Pasadena more accurately, the ICU methodology was modified to acknowledge the observed field data for saturation flows by using a capacity of 1,700 vphpl for traffic signals along interconnected corridors controlled by the City's Traffic Management Center (TMC). The City has established a capacity of 1,600 vphpl for those intersections that are not connected to the City's TMC, but instead operate independently. Therefore, for the purpose of the analysis, a capacity of 1,700 vehicles per lane per hour was assumed in the capacity calculations for the three signalized study intersections on Orange Grove Boulevard in accordance with City of Pasadena policy.

The other two study intersections, Grand Avenue & Bellefontaine Street and Arroyo Boulevard & Grand Avenue, are two-way stop-controlled intersections. Levels of service at these two intersections were evaluated using stop-control methodology from *2000 Highway Capacity Manual* (2000 HCM) (Transportation Research Board, 2000), which determines the average vehicle delay and the level of service using the relationship indicated in Table 3. Level of service categories range from excellent, nearly free-flow traffic at LOS A to overloaded, stop-and-go conditions at LOS F.

Existing Peak Hour Intersection Levels of Service

Table 4 summarizes the results of the analysis conducted at the five locations to assess the existing operating conditions at these intersections, including the V/C ratio (or delay) and corresponding LOS at each of the study intersections during the morning, midday, and afternoon peak hours. As shown in Table 4, all five intersections currently operate at acceptable levels of service (LOS D or better) during all peak periods.

EXISTING TRANSIT SERVICE

Existing transit service in the vicinity of the proposed project site is provided by the Los Angeles County Metropolitan Transportation Authority (Metro) Line 256. Metro Line 256 is a local north-south line that travels from Commerce to Altadena. This line provides service to the Del Mar and Allen Avenue Metro Gold Line Stations. This line travels along Orange Grove Boulevard and California Boulevard in the study area.

TABLE 3
LEVEL OF SERVICE DEFINITIONS FOR STOP-CONTROLLED INTERSECTIONS

Level of Service	Average Vehicle Delay (seconds)
A	≤ 10.0
B	> 10.0 and ≤ 15.0
C	> 15.0 and ≤ 25.0
D	> 25.0 and ≤ 35.0
E	> 35.0 and ≤ 50.0
F	≤ 50.0

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

TABLE 4
YEAR 2006 EXISTING CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing Conditions Year 2006	
		V/C or Delay (seconds)	LOS
1. Orange Grove Bl & California Bl	A.M.	0.840	D
	MID	0.701	C
	P.M.	0.750	C
2. Orange Grove Bl & Bellefontaine Bl	A.M.	0.590	A
	MID	0.497	A
	P.M.	0.510	A
3. Orange Grove Bl & Madeline Dr	A.M.	0.506	A
	MID	0.415	A
	P.M.	0.495	A
4. Grand Av & Bellefontaine St [a]	A.M.	32.8	D
	MID	11.0	B
	P.M.	13.1	B
5. Arroyo Bl & Grand Av [a]	A.M.	11.0	B
	MID	10.2	B
	P.M.	13.1	B

Notes:
[a] Intersection is controlled by stop sign(s). Analysis was done using Highway Capacity Manual stop-controlled methodology. For the purpose of evaluating the operating conditions of the intersection, average vehicular delay in seconds is reported rather than V/C ratio.

III. FUTURE TRAFFIC CONDITIONS

In order to evaluate properly the potential traffic impact of the proposed student enrollment increase and the driveway reconfiguration project on the local street system, it was necessary to develop estimates of future traffic conditions both with and without the proposed project. Forecasts of future traffic conditions without the proposed project reflect traffic increases due to general regional growth and development as well as traffic expected to be generated by other specific developments in the vicinity of the project site. These conditions are known as the cumulative base conditions (i.e., no project conditions). The additional amount of traffic expected to result from the proposed project and related school traffic shifts was then estimated and separately assigned to the surrounding street system. The sum of the cumulative base and project-generated net traffic represents the cumulative plus project conditions. The development of these future traffic scenarios is described in this chapter.

CUMULATIVE BASE TRAFFIC PROJECTIONS

The cumulative base traffic projections reflect growth in traffic over existing conditions from two sources: growth in the existing traffic volumes to reflect the effects of overall regional growth and development outside the study area, and traffic generated by specific projects located within, or in the vicinity of, the study area. These factors are described below.

Ambient Growth in Traffic

While the estimated 1.0% - 1.5% annual growth factor has been used for other traffic studies for projects elsewhere in the City of Pasadena, the Pasadena General Plan Mobility Element Model suggests that the growth rate for streets in the vicinity of the project will be less than 0.5% per year. Given the fact that that most land uses on Grand Avenue and Bellefontaine are single-family residential uses, an annual growth rate of 1% was estimated for the two study intersections on Grand Avenue to reflect future traffic volumes in the year 2013. While the

majority of the land uses on Orange Grove Boulevard are also residential uses, a higher estimate of 1.5% was used for other three study intersections along Orange Grove Boulevard to reflect higher background traffic growth because of the proximity of these three intersections to major arterials and the regional freeway system. Therefore, assuming project completion in the year 2013, the existing 2006 traffic volumes were increased by approximately 7% for the two study intersections on Grand Avenue and 10.5% for the three study intersections on Orange Grove Boulevard to reflect ambient regional growth between 2006 and 2013.

Traffic Generation of Cumulative Development Projects (Related Projects)

Traffic expected to be generated by specific development projects within, or in the vicinity of, the study area was also considered. Information regarding potential future projects that are either under construction, planned, or proposed for development was obtained from several sources including City of Pasadena files and previous traffic studies conducted in the vicinity of the proposed project. A total of 43 related projects were identified, as shown in Table 5, and their locations are illustrated in Figure 5. As can be seen in Figure 5, the majority of the related projects are located north and east of the project site.

Trip Generation. Trip generation estimates for the related projects were calculated using a combination of previous study findings and the trip generation rates contained in *Trip Generation, 7th Edition* (Institute of Transportation Engineers, 2003). As shown in Table 5, it was projected that the 43 related projects would generate a combined total of approximately 63,944 daily trips, including approximately 4,369 morning peak hour trips, 3,039 midday peak hour trips, and 5,904 afternoon peak hour trips. These projections are conservative in that they do not in every case account for either the existing uses to be removed or the likely use of non-motorized travel modes (transit, walking, etc.).

Trip Distribution/Assignment. Using the trip generation estimates and trip distribution patterns dependent on the type and density of the proposed land use, the geographic distribution of population from which the employees and potential patrons of the proposed projects could be drawn, and the location of the projects in relation to the surrounding street system, traffic expected to be generated by the identified related projects was assigned to the street network. These related project only traffic volumes were then added to the existing traffic

TABLE 5
CUMULATIVE PROJECT TRIP GENERATION ESTIMATES

ID	ADDRESS	LAND USE	ITE Land Use Code	TRIP GENERATION ESTIMATES								
				Daily	A.M. Peak Hour [1]			P.M. Peak Hour [1]			MIDDAY Peak Hour [2]		
				Trips	In	Out	Total	In	Out	Total	In	Out	Total
1	310 S Arroyo Parkway	68 unit condominium development over retail and 2 levels of parking	condo (230)	398	5	25	30	23	12	35	15	8	23
2	355 E Colorado Blvd	7 Story 36 Unit and 6 Story 23 Unit Condominium Project	condo (230)	346	4	22	26	21	10	31	14	7	21
3	385 E Colorado Blvd	255.000 S Story Office Building	office (710)	2.808	348	47	395	65	315	380	7	32	39
4	592 E Colorado Blvd	146 residential units over retail with 4 levels of subterranean parking	condo (230)	856	11	53	64	51	25	76	33	16	49
5	621 E Colorado Blvd	304 Residential Units, 882 parking spaces,14 602 sqft retail	condo (230)	1.781	23	111	134	106	52	158	69	34	103
			retail (820)	627	9	6	15	26	29	55	20	22	42
			Subtota	2.408	32	117	149	132	81	213	89	56	145
6	720 E Colorado Blvd	5-story Mixed Use over parking, 8.000 sqft commercial, 120 units	condo (230)	703	9	44	53	42	20	62	27	13	40
			retail (820)	344	5	3	8	14	16	30	11	12	23
			Subtota	1.047	14	47	61	56	36	92	38	25	63
7	65 W Dayton St	4-story Mixed-use Development - 42 Apt Units & 12.700 sqft Office/Retail	condo (230)	23	0	2	2	1	1	2	1	1	2
			office (710)	74	9	1	10	2	8	10	0	1	1
			retail (820)	258	4	2	6	11	12	23	8	9	17
				355	13	5	18	14	21	35	9	11	20
8	250 S Delacey Ave	Six-story mixed-use project w/ 34 condominiums & 8.594 sqft commercial	condo (230)	199	3	12	15	12	6	18	8	4	12
			commercial (820)	369	5	4	9	15	17	32	11	13	24
			Subtota	568	8	16	24	27	23	50	19	17	36
9	760 N Fair Oaks Ave	Multi-family Affordable Senior Residential - 106 Units/4 000 Commercial	Senior apt (253)	214	4	2	6	10	8	18	7	5	12
			commercial (820)	172	2	2	4	7	8	15	5	6	11
			Subtota	386	6	4	10	17	16	33	12	11	23
10	3 S Grand Ave	Rehabilitation of historic bungalows & construction of 25 new units	condo (230)	147	2	9	11	9	4	13	6	3	9
11	840 E Green St	Mixed-use project 103 residential units & commercial space	condo (230)	604	8	37	45	36	18	54	23	12	35
12	100 W Green St	Four-story mixed-use project w/ 61 residential units & 8 878 sqft commercial	condo (230)	357	5	22	27	21	11	32	14	7	21
13	169 W Green St	Five Story Mixed-use Development - 38 Apt Units & 8.200 sqft Retail	condo (230)	223	3	14	17	13	7	20	8	5	13
			retail (820)	356	5	4	9	15	16	31	11	12	23
			Subtota	579	8	18	26	28	23	51	19	17	36
14	300 W Green St	1431 Residential Units	condo (230)	8.386	107	523	630	498	246	744	324	160	484
15	160 S Hudson Ave	Four-story 72 residential units & 2 045 sqft retail	condo (230)	422	5	27	32	25	12	37	16	8	24
			retail (820)	88	1	1	2	4	4	8	3	3	6
			Subtota	510	6	28	34	29	16	45	19	11	30
16	203 N Lake Ave	230.000 sf 6-story office building	office (710)	2.532	314	43	357	58	285	343	6	29	35
17	220 N Lake Ave	6 story - 9 200 sf retail, 9,200 sf office and 94 condominium units - 180.382 sf total	condo (230)	551	7	34	41	33	16	49	21	10	31
			office (710)	101	12	2	14	2	12	14	0	1	1
			retail (820)	395	5	4	9	17	18	35	13	14	27
			Subtota	1.047	24	40	64	52	46	98	34	25	59
18	175 S Lake Ave	5 Story 115.000 SF Office with 485 Parking Spaces	office (710)	1.266	157	21	178	29	142	171	3	14	17
19	255 N Madison Ave	4 Story 160 unit Student Housing Complex 4 buildings over subterranean parking	condo (230)	938	12	58	70	56	27	83	36	18	54
20	128 N Oak Knoll	4 story 53 Condominium Project	condo (230)	311	4	19	23	19	9	28	12	6	18
21	466 E Orange Grove Blvd	3 story mixed use project w/ 31 residential units & 24.704 sf commercial	condo (230)	182	2	12	14	11	5	16	7	3	10
			commercial (820)	1.061	15	10	25	45	48	93	34	36	70
			Subtota	1.243	17	22	39	56	53	109	41	39	80
22	35 N Raymond Ave	4 story mixed use project w/ 38 residential units & 13.845 sq ft commercial	condo (230)	223	3	14	17	13	7	20	8	5	13
			commercial (820)	595	9	5	14	25	27	52	19	20	39
			Subtota	818	12	19	31	38	34	72	27	25	52
23	129 N Raymond Ave	Demo & Rebuild of Raymond Theatre & Addition Of New Building - 39 600 sq ft	theater (443)	3.091	5	4	9	134	110	244	101	83	184
24	252 S Raymond Ave	Gold Line Joint Dev 347 units, 11.000 sq ft retail and 1 200 parking spaces	condo (230)	2.033	26	127	153	121	59	180	79	38	117
			retail (820)	472	7	4	11	20	21	41	15	16	31
			Subtota	2.505	33	131	164	141	80	221	94	54	148
25	950 San Pasquel St	4 story - 72 unit residential development	condo (230)	422	5	27	32	25	12	37	16	8	24
26	775 E Union St	4 story 98 unit senior housing project plus 78 parking space	senior apt (253)	198	4	2	6	9	8	17	6	5	11
27	Pico St and Raymond Ave	Construct 56 819 square feet of medical office space and demolish12 650 square feet of retail and manufacturing uses	medical office (720)	2.053	111	30	141	57	154	211	6	15	21
			retail (820)	-190	-3	-2	-5	-8	-9	-17	-6	-7	-13
			manufacturing (140)	-31	-5	-1	-6	-2	-4	-6	0	0	0
			Subtota	1.832	103	27	130	47	141	188	0	8	8
28	451-455 S Arroyo Parkway [3]	45.700 sf super market 17 100 drug store 8.200 sf nursery garden center	supermarket (850) drug store w/drive thru (881) nursery garden center (817)	3.211	23	20	43	146	139	285	110	104	214
29	40 E California Blvd [3]	7200 sf addition to draper cleaning service	light industrial (110)	50	6	1	7	1	6	7	0	1	1
30	100 W California Blvd [3]	152.275 sf west wing of Huntington memorial hospital	hospital (610)	2.675	122	60	182	59	120	179	44	90	134
31	70-100 W California Blvd [3]	construct 195.000 sf medical office, demolish 21.000 sf warehouse, 10.639 sf pharmacy, and 1 968 office	Medical Office (720) Warehousing (150) Pharmacy (880) Office (710)	5.059	259	66	325	89	281	370	9	28	37
32	250 S De Lacey Ave [3]	34 condos and 5 000 sf of retail	Condo (230) Office (710)	213	5	12	17	12	8	20	9	6	15
33	909 S Fair Oaks Ave [3]	78.200 sf retail and 40 000 sf office	[3]	1.774	11	12	23	88	64	152	66	48	114
34	951 S Fair Oaks Ave [3]	47-unit assisted living with 51 bedrooms	Assisted Living (2540	140	6	2	8	7	12	19	5	8	13
35	511 S Marengo Ave [3]	6 condos	[3]	35	1	2	3	2	1	3	1	1	2
36	1088 S Marengo Ave [3]	11 condos	[3]	64	1	4	5	4	2	6	3	1	4
37	240 S Raymond Ave [3]	349 apartments 8 000 SF restaurant 7 000 sf retail	[3]	2.867	59	145	204	159	91	250	119	68	187
38	620 S Raymond Ave [3]	demolish warehouse and construct 59 476 sf medical office building	[3]	1.938	112	27	139	50	149	199	5	15	20
39	766 S Raymond Ave [3]	30 000 sf medical office and 250 Gold Line Light Rail Park-and-Ride spaces (Fillmore Station/Medical Center)	medical office (720)	1.084	59	16	75	30	81	111	3	8	11

TABLE 5
CUMULATIVE PROJECT TRIP GENERATION ESTIMATES

ID	ADDRESS	LAND USE	ITE Land Use Code	TRIP GENERATION ESTIMATES								
				Daily	A.M. Peak Hour [1]			P.M. Peak Hour [1]			MIDDAY Peak Hour [2]	
				Trips	In	Out	Total	In	Out	Total	In	Out	Total
40	686-700 S. Raymond Ave [3]	demolish 12,535 sf of vacant structures and construct 45,000 sf R&D and 4,000 sf retail	[3]	555	53	12	65	14	53	67	1	5	6
41	169 Valley St [3]	832 dwelling units and 30,000 sf retail Ambassador Campus (East)	[3]	5,520	71	310	381	317	172	489	238	129	367
42	240-260 S. Arroyo Parkway [3]	demolish existing restaurant and office uses ed construct 68 condos, 10,000 sf restaurant, 7,000 sf retail	[3]	1,339	41	61	102	73	42	115	55	32	87
43	1200 E. California Blvd [4]	Amend Caltech Master Development Plan (CMDP), originally Formulated in 1989	[4]	1461	100	37	137	37	100	137	28	75	103
			TOTAL	63,944	2,198	2,173	4,369	2,779	3,126	5,904	1,713	1,326	3,039

Notes:
KSF = thousands of square feet DU = dwelling units SFR = single-family residential AFF = affordable housing

[1] Weekday A.M. and P.M. peak hour trip generation estimates were based on the Institute of Transportation Engineers (ITE), Trip Generation, Seventh Edition, 2003, unless otherwise noted

[2] Weekday midday peak hour trips assumed a percentage of P.M. peak hour trips: retail 75%, residential 65%, office 10%. Sources on these percentages were from the following:
"Hourly Variation in Shopping Center Traffic, ITE Trip Generation 7th Edition, and Traffic Analysis for 8601 Wilshire Bl involving 24-hour count distribution

[3] Project information and trip generation estimates are provided by the City fo Pasadena Department of Transportation, January 2006

[4] Traffic and Parking Study for the Caltech Master Development Plan Amendments, Pasadena, California, CA. (Kaku Associates, Inc, April 2006)

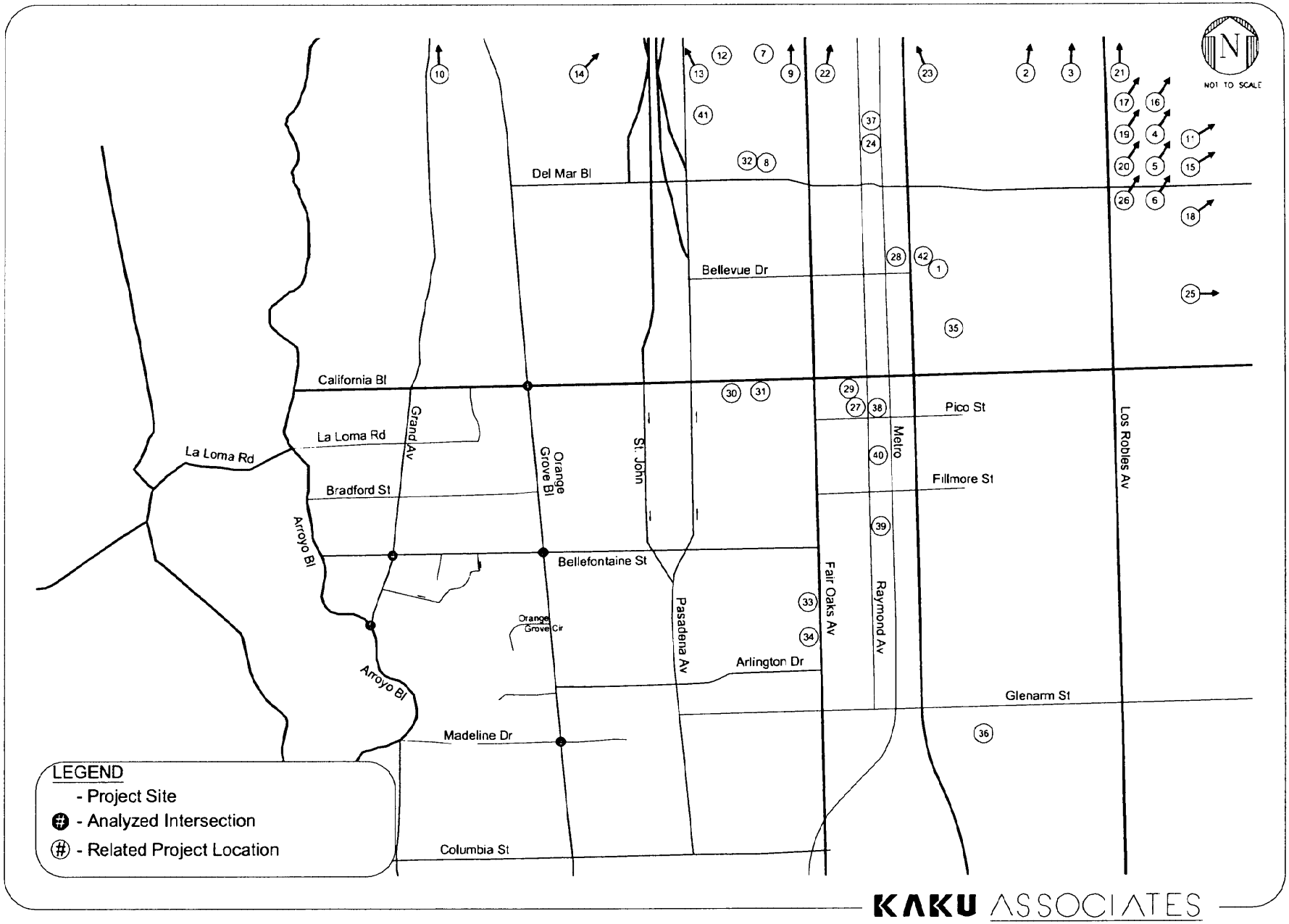

FIGURE 5
LOCATION OF RELATED PROJECTS

volumes after the adjustment for areawide growth to represent cumulative base conditions (i.e., future conditions without the proposed project). Figure 6 illustrates the cumulative base traffic conditions for the weekday peak periods in 2013.

PROJECT TRAFFIC VOLUMES

Traffic generation estimates for the proposed project involves the use of a three-step process similar to the estimates for the related projects. The three steps are traffic generation, trip distribution, and traffic assignment. Redistribution of the existing school traffic pattern would occur due to the proposed reconfigurations of existing school access driveways and campus parking spaces and the construction of new access driveway and parking facility off Orange Grove Circle. Future school-only traffic volumes were first developed for the proposed scenario. The difference between the existing school-only traffic pattern and future school-only traffic pattern represents the "project-only" traffic pattern specified in this report. The project-only traffic volumes (or net school-only volumes) represent the incremental changes in school-only traffic volumes that would occur on the adjacent street network due to the proposed student enrollment increase and the reconfiguration of school access points and parking facilities.

Existing School-only Traffic Volumes

The following describes the development of existing school-only traffic volumes using the three-step traffic forecast process.

Trip Generation. To develop existing school-only traffic volumes, manual turning movement counts were collected at the school driveways on Bellefontaine Street and Grand Avenue for the a.m. peak hour (7:15 to 8:15 a.m.) and the midday peak hour (2:45 to 3:45 p.m.) on typical school days in June 2006. Existing school trip generation during the afternoon peak hour (4:45 to 5:45 p.m.) was estimated based on the trip generation rates/equations from *Trip Generation, 7th Edition*. Given no change in student enrollment over the past three years (between 2003 and 2006), previous 24-hour machine counts conducted at the school driveway in September

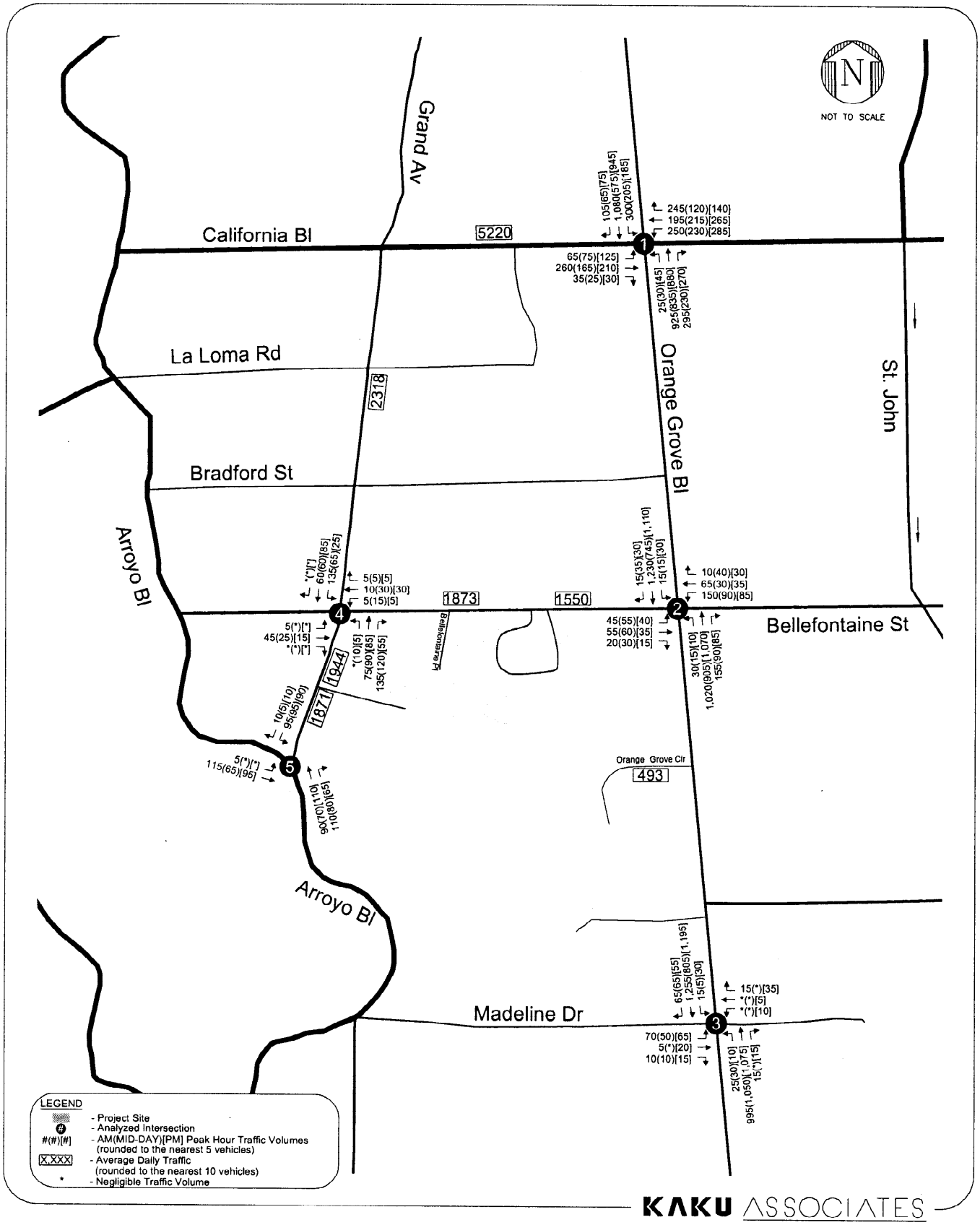

FIGURE 6
CUMULATIVE BASE WEEKDAY TRAFFIC VOLUMES

2003 were used to estimate the school trip generation per day for the purpose of this analysis. The resultant existing school trip generation for the three school peak periods is summarized in Table 6. As shown in Table 6, the high school currently generates 1,338 daily trips, including approximately 369 during the morning peak hour, 238 during the midday peak hour and 60 during the afternoon commute peak hour.

With the proposed 10% increase in student enrollment from 300 students to 330 students, school traffic due to the proposed increased enrollment was estimated to increase by the same 10%. This assumes a proportional increase in faculty/staff and a continuation of the current levels of student drivers, pick up/drop off, and carpooling. As shown in Table 6, with the proportional increase in school trip generation from 30 new students, the resulting future school trip generation for 330 students is projected to be approximately 1,472 trips per day, including about 406 morning peak hour trips, 261 midday peak hour trips, and 66 afternoon peak hour trips. In addition, as part of the Master Plan, one single-family house on Orange Grove Circle would be demolished for the construction of the proposed Educational Center and was taken into account in the project trip generation estimates. Therefore, as summarized in Table 6, the proposed Master Plan would generate 124 net new trips per day, including 36 new morning peak hour trips, 23 new midday peak hour trips, and five new afternoon peak hour trips.

Trip Distribution. The geographic distribution of current school trips depends on several factors. These factors include the geographic distribution of population served by the school and the location of Mayfield Senior High School in relation to the surrounding street system. Mayfield Senior High School draws approximately 25% students and staff/faculty members from the north, 35% from the east, 37% from the south, and 3% from the west. Due to the school access control of westbound left turns on Bellefontaine Driveway, approximately 2/3 of the school inbound trips from the north and south are connected to the project site by traveling from the west on Bellefontaine Street. This overall distribution was reviewed and approved by City of Pasadena staff.

Trip Assignment. Given the existing one-way access road on campus, all inbound trips use the school entrance driveway at Bellefontaine Street and all outbound trips exit the driveway at Grand Avenue. Based on the manual counts of turning movements at school driveways, during the morning and afternoon peak hour at the entrance on Bellefontaine Street, approximately 1/3 of school trips entered from the east by making westbound left turns, while 2/3 entered from the

TABLE 6
TRIP GENERATION OF MAYFIELD SENIOR HIGH SCHOOL

Land Use	Size	Daily	A.M. Peak Hour (7:15-8:15 a.m.) [b]			Midday Peak Hour (2:45-3:45 p.m.) [b]			P.M. Peak Hour (4:45-5:45 p.m.) [c]		
			IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Mayfield Senior High School											
Existing Enrollment	300 students	1,338	225	144	369	94	144	238	23	37	60
Proposed New Enrollment	30 students	134	23	14	37	9	14	23	2	4	6
Ultimate Enrollment	330 students	1,472	248	158	406	103	158	261	25	41	66
Existing Use to be Removed											
- Single-Family Detached Housing [e]	1 dwelling unit	10	0	1	1	*	*	*	1	0	1
Net Trips due to Increased Enrollment and Removal of Existing Use		124	23	13	36	9	14	23	1	4	5

Note:
* - Negligle Volume.

[a] Existing daily traffic volume for the school were obtained from previous 24-hour machine counts at the school driveways in September 2003.
[b] Existing school trip generation for A.M. peak hour and midday peak hour was obtained from site traffic counts on May 24, 2006.
[c] Existing school trip generation for the P.M. peak hour was obtained based on ITE 7th Edition (Land Use Code 530 Private School K-12).

[d] With the proposed 10% increase in student enrollment, school traffic due to the proposed increased enrollment was estimated to increase by the same 10%. This assumes a proportional increase in faculty/staff and a continuation of the current levels of student drivers, pick-up/drop off, and carpooling.
[e] Daily, weekday A.M., and P.M. peak hour trip generation estimates were based on the Institute of Transportation Engineers (ITE), Trip Generation, Seventh Edition, 2003 for Land Use 210 Single-Family Detached Housing.

west by making eastbound right turns. A difference was observed during the midday peak hour, when a slightly higher percentage of inbound trips came from the west and made right turns to access the school site.

At the school exit driveway at Grand Avenue, approximately 76% of school traffic made right turns to the north and 24% made left turns to the south during the morning peak hour. A slight difference was also observed during the midday and p.m. peak hour, with a higher percentage of existing school traffic making right turns to the north. The details of existing school trip distribution at each of the analyzed intersections and school driveways for the weekday a.m., midday, and p.m. peak hours are illustrated in Appendix C. Given the observed school trip generation and the distribution patterns described above, the existing school-only traffic volumes were assigned to the street system at the five study intersections for the a.m., midday and p.m. peak hour periods, and are included in Appendix C.

Future Project-Only Traffic Volumes

The following section describes the development of future school-only traffic volumes for the proposed project using the same three-step traffic forecast process. Then, future project-only traffic volumes resulting from traffic shifts and student enrollment increase are estimated.

As the proposed Master Plan would increase student enrollment, future school trip generation would increase by 10%, as shown in Table 6. The high school would generate 1,472 daily trips, including approximately 406 trips during the morning peak hour, 261 trips during the midday peak hour and 66 trips during the afternoon peak hour. Given the assumption that the geographic population served by the school district and the surrounding street system would remain the same in the future, the overall geographic distribution of future school trips would be similar to the existing pattern: 25% from the north, 35% from the east, 37% from the south, and 3% from the west. Future school trip assignment based on the proposed reconfiguration project (as shown in Figure 3) would improve traffic operations along Bellefontaine Street, as described below.

Under the existing school configuration during the morning drop-off periods, 100% of the school inbound trips would enter from Bellefontaine Street and exit through the Grand Avenue

driveway. Westbound left-turning vehicles (80 trips in the morning and 28 trips in the afternoon) entering on Bellefontaine currently conflict with the opposing eastbound through traffic, which includes many vehicles that have already made a student drop off.

With the future proposed site access scenario with the Bellefontaine driveway limited to right turns in and right turns out only, westbound left turns at the Bellefontaine entrance driveway or northbound left turns from the Bellefontaine exit driveways would be prohibited. Trips approaching the school from the north, east, or south would make a counterclockwise detour to reach campus by traveling on Orange Grove Boulevard, California Boulevard, Grand Avenue, and finally Bellefontaine Street in the eastbound direction. Approximately 1/3 of the school trips from the south would also be expected to arrive at campus by traveling northbound on Grand Avenue to reach the Grand or the Bellefontaine entrance. The school outbound trips to the west or southwest would also need to alter their existing travel patterns as they would only be allowed to make right turns onto Bellefontaine Street to exit the campus. After loading their students, the pick-up/drop-off vehicles would be required to exit campus by making right turns onto Bellefontaine Street, which would reduce the queue length of vehicles at the Bellefontaine entrance. This would reduce the delay for westbound through traffic and would eliminate the crossing of school inbound and outbound traffic.

The details of future school trip distribution and turning movement volumes for the proposed scenario at each analyzed intersection and school driveway for the weekday a.m., midday, and p.m. peak hours are illustrated in Appendix D. The net project-only volumes are illustrated in Figure 7, representing the difference in school-only traffic when the future project traffic flow is compared to the existing travel patterns.

CUMULATIVE PLUS PROJECT TRAFFIC PROJECTIONS

The estimated future project traffic patterns (net school-only traffic volumes) for the proposed project were added to the cumulative base traffic forecasts to yield the cumulative plus project traffic forecasts.

The resulting cumulative plus project traffic volumes and turning movements at the analyzed intersections for the a.m., midday, and p.m. peak hour periods are illustrated in Figure 8.

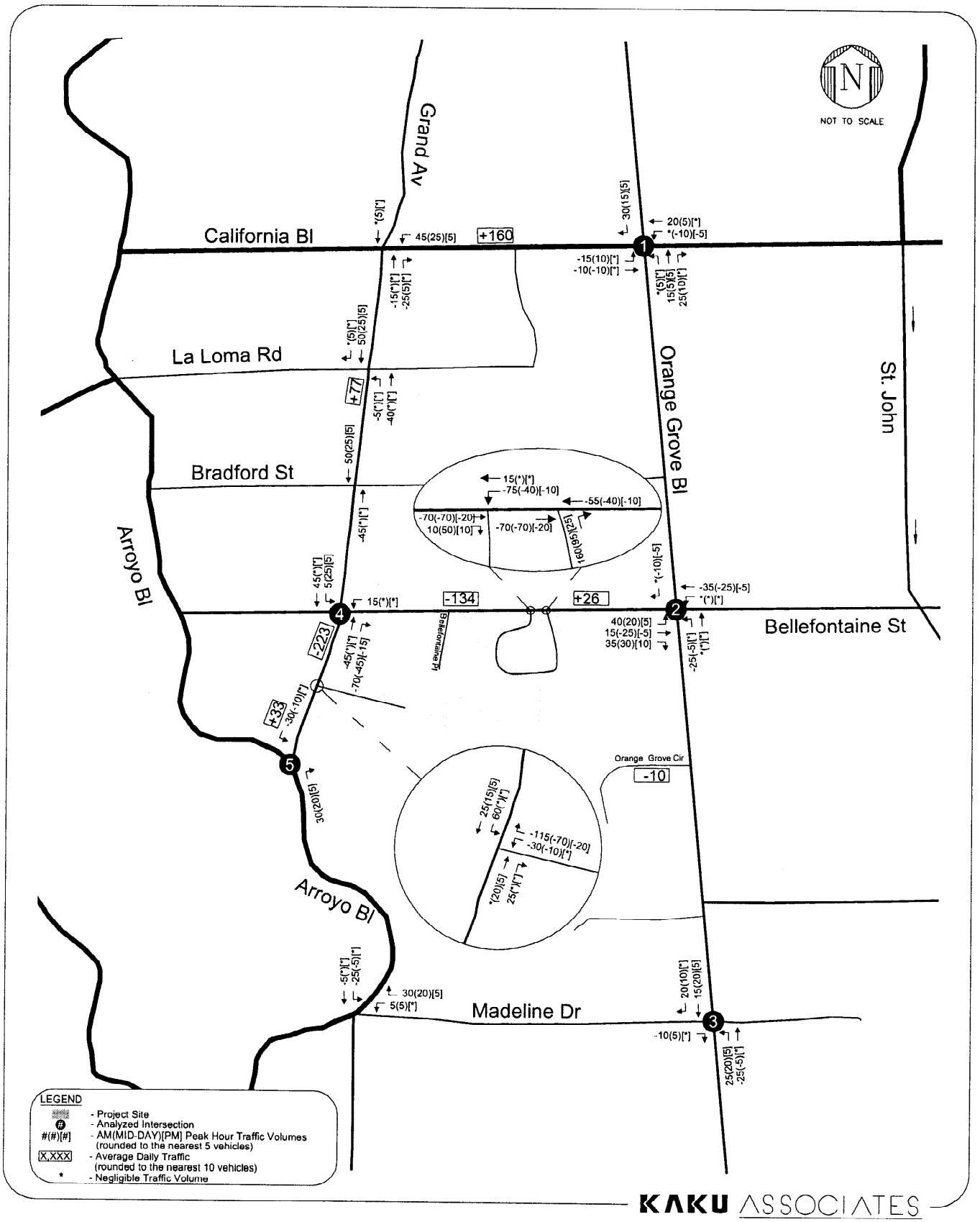

FIGURE 7
PROPOSED PROJECT ONLY WEEKDAY TRAFFIC VOLUMES

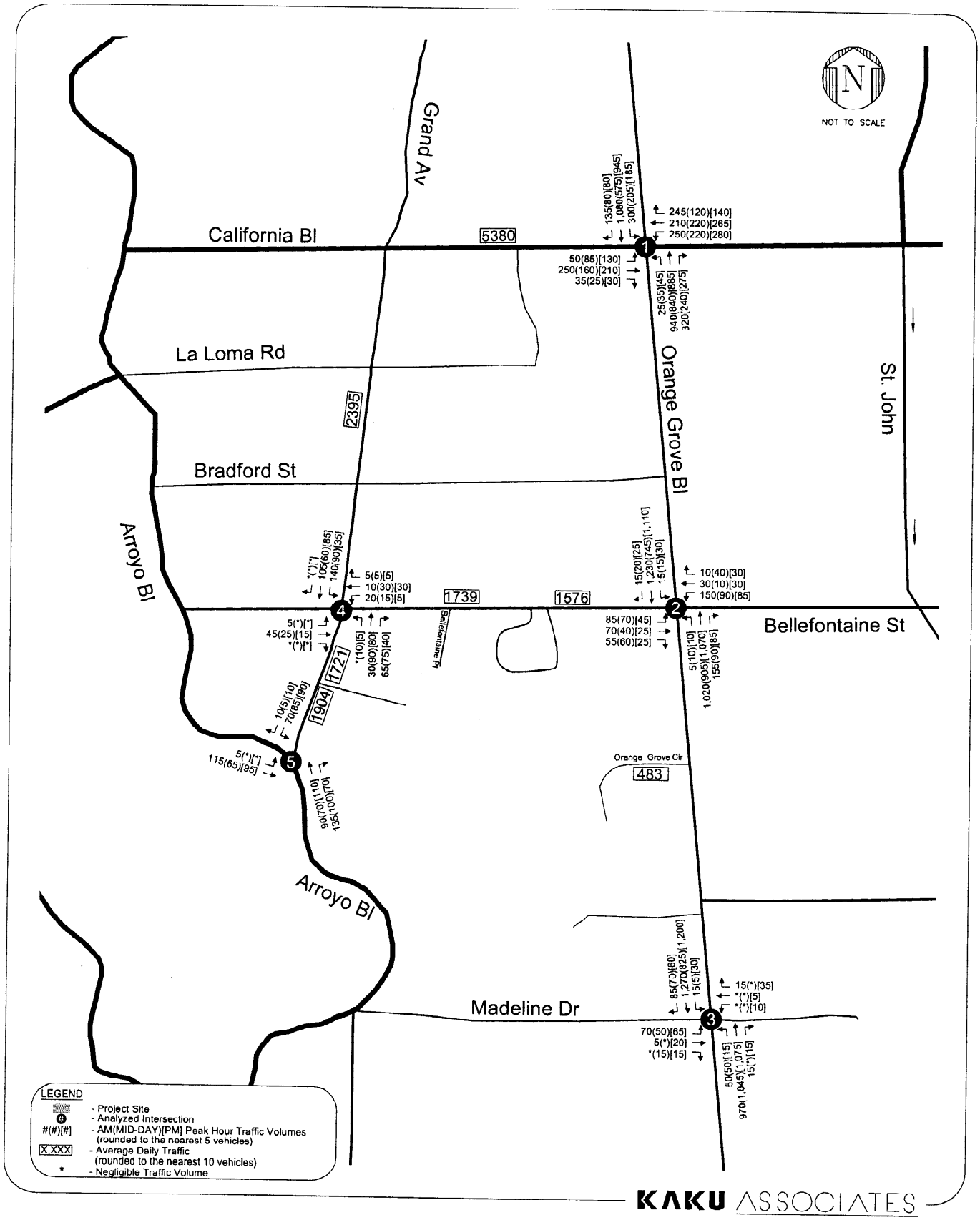

FIGURE 8
PROPOSED CUMULATIVE PLUS PROJECT WEEKDAY TRAFFIC VOLUMES

IV. INTERSECTION TRAFFIC IMPACT ANALYSIS

This chapter presents an analysis of the potential impacts of the traffic generated by the proposed project on the local street system. The analysis compares the projected levels of service at each study intersection under the cumulative base and cumulative plus project conditions for the proposed project to determine the potential impacts using significance criteria established by the City of Pasadena.

SIGNIFICANT TRAFFIC IMPACT CRITERIA

The City of Pasadena has established criteria that are used to determine if a project has a significant impact at an intersection. Using the City of Pasadena criteria, a project impact would be considered significant if the following conditions were met:

LOS under Future Conditions with Project	Increase in LOS Significant Due to Project Traffic Considered Significant
A	0.060
B	0.050
C	0.040
D	0.030
E	0.020
F	0.010

Using these criteria, a project would not have a significant impact at an intersection, for example, if it is operating at LOS C or better after the addition of project traffic and the incremental change in V/C ratio is less than 0.040. If, however, the intersection is operating at LOS F with the addition of project traffic, and the incremental change in the V/C ratio is 0.010 or greater, a significant impact would be identified at this intersection.

CUMULATIVE BASE TRAFFIC CONDITIONS

The year 2013 cumulative base peak hour traffic volumes illustrated in Figure 6 were analyzed to determine the V/C ratio and LOS at the five study intersections for the "without project" conditions. The results are summarized in Table 7. Based on the criteria established by the City of Pasadena, three of the five intersections are projected to operate at acceptable level of service (LOS D or better) under future conditions before the addition of the proposed project traffic (incremental change in school-only traffic volumes).

CUMULATIVE PLUS PROJECT TRAFFIC CONDITIONS

The cumulative plus project peak hour traffic volumes for the proposed project, illustrated in Figure 8, were analyzed to determine the projected future operating conditions with the addition of traffic generated by the proposed project. The results of the cumulative plus project V/C ratio and LOS analysis at the five study intersections are presented in Table 7.

INTERSECTION TRAFFIC IMPACT ANALYSIS

Application of the City of Pasadena significance criteria, as shown in Table 7, results in the conclusion that the proposed Master Plan would not result in a significant impact at any of the five analyzed intersections. Therefore, no project mitigation measures at the study intersections would be required for the proposed project.

TABLE 7
YEAR 2013 FUTURE CONDITIONS
INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Future Base year 2013		Future plus Project year 2013			
		V/C or Delay	LOS	V/C or Delay	LOS	Increase in V/C	Significant Impact?
1. Orange Grove Bl & California Bl	A.M.	0.960	E	0.966	E	0.006	NO
	MID	0.790	C	0.784	C	-0.006	NO
	P.M.	0.872	D	0.870	D	-0.002	NO
2. Orange Grove Bl & Bellefontaine Bl	A.M.	0.650	B	0.686	B	0.036	NO
	MID	0.547	A	0.559	A	0.012	NO
	P.M.	0.572	A	0.572	A	0.000	NO
3. Orange Grove Bl & Madeline Dr	A.M.	0.561	A	0.584	A	0.023	NO
	MID	0.459	A	0.466	A	0.007	NO
	P.M.	0.551	A	0.555	A	0.004	NO
4. Grand Av & Bellefontaine St [a]	A.M.	35.4	E	29.0	D	-	-
	MID	10.3	B	13.8	B	-	-
	P.M.	11.2	B	11.3	B	-	-
	A.M.	0.350	-	0.303	-	-0.047	NO
	MID	0.312	-	0.300	-	-0.012	NO
	P.M.	0.231	-	0.226	-	-0.005	NO
5. Arroyo Bl & Grand Av [a]	A.M.	11.2	B	11.0	B	-	-
	MID	10.3	B	10.3	B	-	-
	P.M.	10.4	B	10.4	B	-	-
	A.M.	0.286	-	0.286	-	0.000	NO
	MID	0.254	-	0.262	-	0.008	NO
	P.M.	0.268	-	0.271	-	0.003	NO

Notes:

[a] Intersection is controlled by stop sign(s). The top rows show analysis using Highway Capacity Manual stop-controlled methodology. For the purpose of evaluating the operating condition of the intersection, average vehicular delay in seconds is reported rather than V/C ratio. The bottom rows show analysis using the CMA methodology. For the purpose of City of Pasadena significance criteria application, V/C ratio is reported.

V. STREET SEGMENT IMPACT ANALYSIS

The following seven street segments providing regional and local access to the school site were selected for analysis:

- Bellefontaine Street between Orange Grove Boulevard and the existing school entrance driveway
- Bellefontaine Street between Grand Avenue and the existing school entrance driveway
- Grand Avenue between the existing school exit driveway and Arroyo Boulevard
- Grand Avenue between Bellefontaine Street and the existing school exit driveway
- Grand Avenue between Bellefontaine Street and California Boulevard
- California Boulevard between Grand Avenue and Orange Grove Boulevard
- Orange Grove Circle west of Orange Grove Boulevard

The compares the average daily traffic volumes at each study street segment under the existing and existing plus project conditions to determine the incremental effects of the traffic shifts due to the proposed project. Potential impacts were identified using significance criteria established by the City of Pasadena.

DAILY TRAFFIC PROJECTIONS

The following described the development of the average daily traffic volumes for the seven study street segments for existing conditions and existing plus project conditions.

As described earlier in Chapter II, new 24-hour machine counts were conducted at Orange Grove Circle on May 16, 2006. Previous 24-hour machine counts collected on Tuesday, April 27, 2004 were obtained for the four street segments adjacent to the Bellefontaine Street school entrance driveway and the Grand Avenue school driveway. The daily traffic volumes for Grand Avenue