

Safety Performance Management Targets for 2018

The California Department of Transportation (Caltrans), in cooperation with the Office of Traffic Safety (OTS), is required to set five annual Safety Performance Management Targets (SPMTs) for all public roads by August 31, 2017 for the 2018 calendar year. This is pursuant to the Moving Ahead for Progress in the 21st Century Act (MAP-21, P.L. 112-141), the Safety Performance Management Final Rule adds Part 490 to Title 23 of the Code of Federal Regulations to implement the performance management requirements in 23 U.S.C. 150.

Caltrans and OTS have adopted aspirational goals consistent with the Strategic Highway Safety Plan (SHSP) and Caltrans' Strategic Management Plan (SMP), as follows:

TABLE 1. THE PERFORMANCE MEASURE AND THE TARGET BASED ON THE 5-YEAR ROLLING AVERAGE

| Performance Target | Data Source | 5- Yr. Rolling Average (2018) | Percent Reduction (2018) |
|--|--------------------|--------------------------------------|---------------------------------|
| Number of Fatalities | FARS | 3590.8 | -7.69% |
| Rate of Fatalities (per 100M VMT) | FARS & HPMS | 1.029 | -7.69% |
| Number of Serious Injuries | SWITRS | 12,823.4 | -1.5% |
| Rate of Serious Injuries (per 100M VMT) | SWITRS & HPMS | 3.831 | -1.5% |
| Number of Non-Motorized Fatalities and Non-Motorized Severe Injuries | FARS & SWITRS | 4271.1 | -10% |

Note: The targets highlighted in gray are set in coordination with OTS.

The Highway Safety Improvement Program (HSIP) is a core Federal-aid program with the purpose to achieve a significant reduction in fatalities and serious injuries on all public roads. The HSIP requires a data-driven, strategic approach to improving highway safety on all public roads that focuses on performance. The HSIP regulation under 23 CFR 924 establishes the Federal Highway Administration's (FHWA) HSIP policy, as well as program structure, planning, implementation, evaluation and reporting requirements for States to successfully administer the HSIP. The overarching highway safety plan for the State of California is the Strategic Highway Safety Plan (SHSP). In September 2015, California updated its SHSP, which is "a statewide coordinated safety plan that provides a comprehensive framework for reducing highway fatalities and severe injuries on all public roads" (SHSP, 5). It further states that the "SHSP is a multi-disciplinary effort involving Federal, State, and local representatives from the 4Es of safety [i.e. engineering, education, enforcement, and emergency services]" (SHSP, 2015-2019, 34). In support of a data-driven and strategic approach, the HSIP Final Rule contains three major policy changes related to: (1) the HSIP report content and schedule, (2) the Strategic Highway Safety Plan (SHSP) update cycle, and (3) the subset of the model inventory of roadway elements (MIRE), also known as the MIRE fundamental data elements.

The Safety PM Final Rule supports the data-driven performance focus of the HSIP. The Safety PM Final Rule establishes five performance measures to carry out the HSIP: the five-year rolling averages for: (1) Number of Fatalities, (2) Rate of Fatalities per 100 million VMT, (3) Number of Serious Injuries, (4) Rate of Serious Injuries per 100 million VMT, and (5) Number of Non-motorized Fatalities and Non-motorized Serious Injuries. These safety performance measures are applicable to all public roads regardless of ownership or functional classification. The Safety PM Final Rule also establishes a common national definition for serious injuries.

States must establish statewide targets for each of the safety performance measures. States also have the option to establish any number of urbanized area targets and one non-urbanized area target for any or all of the measures. Targets will be established annually, beginning in August 2017 for calendar year 2018. For common performance measures (number of fatalities, rate of fatalities and number of serious injuries), targets must be identical to the targets established for the National Highway Transit Safety Administration (NHTSA) Highway Safety Grants program that is administered by OTS. The State Department of Transportation (DOT) must also coordinate with the Metropolitan Planning Organizations (MPO) in the State on establishment of targets, to the maximum extent practicable. States will report targets to the FHWA in the HSIP report due in August of each year.

MPOs will establish targets for the same five safety performance measures for all public roads in the MPO planning area within 180 days after the State establishes each target. The targets will be established in coordination with the State, to the maximum extent practicable. The MPO can either agree to support the State DOT target or establish a numerical target specific to the MPO planning area. MPOs' targets are reported to the State DOT, which must be able to provide the targets to FHWA, upon request.

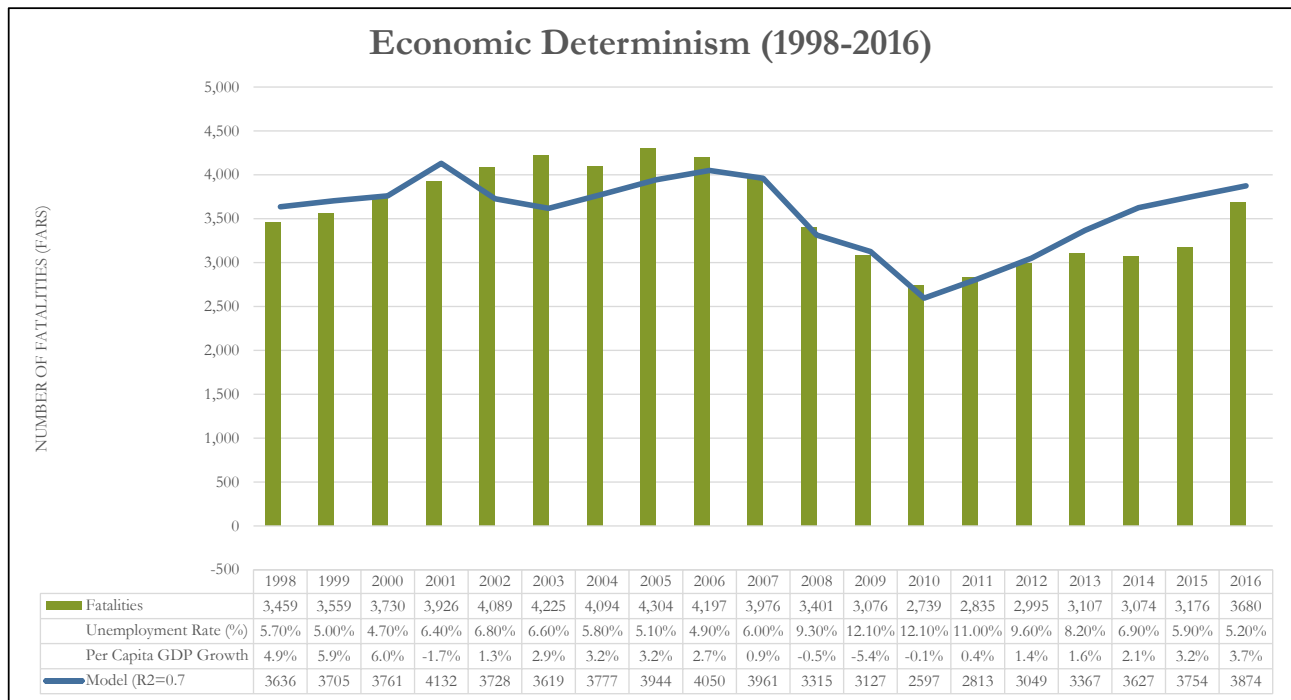
A State is considered to have met or made significant progress toward meeting its safety targets when at least four of the five targets are met or the outcome for the performance measure is better than the baseline performance the year prior to the target year. Optional urbanized area or non-urbanized area targets will not be evaluated. Each year that FHWA determines a State has not met or made significant progress toward meeting its performance targets, the State will be required to use obligation authority equal to the baseline year HSIP apportionment only for safety projects. States must also develop a HSIP Implementation Plan.

Target Selection Methodology

There are three steps to setting safety performance targets, which are: (1) estimating the existing trends to determine where we are now, (2) determining what external factors will impact the target in order to forecast future trends, and (3) to estimate targets based on forecasted fatality reductions from safety plans. The need to forecast future collision trends is prescribed by the fact that safety performance targets are set a year in advance where at least two years of collision data is unknown. For example, in the case of setting the first target in 2018, the total numbers of collisions are not known for the years 2017 and 2018 (and possibly the current year).

In order to answer the question of what external factors will impact the targets, there is an active National Cooperative Highway Research Project (NCHRP) 17-67 titled, “Identification of Factors Contributing to the Decline of Fatalities in the United States.” This study has preliminarily determined that economic factors contribute up to 85 percent of the variation of collisions on yearly basis. This study has found that the main factors are: the percent of unemployment for 16-24 year olds, Gross Domestic Product (GDP) per capita, median income, and beer consumption. In the case of California, seventy percent of the variation can be taken into account from only considering the unemployment rate and per capital GDP growth for California for the years 1998 to 2015.

FIGURE 1: THE INFLUENCE OF ECONOMIC FACTORS ON THE NUMBER OF FATALITIES IN CALIFORNIA



Therefore, to accurately forecast future collision trends for fatalities, serious injuries, and property damage only collision types, the difficult task of forecasting the economy with political and economic uncertainties would need to be completed.

In forecasting the number of fatalities, a more straightforward approach is to use the National Safety Council's (NSC) Motor Vehicle Estimates for the current year and then to extrapolate these values for an additional two years. For example in 2016, California ended up 13 percent higher as compared to 2015 and 19 percent higher as compared to 2014 for the number of fatalities. If this methodology is followed, then collisions are in corresponding fashion extrapolated to also increase 13 percent until 2018 (which is the first safety performance target reporting period). The advantage of using this methodology is that it is simple and it considers actual collision trends that are close in time to the target year. **Therefore, the recommendation is to use NSC estimates to forecast future trends due to the difficulty of forecasting economic trends for the number of fatalities.** If the five-year rolling average is taken from the years 2014 to 2018, this establishes the baseline values from which progress is measured.

The rationale for using current trends to extrapolate to the near future is that in the face of uncertainties the best indicator is what is happening in the present. Therefore, in a likewise fashion, the current trends for serious injuries are extrapolated from current trends. For instance, if the number of serious injuries are increasing nine percent in the current year, then this number is used to forecast numbers for an additional two years (for the purposes of setting targets). Unlike the number of fatalities, there are no official estimates (such as the NSC) to forecast serious injuries.

With regards to forecasting fatality and serious injury reductions from safety plans, the ideal is to set "empirically derived targets based on quantitative modeling of potential strategies. With this approach, targets are based on empirical evidence of the selected interventions' previous effectiveness combined with best estimates of future effectiveness, using a model linking inputs and outcomes" (Performance Management Practices and Methodologies for Setting Safety Performance Targets, Federal Highway Administration, 2011). Since safety performance targets pertain to all public roads, in a practical sense for this to work, local jurisdictions need to develop individual performance measures based on the particular needs of the locality and to also target the appropriate strategies. If regional implementation is adopted, this denotes a bottoms-up approach where targets are rolled up from the State and local jurisdictions based on safety effectiveness, supported by research, and are more realistic and achievable which in turn helps secure political support (Joint Transportation Research Centre of the Organization for Economic Cooperation and Development and International Transport Forum, *Towards Zero: Ambitious Road Safety Targets and the Safe System Approach*, 2008).

At the other end of the spectrum, a target is set by edict from agency leadership, elected officials, or other policy making bodies. The advantage of this approach is it is less time and money intensive and it is unequivocal and well understood. The drawback is that having an aspirational or vision based target is only symbolic if they have no realistic safety program to ensure success and do not define actions and goals of all of the responsible agencies (FHWA, 25, 2011).

As a part of this document, targets have been set through a consensus-based planning process within the context of a performance-based allocation of resources. Moreover, it is "felt strongly that Toward Zero Death (TZD) should be the ultimate aspirational goal for the plan, and that realistic and achievable steps should be set for California to move closer to zero deaths" (SHSP, 14). In a corresponding fashion, the rate of fatalities and serious injuries based on vehicle miles traveled will reflect the TZD goals.

Furthermore, the SHSP recommends that “the regional approach could be an excellent way to address the Executives Leadership’s overarching regional, local, and tribal government policy priorities and could be managed concurrently with the overall statewide effort where Challenge Area Teams continue to meet and work on issues of statewide concern” (SHSP, 38). This approach would be consistent with empirically derived targets as described in the ideal scenario.

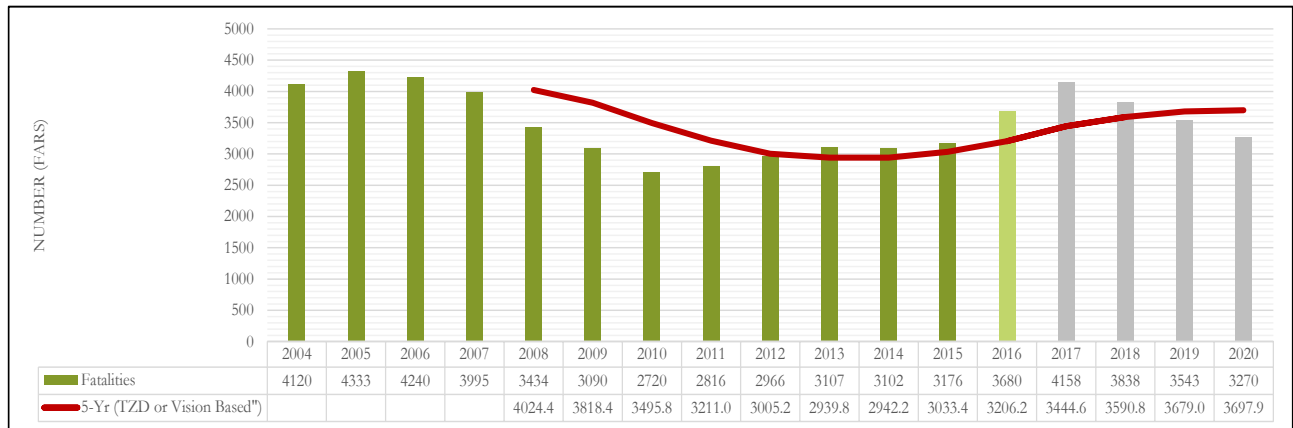
Nevertheless, the SHSP also states that, “a regional approach to implementation has not been formally adopted by the SHSP Executive Leadership and is currently under advisement and review” (SHSP, 38). As a result, the SHSP as currently structured is somewhere in the middle between and bottoms-up regional approach and a top-down aspirational or vision based approach. As currently devised, the SHSP provides a comprehensive umbrella document with fifteen challenge areas that reflect the main topic areas in roadway safety.

The 2018 SPMT engagement process started approximately one year after the 2015-2019 SHSP was published. The 2018 SPMT engagement process revealed a general consensus among California stakeholders, many of which participated in the development of the SHSP, to maintain the aspirational direction outlined in the SHSP a year earlier.

The Number of Fatalities

In 2018, the target for fatalities based on the five-year rolling average is **3590.8** with 3838 fatalities that are projected for the same year. The five-year rolling average includes four years of increasing fatalities and one year of decreasing fatalities. This is best explained while referring to Figure 2. The dark green bars denote the current data available in FARS (as of June 22, 2017), while the light green bar depicts the “NSC Motor Vehicle Fatality Estimates” for 2016. The gray bar in 2017 shows a thirteen percent increase in fatalities from 2016 to 2017, which is based on the most recent trends from 2015 to 2016, which is based on the NSC data. From 2017 to the 2030, the fatalities decrease at a rate of 7.69 percent based on the Toward Zero Death concept by 2030. For example, if the number of fatalities in 2018 of 4158 is multiplied by 0.9231 (or $1.000 - 0.0769 = 0.9231$), this equals 3838 fatalities in 2018. The line in red depicts the five-year rolling average, which takes the average on a year-to-year basis the previous five years of data.

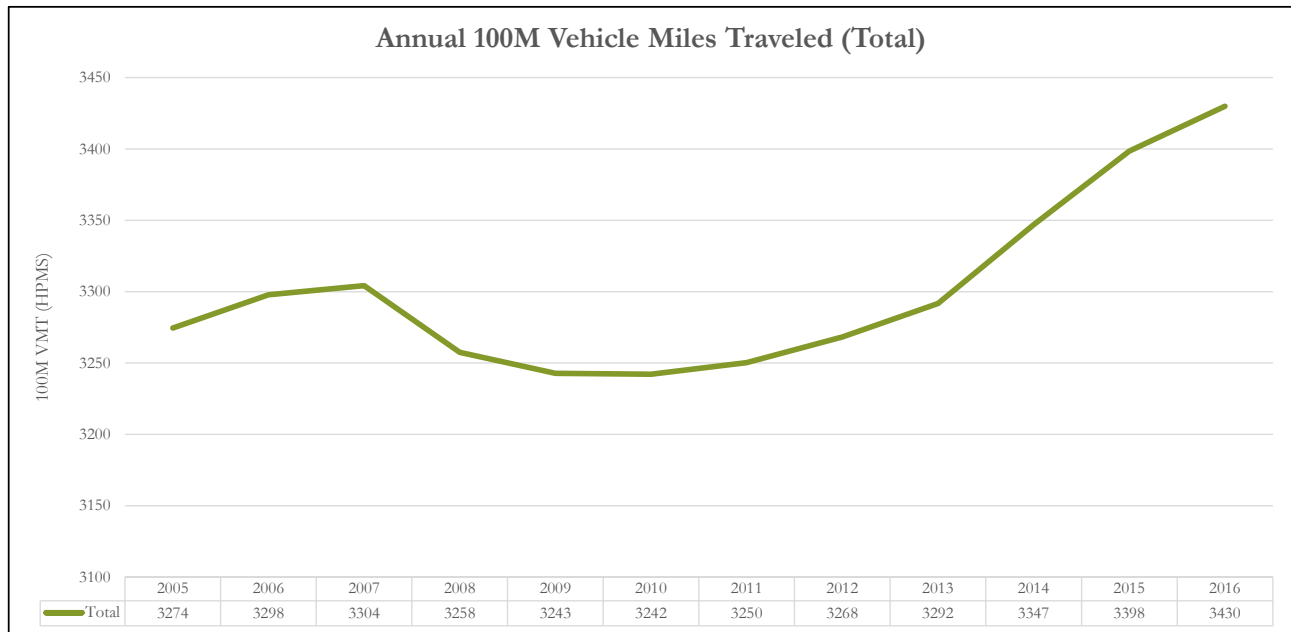
FIGURE 2: THE NUMBER OF FATALITIES



Annual Fatality Rate (per 100M VMT)

Before discussing fatality rates, a few words must be mentioned about statewide traffic volumes, which are reported in one hundred million vehicle miles traveled (100M VMT). While referring to Figure 3, traffic volumes have been steadily increasing since 2011. For the purposes of safety performance target setting, a 2 percent increase in VMT is forecasted from year-to-year for the years from 2015 to 2020.

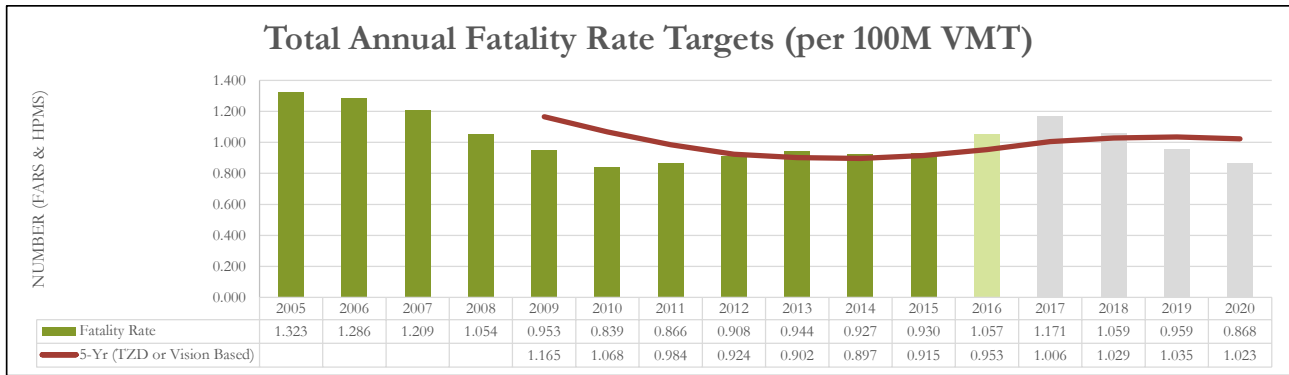
FIGURE 3. ANNUAL STATEWIDE TRAFFIC VOLUMES



The fatality rate is calculated by dividing the number of fatalities by 100M VMT. The same assumptions are relevant for the calculation of the number of fatalities and they are (refer to Figure 4):

- The bars in dark green denote the current data that is available in FARS (as of June 22, 2017 when the OTS presents their targets to NHTSA);
- The light green bar depicts the “NSC Motor Vehicle Fatality Estimates” for 2016; and
- The gray bars show a year-to-year increase of +13% from 2016 to 2017 (which is based on the change of fatalities from 2015 to 2016)

FIGURE 4. THE FATALITY RATE



The red line represents the five-year rolling average from annual fatality numbers that reflect the TZD aspirational goal. This is a “vision” based target, based on a year-to-year decrease of 7.69% from 2017 and onwards (which is divided by the traffic volumes). The 5-year rolling average set at 2018 is 1.029 per 100M VMT. As stated, The Average Annual Daily Traffic (AADT) volumes are increased 2 percent per year from 2014 levels for the years from 2015 to 2020. In summary, the target, which is based on the five-year rolling average (set at 2018), is **1.029** per 100M VMT.

The Number of Serious Injuries

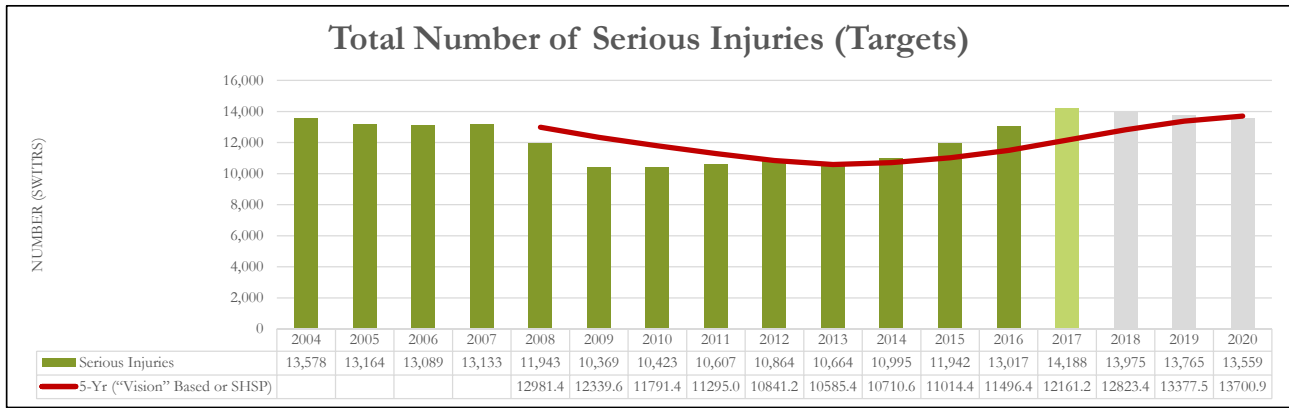
The serious injury data for the State of California resides in the Statewide Integrated Traffic Records System (SWITRS). The definition of serious injury corresponds to “A” in the KABCO Scale and the corresponding value in the SWITRS database is coded as “2”. This is explained in Table 2 (below).

TABLE 2. A COMPARISON BETWEEN KABCO AND SWITRS SERIOUS INJURY DEFINITIONS

| KABCO Definition (FHWA) | SWITRS Definition (CHP) |
|--------------------------------|--------------------------------|
| K: Fatal Serious Injury | 1: Fatal |
| A: Serious Injury | 2: Injury (Severe) |
| B: Minor Injury | 3: Injury (Other Visible) |
| C: Possible Injury | 4: Injury (Complaint of Pain) |
| O: Property Damage Only | 5: Property Damage Only |

Referring to Figure 5 below, the bars in dark green denotes the current data that is available in SWITRS (as of June 22, 2017). The light green bar depicts the forecasted values for 2017, which is based on an increase of +9% (the change from 2015 to 2016 for serious injuries). The gray bars show the number of serious injuries when decreased at a rate of -1.5% per year starting in the year 2018. The target year for serious injury numbers is 13,975. The red line represents a five-year rolling average from a decrease in serious injuries of -1.5% per year starting in 2017. This target is incorporated in the SHSP. This is a “vision” based or “aspirational” target. The five-year rolling average target for 2018 is **12,823.4**.

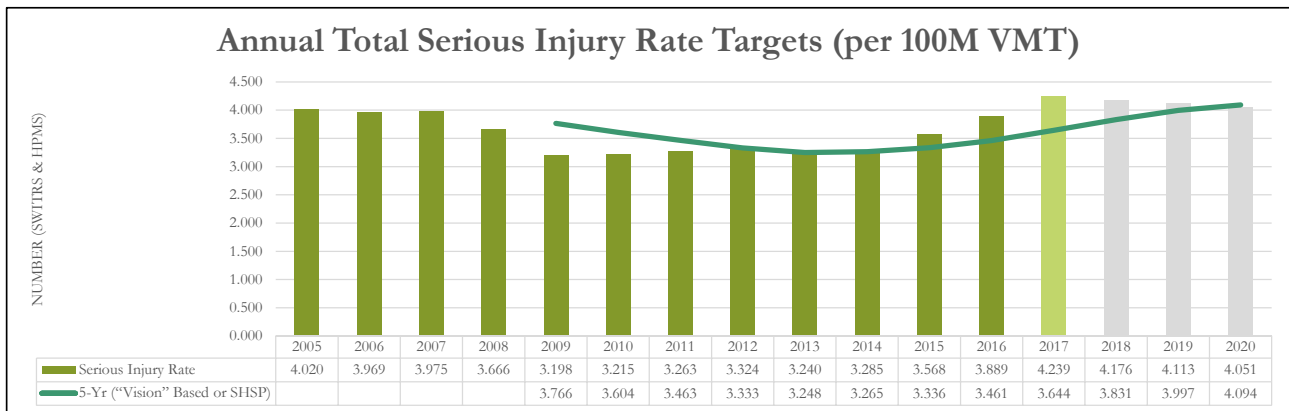
FIGURE 5. THE NUMBER OF SERIOUS INJURIES



The Rate of Serious Injury

The serious injury rate is the number of serious injuries divided by 100M VMT. While referring to Figure 6 (below), the bars in dark green denote the current data that is available in SWITRS and HPMS. The light green bar shows the 2017 value, which incorporates an increase of +9% for serious injuries. The gray bar charts denote an annualized decrease of 1.5% for serious injuries from 2017. The serious injury rate in 2018 is 4.176. The red line represents a five-year rolling average or serious injuries that decreases 1.5 percent per year from 2017. This concept is incorporated in the SHSP. This is a “vision” based or “aspirational” target. The 2018 target for the serious injury rate is **3.831**. The Average Annual Daily Traffic (AADT) volumes are increased 2 percent per year from 2014 levels for the years from 2015 to 2020 (as is the case in calculating the fatality rate).

FIGURE 6. THE RATE OF SERIOUS INJURIES

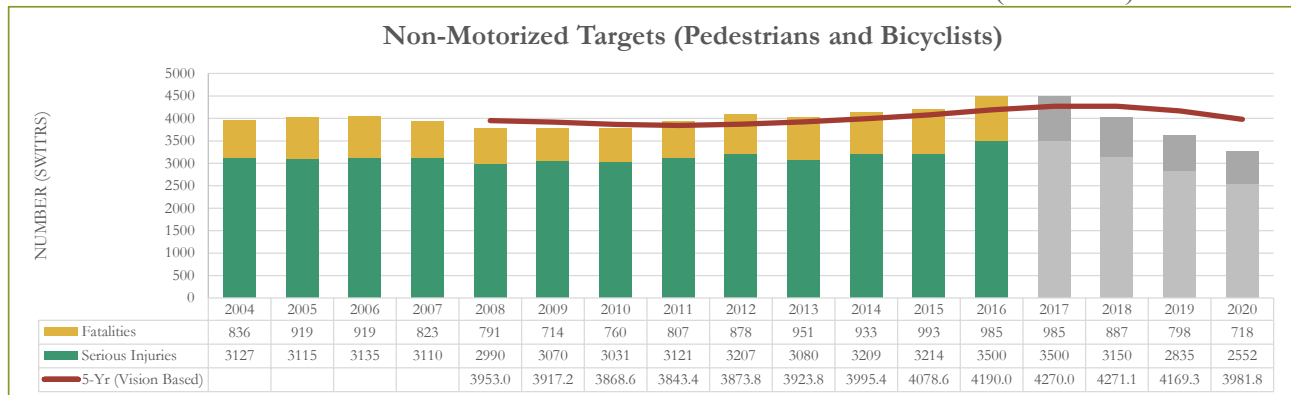


The Number of Non-Motorized Fatalities and Non-Motorized Serious Injuries (Bicycles and Pedestrians)

Concerning the number of fatalities and serious injuries for non-motorists, the strategy is to be more aggressive than the SHSP by mandating performance measures that are consistent with Caltrans’ 2015-2020 SMP. As part of Goal 1 in the SMP, which deals with Safety and Health, the strategic objective is to reduce fatalities and serious injuries by adopting a “Toward Zero Deaths” practice. **Therefore, the target for bicyclists and pedestrians fatalities and serious injuries is a 10 percent reduction per calendar year.** In the SHSP there are challenge areas for both pedestrians and bicycling along with strategies in the implementation plan to reduce fatalities and severe injuries.

While referring to Figure 7 (below), the orange bars show the number of fatalities for pedestrians and bicyclists combined. The number of fatalities is held constant from 2016 to 2017 at 985. The bar chart in green denotes the current data that is available in SWITRS for the number of serious injuries for pedestrians and bicyclists combined. The gray bars depict the forecasts for future years that are based on a year-to-year increase from 2016 to 2017 of 0.00%. That is, the number of serious injuries is held constant at 3500 from 2016 to 2017. The red line represents a five-year rolling average for serious injuries that decrease 10% per year from 2017 to 2020 for both fatalities and serious injuries. This is a “vision” based or “aspirational” target. The final target for 2018 is **4271.1**.

FIGURE 7. NON-MOTORIZED TARGETS FOR FATALITIES AND SERIOUS INJURIES (COMBINE)



Summary

For a breakdown of the five Safety Performance Targets, please refer to Table 1 on page 1. Appendix A also details the outreach efforts done by Caltrans, OTS, and the FHWA to the MPO’s, Counties, and local agencies in order to coordinate and communicate the safety performance targets. Further information with regards to the four webinars listed in Appendix A is accessible at: <http://www.dot.ca.gov/trafficops/shsp/>. Here data is provided from Caltrans, OTS, and the FHWA. For example, traffic volumes from HPMS are broken down by county for 10 years. In addition, all the four webinars have been recorded and can be accessed from this website. In addition, Appendix B provides a reporting template for the MPOs to document the 2018 Safety Performance Targets to the State six months after the August 31, 2017 deadline to the FHWA for the State targets.

APPENDIX A: Safety Performance Target Setting Outreach Efforts

Background:

Safety Performance Management (Safety PM) is part of the overall Transportation Performance Management (TPM) program, which the Federal Highway Administration (FHWA) defines as a strategic approach that uses system *information* to make investment and policy decision to achieve national performance goals. The Safety PM Final Rule supports the Highway Safety Improvement Program (HSIP), as it establishes safety performance measure requirements for the purpose of carrying out the HSIP and to assess fatalities and serious injuries on all public roads.

The Safety PM Final Rule establishes five performance measures as the five-year rolling averages to include:

1. Number of Fatalities
2. Rate of Fatalities per 100 million Vehicle Miles Traveled (VMT)
3. Number of Serious Injuries
4. Rate of Serious Injuries per 100 million VMT
5. Number of Non-motorized Fatalities and Non-motorized Serious Injuries

The Safety PM Final Rule also establishes the process for State Departments of Transportation (DOTs) and Metropolitan Planning Organizations (MPOs) to establish and report their safety targets, and the process that the FHWA will use to assess whether State DOTs have met or made significant progress toward meeting their safety targets.

Important Dates/Deadlines:

The overall State targets required by FHWA are due on August 31st, annually, while the MPOs set their targets six months after the State sets its targets. Three of the five safety targets must be coordinated with the Highway Safety Plan administered by the Office of Traffic Safety (OTS), which must submit their targets to NHTSA by June 30th of each year.

Performance Targets must also be included in updates to Long-Range Statewide Transportation Plans (LRSTP), metropolitan transportation plans (MTP), state transportation improvement programs (STIP) and transportation improvement programs (TIP) after May 27, 2018.

Engagement Timeline:

- **November 28, 2016** – An all day workshop was held in Caltrans' Boardroom to discuss, in a theoretical sense, what is behind safety performance targets. The MPOs, local and regional agencies, and the Tribal Governments were invited. The FHWA co-presented the workshop and answered frequently asked questions about the target setting process and what the possible consequences are for the State and MPOs if safety performance targets are not met. Caltrans presented the latest fatality and serious injury data for the State. The data was also broken down by the challenge areas in the Strategic Highway Safety Plan. A prerequisite webinar was also developed by the FHWA to provide background information to the participants before the workshop. The OTS also presented at the workshop.
- **December 12, 2016** – This workshop was held at the Holiday Inn in Downtown Sacramento, California. Like the workshop in November, the participants included the MPOs, local and regional agencies and the Tribal Governments. The FHWA co-presented the workshop to provide further guidance on the final rules adopted for Safety Performance Management. The OTS also presented since three of the five state performance targets must be coordinated with OTS. Caltrans presented

the latest trend data for fatalities and serious injuries and possible strategies for target setting. After the Caltrans presentation, the participants broke into groups to discuss the targets and preferences for where to set the targets from a regional perspective.

- **February 8, 2017** – This workshop was held in Fontana, California at the District 8 Traffic Management Center. The objective of this workshop was to demonstrate how to access and analyze safety data to set safety performance targets for an MPO. Santa Barbara County Association of Governments (SBCAG) was the example used for the demonstration. The FHWA presented information on how to access HPMS, while the California Highway Patrol (CHP) made a presentation on how to access SWITRS data. Caltrans demonstrated how the data could be analyzed and OTS presented on what countermeasures could be funded through their grant program.
- **June 22, 2017** – The final workshop presented the State safety targets with an explanation of the underlying assumptions in establishing the targets. In addition, an overview of the Office of Traffic Safety’s Behavioral and Education funding opportunities were presented.

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