APPENDIX 2

Corridorwide Safety Assessment Report

By LSA Associates Inc.

Pacific Coast Highway Safety Study

Malibu, California

May 2013

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II. CORRIDORWIDE SAFETY ASSESSMENT REPORT

PACIFIC COAST HIGHWAY SAFETY STUDY

MALIBU, CALIFORNIA

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LSA

May 2013

II. CORRIDORWIDE SAFETY ASSESSMENT REPORT

PACIFIC COAST HIGHWAY SAFETY STUDY

MALIBU, CALIFORNIA

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LSA

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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, 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 serving 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. Ultimately, the City will have an identification of key mobility safety issues, recommendations to address these issues, a funding plan for the recommendations, and a Project Study Report (PSR) for up to five discrete projects. This overall work program has been broken into discrete tasks. The first component of the PCH Safety Study, the Existing Condition Report, 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 six locations. Transit usage data was provided by the Los Angeles County Metropolitan Transportation Authority. Land use and land policy data was collated 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.

While PCH is a four-lane divided roadway throughout the corridor, different topography and adjacent land uses create different 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

The objective of this second task is to assess safety along the project corridor based on the existing conditions. This second component flows from the Existing Condition Report, defining safety concerns and identifying potential safety issues. The list of potential problems for each study area and key conflict areas identified in this report will, in turn, form the base for subsequent components of the PCH Safety Study. Subsequent effort still to come includes the Alternatives Analysis, Funding Plan, and Final Report. This Corridorwide Safety Assessment Report focuses on identifying potential safety issues in support of these subsequent efforts.

The layout of this report is similar to the Existing Conditions Report wherein the safety issues are identified and sequentially described for the three study areas. As public outreach is a large component of this project and a portion of the safety issues were raised by the community, maintaining the previous layout makes it easier for a reader to find the geographic location that (s)he is interested in and review the safety issues associated with the location. For subsequent efforts (Alternatives Analysis, Funding Plan, and Final Report) the layout will be changed to fit the purpose of those reports. These reports will be presented in a way that aligns the safety issues and their alternative solutions to maximize eligibility for funding.

The Alternatives Analysis will build on the safety issues identified at specific locations and identify themes that occur throughout the corridor and could possibly be addressed with corridorwide solutions. These themes may include roadway geometry, pedestrian access, bicycle issues, parking issues, warning signs, driveway and access issues, or others. Safety issues that are location specific could still be addressed with location-specific solutions. To help facilitate the evolution of the process, the Corridorwide Safety Assessment paid specific attention to patterns that began to emerge.

The Funding Plan will identify resources that could be utilized to implement the potential solutions discussed in the Alternatives Analysis. At this time, the LSA Team believes that categorizing the themes and individual location potential safety issues based on the four categories used in the State's Strategic Highway Safety Plan (SHSP) presents the most efficient path to acquiring funding. These four categories are: Enforcement, Engineering, Education, and Emergency Services. The Corridorwide Safety Assessment considered which of these categories apply to the potential safety issues raised in preparation for future components of the PCH Safety Study.

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 develop and prioritize a list of safety issues. Additionally, safety assessments are not conducted from a singular source or manual but are derived from several sources that provide guidance in identifying safety issues.

Several local, State, and federal design standards and thresholds were used to assess the safety issues along the study corridor. For areas related to vehicle travel, technical reference materials such as the *Manual on Uniform Traffic Control Devices* (MUTCD), *American Association of State Highway and Transportation Officials; A Policy on Geometric Design of Highways and Streets* (AASHTO Design Manual), Caltrans *Highway Design Manual* (HDM), and the Transportation Research Board's (TRB) *Access Management Manual* were used. For bicycle-related issues, the National Association of City Transportation Officials (NACTO) Design Manual, AASHTO Design Manual, and California MUTCD were used. For pedestrian facilities, the California MUTCD, AASHTO Design Manual, 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 manuals. 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.

DEFINITIONS

Most of the terms used in this document are meant to convey their common meaning. However, the use of some terms is nuanced or different from the terms' strict legal definition. In order to avoid confusion, the uses of these terms are described below.

- **Collision:** Contact resulting in damage to person or property.
- **Crosswalk:** Painted markings on the pavement indicating pedestrian crossings.
- **Excessive Speed:** Speeds in excess of the predominant flow of traffic.
- **Fog Line:** Solid white line on the right side of the travel lanes.
- **Jaywalking:** Crossing of a roadway outside of a crosswalk, whether permitted or not.
- **Northbound:** PCH traverses the City in an east–west direction. In this report, eastbound and westbound refer to traffic on PCH in the City. As a State Highway, however, PCH is a north–south roadway. Vehicles traveling west through the City are traveling northbound on the State Highway.
- **Regulatory Sign:** A sign that gives notice to road users of traffic laws or regulations.
- **Shoulder:** Paved portion of the roadway outside of the fog lines.
- **Sight Distance:** A length of road surface that a driver can see with an acceptable level of clarity**.**
- **Unsafe Speed:** Speed that is inappropriate for the situation, even if that speed is below the posted speed limit.
- **Warning Sign:** A sign that gives notice to road users of a situation that might not be readily apparent.

California Vehicle Code 275

"Crosswalk" is either:

a) That portion of a roadway included within the prolongation or connection of the boundary lines of sidewalks at intersection where the intersecting roadways meet at approximately right angles, except the prolongation of such lines from an alley across a street.

b) Any portion of a roadway distinctly indicated for pedestrian crossing by lines or other markings on the surface.

Jaywalking

According to the California Vehicle Code list of violations, "jaywalking" is the violation of section 21954, 21955, or 21961, which means crossing where prohibited by sign, crossing between two adjacent controlled intersections, or failing to yield right-of-way to a vehicle that presents an immediate hazard.

COMPREHENSIVE LIST OF SAFETY ISSUES

The Existing Condition report describes the current setting on PCH to include land use, roadway infrastructure, traffic volume, LOS, typical vehicle speeds, transit usage, bicycle infrastructure and volume, pedestrian infrastructure and volume, and recent collision data. That data collection phase also included meetings with stakeholders and opportunities for the community to contribute to the

understanding of how the roadway operates. The Existing Condition report compiled these facts and contributions from stakeholders and the community. This first phase of the PCH Safety Study described the setting along the corridor whether or not elements of that setting were a potential safety issue. This second phase is a refinement of the setting, narrowing the conversation to describe areas of concern. Based on the analysis and the contribution of the community and stakeholders, LSA compiled a list of 80 potential safety issues. This list consists of issues identified by LSA as a result of observation and data analyzed and also concerns raised by roadway users through the public participation process.

Corridorwide Potential Safety Issues

- *Use of shoulder*
- *Signing and striping*
- *Access to adjacent development*
- *Parking cost redistributes impacts*
- *Valet operations*
- *Vehicle/pedestrian conflict*
- *Bicycle safety hazards*
- *Driver and pedestrian behavior*

The list is the primary component of this second phase of the PCH Safety Study. This is an attempt to comprehensively enumerate the majority of the potential safety issues. Not all of the potential issues are significant safety issues. Some may simply be capital improvement projects. Not all of the safety issues have actionable solutions. Still fewer safety issues will have funding sources available to implement the solution. The continued refinement of the potential safety issues into a list of suggested projects will be the subject of the next three phases of the PCH Safety Study. The list is presented in a matrix at the end of this section. This section provides a summary, by geographic location, of some of the more significant issues along PCH as reported in the comprehensive list.

Throughout the corridor, eight potential safety issues were repeated frequently. The first issue is the conflict between travel modes that occurs because of competing desires for use of the shoulder. In areas without sidewalks or bike lanes, both pedestrians and bicycles seek to use the shoulder to stay out of the travel lanes. However, bus stops are also located along the shoulder, and buses pull in to fully occupy the shoulder to avoid blocking a travel lane. Passenger cars also utilize on-street parking in the shoulder. In addition, the shoulder area is used to service adjacent residences for trash collection, utilities, and construction. These are significant demands for the same narrow piece of public ROW. Without rationalizing its use and augmenting it where possible, the first-come-first-served system results in conflict between these varying groups.

Another issue is the use of varying signing and striping throughout the corridor. Signs posted along PCH give motorists inconsistent warnings related to upcoming intersections, crosswalks, and curves that require slowing. Inconsistencies encompass style, type, placement, and spacing of signs. A motorist looking for one type of sign might be caught off guard when approaching another hazard. Nighttime reflectivity standards have also been recently updated, and it is likely that many signs along the corridor are not yet consistent with the new reflectivity standards. Again, this is a potential issue if a gap exists between the expectations of the motorists and the conditions on the roadway.

Inconsistent development of the adjacent land is another potential issue. In some areas of the City, access is taken directly from PCH for residential driveways. In other areas, residential access is concentrated along a single collector road. Near the pier, commercial driveways connecting directly onto PCH are common. The inconsistent manner in which access is taken results in changes to roadway friction that can result in alternating areas of high and low predominant travel speeds. When

motorists are conditioned to high predominant travel speeds and enter an area of low predominant travel speeds without an indication of the change, conflict with other vehicles is possible.

Parking is also an issue throughout the corridor. In the City, it is common that off-street parking is paid parking, particularly near the beach. 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. Parking maneuvers are not a common characteristic of state highways or regional roadways. The volume of parking maneuvers on PCH in the City also exceeds expectations for a typical city's main road, where parking demand is usually accommodated by off-street parking lots. 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. The disparity in pricing focuses the impacts of parking heavily on PCH.

In a related topic, valet services are active on PCH. Restaurants located along PCH may 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 ideal circumstances, where valet operations are standard, professional valet attendants may be safer when entering and exiting on-street parking spaces due to their familiarity with the procedure. Under current conditions, however, procedures are not consistent across operators, and operations may not consider the safety of motorists and the operators. When speed is a higher priority than safety, sudden stopping, premature turns, and risky pedestrian behavior are possibilities.

Conflict between vehicles and pedestrians is common throughout the corridor. As previously mentioned, there is a conflict between vehicle and pedestrian use of the shoulder. As also previously mentioned, indication of nearby crosswalks is not uniform throughout the corridor. In addition to these conditions, conflict between vehicles and pedestrians is possible because transit users are pedestrians at the beginning and end of their transit trip. Bus stops were installed in the City prior to the ADA. Some had been Greyhound bus stops that were incorporated into the existing transit system. While many bus riders are traveling to destinations on the south side of the roadway, 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. The bus stops themselves, on either side of the roadway, 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 have no paved walking path other than the roadway. In at least one area, the bus stop is located on a traffic island where no safe pedestrian path is provided to access it. Between January 2010 and May 2013, four pedestrian fatalities occurred while the pedestrian was crossing outside of a crosswalk.

The corridor may be popular with cyclists on weekends, but the roadway is not currently designed to be bicycle-friendly. Between January 2010 and June 2012, 16 cyclists were injured on PCH. In October 2012, a cyclist was killed. In some areas, roadwork has encroached on the shoulder and leaves no space for bicycles other than the travel lanes. 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.

Another issue common throughout the corridor is driver behavior impacting safety. The most common type of collision in the corridor is rear-end. This could be partly attributed to parking maneuvers, as discussed previously, but also suggests the potential that driver distraction is a possibility and that speeds are higher than the conditions can safely accommodate. Travel speed is an issue because stopping distance increases rapidly as speed increases. At 45 mph, stopping distance is 360 feet (ft); at 50 mph, stopping distance is 430 ft; at 55 mph, stopping distance is 500 ft; and at 60 mph, stopping distance is 580 ft.[1] LSA conducted floating vehicle speed surveys, where a vehicle traveling on the roadway determines the prevailing speed. Those surveys determined that traffic generally travels at 5 mph over the posted speed limit. To verify these observations, LSA also collected automated speed surveys at five locations along PCH. These automated surveys also found that prevailing speeds are generally 5 mph over the posted speed limit. However, near the Malibu Pier (a 45 mph zone), the prevailing speed was 53 mph, and west of Decker Canyon Road (a 55 mph zone), the prevailing speed was 65 mph. Although not necessarily frequent, vehicles exceeding 10 mph over the posted speed limit were recorded by the automated speed surveys. LSA reviewed this data by time of day. The percentage of vehicles exceeding the posted speed limit by 10 mph or greater is displayed in Table A for the five areas surveyed along PCH. As Table A shows, driver behavior could be a safety concern, especially near Malibu Pier and west of Decker Canyon Road.

In addition to the global issues described above, the matrix provided lists location-specific issues. Some highlights from the matrix are described below.

Table A: Percent of Vehicles Exceeding Posted Speed Limit by 10 mph or Greater

	East of Las Flores Canyon Road	Malibu Pier	Busch Drive	Broad Beach	West of Decker Canyon Road
Morning 7:00 a.m. to 11:00 a.m.	2%	12%	3%	3%	12%
Midday 11:00 a.m. to 3:00 p.m.	1%	4%	3%	2%	15%
Afternoon 3:00 p.m. to 7:00 p.m.	1%	5%	4%	2%	18%
Evening 7:00 p.m. to 11:00 p.m.	2%	14%	8%	2%	19%
Night 11:00 p.m. to 7:00 a.m.	4%	20%	7%	4%	10%

mph = miles per hour

[1] California Department of Transportation, *Highway Design Manual,* Table 201.1

Study Area 1

East of Big Rock Drive on the north side of the roadway, a temporary barrier bracing the hillside against landslide has been placed up to the fog line. This has completely eliminated the shoulder and forces bicycles into the travel lane unexpectedly. Between Big Rock Drive and Las Flores Canyon Road in Study Area 1, residential parking spaces on the south side of the roadway require vehicles to back into traffic. Little space exists between the roadway and homes, and some vehicles would be encroaching on the travel lane as soon as they start backing. Oncoming vehicles may not be able to differentiate between a parked vehicle and a backing vehicle.

The intersection of Las Flores Canyon Road/PCH has a high reported collision rate. However, traffic collisions attributed to an intersection could be in the vicinity of the intersection without having been caused by the operation of the intersection. When looking more in depth at the collisions attributed to this intersection, it becomes clear that more collisions are in the vicinity of the intersection than in the intersection itself. Half of the collisions in the intersection involved vehicles making left turns. Parking maneuvers near Las Flores Canyon Road for local restaurants may contribute to the high volume of collisions occurring in the vicinity of Las Flores Canyon Road.

The area between Rambla Pacifico and Rambla Vista East has some nonstandard features. Typical intersections are formed at 90 degrees and have clearly defined lanes for entering and exiting vehicles. It is atypical for the intersection of two streets to also function as a shopping center driveway. On the Rambla Pacifico side, in the morning, vehicles drop off school children at the shopping center and then make tight turning movements in congestion to get back to the intersection. On the Rambla Vista East side, paths cross for vehicles traveling between PCH, the shopping center, and Rambla Vista East, with no markings or guidance provided for vehicles entering or exiting. The inadequate throat length contributes to overlapping conflict areas that decrease the safety on-site and on the adjacent highway.

Not far from the Rambla Vista/PCH intersection, a striped crosswalk provides a path across PCH to the La Costa Beach Club. This is a midblock crosswalk without a traffic signal and without the usual pedestrian landmarks that indicate the presence of a crosswalk to motorists. The crosswalk terminates at a private residence and a wall of the club. Signs indicating the presence of a crosswalk are located approximately 20 ft north and south of the crosswalk. In addition, “Ped Xing” warnings are painted on the roadway approximately 300 ft north and south of the crosswalk. However, stopping distance at 45 mph is 360 ft, according to the Caltrans HDM. Parking is restricted along the approaches to the crosswalk, which provides some sight distance benefits to pedestrians. However, it is difficult to identify this area as a crosswalk zone.

The intersection of Carbon Canyon Road/PCH has many collisions attributed to it. Upon closer inspection of the collision data, however, it becomes clear that few of these collisions occur in the intersection. Of the collisions occurring in the vicinity of the intersection, over half are rear-end collisions. Collisions with parked cars and during turning movements were the next most common. In this area, PCH provides direct access to residential garages along the south side of the roadway.

The flashing yellow crosswalk at 22506 PCH is a potential safety issue. This type of signal alerts motorists to the presence of a crosswalk, but does not indicate when pedestrians are present. As such, motorists can become desensitized to the constant flashing yellow light. The signalized pedestrian

crossings at 22333 PCH, 22730 PCH, and the Malibu Pier provide a more uniform and identifiable type of crossing. Reported pedestrian collisions are not common at these locations.

Of the collisions at the pedestrian crossings, by far the most common type is one vehicle rear-ending another vehicle while proceeding straight. This is suggestive of a vehicle seeing and stopping for pedestrians, but having the following vehicle unprepared to stop. As mentioned previously, rear-end collisions could also occur because of parking maneuvers. Other types of collisions that are common in this section, which may not be due to the pedestrian crossings, are collisions with parked cars, collisions while turning, and collisions while entering traffic.

The Malibu Pier area is busy with pedestrian activity. On the surveyed weekday in July 2012, 163 pedestrians were counted crossing PCH at the Malibu Pier crosswalk in the afternoon peak hour. This volume increased to 630 during the weekend midday peak hour. Additionally, 328 pedestrians were counted walking along the north side of the intersection in the weekend midday peak hour. Sidewalks are provided for pedestrians between Carbon Canyon Road and Cross Creek Road. This is also the portion of the City with the highest concentration of crosswalks. However, pedestrian crossings outside of a crosswalk are reported to still be very high. This is potentially due to inadequate knowledge of crosswalk locations, location of crosswalks not near pedestrian destinations or too far apart to meet pedestrian demand, or pedestrian behavior to reach a destination in the most convenient, not necessarily safe, manner.

For bicycles, the portion of PCH near the Malibu Pier parking lot has the potential to offer additional space between the travel lane and vehicles parked on the shoulder. Unfortunately, in the areas where bicycles could have had adequate space, it is common for vehicles to double-park while waiting for an on-street parking space to open. Off-street parking is present near the Malibu Pier, but on-street parking remains in high demand because of the price advantage.

At the intersection of Serra Road/PCH, PCH is free flowing and Serra Road has a posted stop sign. Vehicles exiting Serra Road are expected to wait until an appropriate gap appears in traffic, permitting the safe execution of their turning movement. For vehicles making a left turn from Serra Road or a left turn from PCH into Serra Road, a two-way left-turn median is provided on PCH to facilitate a two-step turn movement. Because drivers must judge for themselves when a gap in traffic is safe, the distance drivers can see is very important. At this location, it appears that sight distance is less than recommended. Vehicles turning left from PCH to Serra Road can see approximately 300 ft down PCH. Vehicles turning from Serra Road can see approximately 200 ft to their left. At the speed limit of 45 mph, the Caltrans HDM recommends at least 360 ft of sight distance. It should be noted that the prevailing speed measured near this area was found to be 53 mph.

Study Area 2

Based on the July 2012 surveyed volume, the intersection of Cross Creek Road/PCH would be expected to operate at Level of Service (LOS) D. The observed congested conditions at this intersection are the result of other circumstances. The intersection of Cross Creek Road/PCH is another busy location for pedestrian crossings. During the weekend midday peak hour, 236 pedestrians were counted crossing PCH in this crosswalk. In addition, 79 pedestrians were counted crossing Cross Creek Road. However, these pedestrian crossings conflict with the permitted left turn from the lagoon onto northbound PCH. During periods of high pedestrian volume, left-turning and

through traffic will stack in the intersection and continue to block the intersection for the beginning of the green light for PCH. This creates a conflict between pedestrians and vehicles.

Cross Creek Road provides access to one of the main shopping areas in the City. This results in high volumes for eastbound left turns and westbound right turns. The queue for the eastbound left turns has been observed to exceed the pocket provided. This potentially blocks one of the through lanes on PCH. The westbound right turn does not have a dedicated lane. High turn volume for this movement effectively cuts the through capacity on PCH in half. The condition is exacerbated on weekends, when pedestrian use of the crosswalk along PCH is common. Pedestrians receive a walk signal at the same time PCH receives a green light. Pedestrians in the crosswalk prevent westbound right turns, which in turn completely blocks one of the through lanes on PCH. Congestion resulting from inefficient intersection operations builds back from Cross Creek Road and can reach Serra Road or farther on busy days. Sudden, unexpected slowing can contribute to rear-end collisions. While these conditions may lead to safety concerns, they may be addressed with more simple geometric or capacity-enhancing improvements.

Several development projects are approved or planned in the vicinity of Cross Creek Road. At the initiation of the PCH Safety Study, the City of Malibu provided the latest version of the cumulative projects listing. This complete list is provided in Exhibit 1. Analytic tools are available to forecast future traffic volume that would be expected to occur when and if these proposed projects are constructed and operational. In addition, established measures of effectiveness (e.g., intersection delay and LOS) describe the conditions resulting from that traffic volume. However, no analytic tools are available to forecast future traffic collisions or unsafe conditions. Too many variables affect traffic safety for those forecasts to be reliable. The anticipated traffic conditions resulting from the proposed development projects are disclosed in the traffic studies for those projects, but that information cannot be directly applied to this safety study.

Eastbound Malibu Road (near Cross Creek Road) enters PCH at a shallow angle a short distance before the beginning of the eastbound left-turn pocket at Cross Creek Road. According to the Caltrans HDM, an intersection angle should not be less than 75 degrees; however, this intersection angle is less than 75 degrees. The short distance remaining to Cross Creek Road also means that less acceleration length is provided than recommended by the California MUTCD. The shallow angle requires vehicles from Malibu Road to merge with PCH vehicles rather than waiting to turn at an intersection. The short distance provides little space for Malibu Road vehicles to accelerate to match the speed of PCH vehicles and increases the potential for conflict.

Congestion through the commercial area contributes to the potential for collisions. The intersections of Cross Creek Road/PCH, Webb Way/PCH, and Malibu Canyon Road/PCH are all calculated to exceed the LOS standard set by Caltrans. The result is poor progression due to overburdened intersections, which leads to closely spaced vehicles and the potential for collisions. Most of the collisions near Webb Way between 2010 and 2012 were rear-end collisions.

The westbound right turn from PCH onto Latigo Canyon Road presents a potential for collisions. This movement does not have a separate lane and slows more than expected due to the angle of the turn onto Latigo Canyon Road. Latigo Canyon Road itself has a single approach lane that is stop-controlled at the intersection with PCH. In this area, PCH has a raised median and does not accommodate a two-step left turn. Vehicles turning left from Latigo Canyon Road must wait for gaps in both northbound and southbound PCH traffic to complete their turn. While waiting for

West Malibu

Project Name	Brief Description	Location	Status	Size	Planner
Trancas Town	New residential development	6155 TCR	Pending CDP submittal; zone change UPR	Zone change from Rural Residential to Multi-Family; 32 detached townhomes (preliminary)	B. Blue
HOWS / Trancas Country Market	Remodel and expansion of existing retail	30745 PCH (at TCR)	PA; pre-BPC	53,423 sf total (27,695 sf existing; 25,728 sf new); 339 parking spaces	R. Mollica
SMMC Lechuza Beach Public Access Improvements	Several public access improvements along the areas of East Sea Level, West Sea Level and Bunnie Lane, including stairways	31720.5 PCH	UPR	Beach access	S. Danner
Sea Star Estates	5 NSFRs (infill)	6270, 6304, 6312, 6282, and 6398 Sea Star Dr	UPR	5 NSFRs on 5 existing parcels	A. Fernandez
Malibu High and Middle School Campus Improvement Project	New admin building, remodel existing buildings, new parking area and site improvements	30215 Morning View Drive	UPR	35,315 sf of new construction, 12,509 sf of renovation/modernization of existing buildings, new 150 space parking lot, various parking and site improvements	J. Smith
Broad Beach Restoration Project	Beachwide rock revetment, off-shore sand dredging, sand nourishment, dune restoration	Broad Beach Road	UPR	Beach-wide	CA State Lands Commission / Coastal Commission, S. Danner
Malibu Athletic Field Lighting Project	Sports field lighting	30215 Morning View Drive	UPR	Four 70 ft tall lights installed on the MHS football field/track (limited usability per year per LCP restrictions)	J. Smith
29255 Heathercliff	New residential triplex	29255 Heathercliff Rd	UPR	3 condominium units, 4,450 sf with a 1,768 sf subterranean garage, 12 parking spaces	J. Smith
28811 PCH Subdivision	3 lot subdivision	28811 PCH	UPR	Potential development for each lot equals a maximum TDSF of 8,620 sf; 8,342 sf; and 8,470 sf	S. Danner
Portshead	New office building	6551 Portshead Dr	PA expired; pending new CDP submittal	14,950 sf; 60 parking spaces	R. Mollica
LA County Fire Station No. 71	Fire station reconstruction	28722 PCH	UPR	6,033 sf total (2,881 sf existing; 3,152 sf new); 12 parking spaces; temporary fire station relocation to Zuma Beach Lifegaurd HQ	J. Smith
Solstice Creek Fish Ladder	New fish ladder project at mouth of Solstice Creek / across a portion of Dan Blocker Beach	26038.5 PCH	BPC (State)	Bridge culvert and stream channel reconstruction with rock weirs and step-pools for a total length of 436 feet	S. Edmondson
Galahad Subdivision	5 lot subdivision; 4 buildable lots and 1 open space lot	6061 Galahad Rd	UPR	Potential development for each lot equals a maximum TDSF of 7,044 sf, 7,142 sf, 7,234 sf, and 8,414 sf	A. Fernandez
Zuma Mesa	LLA and 2 NSFR	6271 and 6277 Zuma Mesa Dr	PA; BPC	5,329 sf and 6,984 sf	A. Fernandez
Trancas Highlands Water Assessment District	Water tank/line, buster pump station and NSFR	31537 Anacapa View Dr, Anacapa View Dr and TCR	PA, assessment district formation process underway	500,000 gallon water tank, +/- 12,400 linear feet of trenching, assessment district (+/- 66 existing lots), one NSFR +/- 11,000 sf	B. Blue
Sea Level	2 NSFR (infill) and road widening project	31864 and 31866 Sea Level Dr	UPR	2,185 sf and 1,925 sf, 2,000 sf; and 130 linear feet of road widening (Sea Level Dr)	A. Fernandez
N/A	2-lot LLA and 2 NSFR	5905 and 5909 Latigo Canyon Rd	UPR	Lot line adjustment and construction of 2 NSFR - 8,223 sf and 5,935 sq respectively	S. Danner
Puerco Canyon Road Extension	Road extension	3500 Puerco Canyon Rd	UPR	3,500 linear feet of road extension to provide access to 7 residentially zoned lots (1 City lot/6 County lots)	S. Danner

~~**Acronyms**~~
ac = acres
BPC = in building plan check
CCC = California Coastal Commission
CCD = Cross Creek Drive
CCW = Civic Center Way
CDP = coastal development permit
LLA = lot line adjustment
MCR = Malibu Canyon Road
NSFR = new, single-family residence
PA = planning approval / CDP received
PCH = Pacific Coast Highway
sf = square feet
TCR = Trancas Canyon Road
UC = under construction
UPR = still under planning review

SOURCE: City of Malibu Cumulative Projects Listing, Updated May 1, 2012

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Civic Center Area

Project Name	Brief Description	Location	Status	Size	Planner
Crummer	7 lot subdivision (5 for residential)	24120 PCH	UPR; final project scope pending	(Preliminary) 5 NSFRs; expanded parking for Bluffs Park; 2 acre dedication to City for recreation use	H. Ly
Towing Subdivision	7 lot subdivision (4 for residential)	23915 Malibu Rd	PA; BPC	4 NSFRs	S. Danner
Rancho Malibu Hotel	New hotel and spa	4000 MCR (NW corner of MCR and PCH, along Winter Canyon Rd)	UPR	a 146-room luxury hotel with related facilities. The hotel's 141,428 sf main building contains a retail component, day spa, fitness center, lobby, restaurant, bar, banquet and meeting facilities, and guest rooms. Development also includes 133,873 sf of detached casitas which include guest rooms. A large swimming pool, subterranean parking structure, function lawn, landscaping, and hardscape. CUP for live entertainment, events, alcohol sales and a TTM for a commercial airspace subdivision (146 hotel rooms and 2 retail spaces will be available for private ownership).	S. Danner
SMMC Beach Public Access Improvements	Public beach access improvements and a new stairway	24038 Malibu Rd	PA; pre-BPC	Beach access	R. Mollica
La Paz Shopping Center	New retail, office and institutional development	23465 Civic Center Way	PA; BPC	112,058 sf retail and office; 20,000 sf institutional; 543 parking spaces	S. Edmondson
Whole Foods Shopping Center	New retail development	23401 CCW	UPR	25,000 sf grocery; 14,839 sf retail/commercial (up to 4,000 sf restaurant)l; 220 parking spaces	B. Blue
Civic Center Wastewater Treatment Facility	wastewater treatment and recycling facility	unknown	testing and prelimnary design underway, pending CDP submittal	Scheduled to be online by November 2015 to serve first phase of Civic Center (commercial parcels); second phase by 2019 (residential parcels)	B. Blue
Santa Monica College	New satellite campus on County Civic Center parcel	23555 CCW	pending CDP submittal	+/- 25,000 sf building to replace vacant County Sheriff facility; will serve +/- 200 FTE; 2 classrooms, 3 lab/studios, multipurpose room, 2,100 sf lecture hall, 5,700 sf sheriff substation, interpretive center	B. Blue
Housing Element Update	Overlay to allow up to 20 dwelling units per acre on three sites	APN 4467-013-022, 28401 Pacific Coast Highway, 3700 La Paz Lane (APNs 4458-022-023 and 4458-022-024)	UPR	5.12, 3.25 and 2.3 ac sites -> change from allowing 6 units per ac up to 20 units per ac	S. Danner, R. Mollica
Malibu Sycamore Village	New non-residential mixed use project	23575 CCW (APN 4458-022-011); addressed as 23789 Stuart Ranch Rd per LA County Assessor	pending CDP submittal	60,000 sf office/retail on 10 acre parcel; includes outdoor exhibition space, parking for 300 cars	S. Edmondson

~~Acronyms~~
ac = acres
BPC = in building plan check
CCC = California Coastal Commission
CCD = Cross Creek Drive
CCW = Civic Center Way
CDP = coastal development permit
LLA = lot line adjustment
MCR = Malibu Canyon Road
NSFR = new, single-family residence
PA = planning approval / CDP received
PCH = Pacific Coast Highway
sf = square feet
TCR = Trancas Canyon Road
UC = under construction
UPR = still under planning review

SOURCE: City of Malibu Cumulative Projects Listing, Updated May 1, 2012

Los Angeles County

Pepperdine Campus Life Project	Project would develop and re-develop property within an existing approximately 365 acre area on the Pepperdine campus through a two-phase development program that will take 12 years	24255 PCH	PA; pending approval of an amendment at CCC	Six components of proposed development include approximately 394,137 sf of net new development comprised of the following: 1) Student Housing Rehabilitation; 2) Athletics and Events Center and Parking Structure; 3) Upgraded NCAA Soccer Field and Maintenance Facilities; 4) Town Square and Welcome Center over Subterranean Parking; 5) Enhanced Recreation Center Area; and 6) School of Law Parking Structure.	County of Los Angeles, Regional Planning, S. Danner

East Malibu

Project Name	Brief Description	Location	Status	Size	Planner
Pierview	New restaurant	22716 PCH	PA; UC	7,100 sf; 70 parking spaces (joint use parking agreement with 22706 PCH to donate 10 spaces - total of 59 spaces required for this use with 1 extra)	S. Edmondson
Windsail	New restaurant	22706 PCH	PA; UC	5,904 sf; 64 parking spaces (joint use parking agreement with 22716 PCH for 10 additional spaces - total of 74 spaces required for this use)	S. Edmondson
Hajian	New office	24903 PCH	PA; UC	9,685 sf; 44 parking spaces	H. Ly
N/A	New office and retail	22959 PCH	UPR	2,630 sf office; 4,517 sf retail; 31 parking spaces	J. Smith
N/A	New office	22729 PCH	PA; pre-BPC	2,499 sf; 32 parking spaces	H. Ly
Carbon Condominiums	New condominium	22065 PCH	UC	8 units	J. Smith
N/A	LLA and 3 NSFRs	18805, 18807 & 18809 PCH	PA; BPC	9,559 sf, 9,141 sf, and 7,429 sf	S. Edmondson
N/A	4 NSFRs	22301, 22303, 22305 and 22309 PCH	PA; BPC	9,529 sf, 8,649 sf, 8,271 sf, and 9,249 sf	S. Edmondson
N/A	LLA and 2 NSFRs	21997 and 22003 PCH	PA; BPC	9,818 sf and 8,542 sf	A. Fernandez
Serra Retreat	3 lot subdivision	3314 Serra Rd	PA; pending Final Parcel Map approval	Development potential for each lot equals a maximum TDSF of 7,037 sf, 7,033 sf, and 7,740 sf	S. Danner
N/A	2 NSFR	20624 and 20630 PCH	UPR	2,911 sf and 2,911 sf	R. Mollica
N/A	TPM	27537 PCH	PA	Subdivision of 1 lot into 2 lots	H. Ly

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appropriately sized gaps in both directions, a left-turning vehicle would also block a right-turning vehicle from approaching the intersection to complete its turn. The delay for vehicles on Latigo Canyon Road exceeds LOS standards set by Caltrans. Excessive delay can result in vehicles attempting to turn during an insufficient gap, which increases the potential for collisions. Similar circumstances exist at the unsignalized intersections of Sea Vista Drive/PCH and Winding Way/PCH.

Paradise Cove Road is an area of friction and congestion, particularly during the summer and on weekends. This congestion is caused partly by numerous parking maneuvers as patrons avoid paid parking, a condition discussed previously. High crosswalk volume at this location blocks the path of vehicles out of Paradise Cove that make permitted left- and right-turn movements on their green light. This requires additional green time to be given to the side street at the expense of green time for PCH. High pedestrian traffic also limits the number of southbound PCH vehicles that can make a right turn on red into Paradise Cove. Because the southbound right turn does not have a dedicated lane, this reduces the capacity of the intersection to permit through traffic to proceed through the intersection.

Long northbound left-turn queues on PCH are also observed at Paradise Cove Road. Adequate left-turn storage is available based on surveyed volume and calculations in the Access Management Manual. Observed queues in excess of the storage area provided, potentially blocking a northbound through lane, could indicate less efficient operation of the intersection than normally anticipated. Part of this inefficiency can be explained by U-turns that occur in the intersection. These occur when motorists are circling to find on-street parking and increase dramatically when the parking lot is full. No indication that the parking lot is full is provided until vehicles begin to make their turn. At that point, motorists can see the moveable sign that would indicate the parking lot is full.

The intersection could also operate less efficiently because of pedestrian movements on Paradise Cove Road. After crossing PCH in one of the crosswalks at Paradise Cove Road, pedestrians do not have a sidewalk and have a tendency to walk directly toward the pedestrian gate without regard to passing through the vehicular path of travel. This pedestrian behavior has been observed even when the traffic signal indicates to PCH traffic that it could turn onto Paradise Cove Road. Pedestrian-caused slowing can cause traffic to back up into the intersection. In addition to affecting intersection operation, the lack of a well-defined pedestrian path of travel creates vehicle/pedestrian conflict and a potential safety issue. Additional vehicle/pedestrian conflict is present where pedestrians queue at the entry gate, which is near the vehicle entry. Similar to other areas of the roadway, vehicle/pedestrian conflict is present along the shoulder where pedestrians emerge from parked cars and walk in the narrow area between parked cars and the travel lane due to the lack of sidewalks. At this location, however, the shoulder width is narrow and constrained by hillsides. Because cars parked on the shoulder can occupy the entire shoulder, pedestrians have been observed walking in the travel lane.

The short area between Bonsall Drive, Westward Beach Road, and Busch Drive presents many potential safety issues. Bonsall Drive has an unsignalized intersection with PCH that is slightly offset from the unsignalized intersection of Westward Beach Road/PCH. Westward Beach Road splits into separate left- and right-turn lanes with the right-turn lane approaching PCH at a shallow angle. A bus stop is located on the island created by the intersection of Westward Beach Road/PCH. Transit passengers are pedestrians at the beginning and end of their trip, but no safe walking path is provided to or from the island. Bicycles traveling southbound on PCH also have no path of travel through this area. While Westward Beach Road right-turning traffic is attempting to merge to the left into PCH traffic, southbound bicycles must merge through them to the right. The right-turning vehicles have

approximately 220 ft, far less than recommended, to accelerate from a stop to merge with 50 mph traffic.

A small area of roadway is used by vehicles turning left from PCH onto Bonsall Drive, turning left from PCH onto Westward Beach Road, and turning left from Westward Beach Road onto PCH. The vehicles turning left from PCH have space in the median for both directions to queue while completing their turns in two steps. Motorists turning left from Westward Beach Road may be able to pause in the median, but it should be noted that their view of oncoming traffic is blocked when a bus is stopped at the bus stop. Although prohibited, some motorists attempt to turn left from Bonsall Drive, which requires waiting for an appropriate gap in both directions on PCH. As mentioned previously, drivers tend to accept smaller gaps as their delay increases. These left turns from Bonsall Drive merge with PCH traffic in the same area that Westward Beach Road right turns are merging. This complex combination of permitted turns and necessary merges into uncontrolled PCH traffic introduces many potential points of conflict.

Busch Drive is located less than 500 ft west of the Bonsall Drive/PCH and Westward Beach Road/ PCH intersections. As northbound PCH traffic approaches this traffic signal, vehicles have the option of turning right and looping under PCH to get to Zuma Beach. If vehicles are unable to turn right or the undercrossing is impassible, northbound vehicles can travel through the intersection and then make an unprotected left turn. Southbound PCH traffic can turn right into a short slip ramp to Zuma Beach or can turn left at the signal and join the loop from Busch Drive. These paths lead to a toll plaza for Zuma Beach parking. This is the toll plaza for over 2,000 parking spaces at Zuma Beach. On busy days, the queue from the toll plaza can extend under PCH, through the loop, and onto PCH (a queue of approximately 3,000 lane-feet). If this vehicular undercrossing were removed as an option, up to an additional 3,000 ft of queuing would need to be accommodated on PCH. The back-to-back left-turn lanes for northbound PCH to Zuma Beach and southbound PCH to Busch Drive already leads to inadequate storage space and left-turn queues that block through traffic. Congestion results from queuing for Zuma Beach and queuing for left turns, which increases the potential for collisions.

Study Area 3

On weekends and during the summer months when school is not in session, the three schools located along Morning View Drive provide a free parking alternative to paid parking at Zuma Beach. A crosswalk at the Morning View Drive traffic signal leads pedestrians through the fence at Zuma Beach. The high number of pedestrian calls at the intersection could potentially interrupt the flow of traffic on PCH more frequently than it would be interrupted if only vehicular traffic were activating the traffic signal. On weekday mornings, northbound PCH traffic turning right onto Morning View Drive to the three schools experiences high demand. This westbound right turn does not have a dedicated lane. Currently, use of the shoulder as a turn lane is not always possible because of competing demands from buses (the bus stop is on the near side of the intersection at the stop bar), trash collection for residences on PCH, and parents dropping off on PCH rather than closer to the schools. The high volume of traffic turning onto Morning View Drive creates a constant flow of traffic in the right lane on PCH, making it difficult for vehicles on the shoulder to reenter the roadway after dropping off. This high level of conflicting activity increases the potential for collisions.

In the past, unsafe U-turns in the vicinity of Zuma Beach were frequent. In response to that problem, Caltrans installed a raised median and paddles along this portion of the roadway. In the vicinity of the

unsignalized intersection with Guernsey Avenue, these paddles partially obstruct the view to oncoming traffic for vehicles attempting to make left turns to and from Guernsey Avenue.

The Trancas Market Shopping Center is located at the intersection of Trancas Canyon Road-Broad Beach Road/PCH. Recently, landscaping along PCH was reconfigured to remove one of the three right-in/right-out driveways into the shopping center. Public feedback has reported that this has increased the volume of vehicles turning right from PCH onto Trancas Canyon Road. No deceleration area or dedicated turn lane is provided for this high-volume movement. This reduces the capacity of the intersection to accommodate northbound PCH traffic through the intersection. The additional delay and congestion can result in an increased potential for vehicular conflict. This condition could be worse on weekends, when pedestrian and bicycle volumes are higher. Northbound bicycles and pedestrians in the crosswalk are given a green light at the same time as the turning traffic and would reduce the number of vehicles that can turn during each green light. A dedicated turn lane would not solve this problem for the turning vehicles, but could help to keep turning vehicles from blocking through traffic.

A wide graded area exists north of Lunita Drive in an area overlooking Broad Beach. The median in this area is not striped to permit two-way left turns. Nonetheless, motorists attracted to the view provided in this area may be tempted to turn from PCH into the graded area. Because the area is not accessed at a single point, these turns can occur in an unexpected location at an unexpected time, resulting in potential vehicular conflict.

Three State beaches and one County beach are located in the western portion of the City. These beaches have small parking lots that take access off of PCH. No warning signs are present to alert motorists that these parking lots are approaching. Motorists who see the parking lot late may slow more suddenly than the following vehicle is anticipating. This would be more acute with right-turning vehicles, as left-turning vehicles utilize a two-way left-turn median. Parking is restricted along the south side of the roadway, which improves visibility of beach and residential driveways. However, similar to other areas of the City where parking lots charge for parking, many patrons choose instead to park for free on the north side of PCH, which introduces vehicle/pedestrian conflict.

Description of Safety Assessment Matrix

The previous discussion highlighted key areas and behaviors/conditions to be considered potential safety concerns recommended for further analysis and consideration of alternative treatments. These are a subset of the approximately 80 issues identified by the LSA Team from observation and public input. The list of all 80 potential safety issues is included in the matrix in Table B. The matrix lists the potential safety issue by location, starting at the eastern end of the corridor and proceeding to the west. For each potential safety issue, the circumstances that create or contribute to the issue are stated. While preparing the matrix, patterns of common themes began to emerge. If a circumstance fell into common themes (i.e., roadway geometry, warning signs, pedestrian access, bicycle accommodation, parking issues, or driveway and access issues), the common theme is identified. If the issue or circumstance is particularly acute during the summer months, this is also identified. Using this system, it becomes clear that circumstances related to roadway geometry are the most common along the corridor.

Table B: Safety Assessment Matrix

Location		Issue	Circumstance	Common Themes							Strategic Highway Safety Plan Category			Traffic Volume / Level of Service	Additional Detail
				Roadway Geometry	Warning Signs	Pedestrian	Bicycle	Parking	Driveway/Access	Seasonal Increase	Education	Engineering	Enforcement		
Global	1	Conflict between travel modes	Need to rationalize use of the shoulder and augment where possible	■		■	■	■			■	■			MetroQuest comment requested more public transportation
	2	Signing and striping	Suggest traffic control inventory and placement of signs in the proper location		■							■			California Manual of Uniform Traffic Control Devices 2012 (CA MUTCD) describes description and placement of signs
	3	Inconsistent development of land use	Standard plans and zoning could provide a general guide for access and transportation design						■						
	4	Cost of parking is redistributing impacts	Multiple agencies control parking pricing					■			■		■		
	5	Valet services are active on PCH	Procedures are not consistent across operators					■			■		■		
			Operations may not consider motorists and safety of operators					■			■		■		
	6	Potential vehicle/pedestrian conflict	Many bus stops are not ADA accessible			■						■			
			Many bus stops on northbound PCH have no pedestrian connection to destinations on the south side of the road			■						■			2 fatal pedestrian collisions occurred since 2010 as a result of pedestrians crossing PCH
			Indication of pedestrian crossing is not uniform in the corridor			■					■	■			Pedestrian crosswalk should be consistent with CAMUTCD, Section.3B.18, Figure 3B-17. In-roadway warning lights should be consistent with CAMUTCD, Section.4N.02, Figure 4N-101(CA). Further relevant information may be provided by AASHTO Guide for Planning, Design, and Operation of Pedestrian Facilities. 8 pedestrian injury collisions and 3 fatal pedestrian collisions since 2010
	7	Bicycle safety hazard	Degraded pavement quality, inadequate width, and obstructions, pose riding hazard and can lead to bicyclists riding in travel lanes				■					■			16 bicycle injury collisions and 1 fatal bicycle collision since 2010
	8	Driver behavior impacts safety	Unsafe speed, excessive speed, distraction, and yielding right-of-way								■		■		Most common type of collision in corridor is rear-end collision
Study Area 1															
Entire segment	9	Vehicle/bicycle conflict	No bicycle lane				■					■		46,000 ADT weekday; 47,000 ADT weekend; weekend bicycle volume up to 270 per hour	No bike lane markings present as per CAMUTCD Section 9C.04, Figure 9C-1 to 9C-8, 9C-101 (CA) and 9C-102 (CA).
Topanga Canyon Boulevard	10	Potential for collisions	Lane widths narrower than remainder of the roadway	■								■		LOS D in a.m. and p.m. peak hours, LOS B in Saturday midday peak hour	Lane width currently is 11 ft. According to AASHTO, Section 7.3.3, a 12 ft lane width is recommended for high speed, free flowing arterials. Please refer to this section for more details. Infrequent collision location. Both 2011/12 collisions were sideswipe.
			Substandard channelization	■								■			Deceleration length is approximately 185 feet. According to AASHTO, Section 9.7.2, Figure 9-48, and Table 9-22, a deceleration length, based on a 45 mph speed limit, should be between 275 feet and 425 feet.
	11	Potential vehicle conflict	Parking maneuvers					■				■			On-street parking is available which is consistent with the CAMUTCD Section 3B.19, Figure 3B-21 (CA) and AASHTO Green Book, Section 4.20.
	12	Potential vehicle/pedestrian conflict	Jaywalking			■							■		
Tuna Canyon Road	13	Vehicle/pedestrian conflict	No marked crosswalk			■						■			No marked crosswalk present as described in CAMUTCD, Section 3B.18, Figure 3B-19. 1 bike sideswipe and 2 car sideswipe in intersection since 2010.
	14	Potential vehicle conflict at permitted left-turn	Horizontal curves	■								■			Corner sight distance for vehicles from Tuna Canyon is 320 feet which is less than the recommended stopping sight distance of 360 feet per Highway Design Manual Table 201.1 at a speed limit of 45 mph. Per Highway Design Manual Section 405.1 and Table 405.1A, 492 feet corner sight distance is recommended at this location. Horizontal sight distance is described in Highway Design Manual Figure 201.6. No advanced warning signs present per CAMUTCD, Section 2C.07, Figures 2C-1, 2C-1(CA), 2C-2, and Table 2C-4.
East of Big Rock Drive	15	Vehicle/bicycle conflict	Jersey barrier comes up to travel lane forcing bicycles into travel lane unexpectedly	■			■					■		25 bicycles in a.m. peak hour, 6 bicycles in p.m. peak hour, and 267 bicycles per weekend midday peak hour	No bike lane markings present per CAMUTCD Section 9C.04, Figures 9C-1 to 9C-8, 9C-101 (CA) and 9C-102 (CA).
Big Rock Drive	16	High reported accident rate	Possible inadequate advanced warning of signal		■						■	■		Acceptable LOS all peak hours	Advanced warning signs should be placed at least 775 ft from the intersection based on 45 mph speed limit per Section 2C-36, Table 2C-4 in CAMUTCD. On-site advanced warning sign for warning of signal (W3-3) are present in both direction at 750 ft westbound and 715 ft eastbound. 3 rear end collisions and 1 broadside right turning vehicle in intersections since 2010
			MetroQuest comment attributes to no legal u-turn lane or signal phase									■			
	17	Accidents with parked vehicles	MetroQuest comment attributes to excessive speed				■				■		■		
Moonshadows	18	Potential vehicle/pedestrian conflict	Jaywalking			■					■		■		No marked or unmarked pedestrian crossings are provided for 1.6 miles between Las Flores Canyon Road and Big Rock Drive. Bus stops are located on both the north and south sides of the street at Moonshadows.
Big Rock to Las Flores	19	Potential vehicle conflict	Head in parking requires backing into traffic					■				■			The throat length of the driveways should be at least 50 ft to avoid conflict with the through traffic on the PCH based on Access Management Manual, Figures 10.15, 10.16, and 10.17 and Table 10-8.
			Conflict for use of shoulder between municipal services, private services, parked cars, bicycles, and pedestrians	■		■	■	■	■			■			2 pedestrian collisions 2010-2012
Las Flores Canyon Road	20	High reported accident rate	MetroQuest comment attributes to high speed limit				■				■			Acceptable LOS all peak hours	More collisions in the vicinity of than in the intersection. Half of collisions in intersection were vehicles making left turn.
			MetroQuest comment attributes to no garages on houses or parking for residents					■							
	21	Potential vehicle conflict	Parking maneuvers east of Las Flores for Dukes				■	■							On-street parking is available which is consistent with the CAMUTCD Section 3B.19, Figure 3B-21 (CA) and AASHTO Green Book, Section 4.20.

Location		Issue	Circumstance	Common Themes: Roadway Geometry	Warning Signs	Pedestrian	Bicycle	Parking	Driveway/Access	Seasonal Increase	Strategic Highway Safety Plan Category: Education	Engineering	Enforcement	Traffic Volume / Level of Service	Additional Detail
Las Flores to Rambla Vista	22	Potential vehicle conflict	Uncontrolled driveways and access				■		■			■			The throat length of the driveways should be at least 50 ft to avoid conflict with the through traffic on the PCH based on Access Management Manual, Figures 10.15, 10.16, and 10.17 and Table.10-8. 1 collision involving vehicle entering traffic 2010-2012; parked vehicles accounted for approximately 40% of collisions 2011/12
			Parking maneuvers					■			■				On-street parking is available which is consistent with the CAMUTCD Section 3B.19, Figure 3B-21 (CA). The parking width is less than 12 ft which is the minimum width recommended per AASHTO Green Book Section 4.20 if the space is going to be shared with bikes and pedestrians and other uses. Sideswipe collision involving parking vehicle 2010-2012
			Variable dimensions and geometry	■								■			Based on Access Management Manual Figure 10-13, the short throat length between PCH and the shopping center parking at Rambla Vista could contribute to reduced safety on-site and on PCH.
			Horizontal curves	■								■			
			Median channelization	■								■			Median marking for vehicles exiting Rambla Vista and making left-turn onto PCH should reflect CAMUTCD, Figure 3B-7 (CA) Minor Intersection. CAMUTCD, Figure 3B-13.D illustrates possible dotted line marking showing the path for vehicles entering PCH from Rambla Vista. CAMUTCD, Figure 3B-27 illustrates possible dotted line markings for vehicles making a left turn onto Rambla Vista from PCH. The eastbound left turn pocket length is adequate based on Access Management Manual, Page 173 and Table 10-4.
			Traffic control									■			
	23	Potential vehicle/pedestrian conflict	No pedestrian connectivity to bus stop			■						■			According to AASHTO Green Book, Section 4.17.1, and Highway Design Manual Point 105 (8), a sidewalk or path area should be provided wherever land development conditions affect pedestrian movement along highway and pedestrian facilities are recommended to connect a bus stop to the local roadway. No reported pedestrian collisions 2010-2012
			School children dropped off at shopping center while vehicles are performing tight turns in congestion			■					■		■		
La Costa Beach Club crosswalk	24	Vehicle/pedestrian conflict	Traffic volume			■									One reported pedestrian collision; 2 vehicles rear ended while stopped; 2 parked cars rear ended 2010-2012
			Traffic speed								■		■		
			Lack of usual pedestrian landmarks			■						■			According to AASHTO Green Book, Section 4.17.1, and Highway Design Manual Point 105(8), a sidewalk or path area should be provided wherever land development conditions affect pedestrian movement along highway.
			Sight distance to pedestrians			■						■			On-street parking is prohibited by red curbs leading to the crosswalk in both directions
			No advanced warning of crosswalk to motorists		■	■					■				Advanced warning sign W11-2 is described on Figure 2C-11 in CAMUTCD.
Carbon Canyon Road	25	High reported accident rate	Under investigation											Acceptable LOS all peak hours	collisions in the vicinity are more common than in the intersection. 1 broadside u-turning vehicle and 3 rear end slowing/stopping vehicle in intersection 2010-2012. 1 bicycle collision and 28 vehicle collision in vicinity 2010-2012. 57% rear end, 18% turning movement, 21% parked cars
22333 Traffic Signal	26	High reported accident rate	Under investigation											Acceptable LOS all peak hours	collisions around this signal in 2010-2012 (1 entering traffic, 2 parking, 2 making left, 7 proceeding straight-rear end)
22506 Flashing Yellow Pedestrian Crossing	27	Potential vehicle/pedestrian conflict	Desensitization to flashing yellow because it is constant		■						■		■		No reported pedestrian collisions 2010-2012. Of the 14 collisions near this crosswalk 2010-2012, 36% were rear end, 21% parked cars, 21% turning, 14% entering traffic, and 7% sideswipe
22730 Traffic Signal	28	High reported accident rate	Under investigation		■	■								Acceptable LOS all peak hours	1 pedestrian collision, 1 entering traffic, and 6 rear end collisions in 2010-2012
Malibu Pier	29	Potential for collisions	Parking maneuvers				■	■			■			Acceptable LOS all peak hours	Few off-street parking spaces are available. On-street parking is available which is consistent with the CAMUTCD Section 3B.19, Figure 3B-21 (CA) and AASHTO Green Book, Section 4.20. 14 collisions in vicinity of this signal in 2010-2012: 50% rear end, 21% making left turn, 14% entering traffic, 14% sideswipe
			Congestion							■	■				
	30	Vehicle/pedestrian conflict	Jaywalking			■				■	■		■	18 pedestrians in a.m. peak hour, 163 pedestrians in p.m. peak hour, and 630 pedestrians per weekday midday peak hour crossing the intersection. Pedestrian volume of 328 on north side of intersection during weekend midday peak hour.	1 pedestrian collision in vicinity in 2010-2012
			No pedestrian channelization	■		■						■			According to AASHTO Green Book, Section 4.17.1, and Highway Design Manual Point 105(8), a sidewalk or path area should be provided wherever land development conditions affect pedestrian movement along highway.
			No direction to crosswalks		■	■					■				According to AASHTO Green Book, Section 4.17.1, and Highway Design Manual Point 105(8), a sidewalk or path area should be provided wherever land development conditions affect pedestrian movement along highway.
			Absence of signage for pedestrians and motorists		■						■				
	31	Vehicle/bicycle conflict	No bicycle facilities				■					■		32 bicycles in a.m. peak hour, 5 bicycles in p.m. peak hour, and 159 bicycles per weekend midday peak hour	No bike lane markings are present per CAMUTCD Section 9C.04, Figures 9C-1 to 9C-8, 9C-101 (CA) and 9C-102 (CA). 1 bicycle collision in vicinity 2010-2012
			Where wide enough for bicycles, vehicles double park				■						■		
Serra Road	32	Potential for collisions	Sight distance	■								■			Sight distance for vehicles making left-turn from PCH is 300 ft and 200 ft for vehicles making a right-turn, which is less than the recommended 360 feet per Highway Design Manual Table 201.1 at a speed limit of 45 mph. Per Highway Design Manual Section 405.1 and Table 405.1A, 492 feet corner sight distance is recommended at this location. Horizontal sight distance is described in Highway Design Manual Figure 201.6. No advanced warning signs present as described in CAMUTCD, Section 2C.07, Figures 2C-1, 2C-1(CA), and 2C-2 and Table 2C-4. 2 turning movement collisions in intersection in 2010-2012
			Congestion							■	■				38% of collisions in or near Serra Road were rear-end collisions in 2010-2012

Location		Issue	Circumstance	Common Themes: Roadway Geometry	Warning Signs	Pedestrian	Bicycle	Parking	Driveway/Access	Seasonal Increase	Strategic Highway Safety Plan Category: Education	Engineering	Enforcement	Traffic Volume / Level of Service	Additional Detail
Study Area 2															
Entire segment	33	Potential vehicle conflict	Conflict for use of shoulder between municipal services, private services, parked cars, bicycles, and pedestrians			■	■	■	■			■			No bike lane markings present as per CAMUTCD Section 9C.04, Figures 9C-1 to 9C-8, 9C-101 (CA) and 9C-102 (CA).
			MetroQuest comment states illegal u-turns occur throughout segment										■		
Entire segment	34	Vehicle/bicycle conflict	No bicycle lane				■					■		35,000 ADT weekday; 42,000 ADT weekend; weekend bicycle volume up to 170 per hour	No bike lane markings are present per CAMUTCD Section 9C.04, Figures 9C-1 to 9C-8, 9C-101 (CA) and 9C-102 (CA).
Cross Creek/PCH	35	Potential for collisions	Congestion at intersection due to high crosswalk volume							■		■		LOS D in a.m., p.m., and Saturday midday peak hours	1 rear end collision in intersection, 8 rear end collisions near intersection in 2010-2012 Congestion also contributes to limited sight distance
			Signal operation									■			Vehicles stacked along Cross Creek (waiting at pedestrian crossing) back into the intersection, which increases delays along PCH.
			Mixing of travel modes			■	■				■				1 pedestrian collision in intersection 2010-2012
			Tight radii to make WBR	■								■			Per AASHTO, Section 9.6, Table 9-15, Page 9-58, the existing 30 foot turn radii of the curb (based on aerial measurement) is sufficient for passenger vehicles. Intersection plans may be required for detailed and accurate measurements of radii and taper.
			EBL queue exceeds turn pocket	■								■			
Malibu Road/PCH	36	Potential for collisions	NBR entry at a shallow angle	■								■		Acceptable LOS all peak hours	Intersection angle should not be less than 75 degrees according to Highway Design Manual, Topic 403.3 and Figure 403.3 The internal intersection angle is less than 75 degree at this location. At a speed limit of 45 mph, CAMUTCD, Figure 3B-14 recommends an acceleration length of 1,350 feet. Currently, approximately 280 feet is provided. No lane merging signs per CAMUTCD, Figure 2C-8 are present. 1 injury collision here in 2012
Webb Way/PCH	37	Potential for collisions	Geometry and congestion	■						■		■		LOS D on weekdays, LOS F in Saturday midday peak hour	Congestion along Webb Way (commercial area) contributes to additional delay for vehicles along PCH (especially turning vehicles). The left turn pockets in both directions are adequate per the Access Management Manual, page 173 calculation. However, site observation shows spillover of the left turning vehicles into the through lanes at midday on Saturday. The acceleration length provided for southbound right-turns is approximately 350 feet. According to CAMUTCD, Figure 3B-14, the recommended length based on a 25 mph right-turn speed is 1,000 feet. No lane merging signs are present per CAMUTCD, Figure 2C-8. Collisions in the vicinity are more common than in the intersection. Two broadside left-turning vehicle, 1 sideswipe entering traffic, and 2 rear end collisions in intersection 2010-2012. Two bicycle and 1 pedestrian collision and 19 vehicle collisions in vicinity 2010-2012, 89% of which were rear end.
			MetroQuest comment attributes to lack of protected left-turn phase									■			Of the few collisions in the intersection, about half involved left-turns
Bayshore	38	Potential vehicle/pedestrian conflict	Jaywalking to Bayshore			■				■	■		■		No marked or unmarked pedestrian crossings are provided.
Malibu Seafood	39	Potential vehicle/pedestrian conflict	Parking area across from beach creates attraction for jaywalking			■					■		■		Paths in ice plant support this assertion. No marked or unmarked pedestrian crossings are provided. 1 pedestrian collision 2010-2012 at this location
Dan Blocker Beach	40	Potential vehicle/pedestrian conflict	Jaywalking to beach			■				■	■		■		No marked or unmarked pedestrian crossings are provided. No reported pedestrian collisions 2010-2012
Latigo Canyon Road/PCH	41	Potential for collisions	Greater slowing than expected for WBR	■							■			Unacceptable LOS for southbound approach	Angle of the turn and lack of a turn lane contribute to slower speeds. 2 rear end collisions near intersection and 2 collisions with left-turning vehicles in intersection in 2010-2012
			MetroQuest comment attributes to high bicycle volume contributing to congestion				■								Bicycles traveling through an intersection can limit the ability of vehicles to make right turns, which subsequently can affect vehicles traveling through the intersection.
			MetroQuest comment attributes to delay on Latigo due to single approach lane	■								■			
Sea Vista Drive/PCH	42	Potential vehicle conflict at permitted NBL	Limited sight distance due to vertical curve	■								■			Based on site observations and measurements, sight distance was found to meet the recommended 430 feet stopping site distance per Highway Design Manual Table 201.1 at a speed limit of 50 mph and 550 feet corner sight distance recommended by Highway Design Manual Section 405.1 and Table 405.1A.
			Broken No U-turn sign has not been replaced		■						■				Based on observations, a broken No Left-Turn sign has not been replaced.
Winding Way/PCH	43	Potential vehicle conflict at SBL	No left-turn pocket	■			■					■			
			Limited sight distance due to vertical curve	■								■			
			Limited sight distance due to parked cars					■				■			
Bridge north of Via Escondido	44	Pedestrian safety hazard	Bridge railing is lower than pedestrian center of gravity	■		■						■			AASHTO Green Book, Section 4.10.3, states that appropriate guardrail height is described in 'AASHTO LRFD Bridge Design Specification'.
Paradise Cove Road/PCH	45	Potential for collisions	Long WBL and EBR queues				■		■			■		Acceptable LOS all peak hours - by volume	In part caused by parking lot (beach entrance) operations. 1/10 vehicle collisions 2010-2012 involved left turning vehicle (broadside)
			Congestion due to parking maneuvers					■		■					1/10 vehicle collisions 2010-2012 involved a parking vehicle; 3/10 were rear end collisions
			Congestion at intersection due to high crosswalk volume			■				■		■	■	148 pedestrians crossing PCH during weekend midday peak hour	
			Vehicles performing u-turns in the intersection						■		■				Site operation does not indicate that parking lot is full until a vehicles begin the turn.
			Inadequate left-turn storage and channelization for right turns	■								■			Adequate left turn storage is available based on Access Management Manual, Page 173, Table 10-4. However, observation of intersection operations reveal that left turning vehicles spillover into the through lane during midday peak hour on weekend.
			Potential source for DUI										■		1 DUI collision at this location in 2012, driver origin unknown
	46	Vehicle/pedestrian conflict	Pedestrians in the curb lane			■						■			According to AASHTO Green Book, Section 4.17.1, and Highway Design Manual Point 105(8), a sidewalk or path area should be provided wherever land development conditions affect pedestrian movement along highway. 2 pedestrian collisions in 2010-2012 at this location
			Pedestrians crossing through vehicle path after using crosswalk			■					■		■		1 of those pedestrian collisions occurred in the intersection
			Pedestrians queued at entry gate near vehicle entrance			■									
Zumirez Drive/PCH	47	Potential for collisions	Traffic signal is not visible soon enough for northbound traffic on PCH	■								■			One reported collision in 2010-2012 (rear end proceeding straight)
Cavalleri Road/PCH	48	Potential vehicle conflict at permitted left-turn	Limited sight distance due to vertical curve and landscaping	■								■			Based on site observations and measurements, sight distance from Portshead Road does not appear to meet the recommended 430 feet stopping site distance per Highway Design Manual Table 201.1 at a speed limit of 50 mph and 550 feet corner sight distance recommended by Highway Design Manual Section 405.1 and Table 405.1A. No reported collisions in 2010-2012
PCH east of Heathercliff Road	49	Potential for sideswipe collision	Vehicles pulling back into roadway after visiting food trucks				■		■		■		■		

Location		Issue	Circumstance	Common Themes: Roadway Geometry	Warning Signs	Pedestrian	Bicycle	Parking	Driveway/Access	Seasonal Increase	Strategic Highway Safety Plan Category: Education	Engineering	Enforcement	Traffic Volume / Level of Service	Additional Detail
Bonsall Dr/PCH	50	Conflict between travel modes	No connectivity for pedestrians			■						■		Acceptable LOS a.m. and p.m. LOS F Saturday for southbound	According to AASHTO Green Book, Section 4.17.1, and Highway Design Manual Point 105 (8), a sidewalk or path area should be provided wherever land development conditions affect pedestrian movement along highway and pedestrian facilities are recommended to connect a bus stop to the local roadway.
	51	Vehicle/pedestrian conflict	Bus stop in the gore area with no safe walking path			■						■		18 pedestrians during weekend midday peak hour crossing Bonsall on south side of roadway	According to AASHTO Green Book, Section 4.17.1, and Highway Design Manual Point 105 (8), a sidewalk or path area should be provided wherever land development conditions affect pedestrian movement along highway and pedestrian facilities are recommended to connect a bus stop to the local roadway.
	52	Vehicle/bicycle conflict	No designated bicycle path through intersection with shallow angle of entry				■					■		19 bicycles in a.m. peak hour, 3 in p.m. peak hour, and 127 bicycles per weekend midday peak hour	No bike lane markings are present per CAMUTCD Section 9C.04, Figures 9C-1 to 9C-8, 9C-101 (CA) and 9C-102 (CA). One bicycle collision in vicinity 2010-2012
	53	Potential vehicle conflict at permitted SBL	Limited sight distance	■								■			Based on site observations and measurements, sight distance from Bonsall Drive does not appear to meet the recommended 430 feet stopping site distance per Highway Design Manual Table 201.1 at a speed limit of 50 mph and 550 feet corner sight distance recommended by Highway Design Manual Section 405.1 and Table 405.1A.
			No left-turn refuge	■								■			Left turn refuge is described in the Access Management Manual, Table 11-3 and Highway Design Manual, Section 403.7.
			Conflict with shallow angle right-turns from Westward Beach Road	■								■			Intersection angle should not be less than 75 degrees according to Highway Design Manual, Topic 403.3 and Figure 403.3 The internal intersection angle is less than 75 degree at this location. At a speed limit of 50 mph, CAMUTCD, Figure 3B-14 recommends an acceleration length over 1,350 feet. Currently, approximately 220 feet is provided.
			Conflict with slowing traffic for WBL onto Westward Beach Road	■								■			WBL, NBL, and EBL are conflicting uncontrolled movements competing for the same piece of pavement. According to the Highway Design Manual, Section 403.10, 403.11. A traffic signal might avoid these points of conflicts.
	54	Potential vehicle conflict at SBR	Conflict with permitted left-turns from Westward Beach Road	■								■			WBL, NBL, and EBL are conflicting uncontrolled movements competing for the same piece of pavement. According to the Highway Design Manual, Section 403.10, 403.11. A traffic signal might avoid these points of conflicts.
	55	Potential vehicle conflict at EBL	Competition for limited space among WBL, EBL, and NBL	■			■					■			WBL, NBL, and EBL are conflicting uncontrolled movements competing for the same piece of pavement. According to the Highway Design Manual, Section 403.10, 403.11. A traffic signal might avoid these points of conflicts.
Westward Beach Road/PCH	56	Potential vehicle conflict	Intersection geometry does not support turn movements	■								■			Intersection angle should not be less than 75 degrees according to Highway Design Manual, Topic 403.3 and Figure 403.3. The internal intersection angle is less than 75 degree at this location. One broadside collision in 2010-2012.
	57	Potential vehicle conflict at WBL	Competition for limited space among WBL, EBL, and NBL	■			■					■			WBL, NBL, and EBL are conflicting uncontrolled movements competing for the same piece of pavement. According to the Highway Design Manual, Section 403.10, 403.11. A traffic signal might avoid these points of conflicts. Two broadside and one sideswipe collision of left-turning vehicles in intersection in 2010-2012.
			View to Westward Beach Road is blocked if a bus is at the bus stop		■							■			
	58	Potential vehicle conflict at NBL	Competition for limited space among WBL, EBL, and NBL	■			■					■			WBL, NBL, and EBL are conflicting uncontrolled movements competing for the same piece of pavement. According to the Highway Design Manual, Section 403.10, 403.11. A traffic signal might avoid these points of conflicts. Two broadside and one sideswipe collision of left-turning vehicles in intersection in 2010-2012.
Busch Dr/PCH	59	Potential for collisions	Queue formation for Zuma Beach extends onto PCH					■		■		■		LOS B in a.m., p.m., and Saturday peak hour	Queue formation would be a result of gate operation at Zuma Beach. Two rear end collisions in intersection in 2010-2012.
			EBL queue exceeds turn pocket	■								■			Existing left turn storage is adequate based on Access Management Manual, Page 173, Table 10-4. This is a back-to-back left-turn lane with a westbound left turn into Zuma Beach entrance that is inadequate based on Access Management Manual, Page 173, Table 10-4.
Study Area 3															
Entire segment	60	Vehicle/bicycle conflict	No bicycle lane				■					■		21,000 ADT weekday; 25,000 ADT weekend; weekend bicycle volume up to 210 per hour	No bike lane markings are present per CAMUTCD Section 9C.04, Figures 9C-1 to 9C-8, 9C-101 (CA) and 9C-102 (CA).
Entire segment	61	Potential vehicle conflict	Lack of warning signs before unsignalized intersections (e.g., W2-2)		■							■			Warning signs as described in CAMUTCD Section 2C.11, Table 2C-2, and Figure 2C-9 are not present.
Zuma Beach	62	Vehicle/pedestrian conflict	Jaywalking/avoidance of paid parking			■				■	■		■		No reported pedestrian collisions 2010-2012.
Morning View Dr/PCH	63	Potential for collisions	Congestion at intersection due to high crosswalk volume			■				■		■		Acceptable LOS all peak hours - by volume; 9 pedestrians in a.m. peak hour, 19 pedestrians in p.m. peak hour, and 136 pedestrians per weekend midday peak hour crossing PCH	7/13 collisions in 2010-2012 were rear-end.
PCH WBR at Morning View Dr	64	Potential for collisions	WBR queue during the school year competes with trash service, parking, and drop offs	■				■			■	■			Two collisions with parked cars and two collisions with parking cars in 2010-2012.
Guernsey Ave/PCH	65	Potential vehicle conflict at permitted left-turn	Paddle height limits sight distance for EBL and SBL	■								■		Acceptable LOS a.m. and p.m. peak hours LOS E on Saturday for westbound	Delineators spacing needs to be verified on-site to confirm consistency with CAMUTCD, Figure 3F-1 recommended spacing of 2 to 6 feet. Delineators dimensions need to be verified on site to confirm consistency with CAMUTCD, Figure 3F-101 (CA).
Trancas Creek bridge south of Trancas Cyn Rd	66	Pedestrian safety hazard	Bridge railing is lower than pedestrian center of gravity	■		■						■			AASHTO Green Book, Section 4.10.3, states that appropriate guardrail height is described in 'AASHTO LRFD Bridge Design Specification'.
Broad Beach-Trancas Cyn Rd/PCH intersection	67	Limited sight distance at unsigalized intersection	Vertical curves	■								■		LOS B in a.m., p.m., and Saturday peak hour	Stopping sight distance appears to be adequate per Highway Design Manual, Figure 201.4.
	68	Potential for collisions	No deceleration lane into shopping center	■								■			According to AASHTO, Section 9.7.2, Figure 9-48, and Table 9-22, a deceleration length, based on a 50 mph speed limit, should be 425 feet. No deceleration lane is present currently. None of the collisions in 2010-2012 appear to involve right-turning vehicles.
			MetroQuest comment attributes to high bicycle volume contributing to congestion			■									Bicycles traveling through an intersection can limit the ability of vehicles to make right turns, which subsequently can affect vehicles traveling through the intersection.
			Driver behavior						■			■	■		Eastbound PCH drivers enter gas station over double yellow line and in conflict with the nearby signal. These drivers could safely enter the gas station after turning left at the signal.

Location		Issue	Circumstance	Common Themes							Strategic Highway Safety Plan Category			Traffic Volume / Level of Service	Additional Detail
				Roadway Geometry	Warning Signs	Pedestrian	Bicycle	Parking	Driveway/Access	Seasonal Increase	Education	Engineering	Enforcement		
Trancas Cyn to western City Limit	69	Vehicle/bicycle conflict	Competition for use of the shoulder											22 bicycles in a.m. peak hour, 3 bicycles in p.m. peak hour, and 206 bicycles per weekend midday peak hour measured at Morning View Drive	No bike lane markings present as per CAMUTCD Section 9C.04, Figures 9C-1 to 9C-8, 9C-101 (CA) and 9C-102 (CA). One reported bicycle collision in 2010-2012.
	70	Potential vehicle conflict	Individual residential property driveways												Individual residential driveways appear to have enough room to turn around on-site. The throat length of the driveways should be at least 50 ft to avoid conflict with the through traffic on the PCH based on Access Management Manual, Figures 10.15, 10.16, and 10.17 and Table 10-8.
Broad Beach overlook (north of Lunita Rd)	71	Potential vehicle conflict	Turns into this overlook do not take place at a single location												In this are the median is *not* striped as a two-way left-turn lane.
Broad Beach (west)/PCH intersection	72	Potential vehicle conflict at permitted left-turn	Limited visibility of oncoming traffic due to horizontal curve											LOS B in a.m., p.m., and Saturday peak hours	No advanced warning signs present per CAMUTCD, Section 2C.07, Figures 2C-1, 2C-1(CA), 2C-2, and Table 2C-4. No reported collisions with left-turning vehicles in 2010-2012.
			Utilities and brush encroach on southbound sight distance												Only reported collisions in 2010-2012 involved hitting objects.
El Matador State Beach	73	Vehicle/pedestrian conflict	Jaywalking/avoidance of paid parking												No marked or unmarked pedestrian crossings are provided. No reported pedestrian collisions in 2010-2012.
	74	Potential for collisions	Lack of advanced signage for beach parking entrance contributing to fast/slow vehicle conflict												No warning signs of slowing vehicles currently present in either direction (e.g., W2-2 and W11-2). Regulatory signs directing passing vehicles to use left lanes and slowing ones to use right lane are described in CAMUTCD sections 2B.29 and 2B.30 and Figure 2B-10 (e.g., R4-2 and R4-3). No reported collisions in 2010-2012.
La Piedra State Beach	75	Vehicle/pedestrian conflict	Jaywalking/avoidance of paid parking												No marked or unmarked pedestrian crossings are provided. No reported pedestrian collisions in 2010-2012.
	76	Potential for collisions	Lack of advanced signage contributing to fast/slow vehicle conflict												No warning signs of slowing vehicles currently present in either direction (e.g., W2-2 and W11-2). Regulatory signs directing passing vehicles to use left lanes and slowing ones to use right lane are described in CAMUTCD sections 2B.29 and 2B.30 and Figure 2B-10 (e.g., R4-2 and R4-3). One rear-end collision in 2010-2012.
El Pescador State Beach	77	Vehicle/pedestrian conflict	Jaywalking/avoidance of paid parking												No marked or unmarked pedestrian crossings are provided. One pedestrian fatality crossing roadway in 2010-2013.
	78	Potential for collisions	Lack of advanced signage contributing to fast/slow vehicle conflict												No warning signs of slowing vehicles currently present in either direction (e.g., W2-2 and W11-2). Regulatory signs directing passing vehicles to use left lanes and slowing ones to use right lane are described in CAMUTCD sections 2B.29 and 2B.30 and Figure 2B-10 (e.g., R4-2 and R4-3). No reported collisions in 2010-2012.
Nicholas Canyon County Beach	79	Vehicle/pedestrian conflict	Jaywalking/avoidance of paid parking												No marked or unmarked pedestrian crossings are provided. No reported pedestrian collisions in 2010-2012.
	80	Potential for collisions	Lack of advanced signage contributing to fast/slow vehicle conflict												No warning signs of slowing vehicles currently present in either direction (e.g., W2-2 and W11-2). Regulatory signs directing passing vehicles to use left lanes and slowing ones to use right lane are described in CAMUTCD sections 2B.29 and 2B.30 and Figure 2B-10 (e.g., R4-2 and R4-3). Only reported collision in 2010-2012 was hit object.

Where these issues or circumstances align with the four categories used in the State's SHSP (i.e., Enforcement, Engineering, Education, and Emergency Services), these categories are identified. As mentioned previously, the LSA Team believes that categorizing the potential safety issues based on the SHSP categories presents the most efficient path to acquiring funding. Where applicable, the matrix also includes additional information regarding traffic volume, LOS, engineering standards, or recent collisions.

As mentioned earlier, public outreach was a considerable component of the project. Input from the public was gathered in the form of comments. These comments were reviewed and used in developing the safety assessment matrix. An effort was made to utilize all public concerns regarding potential safety issues. However, a portion of the comments received were not safety issues, but possible solutions (ways of addressing safety issues). These solutions were not included in the safety assessment, but will be considered in the next task, which includes development of alternatives to address the safety issues. A list detailing those proposed solutions are provided in Appendix A. The underlying safety issues associated with the solutions were taken into consideration when developing the safety assessment matrix.

The preceding matrix focused the breadth of evaluation to provide one source detailing the issues identified and the circumstances around those issues. Additional considerations such as the category in the SHSP and seasonality that could impact decisions in subsequent project phases were also included. The purpose of the matrix is to help facilitate discussion by further distilling potential safety issues into projects to be carried forward into future project phases.

Not all of the potential issues listed in Table B are significant safety issues. Some of the issues raised may be remedied by capital improvement projects or another action outside of a formal PSR process. Other issues raised may be significant safety issues but may not have any available funding sources or actionable solutions. This matrix and the dialog started in this Corridorwide Safety Assessment will help to crystalize what are safety concerns and which safety concerns are most effectively addressed through the PSR process.

SPECIFIC LOCATIONS

In the matrix presented in Table B, safety issues for each location were identified along with the circumstances contributing to those issues. The circumstance was reviewed and compared to the applicable engineering standards to identify any inadequacies in design. The matrix and dialog in this Corridorwide Safety Assessment will be used to develop the next phase of the project, which is the Alternatives Analysis. The Alternatives Analysis will build on the safety issues identified to begin forming potential solutions to corridorwide themes or location-specific issues.

This portion of the safety assessment provides an example of a tool to be used more extensively during subsequent phases of the project. LSA will prepare a focused look at a few specific locations as a continued refinement of the discussion of safety issues. While the matrix lists areas of potential safety issues identified by the project team, project advisors, and the public, the location sheets will seek to highlight specific locations where the identified issues could have actionable solutions. The purpose of the location sheets is to provide a helpful synopsis of a location to assist the discussion of the location and development of recommendations. Two examples of the location sheets are presented in Exhibits 2 and 3. These may become useful during funding or developing descriptions associated with rating or PSR development. The full list of specific locations chosen for further evaluation will be selected in consultation with the City and the Project Steering Committee.

PARADISE COVE INTERSECTION

Attributes

Traffic Volume: was 31,000 to 37,500 when surveyed in July 2012; higher vehicle, pedestrian, and bicycle volume on weekends, even in the summer

Infrastructure: no bicycle lane; no sidewalks along PCH; crosswalks on east and west sides of intersection

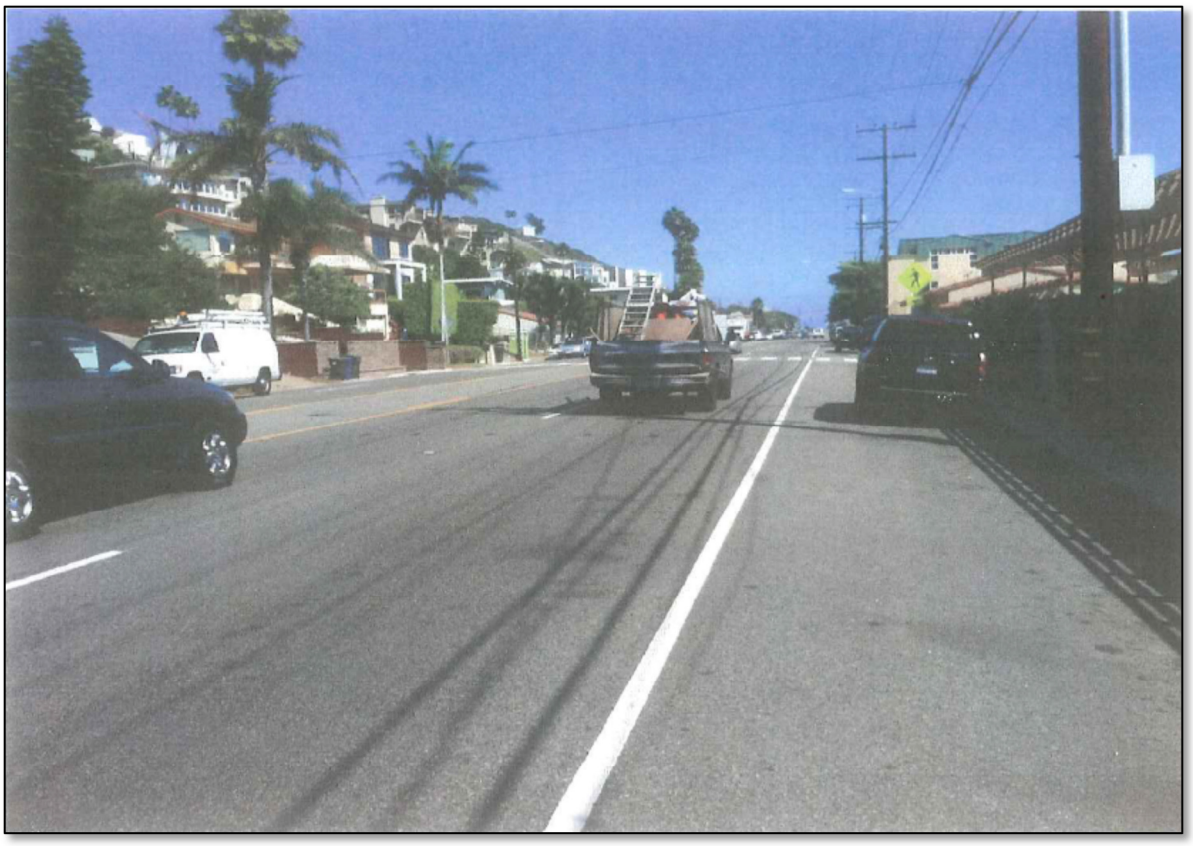
Safety Issue #1: Potential for Collisions

- **Parking maneuvers** along PCH contribute to congestion approaching and leaving the intersection. One of the ten accidents in the past three years was a rear end accident with a parking vehicle.
- **High crosswalk volume** contributes to congestion approaching the intersection.
- Westbound vehicles are observed to perform **u-turns** in the intersection. A 'Lot Full' sign is only visible once a vehicle is at the entrance.
- **Turning queues** into the parking lot exceed engineering estimates based on volume. Downstream operations (i.e., parking lot entrance) appear to be impacting intersection operations.
- Public feedback has expressed that this is a potential source for **DUI** accidents. One DUI accident occurred at this location in 2012, but the driver's origin is unknown at this time.

Safety Issue #2: Vehicle/Pedestrian Conflict

- **Admissions** collected near intersection causing pedestrians to spill over into the street.
- Pedestrians walk in the **curb lane** after parking along PCH.
- Pedestrians cross Paradise Cove Road through the **vehicle path** of travel. This is negatively impacts upstream vehicular operations of the intersection and presents a pedestrian safety problem.

LA COSTA BEACH CLUB CROSSWALK



Attributes

Traffic Volume: was 45,000 to 47,500 when surveyed in July 2012 and 27,500 to 39,000 when surveyed in November 2012

Infrastructure: sidewalks are present between Rambla Vista and this crosswalk on both sides of PCH

Safety Issue: Vehicle/Pedestrian Conflict

- **Traffic volume** along this portion of PCH exceed typical volume for a four lane divided roadway.
- **Traffic speed** is higher than the 45 mph speed limit, but most vehicles are observed to travel less than 50 mph. However, a small percentage (0.16%) of vehicles observed on a consecutive Thursday, Friday, and Saturday exceeded 60 mph. Of the ten vehicles observed exceeding 70 mph, nine occurred on Saturday.
- Motorists have become accustomed to **visual landmarks** alerting them to the presence of a crosswalk. Those common physical conditions are absent here.
- A vehicle traveling 50 mph would require 430 feet of **sight distance** to stop for pedestrians in the crosswalk. At 70 mph, that distance increases to 750 feet. Between 2010 and 2012 two vehicles were rear ended while stopped at the crosswalk. One pedestrian accident was identified during that time.
- Inadequate advance **warning** of crosswalk is provided to motorists. Signs indicating the presence of a crosswalk are located approximately 20 feet north and south of the crosswalk. Similarly, “Ped Xing” warnings are painted on the roadway approximately 300 feet north and south of the crosswalk.

APPENDIX A

LIST OF SUGGESTIONS RECEIVED

APPENDIX A

The following is a list of comments received from the public that suggest possible solutions to their safety concerns along the PCH corridor.

1. City needs to provide parking for staff of Cross Creek businesses, Pier, Malibu Beach Inn, and Malibu Inn.
2. Pedestrian bridges to allow crossing without impeding vehicular flow and safety.
3. Streets for motorized vehicles – do not create interaction points between vehicles and pedestrians.
4. Las Flores Canyon – the traffic lights are not synchronized; therefore, traffic backs up. Then followed by speeding.
5. Police staged in different areas – always the same in the a.m.
6. Police watch in the afternoon and evenings.
7. Reduce speed limit to 25 mph in certain areas and 35 mph in all others. This would discourage the U.S. Route 101 (US-101) traffic from cutting through the canyons to PCH and vice versa.
8. Cameras every mile to catch speeders.
9. Signs every mile "Speed Limit and Double Fines," like in construction zones.
10. Fix signals in all locations to match revised speed limits.
11. More cops 24/7.
12. Tickets to bicyclists not in single file.
13. Need a dedicated turn lane for drivers to maneuver (e.g., a frontage road). Keeps them out of traffic lane when they are parking or leaving parking.
14. There are more accidents, traffic, residential parking problems in Segment One, yet there is a uniform speed limit along PCH. The speed limit should be lower in this area to correspond to the volume. Speed limit should be 25 to 35 mph.
15. Suggestion: the speeding tickets should be doubled in the congested area (where the lower speed limit is enforced) like they have for construction zones. The notice about doubled fines in these areas should be posted on the pavement and on signs so people will see the consequences of speeding.
16. Whenever there is an accident on US-101, people use PCH. Caltrans should help out with incident management.
17. Caltrans should assist with traffic management when the traffic lights are out on PCH.
18. There should be a "PCH Watch" (like Neighborhood Watch) to alert CHP or the Sheriff if there is unsafe driving or people are texting while driving or DUIs.
19. There should be a physical barrier along some sections of PCH so pedestrians do not run across, particularly in the area west of Jack in the Box to the Adamson House driveway.
20. Change behavior through signage.
21. It would just take re-striping to make room for the parked cars, the bikes, and the traffic lanes.

22. As an example where cyclists worked together to change a situation: at the pinch point at Dead Man's Alley, there was a guard rail that left very little space for cyclists. The cycling group worked with Caltrans who were able to accommodate them by moving the guard rail so the cyclists had more space. This works well for about a 50-foot stretch of PCH.
23. Get rid of the median.
24. Lighting at night at the intersections is an issue, e.g., Paradise Cove.
25. Need more pedestrian-activated crosswalks, especially at Moonshadows.
26. Civic Center area – ½ million square feet of retail developed, about 2,000 cars parked. Potential for this to double for future development plans. Working with intersections that are subpar right now. Urban area in the Civic Center on a much smaller scale than a bigger city, bigger cities provide bypasses so that the traffic doesn't come through it. Possible solutions are to create a bypass.
27. Pedestrian safety lights and unmarked crosswalk near La Costa – if it only flashes yellow, doesn't make traffic stop. It should be flashing red to make traffic stop.
28. A few years ago, the City Public Safety Commission worked with Caltrans on a study on putting left-turn pocket lanes throughout the City. That study seemed to just die, can you resurrect it? Can you look at it?
29. During the summer, should have increased police presence. There should be a sheriff substation at Paradise Cove.
30. Study should include electronic equipment that alerts visitor's parking lots' availability and accident information.
31. Consider the removal of parking on the east side of PCH.
32. Deceleration lane to enter the Trancas Market Shopping Center
    a. Potential increase in traffic due to new Starbucks
    b. Unsafe (not to code) pedestrian bridge between Trancas Market and Escondido
        1) Conditions for pedestrians need to be improved; pedestrian was severely hurt
33. Lengthen the westbound left-turn pocket at Heathercliff.
34. Consider removing the redundant crosswalk at Paradise Cove on northwest side.
35. Malibu Seafood is a very dangerous area. Funds are needed to fix this area. There is an underpass nearby that if the sand was removed (maintained), then people can cross using the underpass.
36. Concern of underpass at Bonsall and Zuma Canyon – if it's closed could cause a major problem.
37. Lengthen intersecting approach of Busch Drive traffic signal delay time to increase: right turn on red when traffic allows, increase batching of vehicles, minimum green time for PCH. These measures will reduce rear-end accidents and unnecessary and frequent stoppage of traffic along PCH.
38. Widen shoulder of PCH at Morning View Drive.
39. Add right-turn deceleration lane, westbound PCH into Paradise Cove.
40. Add right-turn deceleration lane, northbound PCH into Trancas Canyon Road.

41. Caltrans investigate striping a longer deceleration lane at Topanga Canyon Boulevard.
42. Caltrans investigate to determine if a marked crosswalk is warranted at Tuna Canyon Road.
43. Caltrans investigate to determine if an intersection warning sign is needed at Tuna Canyon Road.
44. Parents dropping of students inappropriately should be addressed as a school and parent education issue.
45. Caltrans investigate removing the marked midblock crosswalk or installing a pedestrian warning beacon at La Costa Beach Club.
46. Caltrans investigate the need for left-turn signal phasing at PCH/Webb Way.
47. Caltrans investigate the feasibility of striping a westbound right-turn lane at Latigo Canyon Road.
48. Caltrans investigate the feasibility of striping a two-lane approach on Winding Way.
49. Caltrans investigate the need for a westbound No U-turn sign at Paradise Cove Road.
50. Request the Paradise Cove operator improve operations.
51. Caltrans investigate increasing the length of the left-turn lane at Paradise Cove Road.
52. Caltrans investigate the installation of a Signal Ahead sign at Zumirez Drive.
53. Caltrans investigate restriping the westbound approach to allow curbside travel as buses now do at Morning View Drive.
54. Ask a geologist to evaluate whether K-rails can be removed.
55. Restrict parking near the intersection of PCH/Las Flores Canyon Road.
56. Utilize more signs indicating actual vehicle travel speed.
57. Place median barriers anywhere on the PCH you can to stop u-turns.
58. Restrict on-street parking where an open door would encroach on the travel lane.
59. Implement one-way streets on Webb Way and Cross Creek (clockwise) to eliminate turning movements from PCH onto Cross Creek.
60. Provide safe, ADA compliant, access from intersections to bus stops.
61. Cut plants and dirt to make more room for parking and walking around Winding Way.
62. Winding Way left turning lane needs to be longer.
63. Southbound right turning lane needed at Paradise Cove.
64. Northbound left turning lane into Paradise Cove needs to be longer.
65. Install median barrier to prohibit U-turns before the left turning lane into Paradise Cove.
66. Install walking paths with guard rails at Paradise Cove and Heathercliff.
67. Clean out the underpass near Malibu Seafood.
68. Create a walkway utilizing the underpass near the Trancas shopping center.
69. Use utility easements to recapture land for parking and sidewalks.
70. Remove northbound PCH left-turn into Zuma Beach parking lot and lengthen the southbound left-turn lane into Zuma Beach parking lot.