



AWARD CONTRACT TO ALBERT GROVER & ASSOCIATES FOR  
CITYWIDE ENGINEERING AND TRAFFIC VOLUME COUNTS

January 28, 2014

Page 2 of 2

	<b>Albert Grover &amp; Associates</b>	<b>Katz, Okitsu &amp; Associates</b>	<b>Advantec</b>
Rater A	169	148	140
Rater B	166	142	138
Rater C	173	169	170
<b>Totals</b>	<b>508</b>	<b>459</b>	<b>448</b>

Once completed, the City will have a Citywide Engineering and Traffic Survey for approximately 142 roadway segments certified by a registered traffic engineer. When completed, the survey will be a legal document that can be used to adopt and/or change specific speed limits on the surveyed segments. It will also be a document used by the Police Department and the courts in the day-to-day legal defense activities in the use of radar to enforce the established speed limits. Additionally, The City will have up-dated traffic volume counts and a traffic volume flow map showing the current traffic volumes along these roadway segments. Traffic volumes are used on a day-to-day basis in conducting various traffic-engineering functions.

FINANCIAL IMPACT

The cost will be \$41,748, funded through M2 Funds. There will be no impact to the General Fund by this action.

RECOMMENDATION

It is recommended that the City Council:

- Award a contract to Albert Grover and Associates, Inc. to provide a Citywide Engineering and Traffic Survey with Traffic Volume Counts in the amount not to exceed \$41,748.00.

• Authorize the City Manager to execute the agreement on behalf of the City and to make minor modification as appropriate.

  
WILLIAM E. MURRAY, P.E.  
Public Works Director

By:   
Tony Aquino, P.E.  
Associate Engineer

Attachment – Consultant Agreement

**Recommended for Approval**

  
Matthew Fertal  
City Manager

## CONSULTANT AGREEMENT

### ALBERT GROVER & ASSOCIATES

THIS AGREEMENT is made this **28** day of **January** 2014, by the CITY OF GARDEN GROVE, a municipal corporation, ("CITY"), and **Albert Grover & Associates, Inc.**, a California Corporation ("CONSULTANT").

### RECITALS

The following recitals are a substantive part of this Agreement:

1. This Agreement is entered into pursuant to Garden Grove Council authorization dated **January 28, 2014**.
2. CITY desires to utilize the services of CONSULTANT to provide **professional engineering services to conduct an Engineering and Traffic Survey to establish speed limits and to secure traffic volume counts within the City of Garden Grove as described in CONSULTANT'S Proposal attached hereto and incorporated herein by reference.**
3. CONSULTANT is qualified by virtue of experience, training, education and expertise to accomplish services.

### AGREEMENT

THE PARTIES MUTUALLY AGREE AS FOLLOWS:

1. **Term of Agreement:** This Agreement shall cover services rendered from date of this agreement until the services to be provided are completed or unless sooner terminated per Section 3.5.
2. **Services to be Provided:** The services to be performed by CONSULTANT shall consist of the services as further specified in CONSULTANT'S proposal attached hereto as Exhibit "A" and incorporated herein by reference. CONSULTANT agrees that its provision of Services under this Agreement shall be within accepted standards and in accordance with customary and usual practices in CONSULTANT'S profession. By executing this Agreement, CONSULTANT warrants that it has carefully considered how the work should be performed and fully understands the facilities, difficulties, and restrictions attending performance of the work under this Agreement.
3. **Compensation.** CONSULTANT shall be compensated as follows:
  - 3.1 **Amount.** CONSULTANT shall be compensated in accordance with the rate schedule set forth in Exhibit "A".
  - 3.2 **Not to Exceed.** The Parties agree that CONSULTANT shall bill for the Services provided by CONSULTANT to City on an hourly basis, except where otherwise set forth herein, provided compensation under this

Proposal shall not exceed **\$41,748**. CONSULTANT warrants that all services will be performed in a competent, professional and satisfactory manner in accordance with the standards prevalent in the industry for such services. CONSULTANT shall not be compensated for any services rendered in connection with its performance of this Agreement, which are in addition to those set forth herein, unless such additional services are authorized in advance and in writing by the City Manager. The Proposal and this Agreement do not guarantee any specific amount of work.

- 3.3 Payment. For work under this Agreement, payment shall be made per monthly invoice. For extra work not a part of this Agreement, a written authorization by CITY will be required and payment shall be based on hourly rates as provided in Exhibit "A".
- 3.4 Records of Expenses. CONSULTANT shall keep complete and accurate records of payroll costs, travel and incidental expenses. These records will be made available at reasonable times to CITY.
- 3.5 Termination. CITY and CONSULTANT shall each have the right to terminate this Agreement, without cause, by giving thirty (30) days written notice of termination to the other party. If the project is terminated by CITY, then the provisions of paragraph 3 will apply to that portion of the work completed.

#### 4. **Insurance Requirements**

- 4.1 Commencement of Work CONSULTANT shall not commence work under this Agreement until all certificates and endorsements have been received and approved by the CITY. All insurance required by this Agreement shall contain a Statement of Obligation on the part of the carrier to notify the CITY of any material change, cancellation, or termination at least thirty (30) days in advance.
- 4.2 Workers Compensation Insurance For the duration of this Agreement, CONSULTANT and all subcontractors shall maintain Workers Compensation Insurance in the amount and type required by California law, if applicable. The insurer shall waive its rights of subrogation against the CITY, its officers, officials, agents, employees, and volunteers.
- 4.3 Insurance Amounts CONSULTANT shall maintain the following insurance for the duration of this Agreement:
  - (a) Commercial general liability in an amount not less than \$1,000,000 per occurrence; (claims made and modified occurrence policies are not acceptable); Insurance companies must be admitted and licensed in California and have a Best's Guide Rating of A-, Class VII or better, as approved by the CITY;

- (b) Automobile liability in an amount not less than \$1,000,000 per occurrence; (claims made and modified occurrence policies are not acceptable) Insurance companies must be admitted and licensed in California and have a Best's Guide Rating of A-, Class VII or better, as approved by the CITY.
- (c) Professional liability in an amount not less than \$1,000,000 per occurrence; Insurance companies must be acceptable to CITY and have an AM Best's Guide Rating of A-, Class VII or better, as approved by the CITY. If the policy is written on a "claims made" basis, the policy shall be continued in full force and effect at all times during the term of the agreement, and for a period of three (3) years from the date of the completion of services provided. In the event of termination, cancellation, or material change in the policy, professional/consultant shall obtain continuing insurance coverage for the prior acts or omissions of professional/consultant during the course of performing services under the term of the agreement. The coverage shall be evidenced by either a new policy evidencing no gap in coverage, or by obtaining separate extended "tail" coverage with the present or new carrier.

An Additional Insured Endorsement, **ongoing and completed operations**, for the policy under section 4.3 (a) shall designate CITY, its officers, officials, employees, agents, and volunteers as additional insureds for liability arising out of work or operations performed by or on behalf of the CONSULTANT. CONSULTANT shall provide to CITY proof of insurance and endorsement forms that conform to city's requirements, as approved by the CITY.

An Additional Insured Endorsement for the policy under section 4.3 (b) shall designate CITY, its officers, officials, employees, agents, and volunteers as additional insureds for automobiles owned, lease, hired, or borrowed by CONSULTANT. CONSULTANT shall provide to CITY proof of insurance and endorsement forms that conform to CITY's requirements, as approved by the CITY.

For any claims related to this Agreement, CONSULTANT's insurance coverage shall be primary insurance as respects to CITY, its officers, officials, employees, agents, and volunteers. Any insurance or self-insurance maintained by the CITY, its officers, officials, employees, agents, or volunteers shall be excess of the CONSULTANT's insurance and shall not contribute with it.

If CONSULTANT maintains higher insurance limits than the minimums shown above, CONSULTANT shall provide coverage for the higher insurance limits otherwise maintained by the CONSULTANT

5. **Non-Liability of Officials and Employees of the CITY.** No official or employee of CITY shall be personally liable to CONSULTANT in the event of any default or breach by CITY, or for any amount, which may become due to CONSULTANT.
6. **Non-Discrimination.** CONSULTANT covenants there shall be no discrimination against any person or group due to race, color, creed, religion, sex, marital status, age, handicap, national origin or ancestry, in any activity pursuant to this Agreement.
7. **Independent Contractor.** It is agreed to that CONSULTANT shall act and be an independent contractor and not an agent or employee of CITY, and shall obtain no rights to any benefits which accrue to CITY'S employees.
8. **Compliance With Law.** CONSULTANT shall comply with all applicable laws, ordinances, codes and regulations of the federal, state and local government.
9. **Disclosure of Documents.** All documents or other information developed or received by CONSULTANT are confidential and shall not be disclosed without authorization by CITY, unless disclosure is required by law.
10. **Ownership of Work Product.** All documents or other information developed or received by CONSULTANT shall be the property of CITY. CONSULTANT shall provide CITY with copies of these items upon demand or upon termination of this Agreement.
11. **Conflict of Interest and Reporting.** CONSULTANT shall at all times avoid conflict of interest or appearance of conflict of interest in performance of this Agreement.
12. **Notices.** All notices shall be personally delivered or mailed to the below listed addresses, or to such other addresses as may be designated by written notice. These addresses shall be used for delivery of service of process.

(a) Address of CONSULTANT is as follows:

**Albert Grover & Associates, Inc.  
211 E. Imperial Hwy  
Suite 208  
Fullerton, CA 92835  
Attn: Mark Miller, P.E.**

(b) Address of CITY is as follows (with a copy to):

Tony Aquino, P.E.:	City Attorney
Public Works Dept.	City of Garden Grove
City of Garden Grove	P.O. Box 3070
P.O. Box 3070	Garden Grove, CA 92840
Garden Grove, CA 92840	

13. **CONSULTANT'S Proposal.** This Agreement shall include CONSULTANT'S proposal or bid which shall be incorporated herein. In the event of any inconsistency between the terms of the proposal and this Agreement, this Agreement shall govern.
14. **Licenses, Permits and Fees.** At its sole expense, CONSULTANT shall obtain a **Garden Grove Business License**, all permits and licenses as may be required by this Agreement.
15. **Familiarity With Work.** By executing this Agreement, CONSULTANT warrants that: (1) it has investigated the work to be performed; (2) it has investigated the site of the work and is aware of all conditions there; and (3) it understands the facilities, difficulties and restrictions of the work under this Agreement. Should CONSULTANT discover any latent or unknown conditions materially differing from those inherent in the work or as represented by CITY, it shall immediately inform CITY of this and shall not proceed, except at CONSULTANT'S risk, until written instructions are received from CITY.
16. **Time of Essence.** Time is of the essence in the performance of this Agreement.
17. **Limitations Upon Subcontracting and Assignment.** The experience, knowledge, capability and reputation of CONSULTANT, its principals and employees were a substantial inducement for CITY to enter into this Agreement. CONSULTANT shall not contract with any other entity to perform the services required without written approval of the CITY. This Agreement may not be assigned voluntarily or by operation of law, without the prior written approval of CITY. If CONSULTANT is permitted to subcontract any part of this Agreement, CONSULTANT shall be responsible to CITY for the acts and omissions of its subcontractor as it is for persons directly employed. Nothing contained in this Agreement shall create any contractual relationship between any subcontractor and CITY. All persons engaged in the work will be considered employees of CONSULTANT. CITY will deal directly with and will make all payments to CONSULTANT.
18. **Authority to Execute.** The persons executing this Agreement on behalf of the parties warrant that they are duly authorized to execute this Agreement and that by executing this Agreement, the parties are formally bound.
19. **Indemnification.** To the fullest extent permitted by law, CONSULTANT agrees to protect, defend, and hold harmless CITY and its elective or appointive boards, officers, agents, and employees from any and all claims, liabilities, expenses, or damages of any nature, including attorneys' fees, for injury or death of any person, or damages of any nature, including interference with use of property, arising out of, or in any way connected with the negligence, recklessness and/or intentional wrongful conduct of CONSULTANT, CONSULTANT'S agents, officers, employees, subcontractors,

or independent contractors hired by CONSULTANT in the performance of the Agreement. The only exception to CONSULTANT'S responsibility to protect, defend, and hold harmless CITY, is due to the negligence, recklessness and/or wrongful conduct of CITY, or any of its elective or appointive boards, officers, agents, or employees.

This hold harmless agreement shall apply to all liability regardless of whether any insurance policies are applicable. The policy limits do not act as a limitation upon the amount of indemnification to be provided by CONSULTANT.

20. **Modification.** This Agreement constitutes the entire agreement between the parties and supersedes any previous agreements, oral or written. This Agreement may be modified only by subsequent mutual written agreement executed by CITY and CONSULTANT.
21. **Waiver.** All waivers of the provisions of this Agreement must be in writing by the appropriate authorities of the CITY and CONSULTANT.
22. **California Law.** This Agreement shall be construed in accordance with the laws of the State of California. Any action commenced about this Agreement shall be filed in the central branch of the Orange County Superior Court.
23. **Interpretation.** This Agreement shall be interpreted as though prepared by both parties
24. **Preservation of Agreement.** Should any provision of this Agreement be found invalid or unenforceable, the decision shall affect only the provision interpreted, and all remaining provisions shall remain enforceable.

*[SIGNATURES ON FOLLOWING PAGE]*



**IN WITNESS THEREOF**, these parties hereto have caused this Agreement to be executed as of the date set forth opposite the respective signatures.

**"CITY"  
CITY OF GARDEN GROVE**

Dated: \_\_\_\_\_, 2014

By: \_\_\_\_\_  
City Manager

**ATTEST**

**"CONSULTANT"**

\_\_\_\_\_  
City Clerk

By: Rob Kuehn  
Title: Director of Proj. Dev. / Corp. Secretary

Dated: \_\_\_\_\_, 2014

Dated: January 20, 2014

**APPROVED AS TO FORM:**

If CONSULTANT/CONTRACTOR is a corporation, a Corporate Resolution and/or Corporate Seal is required. If a partnership, Statement of Partnership must be submitted to CITY

\_\_\_\_\_  
Garden Grove City Attorney

Dated: \_\_\_\_\_, 2014



November 14, 2013

Mr. Dan Candelaria, P.E., T.E.  
Traffic Engineer/Interim City Engineer  
City of Garden Grove  
11222 Acacia Parkway  
Garden Grove, California 92842

**RE: Fee Proposal to Provide Professional Consulting Services for a Citywide Engineering and Traffic Survey**

Dear Mr. Candelaria:

Albert Grover & Associates (AGA) is pleased to respond to the City of Garden Grove Request for Proposal (RFP) to provide professional consulting services to conduct engineering and traffic surveys, including both speed and volume surveys, at approximately 142 locations on various City streets. Enclosed please find our Fee Proposal to provide the requested services. As requested in the RFP, three copies of our Technical Proposal have been submitted under separate cover.

Our Fee Proposal is presented as a "not to exceed" amount to provide a complete product as described in our Technical Proposal and the City's RFP. This proposal is a firm offer, valid for a period of 90 days from the date of this letter, and I have full authorization to bind Albert Grover & Associates.

We look forward to working with the City of Garden Grove on this project, and to completing the project to the satisfaction of the City. If you have any questions regarding our Fee Proposal, please contact me. We thank the City of Garden Grove for giving us the opportunity to submit this proposal.

Respectfully submitted,

ALBERT GROVER & ASSOCIATES

Rob Kuehn  
*Director of Project Development*

Proposals\Garden Grove\Speed Survey 2014\Fee Proposal\Citywide Traffic Survey Fee Letter.docx

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TRANSPORTATION CONSULTING ENGINEERS

211 E. Imperial Hwy., Suite 208, Fullerton, CA 92835  
(714) 992-2990 FAX (714) 992-2883 E-Mail: [aga@albertgrover.com](mailto:aga@albertgrover.com)

## FEE PROPOSAL

Our Fee Proposal is presented below. All costs (including data collection costs for Transportation Studies, Inc.) have been included. Costs are based on the assumption that approximately 142 roadway segments will be surveyed for speeds, and that 24-hour ADT data will be collected at approximately 142 locations. If the number of count/survey locations is modified, the project costs would likewise be modified at a rate of \$294 per location.

AGA will conduct all tasks as identified in our Technical Proposal, dated November 14, 2013, for approximately 142 locations for a Project Fee of \$41,748.

**Table 1: Resource Requirements**

Task Description	Mark Miller Project Mgr.	Ruben Perales Assoc. Transp. Engineer	Chad Veinot Transp. Eng. Assoc.	Pauline Bingham Project Coord.	Transportation Studies, Inc.	Grand Totals
1. Radar Field Data Collection (Includes Kick-Off Meeting	6	---	6	---	*	12
2. Traffic Count Data Collection (ADTs) & Traffic Flow Map	6	4	6	---	*	16
3. Speed Data Analyses & Speed Zone Map	10	---	14	---	---	24
4. Roadway Segment Characteristics & Speed Limit Sign Location Review	18	---	---	---	---	18
5. Accident History Review & Accident Rate Calculations	4	20	4	6	---	34
6. Speed Zone Survey Compilation, (Summary of Recommendations Chart"	14	2	4	4	---	24
7. Preparation of Draft Report	8	4	4	16	---	32
8. Preparation of Final Report	2	2	2	8	---	14
9. Progress Meetings	6	---	---	---	---	6
10. Presentation to Traffic Commission & City Council	6	---	---	---	---	6
<b>Totals (Hours)</b>	<b>80</b>	<b>32</b>	<b>40</b>	<b>34</b>	<b>---</b>	<b>186</b>

\* Plus Transportation Studies, Inc. time.

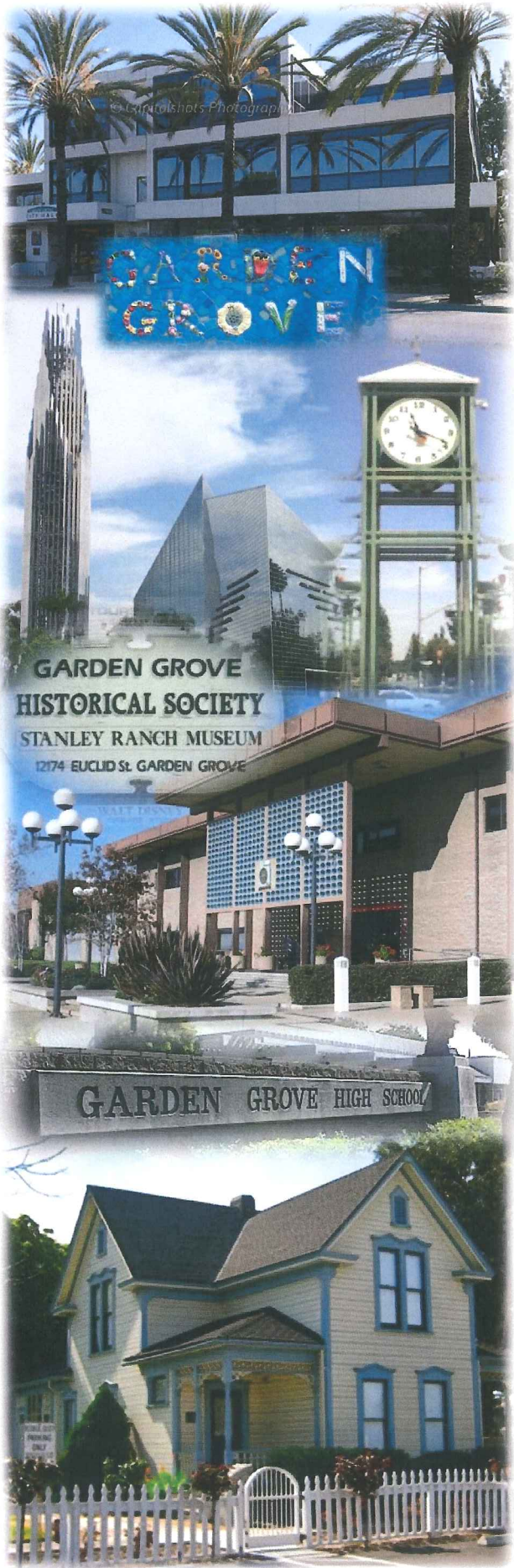
**SCHEDULE OF HOURLY RATES****EFFECTIVE SEPTEMBER 1, 2011**

Principal/President	\$ 275
Vice President	\$ 250
Director of Project Development	\$ 250
Senior Transportation Engineer	\$ 200
Senior Design Engineer	\$ 185
System Integrator	\$ 180
Senior Associate	\$ 170
Transportation Engineer	\$ 165
Design Engineer/Senior Signal Systems Specialist/ Construction Inspector	\$ 150
Associate Transportation Engineer/Civil Engineering Associate	\$ 140
Transportation Engineering Associate	\$ 135
Signal Systems Specialist	\$ 135
Signal Systems Technician	\$ 125
Senior CADD Operator	\$ 125
Project Coordinator/Engineer	\$ 110
CADD Operator	\$ 110
Assistant Transportation Engineer/Assistant Engineer	\$ 90
Traffic Enumerator, Engineering Aide	\$ 75
Engineering Aide II	\$ 50
Council/Commission Meetings, Hearings, etc. (Billing Rate + \$50 Surcharge)	\$ 1,000 Minimum
Expert Witness (Billing Rate + \$50 Surcharge)	\$ 1,000 Minimum
Expert Witness - Deposition/Court (Billing Rate + \$100 Surcharge)	\$ 1,000 Minimum

Subconsultants will be billed at cost plus 20%

*Conditions of Usage:* The above rates are typically effective for a 12-month period, but AGA maintains the right to change the billing rates at any time for convenience of record keeping. Therefore, all billings will always be at the then current billing rates. This will not affect any agreed upon total or not-to-exceed fees.

INVOICES WILL BE SUBMITTED MONTHLY AND SHALL BE DUE AND PAYABLE WITHIN 30 DAYS. FINANCE CHARGES MAY BE ACCRUED DAILY ON UNPAID BALANCES BASED ON A 10% ANNUAL PERCENTAGE RATE.



# TECHNICAL PROPOSAL

TO PROVIDE  
PROFESSIONAL CONSULTING SERVICES  
FOR A  
**CITYWIDE ENGINEERING AND  
TRAFFIC SURVEY**

SUBMITTED TO  
**CITY OF GARDEN GROVE**



PUBLIC WORKS DEPARTMENT  
ENGINEERING DIVISION

NOVEMBER 14, 2013

SUBMITTED BY





November 14, 2013

Mr. Dan Candelaria, P.E., T.E.  
Traffic Engineer/Interim City Engineer  
City of Garden Grove  
11222 Acacia Parkway  
Garden Grove, California 92842

**RE: Technical Proposal to Provide Professional Consulting Services for a Citywide Engineering and Traffic Survey**

Dear Mr. Candelaria:

Albert Grover & Associates (AGA) is pleased to respond to the City of Garden Grove Request for Proposal (RFP), dated October 14, 2013, to provide professional consulting services to conduct engineering and traffic surveys, including both speed and volume surveys, at numerous locations on various City streets. Enclosed please find three copies of our Technical Proposal to provide the requested services. As requested in the RFP, our Fee Proposal has been submitted under separate cover.

We believe that AGA is a highly qualified and innovative firm that possesses all of the necessary capabilities to complete the proposed project in a professional, timely, and cost-effective manner. We fully understand the very important legal aspects involved in this project.

AGA staff completed the last survey in 2008 and have extensive experience in completing other projects similar to the proposed project. Highlights of our experience and expertise include the following:

- ◆ City of Norco Engineering and Traffic Survey, including a radar survey of 78 locations.
- ◆ City of Santa Clarita Engineering and Traffic Survey, including a radar survey of 201 locations.
- ◆ City of Long Beach Engineering and Traffic Survey, including a radar survey of 106 locations.
- ◆ City of Cerritos Engineering and Traffic Survey, including a radar survey of 91 locations.
- ◆ City of Santa Ana Engineering and Traffic Survey, including a radar survey of 175 locations.
- ◆ City of Chino Engineering and Traffic Survey, including a radar survey of 127 locations.
- ◆ City of Montclair Engineering and Traffic Survey, including a radar survey of 68 locations.

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TRANSPORTATION CONSULTING ENGINEERS

211 E. Imperial Hwy., Suite 208, Fullerton, CA 92835

(714) 992-2990 FAX (714) 992-2883 E-Mail: [aga@albertgrover.com](mailto:aga@albertgrover.com)

Mr. Dan Cadelaria, P.E., T.E.  
November 14, 2013  
Page 2

In accordance with the City's RFP, AGA will conduct the following tasks:

- Accident rate analysis using three years of SWITRS data.
- Calculation of accident rates for comparison purposes.
- Street survey conducted by a Registered Civil Engineer/Traffic Engineer.
- Prepare summary of accident survey analysis.
- Prepare summary of speed zone survey recommendations (increase or decrease).
- Review California Roadway System (CRS) maps and provide process for change.
- Meetings with City staff and police to determine increase or decrease in speed and discuss local conditions.
- Document all work in report form for City submission.
- Present studies to City Traffic Commission/City Council.
- Prepare speed survey maps.
- Prepare traffic flow maps.

It should be noted that AGA carries insurance in an amount equal to or greater than that required by the City of Garden Grove, and will name the City as an additional insured on all applicable policies.

We look forward to working with the City of Garden Grove on this project, and to completing the project to the satisfaction of the City. If you have any questions regarding our Technical Proposal, please contact me. We thank the City of Garden Grove for giving us the opportunity to submit this proposal.

Respectfully submitted,

ALBERT GROVER & ASSOCIATES



Rob Kuehn  
*Director of Project Development*

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## APPENDICES

<b>Appendix</b>	
A	Resumes of Key Personnel
B	Sample Engineering and Traffic Survey Report
C	Sample Color Speed Zone Map
D	Sample Color Traffic Volume Map



## CITYWIDE ENGINEERING AND TRAFFIC SURVEY

### CITY OF GARDEN GROVE

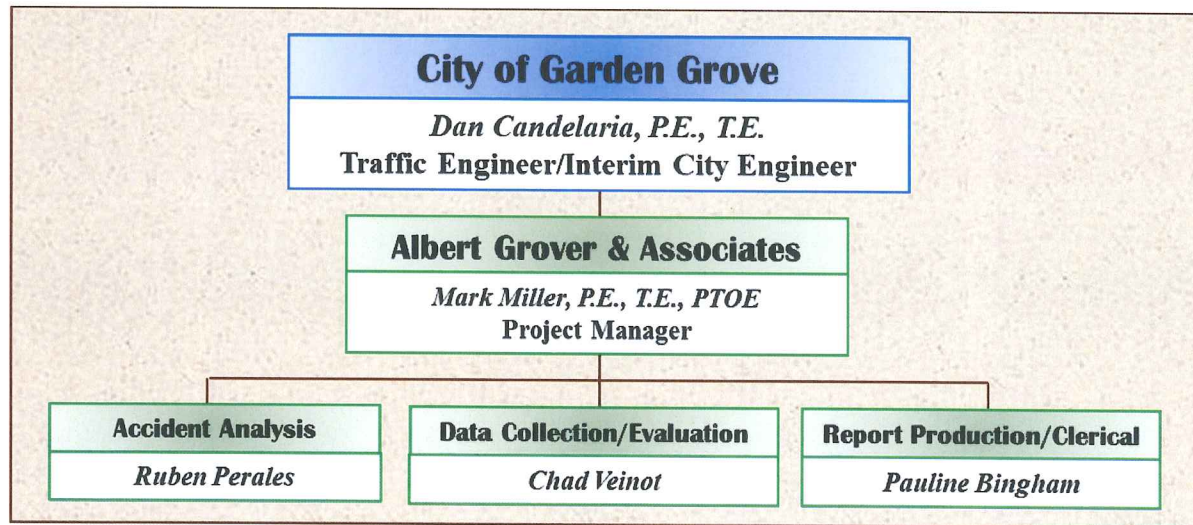
#### I Introduction

Albert Grover & Associates (AGA) possesses all of the necessary qualifications and experience required to successfully complete the Engineering and Traffic Survey Project proposed by the City of Garden Grove. We fully understand the importance to the City of establishing and justifying the speed limits within the City, of collecting and analyzing various traffic operational data, and of providing a computerized database of this information in a timely fashion. Staff of AGA have successfully completed many projects similar to the project proposed herein. We realize the significance of the current project to the City and the importance of our completing the project on time and in a manner that meets all the requirements of the City.

AGA is a California corporation, having been incorporated in 1993. The company is owned by Mr. Albert L. Grover, C.E., T.E.

#### II Project Organization

The project organization is as shown in Figure 1. The Project Manager for this project will be Mr. Mark H. Miller, P.E. He will be assisted by Mr. Ruben Perales and Mr. Chad Veinot. All project team members will work as a team and will apply their administrative and technical abilities to the fullest extent to achieve the objectives of the project.



**FIGURE 1**  
**PROJECT ORGANIZATION CHART**

Following is a brief summary of the qualifications of key members of the team.

**Mark H. Miller, P.E., T.E., PTOE, Executive Vice President** of AGA, will be the Project Manager for this study. Prior to joining AGA in 1993, Mr. Miller was the Vice President/Senior Traffic Engineer at Mohle, Grover & Associates, where he served as the Project Manager for the Cities of Cerritos, La Habra and Cypress Speed Zone Surveys. Mr. Miller also served as Principal-in-Charge and/or Project Manager for AGA's Speed Zone Survey Projects in the Cities of Ontario, Lancaster, Buena Park, Santa Clarita, Santa Ana, Santa Monica and Fountain Valley. All of these surveys were completed on-time and within budget. Additionally, Mr. Miller previously was the City Traffic Engineer for the City of Pomona and Assistant Engineer (Traffic) for the City of Pasadena. Mr. Miller is a registered Civil Engineer, a registered Traffic Engineer, and a Professional Traffic Operations Engineer in the State of California.

**Ruben Perales, E.I.T., Associate Transportation Engineer**, has a wide range of experience in both the public and private sector, having joined AGA after working for several years for the City of Upland. His experience includes both field and office activities, varying from conducting detailed topographic field surveys to the design of traffic signals, development of signing/stripping plans, and conducting traffic signal warrant analyses. Mr. Perales has experience with various large scale database projects, and is well-versed in the use of the Crossroads software program.

**Chad Veinot, TSOS, Transportation Engineering Associate**, has a wide range of traffic engineering and transportation planning experience, including both field and office activities. Mr. Veinot has evaluated speed survey data; reviewed and prepared traffic studies; conducted traffic signal operational analyses; prepared signing and stripping plans; conducted public meetings; performed construction inspection; and prepared design plans for a variety of traffic engineering applications. He was instrumental in AGA's recent speed survey projects for the Cities of Santa Ana and Lancaster. His experience with large scale database projects will be especially helpful for this proposed project.

Resumes for key AGA employees are included in **Appendix A**.

### **III Quality Control**

To fully achieve all of the objectives of the proposed project, the following steps will be adopted as AGA's Quality Control Program:

- ◆ Speed survey sections will be discussed in detail with the City staff and/or the Police Department during the initial meeting after reviewing and finalizing the list of street segments for the study.
- ◆ Prior to commencement of work, AGA will submit samples of the radar speed survey field sheet, the radar speed survey analysis sheet, the field review summary sheet and the summary of recommendations chart for preapproval by the City.
- ◆ A minimum sample of 100 vehicles will be surveyed during off-peak hours, with a minimum of 50 vehicles for each direction of travel. The instruments used will be periodically inspected and calibrated during the survey period.

- ◆ The radar speed surveys will be conducted only on Tuesdays, Wednesdays and Thursdays, not on holidays or days immediately before or after holidays, and in good weather conditions in non-construction areas.

During the radar field survey, representative *free flow* speeds will be recorded.

- ◆ Regular meetings, as indicated in the project schedule, will be held with City staff to update project progress.
- ◆ If there are any unforeseen circumstances with regard to project work delay, the City staff will be immediately informed.

### Experience and References

Within the past five years, staff of AGA have completed many engineering and traffic survey projects similar to the project proposed by the City of Garden Grove. Following are project details and references familiar with the work conducted on several of these studies.

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#### Speed Zone Survey – 175 Locations – City of Santa Ana: 1991, 1996, 2001, 2006, 2011

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Mr. Taig Higgins, Transportation and Development Manager  
City of Santa Ana  
20 Civic Center Plaza  
Santa Ana, CA 92702  
(714) 647-5615

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#### Speed Zone Survey – 201 Locations – City of Santa Clarita: 2000, 2005, 2012

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Mr. Andrew Yi, Traffic Engineer  
City of Santa Clarita  
23920 Valencia Boulevard  
Santa Clarita, California 91355  
(661) 255-4942

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#### Speed Zone Survey – 91 Locations – City of Cerritos: 1998, 2002, 2007, 2012

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Mr. Hal Arbogast, City Engineer  
City of Cerritos  
18125 Bloomfield Avenue  
Cerritos, California 90703-3130  
(562) 916-1219

---

#### Speed Zone Survey – 78 Locations – City of Norco: 2001, 2003, 2006, 2013

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Mr. Dominic Milano, Contract City Engineer  
City of Norco  
2870 Clark Ave  
Norco, CA 92860-1903  
(951) 270-5626

## Project Approach

One objective of the proposed project is to review the existing speed limits and recommend changes to the speed limits (increase or decrease), in accordance with the requirements of Section 627 of the California Vehicle Code (CVC) and the recommended procedures outlined in Chapter 6, entitled "Spot Speeds," of the Manual of Traffic Engineering Studies, 4th Edition, published by ITE. The study will provide sufficient information to document that the conditions of the latest edition of CVC 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 22354, 40802(b) of the CVC requires that where limits are changed pursuant to Section 22357, 22358, and/or 22358.3 of the CVC, the changes must be justified by an engineering and traffic survey conducted within five years prior to the date of the alleged violation.

The product of the study will be a *legal document* that will be acted on by the City Council to formally adopt and/or change specific speed limits at the surveyed locations. The report will be the document used by the Police Department and the courts in the day-to-day legal defense activities of the established speed limit.

Our proposed approach for this project, over and above complying with the specific relevant requirements of the CVC and of the California Manual and Uniform Traffic Control Devices for Streets and Highways (adopted January, 2012), will be to:

- ◆ Meet with City staff and discuss the project completely, including any scheduling and other staff concerns.
- ◆ Conduct field radar surveys under free flow traffic conditions only.
- ◆ Evaluate speed limits by reviewing traffic count data and at least two years of accident history at mid-block locations and intersections in conjunction with the speed survey data.
- ◆ Prepare the recommendations to maintain/increase/decrease the speed limits in the City. Additionally, if certain residential streets are experiencing speeding problems, we will recommend that the City investigate the potential utilization of various traffic calming measures to address the situation.

The following nine tasks have been designed to provide an orderly and efficient completion of the work needed to conduct the speed zone study. It should be noted that the Scope of Services outlined in the City's RFP shall be considered as part of AGA's proposal.

### *Task 1 – Kick-Off Meeting*

AGA will conduct an initial kick-off meeting with City Planning/Engineering (and, if desired, Police Department) staff at City Hall to discuss project parameters, schedule, methodologies, lines of communication, etc.

At the Kick-Off Meeting, AGA will discuss the methodology of how the roadway segments that are labeled as "Major Collectors" on the California Roadway Systems (CRS) Map can be reclassified. We are very familiar with this procedure, which we have completed for a number of other cities. We have conducted a preliminary review of the latest maps and identified a minimum of 18 streets or segments on the maps that were never surveyed for speed limits. Following is a list of those segments:

Street	Segment
Acacia Parkway	Nelson Street to 9th Street
Barclay Drive	Katella Avenue to Orangewood Avenue
Benton Street	Garden Grove Boulevard to Trask Avenue
Buaro Street	Chapman Avenue to Garden Grove Boulevard
Cerulean Avenue	Valley View Street to Topaz Street
Gilbert Street	Garden Grove Boulevard to Trask Avenue
Jozelle Drive	Magnolia Street to Brookhurst Street
Nelson Street	Chapman Avenue to Stanford Avenue
Palmwood Drive	Katella Avenue to Orangewood Avenue
Parliament Avenue	Brookhurst Street to Palmwood Drive
Stanford Avenue	Springdale Street to Knott Street
Stanford Avenue	West City Limit to Josephine Street
Stanford Avenue	Gilbert Street to Main Street
Stanford Avenue	Euclid Street to 9th Street
Taft Street	Garden Grove Boulevard to Westminster Avenue
Topaz Street	Cerulean Avenue to Lampson Avenue
Ward Street	Hazard Avenue to Morningside Drive
Yockey Street	Garden Grove Boulevard to Westminster Avenue

A detailed project schedule will be presented by AGA at this initial meeting. AGA will also provide proof of radar speed meter certification at this meeting.

### *Task 2 – Radar Speed and Volume Data Collection*

After agreeing on the list of roadway segments to be reclassified, finalizing the list of segments surveyed, and discussing the schedule for conducting the surveys and addressing any staff concerns at the initial meeting with City staff, the first task will be to conduct the field radar speed surveys at the approximately 142 recommended road segments per discussion with City staff.

A minimum of 100 bidirectional speed observations, with a minimum of 50 observations for each direction of travel, will be obtained for all of the designated street segments, a list of which will be finalized during the initial meeting with the City staff. For low volume roadways, the survey will be conducted for a one-hour period or when 50 speed samples have been recorded, whichever occurs first. The studies will be conducted during “good weather” conditions and only on Tuesdays, Wednesdays and Thursdays.

Each speed zone will be checked for representative free flow speeds, that is, speeds not influenced by temporary conditions or construction work. The radar gun will be calibrated periodically to achieve and maintain accuracy. Obtaining of a minimum 100 speed samples for each street segment will ensure that there will be a 95% probability that the sample data represents the population data for this type of study.

Radar speed data will be collected by AGA staff who are certified to perform the surveys. Photocopies of radar tally sheets for each radar speed survey location will be provided to the City in an attached appendix.

We will also collect 24-hour directional counts at approximately 142 locations where speeds are measured. Directional counts will be reported in both 15-minute and 1-hour increments. As with the speed measurements, volume measurements will be conducted on Tuesdays, Wednesdays, and Thursdays. All count data will be provided in both hard copy and on disk.

Volume data collection will be conducted by Transportation Studies, Inc. (TSI) and overseen by Mr. Miller. TSI has been collecting various traffic data for more than fifteen years, and has been a key component of AGA's speed survey project team for dozens of projects similar to the proposed Garden Grove project.

### ***Task 3 – Speed Data Analysis***

Utilizing the radar speed survey data for the approximately 142 roadway segments, AGA will summarize the field data and provide speed survey data sheets. It should be noted that our field data measurements, data sheets and summaries will be modified as required to exactly match the current requirements of the City of Garden Grove.

AGA will also coordinate with Caltrans and the Cities of Seal Beach, Los Alamitos, Cypress, Stanton, Westminster, Anaheim, Orange, Santa Ana, and Fountain Valley regarding speed limits for highway segments abutting or under joint control with the City of Garden Grove.

### ***Task 4 – Roadway Segment Characteristics and Speed Limit Sign Locations Review***

This task will be performed by Mr. Mark Miller, P.E., a registered Civil Engineer, Traffic Engineer and Professional Traffic Operations Engineer in California. Mr. Miller will drive all of the street segments to determine, on the basis of experienced traffic engineering judgment, whether or not there are any roadway characteristics not readily apparent to the motorist which would justify the lowering of the proposed speed limit to the maximum reduction permitted under the State established guidelines. Factors considered will include street width and alignment, traffic flow characteristics, number of lanes and other channelization and striping patterns, frequency of driveways and intersections, reversed superelevations, visibility obstructions caused by vertical or horizontal curves, roadside land use, block walls, multiple driveways, grade, heavy pedestrian, bicycle or truck traffic, heavy on-street parking maneuvers, and any other roadside conditions that are not apparent to the motorist.

As part of this work, locations of all speed limit signs will be reviewed in the field to ensure that the speed limit signing is in accordance with the adopted speed limits per the previous speed survey report. The field survey will be documented for analysis purposes.

The product of this review will be a summary of each of the study segments and identification of the study segments which justify consideration for maximum increase/decrease in the recommended speed limits.

### ***Task 5 – Accident History Review and Accident Rate Calculations***

After consultation and agreement with City staff as to the most appropriate methodology for the analysis of accident records, Mr. Ruben Perales of AGA will review the mid-block accident history of each of the street segments to be included in the survey. The appropriate accident rate for each study link will be calculated based on updated volume data collected as part of this project. The calculated accident rate will be compared with the expected accident rate for the various types of roadways within Caltrans District 12.

Mr. Perales has extensive experience in City traffic operations and is therefore well qualified to review these accident records. It is proposed that a **two year** time period be utilized for the accident review.

#### ***Task 6 – Compilation of Speed Zone Survey "Summary of Recommendations" Chart***

A sample data summary table is presented in the report in **Appendix B**. *It should be noted that the survey data summaries will be provided per current City required format.*

In the preparation of these summaries, all of the conclusions reached during the accident review and highway segment characteristics field review conducted under Tasks 4 and 5 will be taken into account. Tasks 4 and 5 will constitute the basis for changing the speed limit from the first five mile per hour increment nearest the 85<sup>th</sup> percentile speed.

The product of this task will be the summary tables showing the posted speed, 15<sup>th</sup> percentile speed, 50<sup>th</sup> (median) percentile speed, 85<sup>th</sup> percentile speed, 10 mph pace speed (with number and percentage of vehicles within the pace), range of all speeds surveyed, and recommended speed limit on all surveyed street segments. The tables will be discussed with City staff prior to the preparation of the final report, and will include all data requested by the City.

#### ***Task 7 – Preparation of Draft Report***

Three copies of the Draft Report will be prepared and submitted to the City for their review. At a minimum, the Draft Report will include the following items:

- ◆ Certification statement(s) for the radar gun(s) utilized in the survey.
- ◆ Radar speed survey operational procedures.
- ◆ Description of the purpose and methodology of Speed Zone establishment, including a discussion of realistic speed zoning, speed traps, CVC requirements, etc.
- ◆ Description of the statistical analysis factors.
- ◆ Description of the field data used in analyzing the related roadway characteristics.
- ◆ A Summary of Findings Table including location, posted speed limit, critical speed, recommended speed limit, average daily traffic (ADT), accidents per million vehicle miles (MAVM), and any comments.
- ◆ Accident history for the street segments, including a table showing locations with unusually high collision rates that may warrant speed limit reduction.
- ◆ Results and recommendations.
- ◆ Summary of recommendations in narrative and table form per desired City format.
- ◆ A color 11x17" Speed Survey Map showing the speed limits on all 142 roadway segments.
- ◆ A color 11x17" Traffic Volume Map showing the 24-hour volumes on all 142 roadway segments.

### *Task 8 – Preparation of Final Report*

After review of the Draft Report by the City, AGA will incorporate City comments, finalize the report and provide twenty (20) certified bound copies of the Final Report, including the actual speed survey data sheets and an electronic file copy of the report (in Microsoft Word and Excel), to the City. AGA will also include in each copy of the speed survey report an 11" x 17" color Citywide Speed Zone Map, prepared in AutoCAD, which differentiates at a glance the different posted speeds on various segments of all streets surveyed; an 11x17" color Traffic Volume Map, prepared in AutoCAD, which differentiates at a glance the different volumes on various segments of all streets surveyed; and a draft of a new section of the City of Garden Grove Municipal Code which established speed limits on certain streets. A sample color Speed Zone Map is presented in **Appendix C**, and a sample color Traffic Volume Map is presented in **Appendix D**.

All deliverables listed in the City's RFP and previously identified in various tasks will be provided.

### *Task 9 – Presentation*

AGA will make one presentation to the City Traffic Commission and one presentation to the City Council regarding the results of the Citywide Speed Zone Survey. Mr. Miller will make the presentation and answer any questions that Commission/Council members may have. Mr. Miller has made similar presentations to many Traffic and Planning Commissions and City Councils regarding not only speed survey issues, but also a wide range of various neighborhood traffic issues. As City Traffic Engineer for the City of Fullerton for the past fifteen years, Mr. Miller has made many such presentations.

### *Optional Task – Sketches for Sign Changes*

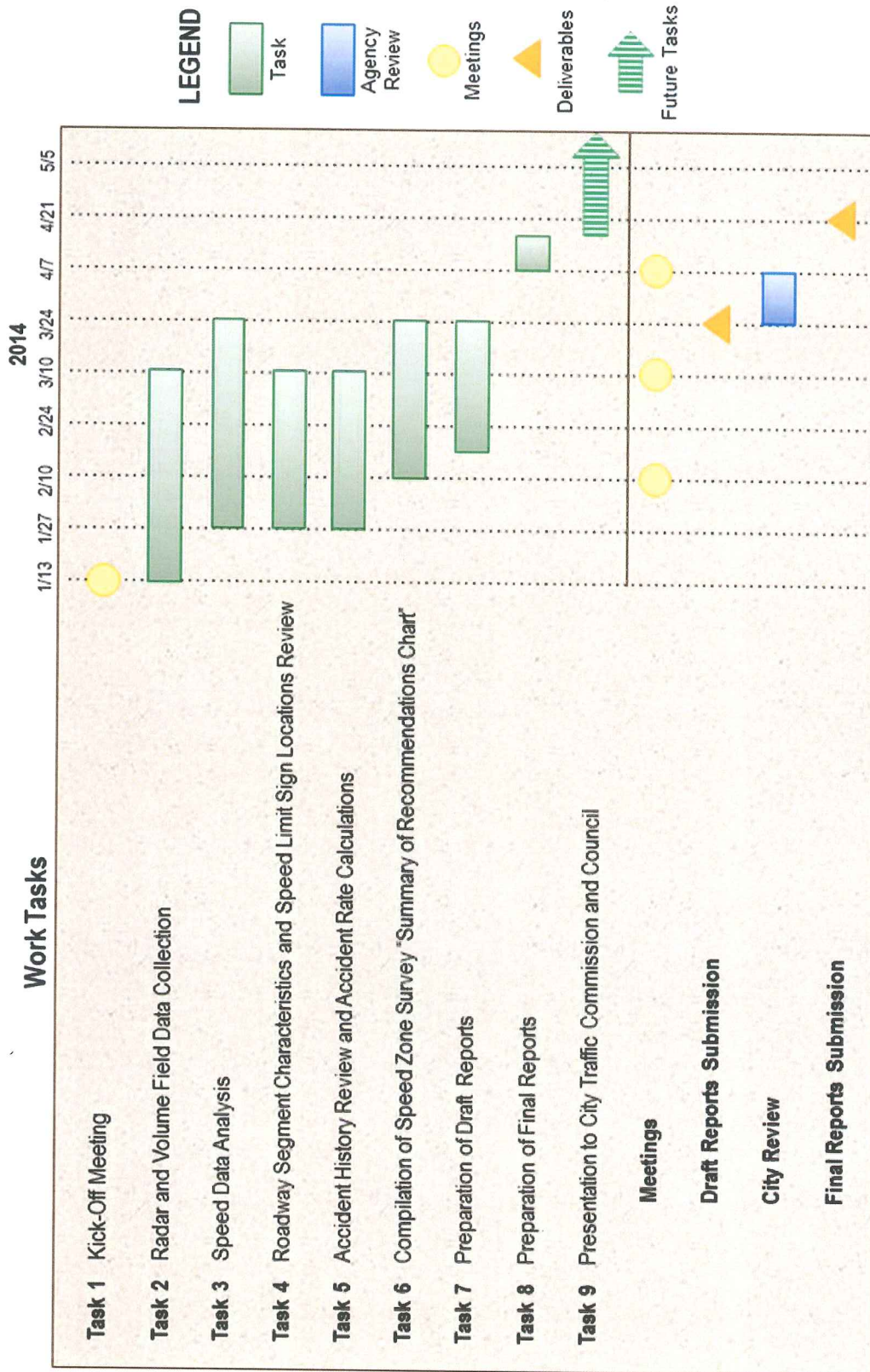
Based on the results of the field review, there may be a need to relocate various speed limit signs throughout the City. For all locations requiring changes, AGA will identify each proposed new sign location at a specific distance from the nearest curb extension; indicate if the sign is new, a replacement and/or removal; if a new sign only or new sign and post will be required; and prepare an 8½" x 11" sketch depicting the above information.

## **Project Schedule**

Pursuant to discussions with City staff, the project schedule, as shown in **Figure 2**, has been prepared considering all the requirements for the study in estimating the time required to complete the project. It is assumed that project kick-off will occur in January 2014. AGA has adequate staff resources to provide Draft Reports to the City of Garden Grove within ten weeks from the date of notification to proceed, and Final Reports to the City within two weeks of receipt of comments on the Draft Reports. The principal contact for this project for AGA will be Mark H. Miller, P.E., Project Manager. Mr. Miller will coordinate with the City prior to data collection to ensure that no planned construction work or other events will potentially impact the scheduled data collection.

An estimate of the number of hours each labor classification will expend in the preparation of the work product is presented in **Table 1 – Resource Requirements** as indicated in the Fee Proposal.





**FIGURE 2**  
**PROJECT SCHEDULE**

**A  
P  
P  
E  
N  
D  
I  
X  
  
A**

**Resumes of Key Personnel**



**MARK H. MILLER, P. E.  
EXECUTIVE VICE PRESIDENT**

**EDUCATION**

BS Civil/Traffic Engineering  
California Polytechnic University  
Pomona, 1974

Northwestern University  
Evanston, Illinois  
Traffic & Transportation Engineering  
Highway Capacity Workshop

Institute of Transportation Studies  
Safety Design and Operational Practices for  
Streets and Highways (FHWA)  
Traffic Signal Equipment & Operations  
Urban Street Design  
Public Works Inspections  
Legal Aspects and Liabilities  
Risk Management & Traffic Safety

**PROFESSIONAL ASSOCIATIONS**

American Public Works Association  
American Society of Civil Engineers  
City Traffic Engineers Association  
Institute of Transportation Engineers  
Orange County Traffic Engineering Council

**PROFESSIONAL REGISTRATION**

Registered Civil Engineer in California  
CE #40956  
Registered Traffic Engineer in California  
TE #1575  
Professional Traffic Operations Engineer  
PTOE #233

**PROFESSIONAL EXPERIENCE**

Mr. Miller joined Albert Grover & Associates in 1993 as Vice President, and provides the firm extensive experience in all phases of ITS design, signal interconnect and coordination plans, CCTV installations, traffic signal/signal system design, and street lighting evaluation and design. Mr. Miller began his consulting career with Mohle, Grover & Associates in January, 1990, as a senior engineer to provide professional traffic engineering and operations services. He is a registered Civil Engineer, Traffic Engineer, and Professional Traffic Operations Engineer with over thirty-five years' experience. This includes more than fifteen years serving as a City Traffic Engineer. Mr. Miller has managed many ITS, traffic signal and street light system projects. He has developed and implemented design standards, specifications and cost estimates for traffic signals, interconnect projects, CCTV projects, and street light projects. He also has experience in preparing traffic signal coordination and timing plans. Additionally, Mr. Miller has provided expert witness testimony on a variety of issues. He has served as both a member and the Chairman of the City Traffic Engineers Association (CTE) and, as such, has been instrumental in conducting workshops to educate Traffic Commissioners and Planning Commission from Cities throughout Southern California on various aspects of traffic engineering. Mr. Miller has provided on call as-needed traffic engineering services to the Cities of Cerritos, La Habra, Montclair, Torrance, and Victorville, and is serving as the Contract Traffic Engineer for the City of Fullerton (since 1998).

While employed as City Traffic Engineer for the City of Pomona, he was responsible for a \$3,000,000 operations and capital improvement budget, and managed 14 subordinates in the traffic engineering division. Mr. Miller has "hands on" experience with programming all models of traffic signal controllers. He has developed numerous traffic signal coordination and timing plans for use with a wide variety of central control and local controller software.

His experience also includes four years with the City of Pasadena as an Assistant Engineer in Traffic. He was responsible for the preparation and review of major transportation studies. He also assisted in the preparation and implementation of the Rose Bowl Major Event Traffic

and Parking Study, Madison Heights/Oakknoll Neighborhood Traffic Study, various bikeway studies, traffic control device inventories and traffic safety studies. He also developed a traffic accident recording system.

From 1979 to 1982, Mr. Miller was a Civil Engineer with the Illinois Department of Transportation. During this time, he worked in the Bureau of Traffic and the Bureau of Bridges. He had responsibility for establishing policies and contracts for maintenance of major interstate signing projects. He also managed various statewide hazard elimination safety projects. He was responsible for developing traffic signing and pavement marking standards for the Illinois Manual of Traffic Control Devices.

Mr. Miller's engineering experience began when he was an Engineering Assistant in the City of San Dimas, California, for two years. He was involved with the preparation and review and inspection of municipal street improvement projects. He managed a variety of pavement maintenance projects from major street reconstruction to slurry sealing. He performed various traffic engineering functions such as speed surveys, school zone signing, and signing and striping projects, in addition to a wide array of street lighting projects.

The following is a brief listing of specific consulting projects for which Mr. Miller has been responsible:

- ❖ Certification testing of various electronic equipment.
- ❖ Interconnect Analysis, Design and Coordination - Cities of Bakersfield, Cerritos, Chino, Colton, La Habra, Lancaster, Loma Linda, Montclair, Palm Springs, Pomona, Rialto, San Bernardino, Santa Clarita, Temecula, Upland, and Visalia.
- ❖ Multijurisdictional Traffic Signal Synchronization - S.C.A.Q.M.D and Orange County Growth Management Area No. 6.
- ❖ Various Traffic Signal Design, CCTV, Striping & Street Light Design Projects for Cities, Counties, and State.
- ❖ Montclair Plaza Traffic Operations Study - City of Montclair.
- ❖ Roadway Signal Improvements - Cities of Cerritos, Chino, Claremont, Cypress, Ontario, and Upland.
- ❖ Congestion Management Plan - City of Santa Ana.
- ❖ Bridge Design and Load Limit Determination, Statewide, State of Illinois.
- ❖ Annual Statewide Interstate Maintenance Signing Project, State of Illinois.
- ❖ Statewide Hazard Elimination Project for Narrow Bridges, State of Illinois.
- ❖ Identification of High Accident Locations - Cities of Downey, Inglewood and Pomona.
- ❖ Annual Citywide Pavement Maintenance Projects - City of San Dimas.
- ❖ Computerized Traffic Accident Record System - City of Pasadena.
- ❖ Annual Monitoring of Traffic Signal Timing - Cities of Colton, Fullerton, Loma Linda, Montclair, Palm Springs and Rialto.
- ❖ Speed Zone Surveys - Cities of Baldwin Park, Buena Park, Cathedral City, Cerritos, Chino, Cypress, Fountain Valley, Fullerton, Gardena, Hawthorne, Hermosa Beach, Huntington Park, La Habra, Lancaster, Long Beach, Norco, Ontario, Palm Springs, Pomona, San Dimas, San Marino, Santa Ana, Santa Clarita, Santa Fe Springs, Santa Monica, Torrance, and Yucaipa; California State Universities of Fullerton, Long Beach, and Los Angeles; and Antelope Valley Community College.
- ❖ School Safety Studies and Development of Safe Route to School Programs.

**PAPERS/PRESENTATIONS**

**“Three Year Experience with Flashing Yellow Arrow Display”**

Presented at ITE Annual Conference, Anaheim, California, August, 2008

**“Effectively Slowing Drivers – Speed Feedback Signs”**

Presented at ITE District 6 Annual Meeting, Honolulu, Hawaii, 2006

**“School Area Traffic Safety”**

Presented at City Traffic Engineers Traffic Commissioners Workshop, 2004

**“Quantifications of Air Quality Benefits Achieved Through Traffic Signal Coordination”**

Presented at ITE District 6 Annual Meeting, Salt Lake City, Utah, July 1997

**“A Successful Multijurisdictional Traffic Signal Coordination Project”**

Presented at ITE Annual Conference, Dana Point, California, March 1996

**“Minimize Delay Maximize Progression with Protected Permissive Lead/Lag Phasing”**

Presented at ITE Inland Empire Section Technical Workshop, December 1995

**“Microwave Traffic Signal Interconnect - A Viable Alternative to Land Lines”**

Presented at ITE District 6 Annual Meeting, Portland, Oregon, July 1994

(Best Paper Award)



**RUBEN PERALES, E.I.T.**  
**ASSOCIATE TRANSPORTATION ENGINEER**

**EDUCATION**

BS, Civil Engineering  
California State Polytechnic University  
Pomona, 2005

**PROFESSIONAL ASSOCIATIONS**

Institute of Transportation Engineers  
American Society of Engineers  
Orange County Traffic Engineering Council

**PROFESSIONAL EXPERIENCE**

Mr. Perales joined Albert Grover & Associates (AGA) in September 2005 as a Transportation Engineering Assistant. While with AGA, Mr. Perales has been working on conceptual improvement plans, intersection level of service analyses, signal design and signal modification plans, fiber optic communication plans, signal coordination plans, citywide speed surveys, signing & striping plans and street lighting. He has prepared plans for Caltrans, other government agencies such as the County of Los Angeles, City of Indio, City of Calimesa, City of Fullerton, and for various private developers such as Home Depot, Walmart, etc. He has conducted field topographic surveys required to develop design plans to improve intersection safety and update signal hardware to current standards. He is very familiar with AutoCAD, Microstation, Crossroads software and various Microsoft applications.

Mr. Perales had previously worked for the City of Upland Traffic Division for one and one half years. His experience there included preparing street improvement/striping/traffic control plans; initiating work orders for removal and installation of traffic signs; striping modifications; retrieval of accident reports and collision diagrams utilizing the Crossroads software program; setting up traffic counters and compiling the count data; calculating traffic volumes; conducting traffic signal warrant analyses; and providing "counter service."

The following is a brief listing of some of the projects on which Mr. Perales has been involved at AGA:

- ❖ City of Huntington Beach: Conducted Level of Service (LOS) analysis for the intersections of Brookhurst Street / Adams Avenue and Bushard Street / Adams Street to identify required geometric improvements at intersection to achieve an acceptable LOS. Prepared geometric conceptual plans, illustrating required improvements and impacts to adjacent properties.
- ❖ City of Indio: Conceptual roadway improvement plans, signing and striping plans, street lighting plans, traffic signal plans, and signal interconnect plans for Jackson Avenue/I-10 Freeway interchange, for Monroe Street/I-10 Freeway interchange, and a new shopping center at Jackson Avenue/Avenue 42. Flashing yellow arrow conversions at Oasis Street/Requa Avenue and Avenue 46/Clinton Street. Traffic signal plans at Jefferson Street/Highway 111 (intersection shared with City of La Quinta) and Highway 111/Shields Road.
- ❖ OCTA Chapman Avenue Traffic Light Synchronization Program (TLSP) Project: Intersection equipment upgrades for City of Garden Grove, City of Orange, Caltrans, and County of Orange for communication purposes. Fiber Optic Communication Plans and Specifications for City of Garden Grove. Intersection improvement plans for Caltrans to upgrade controllers and connect existing fiber for communication purposes.
- ❖ OCTA Orangethorpe Avenue TLSP Project: Intersection equipment upgrades for City of La Palma, City of Buena Park, City of Fullerton, City of Anaheim, City of Placentia, Caltrans, and County of Orange for communication purposes. Caltrans controller upgrades along with installation of GPS units and antenna at

various locations, and fiber integration to Caltrans TMC. Coordinated with each agency in applying for all required encroachment permits. Procurement of required equipment (controllers, GPS units, traffic signal cabinets, service cabinets, etc.) from different vendors and from Caltrans.

- ❖ Orange County Transportation Authority Bus Rapid Transit Project: Signal timing and coordination of 157 signals on three arterials (Harbor Blvd, Chapman Avenue and State College Boulevard) in the Cities of Brea, Fullerton, Anaheim, Garden Grove, Santa Ana, Fountain Valley and Costa Mesa.
- ❖ Orange County Transportation Authority Traffic Signal Synchronization Implementation Project: Implementation and monitoring of signals on three arterials (Harbor Blvd, Chapman Avenue, and State College Boulevard) in the Cities of Brea, Fullerton, Anaheim and Costa Mesa. Development of Traffic Signal Interconnect Plans for City of Costa Mesa along Harbor corridor, which included fiber optic cable installation and integration of fiber related equipment.
- ❖ Los Angeles County Traffic Signal Synchronization Projects: Traffic signal modifications along Artesia Boulevard, Wilmington Avenue, Vincent/Glendor/Hacienda Boulevard, and Studebaker Road.
- ❖ City of Buena Park: Field inventory of existing signal equipment in controller cabinets along Valley View Street, Knott Avenue, and La Palma Avenue to be utilized in signal synchronization project. Coordination with Caltrans for installation of GPS time source receiver unit at the Valley View Street/SR-91 Freeway interchange, which included Encroachment Permit application process.
- ❖ City of Calimesa: Traffic signal plan for Calimesa Boulevard at Myrtlewood Drive along with street lighting plans for Calimesa Boulevard.
- ❖ City of Carson: Traffic signal plans for various intersections including 223<sup>rd</sup> Street at Bonita Street and 223<sup>rd</sup> Street at the RV America Driveway.
- ❖ City of Costa Mesa: Traffic Signal System Master Plan detailing existing infrastructure and infrastructure required for the future. Identification of several corridors throughout the City that could potentially be funded by local grant money.
- ❖ City of Fullerton: Traffic signal plans for various intersections including Harbor Boulevard/Houston Street and Orangethorpe Avenue/Highland Avenue. Flashing yellow arrow conversions at several locations including Euclid Street/Malvern Street and Euclid Street/Commonwealth Avenue. Signal interconnect plans which include installation of wireless ethernet radios for communication purposes along Chapman Avenue.
- ❖ City of La Habra: Conceptual roadway improvement plans for Harbor Boulevard/Whittier Boulevard and Harbor Boulevard/Lambert Road to be used for grant applications.
- ❖ City of La Habra: Harbor Boulevard Fiberoptic Signal Interconnect Plans including design of CCTV camera installations along with integration in Traffic Management Center. Integration of fiber optic and wireless communications.
- ❖ City of Ontario: Traffic signal plans, signing and striping plans, street lighting plans, and signal interconnect plans for Home Depot on Euclid Avenue (SR-83)/Riverside Drive.
- ❖ City of Palm Springs: Traffic signal plans, signing and striping plans, and signal interconnect plans for Home Depot at Gene Autry Trail and Ramon Rd.

- ❖ City of Placentia: Local Signal Synchronization Plan for Rose Drive corridor. Traffic signal cabinet inventory to identify required equipment upgrades along project corridor. Preparation of Citywide Traffic Signal System Map identifying existing signal interconnect, traffic signal cabinet and controller type.
- ❖ City of Redondo Beach: Signing and striping plans for Esplanade between Paseo de la Playa and Knob Hill Avenue. Included conceptual plans for several alternatives such as reverse angle parking and parallel parking with bike lanes and buffer zones.
- ❖ City of Seal Beach: Traffic signal modification, intersection equipment upgrade, and signal interconnect plans. GPS time source unit installation at three Caltrans intersections via Caltrans Encroachment Permit.
- ❖ City of Victorville: Traffic signal plan at Bear Valley Road/3<sup>rd</sup> Avenue. Conceptual roadway improvement plans for Bear Valley Road/I-15 Freeway interchange.
- ❖ Town of Yucca Valley: Traffic signal plans, signing and striping plans, signal interconnect plans and street lighting plans for Home Depot and Walmart along Twentynine Palms Hwy (SR-62).
- ❖ Citywide Traffic Engineering and Speed Surveys for the Cities of Palm Springs, Buena Park, Cerritos, Chino, Lancaster, Santa Ana, Long Beach, and Fountain Valley, many of which included Citywide Speed Zone Maps and Citywide Traffic Volume Maps.





## CHAD VEINOT, TSOS TRANSPORTATION ENGINEERING ASSOCIATE

### EDUCATION

Special Training in Traffic Engineering,  
Traffic Calming, Traffic Signal Timing  
University of California

Variety of Studies in Civil Engineering  
University of Prince Edward Island, PEI,  
Canada

### PROFESSIONAL ASSOCIATIONS

Institute of Transportation Engineers  
City Traffic Engineers Association  
Illuminating Engineering Society

### PROFESSIONAL CERTIFICATES

Traffic Signal Operations Specialist  
TSOS #136

### PROFESSIONAL EXPERIENCE

Mr. Veinot joined Albert Grover & Associates (AGA) in August 2004 as a Transportation Engineering Associate. While with AGA, Mr. Veinot has been responsible for an extensive range of projects, including both design related projects (CCTV designs, street lighting evaluations and design, signal designs, striping plans, interconnect plans, speed studies, etc.) and neighborhood traffic problem resolutions (cut through traffic, STOP sign requests, traffic calming issues, etc.).

Mr. Veinot has a wide range of traffic engineering and transportation planning experience, including both field and office activities. Mr. Veinot has reviewed and prepared traffic studies; evaluated traffic signal operations; analyzed neighborhood traffic problems, developed alternative solutions, and presented results to neighborhood groups; prepared and presented staff reports; conducted public meetings; performed construction inspection; and conducted several traffic engineering and transportation planning studies involving large-scale databases, including citywide speed survey projects. Mr. Veinot is also very familiar with the review/approval process for any State (Caltrans) and/or federally funded improvements relative to pedestrian access issues. Additionally, Mr. Veinot has served as a member, Secretary/Treasurer, and Chair of the City Traffic Engineers (CTE) Association. His involvement with CTE included conducting

workshops to educate Traffic Commissioners and Planning Commissioners of cities throughout Southern California on various aspects of Traffic Engineering.

Mr. Veinot had previously worked for the City of Glendora Traffic Division for two and a half years. His experience there included signal/striping/lighting design and PS&E preparation; neighborhood traffic calming studies; speed surveys; intersection capacity analysis; timing plan development and implementation; signal system monitoring; traffic impact analysis; and providing "counter service," which he has done not only in Glendora, but also for cities where AGA is under contract as the on-site Consultant Traffic Engineer.

Following is a listing of some of AGA's projects on which Mr. Veinot has been involved:

- ❖ City of Beverly Hills: Developed street lighting plans for the commercial areas including Wilshire Boulevard, Robertson Boulevard, La Cienega Boulevard, Beverly Drive, and Olympic Boulevard.
- ❖ California State University, Fullerton: Developed parking lot design and lighting design.
- ❖ City of Cerritos: Various projects including new traffic signal plans; traffic signal modification plans; In-Roadway Warning Light designs; parking lot designs; street and parking lot lighting design layouts; pedestrian and school area studies; Citywide Bikeway Map.
- ❖ City of Cypress: Citywide Safe Route to School Maps; crosswalk evaluations; adult crossing guard studies; signal warrant evaluations.

- ❖ City of Torrance: Conducted nighttime street lighting evaluations; developed Citywide plans for retrofit of safety lighting at intersections; developed parking lot lighting plans; prepared signal modification plans for conversion to protected/permissive left turn phasing utilizing Flashing Yellow Arrow (FYA); prepared and submitted Caltrans Permit Applications.
- ❖ City of Huntington Beach: Various projects including both design and checking of traffic signal plans; preparation of In-Roadway Warning Light designs; development of Traffic Signal Priority List.
- ❖ City of Claremont: Developed flashing beacon layouts; signing and striping plans.
- ❖ City of Compton: Developed Citywide street lighting plans and street lighting modification plans.
- ❖ City of Costa Mesa: Developed Citywide Suggested Route to School maps.
- ❖ Fullerton Joint Union High School District: Various school area studies and circulation designs.
- ❖ City of Fullerton: Various projects including new traffic signal plans; traffic signal modification plans; closed circuit video design; corridor signal timing upgrades; Traffic Signal Priority List; signing and striping plans; special event traffic control plans; conceptual roadway improvement plans; Caltrans Encroachment Permit applications; OCTA Grant applications.
- ❖ City of West Hollywood: Developed striping and traffic signal modification plans for Sunset Boulevard.
- ❖ City of Hermosa Beach: Developed traffic control plans for special events including AVP Volleyball and St. Patrick's Day Parade.
- ❖ City of Montclair: Various projects including new traffic signal plans; traffic signal modification plans; school area studies; signing and striping plans; traffic signal and pedestrian warrants.
- ❖ Pomona Unified School District: Prepared school area studies and developed designs to improve circulation.
- ❖ City of San Dimas: Prepared Suggested Route to School grant application and designed updated school area signing and speed feedback signs.
- ❖ City of Huntington Park: Prepared signal warrant analysis and developed traffic signal plans.
- ❖ City of Big Bear Lake: Developed traffic signal plans and prepared Caltrans Permit Applications for Big Bear Boulevard (SR-18) at Paine Road.
- ❖ City of Brea: Developed street lighting plans and median up-lighting designs.
- ❖ City of La Habra: Successful grant applications for SIP and IIP programs through OCTA.
- ❖ City of Corona: Developed Citywide Bicycle Route Improvement Plans.
- ❖ City of Long Beach: Bikeway signing and striping designs; signal modification designs; median beautification projects.
- ❖ Orange County Great Park: Promenade and parking lot lighting designs.
- ❖ City of Seal Beach: Signal warrant analyses; conceptual ingress/egress modifications for Leisure World; traffic control plans for annual special events.
- ❖ University of La Verne: Analysis for street vacation.

#### **PAPERS/PRESENTATIONS**

**“Effectively Slowing Drivers – Speed Feedback Signs”**

Presented at ITE District 6 Annual Meeting, Honolulu, Hawaii, 2006

**“Pedestrian Countdown Heads – The Final Countdown”**

Presented at ITE District 6 Annual Meeting, Honolulu, Hawaii, 2006

**“Moderator and Chair”**

City Traffic Engineers Traffic Commissioner's Workshop, 2006

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B**

**Sample Engineering and  
Traffic Survey Report**

**CITYWIDE SPEED ZONE SURVEY  
ENGINEERING AND TRAFFIC SURVEYS**

*IN THE*

**CITY OF GARDEN GROVE**

**2010**

*Prepared for*

**CITY OF GARDEN GROVE**

February 2010



TRAFFIC No. 1575

*Submitted by*

**ALBERT  
GROVER &  
ASSOCIATES**

TRANSPORTATION CONSULTING ENGINEERS

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### APPENDIX

- A Speed Zoning Regulations from Caltrans MUTCD 2003 California Supplement “Traffic Manual” and Definitions of Terms
- B Regulations Governing Speed Limits (Excerpts from California Vehicle Code)
- C Citywide Speed Zone Map
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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 City of Garden Grove arterial and secondary arterial 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, the time span can be extended up to seven to ten years depending on specific criteria. These changes are 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 the City records, the last speed zone surveys were conducted in 2001. The current study will verify, increase or decrease existing speed limits within the City of Garden Grove based on the data and the results of this survey.

At 142 locations on the City's arterial and secondary arterial street 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 (MUTCD). Sections of the 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 Transportation Studies Inc. (TSI), a subconsultant to Albert Grover and Associates (AGA). The streets were driven by a California registered traffic engineer from AGA.

## **SECTION 2.0**

### **STUDY METHODOLOGY**

The study involved three major categories of data 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 secondary arterial 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 142 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 secondary arterial 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, 2005 thru December 31, 2006 (2 years) for each roadway segment. The accident rate was calculated and considered in recommending the speed limit.

## SECTION 3.0

### SURVEY RESULTS

#### 3.1 Street Surveillance

“Speed Limit and Zones,” Section 2B.116 of the California MUTCD 2003 California Supplement, 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 (Appendix A).

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 speed zone spot survey data forms in Appendix C.

#### 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, 2005 thru December 31, 2006, 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 Traffic Survey Summary (Appendix B). 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.



*Accident Rate Calculation:*

The rate was calculated using the following equation:

$$\text{Accident Rate} = \frac{\text{Number of Midblock accidents per year} \times 10^6}{24\text{-hour volume} \times 365 \times \text{segment length} \times 2 \text{ years}}$$

Where: Number of mid-block accidents per year based on one year (January 1, 2005 thru December 31, 2006), 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:

$$\begin{aligned} \text{Accident Rate} &= \frac{1 \times 10^6 (11)}{21,678 \times 0.50 \times 365 \times 2} \\ &= \mathbf{1.38 \text{ accidents per million vehicle miles (A/MVM)}} \end{aligned}$$

The Average Expected Accident Rate for the segment is 2.30. The calculated accident rate of 1.38 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 or near the 85th percentile speed recorded for the surveyed segment and not below the 50<sup>th</sup> percentile. 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 contains the spot speed survey data sheets for each of the 142 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.

**City of Garden Grove**  
**Table 1: 2008 Speed Zone Survey - Accident Survey Analysis**

Street	No.	Location	Distance (mile)	Distance (feet)	ADT	Accidents <sup>1</sup> 2 yrs Total	Accident Rate	Expected <sup>2</sup> Acc. Rate
Brookhurst Street	1	Hazard Avenue to Westminster Avenue	0.50	2,662	47,954	10	0.57	2.30
	2	Westminster Avenue to Trask Avenue	0.50	2,637	49,622	16	0.88	2.30
	3	Trask Avenue to Garden Grove Boulevard	0.50	2,641	44,172	9	0.56	2.30
	4	Garden Grove Boulevard to Lampson Avenue	0.56	2,933	37,036	9	0.60	2.30
	5	Lampson Avenue to Chapman Avenue	0.50	2,649	36,092	3	0.23	2.30
	6	Chapman Avenue to Orangewood Avenue	0.50	2,665	31,697	4	0.34	2.30
	7	Orangewood Avenue to Katella Avenue	0.50	2,640	32,713	6	0.50	2.30
Brookhurst Way	8	Stanford Avenue to Garden Grove Boulevard	0.25	1,326	3,061	8	14.26	1.98
Dale Street	9	Garden Grove Boulevard to Lampson Avenue	0.50	2,657	10,076	6	1.62	1.98
	10	Lampson Avenue to Chapman Avenue	0.41	2,149	10,011	2	0.67	1.98
	11	Chapman Avenue to Orangewood Avenue	0.50	2,645	9,356	3	0.88	1.98
	12	Orangewood Avenue to Katella Avenue	0.50	2,658	11,114	4	0.98	1.98
Euclid Street	13	Westminster Avenue to Trask Avenue	0.50	2,656	46,566	17	0.99	2.30
	14	Trask Avenue to Garden Grove Boulevard	0.50	2,656	37,530	10	0.73	2.30
	15	Garden Grove Boulevard to Lampson Avenue	0.56	2,944	32,930	5	0.37	2.30
	16	Lampson Avenue to Chapman Avenue	0.50	2,632	36,343	4	0.30	2.30
	17	Chapman Avenue to Orangewood Avenue	0.50	2,635	29,769	7	0.65	2.30
	18	Orangewood Avenue to Katella Street	0.50	2,640	32,765	9	0.75	2.30
Gilbert Street	19	Garden Grove Boulevard to Lampson Avenue	0.50	2,656	8,662	0	0.00	1.98
	20	Lampson Avenue to Chapman Avenue	0.50	2,648	9,829	1	0.28	2.98
	21	Chapman Avenue to Orangewood Avenue	0.48	2,555	11,349	1	0.25	3.55
	22	Orangewood Avenue to Katella Avenue	0.50	2,649	11,344	4	0.96	3.55
Harbor Boulevard	23	Westminster Avenue to Trask Avenue	0.50	2,653	53,334	13	0.66	2.30
	24	Trask Avenue to Garden Grove Boulevard	0.51	2,670	38,681	25	1.75	2.30
	25	Garden Grove Boulevard to Lampson Avenue	0.66	3,508	32,817	7	0.44	2.30
	26	Lampson Avenue to Chapman Avenue	0.49	2,613	28,292	12	1.17	2.30
	27	Chapman Avenue to Wilken Way (north city limits)	0.29	1,509	28,866	1	0.17	2.30
Haster Street	28	Garden Grove Boulevard to Lampson Avenue	0.50	2,656	21,621	9	1.13	2.30
	29	Lampson Avenue to Chapman Avenue	0.50	2,656	17,082	14	2.23	3.55
	30	Chapman Avenue to Simmons Avenue (north city limits)	0.50	2,656	11,913	4	0.91	3.55
Knott Street	31	Garden Grove Boulevard to Lampson Avenue	0.59	3,089	36,393	15	0.97	2.30
	32	Lampson Avenue to Chapman Avenue	0.50	2,648	28,736	2	0.19	2.30
	33	Chapman Avenue to Orangewood Avenue	0.51	2,678	27,299	7	0.69	3.55
	34	Orangewood Avenue to Patterson Drive (north city limits)	0.19	987	29,880	0	0.00	3.55
Magnolia Street	35	Westminster Avenue to Trask Avenue	0.50	2,645	41,092	10	0.67	2.30
	36	Trask Avenue to Garden Grove Boulevard	0.58	3,058	23,640	13	1.30	3.55
	37	Garden Grove Boulevard to Lampson Avenue	0.50	2,651	26,531	5	0.51	2.30
	38	Lampson Avenue to Chapman Avenue	0.50	2,647	22,480	5	0.61	2.30
	39	Chapman Avenue to Orangewood Avenue	0.50	2,655	16,685	6	0.98	3.55
	40	Orangewood Avenue to Katella Avenue	0.50	2,656	16,155	5	0.84	2.30
Main Street	41	Garden Grove Boulevard to Acacia Parkway	0.50	2,656	3,944	2	1.38	1.98
	42	Acacia Parkway to College Street	0.30	1,604	6,240	5	3.61	1.98
Nelson Street	43	Garden Grove Boulevard to Stanford Avenue	0.25	1,326	7,982	1	0.68	2.30
Newhope Street	44	Westminster Avenue to Trask Avenue	0.50	2,656	27,756	6	0.59	2.30
	45	Trask Avenue to Garden Grove Boulevard	0.50	2,656	16,020	7	1.19	2.30
Newland Street	46	Westminster Avenue to Trask Avenue	0.50	2,647	19,401	4	0.56	2.30
	47	Trask Avenue to Garden Grove Boulevard	0.50	2,642	15,515	7	1.24	1.98
Ninth Street	48	Garden Grove Boulevard to Lampson Avenue	0.50	2,656	8,585	5	1.59	1.98
	49	Lampson Avenue to Chapman Avenue	0.50	2,656	8,091	1	0.34	1.98
	50	Chapman Avenue to Orangewood Avenue	0.50	2,656	6,371	1	0.43	1.98
Nutwood Street	51	Garden Grove Boulevard to Lampson Avenue	0.50	2,655	6,195	1	0.44	1.98
	52	Lampson Avenue to Chapman Avenue	0.50	2,635	4,920	4	2.23	1.98

<sup>1</sup> Accident Data from 1-05 to 12-06

<sup>2</sup> Source: City of Garden Grove Crossroads Program

**City of Garden Grove**  
**Table 1: 2008 Speed Zone Survey - Accident Survey Analysis**

Street	No.	Location	Distance (mile)	Distance (feet)	ADT	Accidents <sup>1</sup> 2 yrs Total	Accident Rate	Expected <sup>2</sup> Acc. Rate
Springdale Street	53	Garden Grove Boulevard to Lampson Avenue	0.50	2,634	12,067	0	0.00	3.55
	54	Lampson Avenue to Chapman Avenue	0.51	2,686	11,522	1	0.23	3.55
	55	Chapman Avenue to Santa Catalina Avenue (north city limits)	0.23	1,200	7,077	0	0.00	3.55
West Street	56	Garden Grove Boulevard to Lampson Avenue	0.50	2,656	13,728	3	0.60	3.55
	57	Lampson Avenue to Chapman Avenue	0.50	2,656	10,704	3	0.76	3.55
	58	Chapman Avenue to Orangewood Avenue	0.50	2,656	12,055	3	0.68	3.55
	59	Orangewood Avenue to Ricky Avenue (north city limits)	0.50	2,656	11,972	0	0.00	3.55
Western Avenue	60	Garden Grove Boulevard to Lampson Avenue	0.50	2,661	15,796	1	0.17	3.55
	61	Lampson Avenue to Chapman Avenue	0.50	2,647	15,704	4	0.70	2.30
	62	Chapman Avenue to Orangewood Avenue	0.50	2,645	18,852	1	0.15	2.30
	63	Orangewood Avenue to Lincoln Way (north city limits)	0.19	993	20,153	0	0.00	2.30
Valley View Street	64	Garden Grove Boulevard to Lampson Avenue	0.76	3,992	54,016	3	0.10	2.30
	65	Lampson Avenue to Chapman Avenue	0.46	2,443	50,973	10	0.58	2.30
	66	Chapman Avenue to Santa Catalina Ave (north city limits)	0.23	1,189	51,838	4	0.47	2.30
Century Boulevard	67	Garden Grove Boulevard to Euclid Street	0.50	2,640	12,180	0	0.00	2.30
Chapman Avenue	68	Bailey Street to Valley View Street	0.22	1,154	6,239	4	4.02	2.30
	69	Valley View Street to Springdale Street	0.50	2,641	11,512	1	0.24	2.30
	70	Springdale Street to Knott Street	0.50	2,642	11,322	1	0.24	2.30
	71	Knott Street to Western Avenue	0.55	2,914	16,437	4	0.60	2.30
	72	Western Avenue to Santa Paula Street (mid-east city limits)	0.42	2,221	19,340	1	0.17	2.30
	73	Briarwood Street (mid-west city limits) to Magnolia Street	0.63	3,303	18,747	3	0.35	3.55
	74	Magnolia Street to Gilbert Street	0.46	2,434	19,660	7	1.06	2.30
	75	Gilbert Street to Brookhurst Street	0.50	2,644	23,215	7	0.82	2.30
	76	Brookhurst Street to Nutwood Street	0.50	2,656	24,286	4	0.45	2.30
	77	Nutwood Street to Euclid Street	0.50	2,656	21,918	8	0.99	2.30
	78	Euclid Street to Ninth Street	0.50	2,656	23,927	5	0.57	2.30
	79	Ninth Street to West Street	0.50	2,656	20,731	1	0.13	3.55
	80	West Street to Harbor Boulevard	0.50	2,656	21,678	11	1.38	2.30
	81	Harbor Boulevard to Haster Street	0.50	2,656	29,392	5	0.46	2.30
82	Haster Street to Lewis Street	0.50	2,656	26,996	9	0.91	2.30	
Garden Grove Boulevard	83	Knott Street to Western Avenue	0.35	1,829	27,672	2	0.29	2.30
	84	Western Avenue to Beach Boulevard	0.49	2,607	18,675	2	0.30	2.30
	85	Beach Boulevard to Dale Street	0.51	2,685	25,066	11	1.18	2.30
	86	Dale Street to Magnolia Street	0.50	2,652	24,509	7	0.78	2.30
	87	Magnolia Street to Gilbert Street	0.48	2,510	19,387	11	1.64	2.30
	88	Gilbert Street to Brookhurst Street	0.69	3,619	23,596	5	0.42	2.30
	89	Brookhurst Street to Nelson Street	0.50	2,656	20,699	8	1.05	2.30
	90	Nelson Street to Euclid Street	0.50	2,656	18,671	12	1.75	2.30
	91	Euclid Street to Newhope Street	0.50	2,656	22,119	3	0.37	2.30
	92	Newhope Street to Harbor Boulevard	0.50	2,656	22,666	15	1.80	2.30
	93	Harbor Boulevard to Haster Street	0.50	2,656	27,073	26	2.62	2.30
	94	Haster Street to Lewis Street	0.50	2,656	36,379	7	0.52	2.30
Hazard Avenue	95	Cork Street to Brookhurst Street	0.28	1,455	16,556	3	0.90	2.30
	96	Brookhurst Street to Ward Street	0.50	2,656	13,458	2	0.40	3.55
	97	Ward Street to Euclid Street	0.50	2,656	12,665	1	0.22	1.98
Lampson Avenue	98	Manley Street (west city limits) to Valley View Street	0.68	3,586	12,305	6	0.98	2.30
	99	Valley View Street to Springdale Street	0.57	3,000	9,665	1	0.25	2.30
	100	Springdale Street to Knott Street	0.50	2,641	10,285	2	0.53	2.30
	101	Knott Street to Western Avenue	0.56	2,951	14,522	2	0.34	2.30
	102	Western Avenue to Santa Rosalia Street (mid-east city limits)	0.19	992	12,178	0	0.00	3.55
	103	San Marcos Drive (mid-west city limits) to Dale Street	0.36	1,927	12,419	1	0.30	1.98
	104	Dale Street to Magnolia Street	0.50	2,643	10,481	2	0.52	1.98
	105	Magnolia Street to Gilbert Street	0.46	2,447	8,992	1	0.33	1.98
	106	Gilbert Street to Brookhurst Street	0.50	2,655	8,256	0	0.00	1.98
	107	Brookhurst Street to Nutwood Street	0.50	2,656	8,242	4	1.32	1.98
	108	Nutwood Street to Euclid Street	0.50	2,656	6,947	4	1.57	1.98
	109	Euclid Street to Ninth Street	0.50	2,656	7,214	1	0.38	1.98

<sup>1</sup> Accident Data from 1-05 to 12-06

<sup>2</sup> Source: City of Garden Grove Crossroads Program

**City of Garden Grove**  
**Table 1: 2008 Speed Zone Survey - Accident Survey Analysis**

Street	No.	Location	Distance (mile)	Distance (feet)	ADT	Accidents <sup>1</sup> 2 yrs Total	Accident Rate	Expected <sup>2</sup> Acc. Rate
Lampson Ave. Cont.	110	Ninth Street to West Street	0.50	2,656	7,488	0	0.00	1.98
	111	West Street to Harbor Boulevard	0.50	2,656	8,309	2	0.66	1.98
	112	Harbor Boulevard to Haster Street	0.50	2,656	11,570	10	2.35	1.98
	113	Haster Street to Lewis Street	0.50	2,656	8,106	2	0.67	1.98
Orangewood Avenue	114	Knott Street to Western Avenue	0.54	2,877	7,506	0	0.00	1.98
	115	Jane Way (mid-west city limits) to Dale Street	0.32	1,687	7,583	0	0.00	1.98
	116	Dale Street to Magnolia Street	0.50	2,635	6,046	0	0.00	1.98
	117	Magnolia Street to Gilbert Street	0.46	2,445	6,142	1	0.48	2.30
	118	Gilbert Street to Brookhurst Street	0.51	2,667	6,342	1	0.43	1.98
	119	Brookhurst Street to Palmwood Drive	0.50	2,656	6,842	4	1.59	3.55
	120	Palmwood Drive to Euclid Street	0.50	2,656	8,127	0	0.00	3.55
	121	Ninth Street to West Street	0.50	2,656	9,334	0	0.00	1.98
	122	West Street to Eugene Street (east city limits)	0.50	2,656	6,271	0	0.00	1.98
Trask Avenue	123	Beach Boulevard to Newland Street	0.51	2,706	11,000	0	0.00	3.55
	124	Newland Street to Magnolia Street	0.50	2,641	10,990	3	0.75	3.55
	125	Magnolia Street to Galway Street	0.53	2,795	12,927	4	0.80	2.30
	126	Galway Street to Brookhurst Street	0.48	2,510	12,952	3	0.67	2.30
	127	Brookhurst Street to Benton Street	0.50	2,656	12,106	3	0.67	2.30
	128	Benton Street to Euclid Street	0.50	2,656	12,740	3	0.64	2.30
	129	Euclid Street to Newhope Street	0.50	2,656	14,623	5	0.93	2.30
	130	Newhope Street to Harbor Boulevard	0.50	2,656	11,255	8	1.94	3.55
	131	Harbor Boulevard to Clinton Street	0.50	2,656	14,626	12	2.23	2.30
	132	Clinton Street to Fairview Street	0.50	2,656	7,879	3	1.04	1.98
Westminster Avenue	133	Newland Street to Magnolia Street	0.34	1,820	27,300	1	0.15	2.30
	134	Magnolia Street to Bushard Street	0.50	2,662	26,683	6	0.61	2.30
	135	Bushard Street to Brookhurst Street	0.50	2,656	33,109	22	1.81	2.30
	136	Brookhurst Street to Bowen Street	0.43	2,251	27,642	12	1.39	2.30
	137	Bowen Street to Euclid Street	0.57	3,006	23,662	13	1.32	2.30
	138	Euclid Street to Newhope Street	0.50	2,642	22,403	0	0.00	2.30
	139	Newhope Street to Harbor Boulevard	0.50	2,642	23,870	2	0.23	2.30
	140	Harbor Boulevard to Clinton Street	0.50	2,642	29,651	1	0.09	2.30
141	Clinton Street to Buena Street (east city limits)	0.22	1,155	22,851	4	1.10	2.30	
Palm Street	142	Harbor Boulevard to Garden Grove Boulevard	0.50	2,656	4,961	2	1.10	1.98

<sup>1</sup> Accident Data from 1-05 to 12-06

<sup>2</sup> Source: City of Garden Grove Crossroads Program

## 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 A, 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
- ◆ Superelevation
- ◆ Grades
- ◆ Shoulder condition
- ◆ Profile condition
- ◆ Intersection spacing offsets
- ◆ Commercial driveway characteristics (land use)
- ◆ Pedestrian traffic with and without sidewalks
- ◆ Pedestrian and Bicycle safety

The above factors for each roadway segment surveyed are listed on the spot speed survey data forms in Appendix C. 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. Table 2 shows the surveyed road segments with posted and recommended speed limits, including any increases or decreases.

#### 4.1 Speed Limit Signing

All California motorists are required to know the basic 15, 25, and 55 MPH speed laws and are tested on the subject when applying for a driver's license. 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.

Table 2: Segment Spot Speed Survey 2008

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	N/S	7/14/2008	25-34	83.3	29.0	33.0	40	40	No change, 45mph in Westminster
	2	N/S	7/14/2008	25-34	92.1	29.0	32.0	40	40	No change
	3	N/S	7/11/2008	36-45	78.0	42.0	45.0	40	45	Increase, 85th percentile, low accident rate
	4	N/S	7/11/2008	36-45	75.4	42.0	46.0	40	45	Increase, 85th percentile, low accident rate
	5	N/S	7/11/2008	43-52	80.7	46.0	50.0	45	45	No change
	6	N/S	7/11/2008	39-48	73.1	45.0	50.0	45	45	No change, 85th percentile, low accident rate
	7	N/S	7/11/2008	41-50	81.1	45.0	49.0	45	45	No change, 85th percentile, low accident, 40 mph Anaheim
Brookhurst Way	8	N/S	7/11/2008	24-33	91.5	26.0	29.0	25	25	Local Street
Dale Street	9	N/S	7/9/2008	29-38	91.2	34.0	37.0	35	35	No change
	10	N/S	7/9/2008	32-41	87.1	37.0	40.0	35	35	No change, 85th percentile, low accident rate
	11	N/S	7/10/2008	32-41	87.0	36.0	39.0	35	35	No change, 85th percentile, low accident rate
	12	N/S	7/10/2008	33-42	87.1	37.0	41.0	35	35	No change, 85th percentile, low accident, 35 mph Anaheim
Euclid Street	13	N/S	7/24/2008	35-44	84.3	40.0	44.0	40	40	No change, 85th percentile, low accident rate, 40 mph Santa Ana
	14	N/S	7/24/2008	35-44	80.1	40.0	43.0	40	40	No change, 85th percentile, low accident rate, continuity of speed
	15	N/S	7/25/2008	35-44	85.8	40.0	44.0	40	40	No change, 85th percentile, low accident rate
	16	N/S	7/25/2008	38-47	77.3	42.0	47.0	40	40	No change, 85th percentile, low accident rate
	17	N/S	7/25/2008	36-45	88.2	40.0	44.0	40	40	No change, 85th percentile, low accident rate, continuity of speed
	18	N/S	7/25/2008	36-45	92.5	40.0	43.0	40	40	No change, 85th percentile, low accident, 40 mph Anaheim
Gilbert Street	19	N/S	7/11/2008	26-35	39.0	31.0	39.0	25	30	Increase, 85th percentile, low accident, continuity of speed
	20	N/S	7/11/2008	23-32	87.1	27.0	30.0	25	30	Increase, 85th percentile, low accident rate
	21	N/S	7/11/2008	32-41	80.8	36.0	41.0	35	35	No change, 85th percentile, low accident rate
	22	N/S	7/11/2008	33-42	76.0	35.0	40.0	35	35	No change, 85th percentile, low accident, 35 mph Anaheim
Harbor Boulevard	23	N/S	7/23/2008	35-44	80.9	40.0	44.0	40	40	No change, 85th, low accident, continuity, 45 mph Santa Ana
	24	N/S	7/23/2008	33-42	81.3	38.0	41.0	40	40	No change
	25	N/S	7/23/2008	33-42	79.7	38.0	42.0	40	40	No change
Haster Street	26	N/S	7/23/2008	35-44	83.3	39.0	42.0	40	40	No change
	27	N/S	7/23/2008	36-45	81.2	40.0	45.0	40	40	No change, continuity of speed, 40 mph in Anaheim
	28	N/S	7/22/2008	35-44	82.9	40.0	43.0	40	40	No change, 85th percentile, low accident rate, continuity of speed
Knott Street	29	N/S	7/22/2008	36-45	84.3	40.0	44.0	40	40	No change, 85th percentile, low accident rate, continuity of speed
	30	N/S	7/23/2008	36-45	87.5	40.0	44.0	40	40	No change, continuity of speed, 40 mph in Anaheim
	31	N/S	7/7/2008	35-44	83.2	40.0	44.0	40	40	No change, 85th percentile, low accident, 40 mph Cypress
Magnolia Street	32	N/S	7/7/2008	36-45	89.4	40.0	44.0	40	40	No change, 85th percentile, low accident rate, continuity of speed
	33	N/S	7/7/2008	35-44	83.3	41.0	45.0	40	40	No change, 85th percentile, low accident rate, continuity of speed
	34	N/S	7/7/2008	36-45	85.7	41.0	45.0	40	40	No change, 85th percentile, low accident, 40 mph Anaheim
	35	N/S	7/10/2008	37-46	87.4	41.0	45.0	40	40	No change, 85th, low accident, 45 mph Westminster, continuity
	36	N/S	7/10/2008	31-40	85.5	36.0	39.0	35	40*	Increase, 85th percentile, low accident rate
	37	N/S	7/10/2008	36-45	86.8	40.0	44.0	40	40	No change, 85th percentile, low accident rate
	38	N/S	7/10/2008	37-46	84.4	41.0	45.0	40	40	No change, 85th percentile, low accident rate
	39	N/S	7/10/2008	36-45	87.1	41.0	45.0	40	40	No change, 85th percentile, low accident rate
40	N/S	7/10/2008	36-45	87.7	40.0	44.0	40	40*	No change, 40 mph Anaheim	
Main Street	41	N/S	7/24/2008	19-Oct	100.0	14.0	16.0	15	25	Increase
	42	N/S	7/25/2008	23-32	91.0	26.0	30.0	25	25	No change, 85th percentile, low accident rate
Nelson Street	43	N/S	7/24/2008	25-34	86.9	30.0	32.0	30	30	No change
Newhope Street	44	N/S	7/23/2008	31-40	78.2	35.0	39.0	35	35	No change, 85th percentile, low accident, 40 mph Santa Ana
	45	N/S	7/23/2008	28-37	85.8	32.0	36.0	35	35*	No change



**Table 2: Segment Spot Speed Survey 2008**

		Page 2 of 3									
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	
Newland Street	46	N/S	7/10/2008	36-45	78.4	41.0	45.0	40	40	No change, low accident rate, 40 mph in Westminster	
	47	N/S	7/10/2008	34-43	80.6	39.0	42.0	40	40	No change	
Ninth Street	48	N/S	7/24/2008	30-39	90.1	34.0	38.0	35	35	No change, 85th percentile, low accident	
	49	N/S	7/24/2008	29-38	82.2	34.0	38.0	35	35	No change, 85th percentile, low accident	
	50	N/S	7/24/2008	30-39	87.7	35.0	38.0	35	35*	No change, 85th percentile, low accident rate, 35 mph in Anaheim	
Nutwood Street	51	N/S	7/25/2008	29-38	83.6	35.0	38.0	35	35	No change, low accident rate, continuity of speed	
	52	N/S	7/25/2008	28-37	84.4	34.0	36.0	35	35	No change	
Springdale Street	53	N/S	7/7/2008	30-39	75.4	35.0	40.0	35	35	No change, 85th percentile, low accident, 35 mph Westminster	
	54	N/S	7/7/2008	30-39	79.4	36.0	39.0	35	35	No change, 85th percentile, low accident rate, continuity of speed	
	55	N/S	7/7/2008	30-39	77.9	35.0	40.0	35	35	No change, 85th percentile, low accident rate, 35 mph Cypress	
West Street	56	N/S	7/23/2008	32-41	79.5	36.0	40.0	35	35	No change, 85th percentile, low accident rate	
	57	N/S	7/24/2008	34-43	82.4	37.0	41.0	35	35	No change, 85th percentile, low accident rate	
	58	N/S	7/24/2008	30-39	85.6	35.0	39.0	35	35	No change, 85th percentile, low accident rate	
	59	N/S	7/24/2008	34-43	80.1	39.0	42.0	40	40	No change, 40 mph in Anaheim	
	60	N/S	7/8/2008	37-46	81.9	41.0	46.0	40	45	Increase, 85th percentile, low accident rate	
Western Avenue	61	N/S	7/8/2008	39-48	82.0	45.0	48.0	45	45	No change, continuity of speed	
	62	N/S	7/8/2008	39-48	80.3	44.0	48.0	45	45	No change, continuity of speed	
	63	N/S	7/8/2008	35-44	87.6	40.0	44.0	40	40	No change, 85th percentile, low accident, 40 mph Anaheim	
Valley View Street	64	N/S	7/7/2008	39-48	78.2	44.0	48.0	45	45	No change, continuity of speed, 45 mph in Westminster	
	65	N/S	7/7/2008	37-46	78.1	41.0	45.0	40	45	Increase, 85th percentile, low accident rate	
	66	N/S	7/7/2008	37-46	78.8	41.0	45.0	40	45	Increase, 85th percentile, low accident, 45 mph Cypress	
Century Boulevard	67	N/S	7/25/2008	34-43	79.8	39.0	42.0	40	40	No change	
Chapman Avenue	68	E/W	7/9/2008	20-29	89.3	25.0	29.0	25	25	No change, high accident rate (local street)	
	69	E/W	7/9/2008	42-51	88.9	46.0	49.0	45	45	No change, continuity of speed	
	70	E/W	7/9/2008	40-49	85.9	45.0	48.0	45	45	No change, continuity of speed	
	71	E/W	7/9/2008	36-45	79.6	41.0	46.0	40	40	No change, 85th percentile, low accident rate	
	72	E/W	7/9/2008	36-45	87.3	42.0	45.0	40	40	No change, 85th percentile, low accident rate, continuity of speed	
	73	E/W	7/15/2008	35-44	84.2	40.0	44.0	40	40	No change, 85th percentile, low accident rate, continuity of speed	
	74	E/W	7/15/2008	33-42	82.3	37.0	40.0	40	40*	No change	
	75	E/W	7/15/2008	30-39	79.7	35.0	39.0	40	40	No change	
	76	E/W	7/17/2008	36-45	78.0	42.0	46.0	40	40	No change, 85th percentile, low accident rate	
	77	E/W	7/17/2008	37-46	79.2	42.0	46.0	40	40	No change, 85th percentile, low accident rate	
	78	E/W	7/17/2008	37-46	84.8	41.0	45.0	40	40	No change, 85th percentile, low accident rate	
	79	E/W	7/17/2008	36-45	86.9	41.0	44.0	40	40	No change, 85th percentile, low accident rate	
	80	E/W	7/17/2008	36-45	81.9	40.0	44.0	40	40	No change, 85th percentile, low accident rate	
	81	E/W	7/17/2008	37-46	80.9	42.0	46.0	40	45	Increase, 85th percentile, low accident rate	
	82	E/W	7/18/2008	37-46	69.6	42.0	48.0	40	45	Increase, 85th percentile, low accident, 40 mph Orange	
Garden Grove Boulevard	83	E/W	7/8/2008	32-41	71.3	35.0	40.0	40	40	No change, 40 mph in Westminster	
	84	E/W	7/8/2008	33-42	82.9	39.0	42.0	40	40	No change	
	85	E/W	7/9/2008	34-43	88.7	39.0	42.0	40	40	No change	
	86	E/W	7/15/2008	34-43	79.4	37.0	42.0	40	40	No change	
	87	E/W	7/15/2008	29-38	85.7	35.0	38.0	35	40	Increase, 85th percentile, low accident rate	
	88	E/W	7/15/2008	28-37	77.0	35.0	38.0	35	40	Increase, 85th percentile, low accident rate	
	89	E/W	7/18/2008	34-43	73.3	38.0	43.0	35	40	Increase, 85th percentile, low accident rate	
	90	E/W	7/18/2008	32-41	80.3	36.0	40.0	35	40*	Increase, 85th percentile, low accident rate	
	91	E/W	7/20/2008	33-42	75.6	37.0	41.0	35	40	Increase, 85th percentile, low accident rate	
	92	E/W	7/20/2008	31-40	82.4	36.0	40.0	35	40	Increase, 85th percentile, low accident rate	
Garden Grove Boulevard	93	E/W	7/21/2008	34-43	87.7	39.0	42.0	40	40	No change	
	94	E/W	7/20/2008	36-45	78.0	40.0	44.0	40	40*	No change, continuity of speed, 40 mph in Orange	

Table 2: Segment Spot Speed Survey 2008

Street	No	Dir.	Date	10-Mile Pace (mph)	% in 10-Mile Pace	50th % Title (mph)	85th % Title (mph)	Posted Speed Limit (mph)	Recommended Speed Limit (mph)	Comments
Hazard Avenue	95	E/W	7/14/2008	36-45	82.9	40.0	44.0	40	40	No change, continuity of speed, 40 mph in Westminster
	96	E/W	7/22/2008	35-44	86.8	40.0	43.0	40	40	No change, continuity of speed, 40 mph in Westminster
	97	E/W	7/22/2008	37-46	84.9	41.0	44.0	40	40	No change, continuity of speed, 35 mph in Santa Ana
Lampson Avenue	98	E/W	7/9/2008	35-44	86.6	41.0	44.0	40	45	Increase, 85th percentile, low accident, 45 mph Seal Beach
	99	E/W	7/18/2008	37-46	80.9	41.0	45.0	40	40	No change, 85th percentile, low accident rate
	100	E/W	7/8/2008	36-45	89.3	40.0	45.0	40	40	No change, 85th percentile, low accident rate
	101	E/W	7/18/2008	35-44	85.4	39.0	43.0	40	40	No change, 85th percentile, low accident rate
	102	E/W	7/18/2008	35-44	86.2	40.0	44.0	40	40	No change, 85th percentile, low accident rate
	103	E/W	7/15/2008	33-42	82.9	39.0	42.0	40	40*	No change
	104	E/W	7/15/2008	32-41	79.4	36.0	41.0	35	35	No change, 85th percentile, low accident rate
	105	E/W	7/15/2008	30-39	87.8	35.0	38.0	35	35	No change, 85th percentile, low accident rate
	106	E/W	7/15/2008	32-41	83.8	36.0	40.0	35	35	No change, 85th percentile, low accident rate
	107	E/W	7/18/2008	32-41	84.4	36.0	40.0	35	35	No change, 85th percentile, low accident rate
	108	E/W	7/18/2008	33-42	81.3	38.0	40.0	35	35	No change, 85th percentile, low accident rate
	109	E/W	7/18/2008	32-41	85.3	37.0	40.0	35	35	No change, 85th percentile, low accident rate
	110	E/W	7/18/2008	32-41	80.2	37.0	40.0	35	35	No change, 85th percentile, low accident rate
	111	E/W	7/18/2008	30-39	79.0	36.0	40.0	35	35	No change, 85th percentile, low accident rate
112	E/W	7/18/2008	32-41	85.4	37.0	40.0	35	35	No change, 85th percentile, low accident rate	
113	E/W	7/18/2008	34-43	75.7	38.0	43.0	35	40*	Increase, 85th percentile, low accident, continuity of speed	
Orangewood Avenue	114	E/W	7/9/2008	34-43	74.5	37.0	43.0	35	40	Increase, 85th, low accident, continuity, 40 mph Cypress
	115	E/W	7/16/2008	31-40	76.3	38.0	40.0	35	40*	Increase, 85th percentile, low accident rate
	116	E/W	7/16/2008	36-45	79.4	39.0	44.0	35	40	Increase, 85th percentile, low accident, continuity of speed
	117	N/S	7/16/2008	33-42	73.1	38.0	42.0	35	35	No change, 85th percentile, low accident rate
	118	E/W	7/16/2008	33-42	84.6	37.0	40.0	35	35	No change, 85th percentile, low accident rate
	119	E/W	7/17/2008	31-40	87.4	36.0	39.0	35	35	No change, 85th percentile, low accident rate, continuity of speed
	120	E/W	7/17/2008	31-40	85.9	36.0	39.0	35	35	No change, 85th, low accident, 40 mph Anaheim, continuity
	121	E/W	7/17/2008	32-41	74.8	36.0	41.0	35	35	No change, 85th percentile, low accident, 40 mph Anaheim
	122	E/W	7/17/2008	35-44	88.7	39.0	42.0	40	40	No change
	123	E/W	7/14/2008	29-38	90.1	34.0	37.0	35	35	No change, 85th percentile, low accident, 35 mph Westminster
	124	E/W	7/14/2008	33-42	83.3	37.0	40.0	40	40*	No change
	Trask Avenue	125	E/W	7/14/2008	32-41	74.9	35.0	40.0	35	40
126		E/W	7/14/2008	32-41	78.7	36.0	40.0	35	40*	Increase, 85th percentile, low accident rate
127		E/W	7/21/2008	35-44	84.4	40.0	43.0	40	40	No change, 85th percentile, low accident rate
128		E/W	7/21/2008	36-45	82.3	40.0	45.0	40	40	No change, 85th percentile, low accident rate
129		E/W	7/21/2008	33-42	86.8	37.0	41.0	35	40	No change, 85th percentile, low accident rate
130		E/W	7/21/2008	35-44	71.9	38.0	44.0	35	40*	Increase, 85th percentile, low accident, continuity of speed
131		E/W	7/21/2008	32-41	78.0	36.0	41.0	35	35	No change, 85th percentile, low accident rate
132		E/W	7/21/2008	30-39	76.5	35.0	40.0	35	35	No change, 85th percentile, low accident rate
133		E/W	7/14/2008	36-45	82.6	40.0	44.0	40	40	No change, 85th, low accident, 40 mph Westminster, continuity
134		E/W	7/14/2008	37-46	79.4	41.0	45.0	40	40	No change, 85th percentile, low accident rate
135		E/W	7/14/2008	37-46	83.9	40.0	45.0	40	45	Increase, 85th percentile, low accident rate
Westminster Avenue		136	E/W	7/22/2008	37-46	71.1	41.0	45.0	40	45
	137	E/W	7/22/2008	37-46	77.7	41.0	46.0	40	45	Increase, 85th percentile, low accident rate
	138	N/S	7/22/2008	34-43	79.0	40.0	43.0	45	45	No change
	139	N/S	7/22/2008	40-49	78.9	44.0	48.0	40	45	Increase, 85th percentile, low accident rate
	140	N/S	7/22/2008	39-48	88.7	44.0	48.0	45	45	No change, 85th percentile, low accident rate
	141	N/S	7/22/2008	36-45	84.5	40.0	43.0	40	45	Increase, 85th percentile, low accident, 45 mph Santa Ana
	142	N/S	7/23/2008	24-33	90.4	27.0	30.0	25	25	Local street

## 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 142 sections on the City's arterial, secondary arterial, and collector street 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 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 Lampson Avenue, it is recommended that the speed limit be increased from 40 mph to 45 mph based on 85<sup>th</sup> percentile speed and low accident rate.
  - ◆ Gilbert Street from Garden Grove Boulevard to Chapman Avenue, it is recommended that the speed limit be increased from 25 mph to 30 mph based on 85<sup>th</sup> percentile speed, low accident rate, and continuity of speed.
  - ◆ Magnolia Street from Trask Avenue to Garden Grove Boulevard, it is recommended that the speed limit be increased from 35 mph to 40 mph based on 85<sup>th</sup> percentile speed and low accident rate.
  - ◆ Main Street from Garden Grove Boulevard to Acacia Parkway, it is recommended that the speed limit be increased from 15 mph to 25 mph.
  - ◆ Western Avenue from Garden Grove Boulevard to Lampson Avenue, it is recommended that the speed limit be increased from 40 mph to 45 mph based on 85<sup>th</sup> percentile speed and low accident rate.
  - ◆ Valley View Street from Lampson Avenue to Santa Catalina Avenue (north City limit), it is recommended that the speed limit be increased from 40 mph to 45 mph based on 85<sup>th</sup> percentile speed and low accident rate.
  - ◆ Chapman Avenue from Harbor Boulevard to Lewis Street, it is recommended that the speed limit be increased from 40 mph to 45 mph based on 85<sup>th</sup> percentile speed and low accident rate.

- ◆ Garden Grove Boulevard from Magnolia Street to Harbor Boulevard, it is recommended that the speed limit be increased from 35 mph to 40 mph based on 85<sup>th</sup> percentile speed, low accident rate, and continuity of speed.
- ◆ Lampson Avenue from Manley Street (west City limit) to Valley View Street, it is recommended that the speed limit be increased from 40 mph to 45 mph based on 85<sup>th</sup> percentile speed and low accident rate.
- ◆ Lampson Avenue from Haster Street to Lewis Street, it is recommended that the speed limit be increased from 35 mph to 40 mph based on 85<sup>th</sup> percentile speed, low accident rate, and continuity of speed.
- ◆ Oranewood Avenue from Knott Street to Magnolia Street, it is recommended that the speed limit be increased from 35 mph to 40 mph based on 85<sup>th</sup> percentile speed, low accident rate, and continuity of speed.
- ◆ Trask Avenue from Magnolia Street to Brookhurst Street, it is recommended that the speed limit be increased from 35 mph to 40 mph based on 85<sup>th</sup> percentile speed and low accident rate.
- ◆ Trask Avenue from Euclid Street to Harbor Boulevard, it is recommended that the speed limit be increased from 35 mph to 40 mph based on 85<sup>th</sup> percentile speed, low accident rate, and continuity of speed.
- ◆ Westminster Avenue from Bushard Street to Euclid Street, it is recommended that the speed limit be increased from 40 mph to 45 mph based on 85<sup>th</sup> percentile speed and low accident rate.
- ◆ Westminster Avenue from Newhope Street to Harbor Boulevard, it is recommended that the speed limit be increased from 40 mph to 45 mph based on 85<sup>th</sup> percentile speed and low accident rate.
- ◆ Westminster Avenue from Clinton Street to Buena Street (east City limit), it is recommended that the speed limit be increased from 40 mph to 45 mph based on 85<sup>th</sup> percentile speed and low accident rate.

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**Speed Zoning Regulations from Caltrans  
California MUTCD  
“Traffic Manual” and Definition of Terms**

## **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 85th-percentile 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**

<b>Average Daily Traffic</b>	Volume of traffic during a 24-hour period.
<b>E.C.L.</b>	Easterly City Limit, (also W.C.L., N.C.L., and S.C.L. for Westerly, Northerly, and Southerly City Limits, respectively).
<b>85<sup>th</sup> Percentile (Critical Speed)</b>	<b>Speed</b> 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.
<b>Mean Speed</b>	The average speed.
<b>MPH or mph</b>	Miles Per Hour.
<b>MVM or mvm</b>	Million Vehicle Miles. Accident rates are generally expressed as the number of accidents occurring per million vehicle miles traveled during a given time period.
<b>Pace</b>	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.

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**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 sides 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 houses 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 by ordinance determine and declare a prima facie limit of 25 miles per hour, 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 hour, 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:

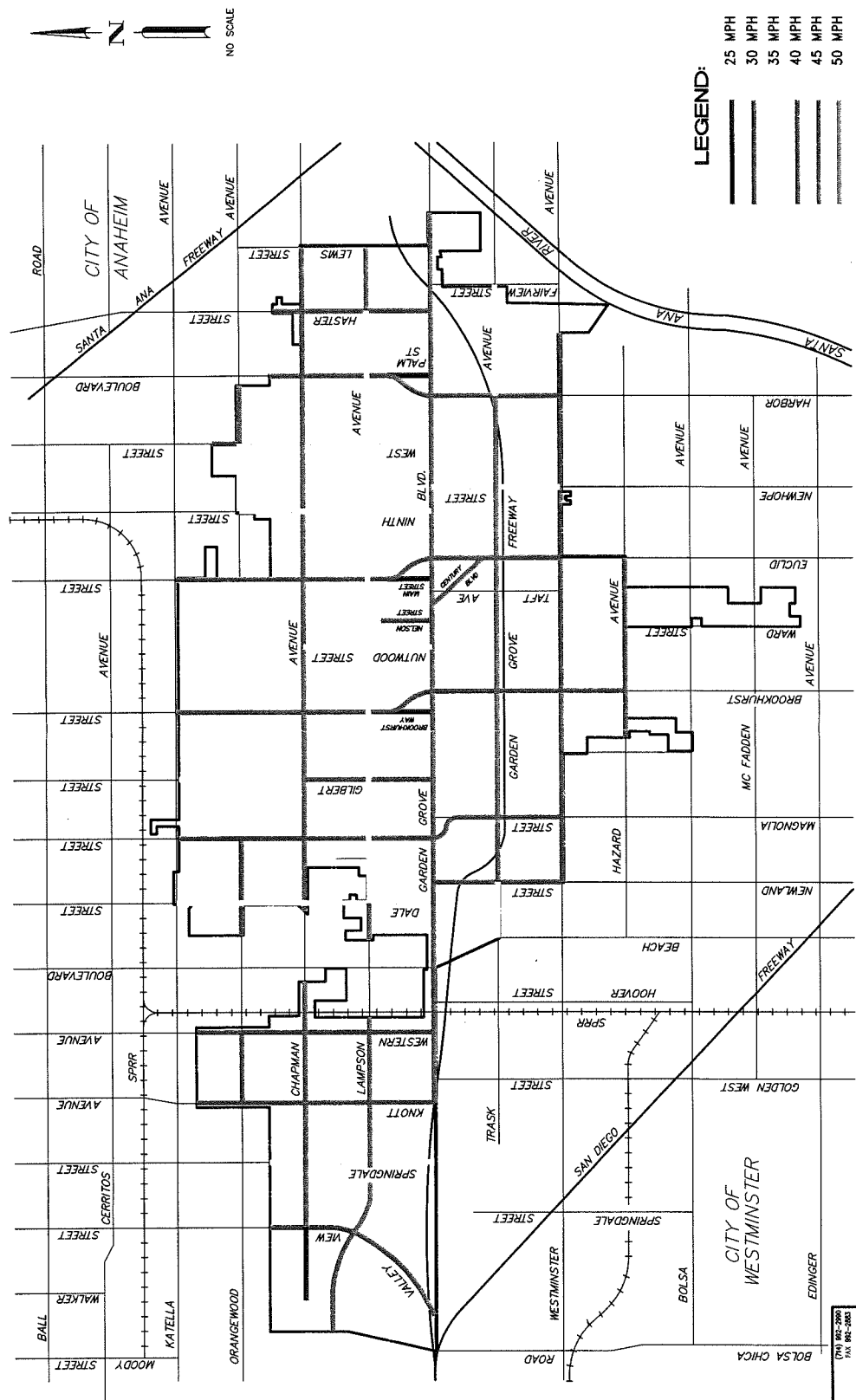
$$\text{Acc/MM} = \frac{\text{Number of Accidents} \times 1,000,000}{\text{Distance} \times \text{ADT} \times \text{No. of Days}}$$

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.



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**Citywide Speed Zone Map**



# 2008 SPEED SURVEY MAP

CHECKED BY:	M.M.
PREPARED BY:	R.P.
DRAWN BY:	R.P.

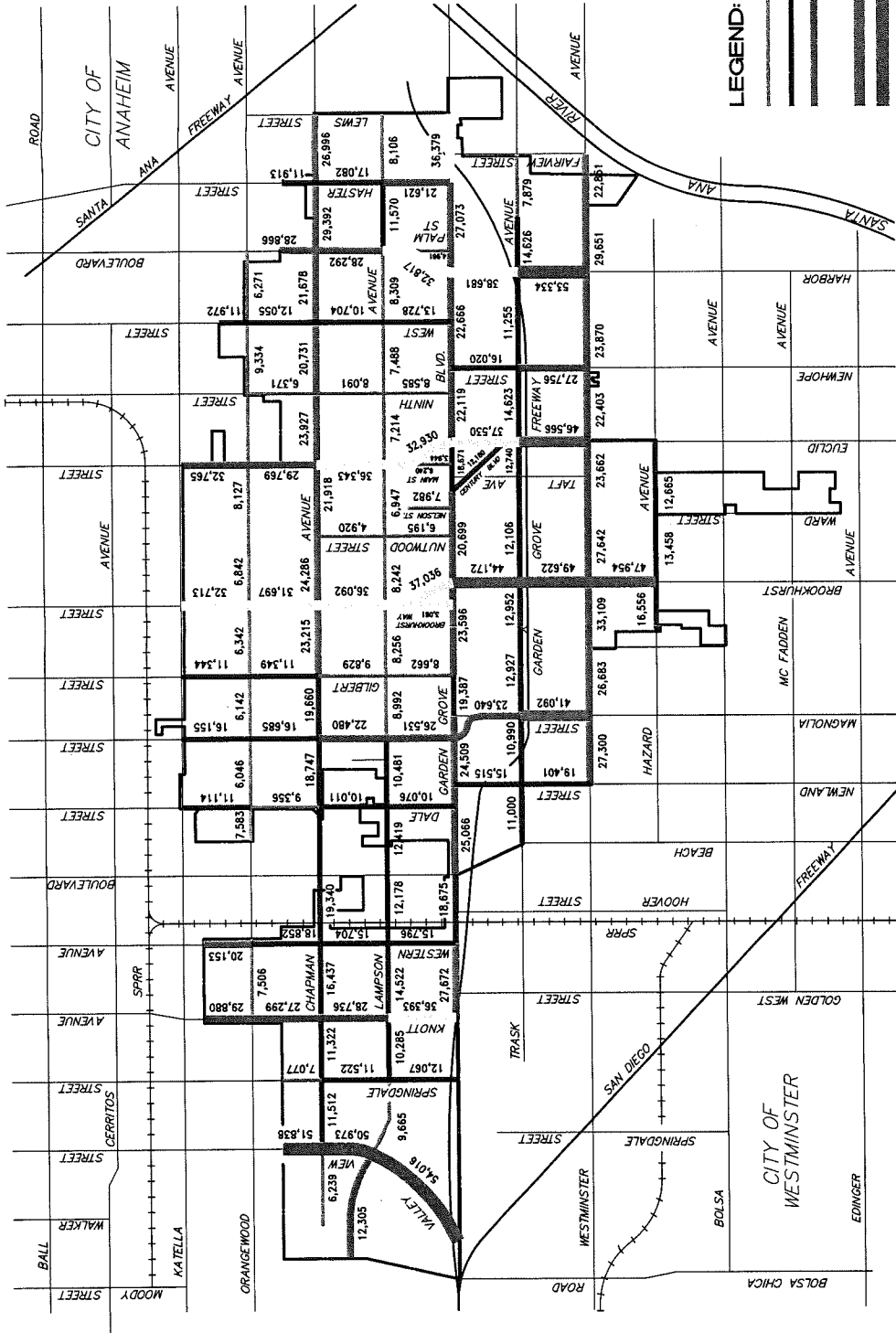
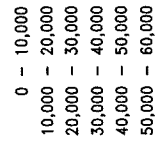
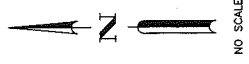
## City Of Garden Grove Department Of Public Works

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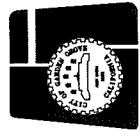
**Traffic Volume Map**



# 24 HOUR 2008 TRAFFIC VOLUME MAP

CHECKED BY: M.M.  
PREPARED BY: R.P.  
DRAWN BY: R.P.

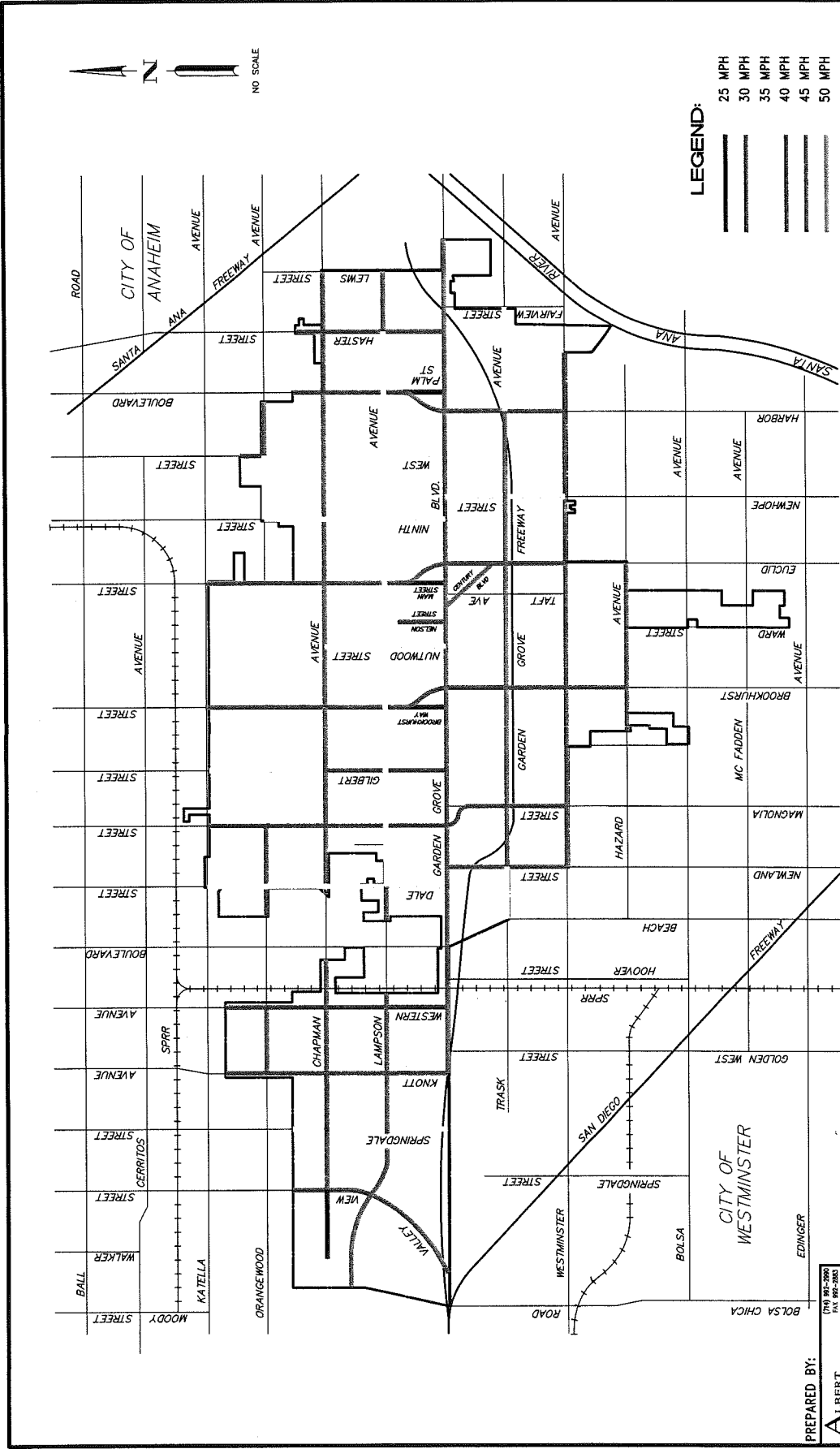
## City Of Garden Grove Department Of Public Works



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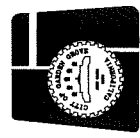
**Sample Color Speed Zone Map**



# 2008 SPEED SURVEY MAP

CHECKED BY: M.M.  
 PREPARED BY: R.P.  
 DRAWN BY: R.P.

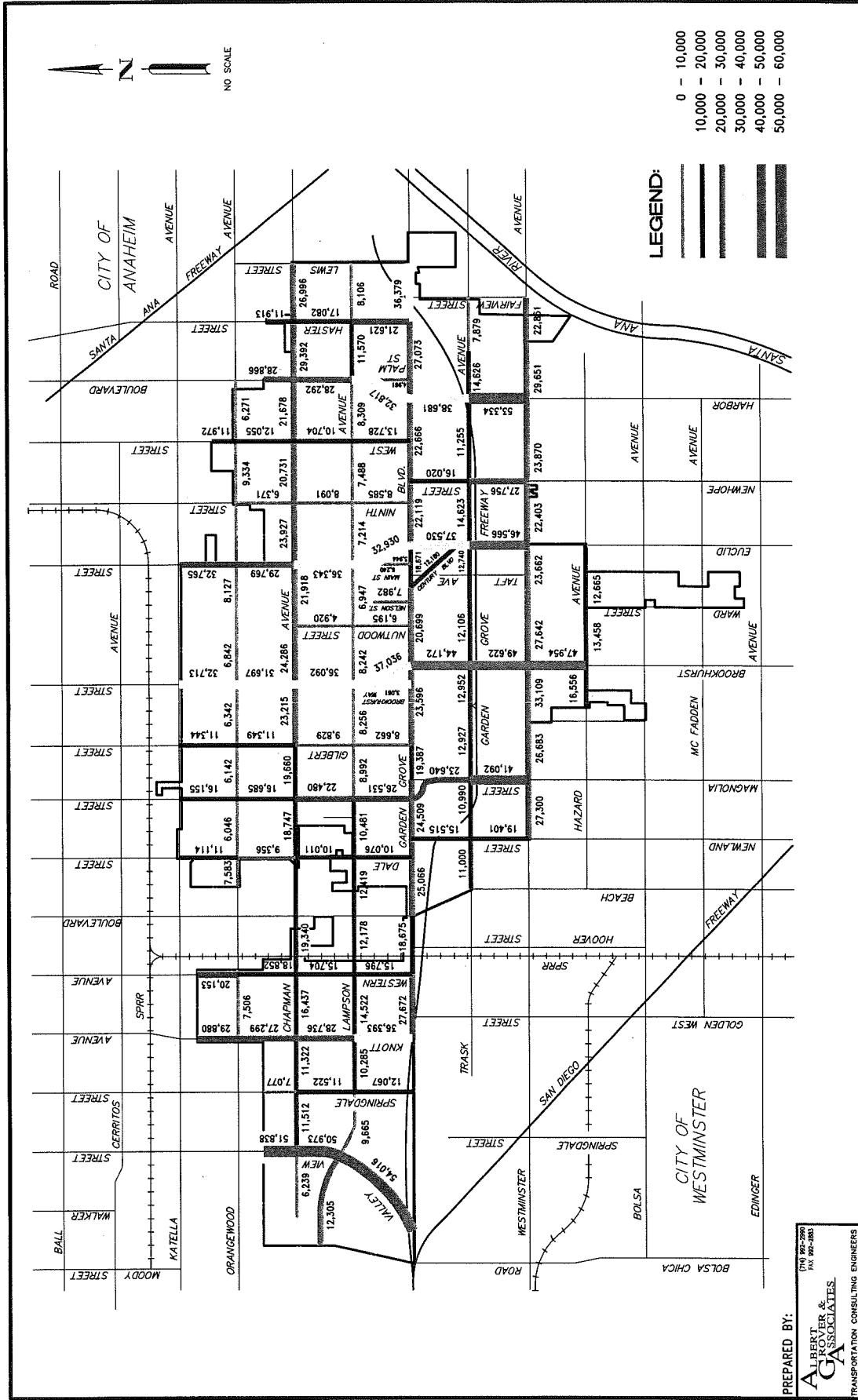
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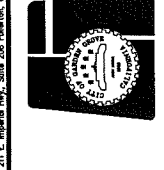
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**Sample Color Traffic Volume Map**



24 HOUR  
2008 TRAFFIC VOLUME  
MAP

CITY OF GARDEN GROVE  
DEPARTMENT OF PUBLIC WORKS



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