



What Is Roadside Safety Hardware?

Roadside safety hardware refers to devices installed alongside the roadway that are designed to lessen the severity of crashes when a driver runs off the road. For example:

- **Guardrails** redirect vehicles away from hazardous objects and unsafe terrain.
- **Crash cushions** help slow a vehicle down or reduce the force of impact with a hazardous obstacle like a bridge pier.
- **Breakaway sign, signal, and light posts** break off at the base so that, when struck, they go over the vehicle, landing behind it rather than on top of it.

These devices are only installed when the possible consequences of striking the device are less harmful than striking the other objects next to the roadway or hurtling off the road into a ravine, a body of water, or other hazard. When a driver has lost control of a vehicle, roadside safety hardware is the last line of defense.

ROADSIDE SAFETY HARDWARE: The Last Line of Defense

It came out of nowhere. Another vehicle going way too fast has sideswiped you on the Interstate, and even though you've braked and tried to recover from the skid, your vehicle is going off the road. Trees flash by, your brakes screech, and then there's the impact. Your car slides along the guardrail for what seems like ages, kicking up gravel and making a terrifying noise. But finally, it comes to a stop. And you're still alive.

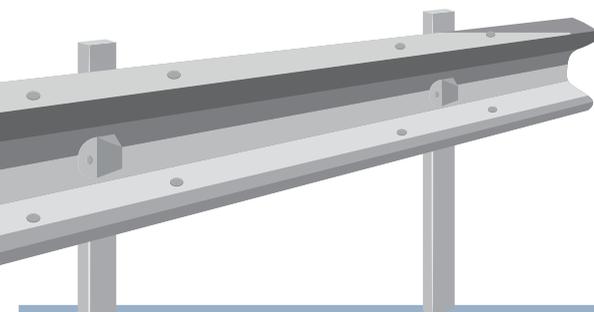
Thousands of Americans have similar experiences every year, and they all have one thing in common: roadside safety hardware has saved their lives. Roadside safety devices have been proven to significantly reduce the number of fatal and serious injury crashes among drivers who would otherwise have run off the road and crashed into a potentially deadly object.¹ For example, median barriers installed on rural four-lane freeways showed a **97 percent reduction** in cross-median crashes.²

Roadside safety hardware redirects vehicles that leave the roadway away from roadside hazards such as steep drop offs, bodies of water, or the roadside itself, which may be lined with fixed objects such as trees, bridge piers, retaining walls, or utility poles. Highway engineers carefully weigh the placement of roadside safety hardware, and in most cases, these devices work extremely well.

Continuous Improvement: Making Roadside Safety Devices Safer

FHWA, in partnership with the American Association of State Highway Transportation Officials (AASHTO), is actively working to improve safety on our Nation's roadways every day. We recognize that a car that crashes into *anything*—even a safety device—can cause an injury or fatality, and we are working to find new ways to continuously improve the roadside safety devices deployed across the country.

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- 1 Y. Zou, A.P. Tarko, E. Chen, M.A. Romero, "Effectiveness of cable barriers, guardrails, and concrete barrier walls in reducing the risk of injury," *Accident Analysis & Prevention* 72 (2014), 55-65.
 - 2 J.L. Graham et al., NCHRP Report 794, *Median Cross-Section Design for Rural Divided Highways* (Washington, DC: TRB, 2014).



CRASH TESTING. To be eligible for Federal highway funding, roadside safety hardware installed on the National Highway System must be crashworthy, meaning that it has been successfully tested in accordance with established national testing requirements. This controlled, repeatable testing is conducted based on the criteria laid out by these requirements at accredited crash test laboratories. These rigorous, standardized crash testing criteria became even more stringent under AASHTO's *Manual for Assessing Safety Hardware* (MASH).³ The new requirements encourage manufacturers to develop safety devices that work better, take into account the increasingly wide range of vehicle types on the road, and address potential crashes that may occur under a more diverse range of conditions.

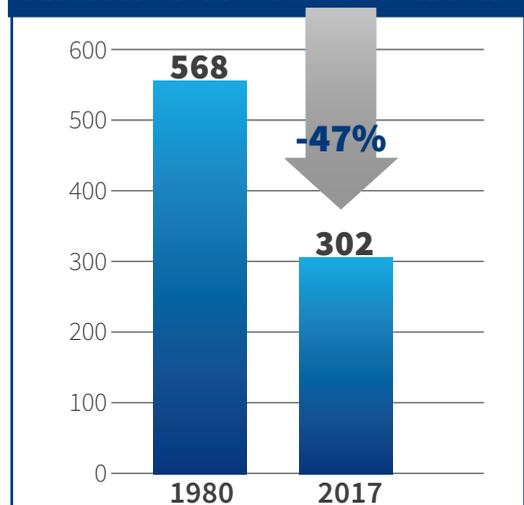
INSTALLATION AND MAINTENANCE PRACTICES. FHWA is working with State and local agencies to improve how roadside safety devices are installed and maintained. FHWA is proactively addressing appropriate placement, installation, and maintenance practices of roadside safety hardware through a [training program](#) offered to State and local agencies. This program is funded through the Fixing America's Surface Transportation (FAST) Act and has several different components to provide flexibility in meeting the needs of different agencies.

IN-SERVICE PERFORMANCE EVALUATION (ISPE). Roadside hardware is rigorously tested at laboratories in situations that are intended to encompass the majority of possible in-service collision types. State ISPE programs provide valuable insights into how these devices perform under a wide variety of real-world conditions. By monitoring what does and doesn't work, research engineers can better understand and improve the design features that are most effective for improving safety. FHWA, working with four State partners, is currently completing a pilot ISPE designed to identify successful practices for:

- Collecting data on crashes involving roadside safety hardware.
- Communicating among agencies at the state level regarding crash reporting.
- Managing data to maximize the effectiveness of hardware inventory and maintenance practices.

FHWA is committed to preventing deaths and injuries on the Nation's roadways, and is working with its safety partners, State agencies, and the public to address sources of potential danger to drivers, whether on or alongside the roadway. For more information, please visit the [Countermeasures that Reduce Crash Severity](#) web page.

FATALITIES from GUARDRAIL CRASHES



Between 1980 and 2017, continuous improvements in engineering and design have reduced by 47 percent the number of fatalities resulting from vehicles crashing into guardrails. By comparison, total fatalities related to motor vehicle crashes declined by 27 percent during the same period.⁴ In 2017, in less than one half of one percent of all 34,247 fatal crashes on highways, the most harmful event is attributed to vehicles striking a guardrail terminal.⁵

³ American Association of Highway and Transportation Officials, *Manual for Assessing Safety Hardware* (MASH), Second Edition, 2011. <https://store.transportation.org/item/publicationdetail/2707>

⁴ Based on a total of 51,091 deaths in 1980 and 37,133 deaths in 2017. Source: 2017 data, FARS (see <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812603>). 1980 data, Insurance Institute for Highway Safety, Highway Loss Data Institute (see <https://www.iihs.org/iihs/topics/t/general-statistics/fatalityfacts/overview-of-fatality-facts>)

⁵ Federal Highway Administration, *Roadside Safety Hardware Identification Methods Report to Congress*, 2018. Available at: https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity/id_methods/ch1.cfm. Source of 2017 fatal crashes: 2017 data, FARS (see <https://www.nhtsa.gov/research-data/fatality-analysis-reporting-system-fars>)