

SANDRO PERTINI BRIDGE MACERATA

Sandro Pertini Bridge. Bridge, design, work supervision, retrofit, base isolation, seismic assessment.

Committente

Province of Macerata

Progetto e D.L.

Studio Calvi Srl

Project manager:

Prof. Eng. Gian Michele Calvi, Eng. Matteo Moratti

Dati dimensionali:

Deck length: 92 m

Number of spans: 5

Classes and categories of work

Ig, IXc € 2.027.000,00

Start of planning

July 2005

End of planning

July 2005

Start of works

July 2005

End of works

September 2005

Description of project

The intervention of consolidation of the bridge located on the main road n.77, outside Macerata, required an overall time of 40 working days; the infrastructure closed to traffic due to static safety reasons. The bridge, dated the early decades of the twentieth century, consists of 5 masonry

arched bays, about 18 meters each for a total length of 90 meters. The road pavement is located at about 10 meters from the bed of the river; the piers (plan dimensions 2.6 x 8 meters) are made of outer coating masonry layer, 0.6m thickness, filled with weak concrete. The foundations are shallow with concrete plinths of about 3 meters high. The arches, all in solid masonry, have a rise of about 2.7 m and a thickness between 0.9 and 1.10 meters.

The project aims to achieve the following objectives:

- retrofit measures for gravity loads applied to first category bridges;
- retrofit measures for seismic events, in accordance with the national standard;
- preservation of the essential aesthetic characteristics of the existing bridge;
- fast execution to reduce the discomfort caused by the closure to traffic.

It was decided to build an essentially independent bridge; the new bridge is constituted by two piles of large diameter (1.2 meters) drilled in each pier and abutment, connected by a cap beam on top that allows a frame behavior in the transverse direction. On this cap beam are then placed three elastomeric isolators, able to transmit gravity loads, with simultaneous strong reduction of the horizontal forces. The deck is built using precast T-section beams and made continuous by means of a suitable integrative concrete casting.

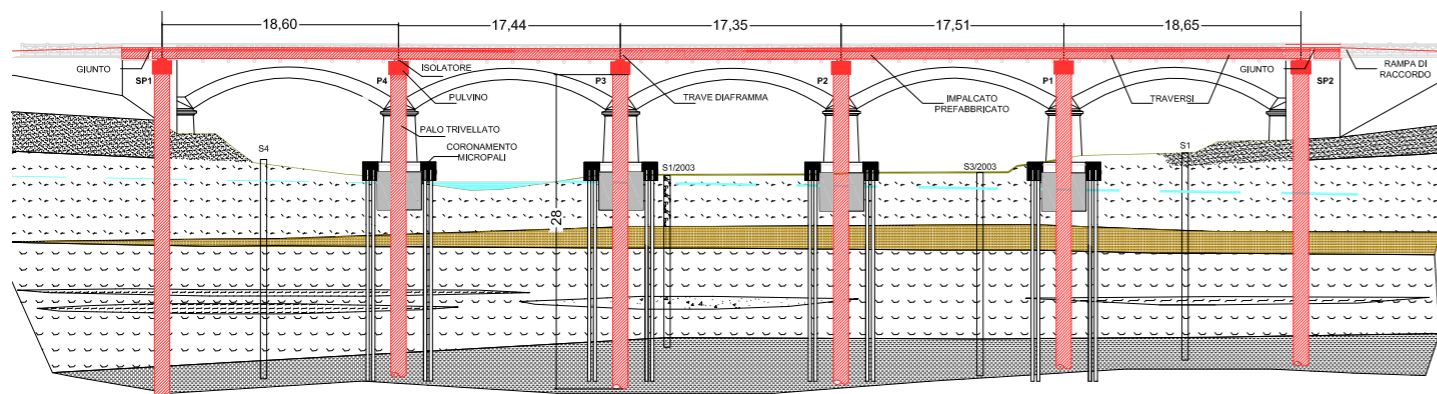
The existing bridge has been completely preserved; arches have been emptied from the filling material, in order



to allow the placement of the new deck without substantial changes in the shape of the ancient bridge. The security of the existing bridge has been increased thanks to the large diameter piles, to the reduction of the seismic mass and to the changed function, which no longer provides the

support to the loads due to the traffic.

At the edges of the bridge expansion joints have been designed in order to withstanding the displacements induced by the design earthquake.



Above. Damage of the bridge before consolidation intervention. Lithostratigraphy and design section (in red is indicate the new bridge). The silty-clayey layer immediately below the original foundation and the consolidation of the foundations by micro-piles are noted.

Opposite page, above. Inauguration of the bridge in September 2005, after the end of the works lasting only 40 days.

Opposite page, below. Panoramic photo of the bridge during the works: the consolidation of the foundations and the casting phases of the supporting are noted. The existing bridge has been completely preserved; arches have been emptied from the filling material, in order to allow the placement of the new deck without substantial changes in the shape of the ancient bridge.

