SAFE SYSTEM PILOT APPLICATION SUMMARY

MEASURING SAFE SYSTEM ALIGNMENT IN THE CALTRANS RUN-OFF-ROAD MONITORING PROGRAM

CASE STUDY | **AUGUST 2024**

To advance implementation of the Safe System Approach (SSA), Federal Highway Administration (FHWA) developed three (3) resources for measuring SSA alignment—Safe System Project-Based Alignment Framework, Safe System Policy-Based Alignment Framework, and Safe System Roadway Design Hierarchy. These resources were introduced, applied, and refined through a series of eight (8) pilot workshops. The Safe System Pilot Application Summaries provide an overview of each pilot application, the approach used to assess Safe System alignment, and outcomes from the pilot effort.

The *Safe System Policy-Based Alignment Framework* offers a series of questions and considerations to help agencies assess policy and program alignment with the SSA. The Framework is based on seven criteria. These criteria include the SSA principles: 1) death and serious injury are unacceptable; 2) humans make mistakes; 3) humans are vulnerable; 4) responsibility is shared; 5) safety is proactive; and 6) redundancy is crucial, as well as equity. A series of prompts guide the user to evaluate the level to which the policy or program is aligned with each criterion. Similar to the *Highway Safety Improvement Program Self Assessment Tool*, there are five levels of alignment—Initiation (an agency has started to address the initiative), Development (an agency has developed a plan or approach to address the initiative), Execution (an agency has executed a plan or approach to address the initiative), Evaluation (an agency has assessed performance of the initiative), and Integration (an agency has integrated the initiative into agency culture). The user assigns a score within the appropriate level.

The Policy-Based Alignment Framework can be used to:

- **BENCHMARK PROGRESS** toward improving the SSA alignment of agency policies.
- **RAISE THE LEVEL OF AWARENESS** and promote adoption of SSA-related practices and strategies.
- **IDENTIFY GAPS** in existing policy and program efforts.
- **GENERATE STRATEGIES** to improve SSA alignment in agency policies and programs.
- **TRACK PROGRESS** of SSA alignment.
- **INFLUENCE A CHANGE** in agency business practices.

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ZERO IS OUR GOAL
A SAFE SYSTEM IS HOW WE GET THERE

CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS) PILOT BACKGROUND

In 2006, Caltrans developed a Run-off-Road (ROR) Collision Monitoring Program to reduce the number of ROR collisions on the State Highway System. The California Strategic Highway Safety Plan (SHSP) identified the Lane Departure Challenge Area as one of its high-priority areas, representing 48 percent of the State's fatalities and 45 percent of the serious injuries from 2008 to 2017. As part of the program, Caltrans generates an annual report of locations exhibiting higher than expected ROR crashes. The report details locations, investigation responsibilities, and countermeasures for addressing locations, including FHWA's Proven Safety Countermeasures that support SHSP and SSA strategies such as providing enhanced signage and pavement markings. Responsibilities are supplemented with a timeline and tracking system, supporting the State's ability to assess the program.

District offices investigate the locations within their jurisdiction that may warrant corrective action. Improvements recommended by the districts are reviewed by Caltrans' Offices of Safe System Approach Integration and Strategic Safety and Implementation, and if approved, are programmed for implementation into the State Highway Operation and Protection Program (SHOPP) or Highway Maintenance Programs. The purpose of this pilot was to review the ROR Collision Monitoring Program through a Safe System lens to improve its alignment with the Safe System principles.

THE APPROACH

Caltrans convened several of its staff, including representatives from the Offices of Safe System Approach Integration, Safety Systems and Devices, and Strategic Safety and Implementation, to participate in a one-day virtual workshop. During the workshop, participants discussed opportunities to improve SSA alignment in the ROR Collision Monitoring Program using the Safe System Policy-Based Alignment Framework. **Organized by the Framework criteria, and building upon participants feedback, the following describes FHWA's best practice ideas to enhance alignment of Caltrans' ROR Collision Monitoring Program with the SSA.**

Death and Serious Injury are Unacceptable

The policy could focus on eliminating fatal and serious injury crashes versus all crashes. Caltrans' ROR Collision Monitoring Program prioritizes locations with observed fatal and serious injury roadway departure crashes. This prioritization method aligns with the SSA; however, the stated goal of the program is to "reduce fatal or serious injury crashes involving vehicles departing the roadway, hitting an object, or overturning." Caltrans could consider modifying the goal of the ROR Collision Monitoring Program to "eliminate fatal and serious injury crashes." This change in terminology demonstrates that Caltrans does not accept any outcome other than zero. While other Caltrans documents explicitly support the elimination of fatalities and serious injuries, all documents could adopt this goal.

Humans Make Mistakes

The policy could acknowledge that humans make mistakes and that systems could be built to make sure that when they occur, the crashes do not yield fatal and serious injuries. Additionally, human factors and behavior generally play a significant role in crashes; thus, developing strategies and policies to accommodate human behavior is critical to creating a Safe System. The ROR Collision Monitoring Program provides a "Countermeasures" section that lists several improvements that account for when "humans make mistakes." ROR programs are often centered around aspects of the roadway that lead to human error, so the documentation supporting this program could explicitly discuss the implication of human error, as well as how the ROR Collision Monitoring Program is addressing the likelihood of human error. Additionally, discussion of behavioral countermeasures and partnerships with agencies focused on education and enforcement could be incorporated into the documentation, as they also help to prevent human errors. These other stakeholders often focus on addressing different aspects of these mistakes.

Humans are Vulnerable

The policy could recognize that the human body can only withstand a certain amount of kinetic energy which is directly affected by speed and angle of collision. It may identify strategies that discuss vulnerable road users (e.g., pedestrians, bicyclists), speed management (e.g., policy changes, design improvements, etc.), and angle of collision. As documented by the SHSP, lane departure crashes represent 48 percent of the State's fatalities and 45 percent of serious injuries from 2008 to 2017. Based on these statistics, when ROR crashes take place, the chance for severe injury is relatively high due to limitations of the human body to withstand potential fixed object, overturning, and other impacts outside the travel way. Explicit text or infographics about the relationship between speed, ROR crash types, severity, and human vulnerability could be included to better align the document with this SSA principle.

Responsibility is Shared

The policy could address how the responsibility of eliminating fatalities and serious injuries can be shared among all roadway users. The ROR Collision Monitoring Program discusses the "District Reporting Requirements", which implies that this is a statewide effort and that every District has a responsibility to keep up with the report. Caltrans could consider convening a multi-disciplinary stakeholder group to help combat these ROR crashes. Representatives could be both staff at Caltrans, as well as outside partners that already work with on other safety priorities like local and State law enforcement officers, the Office of Traffic Safety (OTS), and others implementing non-engineering countermeasures. When engaged, all of these representatives provide different insights into the roadway network and ROR crashes and assist in the implementation and monitoring of countermeasures.

Safety is Proactive

The policy could proactively account for risks and behaviors that may lead to fatal and serious injury crashes. The ROR Collision Monitoring Program Report and supporting procedures provide some explanation on the importance of risk identification, but the current criteria for identifying priority ROR locations could expand beyond crash history alone, taking a more systemic approach by proactively reviewing roadway risk characteristics overrepresented in ROR crashes similar to Caltrans Pedestrian and Bicycle Systemic Programs. When discussing the background and program criteria, the policy guidance could explicitly state that specific risks, or the elimination of those risks, can yield a reduction in fatal and serious injury ROR crashes. The list of countermeasures is a comprehensive list of infrastructure improvements and could be used to also identify the risks each countermeasure may target, and when each should be prioritized based on various factors and criteria such as the alignment with the Safe System Roadway Design Hierarchy. Proactively providing a list of locations and a funding mechanism for Districts to implement the listed improvements is also a great step for addressing network-wide issues and eliminating ROR fatalities and serious injuries.

Redundancy is Crucial

The policy language could highlight how various infrastructure elements provide layers of protection and how behavioral, education, and enforcement strategies provide another layer of protection if the infrastructure fails. ROR crashes are often addressed by combining multiple countermeasures to address key risks, and the ROR program does identify solutions that could help resolve these types of crashes, as well as stating "countermeasures may be used alone or in combination as the engineer determines is best". Proactively listing the risks that each countermeasure addresses and explaining the benefits of using several of the countermeasures together (e.g., providing enhanced delineation along with edge line rumble at curves) could be beneficial. Additionally, Caltrans could consider providing additional language or support for non-infrastructure improvements, policies, and programs that can be implemented for redundancy, as well as how site evaluation and countermeasure selection could consider post-crash care.

Equity

The policy could prioritize communities and users of the transportation network that are disproportionately impacted by safety challenges and include solicitation of input from those communities and users. Additionally, policy language may include considerations and strategies for addressing inequities in transportation safety investments for all users. California's SHSP and HSIP Implementation Plans detail the importance of both vulnerable road users and equity. The ROR program could reference the SHSP as a way to discuss the importance of equity as one of the four guiding principles of the SHSP, possibly highlighting the impacts of ROR crashes on

different types of users or the impacts of the improvements on various types of users. For example, providing shoulder rumble strips may adversely affect bicyclists riding in the shoulder. Also, the ROR program documentation is a great opportunity to highlight the importance of addressing an overrepresented crash type on lower volume roadways in rural communities and different locations, outside of simply focusing on congested urban intersections.

OUTCOMES

As a result of the Safe System pilot and related efforts, Caltrans is doing the following:

Program Strategy Review

Caltrans has embarked on a comprehensive review of all safety screening and funding programs in the form of a Program Strategy Review. Caltrans will include the findings and recommendations discussed during the Safe System Policy-Based Alignment Framework workshop as part of the review process. The Program Strategy Review is expected to be completed by December of 2024.

APPLYING THE SAFE SYSTEM POLICY-BASED ALIGNMENT FRAMEWORK IN YOUR AGENCY

The *Safe System Policy-Based Alignment Framework* can be used to assess Safe System alignment of any policy, procedure, program, or plan. The following is a summary of the lessons learned from the Caltrans pilot that may benefit other agencies applying the Policy-Based Alignment Framework.

- **COLLABORATE IN-PERSON—**It is important to consider the environment in which the workshop is being conducted. In-person discussions are encouraged. In-person collaboration fosters more honest and open discussion and often yields better results than an online meeting. An in-person meeting also promotes the SSA principle of "responsibility is shared" when participants devote their attention to the workshop and engage in identifying methods for aligning their policy with the SSA.
- **INVOLVE KEY STAKEHOLDERS—**When selecting individuals to participate in a workshop, key stakeholders responsible for implementing the policy being reviewed should be included to the extent possible. Having these individuals provide insights into the policies and programs they implement and manage will result in the greatest likelihood of successful adoption of changes, both because the input received would be most meaningful since it will be from those most familiar with the policies and because there will be buy-in for any changes suggested.

> *"We recommend that all DOTs pilot the Safe System Policy-Based Alignment Framework on a variety of safety programs. This will enable the framework to be evaluated for effectiveness in a robust manner and modified if needed to best meet the needs of State DOTs nationwide."*
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> **– Caltrans Division of Safety Programs**

For more information about the Safe System Policy-Based Framework and other FHWA Safe System related tools and resources, please visit: https://highways.dot.gov/safety/zero-deaths.

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