

## **Linking North and South: Ireland's Pioneering Railway Viaduct**

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### **Abstract**

In the final report of the Irish Railway Commission in 1836, it was recommended that a main line of railway should be built to connect Ireland's capital city of Dublin with the fast developing city of Belfast. By 1853 lines south from Belfast and north from Dublin met at Drogheda straddling the estuary of the river Boyne. To link the communities living north and south this natural barrier required the construction of a pioneering high-level railway viaduct, the Boyne Viaduct.

Designed by Sir John Benjamin Macneill, one of Thomas Telford's assistants, with river spans of wrought-iron double-latticed girders and masonry approach spans, the Boyne Viaduct became an object of great interest amongst contemporary engineers as, at the time, few engineers had any understanding of the distribution and magnitude of the strains (stresses) in iron-framed structures and even fewer the limiting strength of wrought iron.

The principle of multiple lattice construction in wrought iron was first applied on a large scale in the Boyne Viaduct and resulted in a significant increase in the knowledge of the structural properties and behaviour under load of wrought iron. The viaduct was the first of its kind in which, upon a large scale, the strength of each part was accurately proportioned to the strain that it had to withstand. This saved material and, by reducing the weight, avoided all unnecessary stresses that were a feature of earlier viaducts. The safety of the structure was increased, as well as the length of span that could be achieved.

This paper will discuss the conception, design and construction of this pioneering viaduct and, in particular will examine the methods of structural analysis used by James Barton, Alexander Schaw and Bindon Blood Stoney.