

Construction Processes in Historical Western Societies (5th c. BC – 10th c. AD):
Case Studies on Techniques, Models, and Costs



CONSTRUCTION PROCESSES IN HISTORICAL WESTERN SOCIETIES (5TH C. BC – 10TH C. AD)

CASE STUDIES ON TECHNIQUES,
MODELS, AND COSTS

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General Introduction

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M. Serena Vinci, Sebastián Vargas-Vázquez

In every civilisation construction has always represented an excellent reflection of a society's organization, aspirations, and technical capacities. From the humblest structures to the most complex building programs promoted by political or religious authorities, the act of building can tell us a great deal about resources, knowledge, hierarchies, innovation, coordinated effort and, above all, the people themselves. This volume, entitled *Construction Processes in Historical Societies of the West. Case Studies on Techniques, Models and Costs*, was inspired from a desire to delve deeper into that specific and fascinating world where technical knowledge, material conditions and the social dynamics of each era intersect.

Over the past few decades, the study of ancient and medieval architecture has undergone a methodological shift that has completely transformed its analytical framework. Beginning with the pioneering work of Jean-Pierre Adam,¹ Pierre Gros,² and Jean-Claude Bessac³ in France, and later figures such as Janet DeLaine⁴ in the Anglophone world, the focus has shifted away from stylistic or typological descriptions towards the study of processes: how buildings were planned and constructed,⁵ with what resources, and with what kind of planning. In other words, what operational chain was set in motion,⁶ by whose initiative, at what cost,⁷ and with what impact.⁸ This approach, initially driven by the archaeology of construction, has progressively evolved into an archaeology of constructive economy, in which the building is seen as the product of a complex network of technical, economic, and social decisions.

Today, analyzing a building project from the past obliges us not only to take into consideration the design and construction techniques, but also to look closely at the organization of labour, the availability of local and imported resources, supply chains, financing models, the relationships between the various agents

involved—whether public, private, religious, political, or military—and the political or cultural context that conditions every decision. As numerous recent studies have shown—from the estimated costs of the Baths of Caracalla to the management of early medieval quarries—each building is, in itself, an economic and human microcosm, a window into the logistical, technological, and financial capabilities of its society.

This current volume clearly belongs within this analytical framework. This book brings together a selection of original studies that combine documentary rigour, methodological sensitivity, and a comparative outlook from different national traditions in an interdisciplinary and diachronic dialogue.

From the outset, the aim was to go beyond the mere accumulation of case studies. The goal was to understand construction not as an isolated activity, but as a transversal phenomenon, reflecting broader historical processes: the consolidation of imperial power, the growth of urban centers, the transmission of techniques between cultures, the transformation of religious functions, the symbolic valorization of certain materials, or the sustainability of reused structures. Under this premise, the papers presented here—published in a revised and expanded form—offer a chronology spanning the pre-Roman world to the Middle Ages, not to mention a vast geography that encompasses much of the western Mediterranean.

Although the general approach of the volume is clearly archaeological, the studies gathered together here constantly engage with economic and social history, architecture, the anthropology of labour, and the history of building techniques. There is no single school of thought here, nor a single methodology. On the contrary, what gives this work its coherence is a shared perspective on the building as a process rather than a mere result. It is precisely this logic that allows for the inclusion of both the pre-Roman kilns of Gadir and the Late Antique palaces of North Africa, the Italic systems of *evergetism*, and the medieval architectural reuses in southern Hispania. All of these diverse realities can be interpreted through the lens of the “construction process” as an economic, technical, and cultural phenomenon.

¹ Adam 1984.

² Gros 1996.

³ Bessac *et al.* 1999, Bessac 2007, 2014, 2020; Bessac, Abdul Massih, Valat 1997.

⁴ DeLaine 1997.

⁵ Taylor 2006, Fulvio Giuliani 2016.

⁶ DeLaine 2000, 2017, Blary, Gély 2020, Russell 2021, Beck 2023, Baker *et al.* 2023.

⁷ Barresi 2003, DeLaine 2006, Domingo 2012, 2014, 2022, Russell 2013, Courault, Márquez 2020.

⁸ Mascheck 2016, 2020, Bernard 2018, 2022, Courault, Domingo 2020, Courault 2021.

In contrast to overly normative or idealized views of ancient architecture, this volume seeks to highlight the diversity, flexibility, and adaptability of construction practices according to context. Rather than abstract formulas, it privileges the analysis of solid, thoroughly documented, and methodologically rigorous case studies. This not only allows for a more nuanced understanding, free from rigid generalizations, but also brings to light shared patterns, common solutions, knowledge transfers, and significant disruptions over time.

Taken as a whole, this volume aspires to be a working tool for researchers, teachers, students, and all people interested in the history of construction, while also serving as an invitation to view ancient buildings from a new perspective: not only as finished objects, but as open-ended processes, built under real conditions, by specific people, in response to specific needs, and guided by a rationality often overlooked by aesthetic or symbolic discourses. Since building, in any period, has always meant much more than just putting up structures, this study takes into the consideration the organizing, decision making, negotiating and imagination needed to overcome challenges.

In this spirit, the volume has been structured into three main sections:

- “From Quarries to Construction”
- “Dynamics, Work Processes and Financing”
- “Buildings, Transformations and Renovations”

Part 1 – From Quarries to Construction

Every building begins long before the first stone is laid. It begins with the objective and purpose of the building, the choice of position, its floor plan, the choice of materials, the extraction of the stone, clay, or lime, the definition of transport routes, the availability of skilled labour, and decisions taken based on location, climate, time constraints, costs, and technical needs. The first part of this volume invites us to trace those initial stages—from the sourcing of raw materials to the earliest phases of building execution—offering a set of studies that help us grasp the complexity and variability of these processes in diverse historical contexts.

The journey begins with a contribution that, in its very subject matter, constitutes a declared methodological stance: in Chapter 1, A. Sáez Romero and R. Belizón Aragón present an analysis of the Punic kilns on the Bay of Cádiz as an integral part of the economic and technical landscape of construction. In contrast to a tradition

that has tended to overlook these structures due to their limited monumentality, the authors demonstrate that the pottery workshops of the southwestern Iberian Peninsula—with their ephemeral but functional architecture—played a key role in the production of essential materials for urban development: from amphorae to bricks and ceramic elements. Through an approach that combines experimental archaeology, archaeometry, and 3D digitisation, the technical cycles of production and maintenance are reconstructed in detail, revealing the high level of knowledge and planning required even to build an adobe kiln.

This approach is broadened in Chapter 2, where E. Romanò and F. Susini focus on clay exploitation and brick production in Etruria between the Late Republican and Imperial periods. Here, the interest shifts from the mere existence of the material to its management as a strategic economic resource: extraction, transport, manufacturing, standardisation, and distribution. Clay, once shaped into brick, emerges as a key product in monumental public programmes—baths, aqueducts, administrative buildings—and its study allows us to delve into complex production networks that go beyond the local level to operate within a regional or even imperial logic. The archaeology of brick, often marginalised, is thus placed at the centre of economic and constructional analysis.

In Chapter 3, P. Pensabene and V. Bruni explore another essential aspect: the transformation of architectural elements in the Pompeian context, such as column shafts and capitals. Through the analysis of working traces, the authors reconstruct the processes of carving, finishing and fitting that accompanied the execution of decorative components, highlighting the continuity between quarry, workshop, and construction site. This chapter offers a methodological bridge between the quarry and the monument, reminding us that the design of a building truly begins with the first chisel mark.

The issue of construction material supply takes centre stage in Chapter 4, written by K. Beaufay. Based on a study of the use of tuff in the bath complexes of central Italy, the analysis focuses on the criteria that influenced the choice of material: availability, cost, strength, weight, and even symbolism. Beaufay succeeds in articulating a nuanced interpretation that simultaneously considers technical, economic, and aesthetic factors, thereby broadening the range of possible readings of construction rationality in the imperial period. Transport logistics—limited to animal traction or river navigation—become fundamentally important here, since after 20 km, land transport could become increasingly prohibitive.⁹

⁹ Courault 2020.

This same logistical perspective is developed in Chapter 5, where J.-P. Gély studies the supply of stone in Lutetia and Lugdunum from distant quarries located in the valleys of the Oise and the Rhône. Through rigorous documentation and a detailed analysis of river networks, the author shows how hydrography—and not just geography—conditioned the feasibility of certain building projects. Port structures, navigation routes, unloading points and transport times emerge as integral parts of construction planning. In this sense, the river is not merely a backdrop to the urban landscape, it is a strategic infrastructure in the regional market.¹⁰

Once the material arrived at the construction site, the building phase proper begins. Chapter 6, by L. Fernandes and C. Cabral Loureiro, analyses the preparatory stages for the implementation of the theatre of Felicitas Iulia Olisipo (Lisbon). Here, topographical analysis and quantitative estimates of resources allow for detailed planning of the construction calendar, task distribution, and construction progress. This contribution is particularly relevant in its effort to quantify the workload, to attach figures—with all due caution—to the duration of the works, the volume of materials, and the required labour force. The fact that the construction of the theatre is estimated to have taken ten years, provides a valuable point of comparison and a reliable measure of the logistical and organisational challenge posed by such undertakings.

This first part of the book concludes with two chapters focusing on the reuse of stone materials. In Chapter 7, J. Oliver Vert analyses the cycle of stone use in Gerunda from its foundation to the year 1000, proposing a long-term history of material supply and reuse. Chapter 8, by F. Sousa and C. Felício, addresses the case of a domestic building in Mirobriga, whose successive historical phases involve not only architectural adaptations but also transformations in material management. Both studies show that a building does not end with its inauguration: its history continues across centuries, through repairs, extensions, changes of use, and repurposing. Stone, far from being a “dead” material, circulates, is transformed, traded, and reused, revealing a second-hand economy.

Taken together, this first part reminds us that construction does not begin with architectural design, but with strategic decisions about materials, resources, and logistics. From the quarry to the first wall, each stage is marked by technical and economic constraints that require planning, empirical knowledge and creative solutions. Through these studies, it becomes clear that all construction is the result of a complex system in

which matter, knowledge, and human labour interact in a balance that is as precarious as it is fascinating.

Part 2 – Dynamics, Work Processes, and Financing

In the second part of the volume, the focus shifts to action: the organization of human labour, the operational planning of building works, the factors that regulate productivity, the logic of patrons, and the economic constraints that shape the form, pace, and scale of each construction project.

Here, architecture is no longer only a technical matter, but clearly emerges as a deeply social and economic reality. Every wall erected is the result of a sequence of operations involving selection, coordination, remuneration, hierarchy, and control. Understanding this logic is key not only to reconstructing *how* something was built, but also *why*, *for whom*, and *at what cost*.

Chapter 9, by F. Remise, offers a critical reflection on quantitative studies applied to the archaeology of construction. Drawing on his experience as an engineer and researcher, the author analyzes the challenges posed by estimating labour productivity and workloads in ancient contexts. In contrast to efforts to establish fixed formulas for calculating time and costs, Remise advocates for a more flexible and contextual approach, one that takes into account variables such as soil quality, tool types, worker motivation, and task seasonality. With a didactic and rigorous approach, the chapter shows that quantification cannot be separated from experience, and that “numbers” only make sense when grounded in a deep understanding of the real conditions of labour.

In Chapter 10, C. Canavas presents a case study that broadens the geographical horizon of the volume: the stelae of Aksum (Ethiopia) and their comparison with the obelisk of Theodosius I (Constantinople). Here, the focus shifts to East Africa, showing that the technical problems of transporting, raising, and positioning large stone blocks are, in fact, shared by many cultures, and that their solutions rely on a combination of empirical experience, practical rationality, and gradual innovation. The author establishes links between architecture, cosmology, and political power, suggesting that “architectural energy”—the accumulated effort required for construction—is also a symbolic manifestation of authority.

Chapters 11 and 12 focus on the final stages of the operational chain: finishing, ornamentation, and the integration of decorative elements into the completed structure. In Chapter 11, C. Márquez studies a series

¹⁰ Blary, Gély 2020.

of architectural pieces stored in the Archaeological Museum of Córdoba, with special attention to the guide marks drawn by craftsmen in local workshops. Through this analysis, the internal organization of work and the distribution of roles among different levels of technical specialization are reconstructed. Chapter 12, by J. Atienza, continues in the same vein by investigating the marks and traces left on the marble of the *frigidarium* in the bathing complex of Valeria. In both cases, seemingly minor details allow for the reconstruction of an entire system of architectural production characterized by efficiency, standardization, and the transmission of technical knowledge.

Chapter 13, authored by I. Triveloni, brings us back to the subject of financing through the analysis of *evergetism* in the construction of Italic amphitheatres. Through the case studies of Luceria, Urbs Salvia, and Alba Fucens, the author shows how the free donation of private land by local elites constitutes a specific form of civic patronage. This gesture, combining economic interest and personal prestige, reveals a logic of cooperation between private initiative and public objectives that, far from being marginal, was vital for the promotion of building in the Empire. Moreover, it reminds us that the “cost” of a building lies not only in its materials and labour but also in the invisible resources—symbolic, political, or legal—that make it possible.

This social and political dimension of construction is further explored in Chapter 14, by J. Á. Domingo, J. de Dios Borrego, and C. Courault, which is dedicated to Balbus the Younger, the patron of two monumental theatres, one in Cádiz, the other in Rome. Drawing on epigraphic, literary, and archaeological evidence, the authors analyze this figure’s role as an intermediary between local power and the imperial sphere, showing how decisions regarding materials, styles, and locations responded not only to technical criteria but also to logics of representation and political legitimation. Here, construction serves not only as a way of asserting identity, it also serves as a tool of negotiation between the center and the periphery.

Finally, Chapter 15, by L. Lauri, closes this second part with a comparative exercise estimating time and cost in the construction of monumental columns in the imperial cult temples of Córdoba and Mérida. After a detailed sequence of operations—quarrying, carving, transport, erection—the author shows that, despite the apparent formal similarity between both ensembles, the topographical, technical, and logistical differences result in significantly different investments of time and resources. This analysis highlights the value of quantitative micro-comparison, which allows us to gauge the economic rationality underlying

each construction decision and to assess the relative efficiency of the solutions adopted.

Taken as a whole, this second part of the volume emphasizes that construction processes are not merely a matter of materials or techniques, but of human decisions: decisions involving organization, hierarchy, task distribution, economic incentives, and financial strategies. Every building is a field of forces, a tangible outcome of interests, values, and capabilities. Studying it rigorously—as these chapters do—means restoring human labour to its central place in the history of architecture. And it also means recognizing that the economics of construction is not an auxiliary discipline, but a fundamental interpretative key for understanding past societies.

Part 3 – Buildings, Transformations and Remodeling

A building does not end with its construction. On the contrary, its history begins from the moment the building is conceived, imagined, designed, built and inaugurated. From then on, it enters an open dynamic of use, maintenance, transformation, and re-signification. In this third part of the volume, the focus is placed on this prolonged life of structures: how they are adapted to new functions, how they are maintained or rebuilt (using previous materials), how their meaning changes as time, power structures and religious beliefs change.

Ancient and medieval architecture—far from being static—is a field of constant negotiation between past and present, between heritage and innovation, between utility and symbolism. Every later intervention on a building is, in essence, a rereading of what that building represents—of its functionality and its potential within the urban or territorial landscape. Studying these transformations not only allows us to better understand the technical capacities of past societies but also their values, priorities, and historical imagination.

The series of studies gathered in this section starts with this premise. **Chapter 16**, by A. Mostalac Carrillo, introduces us to an apparently modest yet meaningful architectural phenomenon: the projecting socles documented in the Ebro basin, which were heirs to an architectural trend that originated in North Africa and Sicily. Beyond their possible decorative or symbolic function, these elements reflect practical solutions to issues of drainage and preservation, revealing an economic rationality that prioritizes durability and the efficient use of space.

Chapter 17, by M. Matteazzi and A. Garattoni, takes us to Doss Penede (Trento, Italy), an architectural complex

that paradigmatically embodies the *ratio aedificandi* of Roman architecture. In this case, architecture is the result of a singular convergence of technical demands, centralized economic resources and high-level decisions. It is a project that, due to its scale and complexity, exceeds local logic and points to a central—likely imperial—power capable of mobilizing extraordinary means. Through stratigraphic study and construction analysis, the chapter sheds light on how political ambition, architectural planning, and material execution were interwoven in the realization of a major project.

On a more domestic scale, **Chapter 18**, by A. Ottati and collaborators, presents a preliminary study of the bath complex of Las Bóvedas (Marbella, Spain), whose unusual layout—composed of alcoves and octagonal structures—reveals an original conception of bathing spaces. The archaeological analysis identifies construction phases, later transformations, and repairs that not only refer to the functional evolution of the building, but also to the technical capabilities of the local population to adapt it to changing needs.

The next contribution, **Chapter 19**, by J. C. Ruiz, focuses on the reuse of coloured marbles from the temple of *divus Augustus* in Tarraco. By examining the presence of these elements in later contexts, the author proposes a reevaluation of the recycling practices of noble materials, not only in economic terms but also in political and symbolic ones. Marble, beyond its material value, retains the memory of its original use, and its relocation can be interpreted as a form of cultural appropriation or identity re-signification.

This approach is reinforced in **Chapter 20**, by J. M. Vila Carabassa and collaborators, which is also focused on Tarragona, and is where the material resources and construction techniques used in the *Torre del Pretorio*, within the provincial forum, are analyzed. The study reveals not only the building's constructional evolution but also the strategies of adaptation and repurposing developed over the centuries. What was originally a component of the Roman state apparatus gradually becomes an urban node articulated around other functions, thereby demonstrating the flexibility of architecture as a type of living infrastructure.

The volume's final two contributions present particularly illustrative cases of functional transformation. In **Chapter 21**, C. M. Amici and A. Ten, study the *Villa dei Sette Bassi* in Rome, where a bath house was eventually converted into an ecclesiastical structure. The architectural analysis documents the adaptation phases and adjustments required to transform a space of hygiene and leisure into a place of worship, revealing how changes in use also entail

deep material transformations: new orientations, new spatial hierarchies, new symbols.

Finally, in **Chapter 22**, A. J. Murcia Muñoz, S. F. Ramallo Asensio, and E. Ruiz Valderas analyze the evolution of the theater of *Carthago Nova*, which, after a fire, was transformed into a warehouse and marketplace. This process, far from being a simple “decline,” represents an active form of re-appropriation of urban space in a time of social upheaval. The new use reveals a functional continuity within the city's economic fabric, and shows that even buildings laden with symbolic meaning can be reintegrated into daily life under new logics.

This third part closes the volume by reminding us that buildings are living organisms: they are born, they are transformed, they adapt, they are reconfigured and sometimes they are reborn with different purposes. Far from architecture being static or untouchable, the cases presented here show how reuse, remodelling and reinterpretation are practices inherent to the constructive history of ancient societies. The building ceases to be an “object” and becomes a prolonged process, full of meaning, memory and adaptive intelligence. Understanding this dimension is key to any modern approach to the history of construction.

Conclusion

Throughout these chapters, the reader is presented with much more than just a succession of case studies. Here, we are shown the many phases of ancient and medieval construction: from the drawing board to the transformed ruin, from quarries to finished buildings, from physical effort to symbolic gesture.

Particularly evident in these chapters is how the history of construction cannot be reduced to a history of styles or monuments. It is, above all, a history of human thought and human labour. It is a history of feelings, reflections and decisions, of accumulated knowledge, of problems solved on site, of rough calculations, of tensions between tradition and adaptation, of balances between functionality, aesthetics and cost. It is also a history of agents: of patrons, architects, craftsmen, merchants, designers, owners, communities. All of them, with their resources, their limitations and their aspirations, have left their mark on the built material. In other words, the history of construction is made through the people who constitute the connection between various dynamics of different sectors, directly or indirectly involved in the building process—hence the importance of carrying out an individual analysis of each one of them.

The studies brought together here have sought to turn the spotlight on those very processes and protagonists, even if we are still a very long way away from achieving a comprehensive understanding. Resisting the temptation to focus only on the final result—the finished building, the idealised monument, the photogenic ruin—this volume proposes a shift in perspective: to look within, into the technical intricacies, into the invisible phases, into the remains of remains, into the margins of the building process, where the most revealing clues so often reside. For this reason, this work also fits comfortably within the field of the archaeology of construction. It is no coincidence that many of the chapters focus on non-canonical elements—kilns, plinths, workshop marks, reused stones, column fragments—because these frequently contain the highest density of information for understanding how people thought and acted when building.

Nevertheless, although this work looks to the past, it also suggests paths for the future. The history of construction today represents a fertile, interdisciplinary and expanding field. The combination of archaeology, economic history, architecture, digital analysis, archaeometry, epigraphic documentation and ethnographic study, among other fields of investigation, is opening up ever broader horizons for understanding the past from a technically informed and socially sensitive perspective. In that sense, this volume is intended as an invitation to dialogue: between methods, scholarly traditions, chronologies and scales.

Therefore, rather than closing a cycle, this book aims to raise new questions and avenues of research. How were the design processes developed more specifically, the choice of architecture, and the main stakeholders of the project (architects, etc....)? How did the ways of organising construction labour evolve in different imperial or post-imperial contexts? What role did supply and transport networks play in the success or failure of certain projects? To what extent can funding patterns be considered comparable across regions as different as Italy, Hispania or Africa? What does the use of recycled materials tell us about the economic mindset of urban or rural communities? How can we better integrate quantitative and qualitative data in our reconstructions of building processes?

The challenges are many, but so too is the potential for this line of research in offering a renewed and deeply human view of the past: since to study how things were built is, ultimately, to study how people lived, how they envisioned the future, how they managed resources, and how they gave shape to collective hope.

And in that—just as in any good construction—lies the enduring value of this book.

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