

Citywide Engineering and Traffic Survey

City of Seal Beach



Submitted by:



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¹ Excerpts from the California Vehicle Code (CVC)



CERTIFICATION

I, Mark H. Miller, do hereby certify that this Engineering and Traffic Survey for the City of Seal Beach was performed under my supervision and is accurate and complete. I certify that I am both experienced in performing surveys of this type and duly registered in the State of California as a professional Traffic Engineer.

A handwritten signature in blue ink, appearing to read "Mark H. Miller", written over a horizontal line.

Mark H. Miller
RTE #1575



TRAFFIC No. 1575



SECTION 1.0

Introduction

The purpose of this report is to document the results of an engineering and traffic survey (E&TS) conducted to update the speed limits on the City of Seal Beach street network on City-selected arterial, collector, and local roadways. The overall study was conducted to comply with existing State regulations concerning the increasing or decreasing of speed limits within City boundaries. Roadways within business and residential districts have an established speed limit of 25 miles per hour while alleys and blind intersections are 15 miles per hour, both limits are designated by California law. As such they are not typically included in the E&TS. Intermediate speed limits between 25 and 65 miles per hour may be established by local authorities based on the E&TS.

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. Excerpts from the CVC regarding regulations governing speed limits and definition of terms used in speed zone surveys are detailed in **Appendix A**.

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 motorists are properly identified. To legally use radar for speed enforcement, Section 40802(b) of the CVC requires that speed limits be established per Sections 22357 and 22358 of the CVC, the limits must be justified by an E&TS conducted within five years prior to the date of the alleged violation. However, a change in State law allows cities to extend the survey period up to seven or ten years depending on specific criteria¹.

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 as a part of this report.

According to City records, the last speed zone survey was prepared in 2015 and was approved in February 2016 by the City Council. The current study will verify, increase, or decrease existing speed limits within the City of Seal Beach based on the data and results of this survey.

At 26 locations on the City's network, spot speed surveys were taken in conformance with the State law for conducting engineering and traffic surveys for the purpose of establishing prima facie speed limits. The data was collected per the California Manual of Uniform Traffic Control Devices (CA MUTCD), November 7, 2014 edition. Sections of the CA MUTCD detailing regulations for conducting the required "Engineering and Traffic Survey" are presented in **Appendix B**.

The actual speed zone surveys were conducted by AGA Engineers, Inc. (AGA). A California registered traffic engineer from AGA reviewed the streets, the survey data, and the crash statistics to arrive at the recommended speed limits for each segment.

¹ Refer to Appendix A for specific survey criteria.



SECTION 2.0

Study Methodology

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

The 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 26 locations to determine existing vehicular travel speeds. A minimum of 100 observations (when possible) were recorded, 50 for each direction of travel. This data was used to calculate statistical information such as the 85th percentile speed, 10 mile per hour pace speed², percent of vehicles within the 10 mile per hour pace, median speed and other pertinent data for analysis.

Certification of the radar technician and the radar gun used for the speed surveys is found in **Appendix C**. The radar technician successfully completed a course on the operation of the radar devices per Section 40802 of the CVC.

Accident data was provided by the City for a two-year period from January 1, 2018 through December 31, 2019 for all roadway segments. The accident rate was calculated and considered in recommending the speed limit.

² Refer to Appendix A for definition of terms.



SECTION 3.0

Survey Results

3.1 Street Surveillance

“Speed Limit Signs,” Section 2B.13 of the CA MUTCD (see Appendix B), 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 change in speed. Whenever such factors are considered to establish the speed limit, they should be documented on the speed survey or in the accompanying engineering report.

The survey streets were reviewed by Mr. Mark Miller, P.E., T.E, Executive Vice President of AGA Engineers, Inc., who is a registered 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 were used to determine if any physical conditions warranted consideration of an *additional* five mile per hour reduction of the recommended speed in accordance with CVC Section 627. The speed survey segment roadway characteristics for each segment are indicated on the Engineering and Speed Survey Summary sheets in **Appendix D**.

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 State of California’s Statewide Integrated Traffic Records System (SWITRS) and City-provided collision reports from January 1, 2018 to December 31, 2019, 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** on the following page and in the Engineering and Speed Survey Summary sheets in Appendix D.

The Average Expected Accident Rates are based on the latest (2017) average rate for each type of roadway in Caltrans District 12.

Roadway Type	Average Expected Accident Rate
Arterial Streets – Divided Highway	
4 lanes less than 45mph	0.91
4 lanes 45mph or greater	0.90
5/6 lanes	1.00
Arterial Streets – Undivided Highway	
4 lanes less than 45mph	0.94
4 lanes 45mph or greater	0.67
5/6 lanes less than 45mph	1.37
5/6 lanes 45mph or greater	3.02
Collector Streets and Local Streets	
All	0.78



Table 1. 2020 Speed Zone Survey - Accident Survey Analysis

Street	No.	Location	Distance (Miles)	Distance (Feet)	24-Hour Volumes	Accidents (2 years)	Accident Rate	Average Expected Acc. Rate
Almond Avenue	1	Aster St to Jasmine Cir	0.60	3,168	1,042	0	0.00	0.78
	2	Oleander St to Violet St	0.26	1,373	345	0	0.00	0.78
Balboa Drive	3	PCH to Bolsa Ave	0.13	686	1,854	0	0.00	0.78
Bayside Drive	4	Bolsa Ave to Crestview Ave	0.27	1,433	1,363	0	0.00	0.90
Bolsa Avenue	5	PCH to Balboa Avenue	0.20	1,051	2,796	0	0.00	0.78
	6	Balboa Avenue to Seal Beach Blvd	0.39	2,085	3,847	2	1.80	0.78
College Park Drive	7	West City Limits to Harvard Ln (N)	0.22	1,162	2,171	1	2.87	0.78
	8	Harvard Ln (N) to Harvard Ln (S)	0.51	2,669	490	0	0.00	0.78
Electric Avenue	9	Seal Beach Blvd to Main St	0.46	2,429	3,743	3	2.39	0.78
	10	Main St to 6th St	0.18	970	3,314	0	0.00	0.78
Fir Avenue	11	Heather St to Wisteria St	0.58	3,046	1,181	0	0.00	0.78
First Street	12	Ocean Ave to Marina Dr	0.16	845	4,721	1	1.81	0.78
	13	Marina Dr to PCH	0.40	2,112	2,490	0	0.00	0.90
Harvard Lane	14	College Park Dr (N) to College Park Dr (S)	0.44	2,346	548	2	11.25	0.78
Lampson Avenue	15	Seal Beach Blvd to Basswood Ave	0.61	3,221	15,280	7	1.03	0.90
	16	Basswood Ave to East City Limits	1.38	7,286	12,867	9	0.69	0.90
Marina Drive	17	West City Limit to PCH	0.57	3,010	4,258	1	0.56	0.90
Ocean Avenue	18	1st St to Dolphin Way	0.82	4,324	4,601	2	0.73	0.78
Rossmoor Center Way	19	West City Limit to Seal Beach Blvd	0.25	1,320	6,482	0	0.00	0.78
Seal Beach Boulevard	20	Electric Ave to PCH	0.28	1,478	6,732	3	2.18	0.78
	21	PCH to Forrestal Ln	0.72	3,813	27,058	4	0.28	1.00
	22	Forrestal Ln to Westminster Blvd	0.97	5,135	32,270	7	0.31	1.00
	23	Westminster Blvd to I-405	1.06	5,605	33,702	7	0.27	1.00
	24	I-405 to North City Limits	0.95	5,016	33,490	16	0.69	1.00
Westminster Boulevard	25	West City Limits to Road B	0.81	4,301	18,606	8	0.72	1.00
	25a	Road B to Seal Beach Blvd						
	26	Seal Beach Blvd to Kitts Hwy	2.01	10,626	15,868	11	0.47	1.00
	26a	Kitts Hwy to East City Limits						

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

The rate was calculated using the following equation:

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

Where:

- Number of mid-block accidents based on two years (January 1, 2018 to December 31, 2019)
- 24-hour volume (both directions) in the survey segment
- Segment length in miles.



Example:

Accident rate on Seal Beach Boulevard between I-405 and the North City Limit:

$$\text{Accident Rate} = \frac{16 \times 10^6}{33,490 \times 365 \times 0.95 \times 2}$$

= 0.69 accidents per million vehicle miles (A/MVM)

The Average Expected Accident Rate for the segment is 1.00. The calculated accident rate of 0.69 is well below the expected rate for this segment.

It should be noted that the Accident Rate for Harvard Lane from College Park Drive (N) to College Park Drive (S) is 11.25 which is well above the Expected Accident Rate based on the formula for calculating the accident rate. This is due to several factors: there is an especially low volume of vehicles, it is a relatively short segment, and there are two collisions in the 2 year period.

3.3 Spot Speed Survey

Spot speed surveys were conducted at each of the 26 street segments to establish a reasonable and effective speed limit based on the premise that the speed limit thus established conforms to the actual behavior of the majority of motorists. The speed limit should normally be established at the first five mile per hour increment nearest the 85th percentile speed recorded for the surveyed segment. However, engineering judgment and other factors such as street surveillance (Section 3.1) and accident rates (Section 3.2) may indicate the need for further reduction in establishing reasonable and effective speed limits. The criteria used in conducting the radar survey are listed in Appendix B.

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.

The field survey raw data sheets used to tabulate the speeds are included in **Appendix E**.



SECTION 4.0

Survey Findings and Recommendations

In accordance with the State-imposed speed limit establishment regulation as defined by CVC Section 627, 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 found in Appendix B also state that the *maximum* permissible lowering of the proposed speed limit from the 85th percentile is 10 miles per hour.

The factors to be considered are:

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

The above factors for each roadway segment surveyed are listed in the Engineering and Traffic Survey Summary sheets in Appendix D. The 85th percentile speed and the above factors were considered in verifying existing speed limits and recommending speed limit changes (increase or decrease). The 2020 Speed Zone Survey – Accident Survey Analysis (Table 1) lists the total number of accidents, calculated accident rate, and the expected accident rate. **Table 2** on the following page shows the surveyed road segments with posted and recommended speed limits. California Vehicle Code sections are defined in Appendix A.

4.1 Speed Limit Signing – General

All California motorists are required to know the basic 15, 25, and 65 mph statutory or prima facie speed laws and are tested on the subject when applying for a driver’s license. The maximum speed limit on most California highways is 65 mph; however, drivers are permitted to travel 70 mph where posted as such. Unless otherwise posted, the maximum speed limit in California is 55 mph on two-lane undivided highways and for vehicles towing trailers provided the street is not within a business or residential district. Consequently, speed limit signs covering these prima facie conditions need not be posted on City streets. Although not required by law, speed limit signs for these limits can be posted by a jurisdiction when an engineer determines doing so would enhance public awareness and compliance of the basic speed law. Typically, such postings occur upon streets that have significant daily vehicular traffic volumes, cut-through traffic problems, significant grades, continued violation of residential 25 mph speed zones, or other unusual environmental or traffic flow characteristics. It is standard engineering practice to recommend the posting of speed limit signs only on streets that have specific speed limits enacted by City ordinance or determined to be justified by an engineer who has performed an Engineering and Traffic Survey (E&TS).

When an E&TS shows that the statutory or prima facie speed limits are not applicable for the existing conditions, the speed limits can be altered with the posting of a different speed limit, which must be determined according to the findings of the E&TS. CVC Section 22354 covers decreasing highway speeds



from 65 mph, and CVC Section 22358 addresses decreasing local speed limits. The CVC does not address decreasing the speed limit below 55 mph on undivided highways; however, the CA MUTCD states that speed zones (other than statutory speed limits) shall only be established on the basis of an E&TS that has been performed in accordance with traffic engineering practices. Even though it is not codified in the CVC, Caltrans has established the practice of using an E&TS for any reduction below a statutory 55 mph speed limit. Law enforcement agencies and courts are accustomed to seeing surveys for these areas and it may be difficult to defend a speed violation citation without one.

Speed limit signs should be installed at approximately every one-half mile on streets which have been speed zoned. Signs are typically installed at the beginning of the speed zone on the departure side of a traffic signal controlled intersection. It is also advisable to install signs at key intersections where there is high side street vehicle entry. It is important that motorists be given adequate notice of the speed limit without over signing, since doing so increases maintenance costs and rarely results in increased compliance.

The CA MUTCD outlines speed limit sign size specifications based on the type of roadway facility. Sign sizes vary from a minimum of 24-inches by 30-inches on a single lane conventional roadway to 48-inches by 60-inches on a freeway. It is also important to post signs in a manner that they are clearly visible to approaching traffic from a distance. Care should be taken to maintain landscaping and other vegetation does not grow to block the motorist view of signs. In certain circumstances, when an engineer has determined that additional motorist awareness of the speed limit is needed, the speed limit can also be painted on the street immediately adjacent to a speed limit sign.

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: 2020 City of Seal Beach Segment Spot Speed Survey

Street	No	Location	Direction	Date	10-Mile Pace (mph)	% in 10-Mile Pace	50th % Tile (mph)	85th % Tile (mph)	Posted Speed Limit (mph)	Recommended Speed Limit (mph)	Comments
Almond Avenue	1	Aster St to Jasmine Cir	E/W	8/13/2020	31-40	75%	33	39	35	35	No change, 85th%, CVC 21400(b)**
	2	Oleander St to Violet St	E/W	8/17/2020	26-35	100%	30	30	30	30	No change, 85th%
Balboa Drive	3	PCH to Bolsa Ave	N/S	8/17/2020	22-31	82%	25	30	25	25	No change, 85th%, CVC 21400(b)**
Bayside Drive	4	Bolsa Ave to Crestview Ave	E/W	8/18/2020	22-31	84%	25	29	25	25	No change, 85th%, CVC 21400(b)**
Bolsa Avenue	5	PCH to Balboa Avenue	E/W	8/18/2020	24-33	73%	28	33	30	30	No change, 85th%, CVC 21400(b)**
	6	Balboa Avenue to Seal Beach Blvd	E/W	8/18/2020	25-34	83%	30	34	30*	30	No change, 85th%, high accident rate, CVC 21400(b)**
College Park Drive	7	West City Limits to Harvard Ln	E/W	8/13/2020	25-34	78%	29	34	25	25	No change, continuity of speed, pedestrians, high accident rate
	8	Harvard Ln (N) to Harvard Ln (S)	E/W	8/13/2020	20-29	79%	25	28	25	25	No change, 85th%, CVC 21400(b)**
Electric Avenue	9	Seal Beach Blvd to Main St	E/W	8/12/2020	21-30	78%	25	30	30	30	No change, 85th%, high accident rate
	10	Main St to 6th St	E/W	8/12/2020	16-25	86%	21	24	30	30	No change
Fir Avenue	11	Heather St to Wisteria St	E/W	8/27/2020	19-28	85%	24	27	25	25	No change, 85th%
First Street	12	Ocean Ave to Marina Dr	N/S	8/17/2020	20-29	85%	23	27	30	30	No change, 85th%
	13	Marina Dr to PCH	N/S	8/17/2020	31-40	69%	34	39	40	40	No change, 85th%
Harvard Lane	14	College Park Dr (N) to College Park Dr (S)	N/S	8/13/2020	19-28	90%	24	27	25	25	No change, 85th%, high accident rate
Lampson Avenue	15	Seal Beach Blvd to Basswood Ave	E/W	8/11/2020	41-50	77%	45	49	45	45	No change, 85th%, CVC 21400(b)**
	16	Basswood Ave to East City Limits	E/W	8/11/2020	39-48	68%	44	50	45	45	No change, 85th%, CVC 21400(b)**
Marina Drive	17	West City Limit to PCH	E/W	8/17/2020	24-33	86%	28	32	30	30	No change, 85th%
Ocean Avenue	18	1st St to Dolphin Way	E/W	8/17/2020	19-28	86%	24	27	25	25	No change, 85th%
Rossmoor Center Way	19	West City Limit to Seal Beach Blvd	E/W	8/13/2020	19-28	85%	23	26	25	25	No change, 85th%
Seal Beach Boulevard	20	Electric Ave to PCH	N/S	8/12/2020	25-34	81%	28	33	30	30	No change, 85th%, high accident rate, CVC 21400(b)**
	21	PCH to Forrestal Ln	N/S	8/12/2020	47-56	68%	50	55	50*	50	No change, continuity of speed, CVC 21400(b)**
	22	Forrestal Ln to Westminster Blvd	N/S	8/11/2020	43-52	62%	46	52	50	50	No change, 85th%
	23	Westminster Blvd to I-405	N/S	8/13/2020	43-52	67%	46	52	50	50	No change, 85th%
	24	I-405 to North City Limits	N/S	8/13/2020	35-44	72%	39	44	40	40	No change, 85th%, 40mph Los Alamitos, CVC 21400(b)**
Westminster Boulevard	25	West City Limits to Road B	E/W	8/11/2020	44-53	66%	47	54	50	50	No change, 85th%, CVC 21400(b)**
	25a	Road B to Seal Beach Blvd	E/W	8/12/2020	44-54	66%	47	54	45	50	Increase, 85th%, CVC 21400(b)**
	26	Seal Beach Blvd to Kitts Hwy	E/W	8/17/2020	48-57	56%	52	59	45	60	Increase, 85th%, low accident rate
	26a	Kitts Hwy to East City Limits	E/W	8/18/2020	48-58	56%	52	59	60	60	No change, 85th%, low accident rate

* School Zone
 *** See Appendix A



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 26 sections on the City's roadway network were surveyed.
3. The accident rate (Table 1) for the majority of the street segments surveyed is below the average expected accident rate of various types of roadway facilities within the City area. However, several locations showed a higher than average accident rate due to low traffic volumes on primarily residential streets. Traffic volumes on the City's arterial and collector streets were also lower than previous years possibly due to the Covid-19 pandemic restrictions.
4. It was concluded that the majority of the existing speed limits on the City's arterial, collector, and local street network are reaffirmed and remain unchanged.
5. It was also concluded that the existing speed limits on the following roadway segments should be increased because of a change in the segments surveyed:
 - **Westminster Avenue from Road "B" to Seal Beach Boulevard** – It is recommended that the existing speed limit of 45 mph be increased on this section to 50 mph based on the 85th percentile speed, low accident rate, and change of speed survey segment limits.
 - **Westminster Avenue from Seal Beach Boulevard to Kitts Highway** – It is recommended that the existing speed limit of 45 mph be increased on this section to 60 mph based on the 85th percentile speed, similar roadway conditions, low accident rate, and change of speed survey segment limits.