

Appendix 3. Bridge Information

Notes for Teachers

- Print all pages.
- Hang all the pages you have printed out on different parts of the classroom (wall, door, window, board, etc.) before the lesson.
- Have students discover information during the research phase.

Why Do We Need Bridges?

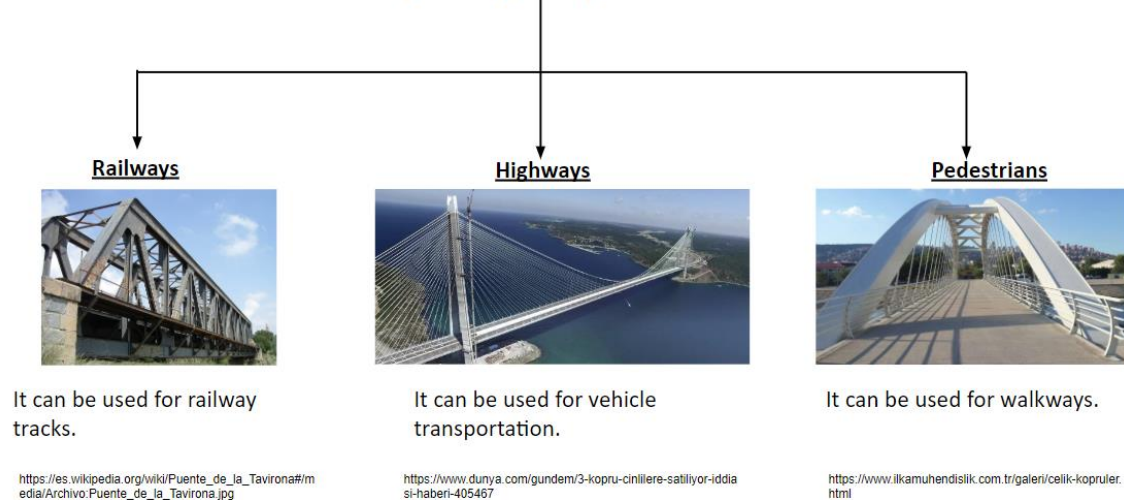
- Generally, the first bridges in forested areas were constructed by lengthening one or more wooden logs. Bridges are constructions built to carry road traffic or other moving loads to cross an obstacle or other structures. Required transitions; pedestrian road, highway, railway, canal, pipeline, etc., or a bridge is a way to cross a stream, river, or valley. They are the constructions that connect two separate sides and allow the traffic flow to pass over the top without interrupting another traffic flow. Bridges are essential constructions in modern road and rail transport systems.



Koyunbaba Bridge, Türkiye

<https://www.flickr.com/photos/sinandogan/4800161394>

Bridges by Purpose of Use

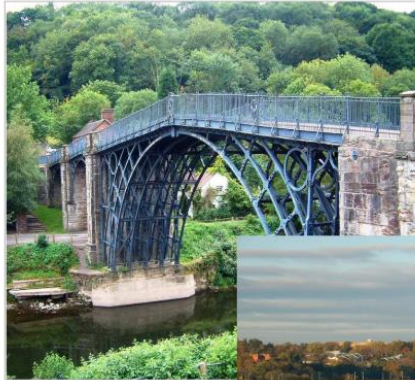


Bridge Types 1 – Arch Bridges

The essence of arch bridges is that there is no bending except for moving loads. They only act under pressure and for this reason, they can be made of structural elements with weak tensile strength, such as stone cast steel concrete. Arch bridges made of brick, wood, aluminum and forged steel are also available today.

Arches are, in a sense, the simplest structure for a bridge, because if it is made of stone or rock, nothing is needed besides to create the arch form. If the stones are properly cut and the appropriate angles are caught, they will automatically work as abutments.

<https://modelsanstone.com/en/mimari-sanati>



<https://www.flickr.com/photos/ableman/283068075>

Types of Bridges 2- Girder Bridges

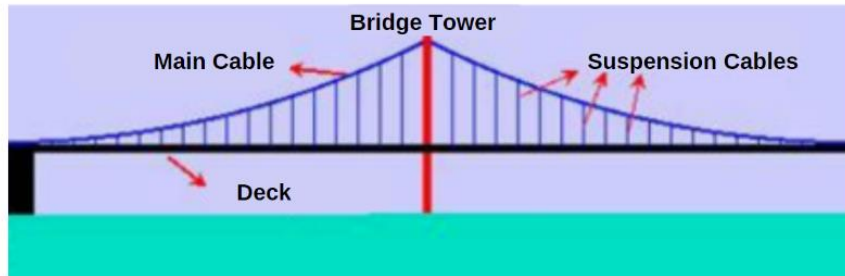
The girder bridge is the most common type of bridge used in the world. In simple terms, even a piece of wood thrown over a 2-3 meter trench creates a bare girder bridge. Wood, concrete or steel can be used as material for girders.



<https://www.erbakan.edu.tr/storage/files/department/insaatmuhendisligi/editor/DersSayfaları/IMG/img3.pdf>

What is a Deck?

- The deck is the element that provides the distribution and is the first to receive the load. In bridges, the deck is the part of the building that carries the railway or the highway.



Bridge Types 3 - Cable Tension Bridges

The bridge towers are usually made of reinforced concrete, and sometimes steel. During the construction of a large and long tensioned bridge, possible oscillations are a major problem until the two end beams meet in the middle.



<https://m.mobile01.com/topicdetail.php?f=204&t=131044>

Examples of Bridge Types

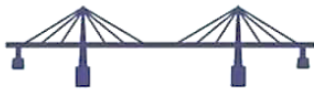
Girder Bridges



Arched Bridges



Cable Tension Bridges



Suspension Bridges



Bridge Spans

Bridge Span	Values that the Bridge Span Can Take
Short	minimum 6 m and maximum 40 m
Middle	min 40 m and max 125 m
Long	at least 125 m

m: represents meters.

Comparison of Bridge Types

Bridge type	Advantages	Disadvantages	Span	Material Used	Design Challenge
Girder	<ul style="list-style-type: none"> Strong and solid frame Works well with most applications 	<ul style="list-style-type: none"> Cannot be used on bridges with curves. Materials are expensive 	<ul style="list-style-type: none"> Short Middle 	<ul style="list-style-type: none"> Iron Steel Any substance for the foundation 	<ul style="list-style-type: none"> Low
Arch	<ul style="list-style-type: none"> Used for longer bridges with aesthetic curves Long-lasting 	<ul style="list-style-type: none"> Long span arches are difficult to construct 	<ul style="list-style-type: none"> Short Middle Long 	<ul style="list-style-type: none"> Stone Cast iron Wood Steel 	<ul style="list-style-type: none"> Low
Suspension	<ul style="list-style-type: none"> Aesthetic Light and flexible 	<ul style="list-style-type: none"> Unstable against the wind Materials are expensive 	<ul style="list-style-type: none"> Long 	<ul style="list-style-type: none"> Steel rope Any substance for the foundation 	<ul style="list-style-type: none"> Middle
Cable Tensioned	<ul style="list-style-type: none"> Economic The construction process is fast Aesthetic 	<ul style="list-style-type: none"> Durable cables should be used for long-lasting bridges. 	<ul style="list-style-type: none"> Middle 	<ul style="list-style-type: none"> Steel rope Any substance for the foundation 	<ul style="list-style-type: none"> High

Properties of Materials Used in Bridges

Materials	Against fire, earthquake, natural disasters	Combustion properties	Lifetime	Harmful/Harmless	Span	Cost
Wood	Flimsy	Flammable	Short-lived	Harmless	Short	Medium
Iron	Resistant	Non-flammable	Long lasting	There are harmful and harmless aspects	Medium and long	High
Concrete	Resistant	Non-flammable	Long lasting	There are harmful and harmless aspects	Very big	High
Steel	Resistant	Non-flammable	Medium lifetime	There are harmful and harmless aspects	Long	Low
Stone	Resistant	Non-flammable	Long lasting	Harmless	Short, Medium, Long	Low
Reinforced concrete	Medium durable	Non-flammable	Short-lived	Harmful	Short and medium	Medium