



After the new span of the Bay Bridge was open, the old bridge was removed and recycled.

Shake-Proof Bridge

San Francisco's Bay Bridge is designed to survive powerful earthquakes.

In October 1989, a powerful **earthquake** shook San Francisco. The quake destroyed part of the San Francisco-Oakland Bay Bridge, a 7.2 kilometer (4.5 mile)-long road that runs across San Francisco Bay. One part of the bridge shifted while another section collapsed. One person was killed.

Workers fixed the bridge. But officials worried about what might happen when another big earthquake came along. So engineers began building a new section of the bridge next to the old one.

They designed the new bridge to withstand the world's most powerful earthquakes. In September 2013, the new span of the Bay Bridge opened to the public.

Smooth Vibrations

This new part of the Bay Bridge is a suspension bridge. Cables connect the roadway to a tower 160 meters (525 feet) high. This design helps the bridge absorb **vibrations**, or shaking, from the ground and from traffic.

"Imagine swinging on a swing set," says Marwan Nader, the bridge's lead designer. "If the ground shakes, you'd barely feel it. But if you're sitting on a chair and the ground shakes, you'd feel it." The cables on the bridge act like a swing's ropes. They absorb vibrations. That keeps the bridge stable when the ground shakes.

Built to Be Flexible

To survive a quake, it's important for a structure to

move along with the ground's movements. So Nader and his team of engineers designed the bridge's tower to be able to bend without breaking. The tower is made of four tall steel shafts. Each can bend a little, but the pieces connecting them are designed to bend much more. That bending can absorb destructive energy during an earthquake. And if the connectors bend so much that they get damaged, they can be easily replaced.

Watching cars zoom over the new section of the Bay Bridge for the first time was a proud moment for Nader. "I experienced the 1989 quake and saw the damage," he says. "It's a relief to know we now have a structure that will help keep people safe for years."