

Bridge Collapse



Wiltshire & Swindon
Prepared



Introduction

Bridge Collapse, it sounds horrendous does it not? Something that's perhaps not out of place in an action movie or seen throughout history in battles/war as a way to stop the advance of an enemy. Unfortunately bridge collapses do also happen in every day life, but luckily they aren't too common.

Interesting Facts

The deadliest bridge failure since 2000 occurred in India in 2002 when a rail bridge over the Dhane River collapsed, which killed approximately 130 people and is thought to be have been an act of terrorism.



What is it?

So I think we can all imagine what a bridge collapse looks like but maybe the better questions is why do they happen? Here some reasons why, but of course, im sure you can think of some others.

Earthquakes: Earthquakes by their nature destroy plenty of buildings and structures. The tremors felt through the Earth are something bridges don't tend to be designed to cope with so are often adversely effected. Its not out of place to see a broken bridge in the images shown post, earthquake. However as we move forward in time builders are now able to construct bridges in earthquake-prone areas to withstand or reduce the impact of earthquakes. Luckily Earthquakes are something we rarely suffer from in the UK.

Fire: Perhaps not something you'd consider in this list, but fires do destroy bridges still. Nowadays most bridges are not built from wood but years ago they were and a major contributor to their destruction was accidental or deliberate fires. Even now when most bridges are constructed from alternative materials fires can still cause havoc as a vehicle traveling under or over it may catch fire resulting in severe damage to the structure.

Train Crash: This is a very rare type of bridge collapse, but it can happen. Trains often go under a bridges and a derailment under or near a bridge could severely damage the structure. Any destruction caused by this 'method' is likely to have a high death toll of not only those on the bridge itself, but anyone in the train/s. Looking not to far back in history to 1998, the Eschede derailment in Germany is a good example of the horror train crashes into bridges can cause, with 101 deaths and 88 injuries occurring.

Boat Impact: Similar to train derailments, boats can also impact the underside or supports of bridges. This is quite rare as it would require the boat to hit a supporting structure at either high force or speed or the structure to be weak therefore requiring less force to cause damage.

Flood: There are several ways in which flooding can cause a bridge collapse, one of which is more obvious than the other:

- **River 'weight' and debris:** In times of flood shear amounts of water can pour under bridges and put untold stress on pillars and supporting structures. In addition to this flood water often pick up large amounts of debris, from cars and trees to even mobile homes and caravans. These regularly hit pillars and get stuck again pushing a large amount of stress on the structure.
- **Gradual wearing:** Less obvious but equally important. The large amount of water and the power it brings with it can wear away at he land around the supporting structures causing it to become unstable and perhaps collapse in the coming days, weeks or months. Bridges are designed to deal with the normal water flows and certain flood scenarios but not some of the more devastating when we can occasionally get.

Construction Accident: Something we might not consider to be that dangerous but actually is. Bridges take a lot of workers to build and can be in very dangerous locations. In history there have been a number of examples where during the construction phase bridges collapse killing many workers who were on the structure. As working practices improve vastly over years its hoped these types of incident are much rarer.

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Manufacturing Defects: Unfortunately as we all know when you buy something that sometimes its defective. With building materials this can also happen and even a small (but crucial) piece if defective can cause a collapse in years to come.

Design Defect: Bad design, does occasionally happen. Its as simple as it sounds, basically the structure hasn't been designed to take the load that it is actually required to take. Sometimes this can happen with a brand new bridge, but can also occur when an old bridge has been updated.

Poor Maintenance: When something is built it is done so with the understanding that it must be maintained. This is no different to the idea of leaving a house empty for 10 years, your unlikely to come back to see it in the same condition you left it. Bridges are the same, they require maintenance and inspections. Failure to do this may result in something breaking or corroding and causing bigger problems further down the line.

Odd Occurrences: Sometimes bridges collapse due to a real odd occurrence that were outside of anyone's thought process. A good example of this is Winkley Bridge in Arkansas. It was a pedestrian bridge that was well known to sway under certain loads. A group deliberately swung the bridge in 1989, so severely that the supports failed and the bridge collapsed killing 5 people.

Reference: science.howstuffworks.com

History

There are countless examples of bridge collapses, but one worth a little bit of time is the Morandi bridge tragedy in 2018. The bridge was more than 1km long and crossed a river, railway depot, factories and a populated area. It was opened in 1967. The Morandi bridge was a cable-stayed bridge, similar to the Brooklyn Bridge in some ways but very different in others.

The bridge collapse occurred during a rainstorm and a section measuring over 200metres collapsed, falling onto the river, railway and industrial buildings below. Approximately 30 – 35 vehicles fell along with the bridge itself, which resulted in 43 confirmed deaths.

The bridge was later demolished in 2019 with a new one being built in its place. Multiple different hypothesis exist around why the bridge collapsed, with many centring on it requiring maintenance.



What are we doing about it in the LRF?

There is little doubt that bridge collapses are catastrophic, but they are generally rare. The LRF marks bridge collapses as a low risk. This is due to a number of factors, firstly the low number of large bridges in our area but also due to the regular inspections and improvement programmes undertaken by Railway and the operational plans put in place by single organisations should any collapse occur. So, although it's not a risk we regularly train and exercise around, the LRF through its single agencies has thorough processes in place to check and maintain structures alongside plans in place to enact any response if required.



What can you do?

There isn't much you can do to prevent a bridge collapse, however should you see anything that concerns you about a bridge structure please do report it to Network rail or the Local Authority.