

A Review of the Dangers to Officers Presented by Passing Vehicles During Traffic Stops, with Survey Data

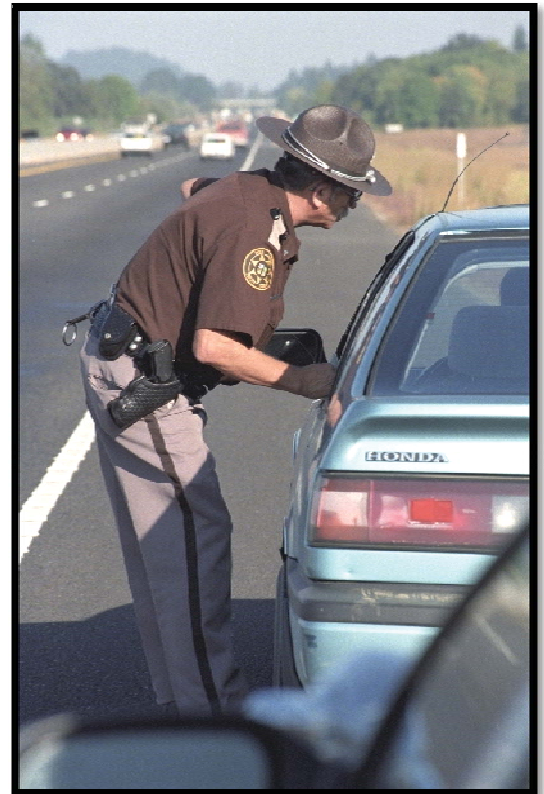
By Sr. Trooper Larry Abel, KSP Ret. and John Broxon, June 2011

Executive Summary

According to a report issued by the National Law Enforcement Officers Memorial Fund, the number of law enforcement officers who died in 2010 after being struck by passing vehicles increased 60% over 2009. This was very surprising, given the move-over/slow-down laws in most states and improved training and techniques for traffic stops.

To investigate this problem, study was undertaken to quantify the dangers presented to officers by passing vehicles. This study incorporated three basic elements:

- A review of prior Federal and independent studies of death rates from being struck by passing vehicles.
- A survey of police officers to gain a first-hand understanding of their experiences, including the rates of injury to themselves and fellow officers
- A review of legal, procedural, and technological solutions intended to make traffic stops safer.



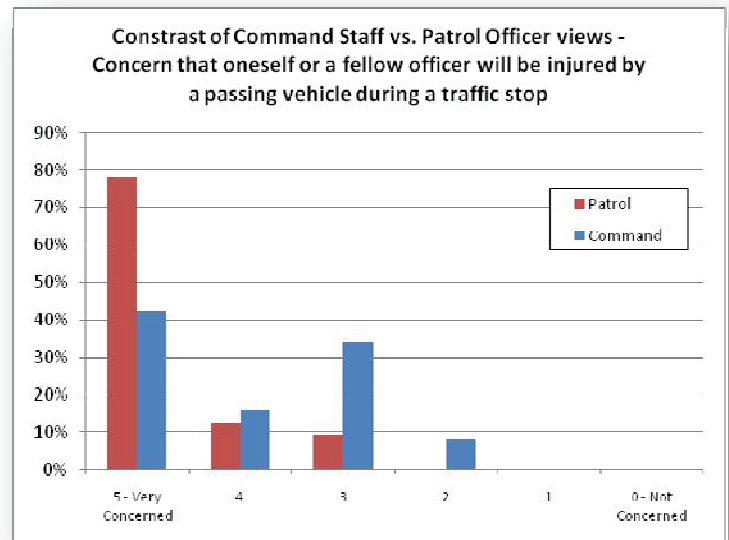
Prior studies into the problem

The primary tool for analyzing officer deaths is the FBI *Law Enforcement Officers Killed and Assaulted* (LEOKA) report. Analysis of the data for the last decade showed that ***one-sixth of all officers who died accidentally in the line of duty were killed by being struck by a vehicle when they were outside of the patrol vehicle.***

Another major study, the Ashton and Mackay study was consulted to estimate the fatality rate when an officer is struck by a vehicle. We recompiled the authors' data, looking at the types of injuries based on the collision speed. This showed that serious injuries begin when the collision speed is greater than 20 mph, and that ***at typical highway speeds, the fatality rate is nearly 100% for a direct collision with a vehicle.***

Survey of police officers

A survey was conducted and collected officers' opinions of the likelihood of being struck by a passing vehicle. A very high percentage of officers who have patrol duties, 78%, had the highest level of concern about themselves or a fellow officer being struck by a vehicle during the performance of his/her duties.

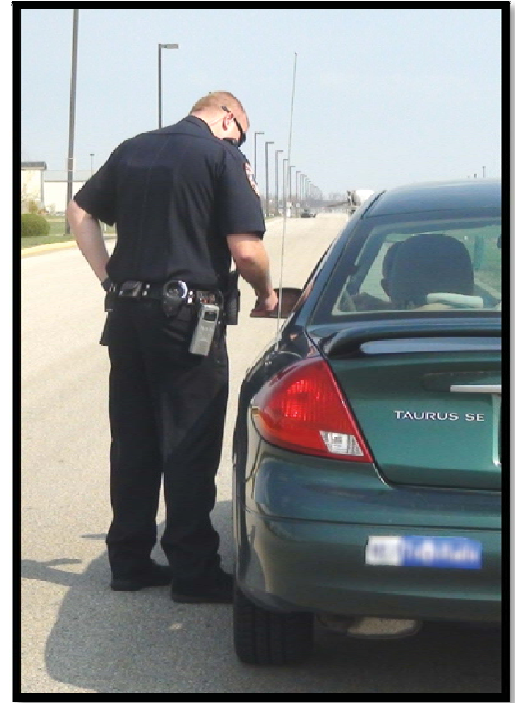


Most surprisingly, though, was that this level of concern was not shared by the command level personnel who participated in the survey. In this group, almost half of the respondents had a reported level of concern of “2” or “3” on a scale of “0” to “5”. ***There is a large difference of perception of the danger posed during traffic stops by passing vehicles between patrol officers and command staff. Patrol officers recognize passing vehicles as a much larger danger than their commanders do.***

Participants in the survey were also asked if they or a fellow officer had been injured by a passing vehicle. ***Nearly 1/4 of all participants reported injuries to either themselves or a coworker,*** and these injuries were roughly evenly split between minor injuries, injuries requiring hospitalization, and fatal injuries.

Procedural and technological solutions

Examples of procedural changes include move-over/slow-down laws and new traffic stop procedures. The overall impact of procedural changes was reviewed by looking at the changes to officer death rates over time. Rather than decreasing over time, these rates have stayed relatively consistent, with around 16% of all accidental officer deaths due to being struck by a vehicle. ***Deaths due to being struck by a vehicle have not fallen off percentage-wise as procedural and legal changes have taken place.***



New technologies were also reviewed. There are very few available. California Highway Patrol conducted searches for technologies to warn officers of impending collisions in 2006 and 2008, and in each case had no responses from industry. However, a new technology that shows promise is SafetyZone™, a feature of MPH Industries' Ranger® EZ traffic radar, that uses distance measuring technology to determine if vehicles are responding to the patrol vehicle's emergency lights, and ***alerts officers to vehicles that do not slow down, so that he/she has time to assess the danger and move to safety, if required.*** SafetyZone is advertized to provide officers with more than ten seconds of warning at highway speeds.

Introduction

Passing vehicles are a danger to officers during traffic stops, as anyone who has worked a traffic stop can attest to. The officer's attention is dominated by the vehicle that he has stopped, and he/she can only commit a portion of his/her attention to oncoming traffic.

Each year, the media has many reports of officers who die by being struck by a passing vehicle. Each of these is tragic, with officers leaving family and loved ones. Many of these incidents involve drivers who were impaired or inattentive, and many occur at night.

Although the news reports are widely reported when incidents occur, little has been done to quantify the potential dangers posed to officers by passing vehicles, and to put the problem into perspective. According to the National Law Enforcement Officers Memorial Fund, these “struck by vehicle” deaths spiked in 2011, increase 60% over 2010¹. This is despite the prevalence of move-over/slow-down laws and new procedures for traffic stops to reduce officers' exposure to passing vehicles.

This study was undertaken with that goal in mind. To achieve this,

- Prior studies and reports from Federal and independent sources were reviewed to quantify the problem,
- A survey was conducted to gain a view of the problem from the officers' perspective. This included their perception of the danger and the reporting of any injuries to themselves or fellow officers
- Changes to the officer death rates over time were analyzed to assess the effects of legal and procedural changes, and
- Technologies that have been developed to warn officers of dangerous vehicles were reviewed.

Review of Data from Prior Studies

FBI's LEOKA study

Each year, the FBI publishes the *Law Enforcement Officers Killed and Assaulted* (LEOKA) report to provide information about the officers who were killed, feloniously or accidentally, and those officers who were assaulted while performing their duties².

The 2009 LEOKA report contained a list of the causes of accidental officer deaths in the last decade. The report shows that the **#2 accidental cause of officer deaths in the past ten years was being "struck by a vehicle"**. 120 officers died from being struck by a vehicle while performing duties outside of their patrol vehicle. **One out of every six officers who died accidentally was killed by being struck by a passing vehicle.**

Ashton and Mackay study

The LEOKA report looks at officer deaths, but does not address injuries. To address this question, the most significant study was performed in the United Kingdom by Ashton and MacKay³, to identify the injury level associated with vehicle collisions with pedestrians. Their data was reanalyzed, to generate data for severity of the pedestrian injuries vs. the collision speed. This data is summarized in Figure 1.

This study re analyzed their data on the severity of collisions of pedestrians with the fronts of vehicles. Looking at the data:

- Below 15 mph, most collisions result in minor injuries. This corresponds to level 1 on the Abbreviated Injury Scale (AIS) (See Figure 2).
- From 15 mph to 30 mph, most collisions result in serious injury, defined by Ashton and Mackay as AIS levels 2 through 5.
- Above 30 mph, the level of fatal injuries increases rapidly, and at 40 mph, more than 80% of injuries result in death.
- In the speed zones where most traffic stops are performed (45 mph and up), the fatality rate from being struck by a vehicle is nearly 100%.

For their study, Ashton and Mackay looked primarily at injuries caused by the fronts of vehicles. In contrast, a number of the injuries

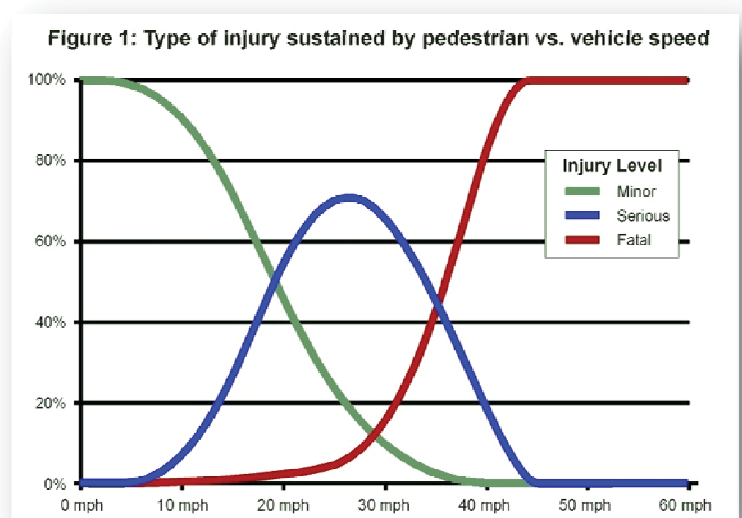


Figure 2: Abbreviated Injury Scale

AIS Score	Injury Level
1	Minor
2	Moderate
3	Serious
4	Severe
5	Critical
6	Fatal

Source: Trauma.org

suffered by officers working traffic stops result from glancing blows, which have a significantly different fatality rate. The severity rate of actual officer injuries is not easy to ascertain from prior studies. Therefore, the authors obtained their own data from law enforcement.

Survey of officer perceptions relating to the danger of passing vehicles

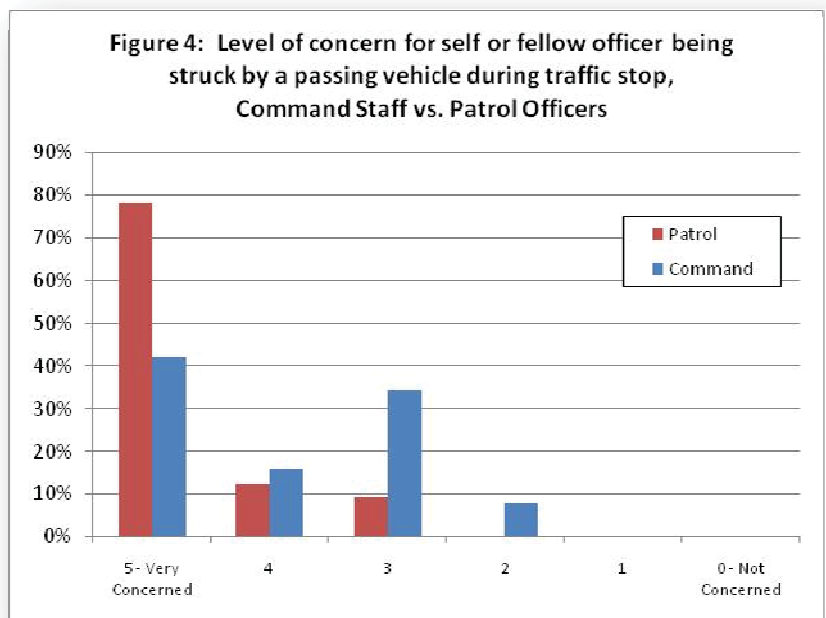
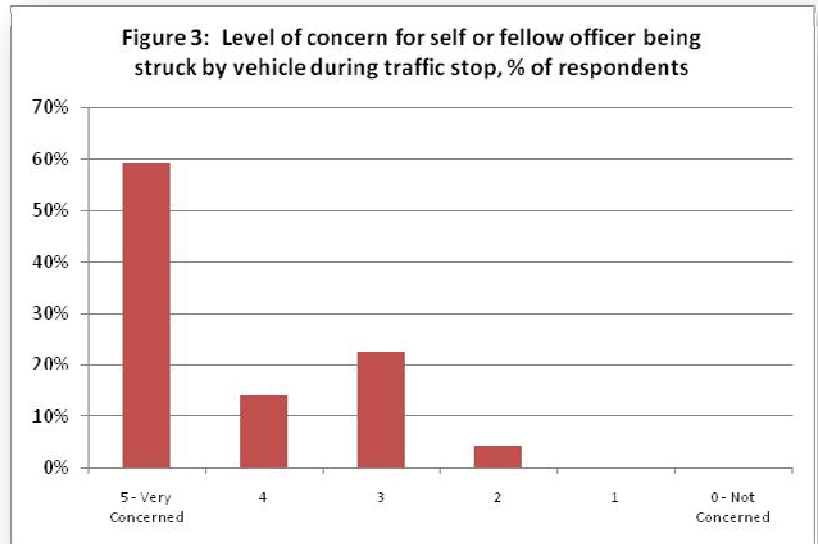
In order to get a better view of the overall incidence of officers being struck by vehicles and the injuries associated with those incidents, a survey was performed to review officers' experiences and perceptions. For several weeks, MPH Industries conducted a survey on its website to learn more about the needs and concerns of police officers on a number of levels. One series of questions related directly to the perceived and actual dangers to officers from passing vehicles during traffic stops. The data is summarized in this section.

Officer concerns for passing vehicle dangers

Survey participants were asked to rate their concern about the possibility of being struck by a vehicle during the performance of a traffic stop. The data is presented in Figure 3. Overall, 59% of the respondents reported the highest level of concern for themselves or a fellow officer being struck by a vehicle.

In reviewing the data, a major difference was discovered in perception between command staff and patrol officers when it comes to the potential of being struck by a vehicle. This is illustrated in Figure 4, which compares the responses of patrol officers to command staff (chief, deputy chief, sheriff, lieutenant, etc.).

In general, the ***concern for injury to themselves or to a fellow officer is much greater for patrol officers than it is for the command staff.*** 78% of patrol officers rated their concern at the highest level, and no response below "3" was received from that group. On the other hand, a significant percentage of command staff, 42%, responded with a "3" or "2". This represents a significant difference in the perceptions of this hazard. ***Further dialogue is needed between the two groups to ensure that proper safety techniques and equipment are in place to reassure officers and keep them safe.*** If the command staff is not properly informed of the concerns of their patrol officers, it is much less likely that the department will make any changes needed in order to make officers jobs safer until an incident occurs.



Frequency and severity of “struck by vehicle” incidents

Survey participants were also asked if either they themselves or a fellow officer had ever been struck by a vehicle during the performance of a traffic stop. As shown in Figure 5, 28% of the respondents reported that either they or a fellow officer had been struck by a vehicle during the performance of a traffic stop.

This number is a bit surprising and is larger than one might suspect, based on the LEOKA data. It tends to point to a large number of non-fatal officer injuries, in addition to the deaths reported in LEOKA.

To explore that further, the severity of the reported injuries is compared in Figure 6. Respondents who reported injuries to themselves or to fellow officers were asked to describe the injuries that were sustained. These were then categorized into three levels,

- Minor injuries that would not require hospitalization,
- Injuries that involved some level of hospital care, and
- Fatal injuries

The data shows a reported injury rate at 2.9 times the death rate. However, it is likely that a large number of minor injuries were not reported, since they would not have been widely known to fellow officers. Informal discussions with officers confirm this; for example, a large percentage of Commercial Vehicle officers interviewed reported being “grazed” by passing vehicles.

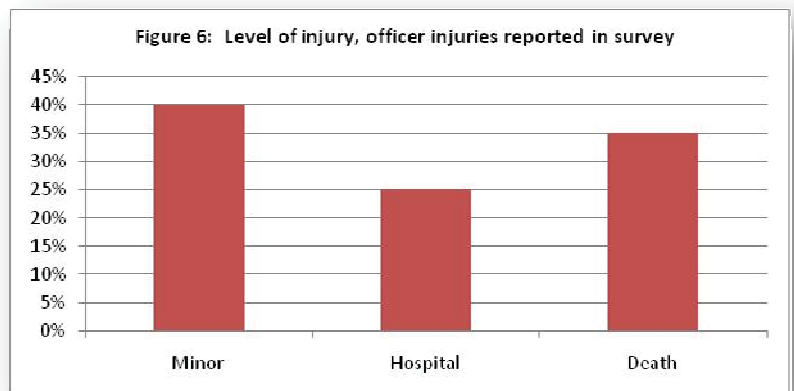
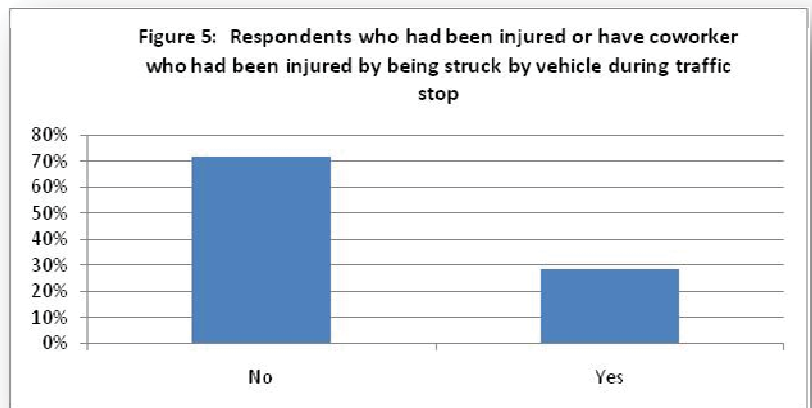
When analyzing the reported deaths and injury rates, as reported by traffic officers and command staff, there was no major difference between the two categories of respondents.

Technology and procedures to reduce officer injuries due to passing vehicles

Procedural and legal changes

Traffic stop procedures

To reduce officer injuries and deaths, agencies have implemented new procedures and training for traffic stops, spearheaded by the International Association of Chiefs of Police (IACP) Law Enforcement Stops and Safety Subcommittee (LESSS). Since 2003, this group has been studying the problem of traffic stop safety, and has issued new guidelines and promotional materials to make traffic stops safer. Most agencies have adopted the LESSS guidelines.



Move Over – Slow Down laws

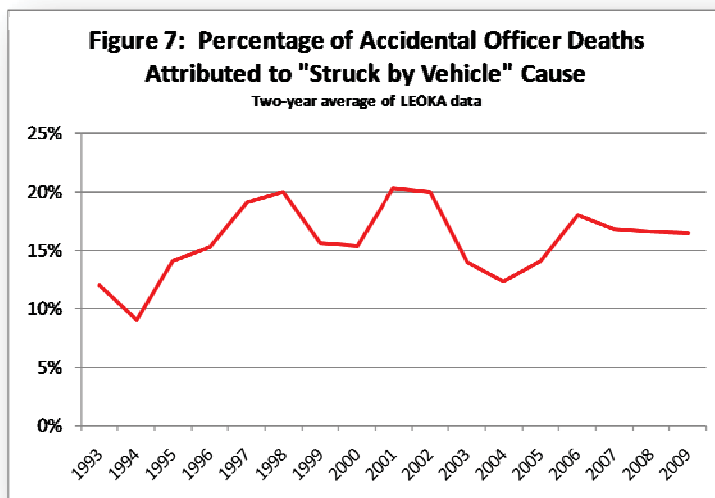
The first line of defense, adopted by 49 of the 50 states, is the enactment of laws requiring drivers to slow down and move to the adjacent lane, if applicable, in the presence of an emergency vehicle. The majority of states enacted these laws before 2005.

Overall effectiveness of these changes

The question arises as to how effective these legal and procedural changes have been. An analysis can be made of the yearly LEOKA officer death rates due to “struck by vehicle” and how that data has changed over time, and the reduction of those deaths since the laws and procedures have been put in place. One would expect that the enactment of the move over – slow down laws and the improved traffic stop procedures would have reduced the relative number of officer deaths due to being struck by a vehicle.

However, the data does not support that. The trend in the LEOKA data is shown in Figure 7⁴. The percentage has of deaths due to being struck by a vehicle actually increased since the 1993-1994 timeframe and has fairly level afterwards. Since 2006, a consistent number, 16%, of accidental officer deaths have been caused by being struck by a passing vehicle. There are several reasons why this might be the case, a few of which include:

- Drivers may not be slowing down for emergency vehicles on the roadside at rates higher than before the laws were enacted.
- The drivers who are most likely to strike an officer may not respond to these laws. This may be due to driver impairment, inattention, or some other cause.



Technology solutions to warn officers of danger

California Highway Patrol

For several years, agencies have looked for technology that would warn the officer of a dangerous vehicle or impending collision, with sufficient warning time to move out of the way of danger. For example, in 2006 and 2008 the California Highway Patrol issued a Request for Information “to find a cost effective solution to alert a patrol officer on a traffic stop when an errant vehicle has entered the shoulder zone and is approaching his or her location at high speed”. They envisioned a warning that “would integrate with existing patrol vehicle systems (i.e., sound the horn or chirp the siren, to sound the alert)”⁵. In neither instance did any company respond with a solution to this problem.

SafetyZone™

Recently, MPH Industries released its Ranger®EZ radar, which has a function called SafetyZone⁶. SafetyZone is designed



Officer being alerted to dangerous vehicle by Ranger EZ's SafetyZone feature

to alert officers to the presence of vehicles who fail to slow down in response to their emergency lights. SafetyZone uses Ranger’s distance measuring technology, so that officers are only alerted to vehicles within a defined distance of the patrol vehicle, to minimize false alarms. The alert can be installed to integrate with existing systems (for example, to “sound the horn or chirp the siren”, as in the CHP case above). SafetyZone can deliver sufficient warning time to allow the officer to identify the threatening vehicle, assess the danger level, and get out of harm’s way.

Table 1⁷ presents the warning time that SafetyZone can achieve, based on the distance setting and the speed of the approaching vehicle.

Speed	Vehicle distance setting							
	50 yds	100 yds	150 yds	200 yds	250 yds	300 yds	350 yds	400 yds
40 mph	2.6 sec	5.1 sec	7.7 sec	10.2 sec	12.8 sec	15.3 sec	17.9 sec	20.5 sec
45 mph	2.3 sec	4.5 sec	6.8 sec	9.1 sec	11.4 sec	13.6 sec	15.9 sec	18.2 sec
50 mph	2.0 sec	4.1 sec	6.1 sec	8.2 sec	10.2 sec	12.3 sec	14.3 sec	16.4 sec
55 mph	1.9 sec	3.7 sec	5.6 sec	7.4 sec	9.3 sec	11.2 sec	13.0 sec	14.9 sec
60 mph	1.7 sec	3.4 sec	5.1 sec	6.8 sec	8.5 sec	10.2 sec	11.9 sec	13.6 sec
65 mph	1.6 sec	3.1 sec	4.7 sec	6.3 sec	7.9 sec	9.4 sec	11.0 sec	12.6 sec
70 mph	1.5 sec	2.9 sec	4.4 sec	5.8 sec	7.3 sec	8.8 sec	10.2 sec	11.7 sec
75 mph	1.4 sec	2.7 sec	4.1 sec	5.5 sec	6.8 sec	8.2 sec	9.5 sec	10.9 sec
80 mph	1.3 sec	2.6 sec	3.8 sec	5.1 sec	6.4 sec	7.7 sec	8.9 sec	10.2 sec
85 mph	1.2 sec	2.4 sec	3.6 sec	4.8 sec	6.0 sec	7.2 sec	8.4 sec	9.6 sec
90 mph	1.1 sec	2.3 sec	3.4 sec	4.5 sec	5.7 sec	6.8 sec	8.0 sec	9.1 sec

Table 1: Alert time versus SafetyZone distance setting and vehicle speed

MPH promotes SafetyZone as a major feature of its Ranger EZ radar, and many agencies have used the feature as a required specification item.

Summary

Many changes have been made to laws and procedures have been made in order to make traffic stops safer. However, these changes have not significantly reduced the risks to officers, as is borne out by the LEOKA statistics of accidental officer deaths and the NLEOMF report. No reduction has been reported in the percentage of accidental officer deaths caused by being struck by a passing vehicle.

New technologies may be able to assist patrol officers, by alerting them to dangerous vehicles so that they can avoid being struck. However, based on our survey results, command staff generally does not perceive the dangers of passing vehicles to be as great as patrol officers do. Therefore, unless the perception of the command staff changes, so that they perceive the dangers, they may not implement the new warning devices.

Two things are needed to improve the safety of traffic stops. Patrol officers must communicate their concerns better to the command staff, so that the danger they perceive is understood. The command staff must review the statistics to verify that the concerns of patrol officers are valid, and based on that understanding, warning devices must be made available to officers who are in the most danger of being struck by vehicles, particularly those who routinely make traffic stops.

Endnotes

¹ Research Bulletin, *Law Enforcement Officers Deaths: Preliminary 2010*, National Law Enforcement Officers Memorial Fund, Released January 2011. Report available from National Law Enforcement Officers Memorial Fund at <http://www.lawmemorial.org>.

- ² Table 63, *Law Enforcement Officers Killed and Assaulted*, Federal Bureau of Investigation, Released October 2010. Report available from FBI Uniform Crime Reports at <http://www.fbi.gov/about-us/cjis/ucr/ucr>.
- ³ Ashton, S.J and Mackay, G.M, *Some Characteristics of the Population Who Suffer Trauma as Pedestrians When Hit by Cars and Some Resulting Implications*, University of Birmingham, 1979.
- ⁴ Data extracted from *Law Enforcement Officers Killed and Assaulted*, Federal Bureau of Investigation, yearly reports from 1996 to 2009. Reports available from FBI Uniform Crime Reports at <http://www.fbi.gov/about-us/cjis/ucr/ucr>.
- ⁵ *Request for Information - High Speed Vehicle Alert Solution, 051-RFI-002*, California Highway Patrol, 2008.
- ⁶ Information on MPH Industries' website: http://www.mphindustries.com/press_releases/ranger_intro.pdf and http://www.mphindustries.com/radar_lidar.php
- ⁷ Ibid.