

**W**hat are those short metal fences by the side of the road? They don't look like much. But they do a big job: keep drivers safe.

People who design highways would always like to have a wide, flat, clear space on either side of the road. That way, if a car goes off the road, it can stop safely.

But in some places, that's just not possible. That's when they put up a guardrail. These short railings are designed to stop cars from running into something more dangerous, without damaging the car too much.

The type of guardrail they put up depends on the road. A weaker guardrail may let the car go farther off the road, but does less damage to the car. A strong guardrail stops a car in a short distance, but the car suffers more damage.



**Jersey barriers** are made of concrete. They are often placed down the center of a road to separate cars going in opposite directions. Jersey barriers are also used around construction zones. They are cheap to make and easy to move around.

**A box-beam guardrail** looks like a long metal box running between posts. Box-beam guardrails are very strong, but expensive. They are used mostly where it's important to stop cars quickly. You might see one in the middle of a road to keep cars from going into oncoming traffic.





The ground that holds the posts is also very important. Engineers use math to make sure that the rails, posts, and ground together can absorb enough energy to stop a moving car safely.

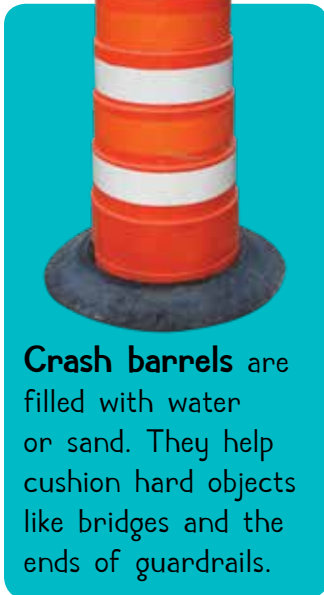


A weak-post W-beam guardrail has posts that are thinner and farther apart. Why would anyone want to make a guardrail with weak posts? A weak-post guardrail will stop a car more slowly than a strong-post guardrail. The more gradually a car slows down, the less likely its riders will be hurt. A weak-post guardrail can be used where there is more space to slow a car down.

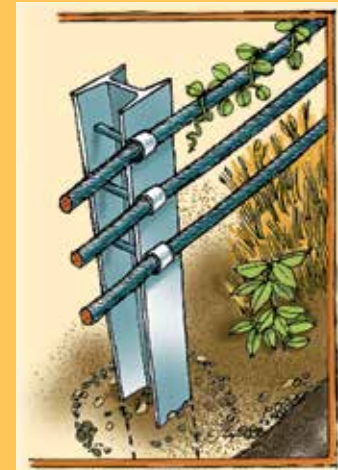
A strong-post W-beam guardrail has short, thick posts set close together. This common guardrail is used where it's important to stop a car quickly to save lives, such as where a cliff is right next to the road. It gets its name from the fact that if it's cut in half, the rail looks like a sideways W.



A three-beam guardrail has a piece of steel that ripples in three C-shapes. This type of guardrail is used on roads with a lot of truck traffic. The curves in the C-shapes absorb energy in a crash, and the rail is high off the ground to catch trucks.



Crash barrels are filled with water or sand. They help cushion hard objects like bridges and the ends of guardrails.



Wire-rope guardrails are made by pulling cable between metal or wooden posts. These guardrails cost less, but are easily damaged. The tension in the cable—how tight the cable is pulled between posts—is very important. A loose cable may not be able to stop a car.

