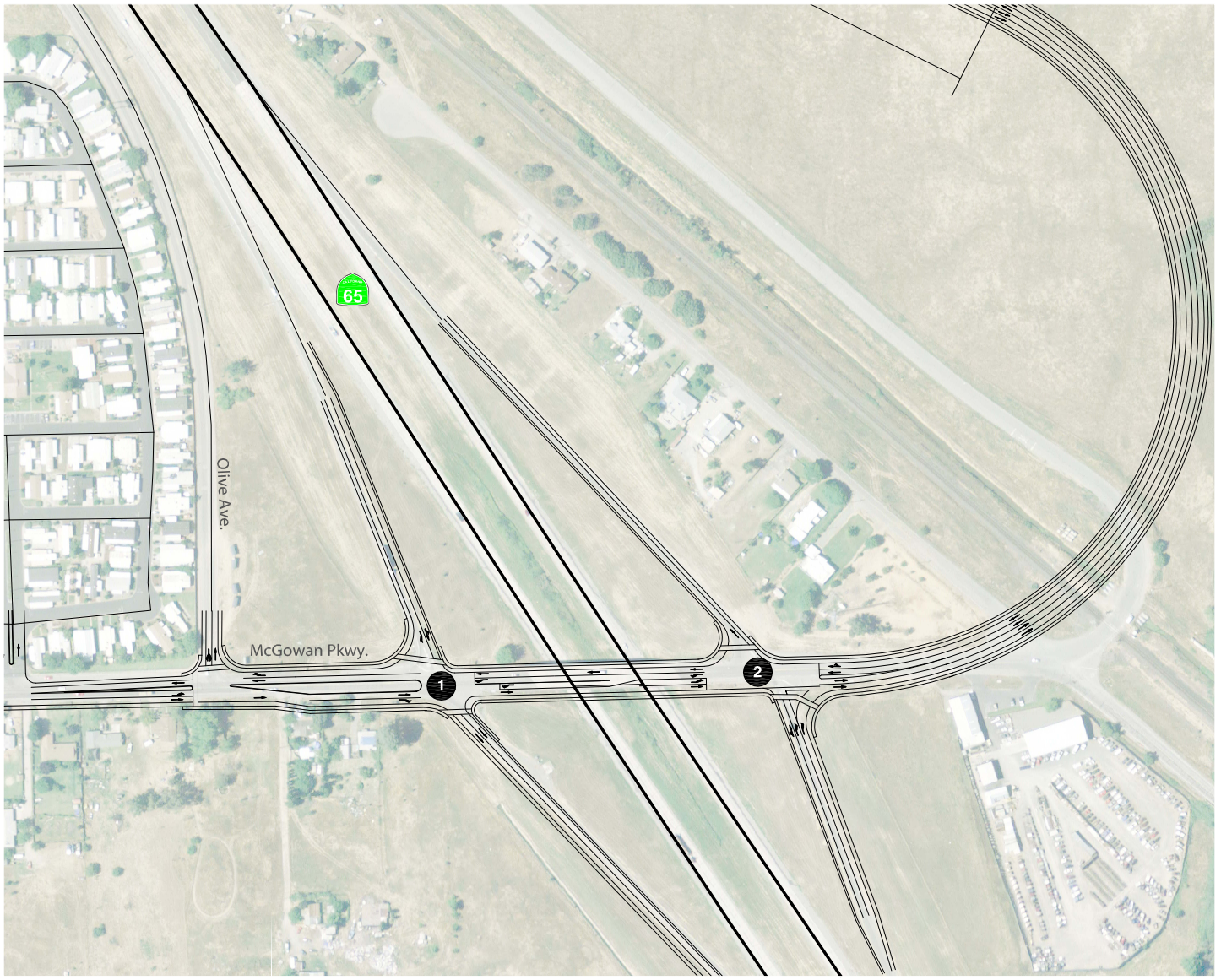
TABLE 9: SR 65/MCGOWAN PARKWAY RAMP INTERSECTION OPERATIONS – DESIGN YEAR (2030) CONDITIONS

Intersection		Alt. 1 Delay – LOS[1]	Alt. 3A Delay - LOS[1]	Alt. 4A Delay - LOS[1]
1. McGowan Pkwy. / SR-65 NB Ramps	AM Peak Hour	16 – C	22 – C	17 – B
	PM Peak Hour	27 – D	41 – D	21 – C
2. McGowan Pkwy. / SR-65 SB Ramps	AM Peak Hour	81 – F	42 – D	16 – B
	PM Peak Hour	16 – C	28 – C	13 – B
3. McGowan Pkwy. / Olive Ave.	AM Peak Hour	19 – B	>150 – F	12 – B
	PM Peak Hour	10 – A	32 - C	11 – B

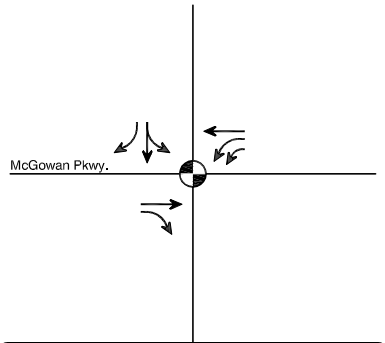
Notes:
1. LOS = Level of service.

Source: Fehr & Peers, 2008

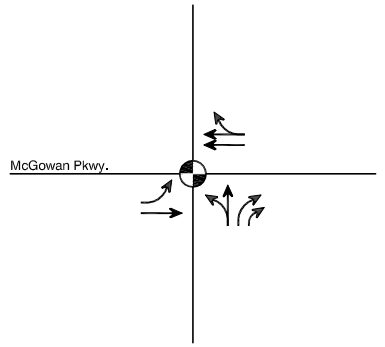
Table 9 indicates that Alternative 1 would operate unacceptably, while Alternatives 3a and 4a would function acceptably at the interchange ramps. Alternative 4a operates better than Alternative 3a given the same geometric conditions. This is because the direct connector ramps allow traffic to access Yuba River Parkway without passing through this interchange.



1. McGowan Pkwy./SR 65 SB Ramps



2. McGowan Pkwy./SR 65 NB Ramps



LEGEND

- Turn Lane
- 1 Study Intersection
- Traffic Signal

N

NOT TO SCALE

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SR 65/MCGOWAN PARKWAY INTERCHANGE DESIGN

FIGURE 7

FREEWAY OPERATIONS

The freeway mainline facilities were analyzed for design year conditions for Alternatives 1, 3a, and 4a using the methodologies described in Chapter 1. Since Alternative 4a adds an auxiliary lane on SR 70 between McGowan Parkway and the SR 65/70/Yuba River Parkway interchange, it was analyzed as a weave section using the Leisch Methodology.

Table 10 summarizes the analysis results (refer to Appendix E for technical calculations). Per Caltrans request, truck percentages of 2% - 8% were used for freeway mainline analysis. As shown, all freeway segments would operate at LOS D or better under each alternative.

TABLE 10: FREEWAY MAINLINE OPERATIONS – DESIGN YEAR (2030) CONDITIONS

Mainline Segment	Direction	AM (PM) Peak Hour					
		Alt. 1		Alt. 3A		Alt. 4A	
		Density[1]	LOS[2]	Density[1]	LOS[2]	Density[1]	LOS[2]
1. SR-70 North of Erle Rd.	Northbound	25.0 (26.1)	C (D)	25.2 (25.2)	C (C)	23.9 (29.5)	C (D)
	Southbound	19.2 (23.4)	C (C)	20.4 (23.5)	C (C)	21.6 (24.4)	C (C)
2. SR-70 South of Erle Rd.	Northbound	20.6 (21.8)	C (C)	19.6 (20.9)	C (C)	15.0 (20.2)	B (C)
	Southbound	27.2 (23.1)	D (C)	21.6 (19.7)	C (C)	18.7 (17.3)	C (B)
3. SR-70 between SR-65 & McGowan Pkwy.	Northbound	14.1 (17.0)	B (B)	11.2 (14.3)	B (B)	Leisch Weave	D (D)
	Southbound	14.3 (12.4)	B (B)	11.9 (12.6)	B (B)	Leisch Weave	C (C)
4. SR-70 South of McGowan Pkwy.	Northbound	10.9 (16.5)	A (B)	10.5 (16.0)	A (B)	13.3 (21.6)	B (C)
	Southbound	14.4 (10.6)	B (A)	14.0 (10.1)	B (A)	16.0 (13.2)	B (B)
5. SR-65 between SR-70 & McGowan Pkwy.	Northbound	11.1 (13.2)	B (B)	8.0 (10.7)	A (A)	7.9 (12.4)	A (B)
	Southbound	12.6 (10.4)	B (A)	11.4 (8.5)	B (A)	12.1 (8.3)	B (A)
6. SR-65 South of McGowan Pkwy.	Northbound	11.2 (13.5)	B (B)	11.9 (17.7)	B (B)	12.0 (18.8)	B (C)
	Southbound	11.0 (10.4)	A (A)	14.6 (13.1)	B (B)	14.9 (12.7)	B (B)

Notes:

1. Density = passenger vehicles per hour per lane per mile
2. LOS = Level of Service

Source: Fehr & Peers, 2008

RAMP JUNCTION OPERATIONS

Table 11 displays the results of the freeway ramp junction merge/diverge analysis under design year conditions for Alternatives 1, 3a, and 4a (refer to Appendix E for technical calculations). Per Caltrans request, truck percentages of 2% - 10% were used for ramp junction analysis. Under Alternatives 1 and 3a, ramp merge/diverge movements operate at LOS C or better. Under Alternative 4a, all ramp merge/diverge movements operate at LOS C or better with the exception of the SR 70 northbound on-ramp at Lindhurst Avenue and the SR 70 southbound off-ramp at Erle Road.

TABLE 11: RAMP JUNCTION ANALYSIS – DESIGN YEAR (2030) CONDITIONS

Mainline Segment	Ramp Type	AM (PM) Peak Hour					
		ALT. 1		ALT. 3A		ALT. 4A	
		Density[1]	LOS[2]	Density[1]	LOS[2]	Density[1]	LOS[2]
1. SR-70 Northbound / Lindhurst Ave.	Off-ramp	26.4 (27.7)	C (C)	25.3 (26.7)	C (C)	20.2 (25.9)	C (C)
	On-ramp	27.7 (24.9)	C (C)	27.8 (28.0)	C (C)	20.9 (31.6)	C (D)
2. SR-70 Southbound / Erle Rd.	Off-ramp	23.0 (27.7)	C (C)	24.4 (27.8)	C (C)	25.8 (28.8)	C (D)
	On-ramp	26.3 (25.3)	C (C)	23.9 (18.3)	C (B)	21.1 (19.7)	C (B)
3. SR-70 Northbound / McGowan Pkwy.	Off-ramp	14.9 (21.1)	B (C)	14.4 (20.5)	B (C)	17.6 (26.8)	B (C)
	On-ramp	16.0 (19.1)	B (B)	13.0 (16.3)	B (B)	N/A (Leisch)	N/A (Leisch)
4. SR-70 Southbound / McGowan Pkwy.	Off-ramp	18.4 (16.3)	B (B)	15.7 (13.7)	B (B)	N/A (Leisch)	N/A (Leisch)
	On-ramp	17.3 (13.5)	B (B)	16.7 (12.9)	B (B)	18.9 (16.1)	B (B)
5. SR-65 Northbound / McGowan Pkwy.	Off-ramp	12.3 (14.8)	B (B)	13.1 (19.6)	B (B)	13.2 (20.8)	B (C)
	On-ramp	13.5 (15.6)	B (B)	11.8 (13.1)	B (B)	10.2 (14.8)	B (B)
6. SR-65 Southbound / McGowan Pkwy.	Off-ramp	17.0 (14.6)	B (B)	15.7 (12.4)	B (B)	16.4 (12.2)	B (B)
	On-ramp	13.3 (12.7)	B (B)	16.6 (15.2)	B (B)	16.9 (14.9)	B (B)
7. SR-70 to SR-65	Interchange Diverge	17.9 (15.2)	B (B)	15.5 (12.4)	B (B)	12.5 (10.6)	B (B)

Notes:

1. Density = passenger vehicles per hour per lane per mile
2. LOS = Level of Service

Source: Fehr & Peers, 2008

VEHICLE QUEUING

Table 12 summarizes the available storage and 95th percentile vehicle queue lengths (from the SimTraffic model results) for the off-ramps at the SR 70/Erle Road and SR 65/McGowan Parkway interchanges (refer to Appendix E for technical calculations). This table also contains recommendations for increased storage at several locations. With these recommendations in place, traffic at these off-ramps is not expected to queue back onto the mainline.

TABLE 12: 95TH PERCENTILE QUEUE LENGTH ESTIMATES AT OFF-RAMPS – DESIGN YEAR CONDITIONS

Intersection	Movement	Available Storage[1]	Alt 3A AM (PM)	Alt 4A AM (PM)	Recommendations
Erle Rd. / SR-70 SB Ramps	SB off - LT	350 ft./lane (2 lanes)	150 ft. (250 ft.)	175 ft. (325 ft.)	--
	SB off - RT	250 ft.	75 ft. (100ft.)	100 ft. (150 ft.)	--
Lindhurst Ave. / SR-70 NB Ramps	NB LT Off-ramp	Not Shown on Plan	150 ft. (225 ft.)	50 ft. (75ft.)	Both alternatives should include 250 feet of storage per lane
	NB RT Off-ramp	Not Shown on Plan	25 ft. (25 ft.)	25 ft. (25 ft.)	
	NB LT Lindhurst Ave.	Not Shown on Plan	25 ft. (25 ft.)	25 ft. (25 ft.)	Provide 200 feet of storage
McGowan Pkwy. / SR-65 SB Ramps	SB LT/TH	275 ft.	600 ft. (100 ft.)	25 ft. (25 ft.)	Alternative 3a should include 400 feet of storage per lane
	SB RT	275 ft.	400 ft. (200 ft.)	100 ft. (50 ft.)	
McGowan Pkwy. / SR-65 NB Ramps	NB LT/TH	300 ft.	200 ft. (225 ft.)	150 ft. (200 ft.)	--
	NB RT	300 ft./lane (2 lanes)	100 ft. (150 ft.)	75 ft. (75 ft.)	--

Notes:

1. Available storage based on geometric drawings for the SR 70/Erle Road (Option D design) and SR 65/McGowan Parkway interchanges

Grey cells indicate that queue length exceeds storage

Source: Fehr & Peers, 2008

A queuing analysis was not conducted for the Yuba River Parkway connector ramps because access control (i.e., location of signals, lanes, etc.) on Yuba River Parkway is unknown. The County and Caltrans have initiated discussions regarding access control limits on Yuba River Parkway. Updated traffic reports will be required for the PA & ED stages of future phasing of this project to address traffic issues, such as queuing analysis, that could not be analyzed during the PSR stage.

YUBA RIVER PARKWAY AND THE DIRECT CONNECTOR RAMPS

This section describes the expected travel demand on Yuba River Parkway and its direct connector ramps under design year conditions.

Alternative 3a

Yuba River Parkway is expected to carry 2,240 AM peak hour vehicles and 2,550 PM peak hour vehicles between the SR 65/McGowan Parkway interchange and the southern edge of the proposed Woodbury Specific Plan. Since the Yuba County General Plan Update Transportation Background Report (2007) identifies 2,630 vehicles per hour as the maximum LOS C volume for a four-lane highway or expressway, a four-lane expressway for this segment would operate acceptably.

Alternative 4a

Yuba River Parkway between the SR 65/McGowan Parkway interchange and the direct connector ramps to/from SR 70 would carry 1,050 AM peak hour vehicles and 1,280 PM peak hour vehicles. This represents less than half the traffic expected on this segment under Alternative 3a. And as such, a two-lane expressway concept would operate acceptably on this segment.

Yuba River Parkway north of the direct connector ramps would carry 4,070 AM peak hour vehicles and 4,590 PM peak hour vehicles. This would require a minimum of three travel lanes in each direction[1].

The northbound SR 70 direct connector ramp to Yuba River Parkway is projected to serve about 1,900 vehicles during the PM peak hour. This volume will require two exiting lanes from SR 70, a two-lane ramp, and two receiving lanes on Yuba River Parkway. The southbound direct connector ramp from Yuba River Parkway to SR 70 is expected to serve 1,460 AM peak hour

[1] Fehr & Peers performed a micro-simulation analysis of the Yuba River Parkway corridor in 2007 in conjunction with the Woodbury Specific Plan. The analysis was based on build-out traffic forecasts, rather than the design year forecasts presented in this report. The analysis identified potential locations for traffic signals, determined the required cross-section of Yuba River Parkway and evaluated other operational concerns such as weaving and sight distance constraints. The analysis indicated that Yuba River Parkway may need to be eight lanes north of the direct connector ramps to accommodate queuing, lane changing, and the expected travel demand. Since the Woodbury Specific Plan is now on hold, the required cross-section will need to be re-evaluated when a new plan is developed.

vehicles and 1,400 PM peak hour vehicles. Fehr & Peers recommends that this be a two-lane ramp that merges to a single lane prior to its connection with SR 70.

EFFECTS ON COUNTY ROADS

This section discusses how Alternatives 3a and 4a would affect traffic conditions and operations on Erle Road, McGowan Parkway, and Lindhurst Avenue, which are three County roads that would be affected by these alternatives.

Erle Road

Under Alternative 3a, Erle Road directly west of Edgewater Circle would carry 4,180 AM peak hour vehicles and 4,260 PM peak hour vehicles. With Alternative 4a, this volume is reduced to 3,340 AM peak hour vehicles and 3,680 PM peak hour vehicles. Although Alternative 4a provides a substantial reduction in traffic, Erle Road would still need to be six lanes from east of Lindhurst Avenue to Yuba River Parkway.

McGowan Parkway

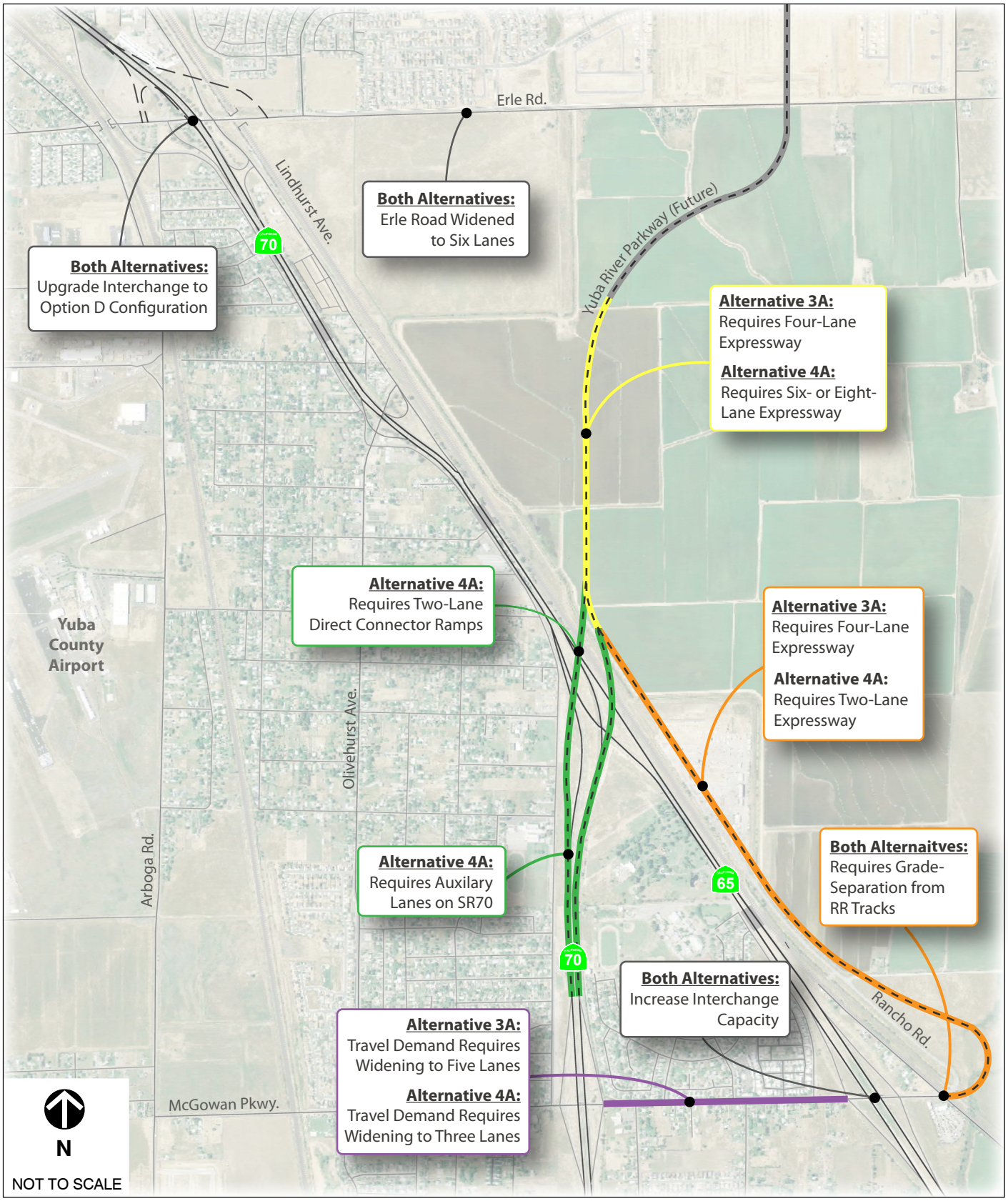
Under Alternative 3a, McGowan Parkway west of its SR 65 interchange would carry 2,170 AM peak hour vehicles and 1,980 PM peak hour vehicles. With Alternative 4a, this volume is reduced to 1,130 AM peak hour vehicles and 940 PM peak hour vehicles. Thus, Alternative 3a would carry almost twice as much traffic on McGowan Parkway between SR 65 and SR 70. Under Alternative 4a, McGowan Parkway between SR 65 and SR 70 would function adequately with two through lanes (with the addition of turn lanes at intersections). However, Alternative 3a would require four through lanes plus a turn lane at intersections to accommodate the expected demand at an acceptable LOS. Since development exists on both sides of the street, widening to a five-lane cross-section may be difficult or undesirable.

Lindhurst Avenue

Under Alternative 3a, Lindhurst Avenue south of the SR 70 NB Ramps intersection would carry 1,190 AM peak hour vehicles and 1,440 PM peak hour vehicles. With Alternative 4a, this volume is reduced to 1,090 AM peak hour vehicles and 1,150 PM peak hour vehicles. This segment of Lindhurst Avenue will likely remain as two lanes under both alternatives. However, Alternative 4a will operate better as a result of adding the direct connector ramps, which reduce the usage of the Lindhurst Avenue NB off-ramp from SR 70.

COMPARISON OF REQUIRED INFRASTRUCTURE FOR ALTERNATIVES 3A AND 4A

Figure 8 shows how Alternatives 3a and 4a differ in terms of the likely required transportation infrastructure on both State and County facilities. As this figure illustrates, the two alternatives share many of the same improvement needs. However, they vary significantly in terms of the type of improvements needed on segments of Yuba River Parkway, SR 70, and McGowan Parkway.



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COMPARISON OF ALTERNATIVES 3A & 4A UNDER DESIGN YEAR CONDITIONS

FIGURE 8