



# The Design and Construction of Greenwich Reach Swing Bridge

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## Abstract

Greenwich Reach Swing Bridge is a cable stayed footbridge with a single mast and a central cable plane that swings open to allow river traffic to pass. This paper outlines the development of the scheme, highlighting the built-in adaptability of the approach structures to accommodate sea level rises, and the generation of human scale architecture and detailing to compliment the urban and mainly residential river front site. The project's focus on innovative ways to reduce future maintenance requirements is highlighted, and key points of interest in the structural design are outlined.

The paper also describes issues associated with predicted vortex-induced vibration in the mast observed during wind tunnel testing due to the bluff-faced shape. The resultant design development is discussed, including the adopted mitigation solution.

**Keywords:** Footbridges; Moving Structures; Cable-stayed; Wind-induced vibration; Adaptability for climate change.

## 1 Introduction

Greenwich Reach Swing Bridge completes another link in the riverside Thames Path, crossing the mouth of Deptford Creek in South East London. The scheme consists of a 44m span cable stayed footbridge with a single mast and a central cable plane. A short 9m backspan contains a counterweight and provides an attachment point for pairs of backstay cables, which support the tip of the mast laterally and longitudinally. The structure is supported on a slewing ring bearing underneath the mast with electric motors to drive the bridge clear of the navigation channel.

The steel structure has been developed with structural efficiency in mind, but has allowed a clear architectural identity to be developed. Faceted planes create a relatively massive backspan before reducing to a more slender main span with a central spine box supporting diagonal struts to the edge of the deck.

This plated concept is continued through the main mast, where two vertical flat plates supported by diagonal stiffeners create an open vierendeel type structure.

## 2 Design

### 2.1 History of the concept

The proposed bridge crossed Deptford Creek, which is part of the Port of London with navigational priority given to ships using the river to access the concrete batching plant just up stream. The Creek is used for access by gravel barges at each high tide and also by leisure vessels (some masted) to access moorings further up stream. Therefore, an opening bridge was required which needed to be entirely clear of the river and over the river bank in the open position to give unlimited clearance. The bridge also needed to carry pedestrians from the local residential areas to public transport and the centre of historic Greenwich, and hence was