

## ADDITIONAL COUNTERMEASURES

### CAT TRACKS ▶▶▶



#### DESCRIPTION

Cat tracks are pavement markings in the form of dotted lines used for guiding or delineating traffic, typically when turning traffic at an intersection.

#### KEY DESIGN FEATURES

- > Cat tracks can follow Caltrans Standard Detail 40 for lane line extensions or 40 A for left or right turns

#### BENEFITS

- > Correct lane encroachment issues especially in cases of dual or triple turn movements

#### APPLICATIONS

- > Locations where side-swipes are observed during turning movements at intersections

### EXTEND SOLID LANE LINE ▶▶▶

#### DESCRIPTION

This creates or lengthens solid lane lines near intersections instead of dashed lane lines with the purpose of preventing motorists from changing lanes.

#### KEY DESIGN FEATURES

- > Stripe lane lines solid on the far side of the intersection

#### BENEFITS

- > Prevents crashes from lane changes

#### APPLICATIONS

- > Upstream of multi-lane intersections where a history exists of lane changing crashes

## HIGHWAY SPEED DILEMMA ZONE ►►►



### DESCRIPTION

Motorists approaching a signal on high-speed approaches can face a dilemma (stop or proceed through the intersection) when the downstream signal turns yellow.

Crashes that may occur in such cases result in high property damage and personal injury due to the high speeds involved.

### KEY DESIGN FEATURES

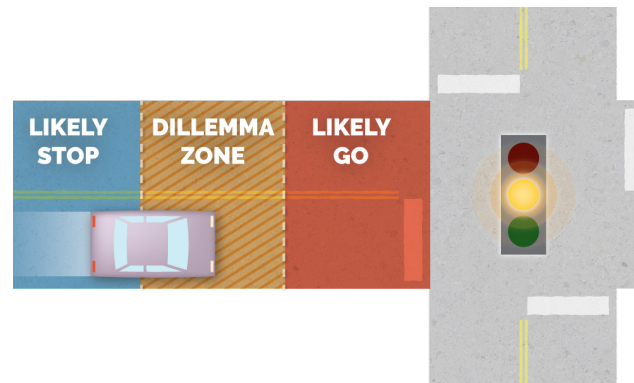
- > Treatments for dilemma zones historically included advance warning signs or flashing beacons for end-of-green. More recently CA MUTCD advises on fully actuated high-speed signal approaches to allow for advance dilemma zone detection. Full actuation is designed to reduce the frequency with which the onset of the yellow change interval is displayed when high-speed approaching vehicles are in the "dilemma zone."

### BENEFITS

- > Reduces number of drivers running red lights
- > Adjusts signal timing

### APPLICATIONS

- > Intersections with high speed approaches



## REDUCED SPEED ZONE ►►►

### DESCRIPTION

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

### KEY DESIGN FEATURES

- > Reduced speed zones currently require an E&TS Study to establish as defined in the CA MUTCD and California Manual for Speed Setting (Caltrans, 2014)

### BENEFITS

- > Adjusts (typically reduces) speed limits to account for existing conditions
- > Reduced speeds have shown to reduce the severity of crashes
- > Warns drivers of changing conditions

### APPLICATIONS

- > School Zones
- > Construction Zones
- > Special Weather Conditions
- > Crash history within a zone
- > Hidden driveways or high driveway density
- > Special road conditions (e.g. grades impacting trucks)



*This page intentionally left blank.*

## ADDITIONAL SAFETY CONSIDERATIONS

### Bus Stops

An important component of roadway safety is ensuring safe access to transit. As the Antelope Valley Transit Authority invests in service, the City of Lancaster can make parallel investments in safe bus stops and on-street transit facilities. The American Public Transportation Association (APTA) report: *Design of On-street Transit Stops and Access for Surrounding Areas* highlights the importance of locating bus stops proximate to pedestrian crossings to create safe environments. When accessing a bus stop, particularly if in a rush to catch the bus, people walking may not always divert their path to use a crosswalk if there is a more expedient path. The NACTO Urban Street Design Guide, the FHWA Pedestrian Safety Guide and Countermeasure Selection System asserts that far-side bus stops, where a bus stops after it crosses an intersection rather than before, are safer because the pedestrian crosses behind the bus. Where bus stops and bike lanes occur at the same location, there is a potential safety risk for cyclists and pedestrians. The literature recommends floating bus boarding islands as the preferred design in these situations.

Key resources:

- > *Pedestrian Safety Guide for Transit Agencies*, Federal Highway Administration (FHWA)
- > *Transit Street Design Guide*, National Association of City Transportation Officials (NACTO)
- > *Design of On-street Transit Stops and Access for Surrounding Areas*, American Public Transportation Association (APTA)

### Maintenance

When considering the installation of safety countermeasures, ongoing maintenance and replacement costs should be taken into account. The U.S. Department of Transportation estimates that poor road conditions and obsolete road designs contribute to approximately 14,000 highway deaths each year. In the absence of a long-term federal transportation bill to fund needed roadway improvements throughout the country, a backlog of transportation maintenance and repair needs has accumulated, leaving much of our transportation infrastructure in disrepair and creating the conditions for traffic injuries and fatalities.

The FHWA notes that approximately one-half of traffic fatalities occur during nighttime hours. Because pavement markings have repeatedly been shown to reduce crashes, this suggests that the proactive maintenance of pavement markings to ensure their visibility may play a crucial role in reducing the number of crashes and the number of fatalities.

Roadway safety improvements are not limited to those that primarily benefit motor vehicle users. A 2016 study of pedestrian safety by Corazza et al. found that the presence of distressed sidewalks – or the complete lack of them – encourages pedestrians to walk in places that increase their vulnerability and jeopardize their safety. This often results from a lack of timely maintenance to repair problematic sections of the sidewalk infrastructure. Implementation of a sidewalk management system could help ensure that safe infrastructure is available for pedestrians to use, lowering the number of injuries and fatalities.

## Curbside Management

Transportation Network Companies (TNCs) such as Uber and Lyft have catalyzed significant changes in the way people travel in recent years. They have increased the number of choices that travelers have with respect to when and how they travel, but they have also generated additional vehicle trips, vehicle miles traveled, and passenger loading activity at the curb and in the street, potentially impacting street safety.

Given the increased curbside activity that has largely been spurred by TNCs, pedestrian safety experts recommend a portfolio of measures to address all the potential risk factors that affect street safety. These measures are grouped into four categories: technology, curb management, education, and enforcement. Examples include geo-fencing high-conflict areas and guiding drivers and passengers to safer loading locations, pricing on-street parking spaces to create more vacant curb space to allow more loading to occur at the curb, requiring for-hire drivers to be trained on where to pick up and drop off passengers, and installing automated enforcement technology to guide behavior.

Key resources:

- > *Curbside Management Practitioner's Guide*, Institute of Transportation Engineers (ITE)
- > *Curb Appeal: Curbside Management Strategies for Improving Transit Reliability*, National Association of City Transportation Officials (NACTO)
- > Best practices from other cities, such as *Right-of-Way Allocation Decision Framework*, City of Seattle

## Future Fleets

Autonomous vehicles (AVs) promise to revolutionize transportation safety through such improvements as reducing human error and eliminating high-risk driving behavior. The National Highway Traffic Safety Administration (NHTSA) estimates that 94-percent of severe crashes are due to human error; shifting to AV technology could significantly reduce such crashes. However, AVs may pose challenges that could negatively impact safety. Overall crash risk could ultimately be heightened by such factors as hardware and software failures, malicious hacking, increased total vehicle travel, and increased vehicle platooning. AVs also pose unique risks for people walking and biking. Currently, many AV technologies that are being tested have low detection of bicyclists and pedestrians because they rely primarily on cues from the built environment. These technologies excel at detecting other vehicles and roadway infrastructure, but until they are able to detect bicyclists and pedestrians with equal accuracy, AVs will not increase safety for people traveling by bike or on foot.

Key resources:

- > *Blueprint for Autonomous Urbanism*, National Association of City Transportation Officials (NACTO)
- > *Discussion Guide for Automated and Connected Vehicles, Pedestrians, and Bicyclists*, Pedestrian and Bicycle Information Center
- > *Preparing for the Future of Transportation: Automated Vehicle 3.0*, U.S. Department of Transportation

## NON-ENGINEERING SAFETY STRATEGIES

### Education

Education pertains to programs that seek to educate roadway users of all types about the rules that govern the roadway and how to prevent crashes. Such programs can be structured classes such as road school for cyclists, or outreach campaigns such as signs that discourage distracted driving.

There are existing regional and statewide programs that Lancaster can deploy locally such as the Southern California Association of Governments (SCAG) and Caltrans campaigns listed below.

- > SCAG Go Human is an outreach and advertising campaign that aims to reduce crashes and promote walking and biking. Individual cities can participate in this effort by working with SCAG to deploy co-branded signs, banners and postcards within their jurisdiction. SCAG also makes available a media kit and radio ads for local use.
- > Caltrans partnered with local agencies in Southern California to deploy “Look Both Way” billboards in response to an increase in pedestrian crashes.

Furthermore, Lancaster can develop targeted outreach education campaigns that focus on the common violations that lead to fatalities and severe injuries in Lancaster. Based on common crash types over the past five years in Lancaster, education and outreach campaigns may include the programs listed here.

For drivers this may include:

- > Signs that emphasize that speeding is deadly because unsafe speeding caused 15% of crashes and 9% of fatal crashes.
- > Signs reinforcing which road user has the right-of-way in different scenarios because improper turning caused 17% and vehicle right-of-way violation caused 21% of total crashes.

For people biking:

- > Class that teaches bicyclists how to use on-street bike facilities, especially for facility types that are new to the City.

For people walking:

- > Education in schools about crossing the street because pedestrian violations caused 22% of fatal crashes.
- > Signs that encourage crossing in crosswalks because during the analysis period, 99 pedestrian crashes occurred when a pedestrian was crossing not in a crosswalk. Although, other approaches are also needed to mitigate pedestrian crash because as many pedestrian crashes occurred when a pedestrian was crossing in a crosswalk.



## Enforcement

Data-driven enforcement is an important safety strategy, allowing the City to focus existing resources on locations with a history of severe crashes and the highest risk behaviors leading to severe crashes.

Appendix D contains cut sheets recommending two potential targeted enforcement scenarios to promote roadway safety in Lancaster. Each scenario highlights the top locations where crashes caused by certain roadway violations occurred. The locations identified in these scenarios overlap with many KSI crashes in Lancaster and recommend targeting enforcement at violations that will mitigate those severe and fatal crashes. This approach takes the focus away from expanding police presence and instead recommends targeting existing law enforcement resources at the most frequent locations and behavioral causes of severe crashes instead.

## Equity

Equity applies to each component of a holistic safety approach: engineering, education, and enforcement. Equity is an important consideration for engineering improvements as it relates to site selection for the improvements. With limited resources to fund roadway changes, it is important not to perpetuate a pattern of historic disinvestment by focusing improvements in neighborhoods which have received more investment in the past. Often, more fatal and severe crashes occur in disadvantaged neighborhoods, so targeting engineering investment into these neighborhoods can improve travel safety.

Education and outreach should also be infused with principles of equity. As the City seeks to communicate with the public about roadway safety, it should be in a meaningful and culturally-relevant manner. Beyond simply providing resources in the languages that constituencies speak, educational campaigns should meet communities where they are at. Working educational efforts into existing community events and partnering with trusted community organizations and leaders can improve efficacy and promote an equitable approach to roadway safety education.

Finally, while enforcement is part of a holistic approach to roadway safety, this consideration must be balanced against the risk of over-policing already vulnerable communities. The intention of the enforcement component of roadway safety is not to promote profiling or over policing. Rather, the intention is to target particularly dangerous behaviors that will have the most benefit to overall safety.