

7. BRIDGES

7.1 Introduction

As discussed in earlier chapters the main advantages of structural steel over other construction materials are its strength and ductility. It has a higher strength to cost ratio in tension and a slightly lower strength to cost ratio in compression when compared with concrete. The stiffness to weight ratio of steel is much higher than that of concrete. Thus, structural steel is an efficient and economic material in bridges. Structural steel has been the natural solution for long span bridges since 1890, when the Firth of Forth cantilever bridge, the world's major steel bridge at that time was completed. Steel is indeed suitable for most span ranges, but particularly for longer spans. Howrah Bridge, also known as Rabindra Setu, is to be looked at as an early classical steel bridge in India. This cantilever bridge was built in 1943. It is 97 m high and 705 m long. This engineering marvel is still serving the nation, deriding all the myths that people have about steel. [See Fig.7.1]



Fig.7.1 Howrah bridge

The following are some of the advantages of steel bridges that have contributed to their popularity in Europe and in many other developed countries.

- They could carry heavier loads over longer spans with minimum dead weight, leading to smaller foundations.
- Steel has the advantage where speed of construction is vital, as many elements can be prefabricated and erected at site.
- In urban environment with traffic congestion and limited working space, steel bridges can be constructed with minimum disruption to the community.
- Greater efficiency than concrete structures is invariably achieved in resisting seismic forces and blast loading.
- The life of steel bridges is longer than that of concrete bridges.
- Due to shallow construction depth, steel bridges offer slender appearance, which make them aesthetically attractive. The reduced depth also contributes to the reduced cost of embankments.
- All these frequently leads to low life cycle costs in steel bridges

In India there are many engineers who feel that corrosion is a problem in steel bridges, but in reality it is not so. Corrosion in steel bridges can be effectively minimised by employing newly developed paints and special types of steel. These techniques are followed in Europe and other developed countries. These have been discussed in chapter 2.