

DETAILED DESIGN FOR CONSTRUCTION OF VIADUCT 16 AT KM 6+320.35

The superstructure of the bridge is composite: Steel Concrete Composite Deck. In plan most of the bridge is situated in horizontal curve with radius R=480m.

Bridge V16 consists of total number of spans 8 for a total length of 257.62m along the inner curve and 259.93m along the outer curve with the following span length 35.02 – 53.26 – 36.02 – 27.67 – 27.66 – 27.63 – 27.67 – 22.68m.

Cross section of the deck presents 2 welded longitudinal I-beams with variable height between 1.53m and 3.28m and with variable 7.00-9.00m spacing.

Transverse beams are welded I-beams with constant height of 1.00m between longitudinal beams and variable height (between 1.00m and 0.40m) at the console outer parts. Current longitudinal distance between transverse beams varies between 2.77m and 3.24m depending on the specific span.

Concrete slab has a total thickness of 0.30m. The width of the concrete deck varies between 11.397m and 15.150m. At the right border of the carriageway is present a concrete road barrier 0.75m wide, at the left border of the carriageway is present a concrete road barrier 0.60m wide. Project axis is at 0.15m from left border of the carriageway. Wearing course has total thickness of 12 cm.

The concrete deck is realized with three predalle precast slab having 60mm of height. The two outer predalle precast slabs are supported by a main longitudinal beam and secondary longitudinal beam which is IPE400 profile. The middle predalle precast slab is supported by the 2main longitudinal beams.

Connection between concrete slab and longitudinal beams is ensured by Nelson studs.

Bridge is supported at the abutments and at the piles by an ideal bearing with the use of shock transmitters for each bearing.

All transitions are made by expansion joints.

Design goes through 3main phases:

Phase 1: Assembling and mounting of the longitudinal beams and transversal elements. The Deck can be launched or lifted up by cranes.

Phase 2: Location of predalle and concrete casting. The slab (including sidewalks and curbs) is casted in phases: in general, along the longitudinal profile, first is casted the slab in the middle span (70% of the span) and then near the supporting sub-structures areas (15% left and right side); concrete casting of slab has to be shared in two phases also in transversal direction with a first phase of casting between main beams and on top of them, and a second phase of casting of the cantilevers.

Phase 3: Realization of the road furniture.

Bridge FEM analysis is performed by Lusas Bridge and Microsoft Excel software according to Eurocodes and national annexes.

EKJ Bulgaria's services:

During design:

EKJ Bulgaria provided consultant services for preparation of project development of the phase "Technical design" of:

Viaduct V16 design in Italy.

- Project management
- Reports and calculations
- FEM modeling
- 3Dmodelling

Special challenges:

- Composite superstructure
- Complex FEM models including Earthquake analysis
- Mid-size multi-span bridge
- Optimization of beams
- Small radius of horizontal curve

Location:	Italy
Client:	CivEn Design Services
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EKJ BG's role:	Contractor
Contract type:	Design
Period:	2019
Scope:	Design of a steel-concrete composite deck bridge
Design phase:	Detail design

