COETZER OPTICAL SYSTEMS (Pty) Ltd

Bridge arch bridge

Overview

An arch bridge is a with at each end shaped as a curved. Arch bridges work by transferring the weight of the bridge and its partially into a horizontal thrust restrained by the abutments at either side, and partially into a vertical load on the arch supports. A (a long bridge) may be made from a series of arches, although other more economical structures are typically used today.

Key Takeaways

An arch bridge is a bridge with a curved structure that transfers loads primarily through compression to its abutments, allowing it to span wide gaps efficiently.Structure and Mechanics

Arch bridges rely on a curved arch to support loads. The weight of the bridge and any additional load is transferred along the curve of the arch to the abutments at each end, which resist both vertical and horizontal forces . The central stone or keystone at the top of the arch pushes outward and downward, making the structure rigid and strong . Unlike beam bridges, arch bridges do not require intermediate supports across the span, making them ideal for rivers, gorges, and valleys .

Materials

Historically, arch bridges were constructed from stone or brick, but modern arch bridges use reinforced concrete, steel, or ferroconcrete, allowing for longer spans and greater load capacity . The use of modern materials also enables the construction of tied or bowstring arch bridges, where a tie connects the ends of the arch to reduce horizontal thrust .

Types of Arch Bridges
• Deck Arch Bridge: The bridge deck rests on top of the arch, directly supporting traffic loads. Examples include the New River Gorge Bridge in West Virginia and the Wanxian Bridge in China .

• Through Arch Bridge: The deck passes through the arch, with the arch rising above the deck. Examples include the Sydney Harbour Bridge and the Hell Gate Bridge .

• Segmental Arch Bridge: Features a curved arch less than a semicircle, allowing higher clearance and lighter construction, commonly used in Roman bridges .

• Corbel Arch Bridge: Constructed by cantilevering successive layers of stone or brick; it does not produce outward thrust and is suitable for smaller spans .
History

Arch bridges have been used for over 3,000 years, with early examples like the Mycenaean Arkadiko Bridge in Greece (c. 1300 BC) . The Romans perfected the design, building hundreds of stone arch bridges and aqueducts across Europe, many of which still stand today . Roman engineers used voussoirs, wedge-shaped stones, to form semicircular or segmental arches, often including flood openings in piers to withstand water flow .

Advantages
• Can span wide gaps without intermediate supports

• Strong and durable, capable of carrying heavy loads

• Efficient use of materials due to compression-based load transfer

• Aesthetically pleasing, often forming semi-circular or elliptical reflections over water
Arch bridges remain popular today, combining historical design principles with modern materials to create long-lasting, visually striking structures.

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Then the contractors who are responsible for the completion of the bridge must follow those plans accurately to ensure a positive

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In this video, we break down the eight main types of bridges engineers use to cross

Truss arch bridge

A truss arch bridge combines the elements of the truss bridge and the arch bridge. The actual resolution of forces will depend upon

Analysis and Design of Arch Bridges

Arch bridges can be classified according to the following; Materials of construction

Types of bridges

Tied-Arch Bridge A tied-arch bridge is a type of bridge that combines characteristics of both arch bridges and suspension bridges.

Design Considerations for Arch Bridges

Arch bridges are one of the oldest types of bridges that are still being used to date. Take a look at their classification,

18 Types of Bridges

Arch bridges utilize arch as a main structural component (arch is constantly located beneath the bridge, never above it). With the

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