



# Glossary



**Abutment:** the structure that the ends of the bridge rests and can be anchored by.

**Aeroelastic flutter:** vibrations or movement, caused by fluids (such as wind) on a flexible material, and can lead to a positive feedback loop - feeding into their own movement and increasing the 'flutter' further.

**Aesthetics:** This is about how something looks. If a bridge is primarily designed to be aesthetically pleasing, the engineers are more concerned with how it looks. It may be the public and the architects who view the appearance of the bridge as of equal importance to how it works.

**Amplitude:** very simplistically, the size of the wave. In sound, the greater the amplitude, the louder the volume.

**Anchor:** acts to secure the bridge to the ground.

**Arch:** semi-circular curved structure.

**A-Shaped Pylon:** pylon that looks like the letter A when viewed from the end of the bridge, as it has two upright members that meet at the top.

**Baltimore Truss:** a type of truss bridge developed in the 1870s in Baltimore, USA. It is mainly used for railway bridges.

**Bascule Bridge:** Bascule is a French word meaning to tip over or seesaw. Bascule bridges move up and down vertically in an arc shape.

**Beam:** the simplest form of bridge, consisting of a single span resting on abutments.

**Bowstring Truss:** this is the form of truss used in the Rochester Old Bridge, patented in 1841 by Squire Whipple.

**Bridge:** a structure that goes over an obstacle to carry or support something else.

**Cable-stayed bridge:** bridge where the cables attach directly to the towers or pylons at an angle.

**Cantilever:** A horizontal structure that projects into space at right angles (perpendicularly) to its supporting structure, supported or fixed at only one end.

**Cast iron:** iron with more carbon and other impurities mixed in, and then shaped using a cast, or mould, whilst hot.

**Cement:** a fine powder that hardens when water is added and used as the binding material in concrete. It is most commonly 'Portland Cement', produced by heating limestone and clay in a kiln, and then adding gypsum.

**Centring:** the temporary structure originally used by the Romans to support the arch during construction.

**Chemical weathering:** the weathering of materials due to chemicals - including rain water which is slightly acidic due to carbon dioxide from the atmosphere being dissolved in it.

**Civil engineering:** the type of engineering that helps shape the world around us, helping to design bridges, tunnels, railways, roadways, as well, as constructing skyscrapers, dams, power stations, airports and sports stadiums.

**Client:** This the generic name for the people or organisation who have asked for a job to be done. In this session, it is the organisation who has asked for some moving bridge solutions.

**Cofferdam:** a temporary box, built in the water, from which the water is removed, leaving a dry space for building.

**Column Pylon:** single vertical pylon.

**Composite:** a material made from two or more different materials combined together.

**Compression:** a force that tries to make things shorter or smaller (a squashing, pushing force).

**Concrete:** a construction material that could be described as 'artificial rock' made up of fine and coarse aggregates, such as sand or gravel, and cement.

**Corrosion:** the chemical change in metal due to environmental factors.

**Corrugated:** folded into small furrows or ridges.

**Dead load:** the bridge's own weight which does not change or move.

**Deck:** the main surface of the bridge, the traffic crosses here.

**Distribution:** the way a load is spread out, or focussed on a specific point, across a bridge.

**Elevation:** In a technical drawing, this is the view from the side. This view is used on engineering plans to show how a bridge design will look from the side, almost as if you're standing in a boat on the water, looking at the bridge over the span of the river.

**Engineering design process:** the process engineers use to describe the steps taken to move from a question, idea or need, to designing the product or process required.

**Engineering habits of mind:** a concept developed to characterise the range of skills usually found in those people that think like an engineer.

**Fan shaped cables:** cables that are attached to the pylon at the same point, or very nearly, but attach at further intervals on the deck, creating a triangular shape that resembles a traditional hand-fan.

**Frequency:** number of waves per second.

**Functionality:** This is about how something works. If a bridge is primarily designed to be functional, the engineers are more concerned with how it works.

**Hanger:** the cables that hang the deck from the main cable.

**Harp shaped cables:** cables that are attached to the pylon and the deck at regular intervals, so they run parallel to each other.

**Hinge:** a fold that allows movement to swing open and closed from that point.

**Howe Truss:** a type of truss bridge patented in 1840 by Millwright William Howe.

**H-Shaped Pylon:** pylon that looks like the letter H when viewed from the end of the bridge, as it has two upright members and a horizontal member between them.



**Inverse Y Shaped Pylon:** pylon that looks like the letter Y upside down, when viewed from the end of the bridge, as it has two upright members angled to meet at a point, and continues vertically up as a single column.

**Iron ore:** a type of rock found in the Earth's crust from which iron can be extracted: when the iron ore is heated to a very high temperature with charcoal, iron is produced.

**Iron triangle of engineering:** a way of showing how three factors in engineering projects affect each other.

**Iron:** a type of metal, and one of the most commonly found in the Earth's crust, found in iron ore.

**Keystone:** the most important, wedge-shaped stone in the very centre of the arch.

**Lamination:** the process of gluing very thin layers of material together, such as wood, to form a much thicker piece, which can be bent or shaped more easily than a similar single piece of wood.

**Lifting Bridge:** This moves the bridge up, above the river like a lift. They tend to have towers on either side that the bridge moves between on its way up and down.

**Live Load:** mainly the weight of what the bridge is carrying, although wind and snow also have an effect, this moves and changes constantly.

**Longitudinal:** running lengthwise, along the material, not across it.

**Main Cable:** the cables that hold up the bridge, anchored at either end and suspended from the towers.



**Maintenance requirements / to maintain:** This is a list of things that are needed to keep the bridge looked after once it has been built, so it is still safe and lasts a long time.

**Mortar:** a clay-based type of 'glue' used to stick the stones together in an arch.

**Parapet:** a low wall or railing alongside the edge of the bridge deck to protect traffic from falling off.

**Pedestrian:** a person walking, rather than travelling in a vehicle, and for bridges, can refer to a bridge made solely for people to walk across, or for part of the deck that people are able to walk safely across (for example, the pavement).

**Physical weathering:** the effect of temperature change on materials, causing them to break apart over time.

**Piers:** the upright columns that support a bridge.

**Pile-driver:** a large weight at the end of a rope, used by Romans to drive the piles in the river bed. There are modern-day versions of this to drive in sheet piles.

**Piles:** the large logs with sharpened ends used by Romans to make cofferdams.

**Plan view:** In a technical drawing, this is the view from above or a bird's-eye view. This view is used in maps and on engineering plans for a new bridge design, showing how the bridge and landscape look from above.

**Point load:** a load applied to a single point in a beam bridge.

**Pratt Truss:** This is a bridge type found commonly in the USA, that was patented in 1844 by Thomas and Caleb Pratt.

**Pylon:** the tower or vertical part of the bridge to which the cables are attached.

**Resonance:** the tendency of an object to move with greater frequency when vibrations match the object's own 'natural' frequency.

**Rust:** a particular form of corrosion or chemical weathering, when iron metal reacts with oxygen in the air in the presence of water, forming an oxide which is red in colour.

**Shear:** a sliding force which occurs when an object is being pulled in two different directions.

**Sheet Piles:** modern versions of piles, made of steel and shaped into a specific 'M' shape.

**Span:** the distance the bridge, or a part of the bridge, covers.

**Steel:** another iron and carbon mixture, although much less carbon than either wrought or cast iron, which means it is much easier to shape and is stronger.

**Suspension bridge:** bridge in which the deck is hung from main cables on vertical hangers.

**Swing Bridge:** This moves horizontally from side to side or around a central pivot to open and close the bridge.

**Tension:** a force that tries to make things longer (a stretching, pulling force).

**Thermal expansion:** the change in a material (getting longer, deeper, wider) as a result of heating.

**Torsion:** a twisting force. This is caused when either end of the object is being moved in opposite directions.

**Total Span:** the full distance, from one side to the other, the bridge covers.

**Tower:** the main structure that supports the bridge, over which the main cables are suspended, or hanging.

**Transverse:** something at right angles, or crossways, to something else.

**Truss:** a bridge designed with lots of triangle shapes.

**Uniformly distributed load:** a load spread evenly across the length of the beam bridge.

**Vousoir:** the special wedge-shaped pieces used in stone arches.

**Warren Truss:** patented in 1848 by its designer James Warren.

**Weathering:** the breakdown of materials as a result of the weather, such as rainwater or temperature changes.

**Weighbridge:** a machine installed in the road for weighing vehicles that pass across it.

**Wind Tunnel:** a tunnel with a large fan at one end that can be used to simulate the effects of wind on a bridge or other structure.

**Wrought iron:** iron mixed with a very small amount of another element, called carbon. It is heated and 'worked', by being squashed and beaten over and over again, by a blacksmith.