

1. INTRODUCTION

The term “roadside safety devices” includes guardrails, cable rail, end treatments, crash cushions and concrete barriers. The purpose of roadside safety devices is to help prevent errant vehicles from crashing into roadside obstacles or into oncoming traffic.

Roadside safety devices must be crash tested and pass strict Federal Highway Administration requirements and be installed according to manufacturers’ instructions. The most recent set of guidelines for crash-testing roadside devices is the Manual for Assessing Safety Hardware (MASH). MASH is an update to the National Cooperative Highway Research Program (NCHRP) Report 350, *Recommended Procedures for the Safety Performance Evaluation of Highway Features*. Each category of roadside safety device is required to be MASH compliant by key dates, the last of which is December 31, 2019.

Roadside safety devices are not managed under CDOT’s formal asset management program. Nevertheless, strategic approaches are needed to identify, and prioritize, assets in-need of repair or replacement to meet MASH and CDOT goals. One purpose of this technical plan is to identify the information, resources, and other gaps that need to be addressed to allow a more strategic approach toward managing roadside safety devices with a performance outcome in mind.

Currently, replacement of non-compliant existing roadside safety devices with MASH-compliant devices occurs when damaged devices are repaired or on an oldest first basis. The highest priority assets to be replaced under the oldest first basis are the roadside devices that only meet the 1981 Report 230 requirements.

The replacement of roadside safety devices does not have a dedicated source of funding. Funding is a year by year decision. For the 2019-2020 fiscal year, \$2 million was allocated from the strategic safety pool toward roadside device replacement.

2. REGULATORY CONSIDERATIONS

The following list provides an overview of relevant regulations, guidelines, and requirements related to roadside safety devices:

- FHWA Information Memorandum concerning Joint Implementation Agreement for the AASHTO Manual for Assessing Safety Hardware (MASH), January 7, 2016.
- FHWA Memo, Federal-aid Reimbursement Eligibility Process for Safety Hardware Devices, November 12, 2015.

3.ASSET INVENTORY & CONDITION

3.1 Current Inventory and Condition

Roadside Safety Device is a term used to describe a grouping of safety devices such as guardrails, cable barriers, end treatments, bridge rails, work zone treatments and concrete barriers. In 2017, a high-level roadside device inventory was performed for the first time by extracting information from images collected during pavement data collection. Pavement data collection is performed by a van that travels the state highway system and takes rear and front facing images every 26 feet. While the primary function of this data collection is to capture pavement conditions, roadside safety device can be seen in the images and information about roadside safety devices can be extracted. The images show the existence of roadside devices, but many attributes are not available such as type, height, and condition. For example, the inventory may report a guardrail location. But information such as the type of guardrail, if it is located on the inside or outside of a roadway, and its condition is not available. In 2018, the image extraction will look for a condition criterion of deficient or not deficient. The 2018 data is not yet available.

Some condition information is derived from CDOT's Maintenance Level of Service (MLOS) summer survey. Generally the condition thresholds are: device age and whether or not a device has sustained crash damage. During for MLOS survey, CDOT Maintenance Crews perform spot checks of randomly selected roadside areas that are one-tenth of a mile long. Approximately 500 surveys are returned every year. The surveys report on the condition of several assets including roadside safety devices.

3.2 Future Inventory and Condition Reporting

Having detailed inventory and condition information about roadside safety devices is a prerequisite to effectively managing and upgrading roadside devices. To this end, a more robust roadside safety device inventory and condition program is desired. Data is needed to better inform decisions about which roadside safety devices are selected to be improved or replaced (i.e., to become MASH compliant).

4.FUNDING

Funding for the replacement of roadside safety devices is available as part of the pavement essential items. The program relies on year-to-year funding decisions. In fiscal year 2019-2020, \$2 million was allocated from the Strategic Safety Pool toward roadside safety device compliance projects.

5.INVESTMENT STRATEGIES

5.1 Current Investment Strategy

The general strategy is to replace the oldest guardrail first. Damaged guardrail is evaluated to determine if it should be repaired or replaced.

5.2 Future Investment Strategy

The development of a formal state-wide strategy for guardrail repair and replacement is another necessary program need. Many factors can be used to evaluate deficiencies, determine the risk factor of the deficiency and identify the highest need for repair or replacement. Risk factors for a highway corridor include the traffic volume, the crash experience, safety history, and presence of a freight corridor. With these factors codified, investment strategies can be developed, and the projects that best meet strategy objectives can be identified and prioritized.

6.PROJECT SELECTION

6.1 Current Project Selection

Currently, regions identify their roadside safety device needs and submit funding requests to the Traffic Assets and Operations Services office. Reactive efforts to crash damage also create projects. Decisions about the severity and level of damage determines if a damaged asset is repaired or replace.

7.HEADQUARTER AND REGION ROLES

- The Traffic Assets and Operations Services office in the Division of Highway Maintenance and Operations is responsible for asset management for roadside safety devices, including project selection and project funding.
- The Standards and Specifications Unit of the Project Support office develops roadside safety device standards, addresses MASH compliance, design issues, and project support. One engineering position is dedicated to roadside safety devices and is a liaison between engineering and maintenance, assists with inspection criteria and repair or replace decisions.
- The CDOT Regions Traffic Sections either construct or contract for the construction of projects and maintenance crews inspect and maintain roadside safety devices.
- Staff Bridge has ownership of the bridge approach rails which are required to comply with MASH.
- The Information Management Unit in the Division of Highway Maintenance and Operations is involved with inventory.

8.REPORTING, MANAGEMENT, DOCUMENTATION

Because roadside safety devices are not formally part of CDOT's Asset Management Program, no formal reporting, or documentation is occurring. Management of roadside safety devices is shared among the Traffic Assets and Operations Services office in the

Division of Highway Maintenance and Operations, the Standards and Specifications Unit of the Project Support Office and the Regions.