American Association of State Highway and Transportation Officials
AASHTO

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Second Edition

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PREFACE

The use of effective roadside safety features provides a reasonable level of safety for the traveling public. New systems are continually emerging to address safety problems. Devices and practices improve in response to an increased understanding of safety performance, a changing vehicle fleet, the emergence of new materials, and other factors.

This second edition of the *Manual for Assessing Safety Hardware* (MASH) is the latest in a long series of crash testing guidance documents dating back to 1962. This update incorporates many changes from the previous edition. Some of the more significant changes include:

- A new matrix for cable barrier testing on slopes
- Modifications to several test vehicle dimensions
- Updated test documentation requirements

This document's purpose is to encourage consistency in crash testing and evaluation. Full-scale crash testing has been and will continue to be the most common method of evaluating the impact performance of safety hardware. Consistency in crash testing and evaluation benefits states, testing facilities, manufacturers, and the public.

Note that MASH addresses only the crash testing of roadside safety features. It does not contain installation or maintenance guidance, nor does it supersede any of the guidelines found in the AASHTO *Roadside Design Guide*.

Implementation of this Manual by roadway agencies is outlined in an AASHTO/FHWA Joint Implementation Agreement. A copy of the agreement is available through the AASHTO Bookstore at: https://bookstore.transportation.org/item_details.aspx?ID=2707.

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1 Introduction

1.1 PURPOSE AND SCOPE

The purpose of this manual is to present uniform guidelines for the crash testing of both permanent and temporary highway safety features and recommended evaluation criteria to assess test results. Guidelines are also presented for the in-service evaluation of safety features. These guidelines and criteria, which have evolved over the past 40 years, incorporate current technology and the collective judgment and expertise of professionals in the field of roadside safety design. They provide: (1) a basis on which researchers and user agencies can compare the impact performance merits of candidate safety features, (2) guidance for developers of new safety features, and (3) a basis on which user agencies can formulate performance specifications for safety features.

A goal of a highway safety feature is to provide a forgiving roadway and roadside that reduces the risk of a serious crash when a motorist leaves the roadway. The safety goal is met when the feature either contains and redirects the vehicle away from a roadside obstacle, decelerates the vehicle to a safe stop, readily breaks away or fractures or yields, allows a controlled penetration, or is traversable, without causing serious injuries to the vehicle's occupants or to other motorists, pedestrians, or work zone personnel.

Ideally, the roadside would be clear of all obstructions, including unnecessary roadside hardware, and be traversable so that an errant motorist could recover control of the vehicle and stop or return to the travelway. However, there are numerous roadside areas that cannot practically be cleared of all fixed objects or made traversable. At these sites, the use of an appropriate safety feature or safety treatment is intended to reduce the consequences of a departure from the roadway.

The crash testing guidelines presented herein cover vehicular tests to evaluate the impact performance of permanent and temporary highway safety features. Performance is evaluated in terms of the risk of injury to occupants of the impacting vehicle, the structural adequacy of the safety feature, the exposure to workers and pedestrians that may be behind a barrier or in the path of debris resulting from impact with a safety feature, and the post-impact behavior of the test vehicle. Other factors that should be evaluated in the design of a safety feature, such as aesthetics, costs (initial and maintenance), and durability (ability to withstand environmental conditions such as freezing and thawing, wind-induced fatigue loading, effects of moisture, ultraviolet radiation, etc.) are not addressed in this document.