



Bridge bearings – Structural design requirements

Harminder Singh
Senior Structural Engineer
J.B. Barry & Partners
Dolcain House Monastery
Road, Clondalkin Dublin
Ireland hsingh@jbbarry.ie



Harminder Singh, born 1977, received his master of engineering degree from the Thapar Deemed University from India and working in the field of highway and railway bridges for the last seven years.

Summary

The load carrying capacity and technology of manufacturing the bearings has been improved tremendously in the past few years. Now large capacity bearings and bearings which are capable of accommodating large movements are available in the market. The construction of large span bridges like cable stayed and suspension bridges are also affected by the choice of bearings and mean of effective load transfer to the substructure. Recently the conventional balanced cantilever bridges are made continuous for the span more than 550.0m. The construction of these long bridges is only possible by good and efficient bearings which can accommodate large movements and rotation.

The paper briefly discuss about different types of bearings normally used in bridges with their advantages and limitations. The bridge with bearings termed as bearing bridges is further compared with the integral bridges and the behaviour of bearing bridges and integral bridges is compared under different load combinations.

Keywords: Bridge; bearing; POT; PTFE; superstructure; substructure; steel.

1. Introduction

In the conventional bridge without movement or moment restraint, there is a joint through which the load is transferred from superstructure of the bridge to substructure. This portion is known bearing who gets its name because it bears the load from the superstructure. The superstructure can be of any type like pre-tensioned or post-tensioned concrete beams, steel beams, steel or concrete box girder etc. but the main purpose of the bearing is to transfer the load vertically and allow the movement in the structure depending upon the requirements of the bridge. The movement and/or rotation can be because of seasonal contraction and expansion of superstructure, earthquake loads and wind loads. The bearing by allowing the rotation and movement in the superstructure discourages or reduces the presence of moments and forces at the connection between superstructure and substructure which are difficult to handle in the design. The cost of bearings becomes a very small portion of the total cost of bridge and it is nearly 5% of total cost of conventional grade separator viaduct. But it plays a very important role in the overall behaviour of the structure in design and actual life of the structure.

2. Bridge bearings

The bearings are proposed in the structure depending upon the span arrangement, length of the bridge and other forces like earthquake forces etc. Before going into the behaviour of bearing bridges with bearings different types of bearings and their utility has been briefly discussed in the following sections.

2.1 Bearing types

There are different types of bearings available in the market but mainly following bearings are commonly used in the structure.

- (i) Elastomeric bearing
- (ii) Pot bearing
- (iii) PTFE bearing