



CITY OF GARDEN GROVE



SPEED RADAR FEEDBACK SIGN STUDY 2003

Background

The City of Garden Grove submitted a proposal for experimental use of non-standard traffic control devices, Radar Speed Signs, on July 9th, 2002 to the California Traffic Control Devices Committee (CTCDC).

This request was presented at the August 22nd, 2002 meeting for the CTCDC meeting held at Caltrans District 11 facilities in San Diego. At this meeting permission was granted to the City of Garden Grove to install Radar Speed Signs at five (5) school locations and one mid block pedestrian actuated signal in front of the Garden Grove Hospital.

The City of Garden Grove received a grant from the California Office of Traffic Safety (OTS) to purchase and install ten (10) radar signs at five (5) schools. Prior to formalizing the grant OTS required the City to secure permission from CTCDC because this was not a standard traffic control device.

The device in the form of a radar trailer has been in use for many years, however, because this was a different application the City requested authorization under the experimental process, established by the California Traffic Control Devices Committee.

Problem Statement

Traffic safety conditions in the City of Garden Grove are increasingly demanding for children, calling for greater awareness than ever before. Sight distance is obstructed, approach speed is relatively high, and traffic volume is heavy at critical crossing locations where many children are present. School age children are especially vulnerable to pedestrian crashes. They are often small in stature and difficult for drivers to see. Children can also lack good judgement when crossing streets.

Existing Conditions

All of the proposed five (5) locations currently have pedestrian actuated traffic signals. All schools also have frontage on arterial streets with multi-lanes except for one (1). The attached maps show locations of the schools along with average daily trips (ADT) and posted speed limits. The City's current speed survey posted speed limits of 35-40 mph on these roadways. It is very difficult for drivers to slow down to a school zone speed of 25 mph when the posted speed limit for the street is 35 or 40 mph. These conditions create a hazardous traffic environment for school children.

Statistical Data

According to the California Office of Traffic Safety, for 1999 the City of Garden Grove ranked 16th out of 45 cities for pedestrian and 19th out of 45 cities for bicyclists involved fatal and injury collisions (under 15 years of age) within our population group (100,001 to 250,000).

According to the high incident report, there have been six (6) pedestrian and eight (8) bicycle related accidents within a few blocks (<2000 feet) away from these schools in the last five (5) years.

Proposed Solution

The City of Garden Grove requested to participate in the experimentation of the Active Radar Speed Signs at five (5) high-volume, high speed school crossings. These permanent signs will offer state-of-the-art solutions to improve sign visibility, alert drivers, and protect children at school crossings. The Driver Feedback Speed Sign gives the motorist passing through a school zone real time feedback as to their vehicle's speed. If the driver's speed exceeds the posted speed limit by more than 5 mph, LEDs will flash to further alert the driver. The design features for the cabinet mounted switch option are attached to the report. The proposed locations were: Walton Intermediate, Bell Intermediate, Enders Elementary, Wakeham Elementary, and Meairs Elementary. One (1) sign will be posted in each direction in front of each school. One of the main reasons for seeking CTCDC's permission was to receive funding approval from the Office of Traffic Safety in experimenting with the active radar speed signs.

Objective

The objective of the test was to determine the usage and effectiveness of the radar speed signs in reducing speeds and thereby improving pedestrian safety.

EXPERIMENT SCHEDULE

Pre-installation Evaluation.....August to December 2003
Installation.....January to March 2003
Experimental Period.....March to May 2003
Evaluation of Results.....June 2003

Scope

The City has selected the following five (5) school locations for the experiment of radar speed signs:

Bell Junior High	12345 Springdale Street
Enders Elementary	12302 Springdale Street
Meairs Elementary	8441 Trask Avenue
Wakeham Elementary	7772 Chapman Avenue
Walton intermediate	12181 Buaro Street

WORKPLAN

Installation

The active radar speed signs were installed as an integral part of the existing signal pole. There were no adjustments to existing traffic control devices in the proposed area.

Evaluation

Effectiveness and acceptance was measured in accordance with the time period and evaluation process shown below.

Time Period

The schedule for testing was as follows:

- Experimental Period.....March to May 2003
- Evaluation of Results.....June 2003

EVALUATION PROCEDURES

The City of Garden Grove requested that the Committee approve the preliminary evaluation plan outlined below. Other criteria and procedures may evolve during the evaluation period. These additional ways of evaluating the use of radar signs and any changes in procedures added to the assessment criteria is discussed in this report to be submitted to the project sponsor and the committee.

- a. Installation Documentation - prepared by the City of Garden Grove personnel.
- b. Maintenance Recording - was performed throughout the life of the experimentation period. A separate maintenance log sheet was created for each site. Periodic inspections was performed and logged by the City of Garden Grove personnel.
- c. Accident data was monitored and analyzed by the City of Garden Grove personnel.
- d. Observations were conducted to determine the effectiveness of the operation. Public input from the school district as well as the PTAs was used to help document the progress of the program as well as for reporting to the Committee, Caltrans, and other interested agencies.

Measures of effectiveness and acceptance during the before and after testing period include, but was not limited to the following actions:

- I. Compared the total number of pedestrian accidents or the pedestrian accident rates.
- II. Conduct speed surveys.

Results

City traffic engineering staff selected four of the five school locations to perform before and after studies to determine the effectiveness of the devices. Two locations are on four lane secondary arterials, one location is on a two lane secondary arterial, and the final location is on a local street.

This selection of locations should provide the best data to determine the various results because of speed and traffic volumes. The arterials are posted 35 mph and the local street is posted 25 mph. Traffic volumes ranged from a high 29,200 to a low of 8,000 vehicles per day.

All of the signs were programmed to operate only at the beginning of school for two hours and at the end of the school day for two hours. Three of the locations had the signs mounted on the signal mast arm so the signs were suspended over the street, at the other two locations the signs were mounted on the signal pole.

At each location an SR4R “School-25 mph-when children are present” sign was installed adjacent to the radar speed sign. Additionally, calculations had to be performed to determine if the mast arm loading exceeded the design of the mast arm.

Staff made contact with each of the schools and police department and the local parent organizations to receive input on the acceptance of the program. In all cases staff received positive feedback. The police department was very receptive and stated traffic complaints on the school area were reduced. There have been no reported pedestrian or bicycle accidents within the school zone at any of the five schools under the study.

The following table reflects the results of the speed surveys conducted before and after the installation of the radar speed signs.

85TH Percentile Speed						
-----------------------------------------	--	--	--	--	--	--

LOCATION	ADT	NO.LANES	SPEED LIMIT	BEFORE	AFTER	%CHANGE
Springdale	11800	4	35	42.7	33.8	20.8
Orangewood	9200	2	35	33.4	30.9	7.5
Trask	29200	4	35	44.0	34.2	22.3
Buaro	8000	2	25	26.9	25.4	5.6

Conclusion

As a result of the 85th percentile speed reduction and the acceptance by the motoring public and school officials it has been determined that the installation of Radar Signs at school pedestrian signals has had a beneficial result in the reduction of speed within a school zone.

It is also shown that the use of such devices can be beneficial in local neighborhood traffic calming projects if properly evaluated and applied.

APPENDICES

**City of Garden Grove
Traffic Engineering Department**

Street Name: ORANGEWOOD AVENUE

Limits: MOSSLER STREET to MOEN STREET

Radars Survey Sheet

X=East/West

	5	10	15	20	25	30	35	40	#	% ea	cum.%
45											
40	X								1	1.9%	100%
	X	X							2	3.8%	98.1%
	X								1	1.9%	94.3%
35	X	X							2	3.8%	92.5%
	X	X	X						3	5.7%	88.7%
	X								1	1.9%	83.0%
	X	X	X	X	X	X			6	11.3%	81.1%
	X	X	X	X	X	X			6	11.3%	69.8%
30	X	X	X	X	X	X	X		7	13.2%	58.5%
	X	X	X	X					4	7.5%	45.3%
	X	X	X	X	X	X			6	11.3%	37.7%
	X	X	X	X	X	X			6	11.3%	26.4%
	X	X	X	X	X	X			6	11.3%	15.1%
25	X	X							2	3.8%	3.8%
20											
15											
10											
5											
0											
	Total Samples								53		

85th Percentile Speed: 33.4
 50th Percentile Speed: 29.4
 15th Percentile Speed: 26.0
 10 MPH Pace: 25 - 34
 Number in Pace: 47
 Percent in Pace: 88.7%

Date of Survey: 01/15/2003 Start Time: 14:30
 Weather: Clear End Time: 15:00
 Road Condition: Good Posted Speed: 35
 Street Class.: Secondary Arterial Observer: T. AQUINO
 Conditions not Apparent: Roadway Speed Design

**City of Garden Grove
Traffic Engineering Department**

Street Name: ORANGEWOOD AVENUE

Limits: MOSSLER STREET to MOEN STREET

Radars Survey Sheet

X=East/West

	5	10	15	20	25	30	35	40	#	% ea	cum.%
45											
40											
35	X								1	1.8%	100%
	X	X							2	3.6%	98.2%
	X	X							2	3.6%	94.6%
	X	X	X						3	5.5%	91.0%
	X	X							2	3.6%	85.5%
30	X	X	X	X	X	X	X	X	8	14.5%	81.8%
	X	X	X	X					5	9.1%	67.3%
	X	X	X	X	X	X	X	X	10	18.2%	58.2%
	X	X	X	X	X	X	X		8	14.5%	40.0%
	X	X	X	X					4	7.3%	25.5%
25	X	X	X	X	X				6	10.9%	18.2%
	X	X	X	X					4	7.3%	7.3%
20											
15											
10											
5											
0											
Total Samples									55		

85th Percentile Speed: 30.9
 50th Percentile Speed: 27.6
 15th Percentile Speed: 24.8
 10 MPH Pace: 24 - 33
 Number in Pace: 52
 Percent in Pace: 94.5%

Date of Survey: 05/29/2003 Start Time: 14:30
 Weather: Clear End Time: 15:00
 Road Condition: Good Posted Speed: 35
 Street Class.: Secondary Arterial Observer: T. AQUINO
 Conditions not Apparent: Roadway Speed Design

**City of Garden Grove
Traffic Engineering Department**

Street Name: TRASK AVENUE

Limits: BROOKHURST STREET to MAGNOLIA STREET

Radars Survey Sheet

X=East/West

	5	10	15	20	25	30	35	40	#	% ea	cum.%
50	X								1	1.0%	100%
	XX								2	2.0%	99.0%
	XXXXX								5	5.0%	97.0%
45	XXXXXXXXXX								7	7.0%	92.0%
	XXXXXXXXXX								8	8.0%	85.0%
	XXXXXXXXXX								7	7.0%	77.0%
	XXXXXXXXXX								11	11.0%	70.0%
	XXXXXXXXXX								11	11.0%	59.0%
40	XXXXXXXXXX								14	14.0%	48.0%
	XXXXXXXXXX								7	7.0%	34.0%
	XXXXXXXXXX								8	8.0%	27.0%
	XXXXXXXXXX								7	7.0%	19.0%
	XXXXXX								5	5.0%	12.0%
35	XXXXX								4	4.0%	7.0%
	XX								2	2.0%	3.0%
	X								1	1.0%	1.0%
30											
25											
20											
15											
10											
5											
	Total Samples									100	

85th Percentile Speed: <u>44.0</u>	Date of Survey: <u>01/13/2003</u>	Start Time: <u>14:20</u>
50th Percentile Speed: <u>40.2</u>	Weather: <u>Clear</u>	End Time: <u>14:35</u>
15th Percentile Speed: <u>36.4</u>	Road Condition: <u>Good</u>	Posted Speed: <u>35</u>
10 MPH Pace: <u>36 - 45</u>	Street Class.: <u>Secondary Arterial</u>	Observer: <u>DV</u>
Number in Pace: <u>85</u>	Conditions not Apparent:	
Percent in Pace: <u>85.0%</u>		

**City of Garden Grove
Traffic Engineering Department**

Street Name: BUARO STREET

Limits: LAMPSON AVENUE to CHAPMAN AVENUE

Radars Survey Sheet

X=North/South

	5	10	15	20	25	30	35	40	#	% ea	cum.%	
45												
44												
43												
42												
41												
40												
39												
38												
37												
36												
35												
34												
33												
32												
31	X	X	X						3	6.0%	100%	
30	X	X							2	4.0%	94.0%	
29												
28	X	X							2	4.0%	90.0%	
27	X	X	X	X					4	8.0%	86.0%	
26	X	X	X	X					4	8.0%	78.0%	
25	X	X	X	X					4	8.0%	70.0%	
24	X	X	X						3	6.0%	62.0%	
23	X	X	X						3	6.0%	56.0%	
22	X	X	X						3	6.0%	50.0%	
21	X	X	X						3	6.0%	44.0%	
20	X	X	X	X	X	X			6	12.0%	38.0%	
19	X	X							2	4.0%	26.0%	
18	X	X	X	X	X				5	10.0%	22.0%	
17	X	X	X						3	6.0%	12.0%	
16	X	X							2	4.0%	6.0%	
15	X								1	2.0%	2.0%	
14												
13												
12												
11												
10												
9												
8												
7												
6												
5												
4												
3												
2												
1												
0												
	Total Samples									50		

85th Percentile Speed: 26.9
 50th Percentile Speed: 22.0
 15th Percentile Speed: 17.3
 10 MPH Pace: 18 - 27
 Number in Pace: 37
 Percent in Pace: 74.0%

Date of Survey: 11/12/2002
 Weather: Clear
 Road Condition: Good
 Street Class.: Local
 Conditions not Apparent:

Start Time: 2:15
 End Time: 2:35
 Posted Speed: 25
 Observer: DAI

**City of Garden Grove
Traffic Engineering Department**

Street Name: BUARO STREET

Limits: LAMPSON AVENUE to CHAPMAN AVENUE

Radars Survey Sheet

X=North/South

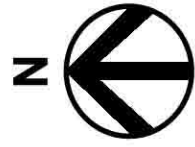
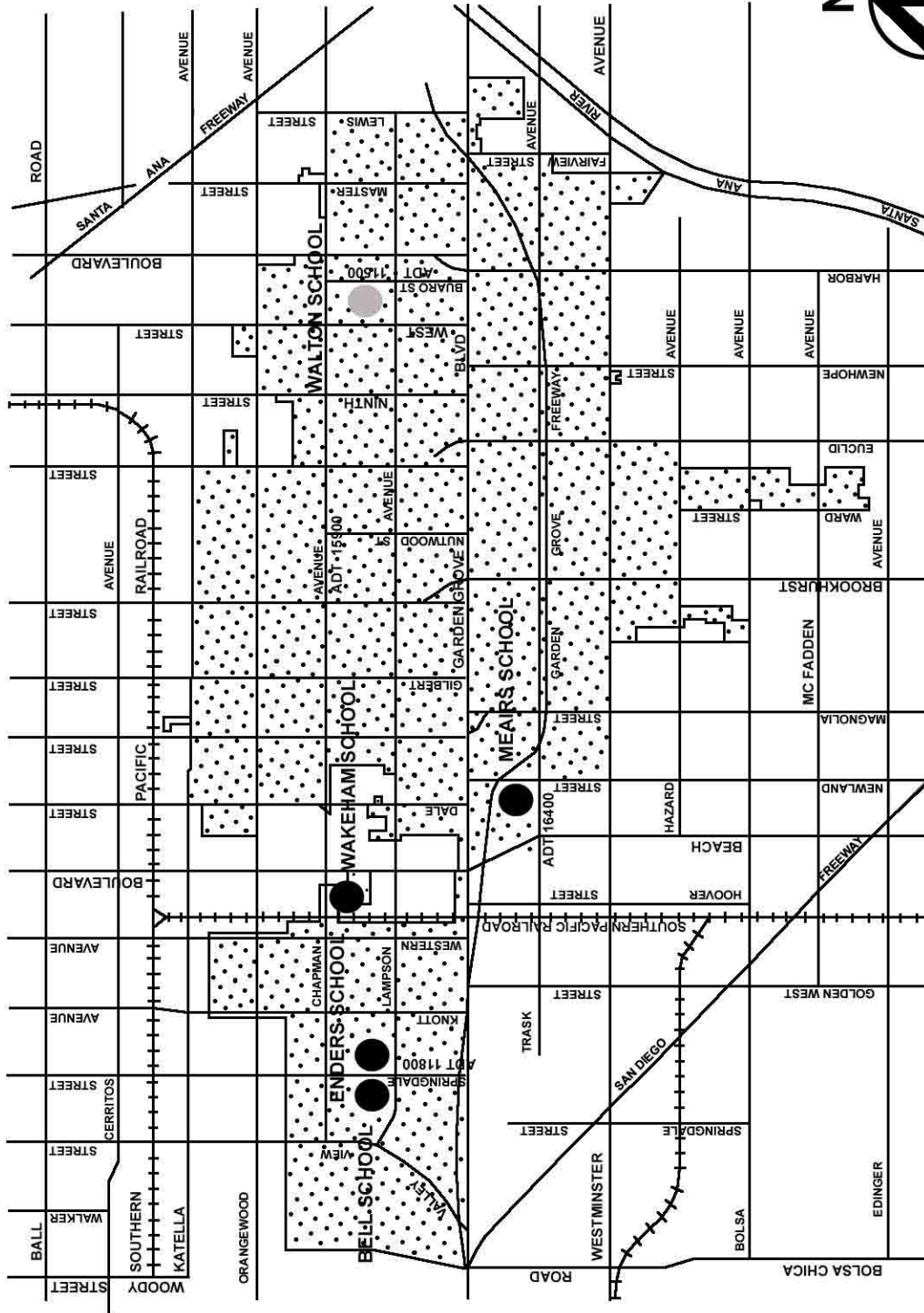
	5	10	15	20	25	30	35	40	#	% ea	cum.%
45											
40											
35											
30											
	X								1	2.0%	100%
	X	X							2	4.0%	98.0%
	X								1	2.0%	94.0%
	X	X	X	X	X	X			6	12.0%	92.0%
25	X	X	X	X	X	X			7	14.0%	80.0%
	X	X	X	X	X	X	X		8	16.0%	66.0%
	X	X	X	X	X	X	X		7	14.0%	50.0%
	X	X	X	X	X	X			7	14.0%	36.0%
	X	X	X	X	X	X			7	14.0%	22.0%
20	X	X	X						3	6.0%	8.0%
	X								1	2.0%	2.0%
15											
10											
5											
0											
									Total Samples	50	

85th Percentile Speed: 25.4
 50th Percentile Speed: 23.0
 15th Percentile Speed: 20.5
 10 MPH Pace: 19 - 28
 Number in Pace: 49
 Percent in Pace: 98.0%

Date of Survey: 05/28/2003
 Weather: Clear
 Road Condition: Good
 Street Class.: Local
 Conditions not Apparent:

Start Time: 14:10
 End Time: 14:30
 Posted Speed: 25
 Observer: DAI

LOCATION MAP CITY OF GARDEN GROVE



SCALE: NONE

LEGEND

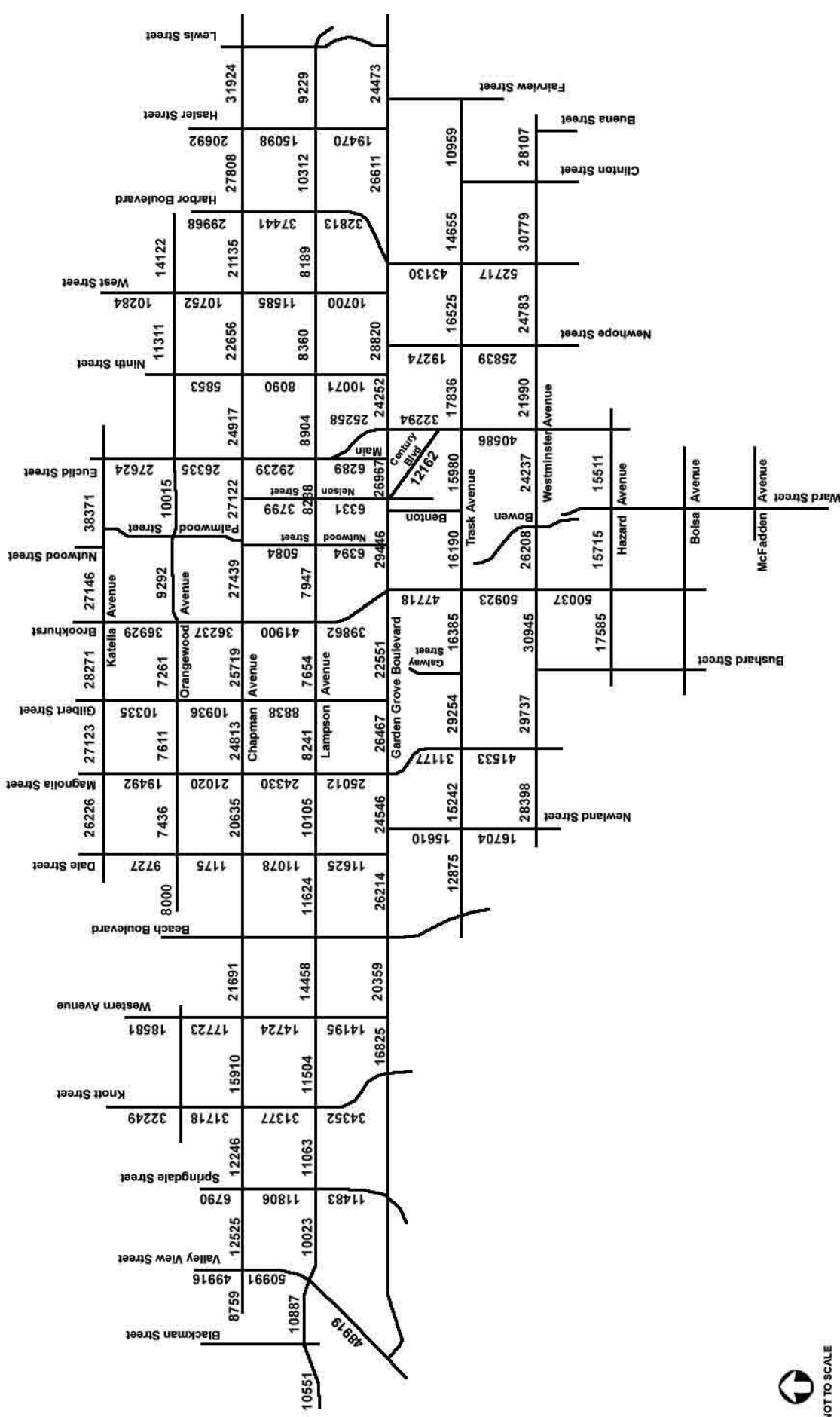
ADT TRAFFIC VOLUME

● SCHOOL NOT ON MAIN ARTERY STREET

● SCHOOL ON MAIN ARTERY STREET

- Bell Junior High School 12345 Springdale St
- Enders Elementary 12303 Springdale St
- Meairs Elementary 8441 Trask Ave
- Wakeham Elementary 7772 Chapman Ave
- Walton Intermediate 12181 Buaro St

CITY OF GARDEN GROVE 2001 AVERAGE DAILY TRAFFIC VOLUME
GARDEN GROVE SPEED SURVEY



NOT TO SCALE

