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REDESIGNING A LOCATION: THE GIARABASSA BRIDGE

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Abstract: *Along the SP27 in the Province of Padua in Italy, a degraded and inadequate bridge has given rise to the need for a new one that fully satisfies the traffic and safety requirements. However, the project that has been presented to solve the problem also took the opportunity to redesign the landscape, which is of special worth and rich in vegetation.*

1 INTRODUCTION

The SP27, which runs through the municipal districts of Piazzola sul Brenta, at Carturo, and San Giorgio Bosco in the province of Padua, contains a bridge which is totally inadequate in terms of static safety and size.



Figure 1: The “bottleneck” on the bridge

Although this stretch of road is not subject to very heavy traffic, due to the bottleneck that is formed on approaching the bridge at certain times of the day both light and heavy goods traffic comes to a standstill and it is very difficult for pedestrians to cross. Consequently Padua provincial council decided to consider a range of solutions to eliminate these dangerous and inconvenient conditions.

Along with the functional nature of the work, special consideration should also be made of the aesthetic value of the context given by the luxuriant vegetation along the banks of the River Brenta. Hence the project for the Carturo-Giarabassa Bridge, whose concept not only solves the traffic problems but also internalises the significance of the landscape.

2 THE LOCATION

The site is situated at approximately 3 kilometres from San Giorgio in Bosco on the SR 47, and approximately 7.5 kilometres from Piazzola sul Brenta.

The project area includes the central stretches running through the municipal districts of Fontaniva, Piazzola sul Brenta, Grantorto, San Giorgio in Bosco, Curtarolo, Carmignano di Brenta, Limena, Campo San Martino and Vigodarzere.

The areas along the river alone constitute an extremely interesting environmental system with terracing and morphological shapes created by the river, with numerous marginal environments (ecotones).

The stretch of river involved with the project runs through the Veneto plain, a densely populated area where the towns, industrial zones and intensive farming areas follow one another, with very few natural relict areas. The River Brenta plays a fundamental role as *ecological corridor* in this context, providing refuge to numerous animal species thanks to the wide variety of different environments along the river. In fact, as far as San Giorgio in Bosco (Padua) the river flows over a wide gravelly bed, with secondary branches that house some very special habitats.

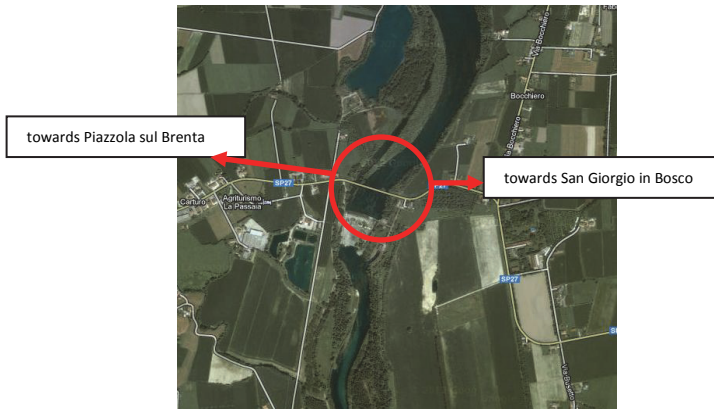


Figure 2: Contextualization of the project area



Figure 3: A section of the bridge surrounded by the vegetation

Over the years this environmental scenario has helped compose an extremely interesting and visually important landscape, mainly of vegetation. Therefore, on the basis of these considerations, given the shape of the current bridge it is totally foreign to the natural elements in the context and has a permanently intrusive nature. These effects are amplified further when we consider the state of decline of the bridge and its type of construction, a type which is very widely used and endows all the sites with the same standardised appearance.

Consequently, apart from evaluating the various strategic-location alternatives, i.e. obtaining efficient traffic functions with alternative routes, an in-depth study was conducted into the type of bridge to evaluate the theme of the forms of a work of art.

2 THE ALTERNATIVE TYPES

Given the aims of the project, the design idea was introduced into the site in question, addressed to identifying which form could be the most suitable and totally compatible with the surrounding landscape.

Therefore a typology research was conducted, exploring all the possible forms that were most adequate for the location. Initially a cable-stayed bridge was considered, but given the span of the bridge, the counter-stays would have created both a physical and visual encumbrance that would not have fitted in with the context.

Secondly, attention focused on the type of arch and, having immediately rejected the true and through arch types, given the height of the riverbanks, a half-trough arch bridge was decided upon, with a formal hierarchy which is described in the next chapter.

3 THE ARCHITECTURAL PROJECT

From a formal and composition point of view, the planned bridge crosses the River Brenta from the banks in Piazzola and S. Giorgio in Bosco, with an approach to the river that is as unobtrusive as possible. It is distinctive for its apparently formal and functional simplicity, and is marked by three pairs of twin circular section steel arches, which are laid on piers with cutwater shaped ends (to help the water flow past easily), and joined by keystone elements. The bridge has three bays, side bays measuring 80 meters and the central bay of 100 meters. This type of arch bridge is a winning and dynamic structural system, supporting a plastic and slender deck. The deck is formed of a series of HE profile longitudinal steel girders, joined to the 30 cm thick composite concrete slab. The structure is clad externally in steel casing. The arches are mutually joined to the piers by flanges with plates clamped and buried in the concrete at the top of the piers.

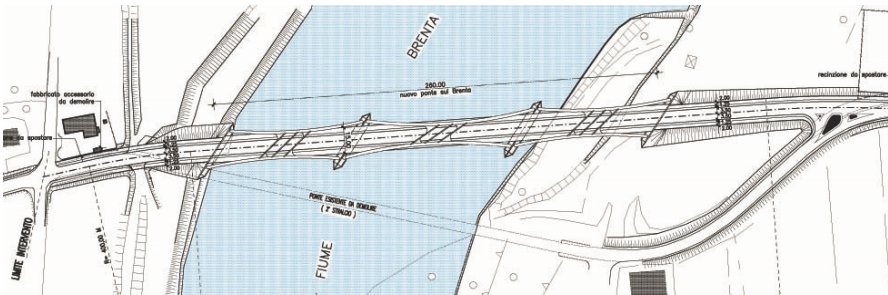


Figure 4: Plan

The piers are also concrete and installed on a foundation slab. The foundations are deep, formed of a series of large diameter piles laid in a manner to absorb all the horizontal thrust from the arches, and joined at the top by the slab.

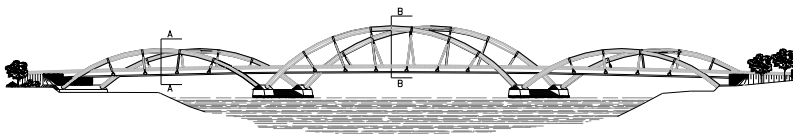


Figure 5: View of the design bridge

The crossing is formed of two 3.50 meter wide traffic lanes and two 1.80 meter wide pathways for safe transit for both pedestrians and cyclists.

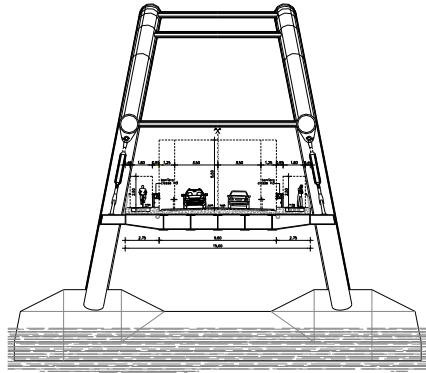


Figure 6: Section A-A

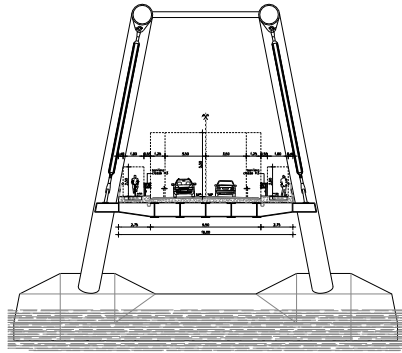


Figure 7: Section B-B

4 THE STRUCTURAL DESIGN

The bridge is of a half-through arch type, with the deck continuously suspended over a series of bays for a total length of approximately 260 meters. The arches supporting the central bay have a tubular profile measuring $\varnothing$ 1800 mm, and form circle arches with a curve radius of approximately 62 meters, while the arches supporting the side bays have a tubular profile measuring $\varnothing$ 1500 mm, and form circle arches with a curve radius of approximately 58 meters.

The deck is overall 15 meters wide, formed of main solid steel girders joined to the stiffening cross beams, and of the reinforced concrete slab cast on composite 4 cm precast plates, for a total thickness of approximately 30 cm. The girder-slab connection is completed using Nelson type head electro-welded shear connectors.

The steel girders are connected at the top by horizontal temporary wind bracing, which shall be removed after the final casting of the reinforced concrete slab is complete.

4 RELATIONSHIP WITH THE CONTEXT

In landscape terms, the project is considered as *landscape management* (institutional definition – Resolution by the European Council on 4th June 1997), which involves activities addressed to harmonising the changes to a landscape, which are determined by economic and social needs, with the needs of the people and their quality of life in a view to sustainable development.

In fact, in this particular case in defining the formal relationship of the project and its context, an architectural design was sought that in both planimetric and altimetric terms manages to “bind” the construction to its surrounding landscape.

The curve of the arches and their scale with respect to the land are consistent with the undulating lines of the dense vegetation along the banks of the River Brenta in this area.



Figure 8: Rendering of the bridge in the context

In the landscape conception of the project, alterations to the natural skyline are created which however, with respect to the current bridge, improve both the perceptive and scenic orders. This “scenic” improvement is also aided by the hierarchy of the arches, in a symmetrical order which, in certain points, emphasise the *vanishing point* that the entire impression converges towards.

4 CONCLUSIONS

This project has a dual aim: technical-performance and landscape. It must be emphasised that these aims are not a consequence of each other but have been pursued in parallel, by means of a structural, typological and formal study that incorporated the detailed, architectural and landscape scales.

A project that involves redesigning a location, a space used by man.