

Organic Prestressing Impact in Multi-Span Large Deck Construction

Pedro Pacheco, Hugo Coelho, André Resende, Diogo Carvalho

BERD, Matosinhos, Portugal

Contact: pedro.pacheco@berd.eu

Abstract

In the past decades, a “critical range of spans” – 70m to 100m - for multi-span viaducts with concrete decks has been identified. The most common construction methods adopted for that type of viaduct are 1) cast in situ free cantilever; 2) precast segmental free cantilever and 3) precast full segment. With recent technological developments, another possible 4th alternative may be considered and studied for certain bridge types within the mentioned span range: in situ, span by span construction. In this presentation its features and its limitations are discussed considering the involved technological challenges.

Keywords: Bridge Construction, MSS, large spans, OPS

1 Introduction

In the past decades, a “critical range of spans” – 70m to 100m - for multi-span viaducts with concrete decks has been identified. The most common construction methods adopted for that type of viaduct are 1) cast in situ free cantilever; 2) precast segmental free cantilever and 3) precast full segment. The first is a low productivity method, with medium material consumption and with low equipment investment. The second is a medium productivity method, with high material consumption and with medium equipment investment. The third is a high productivity method, with medium-high material consumption and with very high investment in equipment and site facilities.

In the beginning of the XXI century, a summarized qualitative picture of feasible span ranges for main and most common constructive methods/bridge types would be similar to the matrix of Figure 1.

In Figure 1, it can be observed that there are two poles of “very frequent solutions” one essentially centred in the small span ranges (<30m to 50 m) and the other one essentially centred in the large (and very large) spans range (>120 m). It can be also observed that, within the range of “more common multi-span viaducts” there is a “bottle neck” once there are few construction methods understood as suitable for a wide scope of spans.. Moreover, in what concerns to the particular case of multi-span large viaducts, where there is a strong need for highly industrialized solutions, there is clearly a “critical range of spans” – 70m to 100m – that seems to be frequently “avoided” – as other studies reveal [1]. Indeed, within that span range, only one – prestressed concrete (PC) industrialized method was commonly applied (PC Cantilever Method – precast segments – with launching gantry). Also relevant – bellow the limit of 70 m, several methods were common or even very frequent.