Lai Chi Kok Viaduct Erection – Hong Kong

A challenging project requiring the erection of Precast Segmental Balanced Cantilever structures in a heavily congested urban area.

▲ *VSL is carrying out the works in alliance with Necso*

Scope of works performed

- Design, supply and operation of a pair of custom made lifting frames
- Supply of 2 additional set of lifting frames for erecting segments in special configurations:

a-By transporting the segments from the pier to the cantilever tip below the already erected deck, and the erecting the segments

b-By erecting segments in mitigating the effect of the temporary loads on the permanent structures which is not capable of withstanding these loadings

- All Engineering works related to the erection works
- Operation of the 1000t 185m long overhead launching girder supplied new by the Main Contractor
- Erection of 1,771 segments total measuring between 13 and 16 meter width, 2.5 meter long and 3.5 meter of height, weighing between 70 and 100 tons each
- Supply and installation of 3,200 tons of Post-tensioning both internal and external, made of 6-19 strand tendons (anchorages E6-19)
- Supply and installation of 80 pot bearings
- Supply and installation of joints.

The Lai Chi Kok Viaduct is part of the Route 8 project, the new link between the airport and the new territories in Shatin. The structure is built in congested areas in the middle of the city, above a dense network of existing roads, and in between buildings.
Locally, the bridge crawls below some High Voltage cables requiring the erection equipment and the kinematics to be adapted to pass through.

VSL is carrying out the works in Alliance with NECSO as Main Contractor.

Start of the works was January 2004 with erection works scheduled between September 2004 and January 2006 (17 months). The project is scheduled for completion in June 2006.

ERECTION SCHEMES

Launching Gantry used for erection of the Main Line at the center of the project.

Lifting Frame (LCK) designed for the project. It is used especially for the erection of the bridge access at South of bridge and for Slip Road C at the North.

Lifting Frame (WTY) recycled from a previous project and mobilized to erect Pier P18. This machine is capable of picking up the segments below the deck at the pier location, transporting them below the deck and erecting them at the tip of the cantilevers. Its use dictated by

▲ *Launching of segments with Gantry at Pier 6 – Night works over roads.*

the landscape below impeding delivery of the segment at the erection points, and the high voltage cable above.

This frame will also be used to erect 2 cantilevers on the slip road D.

Lifting frame (SWC) to erect piers P11, 12 and 13. This frame is used as it allows minimum impact of the temporary loadings on the permanent structure made of a double deck resting on a single Pier.

Crane erection at the South of the project and for slip road D generally.

▲ *Cantilever at Pier P1L completed*

OWNER
Highway Department - Hong Kong SAR

ENGINEER
Maunsell- Hyder Joint Venture

MAIN CONTRACTOR
Necso Entrecanales Cubiertas, S.A..

SPECIALIST SUB-CONTRACTOR
VSL Hong Kong - NECSO Alliance

▼ *Segment erection by Gantry at Pier 6*

STRUCTURAL RESTRICTIONS

The permanent structure is generally not capable of withstanding its own permanent weight during the erection phase. Temporary measures such as additional temporary PT in the deck, and temporary towers, are generally required throughout the viaduct. In some areas where this is not possible, redesign of the permanent structure is being implemented by the engineer directly.

Overhead high voltage cables at the North, which limits the head room available above the deck. 2 power outages are required. The schedule of the works is dictated by these milestones as they can be schedule only during the winter time. This is only time when the gantry can cross below, so as to move from the South to the North of the project.

CHALLENGES OF THE PROJECT

TTA (Temporary Traffic Management) : The LCK area is very congested, and the works have to be scheduled with respect to the traffic, which shall remain uninterrupted during the works.

NOISE RESTRICTIONS

Some of the areas of works are within residential area, at the South, which requires special attention , and restriction of the working hours.

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