

The 200 Year Bridge - The New Goethals Bridge as a Roadmap

Thomas SPOTH, PE

Engineer of Record

Parsons

New York, NY, USA

Tom.Spoth@parsons.com

Tom Spoth has 35 years of experience in bridge design, fabrication, inspection, condition evaluation, and rehabilitation of major bridge projects.



Seth CONDELL, PE

Design Manager

Parsons

New York, NY, USA

Seth.Condell@parsons.com

Seth Condell has 21 years of experience as a structural engineer and project management, specializing in design, rehabilitation, and inspection of long-span bridge structures.



Contact: Seth.Condell@parsons.com

1 Abstract

The Port Authority of New York and New Jersey has completed the replacement of the congested and functionally obsolete Goethals Bridge, a circa 1928 steel cantilever truss bridge, with a dual-span modern cable-stayed bridge connecting Elizabeth, New Jersey and Staten Island, NY. Designed as a 150 year service life structure, the newly opened crossing paves the way towards achieving the possibility of a 200 year bridge, both in material durability, structural redundancy / resilience, and modal flexibility.

The new crossing features three eastbound and three westbound lanes plus a 3 m wide shared use path (SUP) for bicycles and pedestrians. To accommodate future expansion, the superstructure of the cable stayed spans is designed to receive steel framing to support a variety of possible transit options including light rail, while the substructure need not be strengthened for this future load. With a 274 m main span, the new crossing provides a significant maritime navigational improvement over the original 205 m steel truss span.

Herein we focus on the strategic application of corrosion protection strategies to achieve the long service life in a competitive bid environment, structural benefit of the design as relates to resiliency, modal flexibility, and operational redundancy to withstand extreme events.

Keywords: Cable Stayed Bridge; Extended Service Life; Corrosion Protection; Public-Private Partnership; Alternative Project Delivery; Design-Build; Resiliency.

2 Introduction

The current condition of America's infrastructure is a topic of daily discussion, with much of the U.S. Interstate system at or beyond its intended lifespan, sparse funding, and increasing traffic demands. In this environment, the industry is wise to seek extending the service life of its existing bridge inventory and to ensure that new structures are designed with flexibility and extended service lives

in mind. When the Port Authority of New York and New Jersey (PANYNJ) embarked upon the replacement of the 1928 Goethals Bridge, an extended service life became a primary requirement for the noted reasons.

As early as 1997 the PANYNJ studied replacement options for the then aging bridge. With only two 3 m lanes in each direction and no shoulders, the crossing that had once opened a key transportation route had become functionally and physically obsolete. The replacement need led to a