

CALIFORNIA MANUAL FOR SETTING SPEED LIMITS



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Division of Safety Programs
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Disclaimer

The California Manual for Setting Speed Limits (Manual) is not a standard, specification, or regulation. The Manual does not replace the existing California Department of Transportation (Caltrans) mandatory or advisory standards and is not intended to be a substitute for engineering knowledge, experience, or judgment. The Manual promotes better access to helpful information and concepts from various agencies and organizations. Caltrans acknowledges the existence of other practices and provides the guidelines for reference and direction for those responsible for making professional engineering or other design decisions.

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Preamble

Excessive speed is one of the primary reasons for deaths and serious injuries on California's public roads. On average, about 3,900 people die every year across the state in speed-related crashes. As pointed out in the California State Transportation Agency report completed by the Zero Traffic Fatalities Task Force, many factors contribute to traffic deaths and injuries including speeding, distracted driving, and impaired driving. However, the relationship between speeding and traffic deaths and injuries is an increasing subject of attention. In California, speeding contributes to about one-third of all motor vehicle fatalities. The notation of "speeding" for crash reporting includes vehicle speeds that are unsafe for conditions and vehicle speeds over the speed limit. Excessive speed has been highlighted by recent important studies as a key risk factor in road traffic deaths and injuries. According to a 2017 National Transportation Safety Board (NTSB) report, speed increases crash risk in two ways: it increases the likelihood of being involved in a crash and it increases the severity of injuries sustained by all road users in a crash. The relationship between speed and injury severity is especially critical for vulnerable road users such as bicyclists and pedestrians.

The Safe System Approach (SSA) has been adopted as the guiding paradigm to address national and state roadway safety through the United States Department of Transportation (US DOT) National Roadway Safety Strategy and the California Department of Transportation (Caltrans) Director's Policy 36 on Road Safety. The SSA is based on a foundational understanding of the root causes of road-related fatalities and serious injuries, particularly on the human body's tolerance to withstand force. This approach views safety as the result of interactions among various components of a system, which shape how individuals behave on the transportation network and their risk of being involved in a crash. The SSA includes the below principles:

- 1) Deaths and serious injuries are unacceptable.
- 2) Humans make mistakes.
- 3) Humans are vulnerable.
- 4) Responsibility is shared.
- 5) Safety is proactive and reactive.
- 6) Redundancy is crucial.

To address these principles and the goal of zero deaths and serious injuries, the SSA sets six core elements: Safe People, Safe Roads, Safe Vehicles, Safe Speeds, Safer Land Use, and Post-Crash Care. Setting safe speed limits is a critical component of achieving Safer Speeds and reducing fatal and serious injury crashes. In the SSA, speed limits are set according to the crash types likely to occur, the impact forces that result, and the tolerance of the human body to withstand these forces. While California's practitioners must still use driver behavior to establish speed limits, this Manual provides more flexibility under recent changes in the law.

Chapter 1 Introduction

1.1 Overview

1.1.1 Purpose of the Manual

The Manual sets forth a uniform procedure for setting speed limits in California. It provides information on applying various sections of the California Vehicle Code (CVC), determining the need for an Engineering and Traffic Survey (E&TS), describing the elements and data needed for the E&TS, determining the proper speed limit for any California street or highway, and includes procedures for documenting the outcome with the court system and law enforcement agencies.

1.1.2 Users of the Manual

The Manual is intended for state and local traffic engineers in charge of determining and recommending speed limits. Local agency officials, law enforcement personnel, legal staff, judicial council members, traffic safety practitioners, and the public may consider the Manual to understand both theory and applicable laws involved in setting speed limits in California.

1.1.3 Roles and Responsibilities

The California State Legislature sets in place the regulations for California speed limits and the CVC places these regulations into language used primarily for enforcement purposes.

The need for an E&TS and its definition are specified in the CVC Sections 627 and 40802. CVC Section 627 authorizes Caltrans to establish methods for E&TS while Section 40802 discusses how a speed zone without a valid E&TS is considered a speed trap. Caltrans Road Safety Division Chief has delegated authority for the development of guidance for speed limit establishment in accordance with CVC Section 22348. Caltrans Road Safety Division Chief or their delegates is responsible for informing Caltrans Districts of actions required to ensure the consistent application of standards, policies, and State and federal laws and regulations related to speed limit settings. The responsibility for establishing speed limits on the local roadways, in accordance with the methods and procedures established by Caltrans, rests with the respective local agency responsible for that roadway.

1.2 General Concepts

The setting of speed limits requires a rational and defensible procedure to maintain the confidence of the public and legal systems. By following a uniform procedure, agencies can establish speed limits uniformly and objectively throughout the state.

In California, speed limits set by an E&TS are set near the 85th percentile speed. The 85th percentile speed is the speed at or below which 85 percent of the free-flowing vehicles travel, under ideal driving conditions. Speed limits established based on the 85th percentile reflect the consensus of motorists on reasonable and prudent speed, rather than the judgment of one or a few individuals. The 85th percentile speed is considered the first approximation for the speed limit. The general method to determine the speed limit is to round the 85th percentile speed to the nearest 5 mph. Under certain circumstances, traffic engineers may adjust from the 85th percentile speed in accordance with the law to determine the most suitable posted speed.

Speed limits rely on the voluntary compliance of the majority of motorists. Therefore, speed limits should not be set arbitrarily high or low, as this would cause the loss of public respect for, and drivers violating, the established speed limits. Such speed limits would also require constant enforcement to maintain compliance. Previous studies (Federal Highway Administration [FHWA] , 1992; FHWA, 1998) show that posting speeds near the 85th percentile speed reduces speed variance and increases driver compliance. Related excerpts from these reports are also provided in Appendix D under the corresponding reference.

The most effective way to reduce vehicle speed is through a combination of strategies using traffic control devices related to speed management, roadway design and engineering solutions, traffic calming strategies, public education, and enforcement efforts. It is realized that implementation of these strategies can be costly and time-consuming. A speed limit sign by itself has little benefit without implementing other speed management strategies.

Appendix E provides a list of CVC sections related to speed law, and Appendix F provides the flowchart for general steps involved in setting speed limits.

1.2.1 Basic Speed Law

The basic speed law is found in CVC Section 22350. It reads: "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." A driver violates the basic speed law if he or she drives at an unsafe speed, even though the operating speed may be lower than the posted regulatory speed limit sign.

Speed limit signs only indicate the maximum speed a driver legally may drive up to under ideal driving conditions. It does not mean a driver can or should always drive up to that speed. The primary law that all drivers must adhere to is the Basic Speed Law. It

is understood that every driver has the highest level of responsibility for their own actions and is ultimately responsible for their behavior while driving a vehicle.

1.2.2 Types of Speed Limits

Speed limits are established by one of the following two conditions:

- Statute, including statutory maximum speed limits and prima facie speed limits by statute, or local ordinance.
- Speed zones, which require E&TS, or local ordinance or resolution if permitted by law.

1.2.3 Speed Limits by Statute and Local Ordinance

Speed limits set by statute are speed limits established by the state legislature such as maximum speed limit of 55 mph on two lane undivided roadways and 65 mph on all other roadways (CVC Section 22349). An E&TS is not required for a speed limit stated by statute. They are enforceable by law even if the speed limit sign is not posted.

Prima facie speed limits by statute are a type of statutory speed limit that apply in designated special areas or zones such as railway crossing and residence districts (CVC Section 22352). An E&TS is not required for the speed limit if they are posted at the statutory prima facie speed value. They are enforceable by law even if the speed limit sign is not posted.

Speed limits by local ordinance are speed limits established by local governments by ordinance for a specific area or road within their jurisdiction such as any playground in a public park (CVC Section 22357.1) or a business activity district (CVC Section 22358.9). In this case, an E&TS is not required to support the speed limit. They are enforceable by law after the proper signs giving notice of the speed limit are erected.

A local street or road as defined by CVC Section 40802(b)(1) may have enforceable speed limits established without the need of an E&TS.

The CVC Sections describing speed limits by statute, local ordinance, or resolution are included in Table 1-1.

Table 1-1 CVC Sections Pertinent to the Setting of Speed Limits

CVC Section	Applies to		Description
	Local Agency	Caltrans	
22349	X	X	Establishes maximum speed limit of 65 mph on all highways with a maximum 55-mph speed limit on 2-lane undivided highways.

CVC Section	Applies to		Description
	Local Agency	Caltrans	
22352(a)	X	X	Establishes 15-mph prima facie speed limit at uncontrolled railway crossings; blind uncontrolled intersections; and alleys.
22352(b)(1) & (2)	X	X	Establishes 25-mph prima facie speed limit in a business or residence district and school zone.
22352(b)(3)	X		Establishes 25-mph prima facie speed limit on highways near senior centers or other facilities primarily used by senior citizens, other than state highways.
22354		X	E&TS to reduce 65-mph speed limit on state highways
22355		X	E&TS to establish variable speed limits on freeways (state highway)
22356		X	E&TS to raise 65-mph speed limit to 70-mph speed limit on state highways
22357	X		E&TS to establish prima facie speed limit above 25 mph for business or residence district, other than state highways
22357.1	X		Establishes by ordinance a 25-mph prima facie limit adjacent to a children's playground in a public park, other than a state highway.
22358	X		E&TS to reduce 65-mph speed limit on any street other than a state highway
22358.3	X		E&TS to reduce 25-mph prima facie speed limit by ordinance in a business district, residential district or public park other than a state highway
22358.4(a)	X		E&TS to reduce 25-mph prima facie speed limit by ordinance. Requires Caltrans' approval prior to implementation on a state highway

CVC Section	Applies to		Description
	Local Agency	Caltrans	
22358.4(b)(1)	X		Establishes by ordinance a 15- or 25-mph prima facie speed limit adjacent to a school under specific conditions. Requires Caltrans approval prior to implementation on a state highway.
22358.6	X	X	Rounding and reduction from 85 th percentile speed in setting speed limit
22358.7	X		Safety Corridors & Land/Facility generating high concentrations of bicyclists/pedestrians
22358.8	X		Retains currently adopted/restores immediately prior speed limit.
22358.9	X		Establishes by ordinance a 25- or 20-mph prima facie speed limit under specific conditions on a highway contiguous to a business activity district, other than state highway.
22363	X	X	Allows highway authority to declare a prima facie speed limit of 40, 35, 30, or 25 mph based on prevailing snow or ice conditions. Signs are placed and removed as conditions warrant.
22406	X	X	Establishes maximum speed of 55 mph for trucks with more than 3 axles, vehicles towing other vehicles and trailers, and buses.
22407	X	X	E&TS to reduce speed below 55 mph for vehicles mentioned in 22406
22413	X		E&TS to reduce 25-mph prima facie speed limit on grades of 10% or greater
40802(b)(1)	X		Identifies local streets or roadways based on functional classification designated on the CRS maps or the described conditions to establish enforceable speed limits without the need of an E&TS

1.2.4 Speed Zones

A speed zone is the speed limit established based on an E&TS for a particular segment of a roadway, or through local ordinance or resolution if permitted by law, for which a statutory speed limit is not appropriate. When an E&TS shows that the statutory

maximum or prima facie speed limits are unreasonable for the existing conditions, the speed limits may be changed with posting a different speed limit. For example, if Caltrans determines that a speed of 35 mph is appropriate for a state highway segment based on findings of the E&TS, Caltrans may change and lower the speed limit to 35 mph under CVC Section 22358.4. Another example is if the local authority determines that a speed of 40 mph is appropriate in a residence district with a prima facie limit of 25 mph based on findings of the E&TS, the local authority may declare a 40-mph speed limit in accordance with CVC Section 22357. Speed zone must be justified by a valid and current E&TS. Speed limits are enforceable by law only after the proper speed limit signs are erected.

1.2.5 Authority to Set Speed Limits

Caltrans has authority to set speed limits on the State Highway System (SHS). Roadways outside of the SHS fall under the responsibility of the respective city or county, also referred to as “a local agency”. Some roadways may fall under the jurisdiction of National Parks, tribal governments, or private properties. Although not mandated, the CA MUTCD should be followed by these jurisdictions as well.

1.2.6 Speed Traps

CVC Section 40801 prohibits the use of speed traps and the use of any evidence obtained by a speed trap for the purpose of prosecution.

A speed trap as defined in CVC Section 40802 is either:

- 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.
- The use of radar or any other electronic devices that measure the speed of a moving object on a section of highway which does not have a valid and current E&TS as required under CVC.

This section does not apply to a local street or road as defined in CVC 40802(b), school zone, senior zone, business activity district, or speed limit adopted under Section 22358.7 or 22358.8.

1.3 Factors Affecting Drivers' Speeds

Many factors influence drivers and their perception of the safe speed at which to operate a vehicle. These factors should be considered as a whole since considering each factor individually is not practical.

1.3.1 Design and Physical Features of the Roadway

The design and physical features of the roadway place limitations on the safe operating speed of vehicles. These features include, but are not limited to:

- Roadway geometry such as horizontal alignment, vertical alignment, side slope, sight distance, roadway width, and shoulder width.
- Roadside characteristics such as number and type of intersections, driveway density, type of median, type of shoulder, type of bike lane, availability of on-street parking, type of pedestrian facilities, and the presence of transit and transit stops.
- Context of the roadway such as zoning, location, and type.

Horizontal and vertical alignment may restrict operating speeds for a short highway segment. In such circumstances, an advisory speed may be posted to inform drivers of the recommended operating speed, i.e., an advisory speed sign may be posted before a horizontal curve. The recommended speed for a horizontal curve can be measured using a ball bank indicator or digital inclinometer (see CA MUTCD, Chapter 2C). Please refer to the Highway Design Manual (HDM) or the American Association of State Highway and Transportation Officials (AASHTO) Policy on Geometric Design of Highways and Streets for recommended design speeds based on highway types and contexts.

The effects of factors such as lane width, condition of the roadway surface, type and width of shoulders, frequency of intersections, and roadside development on speed are not easily measured. Generally, the proper speeds for these factors are determined by conducting spot speed surveys of vehicles using the roadway.

1.3.2 The Vehicle

As vehicles become safer, drivers may feel more comfortable driving at higher speeds. The mechanical condition of vehicles and their characteristics for acceleration, deceleration, stopping, turning, and crash safety devices impact operating speeds under various conditions. Additionally, the body roll angle of different vehicles can affect operating speeds on curves. The braking capabilities of various vehicles, including passenger cars, buses, and different truck-trailer combinations, are significantly different. It is generally impractical to establish recommended speeds for each group based on their operating characteristics.

The common practice is to post speed limits that represent the majority of vehicles using the roadway. However, lower speed limits may be posted for heavier vehicles that require more time to stop in emergency situations (such as semi-trucks and vehicles towing trailers, CVC Section 22407).

1.3.3 The Driver

The abilities of drivers vary from the inexperienced to the professional driver. It would not be advisable to establish safe speeds specifically for drivers at either extreme end of the ability spectrum. The selection of speeds to be posted is aimed at accommodating the abilities and performance of all drivers as determined through spot speed surveys.

Average driver ability is considered in the form of perception-reaction time to calculate critical approach speeds to traffic control signals, crosswalks, and locations with limited sight distance.

1.3.4 Traffic

Other vehicles on the highway, including those that may be entering, crossing, weaving, making turns, or engaged in on-street parking, can affect speeds.

Posted speed limits should be based on off-peak hour traffic under free-flow conditions on an average weekday, as outlined in the procedures described. During congested times, drivers will adjust their speeds under the basic speed law and drive their vehicles at slower speeds compared to free-flow conditions.

1.3.5 Weather and Visibility

Except where the posted speed limit is the statewide maximum legal limit, speeds are generally posted based on daylight speed values determined under good weather conditions and dry pavement.

CVC Section 22350 states that drivers are responsible for adjusting their speed according to different weather and visibility conditions. Additionally, CVC Section 22363 allows the temporary posting of lower speed limits for snow or ice conditions on a highway.

1.3.6 Other Roadway Users

The frequency of pedestrians, bicycle traffic, and the width of shoulder or designated bicycle lanes are also important factors to consider, especially at intersections with limited sight distance and in areas where crosswalks lack intersection traffic controls, and in areas with high bicycle and pedestrian use; especially with children, seniors, people with disabilities, and unhoused individuals.

1.4 Trends, Context, and Considerations

Historically in the U.S., roadways have been designed from the perspective of traffic mobility, meaning moving vehicles from one point to another as quick as possible. Noted in Research Synthesis for AB 2363 Zero Traffic Fatalities Task Force prepared by University of California Institute of Transportation Studies (UC ITS), as highway network expanded to accommodate increasing numbers of vehicles, early attempts to regulate speed for safety gave way to the “consistent focus on improving traffic service for ever-expanding motor vehicle fleets” (UC ITS, 2019).

Today, as agencies, especially cities and counties, are creating and implementing bicycle and pedestrian transportation plans, the different needs of road users such as bicyclists and pedestrians, who are exposed to exponential dangers of excessive speed, have been increasingly challenging the traditional roadway design that

maximizes vehicle mobility. This trend calls attention to the contradiction between level of service and safety. As UC ITS researchers put it, the crux of this issue is “the intuitive trade-off between speed and safety” (UC ITS, 2019). Transportation jurisdiction, especially local agencies, must often balance the need to increase safety by reducing vehicle operating speeds with the level of service that is negatively impacted by an increased traffic congestion and slower vehicle throughput.

As one of the countermeasures to reduce traffic speed, several states across the U.S. adopted speed-limit-setting laws that grant local agencies more flexibility to lower posted speed limits within their jurisdictions in the last several years.

In 2018, California legislative bill AB 2363 (Friedman – Chapter 650, Statutes of 2018) directed the Secretary of Transportation to establish and convene the Zero Traffic Fatalities Task Force (ZTFTF). In 2020, ZTFTF published a Report of Findings (CalSTA, 2020) providing 16 findings and 26 recommendations across 4 categories:

- Establishing speed limits
- Engineering
- Enforcement
- Education

Among these, 8 findings and 13 recommendations are related to establishing speed limit. ZTFTF led to AB 43 and AB 1938, which addressed about half of the recommendations and were chaptered in 2021 and 2022, respectively. AB 43 and AB 1938 focused on traffic safety and speed limits, primarily granting local jurisdictions more flexibility in setting speed limits based on factors like road type, land use, and the concentration levels of vulnerable road users such as pedestrians and bicyclists. AB 43 provides the initial framework for these changes, while AB 1938 clarifies and builds upon AB 43's provisions. These two bills work together to give local authorities greater control over speed limits, allowing them to set speed limits based on specific road conditions and safety considerations while also ensuring reasonable speed limits and promoting traffic safety. They place greater emphasis on vulnerable users and the risk of a future crash by revising E&TS process to allow consideration of the safety of vulnerable groups during E&TS.

Major changes made to CVC by AB 43 and AB 1938 are summarized in Table 1-2. More details about these provisions are presented in Chapter 3 of this Manual.

Table 1-2 Major Changes Made by AB 43 and AB 1938

CVC Section	Apply to	Description
22354	Caltrans	Posting speed limits below 25 mph when supported by an engineering and traffic survey upon a state highway

CVC Section	Apply to	Description
22358	Local	Posting speed limits below 25 mph when supported by an engineering and traffic survey upon portion of street other than a state highway
22358.6	Both Caltrans and Local	85 th Percentile Speed Rounding and Reduction Provision
22358.7	Local	Reduction Provision for Safety Corridor or Land or Facilities Generating High Concentrations of Bicyclists and Pedestrians
22358.8	Local	Retaining Currently Adopted or Restoring Immediately Prior Speed Limit
22358.9	Local	Business Activity District
40802	Both Caltrans and Local	Exempting business activity districts from speed trap Extension of an E&TS to maximum 14 years

In October 2025, AB 1014 was enacted, extending similar flexibilities to the State Highway System in most scenarios. AB 1014 specifically amended four CVC sections: 22358.6, 22358.7, 22358.8, and 22358.9.

1.5 Design Speed, Operating Speed, and Speed Limits

Design speed, operating speed, and speed limits are important aspects of speed which is a fundamental concept in transportation engineering. They are used for different purposes and selected, established, or identified based on different criteria.

Design speed is a selected speed used to determine geometric design features of the roadway. According to California Highway Design Manual (HDM), highway design speed is defined as "a speed selected to establish specific minimum geometric design elements for a particular section of highway". These design elements include vertical and horizontal alignment, and sight distance. Other features such as widths of pavement and shoulders, horizontal clearances, etc., are generally not directly related to highway design speed. Table 1-3 (HDM Table 101.2) shows appropriate ranges of design speeds selected based on various types of facilities, place types, and conditions.

Table 1-3 Vehicular Design Speed (HDM Table 101.2)**Table 101.2****Vehicular Design Speed**

Facility Type	Design Speed (mph)
LIMITED ACCESS HIGHWAYS	
Freeways and expressways in mountainous terrain	50-80
Freeways in urban areas	55-80
Freeways and expressways in rural areas	70-80
Expressways in urban areas	50-70
CONVENTIONAL HIGHWAYS ⁽²⁾	
Rural	
Flat terrain	55-70
Rolling terrain	50-60
Mountainous terrain	40-50
Main Streets – Cities, Towns, and Community Centers	30-40
Urban	
Arterials – Throughways	40-60
Arterials - Main Streets/Rural and Suburban Main Streets	30-40
Downtowns and City Centers	30
LOCAL FACILITIES	
(Within State right of way)	
Facilities crossing a freeway or expressway, connecting to a conventional highway or traversing a State facility	AASHTO ⁽¹⁾
Facilities connecting to a freeway or expressway	35 ^B /45 ^U
	B=Boldface Standard U=Underlined Standard

(1) If outside of State right of way and no specific local standards apply, the minimum design speed shall be 30 miles per hour.

(2) For conventional highways eligible or designated as State scenic highways, see Index 109.2.

Operating speed is the speed at which drivers are driving on a road under free-flow conditions. It is a selection by driver affected by factors such as road geometry, traffic conditions, vehicle, and their own behavior. Operating speed is a statistical measurement of individual vehicular speeds, i.e. average, pace, critical, or 85th percentile speeds. Operating speed needs to be defined with a specific measurement to be meaningful for certain situations. Operating speed reflects the consistency of design speed (road design) and speed limits.

Speed limits, or posted speed limits, are legally enforceable. It indicates the “maximum” speed legally permitted under optimum conditions.

Fitzpatrick et al. pointed out in the National Cooperative Highway Research Program (NCHRP) Report 504 (Design Speed, Operating Speed, and Posted Speed Practices) (Fitzpatrick et al., 2003) that, “a design process is desired that can produce roadway designs that result in a more harmonious relationship between the desired operating speed, the actual operating speed, and the posted speed limit.” It would be desirable

to have strong relationships between design speed, operating speed, and posted speed limit, which could be used to design and build roads that would produce the speed desired for a facility. But NCHRP Report 504 found out that “While the relationship between operating speed and posted speed limit can be defined, the relationship of design speed with either operating speed or posted speed cannot be defined with the same level of confidence” and “relationship between the design speed and the actual operating speed of the roadway is weak or changes with the magnitude of the design speed.” This can be contributed to the reason that “the current design process does not ensure consistent roadway alignment or driver behavior along these alignments” (Fitzpatrick et al., 2003), which geometric design practitioners and researchers are increasingly recognizing, as the report pointed out. The results from this study demonstrated that wide ranges of speeds are present even when same group of characteristics are clearly associated with roadways at different sites, which indicates the influences of roadway characteristics on speed are complex. Variables observed by the study that show some sign of influence on the 85th percentile free-flow operating speed on tangents include signal density, access density, median type, parking along the street, and pedestrian activity level.

Driver behavior, as already pointed out above, is one of the key elements that the current design process does not ensure to be consistent along roadways. A significant percentage of drivers exceed speed limits. According to NCHRP Report 504, the data analyzed within the study “showed that between 37 and 64 percent of the free-flow vehicles on rural roads are at or below the posted speed limit. The percent of vehicles at or below the speed limit is much lower for suburban/urban roadways (on the order of only 23 to 52 percent).” In other words, 36 to 63% of drivers exceed posted speed limit on rural roads, and 48 to 77% of drivers exceed posted speed limit on suburban/urban roads, based on these data. For non-freeway facilities, the report found out that a much larger percentage of vehicles exceed the speed limit on suburban/urban roadways than on rural roadways. For lower speed zones, the report stated that “For the 30-, 35-, and 40-mph ... speed limits, only 28, 22, and 32 percent, respectively, of the vehicles on the road were at or below the posted speed limit” which translates to 68 to 78% of drivers exceed speed limits. In a 2022 national survey conducted by the AAA Foundation for Traffic Safety, about half of respondents indicated they had driven 15 mph over the speed limit on a freeway at least once in the past month, and 35% drivers reported exceeding the speed limit by 10 mph on a residential street (AAA Foundation for Traffic Safety, 2023).

The fact that operating speeds are generally inconsistent and not correlated with the associated design speeds suggests that the design does not introduce strong physical and visual constraints to influence drivers to comply with the target or anticipated operating speeds.

Between operating speed and posted speed limit, the NCHRP Report 504 found the strongest statistical relationship between operating speed and posted speed limit for roadway tangents, which is not unexpected since the 85th percentile speed is the predominant factor used in setting speed limits for majority of agencies. As the 85th

percentile speed increases, posted speed increases. Data available within the report also support the observations that “It is generally acknowledged that 85th percentile operating speeds exceed posted speeds.... Many of these reports have also demonstrated that the 50th percentile operating speed either is near or exceeds the posted speed limit.” (Fitzpatrick et al.,2003).

Self-enforcing roadway concepts (FHWA, 2018) have been proposed as speed management strategy to achieve drivers' speed selection in harmony with the intended speed limits. A self-enforcing road is a roadway that is planned and designed to encourage drivers to select operating speeds that closely match target speeds. The concepts aim to change driver behavior by using geometric elements resulting in operating speeds commensurate with the intended roadway purpose, including the adjacent land use.

1.6 Contextual Planning and Design

In the 2021 Director's Policy on Complete Streets (DP-37), Caltrans committed to the design and development of comfortable, convenient, and connected complete streets facilities for people walking, biking, and taking transit or passenger rail. Caltrans Design Information Bulletin Number 94 (DIB-94) was issued in accordance with DP-37 to provide guidance for the scoping and design of Complete Streets projects on the SHS. DIB-94 provides new flexibility in the design of context-sensitive facilities that serve travelers of all ages and abilities. This design guidance takes a context-based approach, since the most successful streets respond to the various aspects of their context. Contextual design includes consideration of many factors including, but not limited to, varied user groups, place type, land use, community needs and destinations, geography, topography, community input, and environment. Contextual design acknowledges different road characteristics influence drivers' behavior, including how fast drivers choose to drive.

It's critical to be proactive by planning and designing roadways so that the context guides drivers to operate at speeds that are safe and targeted, rather than exceed target operating speed or disregard posted speed limits. Incorporating particular design elements during project planning and design is fundamental to influence operating speeds, achieve safe speed, and reach harmony. Setting a speed limit or selecting a proposed operating speed “without design elements to encourage travel at the slower speed can result in higher than desired operating speeds.” notes DIB-94.

Chapter 2 Regulatory and Advisory Speed Limits

2.1 Overview

When an E&TS indicates the statutory maximum or prima facie speed limits are not applicable for the existing conditions, the speed limits shall be adjusted according to the E&TS findings. Any changes to the statutory maximum or prima facie speed limits will result in a speed zone with signs showing the speed that applies in that zone.

The following types of speed limits are discussed in this chapter:

- Regulatory
- Temporary Traffic Control Advisory and Regulatory Speeds (Construction Zones)
- School Zone
- Business District
- Business Activity District
- Truck
- Private Facilities
- Special Weather Conditions
- Variable

2.2 Regulatory Speed Zones Established by an Engineering and Traffic Survey

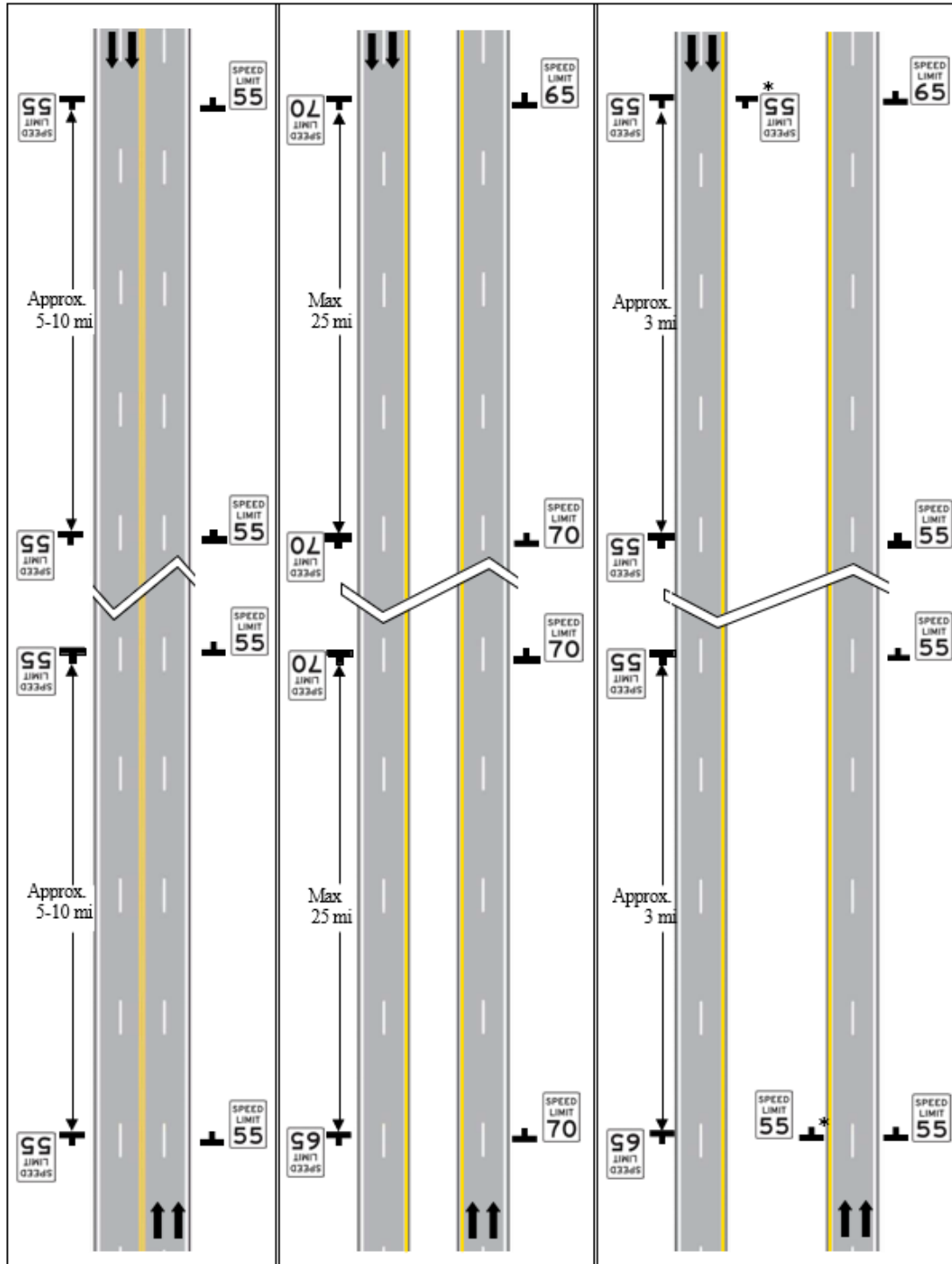
2.2.1 Regulatory Speeds

Regulatory speed zones established by an E&TS should be applied to locations and sections of highways where the statutory maximum or prima facie speed limits are not appropriate for local conditions.

Signs for regulatory speed zones shall be from the R2-1 series with proper size, text, and color as per the CA MUTCD.

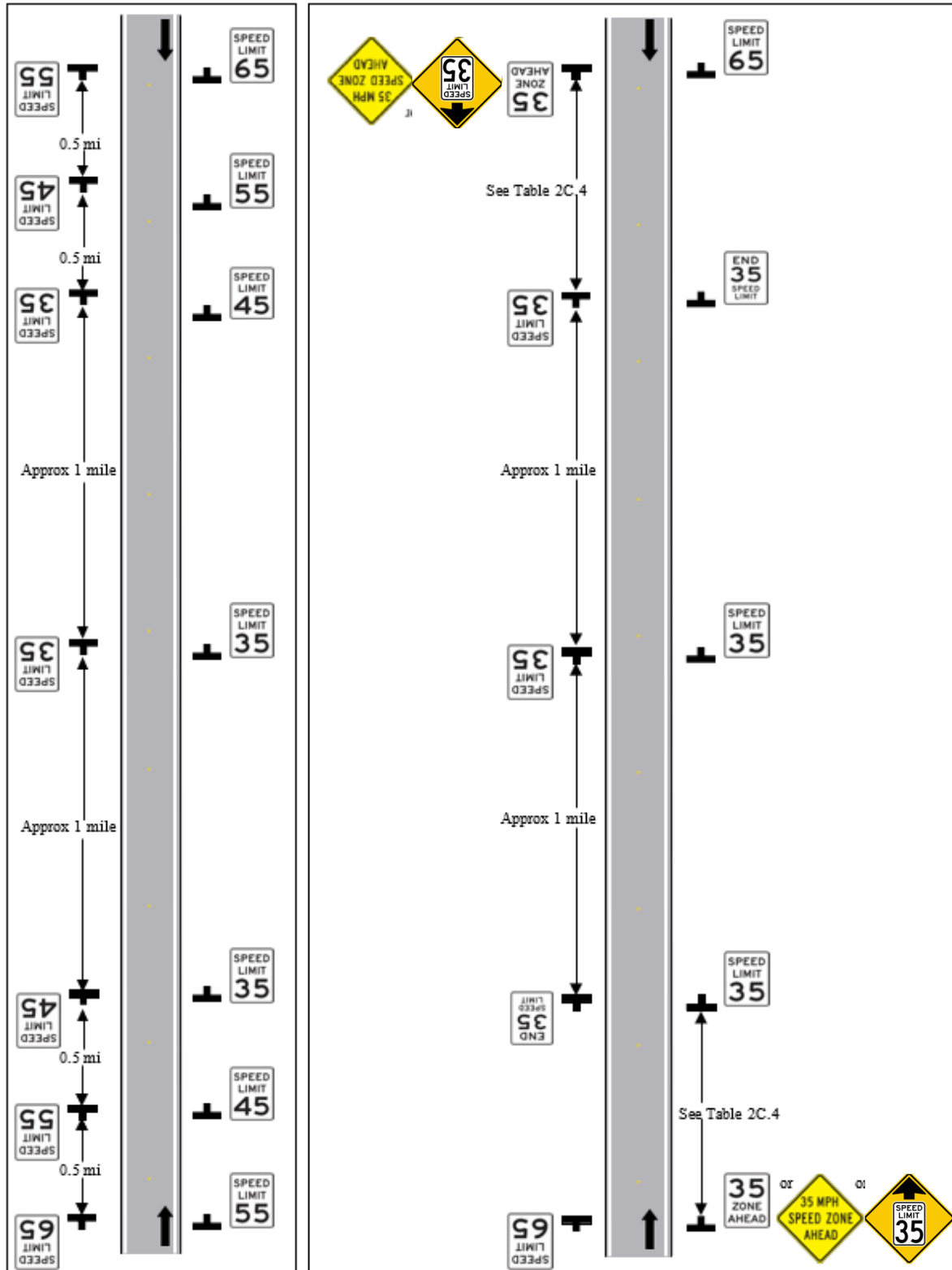
Figure 2-1 Speed Limit Sign**R2-1**

Figures 2-2 and 2-3 illustrate the typical location and frequency of signs for regulatory speed zones and transition zones, respectively. Distances shown between speed limit signs are examples and may differ, based on local conditions.

Figure 2-2 Regulatory Speed Zone Sign Placement Example

*Optional – place on left shoulder only where the median is of sufficient width to permit sign maintenance without lane closures

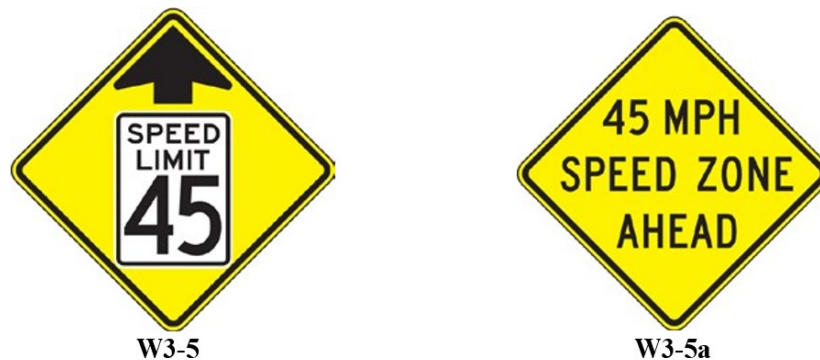
Figure 2-3 Transition Zone Sign Placement Example



2.2.2 Support Signs When Highway Approaches Incorporated Municipalities

Speed zoning on highway approaches to municipalities is applied near cities and towns where built-up businesses and residential areas may require speeds below the statutory maximum speed limit for safe operation. Stepping down from the maximum speed limit should be supported by the changes in driver behavior as reflected by the measured 85th percentile speed determined by a spot speed survey. Stepping down from highway speed to a reduced speed limit can be done in 5 to 10 mph increments as discussed in Section 3.4. Figure 2-4 shows Reduced Speed Limit Ahead Advisory Signs.

Figure 2-4 Reduced Speed Limit Ahead Advisory Signs



2.2.3 Minimum Speeds

CVC Section 22400 states that no person shall drive upon a highway at such a slow speed as to impede or block the normal and reasonable movement of traffic unless the reduced speed is necessary for safe vehicle operation, because of a grade, or in compliance with law. It also states that no person shall bring a vehicle to a complete stop upon a highway to impede or block the normal and reasonable movement of traffic unless the stop is necessary for safe operation or in compliance with law.

Signs used for a minimum speed limit may be placed when slow speeds on any part of a state highway consistently impede the normal and reasonable movement of traffic as determined by an E&TS. Using minimum speed limits is not a common practice in California.

2.2.4 Signs on the State Highway System

Caltrans shall erect and maintain speed limit signs on state highways based on the results of an E&TS or as provided by statute.

2.2.5 Advisory Speeds

Advisory speeds are recommended speeds for curves, intersections, or other locations where physical conditions of the roadway restrict operating speeds to less than the

maximum legal speed or posted speed limit. Figure 2-5 illustrates warning signs with advisory speeds.

Signs for advisory speed zones shall be from the appropriate series with the proper size, text, and color as per the CA MUTCD.

Figure 2-5 Example Advisory Speed Signs



2.2.6 Regulatory Versus Advisory Speeds

Advisory speeds are posted on black on yellow signs. Advisory speeds are determined primarily by the physical and design features of the roadway. They advise the driver of a roadway condition more comfortably traversed at a speed lower than the posted speed limit. They are posted in advance of the pertinent roadway condition and are only relevant to that condition.

Regulatory speed limits are posted on black on white signs. Although regulatory speed limits are influenced by physical and design factors, they are primarily determined by existing free flow traffic speeds and the maximum speed limit laws. Regulatory speed limit signs only represent the maximum speed that may be driven under ideal conditions. It is the responsibility of the driver to reduce their speed if the conditions require it.

From an enforcement standpoint, when a regulatory speed zone is established and signs are posted, the speed values on the signs are the maximum lawful speed.

A driver may not be cited only for exceeding the posted value of an advisory speed sign. Still, if the driver encounters or causes an issue while exceeding the posted

advisory speed, they can be cited for breaking CVC Section 22350 the basic speed law, which prohibits driving at a speed that is greater than reasonable or prudent.

2.2.7 Advisory Speeds in Speed Zones

Advisory speeds may be posted within speed zones to notify drivers of a recommended operating speed to negotiate existing roadway features. Refer to CA MUTCD Chapter 2C -- WARNING SIGNS AND OBJECT MARKERS for applications using advisory speeds.

If an advisory speed is within a speed zone, it is unnecessary to lower the regulatory speed limit to conform to the advisory speed. Per CVC Section 22358.5 physical conditions such as width, curvature, grade and surface conditions, or any other condition readily apparent to a driver, absent other factors, would not require special downward speed zoning. In these situations, it may be appropriate to use advisory signs to provide advance notice of certain conditions to the drivers.

When posting signs for the speed zone, avoid placing the regulatory speed limit signs too close to the advisory speed limit sign to reduce the potential for driver confusion. Regulatory speed signs should not be placed between an advisory speed sign and the location where the advisory speed applies.

An advisory speed within a speed zone should not be posted for a value higher than the posted speed limit of the speed zone. If drivers are regularly driving faster than the regulatory speed limit, it may be necessary to use an advisory speed that is the same value as the regulatory speed limit and an E&TS may be required to evaluate the speed zone.

2.3 Temporary Traffic Control Advisory and Regulatory Speed Limits

Temporary Traffic Control (TTC) speed zones are temporary speed zones used in TTC zones during construction, permit work, traffic incident management or highway maintenance operations. Refer to CA MUTCD Chapter 6C Temporary Traffic Control Elements.

The Caltrans Construction Work Zone Speed Limit Reduction Manual prepared by Caltrans Division of Construction and Division of Traffic Operations states that a 10-mph speed limit reduction is required in work zones on the SHS. Completing the Construction Work Zone Speed Limit Reduction Determination form (CEM-1301) is required for all projects on the SHS. Any variance to this policy must be documented on the CEM-1301 form and approved by the Deputy District Directors of Traffic Operations and Construction. CVC Section 22362 restricts the reduced speed limit to no less than 25 mph and cannot be applied to existing speed zones below 35 mph.

The CEM-1301 form allows a speed limit reduction greater than 10 mph if conditions warrant. Here, the speed limit must be "stepped down" in increments of 10 mph. For example, on a 55-mph highway application of a chip seal where the engineer

determined that work zone speed limit reduction to 35 mph is appropriate, then the speed limit should be stepped down from 55 mph to 45 mph to 35 mph. Justification for decreasing speed over 10 mph must be documented on the CEM-1301 form.

On applicable projects requiring speed limit reductions, Standard Special Provision Section 12-4.02C (12) "Construction Work Zone Speed Limit Reduction" must be included in the project package.

For temporary speed zones in construction work areas under local jurisdiction, the City or County Engineer (or City/County Traffic Engineer) may develop procedures or forms similar to those used by Caltrans.

2.3.1 Advisory Temporary Traffic Control Speeds

The advisory speed in TTC zones can be adjusted based on the prevailing conditions, allowing for multiple advisory speeds to accommodate different circumstances within the project area. The advisory speed plaques (Figure 2-6) are intended to supplement warning signs to decrease speed at a particular location. To preserve its effectiveness, the Advisory Speed (W13-1P) should not be used unless an immediate condition exists applicable to all motorists. At no time should the W13-1P be used by itself as a general application of a slower speed limit in any part of a TTC zone. The W13-1P plaque must be used in combination with a construction roadway condition advanced warning sign to indicate a recommended speed through the TTC Zone. A W3-5a, should be used to inform road users of a reduced speed zone ahead of where the speed limit is being reduced.

Figure 2-6 Temporary Traffic Control Advisory Signs



2.3.2 Temporary Traffic Control Speed Limit in Construction Work Zones

CVC Section 21367 allows the agency with jurisdiction over a highway the authority to regulate the traffic by warning signs, lights, appropriate control devices, or by a person or persons controlling and directing the flow of traffic whenever the traffic may endanger the safety of workers, or the work would interfere with or endanger the movement of traffic through the area. CVC Section 22362 states "It is prima facie a

violation of the basic speed law for any person to operate a vehicle in excess of the posted speed limit upon any portion of a highway where officers or employees of the agency having jurisdiction of the same, or any contractor of the agency or his employees, are at work on the roadway or within the right-of-way so close thereto as to be endangered by passing traffic. This section applies only when appropriate signs, indicating the limits of the restricted zone, and the speed limit applicable therein, are placed by such agency within 400 feet of each end of such zone."

Below are the two types of speed limit reduction in construction work zones.

1. Temporary Construction Work Zone Speed Limit Reduction

Temporary construction work zone speed limits are regulatory speed limits generally established in stationary work zones for construction or maintenance operations to enhance worker and motorist safety. These speed limits are intended for use when the work area and workers are next to traveled lanes open to traffic.

Construction work zone speed limit reduction is required for lane closures on freeways, expressways, and multilane conventional highways. Construction work zone speed limit reduction is required for shoulder closures when workers and equipment are actively working on the shoulder area immediately next to traffic lane.

Exceptions to reducing the speed limits in construction work zones must be documented in the Construction Work Zone Speed Limit Reduction Determination form (CEM-1301). One or more of these conditions should be met for an exception to reducing the speed limit in a Construction Zone:

- No closures required for the project
- Lane closures on conventional highways using reversing traffic control
- Lane closure lengths less than ½ mile
- Short duration closures less than 1-hour
- Moving lane closures
- Ramp closures
- Shoulder closures where no workers or equipment will be working on the shoulder immediately next to a traffic lane
- Lane closures where no workers or equipment will be working within the closed lane

Construction work zone speed limit reduction should not be used for short duration lane closures due to increased worker exposure associated with managing the additional traffic control devices.

Use of construction work zone speed limit reductions for short length closures is discouraged, due to potential confusion of the traveling public, potential enforcement issues, and practicality.

The construction work zone speed limit reduction should be posted only for active work areas where workers are present. Overuse of the work zone speed limit reduction will reduce the effectiveness, so it should be prudently applied where the motorist can

perceive the need to reduce speed. During periods of inactivity or when the temporary traffic controls are removed from the roadway, the temporary speed limit signs must be covered or removed. This requires the installation of speed limit signs and covering existing speed limit signs at the beginning of the work shift and removing signs and uncovering existing signs at the end of the shift.

2. Construction Work Zone Speed Limit Reduction 24 Hours a Day 7 Days a Week

When roadway physical conditions, in a construction zone, affect traffic safety around the clock (twenty-four seven), implement the 24/7 construction work zone speed limit reduction. Roadway physical conditions that impact traffic around the clock include, but are not limited to:

- Major changes in roadway geometric alignment (such as median crossover that results in counter flow traffic or other geometric alignment conditions that affect the highway design speed)
- Long term lane closures (24/7 reduction in the number of lanes)
- Reduced lane widths (less than 11 feet)
- No shoulders
- Temporary barriers next to traffic (no shoulders)
- Pavement conditions, including edge drop-offs, tapered notch wedge, cold planed pavement surfaces and chip seals
- Multiple construction entrances and egress locations, including median access locations
- Stopping and corner sign distance restrictions, including intersections and entrance ramps

Justification for 24/7 reductions in speed limit in a construction zone due to a roadway condition not included in the list above must be documented on the Construction Work Zone Speed Limit Reduction Determination form.

The limits for the construction work zone speed limit reduction 24/7 must match the limits of the work zone, or portion of the work zone where conditions warrant the speed reduction. Do not extend the reduced regulatory speed limits beyond the actual work zone limits.

When lowering speed limits on freeways with a posted speed limit of 70 mph, consider the amount of truck traffic and number of lanes available for use. If only one lane is available for use, the speed limit should be reduced to 55 mph, the maximum speed allowed for trucks.

Consider increasing supplemental funds for Construction Zone Enhanced Enforcement Program (COZEEP) for additional CHP units to enforce the construction work zone speed limit reduction within the speed limit reduction zone. Refer to Section 2-215 of the Caltrans Construction Manual for guidelines on implementing COZEEP in construction work zones. If a 24/7 construction work zone speed limit reduction is required, additional patrolling may be required when work is not actively in progress to encourage a speed reduction of the traveling public.

Temporary signs shall be removed or covered immediately following completion of the work or change in conditions for which they were installed.

Figure 2-7 Temporary Traffic Control Regulatory Signs



2.3.3 Request for Maintenance Regulatory Temporary Traffic Control

Speed limit reduction is optional for maintenance work zones due to their short duration, usually from an hour to several days. Evaluate the benefits of reducing the speed limit against the risk of worker exposure to place the speed limit reduction signage. Consider speed limit reduction in maintenance work zones where it has been determined to have a beneficial impact, such as areas with a high frequency of close calls or incidents where excessive speed was a factor. See Appendix B.1 for an example request for temporary traffic control speed zone.

2.3.4 Signs Installed by the Contractor

The resident engineer shall verify that the contractor does not erect signs of their own design and/or speed limits of their choosing when installing contractor furnished signs associated with speed limit reduction on a construction project. The resident engineer will provide directions for the design and placement of speed limit signs. The contractor has no authority over the design or location of speed limit signs. The resident engineer should consult District Traffic Operations if questions arise.

2.4 School Zones

CVC Section 22352 establishes the prima facie speed limit at 25 mph in a school zone when children are present, effective until January 1, 2031, and 20 mph in a school zone starting January 1, 2031, when any of the following apply:

- (1) A school speed limit sign with attached beacons states "speed limit 20 when flashing" and the beacons are flashing.
- (2) A school speed limit sign states "children are present" and children are present.
- (3) A school speed sign with specific hours determined by the local jurisdiction.

In the meantime, local authorities have the option, through ordinance or resolution, to determine and declare a 20-mph prima facie speed limit within school zones, before January 1, 2031.

A local authority may, by ordinance or resolution, determine and declare a 15-mph speed limit based on an engineering and traffic survey, with an exception for highways in residential districts with a posted speed limit of 30 mph or slower, with a maximum of two traffic lanes, in school zones per CVC section 22358.4.

School zone speed limit should be used for school zones when approaching or passing a school building or the grounds contiguous to a highway and posted with a standard "SCHOOL" warning sign. "When Children Are Present" is defined in CVC Section 22352 as "while children are going to or leaving the school, during school hours or during the noon recess period." The prima facie limit shall also apply when approaching or 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.

Increased school pedestrian crossing activity is the primary basis for reduced school speed zones. Additionally, irregular traffic patterns and other pedestrian movements during student drop-off and pick-up times should be included in the evaluation of the "School Zone."

2.4.1 Planning for School Areas

Agencies should make sure all appropriate traffic control devices are used to prevent conflicts in school areas. Contact with school officials can help agencies learn of proposed building programs or other issues at an early stage, allowing for more prompt implementation of solutions. When proposed building plans are known, it may be possible to suggest access points that will prevent future conflicts. Additionally, the installation of necessary safety and traffic control devices can be scheduled to coincide with their required timeframe.

While an E&TS is not required to establish the prima facie speed limit of 25 mph in a school zone, an E&TS is required to establish speed zone in and around the location when the school zone is not active. E&TS may also determine the boundaries of the

area affected by the school zone. More traffic control devices may be necessary within this expanded area.

2.4.2 School Zones under Local Authority

Per CVC Section 22358.4 (a), whenever a local authority determines upon the basis of an E&TS that the statutory prima facie speed limit is more than is reasonable or safe, the local authority may, by ordinance or resolution, declare a speed limit of 15 mph, based on an engineering and traffic survey.

Such ordinance or resolution shall not be effective until suitable speed limit signs are erected upon the highway. In the case of a state highway, until the ordinance or resolution is approved by Caltrans and the appropriate signs are erected upon the highway.

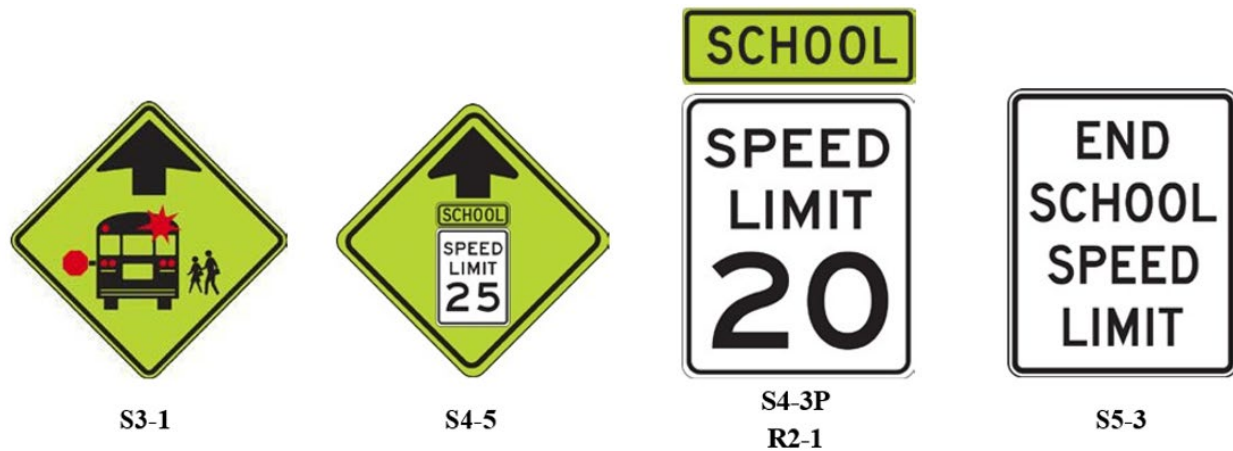
In addition, per CVC Section 22358.4 (b) a local authority may declare a 15-mph speed limit within 500 feet of a school building or school grounds and extended 25-mph speed limit within 500 to 1000 feet from a school or school grounds. If the local authority declares these speed limits by ordinance or resolution, they must fulfill these criteria:

- Street (or highway) is in a residential district.
- School grounds are not separated from the street (or highway) by a fence, gate, or other physical barrier.
- Street (or highway) has no more than two through traffic lanes (one in each direction or two in one direction).
- Street (or highway) outside of a school zone has a posted speed limit no greater than 30 mph.

The 15-mph reduced school zone speed limit and/or an extended 25-mph school zone speed limit shall not be effective until school warning signs and speed limit signs are erected upon the highway. In the case of a state highway, until the ordinance or resolution is approved by Caltrans and the appropriate signs are erected upon the highway.

2.4.3 Signs for School Areas

See CA MUTCD Part 7, Traffic Control for School Areas for a complete discussion of school area traffic control and CA MUTCD Part 4 for Flashing Beacons in School Areas. CA MUTCD figures 7B-5(CA), 7B-102(CA), 7B-103(CA), and 7B-104(CA) show examples of how speed limit signs for school zones are set.

Figure 2-8 Signs for School Areas

2.4.4 Intervals of Operation

Generally, the speed limit indicated on the school sign assembly is in effect only while children are going to or leaving the school either during school hours or during the noon recess period. The intervals of operation of any flashing beacons on the school zone speed limit assembly may be extended or revised for school events as mutually agreed upon by the school district and the entity responsible for the flashing beacons' operation.

2.5 Business District

Under CVC Section 22352, a local agency may adopt an ordinance or resolution to declare a 25-mph prima facie speed limit, on a highway under their jurisdiction identified as a "business district" under CVC Section 235. However, on the SHS, CVC Section 22354 requires Caltrans to conduct E&TS to establish prima facie speed limits below 65 mph. On the SHS, any ordinance or resolution adopted by local agency to declare a prima facie speed limit including the situation based on a "business district" must be approved by Caltrans and be supported by an E&TS to be effective. If a prima facie speed limit in a "business district" on the SHS is established without the justification by an E&TS, enforcement of the speed limit, if using radar or electronic measuring devices, would constitute a "speed trap" under CVC Section 40802.

2.6 Business Activity District

Business Activity District in CVC Section 22358.9 is an additional class of location eligible for a prima facie speed limit. The intent is to increase flexibility in setting speed limits in locations like urban villages, neighborhood downtowns, and other business-oriented locations without having to justify the speed limit with an E&TS. Under CVC Section 22358.9, Caltrans may or a local authority may, by ordinance, declare a 25 mph or 20 mph speed limit on a roadway segment that is not a freeway and is next to a business

activity district when appropriate speed limit sign is posted and when these conditions are met.

Per CVC Section 22358.9 (a), the following conditions must be met:

- Not a freeway
- A maximum of four traffic lanes.
- A maximum posted 30 miles per hour prima facie speed limit immediately prior to and after the business activity district, if establishing a 25 miles per hour speed limit.
- A maximum posted 25 miles per hour prima facie speed limit immediately prior to and after the business activity district, if establishing a 20 miles per hour speed limit.

Additionally, under CVC 22358.9 (b), the roadway must also meet at least three of the four requirements:

- No less than 50 percent of the contiguous property fronting the highway includes retail or dining commercial uses, including outdoor dining, that open directly onto sidewalks next to the highway.
- Parking, including parallel, diagonal, or perpendicular spaces located alongside the highway.
- Traffic control signals or stop signs regulating traffic flow on the highway, at intervals of no more than 600 feet.
- Marked crosswalks not controlled by a traffic control device.

2.7 Reduced Truck Speed Limit on Descending Grades

Highways with long descending grades with a recorded history or concerns of larger runaway vehicles may be a candidate location for posting truck speed limit signs for trucks travelling downhill. Avoid posting signs on descending grades of less than 1 mile since the deceleration of vehicles due to braking action generally provides enough control on these short descending grades. A truck is defined in CVC Section 22406 (a) as a motortruck or truck tractor having three or more axles or any motortruck or truck tractor drawing any other vehicle. Vehicles which meet this description and have a manufacturer's gross vehicle weight rating of 10,000 pounds or more are subject to a truck speed limit.

To establish a downhill truck speed limit, a strip map is needed to show the length and gradient of the highway's vertical alignment. Speed data of vehicles with three axles or more, collected on the downgrade, is used to establish the 85th percentile for truck speeds.

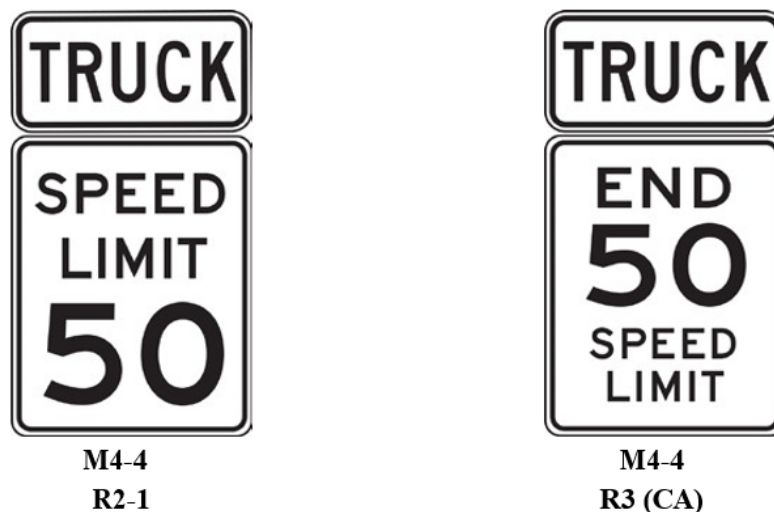
Speed data for truck speed limits should be presented on the same form used for other speed surveys. An analysis of reported collisions involving trucks using these descending grade road sections is needed. Determine the 85th percentile speed and the 10-mph pace for trucks. The 10-mph pace is the 10-mph increment of speed containing the largest number of vehicles. The truck speed limit should be set at the nearest 5-mph

increment to the 85th percentile, to indicate a reasonable speed at which trucks should travel down the grade. A truck speed zone is subject to all the same criteria and conditions as a regular speed zone.

The agency responsible for the highway shall issue a standard speed zone Order for a roadway segment on SHS or local ordinance adopted by a local authority for a roadway segment under local jurisdiction, that documents the need and location of the lower truck speed limit. Posting of the regulation will be by placement of a standard Speed Limit (R2-1) sign with a TRUCK (M4-4) plate. Truck speed zones must meet the same conditions as any other speed zones based on E&TS. They must be reevaluated every 5 and/or 7, and 14 years to remain valid.

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

Figure 2-9 Truck Plaque with Speed Limit Signs



As an alternative, the engineer may consider posting Advisory signs notifying truck drivers of the grade conditions and recommended speeds to safely maintain control. The truck driver, though not bound by a speed lower than the truck maximum speed of 55 mph or other regulatory speed limits established based on E&TS, is however, bound by CVC Section 22350 requiring the truck driver to only drive as fast as the conditions warrant. Placing adequate Advisory signs, recommending a lower truck speed along with the curves and/or percentage of grade, places the responsibility of the driver to slow down to safely navigate the area.

2.8 Private Roads

The CA MUTCD and Caltrans standards and specifications for traffic control devices shall not apply to privately owned and maintained roads or commercial establishments,

unless the city or county enacts an ordinance or resolution to this effect. Refer to CVC Sections 21100, 21100.1, 21107, 21107.5, 21107.6, and 21107.7.

Private roads are roads separated from access by the general public by physical barriers and need not meet the speed zone criteria of this manual.

Indian Reservation Roads are public roads that provide access to, from and within Indian reservations, Indian trust land, and restricted Indian land. Tribal governments have control over these roads and have authority to set and enforce speed limits on their roads.

Privately maintained roads open to the general public are subject to the conditions of this manual. Publicly maintained roads found in parks and universities are subject to the conditions of this manual, unless local law enforcements are contracted to provide enforcement services.

Privately owned parking areas, including the driving aisles within those parking areas, shall not be considered "open to public travel" for purposes of CA MUTCD applicability. All publicly owned parking areas and only those privately owned parking areas where the particular city or county has enacted a resolution to this effect, including the driving aisles within those parking areas, shall be subject to CA MUTCD applicability.

2.9 Variable Speed Limits (VSLs)

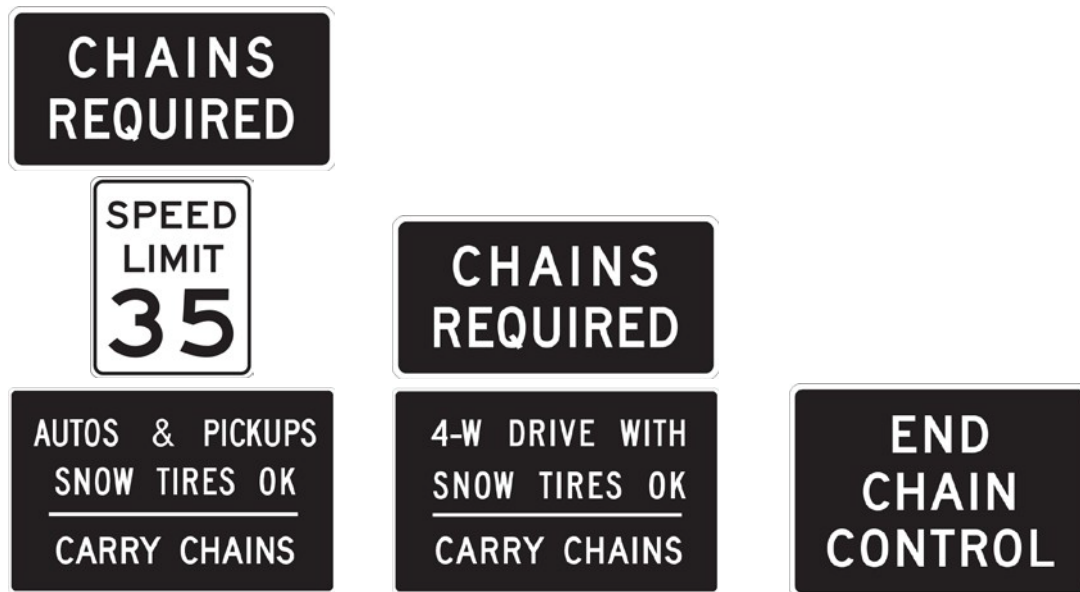
On the occasion when the establishment of VSLs may assist with the safe and orderly movement of traffic on a freeway segment, Caltrans determines, based on an E&TS, whether to implement variable speed limits. As per CVC Section 22355, Caltrans may erect, regulate, and control signs upon the state highway to display different speeds at various times of the day or night. These signs shall be of enough size and clarity to give adequate notice to drivers of the applicable speed limit(s).

However, lowering the posted speed limit during congested periods can impose unnecessary limitations on vehicles during uncongested times. Implementing VSLs based on the time of day can be confusing for the drivers and challenging to enforce. A FHWA report, Synthesis of Variable Speed Limit Signs (FHWA-HOP-17-003), pointed out that many VSLs cannot be enforced as intended due to various reasons (see Appendix Section D.1).

2.10 Setting a Speed Limit at 70 mph

CVC Section 22356 pertains to the increase of freeway speeds to 70 mph. Before implementing a 70-mph speed limit, Caltrans must consult with the CHP and obtain written approval from both the CHP Area Commander or Commissioner and the Caltrans District Director where the increase is requested. When an E&TS shows a speed greater than 65 mph on an existing facility, which is subject to a maximum speed limit of 65 mph, would facilitate the orderly movement of traffic and would be reasonable and safe, the speed limit may be raised to 70 mph. On a newly constructed facility that

meets design standards, Caltrans may declare a maximum speed limit of 70 mph. See Chapter 4, section 4.4 regarding the placement of R2-1 and R6- 3(CA) and R6-4(CA) signs giving maximum statewide speed limits for various types of vehicles where speeds greater than 55 mph are posted.



2.11 Special Weather Conditions

Posted speed limits indicate maximum speeds for good weather conditions with dry pavement. CVC Section 22363 allows the posting of reduced speed limits for snow or ice conditions. Caltrans or a local authority may determine and declare speed limit of 40, 35, 30, or 25 mph whichever is most appropriate on the prevailing snow or ice conditions upon any portion of a highway. Signs including chain control assemblies (Figure 2-10) may be placed and removed as needed as snow or ice conditions vary.

Figure 2-10 Chain Control Assemblies

R76 (CA)
R2-1
R79 (CA)

R76 (CA)
R80-1(CA)

R78(CA)

2.12 Speed Limits for Functionally Classified Local Street or Road

CVC Section 40802 (b)(1) states that a city or county may set a speed limit, without the need of an E&TS for a local street or road defined as:

- A road with the functional classification designated as "local" on the "California Road System" (CRS) maps that are approved by the Federal Highway Administration and maintained by the Department of Transportation, or

- A road that primarily provides access to abutting residential property and meets the following three conditions:
 - Roadway width of not more than 40 feet.
 - Not more than one-half of a mile of uninterrupted length. Interruptions shall include official traffic control signals as defined in Section 445.
 - Not more than one traffic lane in each direction.

This allows cities and counties the opportunity to establish a reasonable speed limit on functionally classified “local” roadways without the need for extensive resources while providing law enforcement the means to monitor and cite drivers exceeding the speed limits. A city or county would identify those “local” streets or roads that meet these conditions, evaluate the facility and then, using sound engineering judgement, may declare a speed limit of 15, 20, 25, 30, 35, 40, 45 or 50 that is more than is reasonable and safe upon the portion of roadway. The city or county would issue an ordinance declaring the speed limits and the physical limits of the speed zone. As this is exempt from the “speed trap” law, the established speed limit is for perpetuity, until the governing city or county declares otherwise. No additional studies must maintain enforceability as long as the street or roadway remains classified as “local” on the CRS maps, or the 3 conditions remain in effect.

Chapter 3 Engineering and Traffic Surveys

3.1 Overview

For the court systems and the public to accept and respect the public agencies' posting and enforcement of posted speed limits, an E&TS must incorporate sound, repeatable methods conforming to the CVC and engineering principles. The following information helps public agencies to conduct and implement an E&TS meeting these purposes.

3.1.1 Scope of Survey

Under CVC Section 627, an E&TS must include engineering measurements of the prevailing free flow speeds in the proposed roadway segment, a review of the collision history, and a review of highway, traffic, or roadside conditions not readily apparent to the driver. Additional considerations based on residential and business density as well as pedestrian and bicyclist safety should also be considered for those facilities under the authority of a city or county.

3.1.2 Components of an E&TS

The documentation of the findings, an E&TS must include:

- A Speed Zone Survey data Sheet, Strip Map schematic, or Facsimile. See Appendices A.1 and A.3.
- Justification memo - Justifies the proposed speed limit for a speed zone. It shall include the limit of the speed zone, roadway characteristics, 85th percentile speeds, collision data and any conditions not readily apparent to a driver. It may also include discussion of roadside development as well as the composition and safety of the other road users. See Appendix B.8 for an example.
- Order, ordinance, or resolution. Every speed zone needs an Order or ordinance to document the speed limit. See Appendices B.3.1 and B.3.2 for examples of Orders, and Appendix B.3.3. for an example of Ordinance.

An E&TS may have multiple speed zones on the strip map, but each speed zone should have a separate justification and order.

3.2 Data Collection and Analysis

3.2.1 Equipment and Staffing

Proper equipment is essential for an accurate measurement of the free flow state of vehicles, including:

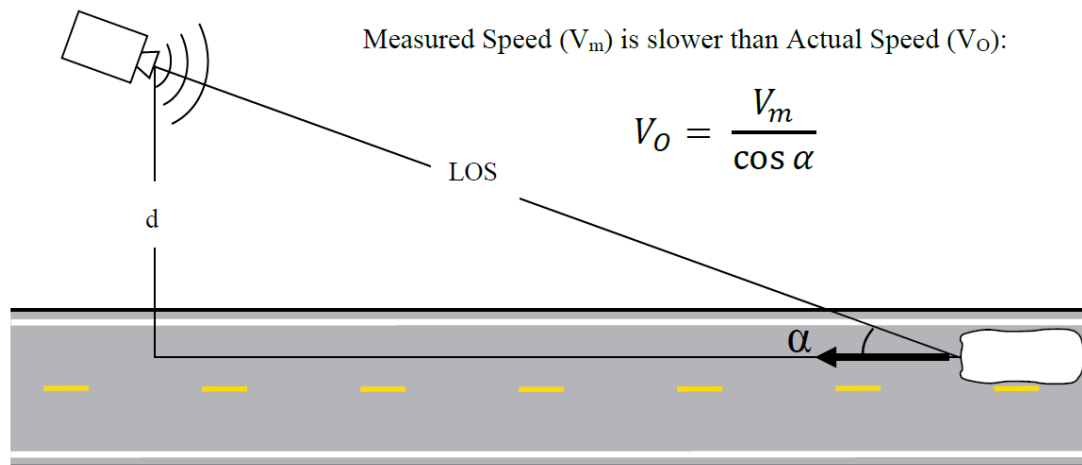
- An unmarked, plain colored vehicle. If the vehicle has amber flashing lights, the lights must be off and inside the vehicle to avoid affecting the speed of traffic.

No other special equipment can be attached to the outside of the vehicle. Marked police vehicles cannot be used.

- Portable Radar or Lidar. The accuracy of the equipment should be verified in a way to assure the vehicle speeds are being accurately measured to within 3 mph. Equipment must be calibrated in the same way as the equipment used by law enforcement personnel. Equipment should be calibrated at least once every three years.

On the SHS, only Department of Transportation employees are authorized to collect speed data. Staff collecting data should receive basic equipment training, understanding of the cosine effect, and know about which cars to include for the Speed Survey.

Figure 3-1 The Cosine Effect



The cosine effect as demonstrated by Figure 3-1 shows that the speed measured by the radar (or other device), V_m , can be an inaccurate measurement of the vehicle's actual speed, V_o , depending on the angle, α , between the radar's line of sight (LOS) and the vehicle's direction of travel. One can minimize the difference between V_m and V_o by minimizing the perpendicular distance, d , between the radar and the vehicle's direction of travel.

3.2.2 Location of Speed Measurements

The intent of the speed measurements is to determine the actual prevailing speed of unimpeded traffic. Locations should be selected where prevailing speeds represent the entire speed zone section. Uncharacteristic locations should be avoided. Locations for measurements should be chosen to minimize the effects of intersections with signal or stop control, roadway narrowing for a short period, intersections and driveways with high turning/cross movements, and any location affected by emergency personnel, roadwork, or law enforcement presence. Radar feedback signs, photo enforcement signs, cameras or other automated systems designed to affect or monitor the speed of

traffic should be turned off and covered or removed at least two weeks prior to the day of speed data collection to obtain true free flow speeds. A check for radar emitting devices in urbanized locations may be necessary to find locations without false speed readings, since radar detectors are readily available and may be in use (many stores use radar detection to open doors).

3.2.3 Selecting Vehicles Under Free Flow Conditions

Free flow is a condition of traffic where a vehicle's speed is not influenced by anything other than the roadway geometry. Some conditions that exist in a free flow state are:

- Minimum 5-second gap between vehicles. The Highway Capacity Manual defines delay as a percentage of vehicle headways less than or equal to 5 seconds.
- Appropriate distance for the vehicle to reach a steady speed not influenced by start-up or slow-down speeds due to traffic signals, stop signs, or other traffic control devices.
- Not influenced by slow vehicles such as trucks or buses.
- Not influenced by enforcement or the perception of enforcement, construction or lane closures, inclement weather or special event traffic.

3.2.4 Measuring Vehicle Speeds

Prevailing speeds collected during the spot speed surveys throughout the proposed speed zone, are used to determine the 85th percentile speed. Obtain an accurate measurement of free flow traffic speed to provide consistency for law enforcement and the court system. Guidelines for a spot speed survey include:

- Choose survey locations as necessary to represent the roadside development, pedestrian and bicycle traffic, and other physical conditions for the entire posted speed limit area.
- In urban areas, survey locations should be at 0.25-mile intervals or as necessary to ensure accurate representation of the speed patterns. Choose locations midway between traffic signals or 0.2 miles away from signals, whichever is less. If signals are so close together that free flow is never reached, the prima facie speed limits for a business or residential district may apply.
- In rural areas, survey locations may be further than 0.25 miles apart, as long as the roadside development, pedestrian and bicycle traffic, and other physical conditions remain consistent. It may be necessary only to survey at the beginning, middle and end of a zone.
- Position the data collection point to reduce the Law of Cosine effect.
- Record prevailing speeds where the speeds represent the entire speed zone section. If it is identified that speed varies on any route, the engineer must create more than one speed zone.

To evaluate for an extension only, the engineer must only sample some locations throughout the speed zone to determine if the 85th percentile has remained

relatively unchanged. A full-length survey or full E&TS is not required. Refer to Chapter 5.

- Measure the prevailing speed of 100 vehicles in each direction at each location.
- Do not combine data from multiple directions or locations to reach 100 vehicles.
- For the sample to represent the actual traffic flow, the minimum sample should be 100 vehicles in each direction at each location, and 50 vehicles on low-volume roads (roads of less than 400 vehicles annual average daily traffic). Never should the sample have less than 50 vehicles.
- Read speeds directly from the Lidar device or other electronic speed measuring devices.
- Measure prevailing speeds in both directions for all types of roadways.
- Take speed measurements during non-commute daytime period with free-flowing traffic.
- Take speed measurements under dry conditions and clear visibility.
- The surveyor and equipment cannot be in a location that will influence traffic speeds before the speed is measured. An unmarked car is necessary to avoid the appearance of law enforcement. The appearance of law enforcement will alter the speed of vehicles and free flow conditions will not exist.
- Do not identify speeds of vehicles with over two axles or towing a trailer.
- Do not take speed measurements in areas affected by changes in the roadway horizontal or vertical alignments (i.e., curves or steep grades).

3.2.5 Recording Measured Speeds

Recording the prevailing speeds of traffic is a critical part of the E&TS and is used to determine the 85th percentile speed. Law enforcement, the public, and other engineers must be able to review the data after it was taken to verify its integrity. See Appendix A.1 for an example of speed survey data and Appendix A.2 for suggested Vehicle Speed Survey Data Sheet Template.

3.2.6 Determining 85th Percentile Speed

If 100 vehicle speeds are plotted, the 85th percentile speed is determined by looking at the speed of the 15th vehicle down from the top speed. If more or less than 100 vehicles are counted, the 85th percentile speed must be determined by calculating 85 percent of vehicles counted and determining the vehicle's 85th percentile speed. For example, if 70 vehicles were counted, $0.85 \times 70 = 59.5$. The speed of vehicle 60 represents the 85th percentile. See Appendix A.1 for an example.

3.2.7 Crash Analysis

Crash data should be reported as actual crash rate (number of crashes per million vehicle miles) and average rate (number of crashes per million vehicle miles). Actual rates should use the most recent three years available or the most recent data for the

latest roadway reconfiguration. Average rates should be based on the roadway being studied.

For SHS, the collision rates are found in a Caltrans Table B. According to Highway Safety Improvement Program (HSIP) Guidelines, Table B is an on-demand report that summarizes collisions and volume data and calculates collision rates for a given time period for a highway segment, ramp or intersection location. The District traffic operations personnel can run Table B reports. An example of a Table B report is included in Appendix A.5.

For local agencies, collision rates are found in the Statewide Integrated Traffic Records System (SWITRS). SWITRS is managed by the CHP and serves as a centralized repository for a wide range of information related to traffic collisions that occur on public roadways within the state.

It is important to note that higher than average crash rates do not necessarily indicate that the posted speed limit is too high. It is crucial to investigate these locations to determine if the crashes are linked to the posted speed limit or other factors not related to speed limit. If speeding is indicated as the cause of the collisions, it is important to investigate if CVC Section 22350 Basic Speed Law, also known as driving too fast for conditions, is the cited section. There is a significant difference between speeding and reckless driving. However, it is important to keep in mind that this section does not always imply that the driver violated the posted speed limit. Congestion-related collisions occur at intersections and during stop-and-go traffic, even at speeds much lower than the posted limit.

Summarize the collision history and review for speed related issues. For state highways, Traffic Accident Surveillance and Analysis System (TASAS) Selective Record Retrieval (TSAR) reports are on-demand reports list the details of collision records and a summary of the results. A TSAR report may facilitate crash analysis. A TSAR report example is included in Appendix A.4. Using collision rates to justify a change of speed limits requires an analysis showing that the proposed speed change would reduce the collision rate or severity.

3.2.8 Evaluating Existing Conditions

In addition to the collection of speed data, the speed zone segment should be reviewed to determine local land uses, traffic control devices, number of lanes, striping details, existing posted signs and existing posted speed limits. Traffic should be observed to determine areas of conflicts, high pedestrian/bicycle movements and other driver behaviors.

Conditions not readily apparent to the motorist is a condition which, if the motorist were aware, they would adjust their speed. Motorists are aware of the width, curvature, grade, and surface conditions. CVC Section 22358.5 specifically prohibits downward speed zoning for these conditions and any other conditions readily apparent to the driver. Special events, construction, or congestion are also apparent when present. The

basic speed law CVC Section 22350 is sufficient regulation for such conditions. If readily apparent conditions are of great concern, advisory speed signs may be posted for specific roadway conditions. See Chapter 2.2.5 for a full discussion on advisory speed signs.

Non-apparent conditions include those high-volume traffic generators (vehicular, bicycle or pedestrian) not visible and access points that are not visible to the motorist. Warning signs can be placed for such conditions; however, this is not always adequate. Every attempt should be made to make the motorist aware of non-apparent conditions before a decision is made to lower the speed limit.

3.3 Developing Strip Map Schematic or Facsimile

3.3.1 Strip Map Schematic or Facsimile Example

See Appendix A.3 for examples of a strip map or facsimile showing the roadway under review for a particular E&TS.

85th percentile speeds are recorded on the strip map or facsimile at speed survey locations. As the goal is to measure free flow traffic, not every point on a roadway can be used to measure the 85th percentile speeds. However, the points where the data is taken are connected by lines on the strip map to graphically represent the progression of speed. These lines do not indicate actual 85th percentile speeds.

3.3.2 Scale for Strip Map Schematic

The scale is left at the engineer's discretion and is meant to be schematic rather than show a high level of detail of the roadway features. An aerial photograph can also be used with speed zone details shown as an overlay.

3.3.3 Information to Include on the Strip Map Schematic or Facsimile

For SHS, at minimum the following data should be included:

- Name and/or highway number of the route to be zoned
- North arrow
- Post Mile or other distance measurement
- Limits of the proposed speed zones for each direction of travel
- Adjoining speed zones
- Roads and crossroad names, number and width of lanes, indicate parking restrictions
- Appropriate notations showing type of roadside zoning and development, such as "scattered business," "solid residential," etc. Schools next 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.
- Important traffic generators, such as factories, shopping centers/malls etc.

- Uncontrolled marked pedestrian crossings including school crosswalks
- Railroad crossings if applicable – show number of tracks
- Collision rates for the zones involved
- Alignment and gradient information
- Annual average daily traffic volume
- Location of traffic signals, signs, striping details, and markings. Signs should include all regulatory signs, advisory curve warning signs, and school signs. Guide signs may be shown to indicate city limits.
- Distinction between divided and undivided sections of the roadway
- Areas where CVC Section 22352 Prima Facie by Statute speeds are being used
- Plotted 85th percentile and lower limit of pace speeds at locations taken showing speed profile
- City and County jurisdictional boundaries
- PE Stamp and Date

For highways under local jurisdiction, a condensed version of documentation may be enough.

3.4 Speed Zone Design

3.4.1 Zone Length

The length of any section of roadway set for a particular speed zone should be as long as possible and consistent with changes in roadway conditions, roadside development, and land use. Speed zone or speed limit changes need to be coordinated with changes in roadway conditions, roadside development, and land use. Speed zones of less than 0.25 miles in urban areas and 0.5 miles in rural locations should be avoided. There is no limit to the maximum length of a speed zone if the speed has been found to be consistent throughout the entire length. It is recommended to create separate speed zones at City, County or other jurisdictional locations.

Speed zone transitions can be done in one of two ways. Speed limits can be stepped down in 5 or 10 mph increments or changed abruptly with "Speed Zone Ahead" warnings. If stepped down, the speed limit changes should be supported by the E&TS and be set near the 85th percentile speed. If the transition is done by changing abruptly from highway speed to city speed, place "Speed Zone Ahead" warning signs before the change. Table 2C-4 in the CA MUTCD as shown in Table 3-1 should determine the minimum distance for placing warning signs advance of the lower speed zone.

Table 3-1 CA MUTCD Table 2C-4**Table 2C-4. Guidelines for Advance Placement of Warning Signs**

Posted or 85th- Percentile Speed	Advance Placement Distance ¹								
	Condition A: Speed reduction and lane changing in heavy traffic ²	Condition B: Deceleration to the listed advisory speed (mph) for the condition							
		0 ³	10 ⁴	20 ⁴	30 ⁴	40 ⁴	50 ⁴	60 ⁴	70 ⁴
20 mph	225 ft	100 ft ⁶	N/A ⁵	—	—	—	—	—	—
25 mph	325 ft	100 ft ⁶	N/A ⁵	N/A ⁵	—	—	—	—	—
30 mph	460 ft	100 ft ⁶	N/A ⁵	N/A ⁵	—	—	—	—	—
35 mph	565 ft	100 ft ⁶	N/A ⁵	N/A ⁵	N/A ⁵	—	—	—	—
40 mph	670 ft	125 ft	100 ft ⁶	100 ft ⁶	N/A ⁵	—	—	—	—
45 mph	775 ft	175 ft	125 ft	100 ft ⁶	100 ft ⁶	N/A ⁵	—	—	—
50 mph	885 ft	250 ft	200 ft	175 ft	125 ft	100 ft ⁶	—	—	—
55 mph	990 ft	325 ft	275 ft	225 ft	200 ft	125 ft	N/A ⁵	—	—
60 mph	1,100 ft	400 ft	350 ft	325 ft	275 ft	200 ft	100 ft ⁶	—	—
65 mph	1,200 ft	475 ft	450 ft	400 ft	350 ft	275 ft	200 ft	100 ft ⁶	—
70 mph	1,250 ft	550 ft	525 ft	500 ft	450 ft	375 ft	275 ft	150 ft	—
75 mph	1,350 ft	650 ft	625 ft	600 ft	550 ft	475 ft	375 ft	250 ft	100 ft ⁶

¹ The distances are adjusted for a sign legibility distance of 180 feet for Condition A. The distances for Condition B have been adjusted for a sign legibility distance of 250 feet, which is appropriate for an alignment warning symbol sign. For Conditions A and B, warning signs with less than 6-inch legend or more than four words, a minimum of 100 feet should be added to the advance placement distance to provide adequate legibility of the warning sign.

² Typical conditions are locations where the road user must use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. Typical signs are Merge and Right Lane Ends. The distances are determined by providing the driver a PRT of 14.0 to 14.5 seconds for vehicle maneuvers (2005 AASHTO Policy, Exhibit 3-3, Decision Sight Distance, Avoidance Maneuver E) minus the legibility distance of 180 feet for the appropriate sign.

³ Typical condition is the warning of a potential stop situation. Typical signs are Stop Ahead, Yield Ahead, Signal Ahead, and Intersection Warning signs. The distances are based on the 2005 AASHTO Policy, Exhibit 3-1, Stopping Sight Distance, providing a PRT of 2.5 seconds, a deceleration rate of 11.2 feet/second², minus the sign legibility distance of 180 feet.

⁴ Typical conditions are locations where the road user must decrease speed to maneuver through the warned condition. Typical signs are Turn, Curve, Reverse Turn, or Reverse Curve. The distance is determined by providing a 2.5 second PRT, a vehicle deceleration rate of 10 feet/second², minus the sign legibility distance of 250 feet.

⁵ No suggested distances are provided for these speeds, as the placement location is dependent on site conditions and other signing. An alignment warning sign may be placed anywhere from the point of curvature up to 100 feet in advance of the curve. However, the alignment warning sign should be installed in advance of the curve and at least 100 feet from any other signs.

⁶ The minimum advance placement distance is listed as 100 feet to provide adequate spacing between signs.

Upward speed transitions are signed in accordance with the downward zoning on the opposing traffic lanes. Speeds are either increased incrementally to match the downward increments or signed "End Speed Zone" followed by the posted highway speed limit.

Example 1:

Based on observed 85th percentile speeds, a speed zone on a two-lane conventional highway through a town starts with a 55-mph zone (length 0.6 miles), followed by a 45-mph zone (length 0.5 miles), and then by a 35-mph zone (length 0.5 miles).

Example 2:

A divided freeway with a posted speed limit of 65 mph approaches a city with cross traffic and signalized intersections. The 85th percentile speeds within the city indicate a posted speed limit of 40 mph. Since it may be difficult to establish 0.5 miles or

longer speed zones with 5- to 10-mph reductions based on observed speeds on this approach, a “40 Zone Ahead” sign should be installed at a proper distance before the first “Speed Limit 40” sign.

See Figure 2-2 for general illustrations.

3.4.2 Directional Differences

The 85th percentile speeds may differ considerably by direction at some locations. Such conditions are usually caused by relatively heavy development on one side of the road. Next to the development, motorists will usually drive slower.

On divided highways with independent alignments, the speeds should conform to the 85th percentile speed in each direction, even though this may require zoning for different speeds in opposite directions.

On undivided roadways the zones in opposite directions should be the same for clarity for the driver and law enforcement purposes. If there is a difference between the 85th percentile speeds of 5 mph or more in the opposing directions, the data from both directions can be averaged to obtain one 85th percentile or the higher 85th percentile may be used to set the limit.

3.4.3 85th percentile speed, Rounding, 5 mph Speed Reduction

The 85th percentile methodology to establish a posted speed limit is a multi-step process. First, the traffic engineer analyzes the collected data and calculates the 85th percentile speed as described in 3.2.6. Then, the engineer rounds the 85th percentile speed to the nearest 5 mph increment, following standard mathematical rules, which may result in rounding up or down.

For cases in which the nearest 5 mph increment of the 85th percentile speed would result in a rounding down, the posted speed limit may be reduced by 5 mph from the nearest 5 mph increment of the 85th percentile speed in compliance with CVC Sections 627 and 22358.5. See CVC Section 22358.6 (b). If the engineer uses the 5-mph reduction, the engineer shall document the justification and conditions in the E&TS and the E&TS shall be approved by a registered Civil or Traffic Engineer. Generally, the most decisive evidence of conditions not readily apparent to the driver are collision histories. For cases in which the nearest 5 mph increment of the 85th percentile speed would result in a rounding up, the posted speed limit may be set by rounding the 85th percentile speed down to the nearest 5 mph increment. For the latter scenario, the speed limit shall be reduced no further with CVC Sections 627 and 22358.5. See CVC Section 22358.6 (c). The engineer need not provide justification for this round down in the E&TS.

Table 3-2 (CA MUTCD Table 2B-103(CA)) shows the applicability of rounding and the 5-mph speed reduction per CVC Section 627 for Caltrans and local agencies.

Table 3-2 CA MUTCD Table 2B-103(CA)**Table 2B-103(CA). Examples Showing the Applicability of Rounding and Additional Speed Reduction**

85 th -Percentile Speed (mph)	Rounding to the nearest 5 mph increment (CVC 22358.6(a))	If rounding to the nearest is up, may round down (CVC 22358.6(c))	If rounding to the nearest is down, it may additionally be lowered by 5 mph (CVC 22358.6(b))	If safety corridor or adjacent to high concentration of bicyclists & pedestrians, may additionally lower by 5 mph (CVC 22358.7)
47.5-50.0	50	45	N/A	40
45.1-47.4	45	N/A	40	35
42.5-45.0	45	40	N/A	35
40.1-42.4	40	N/A	35	30

3.4.4 Additional 5-mph Reduction under CVC Section 22358.7

CVC Section 22358.7 allows for an additional 5-mph reduction in speed limit by Caltrans or a local authority on a highway that is not a freeway based on meeting the requirements of either of the following facilities:

- Designated safety corridors
- Portion of highway adjacent to land or facility that generates high concentration of bicyclists or pedestrians

Reduction based on the facilities mentioned above cannot be combined.

CA MUTCD 2B.21 defines a safety corridor as “a roadway segment within an overall roadway network where the highest number of serious injury and fatality crashes occur.” The crash weighting factors to prioritize the locations of fatal and serious injury crashes in developing the "Safety Corridor" may include, but are not limited to, the factors included in CA MUTCD Table 2B-104(CA) (see Table 3-3). Data used to determine a safety corridor may be from the most recent E&TS performed. The crash data source may include, but is not limited to, SWITRS.

Table 3-3 CA MUTCD Table 2B-104 (CA)**Table 2B-104(CA). Safety Corridor Factors**

Category	Factors
Crash Weighting Factors to Develop One Serious/Fatal Injury Safety Corridor	▪ Crash severity: Fatal Crashes, Serious Injury Crashes ▪ Mode: Pedestrian-bicycle related crashes, vehicle/other ▪ Disadvantaged Community Status: MPO/RTPA or locally defined disadvantaged community status based on most current version of CalEnviroScreen ▪ Vulnerable Populations: Seniors (age 65 and older) and Youth (under age 15) based on the American Community Survey ▪ School proximity (within 0.25 miles) based on the California School Campus Database ▪ Systemic or Predicted Crashes
Crash Density	Each roadway segment block may be converted into ~ 0.25-mile overlapping or contiguous “corridor” segments to create a consistent unit of measurement and assess the concentration of linear patterns of crashes within a defined distance. The highest scoring (i.e., most fatal and serious injury crashes per mile) “corridor” segments within a street need to be identified and an appropriate threshold set to determine safety corridor eligibility.
Maintenance	The jurisdiction may establish a review and re-evaluation frequency for safety corridors. However, such frequency need not exceed seven years.

CA MUTCD 2B.21 defines a land or facility that generates high concentration of bicyclists or pedestrians as a “portion of the highway where one or more of any of the generators listed in Table 2B-105(CA) are present within a distance of 1320 feet.” CA MUTCD Table 2B-105(CA) (see Table 3-4) presents generators to determine land or facility that generates high concentrations of bicyclists or pedestrians.

Table 3-4 CA MUTCD Table 2B-105 (CA)**Table 2B-105(CA). Generators of High Concentrations of Bicyclists or Pedestrians**

Category	Generator
Land Use	Employment centers
	Presence of retail
	Parks, multi-use trails, and recreational destinations
	Schools/universities
	Senior Centers
	Cultural areas, entertainment space areas, or areas of community significance
	Religious facilities
	Health/medical facilities
Transit Factors	Transit stops
	Transit-Oriented Developments/Transit Priority Areas
Presence of Pedestrian/Bicyclist Infrastructure	Sidewalk presence
	Crosswalk presence
	Bikeway presence
	Nearby signalized intersections on four-way intersections
	Presence of micromobility devices such as bicycles or scooters
Demographic Factors	Presence of vulnerable groups, including children, seniors, persons with disabilities, users of personal assistive mobility devices, and the unhoused
	MPO/RTPA or locally defined disadvantaged community status
	Presence of students (all levels)
Local Data	Need identified in a safety analysis, such as a road safety audit or a formalized planning document, such as a local road safety plan

Table 3-2 (CA MUTCD 2B-103(CA)) provides examples of applying additional 5 mph speed reduction based on safety corridor or land next to high concentration of bikes and pedestrians per CVC Section 22368.7.

The total reduction in the speed limit using CVC Sections 22358.6 and 22358.7 shall not exceed 12.4 mph from the 85th-percentile speed.

3.4.5 Retaining the Currently Adopted Speed Limit or Restoring the Immediately Prior Adopted Speed Limit

According to CVC Section 22358.8, if Caltrans or a local authority, after completing a new E&TS finds that the resulting proposed speed limit is still more than is reasonable or safe, Caltrans may or the local authority may, by ordinance, retain the currently adopted speed limit or restore the immediately prior adopted speed limit. To implement CVC Section 22358.8, all these conditions must be met:

- The currently adopted speed limit or the immediately prior adopted speed limit must have been established by an E&TS.

- The roadway segment must have no additional general purpose lanes since the completion of the E&TS that established the currently adopted speed limit or the immediately prior adopted speed limit.
- Speed limit must not be reduced by more than 5 mph from the currently adopted speed limit nor below the immediately prior speed limit. For example, suppose the currently adopted speed limit is 40 mph, while the immediately prior speed limit is 30 mph. In this scenario, the local agency has the option to adopt 40 mph or 35 mph as the new speed limit. This is because 35 mph is 5 mph from the currently adopted speed limit and not less than the immediately prior speed limit of 30 mph.
- No further reduction is allowed if CVC Section 22358.8 is implemented.
- Not on a freeway.

3.4.6 Trial Runs

A “trial run” is a drive through the speed zoned section of a roadway at the chosen speed confirming if the speed is appropriate for the area. After the 85th percentile speeds and zone lengths have been selected, several trial runs should be made through the area in both directions driving at the selected speeds. This would show any irregularities in the zoning which may need adjustment.

3.5 Speed Zoning Examples

Two cases are provided in the following sections for example purposes.

Example 1

Caltrans District 3 evaluated the speed limit of Route 162 in the City of Willows, Glen County, from PM 65.87 to PM 66.80. This 0.92-mile-long speed zone traverses mostly commercial and residential areas. The highway is four-lane conventional with signalized left turn pocket on Rte. 162, in flat valley terrain. A local high school is contiguous to the highway but separated from the highway by fence and gate. Near the school there are four crosswalks located approximately at PM 66.13 and PM 66.24, respectively. Traffic signals are traffic actuated. The existing speed limit is 35 mph, except for the school zone when active.

Figure 3-2, Strip map for the speed zone, shows the following key elements:

- Total roadway width
- Number of striped lanes
- Type of division strip
- Traffic signal data
- Annual average daily traffic
- Observed 85th percentile speed
- Observed 50th percentile speed
- Observed speed pace
- Existing speed zones (currently signed)

Figure 3-2 Strip Map for Route 162 (PM 65.87 to PM 66.80)

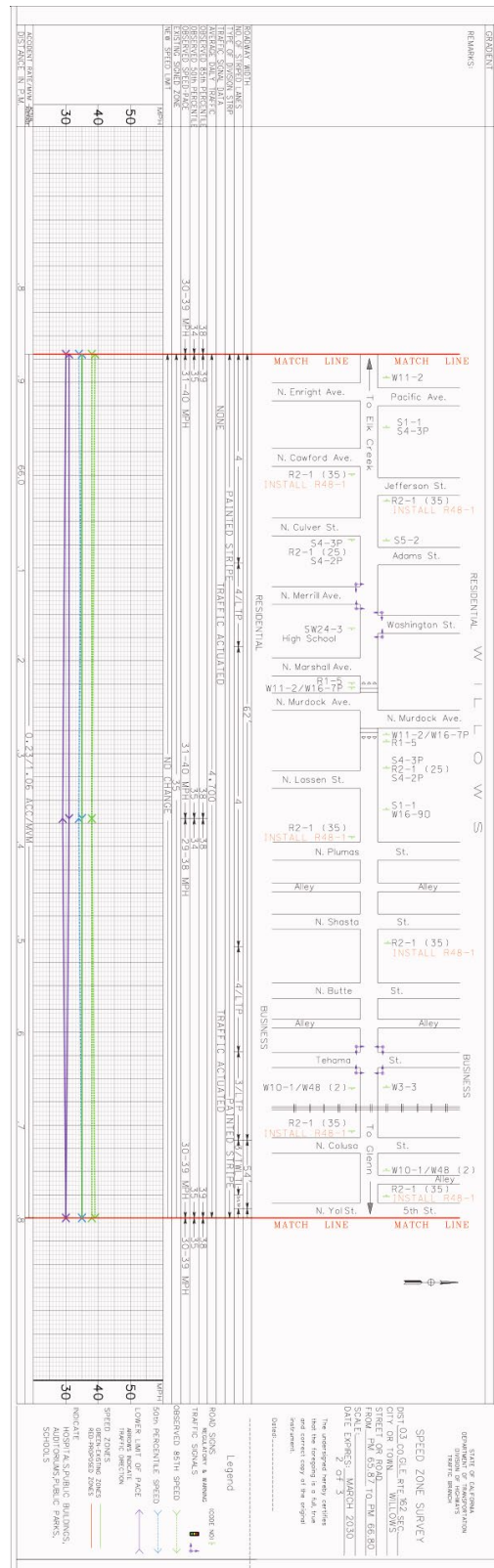


Table 3-5 presents summary data which are also shown on the strip map.

Table 3-5 Observed Speed Profile and Traffic Volumes

Data Collection Location	85th-percentile Speed (mph)	50th-percentile Speed (mph)	Observed Speed Pace (mph)	AADT (vehicle/day)
PM65.87				4700
Eastbound	38	34	30-39	
Westbound	39	35	31-40	
PM66.37				4700
Eastbound	38	35	31-40	
Westbound	38	34	29-38	
PM66.80				4700
Eastbound	39	35	30-39	
Westbound	38	35	30-39	

The actual accident rate is 0.23 accidents per million vehicle miles (ACC/MVM) and the average rate is 1.06 ACC/MVM. There was a total of 2 crashes during the 36 months prior to the E&TS. The crash data identified 1 injury, with no fatal. For each of these two crashes, the primary collision factor was failing to yield resulting in a broadside collision during dark conditions and speeding resulting in a rear end collision with injury during daylight, respectively.

Observed 85th-percentile speeds were 3 to 4 mph higher than the existing speed limit. In accordance with CVC Section 22358.6(a), the 85th-percentile speeds, ranging from 38 to 39 mph, are rounded to the nearest 5 mph increment, which results in a calculated 85th percentile speed limit of 40 mph. However, according to CVC Section 22358.6(c), the engineer may round down the observed 85th-percentile speed to the nearest 5 mph, if the prior step, which is rounding to the nearest 5 mph, is a rounding up. As such, the engineer after taking into consideration the school within the speed zone, the crash history, the roadway conditions and use, and determined the observed 85th-percentile speeds were appropriate to round down to the nearest 5 mph, resulting in a calculated 85th-percentile speeds of 35-mph.

The results of this E&TS indicate a speed zone of 35 mph, except for the prima facie speed limit required for the school zone, when children are present. Where radar is used for enforcement, this E&TS satisfies the requirement for a seven-year review.

Example 2

City of XYZ conducted an E&TS for Artificial Blvd, from A St to I St. This 1.2-mile-long speed zone is a major collector, traversing mostly commercial and residential areas in an urban area. The highway is four-lane conventional with signalized left turn pocket on Artificial Blvd, in gently rolling terrain. There are four intersections at the locations where

Artificial Blvd intersecting B St, E St, F St, and H St, and has dedicated bike path from F St to H St. A local high school is contiguous to the highway at the beginning of the subject segment with crosswalk at the entrance to the school. Artificial Blvd forms a relative sharp curve at two locations where it intersects E St. and F St, respectively. The sharp curves reduce sight ability from both intersection roadways.

Traffic signals are traffic actuated. The existing speed limit is 50 mph, except for the school zone.

Table 3-6 presents summary data collected from the speed survey.

Table 3-6 Observed Speed Profile and Traffic Volumes

Data Collection Location	85th-percentile Speed (mph)	50th-percentile Speed (mph)	Observed Speed Pace (mph)	AADT (vehicle/day)
1 Eastbound Westbound	60 61	59 58	52-61 53-62	15000
2 Eastbound Westbound	61 62	58 59	52-61 54-63	32000
3 Eastbound Westbound	62 61	57 57	54-63 53-62	32000
4 Eastbound Westbound	61 62	56 57	53-62 54-63	32000
5 Eastbound Westbound	62 62	59 58	53- 62 53-62	35000

The actual accident rate is 0.25 accidents per million vehicle miles (ACC/MVM) and the average rate is 1.16 ACC/MVM. There were a total of 3 fatal crashes and 12 severe injury crashes during the 36 months prior to the E&TS. The primary collision factors were unsafe speed (27%), traffic signal violation (40%), and driving under the influence (20%). Twelve of these collisions occurred at intersections, mainly at the locations where Artificial Blvd intersects E St. and F St.

Observed 85th-percentile speeds were 10 to 12 mph higher than the existing speed limit. In accordance with CVC Section 22358.6(a), the 85th-percentile speeds, ranging from 60 to 62 mph, are to be rounded to the nearest 5 mph increment, resulting in a calculated 85th-percentile speed of 60 mph.

Additionally, CVC Section 22358.6(b) permits an engineer to consider an additional 5-mph further if in compliance with Sections 627 and 22358.5 and the CA MUTCD.

As a result, after taking into consideration of the sharp curves at the intersections of E St and F St, the significantly reduced sight distance, and the potential for vehicles or bicyclists that may enter the roadway unexpectedly from those two intersecting streets, the engineer concluded they could support justifying further 5-mph reduction below the calculated 85th-percentile speed. The result would be a 55-mph speed zone limit.

According to CVC Section 22358.7, the authority may reduce an addition 5 mph from the speed limit determined as above, if it finds the speed limit is still more than is reasonable or safe, based on the portion of highway being adjacent to any land or facility that generates high concentrations of bicyclists or pedestrians, The highway segment meets the requirements for this conditions based on the qualifiable generators of high concentrations of bicyclists or pedestrians including the presence of 4-way signalized intersections, crosswalks, and bike paths, and that the city's study has specifically identified this highway segment as a high-accident location. Based on this justification, the speed limit is further reduced from 55 mph, obtained from the previous last step, to 50 mph.

The results of this E&TS indicate a speed zone of 50 mph, except for the prima facie speed limits for school zones. Where radar is used for enforcement, this E&TS satisfies the requirement for a seven-year review.

Chapter 4 Location of Regulatory Speed Limit Signs

4.1 Speed Limit: R2-1

The Speed Limit (R2-1) sign (Figure 4-1) shall be used to give notice of the speed limit except as provided under Prima Facie Speed Limits in CVC Section 22352. Speed Limit (R2-1) signs shall be placed at the beginning of all speed zones. Intermediate signs may be placed at approximate one mile but no closer than 0.25-mile intervals where speed zones are longer than one mile. Additional signs within the same zone should be considered at major intersections or at locations where significant volumes of traffic enter the highway. For three or more lanes in each direction, two signs may be used: one in the median and one on the shoulder, facing the same direction (dual installation).

For freeways with a speed limit of 65 mph or 70 mph:

- The Speed Limit (R2-1) signs shall be installed at the segment entrance to the right of traffic off the right shoulder.
- The Speed Limit (R2-1) signs shall also be installed off of the right shoulder, throughout the segment, at a maximum of 10-mile interval and immediately after locations where significant volumes of traffic enter the segment.
- Optional 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.
- The TRUCKS, 3 AXLES OR MORE 55 MAXIMUM (R6-3(CA)) sign shall be installed approximately 750 feet following each R2-1 sign, both at the beginning and throughout each 65 or 70 mph segment.
- The ALL VEHICLES WHEN TOWING 55 MAXIMUM (R6-4(CA)) sign shall be installed approximately 750 feet following each R6- 3(CA) sign.
- Signs shall be placed in protected locations.
- R2-1 signs with the appropriate number for the next speed limit shall be installed beyond the paved right shoulder at the end of the 65/70 mph segment.

For freeway segments with an approved 55-mph speed limit:

- The beginning of the segment shall be posted with an R2-1 sign installed beyond the paved right shoulder and in the median if it is wide enough to permit sign maintenance without lane closures.
- Subsequent signs should then be posted beyond the paved right shoulder, at approximate 3-mile intervals, with no more than three 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.
- At the end of the segment, a R2-1 sign with the appropriate number for the next speed limit should be posted beyond the paved right shoulder.

For conventional highways with 55-mph to 65-mph speed limits:

- The beginning of the segment shall be posted with an R2-1 sign installed beyond the paved right shoulder.
- Subsequent signs should then be posted on approximate 5- to 10-mile 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 beyond the paved right shoulder.
- If used, the TRUCKS, 3 AXLES OR MORE 55 MAXIMUM (R6-3(CA)) sign shall be installed approximately 750 feet following each R2-1 sign.
- If used, the ALL VEHICLES WHEN TOWING 55 MAXIMUM R6-4(CA) sign shall be installed approximately 750 feet following each R6-3(CA) sign.

See Figure 2-2 for illustrations of regulatory sign placement. Pavement markings with numerals (see CA MUTCD Section 3B.19) may be used to supplement speed limit signs.

Figure 4-1 Speed Limit Sign



4.2 Speed Zone Ahead: R2-4 (CA)

The Speed Zone Ahead R2-4(CA) sign (Figure 4-2) should be used to inform the motorist of a reduced speed zone. The R2-4(CA) sign shall always be followed by a R2-1 sign installed at the beginning of the zone where the reduced speed limit applies.

Figure 4-2 Reduced Speed Zone Ahead



4.3 End Speed Limit: R3 (CA)

The End Speed Limit R3 (CA) signs (Figure 4-3) may be placed at the end of reduced speed zones to help with a calmer increase in speed leading out of the final speed zone into a statutory limit. The R3 (CA) sign shall be used only to mark the end of a speed zone. When used, an R2-1 shall be placed within a reasonable distance of the R3(CA), based on engineering judgment, no greater than 1000 ft apart, to remind drivers of the speed limit of the facility. The R3(CA) sign shall not be used for a change in speed limits within a reduced zone. The R3(CA) sign may be used with the TRUCK(M4-4) plaque to mark the end of truck speed zones on descending grades. An illustration of the locations of regulatory speed limit signs within a transition zone is provided in Figure 2-3.

Figure 4-3 End Speed Limit



4.4 Speed Limit, Trucks, & All Vehicles When Towing: R2-1, R6-3(CA) and R6-4(CA)

The R2-1 and R6-3(CA) and R6-4(CA) signs (Figure 4-4) give the maximum statewide speed limits for various types of vehicles shall be installed on all State highways near the points of entrance into California. These signs should be placed in a location to be viewed by the approaching motorists.

When used, the R6-3(CA) sign shall be installed approximately 750 ft following each R2-1 sign. The R6-4(CA) sign shall be installed approximately 750 ft following the R6-3(CA) sign. The R6-3(CA) and R6-4(CA) signs should be placed on highway segments where speeds over 55 mph are allowed. Refer to CVC Section 22406 for types of vehicles subject to the 55-mph maximum speed limit.

Figure 4-4 Trucks 3 Axles or More and All Vehicles When Towing Signs

4.5 Special Enforcement Signs

4.5.1 Speed Enforced by Radar: R48 (CA)

The SPEED ENFORCED BY RADAR R48 (CA) sign (Figure 4-5) may be used where law enforcement has the authority to use radar. The R48 (CA) sign may be used when leaving a statutory speed limit and entering into a location with speed zones. Where radar enforcement is in effect, one sign should be used in each direction at the beginning of the segment of roadway, and at intervening major route intersections. 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.

Figure 4-5 Speed Enforced by Radar

4.5.2 Radar Enforced: R48-1(CA)

The R48-1 (CA) sign (Figure 4-6) may be used in combination with the Speed Limit (R2-1) sign on any roadway where law enforcement has the authority to use radar. Where radar enforcement is in effect, 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.

Figure 4-6 Radar Enforced

4.5.3 Speed Enforced by Aircraft: R48-2(CA)

The R48-2(CA) (Figure 4-7) sign may be placed, when requested by the California Highway Patrol, on sections of highway regularly patrolled by aircraft. The R48-2(CA) sign shall be used for both directions of travel. The R48-2(CA) sign should be placed at the beginning of the section and spaced at 25-mile intervals.

Figure 4-7 Speed Enforced by Aircraft

Chapter 5 Renewal of Engineering and Traffic Surveys

5.1 Overview

According to CVC Section 40802, an E&TS is valid for five years, or seven years if criteria specified in CVC 40802(c)(1) are met. Under specific conditions stated in CVC Section 40802, the E&TS may be extended to fourteen years if there have been no significant changes in roadway or traffic conditions in the speed zone when compared to the original justification and data. Once a speed zone is established at a statutory maximum speed limit (CVC Section 22349), no further studies are required.

5.2 E&TS Extension and Termination

According to CVC Section 40802, A "Speed Trap" is section of a highway with either:

- 1) A speed limit that has not been justified by an E&TS within five or seven years or extended to seven or fourteen years and enforcement of the speed limit involves the use of radar or any other electronic device that measures the speed of moving objects.
- 2) The enforcement of the speed limit involves timing vehicles between a set distance of roadway to calculate the speed of a vehicle.

Any segment of highway that requires an E&TS for the purpose of setting a speed limit, must be re-evaluated based on specific time and condition requirements, in order to remain enforceable or it will be deemed a "speed trap".

An E&TS is initially valid for seven years if the following conditions as specified in CVC Section 40802(c)(1) are met:

- When using radar, the officer has successfully completed a radar operator course of not less than 24 hours on the use of police traffic radar, and the course was approved and certified by the Commission on Peace Officer Standards and Training.
- When laser or any other electronic device is used to measure the speed of moving objects, the officer must also complete an additional training course of not less than two hours approved and certified by the Commission on Peace Officer Standards and Training.
- The radar, laser, or other electronic device used to measure the speed of the accused meets or exceeds the minimal operational standards of the National Highway Traffic Safety Administration and has been calibrated within the three years before the date of the alleged violation by an independent certified laser or radar repair and testing or calibration facility.

An E&TS may be extended to seven (if initially set for 5 years) or fourteen years if a registered engineer determines that no significant changes in roadway or traffic

conditions have occurred from the original justification data, including but not limited to, changes in the 85th percentile speed, adjacent property or land use, roadway configuration, traffic volume, or collision rate. Other considerations include changes to roadway configuration such as adding bike lane, implementation of traffic calming measures or significant change in collision rate.

CVC 40802 (2) (B)(i)(II) indicates that if a speed zone is expired, a registered engineer can revisit and investigate the speed zone to extend to the maximum 14 years from the original Order date for SHS, and the date of the E&TS (if not change in speed limit) or ordinance (when a change is needed) for roadway segments under local jurisdiction, if conditions are met. The engineer does not have to redo the entire E&TS but must resample speed data and examine the conditions and other information on which the E&TS was based.

An existing E&TS cannot be extended if it has been greater than 14 years. A full, new E&TS must be performed.

During the life cycle of an E&TS, when significant changes in roadway or traffic conditions have occurred from the original justification data before the E&TS expires, including, but not limited to, changes in adjoining property or land use, roadway width, or traffic volume, the existing E&TS must be terminated.

Example 1:

A 2-mile section of a two-lane conventional highway was upgraded to a divided, four-lane highway. This section is preceded by a reduced speed zone (less than 55 mph) and followed by a 55-mph two-lane conventional highway section. The 65-mph speed limit in Section 22349 (a) of CVC may apply to this section.

Example 2:

A 2-mile section of two-lane conventional highway posted at 55 mph has experienced significant commercial development on both sides of the highway. The shoulders have been widened with the addition of curb, gutter and sidewalk. There are significant changes to traffic patterns and pedestrian traffic. A speed limit reduction may be appropriate for this segment, because of the development along the highway corridor.

5.3 Procedure for Extension to 14 Years

After a registered engineer determines an existing E&TS qualifies for an extension from seven to fourteen years, the engineer shall write a memo to amend the existing E&TS describing the conditions that have led to the extension. The memo is sent to law enforcement agencies with a copy sent to the local authorities involved as well.

For SHS, an E&TS Extension Package shall include the following as a minimum:

- Letter to CHP area commander stating the intention to extend the original E&TS. An example of such a memo is provided in Appendix B.9. Copy to Local Authority.

- Original Order
- Original recommendation and Justifications with "Extend to 14 Years" marked
- Original Strip Map or Facsimile with "Extend to 14 Year" marked

For highways under local jurisdiction, an E&TS Extension Package shall include the following as a minimum:

- Letter to local law enforcement stating the intention to extend the original E&TS
- Original ordinance
- Original recommendation and Justifications with "Extend to 14 Years" marked
- Original Strip Map or Facsimile with "Extend to 14 Year" marked

5.4 Procedure for Termination

During the life cycle of an E&TS, if the E&TS is no longer based on the existing justification, it must be terminated. A memo shall be sent to the CHP Commander for SHS or appropriate law enforcement for non-SHS, for that location, informing them that the use of LiDAR or RADAR for that area is no longer permitted for speed enforcement until a new, full E&TS is conducted. Included with the new memo shall be an Order to Rescind that will legally terminate the existing speed zone. An example of this document is provided in Appendix B.3.2. A new E&TS would need to be performed to establish the appropriate speed limit to be posted.

Chapter 6 Speed Zone Approval and Distribution

6.1 Overview

Once the draft E&TS is ready, law enforcement and other affected agencies shall be contacted to discuss the findings. If the findings show a need to raise or lower the posted speed limit, a letter shall be sent to local officials to allow for a public hearing. If there is no proposed change to the speed limit, notification and the new E&TS are sent to law enforcement.

Local governments are not subject to the local hearing provisions of CVC Section 22354.5 but must meet local requirements to pass an ordinance or resolution.

6.2 Approval Process

6.2.1 Consultation with Area California Highway Patrol – for SHS

Whenever Caltrans determines the need to raise or lower a speed limit on state highways, it must consult the CHP and consider their recommendations according to CVC Section 22354.5.

6.2.2 Local Government and Other Agency Notification and Public Hearing

CVC Section 22354.5 allows a public hearing to be conducted by a city council or county board of supervisors when Caltrans proposes changing a speed limit on the SHS, and that Caltrans shall consider the results of the meeting. A letter should be sent to the local agencies to notify them of the changes under consideration. The letter should inform the city or county of the locations of the proposed changes, the opportunity to hold a hearing, and that the hearing will be run by the city or county. The letter should provide the option to hold or not hold a public meeting and a date after which Caltrans will move forward if no reply is received. See example letter in Appendix B.2.

6.2.3 Reassess Proposed Speed Limit Change

Once the public hearing is concluded, the results shall be considered and any new concerns or non-apparent conditions investigated. Collision data and non-apparent conditions may be used to justify a 5-mph reduction if the 85th percentile speed has been rounded down under CVC 22358.6(b).

6.2.4 Public Opinion and Political Interest

E&TS are based on current roadway conditions. Public and political opinions or hypothetical situations are not reasons to change the results of an E&TS and cannot be used as justification to reduce a speed limit. The engineer must be able to support their

decisions based on engineering principles and substantiated data that a court can readily analyze.

6.2.5 Prepare New Speed Zone Orders for SHS or Ordinance for Local Roadways

Orders must be written and signed when Caltrans set a speed limit deviating from statutory maximum speed limit or statutory prima facie speed limit, i.e., reducing the speed limit from 55 mph for 2-lane undivided highways or 65 mph for all other highways, or increasing a speed limit from 65 mph to 70 mph. If the proposed speed limit is 70 mph, both the CHP Area Commander or Commissioner and the Caltrans District Director of the subject district must concur per CVC Section 22356.

Orders shall be rewritten at least every 14 years, or when an E&TS must be redone. See example Orders in Appendix B.3.

Similarly, CVC Section 22358 requires local jurisdictions to pass an ordinance for speed zones established by E&TS. See example ordinance in Appendix B.3.3.

6.2.6 Determine Need for New Advisory Speed Signing

Higher speed limits may result in a need to re-evaluate advisory speeds on curves or other locations without speed advisory signs.

6.2.7 Determine Need for Signal Detection to be Adjusted

Advance signal detection are placed in or under the pavement of the detection zone determined based on the approach speed. Changes in the posted speed limits may require new detection to be placed at different locations to meet the newly posted speed limits.

6.2.8 Determine Need for Yellow Change Interval Timing to be Adjusted

Yellow change intervals are based on approach speed. The CA MUTCD guidance states that the minimum yellow change interval shall follow Table 4D-102(CA). The posted speed limit, or the prima facie speed limit established by the CVC shall be used for determination of the minimum yellow change interval for the through traffic movement. As an option, the minimum yellow change interval for the through movement and the protected left-turn or protected right-turn may be increased based on a field review or by using appropriate judgment. That judgment may be based on many factors, including, but not limited to, 85th percentile speed, intersection geometry, and field observation of traffic behavior.

6.2.9 Study Completion

For SHS, an E&TS should be presented as a memo to the District Director or their assigned delegate. Local agencies will direct their reports to the county board of supervisors or the appropriate city councils. The E&TS should include the components

listed in Section 3.1.2. The local agencies would substitute a proposed ordinance for the declaration. In addition, any proposed speed limit change based on non-apparent conditions requires documentation by a licensed engineer on the memo accompanying the engineering report. The effective date for the E&TS is when the Orders are signed for State Highways, or when the ordinance or resolution is adopted by local agency for local roadways. This date need not match the date the strip map was stamped or the date of the justification memo accompanying the E&TS.

6.2.10 Transmittal Memo

For State highways, a transmittal letter to the District Director or their assigned delegate should transmit the E&TS for signature of the speed zone orders and final review of the proposed speed limit. The transmittal letter should include acknowledgement of communications with both the CHP and local agencies per CVC 22354.5. See Appendix B.4 for an example transmittal memo.

For local roadways and highways, the agency of responsibility will utilize their own internal correspondence procedures.

6.2.11 Sign Installation Orders

Sign installation orders need to be prepared to change the regulatory speed limit signs and advisory speed signs. This is also a good opportunity to place signs for any other conditions or concerns discovered.

6.3 Distribution

6.3.1 Regular Distribution

For SHS, send a copy of the completed E&TS to the CHP. Additional copies may be forwarded to local law enforcement agencies and local authorities. See sample transmittal letter in Appendix B.5.

6.3.2 Public Request

The public routinely requests a copy of the latest "speed survey" for a particular section of roadway. All requests should be made via a California public records act request form. See TOPD 09-05-R1 for the release of records policy for roadways on SHS. Local authorities should follow local procedures and policies related to CPRA requests. These requests are generally of these three types:

- 1) A speed zone established under CVC Section 22354, reducing below statutory maximum speed limit. If the requester is contesting a traffic citation, the E&TS may be sent out with a cover letter (Appendix B.6). If the requestor files a claim against the state, the district public information office should be contacted immediately for further directions.

- 2) E&TS for sections of roadway operated under CVC Section 22349, Maximum Speed Limit. If the requestor insists on a letter after being informed that an E&TS is not required for this section of roadway, the engineer may use the example letter shown in Appendix B.7.
- 3) Legal action against the state. If the requestor is filing a claim against the state, the district public information office should be contacted immediately for further direction.

Appendix A Example Speed Survey and Crash Data

A.1 Vehicle Speed Survey Data Sheet

SPEED SURVEY DATA SHEET																							
														START	12:50								
														FINISH	1:50								
Co:	FRE	RTE:	168	PM:	46.25	Location:				Fire Station				Operator:		Bob D							
Day/Date:		Tuesday 21 Jun 2022			Weather:		Clear		Surface Condition:				Dry		Checked By:		Cathy M						
DIRECTION:		SB							DIRECTION:		NB												
85th =		43 mph		50th =		40 mph		Pace =		36 - 45		85th =		42 mph		50th =		39 mph		Pace =		32 - 41	
MPH	5	10	15	20	EACH	CUM	%	MPH	5	10	15	20	EACH	CUM	%								
80						103		80							102								
79						103		79							102								
78						103		78							102								
77						103		77							102								
76						103		76							102								
75						103		75							102								
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62						103		62							102								
61						103		61							102								
60						103		60							102								
59						103		59							102								
58						103		58							102								
57	\				1	103	1%	57	\						102								
56						102		56	\					1	102	1%							
55						102		55							101								
54						102		54	\						101								
53						102		53	\					1	101	1%							
52						102		52							100								
51						102		51							100								
50						102		50							100								
49	\	\			2	102	2%	49	\					1	100	1%							
48	\				1	100	1%	48							99								
47	\	\			2	99	2%	47	\					1	99	1%							
46						97		46	\					1	98	1%							
45	\	\	\	\	7	97	7%	45	\	\				2	97	2%							
44	\	\			2	90	2%	44	\					1	95	1%							
43	\	\	\	\	7	88	7%	43	\	\	\			4	94	4%							
42	\	\	\	\	4	81	4%	42	\	\	\			4	90	4%							
41	\	\	\	\	10	77	10%	41	x	x	x	\	\	24	86	24%							
40	x	x	x	\	24	67	23%	40	\	\	\	\	\	8	62	8%							
39	\	\	\	\	5	43	5%	39	\	\	\	\	\	5	54	5%							
38	\	\	\	\	5	38	5%	38	\	\	\	\	\	10	49	10%							
37	\	\	\	\	10	33	10%	37	\	\	\	\	\	11	39	11%							
36	\	\	\	\	8	23	8%	36	\	\	\	\	\	7	28	7%							
35	\	\			2	15	2%	35	\	\	\	\		5	21	5%							
34	\	\	\	\	5	13	5%	34	\	\	\	\		2	16	2%							
33	\	\	\		3	8	3%	33	\	\	\	\		5	14	5%							
32	\	\	\		3	5	3%	32	\	\	\	\		5	9	5%							
31	\				1	2	1%	31	\					1	4	1%							
30	\				1	1	1%	30	\	\				2	3	2%							
29								29	\					1	1	1%							
28								28															
27								27															
26								26															
25								25															
24								24															
23								23															
22								22															
21								21															
20								20															
19								19															
18								18															
17								17															
16								16															
Total							103	100%	Total							102	100%						

MPH Column from highest to lowest

Cumulative calculated from the bottom up

85th Percentile Calculation - Interpolate if needed.

((Total Vehicles x 0.85) = 85th Percentile) : identifies the 85th Percentile for Cumulative Total. Look across to the corresponding MPH.

A.2 Vehicle Speed Survey Data Sheet Template

															START								
															FINISH								
Co:			RTE:			PM:			Location:			Operator:											
Day/Date:						Weather:			Surface Condition:			Checked By:											
DIRECTION:												DIRECTION:											
85th =				50th =				Pace =				85th =				50th =				Pace =			
MPH	5	10	15	20	EACH	CUM	%	MPH	5	10	15	20	EACH	CUM	%	MPH	5	10	15	20	EACH	CUM	%
80								80								80							
79								79								79							
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19								19								19							
18								18								18							
17								17								17							
16								16								16							
Total								Total															

MPH Column from highest to lowest

Cumulative calculated from the bottom

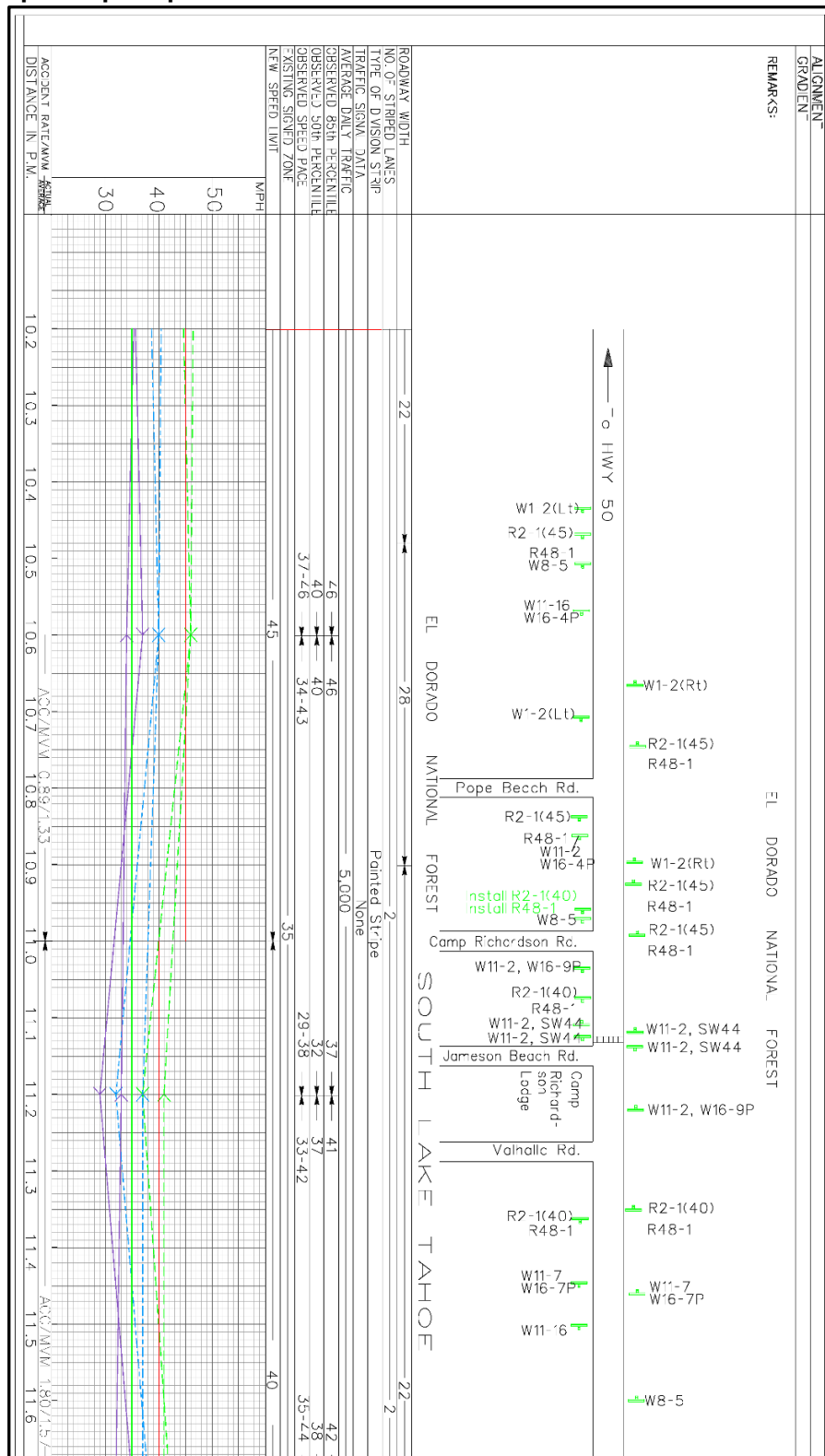
up

85th Percentile Calculation - Interpolate if needed.

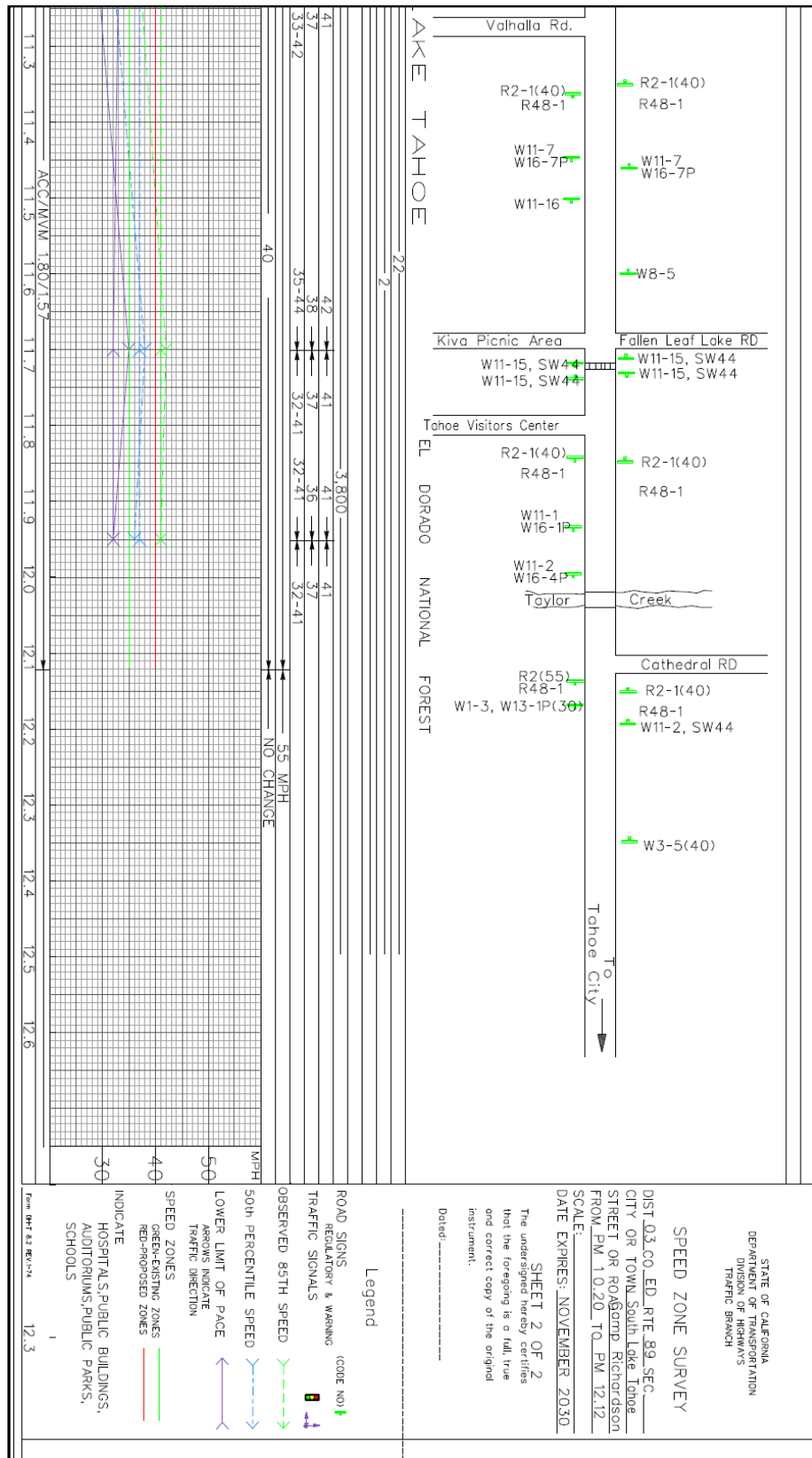
((Total Vehicles x 0.85)= 85th Percentile): identifies the 85th Percentile for Cumulative Total. Look across to the corresponding MPH.

A.3 Example Strip Map

Example Strip Map Sheet 1 of 2



Example Strip Map Sheet 2 of 2



Example TSAR Report Page 1 of 4

66

Example TSAR Report Page 2 of 4

OTM22215		TASAS SELECTIVE RECORD RETRIEVAL		Page#2	
06/21/2007		TSAR - ACCIDENT SUMMARY			
02:16 PM					
<--- PRIMARY COLLISION FACTOR -->		<--- TYPE OF COLLISION --->		<--- ROADWAY CONDITION --->	
NUMBER	PCT CODE	NUMBER	PCT CODE	NUMBER	PCT CODE
1	6.3	1	6.3	0	0.0
0	0.0	2	12.5	0	0.0
0	0.0	10	62.5	0	0.0
3	18.8	0	0.0	0	0.0
10	62.5	2	12.5	0	0.0
2	12.5	0	0.0	0	0.0
0	0.0	0	0.0	0	0.0
0	0.0	0	0.0	0	0.0
0	0.0	1	6.3	15	93.8
0	0.0	0	0.0	1	6.3
0	0.0	0	0.0	0	0.0
0	0.0	0	0.0		
<--- WEATHER ----->		<--- LIGHTING ----->		<--- ROAD SURFACE ----->	
NUMBER	PCT CODE	NUMBER	PCT CODE	NUMBER	PCT CODE
15	93.8	15	93.8	15	93.8
1	6.3	0	0.0	0	0.0
0	0.0	0	0.0	0	0.0
0	0.0	0	0.0	0	0.0
0	0.0	0	0.0	1	6.3
0	0.0	0	0.0	0	0.0
0	0.0	1	6.3		
0	0.0	0	0.0		
0	0.0	0	0.0		
<--- RIGHT OF WAY CONTROL ----->		<--- HIGHWAY GROUP ----->		<--- INTERSECTION/RAMP ACCIDENT LOCATION -->	
NUMBER	PCT CODE	NUMBER	PCT CODE	NUMBER	PCT CODE
0	0.0	0	0.0	0	0.0
0	0.0	16	100.0	1	6.3
0	0.0	0	0.0	0	0.0
16	***	0	0.0	0	0.0
0	0.0			0	0.0
0	0.0			15	93.8

Example TSAR Report Page 3 of 4

OTW22215										Page#3									
06/21/2007 02:16 PM										TASAS SELECTIVE RECORD RETRIEVAL TSAR - PARTY SUMMARY									
<----- PARTY TYPE ----->										<----- MOVEMENT PRECEDING COLLISION ->									
NUMBER	PCT	CODE	NUMBER	PCT	CODE	NUMBER	PCT	CODE	NUMBER	#1 NUMBER	#2 NUMBER	PCT	CODE	<----- OTHER ASSOCIATED FACTORS----->					
14	87.5	A-PASNGR CAR/STA WAGON	3	18.8	A-STOPPED	0	0.0	0	0.0	0	0.0	0	0.0	0.0	1-INFLUENCE ALCOHOL				
0	0.0	B-PASNGR CAR W/TRAILER	12	75.0	B-PROCEEDED STRAIGHT	0	0.0	0	0.0	0	0.0	0	0.0	0.0	2-FOLLOW TOO CLOSE				
0	0.0	C-MOTORCYCLE	0	0.0	C-RAN OFF ROAD	0	0.0	0	0.0	0	0.0	0	0.0	0.0	3-FAILURE TO YIELD				
7	43.8	D-PICKUP/PANEL TRUCK	0	0.0	D-MAKING RIGHT TURN	1	6.3	0	0.0	1	6.3	0	0.0	0.0	4-IMPROPER TURN				
0	0.0	E-PICKUP/PANEL W/TRAILER	0	0.0	E-MAKING LEFT TURN	1	6.3	0	0.0	1	6.3	0	0.0	0.0	5-SPEEDING				
0	0.0	F-TRUCK/TRUCK TRACTOR	0	0.0	F-MAKING U TURN	1	6.3	0	0.0	1	6.3	0	0.0	0.0	6-OTHER VIOLATIONS				
2	12.5	G-TRUCK/TRACTOR & 1 TRAILER (INATTN)	1	6.3	G-BACKING	0	0.0	0	0.0	0	0.0	0	0.0	0.0	A-CELL PHONE*				
0	0.0	2-TRUCK/TRACTOR & 2 TRAILER EQUIP* (INATTN)	2	12.5	H-SLOWING, STOPPING	0	0.0	0	0.0	0	0.0	0	0.0	0.0	B-ELECTRC				
0	0.0	3-TRUCK/TRACTOR & 3 TRAILER RADIO/CD/HDPHN* (INATTN)	0	0.0	I-PASS OTHER VEHICLE	0	0.0	0	0.0	0	0.0	0	0.0	0.0	C-				
0	0.0	4-SINGLE UNIT TANKER	2	12.5	J-CHANGING LANES	0	0.0	0	0.0	0	0.0	0	0.0	0.0	D-SMOKING* (INATTN)				
0	0.0	5-TRUCK/TRA & 1 TANK TRAILR	0	0.0	K-PARKING	0	0.0	0	0.0	0	0.0	0	0.0	0.0	E-VISION OBSCUREMENT				
0	0.0	6-TRUCK/TRA & 2 TANK TRAILR	0	0.0	L-ENTER FROM SHLDR	2	12.5	0	0.0	2	12.5	0	0.0	0.0	F-INATTENTION - OTHER				
0	0.0	H-SCHOOL BUS	0	0.0	M-OTHER UNSAFE TURN	3	18.8	0	0.0	3	18.8	0	0.0	0.0	G-STOP & GO TRAFFIC				
0	0.0	I-OTHER BUS	0	0.0	N-CROSS INTO OPP LN	0	0.0	0	0.0	0	0.0	0	0.0	0.0	H-ENTER/LEAVE RAMP				
1	6.3	J-EMERGENCY VEHICLE	0	0.0	O-PARKED	0	0.0	0	0.0	0	0.0	0	0.0	0.0	I-PREVIOUS COLLISION				
0	0.0	K-HIGHWAY CONST EQUIP	0	0.0	P-MERGING	0	0.0	0	0.0	0	0.0	0	0.0	0.0	J-UNFAMILIAR WITH				
0	0.0	L-BICYCLE	0	0.0	Q-TRAVEL WRONG WAY	0	0.0	0	0.0	0	0.0	0	0.0	0.0	K-DEFECT VEHICLE				
0	0.0	M-OTHER-MOTOR VEH	4	25.0	R-OTHER	0	0.0	0	0.0	0	0.0	0	0.0	0.0	L-UNINVOLVED VEHICLE				
1	6.3	N-OTHER-NON-MOTOR VEH	0	0.0	<-NOT STATED	0	0.0	0	0.0	0	0.0	0	0.0	0.0	M-OTHER				
0	0.0	O-SPILED LOADS	0	0.0		0	0.0	0	0.0	13	81.3	0	0.0	0.0	N-NONE APPARENT				
0	0.0	P-DISENGAGED TOW	0	0.0		0	0.0	0	0.0	0	0.0	0	0.0	0.0	P-WIND				
0	0.0	Q-UNINVOLVED VEHICLE	0	0.0	PEDESTRIAN	0	0.0	0	0.0	0	0.0	0	0.0	0.0	R-RAMP ACCIDENT				
0	0.0	R-MOPED	0	0.0		0	0.0	0	0.0	0	0.0	0	0.0	0.0	S-RUNAWAY VEHICLE				
0	0.0	T-TRAIN	0	0.0	0 0.0 2- XING XWALK - INTRST	0	0.0	0	0.0	0	0.0	0	0.0	0.0	T-EATING* (INATTN)				
0	0.0	U-PEDESTRIAN	0	0.0	0 0.0 3- XING XWALK - NOT INTR	0	0.0	0	0.0	0	0.0	0	0.0	0.0	U-CHILDREN* (INATTN)				
0	0.0	V-DISMOUNT PEDESTRIAN	0	0.0	0 0.0 4- XING NOT XWALK	0	0.0	0	0.0	0	0.0	0	0.0	0.0	V-ANIMALS* (INATTN)				
0	0.0	W-ANIMAL - LIVESTOCK	0	0.0	0 0.0 5- ROADWAY - INCL SHLDR	0	0.0	0	0.0	0	0.0	0	0.0	0.0	W-PERSNL				
0	0.0	X-ANIMAL - DEER	0	0.0	0 0.0 6- NOT IN ROADWAY	0	0.0	0	0.0	0	0.0	0	0.0	0.0	X-READING* (INATTN)				
0	0.0	Z-ANIMAL - OTHER	0	0.0	0 0.0 7- APRH-LEAVE SCHL BUS	1	6.3	16	100.0	1	6.3	16	100.0	<-NOT STATED					
0	0.0		0	0.0	0 0.0 - INVALID CODES	0	0.0	0	0.0	0	0.0	0	0.0	--DOES NOT APPLY					
<----- DIRECTION OF TRAVEL ----->										<----- SPECIAL INFORMATION ----->									
NUMBER	PCT	CODE	NUMBER	PCT	CODE	NUMBER	PCT	CODE	NUMBER	* INATTENTION CODES EFF. 01-01-01									
0	0.0	N-N, NE, NW BOUND	0	0.0	A-HAZARDOUS MATERIALS	0	0.0	A-HAZARDOUS MATERIALS	0										
0	0.0	S-S, SE, SW BOUND	1	6.3	B-CELL PHONE IN USE*	1	6.3	B-CELL PHONE IN USE*	1										
12	75.0	E-EASTBOUND	13	81.3	C-CELL PHONE NOT IN USE*	13	81.3	C-CELL PHONE NOT IN USE*	13										
4	25.0	W-WESTBOUND	0	0.0	D-CELL PHONE NONE/UNKNOWN*	0	0.0	D-CELL PHONE NONE/UNKNOWN*	0										
0	0.0	<-NOT STATED	4	25.0	<-NOT STATED	4	25.0	<-NOT STATED	4										
0	0.0	--DOES NOT APPLY	0	0.0	--DOES NOT APPLY	0	0.0	--DOES NOT APPLY	0										
0	0.0	--INVALID CODES	0	0.0	--INVALID CODES	0	0.0	--INVALID CODES	0										

Page#4

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TSAR Detail Key

TSAR COLLISION DETAIL KEY

PAGE 1

TASAS SELECTIVE RECORD RETRIEVAL

AXR330 ACC-DETAIL

REQ NO 5642

ALL COLLISIONS ON 02-SHA-273-5.000/11.000 FOR TIME PERIOD 01/01/2000 THROUGH 06/30/2000

PARTY INFORMATION									
MSD	OP	12	770/780: SOBRIETY/DRUG/PHYSICAL						
QA	OP		760: MOVEMENT PRECEDING COLLISION						
QA	OP		740/750: OTHER ASSOCIATED FACTORS						
OL	SO	OC	...	690: OTHER LOCATION OF COLLISION					
OL	SO	OC	...	680: OTHER OBJECT STRUCK					
OL	SO	OC	...	690: OTHER LOCATION OF COLLISION					
OL	SO	OC	...	680: OTHER OBJECT STRUCK					
LO	SO	OC	...	690: OTHER LOCATION OF COLLISION					
LO	SO	OC	...	680: OTHER OBJECT STRUCK					
LO	SO	OC	...	670: PRIMARY LOCATION OF COLLISION					
LO	SO	OC	...	660: PRIMARY OBJECT STRUCK					
PERSON	K	I	00	NUMBER OF PERSONS INJURED					
PERSON	K	I	00	NUMBER OF PERSONS KILLED					
V	S	I	<	630: SPECIAL INFORMATION					
D	I	R	1	620: VEHICLE HIGHWAY INDICATOR					
P	T	R	E	610: DIRECTION OF TRAVEL					
P	T	R	E	600: PARTY TYPE					
NO	MT	R	02	NUMBER OF MOTOR VEHICLES					
RT	WC	C	D	526: TYPE OF COLLISION					
RT	WC	C	D	525: RIGHT OF WAY CONTROL					
RT	WC	C	H	524: ROADWAY CONDITION					
ENVIR	COND	W	A	523: ROAD SURFACE					
ENVIR	COND	W	A	522: LIGHTING					
ENVIR	COND	W	A	521: WEATHER					
P	C	F	6	519: PRIMARY COLLISION FACTOR					
COMM ON ACCIDENT			450100452	517: COMMON ACCIDENT					
ACIDENT			TIME	TIME (24 HR)					
ACIDENT			DATE	DATE					
ACIDENT			MO-DA-	DATE					
ACIDENT			05-23-00	DATE					
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PARTY INFORMATION

GENERAL COLLISION INFORMATION

HIGHWAY INFO.

LOCATION

A.5 Example Table B Report

OTM22130
06/06/2007
03:04 PM

California Department of Transportation
Table B - Selective Accident Rate Calculation

Page 1

Location Description	Rate Group	No. of Accidents / Significances		ADT Total		Accident Rates	
		Multi		Kld Main MV+ or		Actual Average	
		Tot	Fat Inj F+I Veh Wet Dark Inj X-St W/M	Fat	F+I Tot	Fat	F+I Tot

51 SHA 005 001.000 - 51 SHA 555 0.500MI H 54 4 0 2 2 2 1 2 0 57.0 10.4 0.000 .19 .39 0.019 .26 .60							
0001-0001 2006-01-01 2006-12-31 12mo. R							

OTM22131

06/06/2007
12:00 AM

Table B Accident Records

Page 1

REQUEST- & LINE	ARS	P POST P F R O A DATE P MILE S T L H Y MM-DD-YY HHMM	COMMON ACCIDENT TIME NUMBER	P ENVIR COND R W O MTR F W L S C C VEH	R T NO P D V S PERSO T I H I K I S O S O S O F O P	Accident Rates											
						O L O L											

Appendix B Example Letters

B.1 Example Request for Temporary Traffic Control Speed Zone – For SHS only

M e m o r a n d u m

To: TRAFFIC OPERATIONS BRANCH CHIEF

Date: MMDD, YYYY

From: MAINTENANCE REPRESENTATIVE

Signature

Subject: Request for Regulatory Speed Zone

In accordance with the California Vehicle Code (CVC) Section 22362 a speed reduction of xx mph will provide protection for workers while at work in the State right of way. The reduced speed limit shall be in effect only during working hours and signs will be covered when work is not in progress. The current posted speed limit in this segment is xx mph and the reduced limit will be xx mph.

Include a brief description of the maintenance work zone (Limits of work zone, activities, date-time etc.)

B.2 Example Notification to Board of Supervisors/Public Hearing

Example Notification to Board of Supervisors/Public Hearing – Part 1

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY

Gavin Newsom, Governor

DEPARTMENT OF TRANSPORTATION

DISTRICT X

Address

PHONE

FAX

TTY 711



Making Conservation
a California Way of Life.

DATE

CO-RTE-PM(s)
General Location

Name

City Counsel or County Board of Supervisors

Address

The Department of Transportation (Caltrans) recently conducted an Engineering and Traffic Survey (E&TS) on State Route XX from (specific location) to (specific location). Periodic E&TSs are necessary to ensure zones remain enforceable.

As required by Section 22354.5(b) of the California Vehicle Code, this letter provides you notice that your staff may choose to conduct a public meeting on the results of the draft E&TS and forward Caltrans any comments you may receive. We will then take any input you provide into consideration prior to finalizing any speed zones.

Enclosed is a draft copy of justification sheets and strip maps for your review. Please submit a response to this letter to us by **(60 days from date of notice)**. If we have not heard from you by this date, we will conclude there are no objections or comments, and we will proceed with finalizing the changes to the existing speed zones accordingly.

If you have any questions or would like to meet in-person to discuss the details of the E&TS, prior to deciding on the direction to take with a public meeting, we would be happy to reserve time at the Caltrans District Office (location) to meet with your agency. Please contact **(name and contact information)** to schedule a time at your convenience.

Sincerely,

NAME, P.E.

Chief, Traffic Safety Branch

Cc: Name, City Manager, City of Name
or
Name, Administrator, County

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Example Notification to Board of Supervisors/Public Hearing – Part 2

<u>STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY</u>	<u>Gavin Newsom, Governor</u>
---	-------------------------------

With regards to the Engineering & Traffic Survey performed on **Dist/Co/Rte**, in and (general description) or their delegate, submits the following response:

_____ A public hearing is not necessary.

_____ The **(Name of Agency)** would like to conduct a public hearing for the segment referenced above. If a Public Hearing is held, please forward us a copy of the comments and any official recommendations or concerns no later than 60 days from this notice.

Name & Title of Responding Official

Signature of Responding Official

Date

Return response to:

California Department of Transportation
District X – Department of Safety
Address
Attention: Contact Name

Or you may submit a scanned signed response via email: (email address)

“Provide a safe, sustainable, integrated and efficient transportation system to enhance California’s economy and livability.”

B.3 Example Orders and Ordinance

B.3.1 Example Order 1: Setting A Speed Limit on State Highway

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY DEPARTMENT OF TRANSPORTATION DISTRICT 3 703 B STREET MARYSVILLE, CA 95901 PHONE (530) 741-4233 FAX (530) 741-4245 TTY 711 www.dot.ca.gov/dist3	GAVIN NEWSOM, Governor  <i>Making Conservation a California Way of Life.</i>
-ORDER DECREASING 65-MILE PER HOUR SPEED LIMIT ON STATE HIGHWAY -	
The California Department of Transportation, pursuant to the provisions of Section 22354, of the California Vehicle Code, upon the basis of engineering and traffic surveys, declares that a speed limit of 65 miles per hour is more than reasonable and safe upon the portion of State highway hereinafter described, and the speed limit hereinafter specified lower than 65 miles per hour is appropriate to facilitate the orderly movement of vehicular traffic and is reasonable and safe thereon; it is accordingly, ORDERED, that a speed limit of XX miles per hour is hereby determined and declared on and for State Highway Route Dist/Co/Rte beginning at P.M. XX.XX, (description of location start) and extending northerly to P.M. XX.XX, (description of location start), a total of XX.XX miles. IT IS FURTHER ORDERED that appropriate signs giving notice of said speed limit be erected upon said State Highway to indicate the change in speed limit and that said speed limit shall be effective upon the erection of said signs. This order is made pursuant to the current delegations of authority from the Director of Transportation to the District Director of Transportation to the undersigned Deputy District Director. Any previous orders restricting speed limits on the above-described portions of said State Highway are herewith revoked. Dated: _____ _____ Name Deputy District Director Maintenance and Traffic Operations	
<i>Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability</i>	

B.3.2 Example Order 2: Rescinding A Speed Limit on State Highway

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY DEPARTMENT OF TRANSPORTATION DISTRICT 3 703 B STREET MARYSVILLE, CA 95901-0911 PHONE (530) XXX-XXXX FAX (530) XX-XXXX TTY 711	GAVIN NEWSOM, Governor  <i>Making Conservation a California Way of Life.</i>
-ORDER RECINDING XX-MILE PER HOUR SPEED LIMIT ON STATE HIGHWAY -	
The California Department of Transportation has determined, pursuant to the provisions of Section 22349, of the California Vehicle Code upon the basis of engineering and traffic surveys, that a speed limit of XX miles per hour would facilitate the orderly movement of vehicular traffic and is reasonable and safe upon the State Highway as described below. It is accordingly;	
ORDERED that the existing speed limit of XX miles per hour is hereby rescinded on and for State Highway Route Dist/Co./Rte, beginning at P.M. XX.XX, a point located approximately (location description), and extending easterly to P.M. XX.XX, a point approximately (location description), a total distance of approximately XX.XX miles.	
IT IS FURTHER ORDERED that all previously placed speed limit signs lower than the declared speed limit be removed from said State highway and that said speed limit shall be effective upon the erection of any required said signs.	
This order is made pursuant to the current delegations of authority from the Director of Transportation to the District Director of Transportation to the undersigned Deputy District Director.	
Any previous orders restricting speed limits on the above-described portions of said State Highway are herewith revoked.	
Dated: _____ _____	
Name Deputy District Director Maintenance and Traffic Operations	
<i>Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability</i>	

B.3.3 Example Ordinance

LOCAL AGENCY NAME

DEPARTMENT OF TRANSPORTATION (or appropriate department)

ORDINANCE NO.

The (CITY COUNSEL OR COUNTY BOARD OF SUPERVISORS NAME) of (CITY OR COUNTY), State of California, pursuant to the provisions of Section 40802(a)(2) and 40802(2)(b)(1) of the California Vehicle Code, exempting roadways classified as “local” from being both identified as a “speed trap” and requiring a valid engineering and traffic study to be performed for the purpose of setting an enforceable speed limit, has identified the following speed limits that would facilitate the orderly movement of vehicular traffic that are reasonable and safe thereon.

Section 1. The (CITY COUNSEL OR COUNTY BOARD OF SUPERVISORS NAME) hereby ordains the following “local” speed limits:

{Insert Table identifying street, road, highway, existing Speed Limit, and new revised new Speed Limit}

Street Start Location	Street End Location	Existing Speed Limit (MPH)	New Revised Speed Limit (MPH)

Section 2. All previously enacted and existing Ordinances relating to the identified locations concerning speed zones on these sections of roadways herein are repealed and superseded by this Ordinance.

Section 3. This Ordinance remains in effect until revoked or revised by (CITY COUNSEL OR COUNTY BOARD OF SUPERVISORS NAME) or the until such time that the facility is no longer functionally classified as “local” per CVC 40802 (b) (1), or (A) (B), and (C).

Section 4. This Ordinance permits the authorized use of radar, laser or other electronic devices on a “local” classified road for the purpose of speed enforcement absent of an engineering and traffic study when the officer meets the conditions identified in Section 40802 (c).

Section 5. This Ordinance shall take effect and be enforced (30) days from and after the date of its passage and before the expiration of fifteen (15) days after the passage it shall be publish with the names of the members voting for and against the same for at least one (1) time in a newspaper of general circulation published in the (CITY or COUNTY NAME), State of California.

(NAME)
(City Counsel/Board of Supervisor) Transportation Committee

DATE: _____

B.4 Example Transmittal Memos to Deputy District Director

Memo for a new E&TS

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

M e m o r a n d u m

*Making Conservation
a California Way of Life.*

To: **NAME, PE**
Deputy District Director
Maintenance and Traffic Operations

Date: Month, Day, Year

File: Dist-Co-Rte
P.M. XX.XX – XX.XX
(General Location)

From: **NAME, Chief**
Traffic Safety Branch

Subject: **Speed Limits on SR XXX in and around the (General Location) in (County Name) County**

This is notice that the previous XX mph location on Co.-Rte P.M. XX.XX to Co.-Rte P.M. XX.XX shall be increased to XX mph. Speed limits at all the other locations were found to be consistent with existing posted speed limits and will be maintained.

In accordance with Section 22354.5(a) of California Vehicle Code (CVC), we consulted with the California Highway Patrol and received concurrence.

In accordance with Section 22354.5(b) of CVC, on Month, Day, Year, we sent a letter to the (agency name City or County) informing the agency that they had an opportunity to conduct a public hearing regarding the draft engineering and traffic survey and to forward any comments to Caltrans by Month, Day, Year. All comments that were forwarded to our department were thoroughly reviewed.

Caltrans cannot address hypothetical, emotional or unsubstantiated information. As such, after full review of the comments provided, it was determined that the draft Engineering and Traffic Survey was appropriate without further changes.

I recommend the zone be maintained/increased as stated. Orders are attached.

APPROVAL RECOMMENDED:

NAME, Chief
Office of Traffic Operations

Attachments

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Memo for extending an E&TS

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

M e m o r a n d u m

*Making Conservation
a California Way of Life.*

To: **NAME, PE**
Deputy District Director
Maintenance and Traffic Operations

Date: Month, Day, Year

File: Dist-Co-Rte
P.M. XX.XX – XX.XX
(General Location)

From: **NAME, Chief**
Traffic Safety Branch

Subject: **Extension of Speed Limits on SR XXX in and around the (General Location) in (County Name) County**

This is notice that the previous speed zones located in and around the (City or County General Location) on Co.-Rte P.M. XX.XX to Co.-Rte P.M. XX.XX shall be extended to the maximum 14-year limit.

Based on sample survey results, data remained consistent with the existing E&TS for the facilities.

I recommend the zones be maintained as stated. Updated Orders are attached for your approval.

APPROVAL RECOMMENDED:

NAME, Chief
Office of Traffic Operations

Attachments

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

B.5 Example Transmittal Letter to California Highway Patrol

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY DEPARTMENT OF TRANSPORTATION DISTRICT 3 703 B STREET MARYSVILLE, CA 95901-0911 PHONE (530) 741-4318 FAX (530) 741-4245 TTY 711 www.dot.ca.gov/dist3	GAVIN NEWSOM, Governor  <i>Making Conservation a California Way of Life.</i>
---	---

Date _____

Commander or Lieutenant NAME _____ California Highway Patrol Address _____	File: Dist-Co-Rte _____ P.M. to P.M. _____
---	--

Dear NAME:

Enclosed for your information and files, are three copies of the signed and stamped Engineering and Traffic Survey (E&TS) including Order for each speed zone, justifying the use of radar enforcement on a portion of **State Highway XX** from **P.M. XX to P.M. XX** through the city of **CITY, COUNTY**.

The results of our studies indicate:

- (1) a speed zone of **XX mph** from **P.M. XX.XX to P.M. XX.XX**,
- (2) a speed zone of **XX-mph** from **P.M. XX.XX to P.M. XX.XX**

Where radar is used for enforcement, this engineering and traffic survey satisfies the requirement for a **seven-year** review and will remain in effect until **MONTH-YYYY**.

If you have any additional questions or concerns about these speed zones, please call **(Insert Contact Information)**

Sincerely,

NAME, Chief
 Traffic Safety Branch

Cc: Name, City Manager, City of XXX
 Name, Chief of Police, NAME Police Department
 or
 Name, Sheriff, County
 Name, Administrator, County

Enclosures

B.6 Example Cover Letter for Speed Survey to Public Person(s)

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY

GAVIN NEWSOM, Governor

DEPARTMENT OF TRANSPORTATION**DISTRICT 3**

703 B STREET

MARYSVILLE, CA 95901-0911

PHONE (530) 741-4318

FAX (530) 741-4245

TTY 711

www.dot.ca.gov/dist3

*Making Conservation
a California Way of Life.*

Date: **Month Day, Year**

Dear **NAME**:

Enclosed for your information is the requested Engineering and Traffic Survey (E&TS) on a portion of **State Highway XXX** from **Post Mile XX.XX to Post Mile XX.XX** through the **(CITY, COUNTY)**.

{The E&TS for this location is currently valid and justifies the use of radar/LiDAR for the purpose of identifying vehicle speeds by law enforcement.}

Or

{The E&TS for this location is currently expired and no longer valid. The use of radar/LiDAR for the purpose of identifying vehicle speeds by law enforcement for vehicle speeds below the statutory maximum speed limit, is no longer authorized.}

If you have any additional questions or concerns about these speed zones, please call **(Insert Contact Information)**

Sincerely,

NAME, Chief
Traffic Safety Branch

Enclosures

Location Strip Map
Justification Memo
Order of Speed Limit

B.7 Example Response Letter for Non-E&TS Area

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY	GAVIN NEWSOM, Governor
DEPARTMENT OF TRANSPORTATION DISTRICT 3 703 B STREET MARYSVILLE, CA 95901-0911 PHONE (530) 741-4318 FAX (530) 741-4245 TTY 711 www.dot.ca.gov/dist3	 <i>Making Conservation a California Way of Life.</i>
Date: Month Day, Year	
Dear NAME:	
Thank you for your request to obtain an Engineering and Traffic Survey (E&TS) on a portion of State Highway XXX from Post Mile XX.XX to Post Mile XX.XX through the (CITY, COUNTY).	
The speed limit within this location is set by statute as identified in the California Vehicle Code 22349. As such, no E&TS is required to be performed. Law enforcements are authorized to utilize radar/LiDAR to determine vehicle speeds for the purpose of issuing citations accordingly.	
If you have any additional questions or concerns about these speed zones, please call (Insert Contact Information)	
Sincerely,	
NAME, Traffic Safety Branch	

B.8 Example Justification Memo

Memorandum

To: NAME, CHIEF
Traffic Safety Branch

Date: Month Date, Year

File: Dist/Co/Rte
P.M to PM
Proposed XX MPH Zone

From: NAME, PE
Traffic Operations Engineer

Signature: _____



Subject: SPEED ZONE JUSTIFICATION

The current 0.21-mile-long 45 mph speed zone traverses mostly residential and open areas. The highway is a two-lane conventional in a flat valley terrain.

**85th Percentile
Speeds**

Northbound: 48-53 mph (range)
Southbound: 49-52 mph (range)

**District Collision
Records**

There were 2 accidents (0 fatalities) in the three-year period from January 1, 2016, to December 31, 2018. The actual collision rate is 1.24 ACC/MVM (accidents per million vehicle miles) and the statewide average rate is 1.80 ACC/MVM.

**Conditions Not
Readily Apparent
to the Driver**

Many driveways are on the west side of the highway and difficult to see.

Summary

State collision records show that the average actual accident rate is 0.69 times the average accident rate and below the statewide average rate.

According to State accident records, the primary collision factors were improper turn and driving under the influence.

The 85th percentile speeds were 4 to 5 mph higher than the existing posted speed limit. Observed 50th percentile speeds were 1 mph lower than the existing speed limit.

Based on this information and our engineering judgement, a 5-mph reduction will be taken in accordance with CVC 22358.6(b) and the existing 45 mph speed limit will be retained.

B.9 Example Letter to CHP Extending Survey to 14 Years

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY

GAVIN NEWSOM, Governor

DEPARTMENT OF TRANSPORTATION

DISTRICT 3

703 B STREET

MARYSVILLE, CA 95901-0911

PHONE (530) XXX-XXXX

FAX (530) XXX-XXXX

TTY 711

www.dot.ca.gov



*Making Conservation
a California Way of Life.*

Date

Commander or Lieutenant NAME
California Highway Patrol
Address

File: Dist-Co-Rte
P.M. to P.M.
E&TS Extension

Dear NAME:

Enclosed, for your information and files, are three signed and stamped copies of the Engineering and Traffic Survey (E&TS), justifying the use of radar enforcement on a portion of **State Highway XX** in (**County**), in and around the (**location description**).

Where radar is used for enforcement, this Engineering and Traffic Survey satisfies the requirement for **EXTENSION** to **14-years**. This survey is in effect until (**MMYY**).

If you have any questions about this speed zone, please contact (**Insert Contact Information**)

Sincerely,

NAME, Chief
Traffic Safety Branch

Cc: Name, City Manager, City of XXX
Name, Chief of Police, NAME Police Department

or

Name, Sheriff, County
Name, Administrator, County

Enclosures

Appendix C Glossary

When used in the Manual, these terms have the meanings shown below.

Advisory Speeds

Advisory speeds are determined primarily by physical and design characteristics of the roadway and/or a Ball-banking test. The setting of regulatory speeds, while also affected by physical and design factors, is determined largely by existing free flow traffic speeds. Advisory speeds warn motorists about roadway design speeds. It is not a Prima Facie speed limit, is not an enforceable speed limit and is not based on the 85th percentile speed. R2-1 signs are not used to display Advisory speed, typically W1 thru W4 warning signs are used.

Business District

Section 235 states that 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 or more of the contiguous property fronting thereon is occupied by buildings in use for business, or (b) upon both sides 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 distances specified in this section if the above ratio of buildings in use for business to the length of the highway exists.

In determining whether a highway is within a business or residence district, these limitations shall apply and shall qualify the definitions in Sections 235 and 515:

- (a) No building shall be regarded 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 regarded to determine whether the roadway is within a district.
- (c) All churches, apartments, hotels, multiple dwelling houses, clubs, and public buildings, other than schools, shall be considered business structures.
- (d) A highway or portion of a highway shall not be deemed to be within a district despite the number of buildings on the contiguous property if there is no right of access to the highway by vehicles from the contiguous property.

Business Activity District

CVC section 22358.9(b) states that a “business activity district” is that portion of a highway and the property contiguous thereto that includes central or neighborhood downtowns, urban villages, or zoning designations that prioritize commercial land uses at the downtown or neighborhood scale and meets at least three of these requirements in paragraphs (1) to (4), inclusive:

- (1) No less than 50 percent of the contiguous property fronting the highway consists of retail or dining commercial uses, including outdoor dining, that open directly onto sidewalks adjacent to the highway.
- (2) Parking, including parallel, diagonal, or perpendicular spaces located alongside the highway.
- (3) Traffic control signals or stop signs regulating traffic flow on the highway, located at intervals of no more than 600 feet.
- (4) Marked crosswalks not controlled by a traffic control device.

Construction Zone

When authorized work is done in the roadway, ramps or recovery zone that affects motorists.

Decision Zone

On a high-speed approach to a signalized intersection (over 35 mph), there is a length of roadway before the intersection, commonly called the “decision zone”, wherein drivers may be indecisive and respond differently to the onset of the yellow signal indication. When in the zone at the onset of yellow, some drivers may stop abruptly while others may decide not to stop, and maybe even accelerate through the intersection. This variation in driver behavior is conducive to the occurrence of collisions on the intersection approach. Sometimes, drivers' decisions to move forward through the intersection at the onset of yellow may cause a collision with vehicles on conflicting phases.

The most common locations for this area are:

- When a poor or non-compliant E&TS is performed.
- When a speed is reduced well below the 85th percentile.
- When the posted speed is below the 50th percentile.

The yellow interval in traffic signal timing is designed to let drivers decide either to stop or to drive through the intersection before the following red interval begins. When the speed and the location of the vehicle is such that the driver cannot stop and cannot drive through in time, the vehicle is said to be in a dilemma zone. For a fixed speed v , there is a minimum distance before the vehicle can stop (the stopping sight distance), and there is a maximum distance that the vehicle can travel through during the yellow interval (the clearing distance). If the vehicle's current distance to the intersection is shorter than the stopping sight distance but longer than the clearing distance, then it is in the dilemma zone. The greater the difference between the stopping sight distance and the clearing distance, the bigger the dilemma zone. See FHWA studies OH-2001/12 and Federal House of the Majority Leader Report from 2001.

Divided Highway

The definition of divided highway must be inferred from CVC Section 21651(a) which states: “Whenever a highway has been divided into two or more roadways by means of intermittent barriers or by means of a dividing section of not less than two feet in width,

either unpaved or delineated by curbs, double-parallel lines, or other markings on the roadway...”

Engineer

A Professional Civil or Traffic Engineer licensed in the State of California and recognized by the California Department of Consumer Affairs.

Engineering Judgment

Evaluating available pertinent information, and the application of principles, experience, education, discretion, Standards, Guidance, and practices to decide upon the applicability, design, operation, or installation of a traffic control device. Engineering judgment shall be exercised by a Professional Civil Engineer Licensed in the State of California or by an individual working under the supervision of a Professional Engineer, through the application of procedures and criteria established by the engineer.

Engineering Study

The comprehensive analysis and evaluating available pertinent information, and applying appropriate principles, engineering judgment, experience, education, discretion, Standards, Guidance, and practices in the Guidelines and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. An engineering study shall be performed by a Professional Engineer, or by an individual working under the supervision of a Professional Engineer, through the application of procedures and criteria established by the engineer. An engineering study shall be documented.

Engineering and Traffic Survey or E&TS

The complete package includes:

- A cover sheet/title page.
- A signature/P.E. stamp/acceptance with the effective date.
- Justification/summary of finding including the consultation of local law enforcement and engineering officials.
- Raw accident data such as TSAR or Table B summary page for a 3-year history for comparison with average or similar intersections.
- Vehicle Speed Survey sheets for each area.
- A declaration or order or ordinance approving the lowering from 55 mph or 65 mph (State roads) or raising from 25 mph (local and county streets).
- The Strip map.

These are the minimum documents in an E&TS. For a public document requests or when someone is contesting a ticket, the accident data can be omitted if the speed limit was not reduced because of accident data. See TOPD 11-05 for the release of records policy.

Free Flow

A condition of traffic where a vehicle's speed is not being influenced by anything other than the geometry of the roadway. Some conditions that exist in a Free Flow state are:

- Minimum 5 second gap between vehicles as the Highway Capacity manual defines delay as a percentage of vehicle headways less than or equal to 5 seconds.
- Appropriate distance for the vehicle to reach a steady velocity not influenced by start-up or slow-down speeds due to traffic signals, stop signs, or other traffic control devices.
- Not influenced by slow vehicles such as trucks or buses.
- Not influenced by enforcement or the perception of enforcement.
- Not influenced by construction or closures.
- Not influenced by inclement weather conditions.
- Not influence by a special event or the effects of that special event.

Highway

A way or place of whatever nature, publicly maintained and open to the use of the public for purposes of vehicular travel. Highway includes street.

Prevailing Speeds

The free flow speeds of vehicles on a roadway commonly collected in a Spot Speed Survey and used to determine the 85th percentile speed.

Prima Facie

A speed limit is Prima Facie when predetermined by statute, zoning, and local ordinance for areas such as schools, police, and fire stations; or once an agency has completed an E&TS and determined that 65 mph/55 mph is not safe and reasonable for the orderly movement of traffic, has determined an appropriate speed, and that appropriate speed has been posted on a R2-1 sign in the appropriate location. All speed limits in compliance with the CVC, set standards and procedures, and posted on regulatory signing (R2-1), are Prima Facie. A sign displaying a speed limit that has not been established by ordinance, code, or statute, nor has been reduced from the maximum speed by a proper and complete E&TS, is neither Prima Facie nor is it an official traffic control device.

Residence District

CVC Section 515 states 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. All churches, apartments, hotels, multiple dwelling houses, clubs, and public buildings, other than schools, shall be deemed to be business structures.

Roadside Development

The area directly next to the roadway. Examples are parks, residential or business districts, etc. These areas are typically zoned by local agencies. Studies such as FHWA—RD-98-154 show roadside development is the second most important factor when setting speed limits, behind only the 85th percentile speed.

Speed

The term “speed” is used in several applications:

- **Advisory Speed** - a recommended speed for all vehicles operating on a section of highway based on the highway design, operating characteristics, and (noun) conditions.
- **Average Speed** - the summation of the instantaneous or spot-measured speeds at a specific location of vehicles divided by the number of vehicles observed.
- **Design Speed** - a selected speed used to determine the various geometric design features of a roadway.
- **85th Percentile Speed** - the speed at or below which 85 percent of Free Flow vehicles travel. 85th percentile speed is always expressed as a whole number without decimal. The 85th percentile speed is recognized as a “safe and reasonable speed” for motorists to be traveling in normal conditions. May also be referred to as critical speed.
- **50th Percentile Speed** - the speed at or below which 50 percent of Free Flow vehicles travel. 50th percentile speed is always expressed as a whole number without decimal. The 50th percentile speed is recognized as a critical point that must be considered when applying reductions below the 85th percentile. Speed limits set below the 50th percentile can result in “unsafe and unreasonable speed” for motorists to be traveling in normal conditions. Speed limits set below the 50th are often identified as “speed traps” as they are only relevant to a small number of vehicles, while results in most drivers being automatic violators of the posted speed limit.
- **Operating Speed** - the speed at which a typical vehicle or the overall traffic operates. Operating speed might be defined with speed values such as the average, pace, critical or 85th percentile speeds.
- **Pace Speed** - the 10 mph increment of speed containing the largest number of vehicles.
- **Posted Speed** - the speed limit shown on Speed Limit signs (R2-1).
- **Statutory Speed** - a speed limit established by legislative action that typically is applicable for highways with specified design, functional, jurisdictional, and/or location characteristic and is not necessarily shown on Speed Limit signs.

Speed Limit

The maximum or posted speed allowed on a section of highway as established by law.

Speed Zone

A segment of roadway with a speed limit set by E&TS deviating from the statutory speed limit.

Spot Speed Survey

The part of the E&TS that specifically refers to the measurement and collection of vehicle speeds of free flow traffic at a specific location.

Strip Map

A plan view, aerial photo, or schematic drawing of the speed zone area with a legend and a profile plot of the 85th percentile, the lower end of the pace, the existing and proposed speed zones. The strip map should also include local land uses, major traffic generators, traffic control devices, number of lanes, type and width of division strip, existing regulatory and warning signs, roadway width, traffic volumes and accident rates.

Undivided Highway

CVC Section 22349 states "A two-lane, undivided highway is a highway with not more than one through lane of travel in each direction. Passing lanes may not be considered when determining the number of through lanes."

Appendix D References

1. AAA Foundation for Traffic Safety. (2023). 2022 Traffic Safety Culture Index (Technical Report). Washington, D.C.: AAA Foundation for Traffic Safety
2. AASHTO. A Policy on Geometric Design of Highways and Streets
<https://transportation.org/design/resources/>
3. California State Transportation Agency (CalSTA) (2020). CalSTA Report of Findings: AB 2363 Zero Traffic Fatalities Task Force
<https://calsta.ca.gov/-/media/calsta-media/documents/calsta-report-of-findings-ab-2363-zero-traffic-fatalities-task-force-all.pdf>
4. California Manual on Uniform Traffic Control Devices (CA MUTCD). California Department of Transportation
<https://dot.ca.gov/programs/safety-programs/camutcd>
5. Caltrans Design Information Bulletin 94 (DIB 94). California Department of Transportation
<https://dot.ca.gov/programs/design/design-information-bulletins-dibs>
6. Highway Design Manual (HDM) (7th Edition). California Department of Transportation
<https://dot.ca.gov/programs/design/manual-highway-design-manual-hdm>
7. Federal Highway Administration. (1998). Synthesis of Safety Research Related to Speed and Speed Management (Report No. FHWA-RD-98-154). U.S. Department of Transportation
<https://www.fhwa.dot.gov/publications/research/safety/98154/>

There is evidence that crash risk is lowest near the average speed of traffic and increases for vehicles traveling much faster or slower than average. The occurrence of a large number of crashes involving turning maneuver partly explains the increased risk for motorists traveling slower than average and confirms the importance of safety programs involving turn lanes, access control, grade separation, and other measures to reduce conflicts resulting from large differences in travel speeds.

When the consequences of crashes are taken into account, the risk of being involved in an injury crash is lowest for vehicles that travel near the median speed or slower and increases exponentially for motorists traveling much faster.

In general, changing speed limits on low and moderate speed roads appears to have little or no effect on speed and thus little or no effect on crashes. This suggests that drivers travel at speeds they feel are reasonable and safe for the road and traffic regardless of the posted limit.

In a survey of speed zoning practices, Parker (1985) found that all states and most local agencies consider the speed of traffic in setting speed limits. The primary

factors considered in engineering studies to set speed limits were, in order of their importance:

- 85th percentile speed.
 - Type and amount of roadside development.
 - Accident experience.
 - Adjacent Limits.
 - 10 mph pace (i.e., speed range that contains the largest percentage of vehicles).
 - Horizontal and vertical alignment.
 - Design speed.
 - Average test run speed.
 - Pedestrians.
8. Federal Highway Administration. (1992). Effects of Raising and Lowering Speed Limits on Selected Roadway Sections (Report No. FHWA-RD-92-084). U.S. Department of Transportation
- <https://www.fhwa.dot.gov/publications/research/safety/97084/97084.pdf>.

The objectives of this research was to determine the effects of raising and lowering posted speed limits on driver behavior and accidents for non-limited access rural and urban highways. Speed and accident data were collected in 22 States at 100 sites before and after speed limits were altered. Before and after data were also collected simultaneously at comparison sites where speed limits were not changed to control for the time trends. Repeated measurements were made at 14 sites to examine short - and long-term effects of speed limit changes.

The results of the study indicated that lowering posted speed limits by as much as 20 mi/h (32 km/h) or raising speed limits by as much as 15 mi/h (24 km/h) had little effect on motorist' speed. The majority of motorist did not drive 5 mi/h (8 km/h) above the posted speed limits when speed limits were raised, nor did they reduce their speed by 5 or 10 mi/h (8 or 16 km/h) when speed limits are lowered. Data collected at the study sites indicated that the majority of speed limits are posed below the average speed of traffic. Lowering speed limits below the 50th percentile does not reduce accidents but does significantly increase driver violations of the speed limit. Conversely, raising the posted speed limits did not increase speeds or accidents.

One primary reason for setting speed limits lower than speed considered safe and reasonable by the majority of motorists is based on the belief that lower speed limits reduced seeds and accidents. Also, it has been frequently suggested that most motorists drive 5 to 10 mph (8 to 16 km/h) over the posted speed limit, so lower limits should be established to account for this condition.

Conversely, it is believed that raising the speed limit increases speeds and accidents. For example, following a severe accident, one of the most frequent requests made to highway jurisdictions is to lower the speed limit. These requests are founded on public knowledge that accident severity increases with increasing vehicle speed because in a collision, the amount of kinetic energy dissipated is proportional to the square of the velocity. Simply stated, when a vehicle is involved in a crash the higher the vehicle speed, the greater the chance of being seriously injured or killed. However, as noted by a number of researchers, the potential for being involved in an accident is highest when traveling at speed much lower or much higher than the majority of motorists.

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Appendix E Pertinent CVC Sections

This list includes titles of CVC sections which relate to speed limits and speed limit signs.

CVC Section 235: Business District

CVC Section 240: Business and residence Districts: Determination

CVC Section 440: Official Traffic Control Device

CVC Section 515: Residence District

CVC Section 627: Engineering and Traffic Survey

CVC Section 21100: Local Regulation Scope

CVC Section 21100.5: Local Regulation Scope: City on a Natural Island

CVC Section 21107.9: Local Regulation within Mobile home Parks

CVC Section 21115: Local Regulation Regarding the Use of Golf Carts on Highways

CVC Section 21350: Placement of Traffic Control Devices by Department of Transportation

CVC Section 21351: Placement of Traffic Control Devices by Local Authorities

CVC Section 21351.3: Use of Units of Measurement by Local Regulation

CVC Section 21353: Local Regulation Affecting State Highway Traffic

CVC Section 21357: Speed Signs for Business or Residence Districts

CVC Section 21358: Speed Signs at District Boundaries

CVC Section 21359: Speed Signs for Special Areas

CVC Section 21367: Traffic Control: Highway Construction

CVC Section 21369: Speed Signs Ratified

CVC Section 21370: Regulation of Traffic: Construction Zone

CVC Section 21400: Department of Transportation General Practices Regarding Traffic Control Devices

CVC Section 22348: Excessive Speed and Designated Lane Use

CVC Section 22349: Maximum Speed Limit on Highways

CVC Section 22350: Basic Speed Law

CVC Section 22351: Speed Law Violations

CVC Section 22352: Prima Facie Speed Limits

CVC Section 22353: City of Norco: Equestrian Safety

CVC Section 22354: Decrease of State Highway Speed Limits

CVC Section 22354.5: Speed Limit Change: Consultation and Consideration Requirements

CVC Section 22355: Variable Speed Limits

CVC Section 22356: Increase of Freeway Speed Limit to 70 Miles Per Hour

CVC Section 22357: Increase of Local Speed Limits to 65 Miles Per Hour

CVC Section 22357.1: Decrease Near Children's Playgrounds

CVC Section 22358: Decrease of Local Speed Limits

CVC Section 22358.3: Decrease in business or residence district or in public park

CVC Section 22358.4: Decrease of Prima Facie Speed Limit

CVC Section 22358.5: Downward Speed Zoning

CVC Section 22358.6: Rounding 85th-Percentile Speed

CVC Section 22358.7: Reduce Speed Limit for Local Roads

CVC Section 22358.8: Retain or Restore Speed Limit for Local Roads

CVC Section 22358.9: Prima Facie Speed Limit in Business Activity District

CVC Section 22359: Boundary Line Streets

CVC Section 22360: Maximum Speed Limit on Local Highway Linking Districts

CVC Section 22361: Multiple-Lane Highways

CVC Section 22362: Speed Limit Where Persons at Work

CVC Section 22363: Restrictions Because of Snow or Ice Conditions

CVC Section 22364: Lane Speed Limits

CVC Section 22365: Prima Facie Speed Limit: South Coast Air Quality Management District: Local Ordinances

CVC Section 22366: Notice of Authorization to Increase Maximum Speed Limit

CVC Section 22400: Minimum Speed Law

CVC Section 22401: Traffic Signals

CVC Section 22402: Bridges and Structures

CVC Section 22403: Local Bridges and Structures

CVC Section 22404: Revision of Speed Limit on Bridges and Structures

CVC Section 22405: Violations on Bridges and Structures

CVC Section 22406: Maximum Speed for Designated Vehicles

CVC Section 22406.1: Commercial Motor Vehicle Driver: Penalties

CVC Section 22406.5: Tank Vehicle Driver Penalties

CVC Section 22407: Decreasing Truck Speed Limit

CVC Section 22409: Solid Tire

CVC Section 22410: Metal Tires

CVC Section 22411: Maximum Speed for Motorized Scooters

CVC Section 22413: Decreasing Speed Limit on Grades

CVC Section 38310: Speed Laws for Off-Highway Vehicles

CVC Section 40800: Vehicle and Uniform Used by Officers

CVC Section 40801: Speed Trap Prohibition

CVC Section 40802: Speed Traps

CVC Section 40803: Speed Trap Evidence

CVC Section 40804: Testimony Based on Speed Trap

CVC Section 40805: Admission of Speed Trap Evidence

CVC Section 40806: Police Reports

CVC Section 40807: Use of Evidence Regarding Departmental Action

CVC Section 40808: Speed Trap Evidence

CVC Section 41100: Speed Restriction Signs

CVC Section 41101: Official Signs and Traffic Control Devices

Appendix F Flowchart for Setting Speed Limit

