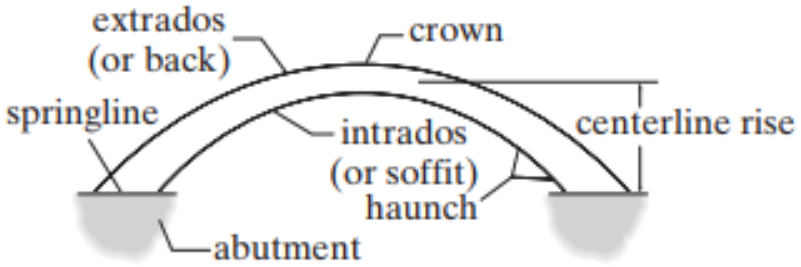
I.7.3.Long-Span Arches:

I.7.3.1. Definition

In long-span buildings, arches can be employed to lessen the bending moments. It takes loads mostly in compression but must also resist some bending and shear due to its stiffness, depending on how it is loaded and curved.



A typical arch

I.7.3.2. Types

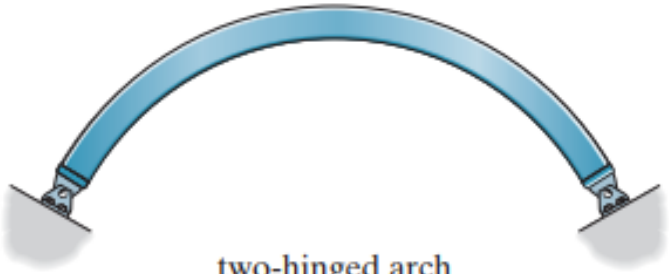
A- Fixed Arches

A fixed arch is designed as a continuous member, rigidly connected to both base supports. The arch must be designed to resist bending stresses throughout its length and at both of its supports. It is frequently constructed of reinforced concrete.

fixed arch

B- Two-Hinged Arches

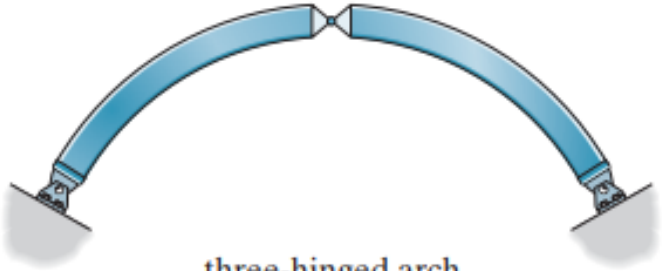
Two-hinged arches are designed as a continuous structure with pin connections at both base supports. the pin joints hinder the development of significant bending loads by enabling the frame to rotate as a unit when strained by support settlements and to gradually flex when stressed by temperature variations. It is commonly made from metal or timber.



two-hinged arch

C- Three-Hinged Arches

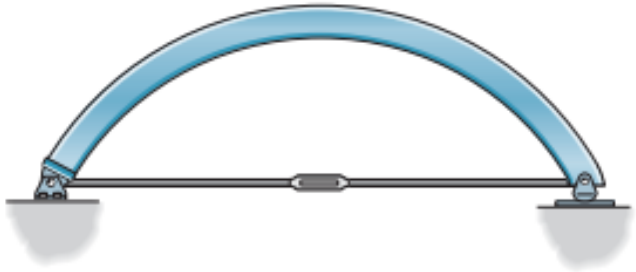
Three-hinged arches are structural assemblies of two rigid sections connected to each other at the crown and to the base supports with pin joints. Even though three-hinged arches are more susceptible to deflection than fixed or two-hinged frames, support settlements and thermal loads have the least impact on them. It is made from metal or timber.



three-hinged arch

D- Tied Arches

A tied arch enables the structure to function as a rigid unit, since the tie rod carries the horizontal component of thrust at the supports. Moreover, it is unaffected by the supports' relative settling.



tied arch

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