

Tech Brief

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In-Service Evaluation of Barrier Systems

ISSUE: Before a traffic barrier, terminal, or crash cushion can be installed on a public road, devices must meet requirements of standardized crash tests, and be included on ADOT's Standard Drawings or Approved Products List (APL). Even so, each barrier type, terminal, and crash cushion has unique installation requirements, different crash performance, and varying degrees of required maintenance/repair during its service life. Unless real world information on these variables is uniformly collected and analyzed statewide, it is possible that the most cost-effective devices are not always selected for use at specific locations and that some devices may not be performing as well in the field as expected.

OBJECTIVE: To inform field personnel to the importance of collecting data on the performance and repair costs associated with safety hardware involved in a crash, as well as an assessment of possible installation issues and degradation due to environmental conditions such as weather, age, climate.

METHODOLOGY: Some state DOTs currently require a field review at locations where any serious crash involving roadside hardware has occurred. A similar review may be appropriate where a barrier, terminal, or crash cushion requires repair following an impact. The type of information to be collected varies, depending on the type of barrier system impacted. Recommended data items to record for each barrier system are listed below.

TRAFFIC BARRIERS:

The primary traffic barriers used that require repair after a crash are cable barriers, box-beam, three-beam and w-beam guardrail. Each system can be used as a roadside barrier or as a median barrier. It is recommended to collect and record the following information when these barriers are damaged:

- Identify the type of barrier.
- Evaluate the condition of barrier components (posts, blockouts, rail, etc.) that were damaged and for degradation due to environmental conditions.
- If there is a crash report available, obtain a copy to determine the extent of occupant injuries, the vehicle type and impact conditions (i.e., estimated speed and impact angle), and the final resting position of the vehicle. (If there is no police report, one may conclude the impact was minor and the vehicle was driven from the scene). Did the barrier contain and redirect the impacting vehicle?



EXPECTED RESULTS:

The information collected as part of this effort will aid ADOT Design engineers with the selection and placement of barrier systems and recognize deficiencies that may compromise performance.

- Measure the distance from the edge of the travel lane to the face of the barrier.
- Identify and record any installation issues such as slopes and/or curbs from the edge of the shoulder to the barrier face, the flare rate if any, slope immediately behind the barrier, deviation from standard drawing, etc.
- Record the height of the barrier upstream and downstream of the damaged area. For cable barrier, identify the manufacturer and measure the height of each cable adjacent to the damaged section and the post spacing.
- Was the barrier a current or obsolete design? Look for things such as steel blockouts or rectangular washers on the face of w-beam barriers. Also note if w-beam rail splices were at the post or mid-span between posts as well as the post spacing.
- Measure the permanent deflection and if the barrier was shielding a vertical fixed object, record the available deflection distance.
- Provide photos of the damaged and adjacent barrier sections.
- Record the extent of damaged barrier and the estimated cost along with any anticipated difficulties with the replacement or repair.



TERMINALS/CRASH CUSHIONS:

There are several types of terminals and crash cushions used throughout the country along with existing systems that no longer meet the current testing criteria. It is recommended to collect and record the following information when these systems are damaged:

- Identify the type of terminal or crash cushion damaged and obtain a copy of the crash report if one was completed.
- If there is a crash report available, determine the extent of occupant injuries, the vehicle type and impact conditions (i.e., estimated speed and impact angle), and the final resting position of the vehicle.
- Identify any installation concerns such as stub height, flare rate, grading, runout area behind terminal, presence of curbs or other objects, missing or nonconforming parts or other deviations from the standard drawings or manufacturer's guidance.
- Identify any secondary impacts or rollover that may have occurred after impact with the terminal or crash cushion. Was this the result of inadequate length or clear area?
- Did the system perform as intended?
- Provide information of the condition of the system as a result of the impact and/or due to environmental issues such as weathering, age, climate, etc.
- Determine if there were any installation issues such as compliance with the manufacturer's drawings, proper site preparation, etc.
- Provide photos of the damaged installation and surrounding conditions.
- Record the estimated cost and any anticipated difficulties to repair or replace a crashworthy system, or to upgrade to State's typical maintenance practices.

