Project sheet

Delta Marine Consultants
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Delta Marine Consultants is a trade name of BAM Infraconsult bv

City Bridge Nijmegen

The city bridge Nijmegen is a new bridge across the river Waal, built to improve the accessibility of the city and to improve traffic flow around the wider city area. The bridge was built at a historical location known as "De Oversteek" ("The Crossing"), where American soldiers crossed the river to secure the existing Waal bridge during the operation Market Garden. The existing Waal bridge, dated 1936, was at the time of completion the biggest arch bridge in Europe with a span of 244m. Then new City Bridge, which will allow a five lane crossing, a two lane-cycle path at the east side of the bridge and a 1.0 m wide inspection lane at the west side of the bridge.

DMC was part of the design team and responsible for a large range of technical as well as management aspects.

Client
Municipality Nijmegen

Realisation
BAM Civiel / Max Bögl / Ney Pouilissen

Type of Contract
Design, Built & Maintain (25 year)

Completion
2013

Location
Nijmegen, the Netherlands

Construction costs
Euro 100 mio

Consultancy Fees
Category 5 (see page 2)

Participation BAM Infraconsult
Design Approach Bridges
Design River Piers, Intermediate Piers and Foundations
Concrete Technology
Design Coordination
Road Design
Scour Protection and River Design
Morphology
Systems Engineering
Permits and Environment
Water drainage

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City Bridge Nijmegen

Project Description

TThe design, build and 25 years maintenance contract of the new bridge crossing was awarded to a consortium consisting of BAM Civiel, Max Bögl and Ney Poulissen Architects and Engineers. The bridge has a total length of 1,400 m. The southern approach bridge at the city side, has a curvature with a radius of 500 meters. The main span crosses the river Waal in a straight line, while the northern approach bridge has a horizontal curvature of 2,000 meters.

The main span consists of a steel single tied arch structure and has a span with a length of 285 m. The composite roadway deck is suspended from the arch by inclined stay cables and has a typical width of 25m.

The approach bridges consist of a series of concrete arches. The span of each of these arches is 42.5 m. The thickness of the arches at the piers is 1.5 m and reduces to 0.5 m in the middle of the span. The void above the arches is filled with foam concrete to minimize the weight on the arches and is covered with mixed aggregates and asphalt layers. At the south side the continuous bridge measures a total length of 275 m.

The total continuous length of the spans at the north side of the bridge equals 703 m, including the abutment at the Oosterhoutsedijk. The concrete arches of the northern and southern approach bridges are rigidly connected to the bridge piers without bearings and expansion joints, to save maintenance costs.

Design Involvement

DMC has prepared the Tender- and Detailed Design for the approach bridges including the river piers for the main span, roadway design, river design and water drainage systems. Besides structural, geotechnical and coastal design, DMC was also responsible for the material / concrete technology and design coordination. DMC had an instrumental role in an integrating design and construct processes by facilitating the Building Information Management and Systems Engineering.

Risk Analysis

The bridge is designed in accordance with the load cases detailed in EN 1992-2. In order to minimize the risk of progressive collapse due to accidental load cases or unforeseen events, an extensive risk analyses has been performed. This analysis included the consideration of a large number of additional potential failure scenarios such as ship impact, fire by traffic under the bridge, extraordinary settlements, etc. This has resulted in a very robust design able to withstand a large variety of accidental scenarios. The same level of risk analysis is performed in relation to the temporary construction phases, during the erection of the bridge.

Durability

To ensure that all durability requirements are met, DMC have developed a project specific concrete mix designs. This includes the foam concrete that is used to fill up the arches. This foam is designed to withstand the movements of the bridge for its 100 year design life. Material and fatigue tests were used to confirm the durability of the foam concrete. The outer and inner walls of the concrete bridge were finished with brickwork. This prevents gravity painting and gives the bridge a very natural look in the river landscape.

Consultancy Fees: 1: 50.000€ 2: 50 - 150.000€ 3: 150 - 300.000€ 4: 300 - 600.000€ 5: > 600.000€

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