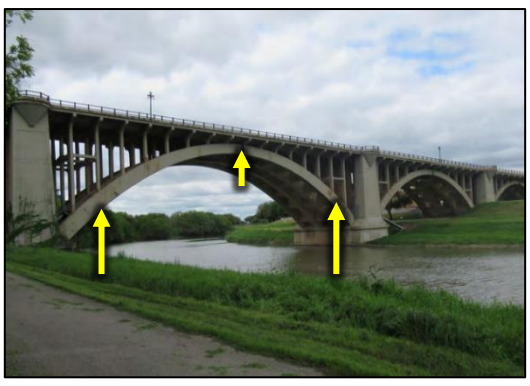
HISTORIC CONTEXT VISUAL GLOSSARY

TxDOT Non-truss Bridge Survey Update

Abutment/Wingwall

Abutment: A retaining wall that supports the ends of the superstructure. Abutments can be constructed of concrete, stone, steel or wood.

Wingwall: An angled wall that is attached to the corner of an abutment that helps stabilize earth embankments.

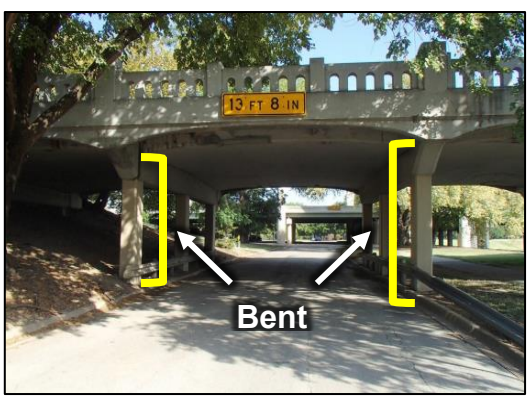


Arch Ring

The part of the arch that has a downward curve and distributes the weight of the bridge directly into the bridge's foundations.

Balustrades

Decorative railings supported by small, evenly spaced vertical columns or balusters.



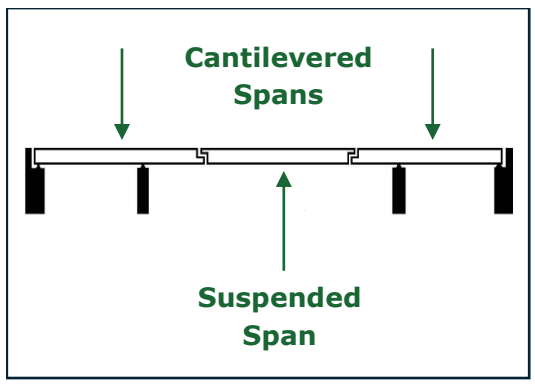
Bent

A type of pier, which is a support structure under the bridge. It generally includes vertical members (i.e. columns or piles) and a horizontal cap. The foundation of the bent (usually concrete footings or drilled shafts) is below grade.

See also ***Piers***

Bolt

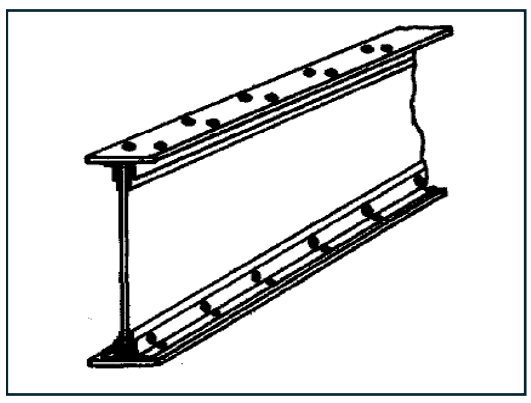
A threaded metal fastener with a nut used to connect members of a bridge together. Square and hexagonal bolts have been in use since the 19th century. High-strength bolts replaced these older bolt types in the 1950s.



Cantilevered span

Spans that are only supported at one end. Projecting beams (called cantilevers) may meet at the middle or support a suspended span.

See also ***Suspended Span***



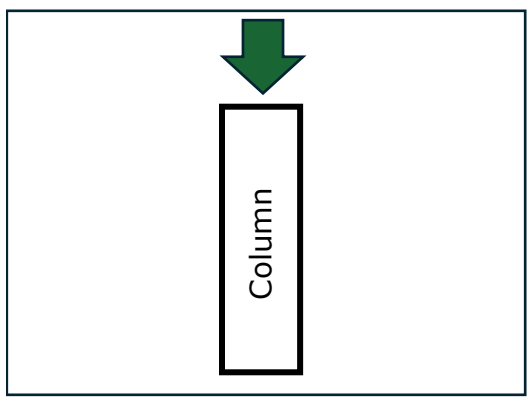
Built-up Beams

Steel girders composed of plates, channels, and angles that are joined together with rivets and bolts (and later welded joints).

Cast-in-place/Precast

Cast-in-place: Concrete is poured into a wood or metal form at the project site. Often the impressions of wood or steel formwork can be seen after a bridge is built.

Precast: This is a construction method using a reusable form or mold, cured in a controlled environment, and transported to a construction site (not illustrated).



Compression

A force that squeezes and pushes material inward.

Concrete Arch Bridge

Concrete Arch, Closed Spandrel: This bridge type has one or more arch rings supporting walls, called spandrels, that hold back fill and carry the deck and railings.

See also ***Arch Ring***

Concrete Arch Bridge

Concrete Arch, Open Spandrel: Arch bridge that has columns that rest on the arch rings and support a deck slab. The arch rings can either be solid or ribbed.

See also ***Arch Ring***

Concrete Box Culvert

Structures with rectangular cross-section integrating the top, two sides, and floor of the box into a monolithic structure.

Concrete Rigid Frame

Bridges in which the superstructure and the substructure are constructed as a single unit. The abutments of a rigid frame are sometimes referred to as legs.

Concrete Slab Bridge

This bridge type functions as a wide, full-width shallow beam. Slab bridges have reinforcing steel that runs along the bottom of the slabs.

Concrete Slab Bridge

FS Slabs with Integrated Curbs*:* Slab bridges with monolithically poured curbs and thinner slabs than other pre-1946 slab bridges.

Concrete Slab Bridge

Variable-Depth Concrete Slab: Multi-span bridge where the depth of the slab is greatest over the piers or abutments. These bridges have a slightly curved or haunched soffit, which resembles a shallow arch.

See also ***Soffit***

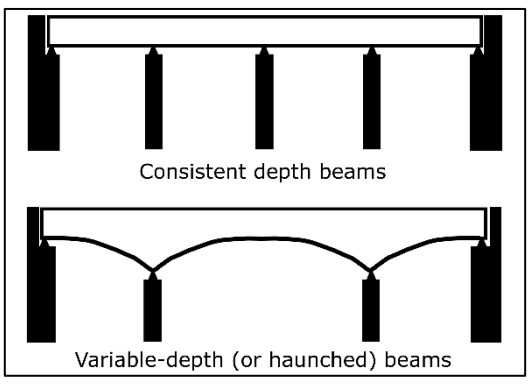
Concrete Tee Beam Bridge

Reinforced concrete cast-in-place bridges comprised of longitudinal laid beams. The name of the beams refers to the pattern of placement of the internal rebar, which looks like a “T” in cross section.

Concrete Tee Beam Bridge

Variable-Depth Concrete Tee Beam: Tee beam with shallow, arched soffits.

See also ***Soffit***



Continuous Span

A span without joints over two or more substructure supports, which distributes the load over a series of spans and supports. Continuous spans may have consistent or variable-depth beams. The opposite is a simple span.

Corrugated Steel

Corrugated steel is a building material composed of sheets formed with a linear ridged pattern. In bridge applications, sheets are often curved to form arch segments or pipes.

Coursed Stone

A method of masonry using stone with similar height and widths to create level rows and a more uniform appearance. The opposite is random uncoursed stone.

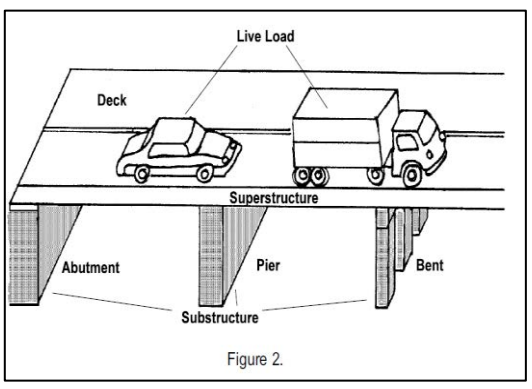


Figure 2.

Dead Load

This is the total weight of the bridge superstructure and substructure elements.

Live Load

Sometimes referred to as a “moving load,” a live load consists of cars, pedestrians, trucks, and trains.

Deck

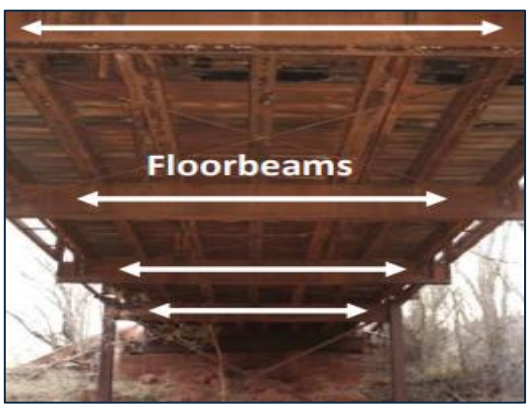
The roadway portion or riding surface of the bridge, including the shoulders.

Dry-laid stone

A method of construction where individual stones are stacked without the use of mortar or other binding materials between the individual stones.

Flange

The horizontal parts of an I-beam or girder.



Floorbeams

Beams under and perpendicular to the deck transferring loads to the principal longitudinal bridge members.

Girder

A girder is generally the largest and strongest beam in a bridge. They are longitudinal beams that support all other bridge elements.

Headwall

A retaining wall placed around a culvert opening that helps to stabilize the embankment or fill material supporting the roadway.

Masonry Arch

Bridge type built of stone, which distributes its load via an arch ring to the abutments.

See also ***Arch Ring***

Mortar Joints

The spaces between bricks or concrete blocks that are filled with mortar. Mortar is a mixture of water, sand, and a binder such as cement.

Parapets

Solid railings on either side of the deck. Parapets are typically constructed of stone or concrete.

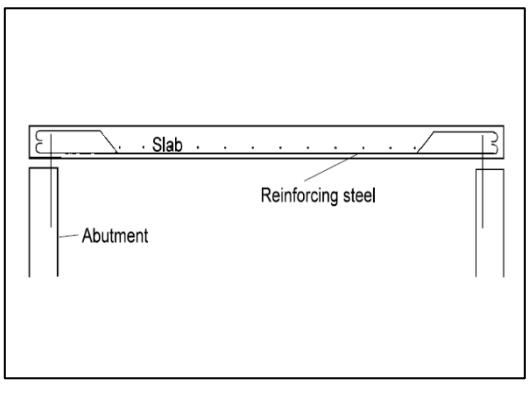
Piers

An intermediate substructure support for a bridge of more than one span. Piers have solid walls and columns (as shown below) or bents.

See also ***Bent***

Pin-and-Hanger Connections

A method of connecting the ends of two beams consisting of an assembly of two steel hanger pins and a hanger plate. These connections are used with cantilevered and suspended spans.



Reinforcing Steel Bars

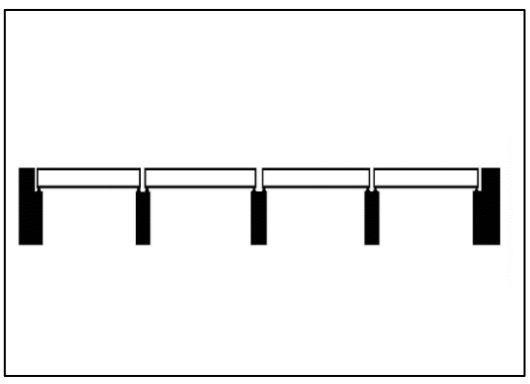
Also known as rebar, reinforcing steel bars increase the strength of concrete. Rebars are embedded in the tension zones of the concrete bridge member.

Rivets

Metal fasteners most often with rounded heads used to connect bridge members.

Shiplap connections

Ends of beams that overlap at right angles with the upper beam resting on the lower one. The connection takes its name from a similar appearing joint used in carpentry. These connections are used with cantilevered and suspended spans.



Simple Plan

A superstructure where the beams extend from one substructure support to the next with a joint or break at each support so that all loads are contained within a single span. The opposite of a continuous span bridge.

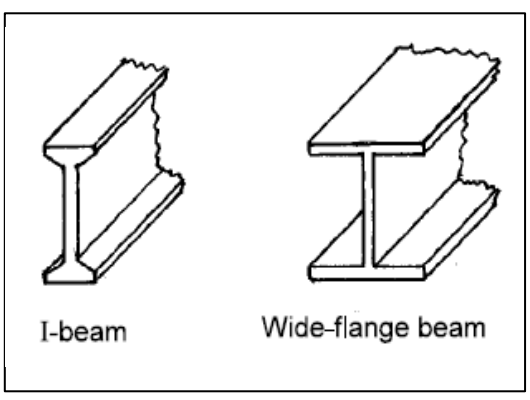
Soffit

The bottom surface of a bridge beam or slab.

Spandrel

The space between an arch ring and the deck.

See also ***Concrete Arch Bridge, Closed Spandrel*** *and* ***Concrete Arch Bridge, Open Spandrel***



Steel I-beam

A steel beam that looks like an "I" or a sideways "H" in cross-section. The "H" shaped beams are often called wide-flange beams and have only been in use since the early twentieth century. TxDOT often calls the wide-flange beams I-beams.

Steel I-beam Bridge

Sometimes referred to as multi-beam or stringer bridges, these bridges have multiple strings (or lines) of parallel longitudinal beams.

Steel I-beam – Concrete Encased

Steel I-beams covered in concrete to protect the beams from corrosion. This construction technique is most often found over railroads.

Steel I-beam with Jack Arch Deck

A bridge with a deck formed by shallow arches between the longitudinal I-beams. The arches are usually concrete poured over a form liner of wood or sheet metal. The form liners often were left in place.

Steel Plate Arches

Arch superstructures formed of prefabricated, corrugated sheet metal. The sheets are typically segmental arch shapes that are bolted together to form the desired length and rise of arch. Headwalls are required to support the fill material that carries the roadway.

Steel Plate Girder Bridge

Steel Plate Girder with Floor System*:* These bridges consist of longitudinal lines of plate girders with flooring systems consisting of transverse beams supporting and under a deck.

Steel Plate Girder Bridge

Steel Plate Girder - Through*:* Plate girder bridge with floorbeams that are in line with the bottom flanges of the longitudinal girders. On these bridges, vehicles drive through the steel plate girders.

Steel Plate Girder Bridge

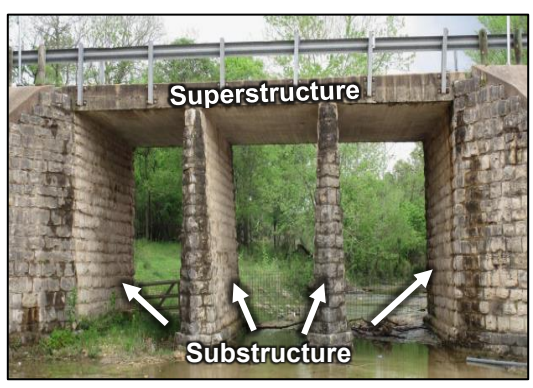
Variable-Depth Plate Girders*:* Steel plate girders with shallow arched soffits.

Stiffeners

On plate girders, these vertical pieces are affixed to the web and “stiffen” the web to add to the rigidity and strength of the girder.

Stringers

Beams supporting a bridge deck and placed parallel to the direction of travel. Stringers may be wood or metal.

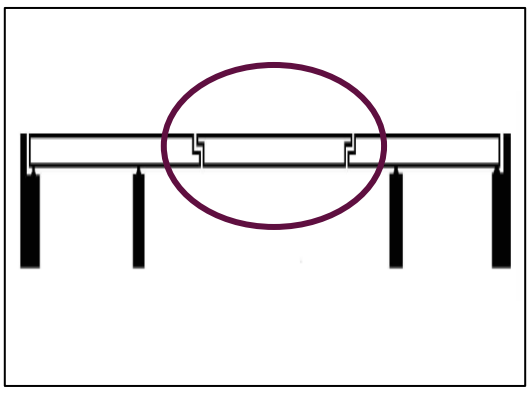


Substructure

Supports the superstructure and includes footing, abutments, wingwalls, piers, and bents.

Superstructure

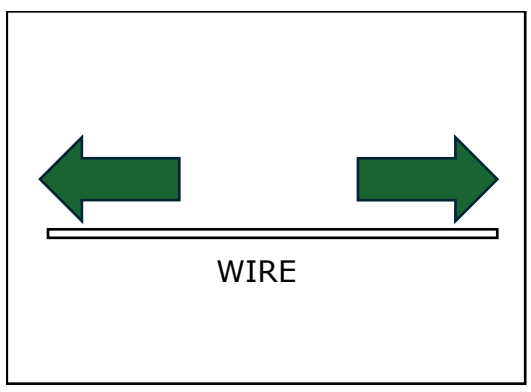
Rests on the substructure and includes components that span an obstacle, such as water, ravine, or road. This includes the bridge deck and railing.



Suspended Span

A "drop-in" section placed between the two cantilevered spans to fill the gap.

See also ***Cantilevered span***

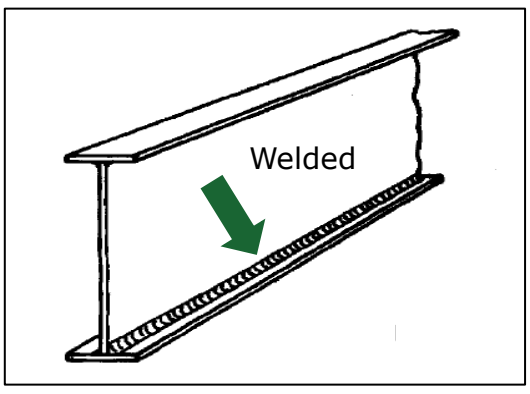


Tension

A force that pulls material apart or outward.

Web

Vertical section of a beam or girder.



Weld

A process of fusing two or more parts together though heat, pressure, or both and forming a joint as the parts cool.

Credits:

Drawings and diagrams are extracted from Patrick Harshbarger and Mary McCahon (Lichtenstein Consulting Engineers), Bridge Basics from Historic Bridge Types Common in North America Workshop, SIA Annual Conference, Milwaukee, Wisconsin, 2005.

Photographs provided by TxDOT.