



COLORADO

**HIGHWAY SAFETY
IMPROVEMENT PROGRAM**
2018 ANNUAL REPORT



U.S. Department of Transportation
Federal Highway Administration

Photo source: Federal Highway Administration

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Disclaimer

Protection of Data from Discovery Admission into Evidence

23 U.S.C. 148(h)(4) states “Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for any purpose relating to this section [HSIP], shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location identified or addressed in the reports, surveys, schedules, lists, or other data.”

23 U.S.C. 409 states “Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.”

Executive Summary

Colorado's (5 year average) fatalities and fatal crash rates have increased in 2017. Both (5 year average) serious injuries and the serious injury crash rate have seen little change in 2017.

Colorado uses HSIP resources to incorporate safety improvements across a broad range of maintenance, safety and non-infrastructure projects. Innovative methodologies developed and used by CDOT will continue to identify more locations, on a statewide scale, with the greatest potential for crash reduction. Applications of Highway Safety Manual concepts and systemic approaches are also being integrated into the HSIP program, with a focus in particular on developing a more defined application process with respect to the systemic approach.

Colorado's current SHSP implementation plan targets goals and devises strategies in each emphasis area to see where improvements can be made in order to support the vision of moving towards zero deaths. During 2017, CDOT made additional successful efforts to solicit off-system (non-state highway), local agency projects; over the next fiscal year, CDOT hopes to continue to solicit a greater number of off system locations with high potential for crash reduction with the help of local agencies partners and stakeholders.

High Risk Rural Roads (HRRR) and Local Agency safety improvements will be specifically focused on and incorporated in FY 2018 and going forward. A separate HRRR solicitation occurred during FY2017 to address a required special allocation of just over \$2.8 million to these project types in response to Colorado being notified that our fatality crash rate on these rural roads have increased and thus requires CDOT to make efforts to specifically address this issue. Project applications were received; however, response was not as hoped for. So CDOT is making efforts to increase outreach, education, and assistance to local agencies to increase the number of projects submitted and ultimately delivered.

Additional solicitations for these specific type of local agency and HRRR projects will take place to help address local and more rural crashes occurring on Colorado's roadways. Additionally, CDOT intends to provide more guidance and detail regarding resources available to them to aid in their endeavors to secure HSIP funding for their projects.

Introduction

The Highway Safety Improvement Program (HSIP) is a core Federal-aid program with the purpose of achieving a significant reduction in fatalities and serious injuries on all public roads. As per 23 U.S.C. 148(h) and 23 CFR 924.15, States are required to report annually on the progress being made to advance HSIP implementation and evaluation efforts. The format of this report is consistent with the HSIP Reporting Guidance dated December 29, 2016 and consists of five sections: program structure, progress in implementing highway safety improvement projects, progress in achieving safety outcomes and performance targets, effectiveness of the improvements and compliance assessment.

Program Structure

Program Administration

Describe the general structure of the HSIP in the State.

Colorado's overall HSIP program is administered by the Traffic & Safety Engineering group at CDOT headquarters.

Regional CDOT traffic and safety engineering staff work internally and in consort with local agencies to identify projects with safety improvement needs. Initial review and analysis occur at this regional level. Upon acceptance by the region as a viable and potentially necessary safety project, the region makes a request to HQ for final review and analysis and associated HSIP funding eligibility criteria. Upon completion of final review and quantitative and qualitative analysis by HQ traffic and safety engineering staff of projects submitted by CDOT Regional traffic and safety engineering, the projects are either approved or denied and budgeted accordingly against the projected regional allocation for the fiscal year in which the funding is needed. In an effort to increase safety overall across the state, thorough dialogue between HQ and the requesting region occurs on a project-by-project basis when additional information, background, or data are needed in the event that a project appears to fall short of eligibility. Additionally, because projects that are awarded HSIP funding are required to address individual areas of focus as defined within the Strategic Highway Safety Plan (SHSP), as part of the review and analysis process, our group confirms that such projects do in fact fall within the SHSP areas of focus.

Upon approval of such HSIP funding the CDOT regions are responsible for final project delivery on-system. In the event that a local agency is receiving HSIP funding for off-system safety improvements, the CDOT regional staff coordinate with such local agencies regarding HSIP funding to enable these local agencies to deliver these projects.

Where is HSIP staff located within the State DOT?

Engineering

Enter additional comments here to clarify your response for this question or add supporting information.

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Within Transportation Systems Management & Operations (TSM&O)

Under HQ Traffic Safety & Engineering

How are HSIP funds allocated in a State?

Formula via Districts/Regions

Enter additional comments here to clarify your response for this question or add supporting information.

HSIP funds are allocated to each CDOT Region based upon crash distribution and the program is administered through the central CDOT headquarters group.

Describe how local and tribal roads are addressed as part of HSIP.

Under this program all public roadways are eligible for participation. Submittals for projects not located on the State Highway system are solicited from local authorities through the various Metropolitan Planning Organizations (MPO's) and the Special Highway Committee of the Colorado Counties, Inc. and the Colorado Municipal League. These candidate proposals for safety improvement projects are submitted for locations identified using the locals' own high hazard locations identification system. As with the Region applications, all submittals will be required to meet the minimum criteria. Copies of project applications received in the Safety and Traffic Engineering Office from locals are submitted to the Region offices for comments, evaluation and approval. The Region offices are specifically requested to verify project cost estimates, and when necessary, are also requested to make project cost adjustments with the submitting local authorities' concurrence. In addition to CDOT's standard practice of soliciting local agencies, for FY 2017 CDOT issued a separate solicitation for High Risk Rural Roads (HRRR) to facilitate safety improvements on off-network (non CDOT state hwy/freeway) locations. Few local applications were received under this solicitation and no applications for roadways on tribal lands were received. It is our hope that increased outreach and education by CDOT, in consort with local agency efforts, that more applications for HSIP funding will be received in future solicitations.

Approximately one half of the HSIP funding is allocated toward off-system locations (including tribal lands) because approximately half of all statewide crashes occur off system. The allocation is based on statewide crash distribution. In recent years, there have not been enough off-system safety improvement projects to use the full allocated amount. In such cases, the state will apply those unused funds for state highway safety improvement projects. CDOT will look to offer more support in helping local agencies submit enough projects to account for their full allocation in the future.

Finally, CDOT is working to develop a Local Road Safety Program (LRSP) to hopefully better serve our local agency partners in improving roadways safety for the traveling public.

Identify which internal partners (e.g., State departments of transportation (DOTs) Bureaus, Divisions) are involved with HSIP planning.

2018 Colorado Highway Safety Improvement Program
Traffic Engineering/Safety
Design
Planning
Operations
Governors Highway Safety Office
Other-Office of Financial Management & Budget
Other-CDOT Regions

Enter additional comments here to clarify your response for this question or add supporting information.

Describe coordination with internal partners.

The CDOT HQ Traffic and Safety Engineering (TSE) branch periodically produces a statewide composite listing of potential locations for crash reduction is compiled for all highway segments and intersections performing at a sub-standard level of service of safety (LOSS) as well as identifying crash patterns that are over-represented at those locations. This listing is provided to each CDOT Region where their traffic units, roadway design staff and transportation planners can coordinate and select appropriate safety improvement projects with the goal of reducing roadway fatalities and serious injuries. The Regions use the listing 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 projects. The Region may also choose to nominate other safety project locations besides those mentioned on the listing.

Applications for new highway safety improvement projects are sent to TSE branch for evaluation to determine HSIP eligibility and level of funding. The TSE branch works with the Office of Financial Management & Budget (OFMB) to determine the amount of HSIP funding available for the current fiscal year as well as how much is anticipated to be available in future fiscal years for HSIP project planning and scheduling. The TSE branch also works with OFMB to obtain status updates on HSIP obligation and expenditure amounts for ongoing projects. Approved HSIP projects are incorporated into the Integrated Safety Plan in coordination with the CDOT Office of Transportation Safety group and their safety programs.

Identify which external partners are involved with HSIP planning.

Regional Planning Organizations (e.g. MPOs, RPOs, COGs)
Governors Highway Safety Office
Local Technical Assistance Program
FHWA
Other-Local Agencies

Enter additional comments here to clarify your response for this question or add supporting information.

Describe coordination with external partners.

In an effort to maintain consistency in data, analysis, and understanding of safety needs statewide, and subsequent implementation of such safety improvement projects CDOT HQ Traffic & Safety Engineering staff

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communicate and work directly with external entities and governing bodies such as FHWA, state and local law enforcement, other state agencies, MPO's, municipalities, counties, and other interested parties.

Additionally, at the regional level, CDOT Regional traffic & safety engineering staff coordinate more directly with local government officials, the citizenry, other such stakeholders having traffic and safety concerns that are specific to their particular region, and media relations.

These individual areas of focus enable the regions to be more directly in touch with local needs for which HSIP funding may be eligible. This then translates to CDOT's overall ability to integrate HSIP funded solutions utilized within any specific region into the statewide efforts to reduce crash severity, crashes overall, and progress toward the goal of Zero Deaths.

Have any program administration practices used to implement the HSIP changed since the last reporting period?

Yes

Describe HSIP program administration practices that have changed since the last reporting period.

In response to excellent feedback obtained from many partners both internal and external during a program assessment, we are endeavoring to improve our HSIP program by incorporating a systemic approach as a specific option to help address safety concerns statewide. We are also currently revisiting our HSIP manual to incorporate both improvements identified during the course of our recent HSIP Assessment completed by FHWA as well as improvements that we have identified internally which we believe will help deliver our HSIP in an effective and efficient way. Our overall administration practices are not anticipated to undergo any specific changes other than to incorporate methodology to account for the above mentioned systemic methodology.

Are there any other aspects of HSIP Administration on which the State would like to elaborate?

Yes

Describe other aspects of HSIP Administration on which the State would like to elaborate.

CDOT was notified that our 5 year average fatality rate has increased on rural roadways, and thus would need to allocate, in this case, just over \$2.8 million to specifically address this issue. In response, CDOT HQ Traffic & Safety Engineering prepared and issues a special solicitation for High Risk Rural Roads (HRRR) in an effort to address this concern. We did receive applications that were good safety projects and were approved. However, the response was not as hoped for. Our office intends to include more education and outreach efforts on future solicitations of this type in order to encourage more participation on the part of local agencies.

Program Methodology

Does the State have an HSIP manual or similar that clearly describes HSIP planning, implementation and evaluation processes?

Yes

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To upload a copy of the State processes, attach files below.

File Name:
[HSIP 2016.pdf](#)

Select the programs that are administered under the HSIP.

HSIP (no subprograms)
HRRR
Other-General

Enter additional comments here to clarify your response for this question or add supporting information.

Program: HRRR

Date of Program Methodology: 4/4/2017

What is the justification for this program? [Check all that apply]

FHWA focused approach to safety

What is the funding approach for this program? [Check one]

Funding set-aside

What data types were used in the program methodology? [Check all that apply]

| Crashes | Exposure | Roadway |
|-------------|----------------|---------------------------|
| All crashes | Traffic Volume | Functional classification |

What project identification methodology was used for this program? [Check all that apply]

Crash frequency
Expected crash frequency with EB adjustment
Crash rate
Level of service of safety (LOSS)
Excess expected crash frequency using SPFs
Excess expected crash frequency with the EB adjustment
Probability of specific crash types
Excess proportions of specific crash types

Are local roads (non-state owned and operated) included or addressed in this program?

Yes

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Are local road projects identified using the same methodology as state roads?

Yes

Describe the methodology used to identify local road projects as part of this program.

How are projects under this program advanced for implementation?

Competitive application process

Select the processes used to prioritize projects for implementation. For the methods selected, indicate the relative importance of each process in project prioritization. Enter either the weights or numerical rankings. If weights are entered, the sum must equal 100. If ranks are entered, indicate ties by giving both processes the same rank and skip the next highest rank (as an example: 1, 2, 2, 4).

Rank of Priority Consideration

Ranking based on B/C : 2

Available funding : 1

Program: HSIP (no subprograms)

Date of Program Methodology: 9/1/2016

What is the justification for this program? [Check all that apply]

What is the funding approach for this program? [Check one]

Other-Regional Distribution By Crash Totals

What data types were used in the program methodology? [Check all that apply]

| Crashes | Exposure | Roadway |
|----------------|-------------------|---------------------------|
| All crashes | Traffic Volume | Functional classification |

What project identification methodology was used for this program? [Check all that apply]

- Crash frequency
- Expected crash frequency with EB adjustment
- Level of service of safety (LOSS)
- Excess expected crash frequency using SPFs

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Excess expected crash frequency with the EB adjustment
Probability of specific crash types
Excess proportions of specific crash types

Are local roads (non-state owned and operated) included or addressed in this program?

Yes

Are local road projects identified using the same methodology as state roads?

Yes

Describe the methodology used to identify local road projects as part of this program.

How are projects under this program advanced for implementation?

Competitive application process

Select the processes used to prioritize projects for implementation. For the methods selected, indicate the relative importance of each process in project prioritization. Enter either the weights or numerical rankings. If weights are entered, the sum must equal 100. If ranks are entered, indicate ties by giving both processes the same rank and skip the next highest rank (as an example: 1, 2, 2, 4).

Rank of Priority Consideration

Ranking based on net benefit : 2

Cost Effectiveness : 1

Program: Other-General

Date of Program Methodology: 1/1/2000

What is the justification for this program? [Check all that apply]

What is the funding approach for this program? [Check one]

Other-Regional Distribution By Crash Totals

What data types were used in the program methodology? [Check all that apply]

| Crashes | Exposure | Roadway |
|----------------|-------------------|---------------------------|
| All crashes | Traffic Volume | Functional classification |

What project identification methodology was used for this program? [Check all that apply]

- Crash frequency
- Expected crash frequency with EB adjustment
- Level of service of safety (LOSS)
- Excess expected crash frequency using SPFs
- Excess expected crash frequency with the EB adjustment
- Probability of specific crash types
- Excess proportions of specific crash types

Are local roads (non-state owned and operated) included or addressed in this program?

Yes

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Competitive application process

Select the processes used to prioritize projects for implementation. For the methods selected, indicate the relative importance of each process in project prioritization. Enter either the weights or numerical rankings. If weights are entered, the sum must equal 100. If ranks are entered, indicate ties by giving both processes the same rank and skip the next highest rank (as an example: 1, 2, 2, 4).

Rank of Priority Consideration

Ranking based on B/C : 2
Available funding : 1

What percentage of HSIP funds address systemic improvements?

5

HSIP funds are used to address which of the following systemic improvements? Please check all that apply.

- Cable Median Barriers
- Rumble Strips
- Traffic Control Device Rehabilitation
- Pavement/Shoulder Widening
- Install/Improve Signing
- Install/Improve Pavement Marking and/or Delineation

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Upgrade Guard Rails
Clear Zone Improvements
Safety Edge
Install/Improve Lighting
Add/Upgrade/Modify/Remove Traffic Signal
Horizontal curve signs
Wrong way driving treatments
Other-Ramp Metering
Other-Bike/Ped Access Improvements

Enter additional comments here to clarify your response for this question or add supporting information.

Following implementation of our systemic methodology under development, we anticipate that the portion of total funding going to systemic improvements will increase beyond the approximate 5% that we have currently provided.

What process is used to identify potential countermeasures? [Check all that apply]

Engineering Study
Road Safety Assessment
Crash data analysis
SHSP/Local road safety plan
Data-driven safety analysis tools (HSM, CMF Clearinghouse, SafetyAnalyst, usRAP)
Stakeholder input
Other-Requests by local agencies for investigations
Other-Independent Research & Peer State Communication

Enter additional comments here to clarify your response for this question or add supporting information.

Does the State HSIP consider connected vehicles and ITS technologies?

Yes

Describe how the State HSIP considers connected vehicles and ITS technologies.

In addition to CDOT's employment of ITS technology statewide, CDOT is currently evaluating the potential safety benefits of proposed connected vehicle technology for on-system application and implementation. At this time the state is looking into potentially partially funding, through HSIP, specific aspects of emerging connected vehicle infrastructure and ITS technology which potentially presents safety benefits.

At this time, CDOT is focused on awarding HSIP funding to proposed projects which incorporate proven and developed mitigation components. However, in light of CDOT's awareness of modern technology and the ever-changing automotive and transportation industry in terms of technological advancement, it is the hope of the state of Colorado to ultimately realize academically predicted safety benefits such that it may continue to reasonably and responsibly provide funding through monies awarded by our HSIP to improve safety through technology.

Does the State use the Highway Safety Manual to support HSIP efforts?

Yes

Please describe how the State uses the HSM to support HSIP efforts.

Quantitative analysis methodology as described within the 1st Edition (2010) of the Highway Safety Manual (HSM) is incorporated into the software, manual techniques, and systemic analysis processes that are employed by the CDOT Traffic & Safety Engineering staff who are charged with responsibly determining HSIP funding eligibility for safety related projects statewide. Subject matter from the HSM that is incorporated into CDOT's HSIP efforts includes but is not limited to the following: Fundamentals, Data Requirements, CMF/CRF Selection, Safety Performance Functions(s) (SPF's) Development, Diagnostics, Countermeasure Selection, Economic Appraisal (Benefit/Cost analysis), Predictive Methodology, Network Screening, etc..

Have any program methodology practices used to implement the HSIP changed since the last reporting period?

No

Are there any other aspects of the HSIP methodology on which the State would like to elaborate?

Yes

Describe other aspects of the HSIP methodology on which the State would like to elaborate.

In addition to the HSM methodology that Colorado has incorporated into the HSIP efforts, CDOT and its consultants have developed, and continue to develop and refine Safety Performance Functions (SPF's) baseline normative crash expectancy details that are specific to Colorado roadways, highways, freeways, interchanges, and intersections. CDOT believes this method allows the agency to be better prepared to address the specific safety concerns on Colorado roadways with respect to Colorado ADT, specific driving conditions, and driving habits.

Project Implementation

Funds Programmed

Reporting period for HSIP funding.

State Fiscal Year

Enter additional comments here to clarify your response for this question or add supporting information.

State Fiscal Year 2018 (July 1, 2017 - June 30, 2018)

Enter the programmed and obligated funding for each applicable funding category.

| FUNDING CATEGORY | PROGRAMMED | OBLIGATED | % OBLIGATED/PROGRAMMED |
|--|---------------------|---------------------|------------------------|
| HSIP (23 U.S.C. 148) | \$3,903,345 | \$7,881,035 | 201.9% |
| HRRR Special Rule (23 U.S.C. 148(g)(1)) | \$1,865,323 | \$1,865,323 | 100% |
| Penalty Funds (23 U.S.C. 154) | \$0 | \$0 | 0% |
| Penalty Funds (23 U.S.C. 164) | \$11,592,970 | \$11,592,970 | 100% |
| RHCP (for HSIP purposes) (23 U.S.C. 130(e)(2)) | \$0 | \$0 | 0% |
| Other Federal-aid Funds (i.e. STBG, NHPP) | \$0 | \$0 | 0% |
| State and Local Funds | \$0 | \$0 | 0% |
| Totals | \$17,361,638 | \$21,339,328 | 122.91% |

Enter additional comments here to clarify your response for this question or add supporting information.

These totals include \$881,190 of HRRR funding that was provided to a Central Federal Lands Project for improving safety along County Road 306 (non-state owned) in Chaffee County. This amount may not be accounted for in the CDOT financial system (SAP) or the Federal FMIS; however, this funding is considered programmed and obligated within this reporting period.

Obligation amounts also cover amounts programmed from previous fiscal years which explains why obligated amounts exceed programmed amounts.

How much funding is programmed to local (non-state owned and operated) or tribal safety projects?

\$1,188,410

How much funding is obligated to local or tribal safety projects?

\$5,060,006

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Enter additional comments here to clarify your response for this question or add supporting information.

These totals include \$881,190 of HRRR funding that was provided to a Central Federal Lands Project for improving safety along County Road 306 (non-state owned) in Chaffee County. This amount may not be accounted for in the CDOT financial system (SAP) or the Federal FMIS; however, this funding is considered programmed and obligated within this reporting period.

Obligation amounts also cover amounts programmed from previous fiscal years which explains why obligated amounts exceed programmed amounts.

How much funding is programmed to non-infrastructure safety projects?

\$1,195,903

How much funding is obligated to non-infrastructure safety projects?

\$357,843

Enter additional comments here to clarify your response for this question or add supporting information.

How much funding was transferred in to the HSIP from other core program areas during the reporting period under 23 U.S.C. 126?

\$0

How much funding was transferred out of the HSIP to other core program areas during the reporting period under 23 U.S.C. 126?

\$11,600,000

Enter additional comments here to clarify your response for this question or add supporting information.

In this reporting period, \$11,600,000 of HSIP funds was transferred out of the HSIP to CDOT's RoadX Program (see link below) as National Highway Performance Program (NHPP) funds as directed by CDOT's executive management and approved by Colorado's Transportation Commission. The amount transferred is the approximate equal to the amount of section 164 penalty funds that Colorado is required to obligate in FY 2018.

<https://www.codot.gov/programs/roadx>

Discuss impediments to obligating HSIP funds and plans to overcome this challenge in the future.

CDOT's Office of Financial Management and Budget (OFMB) does not typically obligate HSIP funding until the project has invoices submitted while under construction. The purpose of this is limit the possibility of having inactive projects. However, this does impact Colorado HSIP obligation rates as this tends to result in delayed obligation of funds for HSIP projects. There are longer than expected start up times for safety improvement projects, especially those run by local agencies. Special attention will now be given to construction scheduling and priority for fund programming will be given to projects that can deliver on a timely basis.

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Does the State want to elaborate on any other aspects of it's progress in implementing HSIP projects?

Yes

Describe any other aspects of the State's progress in implementing HSIP projects on which the State would like to elaborate.

CDOT's Office of Financial Management & Budget (OFMB) is working with the HSIP program managers to find ways to manage Section 164 penalty funds so that those funds can be obligated immediately. It is anticipated that Section 164 penalty funding will continue into future fiscal years in Colorado.

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General Listing of Projects

List the projects obligated using HSIP funds for the reporting period.

| | | | | | | | | | | | | | RELATIONSHIP TO SHSP | |
|--|------------------------------|---|---------|---------------|-----------------------|------------------------|-------------------------------|---|--------|-------|----------------------------------|---------------------------|----------------------|----------|
| PROJECT NAME | IMPROVEMENT CATEGORY | SUBCATEGORY | OUTPUTS | OUTPUT TYPE | HSIP PROJECT COST(\$) | TOTAL PROJECT COST(\$) | FUNDING CATEGORY | FUNCTIONAL CLASSIFICATION | AADT | SPEED | OWNERSHIP | METHOD FOR SITE SELECTION | EMPHASIS AREA | STRATEGY |
| US287 & Orchards Shopping Center HES | Intersection traffic control | Modify traffic signal - modernization/replacement | 1 | Intersections | \$249999 | \$250000 | HSIP (23 U.S.C. 148) | Urban Principal Arterial (UPA) - Other | 28,000 | | State Highway Agency | Spot | Intersections | |
| US 85 Resurf Ph-I, & SH 392 Intersection | Intersection geometry | Auxiliary lanes - modify left-turn lane offset | 1 | Intersections | \$7300000 | \$20251817 | HSIP (23 U.S.C. 148) | Rural Principal Arterial (RPA) - Other | 12,000 | | State Highway Agency | Spot | Intersections | |
| INT. IMPROVEMENTS @ PLATTE & TEJON | Intersection geometry | Auxiliary lanes - add left-turn lane | 1 | Intersections | \$103421 | \$114912 | HSIP (23 U.S.C. 148) | Urban Principal Arterial (UPA) - Other | 10,000 | | City of Municipal Highway Agency | Spot | Intersections | |
| I-70 GW Canyon Variable Speed Signing | Advanced technology and ITS | Dynamic message signs | 17 | Miles | \$6015307 | \$8028773 | Penalty Funds (23 U.S.C. 164) | Rural Principal Arterial (RPA) - Interstate | 17,000 | | State Highway Agency | Spot | Roadway Departure | |
| SH 340 Redlands Parkway Roundabout | Intersection traffic control | Modify control - traffic signal to roundabout | 1 | Intersections | \$4879972 | \$5735971 | HSIP (23 U.S.C. 148) | Urban Minor Arterial | 12,000 | | State Highway Agency | Spot | Intersections | |
| I-70 Wildlife Fencing MP 65-87 | Roadside | Fencing | 4 | Miles | \$1000000 | \$5747892 | HSIP (23 U.S.C. 148) | Rural Principal Arterial (RPA) - Interstate | 16,500 | | State Highway Agency | Spot | Wild Animal | |
| FY15 DENVER TRAFFIC SIGNALS | Intersection traffic control | Modify traffic signal - modernization/replacement | 5 | Intersections | \$1240200 | \$1378000 | Penalty Funds (23 U.S.C. 164) | Urban Principal Arterial (UPA) - Other | 60,000 | | State Highway Agency | Spot | Intersections | |
| SH96A ABRIENDO - ORMAN Signals Improv | Intersection traffic control | Modify traffic signal - modernization/replacement | 1 | Intersections | \$443323 | \$475942 | Penalty Funds (23 U.S.C. 164) | Urban Principal Arterial (UPA) - Other | 23,500 | | State Highway Agency | Spot | Intersections | |
| US 85 Resurfacing Eaton to Ault | Intersection traffic control | Intersection traffic control - other | 1 | Intersections | \$400000 | \$23535413 | HSIP (23 U.S.C. 148) | Rural Principal Arterial (RPA) - Other | 6,600 | | State Highway Agency | Spot | Intersections | |
| US 24 AT 31ST STREET INTERSECTION | Intersection traffic control | Modify traffic signal - modernization/replacement | 2 | Intersections | \$1839999 | \$2502398.96 | HSIP (23 U.S.C. 148) | Urban Principal Arterial (UPA) - Other Freeways and Expressways | 31,500 | | State Highway Agency | Spot | Intersections | |
| SH83 LIGHTING: HARVARD TO MISSISSIPPI | Lighting | Continuous roadway lighting | 2 | Miles | \$2436554 | \$2445265 | HSIP (23 U.S.C. 148) | Urban Principal Arterial (UPA) - Other | 31,000 | | State Highway Agency | Spot | Roadway Departure | |
| I-25 MEDIAN CABLERAIL PHS II | Roadside | Barrier - cable | 24 | Miles | \$3442373.21 | \$3653555.9 | Penalty Funds (23 U.S.C. 164) | Rural Principal Arterial (RPA) - Interstate | 32,000 | | State Highway Agency | Spot | Roadway Departure | |
| CDOT ROADWAY LIGHTING CONTROLS | Non-infrastructure | Non-infrastructure - other | | | \$54169 | \$55679 | HSIP (23 U.S.C. 148) | | 0 | | | | Roadway Departure | |

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| PROJECT NAME | IMPROVEMENT CATEGORY | SUBCATEGORY | OUTPUTS | OUTPUT TYPE | HSIP PROJECT COST(\$) | TOTAL PROJECT COST(\$) | FUNDING CATEGORY | FUNCTIONAL CLASSIFICATION | AADT | SPEED | OWNERSHIP | METHOD FOR SITE SELECTION | RELATIONSHIP TO SHSP | |
|--|-----------------------------------|---|---------|----------------|-----------------------|------------------------|---|---|--------|-------|----------------------------------|---------------------------|----------------------|----------|
| | | | | | | | | | | | | | EMPHASIS AREA | STRATEGY |
| US 160 WOLF CREEK PASS RSA | Roadway signs and traffic control | Roadway signs and traffic control - other | 9 | Miles | \$893029 | \$2584957 | HRRR Special Rule (23 U.S.C. 148(g)(1)) | Rural Principal Arterial (RPA) - Other | 3,000 | | State Highway Agency | Spot | Roadway Departure | |
| Boulder Intersection Improvements | Pedestrians and bicyclists | Miscellaneous pedestrians and bicyclists | 1 | Intersections | \$79999 | \$80000 | HSIP (23 U.S.C. 148) | Urban Principal Arterial (UPA) - Other | 36,000 | | State Highway Agency | Spot | Bicyclists | |
| I-25 NB Off-Ramp Intersection with SH52A | Intersection geometry | Auxiliary lanes - add acceleration lane | 1 | Intersections | \$443785 | \$484984 | HSIP (23 U.S.C. 148) | Urban Principal Arterial (UPA) - Other | 20,000 | | State Highway Agency | Spot | Intersections | |
| Various Loveland Left Turn Signals | Intersection traffic control | Modify traffic signal - add flashing yellow arrow | 37 | Intersections | \$48600 | \$54000 | HSIP (23 U.S.C. 148) | | 0 | | City of Municipal Highway Agency | Systemic | Intersections | |
| Isabelle Rd at US287 Intersect. Impvment | Intersection geometry | Auxiliary lanes - add right-turn lane | 1 | Intersections | \$329999 | \$330000 | HSIP (23 U.S.C. 148) | Rural Principal Arterial (RPA) - Other | 27,500 | | State Highway Agency | Spot | Intersections | |
| SH40 & SH83 INTERSECTION SAFETY IMP | Intersection geometry | Auxiliary lanes - modify left-turn lane offset | 1 | Intersections | \$139999 | \$140000 | HSIP (23 U.S.C. 148) | Urban Principal Arterial (UPA) - Other | 6,100 | | State Highway Agency | Spot | Intersections | |
| US 40 Fraser Pedestrian Trail | Pedestrians and bicyclists | Medians and pedestrian refuge areas | 6 | Raised Medians | \$607439 | \$1112432 | HSIP (23 U.S.C. 148) | Rural Principal Arterial (RPA) - Other | 11,000 | | State Highway Agency | Systemic | Pedestrians | |
| TCS TRAINING | Non-infrastructure | Training and workforce development | | | \$99999 | \$100000 | HSIP (23 U.S.C. 148) | | 0 | | | | Work Zones | |
| I70 GENESEE MED BARRIER, MORRISON & I270 | Roadside | Barrier - cable | 3 | Locations | \$267454 | \$2331883 | HSIP (23 U.S.C. 148) | Urban Principal Arterial (UPA) - Interstate | 0 | | State Highway Agency | Spot | Roadway Departure | |
| SH67 SAFETY IMPROVEMENTS | Roadway | Superelevation / cross slope | 3 | Curves | \$144999 | \$145000 | HRRR Special Rule (23 U.S.C. 148(g)(1)) | Rural Minor Arterial | 2,000 | | State Highway Agency | Systemic | Roadway Departure | |
| US 24 SAFETY IMPRVMENTS, E OF FLORRISANT | Roadway | Roadway widening - curve | 1 | Curves | \$90000 | \$100000 | HSIP (23 U.S.C. 148) | Rural Minor Arterial | 5,600 | | State Highway Agency | Spot | Roadway Departure | |
| SH 21/OMAHA INTERSECTION IMPROVEMENTS | Access management | Raised island - install new | 1 | Intersections | \$941397 | \$955623 | HSIP (23 U.S.C. 148) | Urban Principal Arterial (UPA) - Other Freeways and Expressways | 60,000 | | State Highway Agency | Spot | Intersections | |
| I-70 Exit 26 DDI Modifications | Interchange design | Interchange design - other | 1 | Interchanges | \$124999 | \$125000 | HSIP (23 U.S.C. 148) | Urban Principal Arterial (UPA) - Interstate | 16,000 | | State Highway Agency | Spot | Intersections | |
| SH2 & SH95 CCD SIGNALS & MEDIANS FY20 | Access management | Raised island - install new | 8 | Intersections | \$304500 | \$509000 | HSIP (23 U.S.C. 148) | Urban Principal Arterial (UPA) - Other | 0 | | State Highway Agency | Spot | Intersections | |
| R1 CORRIDOR SAFETY STUDY FY18 | Non-infrastructure | Transportation safety planning | | | \$268042 | \$268043 | HSIP (23 U.S.C. 148) | | 0 | | | Spot | Roadway Departure | |
| R1 INTERSECTION | Non-infrastructure | Transportation safety planning | | | \$264999 | \$265000 | HSIP (23 U.S.C. 148) | | 0 | | | | Intersections | |

2018 Colorado Highway Safety Improvement Program

| PROJECT NAME | IMPROVEMENT CATEGORY | SUBCATEGORY | OUTPUTS | OUTPUT TYPE | HSIP PROJECT COST(\$) | TOTAL PROJECT COST(\$) | FUNDING CATEGORY | FUNCTIONAL CLASSIFICATION | AADT | SPEED | OWNERSHIP | METHOD FOR SITE SELECTION | RELATIONSHIP TO SHSP | |
|---|------------------------------|---|---------|---------------|-----------------------|------------------------|----------------------|---|--------|-------|----------------------|---------------------------|----------------------|----------|
| | | | | | | | | | | | | | EMPHASIS AREA | STRATEGY |
| SAFETY STUDY FY18 | | | | | | | | | | | | | | |
| AURORA SIGNAL IMPROVEMENT FY 18 | Intersection traffic control | Modify traffic signal - modify signal mounting (spanwire to mast arm) | 2 | Intersections | \$198500 | \$243743 | HSIP (23 U.S.C. 148) | Urban Principal Arterial (UPA) - Interstate | 44,000 | | State Highway Agency | | Intersections | |
| I-70 Median Cable Rail Installation | Roadside | Barrier - cable | 3 | Miles | \$876921 | \$989080 | HSIP (23 U.S.C. 148) | Urban Principal Arterial (UPA) - Interstate | 20,000 | | State Highway Agency | Spot | Roadway Departure | |
| MULLER SAFETY ASSESSMENT SUPPORT | Non-infrastructure | Road safety audits | | | \$149999 | \$150000 | HSIP (23 U.S.C. 148) | | 0 | | | | | |
| STOLFUS SAFETY ASSESSMENT SUPPORT | Non-infrastructure | Road safety audits | | | \$99998 | \$99999 | HSIP (23 U.S.C. 148) | | 0 | | | | | |
| LIGHTING DESIGN STANDARDS MULLER | Non-infrastructure | Non-infrastructure - other | | | \$110999 | \$111000 | HSIP (23 U.S.C. 148) | | 0 | | | | Roadway Departure | |
| FHU SAFETY ASSESSMENT SUPPORT | Non-infrastructure | Road safety audits | | | \$120785 | \$120786 | HSIP (23 U.S.C. 148) | | 0 | | | | | |
| HSIP BEFORE AND AFTER 2018 | Non-infrastructure | Non-infrastructure - other | | | \$73416 | \$73417 | HSIP (23 U.S.C. 148) | | 0 | | | | | |
| Intersection Prioritization Study PH II | Non-infrastructure | Transportation safety planning | | | \$198650 | \$220722 | HSIP (23 U.S.C. 148) | | 0 | | | | Intersections | |

Enter additional comments here to clarify your response for this question or add supporting information.

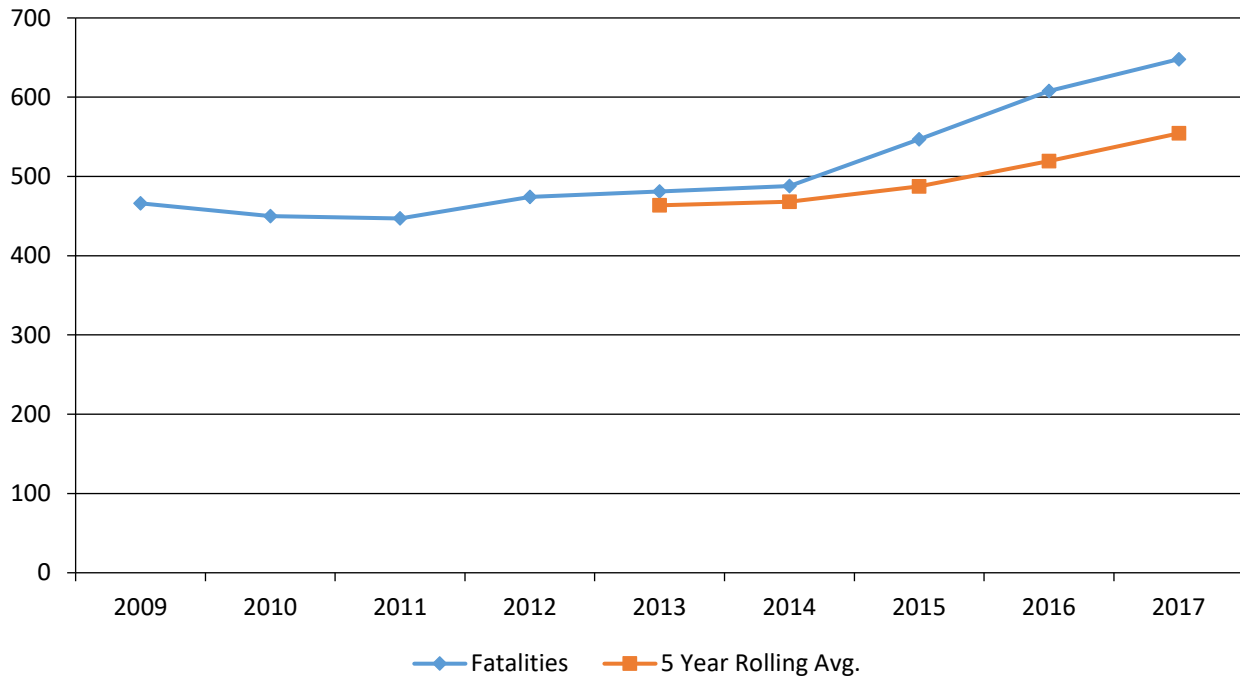
Safety Performance

General Highway Safety Trends

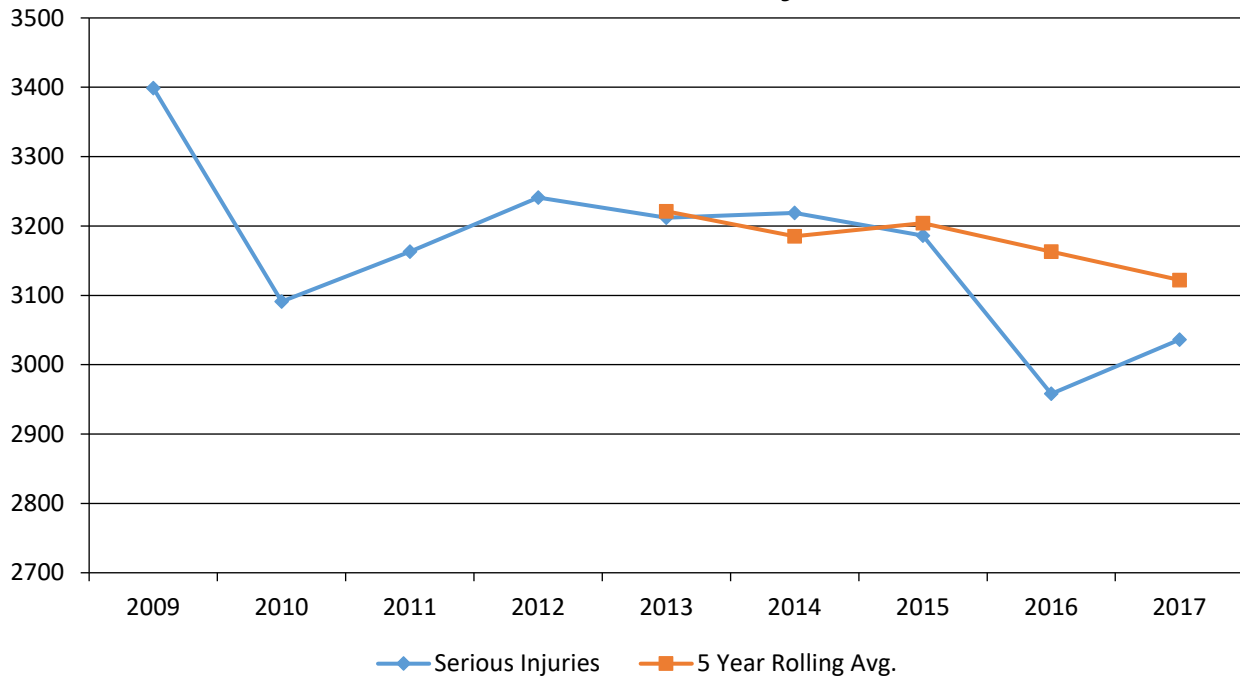
Present data showing the general highway safety trends in the State for the past five years.

| PERFORMANCE MEASURES | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Fatalities | 466 | 450 | 447 | 474 | 481 | 488 | 547 | 608 | 648 |
| Serious Injuries | 3,399 | 3,091 | 3,163 | 3,241 | 3,212 | 3,219 | 3,186 | 2,958 | 3,036 |
| Fatality rate (per HMVMT) | 1.008 | 0.959 | 0.959 | 1.016 | 1.024 | 0.996 | 1.085 | 1.166 | 1.214 |
| Serious injury rate (per HMVMT) | 7.352 | 6.585 | 6.787 | 6.949 | 6.839 | 6.571 | 6.317 | 5.672 | 5.688 |
| Number non-motorized fatalities | 61 | 48 | 55 | 91 | 64 | 75 | 78 | 100 | 108 |
| Number of non-motorized serious injuries | 394 | 387 | 396 | 408 | 492 | 472 | 490 | 439 | 423 |

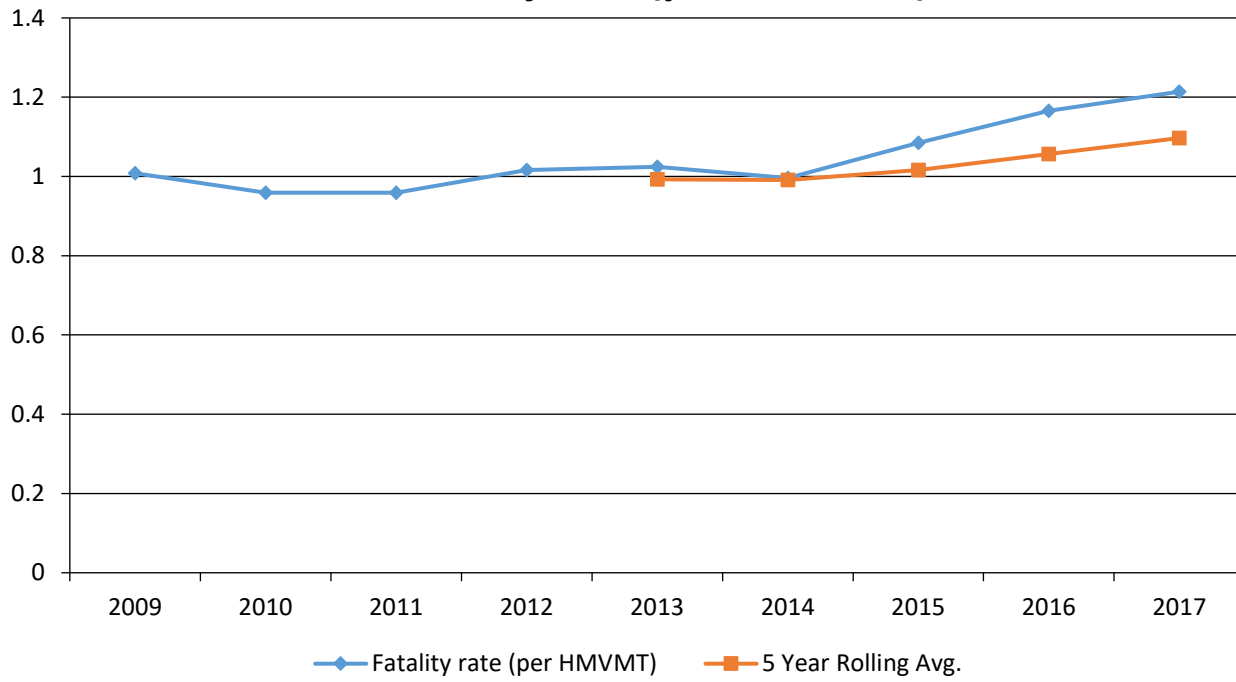
Annual Fatalities



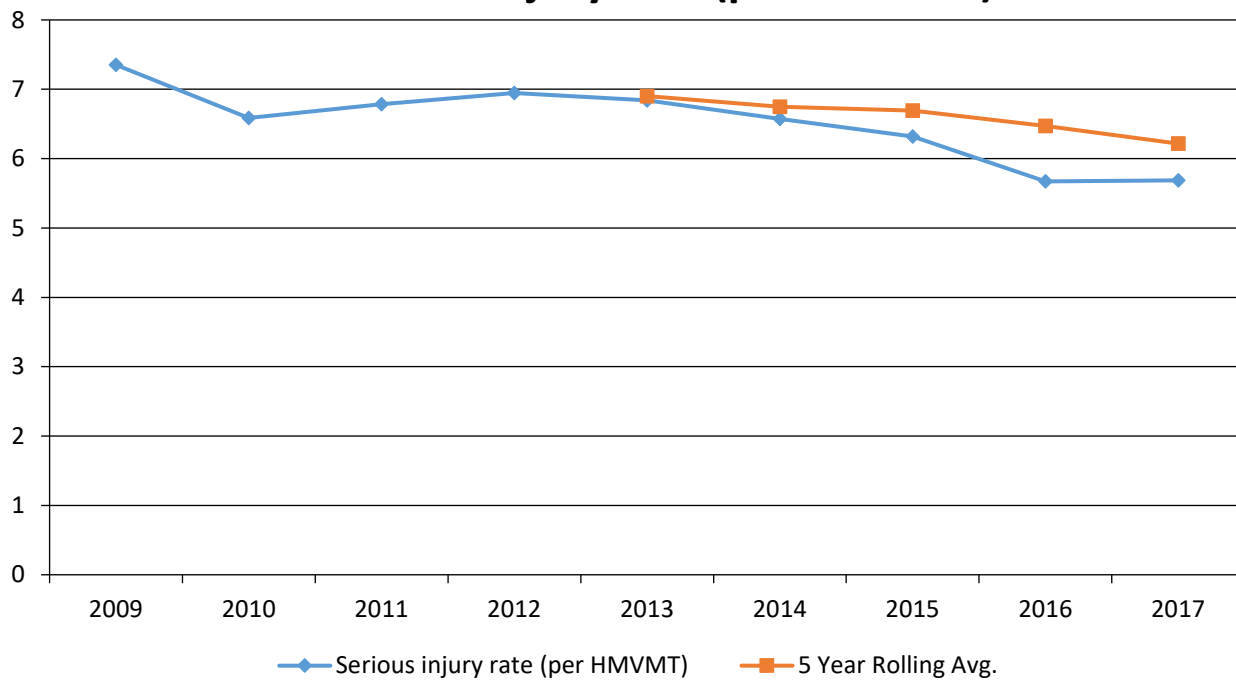
Annual Serious Injuries



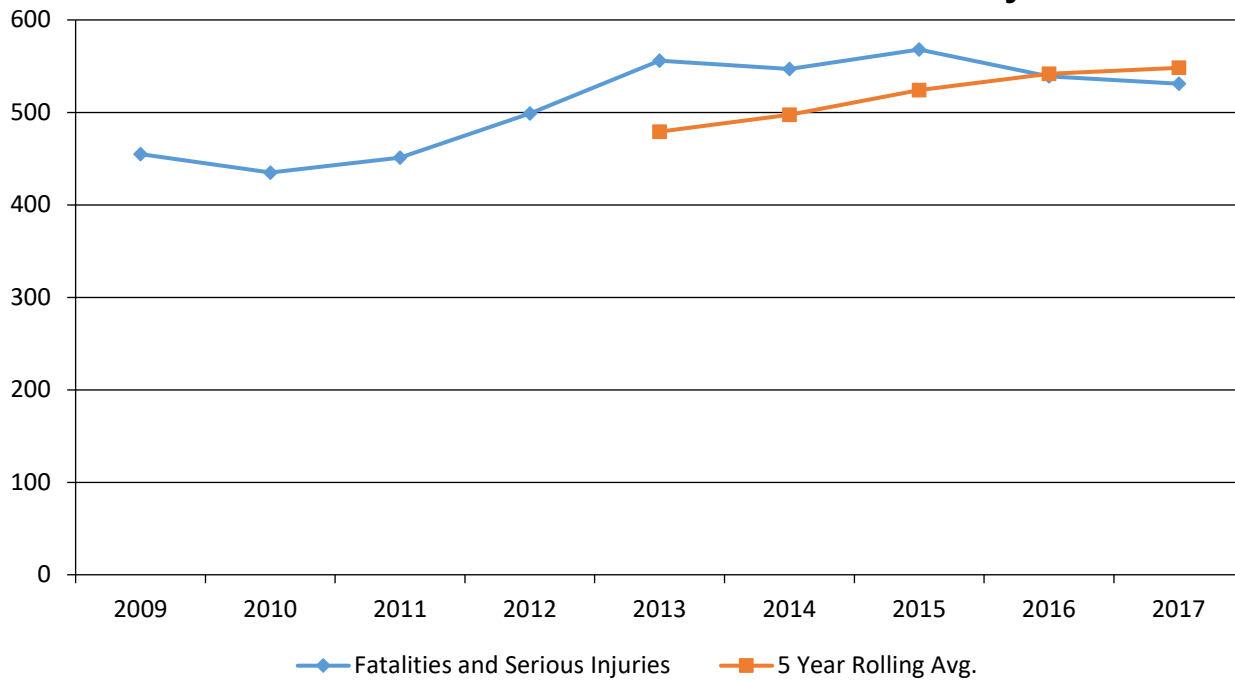
Fatality rate (per HMVMT)



Serious injury rate (per HMVMT)



Non Motorized Fatalities and Serious Injuries



Enter additional comments here to clarify your response for this question or add supporting information.

While completing this year's report for 2017, it was noticed that data within the following rows were incorrectly entered in the past:

Number of Non-Motorized Fatalities 2009 through 2016
 Number of Non-Motorized Serious Injuries 2009 through 2016

Correct data has been verified and entered for all years 2009 through 2017; subsequently, the 5 year averages have also been correctly recalculated.

Describe fatality data source.

FARS

Enter additional comments here to clarify your response for this question or add supporting information.

To the maximum extent possible, present this data by functional classification and ownership.

Year 2017

| Functional Classification | Number of Fatalities (5-yr avg) | Number of Serious Injuries (5-yr avg) | Fatality Rate (per HMVMT) (5-yr avg) | Serious Injury Rate (per HMVMT) (5-yr avg) |
|---|---------------------------------|---------------------------------------|--------------------------------------|--|
| Rural Principal Arterial (RPA) - Interstate | 48.6 | | | |

2018 Colorado Highway Safety Improvement Program

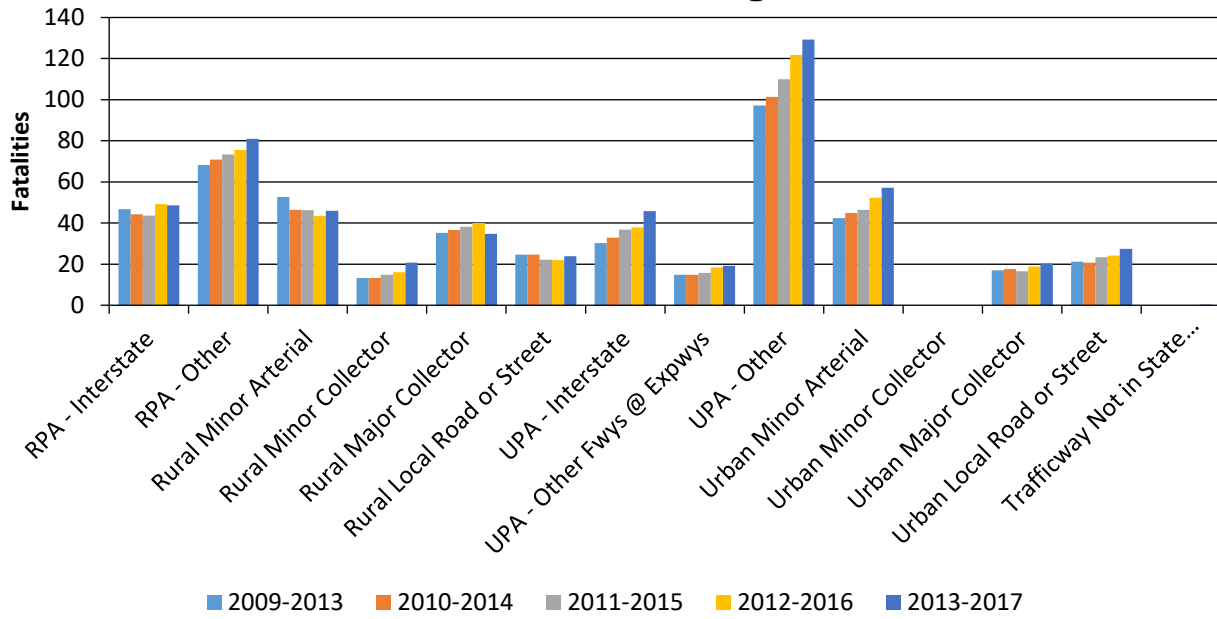
| Functional Classification | Number of Fatalities (5-yr avg) | Number of Serious Injuries (5-yr avg) | Fatality Rate (per HMVMT) (5-yr avg) | Serious Injury Rate (per HMVMT) (5-yr avg) |
|---|------------------------------------|---|--|--|
| Rural Principal Arterial (RPA) - Other Freeways and Expressways | | | | |
| Rural Principal Arterial (RPA) - Other | 81 | | | |
| Rural Minor Arterial | 46 | | | |
| Rural Minor Collector | 20.8 | | | |
| Rural Major Collector | 34.8 | | | |
| Rural Local Road or Street | 23.8 | | | |
| Urban Principal Arterial (UPA) - Interstate | 45.8 | | | |
| Urban Principal Arterial (UPA) - Other Freeways and Expressways | 19.2 | | | |
| Urban Principal Arterial (UPA) - Other | 129.2 | | | |
| Urban Minor Arterial | 57.2 | | | |
| Urban Minor Collector | | | | |
| Urban Major Collector | 20.2 | | | |
| Urban Local Road or Street | 27.4 | | | |
| Trafficway Not in State Inventory | 0.4 | | | |

2018 Colorado Highway Safety Improvement Program

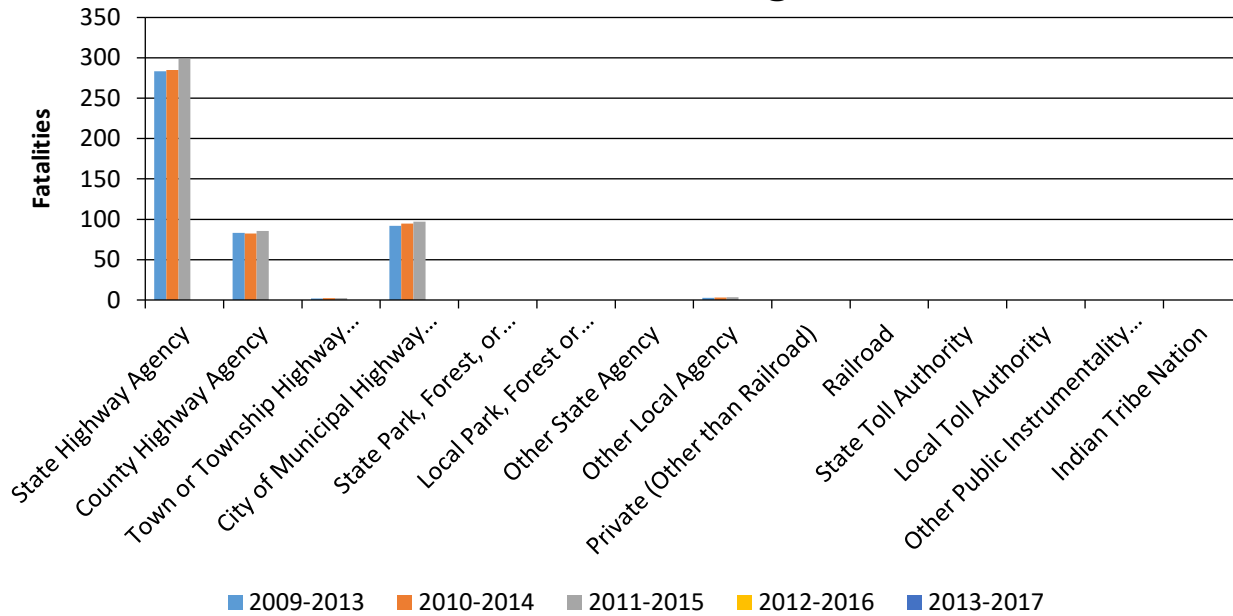
Year 2015

| Roadways | Number of Fatalities (5-yr avg) | Number of Serious Injuries (5-yr avg) | Fatality Rate (per HMVMT) (5-yr avg) | Serious Injury Rate (per HMVMT) (5-yr avg) |
|---|--|--|---|---|
| State Highway Agency | 298.8 | | | |
| County Highway Agency | 85.6 | | | |
| Town or Township Highway Agency | 2.2 | | | |
| City of Municipal Highway Agency | 97 | | | |
| State Park, Forest, or Reservation Agency | 0 | | | |
| Local Park, Forest or Reservation Agency | 0 | | | |
| Other State Agency | 0 | | | |
| Other Local Agency | 3.4 | | | |
| Private (Other than Railroad) | 0 | | | |
| Railroad | 0 | | | |
| State Toll Authority | 0 | | | |
| Local Toll Authority | 0 | | | |
| Other Public Instrumentality (e.g. Airport, School, University) | 0 | | | |
| Indian Tribe Nation | 0 | | | |

Number of Fatalities by Functional Classification 5 Year Average



Number of Fatalities by Roadway Ownership 5 Year Average



Enter additional comments here to clarify your response for this question or add supporting information.

Are there any other aspects of the general highway safety trends on which the State would like to elaborate?

Yes

Provide additional discussion related to general highway safety trends.

Following the trend seen across the country, fatalities have seen an increase in Colorado in 2017. Even with increased VMT, fatality rates have also risen. When comparing 2017 to the previous year, the data has shown that there are six specific areas where the percentage increase in fatalities were higher than the overall percentage in fatality increase. These areas are as follows:

Urban, Young Driver (Under 21 Years of Age), Pedestrian, Seat Belt Unrestrained, Off System, and Construction Zone. Serious injuries have remained relatively stable in this time with the rate continuing to decrease over the last several years.

Safety Performance Targets

Safety Performance Targets

Calendar Year 2019 Targets *

2018 Colorado Highway Safety Improvement Program

Number of Fatalities 644.0

Describe the basis for established target, including how it supports SHSP goals.

CDOT analyzed fatal crash data going back to 2002, developed multiple models, created best fit curves, and determined targets based on examination of the various predicted values. Contributing factors were considered, including the following: population growth, increases in VMT, economic growth, potential funding changes, and legislative changes. All of the models indicated future increases in fatal crash numbers, resulting in short term targets with an increase in fatal crashes. The SHSP is an aspirational goal of moving Colorado towards zero deaths and is the long term vision for the state. The targets recognize the uptick in fatalities and the need to focus on programs to reduce crashes in order to pursue the aspirational goal. The target of 644 is the predicted five year rolling average.

Number of Serious Injuries 2909.0

Describe the basis for established target, including how it supports SHSP goals.

CDOT analyzed serious injury crash data going back to 2002, developed multiple models, created best fit curves, and determined targets based on examination of the various predicted values. Contributing factors were considered, including the following: population growth, increases in VMT, economic growth, potential funding changes, and legislative changes. All of the models indicated future increases in serious injury crash numbers, resulting in short term targets with an increase in serious injury crashes. The SHSP is an aspirational goal of moving Colorado towards zero deaths and is the long term vision for the state. The targets recognize the uptick in serious injury crashes and the need to focus on programs to reduce crashes in pursuit of the aspirational goal. The target of 2909 is the predicted five year average.

Fatality Rate 1.210

Describe the basis for established target, including how it supports SHSP goals.

CDOT analyzed fatal crash data going back to 2002, developed multiple models, created best fit curves, and determined targets based on examination of the various predicted values. The fatality rate is based on the assumption that fatal crashes and VMT are both increasing in the near term. Contributing factors were considered, including the following: population growth, increases in VMT, economic growth, potential funding changes, and legislative changes. All of the models indicated future increases in fatality rates, resulting in short term targets with an increase in the fatal rate. The SHSP is an aspirational goal of moving Colorado towards zero deaths and is the long term vision for the state. The targets recognize the uptick in the fatality rate and the need to focus on programs to reduce crashes in order to pursue the aspirational goal. The target of 1.21 is based on the five year moving average.

Serious Injury Rate 5.575

Describe the basis for established target, including how it supports SHSP goals.

2018 Colorado Highway Safety Improvement Program

CDOT analyzed serious injury crash data going back to 2002, developed multiple models, created best fit curves, and determined targets based on examination of the various predicted values. Contributing factors were considered, including the following: population growth, increases in VMT, economic growth, potential funding changes, and legislative changes. The serious injury rate is based on the assumption that serious injury crashes and VMT are both increasing in the near term. The SHSP is an aspirational goal of moving Colorado towards zero deaths and is the long term vision for the state. The targets recognize the uptick in serious injury crashes and the need to focus on programs to reduce crashes in pursuit of the aspirational goal. The target of 5.575 is the predicted five year average.

Total Number of Non-Motorized Fatalities and Serious Injuries 514.0

Describe the basis for established target, including how it supports SHSP goals.

CDOT analyzed the non-motorized fatalities and serious injury data going back to 2007, developed multiple models, created best fit curves, and determined targets based on examination of the various predicted values. Contributing factors were considered, including the following: population growth, increases in VMT, economic growth, potential funding changes, and legislative changes. All of the models indicated increases in the non-motorized crashes. The SHSP is an aspirational goal of moving Colorado towards zero deaths and is the long term vision for the state. The targets recognize the uptick in the fatality rate and the need to focus on programs to reduce crashes in order to pursue the aspirational goal. The target of 514 is based on the five year moving average.

Enter additional comments here to clarify your response for this question or add supporting information.

Describe efforts to coordinate with other stakeholders (e.g. MPOs, SHSO) to establish safety performance targets.

The SHSP process reached out to over 1,000 individuals, inviting them to participate in the process in person or through online meetings, emails, focus groups, surveys, and emphasis area teams. Participants were also invited to the Colorado Traffic Safety Summit to review the emphasis areas and goals for the SHSP. The CDOT offices of transportation safety and traffic engineering coordinated with the Colorado Department of Health and Environment to evaluate historical crash data and develop various trend models. CDOT and the MPO's participated in FHWA training on the new rule making and requirements for establishing targets. Various meetings have been held with CDOT management, planners, MPO's, and CDPHE staff to review CDOT's proposed targets. Meetings are ongoing with individual MPO's to present data, review CDOT's process, and provide assistance in the establishment of individual MPO goals or adoption of the statewide goals. The MPO's continue to work toward establishing their targets or adopting CDOT's targets. They are aware of the February 2019 deadline and are working toward this goal; however, achievement of this deadline is unclear at present. CDOT will continue to coordinate with these organizations to help motivate this effort.

Does the State want to report additional optional targets?

No

Enter additional comments here to clarify your response for this question or add supporting information.

Applicability of Special Rules

Does the HRRR special rule apply to the State for this reporting period?

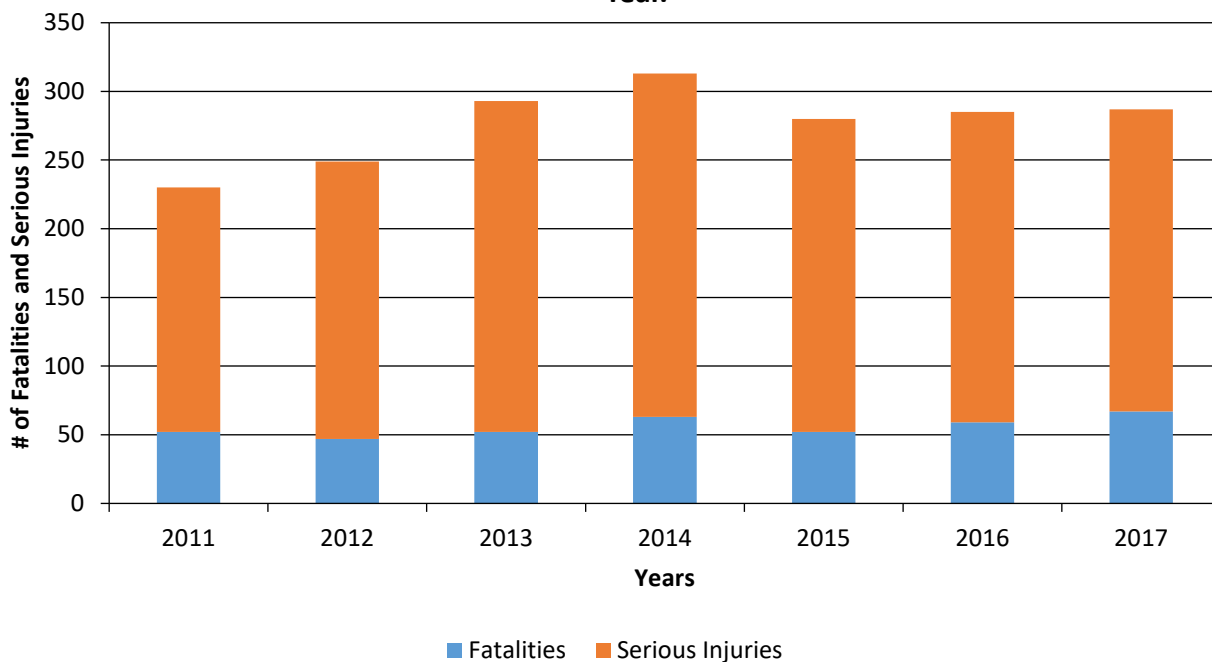
Yes

Enter additional comments here to clarify your response for this question or add supporting information.

Provide the number of older driver and pedestrian fatalities and serious injuries 65 years of age and older for the past seven years.

| PERFORMANCE MEASURES | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|--|------|------|------|------|------|------|------|
| Number of Older Driver and Pedestrian Fatalities | 52 | 47 | 52 | 63 | 52 | 59 | 67 |
| Number of Older Driver and Pedestrian Serious Injuries | 178 | 202 | 241 | 250 | 228 | 226 | 220 |

Number of Older Driver and Pedestrian Fatalities and Serious Injuries by Year.



Enter additional comments here to clarify your response for this question or add supporting information.

Evaluation

Program Effectiveness

How does the State measure effectiveness of the HSIP?

Change in fatalities and serious injuries
Benefit/Cost Ratio
Lives saved
Other-Before and After Studies

Enter additional comments here to clarify your response for this question or add supporting information.

Based on the measures of effectiveness selected previously, describe the results of the State's program level evaluations.

Overall, the HSIP program in Colorado has had a positive impact on reducing crashes overall, as well as specifically reducing severe and fatal crashes. CDOT relies on crash data to effectively evaluate the overall impact that HSIP in the state of Colorado. Not only does CDOT consider the reduction in crashes overall and reduction in severe and fatal crashes, CDOT also primarily relies on the benefit/cost (B/C) ratio that is ultimately realized on a statewide level to gain an understanding of the effectiveness of the HSIP.

Prior to this reporting period, CDOT, in cooperation with an unbiased consultant team, evaluated 48 projects which have five years (2011-2015) of post-installation data available to determine realized B/C ratio and compare to those calculated at the time of project HSIP funding eligibility review. A final report describing the findings of this endeavor was generated in December, 2016.

CDOT has recently begun, in cooperation with an unbiased consultant team, the evaluation of what is anticipated to be up to 30 projects which have five years (2012-2016) of post-installation/construction crash data available to determine realized B/C ratio and compare to those calculated at the time of project HSIP funding eligibility review. A final report describing the findings of this endeavor is expected to be generated toward the end of the first quarter of CY2019.

Additionally, CDOT participated in an FHWA-led HSIP assessment during the reporting period. The final draft of this report was issued in May, 2018. The results of this report were overall positive regarding the operation and administration of the program. Valuable feedback from FHWA and engaged stakeholders was received within the content of this assessment regarding components which CDOT is doing well and/or excelling in, as well as described areas of potential improvement recommendations. CDOT continues to work to address areas of improvement as described within this report. We have recently issued an action plan to address the specific recommendations within this report. Implementation will be incremental dependent upon the specific of each recommendation and our ability to do so in a timely manner based upon organizational demands and capabilities.

What other indicators of success does the State use to demonstrate effectiveness and success of the Highway Safety Improvement Program?

miles improved by HSIP

2018 Colorado Highway Safety Improvement Program
 More systemic programs
 Organizational change
 Increased awareness of safety and data-driven process
 Increased focus on local road safety
 HSIP Obligations
 Other-Realized Positive B/C Ratio

Enter additional comments here to clarify your response for this question or add supporting information.

Are there any significant programmatic changes that have occurred since the last reporting period?

Yes

Describe significant program changes that have occurred since the last reporting period.

In response to the special HSIP obligation of approximately \$2.9M which was required to address the increased fatality rate for Colorado High Risk Rural Roads (HRRR) based upon FHWA (23 USC 148(g)(I) - Fiscal Year (FY) 2018 High Risk Rural Roads - Special Rule) - CDOT issued a special solicitation to address this concern. The qualifying criteria and analysis techniques for approving project applications for this HRRR funding is the same as for the HSIP qualifying overall. However, these funds are specifically set aside to address off-system rural roads in Colorado. If the rural road fatality rate should continue to increase, which CDOT is working diligently to avoid, and the aforementioned FHWA special rule continue to apply, this HRRR solicitation will remain in place to help reduce fatalities on rural roads.

Effectiveness of Groupings or Similar Types of Improvements

Present and describe trends in SHSP emphasis area performance measures.

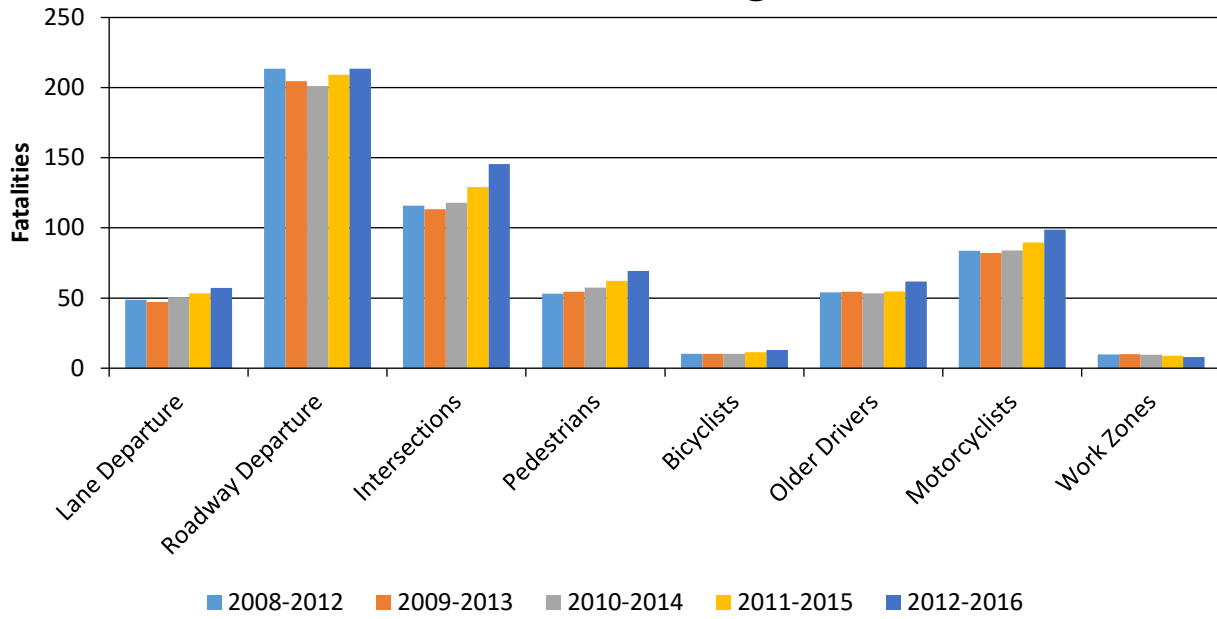
Year 2016

| SHSP Emphasis Area | Targeted Crash Type | Number of Fatalities (5-yr avg) | Number of Serious Injuries (5-yr avg) | Fatality Rate (per HMVMT) (5-yr avg) | Serious Injury Rate (per HMVMT) (5-yr avg) | Other 1 | Other 2 | Other 3 |
|--------------------|---------------------|---------------------------------|---------------------------------------|--------------------------------------|--|---------|---------|---------|
| Lane Departure | | 57.2 | 196.4 | 0.11 | 0.4 | 0 | 0 | 0 |
| Roadway Departure | | 213.4 | 902.4 | 0.44 | 1.85 | 0 | 0 | 0 |
| Intersections | | 145.4 | 1,390.4 | 0.29 | 2.84 | 0 | 0 | 0 |
| Pedestrians | | 69.4 | 302.2 | 0.14 | 0.62 | 0 | 0 | 0 |
| Bicyclists | | 13 | 156 | 0.03 | 0.32 | 0 | 0 | 0 |

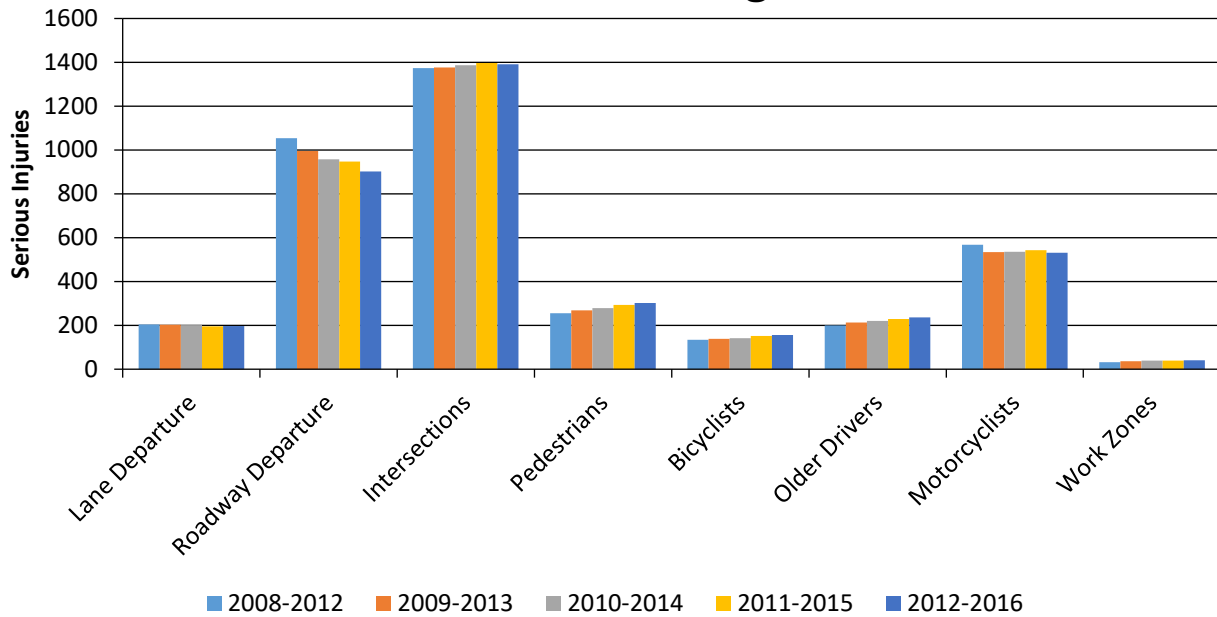
2018 Colorado Highway Safety Improvement Program

| SHSP Emphasis Area | Targeted Crash Type | Number of Fatalities (5-yr avg) | Number of Serious Injuries (5-yr avg) | Fatality Rate (per HMVMT) (5-yr avg) | Serious Injury Rate (per HMVMT) (5-yr avg) | Other 1 | Other 2 | Other 3 |
|--------------------|---------------------|---------------------------------|---------------------------------------|--------------------------------------|--|---------|---------|---------|
| Older Drivers | | 61.8 | 235.8 | 0.13 | 0.48 | 0 | 0 | 0 |
| Motorcyclists | | 98.8 | 531.2 | 0.2 | 1.09 | 0 | 0 | 0 |
| Work Zones | | 8 | 40 | 0.02 | 0.08 | 0 | 0 | 0 |

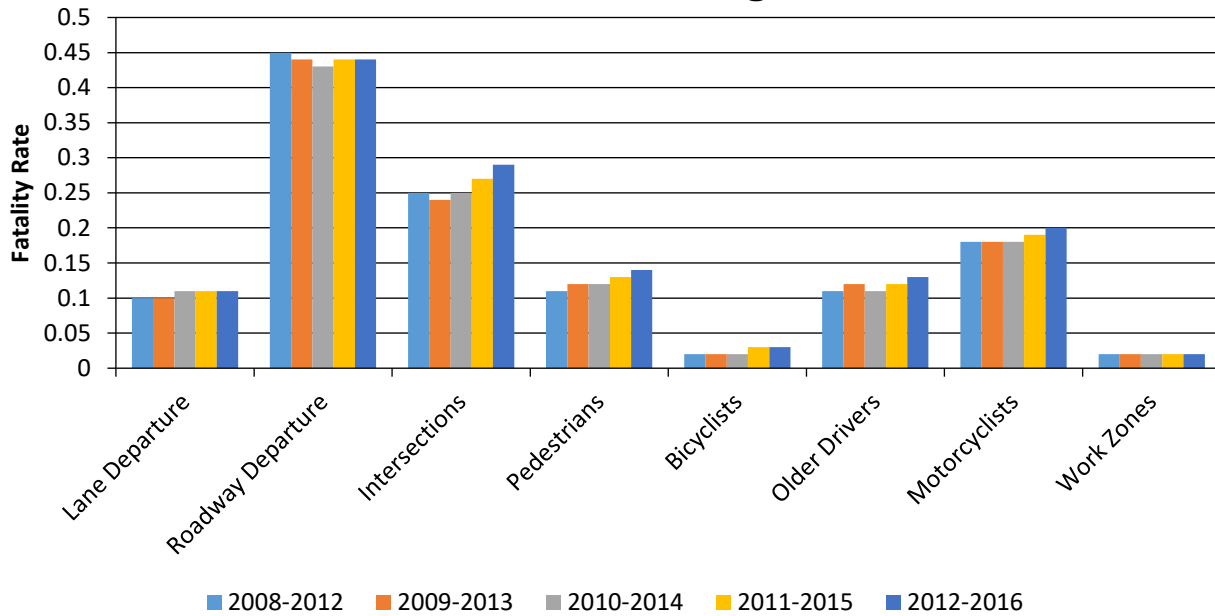
Number of Fatalities 5 Year Average



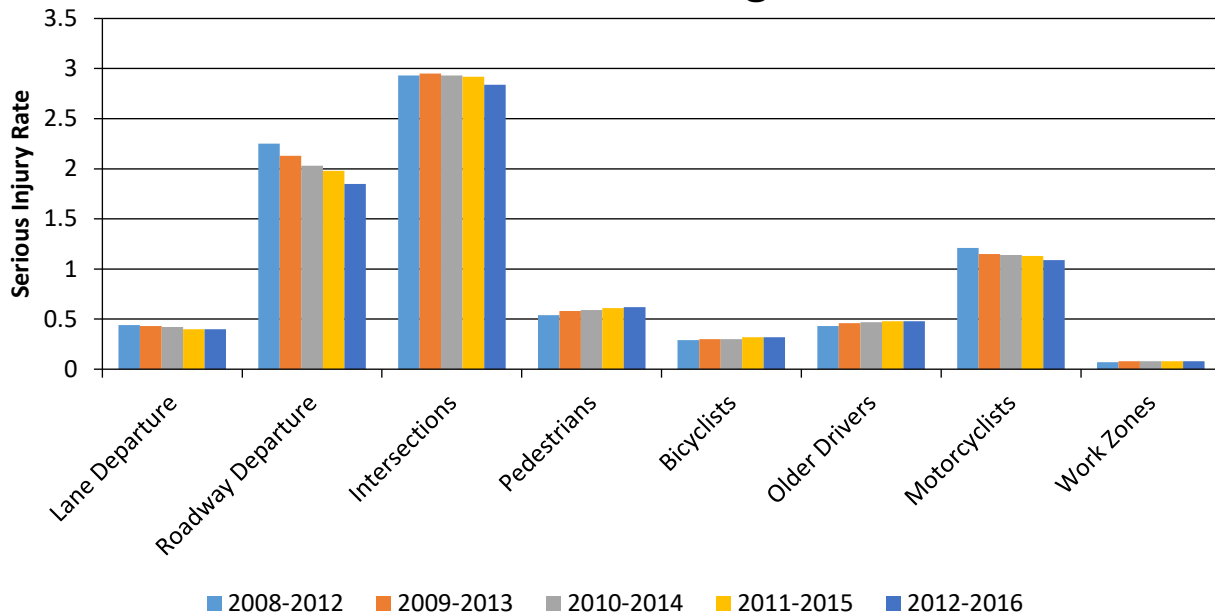
Number of Serious Injuries 5 Year Average



Fatality Rate (per HMVMT) 5 Year Average



Serious Injury Rate (per HMVMT) 5 Year Average



Enter additional comments here to clarify your response for this question or add supporting information.

During this year's reporting efforts, minor corrections in previously submitted data and rates were completed based upon updated data for years 2008-2016.

Has the State completed any countermeasure effectiveness evaluations during the reporting period?

No

Enter additional comments here to clarify your response for this question or add supporting information.

CDOT traffic & safety continually evaluates currently employed and proposed countermeasures for potential effectiveness based upon academic research as well as historical performance of such countermeasures that may have been implemented in other states under similar conditions to address similar crash patterns. Upon our determination as to the viability of such countermeasures for use on Colorado roadways, and if a viable CMF/CRF is available or able to be reasonably approximated, CDOT may award HSIP funding for installation dependent upon project circumstances and projected efficacy of the specific countermeasure with respect to the determined crash pattern(s) at the subject location(s).

Additionally, although CDOT has not completed a formal quantitative review of a specific countermeasure's realized effectiveness upon installation in this reporting period, it should be noted that a statewide evaluation on select projects was completed in the prior reporting years, and that a new study is underway for the same purpose. The results of the past report indicated a relatively high level of effectiveness for HSIP overall and we are hoping for the same for the current effort. The primary indicator being the results of a review of 5 years of crash data following installation of such countermeasures. This was compared both to 5 years of crash data preceding countermeasure installation and to the calculated benefit/cost ratio projected at the time of countermeasure analysis / application review for HSIP funding eligibility. In general, for the past statewide evaluation, overall benefit/cost ratios that were realized positively exceeded those projected during project application review.

It is important to compile a statistically significant data set following installation of such countermeasures in order to conduct a thorough analysis of installed countermeasures. This generally includes a minimum of 3 years of compiled data for areas with significant ADT, and at least 5 years of compiled data for all other areas in general. To that end, CDOT conducts periodic rather than annual countermeasure effectiveness evaluations.

Provide the following information for previously implemented projects that the State evaluated this reporting period.

| LOCATION | FUNCTIONAL CLASS | IMPROVEMENT CATEGORY | IMPROVEMENT TYPE | PDO BEFORE | PDO AFTER | FATALITY BEFORE | FATALITY AFTER | SERIOUS INJURY BEFORE | SERIOUS INJURY AFTER | ALL OTHER INJURY BEFORE | ALL OTHER INJURY AFTER | TOTAL BEFORE | TOTAL AFTER | EVALUATION RESULTS (BENEFIT/COST RATIO) |
|----------------------------------|---|----------------------|------------------------------|------------|-----------|-----------------|----------------|-----------------------|----------------------|-------------------------|------------------------|--------------|-------------|---|
| I-70 - Dowd Canyon, West of Vail | Rural Principal Arterial (RPA) - Interstate | Interchange design | Extend existing lane on ramp | 140.00 | 82.00 | | | | | 27.00 | 21.00 | 167.00 | 103.00 | 16.11 |

Enter additional comments here to clarify your response for this question or add supporting information.

The above described project is one example of a before and after evaluation that was recently completed by CDOT & its consultants to evaluate and aide in understand the overall effectiveness of the program in Colorado. In the case of the example, the project is designed to mitigate conflict between vehicles and wildlife in a corridor with particularly high collisions of this type, additionally, lane departure and sideswipe same direction crashes were focused upon at this location. In the interest of being concise for this portion of this annual HSIP report, we have only provided this one example; however, for further examples of various crash pattern mitigation projects for which before and after studies were completed, please review the reports entitled "2015 Study" and "2016 Study" at the CDOT public website below. Additionally, it is anticipated that by mid-2019, a new "2018 Study" will also be posted to this location as we have a new study currently underway which will cover additional projects. Note: In the table above, "Serious Injury" is combined within "All Other Injuries", and these are crash totals, not actual injured persons. In this case, injured persons before was 42 and injured persons after was 27. The B/C is calculated based upon total injuries prevented, rather than injury crashes.

<https://www.codot.gov/library/traffic/hsip/studies>

Are there any other aspects of the overall HSIP effectiveness on which the State would like to elaborate?

No

Compliance Assessment

What date was the State’s current SHSP approved by the Governor or designated State representative?

10/01/2014

What are the years being covered by the current SHSP?

From: 2015 To: 2019

When does the State anticipate completing it’s next SHSP update?

2019

Enter additional comments here to clarify your response for this question or add supporting information.

Individual strategic focus areas as defined within the SHSP undergo consistent review and updates as data becomes available with the intended goal of meeting the vision defined within the Strategic Highway Safety Program and Colorado's safety initiative: "Moving Toward Zero Deaths".

Provide the current status (percent complete) of MIRE fundamental data elements collection efforts using the table below.

| MIRE NAME (MIRE NO.) | NON LOCAL PAVED ROADS - SEGMENT | | NON LOCAL PAVED ROADS - INTERSECTION | | NON LOCAL PAVED ROADS - RAMPS | | LOCAL PAVED ROADS | | UNPAVED ROADS | |
|-------------------------------------|---------------------------------|-----------|--------------------------------------|-----------|-------------------------------|-----------|-------------------|-----------|---------------|-----------|
| | STATE | NON-STATE | STATE | NON-STATE | STATE | NON-STATE | STATE | NON-STATE | STATE | NON-STATE |
| ROADWAY SEGMENT | | | | | | | | | | |
| Segment Identifier (12) | 100 | 100 | | | | | 100 | 100 | 100 | 100 |
| Route Number (8) | 100 | 100 | | | | | | | | |
| Route/Street Name (9) | 100 | 100 | | | | | | | | |
| Federal Aid/Route Type (21) | 100 | 100 | | | | | | | | |
| Rural/Urban Designation (20) | 100 | 100 | | | | | 100 | 100 | | |
| Surface Type (23) | 100 | 100 | | | | | 100 | 100 | | |
| Begin Point Segment Descriptor (10) | 100 | 100 | | | | | 100 | 100 | 100 | 100 |
| End Point Segment Descriptor (11) | 100 | 100 | | | | | 100 | 100 | 100 | 100 |
| Segment Length (13) | 100 | 100 | | | | | | | | |
| Direction of Inventory (18) | 100 | 100 | | | | | | | | |
| Functional Class (19) | 100 | 100 | | | | | 100 | 100 | 100 | 100 |

2018 Colorado Highway Safety Improvement Program

| MIRE NAME (MIRE NO.) | NON LOCAL PAVED ROADS - SEGMENT | | NON LOCAL PAVED ROADS - INTERSECTION | | NON LOCAL PAVED ROADS - RAMPS | | LOCAL PAVED ROADS | | UNPAVED ROADS | |
|---|---------------------------------|-----------|--------------------------------------|-----------|-------------------------------|-----------|-------------------|-----------|---------------|-----------|
| | STATE | NON-STATE | STATE | NON-STATE | STATE | NON-STATE | STATE | NON-STATE | STATE | NON-STATE |
| Median Type (54) | 100 | 0 | | | | | | | | |
| Access Control (22) | 100 | 100 | | | | | | | | |
| One/Two Way Operations (91) | 100 | 100 | | | | | | | | |
| Number of Through Lanes (31) | 100 | 100 | | | | | 100 | 100 | | |
| Average Annual Daily Traffic (79) | 100 | 50 | | | | | 100 | 100 | | |
| AADT Year (80) | 100 | 50 | | | | | | | | |
| Type of Governmental Ownership (4) | 100 | 100 | | | | | 100 | 100 | 100 | 100 |
| INTERSECTION | | | | | | | | | | |
| Unique Junction Identifier (120) | | | 100 | 0 | | | | | | |
| Location Identifier for Road 1 Crossing Point (122) | | | 100 | 0 | | | | | | |
| Location Identifier for Road 2 Crossing Point (123) | | | 100 | 0 | | | | | | |
| Intersection/Junction Geometry (126) | | | 100 | 0 | | | | | | |
| Intersection/Junction Traffic Control (131) | | | 100 | 0 | | | | | | |
| AADT for Each Intersecting Road (79) | | | 100 | 50 | | | | | | |
| AADT Year (80) | | | 100 | 50 | | | | | | |
| Unique Approach Identifier (139) | | | 0 | 0 | | | | | | |
| INTERCHANGE/RAMP | | | | | | | | | | |
| Unique Interchange Identifier (178) | | | | | 100 | 0 | | | | |
| Location Identifier for Roadway at Beginning of Ramp Terminal (197) | | | | | 100 | 0 | | | | |
| Location Identifier for Roadway at Ending Ramp Terminal (201) | | | | | 100 | 0 | | | | |
| Ramp Length (187) | | | | | 100 | 0 | | | | |

2018 Colorado Highway Safety Improvement Program

| MIRE NAME (MIRE NO.) | NON LOCAL PAVED ROADS - SEGMENT | | NON LOCAL PAVED ROADS - INTERSECTION | | NON LOCAL PAVED ROADS - RAMPS | | LOCAL PAVED ROADS | | UNPAVED ROADS | |
|--|---------------------------------|--------------|--------------------------------------|--------------|-------------------------------|-------------|-------------------|---------------|---------------|---------------|
| | STATE | NON-STATE | STATE | NON-STATE | STATE | NON-STATE | STATE | NON-STATE | STATE | NON-STATE |
| Roadway Type at Beginning of Ramp Terminal (195) | | | | | 100 | 0 | | | | |
| Roadway Type at End Ramp Terminal (199) | | | | | 100 | 0 | | | | |
| Interchange Type (182) | | | | | 100 | 0 | | | | |
| Ramp AADT (191) | | | | | 100 | 0 | | | | |
| Year of Ramp AADT (192) | | | | | 100 | 0 | | | | |
| Functional Class (19) | | | | | 100 | 0 | | | | |
| Type of Governmental Ownership (4) | | | | | 100 | 0 | | | | |
| Totals (Average Percent Complete): | 100.00 | 88.89 | 87.50 | 12.50 | 100.00 | 0.00 | 100.00 | 100.00 | 100.00 | 100.00 |

*Based on Functional Classification

Enter additional comments here to clarify your response for this question or add supporting information.

CDOT does not believe that there are any interchanges or grade-separated ramps that are currently under non-state jurisdiction within Colorado. CDOT has AADT on all Fed-Aid roads. There are 8,752 miles of Rural Collectors that we do not have AADT data on. Most notably we are missing data on Non-State, Non-local paved intersections of which we have approximately 10,000.

Describe actions the State will take moving forward to meet the requirement to have complete access to the MIRE fundamental data elements on all public roads by September 30, 2026.

Due to the magnitude involved with collecting the missing data elements and the potential system changes that will need to be made, CDOT intends to utilize the next 2-3 years to research and assess various methodologies to meet the 10 year deadline for providing the required information. This planning stage will consist of the following assessment activities:

1. Contact other State DOT's and survey what methodologies they are employing to meet these requirements.
2. Research and monitor 3rd party big data providers. Technology and data collection is progressing rapidly; there is a possibility that companies aware of these requirements may move to collect this information for retail sale.
3. Research other potential sources for the required data elements, including local jurisdictions and MPOs.
4. If 3rd party data is not available and other potential sources do not exist, we will move forward with developing a long term plan for collection, including locating and procuring funding.

Provide the suspected serious injury identifier, definition and attributes used by the State for both the crash report form and the crash database using the table below. Please also indicate whether or not these elements are compliant with the MMUCC 4th edition criteria for data element P5. Injury Status, suspected serious injury.

| CRITERIA | SUSPECTED SERIOUS INJURY IDENTIFIER(NAME) | MMUCC 4TH EDITION COMPLIANT * | SUSPECTED SERIOUS INJURY DEFINITION | MMUCC 4TH EDITION COMPLIANT * | SUSPECTED SERIOUS INJURY ATTRIBUTES(DESCRIPTORS) | MMUCC 4TH EDITION COMPLIANT * |
|--------------------------------------|---|-------------------------------|--|-------------------------------|---|-------------------------------|
| Crash Report Form | 03 Evident Incapacitating Injury | No | N/A | No | N/A | No |
| Crash Report Form Instruction Manual | 03 Evident incapacitating injury | No | This is an injury other than a fatal injury which prevents the injured person from walking, driving or normally continuing the activities he/she was capable of performing before the injury occurred. Included are severe lacerations, broken or distorted limbs, and internal injuries. This also includes an injured party transported to a | No | Severe lacerations. Broken or distorted limbs. Internal injuries. Injured transported to hospital. | No |

2018 Colorado Highway Safety Improvement Program

| CRITERIA | SUSPECTED SERIOUS INJURY IDENTIFIER(NAME) | MMUCC 4TH EDITION COMPLIANT * | SUSPECTED SERIOUS INJURY DEFINITION | MMUCC 4TH EDITION COMPLIANT * | SUSPECTED SERIOUS INJURY ATTRIBUTES(DESCRPTORS) | MMUCC 4TH EDITION COMPLIANT * |
|--------------------------------|---|-------------------------------|--|-------------------------------|---|-------------------------------|
| | | | hospital because of the severity of the injuries. | | | |
| Crash Database | 03 Evident incapacitating injury | Yes | N/A | No | N/A | No |
| Crash Database Data Dictionary | 03 Evident incapacitating injury | No | This is an injury other than a fatal injury which prevents the injured person from walking, driving or normally continuing the activities he/she was capable of performing before the injury occurred. Included are severe lacerations, broken or distorted limbs, and internal injuries. This also includes an injured party transported to a hospital because of the severity of the injuries. | No | Severe lacerations. Broken or distorted limbs. Internal injuries. Injured transported to hospital. | No |

Please describe the actions the State is taking to become compliant by April 15, 2019.

CDOT is updating the statewide crash form from the DR2447 to the DR3447. Along with the crash form, the officer's manual is also being updated to modify the definitions of the injury levels to be in compliance with the MMUCC 4th and 5th editions. Adoption of the new crash form and officer's manual was anticipated in 2018, prior to the required compliance date of April 2019. However, the actual adoption of the new crash form has not yet occurred; CDOT continues efforts to reinforce the importance of adoption of this updated crash form and officer's manual for MMUCC compliance by April 2019.

Enter additional comments here to clarify your response for this question or add supporting information.

Did the State conduct an HSIP program assessment during the reporting period?

Yes

Describe the purpose and outcomes of the State's HSIP program assessment.

The State of Colorado did not conduct a self-assessment during the reporting period. However, FHWA did conduct an assessment on Colorado's HSIP during the reporting period. The resulting report issued by FHWA in May of 2018 did yield a positive listing of best practices as well as areas of improvement. CDOT is currently working to address the improvement recommendations and have recently submitted an action plan in response to FHWA's Assessment Report. We look favorably upon the detailed information and insight obtained through this assessment process and look forward to striving toward continuous improvement of Colorado's HSIP.

The final report is available on the FHWA website for anyone wishing to learn more specific detail on the assessment process, involved stakeholders, best practices, and recommendations; however, among other recommended improvements, we would like to very briefly point out a few key areas which we will be placing special focus on in order to improve our program. Those areas are as follows:

1. Develop a systemic approach to include in our HSIP for addressing statewide safety concerns that may better be addressed through systemic improvements over spot locations.
2. Improve local agency participation through providing better education, assistance, and engagement.
3. Improve overall crash data access and basic, high-level analysis tools for local agencies to help identify and submit eligible safety improvement projects for HSIP funding.

Optional Attachments

Program Structure:

[HSIP_2016.pdf](#)

Project Implementation:

Safety Performance:

Evaluation:

Compliance Assessment:

Glossary

| | |
|---|---|
| 5 year rolling average | means the average of five individuals, consecutive annual points of data (e.g. annual fatality rate). |
| Emphasis area | means a highway safety priority in a State’s SHSP, identified through a data-driven, collaborative process. |
| Highway safety improvement project | means strategies, activities and projects on a public road that are consistent with a State strategic highway safety plan and corrects or improves a hazardous road location or feature or addresses a highway safety problem. |
| HMVMT | means hundred million vehicle miles traveled. |
| Non-infrastructure projects | are projects that do not result in construction. Examples of non-infrastructure projects include road safety audits, transportation safety planning activities, improvements in the collection and analysis of data, education and outreach, and enforcement activities. |
| Older driver special rule | applies if traffic fatalities and serious injuries per capita for drivers and pedestrians over the age of 65 in a State increases during the most recent 2-year period for which data are available, as defined in the Older Driver and Pedestrian Special Rule Interim Guidance dated February 13, 2013. |
| Performance measure | means indicators that enable decision-makers and other stakeholders to monitor changes in system condition and performance against established visions, goals, and objectives. |
| Programmed funds | mean those funds that have been programmed in the Statewide Transportation Improvement Program (STIP) to be expended on highway safety improvement projects. |
| Roadway Functional Classification | means the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide. |
| Strategic Highway Safety Plan (SHSP) | means a comprehensive, multi-disciplinary plan, based on safety data developed by a State Department of Transportation in accordance with 23 U.S.C. 148. |
| Systematic | refers to an approach where an agency deploys countermeasures at all locations across a system. |
| Systemic safety improvement | means an improvement that is widely implemented based on high risk roadway features that are correlated with specific severe crash types. |
| Transfer | means, in accordance with provisions of 23 U.S.C. 126, a State may transfer from an apportionment under section 104(b) not to exceed 50 percent of the amount apportioned for the fiscal year to any other apportionment of the State under that section. |