

## Structural Rehabilitation of Viaduct Cernicchiara

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### Abstract

Structural rehabilitation of existing bridges and viaducts as an environmental sustainability effort. It is frequently possible to execute activities aimed at reaching new safety standards on existing structures: not only does this promote decarbonisation in terms of sustainability, but it also prevents the production of large quantities of waste material.

The article covers the rehabilitation of a 1962 viaduct in Salerno, Italy, made of reinforced concrete cast-in-situ and therefore subject to notable realization issues. The existing structure's analysis and the rehabilitation technique adopted (CFRP reinforcement of beams and arches) made it possible to adapt the structure to new mobile and seismic loads.

**Keywords:** existing bridges, arc bridges, viaduct, structural rehabilitation, fibre reinforced, CFRP reinforcement, reinforced concrete, slab, pillar reinforced, seismic improvement, moving loads.

### Introduction

The challenge was started when “**Valori Scarl – Consorzio stabile**” asked a better solution to solve the problem of “Cernicchiara Viaduct” Structural Rehabilitation.

“Valori Scarl – Consorzio Stabile”, thanks to its know-how as a construction company and to its consolidated experience in maintenance works on main Italian infrastructures (Akragas by Ing. Riccardo Morandi and Salsetto Viaducts in Agrigento, Bisantis Bridge by ing. Riccardo Morandi in Catanzaro, and several others), has become a leader in its sector: the maintenance and safety of viaducts and bridges.

In 2018, it won the Framework Agreement “ANAS SpA DG 37/17 – Lotto 5 Calabria” for the “special maintenance and structural rehabilitation of structures”, for a total amount of € 10 million. Among the planned interventions in this contract, a few stand out for their technological complexity and innovation: the structural reinforcement of the Cernicchiara Viaduct's decks and impost blocks.

The viaduct's structural improvement was realized using CFRP (Carbon Fiber Reinforced Polymers) techniques. In Italy, this kind of technical improvement in an infrastructural context is quite recent and represents an innovative aspect in structural rehabilitation activities.

CFRP reinforcements allow for better mechanical performance of structural elements, increasing their ductility and ensuring a longer durability to the work. With regards to decarbonisation policies, the structural renovation of existent works plays a crucial role in the reduction of CO<sub>2</sub> emissions.

### Cernicchiara Viaduct

Having six spans and a central arch, each span is traceable to the pattern of a beam resting on its extremities, represented by the pylons, while the central one is traceable to an arch wedged at the base. The pylons are frame-type in two directions. Each pylon is therefore made up by four columns, linked by two levels of horizontal beams on the viaduct's transversal axis. The entire viaduct was realised in reinforced concrete cast on site.