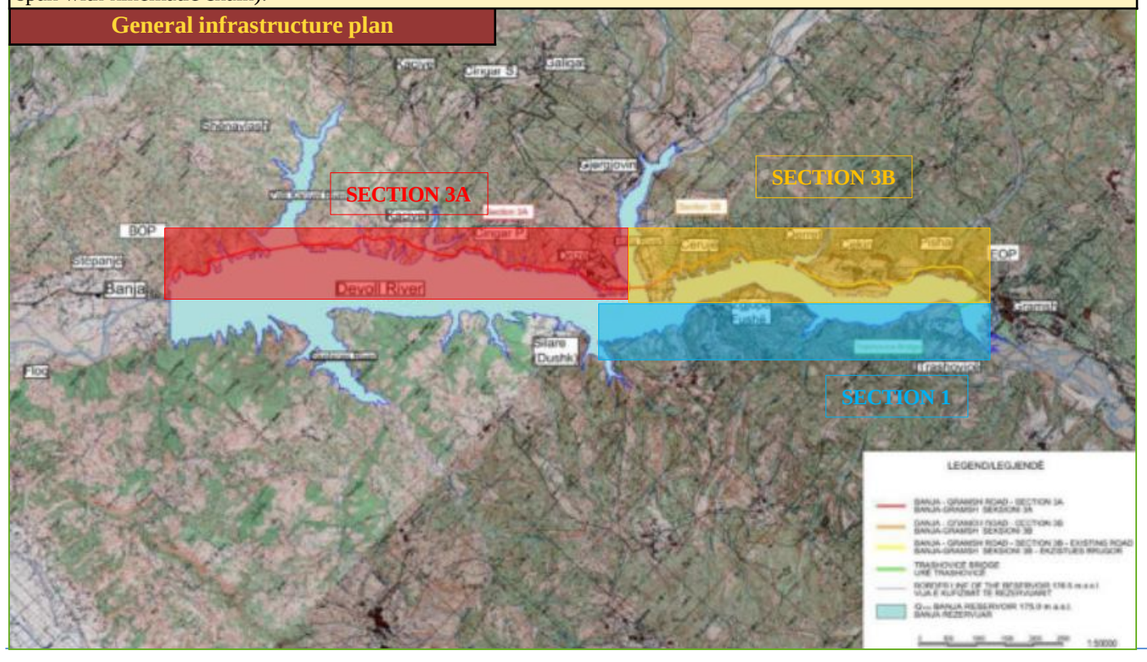
FEATURE OF TECHNICAL SERVICE

Subject	"Devoll Hydropower project – Replacement infrastructure – Design of Replacement Roads": Replacement Main Road from Banja to Gramsh including bridges across the Devoll River. Replacement Rural Road Banja South Shore - Replacement main road on North shore of Moglice reservoir, replacement rural roads on the south shore of Moglice reservoir: design support for ongoing construction works on roads between Kodovjat and Maliq" Preliminary design, tender offer and detailed executive project of 55km of roads; design support during construction; geological and geotechnical studies; Hydraulic study (road body and catchment area); structural design in high seismic areas of 2000 ml of isolated bridges, returned in BIM-Revit; structural design of minor works; road pavement design; 15 km design update of the existing Kodovjat-Maliq road; supply of mountaineering geologists with experience of rope work for verification and study of landslide consolidation interventions in the Canyon area from Kodovjat-Maliq
Carried out by	ATI SGAI Srl di E. Forlani & C. (Mandataria) - Infra Engineering - Hydrodata
Client	Italconsult & Sgai SH.P.K (Albania)
Service length	2014 – 2018
Value of works	€ 24'173'016,14
	S.04 € 8'150'533,34
	V.02 € 14'302'661,41

Devoll Hydropower - Description of the bridge project

Following the construction of the dam on the Devoll river and the raising of the waters in the basin, it was necessary to raise the share of the existing road and consequently the construction of various bridges to overcome the waterways that intersect with the road layout. The project comprises 55 km of roads and is divided into 3 sections: Sec.3A, Sec. 3B, Sec. 1. The project comprises 15 bridges with reinforced concrete piers and abutments with pile foundations. Decks are seismically isolated from the substructures using specific devices connected transversely to the substructures themselves and longitudinally to an anchor block realized behind one of the abutments. The decks are of two types: n.8 with steel-concrete composite sections (single-span and multi-span) and n.7 with prestressed concrete beams (pinned-pinned multi-span with kinematic chain).

General infrastructure plan



Decks with steel-concrete composite girders (ex. br. 04_sec.3A)

Decks with prestressed concrete beams (ex. br. 02_sec.1)

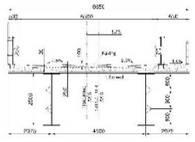
Devoll Hydropower - Computational aspects - Simulation, results and checks

The analysis and study of the static and dynamic behavior of the substructures of the bridges and the analyzes on the steel decks were carried out by simulating the structure with a 3D finite element numerical model, resolved with the SAP 2000 calculation code (CSi Computer & Structures, Inc.). Analyzes relating to prestressed beams decks are made using Midas Civil 2020 software. Reinforced concrete slabs models are performed through 2SI ProSap calculation software. In detail, the following numerical models have been created, specific for each bridge, to check all structural elements:

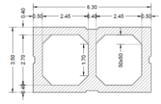
- Global models with substructures and deck, for piers, abutments, piles foundations and anti-seismic devices analysis and verifications;
- Longitudinal anchor block specific FEM model;
- Prestressed decks specific FEM models for longitudinal and trasversal beams verifications;
- Composite steel-concrete decks specific FEM models for longitudinal and trasversal beams verifications;
- Reinforced concrete plate FEM models to evaluate traffic local effects on deck slabs.

DEVOLL BRIDGES (STEEL-CONCRETE COMPOSITE SECTIONS) structural calculation with 3D FEM models

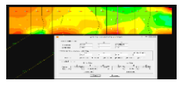
Deck section



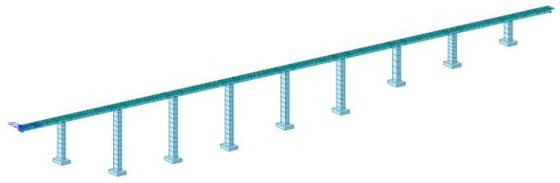
Pier section

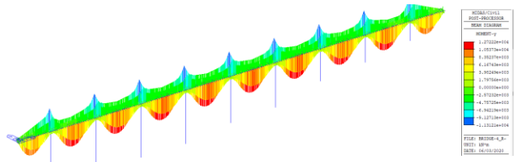


Longitudinal anchor block

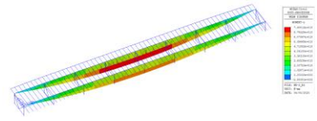


Global model

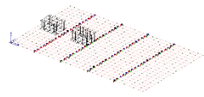


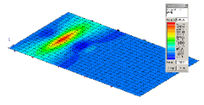


Deck model



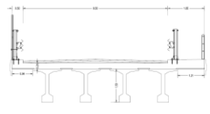
Deck slab model



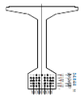


DEVOLL BRIDGES (DECK WITH PRESTRESSED BEAMS) structural calculation with 3D FEM models

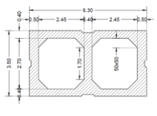
Deck section



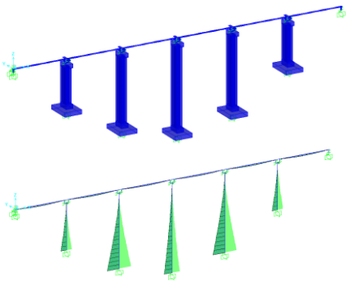
Prestressed beam section



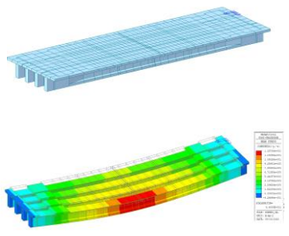
Pier section



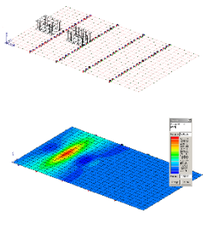
Global model



Deck model



Deck slab model



BRIDGES AND VIADUCTS