

# Great Kanto Earthquake of 1923 caused great damage

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[Randy Bright](#)

Oklahomans are more interested in earthquakes these days, most of us having felt a tremor or two over the last few years. But they are nothing like the ones that hit Japan. On April 16<sup>th</sup> a few years ago, a 6.2 struck, killing 9 people, but a much larger one occurred on March 11, 2011. It was a 9.0 that brought about mass destruction on the island nation. That was the second earthquake in less than a century that has brought mass destruction to the Japanese islands.

The first one, the Great Kanto Earthquake, struck during the lunch hour on September 1, 1923, when a 7.9 (or possibly an 8.3) magnitude earthquake struck and shook the area for up to ten minutes. There were 57 recorded aftershocks.

Because so many residents were cooking with open fires at the time, massive fires broke out. At the same time, high winds from a nearby typhoon turned the fires into deadly firestorms. In one instance, 38,000 people died when they crowded into a clothing depot and were all incinerated by a firestorm.

Tsunamis also caused massive destruction and death, when 30-foot high waves came ashore. Nearly two million people were left homeless.

The tremors also caused landslides, one of them taking a train and a train station down into the sea, killing 100 people. Another 800 were killed when mountainsides collapsed, burying or sweeping away homes.

Tokyo was especially hard hit, but one structure survived. That was the Imperial Hotel, designed by none other than American architect Frank Lloyd Wright. After the earthquake hit, Wright received a telegram telling him, "Hotel stands undamaged as monument to your genius. Congratulations."

I recall one of my architectural history professors at The University of Illinois, who had been an apprentice to Wright, telling us of how Wright's hotel was the only building in Tokyo left standing.

Wright's design for the hotel foundation was unusual for its time, especially in Tokyo. Its walls were thicker at the bottom than the top, and rested on piers driven deep into the alluvial mud. On Wright's construction drawing describing the foundation, he wrote, "Floor slabs balanced over central supports as a tray rests on a waiter's fingers to prevent failure under earthquake strain."

Wright also incorporated other features in the design to make the building less susceptible to earthquake damage. He included a large reflecting pool in the courtyard to serve as a source for water for fire protection, installed special joints in the building to help it absorb movement, and used copper roofing instead of tiles to prevent falling objects.

Despite publicity to the contrary, and despite the fact that the building was indeed still standing, it did in fact sustain a great deal of damage. However, Wright's attention to designing the building to resist Japan's frequent earthquakes meant that no one died in his hotel. That is significant, considering that around 140,000 were killed, mostly by firestorms.

There are a lot of similarities between the 1923 earthquake and the one that took place in 2011. According to the USGS, that one was located over 15 miles deep beneath the sea off the east coast of Honshu, one of the four largest islands that make up the island-state of Japan. The 1923 earthquake was located on the island of Honshu itself, but it still caused a tsunami. Both caused massive fires and massive loss of life, but newer construction techniques limited the loss of life in the 2011 earthquake in comparison to 1923. Much of the loss of life in the 2011 quake was caused by a tsunami that was as high as 133 feet in places. 15,894 people were killed, and another 2,562 were listed as missing.

Experts stated that the 2011 earthquake was 1,000 times more powerful than the earthquake that hit Haiti the year before, and more than 8,000 times more powerful than an earthquake that hit New Zealand about the same time. It was so powerful that some scientists believe it moved the island of Honshu 8 feet east and shifted the earth's axis by 10cm.

Despite the rash of earthquakes occurring in central-northern Oklahoma, the earthquake for us to watch for is the one that is long overdue – the New Madrid fault in southeastern Missouri, where seismic charts literally paint a bulls-eye. Even if it is a large earthquake, we probably won't receive much damage here, but our neighbors in St. Louis and Memphis, where there are still a lot of unreinforced masonry structures and high concentrations of population, will certainly see extensive damage.



Randy W. Bright, AIA, NCARB, is an architect who specializes in church and church-related projects. You may contact him at 918-582-3972, [rwbrightchurcharch@sbcglobal.net](mailto:rwbrightchurcharch@sbcglobal.net) or [www.churcharchitect.net](http://www.churcharchitect.net). ©2016 Randy W. Bright