

FEATURE OF TECHNICAL SERVICE

Subject	Executive and Detailed Executive design concerning the construction of the «Bridge over Crati river», Cosenza.	
Carried out by	SGAI Srl of E. Forlani & C	
Client	Cimolai S.p.A.	
Service length	2008 - 2013	
Value of works	€ 13'141'810,84	
Categories value	S.06	6'965'159,75

CRATI RIVER BRIDGE - Design issues and their resolution

The bridge over the Crati river, designed by Santiago Calatrava, is conceived as a work of urban regeneration and mending between the old city of Cosenza and the district of Gergeri, that will bring growth and development prospects for the latter. In particular, the project involved the executive and constructive design of the temporary and definitive structural works and the design of the special foundations of the Bridge.

The work has a total span of 140m and is divided into two parts. The first one consists of the deck of the bridge with a reinforced concrete bearing structure having a span of about 30m, which overpasses the railway station.

The second part has a cable-stayed structure with a span of 110m, composed by a central pillar with a truncated cone shape and a pseudo elliptical base, inclined around 51° and over 90m high, connected to the steel deck via twenty pairs of cables.

The cross section of the bridge has a constant width of 24m, which allows to house four vehicle lanes, two for each direction of travel, and a slightly elevated central pedestrian lane.

The pedestrian path provided on the bridge allows direct access to the railway station of Calabria, located under the northwest abutment.

CRATI RIVER BRIDGE - Computational aspects - Simulation, results and checks

The design of the substructures was carried out by creating a 3D global model, including both the deck and the substructures (abutments and piers), in which the loads required by technical regulations were applied; in particular, according to the NTC2008, loads for "bridge of first category" were considered. In order to do that, PROSap and SAP2000 software were used. Thanks to the results of the supplementary geognostic campaign, it was possible to proceed with the optimization of the bridge foundations. Moreover, to further reduce the actions transmitted to the substructures, appropriate support devices has been used to seismically isolate the metal deck. The reduction of the horizontal seismic response was obtained, as well as limiting the masses of the decks, increasing the fundamental period making it within the range of the lowest response accelerations.

Photomontage of Crati river bridge

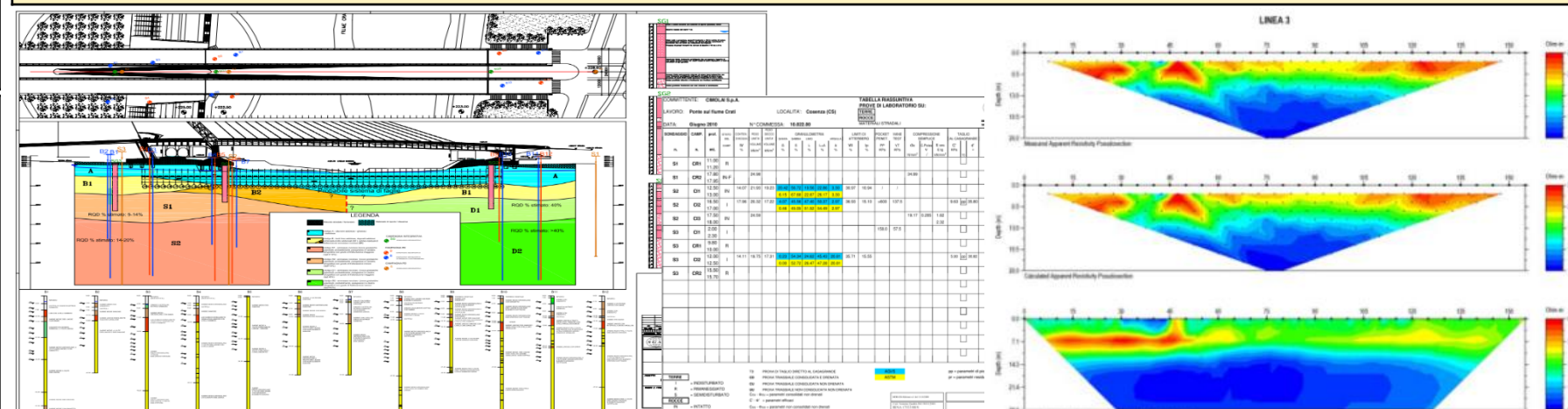


Aerial view during works execution



CRATI RIVER BRIDGE - Geotechnical features

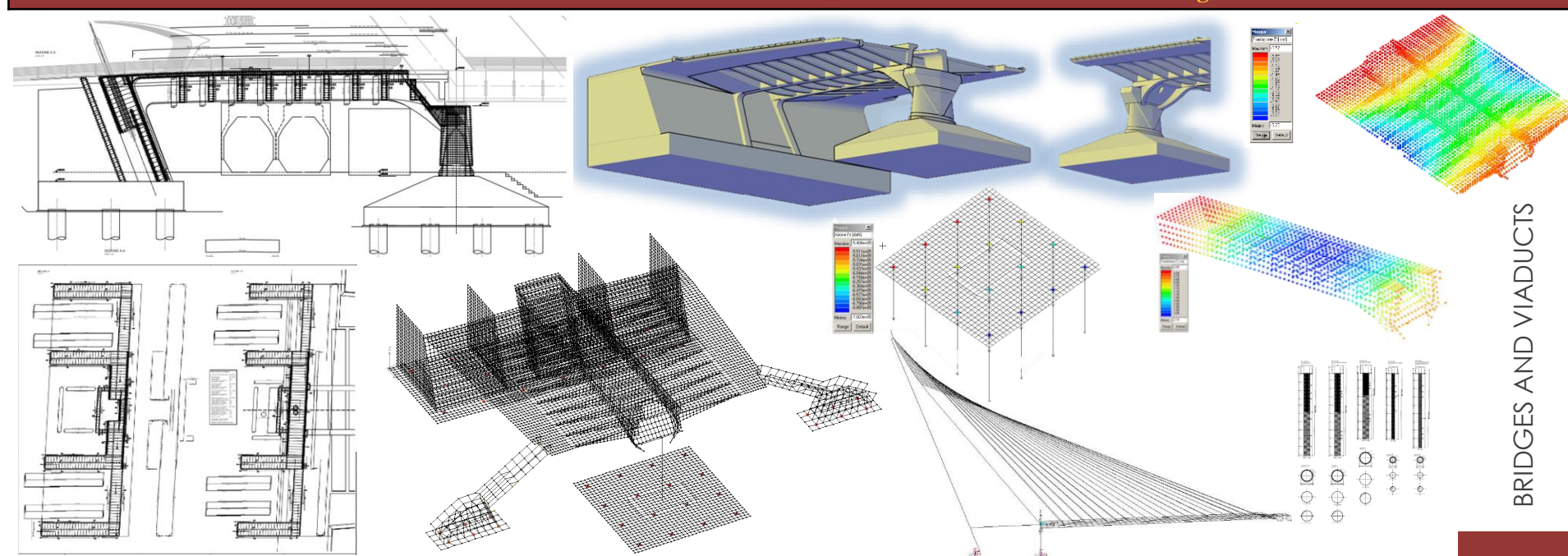
The geotechnical context was defined considering the available geognostic data and those deriving from a supplementary investigation campaign. The latter, consisting of seismic refraction analysis, continuous coring perforations and related laboratory tests performed on extracted samples by the SGALab laboratory, allowed to substantially review the geotechnical hypothesis assumed by the previous project. In fact, the results' analysis showed the presence of the lithoid substrate, of a granitoid gneissic nature, at a depth of only 16-17m, reducing the extent of the most deformable surface layers. SPT tests and tomographic investigations made possible to exclude the susceptibility to soil liquefaction, as well as site effects and seismic amplification.



Superstructure's executive phases



CRATI RIVER BRIDGE - 3D structural analysis and FEM numerical modeling



BRIDGES AND VIADUCTS