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III. ALTERNATIVES ANALYSIS

PACIFIC COAST HIGHWAY SAFETY STUDY

MALIBU, CALIFORNIA

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LSA

July 2013

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PACIFIC COAST HIGHWAY SAFETY STUDY

MALIBU, CALIFORNIA

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INTRODUCTION

Pacific Coast Highway (PCH or State Route 1 [SR-1]) is the sole east-west artery in the City of Malibu (City). PCH serves as a major thoroughfare serving local and daily commuters as well as recreational traffic for a distance of approximately 21 miles (mi) through the City. Along this route, the posted speed limit is between 45 and 55 miles per hour (mph). Generally, its four lanes are constrained by the Pacific Ocean and the Santa Monica Mountains into a tight cross-section. Along much of PCH, private development lines one or both sides of the street. These constraints, as well as vertical and horizontal curves, create a tight cross section for the four lanes of vehicular traffic and leave little right-of-way (ROW) for sidewalks or bicycle lanes. Most commercial and recreational activity in town is accessed directly from PCH. PCH is a constrained mobility corridor that accommodates several modes and serves a diverse array of adjoining land uses. Motorists use it for commuting and recreation, bicyclists for sport and entertainment, and pedestrians for exercise, coastal access, and connection to transit. Because PCH is a State Highway, it is controlled and maintained by the California Department of Transportation (Caltrans).

The LSA Associates, Inc. (LSA) Team is preparing a safety study with recommendations for the 21 mi corridor of PCH through the City. The first component of the PCH Safety Study, the Existing Condition Report (February 2013), described PCH's existing mobility and safety setting based on information obtained from the City, the public, research, and observations. Traffic-turning movement data were collected for a.m. and p.m. peak periods at 28 intersections along PCH. Pedestrian and bicycle data were collected at 12 intersections. Daily traffic volumes were collected at 6 locations. Transit usage data were provided by the Los Angeles County Metropolitan Transportation Authority (Metro). Land use and land policy data were collected from the United States (U.S.) Census, the City Local Coastal Program (LCP), the City General Plan, and other policy documents. Collision statistics were gathered from previous reports prepared for the PCH corridor, the Statewide Integrated Traffic Records System (SWITRS), the Transportation Injury Mapping System (TIMS), and Los Angeles County Sheriff's Department Collision Summary Reports.

The second component of the PCH Safety Study, the Corridorwide Safety Assessment (May 2013), analyzed safety along the project corridor based on the existing conditions, defining safety concerns and identifying potential safety issues. The list of potential problems for each study area and key conflict areas identified in that report form the basis of this Alternatives Analysis. Subsequent effort still to come includes the Funding Plan and Final Report. This Alternatives Analysis focuses on describing potential policies, actions, or projects that could address the safety issues previously identified. Feedback from the Project Steering Committee, the public, and the Funding Plan will lead to final recommendations in the final report.

While PCH is a four-lane divided roadway throughout the corridor, different topography and adjacent land uses create a diversified roadway character along the route. To facilitate analysis and discussion of PCH, the project corridor has been divided into the following three study areas:

- **Study Area 1:** Topanga Canyon to Cross Creek Road
- **Study Area 2:** Cross Creek Road to Busch Drive
- **Study Area 3:** Busch Drive to Western City Limits

Safety is subjective, variable, and context sensitive. The perception of a "safe environment" varies from person to person. The interpretation of "safety" changes with new technical studies, new court decisions (law), and new technology. Due to the ever-changing perception of safety, it is a challenge

to assess the existing infrastructure and safety issues and develop a list of policies, actions, and projects that will create a safer environment. In addition, safety assessments are not conducted from a single source or manual, but are derived instead from several sources that provide guidance in identifying safety issues.

Several local, State, and federal design standards and thresholds were used to determine potential policies, actions, or projects along the study corridor. For areas related to vehicle travel, technical reference materials such as the Federal Highway Administration (FHWA) *Manual on Uniform Traffic Control Devices* (MUTCD), American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets ("Green Book")*, Caltrans *Highway Design Manual* (HDM), and Transportation Research Board (TRB) *Access Management Manual* were used. For bicycle-related issues, the National Association of City Transportation Officials (NACTO) Design Manual, AASHTO Green Book, and Caltrans *California Manual on Uniform Traffic Control Devices* (California MUTCD) were used. For pedestrian facilities, the California MUTCD, AASHTO Green Book, and Caltrans HDM were referenced. The transit infrastructure was assessed based on the American with Disabilities Act (ADA) Standards for Accessible Design.

These resources provide suggestions for standard application, but are not strict mandates. Context and engineering judgment are essential during the application of any of these sources. The physical constraints of PCH and its role as both a State Highway and the City's main street make it all the more imperative to seek input from the many users of the roadway and systematically seek the best fit of standards for the unique situation.

REPORT STRUCTURE

The Corridorwide Safety Assessment Report identified about 80 potential safety issues from observation and public input and provided insight on the reason or possible causes for the situations. As the Safety Assessment progressed, it became evident that two categories of issues exist: corridorwide and location specific. Corridorwide issues persist throughout the 21 miles of PCH, which could be due to physical limitations (e.g., conflict for use of the shoulder), physical conditions (e.g., inconsistent signing and traffic control through the corridor), or motorist behavior (e.g., aggressive driving and excessive speed in all segments of PCH). Remedies for these issues are holistic in terms of the area to be covered, the resources expended, and the planning and engineering efforts undertaken.

Location-specific issues occur at discrete points as a result of particular conditions, activities, or behaviors. The built environment could be a contributing factor as evidenced near East Rambla Vista, where the street and a shopping center share access to PCH. Visitor activity, such as that observed at Paradise Cove, may create safety concerns at a specific location. Corridorwide issues, such as pedestrians crossing the roadway, may be concentrated at specific locations near restaurants, thereby creating a location-specific issue.

Addressing corridorwide issues will also address many of the location-specific safety issues. This Alternatives Analysis examines those 80 issues more closely in order to: (1) identify the type of safety issue; (2) recommend potential solutions; (3) identify the agency or entity responsible for implementing the solution; (4) qualitatively analyze the obstacles or constraints of implementation; and (5) identify the next steps or studies needed for implementation.

Through this series of examination, the goal of the Alternatives Analysis is to select the best qualified set of safety issues to be addressed in a Project Initiation Document (PID) format and process. Typically, Project Study Reports (PSRs) and PSR Equivalents, which are a type of PID, are prepared for projects on a State highway and are the engineering reports that agencies prepare in order to be considered for inclusion in future programming (i.e., funding) documents by Caltrans. This planning effort includes identifying recommendations and initiating the PID process.

The structure of this Alternatives Analysis is to examine the 80 issues in a variety of means through a series of matrices. This process will result in an understanding of the potential solutions and the process required to implement those solutions. The matrices will be explained in more detail in the following pages, but in summary, the process is as follows:

- **Matrix 1:** Identification of preliminary solutions for each safety issue
- **Matrix 2:** Identification of the responsible agency and/or entity for the solution, and identification of the possible process to implement the solution
- **Matrix 3:** Roadmap for addressing remaining issues in terms of timing and potential methods for implementation

CORRIDORWIDE SAFETY ISSUES

In general, the Corridorwide Safety Assessment concluded that corridorwide issues result from eight potential safety issues:

1. Conflict between travel modes
2. Signing and striping
3. Access to adjacent development
4. Parking cost redistribution of impacts
5. Valet operations
6. Vehicle/pedestrian conflict
7. Bicycle safety hazards
8. Driver behavior

This section discusses methods for addressing these corridorwide issues.

Conflict Between Travel Modes

One issue that was identified in the Corridorwide Safety Assessment as being prevalent throughout the corridor is the conflict in use of the PCH shoulder and the associated safety issues for cyclists. Throughout the PCH corridor, the number 2 lane is delineated from the shoulder by an edge stripe or fog line. Outside the edge stripe, the shoulder may be used as a deceleration lane, for parking, as a residential driveway, as a bike lane, for pedestrian travel, for refuse pick up, for contractor parking, and more. Where there is curb and gutter, on-street parking is provided and no edge striping is present.

During the weekday, eastbound and westbound bicycle volumes are low to moderate during the commute periods. On the weekends, however, bicycle traffic rises to between 50 to 200 bicycles per hour as recreation, leisure, and tourist cyclists travel along PCH. As disclosed in the Existing Condition Report, the rate of traffic collisions involving bicycles averaged 4 per year between 1996 and 1998. This rate is rising with 9 collisions occurring in the first 6 months of 2012. Four bicycle fatalities have occurred in the past 10 years.

Given the increasing use of PCH as a bicycle route and the rise in traffic collisions involving bicycles, installation of a bicycle lane eastbound and westbound along PCH through the City of Malibu is recommended. General conditions for the bicycle lane would be consistent with the provisions of the MUTCD and would include a single striped white lane (broken when approaching intersections without dedicated right-turn lanes), appropriate pavement marking "Bike Lane Only", and appropriate signing adjacent to the bike lane. In some areas, utility easements might provide additional space to accommodate bike lanes. In areas where sufficient ROW does not exist to accommodate the four vehicular travel lanes, median or middle striping, and a bike lane, Caltrans and the City may wish to consider other striping options such as "sharrows" or simply a Class 3 bike route signing standard.

Strategy A: Initiate planning, design, and implementation of bicycle travel lane from Topanga Canyon Boulevard to the western City limits.

Signing and Striping

The issue of variable signing and striping has been identified as a safety concern at various locations throughout the corridor. Contributing factors to this issue include signs that are hidden by vegetation, signs that have been knocked down and not replaced, signs that may not be visible within stopping sight distance, and signs that are not consistent with the most recent reflectivity standards. One particular issue related to signing and striping is the varying treatment near pedestrian crossings. While it is acknowledged that the overuse of signs degrades their effectiveness, consistent application is essential to communicating to drivers what conditions are ahead.

The City could collaborate with Caltrans and conduct a comprehensive Traffic Control Device Inventory (TCDI) from Topanga Canyon Boulevard to the western City limits. All signing, lighting, traffic control devices, and other devices subject to the California MUTCD would be inventoried geospatially.

Once the TCDI record is complete, a comprehensive signing/striping program would be completed that identifies standard signing design, location, spacing, and placement through the entire corridor. The plan would include all regulatory, warning, and information signs, illumination, and roadway striping, and consider travel through the entire corridor eastbound and westbound. The program may be used as an implementation plan with a temporal horizon consistent with the City's Capital Improvement Plan (CIP) or Regional Transportation Plan (RTP) schedule.

Once the TCDI is complete and the comprehensive signing/striping implementation plan is complete, the City/Caltrans can select critical elements to implement on a regularly scheduled basis consistent with available or anticipated funding. This is one overlay recommendation for the corridorwide issue that was identified in the Corridorwide Safety Assessment. More targeted recommendations are made in later sections.

Strategy B: Initiate planning, design, and implementation of uniform and updated traffic control beginning with a TCDI.

Access to Adjacent Development

In some areas of the City, access is taken directly from PCH for residential driveways. In some areas, on-site turnaround is possible, thereby allowing vehicles to enter traffic traveling forward. In other areas, residential vehicles must back into the travel lane. Backing into the travel lane presents a challenge to motorists and a danger to bicycles and pedestrians who might not be visible to the backing vehicle. Near the pier, commercial driveways onto PCH are common. On-street parallel parking is sometimes permitted up to the apron of the driveway. California MUTCD Section 3B-19 suggests a 6-foot (ft) parking restriction on either side of a driveway and a 20 ft parking restriction on either side of an intersection. Without adequate parking restrictions, sight distance from driveways is impaired, which increases the opportunity for conflict between vehicles. Applying consistent standards for parking restriction would be part of the TCDI discussed above. Parking policy in general could be addressed in the upcoming City/Caltrans Parking Management Plan.

Strategy C: Review commercial access and City intersections to provide adequate sight distance by restricting or reconfiguring parking as appropriate.

One of the parking policies that could be considered for limited applications when considering reconfiguration is back-in angled parking. In *Main Streets: Flexibility in Design and Operations*, Caltrans states that angled parking can be forward (nose-in) or reverse (back-in). Back-in angled parking requires vehicles to travel in reverse when initially parking, similar to parallel parking, but offers advantages for vehicles re-entering traffic (compared to nose-in parking), the primary advantage of which is that facing forward to re-enter traffic provides greater visibility of oncoming vehicles, bicycles, and pedestrians.

Parking Cost Redistribution of Impacts

In the City, it is common that off-street parking is paid parking, particularly near the beach (i.e., Zuma Beach, El Matador, La Piedra, El Pescador, and Nicholas Canyon). However, on-street parking along PCH is free. Because of this difference in price, demand for parking on PCH is higher than demand for parking in parking lots closer to recreational attractions. The resulting on-street parking maneuvers involve motorists slowing while searching for a space, making sudden turns, making unexpected stops, backing into parallel parking spaces, and eventually reentering traffic from the shoulder. Parking maneuvers negatively impact pedestrians and bicycles that are competing for use of the shoulder. Parking maneuvers also negatively impact vehicle operation because they increase friction in the right-hand lane and the potential for collisions. As mentioned above, on-street parking up to the curb return of driveways decreases sight distance from the driveways and increases opportunities for conflict. The disparity in parking pricing focuses the impacts of parking heavily on PCH.

Addressing the disparity in parking pricing could take the form of adjusting the cost down in off-street parking lots at times when they are underutilized. It could also take the form of adjusting the cost up for on-street parking in areas where public off-street parking is available. Public access does not necessarily mean free access. Pricing policy for on-street parking could be addressed in the upcoming City/Caltrans Parking Management Plan. The City could also encourage the County and State operators of off-street beach parking to re-examine their pricing policy to avoid underutilizing their parking lots.

Strategy D: ***Coordinate parking pricing with State (Caltrans, Coastal Commission) and County (Department of Beaches and Harbors) agencies to create equity and discourage unsafe parking and pedestrian activities.***

Valet Operations

Valet services are active on PCH where restaurants find that their parking demand exceeds the capacity of their off-street parking lots. In these circumstances, either patrons or restaurant valet employees would use public on-street parking on PCH. Under current conditions, procedures are not consistent across operators, and may lead to safety concerns such as sudden stopping, premature turns, and risky pedestrian behavior. The City should adopt standards for valet operations to be included in future Conditional Use Permits (CUPs). The standards could address: (a) whether valet operators can use parking on the opposite side of PCH, (b) reflectivity standards of valet operator clothing when operating at night, and (c) conditions leading to a review of the CUP (e.g., interference with traffic on PCH).

Strategy E: ***Review valet parking standards in westside Los Angeles communities and adopt best practices.***

Vehicle/Pedestrian Conflict

Conflict between vehicles and pedestrians occurs when pedestrians walk along the shoulder to and from bus stops, walk along the shoulder after parking, and when pedestrians cross the roadway at unmarked and marked mid-block locations as well as signalized intersections. The bus stops themselves are difficult to access. These bus stops are not consistent with ADA but can be challenging to get to for able-bodied patrons. Bus stops not located near intersections (e.g., at Moonshadows) have no paved walking path other than the roadway. At Bonsall Drive, the bus stop is located on a traffic island where no safe pedestrian path is provided. A comprehensive review of bus stops, which are located between Topanga Canyon Boulevard and Trancas Canyon Road, should be undertaken to determine how to provide ADA accessibility to these locations. This project would provide a co-benefit to other pedestrians walking along PCH.

Strategy F: ***Initiate planning, design, and implementation of Metro-consistent ADA accessibility to bus stops.***

Pedestrians cross PCH for several reasons. Many bus stops on the north side of the roadway have no pedestrian connection (marked or unmarked) to the south side of the roadway. Bus patrons have little choice but to cross PCH outside of a crosswalk. Some residents live on the south side of PCH but limited parking requires them to park on the north side of PCH. Visitors will also cross the roadway if

their parking space is on the north side of the roadway. Crossing PCH outside of a marked crosswalk is legal as long as the pedestrian yields right-of-way to vehicles close enough to present an immediate hazard. However, between January 2010 and May 2013, four pedestrian fatalities occurred while the pedestrian was crossing outside of a crosswalk. Where provided, marked pedestrian crossings can be unexpected by drivers because the crossings do not give the usual visual cues.

Methods for addressing vehicle pedestrian conflict while crossing the roadway that were considered but rejected include increasing the number of unsignalized mid-block crossings and improving culverts for use by pedestrians. Both of these methods would expose the City and Caltrans to liability without completely addressing the safety issue. It is Caltrans policy to discourage mid-block crossings because they are generally unexpected by motorists. Mid-block crossings on roadways with two or more travel lanes in one direction create more concern. Undercrossings that were not originally designed for pedestrian use also produce safety concerns. These areas would not be accessible to all users and are out of public view.

At existing marked pedestrian crossings, methods for addressing vehicle pedestrian conflict that should be further considered include: (a) creating a consistent look for all pedestrian crossings between Rambla Vista and Cross Creek or the entire City if possible, (b) install pavement extensions (bulb-outs) on each side of the crosswalk, and (c) using in-roadway flashing lights to warn highway users to slow or come to a stop. The appropriate location and application of regulatory signs such as R1-6 would be determined as part of the TCDI discussed above. Bulb-outs extending only as far as a parallel parked car (to avoid additional interference to bicycles) would make pedestrians more visible, reduce walking distance, and contribute to a uniform look for crossings to give drivers visual cues. The final bulb-out design should maintain roadway drainage. In-roadway flashing lights (i.e., high-intensity activated crosswalk [HAWK]) are described in the California MUTCD in Chapter 4L. This traffic control device alerts drivers that pedestrians are present and is most visible at night when pedestrians are least visible.

Strategy G: Provide uniform signage and look at mid-block pedestrian crossings, including providing bulb-outs and HAWK lighting (or equivalent illumination,) to provide drivers with consistent visual cues of conditions ahead.

At locations with high pedestrian volume crossing the roadway and no marked crosswalk, the alternatives are: (a) placement of a “no crossing sign” (i.e., R9-3), (b) installing a signalized crosswalk, (c) installing a pedestrian overcrossing, and (d) doing nothing. Placement of signage would be determined as part of the TCDI discussed above. If a marked crosswalk is located within a reasonable distance, pedestrians could be redirected to cross at that location. Where sight distance is an issue and another marked crosswalk is not located within a reasonable distance, a signalized crosswalk, with the consistent look of other City pedestrian signals, would be preferred over an unmarked crosswalk. A pedestrian overcrossing, while expensive, would eliminate the interaction between pedestrians and vehicles. Doing nothing but reviewing placement of warning signs (i.e., W11-2) as part of the TCDI is also an option. Pedestrian crossings are legal, most are accomplished without resulting in a collision, and addressing corridorwide speed issues could lessen the severity of this issue.

Strategy H: Address unmarked pedestrian crossings by either prohibiting, providing a crossing, or addressing vehicle speed.

Bicycle Safety Hazards

Throughout the corridor, conditions on the shoulders present a bicycle safety hazard. Rocks and other debris left on the shoulder can force bicycles into travel lanes to avoid them. Even when debris is cleared, dangers remain for cyclists. Degraded pavement quality poses hazards to bicycles and can be harder to see than debris. The most common type of pavement degrading observed along PCH is asphalt spreading, which results in cracks. These cracks can catch bicycle tires. Even when the cracks are filled with new tar, the patch can have a lip that could kick a bicycle tire to the side. As of Fall 2012, Caltrans maintenance workers began repairing cracks. Monitoring and maintenance of PCH should include all pavement, including the shoulders. In particular, debris removed from the roadway should also be removed from the shoulder.

Strategy I: Regularly maintain all pavement to provide safe passage.

Driver Behavior

Driver behavior is a global concern along PCH in Malibu and exacerbates almost all other safety concerns. A driver's failure to properly yield ROW to bicycles and pedestrians increases the conflict between travel modes and directly impacts the safety of these two groups. Drivers could overcome the safety concerns at driveways by approaching them with greater caution and safer speeds. Continuing to travel at a high rate of speed compounds sight distance issues. A vehicle's speed also affects a driver's ability to safely maneuver their vehicle, properly yield ROW to pedestrians and bicycles, and effectively consider the safety of other vehicles.

The most common type of collision along the corridor is rear-end, which is evidence that speeds are often not appropriate for the situation. The Corridorwide Safety Assessment also indicated that accidents with parked vehicles are prevalent with excessive speeds as contributing factors. Automated speed data collected at five locations along the roadway indicated that vehicles exceeding the speed limit by 10 mph or greater occur throughout the corridor and are a significant issue near the Malibu Pier. Addressing the speed issue would improve almost every other safety concern, thereby benefiting vehicles, bicycles, and pedestrians.

Methods for controlling vehicle speed that were considered but rejected include lowering the speed limit and narrowing lanes. As stated in California Vehicle Code 22358, changing the speed limit on a State Highway would require an Engineering and Traffic Survey (ETS) and cannot be lowered arbitrarily. (An ETS is described in California MUTCD Section 2B.13.) In addition, the existing conditions reveal many vehicles exceeding the currently posted speed limit. Lane width below 12 ft is a non-standard design feature that Caltrans must approve on a case-by-case basis. Narrowing lanes reduces vehicle separation. Current conditions show that drivers are not responding to less safe conditions with safer driving behavior. Reducing vehicle separation would create less safe conditions with no guarantee that vehicle speeds would be lowered.

One method for controlling vehicle speed that should be further considered includes ***education***. The TCDI discussed above should include consistent speed signing and warning signs to alert drivers to areas presenting increased hazards. In addition to roadside signage, painted warnings on the roadway could include: "LOWER SPEED AHEAD," "WATCH FOR PEDS," or "SHARE THE ROAD." Techniques commonly used to combat drunk driving could also be used to educate the public about speeding. These could include public service announcements, bus banners, billboards, and crash cars.

Increased ***enforcement*** could also help to control vehicle speed. The Los Angeles County Sheriff's Department provides law enforcement services within the City of Malibu, including patrolling PCH for moving violations. Providing additional resources for the Sheriffs to apply targeted enforcement between Las Flores Canyon Road and Malibu Pier would discourage the prevalence of excessive speed reported in the Corridorwide Safety Assessment. The additional resources could take the form of either more patrol officers at any given time or extending the hours of regular patrols. PCH is a State Highway and within the jurisdiction of the California Highway Patrol (CHP). However, the CHP currently does not regularly patrol PCH through the City of Malibu. State allocated funding for regular CHP patrols of PCH could also discourage excessive speeds. Again, this could take the form of simultaneous patrols with the Sheriffs or extending the hours of regular patrols. Coordination with the CHP would require staff time and resources from both the Sheriff's Department and the City.

Strategy J: Pursue policies of increased education and enforcement to address excessive speed through the corridor.

In 2011, the Caltrans Division of Research and Innovation commissioned a study of Automated Speed Enforcement (ASE) effectiveness and policies in the various states where it has been implemented. That study is included herein as Appendix A. The study concluded that ASE programs have generally been effective in reducing driver speeds. The State of California has neither passed a law governing ASE nor a law prohibiting ASE. The study reports that ASE programs have the potential to face legal challenges, but tempers this by stating that most legal scholars agree that ASE does not violate due process or protections against illegal search and seizure.

Point-to-point monitoring would allow the City to establish a zone between ASE locations where drivers would be incentivized to maintain the speed limit for the duration of the zone. These zones would function best in areas with no intervening traffic signals (e.g., between Big Rock Drive and Las Flores Canyon Road, between Rambla Pacifico and Carbon Canyon Road, or between the 22730 PCH and Malibu Pier traffic signals). Controlling vehicle speeds within these zones would benefit all roadway users, including other vehicles, bicycles, pedestrians walking along PCH, and pedestrians crossing PCH.

Strategy K: Consider an Automated Speed Enforcement pilot project.

Existing traffic signals could be utilized to assist in discouraging excessive speed. Excessive speed is more prevalent at night east of Las Flores Canyon Road, near the Malibu Pier, and near Broad Beach. Existing signal timing for the traffic signals rests on green for through traffic on PCH when not activated by opposing movements. The traffic signals could be reprogrammed in all directions to manage flow and create platooning. Requiring vehicles to stop occasionally could reduce the slow but steady acceleration that occurs when vehicles travel unencumbered in one direction. However, it could also result in some drivers speeding up to make up for time lost at traffic signals. Existing traffic signals could also be modified with leading detectors. If those leading detectors identify a vehicle traveling at excessive speed, the red light could be activated (in this circumstance, a longer all-red time than usual would also be used). When vehicles are traveling at the speed limit, the traffic signal would maintain normal operation.

Strategy L: Investigate traffic signal modifications to address excessive speed and traffic safety.

LOCATION-SPECIFIC SAFETY ISSUES AND SOLUTIONS

The first matrix (Table A) lists the 80 issues identified in the Corridorwide Safety Assessment and their locations. Policies, actions, or projects to address the safety issues are presented and categorized by common strategies. The corridorwide strategies described above include:

- **Strategy A:** Initiate planning, design, and implementation of bicycle travel lane from Topanga Canyon Boulevard to the western City limits.
- **Strategy B:** Initiate planning, design, and implementation of uniform and updated traffic control beginning with a TCDI.
- **Strategy C:** Review commercial access and City intersections to provide adequate sight distance by restricting or reconfiguring parking as appropriate.
- **Strategy D:** Coordinate parking pricing with State (Caltrans, Coastal Commission) and County (Department of Beaches and Harbors) agencies to create equity and discourage unsafe parking and pedestrian activities.
- **Strategy E:** Review valet parking standards in westside Los Angeles communities and adopt best practices.
- **Strategy F:** Initiate planning, design, and implementation of Metro-consistent ADA accessibility to bus stops.
- **Strategy G:** Provide uniform signage and look at mid-block pedestrian crossings, including providing bulb-outs and HAWK lighting (or equivalent illumination), to provide drivers with consistent visual cues of conditions ahead.
- **Strategy H:** Address unmarked pedestrian crossings by either prohibiting, providing a crossing, or addressing vehicle speed.
- **Strategy I:** Regularly maintain all pavement to provide safe passage.
- **Strategy J:** Pursue policies of increased education and enforcement to address excessive speed through corridor.
- **Strategy K:** Consider an Automated Speed Enforcement pilot project.
- **Strategy L:** Investigate traffic signal modifications to address excessive speed and traffic safety.

In addition to the strategies to address corridorwide safety issues, two additional strategies would address location specific issues found throughout the corridor. These strategies are:

- **Strategy M:** Develop projects to address turn lane and lane geometry modification to enhance performance and safety.
- **Strategy N:** Perform additional engineering analysis to address discrete issues and locations to affect improvements in safety.

The Strategic Highway Safety Plan (SHSP) categories are also indicated for each of the solutions. Indicating these categories assists in determining potential sources of funding to implement the solutions. A description of the categories is provided below:

- Engineering tools include road design, traffic calming devices, and pavement markings. These can also include the technology that goes into the design and manufacturing of vehicles, safety devices, and traffic systems.

Table A: Matrix 1 - Preliminary Solutions

Location		Safety Assessment Issue	Policies, Actions, or Projects	Strategy															Strategic Highway Safety Plan Category		
				A: Bicycle Lane	B: Updated Uniform Signage	C: Parking Reconfiguration	D: Paid On-street Parking	E: Valet Parking Standards	F: Bus Stop Accessibility	G: Uniform Mid-Block Crossings	H: Address Unmarked Pedestrian Crossings	I: Maintain Pavement	J: Speed Education and Enforcement	K: Automated Speed Enforcement	L: Traffic Signal Modifications	M: Lane Geometry Modifications	N: Additional Engineering Analysis	Education	Engineering	Enforcement
Corridorwide	1	Conflict between travel modes	Install bicycle lane throughout corridor or at least at key locations																	
	2	Signing and striping	Conduct a comprehensive TCDI																	
	3	Access to adjacent land use	Restrict parking near all driveways and consider reconfiguring parking in spots																	
	4	Cost of parking is redistributing impacts	Pursue paid on-street parking in spots and reduced parking cost in off-street lots																	
	5	Valet services are active on PCH	Adopt citywide valet standards																	
	6	Potential vehicle/pedestrian conflict	Comprehensive review and ADA accessibility of bus stops																	
			Provide standard look for pedestrian crossings including consistent signage, bulb-outs, and HAWK lighting																	
			Restrict crossing, provide marked crossing, or do nothing																	
	7	Bicycle safety hazard	Maintain shoulder equivalent with roadway																	
	8	Driver behavior	Use signage, roadway striping, and other techniques to eductate																	
			or increase resources for enforcement or pursue automated enforcement																	
			or modify traffic signals to moderate traffic																	
Study Area 1																				
Entire segment	9	Vehicle/bicycle conflict	Addressed through corridorwide bicycle policy																	
Topanga Canyon Boulevard	10	Potential for collisions	Widen 11 foot lanes to 12 feet as is found in all other locations along PCH																	
	11	Potential vehicle conflict	Extend westbound deceleration lane																	
	12	Potential vehicle/pedestrian conflict	Addressed through corridorwide pedestrian policy																	
Tuna Canyon Road	13	Vehicle/pedestrian conflict	Addressed through corridorwide pedestrian policy																	
	14	Potential vehicle conflict at permitted left-turn	Maintain landscaping to avoid encroaching on sight distance																	
East of Big Rock Drive	15	Vehicle/bicycle conflict	Investigate modifications to barrier to provide shoulder area for bike lane																	
Big Rock Drive	16	High reported accident rate	Increase visibility of traffic signal by placing signal head on top of the existing signal pole																	
			Add a protected eastbound left-turn signal phase																	
	17	Accidents with parked vehicles	Addressed through corridorwide speed policy																	
Moonshadows	18	Potential vehicle/pedestrian conflict	Addressed through corridorwide pedestrian policy, including possible new marked crossings and valet policy																	
Big Rock to Las Flores	19	Potential vehicle conflict	Consider reconfiguration of parking																	
Las Flores Canyon Road	20	High reported accident rate	Increase visibility of traffic signal by placing signal head on top of the existing signal pole																	
			Convert eastbound protected/permitted left-turn to protected only with both a leading and lagging left-turn phase																	
	21	Potential vehicle conflict	Addressed through citywide valet policy																	
Las Flores to Rambla Vista	22	Potential vehicle conflict	Interconnect traffic signals and sychronize to create gaps in traffic for driveways																	
			Consider signalization and interconnection of Rambla Vista																	
			Perform focused engineering study to determine proper channelization, geometrics, and access at Rambla Vista																	
	23	Potential vehicle/pedestrian conflict	Pedestrian crossings addressed through corridorwide bus stop access and pedestrian policies																	
			Consider parking time restrictions to accommodate student pick-up/drop-off																	
La Costa Beach Club crosswalk	24	Vehicle/pedestrian conflict	Addressed through corridorwide pedestrian policy																	
Carbon Canyon Road	25	High reported accident rate	Create a buffer between residential driveways and travel lane																	
			or use traffic signals to create gaps in traffic																	

Location		Safety Assessment Issue	Policies, Actions, or Projects	Strategy															Strategic Highway Safety Plan Category		
				A: Bicycle Lane	B: Updated Uniform Signage	C: Parking Reconfiguration	D: Paid On-street Parking	E: Valet Parking Standards	F: Bus Stop Accessibility	G: Uniform Mid-Block Crossings	H: Address Unmarked Pedestrian Crossings	I: Maintain Pavement	J: Speed Education and Enforcement	K: Automated Speed Enforcement	L: Traffic Signal Modifications	M: Lane Geometry Modifications	N: Additional Engineering Analysis	Education	Engineering	Enforcement
22333 Traffic Signal	26	High reported accident rate	Addressed through corridorwide pedestrian policy		■					■									■	
			Increase visibility of traffic signal by placing signal head on top of the existing signal pole												■				■	
22506 Flashing Yellow Pedestrian Crossing	27	Potential vehicle/pedestrian conflict	Addressed through corridorwide pedestrian policy		■					■									■	
22730 Traffic Signal	28	High reported accident rate	Addressed through corridorwide pedestrian policy		■					■									■	
			Increase visibility of traffic signal by placing signal head on top of the existing signal pole		■										■				■	
Malibu Pier	29	Potential for collisions	Use traffic signals to create gaps in traffic												■				■	
			Increase visibility of driveways by restricting parking within 6 feet of curb return			■														■
	30	Vehicle/pedestrian conflict	Addressed through corridorwide pedestrian policy, including possible new marked crossings								■								■	
			Install area maps directing pedestrians to marked crossing locations		■													■		
	31	Vehicle/bicycle conflict	Addressed through corridorwide bicycle policy	■															■	
Serra Road	32	Potential for collisions	Maintain landscaping to avoid encroaching on sight distance														■		■	
			Use traffic signals to create gaps in traffic												■				■	
Study Area 2																				
Entire segment	33	Potential vehicle conflict	Create a buffer between residential driveways and travel lane													■			■	
Entire segment	34	Vehicle/bicycle conflict	Addressed through corridorwide bicycle policy	■															■	
Cross Creek/PCH	35	Potential for collisions	Develop pedestrian overcrossings criteria and guidance to be used to remove pedestrian volume from intersection														■		■	
			At specific locations determined by Safety Assessment and subsequent focused studies add or legthen turn lanes													■			■	
			or convert Cross Creek Road to a one-way southbound street														■		■	
Malibu Road/PCH	36	Potential for collisions	Reconfigure Malibu Road to intersect at a 90 degree angle														■		■	
Webb Way/PCH	37	Potential for collisions	Provide protected left-turn signal phasing at Webb Way approaches												■				■	
Bayshore	38	Potential vehicle/pedestrian conflict	Addressed through corridorwide pedestrian policy, including possible new marked crossings								■								■	
Malibu Seafood	39	Potential vehicle/pedestrian conflict	Addressed through corridorwide pedestrian policy, including possible new marked crossings					■			■								■	
Dan Blocker Beach	40	Potential vehicle/pedestrian conflict	Addressed through corridorwide pedestrian policy, including possible new marked crossings								■								■	
Latigo Canyon Road/PCH	41	Potential for collisions	Install westbound right-turn lane with deceleration lane													■			■	
Sea Vista Drive/PCH	42	Potential vehicle conflict at permitted NBL	Advanced warning of intersection addressed through TCDI		■														■	
			Provide a median refuge for turning vehicles													■			■	
Winding Way/PCH	43	Potential vehicle conflict at SBL	Advanced warning of intersection addressed through TCDI		■														■	
			Restrict parking within 20 feet of Winding Way			■														■
			or cut plants and dirt to make more room for parking and walking around Winding Way														■		■	
Bridge north of Via Escondido	44	Pedestrian safety hazard	Repair bridge railing														■		■	
Paradise Cove Road/PCH	45	Potential for collisions	Restrict on-street parking to reduce the number of pedestrians crossing through vehicle paths during eastbound right and westbound left green time, resulting in more efficient utilization of the existing lanes			■														■
	46	Vehicle/pedestrian conflict	Restrict on-street parking to reduce the number of pedestrians along the side of the highway and the number of pedestrians crossing through vehicle paths			■													■	
Zumirez Drive/PCH	47	Potential for collisions	Increase visibility of traffic signal by placing signal head on top of the existing signal pole													■			■	
Cavalleri Road/PCH	48	Potential vehicle conflict at permitted left-turn	Advanced warning of intersection addressed through TCDI		■														■	
			Excavate hillside and trim landscaping to provide greater sight distance from Cavalleri Road														■		■	

Location		Safety Assessment Issue	Policies, Actions, or Projects	Strategy															Strategic Highway Safety Plan Category		
				A: Bicycle Lane	B: Updated Uniform Signage	C: Parking Reconfiguration	D: Paid On-street Parking	E: Valet Parking Standards	F: Bus Stop Accessibility	G: Uniform Mid-Block Crossings	H: Address Unmarked Pedestrian Crossings	I: Maintain Pavement	J: Speed Education and Enforcement	K: Automated Speed Enforcement	L: Traffic Signal Modifications	M: Lane Geometry Modifications	N: Additional Engineering Analysis	Education	Engineering	Enforcement
PCH east of Heathercliff Road	49	Potential for sideswipe collision	Monitor situation and restrict food truck parking if a safety concern develops			■														■
Bonsall Dr/PCH	50	Conflict between travel modes	Pedestrian issues addressed through corridorwide bus access policy						■										■	
	51	Vehicle/pedestrian conflict	Addressed through corridorwide bus access policy						■										■	
	52	Vehicle/bicycle conflict	Addressed through corridorwide bicycle policy						■										■	
	53	Potential vehicle conflict at permitted SBL	Consider traffic control modification including aligning Bonsall Drive and Westward Beach Road, signalizing, and interconnecting with Busch Drive												■	■	■		■	
	54	Potential vehicle conflict at SBR	Consider traffic control modification including aligning Bonsall Drive and Westward Beach Road, signalizing, and interconnecting with Busch Drive												■	■	■		■	
	55	Potential vehicle conflict at EBL	Consider traffic control modification including aligning Bonsall Drive and Westward Beach Road, signalizing, and interconnecting with Busch Drive												■	■	■		■	
Westward Beach Road/PCH	56	Potential vehicle conflict	Consider traffic control modification including aligning Bonsall Drive and Westward Beach Road, signalizing, and interconnecting with Busch Drive												■	■	■		■	
	57	Potential vehicle conflict at WBL	Consider traffic control modification including aligning Bonsall Drive and Westward Beach Road, signalizing, and interconnecting with Busch Drive												■	■	■		■	
	58	Potential vehicle conflict at NBL	Consider traffic control modification including aligning Bonsall Drive and Westward Beach Road, signalizing, and interconnecting with Busch Drive												■	■	■		■	
Busch Dr/PCH	59	Potential for collisions	Stripe Zuma access road for three inbound lanes after the undercrossing to limit queue reaching Busch Drive													■			■	
			Remove westbound left-turn lane into Zuma Beach parking lot and lengthen the eastbound left-turn lane													■			■	
Study Area 3																				
Entire segment	60	Vehicle/bicycle conflict	Addressed through corridorwide bicycle policy	■															■	
Entire segment	61	Potential vehicle conflict	Advanced warning of intersections addressed through TCDI		■														■	
Zuma Beach	62	Vehicle/pedestrian conflict	Addressed through parking pricing policy				■												■	
Morning View Dr/PCH	63	Potential for collisions	Need for advanced warning sign addressed through TCDI		■														■	
PCH WBR at Morning View Dr	64	Potential for collisions	Provide a westbound right-turn lane with deceleration lane													■			■	
Guernsey Ave/PCH	65	Potential vehicle conflict at permitted left-turn	Reduce paddle height along the left-turn lane													■			■	
Trancas Creek bridge south of Trancas Cyn Rd	66	Pedestrian safety hazard	Repair bridge railing														■		■	
Broad Beach-Trancas Cyn Rd/PCH intersection	67	Limited sight distance at unsigalized intersection	Install median barrier along eastbound left-turn lane to prevent turns into gas station against westbound traffic													■			■	
	68	Potential for collisions	Provide westbound deceleration lane													■			■	
Trancas Cyn to western City Limit	69	Vehicle/bicycle conflict	Addressed through corridorwide bicycle policy	■															■	
	70	Potential vehicle conflict	Residences appear to have on-site turn around; advanced warning of driveways addressed through TCDI		■														■	
Broad Beach overlook (north of Lunita Rd)	71	Potential vehicle conflict	Consider striping and signage for one turn into the overlook		■											■			■	
Broad Beach (west)/PCH intersection	72	Potential vehicle conflict at permitted left-turn	Remove brush and relocate utilities														■		■	
El Matador State Beach	73	Vehicle/pedestrian conflict	Addressed through corridorwide parking pricing and pedestrian policies				■				■								■	
	74	Potential for collisions	Advanced warning of intersections addressed through TCDI		■														■	
La Piedra State Beach	75	Vehicle/pedestrian conflict	Addressed through corridorwide parking pricing and pedestrian policies				■				■								■	
	76	Potential for collisions	Advanced warning of intersections addressed through TCDI		■														■	
El Pescador State Beach	77	Vehicle/pedestrian conflict	Addressed through corridorwide parking pricing and pedestrian policies				■				■								■	
	78	Potential for collisions	Advanced warning of intersections addressed through TCDI		■														■	
Nicholas Canyon County Beach	79	Vehicle/pedestrian conflict	Addressed through corridorwide parking pricing and pedestrian policies				■				■								■	
	80	Potential for collisions	Advanced warning of intersections addressed through TCDI		■														■	

- Education tools are used to inform people through media safety campaigns, signage, speed watch programs, neighborhood meetings, education classes, and presentations to schools.
- Enforcement techniques include CHP and Sheriff's warnings and citations, radar devices, no parking signs or ticketing, speed display signs, and changeable message signs.

Table A presents this matrix of issues, solutions, solution type, and SHSP categories.

The most common solution type is addressing unmarked pedestrian crossings. Also frequently listed are implementing uniform and updated traffic control beginning with a TCDI and traffic signal modifications. It should be noted, however, that because vehicle speed exacerbates almost all other safety issues, addressing the corridorwide speed issue would be expected to produce the most significant results.

RESPONSIBILITY

The intent of the second matrix is to identify which agencies and entities could play a role in implementing the potential solution. PCH is a State Highway owned and operated by Caltrans and, as such, the responsibility for maintaining and/or modifying PCH lies with Caltrans. However, PCH spans the entire city of Malibu and serves as the primary corridor for business, residential, recreational, and public uses. Many entities play different roles along the corridor and have a variety of interests and thus have an impact on what occurs within and adjacent to the ROW. Each also has a specific responsibility as it relates to safety issues along the corridor.

The ***City of Malibu*** is responsible for code enforcement and compliance with the laws and regulations stated in the municipal code and zoning ordinance for land use decisions adjacent to PCH. The City is responsible for approving and regulating land development along PCH, which includes ensuring that safety, access, parking, and transportation issues are adequately addressed and implemented. The City, in partnership with the California Coastal Commission, must prepare a land use plan as part of the Local Coastal Program (LCP). The purpose of a land use plan is to ensure that coastal resources are protected, particularly when these resources are impacted by development and changing circumstances.

Caltrans is responsible for planning, designing, building, operating, and maintaining California's State Highway system. Basically on behalf of the State, Caltrans functions as the owner, operator, and maintainer of PCH. As it relates to safety, Caltrans is responsible for monitoring, analyzing, and implementing appropriate as-needed solutions. Other agencies and entities can implement improvements to the State Highway system, but Caltrans must evaluate and approve the proposed improvements in accordance with the Sate's standards and requirements. Approval is obtained during various phases of the project development process, but ultimately approval of an encroachment permit is required for any work or activities within the State Highway ROW.

The City of Malibu contracts with the ***Los Angeles County Sheriff's Department*** to provide general law enforcement services and traffic enforcement. The specific services provided to the City by the Sheriff's Department include patrol, accident response, search and rescue, and disaster communication services. Additionally, the Sheriffs operate the Sheriff's Teen Traffic Offender Program (STTOP), an innovative intervention program that provides the public with a method to report reckless teen driving and an opportunity to educate young drivers and their parents. The

Sheriff's Department can play a significant role along PCH in traffic enforcement, pedestrian and bicyclist activities, and safety education programs.

The primary mission of the ***California Highway Patrol (CHP)*** is "the management and regulation of traffic to achieve safe, lawful, and efficient use of the highway transportation system." On PCH, the CHP's primary role is traffic enforcement. Other responsibilities include assisting in emergencies, safety education programs, and public awareness campaigns.

The ***California Coastal Commission*** is responsible for administering the California Coastal Act, which requires each community within the Coastal Zone to prepare an LCP that includes a coastal Land Use Plan to protect, maintain and, where feasible, enhance and restore the overall quality of the Coastal Zone environment. LCPs must contain a specific public access component ensuring maximum public access to the coast and that public recreation areas are provided. Development within the Coastal Zone may not commence until the Commission or a local government issues a Coastal Development Permit (CDP).

Within Malibu limits, the ***Los Angeles County Department of Beaches and Harbors*** (DBH) is responsible for visitors and beach users of the County-owned beaches, including Nicholas Canyon, El Sol, Zuma, Point Dume, Latigo Shores, Dan Blocker, and Las Tunas beaches. This responsibility includes expanding beach use by enhancing existing access. DBH's latest Strategic Plan outlined objectives and actions items to expand beach use. Some of the objectives included analyzing peak-hour parking lot demand on average summer weekends and identifying issues or problems with safety, queuing and delays, and space availability. The corresponding solutions included operational (staffing, intersection controls, etc.) and major maintenance/capital projects (restriping, additional exits or entrances, and signage). DBH's primary roles in assisting in safety solutions along PCH are parking management at the area beaches and installation and maintenance of signage, particularly as it relates to beach access for vehicles and pedestrians.

The ***Los Angeles County Metropolitan Transportation Authority*** (Metro) is the regional transportation planning agency and public transportation operating agency for the County. Metro also develops and oversees transportation plans, policies, and funding programs. Metro is responsible for overseeing the expenditure plan for Measure R, the half-cent sales tax for the County to finance new transportation projects and programs. Metro is also responsible for all the public transit that operates along PCH. Metro plays a role in locating and designing safe transit stops and will be instrumental in assisting with safe pedestrian access to these stops.

Local businesses located along PCH have a responsibility to adhere to City regulations regarding safe access to and from their operations. This includes pedestrian and bicycle access, vehicular ingress and egress, and adequate and safe parking.

Residents and ***visitors*** to Malibu have a responsibility to follow State and local rules and regulations regarding safe driving and bicycling and pedestrian activities. Specifically, this means driving within the speed limit, being mindful of other vehicles on the roadways, walking within safe environments, and crossing PCH at specified crossings when provided.

The City has many responsibilities beyond safety, but many of these do affect conditions and variables of creating safe environments for people and vehicles. The City is responsible for land use planning within the PCH corridor that includes the provision and maintenance of public services,

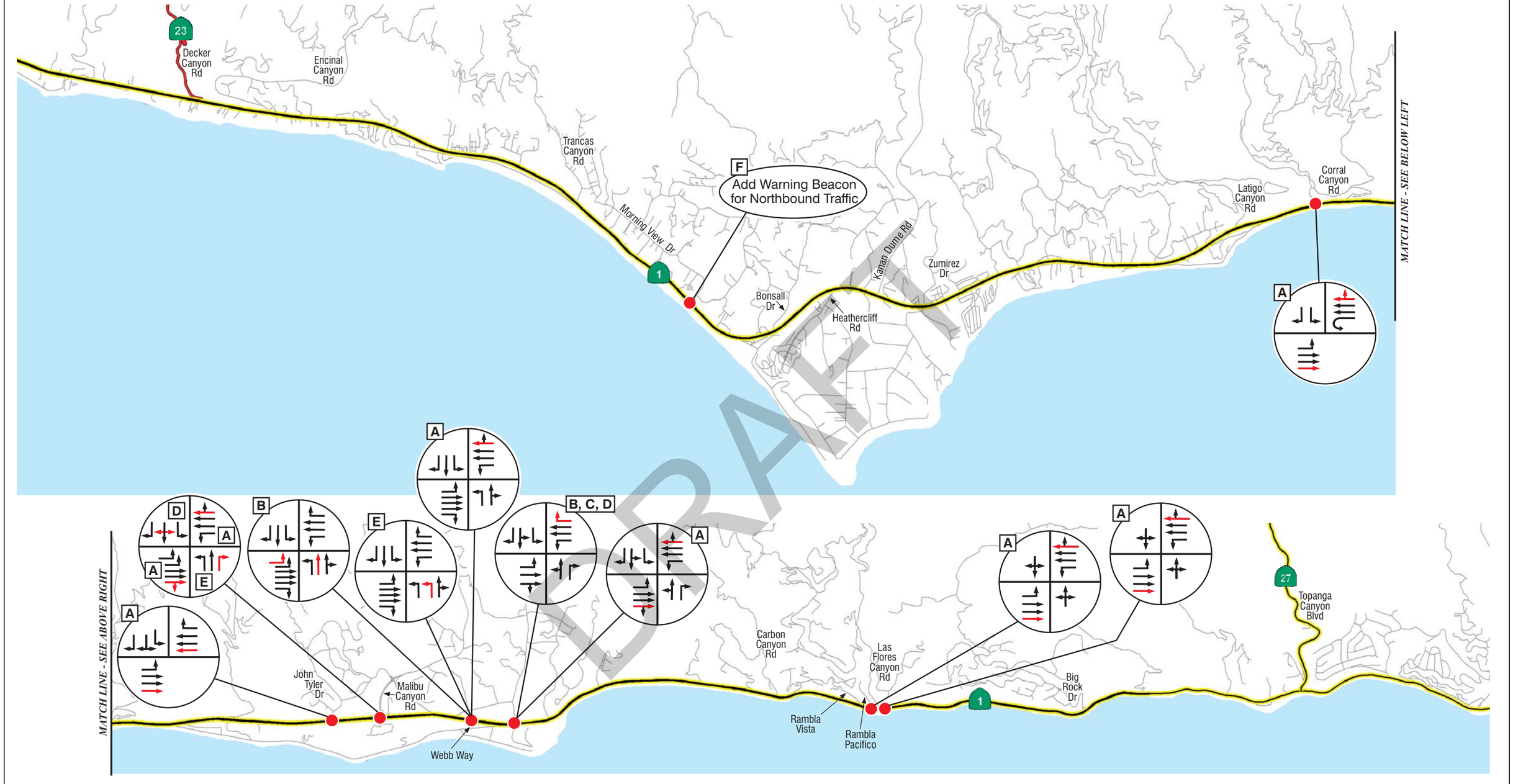
including access roads, parking, utilities, and wastewater management. It also includes the review and approval of development projects.

As part of its responsibility for land use planning, the City certifies environmental documents that include analyses of impacts to traffic and circulation. If a project is determined to have a potentially significant impact, mitigation is recommended that would reduce the impact to a level that is less than significant. However, because the City does not have jurisdiction over physical changes to PCH, recommended mitigation to PCH cannot be compelled by the City. In these circumstances, the City could deny the project because it has significant and unavoidable impacts or the City could determine that the project has overriding considerations and could approve the project without a direct responsibility to mitigate the potential impacts. Figure 1 displays roadway improvements that have been recommended in recent environmental documents prepared for projects in the City of Malibu. It should be noted, however, that because no mechanism exists to compel these improvements, it is not believed these improvements are planned.

The City also has the primary responsibility of proposing transportation projects and seeking funding through a variety of sources, most commonly federal, State, and regional. There are current projects in the planning or early implementation stages that could play a role in solving some of the safety issues along PCH. For example, the City has been successful in securing $14 million of the voter-approved Los Angeles County's Measure R program. Measure R committed a projected $40 billion to traffic relief and transportation upgrades throughout the County over the next 30 years. In the first full year of Measure R implementation, local jurisdictions are expected to receive a total of over $100 million for their transportation needs.

In the second matrix (Table B), safety issues that would be addressed as part of a corridorwide policy, action, or project are rolled up into the corridorwide issues. Table B presents the corridorwide and location-specific issues, and identifies the agencies and entities that could play a role in implementing the potential solution and whether a project is currently underway that is correlated with the potential solution. It should be noted that Table B only identifies a correlation. Further analysis will be needed to determine if the safety issue is resolved, but the purpose of this exercise is to provide the City with another level of analysis as it pursues developing solutions throughout the PCH corridor.

Table B illustrates that most of the corridorwide solutions will require the participation of multiple agencies. These corridorwide solutions will have a high return, but will require more coordination, time, and resources to plan, engineer, and implement the solutions. As a potential benefit, the involvement of more agencies may also mean more potential sources for funding. Table B also shows that many location-specific issues can be addressed through coordination between the City and Caltrans. Because these solutions rely only on the relationship between the City and Caltrans, they may be implemented quicker, but will require the City and Caltrans to identify paths to implementation.



LSA

LEGEND

- Existing Lane
- Recommended Mitigation

A - Pepperdine University Campus Life Project
B - Malibu La Paz Project
C - Malibu Neighborhood Shopping Center Project
D - Malibu Housing Element EIR
E - Rancho Malibu Resort Hotel
F - Malibu High School Campus Improvement Project

FIGURE 1

PCH Safety Study

Recommended Mitigation for New Development

I:\SGO1201\G\New Development Mitigation.cdr (6/24/13)

Table B: Matrix 2 - Agency Involvement

Location	Safety Assessment Issue Number	Strategy	Policies, Actions, or Projects	Agency Involvement: City of Malibu	Caltrans	Los Angeles County Sheriffs Department	California Highway Patrol	California Coastal Commission	County Department of Beaches and Harbors	California Parks and Recreation	Metropolitan Transportation Authority	Project Currently Underway
Corridorwide	1, 9, 15, 31, 34, 52, 60, 69	A	Install bicycle lane throughout corridor or at least at key locations	■	■			■				
	2, 42, 43, 48, 61, 63, 70, 74, 76, 78, 80	B	Conduct a comprehensive TCDI		■		■					
	3, 19, 23, 29, 43	C	Restrict parking near all driveways and consider reconfiguring parking in spots	■	■			■				
	4, 62	D	Pursue paid on-street parking in spots and reduced parking cost in off-street lots	■	■			■	■	■		
	5, 18, 21, 39	E	Adopt citywide valet standards	■								
	6, 18, 23, 50, 51	F	Comprehensive review and ADA accessibility of bus stops		■						■	
	6, 24, 26, 27, 28, 29, 30	G	Provide standard look for pedestrian crossings including consistent signage, bulb-outs, and HAWK lighting	■	■							PCH Intersection Improvements
	6, 12, 13, 18, 30, 38, 39, 40, 73, 75, 77, 79	H	Restrict crossing, provide marked crossing, or do nothing	■	■			■	■			
	7	I	Maintain shoulder equivalent with roadway		■							
	8, 17	J	Use signage, roadway striping, and other techniques to eductate	■	■						■	PCH Regional Traffic Messaging
		K	or increase resources for enforcement or pursue automated enforcement	■	■	■	■					
		L	or modify traffic signals to moderate traffic	■	■							
Study Area 1												
Topanga Canyon Boulevard	10	M	Widen 11 foot lanes to 12 feet as is found in all other locations along PCH		■							
	11	M	Extend westbound deceleration lane	■	■							
	14	H	Maintain landscaping to avoid encroaching on sight distance		■							
East of Big Rock Drive	15	A, M	Investigate modifications to barrier to provide shoulder area for bike lane	■	■							
Big Rock Drive	16	L	Increase visibility of traffic signal by placing signal head on top of the existing signal pole	■	■							
		L	Add a protected eastbound left-turn signal phase	■	■							PCH Intersection Improvements
Big Rock to Las Flores	19	C	Consider reconfiguration of parking	■	■							
Las Flores Canyon Road	20	L	Increase visibility of traffic signal by placing signal head on top of the existing signal pole	■	■							
		L	Convert eastbound protected/permitted left-turn to protected only with both a leading and lagging left-turn phase	■	■							
Las Flores to Rambla Vista	22	L	Interconnect traffic signals and sychronize to create gaps in traffic for driveways	■	■							
		L	Consider signalization and interconnection of Rambla Vista	■	■							
		N	Perform focused engineering study to determine proper channelization, geometrics, and access at Rambla Vista	■	■							
	23	F	Consider parking time restrictions to accommodate student pick-up/drop-off [1]	■								
Carbon Canyon Road	25	L, M	Create a buffer between residential driveways and travel lane or use traffic signals to create gaps in traffic	■	■							
22333 Traffic Signal	26	L	Increase visibility of traffic signal by placing signal head on top of the existing signal pole	■	■							
22730 Traffic Signal	28	L	Increase visibility of traffic signal by placing signal head on top of the existing signal pole	■	■							
Malibu Pier	29	L	Use traffic signals to create gaps in traffic	■	■							
		C	Increase visibility of driveways by restricting parking within 6 feet of curb return	■	■			■				
		B	Install area maps directing pedestrians to marked crossing locations	■				■				
Serra Road	32	N	Maintain landscaping to avoid encroaching on sight distance		■							
		L	Use traffic signals to create gaps in traffic	■	■							

Location	Safety Assessment Issue Number	Strategy	Policies, Actions, or Projects	Agency Involvement: City of Malibu	Caltrans	Los Angeles County Sheriffs Department	California Highway Patrol	California Coastal Commission	County Department of Beaches and Harbors	California Parks and Recreation	Metropolitan Transportation Authority	Project Currently Underway
Study Area 2												
Entire segment	33	M	Create a buffer between residential driveways and travel lane									
Cross Creek/PCH	35	N	Develop pedestrian overcrossings criteria and guidance to be used to remove pedestrian volume from intersection									
		M, N	At specific locations determined by Safety Assessment and subsequent focused studies add or legthen turn lanes or convert Cross Creek Road to a one-way southbound street									
Malibu Road/PCH	36	N	Reconfigure Malibu Road to intersect at a 90 degree angle									Raised Median Enhancements Webb Way to Corral Cyn
Webb Way/PCH	37	L	Provide protected left-turn signal phasing at Webb Way approaches									
Latigo Canyon Road/PCH	41	M	Install westbound right-turn lane with deceleration lane									
Sea Vista Drive/PCH	42	M	Provide a median refuge for turning vehicles									
Winding Way/PCH	43	C	Restrict parking within 20 feet of Winding Way									
		N	or cut plants and dirt to make more room for parking and walking around Winding Way									
Bridge north of Via Escondido	44	N	Repair bridge railing									
Paradise Cove Road/PCH	45, 46	C	Restrict on-street parking to reduce the number of pedestrians crossing through vehicle paths during eastbound right and westbound left green time, resulting in more efficient utilization of the existing lanes									Paradise Cove Parking Restriction
Zumirez Drive/PCH	47	M	Increase visibility of traffic signal by placing signal head on top of the existing signal pole									
Cavalleri Road/PCH	48	N	Excavate hillside and trim landscaping to provide greater sight distance from Cavalleri Road									
PCH east of Heathercliff Road	49	C	Monitor situation and restrict food truck parking if a safety concern develops									
Bonsall Dr/Westward Beach Road/PCH	53, 54, 55, 56, 57, 58	L, M, N	Consider traffic control modification including aligning Bonsall Drive and Westward Beach Road, signalizing, and interconnecting with Busch Drive									
Busch Dr/PCH	59	M	Stripe Zuma access road for three inbound lanes after the undercrossing to limit queue reaching Busch Drive									
			Remove westbound left-turn lane into Zuma Beach parking lot and lengthen the eastbound left-turn lane									
Study Area 3												
PCH WBR at Morning View Dr	64	M	Provide a westbound right-turn lane with deceleration lane									
Guernsey Ave/PCH	65	M	Reduce paddle height along the left-turn lane									
Trancas Creek bridge south of Trancas Cyn Rd	66	N	Repair bridge railing									
Broad Beach-Trancas Cyn Rd/PCH intersection	67	M	Install median barrier along eastbound left-turn lane to prevent turns into gas station against westbound traffic									
	68	M	Provide westbound deceleration lane									
Broad Beach overlook (north of Lunita Rd)	71	B, M	Consider striping and signage for one turn into the overlook									
Broad Beach (west)/PCH intersection	72	N	Remove brush and relocate utilities									

Notes:

[1] The Santa Monica-Malibu Unified School District would also be involved.

PATHS TO IMPLEMENTATION

The goal of the Alternatives Analysis is to identify potential solutions and implementation steps for the safety issues identified along the PCH corridor. A discrete number of projects will be identified to be studied further so that they are in a position for programming and implementation. The third matrix (Table C) identifies the process that is recommended to address the solutions. While the ultimate goal of the Alternative Assessment is to provide direction to the City, Caltrans, Southern California Association of Governments (SCAG), Steering Committee, and the public in order to identify those strategies and/or projects to pursue to improve safety along the PCH corridor. To this end, the paths to implementation could involve different forms of study and documentation depending on various factors such as whether the strategy or project is an engineering, enforcement, or educational improvement, the cost or extent of effort involved, or whether it is located on a State Highway or within the jurisdiction of the City, County, or Metro. Examples of approval or implementation documents could include:

- ***Project Initiation Documents (PIDs)*** are engineering documents or technical reports that describe a project's conceptual scope, cost, and schedule to provide a better basis for funding decisions and the next phase of project implementation. There are various types of PIDs, such as PSRs, Small Capital Value Reports (SCVPs), PSR-Project Development Support only, and feasibility studies. Caltrans and local agencies develop PIDs for projects on the State transportation system, and the type of PID needed is directly related to the scope, cost, and type of improvement under consideration. A PID is a record of the existing information, initial assumptions, identified risks, and constraints that drove the development of the project work plan. They are used to obtain approval into a programming document or to get conceptual approval of a project funded by others.
- ***Traffic investigation reports*** lower the collision rate and severity of collisions. Caltrans, as part of its regular monitoring effort, occasionally will conduct an analysis of specific locations. This analysis can be triggered by accidents and other factors. The results could determine an incremental set of improvements to address the identified concerns such as signage and striping.
- ***Maintenance activities*** are projects that keep the facility safe and serviceable until rehabilitation is needed. These activities include routine, major, and preventive maintenance.
- ***Enforcement efforts*** can take many different shapes. A comprehensive speed enforcement effort could entail establishing discreet enforcement zones where speeding is a persistent problem. Radar or laser speed monitoring equipment could be deployed. Parked patrol vehicles are often used to imply a police presence.
- ***Education campaigns*** are often used to promote bicycle and pedestrian safety. Resources include public service announcements, posters, brochures, newspaper articles, special events, school visits, and billboards.
- The City's ***CIP*** can include transportation projects that result in a physical change of roadways and intersections, including traffic signal modification, turn-lane enhancement, median improvement, and signing and striping. However, in order to implement any of the City's projects along the State Highway, Caltrans must issue an encroachment permit allowing work within the State ROW.

Table C: Matrix 3 - Implementation

Location	Safety Assessment Issue Number	Strategy	Policies, Actions, or Projects	PID	Traffic Investigation	Maintenance Activities	Enforcement Efforts	Education Campaign	Capital Improvement Plan	Time Frame: Short Term	Time Frame: Medium Term	Time Frame: Long Term
Corridorwide	1, 9, 15, 31, 34, 52, 60, 69	A	Install bicycle lane throughout corridor or at least at key locations									
	2, 42, 43, 48, 61, 63, 70, 74, 76, 78, 80	B	Conduct a comprehensive TCDI									
	3, 19, 23, 29, 43	C	Restrict parking near all driveways and consider reconfiguring parking in spots									
	4, 62	D	Create cost equity between on- and off-street parking to reduce unsafe parking and pedestrian maneuvers									
	5, 18, 21, 39	E	Adopt citywide valet standards									
	6, 18, 23, 50, 51	F	Comprehensive review and ADA accessibility of bus stops									
	6, 24, 26, 27, 28, 29, 30	G	Provide standard look for pedestrian crossings including consistent signage, bulb-outs, and HAWK lighting									
	6, 12, 13, 18, 30, 38, 39, 40, 73, 75, 77, 79	H	Restrict crossing, provide marked crossing, or do nothing									
	7	I	Maintain shoulder equivalent with roadway									
	8, 17	J	Use signage, roadway striping, and other techniques to eductate									
		K	or increase resources for enforcement or pursue automated enforcement									
		L	or modify traffic signals to moderate traffic									
Study Area 1												
Topanga Canyon Boulevard	10	M	Widen 11 foot lanes to 12 feet as is found in all other locations along PCH									
	11	M	Extend westbound deceleration lane									
	14	H	Maintain landscaping to avoid encroaching on sight distance									
East of Big Rock Drive	15	A, M	Investigate modifications to barrier to provide shoulder area for bike lane									
Big Rock Drive	16	L	Increase visibility of traffic signal by placing signal head on top of the existing signal pole									
		L	Add a protected eastbound left-turn signal phase									
Big Rock to Las Flores	19	C	Consider reconfiguration of parking									
Las Flores Canyon Road	20	L	Increase visibility of traffic signal by placing signal head on top of the existing signal pole									
		L	Convert eastbound protected/permitted left-turn to protected only with both a leading and lagging left-turn phase									
Las Flores to Rambla Vista	22	L	Interconnect traffic signals and sychronize to create gaps in traffic for driveways									
		L	Consider signalization and interconnection of Rambla Vista									
		N	Perform focused engineering study to determine proper channelization, geometrics, and access at Rambla Vista									
	23	F	Consider parking time restrictions to accommodate student pick-up/drop-off									
Carbon Canyon Road	25	L, M	Create a buffer between residential driveways and travel lane									
			or use traffic signals to create gaps in traffic									
22333 Traffic Signal	26	L	Increase visibility of traffic signal by placing signal head on top of the existing signal pole									
22730 Traffic Signal	28	L	Increase visibility of traffic signal by placing signal head on top of the existing signal pole									
Malibu Pier	29	L	Use traffic signals to create gaps in traffic									
		C	Increase visibility of driveways by restricting parking within 6 feet of curb return									
		B	Install area maps directing pedestrians to marked crossing locations									
Serra Road	32	N	Maintain landscaping to avoid encroaching on sight distance									
		L	Use traffic signals to create gaps in traffic									

Location	Safety Assessment Issue Number	Strategy	Policies, Actions, or Projects	PID	Traffic Investigation	Maintenance Activities	Enforcement Efforts	Education Campaign	Capital Improvement Plan	Time Frame: Short Term	Time Frame: Medium Term	Time Frame: Long Term
Study Area 2												
Entire segment	33	M	Create a buffer between residential driveways and travel lane									
Cross Creek/PCH	35	N	Develop pedestrian overcrossings criteria and guidance to be used to remove pedestrian volume from intersection									
		M, N	At specific locations determined by Safety Assessment and subsequent focused studies add or legthen turn lanes									
			or convert Cross Creek Road to a one-way southbound street									
Malibu Road/PCH	36	N	Reconfigure Malibu Road to intersect at a 90 degree angle									
Webb Way/PCH	37	L	Provide protected left-turn signal phasing at Webb Way approaches									
Latigo Canyon Road/PCH	41	M	Install westbound right-turn lane with deceleration lane									
Sea Vista Drive/PCH	42	M	Provide a median refuge for turning vehicles									
Winding Way/PCH	43	C	Restrict parking within 20 feet of Winding Way									
		N	or cut plants and dirt to make more room for parking and walking around Winding Way									
Bridge north of Via Escondido	44	N	Repair bridge railing									
Paradise Cove Road/PCH	45, 46	C	Restrict on-street parking to reduce the number of pedestrians crossing through vehicle paths during eastbound right and westbound left green time, resulting in more efficient utilization of the existing lanes									
Zumirez Drive/PCH	47	M	Increase visibility of traffic signal by placing signal head on top of the existing signal pole									
Cavalleri Road/PCH	48	N	Excavate hillside and trim landscaping to provide greater sight distance from Cavalleri Road									
PCH east of Heathercliff Road	49	C	Monitor situation and restrict food truck parking if a safety concern develops									
Bonsall Dr/Westward Beach Road/PCH	53, 54, 55, 56, 57, 58	L, M, N	Consider design alternative to realign intersection and access system including striping, lanes, channelization, and traffic control									
Busch Dr/PCH	59	M	Stripe Zuma access road for three inbound lanes after the undercrossing to limit queue reaching Busch Drive									
			Remove westbound left-turn lane into Zuma Beach parking lot and lengthen the eastbound left-turn lane									
Study Area 3												
PCH WBR at Morning View Dr	64	M	Provide a westbound right-turn lane with deceleration lane									
Guernsey Ave/PCH	65	M	Reduce paddle height along the left-turn lane									
Trancas Creek bridge south of Trancas Cyn Rd	66	N	Repair bridge railing									
Broad Beach-Trancas Cyn Rd/PCH intersection	67	M	Install median barrier along eastbound left-turn lane to prevent turns into gas station against westbound traffic									
	68	M	Provide westbound deceleration lane									
Broad Beach overlook (north of Lunita Rd)	71	B, M	Consider striping and signage for one turn into the overlook									
Broad Beach (west)/PCH intersection	72	N	Remove brush and relocate utilities									

Table C presents the third matrix and identifies which of these paths could be utilized for the potential solutions. Table C also identifies the potential timing of a solution (i.e., short, medium, and long term). As discussed previously, the involvement of more agencies will extend the timing of a potential solution. The paths for implementation and timing will be used to complete the funding plan in the next phase of the PCH Safety Study.

As Table C shows, the identified safety solutions can be addressed in a variety of formats. In addition, Table C shows some solutions that will require a longer time frame to implement if the solutions are pursued. For those solutions identified in the PID column, further consultation with Caltrans and the City will be needed to determine the specific format required and which specific improvements will require the completion of a PSR as the next step.

NEXT STEPS

The PCH Safety Study began by gathering data and observations and identifying the existing conditions along the corridor. These conditions informed the creation of a matrix identifying 80 safety issues that occurred throughout the corridor and at specific locations. However, this exhaustive study resulted in the conclusion that most of these 80 issues result from eight core issues that exist in one form or another throughout the entire corridor. The strategies laid out earlier in this report address these in a holistic way and present a path to the City, Caltrans, and others that, if undertaken in a strategic, collaborative, and deliberative manner, could be transformative to the Malibu community. In addition, pursuing pilot projects could inform and instruct Caltrans on the tools needed to address similar safety issues on the State Highway system.

This Alternatives Analysis presents potential policies, actions, and projects to address the safety issues. Some of the solutions presented would address corridorwide issues and others are location specific. To this point, the process has been based on observations (including the observations of stakeholders and the public), and those observations have been reported. In order to present feasible and desirable recommendations, it is important at this time to vet the potential solutions within the community. The City, Caltrans, Project Steering Committee, and the public play a vital role in identifying and prioritizing solutions to pursue.

The next step is to present these 80 issues and 14 strategies (Strategies A through N) to the Project Steering Committee and the public, and request their participation in prioritizing the projects. Caltrans and Metro will also be consulted to further refine the appropriate project initiation documents needed for both the issues and strategies. After compiling the results of this targeted outreach, a discreet list of recommended projects to pursue in developing documentation for programming and implementation will be presented to the City.

APPENDIX A

HIGHWAY WORKER SAFETY: AUTOMATED SPEED ENFORCEMENT, CALTRANS DIVISION OF RESEARCH AND INNOVATION, AUGUST 3, 2011

Highway Worker Safety: Automated Speed Enforcement

Requested by
Rebecca Boyer, Caltrans Division of Research and Innovation

August 3, 2011

The Caltrans Division of Research and Innovation (DRI) receives and evaluates numerous research problem statements for funding every year. DRI conducts Preliminary Investigations on these problem statements to better scope and prioritize the proposed research in light of existing credible work on the topics nationally and internationally. Online and print sources for Preliminary Investigations include the National Cooperative Highway Research Program (NCHRP) and other Transportation Research Board (TRB) programs, the American Association of State Highway and Transportation Officials (AASHTO), the research and practices of other transportation agencies, and related academic and industry research. The views and conclusions in cited works, while generally peer reviewed or published by authoritative sources, may not be accepted without qualification by all experts in the field.

Executive Summary

Background

Caltrans is interested in how other states are implementing automated speed enforcement (ASE) from the following perspectives:

- Policy and legal considerations.
- Education and outreach (including signage).
- Types and effectiveness of the ASE technologies deployed.

Summary of Findings

Below we summarize findings in the three topic areas.

Policy and Legal Considerations

Overview of ASE Laws in the States

- Web sites maintained by national associations offer a wealth of information about ASE laws. Using data from these web sites we provide a summary of state programs, including the reach of each ASE program and program structure (the type of citation issued, liability, the type of image taken and ASE penalties).
    - A limited number of states are maintaining active ASE programs. Among the states most active in the use of ASE are Colorado, Illinois, Maryland, Oregon, Tennessee, Utah and Washington, and the District of Columbia.
    - Iowa and Ohio do not have state laws with regard to ASE, but there are programs operating under local ordinance.
    - Missouri also lacks a state law, but the Missouri Highways and Transportation Commission recently adopted a policy on automated traffic enforcement.

    - Arizona appears to be discontinuing its ASE program with the recent passage of legislation that repeals the statute establishing the Photo Enforcement Fund.

- The Insurance Institute for Highway Safety provides an extensive analysis of court decisions related to camera enforcement, providing citations and links to case documentation.
- An April 2011 report by the National Highway Traffic Safety Administration (NHTSA) provides a summary of key provisions of state speeding laws effective as of February 1, 2010, including ASE. We present data regarding the permissibility of ASE, including links to relevant statutes and a brief description of the statute or other relevant citation.

Supplementary Information on State Legislation, Policies or Programs

- Here we provide links to documents relating to:
    - Recent Arizona legislation that repeals the statute establishing the Photo Enforcement Fund effective July 2012.
    - The Missouri Highways and Transportation Commission's policy on automated traffic enforcement. Missouri DOT does not own or operate the ASE systems but allows local governments to install the systems on state highways.
    - Washington legislation that authorizes pilot projects, overseen by the Washington Traffic Safety Commission, to implement ASE in cities west of the Cascade Mountains with a population over 195,000. The legislation also authorizes continuation of a pilot project to employ ASE in work zones on state highways.

Other Research

- A 2007 report published by the California PATH program provides a detailed assessment of the legal issues associated with ASE. In addition to examining potential challenges to ASE programs, the authors identify key program design considerations.
- Another 2007 publication, written by a traffic photographic-enforcement industry representative, discusses the value of the evidence gathered by stationary traffic surveillance systems.

Education and Outreach

Public Education

- Outreach materials for ASE programs in the United States seem to be few in number and difficult to find online; we list available materials for states, including program pages, brochures and press releases.
- A number of studies detail public education efforts:
    - In Montgomery County, MD, officials created public awareness using press releases, a program website, informational materials, a speakers bureau, and a logo to create public brand recognition of the "Safe Speed" program.
    - See especially *Demonstration of Automated Speed Enforcement in School Zones in Portland, Oregon* for a detailed description of outreach strategies, including the development of a media packet, securing of radio and TV coverage, and the use of "Photo Enforced" placards on speed signs.
- NHTSA's *Speed Enforcement Camera Systems Operational Guidelines* includes extensive advice on how to implement a communications campaign to create awareness of ASE programs.

Public Perception

- Polls repeatedly show that the majority of the public responds positively to ASE. However, the margins of support vary widely, from a low of 51 percent in Washington, D.C. to a high of 77 percent in Scottsdale, AZ.
- In a national survey sponsored by NHTSA in 2002, 68 percent of the respondents indicated that the use of ASE systems was a good idea for those "going 20 mph or more over the posted speed limit" and 78 percent for speeding in a school zone. In a 1998 national survey sponsored by NHTSA, 71 percent of the respondents indicated that they favored the use of automated devices for speed enforcement.
- Oregon studies showed the following:
    - The public's acceptance of the use of ASE increased for school neighborhoods after a demonstration project and public outreach.
    - A survey showed an approval rating for ASE programs after eight months of 88 percent of residents of Beaverton, OR, and 89 percent of residents of Portland.
- In a Maryland study, six months after enforcement of an automated speed program began, 60 percent of drivers were aware of the camera program and 62 percent supported it.
- Opponents of ASE programs can be vocal and generate controversies, and a number of programs—including those in Arizona and one in California, where public outreach campaigns were considered successful and public approval high—have been discontinued because of vocal opposition.
- According to the 1998 NHTSA survey, leading public objections included:
    - Invasion of privacy (26 percent).
    - Preference for in-person contact with an officer (14 percent).
    - Camera errors (12 percent).

Signage

- The 2009 edition of the national Manual on Uniform Traffic Devices (MUTCD) provides recommended signage for photo enforcement.
- Iowa, Maryland, Ohio and Oregon are among the states that have adopted the national MUTCD and/or a state-specific supplement that provides guidelines for the state's ASE signage.
- In other states, including Arizona and Colorado, statutory provisions specify the type of signage required for photo enforcement or ASE.

ASE Technologies

Effectiveness Studies

- Numerous studies have been performed regarding the effectiveness of particular implementations of ASE. All reports located for this synthesis found the practice to be effective in reducing driver speeds.
- Several studies identified, such as those performed in California, Illinois, Maryland and Oregon, specifically address the use of ASE in work zones.
- This has been enough of an area of interest in recent years that multiple syntheses are also available surveying ASE implementations, including "Automated Speed Enforcement in the U.S.: A Review of the Literature on Benefits and Barriers to Implementation" (described here under "Other Guidance and Research").

Note: A synthesis report was prepared for the Washington State DOT on Automated Enforcement Systems in October 2007. The current document does not replicate that report, but instead focuses on more recent sources and research. That synthesis—more than half of which concerns red light enforcement—can be found at http://www.wsdot.wa.gov/NR/rdonlyres/A5E3943E-5C43-4966-89ED-E0F12EE2A7FA/0/AutomatedEnforcementSynthesisTrepanier605.pdf.

- A Research Need Statement was issued by the Transportation Research Board in 2007 for a comprehensive effectiveness study for various ASE technologies, indicating that Caltrans may be able to leverage other states' interest in this topic through cooperative funding efforts or in other ways.
- ASE has long been used in European countries, making effectiveness data and guidance available from additional sources. For instance, we have provided a citation to a 2008 summary effort, "Safety Effects of Automated Speed Enforcement Programs: Critical Review of International Literature."

Best Practices and Comparison of Methods

- The case studies located for this report employ radar, photo, and in some cases laser enforcement. In some studies, the effectiveness of an ASE method was compared with the presence of patrol vehicles, and studies and guidance cover both mobile and stationary implementations, though mobile ones are much more common. While some studies such as the two listed here for California compare multiple available systems, no systematic comparison of all of the available options was located.
- An often-cited recent innovation in ASE is point-to-point monitoring, which tracks average speed between two points on a roadway.

Policy and Legal Considerations

The citations below provide a summary of automated enforcement laws and the legal decisions that relate to ASE.

Overview of ASE Laws in the States

Automated Enforcement Laws, Insurance Institute for Highway Safety (IIHS), August 2011.
http://www.iihs.org/laws/automated_enforcement.aspx
This summary of automated enforcement laws notes that while "many states have laws explicitly authorizing automated enforcement, not all states where cameras are in use have such laws, nor are they always necessary." The web site provides a table that summarizes automated enforcement laws in each state and the District of Columbia. The table also includes ratings of red light camera laws.

Speed and Red Light Camera Laws, Governors Highway Safety Association (GHSA), August 2011.
http://www.statehighwaysafety.org/html/stateinfo/laws/auto_enforce.html
Using data from the National Conference of State Legislatures, IIHS and state highway safety offices, this web site presents a state-by-state accounting of the criteria for the use of speed and red light cameras, including information about the citation issued, the image taken and traditional penalties.

Twelve states have passed laws that prohibit the use of speed cameras—some with very narrow exceptions. Twenty-nine states have no law addressing speed cameras. Below is a summary of the states with ASE programs at the state or local level.

ASE Programs (State or Local)

- **Arizona** – statewide application. (The statute establishing funding for Arizona's ASE program is scheduled for repeal in July 2012.)
- **California** – no state law, but program operating on Mountains Recreation and Conservation Authority park roads.
- **Colorado** – restricted to construction and school zones, residential areas or adjacent to a municipal park.
- **District of Columbia** – jurisdiction-wide authority to use automated enforcement to capture all moving infractions.
- **Illinois** – statewide only in construction zones or Illinois Toll Authority roads; local authorities are prohibited from using speed cameras; state may use speed cameras, but only when a law enforcement officer is present and witnesses the event.
- **Iowa** – no state law, but programs are operating under local ordinance.
- **Louisiana** – state law provides that convictions resulting from camera enforcement shall not be reported for inclusion in driver record; the law is silent on other issues.
- **Maryland** – Montgomery County school zones and residential districts; Prince George's County school zones; statewide in school zones by local ordinance and work zones.
- **Missouri** – no state law, but programs are operating under Missouri DOT policy (see http://www.modot.mo.gov/documents/2011AECommissionPolicy.pdf).
- **Ohio** – no state law, but programs are operating under local ordinance.

- **Oregon** – specific cities where ASE is permitted; may not be used for more than four hours per day in any location.
- **Tennessee** – statewide except for Interstate highways that are not work zones.
- **Utah** – statewide only in school zones or where the speed limit is 30 mph or less; officer must be present; requires local ordinance.
- **Washington** – applicable in school zones only. (A recent budget bill authorizes pilot programs overseen by the Washington Traffic Safety Commission to detect speed violations within cities west of the Cascade Mountains that have a population over 195,000. A pilot project to test ASE in work zones continues under the new budget.)

Additional information about the program structure of selected state ASE programs appears in the table below.

ASE Program Parameters for Selected States

State	Citation Issued To	Liability	Image Taken	ASE Penalties / Record
Arizona	Not addressed	Not addressed	Not addressed	$165 fine / 3 points
Colorado	Registered owner	Driver	Tag and driver	$40 maximum fine ($80 in school zone); no points or record; warning only for first photo radar offense if speed within 10 mph of limit
District of Columbia	Registered owner	Owner	Not addressed	$75 fine; no points
Illinois	Registered owner	Driver	Tag and driver	$250 or 25 hours community service
Maryland	Registered owner	Owner	2 or more images of rear of vehicle and tag in any medium	$40 maximum fine; no points
Oregon	Registered owner or driver, if identifiable	Registered owner	Photographs; digital images	$300 maximum fine
Tennessee	Registered owner	Registered owner	Not addressed	$50; not reportable; no points
Utah	Not addressed	Not addressed	Photograph	No reportable; no points may be assessed
Washington	Registered owner	Registered owner	Vehicle, license tag	Fine up to the maximum for parking violations in the jurisdiction; no record; no points

ASE-Related Statutory Provisions

Summary of State Speed Laws, National Highway Traffic Safety Administration, Eleventh Edition, April 2011.
http://www.nhtsa.gov/staticfiles/nti/pdf/811457.pdf
This publication provides a summary chart of key provisions of state speeding laws effective as of February 1, 2010, including ASE. The tables below present data taken from the report in three categories:

- ASE is expressly permitted by statutory provision.
- ASE is permitted under certain conditions.
- ASE permissibility is inferred from related legislation or case law.

ASE Expressly Permitted by Statute

State	Statute(s)	Description
Arizona	AZ ST § 41-1722(A), (B), (D) http://www.azleg.gov/ArizonaRevisedStatutes.asp?Title=28 *Note*: This statute is scheduled for repeal July 1, 2012.	Section 41-1722 mandates the department of transportation to enter into contract(s) with private vendor(s) to establish a photo enforcement system relating to vehicle traffic and speed. A violation pursuant to this section is $165, but such violation shall not be considered for the purpose of determining driver's license suspension/revocation.
District of Columbia	DC ST § 50-2209.01 http://government.westlaw.com/linkedslice/search/default.asp?RS=GVT1.0&VR=2.0&SP=dcc-1000; enter "50-2209.01" in the search box	Automated traffic enforcement systems may be used to detect moving infractions.
Iowa	IA ST § 321.235; IA ST § 321.236 http://search.legis.state.ia.us/nxt/gateway.dll/ic/1/13/11201/11750/11751/12008?f=templates&fn=default.htm and http://search.legis.state.ia.us/nxt/gateway.dll/ic/1/13/11201/11750/11751/12010?f=templates&fn=default.htm	It appears local governments may enact additional traffic regulations as long as they are not in conflict with the goal of uniformity throughout the state. In *City of Davenport v. Seymore*, 755 N.W.2d 533 (Iowa 2008), the court held that those statutes, along with others in the Iowa Code, do not preempt a local government from using automated traffic enforcement systems.
Montana	MT ST § 6112-101(2) http://data.opi.mt.gov/bills/mca/61/12/61-12-101.htm	Local authorities are permitted to regulate traffic by means of police officers or other traffic control devices. See 45 A.G. Op. 7 (1993), which holds that the city of Billings was not precluded by state statute from enacting a photo-radar ordinance regulating speeding.
North Carolina	NC ST § 160A-300.1 http://www.ncga.state.nc.us/EnactedLegislation/Statutes/HTML/BySection/Chapter_160A/GS_160A-300.1.html	The use of a "traffic control photograph system" (both speed and red light violations) is permitted, so long as appropriate advance warning signs are conspicuously posted (not more than 300 feet from the location of the system).

ASE Expressly Permitted by Statute		
State	**Statute(s)**	**Description**
Ohio	OH ST § 4511.094 http://codes.ohio.gov/orc/4511.094	A local authority may use a traffic law photo-monitoring device to enforce any traffic law *only* after it has erected signs giving notice.
Oregon	OR ST § 810.434 http://www.leg.state.or.us/ors/810.html; scroll down to 810.434	Speed cameras are permitted. Currently, speed cameras are in the following localities: Albany, Beaverton, Bend, Eugene, Medford, Portland and Tigard.
Tennessee	TN ST § 55-8-198(a) http://www.lexisnexis.com/hottopics/tncode/Default.asp Find the full text by selecting "Full-text of source documents" under "Search" and expanding the outline: Title 55; Chapter 8, Part 1; select 55-8-198	Automated traffic enforcement is permitted statewide for traffic violations. Any traffic citation that is solely based upon evidence obtained from a surveillance camera shall be considered a nonmoving violation.

ASE Permitted Under Certain Conditions		
State	**Statute(s)**	**Description**
Arkansas	AR ST § 27-52-110; AR ST § 27-52-111 http://www.lexisnexis.com/hottopics/arcode/Default.asp Find the full text by selecting "Full-text of source documents" under "Search" and expanding the outline: Title 27; Subtitle 4; Chapter 52; Subchapter 1; select 27-52-110 and 27-52-111	Automated enforcement devices may only be used to detect and enforce violations of traffic laws or ordinances within school zone or at railroad crossings. Law enforcement officer must be present and citation must be issued at time of violation.
Colorado	CO ST § 42-4-110.5 http://www.michie.com/colorado/lpExt.dll?f=templates&eMail=Y&fn=main-h.htm&cp=cocode/1/6d9fa/6ed2d/6ed2f/6ee62/6ef42	• The state may use automated vehicle identification systems to detect speeding only within ongoing highway maintenance, repair or construction zones. • A local government may use automated vehicle identification systems to detect violations of traffic regulations only if posted notice is provided to drivers. Signage provisions: o Place in a conspicuous place not fewer than 200 feet nor more than 500 feet before the automated vehicle identification system. o Use lettering that is at least 4 inches high for uppercase letters and 2.9 inches high for lowercase letters.

ASE Permitted Under Certain Conditions		
State	**Statute(s)**	**Description**
Illinois	625 ILCS 5/11-602; 625 ILCS 5/11-605.1; 625 ILCS 5/11-612 http://www.ilga.gov/legislation/ilcs/ilcs4.asp?DocName=06250050HCh%2E+11+Art%2E+VI&ActID=1815&ChapterID=49&SeqStart=111100000&SeqEnd=112600000 625 ILCS 7/ http://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=2619&ChapterID=49	Automated traffic control systems are permitted within 500 feet of signs within a construction or maintenance speed zone only, or when a state law enforcement officer is present at the scene and witnesses the event. In all other instances, speed cameras are prohibited. Illinois State Police must conduct a public information campaign to inform drivers about the use of automated traffic control systems in highway construction or maintenance zones before establishing any of those systems. Signs indicating that speeds are enforced by automated traffic control systems must be clearly posted in the areas where the systems are in use.
Maryland	MD TRANS § 21-809 http://mlis.state.md.us/asp/articles_net/pdf_output_2012/gtr/21-809.pdf	The following counties/cities are permitted to enforce speed violations by using a "speed monitoring system," which produces recorded images of motor vehicles traveling at least 10 mph over the posted speed limit on a highway, in work zones, in a residential district, and in school zones with a maximum posted speed limit of 35 mph: Prince George's County, Montgomery County, Berwyn Heights, Baltimore County. Anyone found in violation is subject to a civil penalty of not more than $40.
Utah	UT ST § 41-6a-608 http://le.utah.gov/~code/TITLE41/htm/41_06a060800.htm	"Photo radar" is permitted in school zones or other areas with a posted speed limit of 30 mph or less; a law enforcement officer must also be present, signs must be posted providing notice to motorists of the use of photo radars, and photo radars must be approved by the appropriate local governing body. "Photo radar" means a device used primarily for highway speed limit enforcement substantially consisting of a low-power Doppler radar unit and camera mounted in or on a vehicle, which automatically produces a photograph of a vehicle traveling in excess of the legal speed limit, with the vehicle's speed, the date, time of day, and location of the violation printed on the photograph.
Washington	WA ST § 46.63.170 http://apps.leg.wa.gov/rcw/default.aspx?cite=46.63.170	Speed cameras are permitted in school zones and arterial streets in cities with a population over 5,000 only. However, if a local legislative authority enacts an ordinance authorizing the use of speed cameras, then such use shall be permitted.

ASE Permissibility Inferred	
State	**Description**
Alaska	*See Municipality of Anchorage v. Baxley*, 946 P.2d 894 (Alaska App. 1997). This case concerns the use of photo radar and whether the specific defendants should have been found guilty of speeding in a school zone. There is no statutory provision for the use of photo radar (speed cameras), but considering the nature of this case, it appears that localities or municipalities in Alaska may use speed cameras (photo radar) to detect speeding.
Louisiana	Local authorities may adopt ordinances enforcing the Louisiana traffic and safety laws, by means of police officers or by the use of traffic-control devices (LA R.S. § 32:21; LA R.S. § 32:41). *See La. Atty. Gen. Op. No. 07-0062* (September 4, 2007), which holds that the local government's use of a photographic traffic signal enforcement system is an alternate method of enforcement of an existing approved traffic control device.
Massachusetts	The state treasurer is authorized to pay the cost of installing suitable traffic control signs, or safety devices, and constructing necessary safety improvements at high-accident locations in cities and towns, in accordance with the following procedure (MA ST 90 § 33B). This does not specifically include or exclude speed cameras.

Court Decisions Affecting ASE

Summary of Decisions Concerning Automated Enforcement, Insurance Institute for Highway Safety, as of March 2010.
http://www.iihs.org/laws/auto_enforce_cases.html
This summary of court decisions related to camera or automated enforcement as a method of using technology to photograph violations of traffic law considers the following:

- Decriminalization.
- Procedural adequacy.
- Separation of powers and delegation.
- Equal protection.
- Presumption.
- Conflict of laws and preemption.
- Privacy.
- Purpose of camera enforcement.
- Notice.
- Civil rights and Racketeer and Influenced and Corrupt Organization Act claims.

Citations and links to case documentation are provided.

Supplementary Information on State Legislation, Policies or Programs

Arizona

Legislative Update, Committee on Superior Court, Arizona Judicial Branch, May 20, 2011.
http://www.azcourts.gov/Portals/74/COSC/3bLegislativeUpdate.pdf
See pages 11 and 12 of the PDF for a discussion of SB 1398: Moving Violations; Assessment; Equipment; Enforcement. The new law repeals the statute establishing the Photo Enforcement Fund (§ 41-1722) on July 1, 2012. Forty percent of the monies remaining in this fund in FY 2011 and FY 2012, after paying expenses and court costs and not exceeding $7 million, are to be deposited in the Public Safety Equipment Fund.

Title 28, Transportation, Arizona Revised Statutes.
http://www.azleg.gov/ArizonaRevisedStatutes.asp?Title=28
See below for excerpts related to the current law on photo enforcement:

> 28-1203. Photo enforcement system placement; speed limit change
> A photo enforcement system shall not be placed on a street or highway within six hundred feet of a posted speed limit change except that a photo enforcement system may be placed in an area around a school crossing that is delineated by signs as prescribed by section 28-797, subsection D.
>
> 28-1602. Photo enforcement violation; no duty to identify photo or respond; definitions
> A. Notwithstanding any other law, if a person receives a notice of violation in the mail for a violation of chapter 3, article 3 or 6 of this title or of a city or town ordinance for excessive speed or failure to obey a traffic control device that is obtained using a photo enforcement system, the person does not have to do either of the following:
> 1. Identify who is in the photo.
> 2. Respond to the notice of violation.
> B. The notice of violation that is described in subsection A of this section must state the following:
> 1. The notice is not a court issued document and the recipient is under no obligation to identify the person or respond to the notice.
> 2. Failure to respond to the notice may result in official service that may result in an additional fee being levied.
> C. For the purposes of this section:
> 1. "Notice of violation" means a notice issued by a photo enforcement company or municipality that is not a uniform traffic ticket or complaint.
> 2. Photo enforcement system" has the same meaning prescribed in section 28-601.

Illinois

Work Zone Safety Photo Radar Speed Enforcement, Priscilla Tobias, Illinois Department of Transportation, 2006.
http://www.modot.org/tsc/documents/WorkZone.pdf
Slide 7 of this presentation begins the discussion of photo enforcement in Illinois. A synopsis of Illinois DOT's ASE program:

- Work zone fines apply when workers are present.
- No restriction on time of day.
- Work zone must be signed.
- Picture of driver and license plate; time, date and location.
- Violation tied to driver; sent certified mail in six business days.
- Trooper not required.

The presentation also provides a detailed description of the technology used, the proposed process flow, costs and hurdles encountered in administering the program.

Louisiana

Photo Enforcement: DOTD's Roll [sic], Peter Allain, *Louisiana Transportation Conference*, February 2009.
http://www.ltrc.lsu.edu/ltc_09/pdf/Allain,%20Peter.pdf
This presentation by the Traffic Engineering Division Chief in the Louisiana Department of Transportation and Development presents a legal question as to the permissibility of ASE, citing this statute on slide 22:

> RS 32:365. Television
> B. Law enforcement officers of the state or any political subdivision thereof shall be authorized to operate video recording equipment and monitors in their law enforcement vehicles while in the performance of their duties. However, this provision shall not be construed to allow law enforcement officers to record vehicles in violation of traffic safety laws with citations for such violations to be mailed to the alleged violator at a later date.

Slide 23 provides this history of photo enforcement legislation in Louisiana:

> 2001: HB 1591 – municipalities – failed to pass House
> 2001: SB 1059 – municipalities – failed in committee
> 2004: HB 1078 – municipalities – failed to pass House
> 2004: SB 612 – municipalities > 50,000 pop – died in House
> 2005: SB 168 – for New Orleans – withdrawn
> 2005: HB 368 – for New Orleans – died in House

Missouri

Official Minutes, Missouri Highways and Transportation Commission, January 12, 2011.
http://www.modot.org/about/commission/documents/2011-01-12MinutesRevised.pdf
These meeting minutes include a report and recommendation regarding automated traffic enforcement on Missouri's state highway system.

In October 2010, Missouri DOT suspended installations of automated enforcement on the state highway system to allow for review and development of a formal policy. MoDOT does not own or operate the automated enforcement systems but is allowing local governments to install the systems on state highways. The department does not receive revenue from automated enforcement. After discussion, the commission adopted the policy below.

> **Automated Traffic Enforcement Policy,** Missouri Highways and Transportation Commission (MHTC), 2011.
> http://www.modot.mo.gov/documents/2011AECommissionPolicy.pdf
> This policy addresses the installation and use of ASE systems by state, city and county law enforcement agencies on the state highway system. Policy highlights include:
>
> - Cameras may be used to assist with enforcement of state speed limit laws in school zones, work zones and Travel Safe Zones on the state highway system. Use of ASE equipment in any other location is not allowed.
> - A certified law enforcement officer must review and make the determination of any violation.
> - Advance signage is required.

- Cities or counties using ASE are required to conduct a public awareness campaign at least 30 days prior to issuing citations.
- Each city or county using ASE equipment will be required to submit an annual report to MoDOT for each state highway corridor in which the equipment is used. The report will include safety performance and citation data from the previous year.
- The city or county must enter into a contract with MHTC for the use of an automated speed violation enforcement system on state-maintained highways. Part of the contract will require an ordinance allowing the use and issuance of citations using ASE equipment. Once a contract is executed and a permit is issued, the city or county may proceed with the installation of the equipment.

Washington

Transportation Budget, Engrossed Substitute House Bill, Chapter 367, 62nd Legislature, State of Washington, 2011.
http://apps.leg.wa.gov/documents/billdocs/2011-12/Pdf/Bills/Session%20Law%202011/1175-S.SL.pdf
A 2011 transportation budget bill authorizes pilot projects implementing ASE with oversight by the Washington Traffic Safety Commission. From page 7 of the PDF:

> (2) The commission may oversee pilot projects implementing the use of automated traffic safety cameras to detect speed violations within cities west of the Cascade mountains that have a population over one hundred ninety-five thousand. For the purposes of pilot projects in this subsection, no more than one automated traffic safety camera may be used to detect speed violations within any one jurisdiction.
> (a) The commission shall comply with RCW 46.63.170 in administering the pilot projects.
> (b) In order to ensure adequate time in the 2011-2013 fiscal biennium to evaluate the effectiveness of the pilot projects, any projects authorized by the commission must be authorized by December 31, 2011.
> (c) By January 1, 2013, the commission shall provide a report to the legislature regarding the use, public acceptance, outcomes, and other relevant issues regarding automated traffic safety cameras demonstrated by the pilot projects.

Page 116 of the PDF notes the continuation of a pilot program to employ automated traffic safety cameras in work zones on state highways managed by Washington State DOT in consultation with Washington State Patrol:

> The department, in consultation with the Washington state patrol, may continue a pilot program for the patrol to issue infractions based on information from automated traffic safety cameras in roadway construction zones on state highways. For the purpose of this pilot program, during the 2009-11 fiscal biennium, a roadway construction zone includes areas where public employees or private contractors are not present but where a driving condition exists that would make it unsafe to drive at higher speeds, such as, when the department is redirecting or realigning lanes on any public roadway pursuant to ongoing construction.

Related Resource:

Automated Enforcement in Work Zone Pilot Project; Fall 2008/Spring 2009 Deployment. Washington State Department of Transportation, undated.
http://www.wsdot.wa.gov/NR/rdonlyres/145EB4CD-180C-4136-88C2-8949A4140898/69988/AutomatedEnforcementinWorkZonePilotProjectLegislat.pdf
This report describes a pilot project to test the use of ASE in highway work zones. Working with the Washington State Patrol, WSDOT established two test locations in work zones on Interstate 5. At the time of this report, with less than 10 weeks of enforcement data, the authors indicate that firm

conclusions cannot drawn but indicators show improved work zone safety. The number of vehicles greatly exceeding the speed limit (traveling over 75 mph) was reduced significantly in one of the I-5 test locations, and there were no speed-related collisions during the automated enforcement period.

Other Research

Automated Speed Enforcement for California: A Review of Legal and Institutional Issues, California PATH Program, Institute of Transportation Studies, University of California, Berkeley, Caltrans, California PATH Research Report UCB-ITSPRR-2007-14, September 2007.
http://www.path.berkeley.edu/PATH/Publications/PDF/PRR/2007/PRR-2007-14.pdf
This literature review explored the potential benefits and barriers to implementing ASE programs in the United States. The authors note that ASE programs have the potential to be challenged on the grounds that they may violate constitutional rights and protections, including the right to privacy and freedom of association under the First Amendment; protection against illegal search and seizure under the Fourth Amendment; the right to due process under the Fifth and Fourteenth Amendments; the equal protection doctrine in the Fourteenth Amendment; and the taking clause of the Fifth Amendment. The authors further note that "legal scholars, however, appear to agree, based on the body of established case law—both specific and not specific to automated enforcement—that these programs do not violate these constitutional rights."

The authors identify key program design considerations, including:

- *Owner or driver liability*. Many automated enforcement programs assign liability to the registered owner as a civil infraction similar to a parking ticket, while others assign responsibility only to the driver.
- *Manned/mobile or unmanned/fixed operation*. Under the legal principle known as the pictorial testimony theory, automated enforcement equipment must be attended by an officer who can testify that the photograph is an accurate depiction of the event. Under the silent witness theory, the photograph itself can stand as evidence.
- *Visibility*. The degree to which automated enforcement programs notify the public about their cameras can have an effect on the program's acceptance and safety benefits.
- *Location*. ASE programs in the United States primarily target speeding on surface streets with speeds from 30 mph to 50 mph, and many are restricted to residential streets. At the time of publication, there was only one ASE program on high-speed, high-volume roadways (Washington, D.C.).
- *Revenue distribution*. Few existing programs actually generate revenue and many are either revenue-neutral or require a subsidy.

"Chain of Evidence: A Trouble-Free Solution That Removes Weak Links is a Blessing for Traffic Managers Who Need to Deal With the Issue of Photo Enforcement," Timo Gatsonides, *Traffic Technology International*, June 2007: 83-84.
Citation at http://trid.trb.org/view.aspx?id=811272
This article, written by a traffic photographic-enforcement industry representative, discusses the value of the evidence gathered by stationary traffic surveillance systems. The most important factor is that the evidentiary chain is not broken by gaps in the photographic evidence. The first step listed is detection (radar); the next step is the actual image data capture. The third and final element in the chain is that of the actual evidence provided by the cameras.

Education and Outreach

Public Education and Perception by State

Arizona

Available Outreach Materials

Arizona seems to have ceased using ASE. See "Arizona Halts Photo Enforcement of Speed Laws," available at http://www.nytimes.com/2010/07/16/us/16camera.html: "The state, the first to adopt such cameras on its highways in October 2008, has become the first to pull the plug, bowing to the wishes of a vocal band of conservative activists who complained that photo enforcement intruded on privacy and was mainly designed to raise money."

And photo enforcement is coming to an end in Tempe, AZ; see http://www.abc15.com/dpp/news/region_southeast_valley/tempe/photo-enforcement-in-tempe-will-come-to-an-end-this-month.

Related Research

Evaluation of Automated Speed Enforcement on Loop 101 Freeway in Scottsdale, Arizona, Insurance Institute for Highway Safety, January 2008.
http://www.stopredlightrunning.com/pdfs/Evaluation%20of%20Automated%20Speed%20Enforcement%20on%20Loop%20101%20Freeway%20in%20Scottsdale,%20AZ.pdf

Public Perception

Public opinion surveys found widespread concerns about speeding on the Loop 101 freeway and high levels of support for speed camera enforcement on this road.

Technical Evaluation of Photo Speed Enforcement for Freeways, Arizona Department of Transportation, FHWA, Report No. ADOT-AZ-05-596, October 2005.
http://www.azdot.gov/TPD/ATRC/publications/project_reports/PDF/AZ596.pdf

Public Perception

Thirteen agencies that have used or are currently using a photo speed enforcement system were interviewed via email and phone. Most of the users report strong public support of their enforcement system, with only two out of 13 stating that there was an even split in public support. See pages 35-39 for a general discussion of public attitudes, common objections and results of opinion surveys outside of Arizona. Pages 39-41 detail the results of a survey of Scottsdale, AZ, residents concerning its red light and speed camera programs, with a strong majority of residents supporting the programs.

Automated Speed Enforcement Study, Lieutenant Jack Hegarty, Arizona Department of Public Safety, Phoenix, Arizona, *The Police Chief*, July 2007.
http://www.policechiefmagazine.org/magazine/index.cfm?fuseaction=display_arch&article_id=1228&issue_id=72007

Public Education

The information campaign before and during the ASE period was substantial. The details of the project location and dates were widely publicized. Morning radio talk shows, local TV news, and the Internet all covered the story.

Local newspapers published dozens of related articles during 2006. Several potential legislative bills regarding ASE systems received publicity during the project. This traffic enforcement project was one of the most publicized in Arizona history; the attention alone may have had a significant effect on its results.

California

Available Outreach Materials
San Jose's NASCOP (Neighborhood Automated Speed Copliance Program) seems no longer to be in operation; see http://www.sanjoseca.gov/transportation/traffic_photoradar.htm.

Related Research
Automated Speed Enforcement for California: A Review of Legal and Institutional Issues, California PATH Program, Institute of Transportation Studies, University of California, Berkeley, Caltrans, California PATH Research Report UCB-ITSPRR-2007-14, September 2007. http://www.path.berkeley.edu/PATH/Publications/PDF/PRR/2007/PRR-2007-14.pdf

Public Education

- Many experts assert that public acceptance of ASE programs may hinge on the public's recognition of speeding as an important community problem.
- Public involvement appears to increase the odds of program success. In Hawaii, the lack of public involvement in the development of their ASE program may have contributed to the public backlash that eventually led the state Legislature to shut down the program.
- The degree to which automated enforcement programs notify the public about their cameras can have an effect on the program's acceptance and safety benefits (see page 14 of the PDF).

Public Perception
Pages 8-12 cover stakeholder support:

- Overall, survey results indicate that the majority of the public supports ASE. However, the margins of support vary widely, from a low of 51 percent in Washington, D.C. to a high of 77 percent in Scottsdale, AZ.
- In a national survey sponsored by NHTSA in 2002, 68 percent of the respondents indicated that the use of ASE systems was a good idea for those "going 20 mph or more over the posted speed limit" and 78 percent for speeding in a school zone. In a 1998 national survey sponsored by NHTSA, 71 percent of the respondents indicated that they favored the use of automated devices for speed enforcement.
- According to the 1998 NHTSA survey, leading public objections included:
    - Invasion of privacy (26 percent).
    - Preference for in-person contact with an officer (14 percent).
    - Camera errors (12 percent).
- In 1989, telephone surveys were conducted in and around a number of cities in the United States that had recently initiated ASE programs. The results indicated that a majority of survey respondents were aware of the use of ASE systems and supported their use.

Colorado

Available Outreach Materials
Boulder

- Boulder describes its photo radar program here and allows users to respond to citations online: http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=301&Itemid=1206.

- FAQs: http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=304&Itemid=305 and http://www.bouldercolorado.gov/index.php?option=com_content&view=article&id=10734&Itemid=3559

Colorado Springs

- Photo Enforcement Program, *Focus on Safety*: http://www.springsgov.com/SectionIndex.aspx?SectionID=61
- Introduction: http://www.springsgov.com/news.aspx?newsid=491 and http://www.springsgov.com/news.aspx?newsid=904. The second item was advertised on the city's Facebook page: http://www.facebook.com/posted.php?id=81797562163&share_id=101562929909159&comments=1.
- Speed enforcement: http://www.springsgov.com/page.aspx?navid=3906
    - FAQs: http://www.springsgov.com/Page.aspx?NavID=3919
    - Information on how it works: http://www.springsgov.com/Page.aspx?NavID=3929
    - Press release: http://www.springsgov.com/Page.aspx?NavID=3920
- Presentation: http://www.springsgov.com/units/police/miscDocs/PhotoEnforcement_PPCouncil.pdf

Denver

- Program page: http://www.denvergov.org/Traffic_Operations/PhotoEnforcementUnit/tabid/395288/Default.aspx
- FAQs: http://www.denvergov.org/Traffic_Operations/PhotoEnforcementUnit/FrequentlyAskedQuestions/tabid/434688/Default.aspx

District of Columbia

Available Outreach Materials

- Program page: http://mpdc.dc.gov/mpdc/cwp/view,a,1240,Q,547970,mpdcNav_GID,1552,mpdcNav,%7C,.asp
    - Brochure: http://mpdc.dc.gov/mpdc/frames.asp?doc=/mpdc/lib/mpdc/info/traffic/pdf/dcphoto_english.pdf
    - FAQs: http://mpdc.dc.gov/mpdc/cwp/view,a,1240,q,547977,mpdcNav_GID,1552,mpdcNav,%7C31886%7C.asp
    - News and links: http://mpdc.dc.gov/mpdc/cwp/view,a,1240,Q,547998,mpdcNav_GID,1552,mpdcNav,%7C31886%7C,.asp
    - Also includes links to laws, locations and other information.

Related Research

"Evaluation of Speed Camera Enforcement in the District of Columbia, R. A. Retting, C. M. Farmer, *Transportation Research Record*, Vol. 1830, 2003: 34-37.
http://www.ltrc.lsu.edu/TRB_82/TRB2003-002012.pdf
From page 3 of the PDF: "City officials generated publicity and awareness of the new program through the news media."

Illinois

Available Outreach Materials

- FAQ: http://www.dot.state.il.us/workzone/Q%26AsPhotoEnforce.pdf
- Press release: http://www.dot.state.il.us/press/r040709_2.html
- Illinois Tollway information page: http://www.illinoistollway.com/portal/page?_pageid=133,1828705&_dad=portal&_schema=PORTAL
- Press release: "IDOT, ISP & Tollway Unveil Photo Speed Enforcement Van At Chicago Auto Show," http://www.dot.state.il.us/press/r020906.html
- Work Zone Safety Photo Radar Speed Enforcement Presentation, Priscilla Tobias: http://www.modot.org/tsc/documents/WorkZone.pdf

Iowa

Available Outreach Materials

City of Davenport

- *No Need for Speed* program page: http://www.cityofdavenportiowa.com/egov/apps/services/index.egov?path=details&action=i&id=332
- Six-page brochure highlighting benefits to public safety: http://www.cityofdavenportiowa.com/egov/docs/1235684082_618621.pdf
  While this brochure focuses on red light enforcement, it is a good example of an agency advocating automated enforcement.

Safe Routes to School: http://www.iowadot.gov/saferoutes/grants.html

Louisiana

Available Outreach Materials

New Orleans

- FAQs: http://www.google.com/url?sa=t&source=web&cd=2&ved=0CBwQFjAB&url=http%3A%2F%2Fwww.nola.gov%2FRoot%2FRESIDENTS%2F~%2Fmedia%2FFiles%2FDepartment%2520of%2520Public%2520Works%2FRed%2520Light%2520Camera%2520FAQs.ashx&rct=j&q=%22new%20orleans%22%20%22safety%20camera%20program%22&ei=MaY4TqOSN8nX0QGbveHOAw&usg=AFQjCNEwivVJyK1rjLQxpR0JPcN1I1JAyA&sig2=6FwBPcBAIeFwRA0mpKi50Q

- Press releases:
    - "61,000 Photo Enforcement Violations Cited 2008," http://www.nola.gov/en/PRESS/City-Of-New-Orleans/All-Articles/61000-Photo-Enforcement-Violations-Cited-in-2008
    - "City Expands Safety Camera Program," http://www.nola.gov/en/PRESS/City-Of-New-Orleans/All-Articles/CITY-EXPANDS-SAFETY-CAMERA-PROGRAM

Maryland

Available Outreach Materials

Maryland Department of Transportation information on ASE:
http://www.marylandroads.com/index.aspx?pageid=780

Maryland Safe Zones

- Program page: http://safezones.maryland.gov/
    - Facts: http://safezones.maryland.gov/mdsafezones.html
    - Work zone safety information: http://safezones.maryland.gov/workzonesafety.html
    - FAQs: http://safezones.maryland.gov/faqs.html and http://www.marylandroads.com/pages/faqs.aspx?CatId=0&QId=8
- Public service announcement (PSA): http://www.youtube.com/watch?v=EWr_JGghdvk
- Fact sheet: http://www.marylandroads.com/OC/Speed_camera_law_fact_sheet.pdf (with pictures of signs, rule about conspicuous signs)
- Former MDOT Secretary Porcari's letter to the editor in the Gazette Newspapers: http://www.marylandroads.com/OC/PorcariLetterApril09.pdf
- Presentation: http://www.outreach.psu.edu/programs/transportation/files/1a_tabacek.pdf

Montgomery County Safe Speed Program

- Program page: http://www.montgomerycountymd.gov/poltmpl.asp?url=/content/pol/districts/FSB/sod/speed/Speed.asp
- Speed enforcement video: http://www.montgomerycountymd.gov/content/pol/districts/FSB/sod/speed.wmv

City of Laurel

- Program page: http://www.laurel.md.us/content/automated-speed-enforcement-program

City of Frederick

- Press release: http://www.cityoffrederick.com/cms/press/mediaadvisory.php?ID=1948

School Zones

- Brochure: http://www.marylandroads.com/OOTS/SZ-ASE%20Brochure.pdf
- FAQs: http://www.marylandroads.com/pages/faqs.aspx?CatId=0&QId=7

Related Research

Evaluation of Automated Speed Enforcement in Montgomery County, Maryland, Insurance Institute for Highway Safety, January 2008.
http://safety.fhwa.dot.gov/speedmgt/ref_mats/fhwasa09028/resources/Evaluation%20of%20ASE%20in%20Montgomery%20County,%20MD.pdf

Public Education

From pages 2 and 3:

> In line with recommendations by Delaney et al. (2005), Montgomery County officials placed considerable emphasis on creating public awareness of the speed camera program and building public support for automated speed enforcement. Police officials developed a public information and education campaign that initially emphasized the dangers of speeding and the role of speed cameras, and later informed drivers that speed cameras were in use. The campaign included press releases, a program website, informational materials, a speakers bureau, and a logo to create public brand recognition of the "Safe Speed" program (Figure 1). This logo was used by Montgomery County as well as three smaller municipalities within the county (Chevy Chase, Gaithersburg, and Rockville) that planned to implement speed camera programs.

Public Perception

> To assess public awareness of the speed camera program and attitudes toward camera enforcement, telephone surveys were conducted approximately 6 months in advance of camera enforcement and the public education campaign and then approximately 6 months following implementation of the speed camera program.
>
> Public opinion surveys found 74 percent of Montgomery County drivers thought speeding on residential streets was a problem. Six months after enforcement began, 60 percent of drivers were aware of the camera program and 62 percent supported it.
>
> Although a majority of drivers supported automated speed enforcement on residential streets in Montgomery County, about one-third opposed it. Opponents can express strong views that generate controversies wherever speed cameras are used. Jurisdictions planning to implement speed camera programs should draw on international experience to anticipate the controversies that generally arise (Delaney et al., 2005) and take steps in advance to address them.

Guidelines for Automated Speed Enforcement Systems in School Zones, Maryland State Highway Administration, January 2011.
http://www.sha.maryland.gov/OOTS/ASE_Schools_Zone_Guidelines.pdf
Includes a section on public outreach (page 9), and recommends that a communications campaign:

- Identify the types of behavior that are targeted by the ASE systems.
- Encourage community awareness and involvement.
- Make traffic safety an integral part of the program.
- Increase awareness of the dangers of crashes associated with driving too fast for conditions.
- Use the appropriate data to correlate ASE with reduction of speeds, crashes and injuries.
- Use various channels of communication to inform the public, such as web sites, newspapers, radio, brochures, workshops, annual evaluations and reports, newsletters, paid media spots, local association meetings, etc.
- Promote transparency.

Missouri

Available Outreach Materials
St. Ann, MO, Automated Traffic Enforcement

- Program page: http://www.stannmo.org/index.aspx?NID=347
- FAQs: http://www.stannmo.org/index.aspx?NID=348

MoDOT page on ASE policy: http://www.modot.mo.gov/documents/2011AECommissionPolicy.pdf

North Carolina

Available Outreach Materials
Charlotte

- Safe Speed Photographic Speed Enforcement Program presentations:
  http://www.ncdot.org/doh/preconstruct/traffic/echs/DOCS/safespeed.pdf
  http://www.ncdot.org/doh/preconstruct/traffic/conference/2004/Day1_TEI1.pdf

Oregon

Available Outreach Materials
Portland

- Program page: http://www.portlandonline.com/police/index.cfm?&c=30591&x=12&y=11
- Q&A: http://www.portlandonline.com/police/index.cfm?a=33798&c=30591
- FAQs: http://www.portlandonline.com/police/index.cfm?a=33788&c=30559

Related Research
Demonstration of Automated Speed Enforcement in School Zones in Portland, Oregon, National Highway Traffic Safety Administration, February 2006.
http://www.nhtsa.gov/DOT/NHTSA/Traffic%20Injury%20Control/Articles/Associated%20Files/HS810764.pdf

Public Education
From page 2 of the PDF:

> In an effort to maximize deterrence, prior to deployment of a public information and education (PI&E) campaign was targeted in the neighborhoods of the five demonstration school zones and also presented more broadly to the Portland community, including a press conference that produced citywide media attention. The program was implemented by the PDOT Public Information Coordinator, who identified key stakeholders in school zone communities; notified and informed Portland Public School District officials, neighborhood associations, and school community members about the project and secured their endorsement; installed "PHOTO ENFORCED" placards to supplement existing "SCHOOL SPEED 20" signs in demonstration school zones; coordinated media materials and events; provided materials for PDOT publications; and presented at community and professional meetings.

Section 2.3 (pages 11-14) further details public outreach efforts. Strategies included:

- Notifying Portland Public School District administration and other key personnel about the ASE project via email, phone and in-person meetings.
- Developing a media packet—media advisory and press release—for press event at start of project.
- Developing and distributing—via email, FAX and newsletters—a public information item about the project for key stakeholders.
- Securing print and TV/radio media coverage of project work at test school zones.
- Making presentations about ASE project in community and professional meetings
- Assigning responsibility for public information and education to coordinator.
- Hired a consultant to measure and assess the impacts of the public information campaign on public knowledge, awareness and attitudes.

Public Perception
From page 2 of the PDF:

> Public perceptions and awareness of the safety risks at school zones and the presence of speed enforcement were surveyed on a sample of 400 residents prior to the PI&E campaign and 400 residents during the demonstration period, with both survey waves equally divided among demonstration and comparison school samples. Public attitudes and awareness were also evaluated by tracking community contacts, media outreach, and media hits.

Results (see page 5 of the PDF):

- The public's acceptance of the use of ASE in school zones increased from pre-demonstration to demonstration periods in demonstration school neighborhoods, but did not change in comparison school neighborhoods.
- Following the implementation of ASE, the proportion of drivers in demonstration community neighborhoods who said that speeds near schools were just about right decreased and the proportion who said that people drove too fast increased to a plurality. There was no change from pre-demonstration to demonstration periods in the comparison neighborhoods, where the majority of drivers said that speeds were just about right.
- With the implementation of ASE, there was an increase in the proportion of demonstration community drivers who said they were very likely to drive slower if they saw ASE deployed three times a week in school zones. There was no such change in the comparison community driver sample.
- There was an increase from the pre-demonstration to the demonstration period in the proportion of drivers in demonstration neighborhoods who said that driving 20 mph or less in school zones would be a major safety improvement. There was also an increase in the comparison community, but it was smaller.

Tennessee

Available Outreach Materials
Morristown

- Information page: http://www.mymorristown.com/mpd_autoenf.pdf

Washington

Available Outreach Materials
WSDOT Automated Traffic Safety Cameras

- Program page: http://www.wsdot.wa.gov/Safety/ATSC.htm
  - FAQs: http://www.wsdot.wa.gov/Safety/faq.htm
  - Give 'em a Brake work zone safety page: http://www.wsdot.wa.gov/Safety/Brake/
- City of Auburn PSA: http://www.youtube.com/watch?v=WCxXn5ESaBk
- City of Bellingham FAQs: http://www.cob.org/documents/police/photo-enforcement-faq.pdf

Related Research
Automated Enforcement in Work Zone Pilot Project; Fall 2008/Spring 2009 Deployment, Washington State Department of Transportation, undated.
http://www.wsdot.wa.gov/NR/rdonlyres/145EB4CD-180C-4136-88C2-8949A4140898/69988/AutomatedEnforcementinWorkZonePilotProjectLegislat.pdf

Public Perception
See page 15 of the PDF:

Prior to deployment the department held media awareness events and distributed press releases.

The program's communications efforts had the following key messages:

- WSDOT and Washington State Police place a high priority on safety of workers, drivers and passengers in the work zone and speed remains the most likely cause of incidents in the work zone.
- Cameras are just one part of WSDOT's efforts to keep work zones safe.
- WSDOT will use the cameras and accompanying signing as a deterrent, not a punishment.
- WSDOT has done its research to make sure this program is successful.
- Through communications efforts, drivers will slow down to increase worker safety, driver safety and passenger safety in work zones.

WSDOT engaged in active media outreach prior to each deployment. The department also posted program information, including a question and answer document, on the WSDOT web site. The communications campaign garnered the program stories on Seattle TV (KING and KIRO) along with Portland coverage (KATU). Daily newspapers in Seattle, Tacoma, Olympia, Longview, Vancouver and Portland ran stories.

Other Outreach Materials

PSA, Insurance Institute for Highway Safety
http://www.youtube.com/watch?v=dsWou0avdk4
This video advocates automated enforcement and includes interviews with the police chief of Montgomery County, MD, and sheriff of Sacramento, CA.

Other Guidance and Research

Q&A: Speed – Law Enforcement, Insurance Institute for Highway Safety, February 2011.
http://www.iihs.org/research/qanda/speed_lawenf.aspx
Questions 10 through 14 address the use of speed cameras.

FAQ 14 notes that the public supports the use of speed cameras:

- A survey conducted in the District of Columbia nine months after speed cameras were introduced showed that 51 percent of drivers favored cameras and 36 percent opposed them.
- A survey conducted six months after speed cameras were deployed in Montgomery County, MD, found that 62 percent of drivers were in favor of speed cameras on residential streets.
- In Scottsdale, AZ, 63 percent of drivers surveyed prior to the start of automated enforcement said speed cameras should be used on an urban freeway where camera enforcement was planned. After speed cameras were operational, 77 percent of drivers supported their use.

"Two Decades of Photo Enforcement in the United States: A Brief Summary of Experience and Lessons Learned," Richard A. Retting, *ITE Journal*, Vol. 80, No. 11, November 2010: 20-24, 29.
Citation at http://trid.trb.org/view.aspx?id=1085158
Despite substantial evidence of effectiveness and relatively high public support, photo enforcement remains controversial. Some legal challenges have produced judicial findings that negatively affect photo enforcement programs, while other findings have affirmed its legality. In order to help ensure the success of photo enforcement programs, it is recommended that agencies focus on safety benefits, emphasize fairness in program design and operations, avoid the appearance of a revenue motive, anticipate legal setbacks, pay attention to proper engineering, use effective communication strategies, and evaluate program performance and outcomes.

Speed Enforcement Camera Systems Operational Guidelines, National Highway Traffic Safety Administration, FHWA, Report No. HS-810 916, March 2008.
http://www.nhtsa.gov/DOT/NHTSA/Traffic%20Injury%20Control/Articles/Associated%20Files/810916.pdf

Public Education
Communications and Media Activities (see page 21 of the PDF):

> It is important to explain the philosophy and strategy behind the ASE program through communications and marketing programs, public meetings, and hearings. ASE should be described as a tool that can enhance the capabilities of traffic law enforcement and that ASE will supplement, rather than re-place, traffic stops by law enforcement officers. The public should be made aware that ASE is used to improve safety, not to generate revenue or impose "big brother" surveillance. Saying this will not necessarily make it so in the eyes of the public, so it is important to explain how each element of the ASE program puts safety first and how controls are in place to prevent misuse of the system.
>
> A comprehensive communications campaign is essential to maintain positive public relations and to ensure that the public understands how ASE works and why it will improve safety as a supplement to traditional enforcement. The campaign should begin several months to a year in advance of ASE implementation. The two most important goals of the communications plan are to maximize public awareness and acceptance of the ASE program. Data should be evaluated to identify at-risk drivers in the community. Special attention should focus on males and young drivers.

The report advocates:

- Promoting awareness of the ASE program and how it works, possibly including enforcement locations, procedures for violation processing, adjudication and payment. While drivers should be made aware that they will not be ticketed for traveling 2 mph or 3 mph above the speed limit, it is best not to tell drivers the threshold may be as large as 6 mph to 11 mph.
- Promoting acceptance of the ASE program by explaining why it is worthwhile. To promote acceptance of the ASE program, it is important to educate the public about the general dangers of speeding and the specific speeding-related safety problem overall and at specific locations in the jurisdiction. This effort should also emphasize the safety and congestion mitigation benefits of ASE. The report includes examples from specific studies showing the safety benefits of ASE (page 22), and a chart with responses to common arguments against ASE (page 23).
- Using the following information outlets to market ASE:
    - Media coverage by local TV, radio, and print media outlets. Press releases or video releases can be used to provide important information to the media and to announce program milestones or changes.
    - Marketing and branding, including a name for the ASE program that is memorable and favorably viewed by the public; flyers and other print materials; and the use of road signs and billboards. Marketing outlets include TV, radio, newspapers and newsletters, signs and billboards, posters, flyers, video presentations, and giveaway items such as bumper stickers, lapel pins, pens and similar incentive items. Page 25 shows an example of an advertisement used on the rear of city buses for ASE in the District of Columbia.
        - See pages 28-30 and page A-8 for information on signage, including photographs of several examples.
    - A jurisdiction web site with ASE information, marketing materials and an FAQ.
    - Public input, via telephone, email, and mail; public events such as open houses and town hall-style meetings; guest appearances on call-in TV and radio shows; focus groups; and surveys.
    - Continuing public information and education after startup, especially for new drivers.
    - Implementing a program rollout and warning period, during which the program is in full operation but violations do not carry fines or license sanctions.

<u>Public Perception</u>

Pages 46 and 47 discuss the evaluation of public awareness and acceptance via surveys and other methods. Page 2 (and A-14) mentions a study of public reaction in Beaverton, OR:

> The project team also evaluated public awareness and acceptance of ASE. Approximately eight months after ASE began, 85 percent of Beaverton residents and 88 percent of Portland residents were aware of the demonstration project and public approval of photo radar in school zones increased to 88 percent in Beaverton and to 89 percent in Portland. Approval for photo radar use in residential neighborhoods also increased during that time period.

Further:

- A District of Columbia ASE evaluation found that 50 percent of residents approved and 36 percent disapproved (A-14).
- An evaluation of ASE in Charlotte, NC, used focus groups with representatives from neighborhood associations, traffic engineers and police officers. Attitudes toward ASE were

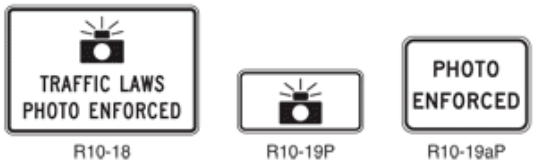
generally positive, but all participants had a preexisting interest in ASE and therefore did not represent the population of Charlotte.

Signage Used in ASE Programs

National Guidance

Chapter 2B, Regulatory Signs, Barricades, and Gates, Manual on Uniform Traffic Control Devices (MUTCD), FHWA, 2009.
http://mutcd.fhwa.dot.gov/pdfs/2009/part2b.pdf
See the relevant excerpts below:

- Examples of photo enforcement signage appear on page 57 of the report (page 13 of the PDF).



- Page 97 of the report (page 53 of the ODF) provides Section 2B.55, Photo Enforced Signs and Plaques (R10-18, R10-19P, R10-19aP):

  Option:
  A TRAFFIC LAWS PHOTO ENFORCED (R10-18) sign (see Figure 2B-3) may be installed at a jurisdictional boundary to advise road users that some of the traffic regulations within that jurisdiction are being enforced by photographic equipment.
  A Photo Enforced (R10-19P) plaque or a PHOTO ENFORCED (R10-19aP) word message plaque (see Figure 2B-3) may be mounted below a regulatory sign to advise road users that the regulation is being enforced by photographic equipment.

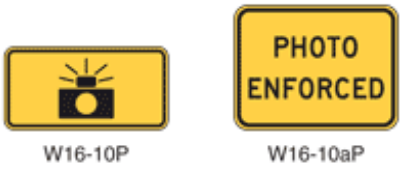
  Standard:
  If used below a regulatory sign, the Photo Enforced (R10-19P or R10-19aP) plaque shall be a rectangle with a black legend and border on a white background.

Chapter 2C, Warning Signs and Object Markers, FHWA, 2009.
http://mutcd.fhwa.dot.gov/pdfs/2009/part2c.pdf
See page 134 of the report (page 32 of the PDF) for Section 2C.61, Photo Enforced Plaque (W16-10P):

Option:
A Photo Enforced (W16-10P) plaque or a PHOTO ENFORCED (W16-10aP) word message plaque (see Figure 2C-12) may be mounted below a warning sign to advise road users that the regulations associated with the condition being warned about (such as a traffic control signal or a toll plaza) are being enforced by photographic equipment.

Standard:
If used below a warning sign, the Photo Enforced (W16-10P or W16-10aP) plaque shall be a rectangle with a black legend and border on a yellow background.

See the example below:



Speed Enforcement Camera Systems Operational Guidelines, National Highway Traffic Safety Administration, FHWA, Report No. HS-810 916, March 2008.
http://www.nhtsa.gov/DOT/NHTSA/Traffic%20Injury%20Control/Articles/Associated%20Files/810916.pdf
Page 36 of the PDF begins a discussion of three types of ASE signage. Note that the discussion of the MUTCD relates to the 2003 edition, not the 2009 edition upon which most states will be basing current ASE signage practices.

- *General signage* can be placed anywhere in the jurisdiction to notify drivers that the jurisdiction uses ASE. General signage serves a public awareness function. The goal is to indicate to drivers that ASE is being used in the jurisdiction and that they should not speed. To maximize awareness, general signage should be placed on major roads and entrances to the jurisdiction. Section 2B.46 of the MUTCD specifies a "Traffic Laws Photo Enforced" sign (sign R10-18) as an option for entrances to the jurisdiction.
- *Fixed advance signage* can be placed on any road where ASE can be used. The goal of fixed advance signage is to alert drivers to the possible presence of ASE ahead and to encourage them not to speed. The MUTCD specifies a "Photo Enforced" sign (sign R10-19) as an optional plaque that can be mounted below a speed limit sign. If the "Photo Enforced" sign is used below a speed limit sign, the MUTCD requires that it "shall be a rectangle with a black legend and border on a white background." Fixed advance signs should primarily be used to supplement speed limit signs, but stand-alone signs may also be used. Stand-alone signs do not need to follow the MUTCD requirements for a regulatory sign because they are not connected to a regulatory sign and can use different messages and formats.
- *Temporary advance signage* can be placed upstream of an active enforcement unit to inform drivers that they are approaching ASE in progress. Temporary advance signage is generally undesirable because drivers become aware that they will be warned and given time to slow down before they reach the ASE unit, thereby reducing the deterrent effect of ASE. However, temporary advance signage is often desired by the public and is sometimes required by law or as a compromise to satisfy opponents of ASE. If temporary advance signage is used, it should be located somewhere that it is visible and legible to approaching drivers, yet not an obstruction to drivers, pedestrians, or cyclists. The distance between the sign and the ASE unit can be selected by the jurisdiction, but the distance should be consistent between ASE sessions and sites. The sign should be wind resistant so it does not move when hit by wind gusts.

If photo enforcement is conducted by unmarked (covert) units, the guidelines recommend noting this on general and fixed advance signs so that drivers are aware that they might not be able to see the ASE units.

State Signage Policies and Practices

Arizona

Arizona anticipates adopting the 2009 national MUTCD along with a state supplement in January 2012. Until that time, the 2004 supplement is in effect, and there are no provisions in the current supplement with regard to photo enforcement.

Arizona state statute § 28-1204, available at http://www.azleg.gov/ArizonaRevisedStatutes.asp?Title=28), includes provisions for sign placement:

- At least two signs shall be placed in a location before a photo enforcement system. One sign shall be in a location that is approximately 300 feet before the photo enforcement system. Placement of additional signs shall be more than 300 feet before a photo enforcement system to provide reasonable notice to a person that a photo enforcement system is present and operational.
- A sign that clearly states the posted speed limit shall be placed between the two signs prescribed above.
- Signs indicating a photo enforcement system shall be removed or covered when the photo enforcement system is no longer present or not operating.
- Signs erected by a local authority or agency shall contain a yellow warning notice and correlate with conform to the system set forth in the most recent edition of the MUTCD.

Colorado

Colorado anticipates adopting the 2009 national MUTCD along with a state supplement in October 2011. The current MUTCD supplement does not contain provisions with regard to photo enforcement signage. State statute includes the following signage provisions:

- Place in a conspicuous place not fewer than 200 feet nor more than 500 feet before the automated vehicle identification system.
- Use lettering that is at least 4 inches high for upper case letters and 2.9 inches high for lower case letters.

See http://www.michie.com/colorado/lpExt.dll?f=templates&eMail=Y&fn=main-h.htm&cp=cocode/1/6d9fa/6ed2d/6ed2f/6ee62/6ef42 for Colorado Revised Statute § 42-4-110.5.

Illinois

The 2009 state supplement to the MUTCD contains no special provisions with regard to photo enforcement.

Iowa

Part 2B, Regulatory Sign, Barricades, and Gates, Changes You Need to Know: The 2009 Manual on Uniform Traffic Control Devices (MUTCD), Institute for Transportation, Iowa State University, Spring 2011.
http://www.intrans.iastate.edu/ltap/MUTCD2011docs/MUTCD09Part2Chapter2b.pdf
This presentation is designed to acquaint practitioners with changes reflected in the 2009 edition of Iowa's supplement to the MUTCD. See slide 26 for the signs used for photo enforcement in Iowa.

Maryland

Chapter 2B Regulatory Signs, Maryland Manual on Uniform Traffic Control Devices - 2006 Edition, Maryland State Highway Administration, revised July 2009.
http://www.roads.maryland.gov/MMUTCD/2b.pdf
This document is a combination of the federal MUTCD and the Maryland supplement to the MUTCD. Page 70 of the PDF describes use of photo-enforced signs:

Section 2B.46 Photo Enforced Signs (R10-18, R10-19)

Option:

A TRAFFIC LAWS PHOTO ENFORCED (R10-18) sign (see Figure 2B-1) may be installed at a jurisdictional boundary to advise road users that some of the traffic regulations within that jurisdiction are being enforced by photographic equipment.

A PHOTO ENFORCED (R10-19) sign (see Figure 2B-1) may be mounted below a regulatory sign to advise road users that the regulation is being enforced by photographic equipment.

Standard:

If used below a regulatory sign, the PHOTO ENFORCED (R10-19) sign shall be a rectangle with a black legend and border on a white background.

Chapter 2C Warning Signs, Maryland Manual on Uniform Traffic Control Devices - 2006 Edition, Maryland State Highway Administration, revised July 2009.
http://www.roads.maryland.gov/MMUTCD/2c.pdf
Page 36 of the PDF describes use of photo-enforced signs:

Section 2C.53 PHOTO ENFORCED Plaque (W16-10)

Option:

A PHOTO ENFORCED (W16-10) plaque (see Figure 2C-11) may be mounted below a warning sign to advise road users that the regulations associated with the condition being warned about (such as a traffic control signal or a toll plaza) are being enforced by photographic equipment.

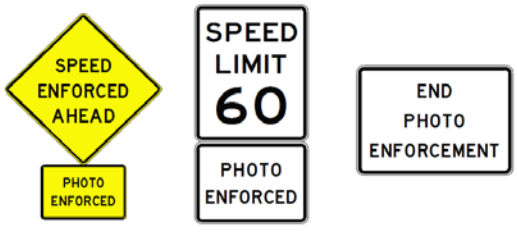
Standard:

If used below a warning sign, the PHOTO ENFORCED plaque shall be a rectangle with a black legend and border on a yellow background.

Maryland expects to adopt a revised state MUTCD in December 2011.

Missouri

The 2011 Automated Traffic Enforcement Policy established by the Missouri Highways and Transportation Commission requires advance signing for the automated traffic enforcement systems installed by state, city and county law enforcement agencies on the state highway system only. See below for sample signage.



The Missouri Highways and Transportation Commission policy is available at http://www.modot.mo.gov/documents/2011AECommissionPolicy.pdf.

Ohio

Part 2, Signs, Ohio Manual of Uniform Traffic Control Devices, 2005 Edition, Revision 2, Ohio Department of Transportation, effective April 15, 2011.
http://www.dot.state.oh.us/Divisions/Operations/Traffic/publications2/OhioMUTCD/Documents/2005OMUTCD_Revision2_file02_Part2_Signs_031711_bookmarked.pdf
From page 79 of the PDF:

> **Section 2B.46 Photo Enforced Signs (R10-18, R10-19)**
> Option:
>
> A TRAFFIC LAWS PHOTO ENFORCED (R10-18) sign (see Figure 2B-1) may be installed at a jurisdictional boundary to advise road users that some of the traffic regulations within that jurisdiction are being enforced by photographic equipment.
>
> A PHOTO ENFORCED (R10-19) sign (see Figure 2B-1) may be mounted below a regulatory sign to advise road users that the regulation is being enforced by photographic equipment.
>
> Standard:
>
> If used below a regulatory sign, the PHOTO ENFORCED (R10-19) sign shall be a rectangle with a black legend and border on a white background.

Examples of the signs appear on page 37 of the PDF.

From page 112 of the PDF:

> **Section 2C.53 PHOTO ENFORCED Plaque (W16-10)**
> Option:
>
> A PHOTO ENFORCED (W16-10) plaque (see Figure 2C-11) may be mounted below a warning sign to advise road users that the regulations associated with the condition being warned about (such as a traffic control signal or a toll plaza) are being enforced by photographic equipment.
>
> Standard:
>
> If used below a warning sign, the PHOTO ENFORCED plaque shall be a rectangle with a black legend and border on a yellow background.

Examples of the signs appear on page 108 of the PDF.

Oregon

Manual on Uniform Traffic Control Devices for Streets and Highways; Oregon Supplement to the 2009 Edition, Oregon Department of Transportation, undated.
http://www.oregon.gov/ODOT/HWY/TRAFFICROADWAY/docs/pdf/Oregon_Supplement_MUTCD_2009_Edition_DRAFT.pdf?ga=t
This final draft is pending adoption by the Oregon Transportation Commission on August 18, 2011, as required by Oregon Administrative Rule 734-020-0005. Relevant sections include:

- Page 9 of the PDF begins Section 2B.55, Photo Enforced Signs and Plaques (R10-18, R10-19P, R10-19aP). The draft provides the following as support of the recommended standard:

  > Oregon law (ORS 810.434 through 810.439) allows photo enforcement of speed and traffic control device violations in certain jurisdictions. The law requires that signs be posted on major routes entering the jurisdiction where such photo enforcement is in use, as well as in advance of the photo radar units or cameras. When the applicable sign is a regulatory sign such as for photo radar speed enforcement, refer to the Oregon Supplement for Section 2B.55. When the applicable sign is a warning sign such as the Signal Ahead (W3-3) sign in advance of red light camera installations, refer to the Oregon Supplement for Section 2C.61.

- Page 11 of the PDF provides Section 2C.61, Photo Enforced Plaque (W16-10P). The same support information as noted above is provided here.

Washington
Automated Enforcement in Work Zone Pilot Project; Fall 2008/Spring 2009 Deployment. Washington State Department of Transportation, undated.
http://www.wsdot.wa.gov/NR/rdonlyres/145EB4CD-180C-4136-88C2-8949A4140898/69988/AutomatedEnforcementinWorkZonePilotProjectLegislat.pdf
See page 5 of the PDF for signage used in two ASE pilot projects in work zones. In one of the two test locations, both on I-5, six signs were installed warning drivers of the photo enforcement operation on all approaches in advance of the project. The pilot project also used a portable highway advisory radio and a portable changeable message sign for advance warning.

ASE Technologies

National Guidance

Speed Enforcement Camera Systems Operational Guidelines, National Highway Traffic Safety Administration, FHWA, Report No. HS-810 916, March 2008.
http://www.nhtsa.gov/DOT/NHTSA/Traffic%20Injury%20Control/Articles/Associated%20Files/810916.pdf
This document focuses on identifying the functional requirements that ASE technologies must meet. It is intended to remain relevant as technologies evolve. Some specific configurations are identified, including both mobile and fixed systems.

The American Association of State Highway and Transportation Officials Strategic Highway Safety Plan, Emphasis Area: Speeding-Related Crashes, Section V – Description of Strategies.
http://safety.transportation.org/htmlguides/speeding/section05.htm
Under "Strategy C2—Implement Automated Speed Enforcement," this document recounts international and domestic experiences with ASE. Additional information is given in Exhibit V-9: "Strategy Attributes for Implementing Automated Speed Enforcement":
http://safety.transportation.org/htmlguides/speeding/section05.htm#exhibit_v_9.

Note: The above information can also be found via **NCHRP Report 500, Guidance for Implementation of the AASHTO Strategic Highway Safety Plan,** Volume 23, A Guide for Reducing Speeding-Related Crashes, 2009.
http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_500v23.pdf

State Research and Guidance

California
Assessing Automated Speed Enforcement in California, California PATH Program, Institute of Transportation Studies, University of California, Berkeley, Caltrans, California PATH Research Report UCB-ITS-PRR-2010-21, April 2010.
http://www.path.berkeley.edu/PATH/Publications/PDF/PRR/2010/PRR-2010-21.pdf
This study examines the field performance of automated speed enforcement (ASE) equipment in a real-world setting, when evaluated against other comparable traffic devices. An ASE system designed for use in work zones was acquired and tested in several field experimental sites, along with several other

commercially-off-the-shelf traffic monitoring devices. Field experiments revealed that traffic speed measurements are likely to yield discrepancies. For considerations of future deployment of ASE, the technologies can be expected to be advanced further. Since all types of sensing devices are susceptible to certain levels of interference and noises in the field, a consistent and robust method of verification and calibration for sensors used for ASE will be essential. From the design point of view, extra measures or techniques can be taken to ensure the robustness and accuracy of ASE systems. The assessment of technical performance of ASE as carried out in this project can provide insights in the process of validating functional characteristics and seeking performance enhancements.

"Technical Evaluation of Road Working Area Safety Systems and Traffic Sensors," Ching-Yao Chan, *15th World Congress on Intelligent Transport Systems and ITS America's 2008 Annual Meeting*, November 2008.
Citation at http://trid.trb.org/view.aspx?id=905162
Speeding is a significant contributor to a significant portion of highway collisions. For work zones in particular, the speeding problem is compounded by on-site road re-configuration, narrowed lanes, or poor visibility. This paper describes a recent study in California that is designed to assess the technical performance of ASE equipment in the field. Several traffic monitoring systems were field tested with an automated speed enforcement system at a study site in California. The study site was located on a rural two-lane highway, where severe collisions occurred frequently and speeding appeared to be a significant factor. The ASE equipment and other devices were found to detect 2-5 % of passing vehicles to travel in excess of 65 mph in a highway with a posted speed limit of 55 mph.

Arizona

Evaluation of Automated Speed Enforcement on Loop 101 Freeway in Scottsdale, Arizona, Insurance Institute for Highway Safety, January 2008.
http://www.stopredlightrunning.com/pdfs/Evaluation%20of%20Automated%20Speed%20Enforcement%20on%20Loop%20101%20Freeway%20in%20Scottsdale,%20AZ.pdf
In 2006 the city of Scottsdale, AZ, implemented a nine-month pilot program to evaluate the feasibility and effects of highly visible speed camera enforcement on a busy urban freeway. This was the first use of fixed speed cameras on a major U.S. highway. Deployment of six cameras along an 8-mile corridor was associated with large declines in mean speeds and an 88 percent decrease in the odds of vehicles traveling 11 mph or more above the 65 mph limit. Traffic speeds increased soon after the pilot program was suspended. In addition to reducing speeding along the enforcement corridor, speed cameras were associated with large reductions in speeding on the same highway but 25 miles away from the camera installations.

Technical Evaluation of Photo Speed Enforcement for Freeways, Arizona Department of Transportation, FHWA, Report No. ADOT-AZ-05-596, October 2005.
http://www.azdot.gov/TPD/ATRC/publications/project_reports/PDF/AZ596.pdf
Photo speed enforcement systems that automatically sense a speeding vehicle and photograph it and its driver have proven effective at reducing speeding violations, primarily on city streets and arterials. The use of this technology on high-volume, high-speed, multilane freeways is technically much more challenging, and largely untested. This research investigates if the current offerings of vendors can provide a viable technical solution in this freeway environment. Twelve ideal characteristics were established that are needed for a speed camera system to operate on Phoenix, AZ, metro-area freeways. Six vendors were interviewed. Thirteen agencies that use speed camera systems were interviewed, although none were found with sufficient freeway operating experience to provide definitive information to design a field trial. Therefore, only a conceptual field trial and accompanying test plan were developed to explore the technical aspects of potential systems. No current vendor offering meets all of the 12 ideal characteristics that were established. One new technology that shows promise is "point-to-point," which tracks average speed between two points on a roadway.

District of Columbia

"Evaluation of Speed Camera Enforcement in the District of Columbia, R. A. Retting, C. M. Farmer, *Transportation Research Record*, Vol. 1830, 2003: 34-37.
Citation at http://dx.doi.org/10.3141/1830-05
From the abstract: Washington, D.C., implemented a speed camera enforcement program in 2001. Vehicle speeds were measured before and after the program. Seven sites in Washington were selected randomly from a total of 60 targeted enforcement zones. Speed data were collected one year before enforcement and approximately six months after enforcement began. Results indicated that mean traffic speeds and the proportion of drivers traveling more than 10 mph above the speed limit—fast enough to warrant a speeding ticket—were reduced at each of the Washington study sites. At eight comparison sites in nearby Baltimore, MD, where speed camera enforcement was not in place, no decline in traffic speeds was observed. Overall, mean speeds at Washington sites declined by a statistically significant 14 percent compared with Baltimore sites, and the proportion of vehicles exceeding the speed limit by more than 10 mph declined 82 percent. These findings indicate that speed camera enforcement reduced speeding on surface streets throughout Washington.

Illinois

"Effectiveness of Automated Speed Enforcement in Work Zones," M. Chitturi, R. F. Benekohal, A. Hajbabaie, M. H. Wang, J. C. Medina, *ITE Journal*, Vol. 80, No. 6, June 2010: 26-28, 33-35.
Citation at http://www.workzonesafety.org/research/record/11261
This study evaluated the performance of automated speed-radar photo enforcement implemented in work zones in Illinois. Down-the-road radar is used to provide speed feedback to motorists and give them an opportunity to reduce their speeds. Across-the-road radar then measures the speed of vehicles 150 ft. upstream of the van, and if the measured speed exceeds a certain threshold, two photographs of the violating vehicle are taken. The system reduced the average speeds of heavy vehicles significantly below the speed limit on both lanes.

Speed Photo-Radar Enforcement Evaluation in Illinois Work Zones, Illinois Department of Transportation, FHWA, Report No. FHWA-ICT-10-064, January 2010.
http://ict.illinois.edu/publications/report%20files/fhwa-ict-10-064.pdf
From the abstract: The effects of an automated speed photo-radar enforcement (SPE) system on the speed of vehicles in highway work zones were evaluated in this study. The SPE effects were also compared to other speed management treatments, including speed display trailers, police presence (with the patrol emergency lights on and off), and the combination of speed display trailer and police presence. Three datasets were collected in two work zones and the effects were studied at the location of the treatment and also at a location about 1.5 miles downstream in the work zone (spatial effects). SPE reduced the average speed of free flowing cars in the median lane by 6.3 mph to 7.9 mph and in the shoulder lane by 4.1 mph to 7.7 mph, which brought down the average speeds near or below the posted speed limit of 55 mph.

"Automated Speed Photo Enforcement Effects on Speeds in Work Zones," Rahim F. Benekohal, Madhav V. Chitturi, Ali Hajbabaie, Ming-Heng Wang, Juan C. Medina, *Transportation Research Record*, Vol. 2055, 2008: 11-20.
Citation at http://dx.doi.org/10.3141/2055-02
From the abstract: The effectiveness of speed photo enforcement by radar in reducing speeds and increasing speed limit compliance in work zones was evaluated for the first time in the United States, at Illinois work zones. Details are presented on SPE implementation and its effectiveness at the point it was stationed and at a downstream location in a work zone. Speed data were collected at the location of SPE and at a location 1.5 mi downstream in the work zone to determine the point and spatial effects of SPE. Results showed that SPE is effective in reducing the average speed and increasing compliance with work zone speed limit. The percentage of vehicles exceeding the speed limit near SPE was reduced from about 40 percent to 8 percent for free-flowing cars and from 17 percent to 4 percent for free-flowing heavy

vehicles. Near the SPE van, none of the cars exceeded the speed limit by more than 10 mph, and none of the heavy vehicles exceeded it by more than 5 mph. At the downstream location, the speed reduction for cars was not significant, while it varied from 0.9 mph to 2.5 mph for heavy vehicles.

Maryland

"Effects of Automated Speed Enforcement in Maryland Work Zones," Mark L. Franz, Gang-Len Chang, *TRB 90th Annual Meeting Compendium of Papers DVD*, Paper #11-3661, 2011.
http://attap.umd.edu/bbs/data/publications/Mark_TRB_2011.pdf
This conference paper provides additional information on the pilot program described above, with two mobile ASE vehicles placed at three highway work zones in the Baltimore/Washington. During the first 30 days of deployment only warnings were issued to motorists traveling 12 mph more over the posted speed limit. During the same period, promotion and media campaigns were widely broadcast to raise the awareness of the general public. Following the initial 30-day period, citations were issued to the registered owner of the speeding vehicle.

"Research on Automated Speed Enforcement. Statement before the Maryland House Committee on Environmental Matters on House Bill 313," Stephen L. Oesch, February 2009.
http://www.iihs.org/laws/testimony/pdf/testimony_2009-02-10_1.pdf
This brief document summarizes the work in Montgomery County described above and also provides some additional examples and citations regarding successful use of speed cameras.

Evaluation of Automated Speed Enforcement in Montgomery County, Maryland, Insurance Institute for Highway Safety, January 2008.
http://safety.fhwa.dot.gov/speedmgt/ref_mats/fhwasa09028/resources/Evaluation%20of%20ASE%20in%20Montgomery%20County,%20MD.pdf
From the abstract: In 2007, Montgomery County implemented the state of Maryland's first ASE program, with camera use limited to residential streets with speeds limits of 35 mph or less and school zones. Vehicle speeds were measured approximately six months before and six months after speed cameras were deployed, and signs were installed warning of the speed enforcement program. Relative to comparison sites in Virginia, the proportion of drivers traveling more than 10 mph above posted speed limits declined by about 70 percent at Montgomery County locations with both warning signs and speed camera enforcement, 39 percent at locations with warning signs but no speed cameras, and 16 percent on residential streets with neither warning signs nor speed cameras.

Automated Speed Enforcement in Work Zones.
http://www.safezones.maryland.gov/
This web site reports on this "joint program of the Maryland State Police, Maryland Transportation Authority & Maryland State Highway Administration." It includes information on a pilot mobile ASE program initiated in October 2009. "Laser technology is in the process of being integrated into the pilot program vehicles." An explanation of laser technology used in several Maryland jurisdictions is given at the site for equipment manufacturer OptoTraffic (http://www.optotraffic.com/blog/laser-speed-camera/).

North Carolina

"Speed Enforcement Cameras in Charlotte, North Carolina: Estimation of Longer-Term Safety Effects," Jae-Pil Moon, Joseph E. Hummer, *Transportation Research Record*, Vol. 2182, 2010: 31-39. Citation at http://dx.doi.org/10.3141/2182-05
From the abstract: The city of Charlotte, NC, conducted a pilot evaluation of the safety effect of speed enforcement cameras. The city selected 14 key corridors with high collisions, and an ASE camera program was implemented in the corridors scattered throughout Charlotte from September 2004 through July 2006. In addition to comparing the net safety effectiveness before and after implementation of automated speed cameras, this study estimated long-term collision patterns from the speed enforcement program with the carryover safety effects after its termination by using an autoregressive integrated

moving average (ARIMA) intervention analysis as well as a before–after analysis with comparison sites. The fitted ARIMA intervention model indicated that the treatment corridors demonstrated a significant reduction in collisions over the study periods.

Oregon

Photo Radar Speed Enforcement in a State Highway Work Zone: Yeon Avenue Demonstration Project, Oregon Department of Transportation, Report No. OR-RD-10-17, April 2010.
http://www.oregon.gov/ODOT/TD/TP_RES/docs/Reports/2010/PhotoRadar_Speed.pdf
From the abstract: The 2007 Oregon legislative assembly passed House Bill 2466, allowing the Oregon Department of Transportation (ODOT) to use photo radar in ODOT work zones on non-Interstate state highways and required ODOT to report back to them on the safety impacts of this enforcement action. This research project examined the impact of photo radar speed enforcement on traffic speed through an active highway work zone. The project also examined the speed data in an attempt to find speed impacts that persisted following the photo radar enforcement periods. During photo radar enforcement periods, speeding was reduced by an average 27.3 percent at the traffic sensor site within the work zone. The observed speeding reduction was temporary and did not persist beyond the departure of the photo radar enforcement van.

"Automated Speed Enforcement in School Zones in Portland, Oregon," National Highway Traffic Safety Administration, *Traffic Safety Facts; Traffic Tech—Technology Transfer Series,* No. 333, August 2007.
http://www.nhtsa.gov/DOT/NHTSA/Communication%20&%20Consumer%20Information/Traffic%20Tech%20Publications/Associated%20Files/tt333.pdf
Mobile ASE vans were deployed two to three times per week at five school zones in Portland, OR, during a three-month period from March through May 2005. When ASE was present and the flashing beacon was off, 85th percentile speeds at demonstration school zones were reduced by approximately 5 mph compared to before the ASE demonstration. Eighty-fifth percentile speeds decreased from 32.4 mph to 27.8 mph. When ASE was present and the flashing beacon was on, 85th percentile speeds were approximately 8 mph to 9 mph lower in the demonstration zones than when neither ASE nor the beacon was present

Other Guidance and Research

European Road Safety Observatory: Speed Enforcement.
http://ec.europa.eu/transport/wcm/road_safety/erso/knowledge/Content/20_speed/speed_enforcement.htm
This web site reports on speed camera use in the U.K., Netherlands, France and Sweden, where this technology has been used for a long time and pervasively. In addressing the effectiveness of ASE, the site states that "The best estimate is that automatic speed enforcement results in an accident reduction of 15 to 20%... For fixed speed cameras, the effects varied from a 5 to 69% reduction in accidents, a 12 to 65% reduction in injuries and a 17-71% reduction in fatalities."

Q&A: Speed – Law Enforcement, Insurance Institute for Highway Safety, February 2011.
http://www.iihs.org/research/qanda/speed_lawenf.aspx
Questions 10 through 14 address the use of speed cameras.

"Sustained and Halo Effects of Various Speed Reduction Treatments in Highway Work Zones,"
Ali Hajbabaie, Ming-Heng Wang, Juan C. Medina, Madhav V. Chitturi, Rahim F. Benekohal, *TRB 90th Annual Meeting Compendium of Papers DVD,* Paper # 11-2782, 2011.
Citation at http://trid.trb.org/view.aspx?id=1092666
From the abstract: This paper analyzes the speed reductions of an automated Speed Photo-radar Enforcement system in highway work zones. A comparison with three traditional speed treatments is also

presented and includes: 1) a speed feedback trailer (Trailer), 2) a police patrol car (Police), and 3) the combination of police patrol and a speed feedback trailer (Police+Trailer). Results indicated that SPE and Police+Trailer reduced the mean speed of both the general traffic stream and free-flowing vehicles by about 5 to 7 mph. The magnitudes of the speed reductions while the treatments were deployed were sustained over time. Police presence alone also reduced the speed significantly but to a lesser degree, and the effects of the Trailer treatment alone were very limited. The frequency and degree of speeding were also influenced by the treatments to various degrees. The percentage of drivers speeding by more than 10 mph was reduced by SPE by 8.7% and by Police+Trailer and Police by 8.9%, bringing the speeding down to 0.2% for SPE and 0% for Police+Trailer and Police cases. These treatments also reduced the frequency of speeding by 10 mph or less by 36-46%. The halo effect in terms of time (after the treatment was removed) for the SPE was limited to a reduction in the mean speed of 2 mph or less, and for the police treatments it was not significant.

"Two Decades of Photo Enforcement in the United States: A Brief Summary of Experience and Lessons Learned," Richard A. Retting, *ITE Journal*, Vol. 80, No. 11, November 2010: 20-24, 29.
Citation at http://trid.trb.org/view.aspx?id=1085158
From the abstract: This article summarizes the growth in the use of photo speed enforcement since the first implementation in 1978, highlighting evaluations of the effectiveness of photo enforcement, effect on crash trends, public opinion and major legal challenges concerning its use. Studies evaluating the effectiveness of red light cameras suggest that they are effective in reducing red light violations and injury crashes. ASE has been shown to substantially reduce speed violations and may reduce crashes. In order to help ensure the success of photo enforcement programs, it is recommended that agencies focus on safety benefits, emphasize fairness in program design and operations, avoid the appearance of a revenue motive, anticipate legal setbacks, pay attention to proper engineering, use effective communication strategies, and evaluate program performance and outcomes.

"Headway and Safety Analysis of Speed Law Enforcement Techniques in Highway Work Zones," Ming-Heng Wang, Rahim F. Benekohal, Hani Ramezani, *TRB 89th Annual Meeting Compendium of Papers DVD*, Paper #10-4003, 2010.
Citation at http://trid.trb.org/view.aspx?id=911371
From the abstract: This paper investigated the headway distribution of platooning vehicles, presence of very short headways, and frequency of applying of brakes and changing lane in work zones with and without law enforcement activities. Law enforcement activities include the police patrol car presence and automated speed photo-radar enforcement. Data from two work zones were collected and analyzed. Mean headway of vehicles in work zones increased when SPE or police patrol car presence was utilized in work zones. This is a beneficial effect and indicates that drivers had a longer time to react to the lead vehicles. The law enforcement presence in work zones, either the SPE or police patrol car presence, in general decreased the number of vehicles traveling with a very short headway. The difference in braking behavior was not significant when the SPE case was compared to police car presence. However, lane changing behavior was significantly different for cars traveling in the median lane; also for trucks traveling in the shoulder lane.

"Field Evaluation of Work-Zone Automated Speed Enforcement Equipment and Traffic Monitoring Devices," Ching-Yao Chan, *TRB 88th Annual Meeting Compendium of Papers DVD*, Paper #09-1732, 2009.
Citation at http://trid.trb.org/view.aspx?id=881338
This paper describes a recent study designed to assess the technical performance of work zone ASE equipment in the field. Several traffic monitoring systems were field tested with an ASE system at a rural two-lane highway. The ASE equipment and other devices were found to detect 2 percent to 5 percent of passing vehicles to travel in excess of 65 mph in a highway with a posted speed limit of 55 mph.

"Safety Effects of Automated Speed Enforcement Programs: Critical Review of International Literature," Libby J. Thomas, Raghavan Srinivasan, Lawrence E. Decina, Loren Staplin, *Transportation Research Record*, Vol. 2078, 2008: 117–126.
Citation at http://trb.metapress.com/content/b5k4k42jxp7t265p/
From the abstract: ASE programs were evaluated worldwide to ascertain the effectiveness of such programs at achieving safety benefits. A critical review process was used to determine the most likely range of probable safety effects of fixed and mobile ASE programs. Among the 90 studies from 16 countries that were initially identified as potential safety evaluation studies, 13 met the criteria for detailed methodological review. On the basis of evidence from the best-controlled evaluation studies, injury crash reductions in the range of 20 percent to 25 percent appear to be a reasonable estimate of site-specific safety benefit from conspicuous, fixed-camera ASE programs. No conclusions were reached regarding site-specific effects of mobile enforcement programs. Estimates of systemwide crash reductions likely attributable to covert, mobile speed enforcement programs were based on different subsets of crashes (daytime casualty crashes and daytime speed-related crashes) and were limited to two studies, but also were in the range of 20 percent to 25 percent.

"Automated Speed Enforcement in the U.S.: A Review of the Literature on Benefits and Barriers to Implementation," Caroline J. Rodier, Susan A. Shaheen, Ellen Cavanaugh, Submitted to the Transportation Research Board Annual Meeting, July 2007.
http://tinyurl.com/3caen8f
From the abstract: In the U.S., ASE programs are currently operated in only 11 states and in Washington D.C., most of which are located on residential streets and not highways. This literature review explores the potential benefits and barriers to implementing ASE programs in the U.S. by examining the large body of literature on automated enforcement programs, including background on the implementation of ASE and a discussion of research on the potential safety and financial effects of these programs. The report includes an evaluation of key program design choices, encompassing issues related to owner or driver liability, manned or unmanned systems, mobile or fixed systems, visibility, location, enforcement thresholds, program management, and revenue distribution.

Use of Speed and Red-Light Cameras for Traffic Enforcement: Guidance on Deployment, Visibility and Signing, UK Department for Transport, January 2007.
http://www2.dft.gov.uk/pgr/roadsafety/speedmanagement/pdfdftcirc0107.pdf
This document provides UK guidance and best practice advice on the deployment of speed cameras. It indicates that Vehicle Activated Signs have been shown to be effective at reducing speeds when used instead of or in conjunction with speed cameras.

Research in Progress

NCHRP 03-93: Automated Enforcement for Speeding and Red Light Running.
http://144.171.11.40/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=1613
The objectives of this project are to (1) prepare a comprehensive assessment of automated speeding and red light enforcement activity in the United States and (2) develop guidelines to ensure successful operation of current and future programs. It is scheduled to have been completed 6/30/11; the contractor's draft report is pending.

"Augmented Speed Enforcement (aSE), Parts 1 and 2," Western Transportation Institute, expected completion date: June 30, 2012.
http://trid.trb.org/view.aspx?id=1095328 and http://trid.trb.org/view.aspx?id=1095327
Sponsored by Caltrans.
From the abstract: Although fewer vehicle miles are traveled in rural areas than urban areas, there are approximately 42 percent more fatal crashes in rural areas compared to urban areas. Aggressive driving

behaviors such as speeding are primary factors contributing to major-injury and fatality crashes. Moreover, studies have shown higher crash rates at specific highway locations such as work zones that temporarily set lower speed limits. Work zone crashes rates are especially high on rural two-lane two-way highways. To reduce traffic fatalities and injuries, technologies have been developed and applied to automatically detect traffic violations. One technology employed to proactively manage speeding is Automated Enforcement Systems (ASE), which supplement traditional traffic law enforcement activities by remotely detecting speed violators and automatically processing speeding citations.

Research Needs Statements

Evaluation of Automated Speed Enforcement Technologies.
http://rns.trb.org/dproject.asp?n=14755
This study was proposed by TRB Subcommittee ANB10, Transportation Safety Management, in October 2007. It would include a literature review, interviews with individuals in three jurisdictions where ASE has been used, and data gathering on crashes and citations on roads where ASE has been implemented along with control roads.