

Agueda River Bridge - Portugal



VSL package including incremental launching, post-tensioning and bearings.



▲ *The deck is 856-m long and includes 14 standard 51.5-m long spans*

The Agueda bridge crosses a valley with an important agriculture potential. It represents a vital infrastructure for the region's economic development. Because of the depth of the valley to be crossed, the main contractor decided to use the incremental launching construction method to build the superstructure.

The deck is 856-m long and it is the first time in Portugal that this method has been used for the construction of a long highway bridge.

Scope of works performed

- Post-tensioning
- Precasting
- Pot bearings

The deck includes 14 standard 51.5-m long spans with two 44 and 15-m end spans. Launched segments are 25.75-m long, i.e. half a standard span. The 3.7-m height of the segments was imposed by the use of incremental launching method to resist loads.

The 32-m long launching nose was bolted to the forward end of the box girder using bars.

The bridge is constructed using a circular alignment (4,000 m plan radius -elevation $R = 3,000$ m), that demanded special attention during the precasting yard phase, the design of the formwork system and the installation of the post-tensioning. Acting as a specialist contractor, VSL was responsible for the design and implementation of the incremental

launching method. This included precasting the segments and formwork, handling the launching nose, the launching procedure itself and carrying out the overall operation. VSL also designed, supplied and installed the internal and external post-tensioning.

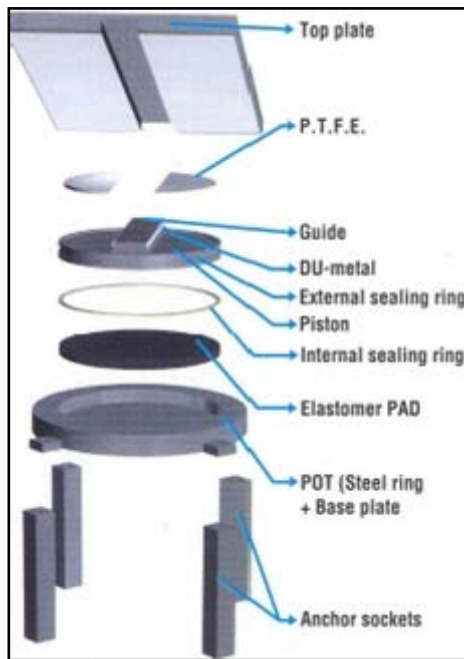


▲ *The deck is post-tensioned longitudinally*

Post-tensioning :

The deck is post-tensioned longitudinally using both strand and bar systems for the internal post-tensioning and includes complementary polygonal external tendons. The internal post-tensioning provides the concrete section with a uniform compression stress, ensuring that the concrete strength is not exceeded during tensile stress.

After the completion and placing of the deck, external post-tensioning was installed to compensate for the action of the remaining dead loads and live load.



▲ A standard CTT pot bearing

▼ VSL Jacking (lifting and pushing) system under operation

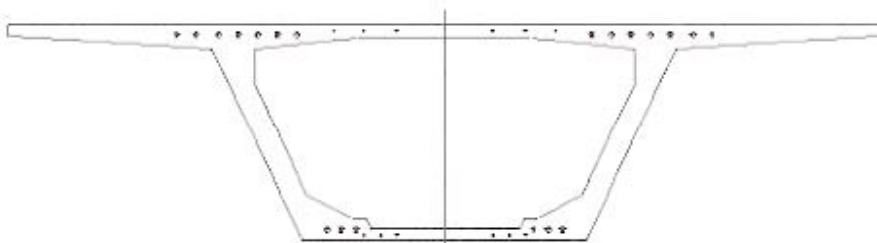


The external tendons are assembled from fifteen greased and sheathed 0.6" monostrands. They have a polygonal design with deviations at 1/3rd of the span length and at pier levels. The deck box is strengthened by a cross-beam in the pier sections (cast during the second phase) to limit transversal deformation as well as simplify the installation of external tendon saddles and anchors. The deviation saddles in intermediate sections are located in the bottom corners of the box beam.

Precasting

Concreting of the segment was carried out in two stages:
Stage 1: the lateral internal moulds were installed and the bottom slab with two webs was then cast.
Stage 2 : Once the concrete reached minimum strength, the lateral moulds were removed and top moulds installed. The top slab was then cast. Concreting and stressing operations had to be completed before sliding. Once the segment was cast and cured, prestressing of straight internal cables was carried out. Concreting

▼ A typical segment



OWNER J.A.E (Junta Autonoma de Estradas)
MAIN CONTRACTOR Soares da Costa
DESIGNERS PROTOPONTE / LISCONCEBE
SUB-CONTRACTOR VSL SISTEMAS PORTUGAL
CONSTRUCTION PERIOD April 1996 - March 1997

of diaphragms and deviators and installation of external cables was done after launching of the deck.

Pot bearings

The Type E pot bearings were especially designed and manufactured by CTT. These bearings are used temporarily during the launching operation and subsequently adapted to provide a permanent superstructure support.

These are standard pot bearings that have a special extended top plate coated with perfectly polished stainless steel. After launching, the bearing moved laterally to its final position and the deck lowered onto the top plate of the pot bearing. Then the top plate is welded to a steel top anchor plate embedded in the deck that assures the correct transmission of the horizontal loads from the deck through the bearings to the piers.

In addition to the pot bearings, CTT also supplied other type of standard pot bearing:

- PU (Guided) bearings to allow uni-directional deck sliding.



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