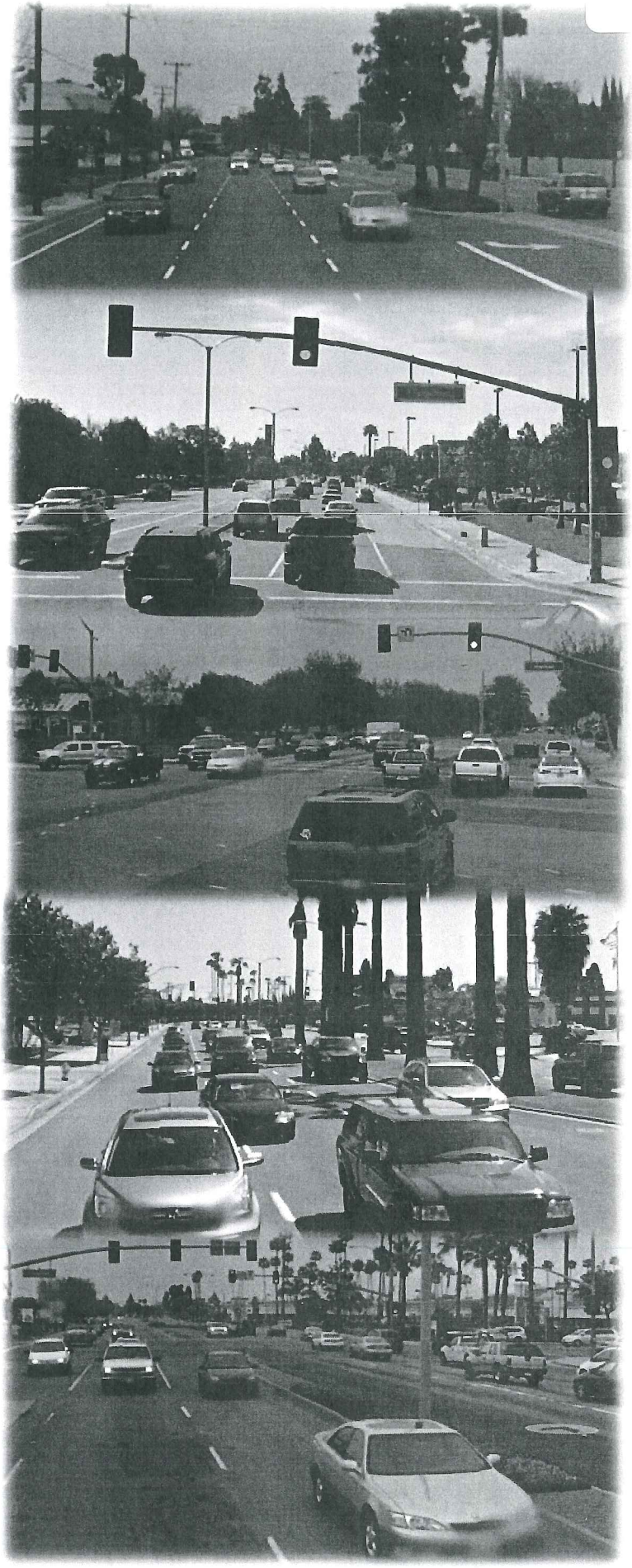
Attachment 1



CITYWIDE ENGINEERING AND TRAFFIC SURVEY

SUBMITTED TO
CITY OF GARDEN GROVE

GARDEN GROVE

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

DECEMBER 2014

SUBMITTED BY

ALBERT GROVER & ASSOCIATES

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SECTION 1.0

INTRODUCTION

The purpose of this report is to document the results of an engineering and traffic survey conducted to update the speed limits on the City of Garden Grove arterial and collector street network. The overall study was conducted to comply with existing State regulations concerning the increasing or decreasing of speed limits within City boundaries.

It is a common belief that posting of speed limit traffic signs will influence drivers to drive at that speed. However, the facts indicate otherwise.

Driver behavioral research conducted in many parts of this country over a span of several decades shows that the average driver is influenced by the appearance of the highway itself and the prevailing traffic conditions in choosing the speed at which he or she drives. Recognizing this, the California Vehicle Code (CVC) requires that speed limits be established in accordance with appropriate engineering practice and methods.

This report contains sufficient information to document that the conditions of the latest edition of the California Vehicle Code Section 627 have been satisfied and that other conditions not readily apparent to a motorist are properly identified. To legally use radar for speed enforcement, Section 40802(b) of the CVC requires that limits be established per Sections 22357 and 22358 of the CVC, the limits must be justified by an engineering and traffic survey conducted within five years prior to the date of the alleged violation. However, a change in State law allows cities to extend the survey period up to seven or ten years depending on specific criteria. This change is expanded on in **Appendix B**. The latest edition of the CVC has highlighted bicycle and pedestrian safety as part of the traffic and engineering survey, and this aspect was considered.

According to City records, the last speed zone survey was prepared in 2008 and approved by the City Council in 2010. The current study will verify, increase, or decrease existing speed limits within the City of Garden Grove based on the data and results of this survey.

At 143 locations on the City's network, spot speed surveys were taken in conformance with the State law for conducting engineering and traffic surveys for the purpose of establishing prima facie speed limits. The data was collected per the California Manual of Uniform Traffic Control Devices (CA MUTCD) January 2012. Sections of the CA MUTCD detailing regulations for conducting the required "Engineering and Traffic Survey" are presented in **Appendix A**. Also in Appendix A are definitions of terms used in speed zone surveys. Excerpts from the CVC regarding regulations governing speed limits are presented in Appendix B.

The actual speed zone surveys were conducted by Albert Grover & Associates (AGA) and Transportation Studies, Inc. (TSI). A California registered traffic engineer from AGA reviewed the streets.

SECTION 2.0

STUDY METHODOLOGY

The study involved three major categories of data collection and analysis. The three major components are: (1) geometric and characteristic street surveillance; (2) spot speed survey; and (3) accident rate analysis.

The arterial and collector streets were surveyed by field observation to determine the existing roadway characteristics, condition and placement of signs and markings, adjacent land uses, pedestrian and bicycle activity, and to identify roadway characteristics that are not readily apparent to vehicle drivers.

Spot speed surveys, utilizing a calibrated radar gun, were conducted at 143 locations to determine existing vehicular travel speeds. A minimum of 100 observations (when possible) were recorded, 50 for each direction of travel, on all the arterial and collector streets. This data was used to calculate statistical information such as the 85th percentile speed, 10 mile per hour pace speed, percent of vehicles within the 10 mile per hour pace, median speed and other pertinent data for analysis.

Accident data was tabulated from the City's Accident Records (Crossroads) for the period from January 1, 2010 through December 31, 2011 (two years) for all roadway segments. The accident rate was calculated and considered in recommending the speed limit.

SECTION 3.0

SURVEY RESULTS

3.1 Street Surveillance

"Speed Limit Signs," Section 2B.13 of the CA MUTCD 2010, states that the speed limit should be established at the nearest five mile per hour increment to the 85th percentile speed recorded during the spot speed survey. However, in matching existing conditions with the traffic safety needs of the community, engineering judgment may indicate the need for a further reduction in speed. Whenever such factors are considered to establish the speed limit, they should be documented on the speed survey or in the accompanying engineering report.

The survey streets were driven by Mr. Mark Miller, P.E, Principal-in-Charge, who is a registered Civil and Traffic Engineer in the State of California. The roadway characteristics, location of speed limit signs, conditions not readily apparent to the driver, type of area adjoining the street (commercial, residential, school zone, parks, etc.) and type of roadway (divided, undivided, number of lanes, etc.) were recorded as part of the study. The roadway characteristics recorded were used to determine if any physical conditions warranted consideration of an *additional* five mile per hour reduction of the recommended speed in accordance with CVC Section 627.

The speed survey segment roadway characteristics for each segment are indicated on the Engineering and Speed Survey Summary sheets in **Appendix C** (binder).

3.2 Accident Rate Analysis

The accident rate for each speed survey segment was determined by using the most recent accident records as required by CVC Section 627. Based on a review of the City's Accident Record System reports from January 1, 2010 to December 31, 2011, mid-block accident rates were calculated for each street surveyed.

The results of the accident rate calculations, including the Average Expected Accident Rates for each type of roadway facility are shown in **Table 1** and in the Engineering and Speed Survey Summary sheets (**Appendix C – binder**). The Average Expected Accident Rates are based on the latest average rate for each type of roadway in the City of Garden Grove.

- Arterial Streets (4-6/divided) 2.30
- Secondary Arterial Streets (4/undivided) 3.55
- Collector Streets (2/ undivided) 1.98

The mid-block accident rate in terms of "accidents per 1,000,000 vehicle miles of travel" for each street surveyed was calculated and is shown on the Engineering and Traffic Survey summary sheets. The following shows a sample calculation.

City of Garden Grove
Table 1: 2014 Speed Zone Survey - Accident Survey Analysis

Street	No.	Location	Distance (mile)	Distance (feet)	ADT	Accidents[1] 2 yrs Total	Accident Rate	Expected[2] Acc. Rate
Brookhurst Street	1	Hazard Avenue to Westminster Avenue	0.50	2,662	46,436	8	0.47	2.30
	2	Westminster Avenue to Trask Avenue	0.50	2,637	57,768	12	0.57	2.30
	3	Trask Avenue to Garden Grove Boulevard	0.50	2,641	47,193	1	0.06	2.30
	4	Garden Grove Boulevard to Lampson Avenue	0.56	2,933	38,400	8	0.51	2.30
	5	Lampson Avenue to Chapman Avenue	0.50	2,649	38,453	5	0.36	2.30
	6	Chapman Avenue to Orangewood Avenue	0.50	2,665	31,957	4	0.34	2.30
	7	Orangewood Avenue to Katella Avenue	0.50	2,640	29,009	4	0.38	2.30
Dale Street	8	Garden Grove Boulevard to Lampson Avenue	0.50	2,657	9,698	0	0.00	1.98
	9	Lampson Avenue to Chapman Avenue	0.41	2,149	10,827	1	0.31	1.98
	10	Chapman Avenue to Orangewood Avenue	0.50	2,645	9,491	2	0.58	1.98
	11	Orangewood Avenue to Katella Avenue	0.50	2,658	9,674	5	1.41	1.98
Euclid Street	12	Westminster Avenue to Trask Avenue	0.50	2,656	57,760	7	0.33	2.30
	13	Trask Avenue to Garden Grove Boulevard	0.50	2,656	37,601	10	0.72	2.30
	14	Garden Grove Boulevard to Lampson Avenue	0.56	2,944	31,293	2	0.16	2.30
	15	Lampson Avenue to Chapman Avenue	0.50	2,632	36,627	4	0.30	2.30
	16	Chapman Avenue to Orangewood Avenue	0.50	2,635	26,886	4	0.41	2.30
	17	Orangewood Avenue to Katella Street	0.50	2,640	36,671	6	0.45	2.30
Gilbert Street	18	Garden Grove Boulevard to Lampson Avenue	0.50	2,656	10,435	0	0.00	1.98
	19	Lampson Avenue to Chapman Avenue	0.50	2,648	9,755	1	0.28	2.98
	20	Chapman Avenue to Orangewood Avenue	0.48	2,555	12,986	1	0.22	3.55
	21	Orangewood Avenue to Katella Avenue	0.50	2,649	11,407	2	0.48	3.55
Harbor Boulevard	22	Westminster Avenue to Trask Avenue	0.50	2,653	66,795	9	0.37	2.30
	23	Trask Avenue to Garden Grove Boulevard	0.51	2,670	42,193	27	1.73	2.30
	24	Garden Grove Boulevard to Lampson Avenue	0.66	3,508	33,761	8	0.49	2.30
	25	Lampson Avenue to Chapman Avenue	0.49	2,613	29,528	4	0.37	2.30
	26	Chapman Avenue to Wilken Way (north city limits)	0.29	1,509	29,443	0	0.00	2.30
Haster Street	27	Garden Grove Boulevard to Lampson Avenue	0.50	2,656	22,251	6	0.73	2.30
	28	Lampson Avenue to Chapman Avenue	0.50	2,656	19,318	17	2.40	3.55
	29	Chapman Avenue to Simmons Avenue (north city limits)	0.50	2,656	19,081	0	0.00	3.55
Knott Street	30	Garden Grove Boulevard to Lampson Avenue	0.59	3,089	35,626	7	0.46	2.30
	31	Lampson Avenue to Chapman Avenue	0.50	2,648	33,212	2	0.16	2.30
	32	Chapman Avenue to Orangewood Avenue	0.51	2,678	31,604	0	0.00	3.55
	33	Orangewood Avenue to Patterson Drive (north city limits)	0.19	987	33,452	0	0.00	3.55
Magnolia Street	34	Westminster Avenue to Trask Avenue	0.50	2,645	42,612	7	0.45	2.30
	35	Trask Avenue to Garden Grove Boulevard	0.58	3,058	33,293	5	0.36	3.55
	36	Garden Grove Boulevard to Lampson Avenue	0.50	2,651	30,403	2	0.18	2.30
	37	Lampson Avenue to Chapman Avenue	0.50	2,647	29,778	2	0.18	2.30
	38	Chapman Avenue to Orangewood Avenue	0.50	2,655	24,151	3	0.34	3.55
	39	Orangewood Avenue to Katella Avenue	0.50	2,656	23,887	5	0.57	2.30
Main Street	40	Garden Grove Boulevard to Acacia Parkway	0.50	2,656	4,244	0	0.00	1.98
	41	Acacia Parkway to College Street	0.30	1,604	6,493	0	0.00	1.98
Nelson Street	42	Garden Grove Boulevard to Stanford Avenue	0.25	1,326	9,774	0	0.00	2.30
Newhope Street	43	Westminster Avenue to Trask Avenue	0.50	2,656	29,010	0	0.00	2.30
	44	Trask Avenue to Garden Grove Boulevard	0.50	2,656	20,967	0	0.00	2.30
Newland Street	45	Westminster Avenue to Trask Avenue	0.50	2,647	18,824	2	0.29	2.30
	46	Trask Avenue to Garden Grove Boulevard	0.50	2,642	17,938	2	0.31	1.98
Ninth Street	47	Garden Grove Boulevard to Lampson Avenue	0.50	2,656	11,192	0	0.00	1.98
	48	Lampson Avenue to Chapman Avenue	0.50	2,656	10,212	1	0.27	1.98
	49	Chapman Avenue to Orangewood Avenue	0.50	2,656	8,256	3	0.99	1.98
Nutwood Street	50	Garden Grove Boulevard to Lampson Avenue	0.50	2,655	7,967	2	0.68	1.98
	51	Lampson Avenue to Chapman Avenue	0.50	2,635	6,434	1	0.43	1.98

[1] Accident Data from 1/1/2010 to 12/31/2011

[2] Source: City of Garden Grove Crossroads Program

City of Garden Grove
Table 1: 2014 Speed Zone Survey - Accident Survey Analysis

Street	No.	Location	Distance (mile)	Distance (feet)	ADT	Accidents[1] 2 yrs Total	Accident Rate	Expected[2] Acc. Rate
Springdale Street	52	Garden Grove Boulevard to Lampson Avenue	0.50	2,634	18,183	1	0.15	3.55
	53	Lampson Avenue to Chapman Avenue	0.51	2,686	19,569	0	0.00	3.55
	54	Chapman Avenue to Santa Catalina Avenue (north city limit	0.23	1,200	11,980	0	0.00	3.55
Taft Street	55	Westminster Boulevard to Trask Avenue	0.50	2,646	9,007	0	0.00	1.98
	56	Trask Avenue to Century Boulevard	0.35	1,873	7,742	0	0.00	1.98
Ward Street	57	Hazard Avenue to Morningside Drive	0.28	1,502	8,727	1	0.55	1.98
West Street	58	Garden Grove Boulevard to Lampson Avenue	0.50	2,656	12,915	5	1.05	3.55
	59	Lampson Avenue to Chapman Avenue	0.50	2,656	11,869	1	0.23	3.55
	60	Chapman Avenue to Orangewood Avenue	0.50	2,656	12,979	1	0.21	3.55
	61	Orangewood Avenue to Ricky Avenue (north city limits)	0.50	2,656	12,740	0	0.00	3.55
Western Avenue	62	Garden Grove Boulevard to Lampson Avenue	0.50	2,661	16,447	3	0.50	3.55
	63	Lampson Avenue to Chapman Avenue	0.50	2,647	16,423	2	0.33	2.30
	64	Chapman Avenue to Orangewood Avenue	0.50	2,645	20,402	0	0.00	2.30
	65	Orangewood Avenue to Lincoln Way (north city limits)	0.19	993	21,079	0	0.00	2.30
Valley View Street	66	Garden Grove Boulevard to Lampson Avenue	0.76	3,992	50,637	11	0.39	2.30
	67	Lampson Avenue to Chapman Avenue	0.46	2,443	47,027	7	0.44	2.30
	68	Chapman Avenue to Santa Catalina Ave (north city limits)	0.23	1,189	49,029	3	0.37	2.30
Century Boulevard	69	Garden Grove Boulevard to Euclid Street	0.50	2,640	13,177	0	0.00	2.30
Chapman Avenue	70	Bailey Street to Valley View Street	0.22	1,154	8,855	4	2.83	2.30
	71	Valley View Street to Springdale Street	0.50	2,641	12,928	1	0.21	2.30
	72	Springdale Street to Knott Street	0.50	2,642	12,935	0	0.00	2.30
	73	Knott Street to Western Avenue	0.55	2,914	19,503	3	0.38	2.30
	74	Western Avenue to Santa Paula Street (mid-east city limits)	0.42	2,221	22,663	0	0.00	2.30
	75	Briarwood Street (mid-west city limits) to Magnolia Street	0.63	3,303	21,028	4	0.42	3.55
	76	Magnolia Street to Gilbert Street	0.46	2,434	25,675	4	0.46	2.30
	77	Gilbert Street to Brookhurst Street	0.50	2,644	27,885	6	0.59	2.30
	78	Brookhurst Street to Nutwood Street	0.50	2,656	27,986	2	0.19	2.30
	79	Nutwood Street to Euclid Street	0.50	2,656	27,819	2	0.20	2.30
	80	Euclid Street to Ninth Street	0.50	2,656	26,615	1	0.10	2.30
	81	Ninth Street to West Street	0.50	2,656	26,846	1	0.10	3.55
	82	West Street to Harbor Boulevard	0.50	2,656	27,317	4	0.40	2.30
	83	Harbor Boulevard to Haster Street	0.50	2,656	30,493	6	0.54	2.30
	84	Haster Street to Lewis Street	0.50	2,656	29,584	11	1.01	2.30
Garden Grove Boulevard	85	Knott Street to Western Avenue	0.35	1,829	16,797	2	0.47	2.30
	86	Western Avenue to Beach Boulevard	0.49	2,607	20,577	2	0.27	2.30
	87	Beach Boulevard to Dale Street	0.51	2,685	22,569	7	0.84	2.30
	88	Dale Street to Magnolia Street	0.50	2,652	24,727	2	0.22	2.30
	89	Magnolia Street to Gilbert Street	0.48	2,510	29,820	1	0.10	2.30
	90	Gilbert Street to Brookhurst Street	0.69	3,619	23,602	12	1.02	2.30
	91	Brookhurst Street to Nelson Street	0.50	2,656	27,953	1	0.10	2.30
	92	Nelson Street to Euclid Street	0.50	2,656	27,192	6	0.60	2.30
	93	Euclid Street to Newhope Street	0.50	2,656	27,004	4	0.40	2.30
	94	Newhope Street to Harbor Boulevard	0.50	2,656	29,689	7	0.64	2.30
	95	Harbor Boulevard to Haster Street	0.50	2,656	26,846	14	1.42	2.30
	96	Haster Street to Lewis Street	0.50	2,656	25,203	6	0.65	2.30
Hazard Avenue	97	Cork Street to Brookhurst Street	0.28	1,455	15,816	1	0.31	2.30
	98	Brookhurst Street to Ward Street	0.50	2,656	15,438	1	0.18	3.55
	99	Ward Street to Euclid Street	0.50	2,656	14,375	1	0.19	1.98
Lampson Avenue	100	Manley Street (west city limits) to Valley View Street	0.68	3,586	10,909	0	0.00	2.30
	101	Valley View Street to Springdale Street	0.57	3,000	9,222	0	0.00	2.30
	102	Springdale Street to Knott Street	0.50	2,641	11,623	1	0.24	2.30
	103	Knott Street to Western Avenue	0.56	2,951	12,373	1	0.20	2.30
	104	Western Avenue to Santa Rosalia Street (mid-east city limits	0.19	992	13,727	1	0.53	3.55
	105	San Marcos Drive (mid-west city limits) to Dale Street	0.36	1,927	12,392	1	0.30	1.98

[1] Accident Data from 1/1/2010 to 12/31/2011
[2] Source: City of Garden Grove Crossroads Program

City of Garden Grove
Table 1: 2014 Speed Zone Survey - Accident Survey Analysis

Street	No.	Location	Distance (mile)	Distance (feet)	ADT	Accidents[1] 2 yrs Total	Accident Rate	Expected[2] Acc. Rate
Lampson Avenue cont.	106	Dale Street to Magnolia Street	0.50	2,643	10,240	1	0.27	1.98
	107	Magnolia Street to Gilbert Street	0.46	2,447	7,924	0	0.00	1.98
	108	Gilbert Street to Brookhurst Street	0.50	2,655	6,703	0	0.00	1.98
	109	Brookhurst Street to Nutwood Street	0.50	2,656	8,140	1	0.33	1.98
	110	Nutwood Street to Euclid Street	0.50	2,656	7,994	1	0.34	1.98
	111	Euclid Street to Ninth Street	0.50	2,656	7,631	0	0.00	1.98
	112	Ninth Street to West Street	0.50	2,656	8,374	2	0.65	1.98
	113	West Street to Harbor Boulevard	0.50	2,656	9,529	0	0.00	1.98
	114	Harbor Boulevard to Haster Street	0.50	2,656	11,234	6	1.45	1.98
	115	Haster Street to Lewis Street	0.50	2,656	9,153	1	0.30	1.98
Orangewood Avenue	116	Knott Street to Western Avenue	0.54	2,877	7,142	0	0.00	1.98
	117	Jane Way (mid-west city limits) to Dale Street	0.32	1,687	7,681	0	0.00	1.98
	118	Dale Street to Magnolia Street	0.50	2,635	7,834	0	0.00	1.98
	119	Magnolia Street to Gilbert Street	0.46	2,445	6,032	0	0.00	2.30
	120	Gilbert Street to Brookhurst Street	0.51	2,667	7,720	0	0.00	1.98
	121	Brookhurst Street to Palmwood Drive	0.50	2,656	8,648	3	0.94	3.55
	122	Palmwood Drive to Euclid Street	0.50	2,656	9,773	4	1.11	3.55
	123	Ninth Street to West Street	0.50	2,656	9,964	0	0.00	1.98
	124	West Street to Eugene Street (east city limits)	0.50	2,656	1,449	1	1.88	1.98
Trask Avenue	125	Beach Boulevard to Newland Street	0.51	2,706	11,393	1	0.23	3.55
	126	Newland Street to Magnolia Street	0.50	2,641	13,813	2	0.40	3.55
	127	Magnolia Street to Galway Street	0.53	2,795	15,367	8	1.35	2.30
	128	Galway Street to Brookhurst Street	0.48	2,510	10,971	5	1.31	2.30
	129	Brookhurst Street to Benton Street	0.50	2,656	14,810	1	0.18	2.30
	130	Benton Street to Euclid Street	0.50	2,656	15,256	2	0.36	2.30
	131	Euclid Street to Newhope Street	0.50	2,656	16,718	2	0.33	2.30
	132	Newhope Street to Harbor Boulevard	0.50	2,656	12,757	3	0.64	3.55
	133	Harbor Boulevard to Clinton Street	0.50	2,656	14,592	6	1.12	2.30
	134	Clinton Street to Fairview Street	0.50	2,656	10,823	1	0.25	1.98
Westminster Avenue	135	Newland Street to Magnolia Street	0.34	1,820	28,997	2	0.27	2.30
	136	Magnolia Street to Bushard Street	0.50	2,662	28,835	3	0.28	2.30
	137	Bushard Street to Brookhurst Street	0.50	2,656	30,674	14	1.24	2.30
	138	Brookhurst Street to Bowen Street	0.43	2,251	27,642	7	0.81	2.30
	139	Bowen Street to Euclid Street	0.57	3,006	29,079	2	0.17	2.30
	140	Euclid Street to Newhope Street	0.50	2,642	24,784	2	0.22	2.30
	141	Newhope Street to Harbor Boulevard	0.50	2,642	25,134	3	0.33	2.30
	142	Harbor Boulevard to Clinton Street	0.50	2,642	27,550	1	0.10	2.30
	143	Clinton Street to Buena Street (east city limits)	0.22	1,155	25,543	2	0.49	2.30

[1] Accident Data from 1/1/2010 to 12/31/2011
[2] Source: City of Garden Grove Crossroads Program

Accident Rate Calculation:

The rate was calculated using the following equation:

$$\text{Accident Rate} = \frac{\text{Number of Midblock accidents} \times 10^6}{\text{24-hour volume} \times 365 \times \text{segment length} \times \text{number of years}}$$

Where: Number of mid-block accidents based on two years (January 1, 2010 to December 1, 2011), 24-hour volume (both directions) in the survey segment and segment length in miles.

Example:

Accident rate on: Chapman Avenue between West Street and Harbor Boulevard:

$$\text{Accident Rate} = \frac{4 \times 10^6}{27{,}317 \times 365 \times .5 \times 2}$$

= **0.40 accidents per million vehicle miles (A/MVM)**

The Average Expected Accident Rate for the segment is 2.30. The calculated accident rate of 0.40 is well below the expected rate for this segment.

3.3 Spot Speed Survey

Spot speed surveys were conducted at each street segment to establish a reasonable and effective speed limit based on the premise that the speed limit thus established conforms to the actual behavior of the majority of motorists. The speed limit should normally be established at the first five mile per hour increment nearest the 85th percentile speed recorded for the surveyed segment. However, engineering judgment and other factors such as Street Surveillance (Section 3.1) and accident rates (Section 3.2) may indicate the need for further reduction in establishing reasonable and effective speed limits.

The criteria used in conducting the radar survey are listed in **Appendix A.**

Appendix C (binder) contains the Engineering and Speed Survey Summary sheets for each of the 143 sections surveyed. The information collected and data calculated for the radar speed survey are as follows:

- Posted speed limit
- Direction of survey
- Date and time of speed survey
- 50th Percentile speed
- 85th Percentile speed
- 10 mph pace speed
- Percent over pace speed

- Range of speeds
- Number of vehicles observed
- Average speed
- Accident History
- Accident Rate
- Average Daily Traffic
- Road Description
- Pedestrian and bicycle activity

The summary contains information about vehicular speed data observed, accident data, street classification, and any unusual conditions at the location.

SECTION 4.0

SURVEY FINDINGS AND RECOMMENDATIONS

In accordance with the State-imposed speed limit establishment regulation, as defined by CVC Section 627 described in **Appendix B**, there are several factors that may be considered to justify setting the prima facie speed limits more than five miles per hour below the observed 85th percentile speed.

It should be noted that the regulations in **Appendix A** also state that the *maximum* permissible lowering of the proposed speed limit from the 85th percentile is 10 miles per hour.

The factors to be considered are:

- Most recent accident record (mid-block)
- Roadway design speed
- Safe stopping sight distance
- Super-elevation
- Grades
- Shoulder condition
- Profile condition
- Intersection spacing offsets
- Commercial driveway characteristics (land use)
- Pedestrian traffic with and without sidewalks
- Pedestrian and Bicycle safety
- Equestrian Safety (City of Garden Grove, only)

The above factors for each roadway segment surveyed are listed in the Engineering and Speed Survey Summary sheets in **Appendix C (binder)**. The 85th percentile speed and the above factors were considered in verifying existing speed limits and recommending speed limit changes (increase or decrease). Additionally, discussions were held with City staff in making decisions with respect to changing existing speed limits. This allowed for consideration of any special knowledge of the segment. The Speed Zone Survey – Accident Survey Analysis (Table 1) lists the total number of accidents, calculated accident rate, and the expected accident rate. **Table 2** shows the surveyed road segments with posted and recommended speed limits.

Table 2: Segment Spot Speed Survey 2014

Street	No		Dir.	Date	10-Mile Pace (mph)	% in 10-Mile Pace	50th % Tile (mph)	85th % Tile (mph)	Posted Speed Limit (mph)	Recommended Speed Limit (mph)	Comments
Brookhurst Street	1	Hazard Avenue to Westminster Avenue	N/S	4/10/2014	27-36	66	33	39	40	40	No change, 45mph in Westminster
	2	Westminster Avenue to Trask Avenue	N/S	4/10/2014	24-33	66	30	36	40	40	No change
	3	Trask Avenue to Garden Grove Boulevard	N/S	4/10/2014	23-32	67	29	34	45	40	Decrease, 85th percentile, bike lane
	4	Garden Grove Boulevard to Lampson Avenue	N/S	4/10/2014	30-39	60	34	40	45	40	Decrease, 85th percentile, bike lane
	5	Lampson Avenue to Chapman Avenue	N/S	4/15/2014	27-36	61	31	39	45	40	Decrease, 85th percentile, bike lane
	6	Chapman Avenue to Orangewood Avenue	N/S	4/15/2014	38-47	60	41	48	45	45	No change, 85th percentile, bike lane, low accident rate
	7	Orangewood Avenue to Katella Avenue	N/S	4/15/2014	38-47	68	42	47	45	45	No change, 85th percentile, low accident, 40 mph in Anaheim
Dale Street	8	Garden Grove Boulevard to Lampson Avenue	N/S	4/8/2014	27-36	75	32	36	35	35	No change
	9	Lampson Avenue to Chapman Avenue	N/S	4/8/2014	33-42	67	36	40	35	35	No change, 85th percentile, continuity of speed
	10	Chapman Avenue to Orangewood Avenue	N/S	4/8/2014	27-36	66	33	38	35	35	No change, 85th percentile
	11	Orangewood Avenue to Katella Avenue	N/S	4/8/2014	34-43	65	38	43	35	35	No change, 85th percentile, continuity, 35 mph in Anaheim
Euclid Street	12	Westminster Avenue to Trask Avenue	N/S	4/9/2014	34-43	67	38	45	40	40	No change, 85th percentile, continuity, 40 mph in Santa Ana
	13	Trask Avenue to Garden Grove Boulevard	N/S	4/9/2014	32-41	61	35	41	40	40	No change, 85th percentile, low accident rate
	14	Garden Grove Boulevard to Lampson Avenue	N/S	6/5/2014	31-40	94	37	40	40	40	No change, 85th percentile, low accident rate
	15	Lampson Avenue to Chapman Avenue	N/S	6/5/2014	31-40	92	39	42	40	40	No change, 85th percentile, low accident rate
	16	Chapman Avenue to Orangewood Avenue	N/S	6/5/2014	32-41	78	37	42	40	40	No change, 85th percentile, low accident rate, continuity
	17	Orangewood Avenue to Katella Street	N/S	4/9/2014	35-44	65	39	45	40	40	No change, 85th percentile, continuity, 40 mph in Anaheim
Gilbert Street	18	Garden Grove Boulevard to Lampson Avenue	N/S	4/10/2014	26-35	74	30	35	30	30	No change, 85th percentile, no sidewalks, multiple driveways
	19	Lampson Avenue to Chapman Avenue	N/S	4/10/2014	28-37	77	32	36	30	30	No change, 85th percentile, no sidewalks, multiple driveways
	20	Chapman Avenue to Orangewood Avenue	N/S	4/10/2014	35-44	83	39	42	35	35	No change, 85th percentile, continuity of speed
	21	Orangewood Avenue to Katella Avenue	N/S	4/10/2014	32-41	71	34	39	35	35	No change, 85th percentile, low accident, 35 mph in Anaheim
Harbor Boulevard	22	Westminster Avenue to Trask Avenue	N/S	4/3/2014	31-40	62	37	43	40	40	No change, 85th, low accident, 45 mph in Santa Ana
	23	Trask Avenue to Garden Grove Boulevard	N/S	4/3/2014	26-35	58	32	40	40	40	No change
	24	Garden Grove Boulevard to Lampson Avenue	N/S	4/3/2014	33-42	70	37	42	40	40	No change
	25	Lampson Avenue to Chapman Avenue	N/S	4/3/2014	33-42	64	38	44	40	40	No change
	26	Chapman Avenue to Wilken Way (north city limits)	N/S	6/5/2014	31-40	88	36	39	40	40	No change, continuity of speed, 40 mph in Anaheim
Haster Street	27	Garden Grove Boulevard to Lampson Avenue	N/S	4/3/2014	33-42	66	38	43	40	40	No change, 85th percentile, low accident rate, continuity
	28	Lampson Avenue to Chapman Avenue	N/S	4/3/2014	31-40	67	36	43	40	40	No change, 85th percentile, low accident rate, continuity
	29	Chapman Avenue to Simmons Avenue (north city limits)	N/S	6/5/2014	35-44	85	40	43	40	40	No change, continuity of speed, 40 mph in Anaheim
Knott Street	30	Garden Grove Boulevard to Lampson Avenue	N/S	4/2/2014	33-42	57	34	41	40	40	No change, 85th percentile, low accident, 40 mph in Cypress
	31	Lampson Avenue to Chapman Avenue	N/S	4/2/2014	35-44	78	39	44	40	40	No change, 85th percentile, low accident rate, continuity
	32	Chapman Avenue to Orangewood Avenue	N/S	4/3/2014	33-42	74	37	41	40	40	No change, 85th percentile, low accident rate, continuity
	33	Orangewood Avenue to Patterson Drive (north city limits)	N/S	4/3/2014	32-41	55	35	42	40	40	No change, 85th percentile, low accident, 40 mph in Anaheim
Magnolia Street	34	Westminster Avenue to Trask Avenue	N/S	4/9/2014	31-40	61	34	39	40	40	No change, 85th, low accident, continuity, 45mph in Westminster
	35	Trask Avenue to Garden Grove Boulevard	N/S	4/9/2014	31-40	74	36	41	35	35*	No change, 85th percentile, low accident rate
	36	Garden Grove Boulevard to Lampson Avenue	N/S	4/9/2014	31-40	73	36	40	40	40	No change, 85th percentile, low accident rate
	37	Lampson Avenue to Chapman Avenue	N/S	4/9/2014	35-44	64	39	44	40	40	No change, 85th percentile, continuity of speed
	38	Chapman Avenue to Orangewood Avenue	N/S	4/9/2014	31-40	71	37	42	40	40	No change, 85th percentile, low accident rate
	39	Orangewood Avenue to Katella Avenue	N/S	4/9/2014	35-44	73	40	44	40	40*	No change, 40 mph in Anaheim
Main Street	40	Garden Grove Boulevard to Acacia Parkway	N/S	4/9/2014	15-24	99	17	18	25	25	No change
	41	Acacia Parkway to College Street	N/S	4/9/2014	21-30	78	26	30	25	25	No change, 85th percentile, continuity of speed
Nelson Street	42	Garden Grove Boulevard to Stanford Avenue	N/S	4/9/2014	27-36	70	32	37	30	35	Increase, 85th percentile, low accident rate
Newhope Street	43	Westminster Avenue to Trask Avenue	N/S	4/8/2014	32-41	66	37	44	35	40	Increase, 85th percentile, bike lane, low accident, 40 mph Santa Ana
	44	Trask Avenue to Garden Grove Boulevard	N/S	4/8/2014	32-41	79	37	41	35	35*	No change, bike lane, low accident rate, multiple driveways
Newland Street	45	Westminster Avenue to Trask Avenue	N/S	4/8/2014	35-44	69	39	44	40	40	No change, low accident rate, 40 mph in Westminster
	46	Trask Avenue to Garden Grove Boulevard	N/S	4/5/2014	30-39	81	34	38	40	40	No change

* School Zone, NP = Not Posted

Table 2: Segment Spot Speed Survey 2014

Street	No		Dir.	Date	10-Mile Pace (mph)	% in 10-Mile Pace	50th % Tile (mph)	85th % Tile (mph)	Posted Speed Limit (mph)	Recommended Speed Limit (mph)	Comments
Ninth Street	47	Garden Grove Boulevard to Lampson Avenue	N/S	4/8/2014	29-38	73	33	39	35	35	No change, 85th percentile, low accident rate
	48	Lampson Avenue to Chapman Avenue	N/S	4/8/2014	29-38	71	36	41	35	35	No change, 85th percentile, low accident, continuity of speed
	49	Chapman Avenue to Orangewood Avenue	N/S	4/8/2014	22-34	67	30	36	35	35*	No change, 85th percentile, bike lane, 35 mph in Anaheim
Nutwood Street	50	Garden Grove Boulevard to Lampson Avenue	N/S	4/10/2014	23-32	82	28	32	35	35	No change, low accident rate, continuity of speed
	51	Lampson Avenue to Chapman Avenue	N/S	4/10/2014	28-37	72	32	37	35	35	No change
Springdale Street	52	Garden Grove Boulevard to Lampson Avenue	N/S	4/2/2014	32-41	76	37	42	35	35*	No change, 85th percentile, low accident, 35 mph in Westminster
	53	Lampson Avenue to Chapman Avenue	N/S	4/2/2014	34-43	74	39	43	35	35*	No change, 85th percentile, low accident rate, continuity of speed
	54	Chapman Avenue to Santa Catalina Avenue (north city limits	N/S	4/2/2014	35-44	70	38	43	35	40	Increase, 85th percentile, low accident rate, 40 mph in Cypress
Taft Street	55	Westminster Boulevard to Trask Avenue	N/S	6/5/2014	25-34	95	30	33	35	35	No change, 85th percentile
	56	Trask Avenue to Century Boulevard	N/S	6/5/2014	25-34	73	30	35	35	35	No change, 85th percentile
Ward Street	57	Hazard Avenue to Morningside Drive	N/S	6/5/2014	27-36	94	30	34	NP	35	Establish a 35 mph speed limit, 85th percentile, bike lane
West Street	58	Garden Grove Boulevard to Lampson Avenue	N/S	4/8/2014	37-46	67	40	46	35	35	No change, 85th percentile, low accident rate, continuity of speed
	59	Lampson Avenue to Chapman Avenue	N/S	4/8/2014	34-43	67	38	43	35	35*	No change, 85th percentile, low accident rate, continuity of speed
	60	Chapman Avenue to Orangewood Avenue	N/S	4/8/2014	33-42	66	37	42	35	35	No change, 85th percentile, low accident rate, continuity of speed
	61	Orangewood Avenue to Ricky Avenue (north city limits)	N/S	4/8/2014	31-40	69	35	40	40	40	No change, 40 mph in Anaheim
Western Avenue	62	Garden Grove Boulevard to Lampson Avenue	N/S	4/3/2014	33-42	71	39	43	45	45	No change, 85th percentile, low accident rate
	63	Lampson Avenue to Chapman Avenue	N/S	4/3/2014	35-44	59	38	44	45	45	No change, continuity of speed
	64	Chapman Avenue to Orangewood Avenue	N/S	4/3/2014	35-44	64	38	44	45	45	No change, continuity of speed, bike lane
	65	Orangewood Avenue to Lincoln Way (north city limits)	N/S	4/3/2014	33-42	65	37	42	40	40	No change, 85th percentile, low accident, bike lane, 40 mph in Anaheim
Valley View Street	66	Garden Grove Boulevard to Lampson Avenue	N/S	4/2/2014	31-40	61	35	40	45	45	No change, continuity of speed, 45 mph in Westminster
	67	Lampson Avenue to Chapman Avenue	N/S	6/5/2014	38-47	81	43	46	45	45	No change, 85th percentile, low accident rate
	68	Chapman Avenue to Santa Catalina Ave (north city limits)	N/S	6/5/2014	37-46	75	42	47	45	45	No change, 85th percentile, low accident, 45 mph in Cypress
Century Boulevard	69	Garden Grove Boulevard to Euclid Street	N/S	4/8/2014	30-39	71	36	42	40	40	No change
Chapman Avenue	70	Bailey Street to Valley View Street	E/W	4/1/2014	18-27	84	23	27	25	25	No change, high accident rate (local street)
	71	Valley View Street to Springdale Street	E/W	4/1/2014	35-44	78	40	45	45	45	No change, continuity of speed, bike lane
	72	Springdale Street to Knott Street	E/W	4/1/2014	41-50	68	45	51	45	45	No change, continuity of speed, bike lane
	73	Knott Street to Western Avenue	E/W	4/1/2014	38-47	77	41	47	40	40	No change, 85th percentile, low accident rate, bike lane
	74	Western Avenue to Santa Paula Street (mid-east city limits)	E/W	4/1/2014	34-43	85	38	42	40	40*	No change, 85th percentile, low accident rate, continuity of speed, bike lane
	75	Briarwood Street (mid-west city limits) to Magnolia Street	E/W	4/1/2014	33-42	82	39	43	40	40	No change, 85th percentile, low accident rate, continuity of speed, bike lane
	76	Magnolia Street to Gilbert Street	E/W	4/1/2014	30-39	62	35	43	40	40*	No change, bike lane
	77	Gilbert Street to Brookhurst Street	E/W	4/1/2014	34-43	72	38	43	40	40	No change
	78	Brookhurst Street to Nutwood Street	E/W	4/1/2014	34-43	68	38	48	40	40	No change, 85th percentile, low accident rate, continuity of speed, bike lane
	79	Nutwood Street to Euclid Street	E/W	4/1/2014	35-44	69	38	43	40	40	No change, 85th percentile, low accident rate, bike lane
	80	Euclid Street to Ninth Street	E/W	4/1/2014	35-44	68	42	48	40	40	No change, 85th percentile, low accident rate, continuity of speed, bike lane
	81	Ninth Street to West Street	E/W	4/1/2014	37-46	93	41	42	40	40	No change, 85th percentile, low accident rate
	82	West Street to Harbor Boulevard	E/W	4/1/2014	34-43	67	39	45	40	40	No change, 85th percentile, low accident rate, continuity of speed, bike lane
	83	Harbor Boulevard to Haster Street	E/W	4/1/2014	33-42	73	38	45	45	45	No change, 85th percentile, low accident rate, bike lane
	84	Haster Street to Lewis Street	E/W	4/1/2014	42-51	73	45	49	45	45	No change, 85th percentile, low accident, 40 mph in Orange
Garden Grove Boulevard	85	Knott Street to Western Avenue	E/W	4/7/2014	34-43	66	37	44	40	40	No change, 40 mph in Westminster
	86	Western Avenue to Beach Boulevard	E/W	4/7/2014	34-43	81	38	42	40	40	No change
	87	Beach Boulevard to Dale Street	E/W	4/7/2014	38-47	80	43	46	40	40	No change, continuity of speed
	88	Dale Street to Magnolia Street	E/W	4/7/2014	29-38	85	34	38	40	40	No change
	89	Magnolia Street to Gilbert Street	E/W	4/7/2014	33-42	78	37	41	40	40	No change
	90	Gilbert Street to Brookhurst Street	E/W	4/7/2014	35-44	74	38	42	40	40	No change
	91	Brookhurst Street to Nelson Street	E/W	4/7/2014	33-42	69	37	41	40	40	No change
	92	Nelson Street to Euclid Street	E/W	4/7/2014	31-40	89	35	39	40	40*	No change
	93	Euclid Street to Newhope Street	E/W	4/7/2014	35-44	79	39	43	40	40	No change

 * School Zone, NP = Not Posted

Table 2: Segment Spot Speed Survey 2014

Street	No		Dir.	Date	10-Mile Pace (mph)	% in 10-Mile Pace	50th % Tile (mph)	85th % Tile (mph)	Posted Speed Limit (mph)	Recommended Speed Limit (mph)	Comments
Garden Grove cont.	94	Newhope Street to Harbor Boulevard	E/W	4/7/2014	35-44	73	40	44	40	40	No change
	95	Harbor Boulevard to Haster Street	E/W	4/7/2014	35-44	79	38	44	40	40	No change
	96	Haster Street to Lewis Street	E/W	4/7/2014	32-41	79	35	40	40	40*	No change, continuity of speed, 40 mph in Orange
Hazard Avenue	97	Cork Street to Brookhurst Street	E/W	4/14/2014	39-48	68	42	48	40	40	No change, continuity of speed, 40 mph in Westminster
	98	Brookhurst Street to Ward Street	E/W	4/11/2014	35-44	87	41	43	40	40	No change, continuity of speed, 40 mph in Westminster
	99	Ward Street to Euclid Street	E/W	4/11/2014	37-46	78	40	45	40	40	No change, continuity of speed, 35 mph in Santa Ana
Lampson Avenue	100	Manley Street (west city limits) to Valley View Street	E/W	4/2/2014	38-47	70	42	47	45	45	No change, 45 mph in Seal Beach, bike lane
	101	Valley View Street to Springdale Street	E/W	4/2/2014	36-45	88	40	44	40	40	No change, 85th percentile, low accident rate, bike lane
	102	Springdale Street to Knott Street	E/W	4/2/2014	37-46	79	42	46	40	40	No change, 85th percentile, continuity of speed, bike lane
	103	Knott Street to Western Avenue	E/W	4/2/2014	37-46	91	41	44	40	40	No change, 85th percentile, bike lane
	104	Western Avenue to Santa Rosalia Street (mid-east city limits	E/W	4/2/2014	34-43	85	38	43	40	40	No change, 85th percentile, bike lane
	105	San Marcos Drive (mid-west city limits) to Dale Street	E/W	4/2/2014	35-44	82	41	44	40	40*	No change, bike lane
	106	Dale Street to Magnolia Street	E/W	4/2/2014	28-37	84	32	36	35	35	No change, 85th percentile, bike lane
	107	Magnolia Street to Gilbert Street	E/W	4/2/2014	28-37	92	33	36	35	35	No change, 85th percentile
	108	Gilbert Street to Brookhurst Street	E/W	4/2/2014	24-33	84	29	33	35	35	No change, 85th percentile
	109	Brookhurst Street to Nutwood Street	E/W	4/2/2014	27-36	82	32	36	35	35	No change, 85th percentile
	110	Nutwood Street to Euclid Street	E/W	4/2/2014	30-39	77	35	39	35	35	No change, 85th percentile, bike lane
	111	Euclid Street to Ninth Street	E/W	4/4/2014	25-34	88	29	33	35	35	No change, 85th percentile, bike lane
	112	Ninth Street to West Street	E/W	4/4/2014	32-41	94	36	40	35	35	No change, 85th percentile, continuity of speed, bike lane
	113	West Street to Harbor Boulevard	E/W	4/4/2014	23-32	98	29	31	35	35	No change, 85th percentile, bike lane
	114	Harbor Boulevard to Haster Street	E/W	4/4/2014	30-39	75	35	40	35	35	No change, 85th percentile, continuity of speed, bike lane
	115	Haster Street to Lewis Street	E/W	4/4/2014	32-41	79	36	41	35	35	No change, 85th percentile, bike lane
Orangewood Avenue	116	Knott Street to Western Avenue	E/W	4/10/2014	29-38	83	35	39	40	40	No change, 85th, low accident, continuity, 40 mph in Cypress
	117	Jane Way (mid-west city limits) to Dale Street	E/W	4/10/2014	31-40	85	34	38	40	40*	No change, 85th percentile, low accident rate
	118	Dale Street to Magnolia Street	E/W	4/10/2014	33-42	92	37	40	40	40	No change, 85th percentile, low accident, continuity of speed, bike lane
	119	Magnolia Street to Gilbert Street	N/S	4/10/2014	32-41	91	37	40	35	35	No change, 85th percentile, bike lane
	120	Gilbert Street to Brookhurst Street	E/W	4/10/2014	25-34	96	31	33	35	35	No change, 85th percentile
	121	Brookhurst Street to Palmwood Drive	E/W	4/4/2014	28-37	74	33	36	35	35	No change, 85th percentile, bike lane
	122	Palmwood Drive to Euclid Street	E/W	4/10/2014	29-38	89	34	37	35	35	No change, 85th, low accident, continuity, bike lane, 40 mph in Anaheim
	123	Ninth Street to West Street	E/W	4/10/2014	31-40	98	34	37	35	35	No change, 85th percentile, low accident, bike lane,40 mph in Anaheim
	124	West Street to Eugene Street (east city limits)	E/W	4/10/2014	32-41	77	36	41	40	40	No change
Trask Avenue	125	Beach Boulevard to Newland Street	E/W	4/8/2014	34-43	66	39	43	35	35	No change, 85th %ile, low accident, continuity, 35 mph Westminster
	126	Newland Street to Magnolia Street	E/W	4/8/2014	32-41	66	38	43	40	40*	No change
	127	Magnolia Street to Galway Street	E/W	4/8/2014	33-42	68	37	43	40	40	No change
	128	Galway Street to Brookhurst Street	E/W	4/8/2014	37-46	76	40	46	40	40*	No change
	129	Brookhurst Street to Benton Street	E/W	4/8/2014	35-44	80	40	44	40	40	No change, 85th percentile, bike lane
	130	Benton Street to Euclid Street	E/W	4/8/2014	37-46	84	42	46	40	40	No change, 85th percentile, continuity of speed, bike lane
	131	Euclid Street to Newhope Street	E/W	4/8/2014	35-44	76	41	47	40	40	No change, 85th percentile, continuity of speed, bike lane
	132	Newhope Street to Harbor Boulevard	E/W	4/8/2014	35-44	92	39	42	40	40*	No change, 85th percentile
	133	Harbor Boulevard to Clinton Street	E/W	4/8/2014	33-42	66	37	42	35	35*	No change, 85th percentile, continuity of speed
	134	Clinton Street to Fairview Street	E/W	4/8/2014	31-40	89	35	37	35	35	No change, 85th percentile
Westminster Avenue	135	Newland Street to Magnolia Street	E/W	4/11/2014	36-45	77	39	44	40	40	No change, 85th, low accident, continuity, 40 mph in Westminster
	136	Magnolia Street to Bushard Street	E/W	4/11/2014	31-40	76	36	41	40	40	No change, 85th percentile, low accident rate
	137	Bushard Street to Brookhurst Street	E/W	4/11/2014	37-46	69	40	45	45	45	No change, 85th percentile
	138	Brookhurst Street to Bowen Street	E/W	4/11/2014	33-42	70	37	43	45	45	No change, 85th percentile
	139	Bowen Street to Euclid Street	E/W	4/11/2014	34-43	89	38	42	45	45	No change, 85th percentile
	140	Euclid Street to Newhope Street	N/S	4/11/2014	37-46	69	40	45	45	45	No change
	141	Newhope Street to Harbor Boulevard	N/S	4/11/2014	36-45	76	40	44	45	45	No change, 85th percentile, low accident rate
	142	Harbor Boulevard to Clinton Street	N/S	4/11/2014	34-43	78	38	43	45	45	No change, 85th percentile, low accident rate
	143	Clinton Street to Buena Street (east city limits)	N/S	4/11/2014	33-42	83	37	41	45	45	No change, 85th percentile, low accident, 45 mph in Santa Ana

* School Zone, NP = Not Posted

4.1 Speed Limit Signing

All California motorists are required to know the basic 15, 25, and 65 MPH speed laws and are tested on the subject when applying for a driver's license. The maximum speed limit on most California highways is 65 mph. You may drive 70 mph where posted. Unless otherwise posted, the maximum speed limit is 55 mph on two-lane undivided highways and for vehicles towing trailers. Consequently, speed limit signs covering these conditions need not be posted on City streets. However, although not required by law, speed limit signs for these situations may be posted on streets that have significant daily vehicular traffic volumes, a by-pass traffic situation, the continued violation of a residential 25 MPH speed zone, or with other applicable warrants.

It is normal policy to recommend the posting of speed limit signs only of streets that have been covered by the City speed limit ordinance or by warranted situations covered above.

Speed limit signs should be installed at about one-half mile intervals on the City streets which have been speed zoned. Signs are normally installed on the exit side of traffic signal controlled intersections and the more important intersections where there is high side street vehicle entry. It is important that motorists be given adequate information while not oversigning, which tends to confuse the motorist.

Enforcement problems can occur when, (a) the highway is posted with inappropriate speed limit signs, (b) the highway is improperly or inadequately posted; or, (c) the highway is not posted nor covered by ordinance and therefore falls under the basic speed law. In any of these events, the result is a debatable validity that may be questioned in court cases where citations are issued and contested.

SECTION 5.0

SUMMARY AND CONCLUSIONS

1. The radar survey and the raw data collection was conducted per CVC Section 627.

2. A total of 143 sections on the City's arterial, secondary arterial, and collector roadway network were surveyed.

3. The accident rate (Table 1) for the majority of the street segments is well below the expected accident rate obtained from the City of Garden Grove for various types of roadway facilities within the Orange County Area.

4. It was concluded that the existing speeds on arterial, secondary arterial, and collector roadways in the City of Garden Grove can remain unchanged, except on the following roadway segments:

   - Brookhurst Street from Trask Avenue to Chapman Avenue – it is recommended that the speed limit be decreased from 45 mph to 40 mph based on the 85th percentile speed.
   - Nelson Street from Garden Grove Boulevard to Stanford Avenue – it is recommended that the speed limit be increased from 30 mph to 35 mph based on the 85th percentile speed and the low accident rate.
   - Newhope Street from Westminster Avenue to Trask Avenue – it is recommended that the speed limit be increased from 35 mph to 40 mph based on the 85th percentile speed, low accident rate, and continuity of speed with the City of Santa Ana.
   - Springdale Street from Chapman Avenue to Santa Catalina Avenue – it is recommended that the speed limit be increased from 35 mph to 40 mph based on the 85th percentile speed, low accident rate, and continuity of speed with the City of Cypress.
   - Ward Street from Hazard Avenue to Morningside Drive – it is recommended that a speed limit of 35 mph be established based on the 85th percentile speed.

APPENDIX A

SPEED ZONING REGULATIONS FROM CALTRANS 2012 CALIFORNIA MUTCD

Section 2B.13 Speed Limit Sign (R2-1)

Support:

The setting of speed limits can be controversial and requires a rational and defensible determination to maintain public confidence. Speed limits are normally set near the 85th-percentile speed that statistically represents one standard deviation above the average speed and establishes the upper limit of what is considered reasonable and prudent. As with most laws, speed limits need to depend on the voluntary compliance of the greater majority of motorists. Speed limits cannot be set arbitrarily low, as this would create violators of the majority of drivers and would not command the respect of the public.

Standard:

After an engineering and traffic survey (E&TS) study has been made in accordance with established traffic engineering practices, the Speed Limit (R2-1) sign (see Figure 2B-1) shall display the limit established by law, ordinance, regulation, or as adopted by the authorized agency. The speed limits shown shall be in multiples of 10 km/h or (5 mph).

Guidance:

At least once every 5, 7 or 10 years, in compliance with CVC Section 40802,States and local agencies should reevaluate non-statutory speed limits on segments of their roadways that have undergone a significant change in roadway characteristics or surrounding land use since the last review. No more than three speed limits should be displayed on any one Speed Limit sign or assembly. When a speed limit is to be posted, it should be within 10 km/h or 5 mph of the 85th-percentile speed of free-flowing traffic.

Standard:

When a speed limit is to be posted, it shall be established at the nearest 10 km/h (5 mph) increment of the 85th-percentile speed of free-flowing traffic, except as shown in the Option below.

Option:

The posted speed may be reduced by 10 km/h (5 mph) from the nearest 10 km/h (5 mph) increment of the 85thpercentile speed, in compliance with CVC Sections 627 and 22358.5.

Standard:

If the speed limit to be posted has had the 10 km/h (5 mph) reduction applied, then an E&TS shall document in writing the conditions and justification for the lower speed limit and be approved by a registered Civil or Traffic Engineer. The reasons for the lower speed limit shall be in compliance with CVC Sections 627 and 22358.5.

Support:

The following examples are provided to explain the application of these speed limit criteria:

1. If the 85th percentile speed in a speed survey for a location was 37 mph, then the speed limit would be established at 35 mph since it is the closest 5 mph increment to the 37 mph speed. As indicated by the option, this 35 mph established speed limit can be further reduced by 5 mph to 30 mph if the conditions and justification for using this lower speed limit are documented in the E&TS and approved by a registered Civil or traffic Engineer.
2. If the 85th percentile speed in a speed survey for a location was 33 mph, then the speed limit would be established at 35 mph since it is the closest 5 mph increment to the 33 mph speed. As indicated by the option, this 35 mph established speed limit can be further reduced by 5 mph to 30 mph if the conditions and justification for using this lower speed limit are documented in the E&TS and approved by a registered Civil or traffic Engineer.
3. If the 85th percentile speed in a speed survey for a location was 38 mph, then the speed limit would be established at 40 mph since it is the closest 5 mph increment to the 38 mph speed. As indicated by the option, this 40 mph established speed limit can be further reduced by 5 mph to 35 mph if the conditions and justification for using this lower speed limit are documented in the E&TS and approved by a registered Civil or traffic Engineer.

Standard:

This method of establishing posted speed limits shall apply to all engineering and traffic surveys (E&TS) performed on or after July 1, 2009 in accordance with the Department's Traffic Operations Policy Directive Number 09-04 dated June 29, 2009.

Support:

Any existing E&TS that was performed before July 1, 2009 in accordance with previous traffic control device standards is not required to comply with the new criteria until it is due for reevaluation per the 5, 7 or 10 year criteria.

Option:

Other factors that may be considered when establishing speed limits are the following:

A. Road characteristics, shoulder condition, grade, alignment, and sight distance;

B. The pace speed;

C. Roadside development and environment;

D. Parking practices and pedestrian activity; and

E. Reported crash experience for at least a 12-month period.

Two types of Speed Limit signs may be used: one to designate passenger car speeds, including any nighttime information or minimum speed limit that might apply; and the other to show any special speed limits for trucks and other vehicles. A changeable message sign that changes the speed limit for traffic and ambient conditions may be installed provided that the appropriate speed limit is shown at the proper times. A changeable message sign that displays to approaching drivers the speed at which they are traveling may be installed in conjunction with a Speed Limit sign.

Guidance:

If a changeable message sign displaying approach speeds is installed, the legend YOUR SPEED XX km/h (MPH) or such similar legend should be shown. The color of the changeable message legend should be a yellow legend on a black background or the reverse of these colors.

Support:

Advisory Speed signs are discussed in Sections 2C.36 and 2C.46 and Temporary Traffic Control Zone Speed signs are discussed in Part 6.

Speed limits in California are governed by the California Vehicle Code (CVC), Sections 22348 through 22413; also, pertinent sections are found in Sections 627 and 40802 and others referenced in this section. See Section 1A.11 for information regarding this publication. Refer to Part 6, Section 6C.01 for speed limit signs in temporary traffic control zones. Refer to Part 7 for speed limit signs in school areas.

Engineering and Traffic Survey (E&TS)

Support:

CVC Section 627 defines the term "Engineering and traffic survey" and lists its requirements.

Standard:

An engineering and traffic survey (E&TS) shall include, among other requirements deemed necessary by the department, consideration of all of the following:

(1) Prevailing speeds as determined by traffic engineering measurements.

(2) Collision records.

(3) Highway, traffic, and roadside conditions not readily apparent to the driver.

Guidance:

The E&TS should contain sufficient information to document that the required three items of CVC Section 627 are provided and that other conditions not readily apparent to a driver are properly identified. Prevailing speeds are determined by a speed zone survey. A speed zone survey should include:

- The intent of the speed measurements is to determine the actual speed of unimpeded traffic. The speed of traffic should not be altered by concentrated law enforcement, or other means, just prior to, or while taking the speed measurements.
- Only one person is required for the field work. Speeds should be read directly from a radar or other electronic speed measuring devices; or,
- Devices, other than radar, capable of accurately distinguishing and measuring the unimpeded speed of free flowing vehicles may be used.
- A location should be selected where prevailing speeds are representative of the entire speed zone section. If speeds vary on a given route, more than one speed zone section may be required, with

separate measurements for each section. Locations for measurements should be chosen so as to minimize the effects of traffic signals or stop signs.

- Speed measurements should be taken during off-peak hours between peak traffic periods on weekdays. If there is difficulty in obtaining the desired quantity, speed measurements may be taken during any period with free flowing traffic.
- The weather should be fair (dry pavement) with no unusual conditions prevailing.
- The surveyor and equipment should not affect the traffic speeds. For this reason, an unmarked car is recommended, and the radar speed meter located as inconspicuously as possible.
- In order for the sample to be representative of the actual traffic flow, the minimum sample should be 100 vehicles in each survey. In no case should the sample contain less than 50 vehicles.
- Short speed zones of less than 0.8 km (0.5 mi) should be avoided, except in transition areas.
- Speed zone changes should be coordinated with changes in roadway conditions or roadside development.
- Speed zoning should be in 20 km/h (10 mph) increments except in urban areas where 10 km/h (5 mph) increments are preferable.
- Speed zoning should be coordinated with adjacent jurisdictions.

Support:

Physical conditions such as width, curvature, grade and surface conditions, or any other condition readily apparent to the driver, in the absence of other factors, would not require special downward speed zoning. Refer to CVC 22358.5.

Option:

When qualifying an appropriate speed limit, local authorities may also consider all of the following findings:

1. Residential density, if any of the following conditions exist on the particular portion of highway and the property contiguous thereto, other than a business district:
   a. Upon one side of the highway, within 0.4 km (0.25 mi), the contiguous property fronting thereon is occupied by 13 or more separate dwelling houses or business structures.
   b. Upon both sides of the highway, collectively, within a distance of 0.4 km (0.25 mi) the contiguous property fronting thereon is occupied by 16 or more separate dwelling houses or business structures.
   c. The portion of highway is larger than 0.4 km (0.25 mi) but has the ratio of separate dwelling houses or business structures to the length of the highway described in either subparagraph a or b.
2. Pedestrian and bicyclist safety.

The following two methods of conducting E&TS may be used to establish speed limits:

1. State Highways - The E&TS for State highways is made under the direction of the Department of Transportation's District Traffic Engineer. The data includes:
   a. One copy of the Standard Speed Zone Survey Sheet (See Figure 2B-101(CA)) showing:
      - A north arrow
      - Engineer's station or post mileage
      - Limits of the proposed zones
      - Appropriate notations showing type of roadside development, such as "scattered business," "solid residential," etc. Schools adjacent to the highway are shown, but other buildings need not be plotted unless they are a factor in the speed recommendation or the point of termination of a speed zone.
      - Collision rates for the zones involved
      - Average daily traffic volume
      - Location of traffic signals, signs and markings
      - If the highway is divided, the limits of zones for each direction of travel
      - Plotted 85th percentile and pace speeds at location taken showing speed profile
   b. A report to the District Director that includes:
      - The reason for the initiation of speed zone survey.

- Recommendations and supporting reasons.
- The enforcement jurisdictions involved and the recommendations and opinions of those officials.
- The stationing or reference post in kilometers (mileage) at the beginning and ending of each proposed zone and any intermediate equations. Location ties must be given to readily identifiable physical features.

2. City and County Through Highways, Arterials, Collector Roads and Local Streets.
   a. The short method of speed zoning is based on the premise that a reasonable speed limit is one that conforms to the actual behavior of the majority of motorists, and that by measuring motorists' speeds, one will be able to select a speed limit that is both reasonable and effective. Other factors that need to be considered include but are not limited to: the most recent two-year collision record, roadway design speed, safe stopping sight distance, superelevation, shoulder conditions, profile conditions, intersection spacing and offsets, commercial driveway characteristics, and pedestrian traffic in the roadway without sidewalks.
   b. Determination of Existing Speed Limits - Figures 2B-103(CA) & 2B-104(CA) show samples of data sheets which may be used to record speed observations. Specific types of vehicles may be tallied by use of letter symbols in appropriate squares.

In most situations, the short form for local streets and roads will be adequate; however, the procedure used on State highways may be used at the option of the local agency.

Guidance:

The factors justifying a reduction below the 85th percentile speed for the posted speed limit are the same factors mentioned above. Whenever such factors are considered to establish the speed limit, they should be documented on the speed zone survey or the accompanying engineering report.

The establishment of a speed limit of more than 10 km/h (5 mph) below the 85th percentile speed should be done with great care as studies have shown that establishing a speed limit at less than the 85th percentile generally results in an increase in collision rates; in addition, this may make violators of a disproportionate number of the reasonable majority of drivers.

Support:

Generally, the most decisive evidence of conditions not readily apparent to the driver surface in collision histories.

Speed limits are established at or near the 85th percentile speed, which is defined as that speed at or below which 85th percent of the traffic is moving. The 85th percentile speed is often referred to as the critical speed. Pace speed is defined as the 16 km/h (10 mph) increment of speed containing the largest number of vehicles (See Figure 2B-102(CA)). The lower limit of the pace is plotted on the Speed Zone Survey Sheets as an aid in determining the proper zone limits.

Speed limits higher than the 85th percentile are not generally considered reasonable and prudent. Speed limits below the 85th percentile do not ordinarily facilitate the orderly movement of traffic and require constant enforcement to maintain compliance. Speed limits established on the basis of the 85th percentile conform to the consensus of those who drive highways as to what speed is reasonable and prudent, and are not dependent on the judgment of one or a few individuals.

The majority of drivers comply with the basic speed law. Speed limits set at or near the 85th percentile speed provide law enforcement officers with a limit to cite drivers who will not conform to what the majority considers reasonable and prudent. Further studies show that establishing a speed limit at less than the 85th percentile (Critical Speed) generally results in an increase in collision rates.

Option:

When roadside development results in traffic conflicts and unusual conditions which are not readily apparent to drivers, as indicated in collision records, speed limits somewhat below the 85th percentile may be justified. Concurrence and support of enforcement officials are necessary for the successful operation of a restricted speed zone.

Guidance:

Speed zones of less than 0.8 km (0.5 mi) and short transition zones should be avoided.

Signs

Standard:

The Speed Limit (R2-1) sign shall be used to give notice of a prima facie or maximum speed limit except as provided under Prima Facie Speed Limits in CVC 22352. When used, the TRUCKS, 3 AXLES OR MORE 55 MAXIMUM (R6-3(CA)) sign shall be installed approximately 230 m (750 ft) following each R2-1 sign. The ALL VEHICLES WHEN TOWING 55 MAXIMUM (R6-4(CA)) sign shall be installed approximately 230 m (750 ft) following the R6-3(CA) sign.

Guidance:

The R6-3(CA) and R6-4(CA) signs should be placed on highway segments where speeds in excess of 90 km/h (55 mph) are permitted.

Option:

The existing AUTOS WITH TRAILERS, TRUCKS 55 MAXIMUM (R6-1(CA)) sign may remain in place until it is knocked down, damaged, stolen, vandalized, or otherwise reaches the end of its useful life. The local California Highway Patrol office may be consulted to identify highway segments where enforcement is an issue. On these segments early replacement of existing R6-1(CA) signs may be necessary.

Support:

Refer to CVC Section 22406 for types of vehicles subject to the 90 km/h (55 mph) maximum speed limit.

Option:

The Speed Zone Ahead (R2-4(CA)) sign (see Figure 2B-1(CA)) may be used to inform the motorist of a reduced speed zone.

Standard:

The R2-4(CA) sign shall always be followed by a Speed Limit (R2-1) sign installed at the beginning of the zone where the reduced speed limit applies. The End Speed Limit (R3(CA)) sign shall only be used to mark the end of a speed zone. The R3(CA) sign shall not be used at a transition into a change in speed limits within a reduced zone.

Option:

The R3(CA) sign (see Figure 2B-1(CA)) may be used with the TRUCK (M4-4) plaque to mark the end of truck speed zones on descending grades.

Standard:

Speed limit signs shall be placed at the beginning of all restricted speed zones.

Option:

Where speed zones are longer than 1.6 km (1 mi), intermediate signs may be placed at approximate 1.6 km (1 mi) intervals. For three or more lanes in each direction, dual installation may be used.

Standard:

The Speed Limit (R2-1) and End Speed Limit (R3(CA)) signs, as appropriate shall be placed at the end of all restricted speed zones.

Freeways with 110 km/h (65 mph) and those segments where a speed limit of 110 km/h (70 mph) has been approved by the Department of Transportation, with approval by the California Highway Patrol, shall be posted as follows:

- **At the segment entrance, R2-1 signs shall be installed right of traffic off of the right shoulder.**
- **R2-1 signs shall also be installed off of the right shoulder only, throughout the segment, at a maximum of 40 km (25 mi) intervals.**

Option:

- The 40 km (25 mi) interval may be modified to include locations following entrance ramps.

Standard:

- **The R6-3(CA) sign (see Figure 2B-3(CA)) shall be installed approximately 230 m (750 ft) following each R2-1 sign, both at the beginning and throughout each 95 (60), 110 (65) or 110 (70) km/h (mph) segment.**

- **The R6-4(CA) sign (see Figure 2B-3(CA)) shall be installed approximately 230 m (750 ft) following each R6-3(CA) sign.**

Option:

- The SLOWER TRAFFIC KEEP RIGHT (R4-3) signs may be installed at locations where there is a tendency of the motorists to drive in the left-hand lane(s) below the normal speed of traffic.

Standard:

- **Signs shall be placed in protected locations.**
- **At the end of the 110 (70)/110 (65) km/h (mph) segment, R2-1 signs shall be installed off of the right shoulder.**

Freeway segments where a 90 km/h (55 mph) speed limit has been approved by the Department of Transportation, with the approval of the California Highway Patrol, shall be posted as follows:

- **The beginning of the segment shall be posted with an R2-1 sign installed on the right shoulder and left shoulder where the median is of sufficient width to permit sign maintenance without lane closures.**

Guidance:

- Subsequent signs should then be posted on the right shoulder, on approximate 4.8 km (3 mi) intervals, with no more than 3 interchanges between signs.
- At the end of the segment, an R2-1 sign with the appropriate number for the next speed limit should be posted on the right shoulder.

Conventional highways with 90 km/h (55 mph) speed limits should be posted as follows:

Standard:

- **The beginning of the segment shall be posted with an R2-1 sign installed on the right shoulder.**

Guidance:

- Subsequent signs should then be posted on approximate 8 to 16 km (5 to 10 mi) intervals and immediately after locations where significant volumes of traffic enter the segment.
- At the end of the segment, an R2-1 sign with the appropriate number for the next speed limit should be posted on the right shoulder.

Conventional highways with 110 km/h (65 mph) speed limits should be posted as follows:

- The beginning of the segment should be posted with an R2-1 sign installed on the right shoulder.
- Subsequent signs should then be posted at 8 to 16 km (5 to 10 mi) intervals and after locations where significant volumes of traffic enter the segment.
- At the end of the segment, an R2-1 sign with the appropriate number for the next speed limit should be posted on the right shoulder.

Option:

Pavement markings with appropriate numerals (see Section 3B.19) may be used to supplement speed limit signs.

Standard:

The R2-1 and R6-3(CA) and R6-4(CA) signs giving maximum statewide speed limits for various types of vehicles shall be installed on all State highways near the points of entrance into California.

Guidance:

The R2-1 and R6-3(CA) and R6-4(CA) signs should be placed in a location to be most effectively viewed by the approaching motorists.

Speed Enforced Signs

Option:

The SPEED ENFORCED BY RADAR (R48(CA)) sign (see Figure 2B-1(CA)) may be used where the California Highway Patrol has received authority to use radar and requests such signs.

Guidance:

One sign should be used in each direction at the beginning of the segment of roadway, and at intervening major route intersections, where radar enforcement is in effect.

Support:

The R48(CA) sign is a stand-alone sign intended to alert motorists that speed is enforced by radar on a particular segment of roadway.

Option:

The RADAR ENFORCED (R48-1(CA)) sign (see Figure 2B-1(CA)) may be used in combination with the Speed Limit (R2-1) sign on any roadway where law enforcement has the authority to use radar.

Guidance:

When used, the R48-1(CA) sign should be placed below the R2-1 sign, at the beginning of the segment of roadway and at intervening major intersections, where radar enforcement is in effect.

Option:

The SPEED ENFORCED BY AIRCRAFT (R48-2(CA)) sign (see Figure 2B-1(CA)) may be placed, when requested by the California Highway Patrol, on sections of highway regularly patrolled by aircraft.

Standard:

The R48-2(CA) sign shall be used for both directions of travel.

Guidance:

The R48-2(CA) sign should be placed at the beginning of the section and spaced at 40 km (25 mi) intervals. See Figure 3B-106(CA).

Vehicle Speed Feedback Signs

Option:

A Vehicle Speed Feedback sign that displays to approaching drivers the speed at which they are traveling may be installed in conjunction with a Speed Limit (R2-1) sign.

Standard:

If a Vehicle Speed Feedback sign displaying approach speeds is installed, the legend shall be YOUR SPEED XX. The numerals displaying the speed shall be white, yellow, yellow-green or amber color on black background. When activated, lights shall be steady-burn conforming to the provisions of CVC Sections 21466 and 21466.5. Vehicle Speed Feedback signs shall not alternatively be operated as variable speed limit signs.

Guidance:

To the degree practical, numerals for displaying approach speeds should be similar font and size as numerals on the corresponding Speed Limit (R2-1) sign.

Option:

When used, the Vehicle Speed Feedback sign may be mounted on either a separate support or on the same support as the Speed Limit (R2-1) sign. In lieu of lights, legend may be retroreflective film for flip-disk systems. The legend YOUR SPEED may be white on black plaque located above the changeable speed display.

Support:

Driver comprehension may improve when the Vehicle Speed Feedback Sign is mounted on the same support below the Speed Limit (R2-1) sign. Vehicle Speed Feedback Signs are appropriate for use with advisory speed signs and with temporary signs in temporary traffic control zones.

Basic Speed Law and Prima Facie Speed Limits – See CVC 22350 & 22352

Support:

The basic speed law states "No person shall drive a vehicle upon a highway at a speed greater than is reasonable or prudent having due regard for weather, visibility, the traffic on, and the surface and width of, the highway, and in no event at a speed which endangers the safety of persons or property."

Standard:

Prima facie speed limits are specific limits and shall apply unless changed based upon an engineering and traffic survey (E&TS) and signs are posted that display the new speed limit.

Option:

Prima facie speed limits may be preempted by the basic speed law, when roadway, traffic or weather conditions warrant a lower speed.

Use of Metric System Designations – See CVC 21351.3

Option:

Dual units for speed limits on signs may be placed on local streets and roads in both Metric and English units.

Guidance:

If used, dual unit speed limits should be rounded to the nearest 10 km/h for Metric and 5 mph for English units for posting on signs on local streets and roads.

Support:

Refer to AASHTO's Traffic Engineering Metric Conversion Factors. See Section 1A.11 for information regarding this publication.

Standard:

Metric speed limits shall not be placed on State highways. For use in this California MUTCD, 70 mph shall be shown as a metric equivalent of 110 km/h, neither of which shall be used on any local street or road.

Legal Authority for Establishing Speed Limits

Support:

Delegation of legal authority to set speed limits on State highways is given to Department of Transportation's District Directors. The District Director of each transportation district is authorized to issue orders regulating the speed of traffic, up to 110 km/h (65 mph) on State highways. The Director of the Department of Transportation retains the authority to approve variable, minimum, and maximum speeds up to 110 km/h (70 mph) on State freeways.

Standard:

The speed limits shown in Table 2B-103(CA) shall apply, unless changed upon the basis of an engineering and traffic survey (E&TS).

Option:

The speed limits shown in Table 2B-104(CA) may apply, unless changed upon E&TS.

Variable Speed Limits on Freeways - See CVC 22355

Option:

The following speed limits may apply:

- Whenever the Department of Transportation determines based upon an engineering and traffic survey (E&TS) that the safe and orderly movement of traffic upon any freeway segment will be facilitated by the establishment of variable speed limits.
- The Department may erect, regulate, and control signs upon the state highway which is a freeway, or any portion thereof, which, if used, signs shall be designed to permit display of different speeds at various times of the day or night.
- Such signs need not conform to the standards & specifications per CVC 21400, but if used, shall be of sufficient size and clarity to give adequate notice of the applicable speed limit.

Minimum Speed Limits on State Highways - See CVC 22400

Option:

The following speed limits may apply:

- Whenever the Department of Transportation determines based upon an engineering and traffic survey (E&TS) that slow speeds on any part of a state highway consistently impede the normal and reasonable movement of traffic, the Department may determine and declare a minimum speed limit. Appropriate signs giving notice shall then be installed on that segment.
- A motorist can be cited for stopping or impeding the normal and reasonable movement of traffic unless the stop is necessary for safe operation and in compliance with the law.

Speed Traps

Support:

Refer to CVC 40802 for Speed Traps.

Standard:

A speed trap shall not apply to a local street, road, or school zone.

A section of highway shall be defined as a speed trap if the prima facie speed limit is not justified by an engineering and traffic survey (E&TS) within five years, and the enforcement of the

speed limit involves the use of radar or any other electronic device that measures the speed of moving objects.

This time provision shall be extended to seven years when using radar and all of the following criteria are met:

- **The arresting officer has successfully completed a minimum of 24 hours of certified radar operator course training.**
- **The radar used to measure the speed meets or exceeds the minimal operational standards of the National Traffic Highway Safety Administration, and has been calibrated within three years of the alleged violation.**

Option:

This time provision for an E&TS may be extended to ten years when all of the above conditions are met and no significant changes in roadway or traffic conditions have occurred, including changes in adjoining property or land use, roadway width, or traffic volume as determined by a registered engineer.

Truck Speed Zone on Descending Grades

Guidance:

Highway descending grades, if used for posting TRUCK Speed Limit signs (R2-1 and M4-4) for trucks travelling downhill, should have recorded incident history of runaway commercial vehicles. Descending grades shorter than 1.6 km (1 mi) should be avoided for posting signs because deceleration of vehicles due to braking action can generally provide sufficient control on descending grades of less than 1.6 km (1 mi).

Support:

To establish a downhill truck speed limit, a physical profile showing length and gradient and a downhill speed profile for three or more axle commercial vehicles with a gross rating of 4,536 kg (10,000 lbs.) or more will be provided.

Standard:

Speed profiles for truck speed limits shall be prepared on the same form as other speed surveys. An analysis of collisions involving trucks shall be prepared.

Guidance:

Posted speeds should be on the low side of the scale, generally within the pace of loaded commercial vehicles.

Standard:

If warranted, the Department of Transportation's District Director shall issue a standard speed zone order.

Support:

Posting of the regulation will be by placement of a standard 900 x 1150 mm (36 x 45 in) Speed Limit (R2-1) sign with a TRUCK (M4-4) plate above.

Standard:

A standard End Speed Limit (R3(CA)) sign with TRUCK (M4-4) plate shall be posted at the end of the truck zone when appropriate.

Definitions of Terms

Average Daily Traffic	Volume of traffic during a 24-hour period.
E.C.L.	Easterly City Limit, (also W.C.L., N.C.L., and S.C.L. for Westerly, Northerly, and Southerly City Limits, respectively.
85th Percentile Speed (Critical Speed	The "speed" which 85% of the observed vehicles are not exceeding. This speed is usually within 2 mph of the upper limit of the pace.
Mean Speed	The average speed.
MPH or mph	Miles Per Hour.
MVM or mvm	Million Vehicle Miles. Accident rates are generally expressed as the number of accidents occurring per million vehicle miles traveled during a given time period.
Pace	The 10 mph range of observed vehicle speeds containing the largest number of vehicles. A normal distribution will contain approximately 70% of the sample within the pace, with 15% above and 15% below.

APPENDIX B

REGULATIONS GOVERNING SPEED LIMITS
(EXCERPTS FROM CALIFORNIA VEHICLE CODE)

RADAR SPEED ZONE SURVEYS

INTRODUCTION

This report presents the results of a traffic and engineering study for establishment of speed limits on city streets as required by Sections 22357 and 22358 of the California Vehicle Code. The review included radar surveys of prevailing vehicle speeds at various locations along the length of each street, recent traffic counts and an analysis of reported traffic accidents recorded during the specific interval.

In order to enforce speed limits by radar or other electronic devices, a study must be conducted every five years. Section 40802 of the California Vehicle Code defines a speed limit enforced by radar and "....which speed limit is not justified by an engineering and traffic survey conducted within five years prior to the date of the alleged violation..." constitutes a speed trap, unless the following criteria are met:

> If officers have completed specialized training courses that are approved by the Commission on Peace Officer Standards Training, the time span between studies can be extended to seven years.
>
> If after seven years, " ...a registered engineer evaluates the section of the highway and determines that no significant changes in roadway or traffic conditions have occurred, including, but not limited to, changes in adjoining property or land use, roadway width, or traffic volume..." the time span between studies can be extended to ten years.

Since speed traps are illegal, the lack of an adequate study effectively precludes the police from using radar enforcement. Through adoption of this study, the police department will be able to enforce posted speed limits with radar equipment.

It is a common belief that posting of speed limit traffic signs will influence drivers to drive at that speed. The facts indicate otherwise.

Driver behavior research conducted in many parts of this country, over a span of several decades; shows that the average driver is influenced by the appearance of the highway itself and the prevailing traffic conditions, in choosing the speed at which he or she drives. Recognizing this, the California Vehicle Code requires that speed limits be established in accordance with appropriate engineering practice and methods.

REGULATIONS GOVERNING SPEED LIMITS

Under California law, the maximum speed limit for any passenger vehicle is 65 miles per hour (mph). All other speed limits are called prima facie limits which "on the face of it", are safe and prudent under normal conditions. Certain prima facie limits are established by law and include the 25 miles per hour limit in business and residential districts; the 15 miles per hour limit in alleys, at blind intersections and blind railroad grade crossings; and a part time 25 miles per hour in school zones when children are going to and from school.

Intermediate speed limits between 25 and 65 miles per hour may be established by local authorities based on traffic engineering surveys. Such surveys include the analysis of roadway conditions, accident records, and the prevailing speed of prudent drivers using the highway under study. If speed limits are established below what the majority of drivers consider reasonable, they are often not obeyed and consequently, are difficult to enforce. Those drivers who do not comply with posted reasonable speed limits are, conversely, subject to equitable enforcement action.

The Vehicle Code provides that the use of radar to enforce speed limits, which have not been based on a traffic and engineering study within the preceding five years, constitutes a "speed trap". Since speed traps are also prohibited by the code, lack of the required study effectively prohibits local agencies from using radar enforcement.

APPLICABLE VEHICLE CODE SECTIONS

Business District

235. A "business district: is that portion of a highway and the property contiguous thereto (a) upon one side of which highway, for a distance of 600 feet, 50 percent of more of the contiguous property fronting thereon is occupied by buildings in use for business, or (b) upon both sided of which highway, collectively, for a distance of 300 feet, 50 percent or more of the contiguous property fronting thereon is so occupied. A business district may be longer than the distance specified in this section if the above ratio of buildings in use for business to the length of the highway exists.

Business and Residence District: Determination

240. In determining whether a highway is within a business or residence district, the following limitations shall apply and shall qualify the definitions Section 235 and 515:

    a) No building shall be counted unless its entrance faces the highway and the front of the building is within 75 feet of the roadway.

b) Where a highway is physically divided into two or more roadways, only those buildings facing each roadway separately shall be counted for the purpose of determining whether the roadway is within a district.

c) All churches, apartments, hotels, multiple dwelling houses, clubs and public buildings, other than schools, shall be deemed to be business structures.

d) A highway or portion of a highway shall not be deemed to be within a district regardless of the number of buildings upon the contiguous property if there is no right of access to the highway by vehicles from the contiguous property.

Residence District

515. A "residence district" is that portion of a highway and the property contiguous thereto, other than a business district, (a) upon one side of which highway, within a distance of a quarter of a mile, the contiguous property fronting thereon is occupied by 13 or more separate dwelling houses or business structures, or (b) upon both sided of which highway, collectively, within a distance of a quarter of a mile, the contiguous property fronting thereon is occupied by 16 or more separate dwelling housed or business structures. A residence district may be longer than one quarter of a mile if the above ratio of separate dwelling houses or business structures to the length of the highway exists.

Engineering and Traffic Survey

627. (a) "Engineering and traffic survey" as used in this Code, means a survey of highway and traffic conditions in accordance with methods determined by the Department of Transportation for use by the state and local authorities.

(b) An engineering and traffic survey shall include, among other requirements deemed necessary by the department, consideration of all the following

1) Prevailing speeds as determined by traffic engineering measurements.

2) Accident records.

3) Highway, traffic, and roadside conditions not readily apparent to the driver.

Maximum Speed Limit

22349. Except as provided in Section 22356, no person shall drive a vehicle upon a highway at a speed greater than 65 miles per hour.

Basic Speed Law

22350. No person shall drive a vehicle upon a highway at a speed greater than is reasonable or prudent having due regard for weather, visibility, the traffic on, and surface

and width of, the highway, and in no event at a speed which endangers the safety of persons or property.

Speed Law Violations

22351. (a) The speed of any vehicle upon a highway not in excess of the limits specified in Section 22352 or established as authorized in this code is lawful unless clearly proved to be in violation of the basic speed law.

(b) The speed of any vehicle upon a highway in excess of the prima facie speed limits in Section 22352 or established as authorized in this code is prima facie unlawful unless the defendant establishes by competent evidence that the speed in excess of said limits did not constitute a violation of the basic speed law at the time, place and under the conditions then existing.

Prima Facie Speed Limits

22352. The prima facie limits are as follows and the same shall be applicable unless changed as authorized in this code and, if so changed, only when signs have been erected giving notice thereof:

(a) Fifteen miles per hour:

1) When traversing a railway grade crossing, if during the last 100 feet of the approach to the crossing the driver does not have a clear and unobstructed view of the crossing and of any traffic on the railway for a distance of 400 feet in both directions along such railway. This subdivision does not apply in the case of any railway grade crossing where a human flagman is on duty or a clearly visible electrical mechanical railway crossing signal device is installed but does not then indicate the immediate approach of a railway train or car.

2) When traversing any intersection of highways if during the last 100 feet of his approach to the intersection the driver does not have a clear and unobstructed view of the intersection and of any traffic upon all of the highways entering the intersection for a distance of 100 feet along all such highways, except at an intersection protected by stop signs or yield right-of-way signs or controlled by official traffic control signals.

3) On any alley.

(b) Twenty-five miles per hour:

1) On any highway other than a state highway, in any business or residence district unless a different speed is determined by local authority under procedures set forth in this code.

2) When passing a school building or the grounds thereof, contiguous to a highway and posted with a standard "SCHOOL" warning sign, while children are going to or leaving the school either during school hours or during the noon recess period. Such prima facie limit shall also apply when passing any school grounds which are not separated from the highway by a fence, gate or other physical barrier while the grounds are in use by children and the highway is posted with a standard "SCHOOL" warning sign.

3) When passing a senior center or facility primarily used by senior citizens, contiguous to a street other than a state highway and posted with a standard "SENIOR" warning sign.

Increase of Local Limits

22357. Whenever a local authority determines upon the basis of an engineering and traffic survey that a speed greater than 25 miles per hour would facilitate the orderly movement of vehicular traffic and would be reasonable and safe upon any street other than a state highway otherwise subject to a prima facie limit of 25 miles per hour, the local authority may be by ordinance determine and declare a prima facie limit of 25 miles per hours, the local authority may by ordinance determine and declare a prima facie speed limit of 30, 35, 40, 45, 50, 55, 60 miles per hour or a maximum speed limit of 65 miles per hour, whichever is found most appropriate to facilitate the orderly movement of traffic and is reasonable and safe. The declared prima facie or maximum speed limit shall be effective when appropriate signs giving notice thereof are erected upon the street and shall not thereafter be revised except upon the basis of an engineering and traffic survey. The provisions of this section shall not apply in respect to any 25-mile-per-hour prima facie limit, which is applicable when passing a school building or the grounds thereof.

Decrease of Local Limits

2358. Whenever a local authority determines upon the basis of an engineering and traffic survey that the limit of 65 miles per hour is more than is reasonable or safe upon any portion of any street other than a state highway where the limit of 65 miles per hour is applicable, the local authority may by ordinance determine and declare a prima facie speed limit of 60, 55, 50, 45,40,35,30, or 25 miles per hours, whichever is found most appropriate to facilitate the orderly movement of traffic and is reasonable and safe, which declared prima facie limit shall be effective when appropriate signs giving notice thereof are erected upon the street.

Downward Speed Zoning

22358.5 It is the intent of the Legislature that physical conditions such as width, curvature, grade and surface conditions or any other condition readily apparent to a driver, in the absence of other factors, would not require special downward speed zoning,

as the basic rule of Section 22350 is sufficient regulation as to such conditions.

Boundary Line Streets

22359. With respect to boundary line streets and highways where portions thereof are within different jurisdictions, no ordinance adopted under Sections 22357 and 22358 shall be effective as to any such portion until all authorities having jurisdiction of the portions of the street concerned have approved the same. This section shall not apply in the case of boundary line streets consisting of separate roadways within different jurisdictions.

Multiple-Lane Highways

22361. On multiple-lane highways with two or more separate roadways, different prima facie speed limits may be established for different roadways under any of the procedures specified in Sections 22354 to 22359, inclusive.

Speed Trap Prohibition

40801. No peace officer or other person shall use a speed trap in arresting, or participating or assisting in the arrest of, any person for any alleged violation of this code nor shall any speed trap be used in securing evidence as to the speed of any vehicle for the purpose of an arrest or prosecution under this code.

Speed Trap

40802. A "speed trap" is either of the following:

a) A particular section of a highway measured as to distance and with boundaries marked, designated, or otherwise determined in order that the speed of a vehicle may be calculated by securing the time it takes the vehicle to travel the known distance.

b) A particular section of a highway with a prima facie speed limit provided by this code or by local ordinance pursuant to paragraph (1) of subdivision (b) of Section 22352, or established pursuant to Section 22354, 22357, 22358, or 22358.3, which speed limit is not justified by an engineering and traffic survey conducted within five years prior to the date of the alleged violation, and where enforcement involves the use of radar or other electronic devices which measures the speed of moving objects. This subdivision does not apply to local streets and roads.

For purposes of this section, local streets and roads shall be defined by the latest functional usage and federal-aid system maps as submitted to the Federal Highway Administration. When these maps have not been submitted, the following definition shall be used: A local street or road primarily provides access to abutting residential property

and shall meet the following three conditions:

1. Roadway width of not more than 40 feet.
2. Not more than one-half mile of uninterrupted length. Interruptions shall include official traffic control devices as defined in Section 445.
3. Not more than one traffic lane in each direction.

Speed Trap Evidence.

40803. (a) No evidence as to the speed of a vehicle upon a highway shall be admitted in any court upon the trial of any person in any prosecution under this code upon a charge involving the speed of a vehicle when the evidence is based upon or obtained from or by the maintenance or use of a speed trap

(b) In any prosecution under this code of a charge involving the speed of a vehicle, where enforcement involves the use of radar or other electronic devices which measure the speed of moving objects, the prosecution shall establish, as part of its prima facie case, that the evidence or testimony presented is not based upon a speed trap as defined in subdivision (b) of Section 40802.

(c) When a traffic and engineering survey is required pursuant to subdivision (b) of Section 40802, evidence that a traffic and engineering survey has been conducted within five years of the date of the alleged violation or evidence that the offense was committed on a local street or road as defined in subdivision (b) of Section 40802 shall constitute a prima facie case that the evidence or testimony is not based upon a speed trap as defined in subdivision (b) 40802.

STUDY METHOD

Speed zones are established to inform drivers of the safe speed limit and to protect the general public from unreasonable and reckless drivers. Research has shown that most drivers travel at speeds that are safe and reasonable, therefore, speed limits are established primarily on the consensus of the majority of those who use the roads. Speed limits are not based on the actions of few. The California Vehicle Code requires the limits to be established on the basis of an engineering and traffic survey rather than by arbitrary methods.

The study is conducted in accordance with the appropriate sections of the California Vehicle Code, the Caltrans Traffic Manual (Chapter 8-03) and the Federal Manual on "Uniform Traffic Control Devices", (Section 2B-10).

Surveys are conducted on arterial streets and selected local streets. Each of the selected streets was analyzed individually.

The accident analysis was based on a review of the City's Traffic Accident Records (Crossroads). Only non-intersection accidents are included since intersection accidents are considered correctable using conventional intersection traffic controls such as stop signs or traffic signals.

Accident rates were computed using a formula that takes into account the number of accidents in the two-year period, the length of roadway being studied, and the average daily traffic volume. The rate is expressed in accidents per million vehicle miles (Acc/MVM). The formula is:

$$\text{Acc/MM} = \frac{\text{Number of Accidents x 1,000,000}}{\text{Distance x ADT x No. of Days}}$$

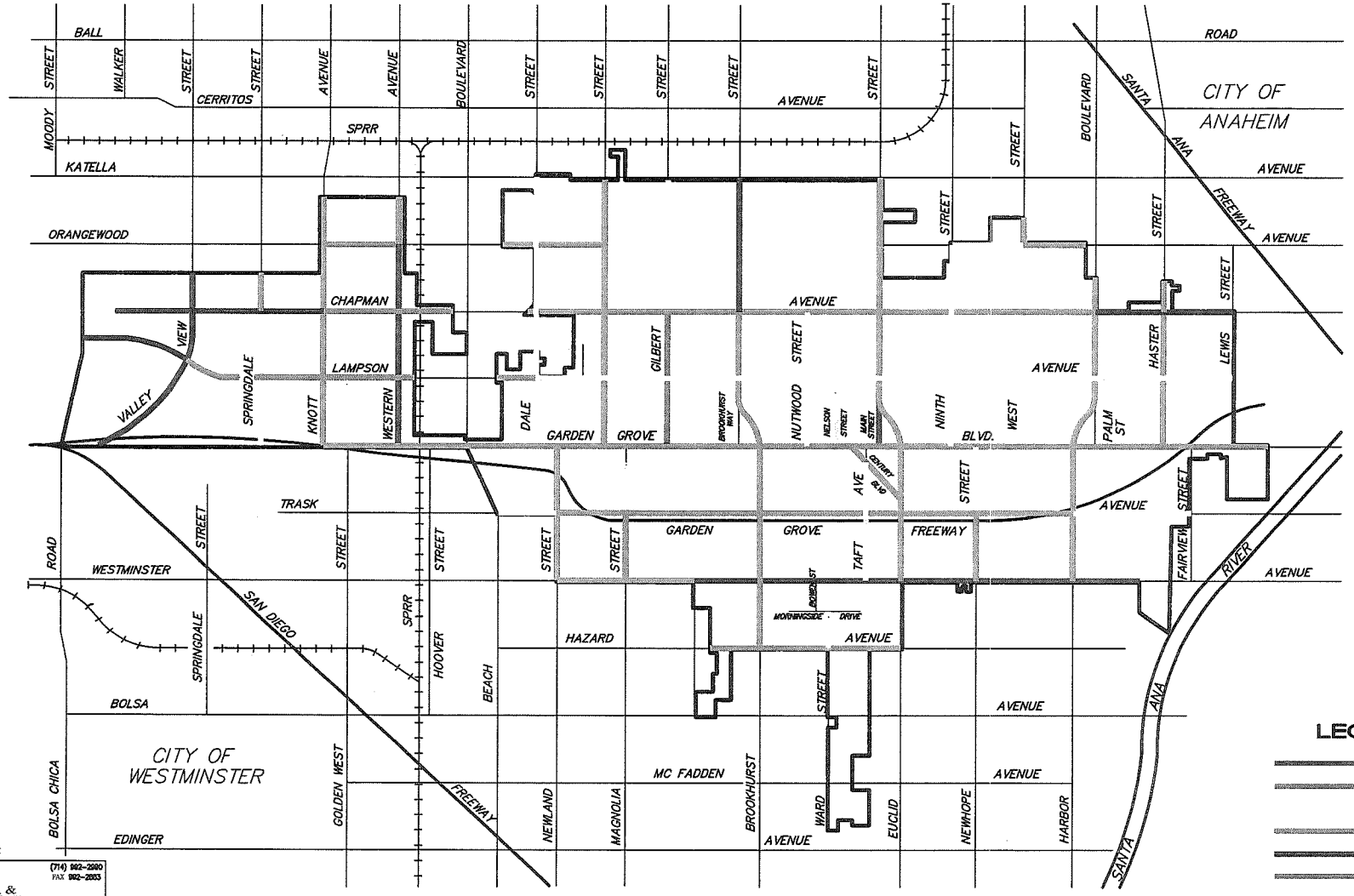
In order to evaluate the accident rates for each street segment, the average rate for all surveyed arterial street segments was calculated. Average rates were calculated for two-lane and four-or-more-lane arterial streets, two-lane collector and two-lane local streets. The accident rates for each segment were compared to the citywide average rates for streets with similar characteristics.

APPENDIX C

RADAR SPEED SURVEY
SUMMARY REPORTS 2014
(separate binder)

APPENDIX D

CITYWIDE SPEED ZONE MAP



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2014 SPEED SURVEY MAP

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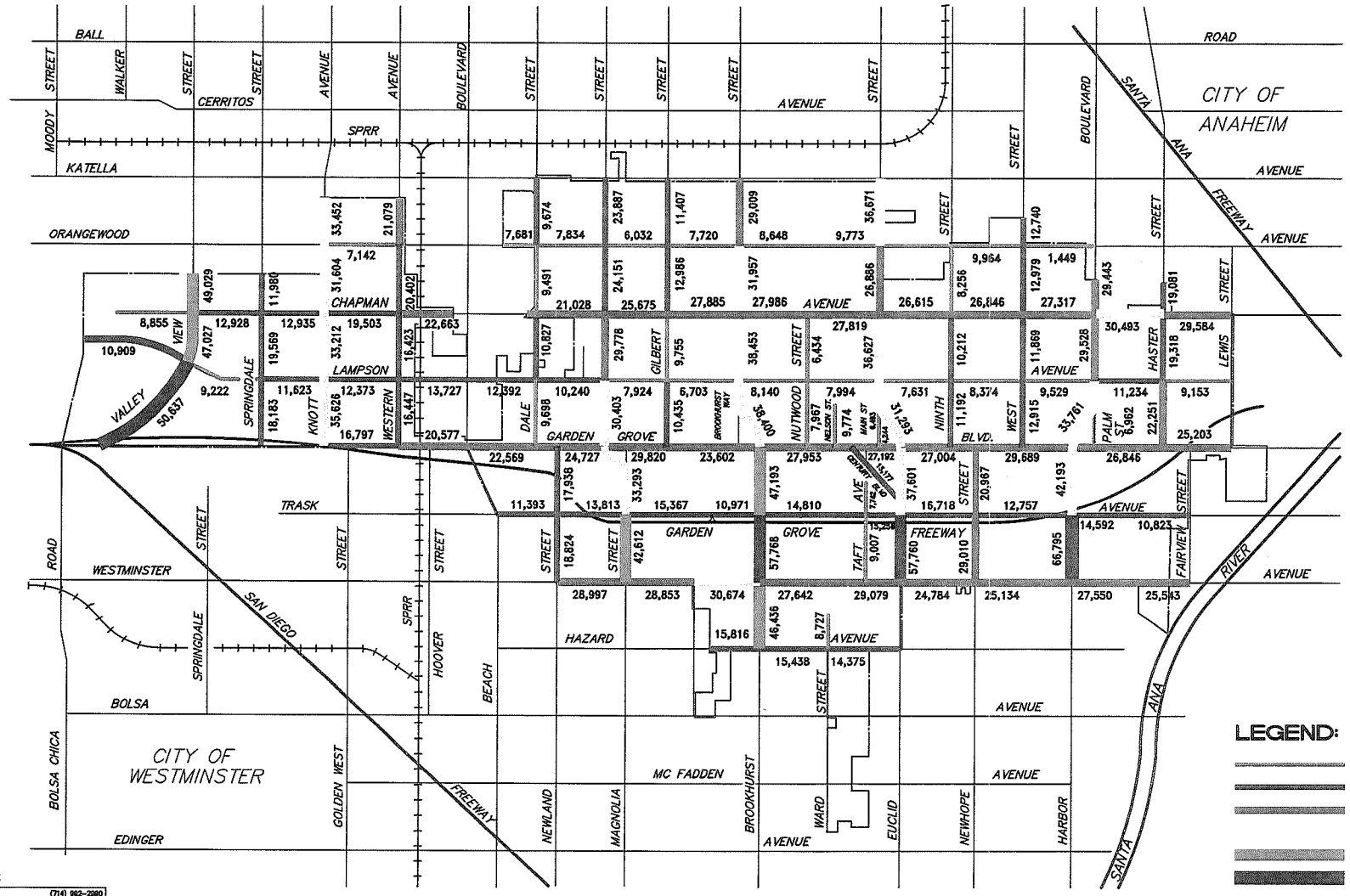
APPENDIX E

TRAFFIC VOLUMES MAP



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24 HOUR 2014 TRAFFIC VOLUME MAP

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