

# **DIGITAL LANDSCAPES**

## **PAESAGGI DIGITALI**

**DIGITAL PROCESSES FOR THE REPRESENTATION  
OF CITY, ARCHITECTURE, PRODUCT**

**PROCESSI DIGITALI PER LA RAPPRESENTAZIONE  
DELLA CITTÀ, L'ARCHITETTURA, IL PRODOTTO**

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La collana adotta un sistema di valutazione dei testi basato sulla revisione paritaria e anonima (*peer-review*). I criteri di valutazione adottati riguardano: l'originalità e la significatività del tema proposto; la coerenza teorica e la pertinenza dei riferimenti rispetto agli ambiti tematici propri della collana; l'assetto metodologico e il rigore scientifico degli strumenti utilizzati; la chiarezza dell'esposizione e la completezza d'analisi. Per temi specifici la revisione anonima è effettuata da esperti esterni scelti dal comitato scientifico.

# ..dL

Digital landscapes / Paesaggi digitali

*Digital processes for the representation of city, architecture, product*

*Processi digitali per la rappresentazione della città, l'architettura, il prodotto*

Landscape is not scenery, it is not a political unit; it is really no more than a collection, a system of man-made spaces on the surface of the earth. Whatever its shape or size it is never simply a natural space, a feature of the natural environment; it is always artificial, always synthetic, always subject to sudden or unpredictable change.

J.B. JACKSON

La collana mette in luce il ruolo della rappresentazione digitale come metodo di prefigurazione del progetto e come strumento di indagine per la conoscenza. Le rappresentazioni, che siano rivolte al pensiero, alla comunicazione o alla costruzione, sono generalmente improntate su processi impliciti che scaturiscono nella mente del progettista. La digitalizzazione impone la necessaria esplicitazione delle azioni per la costruzione dei modelli. Gli ambiti indagati sono il paesaggio, la città, l'architettura e il prodotto. Attraverso esperienze teoriche e casi studio si dimostra quanto le scelte insite nei processi siano foriere di creatività e invenzione. L'interesse verso le procedure per disegnare prevede l'utilizzo di processi aperti e condivisi anche per agevolare il dialogo tra le discipline, rendendo il modello informato e creando un nuovo legame tra modello concettuale e modello costruttivo.

The book series highlights the role of digital representation as a method of foreshadowing the project and as an investigative tool for knowledge. The representations, whether they are aimed at thought, communication or construction, are generally based on implicit processes that flow into the mind of the designer. Digitisation imposes the necessary explicitation of actions for the construction of models. The areas investigated are the landscape, the city, the architecture and the product. Through theoretical experiences and case studies it is shown how much the choices embedded in the processes are the harbingers of creativity and invention. The interest in procedures for designing involves the use of open and shared processes also to facilitate dialogue between disciplines, making the model informed and creating a new link between conceptual model and construction model.

*Classificazione Decimale Dewey:*

**624.2 (23.) INGEGNERIA CIVILE. PONTI**

RAISSA GAROZZO

# BRIDGES OF TIME

A JOURNEY THROUGH  
ARCHIVES, DIGITAL SURVEY  
AND INFORMATION MODELLING  
OF CIRCUMETNEA BRIDGES

*Preface by*

CETTINA SANTAGATI

*Afterword by*

SALVATORE FIORE





ISBN  
979-12-218-2295-3

FIRST EDITION  
**ROME** 5 NOVEMBER 2025

*A Massimiliano*



Construire, c'est collaborer avec la terre: c'est mettre une marque humaine sur un paysage qui en sera modifié à jamais; c'est contribuer aussi à ce lent changement qui est la vie des villes. [...]

J'ai beaucoup reconstruit: c'est collaborer avec le temps sous son aspect de passé, en saisir ou en modifier l'esprit, lui servir de relais vers un plus long avenir ; c'est retrouver sous les pierres le secret des sources.

MARGUERITE YOURCENAR  
*Mémoires d'Hadrien*



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## PREFACE

A bridge is a structure carrying a road, path, railway, or similar across a river, valley, or other obstacle. When we think of the word “bridge” we immediately think of a means of connection, evoking links between places, time, and people, and suggesting powerful metaphors such as overcoming barriers, the meeting of cultures, and continuity between past and future.

Every bridge tells a story of technology, human skill, and the relationship with its surroundings; every arch, pier, and joint bears witness to construction choices and cultural influences. Practical function and symbolic value coexist, creating a work that is simultaneously infrastructure, historical document, and heritage of the imagination.

Within this horizon of meaning, Raissa Garozzo’s work stands as a rigorous and keen exploration of the bridge not merely as infrastructure, but as an instrument of cultural knowledge. The masonry bridges of the Circumetnea Railway emerge not only as crossing pathways, but as tangible expressions of the relationship between humans and their territory: visible traces of history and technological progress, punctuating the landscape. These structures, suspended between function and meaning, become instruments of memory and markers of identity, transforming infrastructure into both a cultural and a landscape document.

The author's research falls squarely within the scientific discipline of Drawing, where representation is a cognitive and interpretative act capable of generating meaning. Starting from the recognition of these structures as cultural assets, and not simply works serving the railway line, Garozzo offers an original reflection on their role in the contemporary urban and territorial landscape: the bridge is not only a connecting structure, but also an archive of historical, constructive, and territorial relationships, capable of bearing witness to the intertwining of technology, place, and culture. In this way, her research opens up new horizons for the study and protection of these structures, emphasizing their cultural and landscape value in the contemporary urban and territorial context.

The volume is notable for its integrated and interdisciplinary methodological approach: historical and archival research conducted at the Circumetnea Railway and the State Archives of Catania is combined with the most advanced practices in digital surveying and information modelling (H-BIM), also addressing related interoperability issues. In this perspective, representation becomes a research tool: surveying is not limited to recording measurements, but generates verifiable data that translates into information models, in which geometry and semantics merge into a digital language capable of restoring heritage in an analytical, dynamic, and shareable way. The three case studies examined are emblematic for the verification of the methodology applied, demonstrating the depth of the analysis on topics ranging from stereotomy to the analysis of the hydrogeological context.

The main merit of the work lies in its ability to transform representation into method, documentation into a tool for protection, and modelling into a project of

knowledge. The result is an operational model that combines technical rigor and critical vision, constituting a methodological reference for the interpretation and enhancement of other segments of Italy's infrastructure heritage.

In short, through her analysis of the railway line and its structures, the author invites us to change our perspective: from the bridge as simple infrastructure to the bridge as a cultural and landscape document. It is in this light that the volume *Bridges of Time* takes on a broader meaning, demonstrating how Drawing can become a meeting place between technique and memory, innovation and protection, restoring to the built heritage its nature as a living matter of knowledge, responsibility, and design.

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## INTRODUCTION

It wasn't love at first sight.

When I began working on the Circumetnea Railway for my doctoral thesis, I was expecting something different. I was used to churches, archaeological sites, architectures that carry an overt *aura*. Places where history asserts itself plainly, where value is declared, certified, handed down for centuries. For that reason, at the outset the Circumetnea, with slightly more than a hundred years of history, felt distant to me and its bridges struck me as technical, functional objects, lacking the “noble” halo I was accustomed to. Over time, something shifted. Little by little I began to look at these structures with different eyes: to catch the hidden logics, the minute variations, the geometries bending to the landscape. I found myself surprised by an abutment that tucked into a slope, by a skew bridge with helicoidal brickwork that challenged orthogonality with engineering grace. Each discovery urged another. It kept me following the line.

The passion matured in the archives, among dusty sheets, faded plans, pencilled notes; it surfaced during site visits—negotiating difficult access, fieldwork under demanding conditions, frustration and flashes of insight; and it took shape in the moment of modelling. The archive, especially, was an intense experience. I had never read a railway section, nor worked with technical drawings conceived by nineteenth-century engineers. And yet every

document, every fold, every stamp, told a story. Discovering that bridges with the same configuration recur far apart along the line turned a simple inventory into an investigation: a narrative of alignments, work crews, solutions repeated and adapted.

The railway drew me slowly in. Not only as a transport system, but as a living infrastructure able to converse with its territory. Watching how bridges have been absorbed by urban growth, or how naturally they adapt to rugged settings, made me understand how these seemingly minor structures are, in fact, essential to telling the deep relationship between technique and place.

At same point, I realized how the same bias I had regarding the cultural value of masonry railway bridges, was shared by many. These are artefacts that have supported, and continue to support, the movement of people and goods for more than a century, quietly shaping the identity and geography of the territories they serve. Yet they are often seen as merely technical works, thus taken for granted and with a poorly acknowledged cultural value.

The main challenge lies in recognising their dual nature: on one hand, they are complex structural systems that must still guarantee safety and functionality within a deeply transformed railway context; on the other hand, they are tangible witnesses to the history of engineering, mobility, and the landscapes they traverse. Their current condition, often marked by material ageing, increased traffic loads, and a looming obsolescence, calls for specialised and multidisciplinary attention.

We must act now, with updated knowledge tools and more responsible management methodologies, to avoid losing a heritage made not only of stone and bricks, but also of collective memory.