

## C.3. Highway Safety Improvement Technical Plan

### C.3.1. Introduction

The [Highway Safety Improvement Program \(HSIP\)](#) is a core Federal-aid program with the purpose of achieving a significant reduction in traffic fatalities and serious injuries on all public roads, including non-State-owned roads and roads on tribal land. The HSIP consists of three main components, the Strategic Highway Safety Plan (SHSP), the Railway-Highway Crossing Program (RHCP) and the High-Risk Rural Roads (HRRR) Program.

The Colorado HSIP is managed by the CDOT Traffic and Safety Engineering Branch. The Program is guided by its focus on [Towards Zero Deaths](#) and strategic, data-driven analysis and decision-making, to support projects that are most effective in improving safety. Colorado HSIP supports continuous and systematic processes that identify and review specific traffic safety issues around the state and identify locations for potential improvement. The ultimate goal of Colorado HSIP is to reduce the number of crashes, injuries and fatalities by eliminating factors that lead to crashes through the implementation of engineering, enforcement, education, and Emergency Medical Services (EMS) solutions.

The [Strategic Highway Safety Plan \(SHSP\)](#) is a major component and requirement of the HSIP. SHSP is a statewide coordinated safety plan that provides a comprehensive framework for reducing highway fatalities and serious injuries on all public roads. The SHSP identifies key safety needs and guides investment decisions towards strategies and countermeasures with the greatest potential to save lives and prevent injuries. Similarly, RHCP funds projects that eliminate hazards at railway-crossings. High Risk Rural Roads is another program contained within HSIP. Because of an increase in the fatality rate on rural roads, CDOT is required to spend a portion of its HSIP funds on rural roads.

All public roadways are eligible for participation under the HSIP program. Most HSIP projects are identified by identifying correctible crash patterns through statewide crash data analyses and confirmation at the locally-level that the observed safety can be addressed through engineering analyses or other HSIP eligible activities. CDOT regional staff consult and build upon the statewide analysis as well as work with local partners to identify candidate projects which are not on the state highway system. Each Region develops an initial listing of candidate locations with higher potential for crash mitigation and submits that list to the Traffic and Safety Engineering Office for funding consideration.

### C.3.2. Regulatory Considerations

#### C.3.2.1. Regulations/Resolutions

The following list provides an overview of relevant federal and state regulations and requirements governing planning, policy, data, performance, funding, and project selection of surface treatment projects.

- 23 Code of Federal Regulations (CFR) Part [924](#) and [490](#)
- United States Code (USC), Sections [130](#), [148](#), [150](#), and [152](#)

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- Colorado Revised Statutes (CRS) [43-5-401](#)
- [Policy Directive 14](#)

### C.3.2.2. Guidelines

The additional guidelines provide insights to HSIP related procedures and practices

- [Colorado Highway Safety Improvement Program Procedural Guide](#)
- [Strategic Highway Safety Plan](#)

### C.3.3. Asset Inventory & Condition

The Highway Safety Improvement Program is a funding source for safety projects and does not have assets.

### C.3.4. Performance

There are no direct performance metrics or targets specific to HSIP. Nevertheless, safety is a theme in many of CDOT's performance metrics, and HSIP is a means of addressing those metrics and achieving performance targets.

### C.3.5. Funding

HSIP's funding source is the Federal Highway Safety Program, and the State Highway Fund which provides matching funds. The funds are allocated to the regions using a formula method based on the percent of crashes occurring in each of the Regions. The Regions make approximately 50 percent of these funds available to local authorities.

#### C.3.5.1. Funding Mechanisms

Projects are funded with 80 percent federal-aid and 20 percent State Highway Fund for the match for state projects or 20 percent local funding for local agency projects. Approximately half of all crashes in Colorado occur off-system. Based on this, half of Colorado's apportionment is reserved for local agencies to use on their public roads. Recent HSIP budgets and estimates are summarized in **Table C-13**.

**Table C-13. HSIP Allocations (millions)**

Actual FY 2016-17	Actual FY 2017-18	Budget FY 2018-19	Proposed FY 2019-20
\$6.4	\$42.5	\$43.1	\$44.0

#### C.3.5.2. Region Pool Distributions (4 Year Forecast)

The region distribution is based on the proportion of crashes that have occur within each Region. The approximate distribution of crashes per region is summarized in **Table C-14**. There is no maximum request limit per project, although there are limited funds and each local agency within each Region competes against each other for that funding (based on the projected benefit over cost). The benefit to cost ratio is calculated using the entire cost of the project, not



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just the amount requested. Given these parameters, the program tends to favor low cost safety improvements over more significant infrastructure projects.

**Table C-14. Regional Distributions**

Region 1	Region 2	Region 3	Region 4	Region 5
52.9%	16.9%	9.3%	17.2%	3.7%

### C.3.6. Investment Strategies

FHWA requires that HSIP investment strategies be data-driven, strategic approaches to improving highway safety on all public roads with a focus on performance. CDOT ensures these ends are met through the operation of Colorado HSIP, and the regular planning and analysis that it undertakes as demonstrated in the Colorado Highway Safety Improvement Program Procedural Guide and Strategic Highway Safety Plan.

### C.3.7. Lifecycle Management & Project Selection

#### C.3.7.1. Treatment Lists

Typical HSIP funded projects involve intersection improvements, guardrail installation, lighting upgrades, pedestrian and bicycle improvements, shoulder widening, ITS, curve flattening and other geometric modifications, as well as sign and pavement marking upgrades

#### C.3.7.2. Project Selection Process

All public roadways are eligible for participation under the HSIP program. Colorado's procedure for complying with Federal requirements has evolved over the years. The projects are selected and prioritized following the CDOT Traffic Engineering Branch's nationally recognized and FHWA approved methodology. State highway improvement projects as well as local, county and city projects are eligible to receive these funds. In addition to a detailed statistical analysis of crash history, the screening procedure incorporates a benefit/cost evaluation which aids in normalizing cost impact, thus allowing projects of divergent budgets to compete for the limited funding resources on a fair basis.

CDOT identifies safety issues to be addressed by HSIP projects through by identifying correctible crash patterns through statewide crash data analyses and confirming locally observed safety issues using engineering analysis. CDOT uses two methods for identifying locations with potential for crash reduction: Level of Service of Safety (LOSS) and Diagnostic Analysis. LOSS is based on the concept of Safety Performance Functions (SPF), while Diagnostic Analysis is developed around the idea of statistical pattern recognition. LOSS reflects how the roadway segment is performing in regard to its expected crash frequency and severity at a specific level of annual average daily traffic. It provides a comparison of crash frequency and severity with what is expected for that type of highway facility.

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### C.3.7.3. Regions

Regions consider safety analysis conducted at the statewide-level to inform their HSIP project prioritization efforts. Regions are provided candidate HSIP project lists for further consideration. The Regions use the list along with other information such as their own operational reviews, input from citizens, staff and city/county personnel as well as other ongoing or scheduled construction activities in order to determine the most feasible and beneficial candidate safety project submittals through application submittal. Applications submitted for candidate projects which are not on the state highway system are solicited from local authorities in coordination with MPOs, the Special Highway Committee of the Colorado Counties, Inc. and the Colorado Municipal League. Finally, regions are responsible for reviewing all applications and submitting them to the Safety and Traffic Engineering Office. More details about this process are available in the Colorado Highway Safety Improvement Program Procedural Guide.

### C.3.8. Reporting, Management, Documentation

#### C.3.8.1. Reporting to Internal and External Stakeholders

The Traffic and Safety Engineering Office develops CDOT's Strategic Highway Safety Plan to assess the progress made in meeting various safety goals. The plan also guides CDOT safety investment, planning, and programming decisions related to highway safety by targeting high- and critical-priority safety problems. The plan incorporates the same "Toward Zero Deaths" philosophy that serves as the HSIP's underpinning.

#### C.3.8.2. Management / Advisory Committees

FHWA requires the development of the State Highway Safety Plan. MPO's and TPR's, Colorado Counties Inc., Public Utilities Commission and the Colorado Municipal League assist with project selection