- Determine existing transit and HOV market shares from available data for the Northeast Area.[5-7] The existing transit market share is 3 percent of all trips. Seventeen percent of home to work trips are carried by HOV's with an occupancy of 2.25 persons per vehicle.

- Review Year 2010 transit and HOV forecasts for the Northeast Area from the ***OCTA Countywide Rail Study***. Establish relationships between land use densities and transit market shares for year 2010.

- Determine background transit/HOV market shares associated with "existing" Northeast Area land use densities (4 percent for transit and 23 percent for HOV). Establish maximum allowable transit and HOV market shares for Northeast Area. Transit Maximum: 8 percent additional for higher land use density in a zone and 11 percent additional for proximity to rail station, multimodal center and/or feeder bus service. HOV maximum: 12 percent above background for higher land use density in a zone.

- Compute growth in square footage for all 45 zones in Northeast Anaheim Redevelopment Area from "existing" to the Base Case and Alternative II.

- Determine future increase in the Average Vehicle Ridership (AVR) for HOV's in the Northeast Area assuming that the SR 91, SR 57 and SR 55 carpool lanes will be restricted to 3 or more persons (Areawide HOV AVR increases from 2.25 to 2.50 persons per vehicle). Thus, a 12 percent increase in HOV market share will result in a 7.2 percent reduction in auto traffic.

- Compute percent reduction in auto trips associated with higher zonal employment densities for both the Base Case and Alternative II. (see table for percent reductions due to improved transit and HOV market shares)

- Compute further reductions in auto trips associated with higher transit use in close proximity to commuter rail stations (multimodal centers) and shuttle bus service.

- Total all vehicle reductions for the Base Case and Alternative II and factor into vehicle trip tables. Reductions in vehicle trips are incorporated into the traffic analysis for each land use scenario.

As shown in Table 1, Alternative II, with its superior transit service and more concentrated densities, generates a composite auto reduction of 10.73 percent above the background transit, while the Base Case achieves an overall 7.04 percent auto reduction in the Northeast Anaheim Redevelopment Area.

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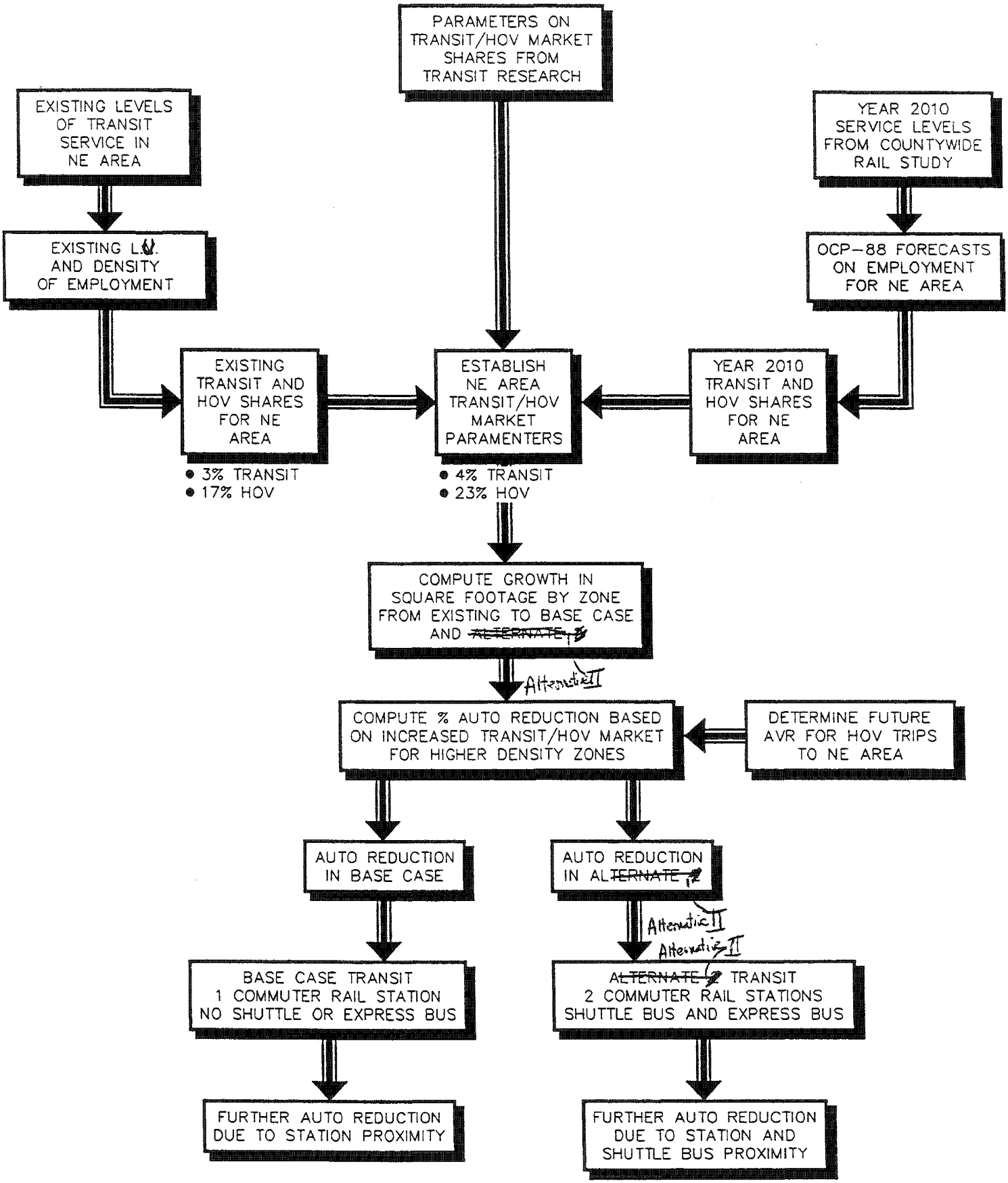
(5) *1976 Urban and Rural Travel Survey (Volume IV: Summary of Findings)*, Caltrans and SCAG.

(6) *Trips In Motion (TR/4)*, LARTS Study, Caltrans.

(7) OCTD Boardings and alightings for February, 1991 Service in Northeast Area.

FIGURE 1
METHODOLOGY FOR TRANSIT / HOV ANALYSIS



NORTHEAST ANAHEIM REDEVELOPMENT AREA TRANSIT ANALYSIS
BASE ALTERNATIVE

Background Transit Usage: 4%
Percent HOV : 23% AVR= 2.5

TAZ	Existing (s.f.)	Base (s.f.)	Growth	Auto Reduction Transit	Auto Reduction HOV	Station/Feeder Bus Proximity	Station/Feeder Bus % Reduc.	Addl. Transit/ HOV Reduction
1	730,754	1,104,962	51%	2.05%	7.07%			9.12%
2	798,705	835,427	5%	0.18%	4.20%			4.38%
3	572,749	785,622	37%	1.49%	5.13%			6.62%
4	0	0	0%	0.00%	0.00%			0.00%
5	483,569	856,072	77%	3.08%	7.20%			10.28%
6	685,461	873,499	27%	1.10%	4.20%			5.30%
7	328,794	398,198	21%	0.84%	4.20%			5.04%
8	863,358	961,881	11%	0.46%	4.20%			4.66%
9	739,949	827,948	12%	0.48%	4.20%			4.68%
10	447,721	606,579	35%	1.42%	4.90%			6.32%
11	1,314,629	1,121,806	-15%	0.00%	4.20%			4.20%
12	3,120,084	3,521,245	13%	0.51%	4.20%			4.71%
13	653,990	951,113	45%	1.82%	6.27%			8.09%
14	25,964	55,486	114%	4.55%	7.20%			11.75%
15	302,892	324,730	7%	0.29%	4.20%			4.49%
16	488,869	625,373	28%	1.12%	4.20%			5.32%
17	93,321	193,470	107%	4.29%	7.20%			11.49%
18	0	0	0%	0.00%	0.00%			0.00%
19	0	0	0%	0.00%	0.00%			0.00%
20	598,000	480,772	-20%	0.00%	4.20%			4.20%
21	318,470	321,629	1%	0.04%	4.20%			4.24%
22	198,610	198,610	0%	0.00%	4.20%			4.20%
23	121,100	176,331	46%	1.82%	6.29%			8.12%
24	63,409	39,333	-38%	0.00%	4.20%			4.20%
25	0	0	0%	0.00%	0.00%			0.00%
26	151,607	308,967	104%	4.15%	7.20%			11.35%
27	543,984	562,138	3%	0.13%	4.20%			4.33%
28	99,162	135,494	37%	1.47%	5.06%			6.52%
29	27,874	45,999	65%	2.60%	7.20%			9.80%
30	899,402	899,402	0%	0.00%	4.20%			4.20%
31	195,021	195,021	0%	0.00%	4.20%			4.20%
34	165,638	301,051	82%	3.27%	7.20%			10.47%
37	1,054,304	1,232,459	17%	0.68%	4.20%			4.88%
38	734,123	1,100,516	50%	2.00%	6.89%			8.88%
39	591,889	712,181	20%	0.81%	4.20%			5.01%
40	108,540	491,827	353%	8.00%	7.20%			15.20%
41	525,477	630,132	20%	0.80%	4.20%			5.00%
42	206,050	147,929	-28%	0.00%	4.20%			4.20%
44	354,858	365,271	3%	0.12%	4.20%			4.32%
45	226,119	212,804	-6%	0.00%	4.20%			4.20%
32	446,243	446,243	0%	0.00%	4.20%	2	11.00%	15.20%
33	337,338	556,172	65%	2.59%	7.20%	2	8.41%	18.20%
35	1,741,713	1,340,943	-23%	0.00%	4.20%	2	11.00%	15.20%
36	870,880	1,200,045	38%	1.51%	5.22%	2	9.49%	16.22%
43	31,898	107,332	236%	8.00%	7.20%	2	3.00%	18.20%
								7.04%

Station / Feeder Bus Proximity: 1 - La Palma Station
2 - Lakeview Station
3 - Feeder Bus Route

BARTON-ASCHMAN ASSOCIATES, INC.

2 Venture, Suite 550 • Irvine, California 92718 USA • (714) 453-1619 • Fax: (714) 453-0323

March 9, 1993

Mr. Alistair Baillie
The IBI Group
18401 Von Karman Ave., Suite 110
Irvine, Ca. 92715

BA Ref.:652093.90100 (prev.4537.01.01)

SUBJECT: ADDENDUM TO TRAFFIC IMPACT STUDY FOR NORTHEAST ANAHEIM REDEVELOPMENT AREA

Dear Alistair:

Barton-Aschman Associates, Inc. prepared a transportation analysis for the Northeast Redevelopment Area Specific Plan and documented our findings in *Traffic Impact Study for the Northeast Anaheim Redevelopment Area*, dated February 19, 1993. The report presented the traffic impacts assuming the Specific Plan was implemented under the Base and Preferred Alternative development plans. Mitigation measures required to achieve level-of-service D or better at the study intersections were identified in this report. For the Preferred Alternative development plan, the traffic analysis identified four intersections which required improvements beyond the assumed Anaheim critical intersection standard or planned Superstreet improvements. In order to achieve level of service D, "further mitigation" was recommended for these locations.

Since the completion of the report, The IBI Group has reassessed the future development potential in the land use zones which include Placentia. Following discussion with the City of Placentia, The IBI Group determined that the majority of the projected business park, corporate headquarters and general office development in Placentia in the Preferred Alternative is more likely to be developed as warehousing and industry. Barton-Aschman was asked to perform capacity analysis at the above-mentioned four intersections under this Revised Preferred Alternative.

This report presents the findings of the capacity analyses at these four intersections for the Revised Preferred Alternative and correlates these findings to those in the transportation analysis performed for the Preferred Alternative.

BACKGROUND

As stated above, under the Preferred Alternative, four study intersections which required improvements beyond the assumed Anaheim critical intersection standard or planned Superstreet improvements, were identified. These four intersections are listed below:

Kraemer Boulevard - La Palma Avenue
Tustin Avenue - La Palma Avenue
Lakeview Avenue - La Palma Avenue
Imperial Highway - La Palma Avenue

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In the *Traffic Impact Study for the Northeast Anaheim Redevelopment Area*, February 19, 1993, critical intersections (with the exception of Tustin Avenue and La Palma, where a modified standard as discussed below, was assumed) were assumed to have dual left-turn lanes, three through lanes and a separate right-turn lane on each approach. Following discussion with the City traffic engineering staff, it was determined that the right-turn lanes at critical intersections would have a free flow operation.

At the intersection of Tustin Avenue and La Palma Avenue, three approaches have already been constructed to provide dual left-turn lanes, two through lanes and a separate right-turn lane on the north and south approaches, and dual left-turn lanes, three through lanes and dual-right-turn lanes on the west approach. With the critical intersection improvements to the east approach to provide dual left-turn lanes, three through lanes and a free flow right-turn lane, this intersection is projected to operate at level of service F, with an ICU of 1.13 in the morning peak-hour period, and level of service F, with an ICU of 1.25 in the evening peak-hour period.

At the intersection of Kraemer Boulevard and La Palma Avenue, the critical lane configuration results in a level of service B with an ICU of 0.67 in the morning peak-hour period, and level of service D, with an ICU of 0.83 in the evening peak-hour period. This intersection no longer requires "further mitigation".

At the intersection of Lakeview Avenue and La Palma Avenue, these critical lane configurations result in a level of service E with an ICU of 0.96 in the morning peak period and in level of service E with an ICU of 1.00 in the evening peak period.

The intersection of Imperial Highway and La Palma Avenue, under the proposed Imperial Highway Superstreet Project lane configurations, is projected to operate at level of service E, with an ICU of 0.92 in the morning peak period and at level of service F, with an ICU of 1.17 in the evening peak-hour period.

Figure 1 provides the lane configurations at these intersections without "further mitigation." Table 1 provides the levels of service and ICU's at these intersections for the Preferred Alternative in the morning and evening peak-hour periods. Morning and evening peak-hour volumes for the Preferred Alternative can be found on Figures 13 and 14, respectively, in *Traffic Impact Study for the Northeast Anaheim Redevelopment Area*, February 19, 1993. ICU worksheets are presented in the Appendix to this letter-report.

"Further mitigation" to achieve level of service D or better identified the need for four through lanes on the north and west approaches and triple left-turn lanes on the east approach at Tustin Avenue - La Palma Avenue; four through lanes on the north and west approaches at Lakeview Avenue - La Palma; and triple left-turn lanes on the south approach of the intersection of Imperial Highway and La Palma Avenue. The intersection configurations with these mitigations are presented on Figure 20 of *Traffic Impact Study for the Northeast Anaheim Redevelopment Area*, February 19, 1993. While these improvements may be physically implementable, other factors, such as excessive right-of-way acquisition costs, land use impacts, traffic signal operations, and undesirable aesthetics may make these "further mitigations" infeasible.

REVISED PREFERRED ALTERNATIVE

Capacity analysis for the morning and evening peak-hour periods was performed at the four intersections assuming the Revised Preferred Alternative land uses and critical intersection or Superstreet lane configurations without "further mitigation". The Revised Preferred Alternative assumes less intense industrial and warehousing land uses in zones 25, 31 and 32 than assumed in the Preferred Alternative. The Revised Preferred Alternative building square footage at buildout is shown in Table 2. The Preferred Alternative square footage at buildout can be found on Table 11 of *Traffic Impact Study for the Northeast Anaheim Redevelopment Area*, February 19, 1993.

Morning peak-hour volumes for the Revised Preferred Alternative are presented in Figure 2. Evening peak-hour volumes for the Revised Preferred Alternative are presented in Figure 3. The lane configuration assumed for the capacity analyses for the Revised Preferred Alternative and the results thereof are presented in Figure 1 and Table 1, respectively.

Under this alternative, the intersection of Kraemer Boulevard and La Palma Avenue will operate acceptably at level of service B, with an ICU of 0.66 in the morning peak-hour period, and at level of service D, with an ICU of 0.83 in the evening peak-hour period. The intersection of Tustin Avenue and La Palma Avenue will operate at level of service F, with an ICU of 1.13 in the morning peak-hour period, and at level of service F, with an ICU of 1.20 in the evening peak period. The intersection of Lakeview Avenue - La Palma Avenue will operate at level of service E, with an ICU of 0.94 in the morning peak period, and level of service E, with an ICU of 0.96 in the evening peak-hour period. The intersection of Imperial Highway at La Palma will operate at level of service E with an ICU of 0.91 in the morning peak-hour period and at level of service F with an ICU of 1.16 in the evening peak-hour period.

In order to achieve level of service D, "further mitigation" such as four through lanes and triple left-turn lanes at some intersections, similar to that for the Preferred Alternative, is required. As stated earlier, implementation of this "further mitigation" may be unfeasible. Since the Orange County Congestion Management Program (CMP) identifies level of service E as acceptable in urbanized area, further mitigation to achieve level of service E was identified at the two intersections which were projected to operate at level of service F in either the morning or the evening peak hour period. Table 1 presents the results of the level of service analysis with mitigation to level of service E for the Revised Preferred Alternative. Figure 4 shows the intersection lane configurations for these mitigated conditions.

The intersection of Imperial Highway and La Palma is a CMP intersection. In order to achieve level of service E during both peak periods, the proposed Superstreet configuration with a free flow right-turn lane or dual right-turn lanes on the west approach (dual left turn lanes, three through lanes and an optional through or right-turn lane on the south approach; dual left-turn lanes, four through lanes and a separate right-turn lane on the north approach; dual left-turn lanes, three through lanes and a separate right turn lane on the east approach; and dual left-turn lanes, three through lanes and a free-flow right-turn lane or dual right-turn lanes on the west approach) is required. Under either configuration, the intersection is projected to operate at an ICU of 0.91 during the morning and evening peak hour periods.

In order to achieve level of service E, with an ICU of 0.97 at the intersection of Tustin Avenue - La Palma (which is not a CMP intersection) in the evening peak-hour period, the following intersection configuration is needed: dual left-turn lanes, three through lanes and a free-flow right-turn lane on the south approach; dual left-turn lanes, three through lanes, and a free-flow right turn lane on the east approach; dual left-turn lanes, three through lanes and a free-flow right-turn lane on the north approach; and dual left-turn lanes, four through lanes and a free-flow right turn lane on the west approach. With this configuration, the intersection is projected to operate at level of service E, with an ICU of 0.97 in the morning peak-hour period as well.

However, comparison with the preliminary results of the City's General Plan traffic study at this intersection indicates that the critical intersection standard, with two separate right-turn lanes on the west approach, will result in acceptable traffic conditions in year 2010. The City's traffic analysis model projects lower volumes on the west approach of this intersection than Barton-Aschman's model. Since it is likely that Barton-Aschman's projections for through traffic growth on La Palma Avenue may be conservative (and thus, too high), it is recommended that this intersection be improved to the General Plan traffic study-identified lane configuration (that is, dual left-turn lanes, three through lanes and free flow right-turn lanes on the north, south and east approaches and dual left-turn lanes, three through lanes and two right-turn lanes on the west approach).

CONCLUSIONS

Barton-Aschman performed traffic analyses for the Northeast Area Specific Plan assuming the Preferred Alternative land uses at buildout. The findings of these analyses are documented in *Traffic Impact Study for the Northeast Anaheim Redevelopment Area*, February 19, 1993. Since the preparation of this report, the Preferred Alternative has been modified to reflect less intense growth in Placentia, as presented in the Revised Preferred Alternative.

Due to this revision, less trips will be generated by the Specific Plan that indicated in the February traffic report. Many of the study intersections will be positively affected by this reduction in trip generation. Hence, the results of the February traffic report can be considered conservative in terms of the Revised Preferred Alternative, and present a "worst case" scenario in terms of traffic impacts.

However, four study intersections in the February report were identified as requiring "further mitigation" beyond the assumed critical intersection or Superstreet project standard to achieve level of service D or better during both the morning and evening peak periods. These four intersections were reanalyzed assuming the Revised Preferred Alternative and free-flow right-turn lanes on critical intersection approaches. Based on this subsequent analysis, three intersections are projected to operate at level of service E or worse during the morning and/or evening peak-hour periods. Since mitigation to level of service D at these locations requires physical improvements which may not be feasible (due to excessive right-of-way constraints, for example), and the Orange County Congestions Management Program identifies level of service E as acceptable, mitigation measures have been identified to achieve level of service E or better. While "further mitigation" is identified in this report for the intersection of Tustin Avenue and La Palma Avenue, these improvements are <u>not</u> recommended in favor of those identified in the preliminary traffic analysis for the General Plan update.

In conclusion, the improvements identified in the February 1993 traffic study, in combination with the improvements identified in this addendum report for the intersections of Kraemer Boulevard - La Palma Avenue, Lakeview Avenue - La Palma Avenue and Imperial Highway - La Palma Avenue, and those identified in the preliminary General Plan traffic analysis for Tustin Avenue - La Palma Avenue, will mitigate traffic impacts resulting from the proposed Revised Preferred Alternative land uses in the Northeast Anaheim Redevelopment Area Specific Plan.

If you have any questions or require additional information regarding the above, please give me a call at (714) 453-1619.

Sincerely,
BARTON-ASCHMAN ASSOCIATES, INC.,

Tijana S. Hamilton

Tijana Stojsic Hamilton, P.E.
Senior Associate

attachments

cc: Michael L. Welch, ARA (with attachments)

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TABLE 1

NORTHEAST ANAHEIM REDEVELOPMENT AREA

REVISED INTERSECTION CAPACITY ANALYSES RESULTS

AM PEAK HOUR	Preferred Alternative		Revised Preferred Alternative		Revised Preferred Alternative Mitigated	
Intersection	ICU	LOS	ICU	LOS	ICU	LOS
La Palma-Kraemer	0.67	B	0.66	B		
La Palma-Tustin	1.13	F	1.13	F	0.97	E
La Palma-Lakeview	0.96	E	0.94	E		
La Palma-Imperial	0.92	E	0.91	E	0.91	E

PM PEAK HOUR	Preferred Alternative		Revised Preferred Alternative		Revised Preferred Alternative Mitigated	
Intersection	ICU	LOS	ICU	LOS	ICU	LOS
La Palma-Kraemer	0.84	D	0.83	D		
La Palma-Tustin	1.25	F	1.20	F	0.97	E
La Palma-Lakeview	1.00	E	0.96	E		
La Palma-Imperial	1.17	F	1.16	F	0.91	E

TABLE 2

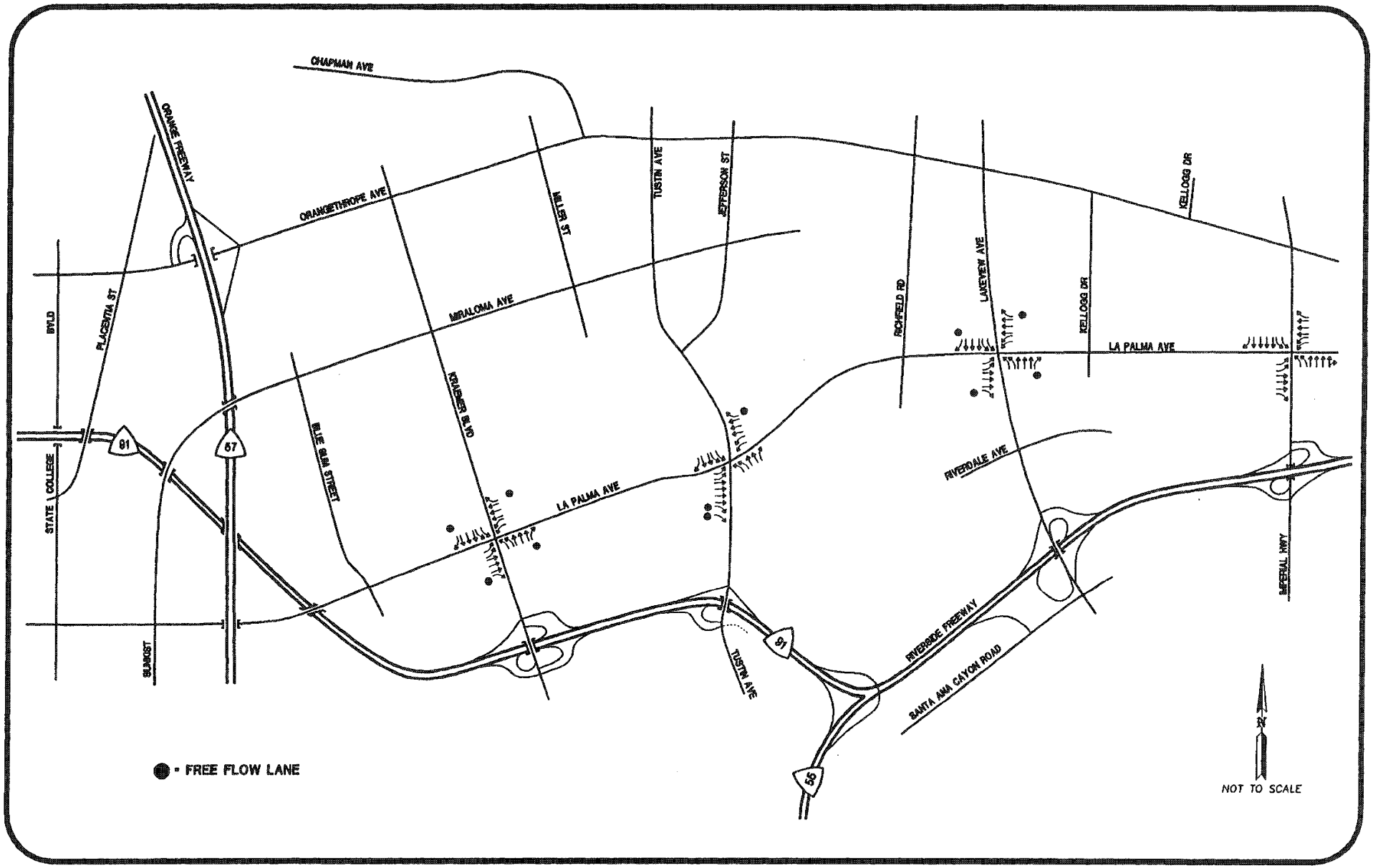
Northeast Area Specific Plan
Land Use Analysis
Overall - Modified

Zones with change in allocation

Building SqFt at Build Out

% Retail	TAZ	Warehousing	Industry	Business Park	Corporate Headquarters	General Office	Retail	Residential	Public/Utility	Vacant	Totals
1%	T00						3,856	303,623			307,479
9%	T01	67,446	512,574	286,431	103,315		94,706				1,064,472
	T02	143,316	276,303	379,086							798,705
10%	T03	11,270	512,711	274,154			90,260				888,395
4%	T04	4,376	177,899	194,808			13,809				390,893
9%	T05	43,746	488,163	127,994		34,246	70,377				764,525
15%	T06	34,404	219,715	506,034	54,232	14,533	146,686				975,603
3%	T07		376,748			10,927	11,932				399,607
2%	T08	7,146	386,520	399,667		8,400	19,633				821,366
9%	T09	11,708	481,771	167,669	118,332		73,425				852,904
25%	T10	56,575	188,858	155,463	46,825		149,052				596,773
7%	T11		248,349	511,914	302,190	171,014	102,143	73,810			1,409,421
1%	T12	97,864	2,641,146	111,316	508,189	31,547	32,279				3,422,340
8%	T13			639,857	220,017	364,017	111,160				1,335,050
30%	T14		18,699	34,193	21,371	16,028	38,200				128,491
	T15		297,857		40,035						337,892
8%	T16		44,945	304,970	172,572	172,572	63,916				758,975
10%	T17				143,922	143,922	31,983				319,826
100%	T18						375,000				375,000
	T19										
7%	T20					930,096	70,011				1,000,107
10%	T21			106,400	79,800	79,800	29,555				295,555
9%	T22		79,610	33,496	129,244	66,992	30,107				339,448
11%	T23		124,115	19,200			18,135				161,450
10%	T24		63,409	43,314	64,971	86,628	29,673				287,996
10%	T25	21,699	121,517				15,913				159,129
6%	T26		92,756	152,086	35,707	47,609	19,617				347,775
1%	T27	12,300	70,277	175,303	195,082	3,867	3,704		32,384		492,917
52%	T28		86,772			32,390	130,964				250,126
	T29					27,874					27,874
	T30			899,402							899,402
4%	T31	81,284	127,598	56,079	80,443		16,709	111,633			473,747
5%	T32	57,490	407,653	198,603	197,234		46,320	6,700	1		914,001
20%	T33	12,115	276,048	115,476	136,306	26,659	145,090				711,693
10%	T34	6,204	89,010	133,138	86,860	24,817	37,820				377,849
1%	T35	67,000		267,620	1,118,735	5,739	13,884				1,472,977
6%	T36	46,902	166,712	134,000	1,077,810	95,203	101,187				1,621,815
11%	T37		124,832	243,912	1,091,543	17,239	189,625				1,667,151
10%	T38	101,890	359,742	206,449	319,352	48,716	119,908				1,156,058
8%	T39	17,642	63,877	365,768	115,254	184,406	63,517				810,464
10%	T40	19,688	271,760	94,503		32,060	44,332				462,342
10%	T41	72,000	8,848	17,718	480,666	7,383	67,193				653,808
22%	T42	48,787	45,250	152,982			71,389				318,408
7%	T43		93,339	1,510	3,775	629	7,484				106,738
9%	T44		32,625	56,131	168,392	168,392	43,657				469,197
10%	T45			238,172	214,355	142,903	66,159				661,589
	Totals	1,042,854	9,578,005	7,804,816	7,326,528	2,996,610	2,810,371	495,766	32,385		32,087,335

Notes: Traffic zone T00 is a new zone in the north section of sub-area 1 that has been included in the analysis. It consists of primarily residential land uses.

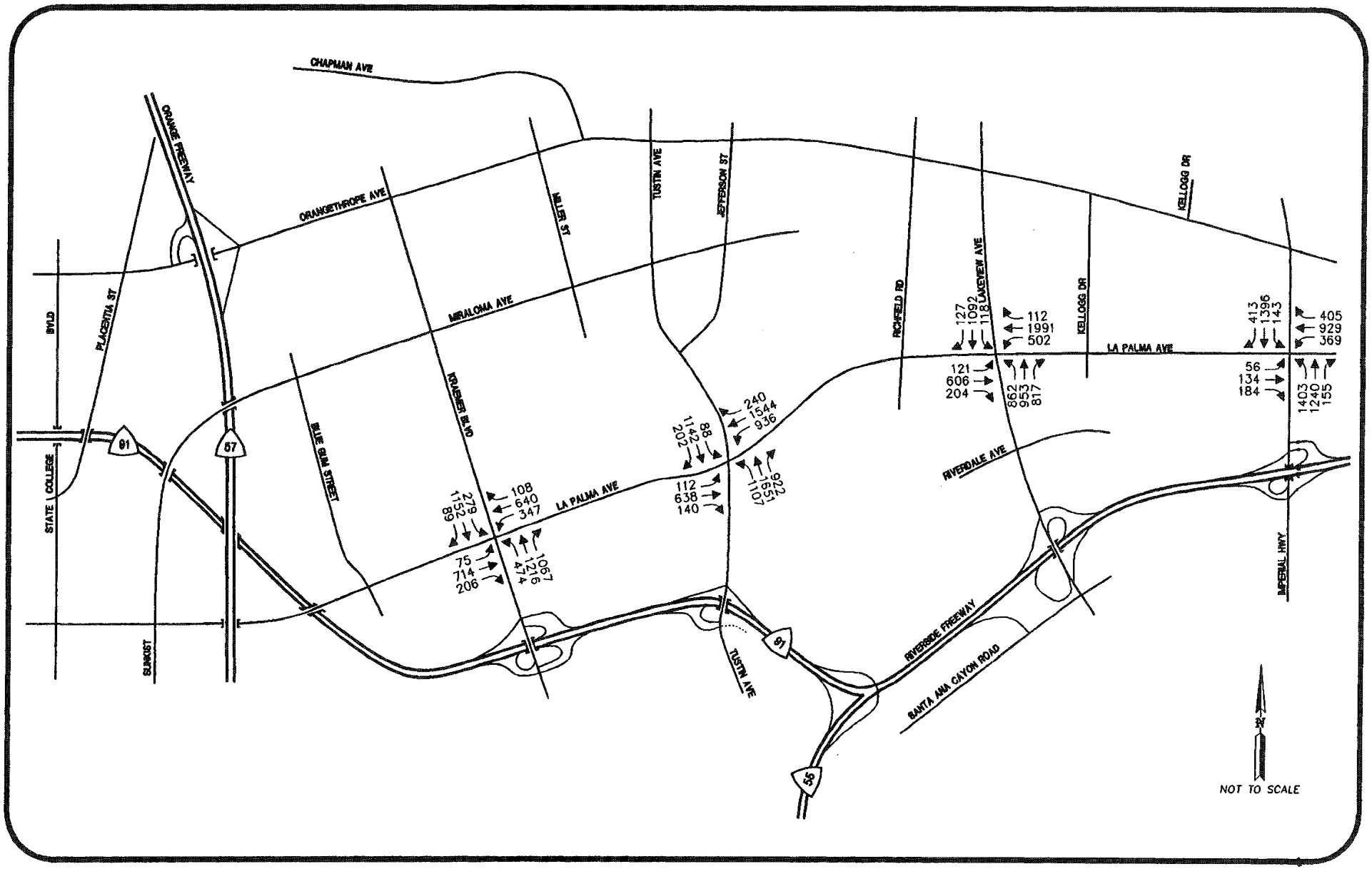


LANE CONFIGURATIONS - CRITICAL AND SUPER STREET INTERSECTIONS

Barton-Aschman Associates Inc.

NORTHEAST ANAHEIM REDEVELOPMENT AREA

FIGURE 1

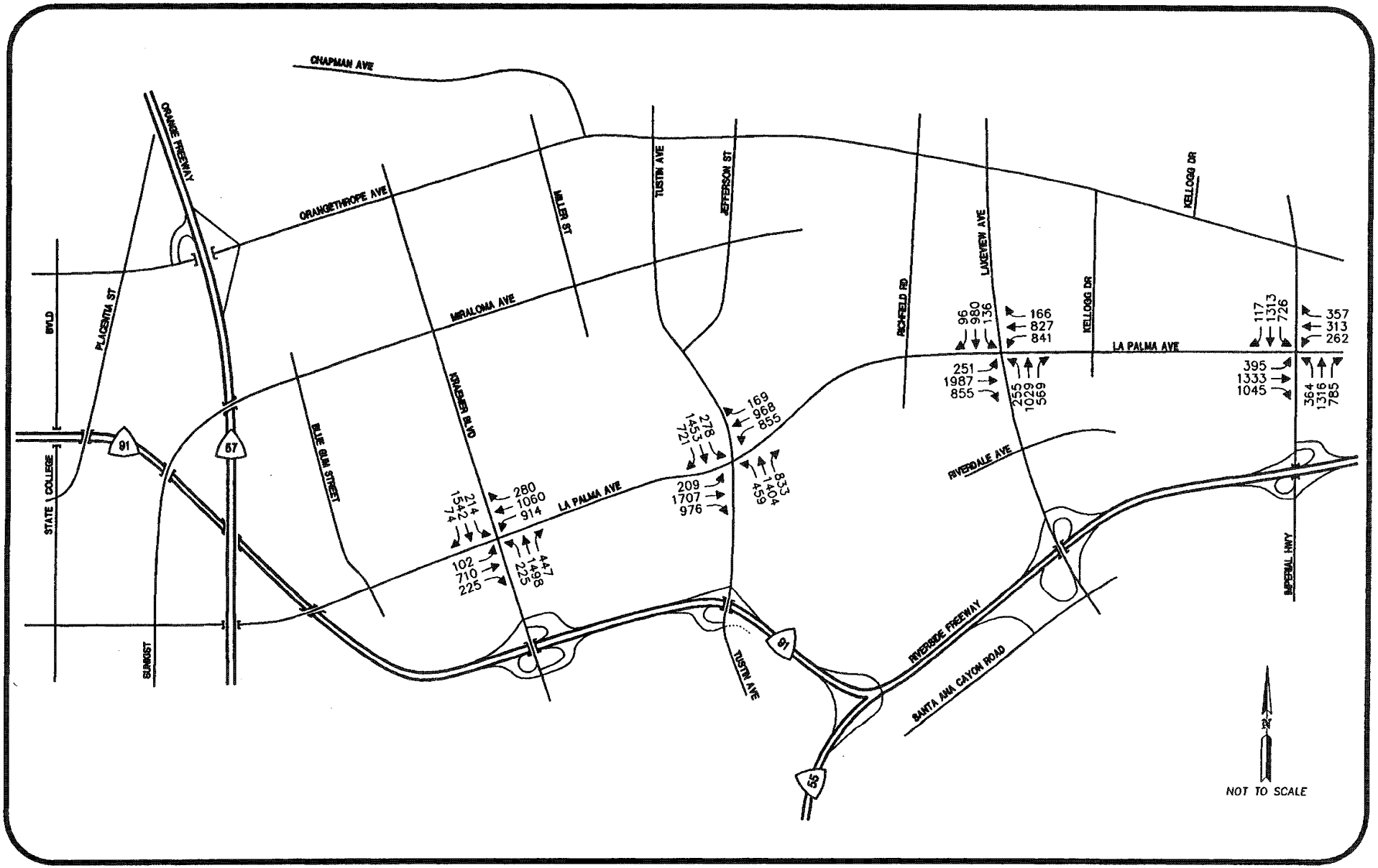


2010 MORNING PEAK HOUR TRAFFIC VOLUMES - REVISED PERFERRED ALTERNATIVE

Barton-Aschman Associates Inc.

NORTHEAST ANAHEIM REDEVELOPMENT AREA

FIGURE 2

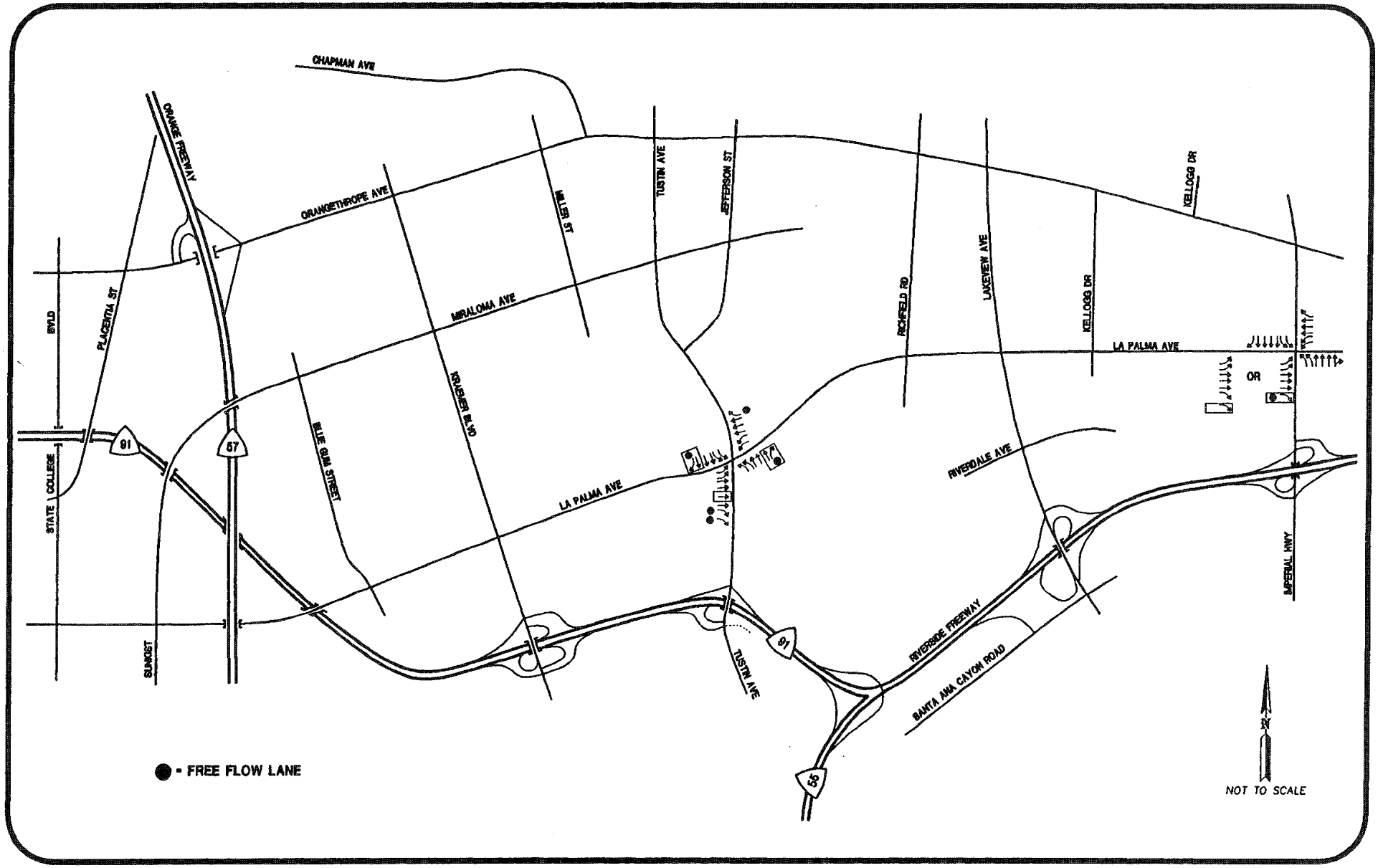


2010 EVENING PEAK HOUR TRAFFIC VOLUMES - REVISED PERFERRED ALTERNATIVE

Barton-Aschman Associates Inc.

NORTHEAST ANAHEIM REDEVELOPMENT AREA

FIGURE 3



LANE CONFIGURATIONS - REVISED PREFERRED ALTERNATIVE - MITIGATED TO LEVEL OF SERVICE E

Barton-Aschman Associates Inc.

NORTHEAST ANAHEIM REDEVELOPMENT AREA

FIGURE 4

APPENDIX

CAPACITY WORKSHEETS

PROJECT TITLE: NORTH-EAST ANAHEIM REDEVELOPMENT
INTERSECTION : LA PALMA AVENUE @ KRAEMER BOULEVARD
DESCRIPTION : 2010 PREFERRED ALTERNATIVE - AM PEAK HOUR (CRIT.)

CAPACITY		RT. TURN ON RED (cr) vpc:	0
THRU Lane:	1700 vph.	CYCLE LENGTH (secs.) :	70
LEFT Lane:	1700 vph.	AMBER (% of cycle) :	5
DOUBLE LT PENALTY:	0 %	V/C ROUND OFF (decs.) :	2

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
NORTH	RT	0	0	0	0	N-S(1):	0.37
	TH	3	1157	5100	0.23	N-S(2):	0.33
	LT	2	279	3400	0.08	E-W(1):	0.15
EAST	RT	0	0	0	0	E-W(2):	0.25
	TH	3	646	5100	0.13		
	LT	2	347	3400	0.1	V/C:	0.62
SOUTH	RT	0	0	0	0	AMBER:	0.05
	TH	3	1265	5100	0.25		
	LT	2	474	3400	0.14		
WEST	RT	0	0	0	0	ICU:	0.67
	TH	3	749	5100	0.15		
	LT	2	75	3400	0.02	LOS: B	