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# Gerald Desmond Bridge Replacement Project Industry Innovations

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## 1 Abstract

The design and construction of the Gerald Desmond Bridge Replacement brings many firsts and innovations to California's infrastructure landscape. Preliminary engineering studies carried out for this design-build project resulted in a 305-meter cable-stayed main span bridge, 157-meter tall mono-pole towers, and single and double-celled box girder approaches built on a moveable scaffolding system.

This paper reviews some of the innovations of the winning proposal design: approach viaduct optimization, viaduct frame dynamic response balancing and tower geometry conception. The focus of the review is interaction between design and construction teams in project innovation.

The review concludes that while project innovation is best served by healthy communication between design and construction teams at the preliminary engineering phase, the most challenging innovations benefit from healthy communication maintained through execution. This way mutual constraints and objectives are conceptually recognized by the innovation, while unknown obstacles associated with executing a new idea may be addressed expediently with the collective design and construction skill set.

**Keywords:** Cable-stayed bridge; mono-pole tower; pile tip post-grouting; moveable scaffolding system (MSS); frame dynamic response balancing; Gerald Desmond Replacement Project.

## 2 Introduction

Late in 2012, the Port of Long Beach in collaboration with the California Department of Transportation awarded a design and construction contract to Shimmick / FCC / Impregilo JV (SFI) for the replacement of the Port of Long Beach's obsolete and deteriorating Gerald Desmond Bridge. The Project consists of the design and construction of a 305-meter main span cable-stayed bridge and approximately two miles of cast-in-place box-girder approach structures. Final design services are performed by Arup North America Ltd. in association with Biggs Cardosa Associates.

Considerable innovation was developed in collaboration between SFI and Arup to meet the Port's state-of-the-art project requirements, both during the preliminary engineering phase and project execution. This paper touches on some of the many highlights:

- Approach viaduct optimization;
- Viaduct frame dynamic response balancing;



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