# FOOTBRIDGES AND THE SCOOL OF ARCHITECTURE IN VENICE

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## ABSTRACT

The Bridges will be presented started as designs for graduation thesis of students attending the "Theory and Design of Bridges" course, founded in 1995. Future architects are trained to be designers of bridges by combining technical expertise, visual awareness and creative skills. At first, to determine the best alternative to create a functional element while addressing community and environmental concerns, they are required to analyse the context under different points: Historical aspect: a good project takes into consideration the history of the site, the technologies and the materials which reflect the aesthetic and social values of their time; Urban planning: it is necessary to know the situation, the codes and standards of the place where the bridge is to located; Geological aspect: the characteristics of the soil influence planning choices; Hydraulic aspect: the risk about water/soil ratio is one of the main factors in the assessment of the type of structure to be fulfilled in that site. During this stage the members of the Local Administration are involved to give their support for issues falling within their competence.After the completion of f this analysis students start to take their choices about defining the shape-structure that will best meet the design intention, together with materials, construction sequence, cost, durability. Students are taught that bridges cannot be designed in pieces, each element must be in relation to the whole, the shape must be in relation to the structure. Details, colours, surfaces as well must be in tune with the shape and the structure. A good project is the result of collaborative working between architects and engineers.

Keywords: footbridges; architecture; engineering; aesthetics; structure; planning

# 1. Introduction

The footbridges, presented in this paper, started as designs for graduation thesis of students attending the "Theory and Design of Bridges" course in the school of Venice. Future architects are trained to be designers of bridges by combining technical expertise, visual awareness and creative skills. At first, to determine the best alternative to create a functional element while addressing community and environmental concerns, they are required to analyse the context under different points:

Historical aspect: a good project takes into consideration the history of the site, the technologies and the materials which reflect the aesthetic and social values of their time;

Urban planning: it is necessary to know the situation, the codes and standards of the place where the bridge is to be located;

Geological aspect: the characteristics of the soil influence planning choices;

Hydraulic aspect: the risk about water/soil ratio is one of the main factors in the assessment of the type of structure to be fulfilled in that site.

During this stage the members of the Local Administration are involved to give their support for issues falling within their competence.

After the completion of f this analysis students start to take their choices about defining the shape -structure that will best meet the design intention, together with materials, construction sequence, cost, durability. Students are taught that bridges cannot be designed in pieces, each element must be in relation to the whole, the shape must be in relation to the structure. Details, colours, surfaces as well must be in tune with the shape and the structure. A good project is the result

of collaborative working between architects and engineers.

# 2. FOOTBRIDGES

## 2.1. A Glass Bridge for Venice, Piero Bertoldo, Paolo Bidoli (1996/97)

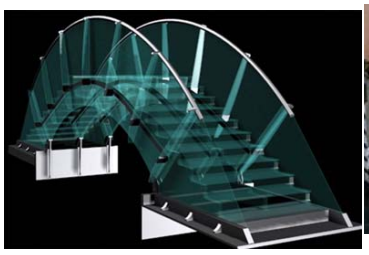


**Fig. 1 Rendering of the bridge Fig. 2 The bridge in the context Fig. 3 View of the bridge**

The design concept of this arch bridge focused on the view of the " Canal Grande". The goal was to keep the view through the bridge as open as possible. Linked to the Venetian tradition on account of its shape, it is modern in its material, the glass. This design asked for the involvement of a firm manufacturing sheets of glass for cars in order to test the feasibility of the work. The result is a transparent structure that allows the space to continue throughout the structure in all directions.

## 2.2. Two Cable-Stayed Footbridges in the over-bank area of Salvezzano, Daila Canevari (1996/97)

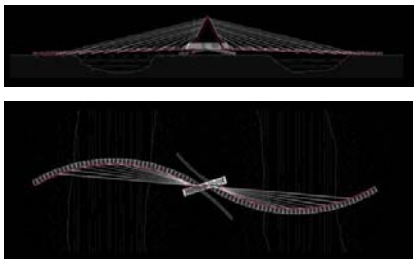


**Fig. 4 Plan and elevation on the bridge** **Fig. 5 Design concept**

This footbridge is located in a natural landscape dominated by the presence of the River “Bacchiglione” near Padua. The

first step of the work consisted in the geological and hydrological analysis, the second one was the study of the environment. The territory is underdeveloped even if it has got a high potential in terms of beauty and resources. The project is composed of two equal cable-stayed bridges that are included in a footpath cutting the over-bank area. The two footbridges are curved in plan and the torsional issues are solved using a tube that supports the deck.

## 2.3. A Pedestrian Footbridge for the Treves Gardens, Padua, Bibi Frusciante (1996-97)

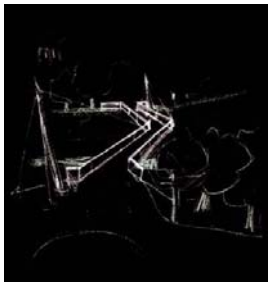


**Fig. 6 View of the bridge in the natural environment** **Fig. 7 Sketch**

This footbridge is located in Padua, in the Treves Gardens, a place famous for the footpaths designed by Giuseppe Jappelli. The environment is dominated by the vegetation of the gardens, the “Basilica di S. Antonio” and the nearby buildings. It is a cable-stayed structure in the shape of a boomerang to re-echo the geometry of the paths. The deck, made of wood, establishes a connection with the place while the masts, made of steel, communicate lightness and modernity. In this way this structure creates harmony between ancient and new elements.

## 2.4. The Footbridge on the Piovego, Padua, Massimo Buda, Gianluca Caputo (1997-98)

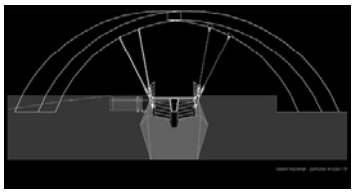


**Fig. 8 Plan on the bridge**

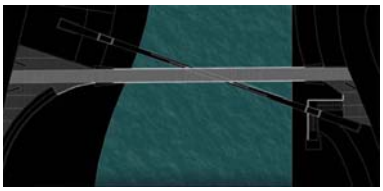


**Fig. 9 Cross-section of the bridge**

The form of this footbridge is the result of the interaction of the structural elements: the arch and the deck., the revolving 90-metre arch upholds the bridge deck in a crosswise sense, reminding in this way cadastral images. In this work the location of the cables solves the problem of the discontinuity of the coupling in formal terms. While fulfilling its function this footbridge then communicates some historical characteristics of the place.

## 2.5. A Cycle-Pedestrian Bridge in Bassano del Grappa, Filippo Bordignon, Luca Smaniotto (1998-99)

**Fig. 10 View of the bridge in the environment**

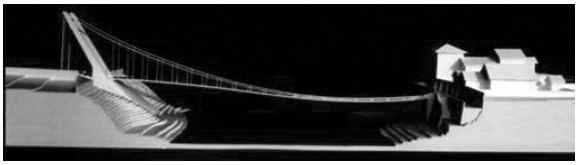


**Fig. 11 View of the bridge**

Crossing the River “Brenta” this footbridge joins a medieval village with an anonymous place and is near “Alpini Bridge” a bridge, by Palladio, built in the 16th century. It is an unsymmetrical suspension bridge with a span of 88 metres. Its structure consists of two steel suspension cables, the structure extremely slender has little visual impact on the environment strongly characterized by the presence of an ancient site.

## 2.6. A Swing Cycle-Pedestrian Bridge in Caorle, Riccardo Lauzzana, Silvia Saltarin (2000-01)

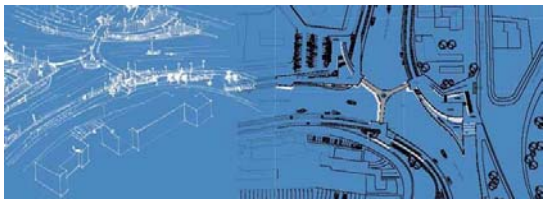


**Fig. 12 Sketch and general location plan**

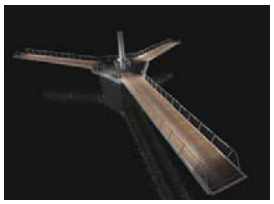


**Fig. 13 View of the bridge**

This cycle-pedestrian bridge is located in the point where two channels join up into a single river. In the middle of it a

lever makes the three legs move up and down for shipping. This solution solves the problem from a functional point of

view while representing the reinterpretation of the navigability of the river. Being extremely light this footbridge does not

affect the skyline of the territory, on the contrary it contributes to enhance the value of the context where it is.

## 2.7. A New Bridge on the Conca River, Andrea Agostini, Cristina Lodi (2001-02)

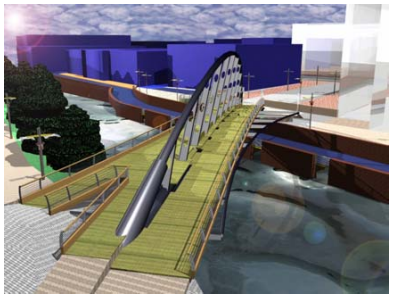


**Fig. 14 Perspective of the bridge**

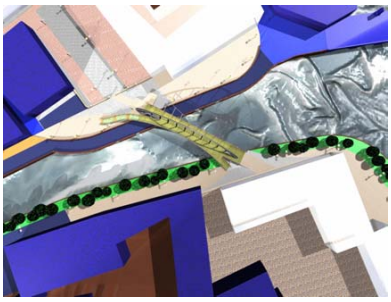
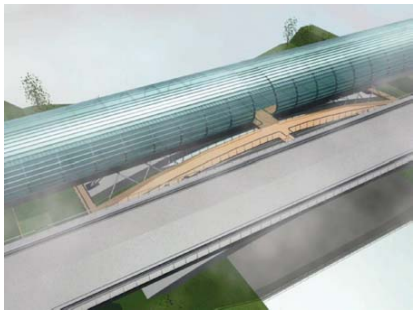


**Fig. 15 Bird's-eye view**

The aim of this project was to connect the centre of Treviso with a new area and the footbridge was designed as the main element for the development of this part of the city. The cycle-pedestrian bridge is located between two institutes of the University of the city and allows pedestrians to move freely. The arch shape refers to the tradition of the place, but unlike the local ancient bridges, it is made of stainless steel, becoming, in this way, a visible sign, a landmark in the context.

## 2.8. A Cycle-Pedestrian Bridge in Pieve di Soligo, Silvia Crosilla , Laura Pipinato (2001-02)



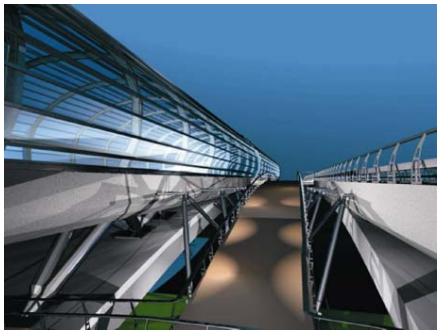
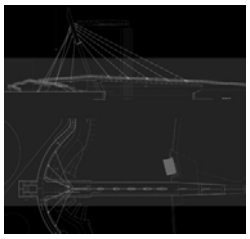
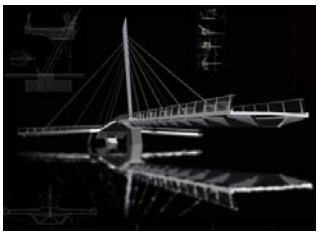


**Fig. 16 View of the multifunctional bridge** **Fig. 17 View of the bridge at night**

This project includes three types of facilities: railway, highway, cycle-pedestrian path, moreover on it there is a railway station. The idea of the designers was to distinguish the functions in three parts while the railway station is developed in a closed space similar to a tube. The cycle-pedestrian ramp is between the railway station and the highway. It is a key-element in this project, it allows the other two parts to be connected. The arch is in concrete while the elements connecting the arch to the deck are in steel in order to create a sensation of lightness.

## 2.9. Between Land, Water and Town, Valentina Minto (2001-02)





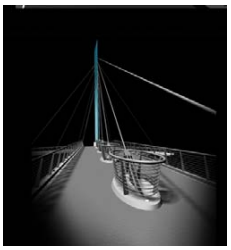


**Fig. 18 Elevation and plan Fig. 19 Rendering of the bridge Fig. 20 View at night**

The design concept of this footbridge focused on two elements: land and water within the urban context of Mestre. All the features that create the aesthetic impression arise from the shape and sizes of its structure. The pylon is put directly in the water and gives the right distribution of stresses. The ramp of the bank opens and enlarges in correspondence of the pylon, then it splits itself into two ramps causing the pylon to become the heart of the new space. This bridge represents a landmark in that context.

## 2.10. A New Bridge in Accademia, Venice, Luciano Motta (2001-02)

**Fig. 21 View of the bridge in the context Fig. 22 View of the bridge from "campo S. Vitale"**

This footbridge is located in Venice and crosses the "Canal Grande". In this project the designer wants to propose a different solution for the current "Accademia" Bridge, a provisional structure that over the years has become the final solution. This new bridge links to the Venetian historical architecture and in particular it refers to the "Ponti degli Scalzi" of Miozzi. The arch changes its form according to the torsion and bending moments and being very thin at the top it creates a minimum visual impact in the environment.

## 2.11. Steel Footbridges: Shape, Structure and Materials, Margherita Pitis (2001-02)

**Fig. 23 Steel footbridge Fig. 24 View at night Fig. 25 The double "Y" frame**

The design concept about these footbridges was based on an idea which, taken into consideration the beauty of the landscape, aimed at creating a functional architectural structure connected with a significant upgrade space. The choice of the Vierendeel was due to the fact that it fits the lightness of the bridge. There is no interruption between existing cycle path and the walkways. The result is a peculiar element in the landscape.

## 2. 12. A Cycle-Pedestrian Bridge on the Ghirlanda River, Francesco Pedone (2002-03)

**Fig. 26 Bird's-eye view**

**Fig. 27 View of the bridge in the context**

The design concept focused first on providing an architectural structure to be used by walkers and cyclists. The second goal was to create good conditions for urban development of the green, surrounding area. The place is pervaded with Renaissance history and the footbridge reflects the historical, physical, social characteristics of the area. In fact its curve, underlines the ancient " Girlanda Bastione", the cross section of its deck has a compact shape as suggested by the massive stony ancient walls, one of its parapets is closed to allude to the ancient walls and the other parapet is transparent to highlight the importance of an old monument.

## 2.13. A Cycle-Pedestrian Bridge in Pieve di Soligo, Silvia Santucci (2002-03)

**Fig. 28 Typical cross-section of the deck**

**Fig. 29 Rendering of the bridge**

This design originated from a need in the area of Pieve di Soligo: a cycle-pedestrian bridge. In order to promote rural tourism the Local Council decided to improve all the pedestrian tracks and to build a new footbridge in substitution of an existent structure. It is a tension structure and it consists of two cables. In the middle the deck is wider than it is in the extremities to satisfy the needs of the bridge, that is: to be a crossing way and to give travellers opportunities of stopping and enjoying a view.

## 2.14. "Un Ponte verso il Mare.." A new Pier for Bibione Coast Line, Davide Codognotto, Andrea Ramon (2003-04)

**Fig. 30 Rendering of the bridge and its relation with the land Fig. 31 Rendering of the bridge and its relation with the water**

The location of this footbridge is the area connecting Bibione and its coast line. There was a desire to have a landmark both to create a connection between the city and the seaside and to transform this area in a new centre full of activities typical of urban centres. All the features that build up the aesthetic impression of this footbridge arise from the shape and sizes of its structural elements, the five spans, the V shaped masts, the cross section. The result is a multi-span cable stayed bridge which looks like a blade hanging between the land/water and the sky.

## 2.15. A "Bridge" over the City Walls: a Conceptual Design for Sirmione, Manuela Cugini, Mirjam Fattori (2003-04)

**Fig. 32 View of the bridge** **Fig. 33 View of the deck**

The bridge is located in "Sirmione", a small town, near the lake of "Garda". This project started from a real problem due to the great number of tourists in the area and to the insufficient existing single access. The idea was to create another new access. The aims were to preserve the view of the environment and the strong relationship between the town and the lake. This strong link is the main element for the project. The asymmetric cable-stayed is 45 metres long and it is characterized by two inclined masts converging towards the top. The designers wanted to satisfy both functional and aesthetic aspects.

## 2.16. The Memory Bridge. A New Footbridge over Vajont, Antonio Marco Barreca, Paolo Piccin (2004-05)

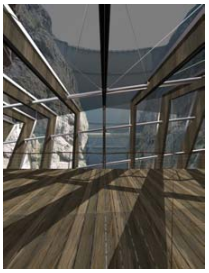
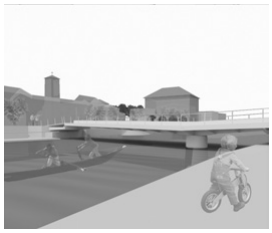
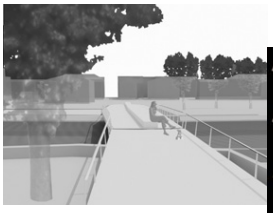


**Fig. 34 Rendering of the bridge** **Fig.35 The view of the dam**

The design concept of the Memory Bridge was based on the topic of the wave and its movement. The background, against which it is seen, is the dam of Vajont. In consideration of the events connected with the place, the bridge was conceived as a "silent" architectural structure and was planned to house a memorial museum, becoming so a kind of exhibition gallery. While crossing the bridge people would feel the sensation of passing through a tube whose structure and materials denounce the presence of "the big wave". The structure, in a spiral form to convey the idea of its appearance following the passing of waves, works thanks to its perfect symmetry. Its materials glass, steel and wood, offer a dynamic and variable volume. The whole looks like a cage which resists both vertical and horizontal loads, being fixed to the four directions. The result is a bridge that meets its design intention: a fluid form full of curves just like the movement of rough water.

## 2.17. A Swing Footbridge for Concordia Sagittaria, Antonio Cusin (2004-05)





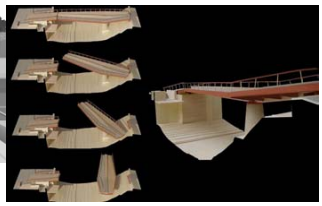


**Fig. 36 View of the bridge Fig. 37 The crossing of the bridge Fig.38 The movements of the bridge**

The idea was to create a footbridge totally integrated with the series of open squares typical of "Concordia Sagittaria", making reference to an ancient bridge located in this area. Its structure includes two spans, one 4 metres long and the other, the movable span

for shipping, 30 metres long. This swing footbridge includes a cycle path and a pedestrian route. The two tracks are different, the first is 1,50 metres wide and is paved with stones the second is 2,00 metres wide and is paved with wood. The handrail is different, depending on the path: wood for the pedestrian route and steel for the cycling–track. This structure is a structure with a little visual impact in the environment.

## 2. 18. Cycle-Pedestrian Bridge in Palermo, Edj Leder (2004-05)

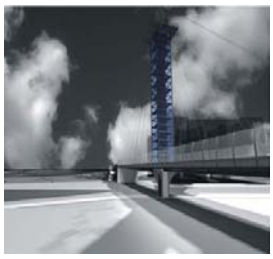




**Fig. 39 View of the bridge Fig. 40 View of the bridge Fig. 41 View under the bridge**

This footbridge, located in Palermo, crosses “Viale Regione Siciliana, a big artery of the city. The design intention included two goals: on the one hand it must have enough height and presence to serve as a landmark, a recognizable sign in this part of the city, on the other hand it must create a dialogue with the context in terms of integration in the environment thanks to also the development of social, economical activities. The bridge is a cable-stayed one. Of all the structural elements, in terms of shapes and sizes, which contribute to create the aesthetic impression of this bridge, the most outstanding one is the mast. Perceived as a bright tower, it integrates itself with the surrounding buildings and due to its height it connects itself to the mountains and the sea.

## 2.19. A Footbridge in San Pellegrino Terme, Bergamo, Nello Orlandini (2004-05)

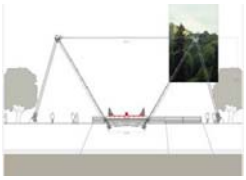




**Fig. 42 View of the bridge in the environment Fig. 43 Section Fig. 44 The masts**

This footbridge, which crosses the River “Brembo”, is located in “San Pellegrino Terme” and it is the continuation of “Matteotti” street. The design concept focused on two aims: lightness and respect for the environment. This pedestrian bridge consists of two suspension cables which permit open vista of the surrounding landscape during the

crossing. About its shape and its effects on the environment, it looks like a slander, transparent structure in daylight and at night-time you can see a thin, bright line along the deck. In this way the designer created a work with little visual impact respecting the architectural and naturalistic elements present in this site.

## 3. CONCLUSIONS

The projects of the footbridges of the school of architecture in Venice, here presented, highlight the relationship between the design-artistic discipline and the technical-scientific one. It is showed that a bridge, out of the synergetic work between architects and engineers, improves the quality of the surrounding environment, it becomes a landmark, an internationally recognised symbol. Thanks to this collaboration some thesis have been awarded with important acknowledgements.

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