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Mapping the Architecture of Three Porosities

A study of urban decay and regeneration in Semarang old town, Indonesia

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To my husband and my daughter.

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Preface

As an architecture scholar still in the process of finding my path, I have always been more drawn to architecture through the lens of the arts, humanities, and social sciences, rather than through science, technology, or engineering. I perceive architecture not merely as a product but as a phenomenon that encompasses complex assemblages and entanglements. These include the built (with its material and physical presence), the human (with cultural, social, and aesthetic preferences), the non-human (other living beings and their habitation), and the environment (nature and its elements). I aim to read, interpret, and speculate on these dynamic, temporal, and ever-changing relationships in the following study.

My interest in porosity - the central topic of this research - originates from a personal curiosity about plants growing in unusual locations within the built environment. While this may seem mundane, especially in Indonesia, where I come from, it holds particular resonance. The tropical climate, with its high humidity and warm temperatures, allows plants to grow rapidly and seemingly everywhere. Architecture and urban spaces become unexpected sites of vegetation, not just parks or designated planting beds, but the cracks in pavements, the corners of windows, roof gutters, or abandoned buildings. I view these instances as architectural phenomena - assemblages of the built, the human, the non-human, and the environmental.

To illustrate, I want to share a personal story that encapsulates this interest.

About seven years ago, a guava tree began growing at the corner of my parents' gate in Indonesia. I noticed it when it had already reached around 70 cm in height. I was fairly sure it was a

guava tree, recognising the shape of the leaves from memories of the many guava trees my grandfather once tended. Though I wasn’t entirely sure, the familiarity was strong. Not long after I noticed it, the tree disappeared. My mother had asked the gardener, who came once a month, to remove it, as it had begun to obstruct the gate.

After learning that the guava tree had been removed, I engaged in an internal dialogue. First, how had it grown there? I couldn’t recall any neighbours with guava trees nearby. Even if someone did have one, how did the seed reach that precise spot? I didn’t know for sure, but it must have involved a medium that inadvertently transported the seed there. I began speculating. Perhaps it was carried by animals—birds, for instance, are well-known seed dispersal agents. A bird may have eaten a guava elsewhere and then deposited the seed. The social context of my neighbourhood in Indonesia might also point to human involvement. Fresh produce sellers regularly travel around with carts in my parents' area. Perhaps one day a guava fell from a cart, smashed on the pavement, and scattered its seeds.

Second, how could a guava tree grow on a concrete surface? Particular material and environmental conditions must have

enabled it to take root in that corner. The location comprised a horizontal concrete pavement and the vertical surface of a brick-and-cement gate structure. It was also close to a drainage channel. I speculated further. Given Indonesia's tropical climate, which is high in humidity and temperature, material conditions may have been altered. Concrete, brick, and cement are inherently porous. Combined with environmental moisture, this could lead to dampness, encouraging moss and mould growth. Over time, such conditions can result in weathering, material decay, and cracks, providing just enough space and nutrients for a seed to germinate and grow.

Third, the guava tree's growing ability seemed dependent on whether my mother, the 'owner' of that corner, perceived it as a nuisance. As soon as it was considered an obstruction, it was removed. The tree's existence was a matter of biological possibility and social acceptability within the context of ownership. This illustrates how the notion of ownership in the built environment shapes who or what can inhabit it, and how it can be inhabited. The decision to remove the tree reflects a power dynamic inherent in ownership.

This internal conversation led me to realise that the guava tree's presence exemplifies unplanned, non-human inhabitation within a built environment. Such unplanned human or non-human inhabitation can be understood as an architectural consequence. Furthermore, the material condition of the built environment, shaped over time by environmental factors, inevitably becomes porous enough to invite such inhabitation. Lastly, ownership consistently governs this process. Even though the tree grew in a space straddling the private (my parents' gate) and the public (the pavement), my parents asserted ownership over that corner. They exercised their right to remove what they deemed an

undesirable presence, thereby preserving the functional and aesthetic integrity of the structure.

These two latter observations underscore further consequences of architecture as a material entity embedded in both environmental and social contexts.

This story of the guava tree illustrates how porosity functions as an architectural phenomenon. The reflections in the previous paragraph highlight key aspects I aim to explore in this study. Porosity, understood as a state of being porous, will be examined as an architectural concept within a broader architectural inquiry. The initial point of investigation will be the material porosity of built structures, which will then unfold into an exploration of the assemblages and entanglements that comprise architectural phenomena, encompassing spatial and social dimensions. Porosity is approached as a form of materiality that begins with physical conditions but extends to performative relationships that go beyond its tangible existence. This conceptualisation of porosity serves as the entry point for my research.

Diandra Saginatari

Publications and Presentations from the Research

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Abstract

This PhD thesis is an architectural inquiry that proposes and explores the concept of architectural porosity as a framework for interpreting patterns of inhabitation within an urban heritage context. It aims to illuminate the diverse definitions and perceptions of porosity within heritage practice and in architectural and urban discourse more broadly.

The research begins by approaching porosity as an interdisciplinary concept, drawing on perspectives from the physical sciences, such as materials science and geology, to the social sciences and humanities, including archaeology, cultural heritage, and urban studies. These various interpretations of porosity are then reframed architecturally: on the one hand, rooted in the materiality of the urban fabric, and on the other, extending beyond its material existence to influence social and spatial dynamics. By applying the idea of porosity both literally and metaphorically, the study identifies three distinct modes or levels of operation: (1) **material porosity**, understood as a typically microscopic quality that reflects the capacity of architectural surfaces to retain traces of past events; (2) **spatial porosity**, observed through an analysis of inhabitable architectural boundaries; and (3) **social porosity**, proposed as a consequence of the preceding two, which denotes a potentially productive coexistence of planned and unplanned, human and non-human inhabitation—often marginalised or erased in conventional urban heritage revitalisation projects. These three forms of porosity are conceptualised collectively as a new definition of **architectural porosity**, offering a framework for reinterpreting urban heritage values and enhancing regeneration outcomes by enriching the diversity of spatial practices and patterns of inhabitation in the built environment.

The research includes an in-depth case study of the revitalised urban heritage site of Semarang Old Town in Indonesia—a historic colonial district comprising over one hundred heritage buildings. Since 2017, Semarang Old Town has undergone a significant revitalisation effort involving infrastructure upgrades and selective restoration of heritage buildings. These interventions have brought notable improvements to environmental quality, including enhanced drainage and redesigned streetscapes featuring new street furniture. However, the regeneration process has also sought to 'clean up' many of the informal practices that once occupied the streets, façades, and building edges—practices that had emerged following the area's stagnation in the post-independence era. Given the site's complex and fragile socio-cultural context—including the uncertain legal status of some heritage buildings and the prevalence of economically driven informal activities—Semarang Old Town remains a mix of restored and decaying structures, with both formal and informal inhabitation continuing despite the revitalisation efforts. Nonetheless, these efforts persist in a direction that treats heritage sites as income-generating assets for a broader and more affluent market. This often entails restoring historical materials, erasing signs of decay, and suppressing informal modes of inhabitation.

This thesis proposes a framework for re-reading the value of heritage sites by developing a **porosity index** based on the three aforementioned categories. The porosity index maps the material, spatial, and social conditions of the heritage buildings studied, indicating their revitalisation status as well as the presence of both human and non-human forms of inhabitation. These three sets of mappings are examined relationally, as an assemblage of latent potentialities found within the urban heritage landscape. This analytical framework offers an

alternative perspective within ongoing debates on heritage conservation, revitalisation, and gentrification, advocating for a more adaptable and inclusive approach that better acknowledges and preserves a broader spectrum of material, spatial, and social inhabitation practices.

Glossary

Angkringan – A form of street vending native to Central and East Java, *angkringan* derives from the Javanese word *nangkring*, meaning to sit in a relaxed manner (Yudhistira et al., 2018). It typically refers to a small stall or kiosk selling food and drinks—ranging from traditional fare to instant beverages, snacks, and instant noodles. The setup usually involves a cart and a tent, which may be mobile or stationary. This type of informal establishment is also commonly referred to as a *warung* or *kedai*.

Architectural porosity – offers a framework for interpreting porosity within architectural discourse by recognising the value of three interrelated dimensions—material porosity, spatial porosity, and social porosity—as contributing conditions that shape the spatial practices and patterns of inhabitation within porous architecture.

BPK2L – Abbreviation for *Badan Pengelola Kawasan Kota* Lama, officially, the Semarang Old Town Management Board.

Claimability – Derived from the notion of claim-ability—the quality of being subject to claim, this study introduces the concept of façade *claimability* to describe the various practices through which façades are claimed, appropriated, and inhabited by human and non-human actors. These practices are understood in terms of the observed tendencies arising from the interaction of the three forms of porosity: material, spatial, and social.

Material porosity – This architectural inquiry conceptualises *material porosity* as a condition that enables architecture to

absorb environmental events and accommodate non-human inhabitation. It allows architectural surfaces to be stained, eroded, pierced, and penetrated by ecological elements and non-human agents. This perspective embraces decay and imperfection, positioning architecture as a witness, record, and archive of the passage of time, environmental change, and non-human presence.

Social porosity – This architectural inquiry understands *social porosity* as a condition of architecture within its social context that permits public access to interior spaces. It facilitates the emergence of perceivable spaces where informal practices can occur. Social porosity acknowledges and values the coexistence of planned and unplanned forms of inhabitation.

Spatial porosity – This architectural inquiry defines *spatial porosity* as a condition that enables architectural boundaries to mediate and connect interior and exterior spaces—inside and outside, indoor and outdoor—through active apertures such as doors, windows, balconies, and similar elements. It supports inhabitation within the boundary's thickness and facilitates its extension by enabling the provision or appropriation of adjacent spaces. Spatial porosity thus allows for interpenetration and exchange between interior and exterior, and permits attachment to the architectural boundary, particularly from the outside.

Porosity – *A state of being porous*, porosity is understood in this research as both a material and a spatial condition. The material dimension draws on concepts from scientific disciplines such as materials science and geology, while discourses in urban studies and architecture inform the spatial dimension.

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Chapter 1. Introduction

1.1. Motivation of the Study

Porosity is an interdisciplinary concept that spans numerous fields—from the physical sciences, such as materials science and geology, to the social sciences and humanities, including archaeology, heritage studies, and urbanism—where it performs distinct roles and is understood in different ways. In materials-based scientific disciplines, porosity is typically regarded as a microscopic property of matter, one that can be measured and modified to enhance performance. For instance, porosity influences a material's capacity to retain water or transmit heat and its strength and bio-receptivity.

Extending beyond this, archaeology often utilises the porosity of material artefacts to infer past human activities, as porous objects may retain traces of food or liquids from earlier periods. Similarly, in urban discourse, porosity is explored as a physical characteristic of materials and a marker of human presence and practice. For example, in Walter Benjamin and Asja Lacis's essay "Naples" ([1925] 1979), porosity is described as a defining quality of urban life—a condition of interpenetration between events, activities, and the built environment:

> "As porous as this stone is the architecture. Building and action interpenetrate in the courtyards, arcades, and stairways. In everything they preserve the scope to become a theatre of new unforeseen constellations" (W. Benjamin & Lacis, 1979, p. 169 [1925]).

This seminal essay has become a foundational reference in discussions of urban porosity. Benjamin and Lacis begin with a

metaphorical interpretation of porosity, linking the physical texture of stone to the social and atmospheric qualities of the city. They portray porosity as a multi-scalar phenomenon, encompassing both the micro-material level—such as the porosity of masonry walls—and the macro socio-spatial scale, reflected in everyday urban life. As Glynn (2020, p. 67) notes, Benjamin and Lacis's concept of porosity "extends beyond the realms of the natural and the built environments and projects it onto the social fabric of the city, as well as the character and psychology of its inhabitants," referencing, for example, the "indolence of the Southern artisan" alongside courtyards, arcades, and stairways as integral to Naples's porosity (Benjamin & Lacis, 1979, p. 169).

This inquiry draws inspiration from such material and socio-spatial understandings of porosity, recognising it as a highly versatile and layered concept. As Wolfrum (2018, p. 16) observes in *Porous City: From Metaphor to Urban Agenda*:

> "Porosity invokes a panoply of interdependent connotations such as:
> - interpenetration, superimposition, and multilayering of spaces
> - integration, overlapping, and communication of spatial elements
> - ambiguous zone, inbetween space, and threshold
> - permeability, spaciousness, and ambiguity of borders
> - coexistence, polyvalence, and sharing
> - blurring, ambivalence, and even weakness
> - provisional, incomplete, even kaput
> - openness of processes concerning, rhythm, and time
> - the flaneur's perspective and a performative approach to urban architecture"

These connotations, summarised from urban discourse, highlight porosity's potential to bridge "– architectural features and qualities of the built environment on the one side and the socially produced space of complex urban society on the other – the material and the social" (Wolfrum, 2018, p. 16).

This presents a productive entry point for considering porosity within architectural discourse, especially when acknowledging the complexity of architecture as a situated practice, one embedded in social and environmental contexts. This architectural inquiry begins with the proposition that porosity is a valuable and under-explored architectural concept.

In architectural design, porosity is often invoked as a generative or conceptual tool. For instance, Kotsopoulos (2007) discusses porosity as the conceptual basis for Steven Holl's *Simmons Hall* project, where porosity guided form-making. Holl derived his approach from a contextual interpretation of porosity, applying its rules and operations in the formal generation of architecture. In exploring vertical porosity, he incorporated sponge-like pores that penetrate the building vertically, creating organic, open forms.

Discussions of porosity are also linked to fundamental construction techniques in architecture. Cacciatore (2016) suggests that architectural form arises through tectonic and stereotomic approaches. The tectonic involves the art of assembly, while the stereotomic concerns the carving or removal of material. These principles reflect the basic typologies identified by Quatremère de Quincy—the hut, the tent, and the cave—where huts and tents employ tectonic methods, and caves are stereotomic. As Kostof (in Huppatz, 2012) notes, the cave might be considered the origin of architecture. Natural caves, as voids or 'pores 'in the earth, suggest that early architecture may have

begun with the inhabitation of such spaces—later evolving into the deliberate creation of pores. Thus, porosity can be understood as the presence of inhabitable space.

Nevertheless, while porosity as a metaphor may serve architectural design and spatial discourse, its material manifestation is not always viewed positively. Porosity contributes to material degradation and decay, leading to structural failure and obsolescence. Consequently, in material-based architectural discourse, particularly in preservation, porosity is often treated as a condition to be prevented or mitigated. Material conservation remains a core concern in heritage practice, with efforts focused on preserving or restoring architectural fabric for future generations.

This exploratory study will address these multiple contexts. It is motivated not only by curiosity about the interdisciplinary richness of porosity but also by a conviction that porosity holds architectural value. This thesis proposes the concept of *architectural porosity*, which recognises porosity as operating on multiple levels—material, spatial, and social—and as a constitutive condition of architectural phenomena.

In this study, architectural porosity will be developed as a framework for reading the condition of architecture in urban heritage sites—contexts that comprise architectural structures (notably heritage buildings) embedded in urban environments shaped by socio-cultural histories and overlaid with discourses of preservation, regeneration, and revitalisation.

Heritage, described by Harrison (2013b, p. 33) as a “mixture of social/material collectives,” provides a fitting context for this exploration, as it acknowledges that heritage is more than a purely material concern. This inquiry focuses on *urban heritage*,

where discussions often centre on heritage-led urban regeneration and the approaches such projects adopt (Ashworth & Tunbridge, 2017; Fouseki & Nicolau, 2018; Pendlebury & Porfyriou, 2017). Such initiatives can result in gentrification (Arkaraprasertkul, 2019; Hayes, 2020), and while they bring visible physical change, it is important to recognise that change extends beyond the material to include socio-political, economic, and cultural dimensions (Eckardt & AlSadaty, 2023).

Semarang Old Town, a colonial urban heritage area in Indonesia, is characterised by predominantly Dutch-style architecture (Dewi et al., 2020). The façades and walls of these buildings define the area's streetscape. Since 2016/2017, the district has undergone a major revitalisation programme, featuring infrastructural upgrades such as newly paved walkways, vintage-style lampposts, benches, and even an English phone booth—reflecting efforts at beautification. Some buildings have been restored and repurposed as fashionable cafés and restaurants, while others remain abandoned or in ruins. The project has also involved the removal of existing informal structures and economic activities, signalling a shift towards gentrification. Nonetheless, informal practices continue characterising the urban landscape, particularly in areas oriented towards tourism and economic activity.

This thesis proposes a framework for reinterpreting the value of heritage sites by developing a *porosity index* based on the three categories previously outlined: material, spatial, and social porosity. This index maps the condition of the heritage buildings studied, indicating their revitalisation status and the presence of both human and non-human inhabitants. These three mapping layers are analysed relationally, as an assemblage of latent potentialities found within the urban heritage context. The aim is to offer an alternative perspective within heritage conservation

discourse and current strategies of revitalisation and gentrification, advocating for a more flexible and inclusive approach that better sustains diverse material, spatial, and social forms of inhabitation.

Returning to the notion of porosity in urban theory, Enright and Olmstead (2023) argue that porosity provides an epistemological, ontological, and aspirational lens for understanding cities. It facilitates thinking about flows, relationships, temporalities, and multifunctionality within the urban realm. While they acknowledge the ambiguity of porosity and the difficulty of defining it precisely, they maintain that it remains a valuable lens for interrogating urban complexity and dynamics. This thesis aims to contribute to exploring, interpreting, and applying porosity as a conceptual and operational framework in architectural discourse.

1.2. Questions, Aim, Objectives, and Approach of the Study

As an architectural inquiry, this study has an overarching aim: to propose the concept of *architectural porosity*, which recognises the value of material, spatial, and social dimensions of porosity as a framework for understanding porosity as a positive condition within the context of urban heritage. This re-framing challenges the dominant tendency in heritage practice to view porosity primarily as a negative trait.

To achieve this aim, the study begins with the following research question: **How is porosity, as an interdisciplinary term, framed within architectural discourse?** This question addresses porosity as a borrowed term—widely used across various disciplines—that must first be re-contextualised within

architectural discourse. It involves an exploration of the concept of porosity across different fields, highlighting its varied performances and the divergent perceptions of porosity as either a beneficial or detrimental condition, depending on context. From this exploration, the study identifies three interrelated frameworks—material, spatial, and social porosity—which form the conceptual foundation for the inquiry.

These three frameworks—collectively called *the three porosities*—correspond to distinct architectural aspects and scales. They also indicate a suitable disciplinary context for the study: the heritage field, where porosity is often treated as a threat to material preservation. As an empirical site, the study focuses on Semarang Old Town, a revitalised urban heritage district in Semarang, Indonesia, characterised by a mix of restored and decaying heritage buildings and embedded in the everyday practices of its inhabitants. This complex setting provides a fertile context for exploring porosity in architectural terms.

The three porosities are then explored theoretically through architectural literature. This theoretical investigation leads to a deeper understanding of how material, spatial, and social porosities conceptualise porosity as a condition that coexists with—and even enhances—architectural and contextual qualities. From this investigation, the study proposes the notion of *architectural porosity*. This leads to the second research question: **What is architectural porosity?** Architectural porosity is presented as a theoretical framework for interpreting spatial phenomena by recognising the value of the three porosities. This framework reveals the multiple layers of porosity that shape spatial configurations, practices, and inhabitation. To operationalise this framework, the study develops a *porosity*

index derived from the three porosities. This index is applied to the case of Semarang Old Town.

From this, the study poses the third research question: **How do the three porosities manifest in the revitalised urban heritage area of Semarang Old Town?** This question investigates how material, spatial, and social porosities are present and how they influence spatial phenomena within the specific context of a revitalised heritage site. The findings from this empirical exploration then inform the final research question: **How can architectural porosity contribute to the discourse of heritage practice?** This question seeks to position architectural porosity within heritage discourse, proposing it as a conceptual and analytical framework for understanding spatial phenomena in urban heritage. By doing so, it suggests that porosity, rather than being perceived solely as a threat, can positively contribute to the revitalisation and regeneration of urban heritage areas, particularly in the Indonesian context

Based on the questions above, the objectives of this study are to:

1. Frame porosity as an interdisciplinary concept and translate it into an architectural framework.
2. Explore porosity through architectural theory and propose the theoretical construct of *architectural porosity*, with its three porosities (material, spatial and social porosities) within an interdisciplinary context.
3. Formulate and apply a *porosity index* to interpret the condition of porosity in the urban heritage context of Semarang Old Town.
4. Identify and articulate the potential contributions of *architectural porosity* to heritage discourse.

This study falls within the scope of architectural social science and adopts a qualitative, case study-based methodology. It follows a theory-led approach, aligning with Lucas's (2016, p. 13) view that:

> "Theory-led studies exist within a framework of understanding first, applied to a context by means of a methodology second."

As Lucas further notes, theory-led studies are frequently cross-disciplinary and often draw on theoretical constructs from other fields (R. Lucas, 2016, p. 14). Similarly, this architectural inquiry begins by exploring porosity as an interdisciplinary term. This exploration is conducted through a literature review encompassing sources from the sciences, social sciences, and built environment disciplines. These references form the foundation for identifying the conceptual frameworks of porosity within architectural discourse, leading to the development of the architectural porosity concept and the selection of urban heritage as the contextual focus of the study.

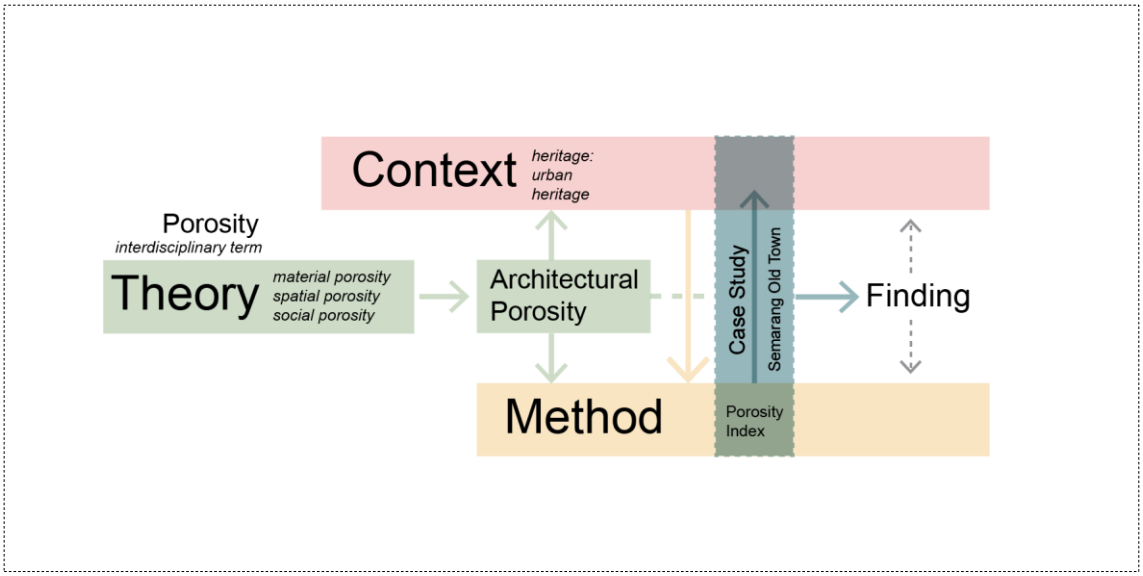

Figure 1.1. Research approach, inspired by R. Lucas (2016)

Architectural porosity acknowledges material, spatial, and social porosities as key aspects of architectural phenomena within the built environment. Building upon the conceptual framework and in response to the selected context, this study proposes and develops a *porosity index* to investigate the case study of Semarang Old Town.

Diverse disciplines, including architecture, heritage, anthropology, archaeology, and urban studies, inform the methods for data collection and analysis. Fieldwork is the primary data collection method, encompassing physical documentation through photographs, video recordings, and 3D scans, complemented by a series of unstructured interviews.

The data are analysed through constructing a *porosity index* (drawing on indexing as discussed in Scherr, 1991), which involves visual mapping techniques. These include plan drawings (at the urban scale) and elevation drawings (at the building façade scale) that document and analyse various porosity conditions. The mappings aim to reveal how different porosity forms contribute to architectural phenomena in context.

This analytical process is accompanied by a descriptive narrative employing *hovering assemblage thinking*—an approach drawn from Dovey (2012), Harrison (2013a), Jervis (2018), and McFarlane (2011)—which proves valuable for uncovering the complex relationships and assemblages of material and socio-spatial elements within the built environment.

1.3. Structure of the Thesis

This section outlines the thesis structure following the research questions, aim, objectives, and overall approach of the study.

The structure aligns with the objectives of the architectural inquiry, with each chapter contributing to addressing the research questions. A summary of each chapter is provided below and will be visually represented in the thesis structure diagram at the end of this chapter.

Front Matter

Acknowledgement

Preface

Abstract

Glossary

Chapter 1 – Introduction

This chapter introduces the central theme of the architectural inquiry: porosity. It presents the background and context of the study. It explains how porosity, as an interdisciplinary concept, will be explored through architectural inquiry, using urban heritage sites as the empirical focus. The chapter also sets out the research questions, aim, objectives, methodological approach, and anticipated contributions of the study. It concludes with a summary of the thesis structure, providing an overview of the contents of each chapter.

Chapter 2 – Probing the Interdisciplinary Term ‘Porosity’: A Step Back

The first part of the literature review, this chapter investigates the concept of porosity across a range of disciplines—including the natural sciences (e.g. materials science, biology, and earth sciences), the social sciences (e.g. heritage studies and archaeology), and built environment disciplines (e.g. landscape and urban studies). Drawing on literature from these fields, the chapter analyses and interprets porosity as a precedent concept. It aims to establish an architectural framing of porosity, identifying conceptual frameworks that serve as the basis for further

theoretical development. These frameworks address material, spatial, and social dimensions of porosity and help to identify heritage discourse as a relevant context for the study.

Chapter 3 – Identifying the Three Porosities: A Theoretical Exploration

This chapter, the second part of the literature review, builds upon the interdisciplinary framing developed in Chapter 2 by examining porosity within the theoretical and conceptual landscape of architectural discourse.

- The *material* aspect of porosity is explored as a condition through which architectural surfaces retain traces of human and non-human activity.

- The *spatial* aspect addresses porosity as a boundary condition, such as a wall, that enables interpenetration between spatial realms (e.g. inside/outside, public/private).

- The *social* aspect considers porosity as a condition of architectural space that accommodates diverse modes of inhabitation, both planned and unplanned, through negotiation, adjustment, and appropriation.

The chapter culminates in the theoretical proposition of *architectural porosity* as a conceptual framework for the remainder of the inquiry. It concludes by discussing the study's interdisciplinary context and the suitability of urban heritage sites as the empirical setting for exploring porosity through architectural inquiry.

Chapter 4 – On Context: Semarang Old Town, Indonesia

This chapter presents the empirical context of the study: Semarang Old Town, an urban heritage site in Central Java,

Indonesia. Building on the disciplinary context outlined in the previous chapter, it positions Semarang Old Town as a colonial heritage district—a material trace of the Dutch colonial era—currently undergoing revitalisation, which began in 2017. The chapter explores the historical development of the area, its cultural heritage practices, and the contemporary socio-spatial dynamics shaped by both human and non-human inhabitation. It highlights the heterogeneous urban fabric and the complex interplay between revitalisation efforts and everyday urban life.

Chapter 5 – On Building Method and Methodology: The Porosity Index

This chapter elaborates on the study's methodological approach, further developing the interdisciplinary context. It draws on methods and practices from architecture, heritage, anthropology, archaeology, and urban studies, showing how these disciplines inform the study's qualitative case study methodology. The chapter details the development of the *porosity index*, comprising two components:

- The *Urban Porosity Index* maps the material condition, forms of inhabitation, and their formal or informal status at the urban scale.

- The *Façade Porosity Index* maps the material, spatial, and social porosities present in the façades of heritage buildings.

These indices are employed to analyse the spatial and socio-material conditions of Semarang Old Town.

Chapter 6 – On Findings and Discussions: Porosity and the Idea of Claimability

This chapter presents and interprets the findings of the case study, examining how the three forms of porosity manifest,

interact, and contribute to architectural phenomena in Semarang Old Town. The analysis reveals varying degrees of *façade claimability,* the capacity of building façades to be appropriated or inhabited, linked to the presence and interaction of material, spatial, and social porosities.

Chapter 7 – On the Significance of Architectural Porosity: A Conclusion

The final chapter reflects on the broader significance of *architectural porosity*. It considers its contribution to heritage discourse, architectural theory, and practice, and addresses the study's limitations and potential directions for further research.

Back Matter

Bibliography

Appendix

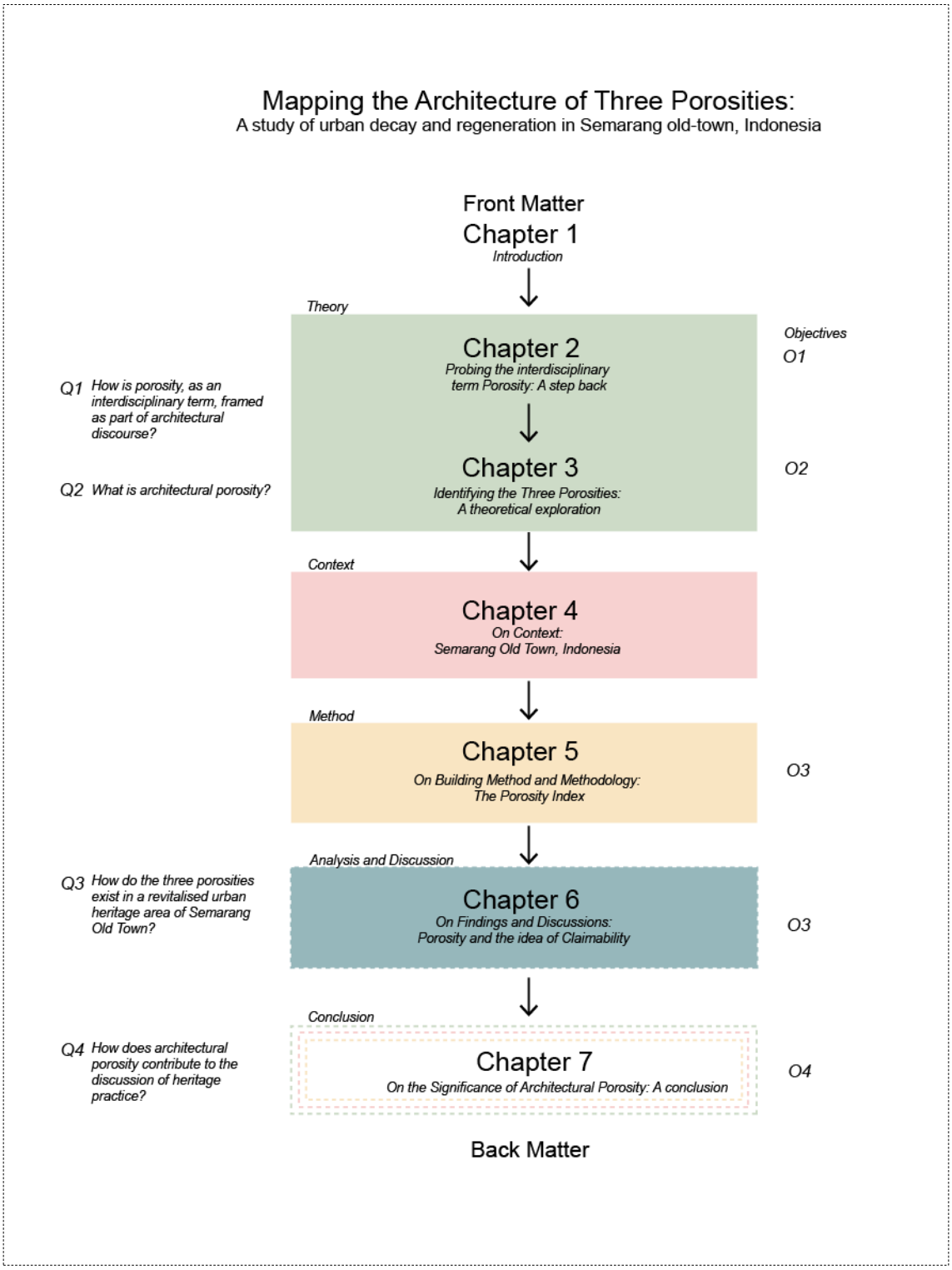

Figure 1.2. Thesis structure

Chapter 2. Probing the interdisciplinary term ‘Porosity’: A step back

This chapter constitutes the first part of the literature review. As the title suggests, it takes a step back—or offers a zoomed-out perspective—to understand how porosity, as an interdisciplinary term, is used across various disciplines to convey a concept, condition, or variable. This investigation is conducted through a qualitative content analysis of published literature from multiple fields, including the sciences (e.g., materials science, biology, and earth sciences), the social sciences (e.g., heritage studies and archaeology), and the built environment disciplines (e.g., landscape and urban studies).

This literature review serves as a preliminary study on porosity. In architectural research, precedent studies identify thematic relevance in scale, performative roles, and visual representation. These themes are particularly familiar in architectural discourse. In this sense, this chapter represents an attempt to frame porosity architecturally: to extract and reinterpret fragments of cross-disciplinary knowledge that resonate with architectural thinking and to position them within the context of architectural theory. This preliminary step is necessary because, within architecture, porosity is arguably a borrowed term—one that needs reframing and contextualisation to be meaningfully integrated into architectural discourse.

2.1. Introduction

This chapter initiates the literature review of this PhD study by examining porosity as an interdisciplinary concept. Rather than immediately engaging with porosity in architectural discourse, it deliberately broadens the scope to explore how the term functions in other fields. This methodological decision stems from the understanding that no research occurs in isolation and that attention must be paid to the broader debates that frame one's work (Goldschmidt, 1998; Weddle & Neveu, 2011).

Forty (2004) critiques the use of architectural terms in English that are often divorced from their original linguistic and disciplinary contexts. This is particularly relevant for porosity, which is not traditionally recognised as an architectural term but is widely understood in material science. Therefore, it is essential to consult cross-disciplinary literature to interpret the meaning and function of porosity across fields, identify possible shared languages or conceptual overlaps, and ultimately determine how it may be reframed within architectural discourse.

This literature review directly addresses the thesis's first research question: *How is porosity, as an interdisciplinary term, framed within architectural discourse?* The chapter examines whether the concept of porosity, as it is explored in other disciplines, shares ideas or characteristics that might mirror or enrich architectural discourse, particularly its social dimensions. In doing so, it adopts a view of architecture not as a technological object, but as a socio-material entity that is continuously shaped through spatial practice and inhabitation. Thus, the study focuses on architecture as a cultural and material process rather than a technological product.

This literature review employs qualitative content analysis (QCA). It reviews over one hundred published articles from various disciplines, including the sciences (materials science, biology, and earth science), the social sciences (e.g., heritage studies), and built environment disciplines (e.g., landscape and urban studies), all of which discuss or investigate the idea of porosity. QCA is a systematic approach to analysing non-numeric data, such as texts, images, and drawings, where categorisation is the central analytical process (Kuckartz & Rädiker, 2023).

Historically, QCA evolved from quantitative content analysis, which sought to test hypotheses or identify patterns using measurable data. In contrast, QCA incorporates hermeneutic principles, making it an interpretive process that explores relationships between established and emerging categories (Kuckartz & Rädiker, 2023). The categorisation process in QCA is inherently reflective and interactive, involving the researcher's engagement with the data and acknowledging the subjectivity embedded in knowledge production, particularly in qualitative research. This review is conducted precisely within such a framework.

The interpretation of porosity presented in this chapter is therefore architectural—or at least intended to be. This PhD study approaches the literature review as a precedent study, following R. Lucas's (2016, p. 35) assertion that "architecture is built upon the idea of precedents." In architectural education and practice, precedent studies are employed to understand design qualities, methodologies, and implications. They allow the researcher to explore the relationship between past and present architectural production (Weddle & Neveu, 2011) and are essential for cultivating design expertise (Lawson, 2004). In architectural research, precedent projects are a necessary form of literature (R. Lucas, 2016).

While previous studies are common in architecture, they often rely on well-known projects by prominent architects (Goldschmidt, 1998). Thus, it becomes essential to clearly define the purpose of the previous study. The study explores how porosity is discussed and enacted in other disciplines, treating these disciplinary discourses as intellectual precedents.

The concept of precedent itself is borrowed from legal practice (Goldschmidt, 1998; Weddle & Neveu, 2011). The Oxford English Dictionary defines precedent as a legal document that is applicable or valid and therefore adaptable (Weddle & Neveu, 2011, p. 7). In legal settings, precedents carry authority because one is ‘‘obliged to make similar decisions under similar circumstances” (Goldschmidt, 1998, p. 262). Legal reasoning is thus based on precedent because ‘‘all legal arguments proceed from precedent” (Weddle & Neveu, 2011, p. 7).

Goldschmidt (1998) points out the crucial distinction between judicial and architectural precedents. In law, cases tend to recur similarly, whereas in architecture, each project is typically unique, demanding innovation and adaptation. As Weddle and Neveu (2011) argue, ‘‘in architecture, to move beyond precedent, one must extend the precedent’s potential beyond facts to values” (p. 7). This highlights the interpretive nature of architectural precedent studies—not merely to extract facts, but to interrogate their significance, understand their values, and imagine how they might be repurposed.

In this literature review, precedents are analysed interpretively through architectural themes. This process draws on *creative misreading*, derived from Harold Bloom’s concept of *misprision* (1973) and adapted by Rifkind (2011) to architectural precedent studies. According to Rifkind, architects often creatively

reinterpret precedents to generate new knowledge and novel design insights.

Creative misreading reframes precedents as *multivalent sources of knowledge* rather than fixed problem-solving models (2011, p. 67). Le Corbusier's reinterpretation of the FIAT factory in Turin—designed by Giacomo Matté Trucco for automotive production—exemplified the process, which influenced the sweeping curve in Villa Savoye. Rifkind also notes that "architecture is an act of interpretation," and that misreading requires metaphorical, analogical, and symbolic reasoning—such as the use of metaphor, synecdoche, or irony—rather than strict empirical analysis (Rifkind, 2011, p. 74).

This chapter adopts such an interpretive stance. The literature reviewed here is approached by an architecture scholar engaging with disciplinary texts that may employ specialised terminology outside her area of expertise. This inevitably leads to *misreading*, which is deliberately and constructively framed through architectural concepts.

The categories used for interpretation in this study—*scale*, *performance*, and *visual representation*—are drawn from architectural discourse.

- **Scale** refers to the level at which porosity is discussed and helps identify the object of study.

- **Performance** captures how porosity functions, including its effects, operations, and attitudes toward it.

- **Visual representation** explores how porosity is depicted or conceptualised visually.

The justification for selecting these categories is outlined at the beginning of the following section.

The core misreading centres on the *performance* of porosity, while *scale* and *visual representation* serve as more straightforward interpretive categories. The analysis of porosity's performance draws on dictionary definitions, supported by descriptive language in the source texts, to distil how porosity operates across disciplines. This interpretive synthesis will form the basis for reframing porosity as an architectural concept.

2.2. *Misreading* Porosity

2.2.1. The Categorisations

This section outlines how misreading was applied to selected published articles and presents the outcomes of this interpretive reading. It begins with a discussion of the three architecture-related concepts that serve as the primary categories for analysing references to porosity: (1) the scale at which porosity is studied, (2) the performative roles of porosity, and (3) the visual representations of porosity.

On scale

Scale is a fundamental concept in architecture. Students are typically trained to represent buildings at varying scales. However, scale is not only a representational tool; it plays a significant role in the experiential dimension of architecture. As Adler (2012, p. 1) notes, "scale is crucial in providing the right setting, physically and psychologically, for human encounter and well-being." Scale is tied to the human body and its ability to perceive dimensions and spatial relationships. Since the time of

the Vitruvian Man, the human figure has been projected onto architectural representation to guide scale and proportion (Brooker & Weinthal, 2018).

Experiencing scale is not static. For instance, one perceives St. Paul's Cathedral in London differently from across the river than from standing on its front steps. Moreover, scale serves as an analytical frame in architecture and built environment disciplines such as landscape and urban studies. Larger-scale representations may reveal finer-grained information. Multi-scalar approaches, which examine relationships across scales, are common in research aiming for integrative contextual understanding (Nevett et al., 2017; Pafka, 2022; Wulff Barreiro & Brito Gonzalez, 2020).

The misreading of scale involves identifying both explicit and implicit references. Explicit scales are those directly measurable—e.g. in millimetres or nanometres. Implicit references may be metaphorical or descriptive, using terms like "near," "wide," or "narrow," which are interpreted as approximate measurements. Scale is also linked to the object or context of study and often intersects with performance and visual representation. Identifying the scale is the first analytical step when misreading the selected articles.

On performance

Leatherbarrow (2009, p. 45) poses a central question for architectural performance: "In what ways does the building act; what, in other words, does the architectural work do?" Two dominant paradigms emerge: performance as machine and performance as stage. The former is aligned with sustainable design, examining aspects such as thermal insulation (Hensel,

2013), energy efficiency, and environmental impact (Gupta et al., 2017), often assessed using simulation tools and certification systems like BREEAM and LEED (Cole, 2005).

The latter paradigm frames architecture as a stage for human activity. Leatherbarrow (2009) describes how buildings 'house' events—auditoriums for lectures, kitchens for cooking, and courtrooms for trials—highlight performance's functional and experiential dimension. This perspective bridges form (artistic) and function (technical) (Hensel, 2013). Situated within architectural social science, this study draws on Bernard Tschumi's concept of the event, understood as an unpredictable occurrence that distinguishes itself from the repetitive nature of programmed space (Fontana-Giusti, 2016, p. 272). Architecture is performed through space, programmes, and events (Tschumi in Hensel, 2013), encompassing planned and unplanned interactions and socio-spatial contexts (Leatherbarrow in Hensel, 2013). Performance also involves praxis—"the actions, behaviours, or performances that people and buildings enact together" (Leatherbarrow, 2009, p. 175).

This understanding of performance, encompassing materiality, human and non-human action, and environmental context, guides the misreading of porosity. While other disciplines may not conceptualise performance in the same terms, the reading focuses on the relationships between porosity, built form, mechanisms of operation, and surrounding context. Depending on the field, performance may involve non-human agents, such as gases, liquids, or microorganisms, aligning with Actor-Network Theory (Latour, 2007) and its recognition of non-human actants in social processes (Hensel, 2013).

The analysis identifies actions (verbs), operational mechanisms, consequences, and the perceived value of porosity (positive,

negative, or neutral) within its context. These components form the basis for understanding the performative roles of porosity across disciplines.

On Visual Representation

Visual representation is used here as a general term to encompass all visual materials that support or communicate a study, narrative, or argument. Given the various disciplines surveyed, visual representations vary and may include diagrams, illustrations, graphs, photographs, or tables. Some may consist of text or numerical data, but are distinct from traditional prose. In cognitive science, a key distinction is made between sentential and diagrammatic representations (Larkin & Simon, 1987). Sentential formats present information linearly, while diagrammatic formats structure information spatially, enabling multiple relational readings.

Visual representation—mainly drawing—plays a central role in architectural practice. Drawing is both a product (an artefact) and a process (a manual intellectual activity) (Unwin, 2007, p. 102) (Unwin, 2007, p. 102). It serves multiple functions: communication (both technical and aesthetic), idea generation, and research (Clear, 2020; Jacoby, 2016; R. Lucas, 2016, 2017).

Given the significance of drawing to architectural inquiry, this study includes visual representation as one of the key categories in the misreading process. The aim is to identify whether porosity is visualised through diagrams, images, or other graphic forms, and how such visualisation contributes to understanding. However, the study does not seek to analyse numerical content or visual data quantitatively.

2.2.2. Searching and Selecting the Precedents

The misreading process draws on published articles from seven selected disciplines: (1) Materials Science, (2) Biology, (3) Earth Science, (4) Heritage Studies, (5) Archaeology, (6) Landscape Studies, and (7) Urban Studies. These represent the sciences, social sciences, and built environment disciplines. The initial search was conducted via the university's online library, which limits access to sources within institutional subscriptions. Keyword searches used combinations such as 'porosity in material science', 'porosity in biology', or specific terms like 'urban porosity' and 'landscape porosity'. Selected articles contained the term 'porosity' or closely related terms such as 'pore' or 'porous' in the title or body of text. At this stage, porosity was treated as an object requiring explicit reference. In subsequent phases, it was analysed conceptually.

Articles were drawn from sub-disciplines within each field. For instance, materials science sources include journals such as the Journal of Materials in Civil Engineering, International Journal of Heat and Mass Transfer, Applied Physics A: Materials Science and Processing, International Biodeterioration & Biodegradation, and Energy and Buildings. The articles span multiple years, as no publication date restrictions were applied.

Articles were initially skimmed based on three criteria: scale, performance (and consequence), and visual representation. To illustrate this process, the study uses two examples: Ibrahim et al. (2003), representing the sciences, and Paris (2014), representing the social sciences and built environment. These are illustrated in Figures 2.1 and 2.2. (In practice, the selection was conducted using downloaded PDFs.)

Skimming began with keyword searches for 'porosity', 'pore', or 'porous' (highlighted in yellow in the figures). Some articles did not include these terms in their titles but used them in the abstract or main text. If porosity was not evident in the title, a keyword search was conducted within the PDF.

Simultaneously, the object and scale of the study (highlighted in blue) were noted. Action words indicating performance (highlighted in green) and potential consequences (highlighted in orange) were also identified. Evaluations of porosity as positive or negative (highlighted in pink) were interpreted from the text where not explicitly stated. Visual representations, if present, were noted (highlighted in purple), though this was not a selection criterion. Not all articles contained all elements, but each selected article needed to discuss porosity, the object and scale of the study, and the potential performance or consequence of porosity.

The first example, "Performance of Porous Ceramic Evaporators for Building Cooling Application" (Ibrahim et al., 2003), already conveys key information in the title: 'porous' signals the focus on porosity; 'ceramic' indicates the object and scale; 'evaporators' implies an action; and 'cooling' suggests a consequence. The abstract confirms these points and presents porosity in a positive light in the context of energy efficiency and evaporative cooling.

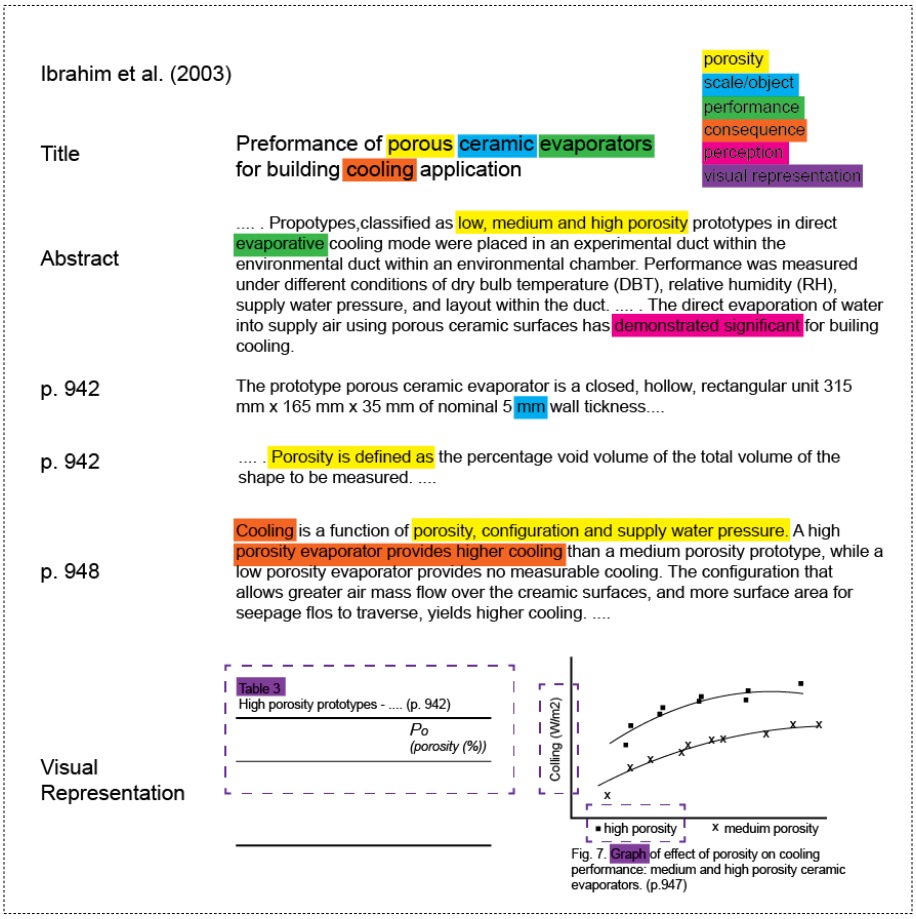

Figure 2.1. Skimming and selecting process examples from a science discipline article

Later in the article, the scale at which porosity is studied is confirmed through the dimensions of the prototypes involved in the research, which are measured in millimetres (mm). The article also defines porosity, which is valuable for identifying disciplinary variations in its conceptualisation. Visual representations of porosity appear in tables and graphs, illustrating its relationship with other variables under investigation.

The second article, titled *Cross-valley Communities: Identity and Interaction in Early Postclassic Period Highland Chiapas*, was published in the Journal of Anthropological Archaeology (Paris, 2014). Although the title does not mention porosity, it is discussed within the article's content. This pattern is typical in the

social sciences and built environment disciplines, where porosity is often decoupled from material references. In this case, the object of study is the interaction between communities across archaeological sites in highland Chiapas, indicating a macro-scale application of porosity in a primarily social context.

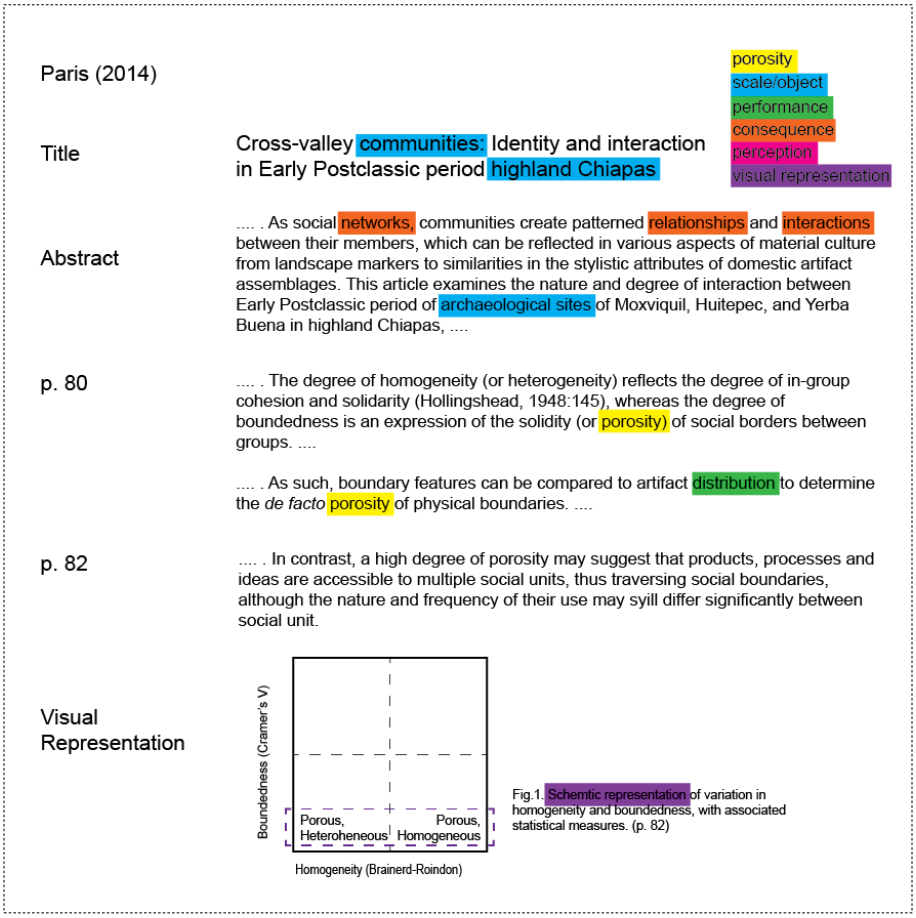

Figure 2.2. Skimming and selecting process examples from a social science discipline article

The article includes action terms associated with porosity, such as 'distribution', which denotes performance, 'networks', 'relationships', and 'interactions', which may be understood as consequences. Porosity is also implicitly represented visually through a schematic diagram that identifies 'porous' conditions as one of the study's key parameters. This article does not express any explicit positive or negative valuation of porosity and is therefore categorised as having a neutral perception.

Once articles are selected, a more detailed misreading is conducted. Relevant information is extracted and organised into a table before being visually mapped in a diagram. The following section discusses the findings from this misreading process, structured around the three themes of scale, performance, and visual representation.

2.2.3. On the Scale of Porosity

As previously outlined, the misreading of the scale of porosity is relatively straightforward. It involves identifying the units of measurement, such as nanometres, millimetres, or kilometres, or observing the object of study, which often indicates the scale at which porosity is being examined. For instance, Ibrahim et al. (2003) investigate the porosity of ceramic materials, which pertains to the micro-scale, whereas Paris (2014) explores porosity at the level of archaeological sites, as depicted in a topographical map, corresponding to a macro-scale interpretation.

Based on the misreading, in disciplines such as material science[1], biology[2], earth science[3], heritage studies[4] and archaeology[5], porosity is studied, observed, and discussed on the micro scale of material (Figure 2.3.). Within materials science, this involves a diverse range of substances, including silicon, pyrene, limestone, and even paint. In contrast, biology, earth sciences, and heritage studies tend to focus on more specific objects: in biology, for instance, porosity is considered about biomaterials and biological processes; in earth sciences, soils or rocks are the focal point; and in heritage studies, it often pertains to historic materials, such as bricks from heritage buildings.

[1] Based on the twenty selected articles, the object of porosity studies in this discipline are different materials, such as silicon (Canham, 1997; Hérino, 1997), hydrocarbon-based materials such as pyrene (Deng et al., 2016), building and construction materials, which includes natural stones such as limestone (C. Hall & Hamilton, 2016; Raneri et al., 2016; Scrivano et al., 2019), marble (Sassoni & Franzoni, 2014)s, earthen materials (Rivera-Gómez et al., 2021), ceramics (Bhattacharjee & Krishnamoorthy, 2004; Ibrahim et al., 2003; Pia et al., 2016; You et al., 2019), bricks (Udawattha et al., 2018), and concrete with different mixture of aggregates (Bonicelli & Pianeta, 2019; Hughes et al., 2013; Manso et al., 2014; Nikitsin & Backiel-Brzozowska, 2013; Talev et al., 2013; Zhang et al., 2020), and other material such as paint in paintings (Gervais et al., 2013).

[2] Based on the thirteen selected articles, the object of porosity studies in this discipline are materials, in particular, biomaterials in the scope of tissue scaffold engineering (Annabi et al., 2010; Buckley & O'Kelly, 2010; Karande et al., 2004; Loh & Choong, 2013; Montazerian et al., 2017; Tang et al., 2010; Tomlins et al., 2004), the material of living things, such as whale baleen (Werth, 2013), human eye and bone (Cassani & Olson, 2020; Rafiq & Khanday, 2016), and fruits (Nugraha et al., 2019), as well as other materials such as fibrous sponge (Sasaki et al., 2010) and sediment but in relation to micro biotic existence on them (Badin et al., 2012).

[3] Based on the thirteen selected articles, the object of porosity studies in this discipline are earth materials such as soils (Banwart et al., 2019; Chen et al., 2012; Fairbridge & Finkl, 1979; Hinsinger et al., 2009; Passoni et al., 2015; Ranaivomanana et al., 2017; Tseng et al., 2018; H. Xie et al., 2023; Zhao et al., 2020), humus (Zaiets & Poch, 2016), volcanic rock (Colombier et al., 2017), natural rock (Ganzhorn et al., 2019), and reservoir sandstone (Heidsiek et al., 2020).

[4] Based on the seventeen selected articles, the object of porosity studies in this discipline are various heritage building materials (Brunello et al., 2021; Li & Gu, 2022; Miller et al., 2012; Tonon et al., 2019, 2021) such as Roman mortar (Farci et al., 2005; Miriello & Crisci, 2006), bricks (Abdrakhimov & Abdrakhimova, 2016; Griffin et al., 2014; Reedy, 2020), Portuguese ceramic tiles (Santos et al., 2012), Tuff stones (Barbero-Barrera et al., 2019; López-Doncel et al., 2013), limestones (Bianco, 2021; Sasso et al., 2016; Sohrabi et al., 2017), and sandstones (Morillas et al., 2018).

[5] Based on the fourteen selected articles, the majority object of porosity studies in this discipline are materials from pottery artefacts such as clay vessels and ceramic potsherds from different places and eras (Curado et al., 2013; Drieu, 2020; Drieu et al., 2019; Jeffra, 2008; Namdar et al., 2009; Van Doosselaere et al., 2014), as well as material of human and animal, remains, such as bones and antlers (Bosch et al., 2014; Mansilla et al., 2014; Smith et al., 2008; Tripp et al., 2018; Turner-Walker, 2019). However, the object of porosity studies in this discipline also includes archaeological sites, a macro scale (Paris, 2014).

In these contexts, porosity is typically viewed as a material property that is either observed and measured to understand inherent performance or engineered to achieve specific outcomes. Porosity is also considered integral to material structure—in earth sciences, for example, as a component of the microstructure of soil or rock. Such microscopic scales necessitate specialised methods to visualise porosity, including formula-based quantification, porosimetry (using fluid intrusion to calculate pore size and distribution), imaging via Scanning Electron Microscopy (SEM), Computed Tomography (CT), or X-ray imaging, and digital 3D simulations. These methods frequently inform the visual representation of porosity.

In archaeology, the object of porosity-related study is often specific: artefacts such as bones or pottery fragments, or broader archaeological sites. Accordingly, some studies focus on micro-scale porosity (as in materials science), while others engage with macro-scale contexts. When studying artefacts, porosity is frequently approached as a measurable material property. However, archaeology also draws from social science perspectives, particularly material culture theory. For example, Steel (2020) uses the metaphor of a porous jug to explore how material engagement can blur the boundaries between the human body and material objects. At the macro-scale, as in the case of archaeological sites, porosity is framed in terms of social dynamics, boundaries, and networks (Paris, 2014).

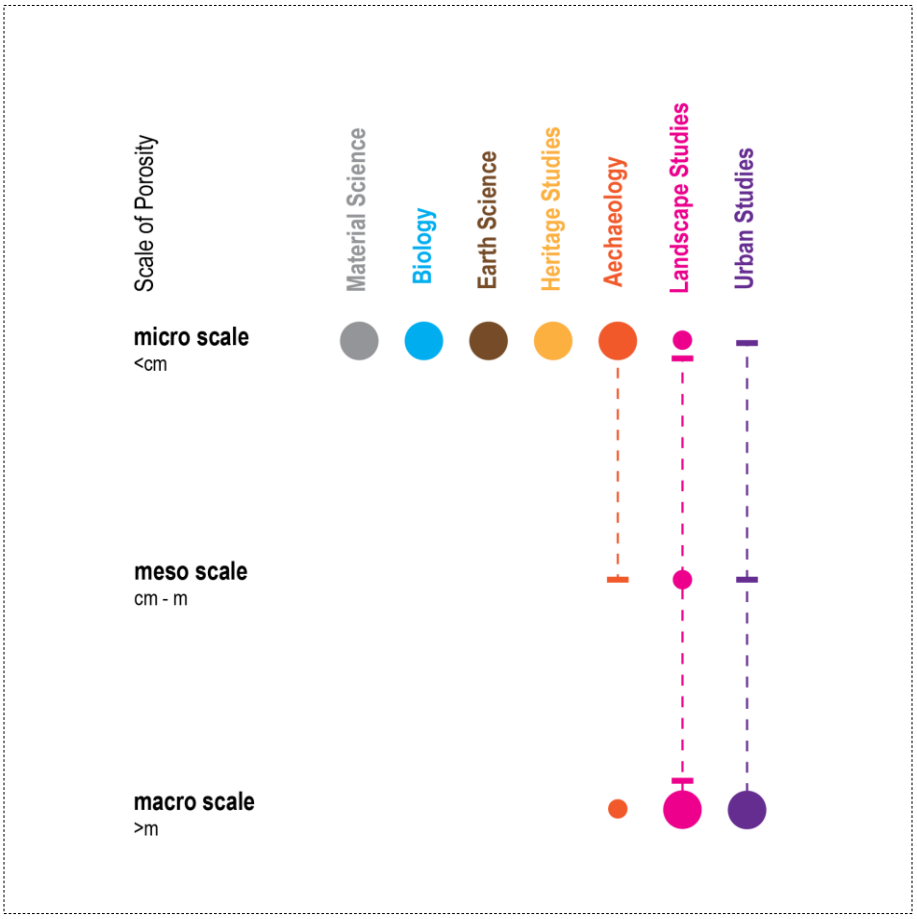

Figure 2.3. A diagram illustrating the scale at which porosity is discussed across disciplines. It shows that while scientific disciplines typically focus on the micro-scale, specific social science disciplines consider porosity in multiscalar contexts.

This diversity of scale is also evident in landscape[6] and urban studies[7]. In landscape studies, the object of porosity may range from large-scale natural or artificial landscapes to mid-scale features, such as hedgerows, and even micro-scale elements, like forest soil. These studies often adopt a multiscalar approach. For instance, investigations into soil porosity help assess forest

[6] Based on the fourteen selected articles, the object of porosity studies in this discipline vary from natural landscapes such as caves (Albert et al., 2015) and forests (Bagaram et al., 2018; Gao et al., 2017), a manmade creation in the landscape such as hedges (Chang, 2006; Otto et al., 2009) and tree belts (Anjum & Tanaka, 2022; Nowak et al., 2022), to a manmade landscape such as young industrial landscape (Heesche et al., 2022), park (Capuano, 2022), and peri-urban area (Busck et al., 2008).

[7] Based on the twenty selected articles, the object of porosity studies in this discipline mostly are in the form of a large area, such as a city or a district within the city (Anderson, 2019; Andrade et al., 2021; W. Benjamin & Lacis, 1979; Breś & Krośnicka, 2021; Bteich, 2006; Ghenciulescu, 2017; Goodwin, 2011; Hauser et al., 2021; Hein, 2021; Jovchelovitch et al., 2020; Lu, 2005; Pessoa et al., 2016; Reinoso Bellido et al., 2021; Stevens, 2022; Tadi et al., 2017; Thelle & Bille, 2020; Y. Yin et al., 2022; Yuan & Ng, 2012).

health, while studies of hedges (Chang, 2006) and caves (Albert et al., 2015) shift from meso- to macro-scales. Regardless of scale, porosity is frequently interpreted as a property linked to the performance of landscape elements or as an aspect of landscape morphology. It is commonly measured, designed, and simulated, resonating with approaches in material science. In some cases, however, porosity is extended as a design concept.

Urban studies share a similar multiscalar perspective. The primary object of study is the city or a specific district, implying a macro-scale approach. In these contexts, porosity may be discussed as a measurable quality related to urban flows or circulation. However, it is also examined through metaphor and concept, often in combination with discussions of materiality. A seminal example is Walter Benjamin and Asja Lacis's Naples, which compares the porous architecture of stone buildings to the interpenetrating activities and events of urban life (Benjamin & Lacis, 1979 [1925]). More recently, Thelle and Bille (2020) explored porosity in the context of pandemic contagion, arguing that porosity connects elements such as microbes, water, air, and the human body, which is itself porous, as it circulates between public and private realms.

These examples illustrate how porosity in urban studies is considered both materially and experientially. It is approached as a quantifiable urban condition and a metaphor for connectivity and spatial accessibility. The expansion of scale in disciplines such as archaeology, landscape, and urban studies is accompanied by an expansion of the conceptual domain or "realm" of porosity. These fields frequently consider porosity not only as a material or physical property, but also as a social condition. Porosity may thus be addressed metaphorically, bridging material and social dimensions. This interdisciplinary

breadth likely reflects the human-centric focus of these fields, where cultural and social factors are inseparable from spatial and material concerns. Consequently, porosity is often discussed across multiple scales, supporting the notion that it is a transcalar phenomenon, manifesting at various observational levels, each capable of informing the others.

2.2.4. On the Performance, Consequence, and Perception of Porosity

The misreading of the performance, consequence, and perception of porosity constitutes the core interpretative activity in this literature review. It is through this process that porosity is unpacked and interpreted in terms of its mechanisms and operative possibilities, which, depending on the discipline, may also extend to conceptual interpretations. Within architectural discourse, particularly in the realm of architectural social science, the concept of performance provides a crucial entry point for framing porosity, whether emerging from a material or social condition. Porosity, as a concept, brings together matter, human and non-human actors, and broader contextual dynamics.

On Performance

The concept of porosity as performance first emerged during the initial stages of this doctoral research, through a visual exploration of human skin undertaken in conjunction with a literature review. The objective was to study skin pores to gain a broader understanding of porosity.

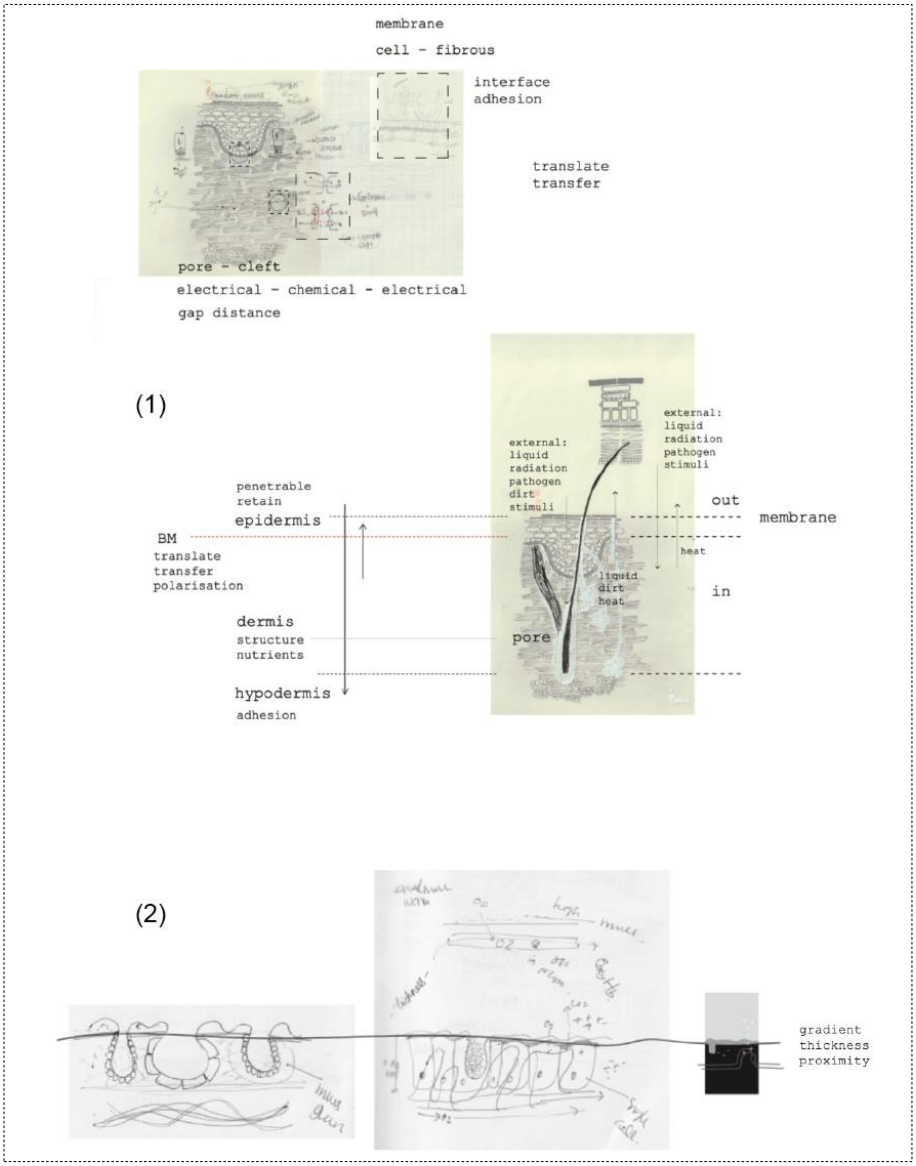

Figure 2.4. Skin study sketches and diagrams: an early exploration of the idea of porosity

According to dictionary definitions, porosity refers to "the quality of being porous" or "the degree to which a material contains minute spaces or holes through which liquid or air may pass." In this sense, porosity refers to the presence of pores—physical structures that may vary in scale but remain essential to their function. In the context of skin, pores serve two principal functions: to facilitate transfer (e.g., perspiration, substance exchange) and to provide space for containment (e.g., hair growth). These functions imply differing anatomical configurations depending on the intended role. When facilitating

transfer, porosity acts as a passage that permits the movement of matter. This requires a network of interstitial spaces or continuous pathways that enable flow. Although sometimes conflated, porosity and permeability differ: permeability refers to the capacity of a substance to pass through a boundary. In contrast, porosity refers to the presence of the pore structure itself.

Alternatively, when acting as a container, porosity may enable a material to hold, retain, or support the growth of something, such as water, air, or living organisms. This form of performance does not depend on continuous pathways but rather on the volume and distribution of voids.

This study categorises the performance of porosity as either "transfer" or "containment" based on terminology identified in the reviewed literature. These terms were further analysed to understand their operational mechanisms, and are summarised in Figure 2.5.

The terminology related to transfer performance includes:

- Penetrate[8], invade, infiltrate, permeate (entry)
- Flow, transport, transmit, migrate, distribute (movement)
- Disperse, diffuse (multi-directional movement)
- Exchange, absorb, desorb[9] (two-way interaction)

[8] The association of penetrate as one of porosity's performance for example is by noting statement such as "[O]nly few sections of the investigated surfaces displayed a more continuous hypal network, penetrating up to 500 μm in to the lithic substrate through intergranular porosity (Fig. 5E)" (Sohrabi et al., 2017, p. 175), where porosity is situated as one of the aspect that allows penetration, in this case, of lichens to heritage building material. This is an example of the misreading process to collect the performance of porosity.

[9] An example for these pair of words of *absorb* and *desorb* to porosity is in the context of building material such as "Most building material are porous, and through absorption and desorption, they have the ability to attenuate the moisture variation of the indoor air" (Talev et al., 2013, p. 104).

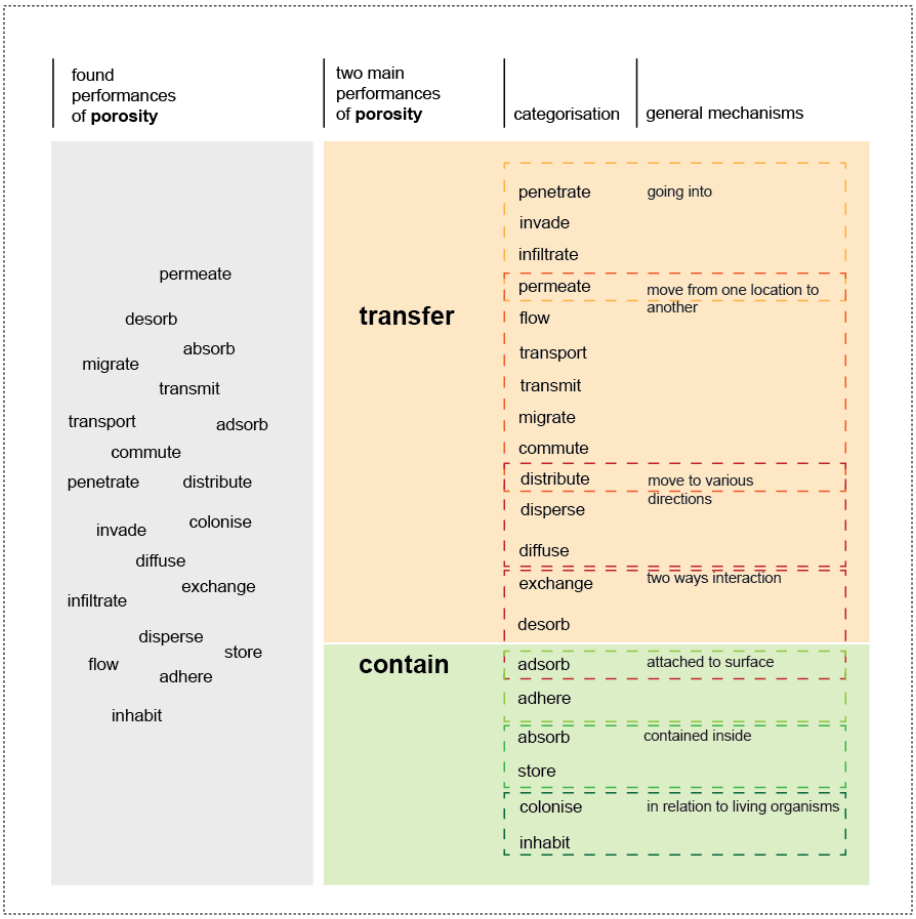

Figure 2.5. List of performance-related terminology associated with porosity

Containment-related performance terms include:

- Absorb, store (internal retention)
- Adsorb, adhere[10] (surface attachment)

[10] In listing the performance of porosity in Figure 2.55, the literal definition of the word is considered and interpreted as some sort of a degree of transfer or contain, at the least based on the position where they happened. For example, *adsorb* is about attaching to surface, while *absorb* is about containing within the bulk of the material.

- Colonise,[11] inhabit[12] (occupation by living organisms)

These terms, while not exhaustive, are representative of how porosity is described and understood across the disciplines examined.

On Consequence

Consequences are understood here as the effects of porosity, categorised either as consequences upon the material or object that possesses porosity (literal consequences), or as effects upon its surrounding entities or broader contexts (phenomenal consequences).

The distinction between literal and phenomenal draws inspiration from Colin Rowe and Robert Slutzky's seminal essay Transparency: Literal and Phenomenal (1963). There, literal transparency pertains to physical properties, while phenomenal transparency refers to spatial perception and organisation. Applied to porosity, literal consequences relate to material attributes, such as structure, strength, and degradation, while phenomenal consequences arise through interactions with other materials, actors, or environments.

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[11] Concerning the idea of colonise here is particularly related to phenomena such as biocolisation, for example "[P]etrophysical properties related to movement of water through rock matrix (e.g. open porosity, permeability, water absorption kinetics, etc.) and the chemical composition of the material seems to be the major properties that can affect colonization" (Miller et al., 2012, p. 8). Here porosity contributes to the colonisation of different organisms in material, not just as one that give the space, but also relates to other performance such as absorbing water, that supports the colonisation.

[12] The idea of *inhabit*, while it could also refer to the idea of biocolonasation in material level, is actually refer more to human inhabitation in built environment, for example "…, Bucharest developed as a city whose borders between the public and the private, between the interior and the exterior space were rather soft. Instead of the clearly demarcated public area and continuous fronts of the Western city, what is prevalent here is a sort of porosity, a slow and mediated transition between realms" (Ghenciulescu, 2017, p. 61). This starts to situate porosity in different context and scale, the urban, where porosity becomes part of the quality of border of realms of which people inhabit, border of which also its own realms to be inhabited.

For instance, a masonry wall exhibits literal porosity, observable under a microscope, with pores that can absorb moisture and lead to deterioration. However, the growth of moss or plants on its surface represents a phenomenal consequence—visible evidence of porosity through secondary phenomena.

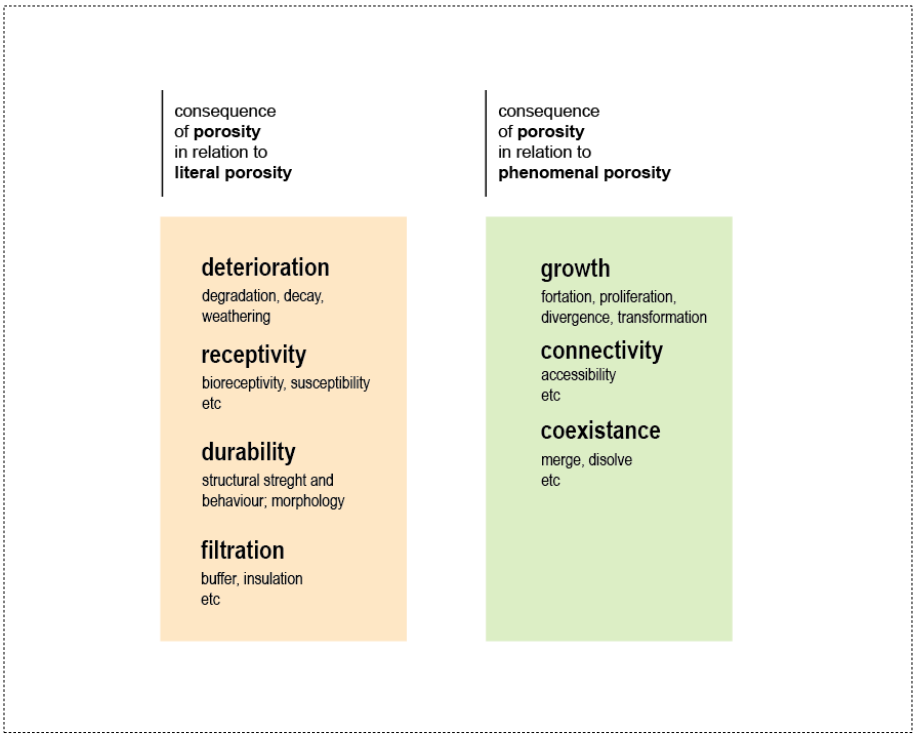

Figure 2.6. List of consequences associated with porosity

Literal consequences identified in this study include:

- Deterioration[13] (including degradation, decay, and weathering)

[13] Based on the selected articles, deterioration as the consequence of porosity commonly discussed in the material based disciplines, such as material science, biology, even the social science that involved material study, such as heritage studies and archaeology. The way that this highlighted is by noting statement such as "[P]orosity is defined as the ratio of the volume of the voids to total volume of the sample. In particular connected porosity, which is related to the flow of weathering agents, decay process, like salt crystallization and frost activity, was found to increase the deterioration of the material" (Santos et al., 2012, p. 104). Such sentences show both performance of porosity (transfer, flow) and the consequence of porosity (deterioration, decay) of the material.

- Receptivity[14] (e.g., bioreceptivity, susceptibility)
- Durability[15] (strength and structural integrity)
- Filtration[16] (condition change via selection or buffering)

Phenomenal consequences include:

- Growth[17] (biological or infrastructural development)
- Connectivity[18] (linkages and accessibility)
- Coexistence[19] (simultaneous occupation by multiple agents)

On Perception

Perception of porosity is informed by Gibson's The Ecological Approach to Visual Perception (2015 [1979]), which posits that

[14] As for receptivity, this is mostly related to porosity in material that involved living organisms, such as bio-susceptibility (Li & Gu, 2022) and bio-receptivity (Manso et al., 2014).
[15] Durability refers to consequence that discuss the mechanical structure or strength of material such as in the context of studying porous scaffold of biomaterial: "The current trend on deformation mechanisms of porous materials classifies porous architecture to bending and stretching dominated structure according o internal pore architecture" (Montazerian et al., 2017, p. 99). Such an example shows how porosity is discussed in the structural aspects of the material, where the percentage of porosity will then determine the mechanical strength of the material.
[16] Filtration as consequence of porosity is whene porosity performs and results in a different condition, such as cooling (Ibrahim et al., 2003), buffering traffic noise (Bonicelli & Pianeta, 2019), water filtration (Badin et al., 2012).
[17] Growth here is a consequence of porosity to give space for development or multiplication of something, usually a living organism, for example in the case of tissue engineering "[T]hese scaffolds serve to provide suitable microenvironments to support cell growth and function. The structural properties of the scaffolds, for example, porosity and pore size have direct implication on their functionality…" (Loh & Choong, 2013, p. 496) or it could also imply the growth/development of peri-urban area such as "A number of examples of this 'porosity' are found, e.g., within the economic sphere (the appearance of new urban activities in rural locations, large proportion of commuter jobs in urban areas) and demographic sphere (new types of residents on farms)" (Busck et al., 2008, p. 146), where porosity then started to be used or interpreted more conceptually or metaphorically, which therefore also phenomenally.
[18] The idea of connectivity as the consequence of porosity here mostly refers to porosity in an urban or landscape context, where porosity is used metaphorically to investigate urban space and urban inclusion (Stevens, 2022), is resulted in both social and ecological connection (Heesche et al., 2022), and allows access to different parts of the city (Ameijde & Song, 2018; Anderson, 2019; Andrade et al., 2021).
[19] As for coexistence, it is when porosity is results in the existence of different elements, events, actors, such as in the context of soil, or rhizosphere, porosity defines the allocation of resource to the soil biota, while also give space for various microorganisms (Hinsinger et al., 2009) or such as in the context of urban where different activities such as social activities and commercial activities could exist in close proximity if not together (Ameijde & Song, 2018) or where the historical part of the city exists amongst the new developments, or between formal and informal activities.

an organism’s perception of its environment directly influences behaviour. Within this study, the perception of porosity is interpreted through linguistic cues, examining whether porosity is framed positively, negatively, or neutrally.

Positive perceptions often align with outcomes such as growth, connectivity, coexistence, and filtration. Examples include:

- Soil porosity supporting microenvironments (Banwart et al., 2019; Gao et al., 2017)
- Porous building materials facilitating indoor cooling (2003; Talev et al., 2013)
- Bio-scaffolds enabling cell proliferation (Buckley & O’Kelly, 2010; Tomlins et al., 2004)
- Urban porosity promoting accessibility and exchange (Heesche et al., 2022)

However, porosity is often perceived ambivalently. For example:

- Pottery and bone artefacts may preserve valuable traces (Drieu et al., 2019; Tripp et al., 2018), but porosity also leads to deterioration (Smith et al., 2008).
- In tissue engineering, increased porosity promotes cell growth but weakens structural integrity (Annabi et al., 2010; Loh & Choong, 2013).

When exclusively negative, porosity is often linked to deterioration in heritage materials, where preservation paradigms favour material stability (López-Doncel et al., 2013; Miller et al., 2012).

This indicates that perceptions of porosity are highly contextual. Nevertheless, they are closely related to perceived consequences—terms like "deterioration" tend to evoke negativity, while "coexistence" or "connectivity" suggest value.

While this review frames perception in binary terms (positive/negative), these perceptions shape intentional design and intervention strategies. This opens the question: if porosity is adopted within architectural discourse, what attitudes or "gestures" will it invoke?

On the Landscape of Performance, Consequence, and Perception of Porosity

To synthesise the relationships between performance, consequence, and perception of porosity, a diagrammatic landscape was constructed. Diagrams in architectural practice serve not only as representations but as analytical tools that foster dialogue between visual and textual knowledge (R. Lucas, 2016).

This diagram draws inspiration from Charles Jencks's Evolutionary Tree (1970), which depicts stylistic trends in twentieth-century architecture. Similarly, the porosity diagram provides a cumulative and organic representation of disciplinary perspectives on porosity.

The construction process involved categorising information from the reviewed articles by discipline and theme, then mapping them within a structured diagram. Vertically, the diagram arranges performance, consequence, and perception (including associated terminology); horizontally, it organises the disciplines. Each article is mapped with its author(s), year, and object of study. Dotted and dashed lines illustrate connections between elements, and perception is marked by coloured dots: green (positive), red (negative), yellow (neutral).

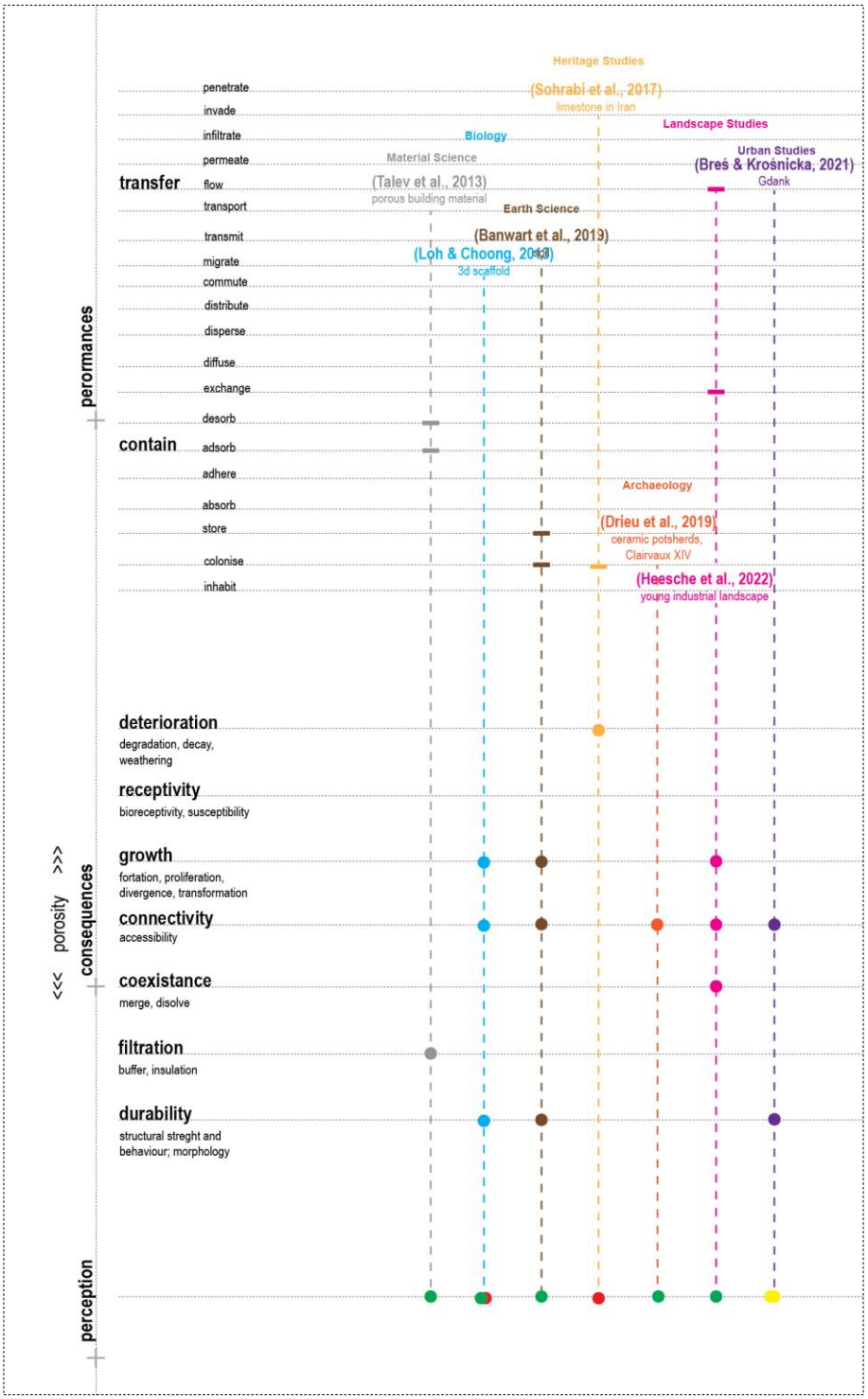

Figure 2.7. Mapping the performance, consequence, and perception of porosity

Examples:

- **Material Science:** Porosity enables moisture transfer (Talev et al., 2013).

- **Biology:** Scaffold porosity supports cell growth (Loh & Choong, 2013).
- **Earth Science:** Porosity structures microhabitats (Banwart et al., 2019).
- **Heritage Studies:** Porosity enables colonisation, leading to material deterioration (Sohrabi et al., 2017).
- **Archaeology:** Pottery porosity stores organic residues, connecting past and present (Drieu et al., 2019).

The mapping shows no uniform correlation between performance, consequence, and perception—porosity's meanings and values differ by discipline and context. While specific performances (e.g., flow) recur across fields, consequences and perceptions vary. Transfer performances dominate, while containment is less frequently explored.

In material science and heritage studies, porosity is typically framed as problematic due to its implications for structural integrity. Conversely, in biology, archaeology, landscape, and urban studies, porosity is more frequently appreciated for its capacity to foster growth, connectivity, or memory. Phenomenal consequences—especially in urban and landscape studies—suggest the conceptual expansion of porosity beyond materiality.

Ultimately, the varied disciplinary discourses reveal porosity as a transcalar and interdisciplinary phenomenon. It operates materially, socially, and metaphorically. These understandings shape the framing of porosity as an architectural concept in the chapters to follow.

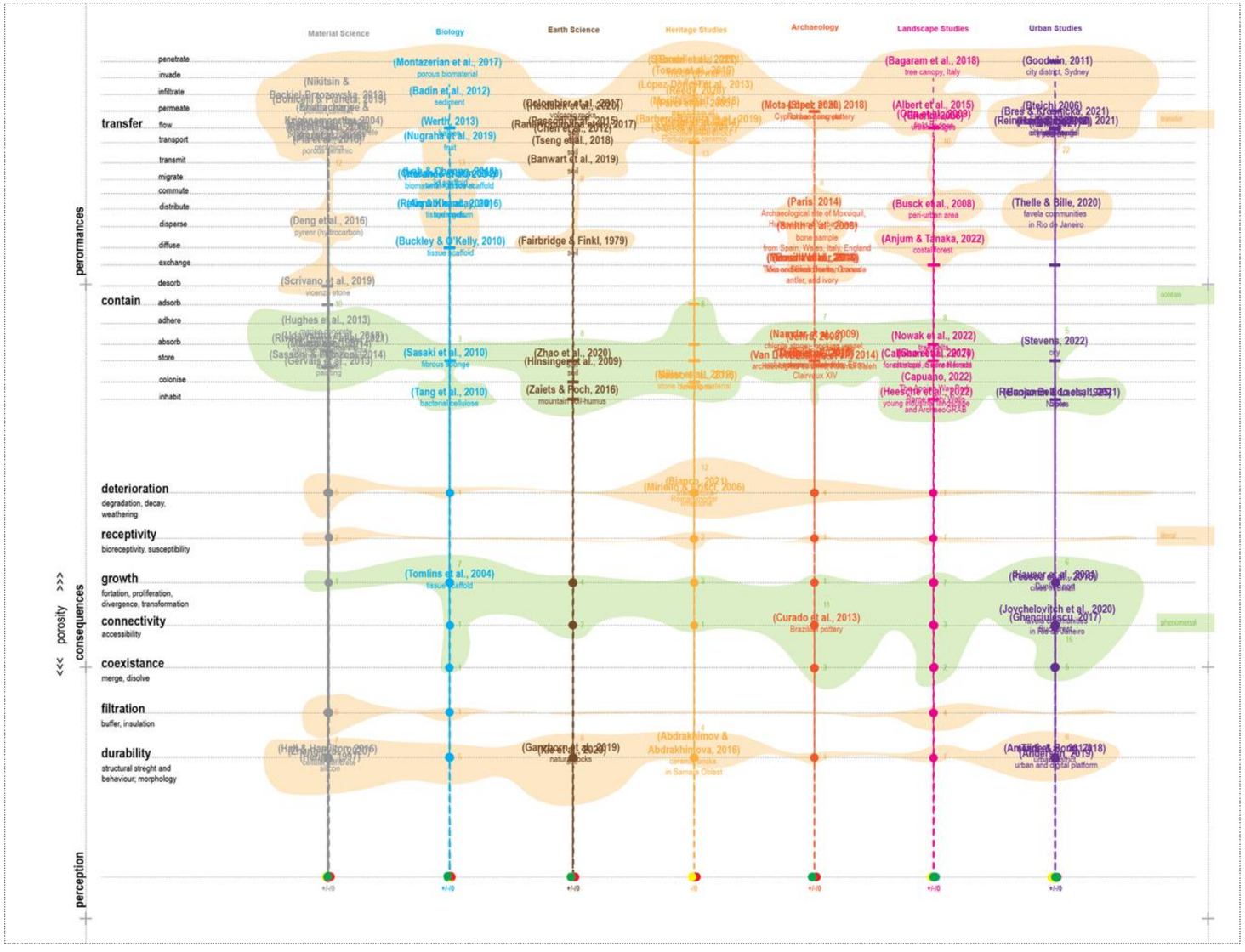

Figure 2.8. The landscape of performance, consequence, and perception of porosity

Let us examine the diagram horizontally to identify disciplinary tendencies in the discussion of porosity, categorised by the three thematic areas: performance, consequence, and perception.

The performance section reveals the varying concentrations of terminology used across disciplines to describe porosity in terms of transfer and containment. As previously mentioned, significantly more terms were associated with transfer than with containment. Accordingly, the density of representation in the transfer-related section is more significant, although areas of notable concentration are evident across the board. In materials science, for example, porosity is frequently associated with the performance of infiltration, permeation, and flow, typically referring to the movement of heat or moisture through materials.

Earth science and heritage studies demonstrate similar emphases; however, the heritage field tends to frame porosity more explicitly in terms of penetration and biological invasion, such as the colonisation of heritage stonework by lichens.
In biology, the performance of porosity is described using a broader range of terminology, spanning from penetration to dispersion. This variety likely reflects the biological focus on organic materials and living organisms, such as in studies of tissue engineering or fruit deterioration, which necessitate reference to mechanisms such as cellular diffusion, migration, and distribution (Annabi et al., 2010; Buckley & O'Kelly, 2010; Karande et al., 2004).

In archaeology, porosity's transfer functions are frequently linked to distribution and exchange. For instance, porosity enables environmental interaction with artefacts through diffusion (Bosch et al., 2014). Additionally, porosity is interpreted metaphorically within social networks to explain the distribution of goods or cultural practices (Paris, 2014).

Landscape studies demonstrate a diverse understanding of porosity in terms of transfer, encompassing penetration, such as air passing through tree canopies (Bagaram et al., 2018) or hedgerows (Chang, 2006), and the flow of people within the landscape (Heesche et al., 2022).

In urban studies, the concept of flow remains a central one. Here, porosity and permeability are associated with the passage of people, goods, and environmental factors across urban boundaries. Case studies include the movement between land and sea at port cities (Hauser et al., 2021; Hein, 2021), access to waterfront areas (Andrade et al., 2021), and exchanges across public and private urban realms (Anderson, 2019; Reinoso Bellido et al., 2021).

While interpretations of porosity as a transfer mechanism differ among disciplines, the underlying principle of enabling movement, whether of moisture, air, people, or information, remains a common thread. These diverse conceptualisations range from the distribution of cells across a porous scaffold to the permeability of urban thresholds. Notably, the transfer function is often framed in terms of porosity’s role as a boundary condition that enables penetration and permeation.

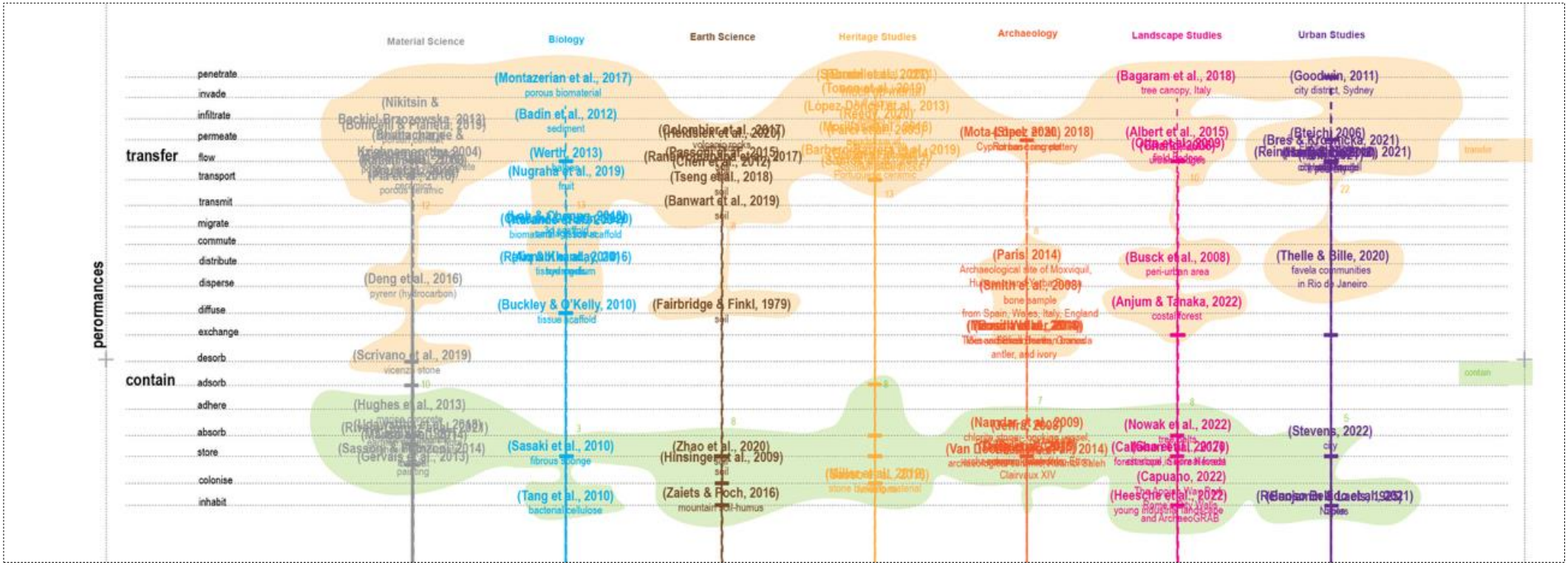

Figure 2.9. The landscape of the performances of porosity diagram

As the discussion shifts to containment, fewer terms and examples emerge. This limited representation partly reflects the reduced lexical diversity and, more broadly, the less frequent treatment of containment as a defining function of porosity. However, where containment is discussed, its articulation centres on two principal themes: absorption and habitation. Material-based disciplines, including those concerned with heat, water, and other elements, use terms such as absorption and storage. Meanwhile, disciplines focusing on living organisms—such as biology, heritage, and urban studies—employ terms such as colonisation and inhabitation.

In material science, for example, porosity is linked to the absorption of water (Udawattha et al., 2018) or sound (Rivera-Gómez et al., 2021). In biology, porosity is studied in the colonisation of materials by microorganisms (Sasaki et al., 2010) or to support cell growth (Tang et al., 2010). In earth science, porosity facilitates microbial colonisation of rock surfaces (Banwart et al., 2019). Similarly, in heritage studies, porosity is seen as permitting lichen growth on heritage stone (Sohrabi et al., 2017). In archaeology, porosity enables artefacts to retain residues such as organic compounds or cooking materials from past civilisations (Van Doosselaere et al., 2014; Namdar et al., 2009).

In landscape and urban studies, the containment function of porosity is closely linked to human habitation in both natural and built environments. A key example is Benjamin and Lacis's Naples essay, which links porosity to the dynamic use of architectural surfaces for daily human activity (1979 [1925]). Similarly, the concept of the Young Industrial Landscape (Heesche et al., 2022) illustrates how porosity enables both social and ecological coexistence within urban systems.

The terminology related to containment thus tends to coalesce around the concepts of storage (for elements such as water and nutrients) and habitation (for organisms, including humans). This suggests a spatial conceptualisation of porosity as the capacity to accommodate.

Turning to the consequences of porosity, each discipline exhibits varying emphases on what this study terms literal and phenomenal consequences. Material science concentrates primarily on literal consequences, including structural deterioration, filtration, receptivity, and changes in material durability. Heritage studies adopt a similar stance, focusing on the detrimental effects of porosity on the integrity of heritage materials. The entry of moisture, organisms, and pollutants into porous materials is viewed as a primary threat to conservation.

Biology and earth science, by contrast, explore both literal and phenomenal consequences, often owing to their inherent focus on living organisms. For instance, porosity facilitates the growth of microbiota and nutrient exchange in natural systems.

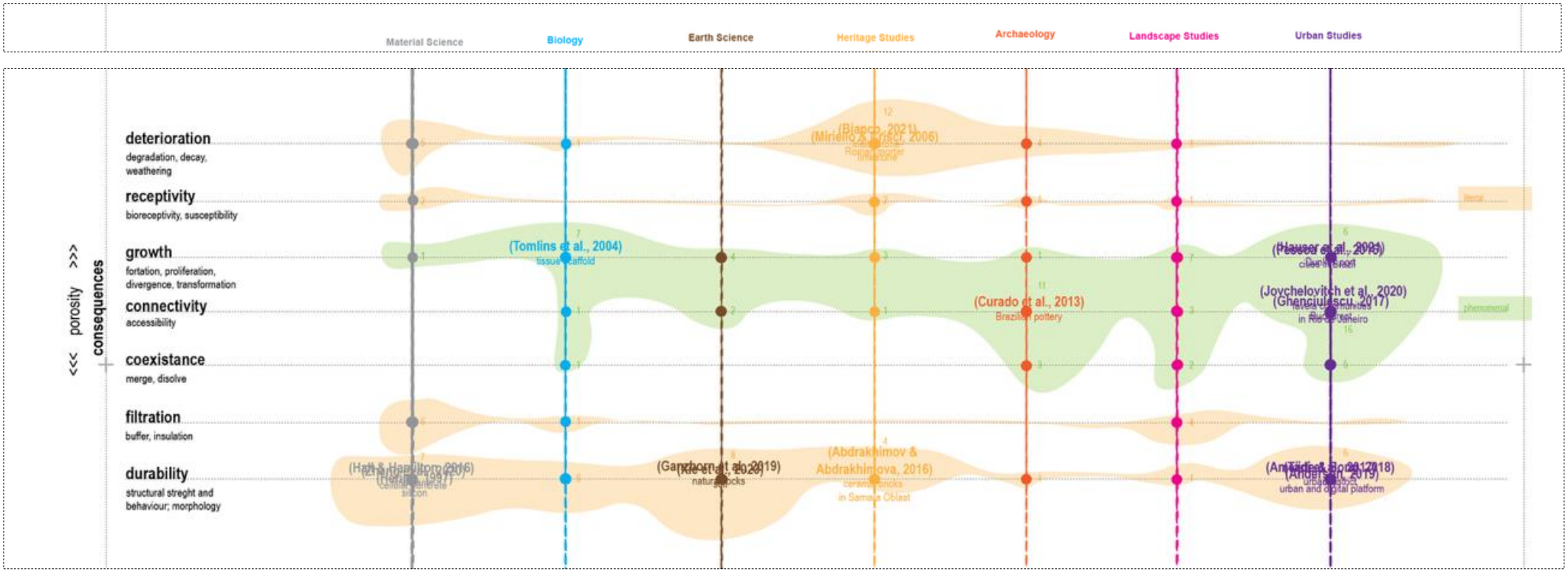

Figure 2.10. The landscape of the consequences of porosity diagram

Archaeology presents a compelling hybrid case. While literal consequences, such as the deterioration of artefacts due to soil interactions, are discussed, there is also a pronounced interest in phenomenal consequences. These include the interpretive potential of porosity to bridge past and present, by providing access to material traces of diet, trade, and social practice.
In landscape and urban studies, the phenomenal consequences are particularly pronounced. Growth (social, ecological, or economic), connectivity, and coexistence emerge as central themes. Porosity here is not simply a physical property but a condition that fosters multiple, concurrent uses of space. For example, urban porosity facilitates interactions between public and private realms, supporting multifunctional social and ecological activities.

While literal consequences predominate in material-based disciplines, social sciences and built environment fields tend to foreground phenomenal consequences; nevertheless, most disciplines recognise both forms, often interwoven in nuanced ways. This fluid transition from literal to phenomenal consequence reinforces the conceptual elasticity of porosity. As the term shifts from describing a physical characteristic to functioning as a metaphor or framework for interpretation, its scale likewise becomes flexible, supporting the thesis's broader argument for porosity as a transcalar concept.

Finally, concerning perception, the reviewed disciplines exhibit a spectrum of attitudes towards porosity. Most studies in biology, archaeology, landscape, and urban disciplines adopt a relatively optimistic view, emphasising benefits such as ecological growth, spatial connectivity, social coexistence, and environmental filtration.

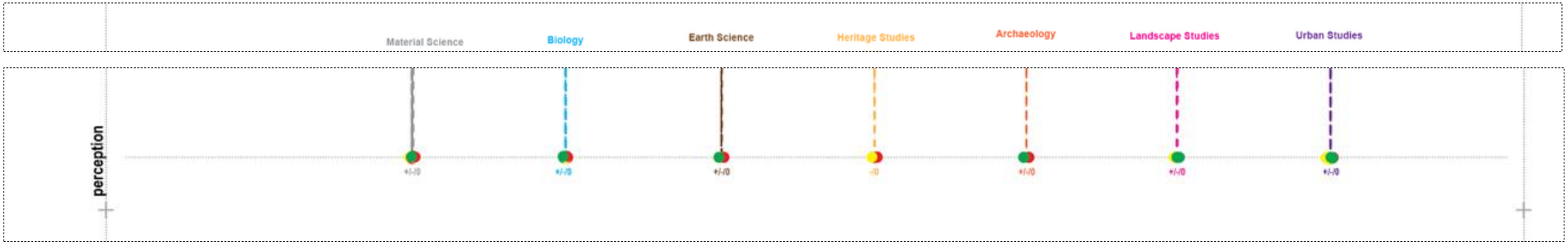

Figure 2.11. The perception of porosity diagram

In contrast, studies in material science and heritage typically perceive porosity as a vulnerability. Here, porosity is framed as a harmful condition, particularly in terms of structural deterioration. Some studies within material science adopt a more balanced view, acknowledging the utility of porosity in applications such as insulation and acoustic regulation. However, none of the heritage-focused studies reviewed present porosity in a positive light, likely reflecting disciplinary priorities in conservation and the valorisation of material integrity.

Overall, the analysis affirms that perceptions of porosity are context-dependent, shaped by disciplinary objectives and underlying assumptions. The findings underscore the utility of porosity as a lens for interdisciplinary inquiry, offering both literal and metaphorical potential for interpreting complex spatial and material phenomena.

2.2.5. On the Visual Representation of Porosity

The misreading of visual representation is relatively straightforward. It involves the collection of any visual representations that depict or relate to porosity, whether explicitly as a term or implicitly through associated variables such as pore distribution or pore size. The types of visual material considered include tables, graphs, charts, photographs, images, and diagrams—essentially any form of visual information typically accompanied by captions. Captions, in particular, are noted during the process, as they often provide essential interpretive context, especially when the visuals themselves may not be immediately intelligible due to disciplinary differences.

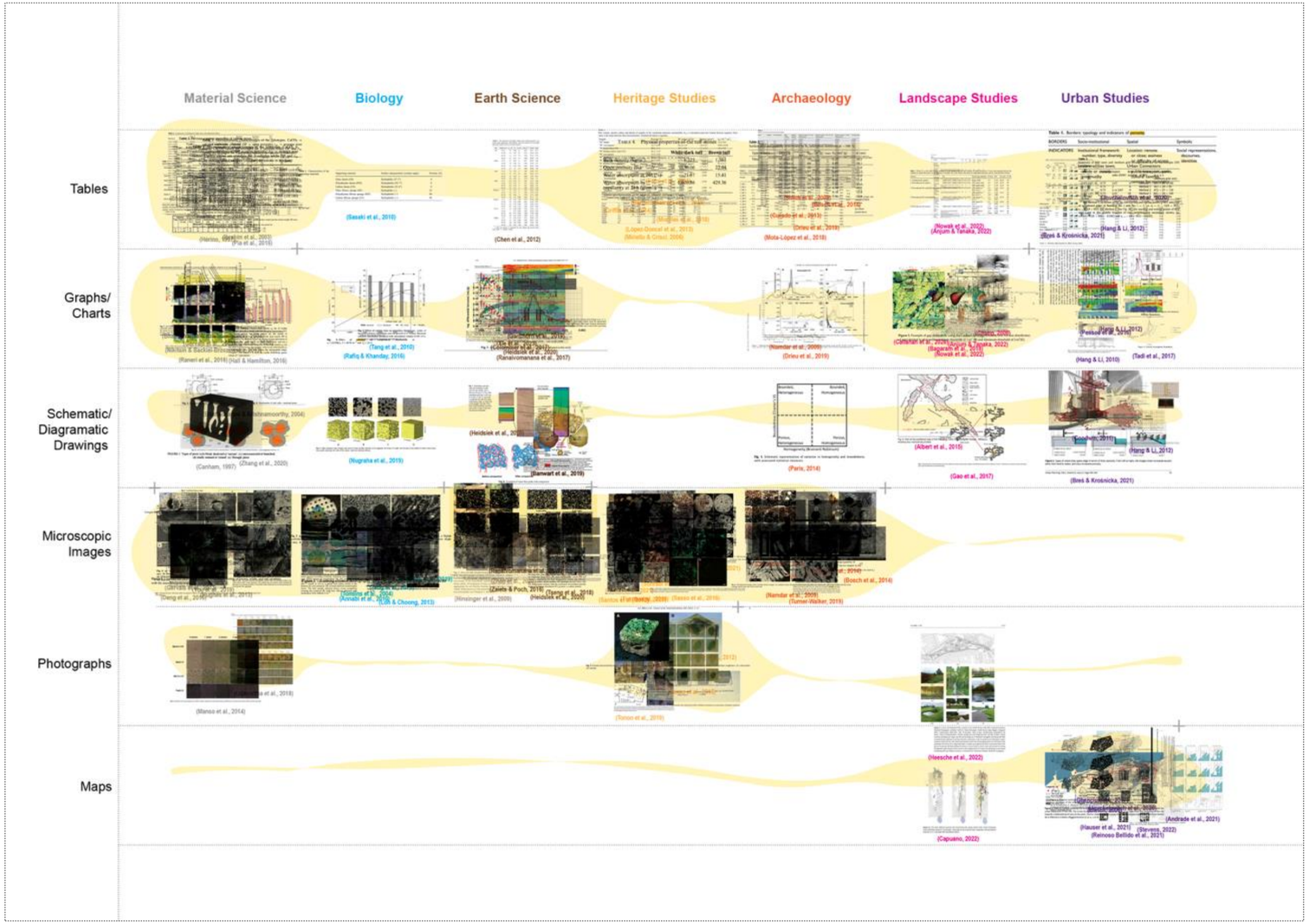

Figure 2.12. Diagram of visual representations of porosity

The table above outlines the collection of visual representations concerning porosity across various disciplines. In materials science, such representations are closely aligned with the methods used to investigate porosity, which is typically quantified using a range of formulae and techniques, including porosimetry. These are often accompanied by visual aids such as tables, graphs, and charts, which frequently display porosity percentages alongside other variables. Notably, terms such as pore size, pore volume, and pore distribution are often employed in place of the word ‘porosity ’itself.

Other investigative approaches, including scanning electron microscopy (SEM) or computed tomography (CT), generate microphotographs that reveal the pore structure, shape, size, and distribution. These images often capture microscopic phenomena surrounding the pores, such as the presence of microbes. Studies involving material experimentation frequently include conventional photographs to document procedural developments, which are presented as part of the visual evidence of porosity. Furthermore, research involving the intentional design or modification of porosity may employ 3D visualisations or diagrammatic renderings to illustrate changes in pore characteristics.

This approach is mirrored in other material-focused disciplines such as biology, where porosity is sometimes studied in the context of temporal growth processes. In such instances, visual representation typically comprises tables, graphs, and charts. Where porosity is engineered, SEM imagery and X-rays are frequently used to capture the material's microstructure and the impact of various fabrication techniques.

Similarly, in earth science, heritage studies, and archaeology, porosity is represented through tables, graphs, charts, and microphotography. In heritage studies, visual documentation often begins with photographs of heritage materials at a macroscopic scale, before zooming in via microphotography to reveal finer details. This approach demonstrates the multiscalar nature of porosity observation. Although archaeology has its distinct modes of visual representation—such as combined photographs and line drawings of artefacts—the representation of porosity itself often reverts to tables, graphs, and microphotographs (e.g., via SEM or micro-CT) that illustrate size, shape, and distribution for purposes of comparison or evidence of embedded historical residues.

In landscape and urban studies, tables and graphs are still used where porosity is simulated or calculated. However, these disciplines also employ conventional representational tools such as maps and diagrams. Examples include figure-ground maps that distinguish built and unbuilt space, as well as zoning diagrams that reveal temporal changes. Diagrammatic drawings often adopt varying scales to articulate conditions of porosity in the urban fabric.

The discussion above reveals that visual representations of porosity are closely tied to both the methodological approach and the observational scale employed. Porosity is most commonly examined at the micro-scale and treated as a quantifiable material property. This emphasis results in the widespread use of tables, graphs, charts, and microphotography. Often, studies integrate multiple representational modes. Tables, graphs, and charts express porosity in numerical or percentage form and typically in relation to other study variables. Microphotography, utilising technologies such as SEM, CT scans, or X-rays, visually captures the presence of pores, enabling the measurement of

size, shape, and distribution, and may reveal micro-ecological interactions occurring within or around the pores.

Tables, graphs, and charts abstract porosity from its material substrate, presenting it as a statistical or relational concept. Conversely, microphotography foregrounds the material and visual reality of porosity at the microstructural level. These two visual formats represent distinct but complementary modes of knowledge: they may be derived from or serve to reinforce one another.

Schematic and diagrammatic illustrations also feature in the visual representation of porosity. These often serve to explain pore behaviour or morphology and can be scaled to enlarge microstructural phenomena or to represent macro-scale urban conditions, as seen in mapping practices. Additionally, regular photographs can be used to depict porosity implicitly. These do not directly show pores, but rather the outcomes or consequences of porosity, for example, images documenting differential moss growth on materials with varying porosity levels over time.

The findings discussed above illustrate the diverse ways in which porosity is visualised across disciplines. These variations are not solely determined by disciplinary conventions, although such tendencies are evident; instead, they reflect the inherent versatility of porosity as a concept. Porosity can be articulated across scales—from micro to macro—and across conceptual domains, from material to metaphorical and social. It may be quantified, designed, observed, or theorised, and it remains the subject of ongoing debate around its positive or negative connotations and applications.

Thus, porosity can be considered a 'porous' term in itself—capable of multiple interpretations and suited to deployment in varied disciplinary contexts. From this point onwards, this thesis will consider porosity within the architectural domain, particularly from the perspective of architecture as a social science.

2.3. Framing Porosity in Architecture

Architecture is a multifaceted discipline, and before framing porosity within it, it is necessary to delineate the understanding of architecture as applied in this thesis. This PhD study positions architecture as a social science discipline, viewing it as an animated object continuously produced and reproduced by people through material, spatial, and social practices. This perspective, which views architecture as a manifestation of human inhabitation within the environment, is also shared by other disciplines, such as anthropology. Significant collaboration has occurred between architecture and anthropology—not only because architecture occasionally serves as an object of anthropological inquiry, as demonstrated by Buchli (2013) (2013), but also due to methodological and conceptual synergies, as shown by Lucas (2020a) and Stender et al. (2022), among others.

This collaborative engagement between architecture and sub-disciplines of anthropology, such as archaeology and social anthropology, combined with insights gained from the porosity study, informs this thesis's attempt to frame porosity within architectural inquiry. It underpins the theoretical exploration of porosity in architecture (Chapter 3), the development of methodologies and methods grounded in porosity (Chapter 5), and the selection of the contextual site for studying porosity (Chapters 4, 5, and 6).

2.3.1. Framing the Scale of Porosity

Insights from the misreading exercise reveal that porosity is primarily understood as a material property. By its nature, porosity exhibits a strong relationship with physical and material existence, as demonstrated across nearly all the disciplines included in the porosity study. The study of porosity invariably involves physical objects, ranging from materials to forests or cities. Even in disciplines where porosity is used conceptually or metaphorically, such as in the social sciences, it remains grounded in a physical context.

This fundamental materiality of porosity serves as the first conceptual frame for its inclusion in architectural inquiry. However, this study extends the concept beyond a strictly physical interpretation. Here, porosity is approached as materiality—that is, as a condition imbued with social and historical agency, in line with Ingold's (2013) framing of material in architecture. While discussion begins with material porosity, it is expected that porosity will manifest and perform beyond the material, encompassing social and environmental realms that are intrinsically linked to the architectural context.

This leads to the discussion of scale. The study demonstrates that porosity is most commonly examined at the material or micro-scale, particularly in science-based disciplines. However, social science and built environment disciplines observe and discuss porosity across a range of scales, demonstrating its potential as a transcalar concept. This constitutes the second conceptual frame in this inquiry: porosity is transcalar and, therefore, must be analysed at multiple architectural scales.

2.3.2. Framing the Performance of Porosity

The misreading of performance indicates that porosity is frequently understood in terms of transfer—enabling flow, penetration, and permeation—across disciplines. Containment is also addressed, albeit less regularly. In this architectural inquiry, containment forms the next key frame for understanding porosity. Porosity is conceptualised as a material condition that holds or contains, including the potential to support inhabitation.

In the built environment disciplines, containment often implies inhabitation, mainly by living organisms. As discussed earlier in this chapter, inhabitation—especially unplanned inhabitation—is a defining feature of architectural performance. This is further associated with growth, a consequence of porosity identified in the misreading exercise. Thus, porosity as a material condition provides space for both human and non-human inhabitation and growth.

Porosity is a condition that must pertain to a material substrate. This links to the earlier framing of porosity as materiality, while also introducing the idea of durability—another consequence of porosity—concerning the impact of porosity on material stability. Consequently, this study assigns porosity to a materialised architectural element, selecting the wall as a primary site of inquiry.

This selection also responds to the concept of connectivity, another key consequence of porosity. As Simmel (1997) posits in his essay "Bridge and Door," human beings connect by separating. Architecture embodies this logic, creating connections and separations through the use of boundaries. Accordingly, this inquiry situates porosity within materialised

architectural boundaries—specifically walls—not merely as physical elements but also as spatial and social constructs. Walls demarcate thresholds and in-between spaces, mediating interactions between distinct realms. Porosity within these boundaries enables interpenetration and connectivity, potentially fostering coexistence between varied realms, conditions, and practices through processes of negotiation, adjustment, and appropriation.

This leads to the final conceptual frame: disciplinary and contextual grounding. As previously stated, this inquiry positions architecture within the social sciences, drawing on anthropological and archaeological concepts and methods. In addition, heritage studies are introduced as a critical disciplinary context.

One striking finding of the misreading exercise was that heritage studies, in contrast to other disciplines, almost uniformly perceive porosity as a negative trait. This likely reflects dominant conservation and preservation paradigms that prioritise material integrity. This negative perception renders heritage studies a particularly compelling context for architectural inquiry into porosity, opening up opportunities for critical engagement and potential contributions to heritage discourse. This will be explored in greater depth at the end of Chapter 3.

2.3.3. Framing the Visual Representation of Porosity

The misreading of visual representations shows that the modes of visualising porosity are closely tied to disciplinary approaches. Visual materials reveal porosity's performance and anatomy, including pore size, shape, and distribution. In this study, the framing of visual material will be grounded in architectural

practice, where visual representation, primarily drawing, is central to both professional activity and the formation of disciplinary knowledge.

However, the diversity of visual representations found across disciplines, such as heritage, archaeology, landscape, and urban studies, inspires this study to adopt a broader repertoire of visual materials and methods. Visual representation in this inquiry will function as a tool for reading porosity, primarily through indexing and mapping. This involves collecting visual data across multiple scales—from close-up photographs of materials to macro-scale urban mapping.

These methods and their integration into the study's methodological framework will be elaborated upon in Chapter 5.

2.4. Conclusion

Porosity, as an interdisciplinary term examined across the sciences, social sciences, and built environment disciplines, has proven a productive subject for preliminary architectural inquiry. The porosity study—analysed and interpreted through an architectural lens—functions not merely as a literature review but as a precedent study. Guided by architectural concepts, the act of misreading has proven instrumental in interpreting findings. The three architectural themes of scale, performance, and visual representation have proved particularly effective in framing porosity within architecture.

In summary, the study demonstrates that porosity possesses a material and physical basis, typically situated at the micro-scale. Nevertheless, it can also be discussed at multiple scales and about broader objects, such as hedgerows or social networks.

Porosity facilitates transfer and containment, resulting in various consequences, including structural transformation, environmental interaction, connectivity, and growth. It is perceived with ambivalence across disciplines, alternately as a positive and negative trait. Furthermore, porosity is frequently accompanied by visual representation, from tables and graphs to maps and microphotography, serving illustrative, analytical, and interpretive functions.

Building on these findings, this study frames porosity in architecture as follows:

- Porosity as Containment: Porosity is first framed as a capacity to contain rather than merely to transfer. In this framing, porosity is a material condition in architecture that provides space for events, particularly unplanned or unpredictable ones, involving both human and non-human actors. These events are understood as part of the architectural experience, as defined by Tschumi's concept of the event (Fontana-Giusti, 2016).

- Porosity as Boundary: Porosity is framed as a condition of architectural boundaries, enabling interpenetration between realms such as inside/outside or public/private. These thresholds are not only physical structures but also spatial and social constructs. Porosity is thus explored as an architectural feature that fosters connectivity and coexistence.

- Porosity as Coexistence: Finally, porosity is framed as a condition that facilitates the coexistence of planned and unplanned, designed and improvised forms of inhabitation. Architecture is viewed as a socio-spatial assemblage, and

porosity enables it to accommodate a multiplicity of actors, situations, and practices.

These three frames reflect the material, spatial, and social aspects of porosity and structure the theoretical discussion in Chapter 3. As previously indicated, the overarching context of this inquiry is heritage. Semarang Old Town in Indonesia will serve as the empirical site, offering a varied urban heritage landscape of revitalised and unrevitalised buildings suitable for exploring porosity. The interdisciplinary context of the inquiry will be justified at the end of Chapter 3, while methodological development will be outlined in Chapter 5.

Chapter 3. Identifying the Three Porosities: A Theoretical Exploration

This chapter constitutes the second part of the literature review, exploring porosity within architectural theory. It begins by examining the conceptualisation of porosity in Walter Benjamin and Asja Lacis's seminal essay Naples (1925), which serves as a principal inspiration for this architectural inquiry. The chapter then expands upon porosity through three theoretical frames—material, spatial, and social—to deepen the architectural discourse on the subject. A conceptual framework for understanding porosity within architecture will be proposed based on this theoretical investigation.

3.1. Introduction: Porosity as Materiality

This theoretical inquiry begins by reiterating the three interpretive frames for understanding porosity within architecture, as established in the previous chapter's conclusion. These three frames—porosity as containment, boundary condition, and coexistence—correspond to material, spatial, and social aspects, respectively, and reflect porosity's operation across multiple scales. Before discussing each frame individually, this chapter situates porosity within architectural discourse as a condition of materiality.

As highlighted earlier, porosity is predominantly conceived in many disciplines, particularly those addressing building materials, as a material property. In such contexts, porosity is a

scientifically quantifiable attribute, typically defined by the proportion of void space in a material. It may be engineered or designed to fulfil specific performance criteria. In this sense, porosity is intrinsically tied to the physical presence of pores, whose characteristics—such as size and distribution—are measurable and functionally significant.

Although this scientific perspective on building materials exists within architectural discourse, and architecture certainly engages in material practices, the present inquiry, rooted in architectural social science, adopts a distinct approach. Here, porosity is not treated as a technical property but is instead regarded as a *material quality*, as conceptualised by Pye (1968). According to Pye, while material properties are objective and measurable, material attributes are subjective and contingent upon human perception and interpretation.

Thus, in this study, porosity is not approached quantitatively but is interpreted qualitatively through its effects and perceived meanings within the material environment. This distinction aligns with broader understandings of *materiality* in architecture.

> "The term 'materiality 'refers not only to the circumstance that architecture is realized with the assistance of building materials, but also to the fact that a material expresses its outward appearance, so that characteristic appeals emanate from it." (Janson & Tigges, 2014, p. 189)

Materiality in architecture, therefore, operates in two primary domains: as an agent in the technical process of construction and as a sensory and experiential condition (Löschke, 2016). Architectural experience is mediated by materiality, which is expressed through characteristics such as scale, rhythm, texture, and colour (Pallasmaa, 2014), and contributes to the atmosphere

of architectural space (Böhme & Thibaud, 2017). It is through materiality that architecture engages the body and influences affect and behaviour (Pallasmaa, 2013)

Materiality also possesses a cultural and social dimension. Its use is embedded in historical and symbolic contexts, reflecting cultural practices and traditions (Böhme & Thibaud, 2017). Ingold (2013) describes materiality as comprising both the physical character of the material world and the human agency involved in appropriating and shaping that materiality for cultural purposes. In this way, materiality is not a static condition but a relational one:

> “It usually designates the material dimension of a phenomenon, a thing, an object, or a system *in relation* to human thought and practice.” (Picon et al., 2020, p. 10, original emphasis)

This perspective enables a holistic view of architectural materiality—from the transformation of raw materials through craftsmanship and construction, to the embodied experience of architecture by its occupants. Moreover, architecture is not isolated from its environment. Material is always situated and contingent, shaped by environmental conditions.

Geoff Bailey (2007), as cited by Ingold (2013), illustrates how material traces on archaeological artefacts may provide insights into past environmental and social contexts. Similarly, Hill (2016) notes that materiality encompasses not only tangible materials, such as brick and glass, but also immaterial conditions, including light, air, and electromagnetic fields.

Jane Bennett (2010) furthers this argument through the concept of *vital materiality*, which acknowledges the agency of both

human and non-human actors within shared environments. She proposes a flattened ontology of material interactions:

> “I am a material configuration, the pigeons in the park are material compositions, the viruses, parasites, and heavy metals in my flesh and in pigeon flesh are materialities, as are neurochemicals, hurricane winds, E. coli, and dust on the floor. Materiality is a rubric that tends to horizontalize the relations between humans, biota, and abiota.” (Bennett, 2010, p. 112)

Accordingly, this study frames porosity as a condition of architectural materiality—one that mediates between physical structure and the social and ecological traces of both human and non-human inhabitation. Rather than focusing on the production or fabrication of materials, porosity is examined as a *found* quality in the built environment that enables or constrains inhabitation.

This theoretical approach is informed by Benjamin and Lacis’s essay *Naples* (1979 [1925]), which articulates a foundational conceptualisation of porosity:

> ‘‘As porous as this stone is, the architecture is. Building and action interpenetrate in the courtyards, arcades, and stairways. In everything, they preserve the scope to become a theatre of new, unforeseen constellations. The stamp of the definitive is avoided. No situation appears intended forever, no figure asserts its ‘thus and not otherwise’.” (Benjamin & Lacis, 1979, p. 169)

In this evocative passage, Benjamin and Lacis describe porosity not only as a physical condition but also as a cultural and social phenomenon—one that enables spontaneous interaction

between built form and daily life. Their portrayal of Naples exemplifies how porosity unfolds across material, spatial, and social dimensions.

Figure 3.1. Santa Lucia, Naples. (C. R. Jones, 1845). CC 0.

Benjamin's method, as Gilloch (1996) observes, employs a physiognomic and metaphorical gaze, linking architectural forms with the behaviours and rituals of inhabitants. As Erben (2018) notes, their narrative of Naples operates through a triadic structure, progressing from material to spatial to cultural dimensions. For example:

> "Someone kneels on the asphalt, a little box beside him, and it is one of the busiest streets. With coloured chalk, he draws the figure of Christ on the stone, below it perhaps the head of the Madonna. Meanwhile a circle has formed around him, the artist gets up, and while he waits beside his work for fifteen minutes or half an hour, sparse, counted-out coins fall from the onlookers onto the limbs, head, and trunk

of his portrait. Until he gathers them up, everyone disperses, and in a few moments the picture is erased by feet.” (Benjamin & Lacis, 1979, p. 171)

Figure 3.2. Street painting (nowadays known as I Madonnari), a traditional form of artistic expression, has its origins in Italy, dating back to the 16th century. In their aforementioned essay, Benjamin and Lacis appear to reference this form of street art as part of the city scene. Top image: Gli artisti di strada che disegnano per strada (Street artists who draw on the street). (Marco, 2017). CC BY-SA 04. Bottom image: I festeggiamenti per il Caravaggio's Day del 2003, a Caravaggio (The celebrations for Caravaggio's Day 2003, in Caravaggio). (Bettani, 2003). CC 0.

This fleeting scene reveals the interdependence of material substrate (stone), artistic action (chalk drawing), and public response (gathering and dispersal)—a demonstration of how porosity enables the ephemeral occupation of space.

In another example:

> “So the house is far less the refuge into which people retreat than the inexhaustible reservoir from which they flood out. Life burst not only from the door, not only into front yards, where people on chairs do their work (for they have the faculty of making their bodies tables). Housekeeping utensils hang from balconies like potted plants. From the windows of the top floors come baskets on ropes for mail, fruit, and cabbage... the street migrates into the living room.” (Benjamin & Lacis, 1979, p. 174)

Here, porosity is articulated as the fluid interpenetration of private and public realms, facilitated by architectural elements such as windows, balconies, and staircases. These structures allow a continuous exchange between domestic interiors and the street. Benjamin and Lacis also highlight the socio-economic dimension of porosity:

> “Poverty has brought about a stretching of frontiers that mirrors the most radiant freedom of thought. There is no hour, often no place, for sleeping and eating. The poorer the quarter, the more numerous the eating houses. From stoves in the open street, those who can do so fetch what they need. The same foods taste different at each stall; things are not done randomly but by proven recipes. In the way that, in the window of the smallest trattoria, dish and meat lie heaped up for inspection, there is a nuance that

goes beyond the requirement of the connoisseur.”
(Benjamin & Lacis, 1979, p. 175)

And:

“Neapolitan cafés are bluntly to the point. A prolonged stay is scarcely possible. A cup of excessively hot caffe espresso – in hot drinks, this city is as unrivalled as in sherbets, spumoni, and ice cream – ushers the visitor out. The tables have a coppery shine, they are small and round, and a companion who is less than stalwart turns hesitantly on his hill in the doorway. Only few people sit down briefly here.”
(W. Benjamin & Lacis, 1979, p. 176)

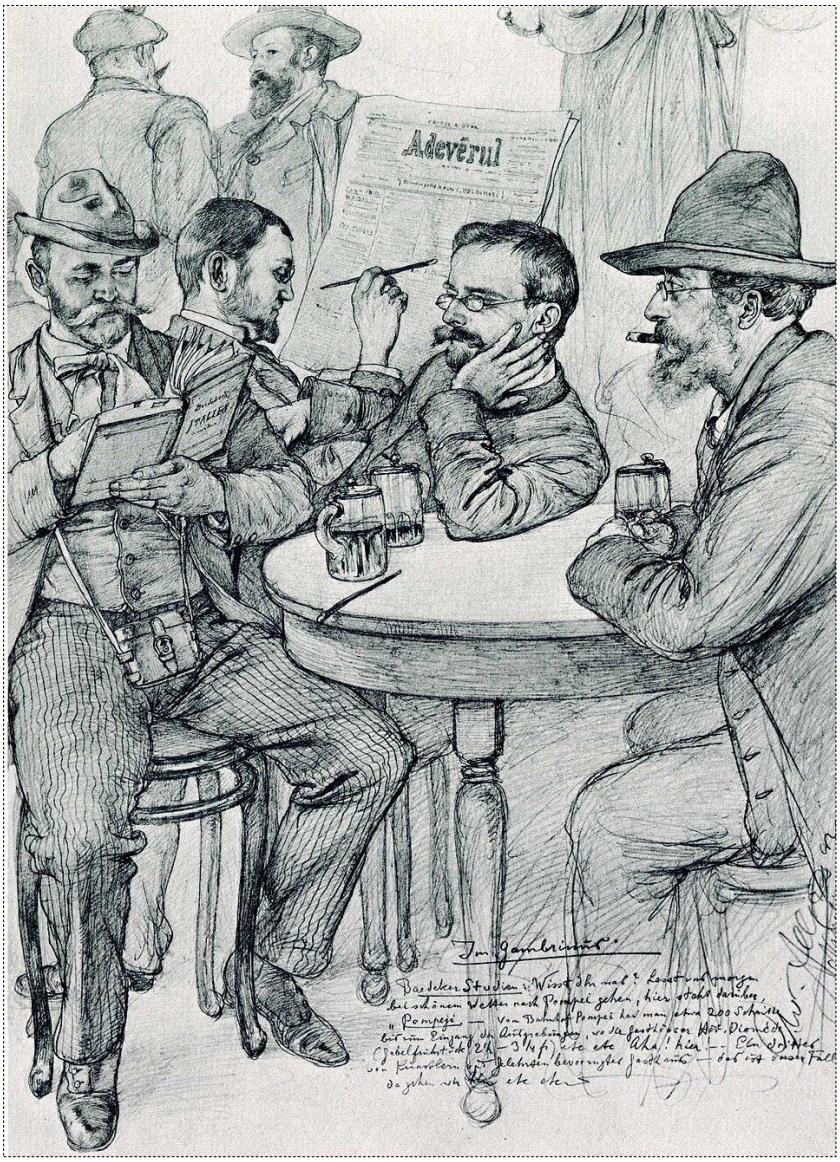

Figure 3.3. Illustration of Tourists in the Café Gambinus Naples. "La bella Napoli" (1893) - "Im Gambrinus" ("The Beautiful Naples" (1893) - "Im Gambrinus"). (Allers, 1893). CC 0.

These descriptions contrast two modes of public life in Naples: the informal and permeable spaces of street kitchens and the fast-paced, transient interactions of the urban café. In both instances, materiality plays a central role—chalk, copper tables, open stoves—each facilitating a different modality of social and spatial engagement.

In summary, this theoretical positioning of porosity as materiality foregrounds the relational and performative qualities of materials

within architecture. Porosity, as understood here, is a generative condition: one that holds the potential to reveal, accommodate, and transform human and non-human experience within architectural space.

This demonstrates how the porosity observed in the material fabric of Naples can be interpreted through the integration of material, spatial, and social dimensions, corresponding respectively to the concepts of containment, boundary, and coexistence.

The following sub-sections will examine each of these aspects in greater depth. The discussion will begin with the concept of *material porosity*, which explores the capacity of porous materials to retain environmental traces and evidence of non-human inhabitation. It will then move on to explore *spatial porosity*, understood here as a characteristic of architectural boundaries that enable interpenetration between distinct spatial realms. Finally, it will consider *social porosity*, which concerns the facilitation of coexistence, particularly between formal and informal practices, or between planned and unplanned uses of space. The chapter concludes by proposing a conceptual framework for understanding architectural porosity.

3.2. On Material Porosity

In Naples, Benjamin and Lacis acknowledged material porosity through a metaphor between the porous stone and the porous architecture. The natural geological features of Naples—especially the shore, with its natural grottoes, fishermen's taverns, and steps—evoke the experience of burrowing into the earth. This was compared to the city's architecture, whose spatial features allow people to wander through staircases, into

courtyards, and converse via balconies. They identified material porosity in Naples without conducting scientific tests on the stone, demonstrating how metaphor can serve as a powerful tool in conveying and describing certain qualities of a place.

This architectural inquiry adopts Benjamin and Lacis's approach in addressing material porosity. The objective is to highlight the value of material porosity. Rather than being scientifically quantified, material porosity is considered in terms of its performance in containing events, specifically environmental phenomena and the activities of non-human entities. Material porosity allows such events to leave traces, which are the focus of this discussion.

3.2.1. The Idea of Material Surface

Architecture is a material object. The discussion of material in architecture can be traced back to classical debates on form versus matter. “In Plato’s theory of forms, the material realisation of a pure form is always imperfect and degraded. The perfect form can only exist in the ideal realm where it is untainted by matter. In a typical account of ‘hylomorphism’, such as Aristotle’s, matter, or ‘hyle’, is given shape by form, or ‘morphe’. Matter in itself is inert and undifferentiated; it is the servant of form and gives it presence. It does not determine form” (Lloyd Thomas, 2007, p. 3).

Such philosophical positions resonate with normative architectural practice, where architecture is initially conceived mentally and translated into drawing (Mindrup, 2015), beginning with schematics, progressing through design development, specification, and construction drawings. The schematic phase is

conceptual, with material considerations introduced later in the design process (Emmons, 2015).

Material is designed, treated, and utilised to serve a purpose, which is not solely functional but also experiential. Material contributes to the architectural atmosphere. As a material object, architecture becomes a perceptible component of the environment. The experience of environmental materiality, including that of architecture, introduces James Gibson's triad of medium, substance, and surface in *The Ecological Approach to Visual Perception.*

"The terrestrial environment is better described in terms of a medium and substances, and the surfaces that separate them" (Gibson, 2015, p. 12). Gibson defines medium as something insubstantial—what Hill might call immaterial—which "affords locomotion to an animate body" (p. 13), such as gas or liquid. The medium allows light and vibration to transmit, facilitates chemical diffusion, and permits respiration. Gas, as a medium, constitutes the atmosphere, which surrounds and interacts with solid objects and is subject to constant change, often referred to as weather.

The second element, substance, is substantial matter in solid or semi-solid form, impervious to bodily locomotion. Substances vary in composition, rigidity, elasticity, plasticity, and density. Enveloped by a medium, a substance is separated from it by the surface. "Insofar as substances persist, their surfaces persist" (Gibson, 2015, p. 18). Thus, a surface is the interface between a substance and its medium.

This triad—medium, substance, and surface—shapes both the environment and architecture. Architecture produces physical and tangible forms (Eichinger & Tröger, 2011), which can be

considered as substance and surface, enclosed by a medium. Notably, it is the surface that mediates our experience of architecture.

The surface is where most interactions occur (Gibson, 2015). In architecture, surface conveys both materiality (Poerschke, 2013) and cultural expression. It is the communicative layer (Eichinger & Tröger, 2011; Pell & Hild, 2010).

The role of the surface extends beyond responding to a programme; it actively generates an effect (A. Benjamin, 2006). One such effect is aura. ‘‘Auras are distinct and yet intangible qualities that hover quite literally on top of the surface” (Lally, 2014, p. 100). Aura, in this sense, is dependent on the surface, illustrating the link between material and immaterial experiences. Additionally, surfaces project sensation. Deleuze and Guattari (in Paterson, 2007) state that “where material ends, sensation begins” (p. 92). Thus, the surface is not merely a boundary for human activity but also a threshold between the tangible and the intangible.

In response to Gibson’s conceptualisation of surface, Ingold (2008) argues that inhabited space is where substance and medium bind. In his discussion of land and weather, he notes that weather inscribes itself on the land. A similar dynamic is evident in Ruskin’s concept of the wall veil, as expressed in his analysis of mountainous textures (Spuybroek, 2016). The Matterhorn’s texture, for example, is shaped by two forces: “from the inside out—constructively—and from the outside in—erosively” (Spuybroek, 2016, p. 58).

These observations prompt a reconsideration of the role of surface in architecture, particularly those surfaces exposed to outdoor environments. One may view the surface as the result of

the binding between the substance and the medium, which leaves behind traces. These traces can redefine the surface. Alternatively, the binding itself may produce the effect of surface, for example, the smell of earth after rain.

The ability of a surface to capture and retain traces of this binding depends on its material properties and qualities. Materials possess the capacity to register change, retain imprints, and archive processes (Schuppli, 2020). Materials and their surfaces are not inert; they are constantly in contact with other materials, elements, and entities. This makes the surface a space of encounter and potential exchange. Even the slightest contact between skin and surface results in microscopic mutual penetration (Eichinger & Tröger, 2011).

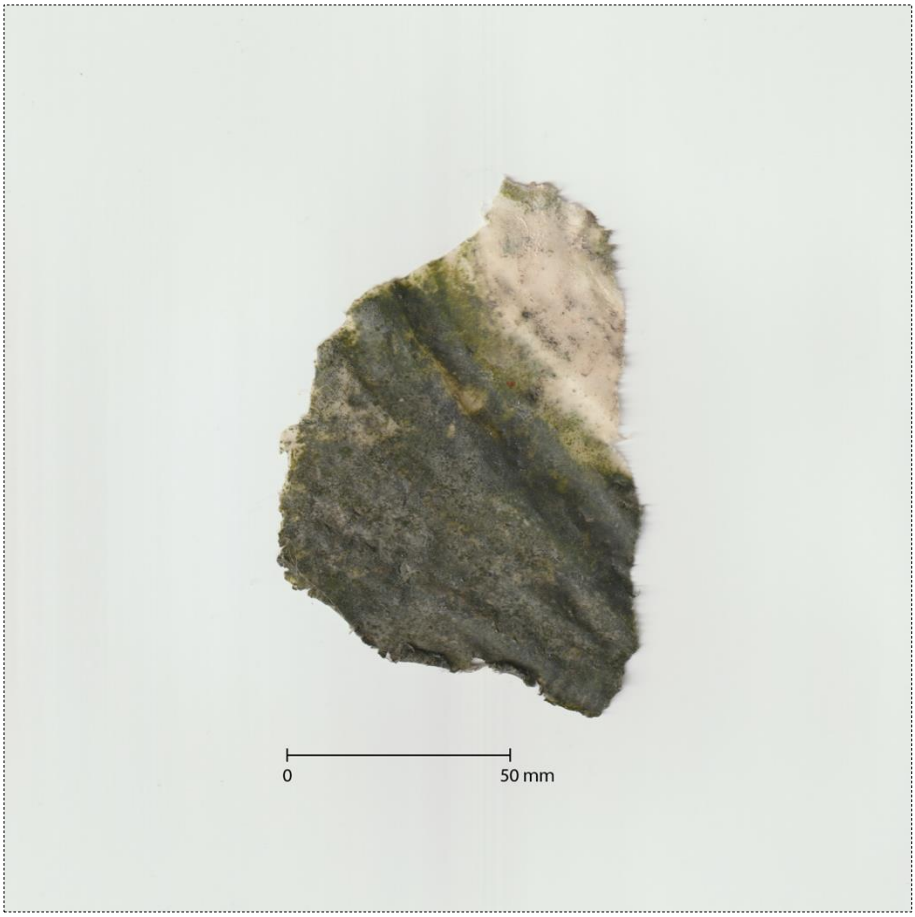

Figure 3.4.A found plastic piece from the banks of the River Thames, London, covered in green moss

This study proposes that porosity—specifically, material porosity—facilitates the retention of traces on material surfaces, allowing microscopic penetrations between materials and other entities. In this context, porosity emerges as a material quality that shapes affordance. According to Gibson, ‘‘The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill” (2015, p. 119). This reflects a reciprocal process of perception between the environment and the perceiving entity.

While Gibson uses the term ‘‘animal” to denote the perceiver and actor within an environment, this inquiry expands the definition to encompass non-animal organisms such as vegetation. Therefore, in examining material porosity, vegetation is included as a perceiving entity. The ensuing discussion will thus focus on how material porosity, as a form of affordance, is 'perceived' by vegetation, enabling the environment to imprint itself on the material through lingering traces.

3.2.2. The Concept of Material Decay

Like all material objects, architecture is subject to the passage of time (Handa, 2015) and exists within a natural environment, operating by natural processes (Forty, 2012). One such environmental factor is weather. Although not the sole contributor, weather significantly influences the ageing and deterioration of building materials. It may even be understood as a design agent—one that continues and completes the architectural design (Mostafavi & Leatherbarrow, 1993).

Weathering may be conceived as a subtractive process—the gradual removal of material through exposure to elements such as rain, wind, and sunlight (Mostafavi & Leatherbarrow, 1993). Architectural surfaces fade, peel, erode, and eventually degrade. From the moment a building is exposed to the weather, it begins to deform and decay. This inevitable process underpins the necessity of maintenance (Cairns & Jacobs, 2014). Human efforts to preserve, restore, and protect architectural works reflect an awareness of their impermanence, firmly placing architecture within the natural cycle of life and death.

Cairns and Jacobs describe decay as a biological process in which “decay follows death” (2014, p. 69), involving the gradual disintegration of organic matter by multiple agents, beginning with enzymes and extending to bacteria, fungi, and other organisms. This frames decay as an ecological exchange—simultaneously destructive and generative (Cairns & Jacobs, 2014). Decay becomes a paradoxical phenomenon, embodying both death and growth (Sotomayor, 2014). It manifests in diverse forms: some materials decay faster than others; some deteriorate internally, others externally, due to overexposure or excessive enclosure (Hage, 2021, p. 6). As Cairns and Jacobs note, decay is a situated phenomenon resulting from the interaction between a building's envelope and its biotope in a specific time and place (2014, p. 85), making it inherently site-specific (Sotomayor, 2014).

In architectural terms, decay may signal death or indicate its ongoing progression. It is closely related to material properties, particularly porosity. As discussed in Chapter 2, disciplines within the physical sciences affirm the correlation between material porosity and decay. This is attributed to porosity's capacity to absorb environmental elements, particularly moisture, which accelerates deterioration. Without maintenance, especially when

a building is uninhabited, decay advances more rapidly, though rates still vary according to material type (Lisci et al., 2003).

Moreover, decay is not solely a symbol of demise; it can also facilitate the emergence of new life (Cairns & Jacobs, 2014). In architectural terms, decay creates new spatial conditions—for instance, cracks formed on decaying surfaces. Vegetation can perceive and inhabit these spaces. Though the mode of perception differs from that of humans, involving physical and chemical responses rather than visual cognition, the logic of spatial engagement remains analogous.

> “The viewers who are freed from the usual concerns like the building’s purpose, event, or history and are enticed to relate directly and immediately to the building’s physical properties seem to have some additional opportunities. The viewers seem able to engage with the building deeper than its surface, that is, its appearance. Because of this, the viewers seem able to employ more than their visual faculty and engage their imagination. And, because they employ their imagination, they seem able to involve the entirety of their existence.” (Handa, 2015, p. 175)

While Handa refers to the human viewer’s engagement with a building, within the context of non-human inhabitation, one might reimagine the ‘viewer ’as vegetation. Vegetation, in its attempt to inhabit decaying building material, interacts directly with the material’s physicality—penetrating and attaching to surfaces to grow. Decay, through the creation of structural openings such as cracks, increases the material’s porosity. In this way, a cyclical relationship emerges: porosity allows decay, and decay, in turn, enhances porosity.

This architectural inquiry further explores decay as a consequence of material porosity. Porosity permits decay by allowing the material to absorb and contain environmental factors such as weather and by providing affordances for non-human inhabitation, such as by vegetation. Although decay and, by extension, porosity are often perceived negatively, this study aims to reposition them as positive forces within architecture. The forthcoming discussion will explore two interrelated dimensions of decay: its aesthetic potential and its ecological value.

The Aesthetic Dimension of Decay

The discussion on the aesthetic dimension of decay begins with its contribution to the notion of the picturesque, arguably a prominent topic in eighteenth-century English landscape discourse. Hill (2012, p. 114) notes that Sir Uvedale Price, in his *Essay on the Picturesque: As Compared with the Sublime and the Beautiful* (1794), proposed that the picturesque occupies a position between the beautiful and the sublime, and is, fundamentally, a product of time. Time transforms a beautiful object into one that is picturesque. In the context of the English garden, this transformation typically involves a built structure: the picturesque effect is achieved as the passage of time and exposure to the elements initiate decay, followed by the encroachment of plants and creepers, ultimately leading to the structure’s ruination.

As decay is integral to the conception of the picturesque, so too is it central to the idea of the sublime. "Undermining the classical tradition that prioritises harmonious, formal beauty, Burke equates the sublime with darkness, vastness, and even

deformity. While the beautiful is merely pleasant, the sublime is magnificent" (Edmund Burke [1957] in Hill, 2019, p. 54).

Decay suggests deformity, and the presence of death contributes to the experience of the sublime. In architectural terms, this is most often articulated through the notion of the ruin.

In his essay on ruins, Simmel observes that ‘‘decay appears as nature’s revenge” (1959, p. 259). Ruins may be regarded as the end of architecture (Cairns & Jacobs, 2014). Commonly, they are understood as ‘‘edifices that are no longer in use” (Hill, 2019, p. 295), defined by ‘‘the loss of the function of the original building” (Somhegyi, 2018, p. 15) as a result of physical decay. Despite the diminishment of their physical form, ruins expand in metaphorical and allegorical significance (Hill, 2012; 2019). They are associated with fragmentation—both as material condition and as a reference to memory—as well as with absence and a sense of incompleteness (Hill, 2019; Somhegyi, 2018), which collectively allow for new interpretations, values, and meanings to emerge.

“In the early eighteenth century, weather in a painting, a novel or a garden building, the unfinished and the fragmented were means to both stimulate and question the author and invigorate and challenge the reader's or the viewer’s imagination. The ruin draws attention to what is absent and was once whole, and implies a possible return to that condition” (Hill, 2019, p. 80). The idea of the ruin in architecture is particularly compelling. It exists simultaneously as a material object and as a metaphorical and allegorical space, capable of bridging past and present, culture and nature, and the real and the imagined. While a more detailed discussion of the ruin will follow in the next chapter, the current emphasis lies in examining how decay contributes to the formation of the ruin, which is aesthetically valued as a positive

attribute. Building on this discussion, the next section will explore the concepts of incompleteness and imperfection in architecture.

Figure 3.5. Ruins captured by Piranesi. (Piranesi, 1778). CC 0.

This discussion returns us to the question of surface. Different materials capture and reveal traces in distinctive ways; some surface marks may even serve as indicators of human habitation. A compelling example is that of pewter cutlery and tableware, where the material surface registers the effects of human use. Scratches on pewter, for instance, can evoke the memory of a grand feast (Eichinger & Tröger, 2011). This idea resonates with the Japanese aesthetic concept of *Wabi-Sabi*. *Wabi* denotes poverty, often referring to the humble and shabby character of a peasant's hut, along with the worn, everyday objects within it. *Sabi* connotes loneliness (Sartwell, 2013). Although both terms stem from ostensibly negative notions, together they articulate an alternative form of beauty. According to Sartwell (2013), in aesthetic terms, *Wabi* embodies humility and imperfection, while *Sabi* suggests solitude and stillness. Combined, *Wabi-Sabi*

celebrates austerity and imperfection, honouring the beauty found in the withered, the weathered, and the tarnished.

In *In Praise of Shadows*, Tanizaki (2001) discusses how this form of beauty is associated with Eastern sensibilities, in contrast to Western ideals of beauty. However, it aligns more closely with Western conceptions of the sublime. He observes that Westerners typically polish silver or steel objects to maintain a pristine, new appearance. In contrast, those in the East prefer a patina that develops from repeated handling: “a polish that comes of being touched over and over again” (Tanizaki, 2001, p. 20). This exemplifies an aesthetic preference for surface imperfections, which are seen not as flaws but as bearers of beauty.

In connection with this notion of imperfection, Handa (2015) proposes appreciating architecture as akin to nature by recognising its incomplete, imperfect, and impermanent characteristics. She draws upon the concept of *Wabi* to interpret architectural imperfection. To illustrate incompleteness, she refers to ruins, which can be understood either as fragments or as synecdoches—both of which signify parts of a whole. The distinction lies in emphasis: a fragment pertains to the physical part, existing independently as a remnant of a once-whole structure. A synecdoche, by contrast, suggests representation, wherein the ruin symbolises a larger whole that may no longer exist but can be imagined.

To explain impermanence, Handa invokes the metaphor of the palimpsest—a writing surface that is reused over time, encapsulating the layering of traces and temporal inscriptions. As such, architecture conceived as a palimpsest reflects the cumulative imprints of its occupants over time. These three concepts—imperfection, incompleteness, and impermanence—

work together to support an appreciation of architecture as natural. While architecture is undeniably a cultural artefact, its materiality behaves in a manner akin to natural processes: continuously evolving and subject to the forces of time.

Materials age; they change through prolonged exposure to environmental conditions, such as weather and wear. In his discussion of diversity in artistry, Pye (1968, p. 65) identifies age and wear as “powerful diversifying agents.” He notes that aged and worn qualities are often undervalued, as novelty is associated with prestige. However, in specific contexts, such as patina, age, wear, and weathering, are regarded as desirable. Patina, which develops on bronze through exposure and use, signifies a surface condition that endows an object with historical and sometimes spiritual significance (Sartwell, 2013). It exemplifies how a surface can come to reflect its depth, essence, and past. Furthermore, patina evidences how an object is shaped by its surroundings, bearing the marks of everything that has touched it (Sartwell, 2013).

While this discussion does not directly address decay, it highlights the aesthetic and symbolic value of age, wear, and the passage of time. Ultimately, it is the materiality of a substance that determines its capacity to capture, contain, and preserve such traces.

The Ecological Dimension of Decay

This section explores the ecological dimension of decay, beginning with the relationship between architecture and nature. A key mediator in this relationship is materiality—specifically, material porosity—which enables decay to occur and invites new

forms of inhabitation and aesthetic experience. This discussion will first consider how decay is intentionally incorporated into architectural design practice. The concept of decay as a design strategy or aesthetic is evident in the work of architects such as Carlo Scarpa, Herzog & de Meuron, and Le Corbusier. Typically, the inclusion of decay in architectural design is framed as a response to modernism, which emphasised material perfection and permanence.

Hagan (2007) argues that the modernist movement established a new standard that sought to eliminate historical continuity. The modernist ambition to produce something entirely new, untouched by history and uninfluenced by context, resulted in a denial of renewal. This pursuit of purity often rejected any suggestion of buildings being part of a broader environmental or temporal context, striving instead for architectural permanence and newness.

> “The new 'classics'—the Barcelona Pavilion, the Villa Savoye—could not therefore, ideologically, be allowed to show their age. Ageing implies an ever-increasing distance from the ever-appearing new, ... Thus, the decay of the materials of the Villa Savoye was unacceptable as the decline of the ideas that produced it.” (Hagan, 2007, p. 252)

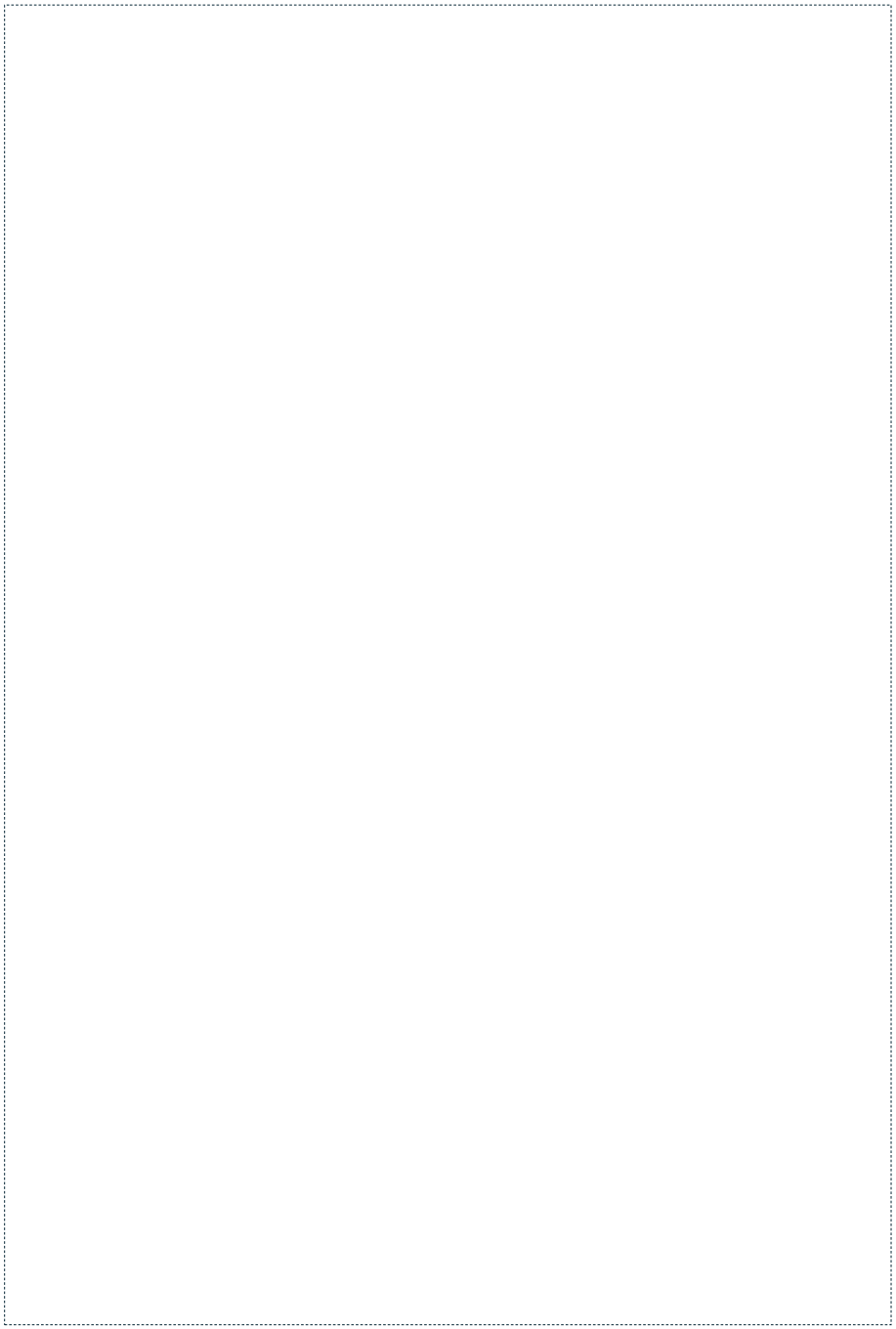

Figure 3.6. Advertisements of Architecture. (Tschumi, 1976)

By contrast, Tschumi (as cited in Hejduk, 2007) interprets decay as a form of transgression—an architectural act that surpasses expectation and challenges convention. He proposes a critique of the limitations of architectural thought and spatial ideology through what Hejduk (2007, p. 396) describes as “the transgressive act of finding pleasure and beauty in the rotting corpse of Modernism’s firstborn.” In this context, decay is no

longer a failure but a creative force—an ecological and aesthetic agent that reconnects architecture with processes of time, nature, and transformation.

In his later works, Le Corbusier came to embrace exposed materials and the processes they undergo, thereby revealing and celebrating material imperfection. Today, however, some of his buildings—such as La Tourette—are deteriorating significantly, to the extent that the decay affects visitors' experiences. This example highlights that decay can be contingent and its effects unpredictable. Nevertheless, certain architectural practices emerging after the modernist period have intentionally incorporated decay as part of their design strategy.

In the works of Carlo Scarpa, such as the Banca Popolare and the Brion Tomb, the use of exposed materials and detailing appears to invite weathering, including features like water stains.

> “The rainwater grooves in the façade of Scarpa’s Banca Popolare complicate the modernist privileging of formal legibility by elevating the status of dirt as an ornamental effect and registering the passage of time.” (Cairns & Jacobs, 2014, p. 85)

Similarly, in Herzog & de Meuron’s projects—such as the Rudin House and the Rémy Zaugg Studio—the use of exposed concrete appears to welcome natural processes, including decay, mould, and algae growth.

> “As Jacques Herzog of the Swiss architectural practice Herzog & de Meuron, one of the pioneers of the revival of exposed concrete, explained: ‘We are interested in the mosses and lichens that grow on the surface of the stones… The pencil of nature (that is what Fox Talbot called

> photography) would also become the pencil of architecture." (Forty, 2012, p. 57)

In both the Rémy Zaugg Studio and the Ricola Europe storage and production plant, Herzog & de Meuron explicitly embrace weathering and biological growth as part of the architectural expression:

> "The novelty rests on the fact that they stage their decay. Rainwater, algae, lichens, and molds are encouraged to attach to, grow on, and stain the black concrete walls of these buildings." (Cairns & Jacobs, 2014, p. 84)

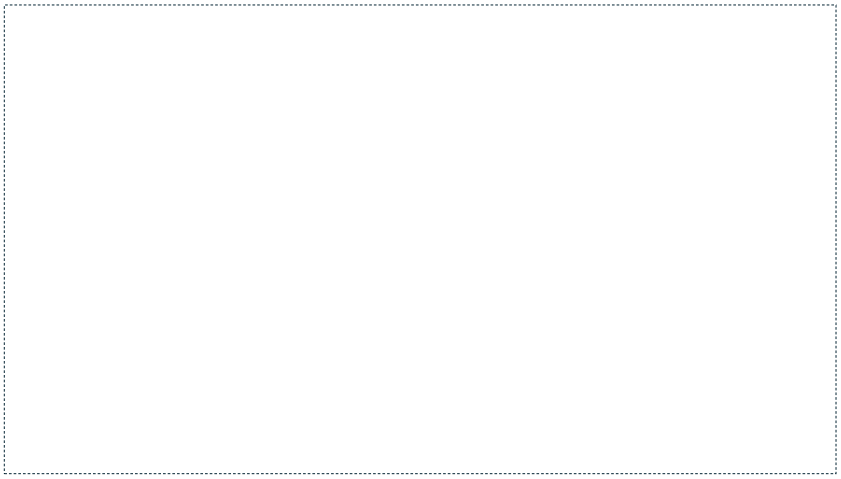

Figure 3.7. Studio Rémy Zaugg, Mulhouse by Herzog & de Meuron. (Richter & Spiluttini, 1995)

These examples suggest a paradigm shift in architectural thinking—one in which decay is no longer resisted or hidden, but instead anticipated, accepted, and aesthetically integrated into the building's life.

The encouragement of non-human organisms to grow on material surfaces reflects a design approach that values porosity and actively incorporates material porosity. This gesture aligns

with one of the key contemporary themes in sustainable design: the bioreceptivity of materials (Cruz & Beckett, 2016).

> “Surface growth of plants upon a material is known as biological colonisation. Buildings – or more specifically building materials – are all prone to vegetative covers at some point in time, especially micro-organisms and cryptogams that are abundant in air, water, and soil systems.” (Cruz & Beckett, 2016, p. 52)

Today, bioreceptivity and the biological colonisation of materials are increasingly being designed into new sustainable and ecological material innovations in architecture. These materials are engineered to support the growth of vegetation on their surfaces. However, biological colonisation is still more commonly observed in older buildings, such as churches, castles, rooftiles, and statues, where it is typically perceived as a naturally occurring phenomenon rather than an intentional design outcome.

> “Biocolonisation is often seen on older buildings such as churches and castles, and also commonly on rooftiles and statues. This ‘growth ’can have both positive and negative connotations depending on the viewer. Colonisation in a negative sense can be associated with biodeterioration and biofouling, whereby the originally ‘clean ’surface of the materials becomes blemished and stained, making the building look dirty and unkempt.” (Cruz & Beckett, 2016, p. 52)

Indeed, biocolonisation is frequently associated with processes of biodeterioration and biofouling, which contribute to the material decay of buildings and are therefore often viewed negatively.

However, there are also positive interpretations of this phenomenon.

> ‘‘Positive associations of biocolonisation create an additional layer to the material which relates to a feeling of protection and a sense that greenery has an inherent vitality. Vivid biocolonisation has, most of all, connotations of environmental health and wellbeing. Noteworthy is also the nostalgic association of biocolonised surfaces following bucolic, idyllic visions of nature often experienced at historic palaces, gardens, and ruins.” (Cruz & Beckett, 2016, p. 53)

Thus, material phenomena such as biocolonisation elicit ambivalent responses—both positive and negative—depending on how one perceives the presence of nature in architecture. While the negative perception remains prevalent, especially in the context of maintaining cleanliness and order, the current era of climate crisis and environmental urgency necessitates a shift in attitude. It becomes imperative to accommodate and even encourage nature’s presence within the built environment. One approach involves the development and use of *living materials*—materials designed to support and integrate natural processes (Riley et al., 2019).

An illustrative example of the ecological dimension of decay and biocolonisation is the practice of non-intervention preservation at Orford Ness Nature Reserve, as discussed by DeSilvey (2017). This preservation strategy embraces ongoing decay, allowing structures to deteriorate naturally while permitting wild flora and fauna to inhabit the remains of this former military testing site. Over time, the ruins become part of the landscape itself. Non-intervention preservation exemplifies a porous approach to material decay. It allows the structure to continue its process of

ruination, embracing material porosity, and ultimately re-integrating the built environment with nature.

3.3. On Spatial Porosity

In Naples, Walter Benjamin and Asja Lacis explore the idea of spatial porosity through their observations of everyday life, revealing the dynamic relationship between architecture and action.

> “Buildings are used as a popular stage. They are all divided into innumerable, simultaneously animated theatres. Balcony, courtyard, window, gateway, staircase, roof are at the same time stage and boxes.” (Benjamin & Lacis, 1979, p. 170)

Here, both architectural elements and the broader urban fabric serve as stages for what Benjamin and Lacis refer to as *communal rhythm*. These physical structures—static and seemingly permanent—interpenetrate with the temporal flows of everyday practices, suggesting overlapping spatial and temporal registers (Benjamin & Lacis, 1979, p. 169). The interpenetration of different realms is central to the concept of spatial porosity. Gilloch (1996, p. 26) highlights the ‘‘mingling of public and private spaces” in Naples as a clear example of architectural porosity. For instance, domestic furniture appears on the streets, while street life spills into living rooms. This interweaving extends beyond objects to include everyday activities, such as sleeping, napping, or cooking, that frequently occur in public space. Such practices demonstrate how the cultural and habitual use of these realms blur the boundaries, creating fluid transitions.

> “Its streets and buildings offer no firm boundaries, no severe walls, that demand that the pedestrian keep his distance … The division between street and structure, which is meant in northern cities to reinforce the distinction between family privacy and public spectacle, does not exist in Naples. Personal relationships shift constantly in an environment where architecture does not enforce distinction.” (Purdy, 2011, p. 292)

Although Benjamin and Lacis explicitly reference architectural and urban elements as stages for theatrical everyday life, their emphasis lies more on the practices themselves than on the structures. This is not to suggest that these physical elements are insignificant; instead, their role deserves greater narrative attention. Purdy’s observation, quoted above, reinforces the notion that in Naples, architecture does not impose rigid distinctions; walls, in particular, do not serve as absolute boundaries but rather enable openness between public and private realms. This shift in emphasis suggests that the analysis of spatial porosity may vary depending on one’s interpretive standpoint.

In this discussion, spatial porosity will be approached by first examining literal boundaries before addressing the interpenetration of social or spatial realms. Between private/public or inside/outside lies a boundary, symbolised by a “/”. In the built environment, such boundaries are materialised in various forms. For this analysis, the wall, specifically, the architectural or building wall, and at times the façade, will be the focus.

> “Every wall is reversible, and its surface is like a membrane… Here the membrane acts as a place of exchange. The whole city is porous and allows for multiple

penetrations, offering unique opportunities for interchange and transaction. Such porosity is what architecture could and should offer." (Teyssot, 2013, p. 27)

Teyssot's statement encapsulates the direction of this inquiry, which considers the wall not as a barrier but as a spatial membrane that facilitates exchange. In Naples, architectural features such as windows and balconies act as spatial extensions of the domestic interior, forming part of the façade from which residents engage with the city. For instance, balconies are not only used to dry laundry but also to sit and observe the urban life below—a function that differs from the view afforded by a window.

Figure 3.8. Gevels met drogend wasgoed in Napels (Façade with drying laundry in Naples. (Sommer, 1870). CC 0.

These apertures—balconies, windows, doorways—are among the architectural features that render walls spatially porous,

enabling access, vision, and interpenetration between interior and exterior realms. This relates to a foundational idea in architecture: the creation of boundaries. These boundaries, often materialised as walls, are imbued with intention—whether to include or to exclude. Spatial porosity, in this sense, can be understood as the result of a porous gesture in the act of boundary-making.

3.3.1. Making Porous Boundaries

The origins of architecture can be traced back to the concepts of the dwelling house described by Vitruvius and the primitive hut of Marc-Antoine Laugier (Küreli, 2016). Vitruvius asserted that architecture began with the discovery of fire, which acted as a social catalyst. As people gathered around the fire, the need for shelter grew, as caves and trees could no longer meet their evolving requirements. Thus, humans began to build. Laugier continued this narrative in his theory of the primitive hut, though his discussion extended more into aesthetics, beauty, and architectural ideals (Küreli, 2016). Despite these differences, both perspectives recognise architecture as an artificial response to the need for shelter, mainly to protect from the environment and preserve something essential, such as fire.

The discovery of fire and the communal gathering around it is considered “the moral element of architecture”—the core surrounded by “three other elements: the roof, the enclosure, and the mound” that protect fire from nature (Semper, 1989, p. 102). According to Semper, the configuration and material composition of these architectural elements depend on environmental and social contexts, reinforcing the idea that architecture is both a response to and an expression of human interaction with the world.

From the beginning, architecture has been rooted in the concept of dwelling. As Heidegger noted, “we are dwellers”, and through dwelling, we build (Heidegger, 2011, p. 246). Heidegger understood dwelling to involve both *staying*—implying duration—and *sparing*—signifying care, responsibility, and relationality, including with the environment. Ingold (2008) highlights this difference by comparing Gibson’s and Heidegger’s conceptions of the environment: Gibson used nouns like *medium*, *substance*, and *surface*, akin to furniture; Heidegger, by contrast, used verbs associated with growth and movement—earth is fruiting, sky is the vaulting path of the sun. Ingold elaborates: “The world that is occupied, I argue, is furnished with already-existing things. But one that is inhabited is woven from the stance of their continual coming-into-being” (2008, p. 1797). Inhabitation, then, entails an ongoing, dynamic encounter between buildings and their users, as well as the events, emotions, and affects they experience (Kraftl & Adey, 2008).

Architecture is one of the outcomes of humanity’s gesture of inhabiting the world through the creation of enclosures, such as walls. According to Semper, the technical origin of enclosure lies in “the art of the *wall fitter* (Wandbereiter), that is, the weaver of mats and carpets”, which in ancient times were used horizontally and vertically for protection and spatial division, preceding masonry construction (Semper, 1989, p. 103, original emphasis).

> “Hanging carpets remained the true walls, the visible boundaries of space. The often solid walls behind them were necessary for reasons that had nothing to do with the creation of space; they were needed for security, for supporting a load, for their permanence, and so on. Wherever the need for these secondary functions did not

> arise, the carpets remained the original means of separating space." (Semper, 1989, p. 104)

Semper thus proposes two conceptualisations of the wall: as the origin of spatial definition, and as a structural element providing durability and security. Walls, therefore, are not merely structural; they are intentional gestures. As Unwin writes, walls express an attitude: "to protect or acquire, to include or to exclude, to bring together or to divide, to clarify or to confuse, to provide support or to impose a burden, to shade or to reflect light, to make a silent place or to enhance sound, to keep cool or warm…" (Unwin, 2000, p. 25). The wall becomes a medium through which humans negotiate spatial and social relationships using material and immaterial means.

Unlike natural walls, such as cliffs or cave walls, which expose only one surface, architectural walls are defined by their dual surfaces (Unwin, 2000). As A. Benjamin asserts, "walls should be understood as that which carries two surfaces" (A. Benjamin, 2006, p. 5). Architectural walls differentiate interior and exterior spaces. Their two sides are often treated differently, both materially and aesthetically, in response to environmental needs and personal preferences. Consider a flat wall: one side may be painted white, fitted with a heater and adorned with family photos; the other, facing the street, may consist of exposed brick, part of a uniform façade regulated by external standards.

The principal external wall of a building—the façade—does more than enclose space or protect from the elements. It is also a surface of representation, often political, expressing identity and power (Zaera-Polo, 2008). As the 'face' of the building, the façade, like many architectural walls, includes apertures such as doors, windows, and balconies. The composition of these elements varies according to the wall's intended function—

access, environmental response (such as light and air), or social connection. These relationships are typically regulated or mediated, allowing for dynamic interactions.

This is where the idea of spatial porosity emerges. It begins with the gesture of wall-making, which enables relationships between the interior and exterior. It is manifested in both materiality and aperture configuration.

The term *"porous"* first entered architectural discourse about medical and hygienic concerns (Ekici, 2016; Erben, 2018). In the context of tuberculosis in the late 19th and early 20th centuries, natural porous materials were perceived as health hazards, as they were capable of trapping harmful substances. The invention of linoleum—a non-porous material—marked a shift towards impermeability in building design (Erben, 2018, p. 26). Porosity was thus initially framed negatively in architecture. Yet paradoxically, porosity also allowed for air circulation and contact with nature, both of which are essential in the treatment of tuberculosis—ideas that were taken up in the hygiene movement of the modern era.

This gave rise to the "purity movement" in modern architecture (Drake, 1997), which emphasised order, cleanliness, and separation between what was deemed clean or dirty, tidy or untidy (Forty, 1992). These values became embodied in architectural forms: white surfaces devoid of ornament to minimise dust and droplets (Campbell, 2005; Forty, 2012); strict spatial standards (e.g., Le Corbusier's *Manual of the Dwelling*); and functional design features such as flat roofs, balconies, terraces, and even furniture like sanitised chairs, especially in sanatoria (Campbell, 2005).

> "… certain architectural features were essential to early sanatorium design. These were deep verandas, balconies, covered corridors and garden shelters which were furnished with reclining couches for the *jour médical*—or the 'Cure'…" (Campbell, 2005, p. 465, original emphasis)

In this context, architecture became an active agent in the healing process, promoting spatial relationships with the outdoors, typically woodland settings that provided fresh air for recovery.

The relationship between hygiene, the human body, and the environment also brings the concept of boundary into focus, through the skin, clothing, and dwelling (Ekici, 2016). Drawing on the work of Max von Pettenkofer (1818–1901), a pioneer in hygiene, Ekici (2016) highlights the concept of the dwelling as an extension of the skin: both protective and permeable, it serves as both a boundary and an interface. The skin, consisting of layers and appendages such as hair follicles and sweat glands, regulates bodily homeostasis. Pores serve as conduits, transferring fluids like sweat and oil from within the body to the surface. Simultaneously, the skin acts as a semi-permeable membrane, allowing environmental substances to enter. In this sense, the skin is both porous and permeable.

Pettenkofer extended this analogy to architecture, arguing that walls, like skin and clothing, must breathe (Ekici, 2016).

> "By advocating permeability, Pettenkofer challenged common views about the separation of the house's inside and outside… In his view, walls should no longer be solid barriers; rather, they should facilitate exchange with the outside." (Ekici, 2016, p. 284)

Initially, the architectural response to health crises involved the use of impermeable materials and a desire to isolate buildings from their polluted external environments. Yet, maintaining hygiene does not require absolute separation, but instead controlled interaction. The connection between interior and exterior remains vital for human well-being. When external air is polluted, architectural enclosures—such as walls—must perform filtration and purification functions (Ekici, 2016).

Walls, therefore, emerge from a range of intentions and perform in multiple ways. In this inquiry, the wall is valued not merely as a barrier but as a device for facilitating interaction and exchange between the interior and exterior. This is the essence of *spatial porosity*—a concept born from the nuanced understanding of walls not as limits, but as thresholds for relational engagement.

3.3.2. Inhabiting porous boundaries

> "Walls frame our existence. The things we do relate in some way to walls more often than not. Walls mark out the territories of our lives; they provide us with shelter and privacy; they support the roofs over our heads; they protect our belongings and keep out strangers; we project images onto them, play games against them… and use them for many other things besides. We build them, and when they are built, they set the space in which our actions and relationships take place." (Unwin, 2000, p. 25)

As materialised architectural boundaries, walls shape the spaces in which inhabitation occurs. We encounter and interact with their surfaces as part of everyday life. This suggests that the wall is not space itself, but instead defines and frames it. A wall is

typically understood as a solid vertical boundary—'solid' in the sense that it cannot be traversed physically by the human body, except through apertures such as doors, windows, and balconies. These apertures not only support the use of the spaces defined by walls but also constitute literal zones of inhabitation, often embedded within or extending from the wall's thickness. This section begins the discussion of inhabiting porous boundaries by considering the roles of the door, window, and balcony as the 'pores' of the wall.

> “The human being who first erected a hut, like the first road-builder, revealed this specifically human capacity over against nature, in so far as they cut a portion out of the continuity and Infinity of space and arranged this into a particular unity by a single meaning. A piece of space was there brought together and separated from the whole remaining world, because the door forms, as it were, a linkage between the space of human beings and everything that remains outside it, it transcends the separation between the inner and the outer.” (Simmel, 1997, p. 65)

In his essay "Bridge and Door," Simmel describes the human inclination to both connect and separate as central to our nature. The door, as an architectural element of the wall, simultaneously enacts and mediates this dual gesture. It connects when open and separates when closed. The primary function of the door in architecture relates to the act of entering or exiting a space. This is a ritualised sequence that begins with an intention to join. If the door belongs to you, you may unlock it. If you are a guest, please knock or ring the bell. The door is then opened, either by yourself or another, often involving a moment of interaction, inquiry, or welcome. Upon being granted access, you step through, crossing the threshold, and the door is eventually closed again.

Exiting involves a similar sequence, though the emotional and sensory experience may differ.

When open, the door connects the interior and exterior, offering a passage through the wall. It is also a liminal space, a threshold, "the boundary point at which human beings always stand or can stand" (Simmel, 1997, p. 65), and a "bridging of space" (Teyssot, 2005). Even when the door is closed, its thickness offers a narrow, inhabitable zone. This liminality is evident in transient moments, such as retrieving milk left at the doorstep, exchanging greetings with neighbours, or simply leaning on the doorframe. The performance of a door is shaped by its dimensions, materials, and mechanisms, whether a hinged, sliding, or automatic door. As door design evolves, it increasingly takes on anthropomorphic characteristics, aiming to automate or substitute human actions (Johnson, 1988 (Written by Bruno Latour)). From doorstops that gently close the door to revolving and automatic doors used in commercial buildings, these variations shape the entry experience and signal the nature of the space within. For example, one expects a residential front door to differ in design and experience from the glass automatic doors of an office lobby.

Whereas the door facilitates bodily passage, the window is primarily a medium of visual and environmental exchange. Its primary role is to permit light, air, and views—qualities that require transparency, usually achieved through glass. Windows often incorporate mechanisms for opening and closing, which allow control over additional elements such as breeze or noise. Teyssot (2005) notes that in eighteenth-century architectural treatises, windows were perceived differently from inside and outside. Externally, windows formed part of the classical architectural facade; internally, they were part of the decorative

scheme. Like walls, windows have two faces, each bearing a distinct meaning and treatment.

Our engagement with windows is usually oriented from inside to outside: “it is there for looking out, not for looking in” (Simmel, 1997, p. 66). Windows allow external conditions—such as light, air, and view—to be experienced within an interior space. For example, in modernist architecture, curtain walls—entire walls composed of glass—were intended to blur boundaries and invite nature indoors. Yet, when the outside view is urban rather than natural, windows may also invite reciprocal gaze, raising privacy concerns.

> “When the natural landscape is replaced by the urban, the window as a place for viewing out becomes also the place where others peer in. The transformation of the singular (outward) view into potentially reciprocating views (looking at and being looked at) thus destabilized conventional understandings of the function of windows.” (Leatherbarrow & Mostafavi, 2002, p. 50)

To mediate this dual visibility, windows are often accompanied by curtains, blinds, or screens, which allow varying degrees of openness, privacy, and light control. Spatial arrangements around windows and design details can either support or conceal exposure. A person might lean out to greet a passerby or sit discreetly behind the pane, observing without being seen. Windows are also spatial features of display. Their thinner construction relative to walls often results in ledges or recesses that accommodate plants, books, or seating. In bay windows, these spaces are extended for habitation. Windows may also facilitate domestic functions, such as drying laundry, releasing cooking smoke, or ventilating interiors.

In some contexts, the personalisation of window spaces is restricted, especially when the external face forms part of a regulated facade. Yet, for artists like Hundertwasser,[20] windows become expressions of individual identity:

> “A person in a rented apartment must be able to lean out of his window and scrape off the masonry within arm’s reach. And he must be allowed to take a long brush and paint everything outside within arm’s reach. So that it will be visible from afar to everyone in the street that someone lives there who is different from the imprisoned, enslaved, standardised man who lives next door.” (Hundertwasser, 1990)

Thus, windows serve as thresholds where domestic life and personal identity may extend outward into public view.
This is how the wall is inhabited through the window. Primarily, it facilitates visual engagement between the interior and exterior, allowing light, air, and views of the picturesque landscape to enter the interior space. However, it also involves bodily interaction—leaning into the window, placing objects on the windowsill, decorating the window, or using it for domestic purposes such as drying laundry or venting cooking smoke, which in turn releases aromas into the surrounding air.

Unlike a door, a window is not designed for bodily access. Yet in exceptional circumstances—such as forgetting one’s key—it may become an improvised entry point. Depending on its dimensions and mechanism, this may be physically possible, though it is rarely the intended function of the window.

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[20] Hundertwasser, through his Window Right Manifesto, viewed window as one’s expression of their existence, or a space that could give accessibility to personalised partially the façade and claimed it through one’s identity. Window is a space where the inside, such as domestic activity or personality leaks out, and they can stay. Some example is Window Right Bülach, Swutzerland, 1972.

Balconies are another form of wall aperture. As appendages projecting from a building's façade, balconies extend private space into the public domain, typically in an elevated form. Unlike ground-level porches or terraces, balconies serve those living above street level.

“On a balcony, one is outside, yet at home; exposed, yet secluded” (Zacka, 2022, p. 84). Balconies offer the possibility of interaction without intimacy: "company without closeness" (Zacka, 2022, p. 86). Their modest dimensions often accommodate chairs, plants, or dining furniture.

Balconies might be considered extended windows. While this is a simplification, they share the window’s function as a visual and environmental conduit while enabling physical presence outdoors. Balconies thus support bodily extension into public space while maintaining private affiliation.

This discussion reveals how walls are inhabited through their apertures. Doors, windows, and balconies enable bodily, visual, and environmental exchange through architectural boundaries. These apertures extend the spatial and experiential thickness of the wall. The following section explores how walls may be inhabited within their thickness.

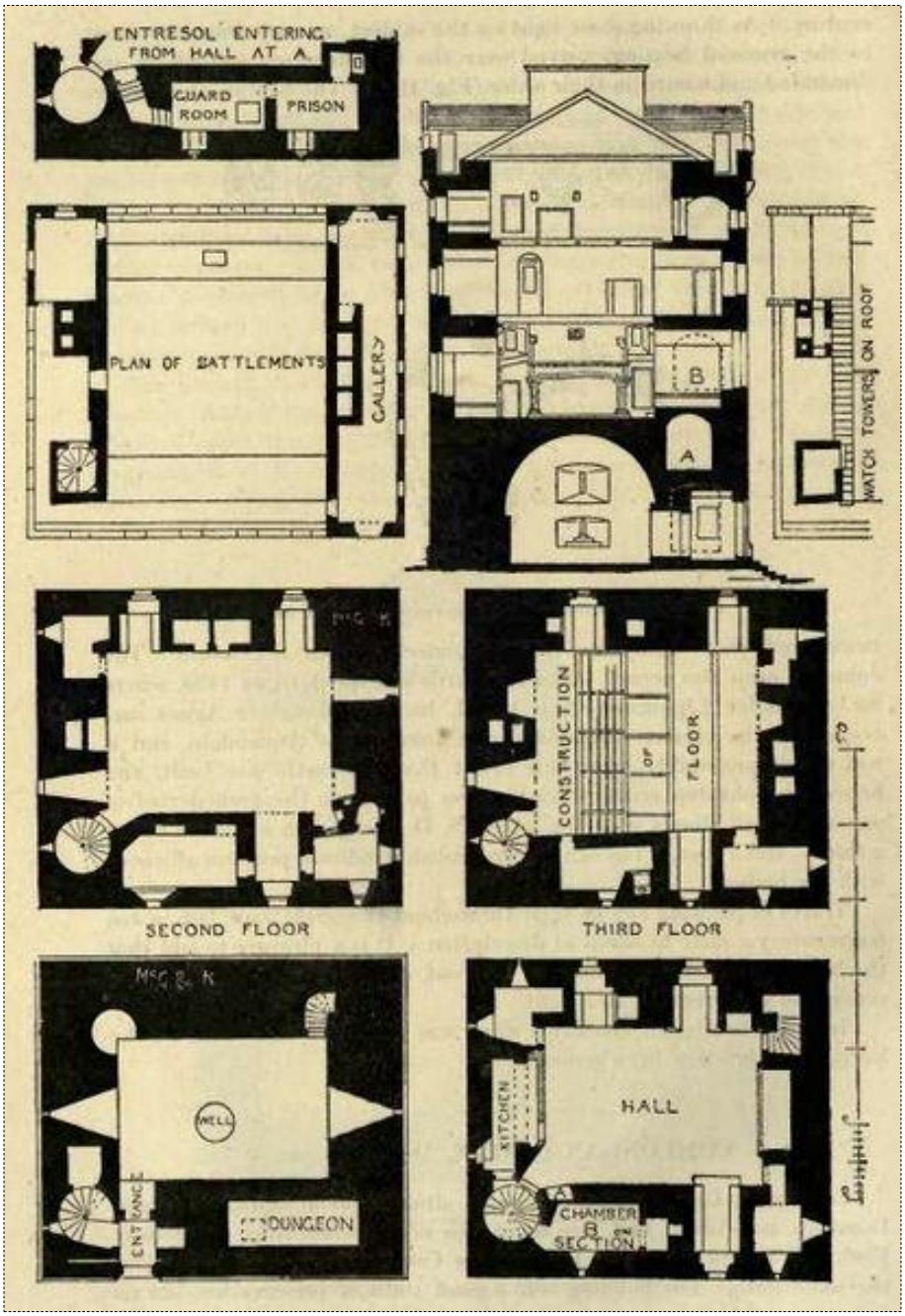


Figure 3.9.Floor plans and a section of Comlongon Castle, near Annan, Scotland. (MacGibbon & Ross, 1887). CC 0.

One example of inhabiting a boundary through its thickness is the hedgerow—a traditional feature of the British landscape. As a porous, living boundary, the hedgerow supports a diverse range of wildlife, providing habitat, shelter, and ecological continuity (Gosling et al., 2016; Wright, 2017). In urban contexts, hedges serve both aesthetic and environmental roles, contributing to biodiversity while providing privacy and mitigating noise pollution.

This concept can be applied to thick walls in architecture. For instance, Comlongon Castle in Scotland features walls thick enough to contain entire rooms, sometimes with openings to exterior or central halls (Unwin, 2000). Similarly, Llawhaden Castle in Wales incorporated habitable curtain walls for defence. Louis Kahn employed this principle in his Unitarian Church design, where thick walls were used not only for light control but also to create interstitial, inhabitable spaces (Cacciatore, 2016).

Walls, therefore, are both material and social constructs. Their exterior surfaces shape public space and urban form, whether through proximity to streets or as elements of the urban landscape.

Thwaites et al. (2020) analyse storefront edges and pedestrian interfaces, observing gradients of porosity in spatial practices. Storefronts often exhibit spatial expansion—blurred thresholds where appropriation and inhabitation occur.

In urban settings, walls are also socio-spatial actors (Brighenti & Kärrholm, 2018) and can serve as sites of biodiversity (Francis, 2011). Accessible walls in public spaces invite physical interaction, allowing people to lean against, sit on, or walk alongside them. Gehl’s concept of the 'edge effect' (Gehl, 2010) describes how walls provide places to pause, reflect, or engage, adding functional depth to their spatial role.

Urban walls can also be claimed informally. Graffiti treats walls as canvases for expression (Brighenti, 2009), while informal settlements and street markets appropriate blank walls for shelter or commerce (Dovey & King, 2011; Sennett, 2019). These instances highlight how architectural walls function as porous boundaries—perceived, appropriated, and inhabited in both

formal and informal ways. Walls are not merely barriers; they are thresholds and territories in their own right.

3.4. On Social Porosity

Benjamin and Lacis's portrayal of Naples arguably introduced the concept of social porosity, whereby the idea of porosity is articulated through Neapolitan socio-cultural practices and socio-economic conditions.

> "Porosity results not only from the indolence of the Southern artisan, but also, above all, from the passion for improvisation, which demands that space and opportunity be at any price preserved." (Benjamin & Lacis, 1979, p. 170)

Some argue that Benjamin and Lacis's view of Naples reflects a dichotomy between northern and southern cultures. Porosity appears either to fuel or result from this cultural divergence, standing in contrast to the "rigid sobriety of Northern Europe" (Glynn, 2020, p. 67). Furthermore, the everyday life of the city, where streets are used for working, trading, cooking, and sleeping, is shaped by both poverty and the structural qualities of its buildings (Ponzi, 2014, p. 74). It appears that porosity arises from these socio-economic conditions, socio-cultural practices, and the physical characteristics of the city's architecture. Poorer districts, at least in the case of Naples, tend to exhibit more porosity (Detering & Beesley, 2018). Arguably, this relates to a form of porosity generated through improvisation and chance (Detering & Beesley, 2018), as well as appropriation—responses often necessitated by limitations in economic resources or available space.

Porosity is a condition that enables improvisation and appropriation. It frequently occurs in the interstices between two social realms—between the formal and the informal, which coexist in many aspects of urban life. In this context, porosity also exists within the tension between public and private spheres, extending the earlier discussion on architectural boundaries.

This is where the concept of social porosity will be further explored in this architectural inquiry. It will expand the discussion into the urban context—a terrain of architectural boundaries and spatial practices that are inherently entangled with social relations. This inquiry draws upon existing discourses on urban porosity.

The city is considered here as a social context of architecture, where buildings and urban elements together define the solid and void spaces of the urban fabric. The voids—spaces that contribute to urban porosity—may arise through various processes and are perceived, accessed, and inhabited in different ways. These processes of creation, perception, and occupation are inherently social and relational, informing this inquiry's conception of social porosity.

3.4.1. On the Concepts of Accessibility and Connectivity

The concepts of accessibility and connectivity in relation to urban porosity are discussed from multiple perspectives. The city as a built environment evolves through "interaction with other cities, through the exchange of people, goods, services, and ideas" (Thierstein, 2018, p. 222), as well as through interactions within its parts. Spaces of interaction and the infrastructures that connect different parts of the city—and even other towns—are

central to urban life. However, such interaction is mediated by social conditions, which may be either deliberately constructed or arise as consequences of physical development; one such condition is the notion of the border.

Cities are composed of territories marked by both literal borders, such as walls, rivers, or fences, and phenomenological ones, like variations in ground surface that imply territorial shifts. Borders may also result from infrastructure, such as highways or railways that sever neighbourhoods, or from socio-cultural constructs like perceived crime zones or morally charged districts (e.g., red-light areas) that demarcate identity and representation (Jovchelovitch et al., 2020, p. 683). Specific spaces—rivers, highways, industrial zones, and parks—may function as wedges or "social holes", influencing neighbourhood sociability (Hipp et al., 2014). The notion of porosity arises precisely in these border zones. Although borders often demarcate separation on a macro scale, they can also be sites of interaction and exchange.

The city comprises a series of territories, delineated by both literal and phenomenal borders. Literal borders may include city walls, rivers, or fences, while phenomenal borders can be formed by variations in ground surfaces that signify different territorial claims. These borders may also arise from infrastructural elements such as highways or railways, which physically divide parts of the city. Additionally, cities can be demarcated through image, identity, and representation—for instance, certain areas may be perceived as sites of crime or violence, or specific districts, such as red-light areas, may symbolically delineate moral boundaries (Jovchelovitch et al., 2020, p. 683).

Some spatial features, such as rivers and highways, may act as wedges, while others, like industrial zones and parks, can function as social voids that influence neighbourhood sociability

(Hipp et al., 2014). It is precisely at these borders that the concept of porosity becomes relevant. Although on a macro scale, such borders tend to segregate urban territories and social landscapes, it is often at the borders themselves where interactions and exchanges occur.

The port city provides another example of borders within urban contexts. Ports serve as both literal and administrative boundaries, facilitating the movement of goods and people, enabling maritime activities, and marking the transition between land and sea. These spaces are shaped by “curated tangible and intangible borders” that mediate spatial and social relations (Hein, 2021, p. 1). Similarly, in cities with blue spaces, such as rivers, the interface between land and water entails specific types of borders that influence how residents access such spaces. These borders must consider safety while also recognising public rights to access these areas (Breś & Krośnicka, 2021).

Sennett (2017) distinguishes between borders and boundaries. In natural ecologies, borders represent the meeting of different species or physical conditions—dynamic zones of engagement and exchange, such as shorelines. In contrast, boundaries are guarded and exclusionary, like the territorial demarcations made by packs of wolves. Cities, as public realms, contain both types—fragments of public and private realms manifesting in overlapping and intersecting ways.

Urban space comprises both indoor and outdoor realms. Buildings broadly define indoor space, serving a variety of functions, while outdoor spaces, such as parks, plazas, and streets, are typically public. However, the correlation between indoor and private spaces and outdoor and public spaces is not absolute. Residential buildings tend to be private, with clear boundaries and restricted access. Office buildings, too, are often

private but may include semi-public areas, such as lobbies or cafés. Public buildings—such as galleries or museums—are open to the public within regulated conditions, often involving security procedures or ticketing (sometimes free but requiring booking).

Thus, the city comprises layered borders and boundaries that define varying degrees of accessibility. Some buildings integrate public functions. A notable example is the South Bank area in London, where urban regeneration has enhanced public life (Simões Aelbrecht, 2017). The Southbank Centre comprises several Brutalist buildings, including the Hayward Gallery, Queen Elizabeth Hall, and Royal Festival Hall, all of which are linked by a promenade that opens onto the River Thames.

Figure 3.10. Queen Elizabeth Hall and The Undercroft, Southbank, London, 2020

The Royal Festival Hall, a renowned theatre and concert venue, features a public lobby. Anyone may enter, sit at the available tables and chairs, and use the lavatories. However, access to the auditorium is restricted to ticket holders. The outdoor spaces between the buildings frequently host pop-up events. A food market typically operates on weekends and public holidays in front of the Royal Festival Hall, facing Waterloo Station. Between the Hall and the Hayward Gallery, there is a water installation where children often play during the summer holidays. Beneath the Queen Elizabeth Hall lies the Undercroft Skatepark—one of

the oldest continually operating skateparks in the UK, active since the 1960s. The space famously resisted attempts at relocation in 2013 (Latham & Layton, 2019), and it continues to serve the skateboarding community today, which has inscribed its identity on its walls. The skatepark has become a notable element of the South Bank's public life.

In his research, Goodwin (2011) defines porosity as "a permeable edge that exists between public and private space" (p. 6). He examines how architecture—"already permeable to the public space" (p. 43)—can contribute to the creation of public realms within the city, albeit in limited ways. Goodwin conducted his research through a porosity experiment inspired by a three-dimensional game of Snakes and Ladders. He attempted to navigate multi-story buildings, subsequently developing a "porosity index" to evaluate their levels of spatial permeability. He writes, "There is such a thing as a one-hour public space" (p. 6), suggesting that particular circulation and access spaces within private buildings may be accessible to the public for limited periods.

Beyond the public spaces created through architectural design, cities also feature formally designated outdoor public spaces, including squares, plazas, and parks. These areas provide residents with accessible environments for leisure, well-being, identity expression, rest, or other non-residential activities. Such spaces are crucial to the city's life. Some have existed since the city's inception, embedded in its design and morphology. In Indonesia, for instance, many cities have an *alun-alun*—a large open field located in front of the main government buildings—the *alun-alun* functions as a public gathering place, where events such as fairs often take place. Similarly, many European cities feature plazas as a fundamental element of their historical urban fabric.

Figure 3.11. Alun-alun Majalengka (Majalengka Town Square), West Java, Indonesia, 2022

Unlike the example of *Alun-Alun Majalengka*, where the public space is bounded by streets, some public spaces are instead defined by the buildings that enclose them. Abdelmonem (2022) discusses the relationship between the permeable or impermeable façades of buildings surrounding a public space and the socio-spatial practices that occur within it. He presents the example of Custom House Square in Dublin, where the formal presence of the Customs House—with what he describes as a "defensive, impermeable façade"—results in the space being vastly underutilised, functioning primarily as a passageway (2022, p. 142). In contrast, he examines Fountain Street, also in Dublin, which benefits from the permeable shopfronts of cafés and restaurants. These façades encourage social interaction between interior spaces and the adjoining public realm.

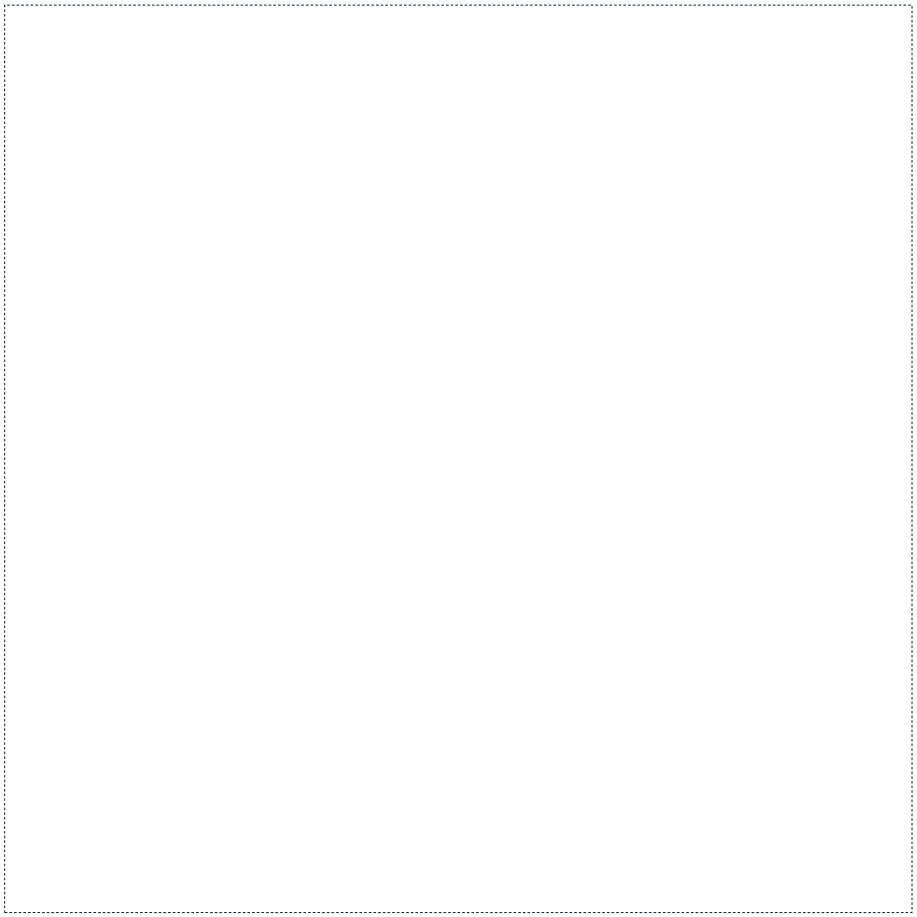


Figure 3.12. Sliced Porosity Block by Steven Holl Architects, Chengdu, China. (Fearson, 2013)

As cities become increasingly dense and vertical, the provision of public space is often integrated into the architectural design of building complexes. One such example is the *Sliced Porosity Block* by Steven Holl Architects in Chengdu, China (Fearson, 2013). In this project, public space is positioned as a central design feature, offering areas for movement, gathering, and engagement with natural elements, all interwoven with the towers that comprise the development. The composition of the tower blocks responds to the site's solar exposure and incorporates geothermal wells for heating and cooling. At street level, and within the podium levels of the complex, public-facing amenities are provided, opening both inward toward the plaza and outward toward the city. The project embodies multiple dimensions of porosity: spatial porosity through the integration of accessible

public spaces, and environmental porosity through the incorporation of energy flows via geothermal systems.

In dense and vertical cities like Hong Kong and Singapore, public spaces are not confined to ground level, but also exist at height. In Hong Kong, for example, to ensure that private developments contribute to the provision of public space, the government introduced the Public Open Space in Private Development (POSPD) policy. Inspired by similar initiatives in New York during the 1960s, this policy has led to the creation of various elevated public spaces, such as rooftop gardens (Rossini et al., 2018).

Another well-known example is the High Line in New York—an elevated urban park developed from a disused railway line. Community efforts drove its regeneration, and it has since become one of the most visited public spaces in the city (Davis & Gray, 2019). These examples represent broader efforts to expand the availability of public space in increasingly dense urban environments. Such initiatives often result in overlapping or direct encounters between public and private realms, involving multiple stakeholders, from government bodies to local communities.

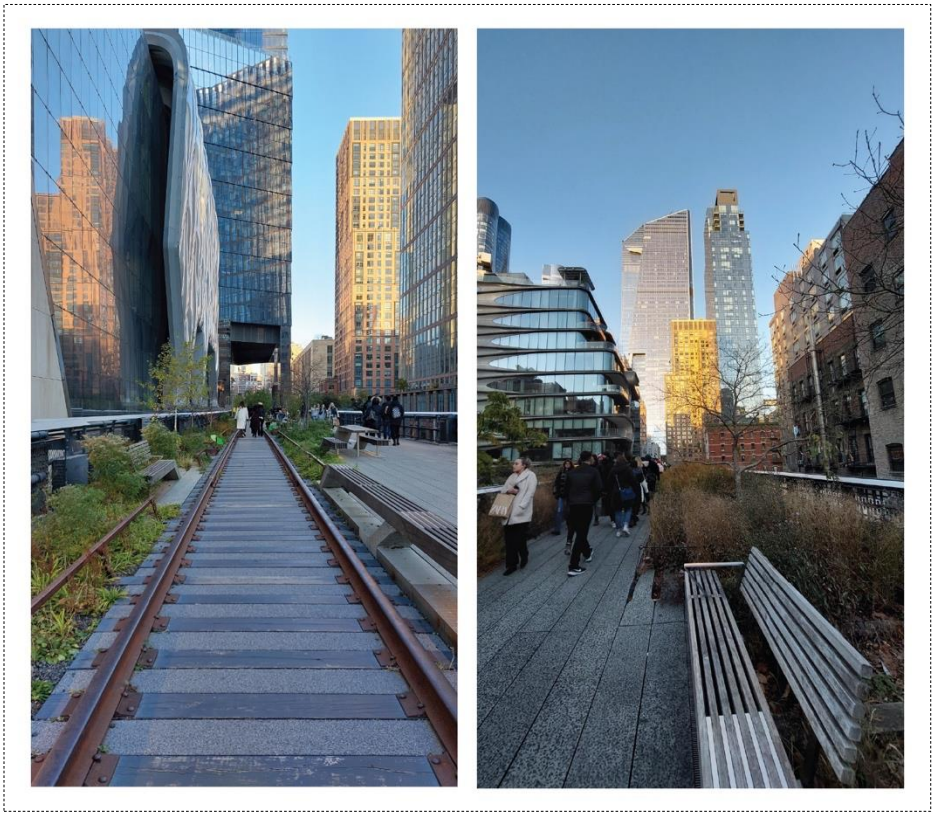


Figure 3.13. Highline, New York, 2022

In their publication *PoroCity: Opening up Solidity*, Winy Maas and The Why Factory explored the idea of porosity through a design research project focused on porous towers within urban settings (Maas & Ravon, 2018). They defined porosity as “the spatial qualities that emerged from the distribution of voids”, which relate to “air and light, to circulations and connectivity, to views and terraces, to climate and social life…” (Maas & Ravon, 2018, p. 28). This framing positions porosity as a design gesture that generates spaces for interaction between humans and nature—spaces of sensorial connectivity and public accessibility.

The preceding discussions support the concept of social porosity, as used in this inquiry, which refers to public accessibility and connectivity. A porous city provides public spaces and access to support the livelihood and well-being of its inhabitants—access that constitutes a basic right, with public spaces understood as commons (Susser & Tonnelat, 2013).

3.4.2. On the idea of coexistence

Any discussion of rights in the city inevitably leads to the issue of power relations. Rights, obligations, and control all play roles in the production, experience, and inhabitation of urban environments. Many have theorised the city through the lens of Deleuze and Guattari's concepts of smooth and striated space, where striated spaces are hierarchical and regulated, while smooth spaces enable rhizomatic, everyday relations (Dovey & Polakit, 2006). In their study of Bangkok, Dovey and Polakit examined the concept of "urban slippage," exploring how such spaces operate within and blur the binaries of public and private, as well as legal and illegal. These are spaces shaped by informal spatial practices.

In discussing porosity, Sennett introduces the concept of the open city, which acknowledges informal practices as integral to the urban social landscape (Sennett, 2018). He uses the example of Nehru Place in Delhi—a plaza surrounded by government offices:

> "Nehru Place was soon colonized, becoming a centre for selling what are politely called 'grey goods '(goods that don't pay taxes or that are stolen). The plaza is a huge centre for the sale of illicit electronics amidst an army of food vendors. It is a colonised space, and masses of people sleep on the pavement when the central area clears at night." (Sennett, 2018, p. 45)

Nehru Place exemplifies the open city, where informal practices have claimed a formal public space as a marketplace. Not only are the practices themselves informal or illegal, but some of the goods being traded are also illicit. This demonstrates that spaces

for informal activities are not typically granted but must be claimed and secured. Such spaces—those susceptible to informal appropriation—can be considered porous spaces (Kling & Jungfer, 2018), *no-man's land* (Groth & Corijn, 2005), or ambiguous urban voids, including plazas, pavements, and leftover spaces like abandoned plots.

> "Porous spaces have agency in that they may be configured to serve different goals. Some spaces are the result of countercultural movements and serve as highly visible exponents of an urban other, others are more concerned with alternative practices of everyday life or community. It is through processes of individual and collective appropriation-by generating the unexpected and disorderly, and by making new connections—that these spaces reproduce their specific qualities. Porous spaces can be seen as accommodating and supporting processes that concern themselves with changing the world. This distinguishes them from spaces established through institutionalised routines." (Kling & Jungfer, 2018, p. 260)

Several examples of porous spaces exist within cities, each with unique spatial characteristics and cultural names. In low-income neighbourhoods of Athens, for example, there are spaces known as *alana*—vacant lots and outdoor areas that are not designated as streets or squares. These spaces are often used for social interaction, where children and adults play and where informal encounters occur between residents of surrounding buildings (Stavrides, 2006). Another example is the *vicoli*, a type of narrow street in Naples that has ‘‘emerged with various informal and creative appropriative practices" (Fatigato, 2023, p. 148), reminiscent of Benjamin and Lacis's descriptions. Here, residents place furniture on the streets to create outdoor dining spaces and support communal life.

Figure 3.14. Pedagang Kaki Lima di Pasar Blok M, Jakarta (Street Vendors in Blok M Market, Jakarta). (Pahing, 1988)

In the city of Jakarta, there exists a type of space known as *emperan*, which refers to areas at the front or side of a building, similar to a terrace or arcade, a narrow, covered space just outside a building's façade. For example, department stores often have an *emperan*, which is frequently appropriated by informal street vendors who sell goods, usually similar to those available inside the store, but at lower prices. These vendors typically claim the space by spreading out a mat or setting up a table to display their products. This reflects how informal practices sometimes emerge as a response to formal structures, not necessarily in direct competition, but rather as an alternative that recognises the existence of different market options. Choosing to buy from an *emperan* vendor may stem from a desire for more affordable goods, regardless of the buyer's economic status or simply out of personal preference.
In his study of Korean markets, Lucas (2020b) observed that formal and informal economies often coexist, similar to what occurs with *emperan* spaces in Jakarta.

> “The inhabitation of Seomun Market presents a complex set of interactions across formal and informal architectures… the cleanliness of a designed building is subverted by a gradual encrustation of attachment: steel decking, clips and clamps, conduits and cables, lean-to structures and claiming of pavement territory by laying down a blanket or forming a canopy with a parasol or tarpaulin.” (R. Lucas, 2020b, p. 106)

Such coexistence is not always tolerated equally by authorities, as illustrated in another example R. Lucas provides from Dongdaemun Market:

> “… Dongdaemun also has an associated flea market. This flea market is one of the most informal – and at that time illegitimate – in the city, and it has been subject to pressure from the city authorities. Having recently been moved on from its site in an abandoned baseball stadium to make way for the construction of Dongdaemun Design Plaza—a cultural institution designed by Zaha Hadid Architects—the flea market has gradually been pushed away from the main drag of Dongdaemun Market. The introduction of the Design Plaza seems much like a top-down imposition that contrasts with the more organic growth of the markets.” (2020b, p. 108)

This reflects a broader pattern of how urban authorities typically respond to informal inhabitation. Informal establishments, such as street vendors, often must adopt defensive strategies to survive in the face of regulatory pressure (Peimani & Kamalipour, 2022). Similarly, in a discussion on London’s street markets, Kelley (2020) noted how private developments tend to marginalise informal vendors, whose liminal status means

informality is seldom embraced. Local informal appropriations are frequently overshadowed by global disappropriation, where development strategies prioritise attracting global brands rather than supporting local, informal businesses (Jiménez-Domínguez, 2006, p. 100).

Figure 3.15. Dongdaemun Design Plaza, Seoul, 2017

Although informality is often stigmatised and associated with serving the lower economic classes, it should not be confused with poverty.

> “High levels of informality enable micro-flows of information, goods, materials and practices that produce income and make life sustainable under conditions of poverty. These practices are integrated with the micro-spatial adaptations that flourish under conditions of informal urbanism, particularly incremental construction processes. Informality is not to be confused with poverty; it is indeed a resource for managing poverty.” (Dovey, 2017, p. 6)

This helps explain why informal activity often follows or coexists alongside formal development. In Jakarta, for example, even in central business districts populated by office towers, informal establishments are typically found nearby, often at the rear of buildings. These usually take the form of street vendors selling food and drinks. They primarily cater to office employees, mainly blue-collar workers who may not be able to afford meals at office cafés or restaurants. Despite being on a smaller, often overlooked scale, these informal practices generate substantial economic flows and are, in many ways, integral to the city's economic lifeblood.

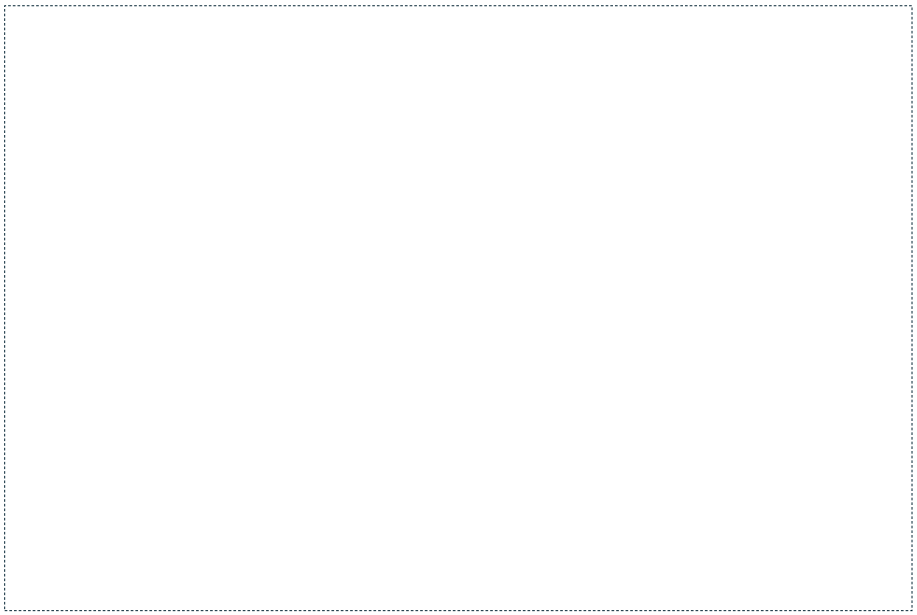


Figure 3.16. Warung Kaki Lima Favorit Karyawan Kantoran Saat Makan Siang (Employees' favourite street vendors), illustrates the contrast of informal street vendors against high-class shopping malls in Jakarta. (Utama, 2023)

Another form of porous space can be understood through Géraldine Borio's concept of the *void*, which refers to:

> "spaces that are not consciously planned but are often the result of other planning agendas… Often ignored by the city's officials, they are characterized by the ambiguity regarding their legal status, not clearly belonging to the

> public but often spontaneously used by the city inhabitants. For them, these abandoned areas in transition offer a momentary space to appropriate.” (Borio, 2023, p. 27)

Such porous spaces may also emerge from economic decline, as in the case of disused industrial sites. These areas are often seen as potential zones for urban regeneration projects that aim to introduce new socio-economic functions (Pessoa et al., 2016). This reflects a top-down approach to repurposing urban voids.

However, that is not the whole picture. While ruins or vacant lots—particularly in cities—are frequently viewed as negative spaces with little or no social or economic value, they can, in some cases, become sites for informal urban activity. These activities may include social, financial, and ecological uses: for example, offering shelter for people experiencing homelessness, serving as informal playgrounds for children, canvases for graffiti artists, skateboarding spots, or even becoming spaces for small-scale urban farming (Dawdy, 2010).

These abandoned or vacant spaces also contribute to the emergence of spontaneous and informal green areas within the city (Phillips & Lindquist, 2021). They are not only vital for human use but also support urban biodiversity in unplanned ways for non-human actors.

Porous spaces in the city provide room for informal practices—both human and non-human—to emerge within and among the formal built environment. They involve acts of appropriation, improvisation, and adaptation. These processes are interconnected and often occur in a state of tension with the formal urban fabric. This dynamic contributes to the notion of social porosity in this architectural inquiry, where porosity signifies an acknowledgement of, and even a celebration of, the

coexistence between the planned and the unplanned, the formal and the informal.

3.5. The Idea of Architectural Porosity

Figure 3.17. Hedgerows in Skylarks Nature Reserve, Nottinghamshire, 2021

Hedgerows, as man-made landscape boundary features, encapsulate the idea of porosity proposed in this architectural inquiry. A hedgerow is a living, porous boundary that demarcates different patches of land. It evolves with the seasons—some hedgerows are evergreen, while others host additional plants that gradually invade and interweave with them. Unlike wire fences, the porous structure of intertwined branches and foliage creates space for animals to nest, interact, and move through the

landscape. It thus possesses material, spatial, and social dimensions (at least for non-human species).

This raises the question: what if an architectural boundary—a wall or façade—were to perform like a hedgerow? Not identically, of course, nor for the same inhabitants, but in a similarly porous way, embodying material, spatial, and social porosity.
This architectural inquiry proposes the concept of **architectural porosity** as a framework for understanding porosity within architectural discourse, encompassing three interconnected dimensions:

- **Material porosity** refers to the capacity of architecture to absorb environmental forces and support non-human habitation. It welcomes erosion, staining, penetration, and decay as expressions of temporal and ecological processes. It values imperfections, positioning them as markers of time, environment, and life.

- **Spatial porosity** refers to the permeability of architectural boundaries, enabling interaction between interior and exterior spaces. This includes active apertures**,** such as doors, windows, and balconies, as well as the use of wall thickness or adjacent spaces for inhabitation. Spatial porosity facilitates exchange and interpenetration between the inside and outside, enabling informal attachment to architectural surfaces.

- **Social porosity** refers to the way architecture operates within a social context**,** allowing public access to interior spaces and accommodating informal practices. It celebrates the coexistence of planned and unplanned uses and forms of inhabitation.

These three forms of porosity shape spatial practice and how architecture is inhabited. Architectural porosity is both a condition found in the built environment and a lens through which to understand spatial practices. In this study, architectural porosity is used as a method for reading architecture as a phenomenon composed of intersecting material, spatial, and social layers. Importantly, this concept resides at the architectural scale, situated between the microscopic scale of materials science and the macroscopic scale of urbanism. While engaging with both extremes, architectural porosity focuses on the scale of elements such as façades and walls, which have the potential to connect material decay, environmental factors, and social activity.

Architectural porosity will be further developed into a **porosity index**, a framework for analysis that separately assesses material, spatial, and social porosities on a continuum from least to most porous. The aim of this index is not to produce a composite score or declare whether something is ‘porous ’or ‘not porous’, but to explore how different forms of porosity co-exist and interact as part of architectural inhabitation and practice. This approach is applied to the case study of Semarang Old Town, a historic urban area in Indonesia. The selection of this site is based on several factors. Firstly, as discussed in Chapter 2, porosity is a multifaceted concept explored across various disciplines. This inquiry aligns with the perspective that values porosity within architectural discourse, as a means to respond to and include a wide range of contexts, including human and non-human entities, temporal change, spatial practices, and environmental processes. It challenges the view of architecture as a purely material object, instead presenting it as something deeply entangled with its surroundings and uses.

This position contrasts with traditional understandings of porosity in material-based disciplines, such as heritage conservation,

which often view porosity negatively, as a flaw that leads to material degradation. In such fields, porosity is associated with microscopic vulnerabilities that permit contaminants such as moisture, frost, lichens, and moulds to penetrate and damage historic materials. The usual conservation response is to prevent this by using coatings or non-destructive methods to remove contaminants and seal materials, thereby preserving them. These strategies are linked to longstanding paradigms in conservation, such as the contrast between Viollet-le-Duc's approach to restoration and Ruskin's celebration of age and decay. Restoration often prioritises material integrity above all else. However, heritage buildings exist within broader environmental and social contexts, especially in urban settings. These contexts contribute to the ongoing transformation of architecture through weathering, inhabitation, or even disaster, such as floods or fires. These are constant forces that shape architectural materiality over time.

The heritage discipline's view of porosity, which focuses on the protection of material entities, motivates this study to introduce architectural porosity into the heritage discourse. The aim is to uncover the potentially positive values of porosity in heritage contexts, particularly in urban heritage environments such as Semarang Old Town.

Semarang Old Town, discussed in more detail in Chapter 4, is a historic colonial district undergoing major revitalisation since 2017. In 2020, it was officially designated a National Heritage site by the Indonesian government. The area features a range of interventions, including new pavements, street furniture, and the refurbishment of some heritage façades. However, the district still exhibits a mix of revitalised and decaying buildings, alongside both formal and informal inhabitation. This coexistence, along with the visible tension between revitalisation efforts and residual

decay, makes Semarang Old Town an ideal context for this architectural inquiry.

A second reason for selecting this site is accessibility. As part of the author's homeland, Semarang Old Town offers not only logistical access for research but also a more profound opportunity for learning from one's own, sometimes unfamiliar, lived environment.

Before turning to the empirical context and outlining the methodology of this study, the next section will explore the interdisciplinary context of the research to justify the selection of a heritage site for investigating the concept of architectural porosity and its three dimensions.

3.6. Situating The Three Porosities in Heritage Discourse

As previously discussed, this study proposes the concept of *architectural porosity*, which values material, spatial, and social porosity. It recognises certain qualities that are often overlooked, particularly within architectural discourse. For instance, *material porosity* in this context celebrates imperfection in architectural materials and considers how such materials provide space for environmental and non-human inhabitation. *Spatial porosity* acknowledges the role of architectural boundaries in facilitating connections and interpenetration between inside and outside. *Social porosity* fosters the coexistence of the planned and the unplanned, the formal and the informal, the human and the non-human, as integral to architectural phenomena and spatial practices.

While these three porosities are framed within architectural discourse, they are themselves porous, intersecting with other fields. Social porosity, for instance, engages with urban discourse. In what follows, these ideas are further examined in the context of *heritage discourse*, particularly about urban heritage.[21]

This study seeks to frame heritage as ‘‘a set of attitudes to, and relationships” with the past—relationships ‘‘characterised by a reverence and attachment to select objects, places, and practices that are thought to connect with or exemplify the past” (Harrison, 2013b, p. 14). Heritage is thus a process of identifying and safeguarding what is deemed significant—what UNESCO refers to as having *Outstanding Universal Value*—for future generations. This process is generally managed through international and national heritage bodies and legal frameworks that establish protocols for listing and conserving heritage. Much heritage practice draws from the World Heritage Convention and the guidelines of ICOMOS. Many sites aspire to achieve designation as UNESCO World Heritage Sites (WHS).

[21] To clarify some terms used in this inquiry, based on the Indonesian heritage law, Semarang Old Town is a heritage site, an area which consists of heritage objects, in this case, the heritage buildings in the area. This study uses the term urban heritage site for Semarang Old Town, which refers to the explanation of Historic Urban Area by ICOMOS in the *Washington Charter* 1987, which is an area “large and small, including cities, towns and historic centres or quarters, together with their natural and man-made environments”. Looking at Semarang Old Town as urban heritage means acknowledging its given heritage status as well as its nature as the built environment, a city district consisting of heritage buildings, which is layered with urban life. Furthermore, the term used in reference to the idea of urban conservation, which based on UNESCO in *Recommendation of Historic Urban Landscape* 2011 is defined as a conservation that “is not limited to the preservation of single buildings. It views architecture as but one element of the overall urban setting” and situated more in the urban planning discourse, in this architectural inquiry is the term revitalisation. It is the term that the government used for such a project, which is also defined in the 2010 Indonesian Heritage Law as the development of heritage through adjustment and giving new spaces and functions that are based on conservation and cultural value, which suggests the idea of urban regeneration, a heritage-led urban regeneration. The term revitalisation will also be used as a conservation effort on heritage buildings, which sometimes involves restoration as well as inserting new programme to the buildings. It suggests that this inquiry will be looking at both urban and architecture scale of revitalisation which is in line with the idea of architectural porosity that attempts to see different aspects from material, spatial, and the social aspects.

While the World Heritage framework provides valuable guidance, it is rooted in a historically Western, top-down model (Winter, 2014b) that often generalises values in ways that may not be universally applicable, especially in regions with distinct political or economic circumstances (J. Xie & Heath, 2017). Moreover, the WHS title itself has both positive and negative impacts.

Heritage is increasingly used as a tool for economic development (Armitage & Irons, 2013) and as “the main force behind a regeneration strategy” (Ashworth, 2014, p. 10). UNESCO designation often serves as a branding mechanism that boosts tourism and job creation, thereby supporting the local economy (Caust & Vecco, 2017). However, these benefits may come at a cost, potentially threatening “the environmental and cultural integrity of these sites” (Caust & Vecco, 2017, p. 3). WHS projects often impose strict spatial demarcations and seek to purify space (Nakamura, 2014), displacing the rhythms of everyday life (Tabunan, 2022). The goal of such efforts is frequently to preserve a pristine historical object or environment, encapsulating a particular—often idealised—moment in time. This risks overlooking the natural and social evolution of heritage in response to environmental, cultural, economic, and political change.

Caust and Vecco (2017) discuss the cases of Hoi An and Luang Prabang, two World Heritage Site towns in Southeast Asia. They highlight the undeniable economic growth triggered by the WHS designation, as well as the transformations these sites have undergone. In Hoi An, for instance, shops that once served local needs have been converted into cafés and galleries; in Luang Prabang, local religious practices are increasingly commodified. A similar shift is visible in the revitalisation of Semarang Old Town, where many heritage buildings have been repurposed as cafés and restaurants. Previously, the area had been largely

abandoned, with widespread informal inhabitation. The revitalisation process, while aimed at regeneration, also involved a form of social cleansing—displacing or relocating informal inhabitants.

With the concept of social porosity in mind, this study aims to recognise alternative forms of heritage—those that involve different processes and more context-sensitive approaches (Winter, 2014a). For instance, heritage formally recognised by international or national authorities may be referred to as *official heritage* (Harrison, 2013b) or *heritage by designation*, a term coined by Michel Rautenberg in 1998 (Sabatini, 2019). Both terms refer to institutional actions: ‘‘a set of professional practices that are authorised by the state and motivated by some legislation or written charter” (Harrison, 2013b, p. 14). Harrison further describes this as ‘‘a contemporary ‘operational ’definition of heritage—as the series of mechanisms by which objects, buildings, and landscapes are set apart from the ‘everyday ’and conserved for their aesthetic, historic, scientific, social, and recreational values” (p. 14, original emphasis).

In contrast, *unofficial heritage* refers to heritage that is not formally recognised by legal or institutional frameworks, but which holds deep significance for individuals or communities (Harrison, 2013b). This is also described as *heritage by appropriation* (Rautenberg, 1998, in Sabatini, 2019), involving informal, collective processes of recognition and value attribution (Sabatini, 2019, p. 35). These unofficial forms of heritage challenge dominant, top-down approaches and emerge in response to the limitations of formal heritage frameworks, especially in accommodating diverse cultural contexts.

Pendlebury, in his book *Conservation in the Age of Consensus*, discusses the concept of "the other" heritage, which contrasts

with heritage visited for its historical significance, and heritage that is commonplace and integrated into everyday life (Mosler, 2019). Building on this idea, Mosler (2019) coined the term *everyday heritage* in his study of the historic city walls of York and Chester. These structures are not only tourist attractions but also part of residents ’daily commutes. This distinction leads to different approaches in the treatment and understanding of heritage.

> “In contrast to conservation-led approaches, these everyday heritage elements/landscapes have been changed or replaced through people-led factors: societal needs leading to appropriation of the built environment, and accumulation of the meaning and identities as a form of place-making process – a lived-in place throughout the time of its existence.” (Mosler, 2019, p. 785)

Figure 3.18. City Wall of York, York, 2024

Giombini (2020) further expands on this concept, defining everyday heritage as “the complex sum of practices, activities, and meaning by which communities quotidianly use all types of local heritage” (p. 54). This emphasises heritage as a living part of daily life.

A related idea is *ordinary heritage*, as discussed by Podder (2018) in the context of Boro Bazaar in Khulna, Bangladesh. The ordinary heritage of Boro Bazaar manifests as a "socio-spatial-temporal assemblage" shaped by the "everyday acts of negotiation", in contrast to the "static and ‘iconic’ heritage edifice" (Podder, 2018, pp. 334, 345, original emphasis). Both the everyday and ordinary heritage frameworks shift the focus away from viewing heritage as isolated monuments detached from present use. Instead, they recognise the significance of living heritage embedded in people’s daily lives, through both tangible objects and intangible practices.

Weiss (2014) pushes this argument further, suggesting that even informal communities and their settlements can possess outstanding universal value through “the daily enactment of practices that materially and bodily assert the right to the city” and they “give meaning to the urban landscape as an agent of social change” (Weiss, 2014, p. 21).

This view strongly aligns with the notion of *social porosity*, which emphasises the intersection of informal practices and heritage spaces. Informal appropriations of heritage—though often labelled as illegal encroachments—can reflect historical neglect and reveal ongoing social struggles. For instance, Nakamura (2014) explores how the informal occupation of the Jogeshwari Caves in India reflects:

> “… a radical failure of state delivery as they lay bare the historical neglect of marginalised urban communities and their ongoing struggles for work, shelter, and security. Landscapes of such encroachment thus haunt and undermine official heritage narratives that valorise the

> monumental, the settled, and the elite.” (Nakamura, 2014, p. 290)

Similarly, Hayes (2020), in his study of Cuenca, Ecuador, discusses how conservation efforts that commodify historic urban centres to appeal to higher-income groups often displace informal vendors and low-income residents, exacerbating social inequality.

As previously discussed about the coexistence of formal and informal practices—central to the idea of social porosity—acts such as *encroachment* or *appropriation* are key forms of informal spatial practice. In the urban context, porous spaces, such as abandoned plots, often become sites of informal appropriation. When applied to urban heritage sites, this can extend to *abandoned heritage buildings* or *ruins*, which may be similarly appropriated.

From the standpoint of conventional heritage practice, the informal appropriation of heritage ruins is typically considered undesirable—or even unlawful. Encroachers are frequently portrayed as antagonists to preservation efforts (Nakamura, 2014). However, this study argues for an alternative perspective: one that acknowledges the role of human agency and social practice in shaping and experiencing heritage. As Perkasa and Padawangi (2017) assert:

> “Members of society have a role to play in shaping and practising heritage.” (p. 63)

Informal, lived practices can contribute to the continuous evolution of built heritage. Rather than viewing these acts as vandalism or destruction, they may be understood as forms of

reappropriation and *adaptation* that enrich the significance of heritage over time:

> “Rather than taking these reappropriation practices as vandalism or as destroying heritage, there are aspects of reshaping the built environment that are manifestations of the evolving heritage. This means that living heritage is not just the intangible or immaterial; living heritage is also the material embodiment of meaningful social relationships and practices.” (Perkasa & Padawangi, 2017, p. 63)

This is precisely where the concept of *social porosity* intersects with heritage discourse: by recognising informal practices not as threats, but as intrinsic to the living, evolving nature of heritage.

The idea that heritage evolves is central to this inquiry. This is especially true of *built heritage*, which has a material presence and is inherently vulnerable to decay and degradation. As DeSilvey (2006) notes, material heritage is subject not only to social interpretation but also to biological and chemical processes.

Built heritage, by its materiality, can be seen as an artefact that records environmental effects and traces of human activity. Traditional heritage conservation often prioritises the preservation or restoration of this material entity, aiming to remove social and environmental traces and maintain an idealised, static condition. However, by applying the concepts of *material* and *spatial porosity*, this study introduces the idea of *porous conservation*—a more inclusive, context-sensitive approach.

This discussion intersects with broader paradigms in architectural conservation, particularly the long-standing debate between the

restoration philosophy of Eugène Viollet-le-Duc and the conservation ethos of John Ruskin and William Morris (Plevoets & Cleempoel, 2019). Viollet-le-Duc, a leading figure in the 19th-century restoration movement, believed in restoring buildings to an ideal state from a specific historical period—often one that never truly existed (Stone, 2020). His approach aimed to symbolise history and present it as a spectacle (Chandler & Pace, 2020).

In contrast, Ruskin and Morris advocated for *anti-restoration*. They argued for preserving buildings in their found condition, seeing any restoration effort as a potential act of destruction. Ruskin saw age as the most precious inheritance and viewed signs of wear as valuable historical testimony. Restoration, in his view, erased these traces and was a form of violence against the building (Coleman, 2020, p. 30). As Scott (2008) summarises:

> "Viollet-le-Duc was the despoiler, and Ruskin the protector of old buildings." (p. 47)

Ruskin's fascination with surface and material as a means of recording time, weathering, and use deeply influenced Morris. Through the Society for the Protection of Ancient Buildings (SPAB), founded in 1877, Morris codified this perspective. One of SPAB's central principles is that:

> "Physical fabric is the tangible record of the intangible human action, not the other way around."
> Heritage should be viewed as "layered text" and "an evolving narrative", rather than "a fixed image"." (Chandler & Pace, 2020, p. 7)

This philosophy is captured in the SPAB manifesto:

> “It is for all these buildings, therefore, of all times and styles, that we plea, and call upon those who have to deal with them, to put Protection in the place of Restoration, to stave off decay by daily care, to prop a perilous wall or mend a leaky roof by such means as are obviously meant for support or covering, and show no pretence of other art, and otherwise to resist all tampering with either the fabric or ornament of the building as it stands; if it has become inconvenient for its present use, to raise another building rather than alter or enlarge the old one in fine to treat our ancient buildings as monuments of a bygone art, created by bygone manners, that modern art cannot meddle with without destroying.” (SPAB, 1877)

This approach values the building’s fabric as a historical artefact, capturing both environmental and social events. As Chandler and Pace (2020) explain:

> “When modifying an existing building, we need to be conscious of the fact that we are handling both material and social history, and that intervention has the power to highlight or erase part of the narrative that building present to us… For him (Morris), the readability of built fabric was the readability of human action, and the layering nature of buildings was a mechanism to demonstrate authenticity of memory as an unequivocal physical reality.” (p. 124)

This view of conservation—careful, contextual, and responsive—differs from image-focused restoration, which often prioritises a single moment in time over material authenticity and temporal depth.

Adding further depth to this discourse is the concept of *age value*, introduced by Alois Riegl in the early 20th century. In his

influential essay, “The Modern Cult of Monuments”, Riegl proposed one of the first value-based approaches to preservation (Lamprakos, 2014). His ideas later informed foundational international charters such as the *Athens Charter* (1931) and the *Venice Charter* (1964) (Ahmer, 2020). Riegl defined age value manifests itself:

> “… through the visible perceptions and appeals to our senses, it is seen in the corrosion of surfaces, in their patina, in the wear and tear of buildings and objects.” (Ahmer, 2020, p. 152)

This understanding resonates with Ruskin’s emphasis on the aesthetic and historical significance of weathered materials. Both thinkers highlight the importance of preserving traces of time embedded within a building’s physical form.

In the mid-20th century, particularly during the 1960s and 1970s, new approaches to heritage conservation emerged in response to the widespread destruction of buildings during the First and Second World Wars. One of the most significant developments from this period was the rise of *adaptive reuse*—a practice embraced by both architects and conservators (Plevoets & Cleempoel, 2019).

> “The increased number of buildings that would potentially need ‘conserving ’in this new and expanded context was enormous. Inevitably, a reconsideration of the concept of conservation emerged and was reflected in the 1964 Venice Charter, which points to the importance of ‘adaptive reuse ’ as a form of ‘conservation’ practice.” (Plevoets & Cleempoel, 2019, p. 15)

Adaptive reuse provides a conceptual and practical alternative to the binary between restoration and conservation. Depending on the strategy and the values at stake, it may involve elements of both. As Plevoets and Cleempoel (2019) explain:

> “Adaptive reuse is based on the words ‘adaptation ’and ‘reuse’. The term explicitly refers to changes that involve both a functional and a physical component.” (p. 23)

This concept aligns with Fred Scott’s notion of *alteration*. In *On Altering Architecture* (2008), Scott argues that a thoughtful alteration incorporates:

> “… the combination of restoration, the original, and an uncertainty.” (Scott, 2008, p. 180)

Such approaches open up more creative, context-sensitive responses to working with historic buildings—responses that not only respect the past but also accommodate the present and future. Adaptive reuse and alteration, then, are not just conservation strategies for old buildings; they also contribute to the ongoing regeneration of the urban environment (Plevoets & Cleempoel, 2019).

This layered approach allows us to view architecture as a palimpsest—a term used to describe a manuscript from which previous text has been scraped or erased, only to reappear over time. As Plevoets and Cleempoel (2019) describe:

> “… a manuscript or other writing material from which text has been scraped or washed off to use it again. After a period, the original text reappears, and different layers of text become visible.” (p. 29)

This idea resonates with Morris's and SPAB's vision of heritage buildings as "layered texts" that carry evolving narratives inscribed into their material fabric. Some adaptive reuse projects explicitly embrace this reading of buildings. A prominent example is Carlo Scarpa's Castelvecchio Museum in Verona, Italy. Scarpa's design:

> "… brings a layer of history to the fore to be consciously observed, whilst at other times allowing elements to recede almost into non-existence." (Stone, 2020, p. 19)

Rather than restoring the building to a single historical state, Scarpa's intervention juxtaposes different historical layers, making their tensions and transitions both visible and meaningful (Plevoets & Cleempoel, 2019, p. 127).

Figure 3.19. Portal in the castle designed by Carlo Scarpa (1906-1978) in the Castelvecchio Museum in Verona, Italy. (Dogears, 2006). CC 0.

Scarpa's work exemplifies an approach to heritage that does not erase the passage of time but rather accentuates it. His treatment of historical material—through contrast, layering, and partial revelation—aligns with the notion of *porous conservation* as proposed in this study. It celebrates material transformation, acknowledges architectural layering, and invites multiple temporalities to coexist within the same spatial frame.
In this context, *architectural porosity* offers a valuable lens for rethinking heritage conservation. Rather than aiming for fixed, pristine representations of the past, a porous approach engages with the realities of decay, adaptation, and human inhabitation. It allows for:

- **Material porosity**, in which surfaces absorb environmental events, record time, and accommodate non-human presence.

- **Spatial porosity**, where boundaries between interior and exterior are blurred, offering opportunities for appropriation and exchange.

- **Social porosity** recognises informal and collective practices as valid forms of engagement with heritage, even when they fall outside official frameworks.

This approach challenges dominant narratives that isolate heritage from its contemporary context. It insists on *coexistence,* recognising that heritage sites are not static relics but *dynamic environments*—shaped and reshaped through use, weathering, resistance, and appropriation. In this sense, porosity becomes both a condition to be read and a strategy to be embraced.
Heritage buildings—especially those in urban settings—are not only about preservation but also about participation. They are

artefacts of memory and space, yes, but also sites of *ongoing negotiation* between state institutions, local communities, the informal sector, and environmental forces. When viewed through the lens of architectural porosity, they are no longer frozen images of the past, but living, breathing participants in the city's evolution.

This brings the discussion back to the case study of Semarang Old Town, where competing forces of revitalisation, informal inhabitation, material decay, and state intervention converge. As previously outlined, the site embodies many of the tensions raised in this inquiry—between the official and the unofficial, the preserved and the improvised, the solid and the porous. By applying the concept of architectural porosity to this context, this study aims to explore how built heritage can be understood not only through material conservation but also through *lived spatial practice*.

The condition in which heritage buildings are found before conservation can vary greatly. Some are in a state of ruin. As discussed in the previous chapter on the artistic dimensions of decay, the concept of ruin carries multiple interpretations. A ruin typically results from the loss of function (Hill, 2019; Somhegyi, 2018) and the absence of parts; in this sense, it is no longer whole (Somhegyi, 2018).

"Ruins are finely calibrated artefacts of the struggle between architectural agency and nature's agency" (Cairns & Jacobs, 2014, p. 174). According to Simmel (1959), ruins represent nature's revenge on architecture. Hill (2019) adds that: "A ruin humanises nature, making it comprehensible and familiar," while also describing the process as "vegetation naturalising architecture" (p. 295).

Ruin thus embodies the *age value* described by Ruskin and Riegl—it captures the effects of nature and time while resisting complete erasure, diminishing gradually rather than disappearing entirely.

Ruins may also be the result of disaster, becoming remnants—sites of remembrance or, conversely, sites of forgetting past trauma (Plevoets & Cleempoel, 2019). Regardless of the cause or whether they evoke the same romantic or aesthetic responses, ruins can be profoundly generative. As Cairns and Jacobs (2014) argue, “ruination nourishes architectural creativity” (p. 180).

Hill (2019) furthers this idea:

> “As a ruin, architecture is more, not less. As a stimulus to the imagination, a ruin’s incomplete and broken forms expand architecture’s allegorical and metaphorical potential… a fragmented composition is a truer reflection of contemporary society than a complete composition, indicating that a work of architecture, art or literature can remain unfinished, literally and in the imagination, focusing attention on the creativity of viewers, users, and designers.” (p. 294)

Ruins invite multiple interpretations and engagements. Building owners may view them as assets to be preserved, either through restoration or adaptive reuse, particularly in the heritage sector. While conservation paradigms have shifted away from purist restoration, they often continue to favour visually and monumentally oriented approaches (Podder, 2018). However, alternative conservation methods embrace ruination and decay. Sandler (2016) introduced the concept of counterpreservation, which challenges mainstream preservation by celebrating the

decay of cultural artefacts. Counterpreservation is situated within the discourse of everyday urbanism, encompassing grassroots initiatives and quotidian adaptations of architectural space.

> “Counterpreservation is not the same as passively letting a building decay. It is neither neglect nor active effacement. Even though the decay may have resulted from involuntary actions, in counterpreservation it is intentionally framed as a desirable future, as an element to be displayed unnoticed. Individuals, groups, and designers reappropriate decay … and put it to use, turning decay into a means of achieving affordable living and working spaces in prime neighbourhoods. This reappropriation is not only concrete, but also symbolic, infusing decay with positive associations of social inclusiveness, freedom, and creativity.” (Sandler, 2016, p. 24)

Counterpreservation functions as a form of resistance to socio-economic forces such as gentrification, and as a form of activism where decay becomes a deliberate and inclusive choice. It is distinct from *ruinenlust* or *ruin porn*, which aestheticise decay for consumption. Instead, counterpreservation is a productive, community-driven approach rooted in context (Sandler, 2016).

The appropriation of decay, often through inhabiting ruinous buildings, is sometimes aligned with informal practices such as squatting or encroachment. Plevoets and Cleempoel (2019) cite the example of Kunsthaus Tacheles in Berlin, where a group of artists informally occupied the ruins of a former shopping arcade. “The artists used the space ‘as found’, doing only necessary interventions using reclaimed and salvaged materials,” occupying rather than redesigning the building (p. 44). Ultimately, due to its informal and illegal nature, the occupation was terminated.

Different types of ruins evoke different responses and possibilities. Edensor (2007) describes walking through industrial ruins as “repellent but also delightful,” as they provoke “unexpected pleasures, imaginings, and desires” (p. 230). Such sites offer multisensory experiences—the smell of decay, the texture of crumbling surfaces, remnants of past inhabitation, and signs of non-human presence. Industrial ruins, in particular, often accommodate “the illicit, the illegal, the adventurous, the innovative, and the expressive” (Cairns & Jacobs, 2014, p. 184), and have featured in various architectural projects.
Cairns and Jacobs (2014) also examine these practices in the Global South:

> “Squatting and ruination have quite different meanings and implications in the context of the Global South. There, squatting is not associated with the the occupation of an engagement with the ‘delicious disordered’ aesthetics of unused infrastructure. More usually it is associated with a ‘lifestyle’ (an evident misnomer in this context) characterized by the absence or substandard provision of formal infrastructure.” (p. 185)

This is the case in Indonesia, including in urban heritage sites such as Semarang Old Town. Following independence, the area experienced a prolonged period of dormancy during which many buildings were abandoned and left without maintenance. Informal inhabitation became widespread over the following 50 years. These informal practices—including trading, hawking, begging, and the construction of makeshift shelters—typically occurred in abandoned or leftover urban spaces (Dovey, 2012; Dovey & King, 2011). In Semarang Old Town, such practices are evident in informal structures attached to building façades and walls, and in some cases, infiltrating the interiors of accessible buildings.

These informal inhabitations are often viewed as *out of place*, a concept introduced by Mary Douglas in 1966. In *Purity and Danger*, Douglas explains that “Dirt is matter out of place,” not necessarily unhygienic or pathological, but rather something that disrupts an established order (Douglas, 2005, p. 44).

Thus, dirt—and by extension, informal inhabitation—is interpreted as a disruption to the ordered urban system. Similarly, plants growing on building walls are considered *weeds*—or, as Gissen (2009) puts it, “plants out of place” (p. 150). Both informal occupation and spontaneous ecological growth are typically addressed in the same way: by removal or relocation to a site deemed more appropriate by authorities.

3.7. Conclusion

This chapter offers a discussion of porosities in the landscape of architectural theories. It begins with Walter Benjamin and Asja Lacis’s essay "Naples" from 1925, which allows for various interpretations of porosity in built environments. Then, the material porosity is discussed in the context of both the aesthetic and environmental aspects of decay, ranging from ruins to the concept of bio-receptive materials, which incorporate porosity at the material level, allowing traces of other organisms to be integrated into architecture and ruins. The spatial porosity is discussed in the context of architectural boundaries, such as walls with doors, windows, and balconies, which act as the pores of architecture, allowing inhabitation within and through its thickness, connecting the different realms — public and private, inside and outside. The concept of social porosity is discussed in the context of architecture and its social context, concerning the coexistence of different actors, both formal and informal, which closely relates to the urban context as a key aspect of

architecture. The three porosities then contribute to the concept of architectural porosity, which will serve as the framework for understanding porosity in the empirical context of the urban heritage site under study.

Furthermore, this chapter concludes with an attempt to situate the three porosities within the broader discussion of heritage practice. In summary, they reside with the ‘other ’type of heritage, which views heritage as part of everyday life, rather than as a mere monument that removes it from its everyday reality. They also reside with the idea of porous conservation, which, first, that perceives the heritage material as one that carries environmental and social events of the past; second, one that perceives decay as a productive tool for conservation, such as counterpreservation; and third, one that acknowledge the engagement or encounter with the informal inhabitations. Essentially, they adhere to the concept of adaptive reuse; however, not only the formal, but also the restorative, one that is inclusive and sensitive towards the faculty of the heritage material and the informal practices.

The next chapter will introduce the context of Semarang Old Town in more detail, discussing the post-revitalisation situation as well as the heritage practices in the area, before developing architectural porosity as a porosity index in the following chapter.

Chapter 4.On Context: Semarang Old Town, Indonesia

This chapter focuses on Semarang Old Town in Indonesia, which serves as the empirical context for this architectural inquiry. It is designated as a National Heritage Site and is characterised by a concentration of Dutch colonial-style buildings that define its distinctive visual identity.

Before this study, I had no personal or professional engagement with Semarang Old Town. I am not a local to Semarang, nor have I previously specialised in architectural history or heritage fields, which typically concern the study of historical sites and buildings, such as those found in Semarang Old Town. I approach the area as a visitor and as a researcher. While I had visited the site recreationally before this project, my engagement for this study has been primarily for architectural fieldwork, rather than heritage studies per se.

Naturally, the historical background of the area is significant. However, this research is more directly concerned with the heritage dimension of the site, particularly in light of the ongoing revitalisation project. This chapter aims to provide the necessary historical and heritage context by examining existing literature, conducting interviews with local experts, reviewing relevant heritage regulations and planning documents, and drawing upon field observations carried out in 2022 and 2023. It will lay the foundation for the porosity index and mapping in the following chapter.

4.1. Introduction

Semarang Old Town—known locally as *Kota Lama Semarang* or *Oudestad*—is one of four designated heritage sites within the broader *Semarang Lama* (Old Semarang) heritage area in Central Java, Indonesia (Figure 4.1). In 2020, this area was officially designated a National Heritage Site by the Ministry of Education and Culture of the Republic of Indonesia. The *Semarang Lama* area comprises four distinct heritage zones:

- Oudestad (Semarang Old Town) – formerly a fortified European colonial settlement;
- Kampung Melayu – formerly inhabited by Malay-speaking communities from outside Java;
- Kampung Kauman – traditionally a settlement for Javanese Muslim communities;
- Kampung Pecinan – the Chinese residential quarter.

These sites collectively illustrate the rich cultural diversity of Semarang and reflect historical influences from various ethnic and national backgrounds.

Semarang holds a strategic position as the capital of Central Java Province. During the Dutch colonial era, Semarang—especially the Old Town area—was a vital centre for trade, military operations, and governance. Its port attracted merchants from around the world, establishing it as an international hub. Today, Semarang has grown into a significant Indonesian metropolis, where historical sites like Semarang Old Town coexist with modern urban development. The continued

existence of such heritage areas is the result of state-led efforts in conservation, restoration, and revitalisation.

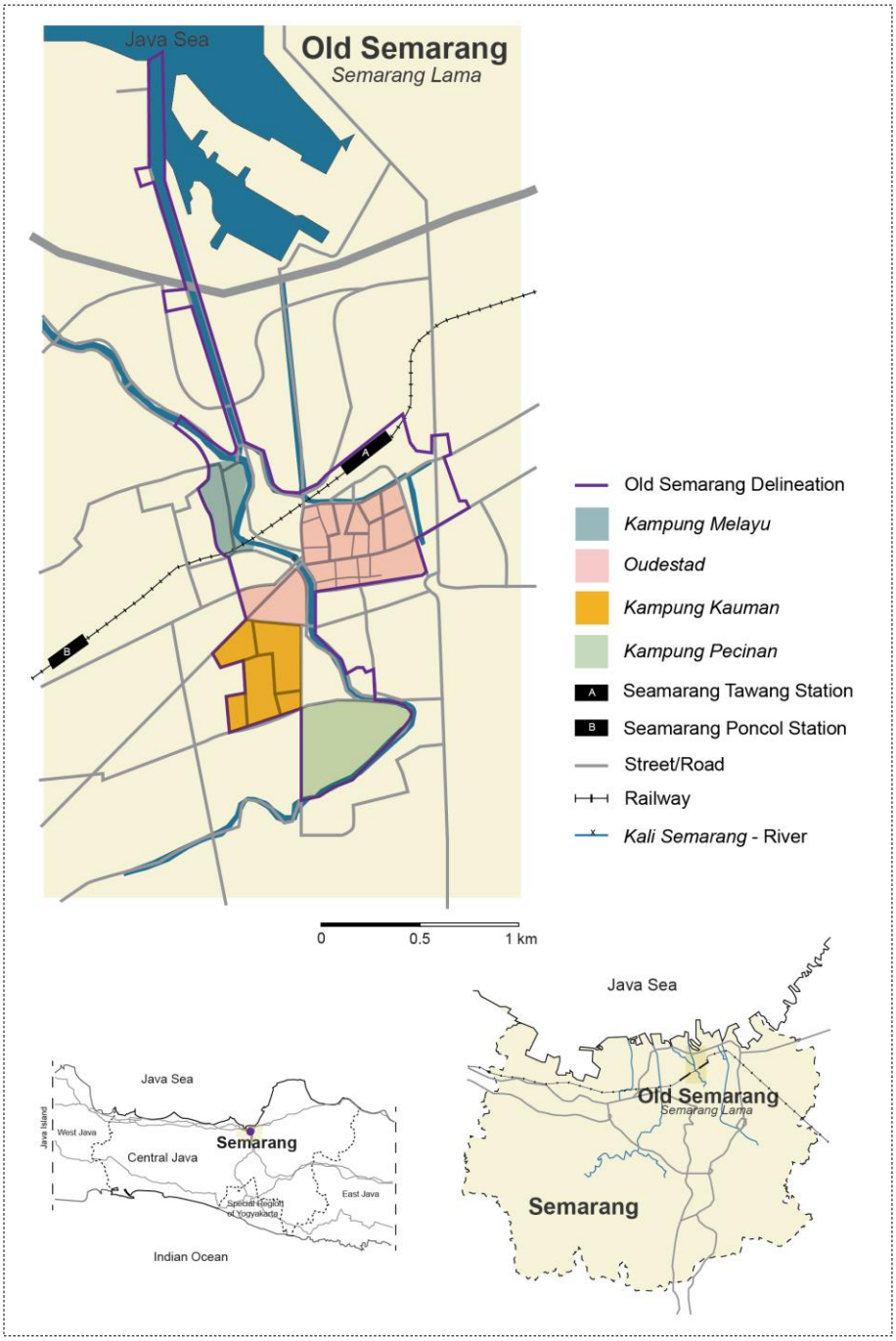


Figure 4.1.Semarang Lama (Old Semarang) Map

Semarang Old Town has been the subject of revitalisation efforts since 2011, initiated by the local municipality. The most significant phase of the revitalisation project began in 2017. This project has transformed the area into the inhabited urban

heritage site it is today, with improved infrastructure including newly paved streets, upgraded drainage systems, additional street furniture, and numerous restored or revitalised buildings—although many remain in a state of disrepair.

This chapter provides a brief historical overview of Semarang Old Town, spanning various eras from the colonial period to the post-independence era, including the New Order, the Reformation period, and the present day. It will then examine the heritage regulations and practices in Indonesia that have shaped the current form of Semarang Old Town. The chapter concludes by situating Semarang Old Town as the empirical context for this architectural inquiry, drawing on field observations from 2022 and 2023, defining the study area, and transitioning into the porosity reading in the next chapter.

4.2. Brief History of Semarang Old Town

This brief history of Semarang Old Town will address the formation of the area, its morphology, and how it has changed through the centuries, set against the socio-political conditions throughout the Dutch colonial era, the Indonesian independence, and up to the present time. It involves examining old maps to trace the formation and any morphological changes, as well as reading available literature on the history of Semarang, the Old Town of Semarang, and the concept of colonial heritage.

4.2.1. From Dutch Colonial Era to Indonesia's Independence

The Dutch colonial era in Indonesia began in the early 17th century, when the Dutch trading company, *Vereenigde*

Oostindische Compagnie (VOC), arrived in Indonesia to control the spice trade. At that time, many kingdoms in the area, now part of Indonesia, coexisted in harmony, while others were engaged in war with each other. When VOC arrived in many parts of Indonesia, some kingdoms fought against them, while others formed alliances with them. However, their purpose seemed to be the same: to profit from the spice monopoly, which means it involved the need for them to conquer and colonise the land and enslave the indigenous people.

VOC, in 17th-century Semarang, positioned itself among the wars between local kingdoms that fought over the area in Java, including Semarang. Due to its alliance with the Mataram Kingdom, the VOC gained control over Semarang in 1678. VOC had been wanting to have the power over Semarang, as one of the city in the north coast of Java, because of its strategic position to enter Java, of its natural resource, fertile ground for plantation, showing its economic potential, and the diverse and open society of Semarang (Yuliati et al., 2020). Since then, the VOC had control over Semarang and started developing the area.

As the coloniser, of course, the VOC had to face many rebellions from the indigenous people. Therefore, the first plan for Semarang was to construct a fort for defence, as shown in the 1695 map of *Semarang's Situation*, which depicts the new fort design in the Semarang landscape (Figure 4.2.). The fort was named *De Vijfhoek F*ort. It was located on the east side of the Semarang River, known as the *Groote Rivier* or Big River, which had a north–south direction, right where this big river met the *Kleine Rivier* or Small River, which had a west–east direction (Yuliati et al., 2020). The fort was considered a gateway to enter Semarang from the sea. The 1695 map already marked or planned the existence of Chinese and Javanese settlements

(which are part of the present-day Old Semarang), as the VOC planned to relocate these different ethnic groups around the ford for control and surveillance.

Figure 4.2.Samarangs situatie 1695 (Semarang's situation 1695). (de Roy, 1695). CC 0.

Moving to the 18th century, Dutch settlements began to develop on the east side of the *De Vijfhoek* fort, featuring houses, a church, and offices, which is considered the origin of the Semarang Old Town, as it is known today (Purwanto, 2005). It was shown in te 1741 *Kart van Semarang en omstreken* map (Figure 4.3. left). At that time, in the early 1740s, a large-scale war broke out between the Chinese and Javanese in Semarang, known as the *Geger Pecinan* or Java War, from 1741 to 1743. It was triggered by the 1740 Batavia Massacre when the VOC slaughtered Chinese residents in Batavia. The war almost overthrew VOC control over Semarang, but they managed to keep their position. However, the *De Vijfhoek F*ort was severely damaged, and in 1746, the reigning Governor General ordered its demolition and the construction of a new fort. This time, the fort was planned to surround the Dutch settlements, as shown in the 1787 *Plan van* de stad Semarang met de profilen der fortificatien (Figure 4.3. right). This planned fortified city was then known as *Europeesche Buurt* or European neighbourhood. It

was intended to be the military and government centre, featuring government offices, an ammunition factory, warehouses, barracks, a hospital, a church, and a market.

*Figure 4.3.Left Map: Kaart van Samarang en omstreken 1741 (Map of Samarang and surrounding areas 1717). (*Kaart van Samarang en omstreken*, 1741). CC 0. Right Map: Plan van de stad Samarang met de profilen der fortificatien 1787 (Plan of the city of Samarang with the profiles of the fortifications 1787). (*Plan van de stad Samarang met de profilen der fortificatien*, 1787). CC 0.*

The acknowledgement of colonial heritage, such as Semarang Old Town, has occurred in almost every Indonesian city. Municipalities began to recognise the colonial heritage within their jurisdictions as an opportunity for development and city branding. As a result, they started to formulate cultural heritage regulations and initiate revitalisation projects. From the early 2000s to the present, it is this municipal recognition of colonial heritage that has significantly shaped Semarang Old Town as it exists today.

Entering the 19th Century: Dutch Governance and Infrastructure Development

At the beginning of the 19th century, the Dutch government assumed control of Semarang from the Dutch East India Company (VOC). This transition marked a period of significant infrastructural development in the city. One of the major projects was the construction of the *De Groote Postweg* (The Great Post Road) in 1808. This 1,000-kilometre road, built under the forced labour of indigenous people, stretched from the western to the eastern coast of Java, following the northern coastline and passing through Semarang.

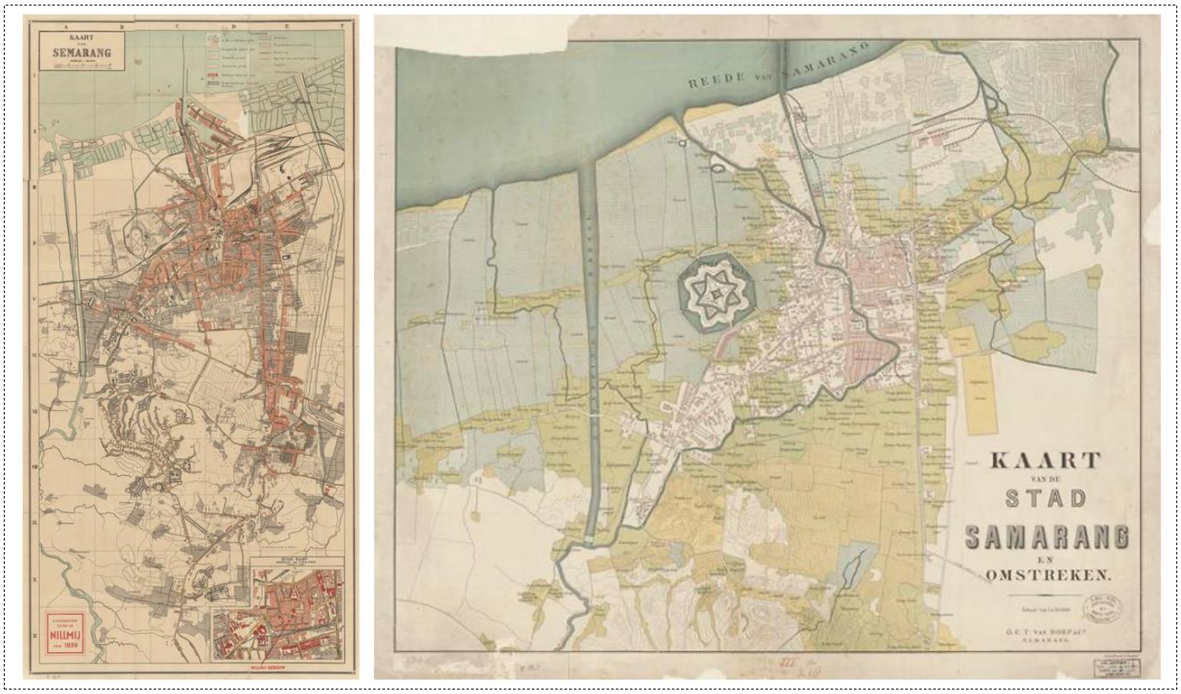


*Figure 4.4.Left Map: Kaart van Semarang aangeboden door de Nillmij van 1859 (Map of Semarang offered by the Nillmij of 1859). (Nillmij, 1920). CC 0. Right Map: Kaart van de stad Samarang en Omstreken 1880 (Map of the city of Samarang and surrounding areas 1880). (*Kaart van de stad Samarang en Omstreken*, 1880). CC 0.*

This road catalysed urban and demographic growth in Semarang. The European settlement expanded, and in 1824, the city's fortifications were deemed obsolete and subsequently dismantled. The moats surrounding the fort were filled in and converted into roads, shaping the modern street layout of

Semarang Old Town (Yuliati et al., 2020). However, the Java War (1825–1830) soon followed, resulting in a Dutch victory. The conflict highlighted the need for renewed military infrastructure, prompting plans for a new fort on the west side of the river (see Figure 5.4).

Under the *cultuurstelsel* (1830–1870), a forced cultivation system requiring Javanese farmers to grow cash crops such as coffee, sugarcane, and indigo, Semarang emerged as a vital trading hub. The first railway station, Semarang Tawang Station, was established in the 1840s in the north of the Old Town, and a new port and canal system were developed to accommodate increasing maritime traffic.

The 1859 *Kaart van Semarang* illustrates the city's expanding infrastructure, with detailed attention to *de Stad Semarang*, the European district now recognised as Semarang Old Town.

Semarang in the Early 20th Century

At the turn of the 20th century, Semarang benefited from a new governance policy of decentralisation, implemented in response to the city's rapid development in the late 19th century. In 1906, Semarang officially became a *gemeente* (municipality) with administrative autonomy and a representative local government composed of Dutch officials, indigenous *pribumi*, and non-Dutch, non-Indonesian members (Yuliati et al., 2020).

Urban growth in Semarang was further fueled by agrarian capitalism, which emerged after the enactment of the 1870 *Agrarische Wet* (Agrarian Law), which enabled private enterprise in agriculture. This led to increased economic activity and the establishment of banks, insurance companies, and trading firms

within *De Stad Semarang*. The 1917 *Semarang en Omstreken* map illustrates the relatively unchanged urban form of the area, although many of the buildings have undergone evolution over time (Figure 4.5).

Figure 4.5.Left Map: Semarang en Omstreken aangeboden door Nillmij 1917 (Semarang and Surroundings offered by Nillmij). (Hoofdagentschap Nillmij (Semarang), 1917). CC 0. Top Right: Kantoor van de Nederlands-Indische Levensverzekering en Lijfrente Maatschappij (Nillmij) te Semarang 1927 (Office of the Dutch-Indian Life Insurance and Annuity Company (Nillmij) in Semarang). (Hisgen, 1927). CC 0. Bottom Right: Paradeplein te Semarang 1915 (Parade Square in Semarang). (Hisgen, 1915a). CC 0.

During the 1910s and 1920s, Semarang experienced significant growth and prosperity. The city's river, Kali Semarang, bustled with trade (Figure 5.6), and the area was especially prominent in sugar trading. Prominent Chinese merchants, such as Oei Tiong Ham, played a significant role in this economy, demonstrating the growing influence of the Chinese community. His company's presence in *de Stad Semarang*—rather than in the traditional

Chinese quarter—highlighted his economic influence and shaped Semarang's urban development (Van Roosmalen, 2020).

Figure 4.6.Sociëteitsbrug te Semarang 1915 (Society bridge in Semarang) and the view of Kali Semarang (Semarang River). (Hisgen, 1915b). CC 0.

However, Semarang's golden age ended with the Great Depression of the 1930s and the economic downturn caused by World War I. The resulting collapse in trade and finance led to widespread bankruptcy, leaving many buildings empty and abandoned. This marked the beginning of the dereliction of *de Stad Semarang*.

4.2.2. Post-Independence Era

Following Indonesia's independence in 1945, the government of the Republic of Indonesia undertook extensive nationalisations of foreign companies. However, these were often poorly managed, leading to further bankruptcies. This situation had a direct impact on Semarang Old Town, which had once been a bustling trading

centre but became a quiet area characterised by numerous empty and abandoned buildings (Purwanto, 2005; Yuliati et al., 2020) leaving behind a neglected colonial urban fabric.

From 1945 until the 1990s, the condition of Semarang Old Town continued to deteriorate. Increasing numbers of buildings were abandoned and left to decay, the area suffered from frequent flooding, and squatter settlements emerged—likely part of the broader growth of urban kampongs in Semarang since the early 1900s (Cobban, 1974). National urban development policies also contributed to this decline under the first Indonesian president, Soekarno, who deliberately distanced national development efforts from the colonial heritage and landscapes (Ford, 1993).

During Soekarno's era, decentralised governance was suspended due to political unrest in various parts of Indonesia, which caused cities such as Semarang to lose the autonomy necessary for local development. Instead, Soekarno concentrated on developing Jakarta, the capital city, through monumental state-led projects (Ford, 1993), such as the National Monument and the National Stadium. While similar large-scale developments were proposed for other major cities such as Semarang and Surabaya, the colonial remnants were primarily neglected, left to decay, and forgotten as part of the urban fabric.

Colonial remnants such as Semarang Old Town remained abandoned during the New Order era, which began in the 1960s under the leadership of the second president, Soeharto, who remained in power for three decades. His administration adopted a pro-Western, pro-capitalist agenda (Ford, 1993), resulting in the modernisation of Indonesian cities through the construction of shopping malls, luxury hotels, and highways. During this period, "the construction of new towns and shopping malls reaped far more prestige than conservation" (Colombijn, 2022, p. 263).

It was only after the fall of the New Order regime in 1998 that these colonial remnants began to be recognised as heritage, and efforts were made to revive them (Sastramidjaja, 2014). This shift was supported by a new policy of decentralisation, which also encouraged the recognition not only of Dutch colonial history but also of the contributions of ethnic minorities such as the Chinese and Arabs to Indonesian heritage (Coté, 2002, in Colombijn, 2022). This period marked the beginning of what Ley in Colombijn (2022) and describe as a national "soul-searching" era, characterised by selective nostalgic engagement with the colonial past, or what Sastramidjaja (2014) refers to as ‘‘colonial nostalgia.”

The recognition of colonial heritage, including Semarang Old Town, has occurred in nearly all Indonesian cities, where municipal governments have begun to view their colonial legacies as opportunities for urban development and city branding. Municipalities introduced cultural heritage regulations and initiated revitalisation projects. From the early 2000s to the present day, the growing municipal recognition of colonial heritage has played a significant role in shaping the current form of Semarang Old Town.

4.3. Cultural Heritage Practice in Indonesia

As discussed at the end of Chapter 3, which justified how urban heritage serves as the context for exploring porosity in architectural inquiry, the general paradigm in heritage practice concerning tangible heritage remains firmly focused on the preservation of material artefacts. This is despite an expanding

discourse that increasingly acknowledges the integration of inseparable social and environmental sustainability. In the context of urban heritage sites, such as Semarang Old Town, cultural heritage practice — encompassing regulatory frameworks, stakeholder involvement, and the implementation of policies and projects — shapes the urban fabric as a lived and experienced material reality. Therefore, it is essential to understand the cultural heritage practices in Indonesia, from national to regional levels, as these have shaped the contemporary form of Semarang Old Town, as observed during fieldwork conducted in 2022 and 2023.

This section addresses cultural heritage practice in Indonesia, beginning with an overview of national-level heritage regulations and key stakeholders. It will then discuss the regional rules established by the Semarang municipality and their implementation in Semarang Old Town, with a particular focus on the significant revitalisation project initiated in 2017. To gain deeper insight into heritage practice and vision at both national and municipal levels, several semi-structured interviews were conducted with members of the Semarang Old Town Management Board, a member of the provincial Cultural Heritage Expert Team, and local heritage activists and historians. The discussion is grounded in these interviews, relevant regulations and planning documents, and existing literature, primarily authored by Indonesian scholars.

4.3.1. National Context

The preservation of culture and heritage is embedded in the 1945 Constitution of the Republic of Indonesia. Article 31, Paragraph 1, affirms the importance of preserving and developing culture for the benefit of future generations. It

mandates the government to implement policies to promote, develop, and safeguard cultural assets, both tangible and intangible, recognising their critical role in shaping national identity and continuity.

Heritage preservation in Indonesia dates back to the Dutch colonial period, when the archipelago, then known as the Dutch East Indies, was considered a rich field for archaeological research due to its wealth of prehistoric, Hindu-Buddhist, Islamic, and colonial sites (Kaharudin, 2019). Interest in collecting and studying antiquities began in the early 18th century and intensified in the 19th century (Fitri et al., 2015). This led to the formation of the *Commissie tot het Opsporen, Verzamelen, en Bewaren van Oudheidkundige Voorwerpen* (Commission for the Discovery, Collection, and Conservation of Ancient Objects) in 1822 (Murray, 2001). Although the commission proved ineffective, it signified that cultural heritage preservation had become a governmental concern under the Dutch. The primary focus at the time was the documentation and restoration of Hindu-Buddhist temples, particularly in Java. One significant example was the restoration of Borobudur Temple, which took place between 1907 and 1911, led by Theodore van Erp (Ismijono et al., 2013).

To formalise heritage protection, the Dutch colonial government issued *Staatsblad van Nederlandsch-Indie 1931 No. 238*, known as the Monument Ordinance (*Monumentenordonnantie*), which became the first official heritage law in the Dutch East Indies. This ordinance aligned with contemporary European conventions, using the term "monument" for cultural heritage objects, similar to Britain's Ancient Monuments Protection Act (1882) and France's Historical Monuments Act (1913). The 1931 ordinance defined monuments according to three criteria: (1) immovable or movable human-made objects over 50 years old,

or in the style of a period at least 50 years old, considered significant for prehistory, history, or art; (2) objects of paleoanthropological importance; and (3) sites containing such objects.

The field of archaeology dominated this early phase of heritage management in Indonesia. As mentioned by a member of the Cultural Heritage Expert Team (*Tim Ahli Cagar Budaya*) during an interview, the responsible agency was initially referred *to as Dinas Purbakala,* the Archaeological Service. Though the name changed several times, the dominance of archaeology—and archaeologists—persisted, often overshadowing other disciplines such as architecture and history.

Following Indonesia's independence, the 1931 ordinance remained in effect. Significant heritage efforts included the second restoration of Borobudur (1973–1983), supported by UNESCO, and the founding of the National Museum in 1979, which evolved from the *Bataviaasch Genootschap van Kunsten en Wetenschappen* (the Batavian Society of Arts and Sciences), established in 1778 (Groot, 2009; Museum Nasional Indonesia, n.d.).

It was not until the early 1990s that Indonesia enacted its national heritage law: *Undang-Undang Republik Indonesia Nomor 5 Tahun 1992 tentang Benda Cagar Budaya* (Law No. 5 of 1992 on Cultural Property). This law replaced the term "monument" with "cultural property," aligning with terminology from the 1954 Hague Convention (Fitri et al., 2017). It recognised objects of historical, scientific, or cultural significance, including natural objects. Although it acknowledged intangible aspects more explicitly, the law remained predominantly focused on tangible cultural artefacts.

In 2007, Presidential Regulation No. 78 endorsed the 2003 UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, further broadening Indonesia's legal framework to incorporate non-material heritage.

During the early 2000s, when Law No. 5/1992 was still in force, Indonesia entered a period of political reform and decentralisation following the fall of the New Order regime in 1998. This allowed regional governments to develop their cultural heritage policies. For example, the Semarang municipality passed *Peraturan Daerah Kota Semarang Nomor 8 Tahun 2003* concerning the planning and zoning of Semarang Old Town. This regulation laid the groundwork for significant revitalisation projects that will be discussed in the subsequent section on regional practice.

A more comprehensive law was enacted in 2010: *Undang-Undang Republik Indonesia Nomor 11 Tahun 2010 tentang Cagar Budaya* (Law No. 11 of 2010 on Cultural Heritage). This law broadened the definition of heritage to include objects (both artificial and natural), buildings, and structures, and introduced the concepts of *kawasan* (area) and *situs* (site). A heritage site refers to a location containing heritage buildings or objects, whereas a heritage area encompasses several such sites. This law still focuses on tangible heritage, while a separate regulation governs intangible heritage: *Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 106 Tahun 2013*, which categorises and details mechanisms for preserving intangible cultural assets.

The 2010 law also outlines preservation actions, including protection (rescue, zoning, maintenance, restoration), development (research, revitalisation, adaptation), and utilisation (for religious, educational, scientific, or tourism purposes). It

mandates further regulation at regional levels to ensure implementation is context-sensitive and locally relevant.
Most of the time, it takes a considerable amount of time for regulations to be enacted. For example, the regulation for the national registration of cultural heritage was only established in 2022 through *Peraturan Pemerintah Republik Indonesia Nomor 1 Tahun 2022 tentang Register Nasional dan Pelestarian Cagar Budaya*. Another example is *Peraturan Menteri Pekerjaan Umum dan Perumahan Rakyat Republik Indonesia Nomor 1/PRT/M/2015 tentang Bangunan Gedung Cagar Budaya yang Dilestarikan*, a ministerial regulation from the Ministry of Public Works and Housing on the preservation of cultural heritage buildings, which was updated in 2021.

Regarding stakeholders, the 2010 law specifies the government and non-governmental bodies involved in cultural heritage preservation efforts, including the central government, provincial governments, municipalities, expert teams, and management boards. Although some of these bodies had already been established beforehand, this legislation provided a framework to support the formation of additional agencies. One such body is the *Tim Ahli Cagar Budaya* (Cultural Heritage Expert Team), which plays a crucial role in recommending, categorising, and potentially removing heritage status. These teams are organised at the national, provincial, and municipal levels, and are aligned with the corresponding levels of heritage registration. The expert teams typically comprise specialists from various disciplines, such as archaeology, history, architecture, geography, anthropology, and law. Their composition may change annually, as these teams are typically appointed on an annual basis.

Another stakeholder outlined in the 2010 law is the management board, particularly for cultural heritage areas. These boards may be established by the central government, provincial or municipal

governments, or by indigenous communities with a long-standing presence in the area. The management boards can include representatives from government, business sectors, local communities, and the general public. Notable examples include the *Badan Pengelola Kawasan Kota Lama* (BPK2L), also known as the Semarang Old Town Management Board, which was formed in 2007, and the *Unit Pengelola Kawasan Kota Tua* (Kota Tua Jakarta Management Unit), established in 2014. These management boards are mainly involved in the development and utilisation aspects of cultural heritage preservation.

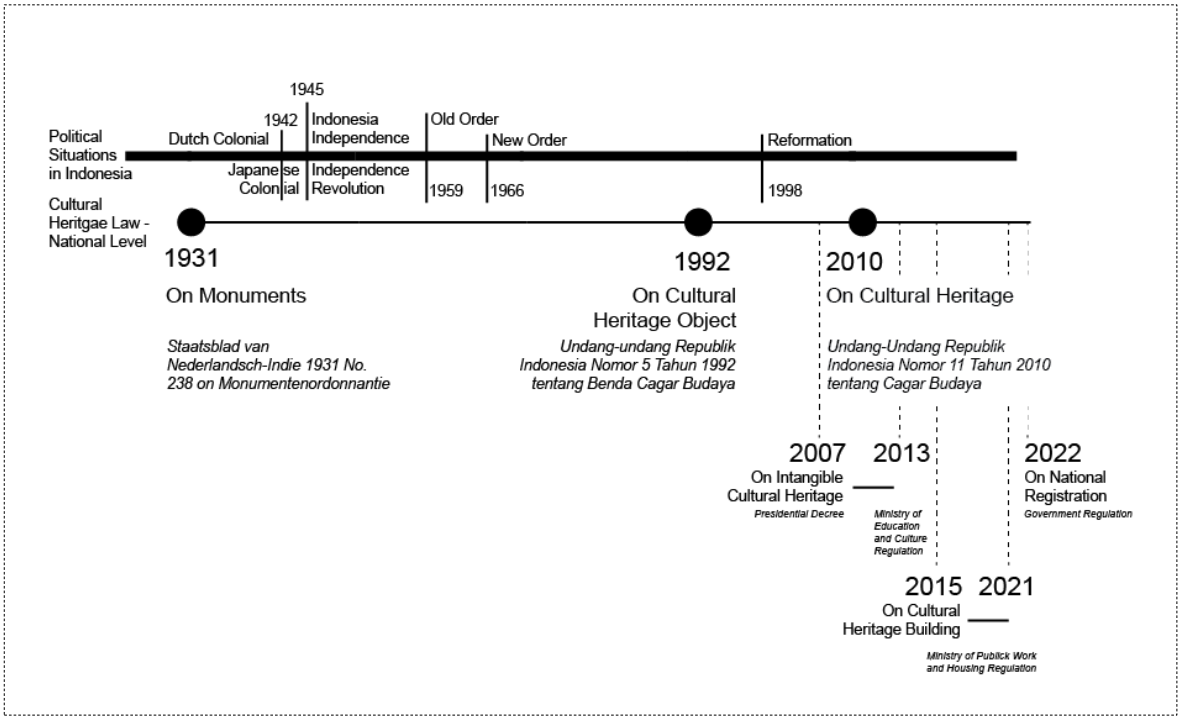


Figure 4.7.General timeline of the national heritage laws in Indonesia

The discussion above illustrates the Indonesian government's efforts to establish legislation and regulations for the preservation of cultural heritage, reflecting its alignment with international conventions, particularly the Convention Concerning the Protection of the World Cultural and Natural Heritage, also known as the World Heritage Convention. In an interview with a member of the Cultural Heritage Expert Team, it was revealed

that attaining World Heritage status is considered a Key Performance Indicator for the Ministry, provincial governments, and municipalities. Consequently, this status often becomes a key goal of preservation initiatives in Indonesia.
As with any legislation, however, the real challenge lies in its implementation. In Indonesia, the enforcement of cultural heritage laws is deeply influenced by economic and political considerations, as well as by the perspectives and paradigms of the stakeholders involved. Additionally, informal or unwritten social norms sometimes continue to guide practice, even when legal frameworks are in place (Suartina, 2022). The practical application of national laws ultimately occurs at the provincial and municipal levels. Therefore, in the following section, the focus will shift to the cultural heritage practice at the level of Semarang Municipality, which is under the jurisdiction of Semarang Old Town.

4.3.2. On the Semarang Municipality level

Semarang Old Town is one of the most important historical districts in the city, representing its colonial past. According to the 2010 Heritage Law, Semarang Old Town qualifies as a cultural heritage site, as it comprises many culturally significant buildings. As Semarang is an urban district, this thesis refers to it as an *urban heritage site*, a term introduced in the previous chapter to suggest how such areas offer a valuable context for exploring porosity in architectural inquiry. The fabric of urban heritage sites, particularly in Semarang Old Town, is shaped by both architectural materiality and patterns of inhabitation.

This section discusses the background of cultural heritage practices at the municipal level in Semarang, with a focus on the preservation efforts that culminated in the significant revitalisation project launched in 2017.

Semarang's municipal efforts in cultural heritage preservation began with the *Keputusan Walikotamadya Kepala Daerah Dati II Semarang No. 646/50/1992*, a mayoral decree issued in 1992 concerning the conservation of historical buildings, predating the 1992 national heritage law. This decree initiated preservation projects involving over 100 old buildings, many of which are located in the Semarang Old Town.

Following this, additional local regulations were introduced, including *Peraturan Daerah Kota Semarang No. 8 Tahun 2003 tentang Rencana Tata Bangunan dan Lingkungan (RTBL) Kawasan Kota Lama*, the first comprehensive planning regulation for Semarang Old Town. It provided policy guidelines and definitions for preservation actions and spatial elements.

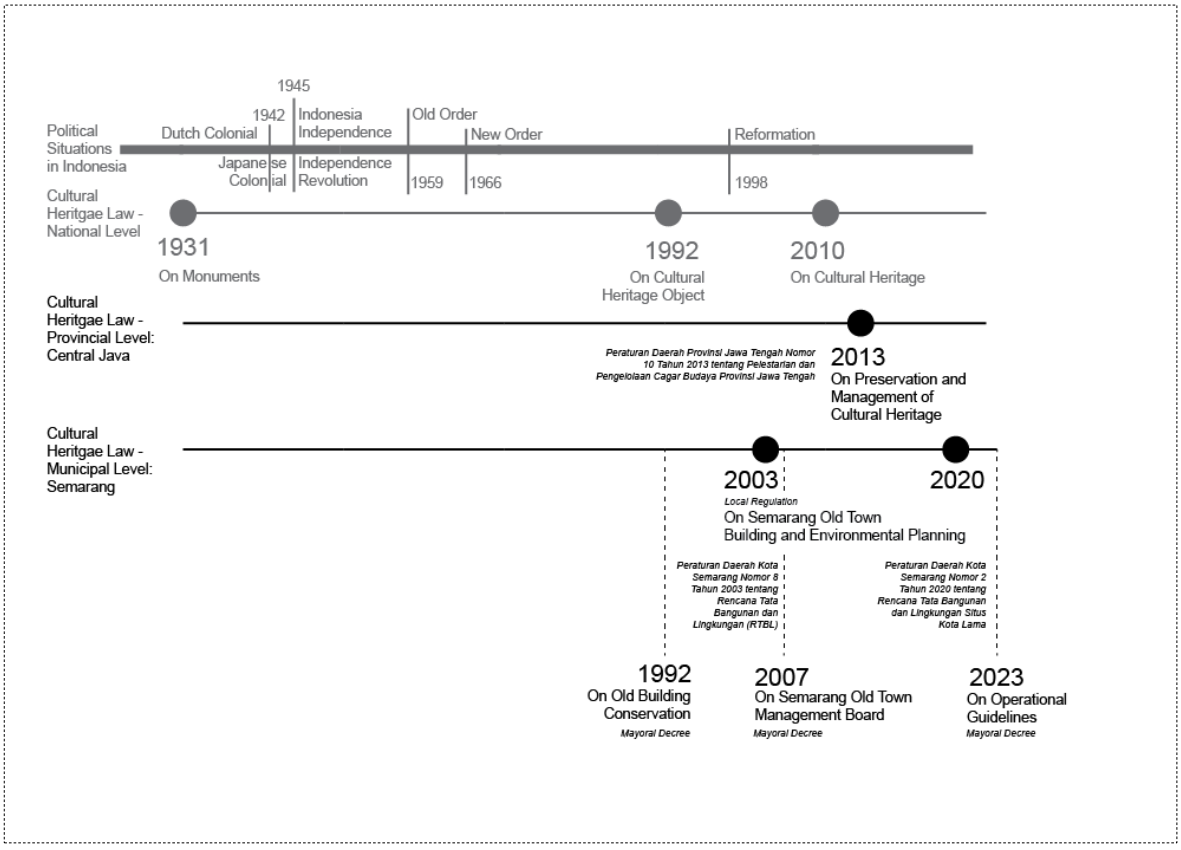


Figure 4.8. General timeline of Semarang Old Town heritage regulations

According to an interview with a member of the *Badan Pengelola Kawasan Kota Lama* (BPK2L), or Semarang Old Town Management Board, this local regulation even served as inspiration for the 2010 National Heritage Law.

In 2007, the municipality enacted *Peraturan Walikota Semarang No. 12 of 2007* to establish BPK2L formally. This board is tasked with managing, developing, and optimising the potential of Semarang Old Town through conservation and revitalisation. It also plays a regulatory role in ensuring that all development in the area adheres to relevant regulations. Although BPK2L is a non-governmental institution, it is appointed by the municipality. It includes representatives from local government agencies, the private sector, academia, and the local community, including heritage building owners.

The board is also involved in overseeing applications for restoration, development, demolition, and utilisation permits. It acts as an intermediary between property owners or developers and the municipal authorities responsible for granting such permissions.

In 2011, the *Badan Perencanaan Pembangunan Daerah* (BAPPEDA), or Semarang's municipal planning agency, commissioned consulting services through an open tender to develop the Grand Design for Semarang Old Town. This document analysed the area's historical significance, listed buildings and their conditions, documented infrastructure, and identified pressing issues. It concluded with a comprehensive action plan for revitalisation. Since then, Semarang has steadily implemented the revitalisation of the Old Town.

The term *revitalisation*, as used in heritage law, refers to efforts to rejuvenate historic areas by assigning them new functions

while maintaining their original architectural character, to enhance economic, social, tourism, and cultural activity. According to the same BPK2L interview, the municipality has jurisdiction mainly over public infrastructure. Thus, municipal revitalisation efforts have primarily targeted public spaces—roads, pavements, parks, and so on. The buildings themselves, however, are mostly owned by private individuals or state-owned enterprises, limiting the municipality's direct involvement. Its role has therefore been to offer support through incentives and guidance to encourage owners to undertake preservation work.

Semarang Old Town continues to be recognised as a socio-cultural strategic zone, a cultural heritage site, and a designated tourism area within the city's spatial planning framework, as outlined in *Rencana Tata Ruang Wilayah Kota Semarang Tahun 2011–2031*, formalised through *Peraturan Daerah Kota Semarang No. 14 Tahun 2011*. This reflects the municipality's vision for Semarang Old Town, which focuses on socio-cultural and tourism-based development.

According to the same BPK2L interview, efforts to secure funding for the revitalisation project began in 2012, when the Semarang municipality initiated discussions with the Ministry of Public Works and Housing. This resulted in the ministry allocating nearly 200 billion rupiah for the 2017 revitalisation initiative. In parallel, several municipalities, including Semarang, submitted dossiers for inclusion on UNESCO's World Heritage Tentative List via the Permanent Delegation of the Republic of Indonesia in 2015. Achieving UNESCO World Heritage status became a key objective of the revitalisation effort.

As revitalisation progressed, the municipality updated its regulations. *Peraturan Daerah Kota Semarang No. 2 Tahun 2020* replaced the 2003 regulation on building and environmental

planning for Semarang Old Town. This was followed by *Peraturan Walikota Semarang No. 29 Tahun 2023*, which offers detailed guidance on the development, maintenance, and utilisation of space, infrastructure, and buildings within the site. In pursuit of UNESCO World Heritage status, the municipality continues to align with national heritage legislation. With the involvement of *Tim Ahli Cagar Budaya* (Cultural Heritage Expert Teams) at municipal, provincial, and national levels, Semarang Old Town was formally designated a *National Cultural Heritage Area* in 2020 via the ministerial decree *Keputusan Menteri Pendidikan dan Kebudayaan Republik Indonesia No. 682/P/2020*. The municipality is currently preparing a revised dossier for submission to UNESCO.

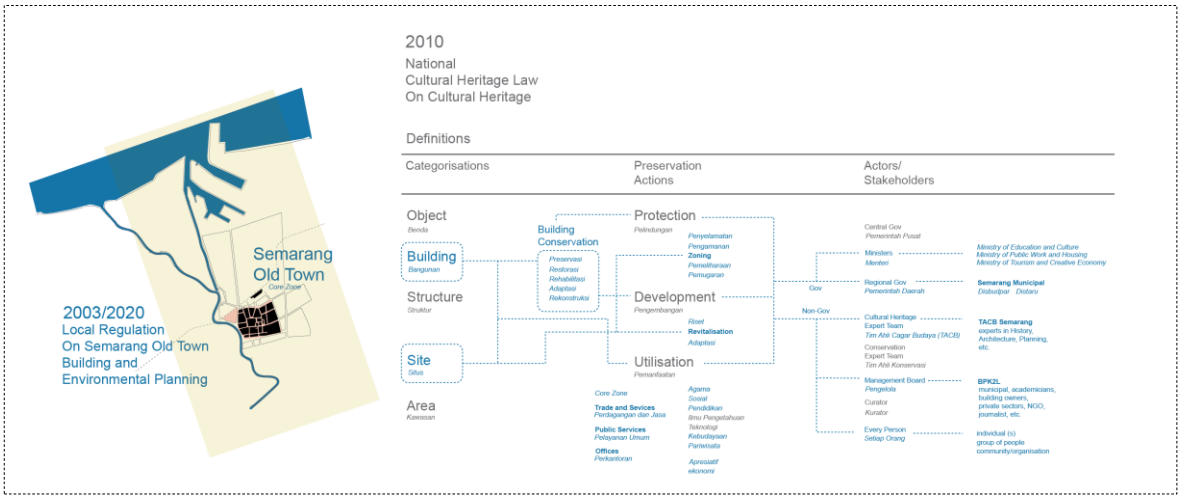


Figure 4.9.Preservation actions and stakeholders in the 2010 National Cultural Heritage Law and the Semarang Old Town heritage regulation

The discussion above outlines the regulatory framework governing formal cultural heritage practices at the municipal level in Semarang, specifically concerning the preservation of the Semarang Old Town. Figure 4.8. illustrates how the local regulations of 2003 and 2020 align with national legislation, while also introducing more detailed measures tailored to the specific context of Semarang Old Town. The following section will examine the implementation of the 2017 revitalisation project,

drawing from literature, primarily by Indonesian scholars, as well as interviews with a member of the management board, an academic from a local university, and a local heritage enthusiast. This suggests that the revitalisation of Semarang Old Town has generated diverse perspectives and discussions among various stakeholders involved in formal heritage practices.

4.3.3. The 2017 (Ongoing) Revitalisation Projects

Semarang Old Town has long been recognised for its historical significance, even before the revitalisation initiative. As such, it has attracted scholarly attention in disciplines such as history, archaeology, heritage studies, architecture, and colonial urban planning. Beyond being an urban heritage site, Semarang Old Town is also considered an archaeological site. Since the early 2000s, Indonesian archaeologists have conducted research aimed at uncovering physical evidence of the historical fort that once surrounded the area.

According to Chawari et al. (2019), in a publication on archaeological research in Semarang Old Town, excavations in the northwestern area revealed remnants of a wall, indicating the possible existence of a former fort. However, it remains unclear whether these excavation sites have since been preserved or integrated into the current heritage landscape. One potential obstacle is that these sites are located in residential areas and on government-owned land, posing challenges in terms of accessibility and permit acquisition for further excavation. While the existence of the fort pertains primarily to the field of archaeology, this section focuses instead on the urban artefacts—namely, the heritage buildings that shape the urban fabric. These are particularly relevant in the context of the

revitalisation and are typically discussed in terms of history, architecture, heritage, and urban planning.

As outlined in previous sections, Semarang Old Town began to be recognised as a valuable asset in the early 1990s. Subsequent preservation efforts affirmed the site's historical value and underscored the Semarang municipality's ambition to gain global recognition through UNESCO World Heritage status. This objective, alongside practical concerns, drove the revitalisation project.

The project also aimed to address pressing environmental and social issues that had accumulated since Indonesia's independence. These included recurrent flooding, fire hazards associated with building abandonment, and social problems such as crime, prostitution, homelessness, gambling, and cockfighting (Nugroho, 2019; Rahayu, 2022).

Semarang Old Town is situated not far from the coast and near the Kali Semarang, a major river that was historically used for transportation. Flooding—sometimes from tidal waters—has been a persistent issue since the colonial era. The floods are attributed to factors such as land subsidence, sedimentation, land-use changes in coastal areas, and inadequate drainage and waste management systems (Nugroho, 2019; Rahdriawan et al., 2021; Ridlo & Ghiffari, 2022).

Additionally, the area has experienced fires, primarily caused by poor electrical installations resulting from neglect and building abandonment (Nugroho, 2019). Two colonial-era wells were designated as emergency water sources for fire prevention, but access was often obstructed by street vendors occupying the already narrow streets (Nugroho, 2019). Hermawan et al. (2022) recently assessed the area's fire risk, concluding that it ranged

from medium to high due to building density and limited access for fire trucks.

These environmental threats have significantly affected the physical condition of the area and its heritage buildings. However, the degradation was also exacerbated by human factors, such as the neglect and abandonment of heritage buildings or, conversely, the implementation of inappropriate and sporadic infrastructure projects that failed to comply with preservation codes (Nugroho, 2019).

Another primary concern addressed by the revitalisation was the socio-economic decline of the area. Since its independence, Semarang Old Town has experienced physical and social deterioration to the extent that it is often described as a "dead" area (Prabowo & Harsritanto, 2018). With most buildings abandoned, the area attracted unauthorised activities, including theft of building materials (Nugroho, 2019), prostitution (often occurring in the streets or unlicensed karaoke venues), cockfighting, gambling, street vending, and homelessness. Homeless individuals would sleep on the roads, construct makeshift shelters, or squat in vacant buildings (Putri & Trilaksana, 2021).

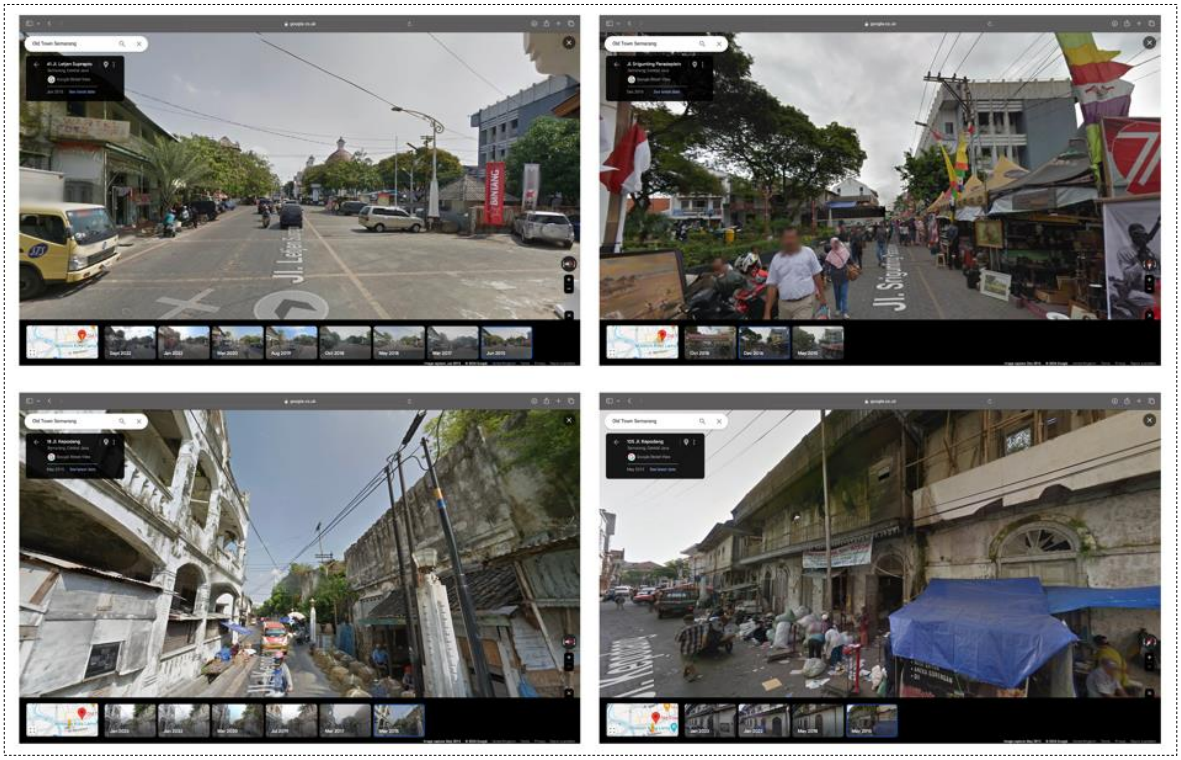


Figure 4.10.Street scenes of Semarang Old Town before the revitalisation project (GSV, 2015)

For many decades, the combination of environmental degradation, abandonment, and what were deemed unauthorised material and social activities formed part of the everyday reality in Semarang Old Town before the revitalisation efforts. Since the introduction of the 2003 planning regulation for Semarang Old Town, various initiatives have been undertaken to reinvigorate the area. Some heritage buildings were revitalised, allowing for the gradual reintroduction of activity and habitation before 2017. Harani et al. (2017) noted an approximately 23% increase in economic activity in Semarang Old Town between 2015 and 2016, attributed to these developments.

However, these early initiatives were not as extensive as the significant revitalisation effort launched in 2017. Funded by the Ministry of Public Works and Housing, the 2017 revitalisation project was implemented in two stages: Stage 1 (2017–2019) and Stage 2 (2020–2023). The project focused on infrastructural improvements, including the installation of drainage systems,

underground ducting, street paving, the construction of a retention pool, and the provision of street furniture throughout the area (Rahayu, 2022). These interventions addressed the physical infrastructure, which falls under the jurisdiction of the municipal government.

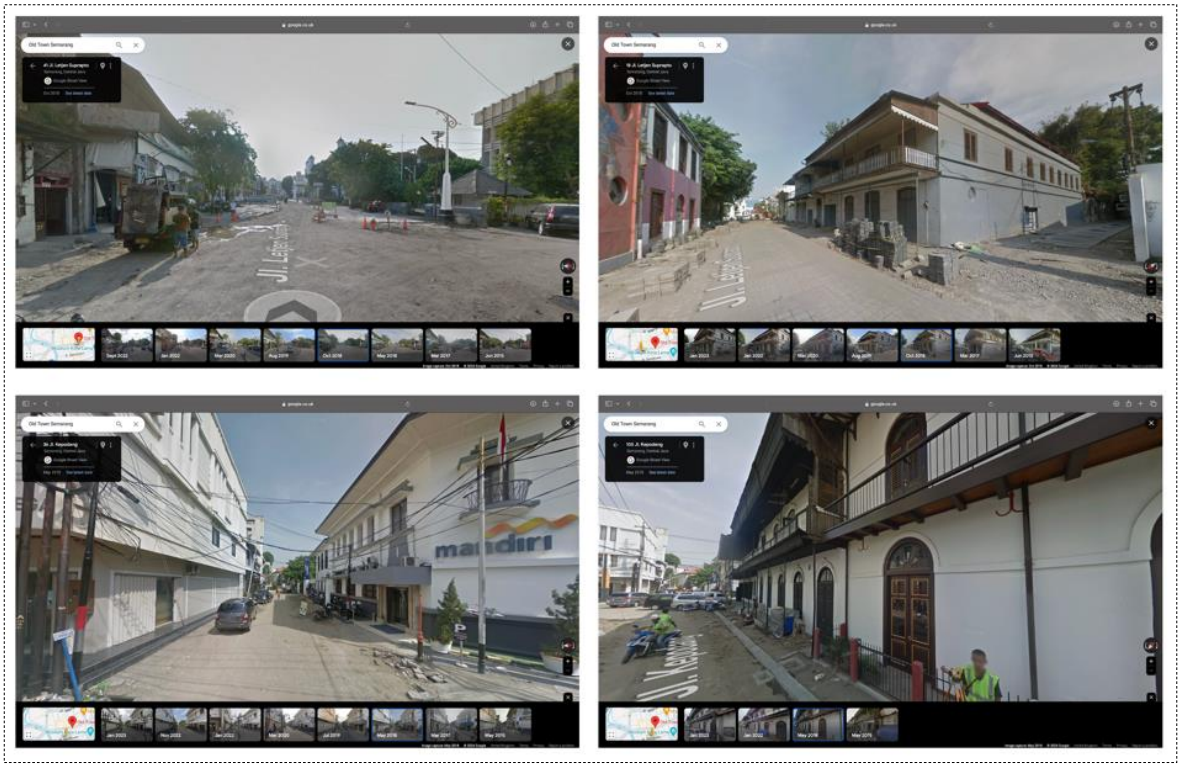


Figure 4.11.Infrastructural works around Semarang Old Town during the revitalisation project (GSV, 2018)

When the revitalisation project took place, being primarily infrastructural, access to the area was either limited or entirely restricted. This significantly impacted businesses that had been operating before the revitalisation, most of which were commercial enterprises. These businesses suffered due to limited access, as well as air and noise pollution from construction works (Ayuning & Mardiansjah, 2022). Many experienced a loss of profits, and some were forced to close before the project was completed. The economic downturn caused by the COVID-19 pandemic in 2020 further exacerbated the situation (Dewi et al., 2021).

Moreover, as the revitalisation involved work on the streets, all unauthorised inhabitation and the associated informal structures were removed. This process was not straightforward—negotiations, evictions, and relocations had to be carried out for various groups. For example, some street vendors were relocated to a revitalised building managed by the municipality. However, they were dissatisfied with the location due to the low foot traffic compared to their previous positions on the street. As a result, many returned to selling on the streets, were subsequently evicted, and moved to areas outside Semarang Old Town. The dedicated indoor relocation site was eventually occupied by new vendors from outside the region (Putri & Trilaksana, 2021).

Figure 4.12.Examples of street furniture in Semarang Old Town, 2022

The infrastructural works transformed the appearance of Semarang Old Town, introducing newly paved streets with improved drainage and ducting systems, alongside the addition of street furniture such as benches, streetlamps, pergolas, bollards, waste bins, and new plantings in tree boxes and planters. The area was also enhanced with information panels and phone booth-style charging stations. The previously prevalent social issues began to subside, and environmental threats, such as flooding, were mitigated; however, some

scholars argue that the problems may have been displaced to other areas. Several buildings were also revitalised, primarily due to the efforts of the Semarang Old Town Management Board (BPK2L). In an interview with one of its members, it was explained that the board has been actively locating building owners, especially of abandoned properties, to encourage and persuade them to revitalise their assets.

As noted earlier, most buildings in Semarang Old Town are owned either by private individuals or state-owned enterprises, which means the municipality does not have the authority to directly revitalise them. Ownership issues have been cited as one of the primary obstacles to revitalisation. In some cases, the owner is unknown; in others, the known owners or their heirs are either unwilling or financially unable to undertake restoration. In some instances, owners reportedly prefer to leave buildings to collapse, to construct new buildings in their place, rather than preserving the heritage structures (Suminar et al., 2023). Restoration or revitalisation of heritage buildings is known to be costly, often requiring material authenticity and professional conservation services.

According to the 2020 planning regulation issued by the Semarang municipality, incentives are available to property owners willing to revitalise their buildings. However, these take the form of tax relief and facilitation with third parties, such as Corporate Social Responsibility (CSR) programmes from state-owned enterprises or other potential sponsors or investors, as the municipality is not legally permitted to provide direct funding. This highlights a key aspect of the complexities surrounding the revitalisation of urban heritage sites comprised of privately owned buildings. Incentives and compensation mechanisms are essential in encouraging the active participation of property owners (Surbakti, 2017). Additionally, public-private partnerships

(PPPs) have been introduced to help finance such projects. These partnerships may take several forms, including Design-Build (DB), Build-Operate-Transfer (BOT), Build-Own-Operate (BOO), and Build-Own-Operate-Transfer (BOOT). While traditionally used for infrastructure projects, they are now being increasingly applied to heritage revitalisation (Dameria & Indradjati, 2022).

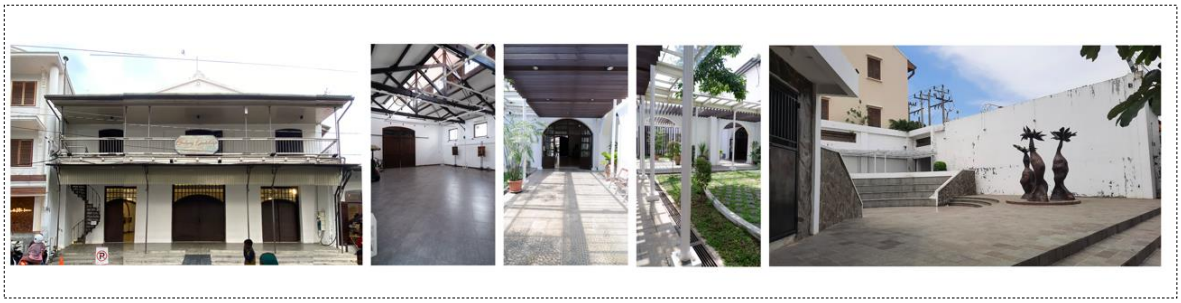


Figure 4.13.Oudetrap Building in Semarang Old Town, 2022

In Semarang Old Town, only one building—the Oudetrap Building—is owned by the municipality (Figure 4.13). It has been revitalised using municipal funds and now serves as a venue for public events, as well as a community space. An open-air theatre added during the revitalisation process has further transformed it into a new public space within the area. The municipality has also collaborated with the Ministry of Tourism and Creative Economy to manage the Semarang Creative Hub and Semarang Creative Gallery, revitalising buildings owned by state-owned enterprises with joint funding from various enterprises and banks. It is also worth noting that chain stores and franchises such as Indomaret, Alfamart, and Starbucks have now established a presence in the area (Putri & Trilaksana, 2021).

This signals the broader direction of change for Semarang Old Town. As the area is revitalised, it becomes increasingly commercialised, with more cafés, restaurants, and retail outlets appearing. As the area is rebranded as a business and tourism

hub, it naturally attracts investors, leading to rising land and rental values (Dewi & Wakhidah, 2020). In one interview with a local heritage enthusiast and small business owner, it was noted that rental prices in the area have become prohibitively expensive for small enterprises. As a result, only larger businesses can afford to operate there, which may lead to the area being dominated by middle- and upper-class consumers.

Figure 4.14.Examples of revitalised heritage buildings in Semarang Old Town, 2022/2023

This is also aligned with the projection of Semarang Old Town as a heritage tourism destination (Dewi & Wakhidah, 2020; Firdaussyah & Dewi, 2021; Yuliati, 2019; Yuliati et al., 2023). This is evident in the increase of commercial spaces and the addition of public facilities, although further improvement is still needed, such as public toilets, parking areas, and ATM centres (Lukito et al., 2019). Tourism can be considered a form of preservation, as it offers the opportunity to manage and develop heritage areas for economic benefit (Mandaka & Ikaputra, 2021).

The projection of Semarang Old Town as a tourist destination seems logical given the direction of the revitalisation project. The addition of street furniture, amenities, a focus on physical and commercial development, and the removal of informal activities all appear intended to transform Semarang Old Town into an attractive destination. However, the overarching vision of achieving UNESCO World Heritage Site status may be overly ambitious or even misguided. In one of the interviews with a local academic, it was noted that none of the letters in UNESCO stand for ‘tourism’, and that development efforts should instead prioritise education and culture. This suggests a possible misinterpretation of what the status entails. A member of the Cultural Heritage Expert Team also noted that World Heritage designation is considered a Key Performance Indicator (KPI) for government institutions. While this may appear beneficial, it also carries significant responsibility for the continued management and protection of heritage sites. Unfortunately, the designation is often perceived solely as a promotional tool to attract tourists and generate economic benefits.

The revitalisation project, led by the Semarang municipality and guided by national regulations and preservation visions aimed at UNESCO designation, can be understood as a formal mode of heritage practice. Given the previous condition of Semarang Old Town, which had been informally occupied and utilised, the complete removal or relocation of informal inhabitants signals a potential tension between formal and informal practices. The informal activities that once took place in Semarang Old Town represented the everyday lives of local people. Despite much of the central area now functioning as a commercial and tourist district, there remain buildings used as offices and warehouses, which continue to bring workers into the area. Thus, people other than tourists still live and work in Semarang Old Town.

Informal actors in Semarang Old Town are primarily street vendors who sell food, goods, and services to both tourists and locals (Dewi et al., 2023). Previously, their presence was more permanent and seamlessly integrated with formal activities, mainly when the area remained unrevitalised. However, following revitalisation, they were removed and are now dispersed around the formalised spaces in more temporary and precarious ways (Dewi et al., 2023). Informal activities tend to follow formal ones: for example, vendors often appear near offices at lunchtime. Their temporary presence is also the result of constant monitoring by the *Satuan Polisi Pamong Praja*, the municipal enforcement police, who routinely carry out raids to evict unauthorised activities such as street vending. Informal actors are not only unwelcome by the authorities. Still, they are sometimes perceived as a nuisance by formal businesses, leading to rivalry and ultimately pushing informal actors out of the revitalised areas (Prabowo & Salaj, 2021).

Figure 4.15.Examples of informal activities in Semarang Old Town, 2022

The 2017 (onward) revitalisation project marks a significant turning point in the development of Semarang Old Town. Although the COVID-19 pandemic did have an impact, the area has continued to evolve. The revitalisation has improved infrastructure to mitigate environmental and social challenges, while simultaneously transforming the site into a tourist destination. However, this shift has also contributed to the

erosion of everyday life and informal activities, rendering the Semarang Old Town increasingly like a curated attraction. At the time of field observation in 2022 and 2023, many buildings had been restored and revitalised, functioning as upscale cafés and restaurants. Yet, as discussed previously, some buildings remain derelict due to ownership issues or a lack of resources for revitalisation. It was also observed that informal activities persist: vendors walk the area selling snacks, drinks, and children's toys. These layers of material and social diversity continue to animate and sustain the lived reality of Semarang Old Town.

4.4. Conclusion

Semarang Old Town is a historical district in Semarang, representing the colonial era and dating back to the 18th century. It began as a Dutch settlement east of the *De Vijfhoek* fort, which later became the fortified city of *Europeesche Buurt*. The fort was demolished by the Dutch themselves as the population grew and the town required expansion. By the early 20th century, it had become one of the busiest port cities in Java. Semarang Old Town has witnessed many historical periods. Its origins lie in the colonial era, followed by a period of prominence as a port city, before experiencing significant decline and decay after Indonesian independence. Today, following an extensive revitalisation project, Semarang Old Town has come back to life. It has even earned the nickname "the Little Netherlands," as the entire area and its buildings reflect Dutch colonial architecture.

Although Semarang Old Town bears witness to Dutch colonisation, contemporary attitudes towards this colonial legacy have become increasingly appreciative. The area is now celebrated. For instance, after the first stage of revitalisation in 2019, the former President of the Republic of Indonesia, Joko

Widodo, visited Semarang Old Town with several ministers, travelling through the district on vintage bicycles, seemingly to evoke the nostalgic atmosphere of the area. Similarly, when Indonesians visit colonial districts like Semarang Old Town, it is not uncommon to see them dressed in traditional attire, such as the *kebaya*, which is reminiscent of everyday clothing from earlier times.

These positive attitudes towards tangible colonial remains can come as a surprise to non-Indonesians, such as Europeans and Americans. It is an example of post-colonial appropriation of colonial-built heritage (van Roosmalen, 2013). The term *appropriation* is particularly relevant here, as it implies both an act, such as the revitalisation project, and an interpretation by the formerly colonised population. Such appropriation arises from various sectors of society. Colombijn (2022) uses the term *bricolage* to describe this process: “Bricolage is the selective conceptual appropriation of colonial buildings for whatever objective the user finds convenient: objects to boost a city’s brand, company advertisements, stops on heritage tours, amusing backdrops for pictures and selfies, counterpoints to consumerist lifestyles in shopping malls, etc.” (Colombijn, 2022, p. 639). In this way, colonial districts and their architecture have become integrated into the city's everyday life, with people seeking utility and meaning in their presence.

During informal conversations with visitors and locals in Semarang Old Town in 2022 and 2023, none expressed opposition to its preservation on the grounds of its colonial origins. All emphasised that it is a part of national history and should be preserved. Sastramidjaja (2014) notes that “the bitter facts of colonialism are consistently downplayed” in the marketing of colonial heritage (p. 446). This selective forgetting contributes to a romanticised view of the colonial era,

encapsulated in the widespread term *tempo doeloe* ("the old times"), which offers a nostalgic narrative that obscures the more uncomfortable aspects of colonial history. This nostalgic framing enables a shared cultural memory that sidesteps the deeper, more painful truths of colonisation (Sastramidjaja, 2014, p. 446).

Such sentiments reflect the contemporary relationship between Indonesians and colonial heritage. The public now celebrates these spaces by conferring upon them cultural heritage status, which in turn obligates preservation. One member of the cultural heritage expert team interviewed for this study noted that the spirit of the 2010 cultural heritage law was to set aside ideological concerns and instead focus on preservation and utilisation. However, this can lead to commercial exploitation or overtourism. This has, at times, become a reality in Semarang Old Town, particularly on weekends and public holidays, when overcrowding leads to traffic congestion and potential friction with residents and informal workers (Prabowo & Salaj, 2021). Additionally, overuse can result in physical damage to heritage buildings—for example, when people climb on windows to take photos or litter in public areas, behaviours that unfortunately still occur.

While cultural heritage discourse historically carried an air of elitism, it is now shifting towards a more inclusive model that involves diverse sectors of society (Yapp, 2015). Although this chapter has focused primarily on formal preservation efforts by government institutions, it is essential to acknowledge that grassroots and community-led initiatives also play a significant role in preservation efforts.

Figure 4.16.Crowds in Semarang Old Town, 2022

Yapp (2015, 2020) identified the contributions of both experts and amateurs to preservation efforts in Indonesia, as part of her study on "heritage advocacy" in Semarang. While experts tend to have academic credentials or official recognition, amateurs are often motivated by personal interest and care for historical sites. Their initiatives include documenting buildings, running social media campaigns, and organising exhibitions, all of which contribute to public historical awareness. One heritage enthusiast interviewed for this study expressed disappointment that the municipality had not made more effort to share historical narratives as part of the revitalisation.

Overall, the interactions between Indonesians and their colonial heritage reveal a layered and complex picture. From a top-down perspective, various levels of government have introduced legislation, launched revitalisation projects, and sought global

recognition, such as UNESCO World Heritage Site status. From the bottom up, community-driven initiatives aim to protect, promote, and repurpose heritage assets. The concept of appropriation helps understand how different societal groups engage with colonial heritage in distinct ways.

In the case of Semarang Old Town, the municipality's revitalisation efforts represent one form of appropriation, transforming colonial remnants into celebrated symbols of nostalgia and potential global recognition. At the same time, community initiatives and informal appropriations— whether through commerce, daily routines, or dwelling —also shape the identity and meaning of this urban heritage site. These varied appropriations manifest in the everyday lived experience of Semarang Old Town, a revitalised space that blends preserved architecture with diverse forms of use and occupation. It has become both a tourist destination and a lived environment characterised by layered material and social conditions. Returning to the architectural inquiry at the heart of this thesis, the everyday realities observed during fieldwork in Semarang Old Town in 2022 and 2023 will be examined through the lens of architectural porosity.

Chapter 5. On Building Method and Methodology: The Porosity Index

This chapter aims to further explore the concept of porosity within the heritage discourse, which provides the contextual foundation for this architectural inquiry. As previously mentioned, this study takes Semarang Old Town as its case study. This chapter provides a detailed examination of the application of the three porosities within the field of heritage studies. It examines how architecture, alongside related disciplines such as archaeology, anthropology, and urban studies, contributes to shaping the development of the method and methodology of this inquiry. It will then propose the Porosity Index that will be utilised to read porosity in context.

5.1. Introduction: Viewing Heritage from Architecture

Although this study engages with heritage as a subject and heritage sites as context, it does not position itself as a heritage study per se. Instead, it is an architectural inquiry rooted in architectural discourse, guided by architectural knowledge and practice. It investigates architectural concepts through phenomena situated within heritage sites. Before delving into the specific methods employed in this inquiry, it is helpful to examine the relationship between architecture and heritage as disciplines. This exploration reveals shared intellectual ground, methodological overlap, and practical intersections that also

extend to other disciplines, thereby enriching the methodological foundations of this inquiry.

This discussion begins with Harrison's (2013b) framing of heritage as a "creative engagement with the past in the present," which arises from the interactions between people, objects, places, and practices. Heritage, according to Harrison, does not draw a strict distinction between the natural and the cultural; instead, it is concerned with the chains of connectivity that link humans and non-humans in keeping the past alive for the future (Harrison, 2013b, pp. 4–5). This conception provides multiple entry points for architectural reflection and underscores the interdisciplinary nature of heritage.

> "Heritage is a merging interdisciplinary field of study… Investigations of heritage may this draw on expertise from range of other disciplines including anthropology, archaeology, architecture, art history, psychology, sociology, and tourism." (Sørensen & Carman, 2009, p. 3)

Heritage studies often focus on determining what should be preserved and how, alongside examining the politics and management structures involved (Harrison, 2013b).While different disciplines bring varied lenses to this field, the nature of heritage often demands cross-disciplinary collaboration. Therefore, this architectural inquiry is a form of heritage study, one that also borrows methodological inspiration from this rich and diverse field.

The most direct intersection between architecture and heritage occurs in the domain of architectural heritage and conservation. France (2019) notes the challenges architects face in conservation practice:

> “Architects have often found conservation challenging to understand and frustrating in practice, mainly because their five year programmes of education have focused almost exclusively on the production of new buildings on vacant sites: innovations in vacuo. Conservation, on the other hand, is about intervening in what already exists; architects perceive the constraints involved as denying them the freedom of personal expression inculcated during their time in higher education." (France, 2019, p. 56)

While traditional architectural education and practice focus on new design, conservation and adaptive reuse involve working with existing structures, often requiring different design approaches and professional sensibilities. However, the growing emphasis on sustainability and the increasing relevance of existing and heritage buildings have opened new roles for architecture in heritage practice. This shift is also reflected in architectural education, where more programmes now include projects involving existing buildings and heritage awareness (Orbasli et al., 2020).

Architectural regeneration, including adaptive reuse, bridges the divide between pure conservation and new-build projects, framing them as part of a shared continuum of knowledge rather than as opposites (Orbasli & Vellinga, 2020b). Such projects require a research-based approach that involves site visits, historical research, and multidisciplinary collaboration. Contributions may come from surveyors conducting measured building surveys using drawings or photogrammetry, or archaeologists providing insights into the site's evolution (Bassindale, 2020).

This demonstrates one of the many overlaps between architecture and heritage. Other related disciplines offer further

inspiration for this inquiry. Here, architecture is approached as a field within the humanities and social sciences. Architecture, in this view, is an animated object that is continuously produced and reproduced through material, spatial, and social practices. This understanding aligns architecture with anthropology, which studies people and their lifeworlds (R. Lucas, 2020a). Architecture forms part of these lifeworlds and can thus reveal how humans relate to their environment. Anthropology provides valuable insights into socio-economic dynamics, conservation management, and everyday spatial practices—all of which are relevant to this inquiry.

Heritage also encompasses socio-economic dimensions and is closely tied to tourism, a subject that has been the subject of anthropological research itself. For example, Palmer (2009) notes how heritage sites gain meaning through their interactions with tourism.

Archaeology, too, is a discipline closely linked to both architecture and heritage. It engages with materiality and temporality, often relying on empirical data to reconstruct past built environments. Buchli (2013) notes:

> "... archaeology as a discipline has probably developed some of the more sophisticated attempts within anthropology to address the issue surrounding architectural form, from describing the primary material context of human social evolution through time to constituting the debates surrounding heritage and the production of communities and nation-states in the present. Archaeology has paid particular attention to the materiality of built forms to engage with these issues – a preoccupation that arises from the inherently empirical and material nature of the data

archaeologists have traditionally dealt with." (Buchli, 2013, p. 48).

Recognising these disciplinary proximities and overlaps helps shape the methodological framework of this architectural inquiry. Inspired by anthropology and archaeology, this study adopts an interdisciplinary, qualitative approach that integrates architectural, spatial, and social analysis to investigate porosity within the heritage context of Semarang Old Town.

5.2. On Approach and Methodology

The term' *architectural inquiry'* is used in this study rather than *'architectural research'* due to the exploratory nature of the investigation. Groat and Wang (2013, p. 3) suggest that *inquiry* connotes a more informal approach to research. While research is defined as a systematic inquiry leading to the production of knowledge, it involves the ‘‘demarcation of how particular information is culled from the rest of our experience, how it is categorised, analysed, and presented” (Groat & Wang, 2013, p. 8). Significantly, the term *systematic*, as used here, is not exclusively associated with the *scientific experiment*, but rather with approaches that are ‘‘appropriate to the task” (Groat & Wang, 2013, p. 8, original emphasis). Thus, while this study adopts the term *architectural inquiry*, it maintains the spirit and rigour of academic research. The term' *inquiry'* is appropriate for the study’s exploratory orientation, which begins with a conceptual premise that is developed into an analytical framework.

In the social sciences—specifically in sociology—*premises* are understood as ‘‘statements of fact” that ‘‘may either be assumed or proved to be true” (Riemer, 1954, p. 551). These may be

treated as hypotheses, which, in the natural sciences, are typically tested through empirical experimentation. In contrast, in the social sciences, "[p]remises may be no more than a hypothetical device to hold certain factors constant and to allow others to vary for empirical observation" (Riemer, 1954, p. 552). This reflects the interpretive reasoning often characteristic of social science methodologies, in contrast to the objective experimentation of the natural sciences.

This study adopts such a view of *premises*. It begins with the premise that porosity is a valuable concept in architecture. This idea is examined through an interdisciplinary exploration of porosity (Chapter 2), resulting in a conceptual framework of three architectural porosities—material, spatial, and social. These are then developed into a proposition for *architectural porosity*, forming a framework for interpreting porosity in a specific context. The context in question—Semarang Old Town as an urban heritage site—enables the framework to make a meaningful contribution to the heritage discourse.

This is a theory-led study, which "exists within a framework of understanding first, applied to a context using a methodology second" (R. Lucas, 2016, p. 13). As Lucas notes, "theoretically led studies are most often cross-disciplinary" and frequently borrow from other disciplines (Lucas, 2016, p. 14). Similarly, this study frames porosity through an interdisciplinary lens before recontextualising it within architecture to explore a heritage site. This architectural inquiry adopts a qualitative approach. As Patricia Leavy states in *The Oxford Handbook of Qualitative Research*, qualitative researchers can be described as *bricoleurs*—those who draw on diverse theories, methods, and bodies of scholarship to conduct their work (Leavy, 2014, p. 5). She also cites Schwandt (2001), who proposes that bricoleurs may assume multiple identities—researcher, scientist, artist—

engaging creatively with fragments of methodologies and epistemologies (Leavy, 2014). This idea resonates with the ethos of this study, which integrates methods drawn from architecture, anthropology, archaeology, heritage, and urban studies—including fieldwork, 3D scanning, indexed architectural drawings, and urban mapping.

A qualitative approach assumes a *subjective reality*, where "the researcher interacts with that being researched" and employs "an inductive process of inquiry that seeks clarification of multiple critical factors affecting the phenomenon" (Groat & Wang, 2013, p. 71, original emphasis). This method focuses on understanding *qualities*, where the categorisation of facts is often contested and shaped by individual or collective perspectives (R. Lucas, 2016, p. 36). Positioned against the positivist paradigm, this inquiry aligns with the *constructivist approach*, sometimes also referred to as *naturalistic*, *qualitative*, or *interpretive* (Groat & Wang, 2013, p. 78). It emphasises natural settings and context-driven interpretation, allowing findings to emerge from the environment and reflect upon theoretical premises.

This study employs this approach to apply the *architectural porosity* framework, comprising material, spatial, and social porosities, to a case study. The chosen site is the Semarang Old Town in Indonesia. Selecting a single case study enables a more in-depth investigation of the context. In Indonesia, urban heritage sites are often governed by municipal-level regulations, making it essential to focus on one specific context. The study examines both the district and selected heritage buildings within it.

Case studies require holistic investigations and typically involve a variety of data collection and analysis tactics (Groat & Wang, 2013, p. 18). They also emphasise the study of real-life contexts: "In other words, you should use the case study method because

you want to understand a real-life phenomenon in depth" (R. K. Yin, 2009, p. 40). Furthermore, Yin notes that case studies may serve exploratory purposes, as in this study, where the aim is to explore architectural porosity and its potential contributions to heritage discourse. *Architectural porosity* will be operationalised through a *porosity index*, which does not aim to produce quantitative scores but instead identifies conditions that indicate varying levels of porosity. These levels will be interpreted about one another, not to establish causality, but to reflect on spatial practice and inhabitation in the built environment.

The ethos of architectural porosity is grounded in two perspectives: first, the understanding of architecture as a dynamic phenomenon situated within environmental and social contexts; and second, the conceptualisation of heritage, following Harrison (2013a), as shaped by human and non-human connections. This second view relates closely to *assemblage thinking*, a concept shared across archaeology (Jervis, 2018), heritage studies (Harrison, 2013a), and discourses on urban informality (Dovey, 2012).

This study draws on assemblage thinking as a methodological lens within its qualitative framework to investigate architectural porosity in an urban heritage context. Assemblage thinking recognises the entanglement of social and material agencies in urban settings (McFarlane, 2011), is inherently multi-scalar, and is especially valuable for interpreting the formal and informal relationships within assemblages that consist of dynamic connections and flows (Dovey, 2012). In the context of heritage, this resonates with Harrison's (2013a) assertion that heritage is "an active process of assembling a series of objects, places and practices" through relational agency, drawing on Latour's actor-network theory and Deleuze and Guattari's assemblage theory.

In archaeology, Jervis contends that ‘‘everything is an assemblage”—objects are constantly changing, materially and conceptually, and are themselves components of other assemblages (Jervis, 2018, p. 2). Bille and Sørensen (2016, p. 3) note that ‘‘architecture is an assemblage of elements” and has long been treated as an archaeological artefact. To study architecture archaeologically is to ‘‘embrace a notion of architecture as composed of a variety of tangible and intangible factors, including mechanisms that merge the solid artefactual evidence and social practices of building, rebuilding, and unbuilding” (Bille & Sørensen, 2016, p. 11).

In the context of material culture, Jane Bennett describes assemblages as ‘‘ad hoc groupings of diverse elements, of vibrant materials of all sorts” with ‘‘uneven topographies,” where ‘‘power is not distributed equally across its surface” (2010, pp. 23–24). This notion captures the temporary and contingent nature of entanglements, reinforcing that assemblages are highly context-dependent.

Assemblage thinking is thus a valuable approach for investigating architectural porosity. It enables the study to interpret the assemblage of material, spatial, and social porosities as forms of spatial practice and inhabitation. These three dimensions together reveal human and non-human entanglements in the built environment. Elements such as heritage buildings, time, weather, people, vegetation, abandonment, and revitalisation intersect in complex and dynamic ways that are never identical. This richness and variability form the essence of architectural porosity in the urban heritage site of Semarang Old Town.

5.3. On Data Collection: Fieldwork

> “Fieldwork is a practice, not a discipline. It is practiced in different ways by different disciplines towards diverging ends, and may contribute to the consolidating, deepening and extending of disciplinary knowledge. Field/work in Architecture is a tacit design knowledge, a resource for the study of site and the making of projects, enacted by learnt strategies, techniques and skills, rather than disciplinary-driven models of applied method or articulated methodologies.” (Ewing, 2011, p. 5)

Fieldwork is a familiar activity within the discipline of architecture. The term *field* may be defined as “a more or less bounded space” (R. Lucas, 2016, p. 71). Throughout architectural education, students frequently engage in fieldwork—often interchangeably referred to as a ‘site visit’—which entails travelling to a specific location to experience, observe, and study the place, its surroundings, and any phenomena occurring within it. These may include buildings, social interactions, cultural activities, or environmental conditions, depending on the aim and scope of the visit.

As a method, fieldwork is more traditionally associated with anthropology, where it is typically based on participant observation and ethnographic writing (McGowan, 2011). Fieldwork is also fundamental in archaeology, where it includes activities such as locating and mapping sites, which may lead to excavation (Carver, 2009). Furthermore, in archaeology, fieldwork can be understood as a “process of disaggregation and assemblage, as things are taken from the ground and become something else, becoming entangled with archaeological

knowledge and with other archival objects" (Gavin Lucas, 2012, in Jervis, 2018, p. 148).

One of the advantages of fieldwork is the opportunity to engage with "the messiness of everyday life", resulting in "research that is grounded in real life rather than abstracted and aloof" (R. Lucas, 2016, p. 69). This requires diligent record-keeping, and documentation becomes a critical component of fieldwork. In conventional anthropological practice, this includes field notes, often in the form of journals and drawings—a practice also common in architecture, where sketchbooks and various forms of architectural drawing are used to document observations (R. Lucas, 2016). Similarly, archaeologists typically produce drawings of sites and artefacts. Fieldwork documentation may also include photography, video, and audio recordings. Depending on the research context, these materials can form a primary data source. Where human subjects are observed, ethical approval and permission for documentation are typically required.

As noted in the previous section, this study draws inspiration from related disciplines, including heritage studies, anthropology, archaeology, and urban planning. These influences are reflected in the chosen approach, particularly in the use of assemblage thinking, as well as in methods of data collection and analysis. Guided by assemblage thinking and interdisciplinary inspiration, this architectural inquiry adopts an archaeological lens in viewing heritage buildings as artefacts.

> "… architecture is caught up in a more specifically archaeological taxonomy where buildings occupy a somewhat ambivalent status between the two more field-based categories of stuff archaeologists deal with: deposits and finds. … as *finds*, buildings are regarded as artefactual,

> as material culture and are analysed using much the same techniques. … But as *deposits*, buildings are rooted to the site, they are entangled with and co-constitute its stratigraphy, acting as envelopes for finds." (G. Lucas, 2016, p. 105, original emphasis)

This statement suggests that architectural remains may be understood both as *finds*—objects that can be removed and studied—and *deposits*—structures embedded in the environment, often entangled with the surrounding material context. This dual identity is how the buildings in Semarang Old Town are conceptualised in this study: as artefacts—material entities found within a specific context. Their heritage status enhances their value as material remnants of the past.

As a research activity, fieldwork is primarily intended for data collection. It is distinguished from deskwork (analytical work conducted away from the field) and textwork (the act of writing up the research findings) (Schwartz-Shea & Yanow, 2012, p. 7). This distinction is also followed in this study. Field observation was used to gather primary data in Semarang Old Town. Before this, desk-based preparatory work included a review of existing literature on Semarang Old Town, an examination of heritage-related legislation, an exploratory 'walking' tour through the district using Google Street View, and communication with academic colleagues at a local university in Semarang to gain a contextual understanding and arrange formal permissions for field observation. These preparations were conducted with ethical clearance approved by the university.

5.3.1. Study Area: Semarang Old Town Core Zone

Semarang Old Town has undergone many historical transitions, yet its urban morphology remains essentially unchanged since its

establishment as the European settlement, or *Europeesche Buurt*. As illustrated in Figure 5.1.—a simplified tracing of historical and current maps—the main streets that define the area's blocks are still intact. The most notable difference is that the former moats surrounding *Europeesche Buurt* have since been transformed into streets. This morphological continuity is one of the qualities cited by the Semarang Municipality to support the area's authenticity in its dossier for inclusion on the UNESCO World Heritage Tentative List.

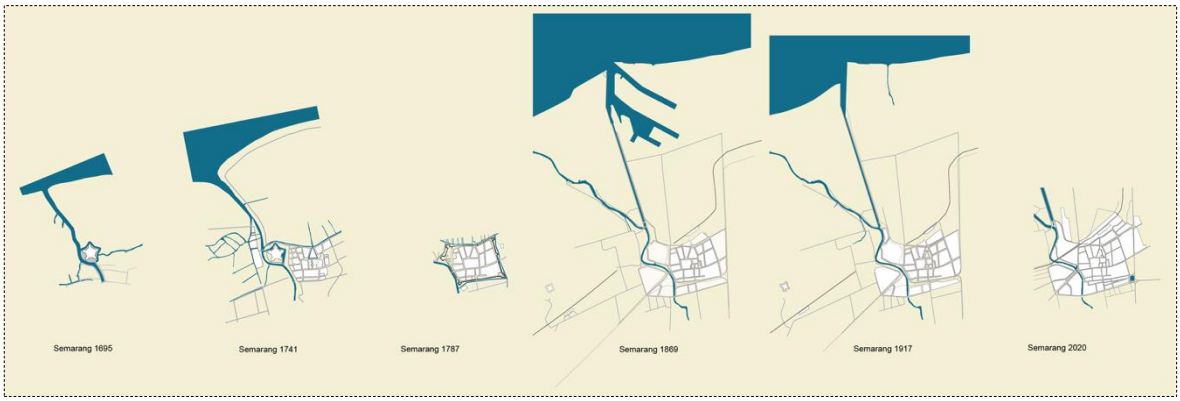


Figure 5.1. Tracing of Semarang Old Town throughout the centuries based on old maps presented in Chapter 4 and the current map in the 2020 planning regulation of Semarang Old Town

Today, Semarang Old Town is protected under its planning regulation, namely *Peraturan Daerah Kota Semarang Nomor 2 Tahun 2020 tentang Rencana Tata Bangunan dan Lingkungan Situs Kota Lama*, which governs building and environmental planning in the area. This regulation establishes zoning designations, regulates land use, and identifies protected heritage buildings. Figure 5.2. illustrates the zoning layout, which includes approximately 25 hectares of core zone and 47 hectares of buffer zone.

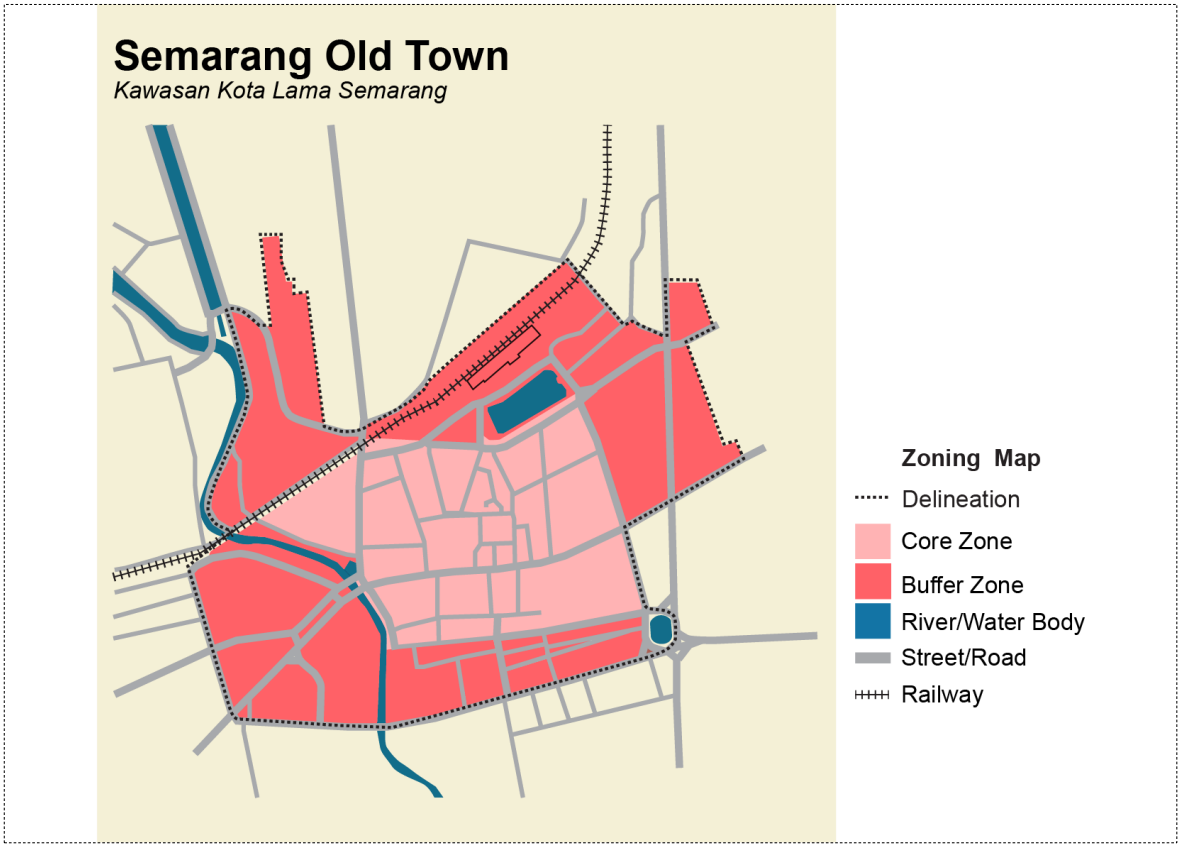


Figure 5.2. Semarang Old Town Zoning based on the 2020 planning regulation of Semarang Old Town

The core zone is demarcated by streets that were once moats during the *Europeesche Buurt* era: Noorderwalstraat, now known as *Jalan* (Jl.) (meaning street) Tawang and Jl. Merak, on the north; Westerwalstraat or Jl. Empu Tantular on the west; Zuiderwalstraat or Jl. Sendowo on the south, and Oosterwalstraat or Jl. Cendrawasih on the east (Yuliati et al., 2020). These *Jalan* or street traverse the area. Letjen Soeprapto—formerly De Heeren Straat, which was part of the Great Post Road built in the early 1800s. This thoroughfare functions as the Old Town's main street, flanked by rows of heritage buildings and featuring Taman Srigunting, the largest public park in the area. It is the busiest and most frequently visited street in the Old Town of Semarang.

The 2020 regulation also outlines proposed land use for the area (Figure 5.3.). Currently, the core zone comprises a mix of residential, commercial, office, and hospitality functions, including hotels, restaurants, and cafés. The land use plan designates the core zone primarily for trade and services, alongside some public services and offices, underscoring the city's vision of developing the area as a profitable heritage tourism destination. Over 100 heritage buildings are officially listed within Semarang Old Town.

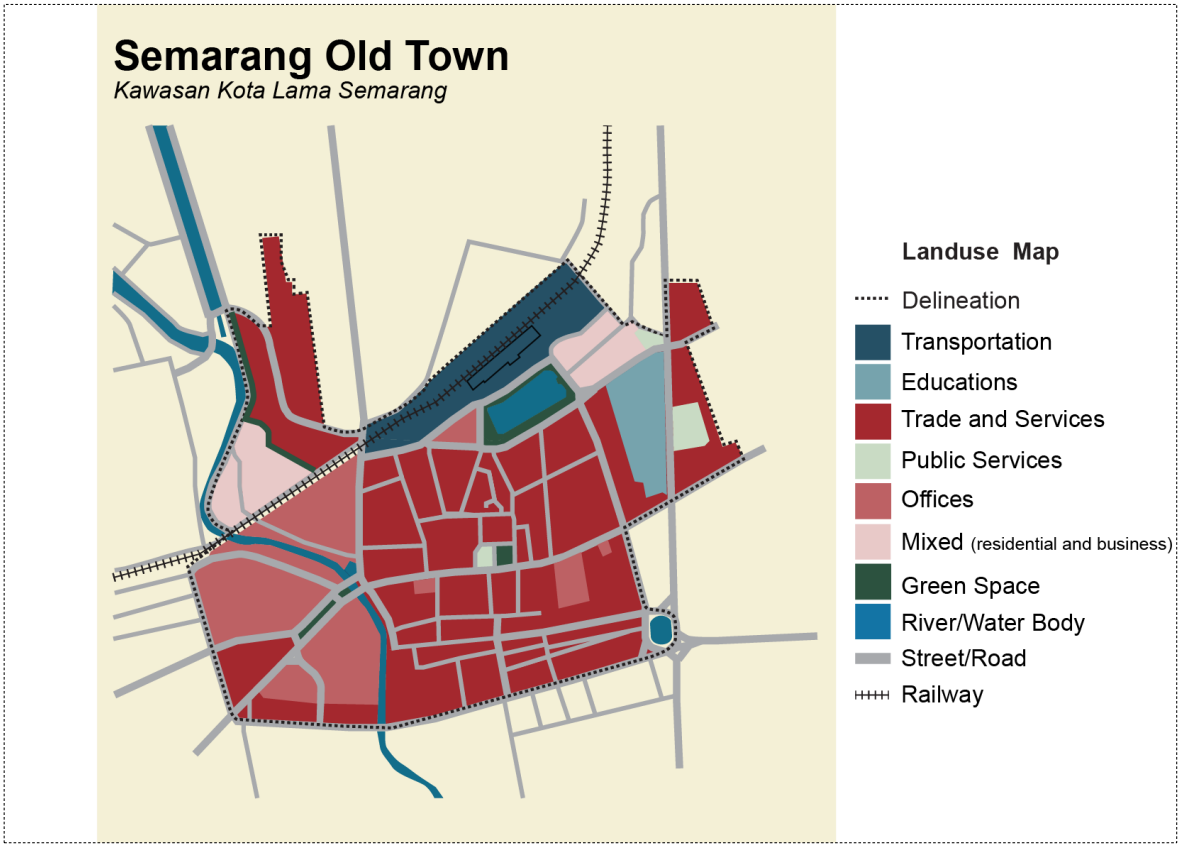


Figure 5.3. Proposed land use in the 2020 planning regulation of Semarang Old Town

The study area encompasses most of the core zone and is bounded by the main streets that were formerly the moats of *Europeesche Buurt*. It consists of 20 streets (listed in Appendix A – Selected Heritage Building List and Street Names), 20 urban blocks, and 109 heritage buildings (also listed in Appendix A). Several open spaces are also included. The urban mapping in this study focuses on the heritage buildings and surrounding

open spaces (shown in white and grey in Figure 5.4.), excluding non-heritage structures.

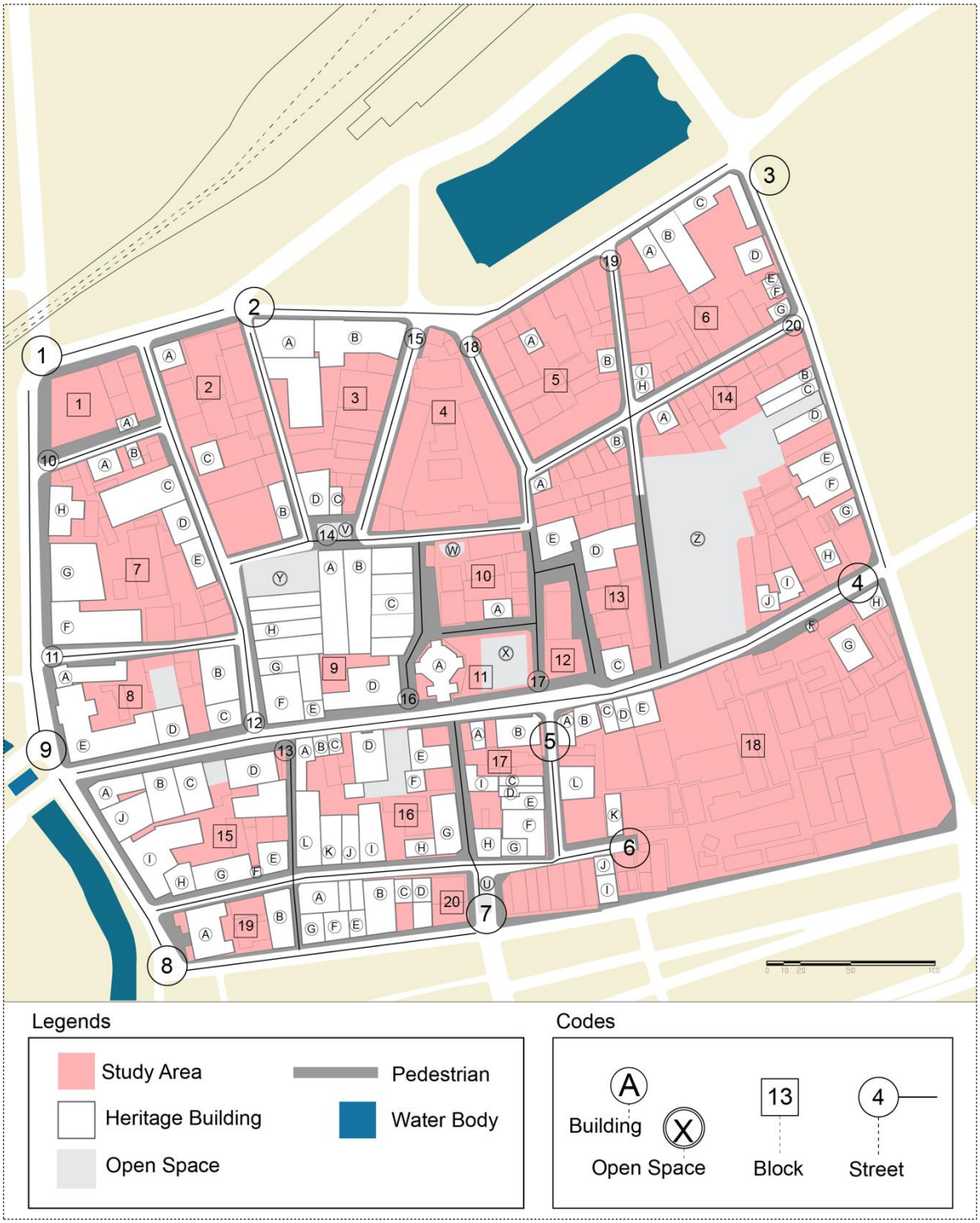


Figure 5.4. Map of the study area based on the 2020 planning regulation of Semarang Old Town , with the building code system for the study

Figure 5.4. also illustrates the coding system used for buildings and façades. Buildings are coded as [building code] – [block code], e.g., A–1 indicates building A in block 1. For façade mapping, the code extends to [building code] – [block code] – [street code], e.g., B–17–4 refers to the façade of building B in block 17 facing street 4. Examples of heritage building façades are provided in Figure 5.5.

Figure 5.5. Examples of heritage building façades in Semarang Old Town, 2022

5.3.2 The Data Collected

As previously discussed in the conceptualisation of architectural porosity, the primary object of this study is the façade of heritage buildings. This is because the research investigates the porosity of architectural boundaries as part of spatial practices and inhabitation within the built environment of urban heritage sites. The primary data collected comprises visual records of the area and building façades, obtained through photographs, video recordings, 3D scans, and field notes. These are supplemented by narrative data collected through interviews with key stakeholders, including municipal officials, experts, and residents.

As part of the desk-based research, efforts were made to collect historical data, given that this inquiry addresses the revitalisation of Semarang Old Town. Historical resources, such as architectural archives and visual documentation of the past, were sought. However, these are often scarce or non-existent. To help understand the pre-revitalisation conditions of the area, this study utilised Google Street View (GSV) as an alternative source of visual data.

GSV images offer time-stamped documentation of the built environment and can be used to capture everyday scenes and building conditions (Campkin & Ross, 2012). These images are beneficial for understanding the material state and social activity in Semarang Old Town before revitalisation. The study focuses on GSV imagery from around 2015 and 2016 to represent pre-revitalisation conditions and also refers to 2022 imagery to supplement gaps in the post-field observation phase. A complete list of GSV images used can be found in Appendix B – Google Street View (GSV) Timestamps.

The primary fieldwork was conducted over nearly four weeks in March 2022, followed by a shorter visit in October 2022 and a remote data collection session in March 2023. The 2022 fieldwork focused on documenting the general atmosphere of the area and capturing all street-facing façades. More detailed visual data were also collected to analyse the materials, spatial configurations, and human activities associated with the façades.

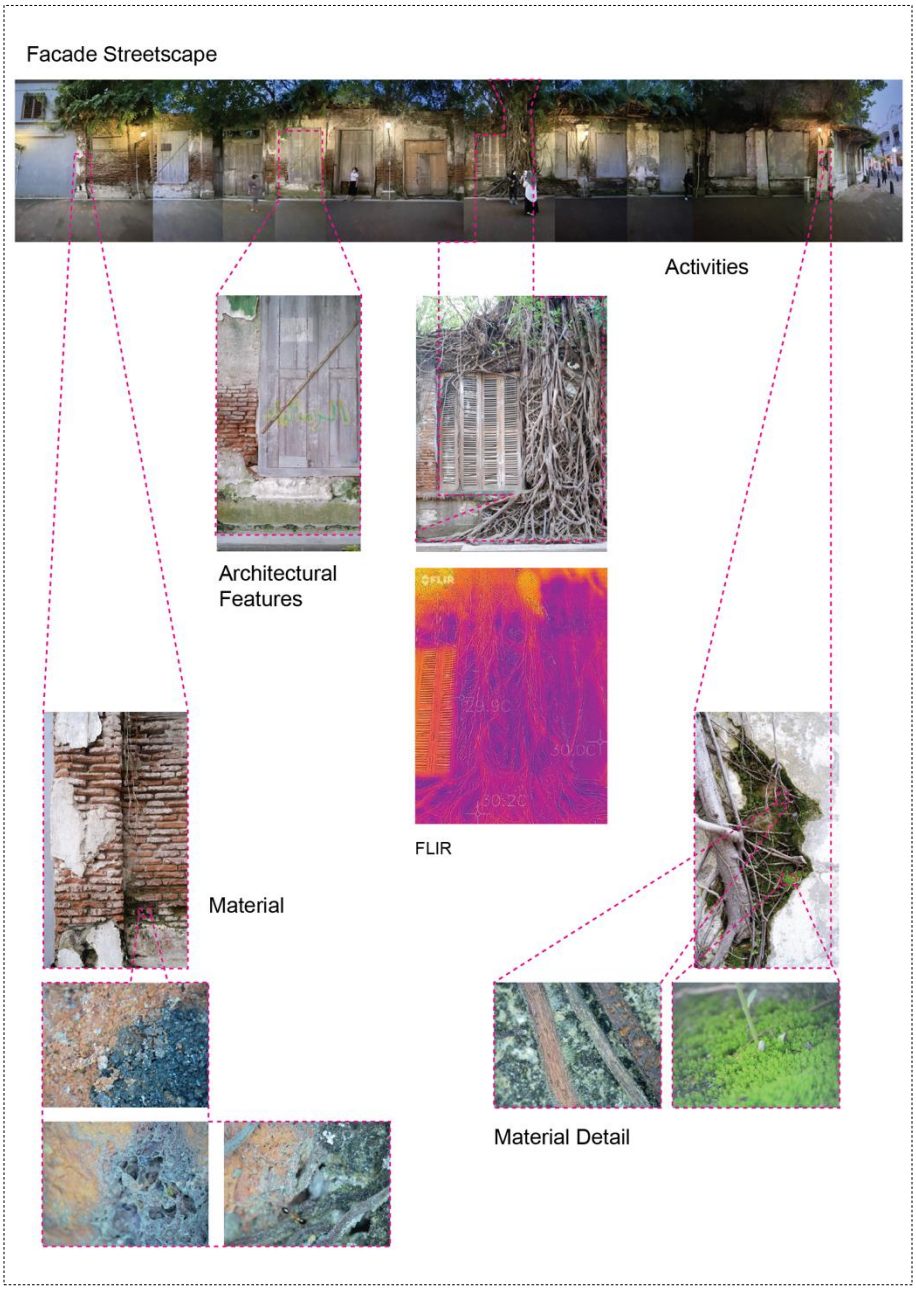


Figure 5.6. Samples of photo documentation collected from the field observation, 2022

The façade documentation was informed by methods used in architectural heritage studies and surveys, which typically include detailed visual recordings of material and construction elements (Bersch et al., 2021; Bianco, 2021; Silveira et al., 2016; Silveira Da Costa & Da Silva Torres, 2023). Techniques such as digital microscopy, used to magnify material characteristics and identify decay, were employed using affordable smartphone-compatible

devices. While more advanced tools, such as X-ray diffraction and infrared thermography, are standard in professional heritage surveys (Delegou et al., 2019), this study utilised thermal imaging via a FLIR smartphone attachment to visualise surface temperature variations. These variations may indicate construction phases, humidity levels, or areas of decay.

The multi-scalar documentation approach ranged from capturing micro-level material conditions (e.g. plant growth or insect activity) to larger-scale assessments of façade arrangements and their relationship with street life. Photographs and videos helped contextualise the façades within their urban surroundings—for example, indicating whether a façade faces a pedestrian-only street or a heavily trafficked roadway. Field notes and mappings of observed activities further supplemented these visual data, providing insight into how façades are inhabited and interacted with in daily life.

Additionally, 3D scanning was used to document façades. In heritage and archaeological research, 3D scanning and photogrammetry are standard techniques for capturing geometric and textural data (Aveta et al., 2017; Delegou et al., 2019; Russo et al., 2019). Such scans enable “reality mapping” (Aveta et al., 2017, p. 548) by translating physical structures into digital representations.

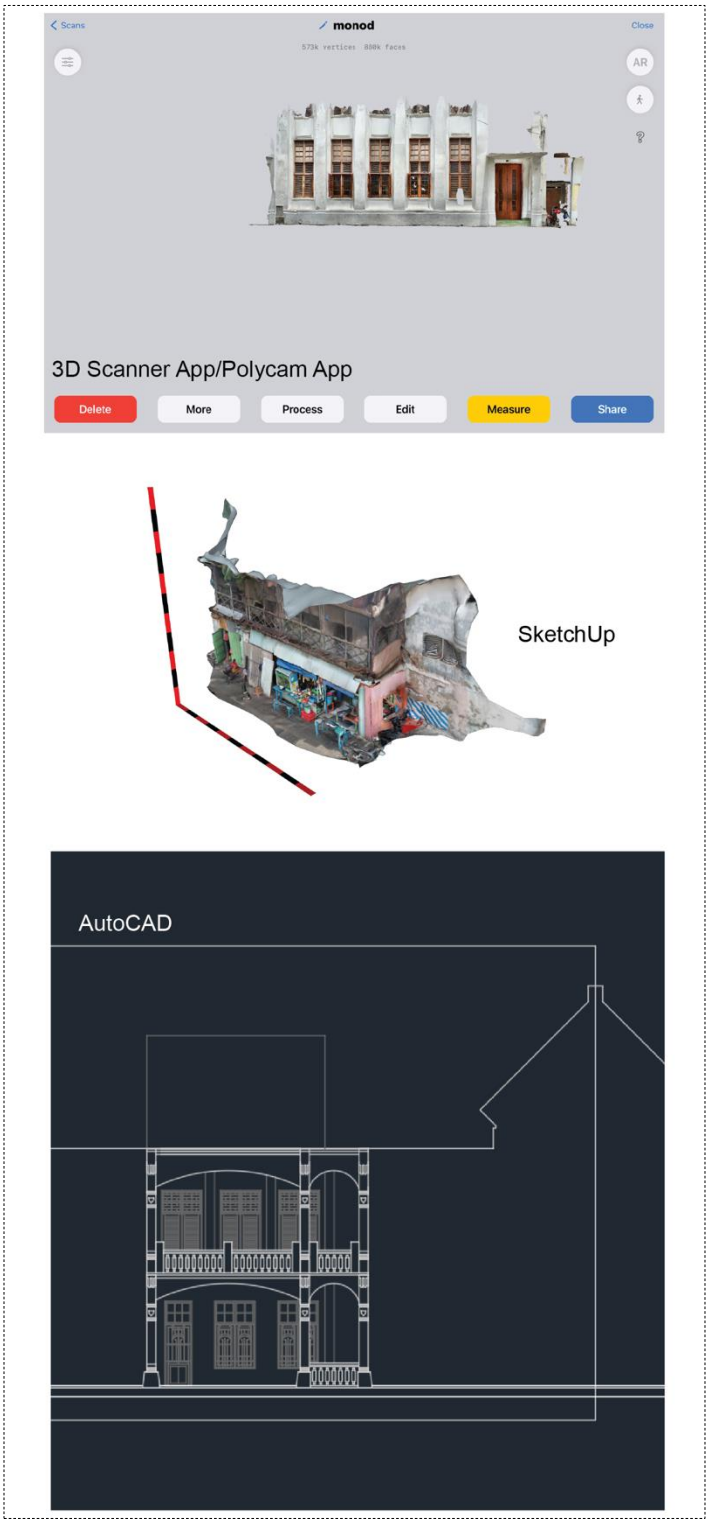


Figure 5.7. From top to bottom: 3d Scanner App, 3D scan on SketchUp, façade drawing on AutoCAD, 2022-2024

This study utilised the *3D Scanner App* on an iPad Pro equipped with LiDAR, and the *Polycam* app on an Android smartphone.

These devices were used interchangeably, depending on the availability of batteries during fieldwork.
Due to human limitations, the scanning was constrained to street-level façades. The quality of the scans does not match professional point-cloud laser scanning, but the data was sufficient to capture basic geometry and dimensions. The scans were transferred to SketchUp for further modelling, then exported to AutoCAD for precise redrawing.

The visual data collected is not time-sensitive in the sense that it does not capture changes during the visit. Instead, they represent a static moment in time—the year of observation. Multiple captures from different dates were consolidated into a single dataset per year. This same approach was applied to the GSV images, which often include numerous monthly timestamps within a single year. For analysis, the primary datasets are the 2015 GSV images (pre-revitalisation) and the 2022 fieldwork data (post-revitalisation).

To supplement the visual data, unstructured interviews were conducted with various stakeholders, including officials from Semarang Municipal's BPK2L (Semarang Old Town Management Board), three heritage experts or enthusiasts, one building owner, and thirteen users of the area, primarily informal economic actors. A complete list of interviews is available in Appendix C – Interview list.

These interviews serve as supplementary data, providing context on the bureaucratic and administrative processes related to heritage management in Semarang and Indonesia. They also offer insight into everyday spatial practices from the perspective of building users, particularly those working in the informal sector. These personal narratives help to reveal the social relationships embedded within the urban fabric.

While the visual data capture material and spatial characteristics of façades are examined, the interviews offer narrative insights into social and economic dynamics. However, not all façades documented in this study are accompanied by interviews, due to logistical constraints in locating and speaking with users. This limitation has influenced the selection of façades, which is discussed in greater detail in the analysis chapters.
During the fieldwork, preliminary mappings and field notes were also produced to begin contextualising observations. Some of these early outputs are included in Appendix D – Field Notes and Early Mappings.

5.4. On Data Analysis: Indexing and Mapping

5.4.1. Indexing: Developing a Framework for Analysis

In this study, architectural porosity is developed as a framework for analysis, referred to as the *porosity index*. This index serves as an analytical tool for interpreting architectural boundaries related to spatial practices and inhabitation within the built environment of urban heritage sites.

The idea of an index, as used here, is inspired by Richard Scherr's concept of *architecture as index*:

> "Architecture as index suggests a far more complex, interactive process of formal derivation. An indexical process implies a cross-referencing to various conditions, some supportive, some conflicting, in a shifting, nonlinear evolution, referring to other levels of meaning, contextual implications, processes of construction or spatial orders that are assembled onto an emerging interactive construct ... An

> architecture of index suggests a theory of *connections*, whereby buildings exist as a physical contingency to that which lies beyond, referenced to both their physical and cultural context, temporally grounded to both past and future conditions, and informed by the processes of their own making." — Scherr (1991, pp. 180–181, original emphasis)

Although Scherr's idea was developed in the context of architectural design, the concept's relevance here lies in the notion that architecture—or components of architecture—can act as signifiers of their broader contexts. To view architecture as an index, then, is to attempt to infer the invisible from visible clues. In material-based scientific disciplines, such as biomedical studies of bone structure, *porosity index* refers to a quantifiable percentage representing porosity levels, typically derived from imaging technologies like MRI (Daniel et al., 2023; Jerban et al., 2023; B. C. Jones et al., 2021). In urban studies, Pessoa et al. (2016) developed a porosity index to investigate the social implications of urban porosity. Their index incorporates metrics related to urban growth (e.g., economic, demographic, and residential expansion) and decline (e.g., segregation and lack of socio-spatial identity).

In architecture, Richard Goodwin (2011) proposed a *porosity index* in his work *Porosity: The Architecture of Invagination*, in which he devised ten sub-indices—such as a permeability index (addressing building accessibility), a transparency index (measuring wall opacity), and a human movement index (estimating footfall per hour)—along with heritage and environmental factors. Goodwin's framework enabled him to assess and compare porosity levels across different floors of high-rise buildings, often showing that ground floors are more porous than upper levels. His index was also used to produce

three-dimensional digital models that visualised ‘chiastic spaces’ as a means to propose future planning scenarios.

Returning to the idea of *architecture as index*, this study interprets *porosity* as an ‘invisible’ quality of architecture and the built environment—‘invisible’ in the sense that, while porosity can be measured microscopically at the material level, its broader implications in architecture and urbanism are more metaphorical, interpretative, and scalar. As porosity is the object of inquiry here, the aim is to develop a method of visual interpretation to make the invisible legible.

The *porosity index* in this study comprises a set of conditions or indicators derived from the three types of porosity—material, spatial, and social—observed at both the urban heritage scale and the building façade level. The goal is not to calculate or quantify porosity in numeric terms, but to explore how different conditions of porosity contribute to architectural phenomena within the built environment.

These conditions are observed through visual data collected in context. Thus, the analysis of porosity involves both visual analysis and visual representation practices. As the visual data—photographs, drawings, and scans—capture frozen moments in time, what can be observed are *traces* of past events and processes. Interpretation of these traces often involves inference about the causes behind visible conditions (Zeisel & Eberhard, 2006). These traces are read as signifiers of porosity and are subsequently analysed and presented through architectural drawings and mapping exercises.

5.4.2. Urban and Façade Mapping: A Visual Analysis

As the *porosity index* is used to interpret porosity in an urban heritage context, two modes of visual representation are employed: urban block plan drawings and façade elevation drawings. These represent different scales of porosity mapping, including urban and architectural. The principal inspiration for the urban porosity mapping is Giambattista Nolli's *Map of Rome* (1748).

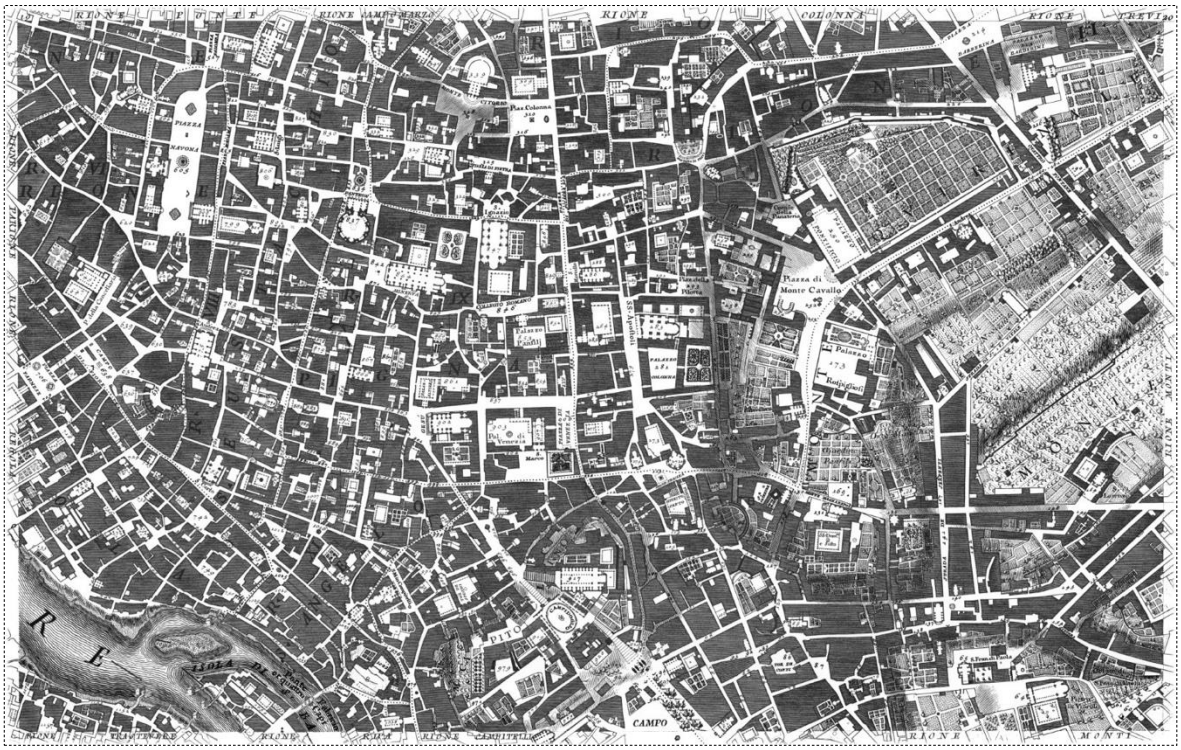


Figure 5.8.Nolli Map of Rome, part of the La Nuova Topografia di Roma or the new topography of Rome. (Nolli, 1748). CC 0.

Nolli's map has long served as a visual reference in discussions of urban porosity. It is often read as a figure-ground map that uses stark contrast—white and black or dark grey—to represent urban solids and voids. White areas typically denote accessible spaces, whether indoor or outdoor, and are sometimes considered public, while black or dark grey areas denote private or inaccessible spaces. This visual device has been employed to study binaries such as public/private (Ji & Ding, 2021; Reinoso

Bellido et al., 2021); built/unbuilt, solid/void, open/enclosed (Jacoby, 2016; Visconti & Capozzi, 2023); and to examine urban morphology and typology (AlSadaty, 2022; Hebbert, 2016).

Of course, figure-ground maps are not the only form of urban mapping. Other mappings address issues such as functional mix (Dovey & Pafka, 2018), urban informality (Kamalipour, 2016; Van Oostrum, 2020), and urban interfaces (Dovey et al., 2018; Dovey & Symons, 2014). These mappings tend to use different visual strategies, including colour coding, to convey information at multiple urban scales.

In this inquiry, the *urban porosity mapping* visualises material condition, function, and formal/informal inhabitation in Semarang Old Town, derived from the framework of the three porosities, as an entry point for understanding porosity at the urban scale. A particular focus is given to changes in porosity before and after the revitalisation project. The mapping adopts a colour-coded scheme using three contrasting colours: blue for *material porosity*, yellow for *spatial porosity*, and red for *social porosity*. Each porosity type includes varying shades; lighter tones indicate higher porosity (approaching white as void or public), while darker tones indicate lower porosity (approaching black as solid or private). This urban mapping serves two aims: first, to visualise how porosity has shifted post-revitalisation; second, to reveal intersecting patterns among the three porosities, identifying façades for more detailed analysis.

The shift from urban plan drawing to façade elevation drawing is not only a shift in scale but also in experiential perspective. During fieldwork, Semarang Old Town was observed bodily and spatially through a human lens—walking the streets and facing façades head-on. In this way, porosity is experienced: Can the façade be accessed? What kind of access—entry, gaze, or both?

What is growing on it? Are there signs of habitation? Thus, façades are both theoretically and experientially significant in the study of spatial porosity and architectural boundaries.
Façades are part of the urban surface and “are fascinating because they are specific physical loci, yet afford readings and interpretations that expand far beyond their material existence” (Andron, 2018, p. 8). They are also, potentially, sites of urban biodiversity (Francis, 2011).

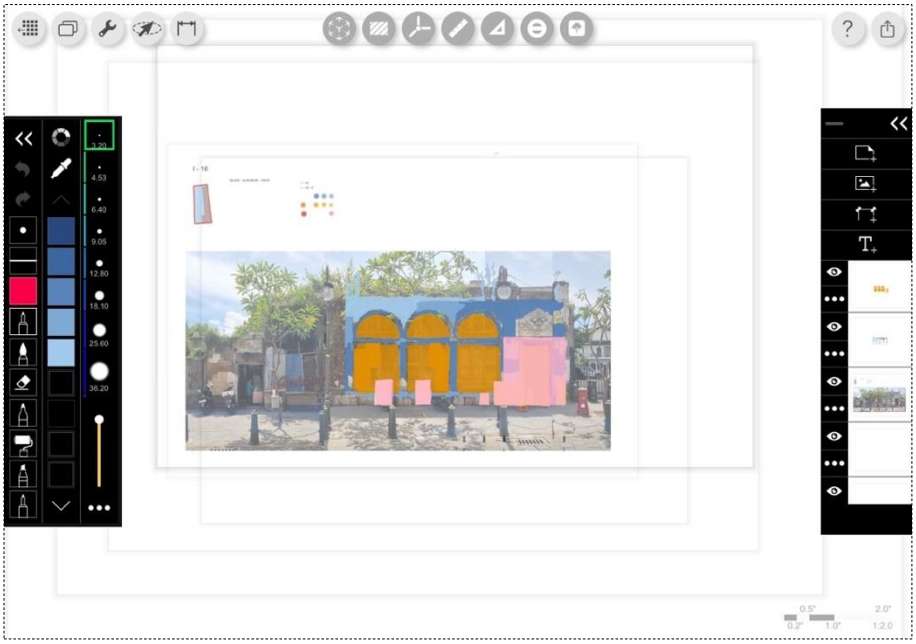


Figure 5.9. Façade porosity mapping through tracing in the Morpholio Trace app. The mapping is conducted through this app or Adobe Illustrator, 2024

The *façade mapping* methodology draws inspiration from decay mapping in architectural heritage and material studies. This visual technique is part of the representation strategies used in heritage building surveys, which typically include photographic documentation, 3D point cloud scans, CAD drawings, and elevation-based decay mapping (Aveta et al., 2017; Bersch et al., 2021; Delegou et al., 2019; Russo et al., 2019; Silveira et al., 2016). While this inquiry does not directly replicate decay mapping from heritage science, it revisits the concept of *inscriptive practice*—graphic works, such as drawings, notations,

diagrams, and maps, as primary analytical and illustrative tools in architecture (R. Lucas, 2016).

Façade porosity mapping begins by redrawing the object of observation—the heritage building façade. These drawings are then overlaid with visual documentation, allowing the researcher to trace and annotate porosity conditions and events. The same three-colour scheme (blue for material, yellow for spatial, red for social porosity) is applied. This tracing process serves to extract and abstract porosity-related information from visual data. When all three porosity layers are overlaid, composite conditions become legible, revealing the interplay between material, spatial, and social porosity.

Following the visual mapping, findings are discussed narratively to interpret spatial practices and inhabitation around each façade. These interpretations occasionally draw upon data from informal interviews conducted during field observation.
Various drawing and colour-coding experiments that supported this analysis are presented in Appendix E – Drawing Explorations Examples.

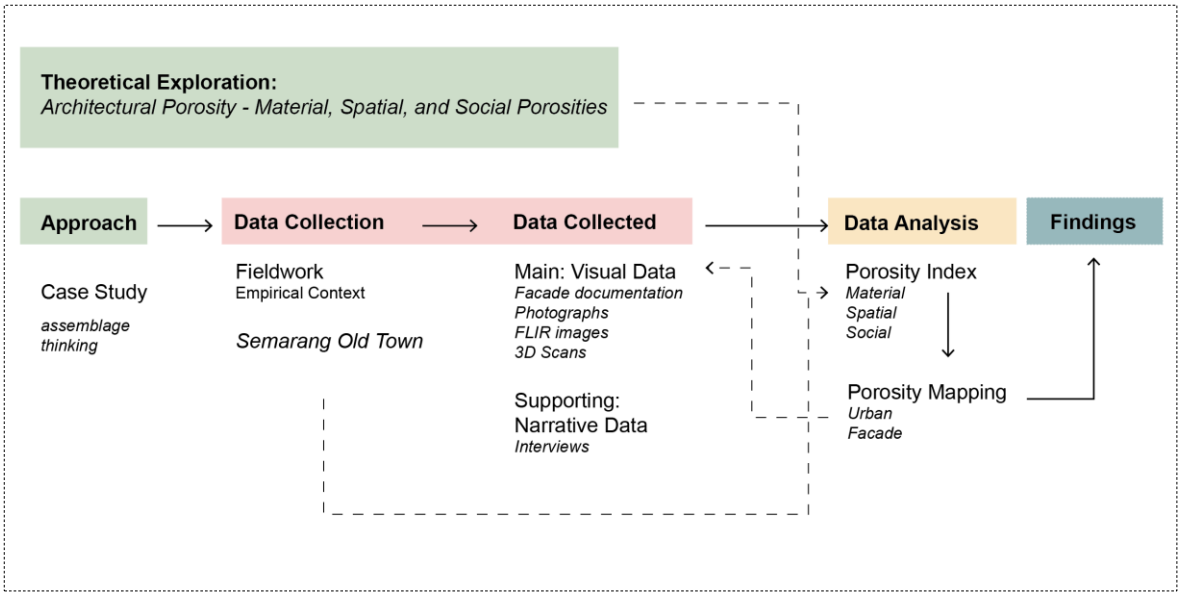


Figure 5.10. Diagram summarising method and methodology of the study

5.5. Porosity Index

The *porosity index* is developed as a framework of degrees representing porous conditions. This study introduces two sets of indices: the urban porosity index, used to visually interpret and map porosity at the metropolitan scale, and the façade porosity index, which focuses on the architectural scale of heritage building façades. Each index addresses the three types of porosity—material, spatial, and social—drawing from theoretical explorations and contextual conditions in Semarang Old Town. In some instances, the index is refined through definitions found in local planning regulations and on-site conditions.

In line with visual mapping conventions—especially urban figure-ground representations of solid-void or literal porosity—the porosity index employs colour gradients. Each type of porosity is associated with a distinct colour: darker shades represent lower porosity, while lighter shades indicate higher porosity.

5.5.1. Material Porosity Index

The conceptual foundation of this index is *material porosity*, which refers to the capacity of architectural materials to absorb environmental conditions and host non-human inhabitation. This includes the concept of *weathering*—the natural process through which materials degrade over time, allowing surfaces to become stained, eroded, or otherwise marked by the environment (Mostafavi & Leatherbarrow, 1993). Additionally, the growth of “subnature,” such as weeds or spontaneous vegetation (Gissen, 2009), further illustrates material porosity by showing how plants colonise architectural surfaces.

The presence of environmental traces or non-human organisms on buildings is often linked to the level of human maintenance and restoration. Lisci et al. (2003) discuss how a building's fate is largely dependent on human intervention. In the absence of use or upkeep, environmental processes—such as weathering and plant growth—accelerate, pushing the building toward deterioration or ruin. Sarmento (2019) offers the case of Chernobyl, where nature thrived in the absence of humans. Furthermore, unoccupied or poorly maintained buildings are more susceptible to vandalism or looting, which can lead to the loss of structural elements.

This relationship highlights how *human activity*, particularly in the form of maintenance or restoration, mitigates material porosity. Conversely, abandonment allows material porosity to intensify, making the building more susceptible to environmental encroachment. In Semarang Old Town, this becomes especially relevant, as material porosity closely correlates with the revitalisation status of buildings.

As previously discussed, although the area underwent significant revitalisation, the municipal programme focused solely on *infrastructure*—streets, pavements, drainage, and public spaces. The revitalisation of individual *heritage buildings* depended on private ownership and initiative, with limited public financial support. As a result, the physical condition of the buildings varies: some have been restored, while others remain in a state of decay or ruin.

Material Porosity Index for Urban Mapping

The *material porosity index* at the urban scale assesses the overall physical condition of heritage buildings. It comprises three levels of porosity, *decent*, *dull*, and *decaying*. These categories

are visually coded using a gradient of a single colour (blue), with the darkest shade representing the *least porous* (decent) and the lightest shade representing the *most porous* (decaying).

A diagram summarising the *material porosity index* will be included below to illustrate the gradation and its visual representation in the urban mapping.

Decent condition: Heritage buildings in *good* condition are typically the result of consistent revitalisation and regular maintenance throughout their lifespan. These buildings often present an immaculate appearance, featuring elements such as freshly painted façades (usually white), polished doors and windows, and well-maintained finishes.The material condition is therefore preserved in a pristine state, evoking a sense of freshness or even newness.

Dull condition: Heritage buildings in a *lifeless* condition often reflect inconsistent or minimal maintenance. These structures may have undergone alternating periods of occupation and abandonment. They exhibit visible signs of wear, including stained and eroded surfaces, minor structural damage, and early-stage plant growth. These conditions signal the onset of deterioration, although the building remains largely intact.

Decaying condition: Buildings classified as *decaying* typically result from prolonged abandonment. They are often in states of ruin, dilapidation, or advanced structural degradation. Such buildings may have missing architectural elements, collapsed sections, and usually become overgrown with vegetation. This condition suggests long-term neglect, with little or no human intervention in recent times.

Table 5-1. Urban material porosity index

Conditions	Decent	Dull	Decaying
Descriptions	Indicating minimal material porosity. Buildings are well-maintained or recently restored, with few signs of decay or environmental encroachment	Indicating moderate material porosity. Buildings show signs of wear, such as staining, peeling paint, or minor plant growth, but remain structurally intact.	Indicating high material porosity. Buildings are visibly deteriorated, with significant damage, overgrowth, or missing architectural elements.
Observable visual conditions	Overall, the building is complete with façade, walls, doors, windows, and roofs. It is kept in a decent material appearance, such as intact paint or material finish, etc. Some wear and tear traces might appear but still decent.	Overall, the building is complete with façade, walls, doors, windows, and roofs. It has deterioration signs such as discoloured, peeled paint, eroded material finish, broken elements, growing of mould and moss on the wall, etc.	Overall, the building might be incomplete with missing elements on the façade, walls, doors, windows, and roofs. It is in ruin and showing major dilapidation such as decaying façade and walls, broken windows, taken over by plants, etc.

Reflecting on the concept of material porosity—defined here as the material's ability to retain traces—the three conditions above represent varying degrees of porosity. In *decent* buildings, material traces are controlled or removed, maintaining a polished image. In *dull* conditions, traces begin to accumulate, while in *decaying* buildings, the material visibly absorbs and reflects the

environmental and social histories of abandonment. These gradations will be applied in the urban mapping of Semarang Old Town, using plan-based visualisations to analyse the spatial distribution of material porosity across heritage buildings.

A detailed analysis of the material porosity of façades will follow in the next section.

Material Porosity Index for Façade Mapping

At the façade scale, the material porosity index is further refined to examine more granular aspects of environmental interaction and non-human inhabitation. This includes surface-level conditions such as weathering, staining, cracks, plant growth, insect activity, and material loss. These features serve as tangible indicators of porosity, revealing how façades register time, use, and neglect.

This refined index, summarised in the accompanying table and diagram (to be included below), focuses on visible decay and weathering patterns, evidence of plant or microbial colonisation, and material fragmentation, erosion, or layering. The index is summarised below.

Table 5-2. Façade material porosity index

Index Num	Conditions/Situations	Visual Reading
1	**Unblemished surface**	Intact façade surface finishing.
2	**Stained surface**	Surficial environmental induced stain on façade surface, such as water stain, dirt, etc.
3	**Eroded surface**	Visible surface erosion, such as peeled paint or cracked plaster that begin to expose the inner material of the façade.
4	**Pierced surface**	Non-human attachment to the façade surface, such as visible growth of mosses, lichens, and small plants on façade.

Index Num	Conditions/Situations	Visual Reading
5	Penetrated surface	Visible growth of higher plants such as trees which roots attached to and penetrate the façade.

Figure 5.11. Façade material porosity index

By mapping these features onto elevation drawings, this index reveals how façades function as material archives—recording interactions between human and non-human agents, environmental forces, and historical events.

These façade-level observations complement and expand the urban material porosity analysis, allowing for a more nuanced understanding of heritage buildings' engagement with their environment.

5.5.2. Spatial Porosity Index

The conceptual foundation of this porosity index lies in the notion of spatial porosity, which describes the capacity of architectural boundaries to mediate between different spatial realms, such as public and private, or interior and exterior, through forms of

inhabitation or transgression across the boundary's thickness. This index focuses on the presence of inhabitation and spatial practices that occur on and around architectural boundaries, particularly building walls.

Walls are constructed with specific intentions and purposes (Unwin, 2000). As architectural boundaries, they define and contain the spaces we inhabit. In addition to their physical and spatial roles—often articulated through appendages such as doors and windows—walls also perform social functions, frequently related to access and control. In this sense, walls are mechanisms of inclusion and exclusion, determining who may or may not access a particular space. These physical, spatial, and social dimensions of architectural boundaries form the foundation of the spatial porosity index.

The index also considers the role of architectural walls in shaping the urban environment. Different wall configurations—through their composition, location, or function—generate varied potentials for inhabitation. For instance, Gehl's (2010) concept of *soft edges* illustrates how façades can invite informal use, offering opportunities to pause, rest, or sit along pedestrian paths. Similarly, Thwaites et al. (2020) introduced the idea of *transitional edges*, where adaptable storefronts encourage dynamic use, blurring the boundary between public and private through temporary or mobile extensions. These ideas inform the development of the spatial porosity index at both the urban and architectural scales.

Spatial Porosity Index for Urban Mapping

Semarang Old Town comprises a variety of heritage buildings with differing functions, each influencing the patterns of

inhabitation and degrees of accessibility, often mediated through the nature of its architectural boundaries. As a designated cultural heritage site, the area is governed by a planning regulation: *Peraturan Daerah Kota Semarang Nomor 2 Tahun 2020 tentang Rencana Tata Bangunan dan Lingkungan Situs Kota Lama*, which guides the use and management of its built environment. For example, as shown in Figure 5.3. (referenced previously), the core zone is designated primarily for trade and service activities.

The definition of building functions can be further clarified by referencing *Peraturan Daerah Kota Semarang Nomor 5 Tahun 2009 tentang Bangunan Gedung*, which categorises building uses as follows:

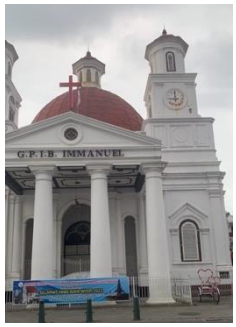
- Religious functions (e.g., churches, mosques, temples)
- Commercial functions (e.g., offices, hotels, tourist attractions, retail)
- Socio-cultural functions (e.g., schools, museums, hospitals, galleries)
- Residential functions (e.g., private homes, social housing)
- Special-purpose buildings (e.g., public utilities or government-defined uses)

Within the study area of Semarang Old Town, most buildings are assigned to one or more of the following categories: commercial, religious, socio-cultural, and residential.

To assess spatial porosity at the urban scale, this index categorises buildings based on the type of activity and degree of public accessibility associated with their use. The categorisation is adapted from Dovey and Pafka (2018), who in turn build on van den Hoek (2008). Their typology of urban use distinguishes

three main categories: *living*, *working*, and *visiting*. This study adopts and extends these categories by adding a fourth: *uninhabited*. These four categories serve as proxies for spatial porosity, moving from the least porous to the most porous conditions.

Table 5-3. Urban spatial porosity index

Inhabitations	**Uninhabited**	**Living**	**Working**	**Visiting**
Descriptions	No sign of human activity.	Dwelling, domestic activities, settling in for a long period of time.	Being employed, an occupation, activities that people do as a living. It usually involves specific schedule as in the working hour.	Visiting refers to the idea of go to see or do something temporarily or in a relatively short time.
Building type or space	*Office to let*	*House* *Informal kitchen*	*Cigarette factory* *Office*	 *Church* *Restaurant*
	Abandoned; Unoccupied.	Private houses; Long-term rented houses/rooms; Informal settlements.	Offices, schools, factories, storages, warehouses, workshops.	Retails (including the small business, street vendors), cafés and restaurants, galleries, exhibition spaces, churches,

Inhabitations	Uninhabited	Living	Working	Visiting
				public parks, parking area, non-building touristy spots and attractions.

Each category reflects a different level of spatial porosity, shaped by the building's functional use and the degree to which its architectural boundary permits interaction and movement. These categories will be visually mapped across Semarang Old Town to reveal patterns of access, control, and inhabitation, and to understand how revitalisation has influenced spatial porosity in the area.

Living: The *living* category refers to the condition of dwelling, which encompasses domestic activities such as sleeping, bathing, cooking, eating, doing laundry, dishwashing, and settling for an extended period. Buildings typically associated with this category include private residences and long-term rented accommodation. Due to their short-term or transient nature, lodging facilities such as hotels and holiday rentals are excluded from this category; instead, they are classified under the *visiting* category. This classification also encompasses informal or illegal living arrangements, such as squatting or temporary shelters, which can be identified by makeshift or collapsible structures supporting domestic functions.

Working: The *working* category refers to buildings where employment or occupation-related activities occur, typically structured around regular schedules or working hours. Examples include offices, schools, warehouses, storage facilities, and workshops. These buildings are functionally defined by productivity, efficiency, and formal engagement with the labour economy.

Visiting: The *visiting* category encompasses temporary or short-term interactions with a space, usually for leisure, educational, religious, or commercial purposes. Buildings in this category include shops, cafés, restaurants, galleries, churches, and exhibition venues. It also includes public open spaces as defined in local regulations, such as streets, parks, the Kali Semarang retention pool, parking areas, and other non-building tourist attractions.

Uninhabited: *Uninhabited* buildings exhibit no observable signs of human activity. Typically, these are abandoned, vacant, or listed for sale. In the urban context, their unoccupied condition implies limited or no accessibility, representing the lowest level of spatial porosity.

At the urban scale, this index aims to identify general patterns of inhabitation and access, based on who can enter or utilise each space. Each category implicitly reflects a degree of spatial porosity, from restricted (private or inaccessible) to open (public and accessible). This mapping serves as a foundation for more detailed investigations into boundary conditions and inhabitation, which are subsequently addressed at the scale of the heritage building façade.

The following section will refine this analysis by developing the façade-scale spatial porosity index, with a focus on direct observations of boundaries and inhabitation.

Spatial Porosity Index for Façade Mapping

This index is then further developed at the architectural scale, focusing specifically on façades as mediating boundaries

between the interior and exterior realms. It considers how façades enable access, communication, or inhabitation through physical features (such as openings) and spatial practices (such as appropriation or decoration).

The façade spatial porosity index is primarily based on the presence and type of apertures (doors, windows, shutters, gates), the degree of openness or closure, the objects and elements that suggest inhabitation or activity (such as signage, furniture, potted plants, or hanging laundry), and the observed interactions between people and façades, indicating how space is used, accessed, or adapted.

These conditions are assessed through visual analysis of the documented façades and summarised in the following table:

Table 5-4. Façade spatial porosity index

Index Num	Conditions/Situations	Visual Reading
1	No access	Inaccessible doors and windows, as well as objects on and around the façade that are part of the gesture to deny or forbid access to the façade and to the inside.
2	Allow Sensory Access	Glass or transparent materials on windows or doors or wall of the façade that visibly allow visual access. Openings or ventilations that possibly allow sound or smell access.
3	Allow Entrance	Accessible door or opening on the façade for entering the inside.
4	Allow Extension	Objects or structures from the inside exist on the or around the façade
5	Allow Attachment	Objects or structures from elsewhere exist on or around the façade.

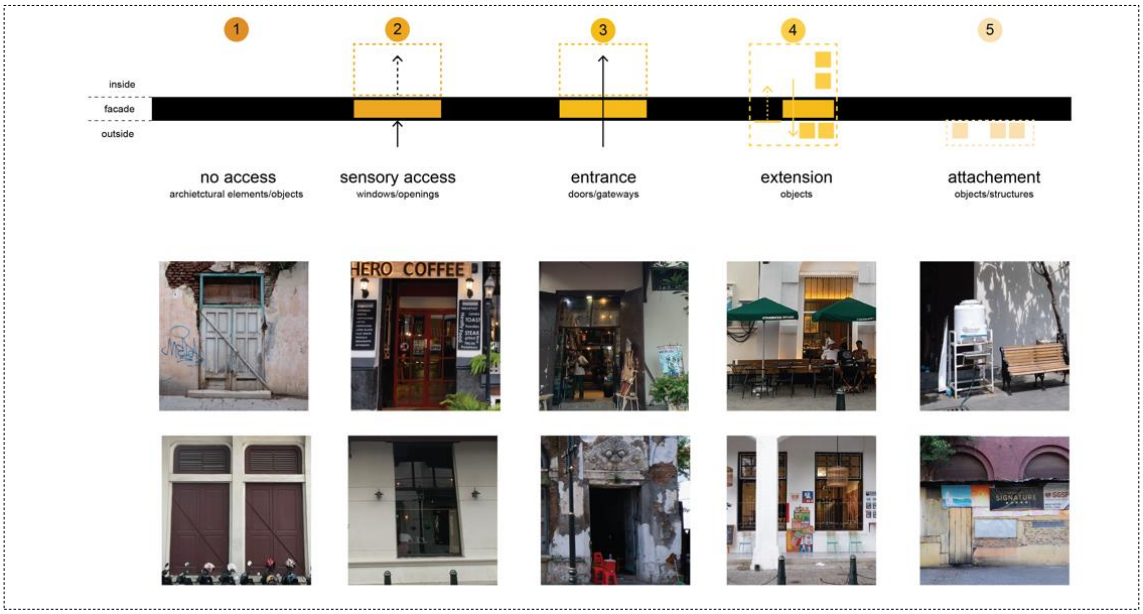


Figure 5.12. Facade spatial porosity index

This scale enables a comparative understanding of how façades mediate access and usage in the urban heritage context. Each condition reflects a different level of spatial porosity, derived from both the physical characteristics of the façade and its observed interaction with the public realm. As with the urban-scale index, this façade-level analysis will be represented through mapped visualisations and supported by field documentation and selected interview insights.

5.5.3. Social Porosity Index

The conceptual basis for this porosity index is the notion of social porosity, which allows the coexistence of multiple forms of inhabitation—both planned and unplanned—with varied motivations and appropriations. It reflects the accessibility of public spaces and acknowledges the formal/informal distinction that often corresponds to legal/illegal status, thereby illustrating the socio-economic conditions of the actors involved.
This index also draws on concepts such as Sennett's (2018) "open city", and the informal use of perceived available urban

space, sometimes termed “porous space” (Kling & Jungfer, 2018), “no-man’s land” (Groth & Corijn, 2005), or voids—spaces of ambiguous legal status, but commonly appropriated by citizens (Borio, 2023). These may include public or abandoned spaces that are actively repurposed through informal inhabitation and use.

In addition, the index incorporates insights from Richard Goodwin (2011), who examines degrees of accessibility in private buildings that offer intermittent public use, for instance, lobbies or restrooms in hotels or theatres. This aligns with spatial porosity about building functions, such as living, working, and visiting, each indicating varying levels of public and private access.
This index is initially developed at the urban scale to map the formal and informal status of inhabitation in Semarang Old Town, and subsequently at the façade scale to assess the social accessibility of selected building façades.

Social Porosity Index for Urban Mapping

This index captures both authorised (formal) and unauthorised (informal) practices, including structures and activities within Semarang Old Town. Definitions of "formal" and "informal" are derived primarily from municipal regulations, reflecting contextual socio-political and legal frameworks.

Formal inhabitation: This refers to authorised, legal use of space aligned with the 2009 building regulations, including functions such as offices, homes, cafés, galleries, churches, and public parks. These spaces comply with land-use permissions and conform to their designated building functions.

Informal inhabitation: Informal inhabitation denotes unauthorised, often temporary or makeshift uses, such as street vending, squatting, or living on public infrastructure. These are typically outside the boundaries of legal use and are often removed or relocated under regulation.[22] For instance, the 2014 municipal law targeting street dwellers and beggars, as well as subsequent regulations such as the 2018 bylaw on the organisation of street vendors, attempt to manage and relocate informal practices that contravene designated urban uses. While informal economies are integral to Indonesian urban life, the official stance seeks to regulate and confine them to designated zones, of which Semarang Old Town is generally excluded.

The index is summarised in the table below.

[22] Some regulations referenced for this index is the Peraturan Daerah Kota Semarang Nomor 5 Tahun 2014 tentang Penanganan Anak Jalanan, Gelandangan, dan Pengemis di Kota Semarang, regulation that addresses people with socio-economic conditions such as beggars, homeless, and street children. Some planning regulations use the term informal sector which they define as, for example in the Peraturan Daerah Kota Semarang Nomor 5 Tahun 2021 tentang Perubahan Atas Peraturan Daerah Nomor 14 Tahun 2011 tentang Rencana Tata Ruang Wilayah Kota Semarang Tahun 2011-2031, long term planning regulation of Semarang, informal sector refers to what's called Pedagang Kaki Lima (PKL) or street vendors. In the same regulation, it was also further defined that the informal sector refers to small businesses. It shows that the regulation takes a more economic practice definition or side of the term informal. However, when it is defined further as a practice such as street vending, it also involves spatial practice. In Semarang, the municipal has its own street vendor regulation, the Peraturan Daerang Kota Semarang Nomor 3 Tahun 2018 tentang Penataan dan Pemberdayaan Pedagang Kaki Lima. And also there is this Keputusan Wali Kota Semarang Nomor 510.17/475 Tahun 2023 tentang Penetapan Lokasi Tempat Usaha Pedagang Kaki Lima di Wilayah Kota Semarang, a mayoral decree, regulates the street vending's authorised location, and Semarang Old Town is not part of it. Therefore, street vending is generally not allowed in the Semarang Old Town area unless it is in the form of festivals or events. During the revitalisation project, street vendors were part of the relocation and eviction process.

Table 5-5. Urban social porosity index

Status	**Formal**	**Informal**
Descriptions	Authorised, legal.	Unauthorised, semi-legal, and illegal.
Building or space functions, utilisation and activities	 *Starbucks* Residentials, Offices, schools, factories, storages, warehouses, workshops, retails, cafés and restaurants, galleries, exhibition spaces, churches, public parks, parking area, non-building touristy spots and attractions.	 *Angkringan – small shops* Mobile/immobile PKL (street vendors, including the traditional form like *angkringan, gelaran lesehan, tenda, shelter*) informal settlement, squatting, basking, parking, etc

This urban-scale mapping visualises the distribution of formal and informal inhabitation, illustrating not only regulatory compliance but also the socio-economic dynamics at play. Informal practices, typically associated with lower-income groups, often reflect necessity-based appropriations of space in contrast to capital-intensive formal establishments.

This distinction informs the subsequent façade-scale mapping, which explores how these practices manifest physically on and around building frontages.

Social Porosity Index for Façade Mapping

This index focuses on the façade as an interface for social accessibility—how building boundaries mediate public and private access and reflect social stratification. It assesses visibility, formality of access, and economic thresholds for engagement, drawing from field observations and visual documentation.

Table 5-6. Façade social porosity index

Index Num	Conditions/Situations	Visual Reading
1	**Private Access**	Façades of residential or office buildings; generally inaccessible to the public. Aligns with ‘living ’and ‘working ’categories.
2	**Semi-public Access**	Façades of establishments like restaurants or short-term rentals where access is conditioned by economic transaction. These are often used by middle or upper socio-economic groups.
3	**Community Access**	Façades that provide entry to spaces used freely by local communities for shared activities.
4	**Public Access**	Façades of retail or cultural buildings open to all, with no entry fee or obligatory purchase; includes streetscape elements that promote public engagement.
5	**Informal Access**	Façades appropriated by street vendors, informal dwellers, or natural overgrowth. Includes any informal structures or misuses of façade elements.

Figure 5.13. Façade social porosity index

These categories allow the façades of heritage buildings to be assessed as loci of social interaction, indicating varied levels of porosity. They provide a framework for understanding how façades function not just as physical barriers, but as socially dynamic thresholds in the urban landscape.

5.6. Porosity Mapping: Reading Porosity in Semarang Old Town

The porosity indexes discussed in the previous section are employed to analyse porosity in Semarang Old Town through a two-stage mapping process: urban-scale mapping (via plan/map drawings) and façade-scale mapping (via elevation drawings). The reading of porosity begins at the macro scale through urban mapping, aiming to capture changes in material, spatial, and social aspects before and after the significant revitalisation project of 2017. This project primarily targeted infrastructural spaces, such as streets, pedestrian pathways, and outdoor public areas.

After separately mapping material, spatial, and social porosity, the three maps are overlaid to interpret the co-existence of the

three porosity types, resulting in a permutation of possible configurations. Based on this permutation, 54 façades from 36 heritage buildings are selected for façade-scale mapping. The façade mapping aims to interpret porosity at the architectural scale, revealing different possible configurations, encounters, engagements, and relationships among the three types of porosity as they manifest in spatial practice and production. This façade-scale mapping constitutes the primary reading of porosity, as the architectural porosity framework and its associated porosity index directly address the conceptualisation of porosity at the architectural level.

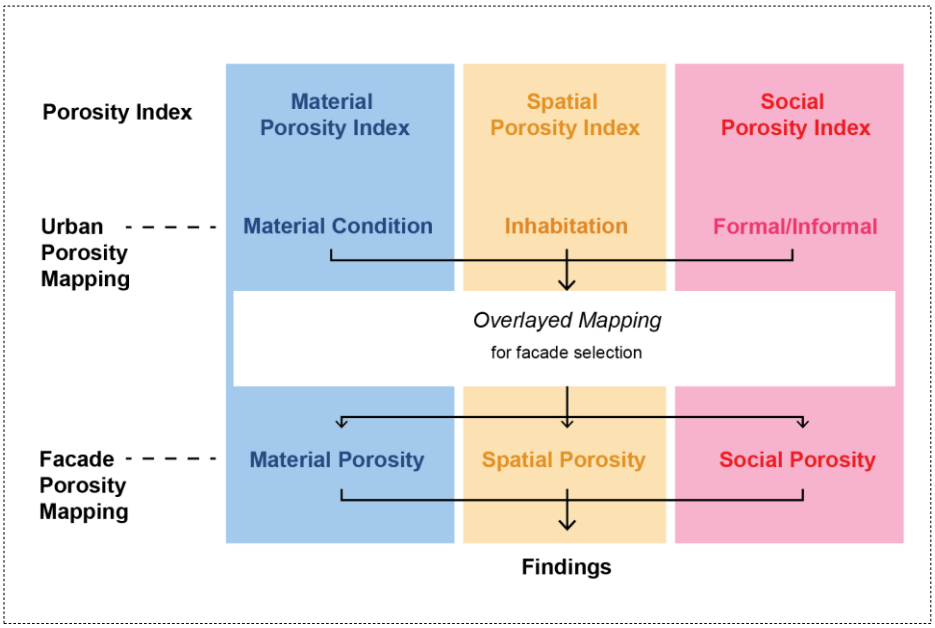


Figure 5.14. Diagram summarising the porosity mapping process

The following sections will elaborate on the urban and façade mapping processes and provide selected examples of porosity readings.

5.6.1. Urban porosity mapping

The urban-scale porosity mapping considers two distinct temporal snapshots: 2015, representing the pre-revitalisation condition, and 2022, representing the post-revitalisation state, which also corresponds with the fieldwork period. This analysis employs the urban porosity index summarised below.

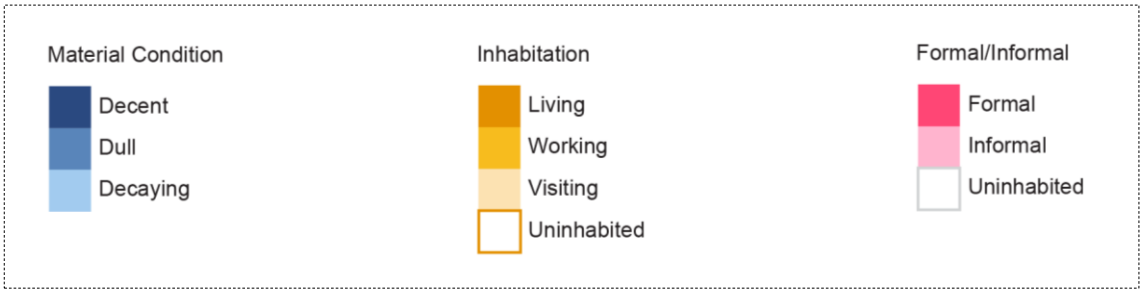


Figure 5.15. Urban material, spatial and social porosity index legends

Urban Material Porosity Mapping

The urban material porosity mapping captures the condition of the heritage buildings and the state of other permanent or semi-permanent material elements in the outdoor spaces of the area, such as street furniture or shelters, that support human activities.

The 2015 mapping of urban material porosity in Semarang Old Town reveals that many heritage buildings were in deteriorated or decaying condition; only a few were in good repair or had been revitalised before the 2017 project. By 2022, the most noticeable change was an increase in the number of buildings in decent condition, indicating the impact of the revitalisation efforts.

Figure 5.16. Urban material porosity mapping, highlighting the material condition of heritage building in 2015 (above) and 2022 (below) Semarang Old Town

The change in the material condition of the heritage buildings varied from one structure to another; selected examples are provided in Appendix G – Material Porosity Urban Mapping. More drastic changes, however, occurred in the streetscape of Semarang Old Town. In 2015, there were no designated pedestrian pathways; an open sewer ran along the streets, and informal settlements and street vendors occupied the street edges. The revitalisation project subsequently repaired the drainage system by relocating it underground and introduced generous pedestrian walkways on both sides of the streets. This transformation also entailed the removal of informal material presences along the roads. Examples of these streetscape changes are also included in Appendix G – Material Porosity Urban Mapping.

In summary, the material condition mapping indicates that the 2017 revitalisation project significantly improved the material state of most heritage buildings. While some buildings had already undergone revitalisation before 2017, the project led to a more significant number of buildings being refurbished and consequently being in decent condition. Furthermore, the project redefined the area's streetscape, where outdoor material elements are now primarily composed of formal street furniture, including benches, handwashing stations, charging stations, waste bins, and streetlamps. Informal structures that once populated the streets have been removed or relocated.

Urban Spatial Porosity Mapping

The urban spatial porosity mapping documents the inhabitation of heritage buildings, the presence of permanent or semi-permanent material elements in outdoor spaces (such as street

furniture and shelters), open spaces, and temporary forms of inhabitation, such as mobile street vendors and informal parking.

Figure 5.17. Urban spatial porosity mapping, highlighting the inhabitations of heritage buildings in 2015 (above) and 2022 (below) Semarang Old Town

The 2015 spatial porosity mapping of Semarang Old Town reveals that more heritage buildings were uninhabited than inhabited. Among those that were occupied, the predominant functions were offices, warehouses, and factories, reflecting historical patterns of use. By 2022, a significant shift had occurred: the number of buildings used for visiting and working purposes had increased, and fewer heritage buildings remained uninhabited. Additionally, new public open spaces were introduced in 2022, including parking areas to accommodate the rise in visitor activity.

The change in the function of heritage buildings varied between structures; selected examples are provided in Appendix H – Spatial Porosity Urban Mapping. More pronounced transformations occurred in the streetscape. In 2015, the streets were occupied by various informal uses, including chicken sellers, informal settlements, unauthorised parking, and street vendors. By 2022, many of these informal street inhabitations had been removed, either through relocation or eviction. Examples of these changes are also included in Appendix H – Spatial Porosity Urban Mapping.

In summary, the inhabitation mapping indicates that the 2017 revitalisation project contributed to a shift in the use of heritage buildings towards more visitor-oriented functions. Some previously uninhabited buildings were revitalised for commercial use, although others retained their previous functions as offices or residences. The character of street inhabitation also changed, with former informal uses replaced by more structured public spaces designed for visitors, including enhanced infrastructure such as public parking. Some former street inhabitants were

relocated to areas outside the Old Town or into revitalised heritage buildings within the region.

Urban Social Porosity Mapping

Urban social porosity mapping documents the formal and informal status of inhabitation while also identifying uninhabited spaces. This includes the occupation of heritage buildings, outdoor spaces, and open public areas.

The 2015 social porosity mapping indicates that a majority of the heritage buildings in the area were uninhabited, and those that were inhabited tended to host formal forms of occupation. However, the mapping also reveals the presence of informal inhabitation along the streets. By 2022, the number of formally inhabited buildings had increased, mainly due to the revitalisation of previously vacant heritage buildings. Additionally, the introduction of official public spaces, such as parks and parking areas, contributed to an increase in formal inhabitation within the region. In contrast, informal inhabitation on the streets had significantly declined, as these uses were either removed or relocated; nevertheless, some informal occupations persisted by appropriating uninhabited heritage buildings. Further examples of changes in social porosity are provided in Appendix I – Social Porosity Urban Mapping.

Figure 5.18. Urban social porosity mapping, highlighting the formal/informal status of inhabitations in 2015 (above) and 2022 (below) Semarang Old Town

In summary, the formal/informal inhabitation mapping shows that the 2017 revitalisation project shifted the area towards a more formal pattern of occupation. More heritage buildings were revitalised and ‘properly’ inhabited, and outdoor spaces were more tightly regulated through the provision of designated public areas and formal street furniture. However, traces of informal inhabitation remain, either occupying marginal spaces within the region or appearing in more temporary, transient forms.

Overlayed Urban Porosity Mapping

To analyse how the three forms of porosity—material, spatial, and social—interact, the corresponding maps were overlaid using Adobe Illustrator. The material condition mapping served as the base layer, onto which the inhabitation and formal/informal status maps were layered using a ‘multiply’ opacity style. This technique produced a visual blending of colours representing the different porosities.

The permutations of the resulting merged colours illustrate how the three porosity conditions co-exist. These merged outcomes fall into three primary categories, as illustrated in Figure 5.19 below.

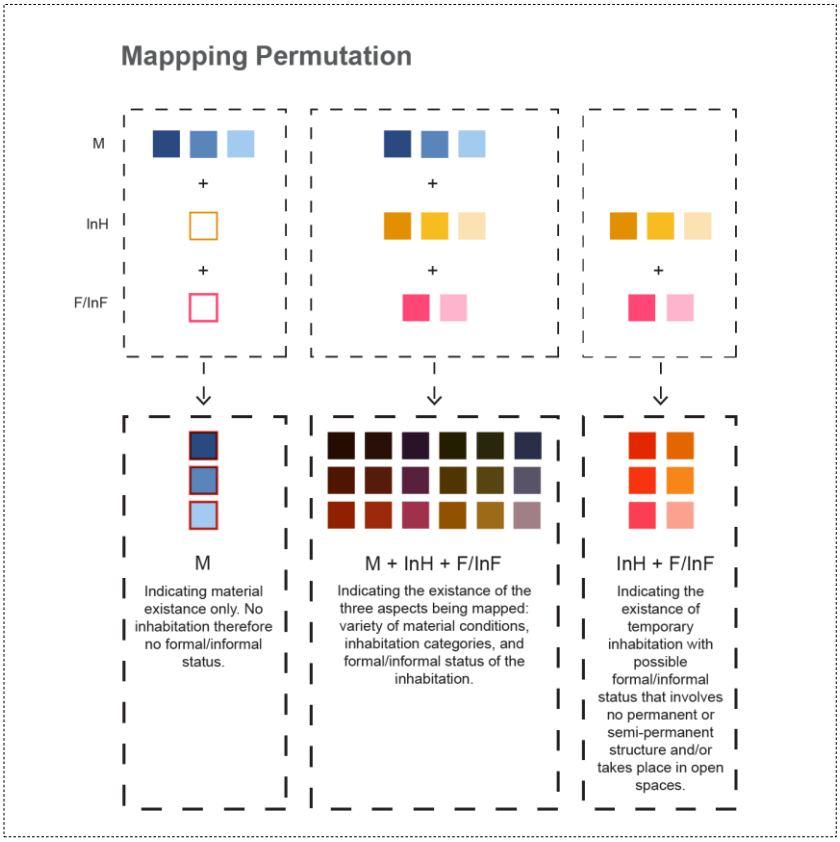


Figure 5.19. Overlayed urban porosity mapping permutation

The first group, referred to as the **M group**, results from the material condition mapping (represented in shades of blue) overlaid with uninhabited areas from both the inhabitation and formal/informal mappings (represented by yellow and pink outlines). This group typically corresponds to uninhabited heritage buildings, which therefore exhibit only material existence without any formal or informal inhabitation. The group varies in three shades of blue, each indicating a different material condition.

The second group, the **M+InH+F/InF group**, results from the overlay of material condition mapping (blue), inhabitation mapping (yellow), and formal/informal status mapping (pink). This group generally represents inhabited heritage buildings or structures in outdoor spaces, where both inhabitation and their formal or informal status can be mapped. It indicates the co-

existence of all three porosity conditions—material, spatial, and social. The group encompasses 18 different colours, each representing a unique combination of the shades of blue, yellow, and pink.

The third group, termed the **InH+F/InF group**, results from the overlay of inhabitation mapping (yellow) with the formal/informal mapping (pink), without any material layer. This group typically corresponds to temporary forms of inhabitation—whether formal or informal—that do not involve permanent built structures or are located in open spaces. As such, they do not register any material existence. This group represents more transient, non-material forms of inhabitation and consists of six shades of orange, each corresponding to a distinct combination of inhabitation type and formal or informal status.

Figure 5.20. Overlayed urban porosity mapping in 2015 (above) and 2022 (below) Semarang Old Town

The 2015 overlayed map reveals that Group M was more prevalent than any other group, indicating a large number of uninhabited heritage buildings in deteriorated condition at that time. The outdoor spaces were primarily occupied by Group InH+F/InF, reflecting a high occurrence of temporary inhabitation. Based on the shades of orange, most of these were informal types of inhabitation, such as informal parking and mobile street vending. Some heritage buildings fell into Group M+InH+F/InF, indicating formal inhabitation. However, this group also represented informal settlements occupying street edges and outdoor areas. Additionally, the presence of this group within uninhabited buildings suggests informal inhabitation inside formally uninhabited structures.

By 2022, the number of Group M areas had decreased, as many previously uninhabited heritage buildings were revitalised and

formally occupied, thus contributing to an increase in Group M+InH+F/InF. The formerly scattered Group InH+F/InF, which was present in streets and outdoor spaces, had diminished and become more localised. Interestingly, this group, when representing open public spaces, had increased, showing a shift in function. Informal street inhabitations previously mapped in Group M+InH+F/InF were replaced by formal street furniture. These areas still appeared in the same group but exhibited different colour combinations due to the formal status. Some areas of Group M+InH+F/InF that indicated informal inhabitation within uninhabited buildings persisted in 2022. Further detailed examples of these changes are presented in Appendix J – Overlayed Urban Mapping.

Selected Façades Based on the Overlayed Urban Porosity Mapping

As previously discussed, this urban mapping marks the initial attempt to analyse porosity in Semarang Old Town through the architectural porosity framework—specifically, to compare the urban condition before and after the 2017 revitalisation project by using the 2015 and 2022 timestamps. The analysis confirms that the 2017 revitalisation significantly transformed the outdoor spaces of the area, and this intervention contributed to the revitalisation of many heritage buildings.

However, the overlayed maps of both years reveal a vital nuance: although there was a clear shift—from a dominance of Group M in 2015 to a prevalence of Group M+InH+F/InF in 2022, alongside evolving manifestations of Group InH+F/InF—all three groups remained present in 2022. This continuity is significant, especially given that the revitalisation project and associated planning regulations aimed to promote formal, economically

productive inhabitation. The persistence of informal inhabitation is therefore both notable and thought-provoking.

At this stage, the porosity reading offers an initial indication of the simultaneous existence of material, spatial, and social porosities. The key insight from the urban mapping lies in the variation between the three mapped conditions—material condition, inhabitation, and formal/informal status—which, when overlaid, generate the three identified groups. These groups reflect the diverse expressions of the three porosity types, contributing to the broader discussion on their role in spatial practice and inhabitation.

The next stage of the porosity analysis involves selecting specific buildings and, subsequently, their façades to serve as case studies for façade-scale porosity mapping. This mapping will employ a more detailed porosity index at the architectural scale. The façades are selected from the overlaid 2022 map, representing the post-revitalisation condition and the period during which the primary field observations were conducted.

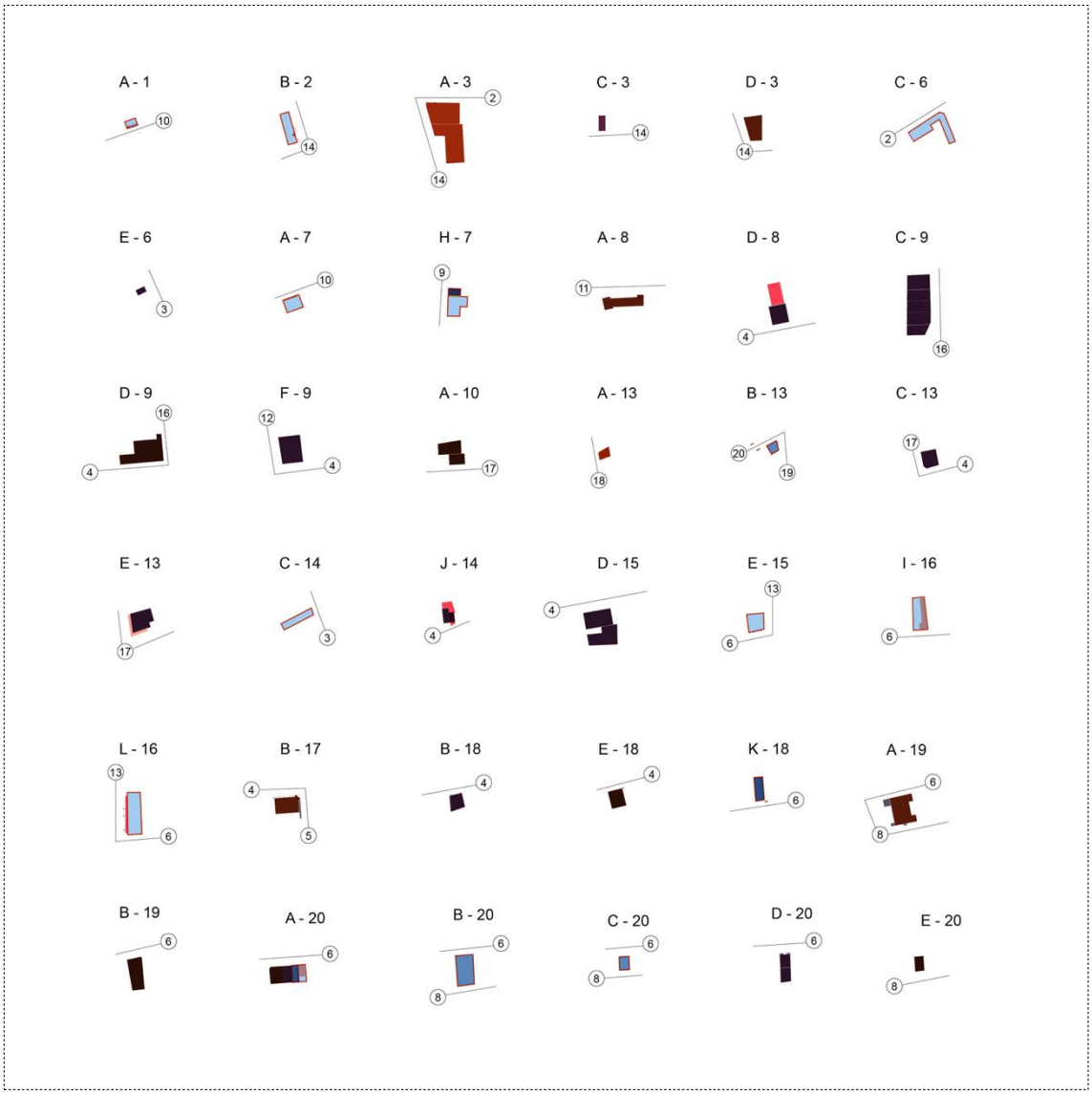


Figure 5.21. Selected building façades selected for façade mapping (the list of the buildings names and street could be found in Appendix A – Selected Heritage Building List and Street Names)

Figure 5.21. above shows the 54 façades from 36 heritage buildings selected for façade mapping. The selection represents the three overlayed map groups: Group M, which indicates material existence only; Group M+InH+F/InF, which signifies the co-existence of all three porosity conditions; and selected examples from Group InH+F/InF, indicating the presence of temporary inhabitation in proximity to the buildings. The purpose of the façade mapping is to examine porosity at the architectural scale, revealing different possible configurations, encounters,

engagements, and relationships between the three porosities as part of spatial practice and production in context.

5.6.2. Façade Porosity Mapping

This façade mapping constitutes the primary mode of porosity reading, as it directly engages with the architectural porosity framework and its associated index. The porosity index is used here to represent varying levels of porosity, ranging from the least to the most porous. This is conveyed through both numerical indices and a colour-coding scheme aligned with the previous urban mapping: blue for material porosity, yellow for spatial porosity, and red for social porosity. Darker shades with lower index numbers represent lower levels of porosity, while lighter shades with higher index numbers indicate higher levels of porosity. Figure 5.22. below illustrates the colour gradations for the three porosity indexes.

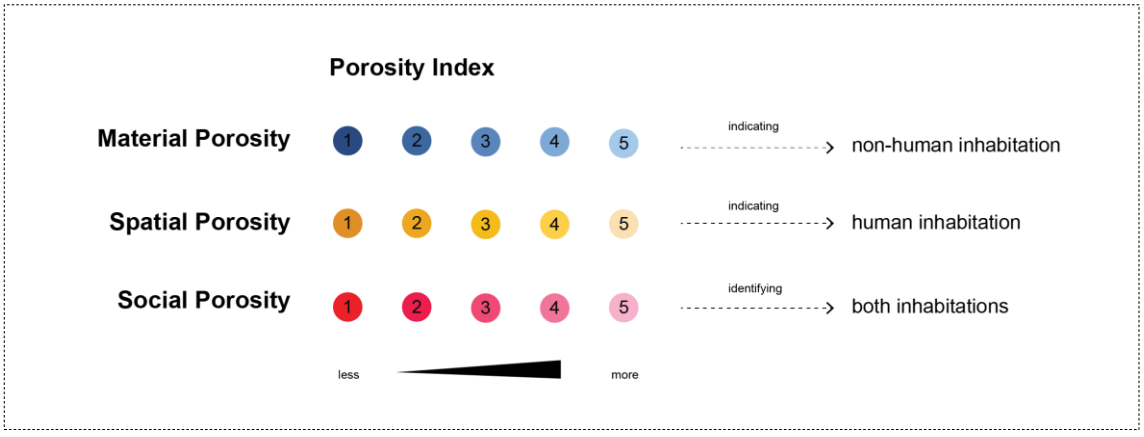


Figure 5.22. Façade porosity index legend

The façade mapping produces two primary outputs (see Figure 5.23. for example):

1. Façade Mapping Drawing – a spatial representation of the porosities overlaid on the architectural façade, highlighting the localisation and architectural elements or objects involved.

2. Coloured Index Number Combinations – a conceptual abstraction that summarises the porosity levels of each façade, enabling analysis of how the three porosities exist, interact, and relate.

These two outputs were produced sequentially: the façade mapping drawings were developed first to highlight porosity levels within the architectural context, followed by the abstraction into coloured index number combinations. However, for analysis, interpretation begins with the coloured index number combinations to identify the presence and intensity of the three porosities. The façade drawings are then referenced to re-situate these readings within the spatial and architectural context.

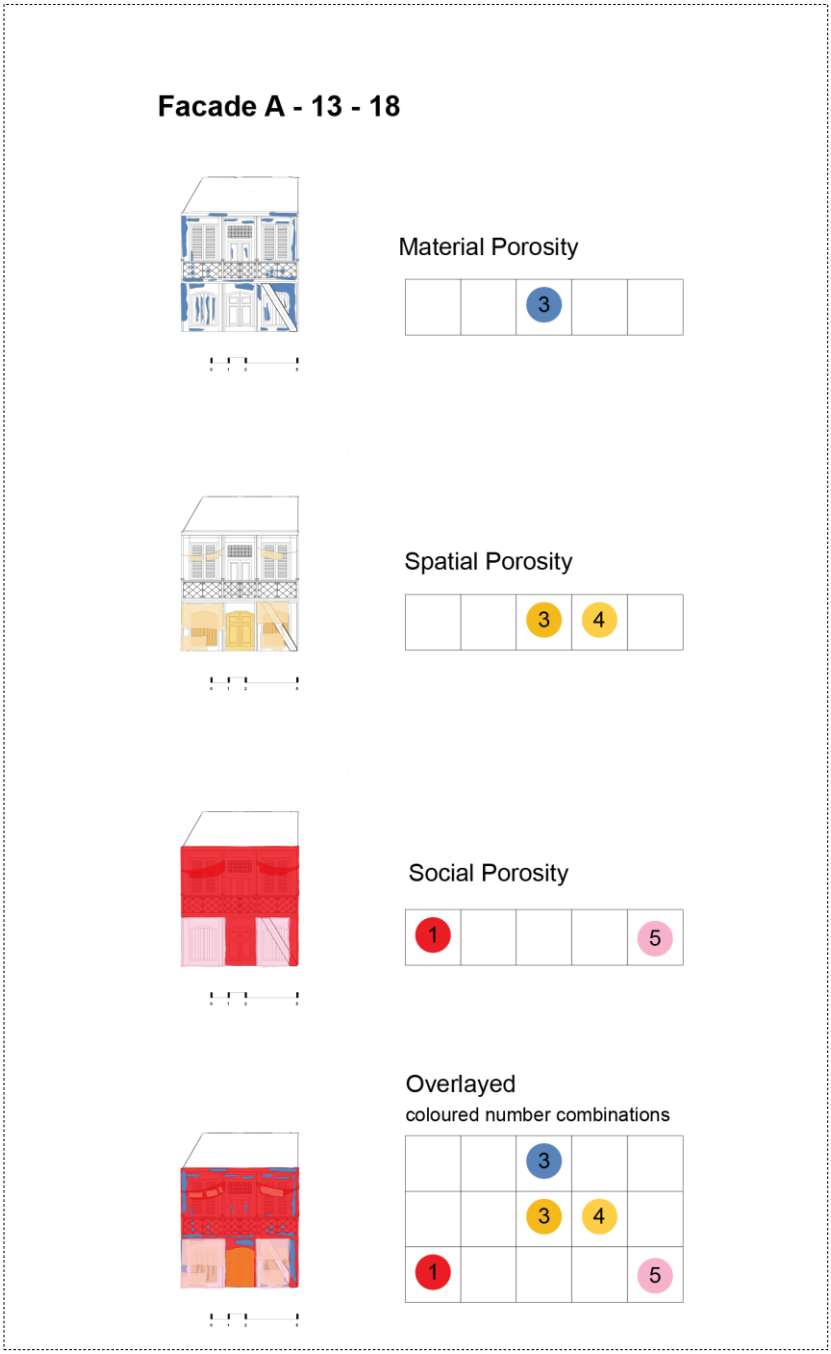


Figure 5.23. The two façade mapping output examples

Coloured Index Number Combination

The material porosity index identifies five conditions of porosity that interpret porosity as the capacity to contain. It focuses on the wall material of the façade and its ability to register traces of time and the environment. These range from containing nothing to bearing stains and ultimately to hosting non-human organisms

such as vegetation. The greater the capacity to contain such traces, the higher the material porosity index.

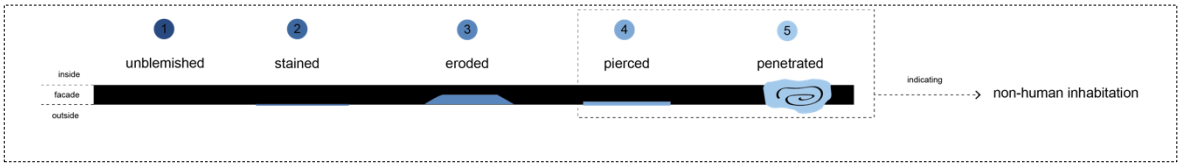


Figure 5.24. Facade material porosity diagram summarising the implication of the index to the façade material conditions

From the mapping, it is evident that most façades exhibit more than one index number combination. However, two general tendencies can be observed.
The first tendency includes combinations that feature index number (1), which may appear alone—(1)—or alongside other values, such as (1) (2), (1) (2) (3), (1) (4), or even (1) (2) (3) (4) (5). In these combinations, index (1) is consistently dominant, while the presence of other index numbers is typically marginal. Combinations that include index (1) represent relatively unblemished surfaces, indicating a non-porous material condition.

The second tendency involves combinations that include index (5) or exclude index (1) altogether. These typically appear as (3) (4) (5), (2) (3) (4), or (2) (4). Such combinations reflect porous façade surfaces, with particular emphasis on indices (4) and (5), which indicate non-human inhabitation (e.g. vegetation, fungi, or environmental traces) embedded within or growing on the façade material.

The spatial porosity index maps five conditions of porosity, interpreting the façade as a boundary between interior and exterior spaces. This mapping focuses on architectural aperture elements—such as doors and windows—as well as objects that exist on or around the façade wall, which contribute to human

inhabitation. These include elements that either permit or restrict the interpenetration of interior and exterior conditions. Additionally, the mapping considers structures or attachments affixed to the façade from the outside, which arguably render the façade more publicly accessible or interactive.

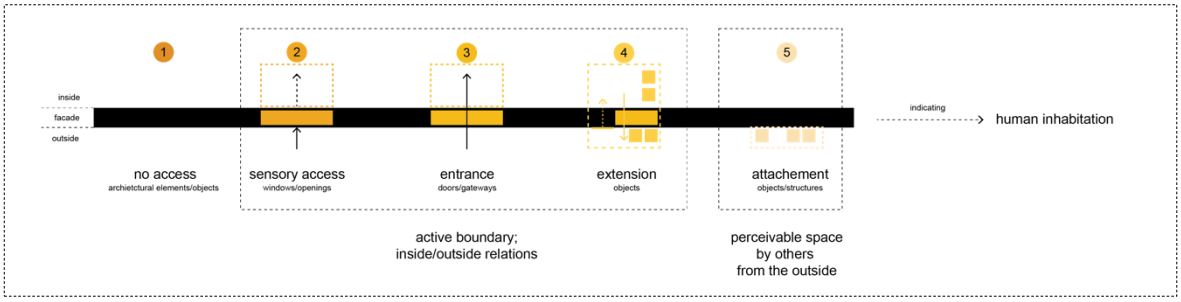


Figure 5.25. Facade spatial porosity diagram summarising the implication of the index to the boundary conditions

The spatial porosity index identifies three boundary conditions, each corresponding to a different role played by the façade. These conditions are indicated through various architectural elements, objects, or additional structures. As with the material porosity mapping, most façades exhibit combinations of coloured index numbers.

A coloured index number combination including (1) signifies that the façade has inaccessible architectural elements, such as locked doors or covered windows, or is associated with objects that express a gesture of protection or restriction, limiting access through or to the façade. This represents a non-porous boundary condition, one that inhibits connections to either the interior behind the façade or to the façade surface itself.
A combination of index numbers (2), (3), and (4) indicates an active boundary, suggesting interaction between the interior and exterior. Specifically:

- (2) refers to functioning windows or openings that enable sensorial access (e.g., visual, auditory) to the interior;
- (3) denotes functioning doors or similar elements that allow bodily access;
- (4) signifies objects or elements that either originate from the interior or imply the presence of inhabitable internal spaces.

Index (4) is usually found in combination with index (3), as bodily access implies the availability of interior space for inhabitation. Together, this combination of indices signals the façade's regulatory role in mediating the relationship between inside and outside.

A coloured index number combination including (5) signifies that the façade provides accessible exterior space, space onto which objects or structures unrelated to the interior can be attached or installed. Here, the role of the façade shifts from acting as a strict boundary between two realms (interior/exterior or private/public) to becoming a site of interaction within the public realm, perceived from the outside. This often relates to unplanned or informal inhabitation, and as such, closely intersects with the themes addressed by the social porosity index.

The social porosity index maps five different conditions of porosity that conceptualise porosity as a form of coexistence, particularly within the social dimensions of public versus private access, and planned/formal versus unplanned/informal inhabitation, by both human and non-human agents. This index overlays material and spatial porosity mappings by considering both the overall inhabitation of the building and the presence of objects, structures, or organisms located on or around the façade.

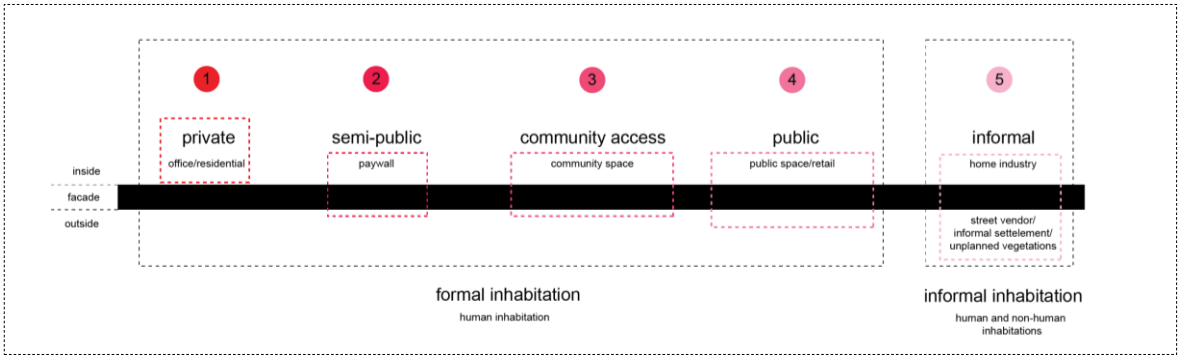


Figure 5.26. Façade social porosity diagram summarising the implication of the index to the social status of the inhabitation

The social porosity index indicates the formal or informal status of inhabitation. Index numbers (1), (2), (3), and (4) refer to formal inhabitation, while index (5) denotes informal inhabitation. In façade mapping, some façades display a single index number, typically when the building's function is clearly defined, while many façades exhibit combinations of indices.

A combination including index (1) typically corresponds to façades of private-use buildings, such as residences or offices, which are characterised by restricted, private access and are therefore considered non-porous. Combinations involving index numbers (2) and (3) usually represent semi-public buildings, such as cafés, bars, or restaurants, where economic transactions mediate access. These indices may also be found in buildings used by specific communities, such as municipally owned spaces that function primarily for municipal events or community gatherings.

A façade marked with index (4) generally represents public or publicly accessible commercial spaces, such as convenience stores or souvenir shops. Conversely, index (5) indicates a tendency towards informal inhabitation, including street vendors, small businesses, home industries, and informal or illegal

settlements. In-depth façade porosity reading example is available in Appendix K – Façade Porosity Reading.

The interpretation of coloured index number combinations across material, spatial, and social porosities begins with the porosity level of the façade material, aligning with the perspective that materiality is central to architectural porosity. Based on this foundation, combinations of spatial and social porosity are used to determine whether the façade material is non-porous or porous.

Coloured Index Number Combination: Non-Porous Material Condition

The following analysis concerns façades identified as having non-porous material conditions, specifically those mapped with index number (1) in the material porosity index. These façades are characterised by unblemished surfaces and good overall condition, indicating that the buildings are functioning, maintained, or revitalised.

Three primary tendencies are observed among façades with non-porous material conditions:

First, coexistence with a porous or active boundary.
These façades often feature active boundary conditions, with index numbers (2), (3), or (4), that regulate the relationship between interior and exterior spaces. Some also include an index (5), indicating perceivable façade space accessible from the outside. Socially, these façades are associated with formal uses, ranging from semi-public to public access (2) (3) (4).

- Example 1: Starbucks (F–9–12)
  This is a formal café franchise located in a revitalised heritage building. As a commercial establishment, access requires a transaction (paywall), aligning with index (2). The establishment also utilises the exterior façade space by providing an outdoor seating area, contributing to spatial porosity, as indexed at (4).

- Example 2: Semarang Creative Hub (C–9–16)
  This example involves a revitalised heritage warehouse now functioning as a mixed-use complex—hosting event spaces, storefronts for the creative economy and small businesses, and a food court. Owned by a state-owned company and managed by the municipality, the building is formally inhabited (indices (2), (3), and (4)) and open to the public. In front of the façade, the city has installed benches and hand-washing stations, creating a publicly accessible seating area that reinforces the façade's spatial porosity (index (5)).

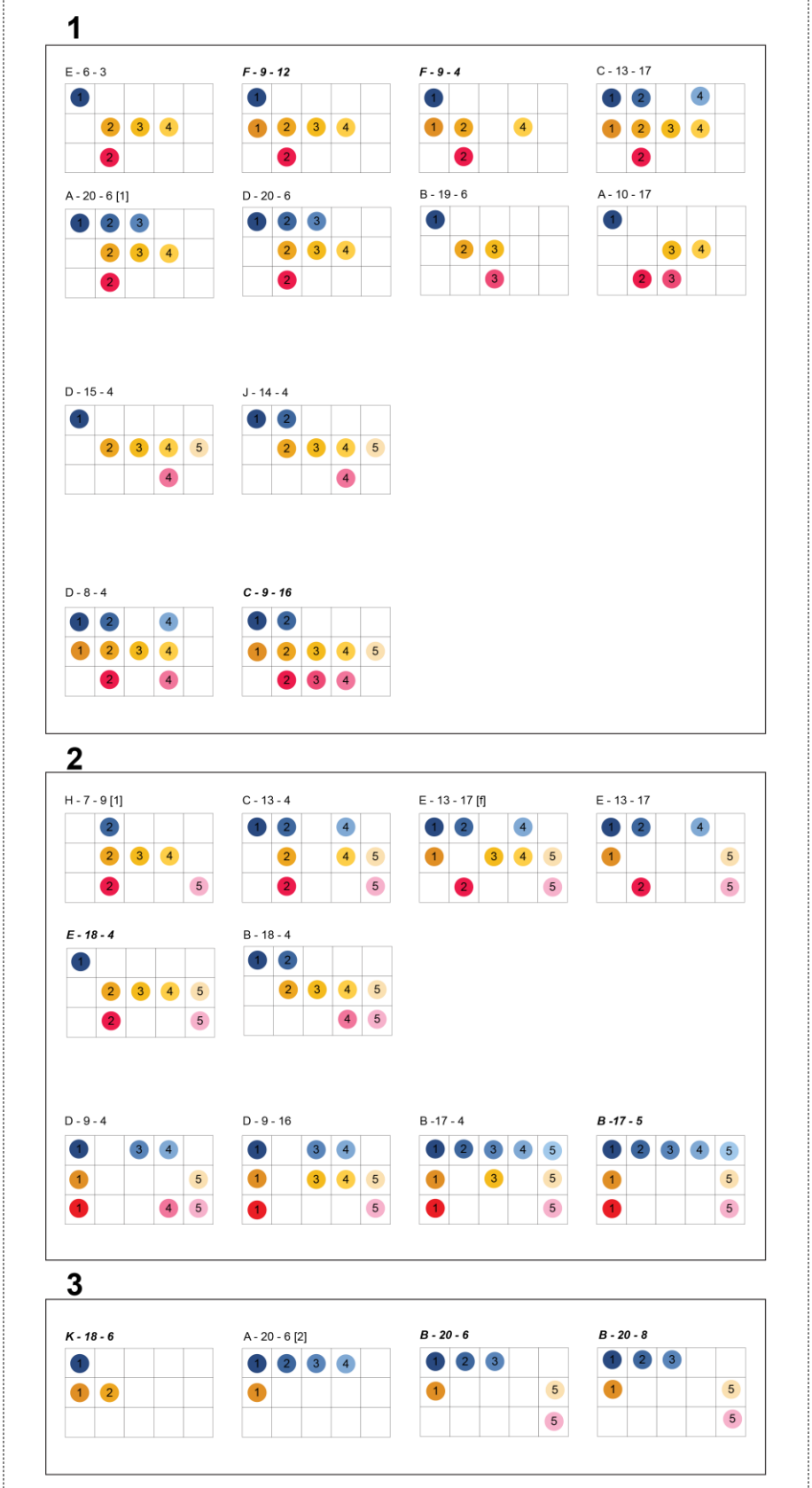


Figure 5.27. Non-porous material condition porosities combinations

Second, coexistence of a non-porous material index (1) with active boundary conditions ((2), (3), (4)), but with a more dominant emphasis on perceivable exterior façade space (5). These façades host both formal inhabitation (indices ((1), (2), (4)) and informal inhabitation (index (5)).

- Example 1: Weeskamer Building (E–18–4)
  This Ministry-owned building has been revitalised and now functions as an event space, which is accessible to the public during events. In front of the façade—specifically at the gate—a mobile street vendor with a pushcart occasionally operates during the day, selling drinks. This represents a momentary, informal occupation of public-facing space.

- Example 2: Marba Building (B–17–5)
  One of the area's most iconic heritage buildings, Marba functions as a well-maintained office building, typically in decent—if somewhat dull—condition. On one of its façades, which has no doors, a warung (a small informal eatery) selling *Nasi Koyor*, a local dish, has been established. The warung features a semi-permanent structure attached directly to Marba's façade, signifying an informal inhabitation that is integrated with a formal one.

Third, tendency involves façades with a non-porous boundary (1), but with no formal inhabitation. These façades belong to revitalised buildings in good condition that are either currently uninhabited or not yet occupied. Despite the lack of interior activity, the spaces in front of these façades are frequently used for informal parking, indicated by duplicate index (5) (5).

Coloured Index Number Combination: Porous Material Condition

The following analysis addresses façades identified as having porous material conditions—i.e., façades with **no** index number (1) in the material porosity mapping. These façades are marked by visible staining, erosion, or surface damage, reflecting limited or absent maintenance. They may belong to either functioning buildings or abandoned structures.

Two main tendencies can be identified among façades with porous material conditions.

First, coexistence with private, formal inhabitation (1) and a porous, active boundary ((2), (3), (4)) that mediates relations between the inside and outside. These façades may also have perceivable façade space (5) and, occasionally, informal inhabitation (5).

- Example 1: Suara Merdeka Building (A–3–2)
  This building houses the offices of a national newspaper and is continuously inhabited, yet suffers from neglect and lack of maintenance, resulting in a visibly decaying façade as of 2022. The exterior façade occasionally features an angkringan, a mobile street food vendor operated by its employees. This informal presence illustrates how social and spatial porosity intersect with material decay, allowing informal use of space even within a formally inhabited structure.

- Example 2: Djakarta Lloyd Building (A–8–11)
  This office building hosts a *warung*, a small informal restaurant, seemingly occupying a former garage space. Before the revitalisation, the warung operated around the corner. Following the revitalisation, it received permission to

use part of the building, formalising its presence within the façade space.

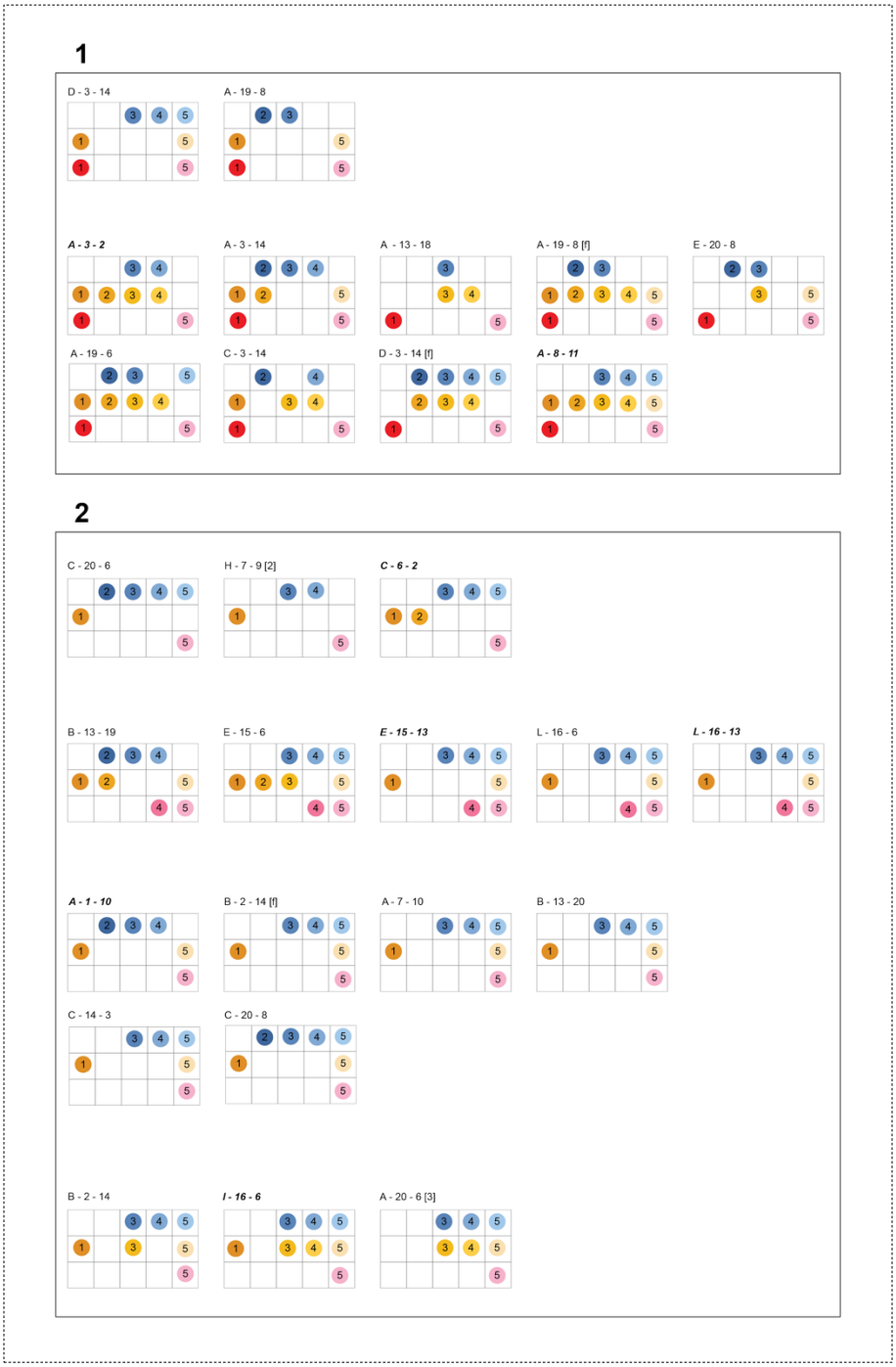


Figure 5.28. Porous material condition porosities combinations

The second tendency among façades with porous material conditions is characterised by significant plant growth on the façade (index (5)), a non-porous boundary (index (1)), and a

perceivable exterior façade space (index (5)). These façades often suggest that the building is uninhabited or abandoned, while also displaying elements of formal public access (index (4)) and informal inhabitation (index (5)).

- Example 1: Uninhabited House (A–1–10)
  This building is in a dull, decaying condition, with an informal eatery, *Kedai Yu Tik*, occupying the façade. The *warung* features a semi-permanent structure—constructed from carts, corrugated metal, and tarpaulin—attached directly to the façade. This informal use was sanctioned by the property owner, who receives a fee from the vendor, which also serves to informally 'protect' the building.

- Example 2: Rumah Akar (L–16–13)
  An abandoned building is now known for the large Banyan tree growing from its façade. The site has become a tourist attraction, and the municipality has installed public benches across the street, creating a formal public seating area in front of the building.

In some cases, such buildings also offer interior space for informal inhabitation.

- Example: Abandoned Building with Barong Head (I–16–6)
  This building, distinguished by a Barong head above the entrance, is in a ruined condition. An informal eatery has been set up inside, appropriating the interior space. The *warung*, which previously operated outside the building, received permission from the Semarang Old Town Management Board to move inside after the revitalisation, possibly as an alternative to being removed from the area altogether.

5.7. Conclusion

This chapter has outlined the development of methods and methodology employed in this study. It has grounded the approach conceptually in assemblage thinking and demonstrated how data collection and analysis draw on shared practices from architecture, urban studies, anthropology, and archaeology. Fieldwork and direct observation were used to collect visual data from Semarang Old Town, including photographic documentation and 3D scans of heritage building façades. Based on theoretical foundations surrounding the three porosities and contextualised within Semarang Old Town, a porosity index was developed and then applied at both urban and architectural scales. This chapter has also introduced some key findings from the mapping.

At the urban scale, porosity was examined through comparative mapping of two timestamps: 2015 and 2022, representing the pre- and post-revitalisation conditions. The analysis revealed drastic transformation, particularly in the outdoor spaces, where the 2017 revitalisation project restructured drainage and streetscape infrastructure, leading to the removal of informal street inhabitation.

Although the revitalisation and planning regulations aimed to reposition Semarang Old Town as an economically productive heritage tourism zone, the overlayed urban maps revealed the continued presence of diverse material, spatial, and social conditions. These findings suggest that the three porosities persisted, even if reconfigured. Informal inhabitation and spatial practices were not wholly eradicated but instead adapted, relocated, or recontextualised, continuing to perform within the porosity framework.

To explore these dynamics further, façade-scale mapping was conducted using the architectural porosity index, producing two analytical outputs: façade mapping drawings, which spatially represent the presence and distribution of porosity across the façade, and coloured index number combinations, which offer a conceptual abstraction of porosity levels.

This mapping identified several recurring tendencies across façades. While causal relationships between material, spatial, and social porosities were not directly established, the analysis revealed meaningful patterns of coexistence. Façades with non-porous material conditions often appeared with porous boundaries and formal social inhabitation, whereas those with porous material conditions frequently correlated with non-porous boundaries and informal social inhabitation.

The next chapter will investigate these tendencies in greater depth, discussing how the three porosities intersect with inhabitation and spatial practice on and around the façades.

Chapter 6.On Findings and Discussions: Porosity and the idea of *Claimability*

This chapter further discusses the tendencies of existence of the three porosities, as indicated by the porosity mapping in the previous chapter. It revisits the core conceptual foundations of each porosity—material, spatial, and social—and situates them within the empirical context of revitalised Semarang Old Town. The aim is to highlight how the three porosities shape the façade inhabitation and spatial practices within the area.

6.1. Introduction

The interpretation of the index number combinations from the façade mapping results led to two main categories: façades with non-porous material conditions and façades with porous material conditions. These two categories broadly correspond to the distinction between revitalised or well-maintained buildings and those that are under-maintained or abandoned, respectively. These contrasting conditions directly affect the degree of material porosity of the façades and also signal different levels of spatial and social porosity in their surroundings (summarised in Figure 6.1.).

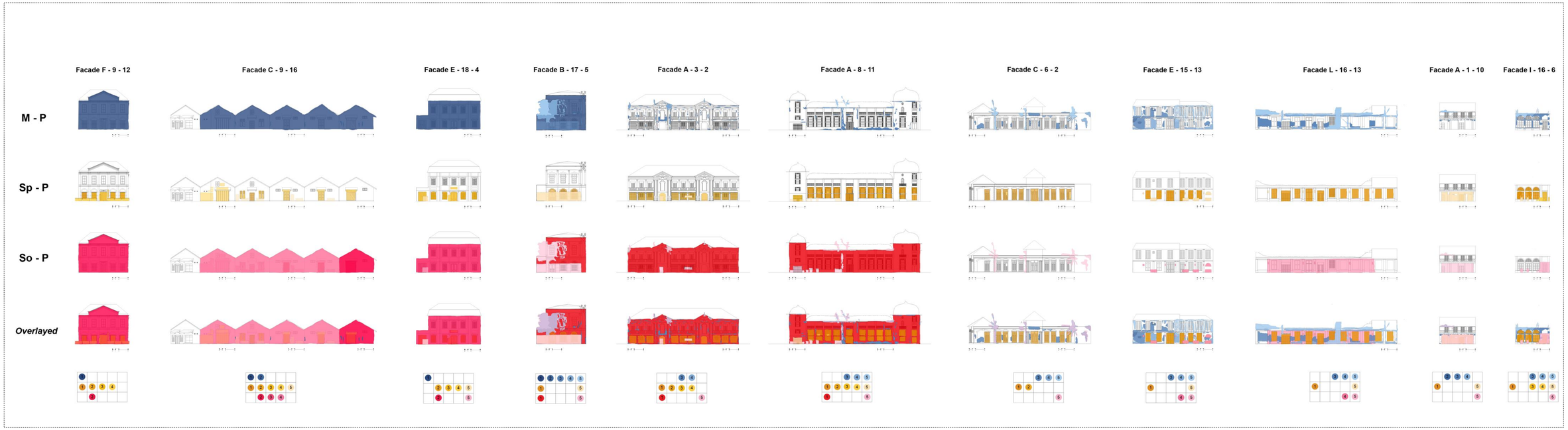


Figure 6.1. The façade mapping results in the tendencies of existence between the three porosities. The general tendency will be categorised into two groups: non-porous material conditions and porous material conditions. The non-porous material condition tends to coexist with porous spatial porosity, implying an active façade that connects the inside and outside, as well as social porosity, which implies public or semi-public access to the building. The porous material condition tends to coexist with less and most spatial porosity, implying no access to the inside, which suggests they are uninhabited. However, at the same time, they provide space for the informal to attach. They are usually abandoned, uninhabited, or under-maintained buildings in a state of decay.

Revitalisation, as defined by Indonesian heritage laws and practices, refers to the act of reviving or renewing heritage buildings that have decayed or been abandoned. This process involves both material restoration and, typically, the introduction of a new formal programme. Maintenance, by contrast, consists of preserving the existing condition of a building over time, typically in response to its ongoing use. Generally, an occupied building tends to be well-maintained, while an unoccupied one is more likely to fall into disrepair. Both revitalisation and maintenance interventions influence the building's material condition by restoring and stabilising it, typically aiming for an immaculate appearance. As a result, traces of time and environmental exposure are often removed or concealed, usually resulting in a white-painted façade.

In contrast, abandonment or neglect entails the withdrawal of human inhabitation and control. Such buildings are often protected by restricting or prohibiting access to prevent human-induced damage or illegal occupation. Nonetheless, these spaces are frequently perceived as claimable and are usually informally appropriated. Over time, they remain exposed to the elements and become inhabited by other organisms. The building materials begin to erode, decay, and disintegrate into ruin. Vegetation may take root and grow, gradually overtaking the structure—trees may start from the corners of façades and eventually cover entire plots.

This chapter examines the emerging patterns of interaction among material, spatial, and social porosities, specifically how these dimensions influence inhabitation and spatial practices surrounding façades. The identified tendencies can be summarised into three main categories of façade porosity: the

formal façade, the *claimable façade*, and the *claimable interior*. Each exhibits different combinations of the three porosity types, contributing in specific ways to patterns of inhabitation and spatial use.

6.2. The Formal Façade

The formal façade is characterised by a non-porous material condition, as indicated by its coloured index number combination. It represents façades involved in conventional revitalisation and maintenance practices. These façades typically belong to buildings that are either revitalised or well-maintained and therefore exhibit unblemished surfaces (1) and structurally sound conditions. They serve formal purposes, primarily associated with public-facing functions such as semi-public (2), community-based (3), or public (4) access. A minority of these façades also support informal inhabitation (5).

These façades feature active boundaries, with functioning windows and doors that allow for sensorial access (2) and physical entry (3). They also enable a degree of spatial extension, where interior inhabitation can spill into the exterior space (4), occasionally permitting additional attachments or modifications over time (5). Each façade's coloured porosity index number combination is unique, reflecting the specific practices surrounding it. Nonetheless, it can be concluded that the formal façade typically exhibits a porous boundary alongside formal social porosity.

6.2.1. The Spatial Porosity of the formal façade

The formal façade belongs to a revitalised or restored building whose material condition is immaculate. Once restored, the façade primarily functions to present the architectural image of the building and its associated brand to the exterior, while regulating the relationship between the interior and the exterior through its functioning doors and windows. Restoration is part of an adaptive reuse project (Plevoets & Cleempoel, 2019), itself a subset of architectural regeneration (Orbasli & Vellinga, 2020a), regardless of whether the intervention was carried out in full accordance with best practices. This leads to patterns of inhabitation that are mainly concentrated within the building's interior.

There is often a tendency to protect the building by preventing unwanted interactions or disturbances at the exterior surface and restricting access to the interior. However, the space immediately in front of the façade can be ambiguous—its status is uncertain, as it is either an extension of the building or part of the public realm, particularly when the façade directly fronts the street or pedestrian walkway without a setback. Several façade examples illustrate this condition.

The first is the Spiegel Building (C–3–4/17), which currently functions as a restaurant and bar on the ground floor, with a co-working space and event venue on the first floor—located along the main street, Jl. Letjen Soeprapto (Street 4), the building had previously been abandoned, with trees growing along its walls. A local entrepreneur, with an architectural background, later purchased it, and its revitalisation was completed in mid-2015. Owing to the owner's training as an architect, the restoration was conducted with attention to detail. The façade was meticulously maintained, and all traces of tree growth were removed. Today, it

appears as a white-painted heritage building, seemingly evoking an idealised past (see Figure 6.1), reflecting a restorative approach that seeks to return the building to a selected historical moment (Stone, 2020).

Figure 6.2. Old image of Spiegel (on the left) n.d., (Badan Pengelola Kawasan Kota Lama Semarang (BPK2L) - Semarang Old Town Management Board, 2021)

The interior is now one of the area's most popular destinations, where visitors can enjoy food and drinks while experiencing the designed interior and observing the lively street scenes of Semarang Old Town. From the inside, additional beams and columns are visible along the walls—inserted to reinforce the first-floor timber structure, which was initially supported only by iron columns, and these have been preserved. Some interior walls are left unfinished, retaining visible evidence of the building's prior state. These material decisions lend the interior a rustic character.

Figure 6.3. Contemporary view of the Spiegel Building

Another example is the Semarang Contemporary Art Gallery (E–13–17), one of the earliest revitalised buildings in the area, completed in 2008. Its owner, also a local architect, oversaw the revitalisation to ensure proper execution. This building, too, had been previously abandoned, with trees growing along its walls. It now serves as an art gallery, featuring predominantly white-

painted walls both inside and out. Visitors enter through a glass door into a small lobby area resembling a ticketing booth. Faux cracks and stickers of exposed brick have been applied to parts of the wall and façade, seemingly to simulate or recall the building's pre-revitalisation condition. Archival images of the building's previous state are also displayed in the lobby.

Figure 6.4. Semarang Contemporary Art Gallery exterior and interior spaces, 2022/2023

The interior has been completely revitalised for gallery use, with all walls converted into pristine white surfaces. This renovation has spatially and visually separated the interior from the exterior. While the façade features a series of large windows, these are not visible from inside, as most are obstructed by white partition walls necessary for the gallery display. Consequently, the windows remain closed and functionally obsolete, making the façade appear inactive, essentially a blank wall despite the presence of window openings. This may explain the emergence of informal parking spaces adjacent to the façade. Previously, around 2018, an antique market operated in this space before being relocated to the Semarang Creative Hub building.

Figure 6.5. Left Image: Antique Market after relocation to Semarang Creative Hub, 2022; Top Right Image: Antique Market before relocation in Jl. Taman Srigunting street, (GSV, 2018); Bottom Right Image: Jl. Taman Srigunting Street informal parking, 2022

Typical formal buildings usually undergo a relatively thorough revitalisation process, aiming to restore the material and structural conditions necessary to create habitable interior spaces. The façade of these buildings functions as an active architectural boundary, with operable doors allowing entrance and windows being utilised as needed, depending on the spatial configuration of the interior. These elements regulate access and help protect the interior environment. From the outside, the façade acts as an architectural image, particularly significant when the building is a heritage structure with a recognisable style. For example, Spiegel prominently features the word *'Spiegel'* on its façade, a name retained from the colonial period. Furthermore, the façade becomes a space of expression or identity, reflecting the building's interior function. It typically includes brand signage indicating what lies inside, open/closed signs on the entrance, and sometimes a special menu displayed near the doorway to attract customers.

Figure 6.6. Examples of signages on façades, 2022/2023

The façade is thus inhabited by the flow of people moving in and out through the door and the reciprocal gaze through the windows, except in cases such as the gallery, where interior wall space takes precedence. In some instances, the exterior façade or the space immediately adjacent to it, such as a terrace, is used as an extension of the interior. Examples include Starbucks (F–9–12) and the Bubble Tea Café in the Soesman Kantoor building (A(1)–20–6), both of which have outdoor seating. Starbucks features tables, chairs, and parasols, while the Soesman Kantoor café uses the terrace for similar purposes.

Figure 6.7. Left Image: Starbucks (F – 9 – 12); Right Image: the Bubble Tea Café in Soesman Kantoor building (A (1) – 20 – 6), 2022

The discussion above demonstrates how the formal façade performs its spatial porosity. First, it establishes the revitalised façade as an architectural image within the urban landscape. Second, it facilitates functional interior use while regulating access between the interior and exterior through operable apertures. Third, it provides a space for the extension of interior inhabitation into the exterior realm. These examples underscore the façade's role as a porous boundary.

6.2.2. The Social Porosity of the Formal Façade

Most heritage buildings with formal façades—typically revitalised structures—are privately owned by individuals, corporations, state-owned enterprises, or governmental bodies. Ownership determines the possibility and direction of revitalisation, influencing how the building is repurposed. In recent years, many buildings have been revitalised under a large-scale heritage initiative, with the dominant outcome being the addition of visitor functions such as cafés, restaurants, and bars. These functions generally offer semi-public access, requiring a commercial

transaction to enter the space. Moreover, such establishments tend to target middle- and upper-income groups.

Some buildings in Semarang Old Town are municipally managed. For instance, the Semarang Creative Hub (C–9–16)—a revitalised warehouse—is jointly operated by the municipal government and the Ministry of Tourism and Creative Economy. It hosts small businesses and previously accommodated the antique market formerly located in front of the Semarang Contemporary Art Gallery. The space is intended to support the small business and creative economy communities and is arguably more accessible to a broader socio-economic demographic.

Another example is the Monod Diephuis building (B–19–6), owned by local philanthropists and dedicated to community functions, such as *gamelan* (traditional Javanese musical instrument) practice for children.

Social porosity is not solely a function of a building's interior programme; it also concerns how façades support exterior spatial practices. Occasionally, the municipal authority appropriates the space adjacent to a heritage building's façade for street furniture, particularly benches. Placement of these benches usually occurs on the pedestrian walkway and depends on the width of the pavement and the condition of the façade. Benches are generally positioned in front of inactive façade sections—i.e., solid walls rather than doorways—although they may sometimes be placed in front of windows if those are not actively used.

In some cases, municipal authorities have appropriated the façade-adjacent spaces of revitalised buildings for public use. Two such buildings—Semarang Creative Hub (C–9–16) and Galeri Kreatif (D–15–4)—are managed in collaboration with

various government ministries. In front of Semarang Creative Hub, for example, the municipality has installed benches, potted plants, and handwashing stations (installed during the COVID-19 pandemic).

Figure 6.8. Left Image: Semarang Creative Hub (C–9–16); Right Image: Galeri Kreatif Building (D–15–4), 2022

A similar condition exists at the Galeri Kreatif Building, where benches and potted plants line the façade. These interventions suggest how municipal authorities perceive and manage such spaces. While the outer spaces in Semarang Old Town officially fall under municipal jurisdiction, the façade-adjacent zones remain ambiguous. However, since the municipality manages these two buildings, they appear more comfortable furnishing and regulating their façade spaces. This strategy may also serve to prevent undesirable uses, such as illegal parking, by establishing a kind of buffer zone between the street and the façade.

The façade spaces of revitalised buildings with visiting functions rarely host informal activities. Here, *'informal'* does not refer to municipally hosted small businesses (e.g., those operating within the Semarang Creative Hub or Galeri Kreatif), but to *informal spatial practices* such as unregulated street vending. For example, the antique market that once occupied Jl. Taman Srigunting (Street 17), in front of the Semarang Contemporary Art Gallery, operated informally by setting up tents and creating a

temporary street market. Today, these vendors have been incorporated into formal interior stalls within revitalised buildings. Thus, their previously informal spatial practices have been formalised. In contrast, street vending and other unregulated activities are what remain excluded from the façades of revitalised buildings.

One example is the Wesskamer building (E–18–4), whose façade originally featured a gateway for vehicle access to the rear parking area. During the day, a drink seller occasionally sets up a cart with a parasol in front of this gate. The half-closed gate, combined with the presence of a city electricity box, creates a sheltered corner where the cart can be stationed. Buildings with parking facilities often also have a *tukang parkir*—an informal parking attendant—who helps regulate such use. In this case, the cart seller's ability to remain in the space depends on a temporary, informal agreement with the parking attendant. This arrangement is neither daily nor permanent, although this particular cart has become a familiar presence.

Figure 6.9. Left Image: Wesskamer building (E – 18 – 4); Right Image: Indomart (B – 18 – 4), 2022

Such scenes are uncommon in revitalised buildings with semi-public visiting functions such as cafés, restaurants, or event venues, which often cater to the middle or upper classes. These

establishments typically employ security personnel—or, at the very least, informal parking attendants—who discourage unauthorised uses of the façade or adjacent space.

In contrast, public-facing establishments like the Indomaret convenience store (B–18–4) tend to tolerate informal economic activity outside their façades. This tolerance fosters informal gathering spaces that attract other mobile vendors. Even the parking attendant may permit such informal traders to remain nearby, albeit temporarily.

This dynamic reveals that many façades in the area represent a kind of ‘‘paywall’’—where access to interior spaces, and even the right to linger nearby, often depends on a financial transaction. These venues remain technically public, but are skewed toward consumers with higher disposable incomes. Such patterns are characteristic of revitalised heritage buildings, which require substantial investment and are often treated as commercial assets. These tendencies reflect the early stages of gentrification, even though informal practices continue to persist. After revitalisation, informal uses like street vending tend to become less permanent, more mobile, and more dependent on either the leniency of building staff or informal agreements with attendants. Façades may still serve as temporary stopping points, but only when such activities are tolerated.

6.3. The Claimable Façade

Whereas formal façades primarily exhibit porosity on the spatial level and support formal social inhabitation, the *claimable façade* expresses porosity at the material level and supports informal social inhabitation. The term *claimable façade* implies both inactivity and potential. It suggests dormancy—often due to a

building's uninhabited status—but also the possibility for active appropriation of the façade's thickness or its adjacent space by people or by nature. Informal inhabitation in this context includes street vending, squatting, or the spontaneous growth of plants on the façade.

These façades typically belong to uninhabited buildings or to inhabited buildings whose façades are inactive, such as a side or rear façade not used for access. The material condition reflects the building's occupancy: uninhabited structures often exhibit signs of decay, such as stains, erosion, and plant overgrowth, whereas inhabited ones are usually maintained, albeit modestly. These façades typically lack operable doors or windows and are disconnected from the building interior.

This section examines how material, spatial, and social porosities intersect to facilitate spatial production and informal inhabitation around claimable façades. It discusses both human claims through informal practices and nature's claims through biological processes. Before this, it introduces the shophouse typology found in the area.

6.3.1. Shophouses

Shophouses are two-storey buildings with ground floors dedicated to business and upper floors for domestic living. They are usually family-owned and operate small, often informal companies, such as *angkringans* or *warungs*. The material condition of their façades is typically dull or decaying, and the façade space is frequently used as an extension of business activity. This informal, mixed-use nature makes shophouses more relevant to the claimable façade category than the formal one.

Façade mapping indicates that shophouses tend to exhibit porous material conditions, characterised by stained (2), eroded (3), and sometimes by small plants growing (4). They are formally inhabited (1), but their business activities fall under the informal economy (5). The façades actively support these uses: the ground floor façades are accessible (3) and extend into outdoor spaces (4).

The first example is *Angkringan Garuda* (C–3). This shophouse hosts a family business—an *angkringan*—on the ground floor. *Angkringan* are informal food stalls that range from mobile carts to semi-permanent setups, typically serving snacks (*gorengan*), instant noodles, and drinks like instant coffee and tea. They foster social interaction in a casual, traditional environment, much like a café.

Figure 6.10. Angkringan Garuda (C–3), 2022

Angkringan Garuda is situated across from Taman Garuda, a small public park. The building is in a somewhat dull condition, with faded paint, missing architectural features (such as the triangular façade ornaments), and some overgrowth. These elements reflect the building's age and lack of formal restoration.

The façade itself comprises a first-floor wall with windows, sometimes used to dry laundry, and a TV antenna, indicating domestic use. A staircase provides access to the upper floor. A banner under the triangular feature advertises the *angkringan*, listing menu items. Beneath the banner is a display table for food and bottled drinks, alongside sachet drink packets on display. While part of the façade is open for business, a revolving door on the left leads to a private interior space. Because the building faces a public park rather than a street, the exterior area is also used for placing tables and chairs.

The location, next to a park with benches and a popular weekend aerobics class, offers excellent visibility and foot traffic. The *angkringan*'s affordable menu makes it accessible to a broad public.

The second example is *Rumah Cendrawasih* (A–13–18). This building, in a more advanced state of decay, presents another variation of the shophouse typology. The façade features a balcony where laundry is hung, allowing domestic life to be visible. A staircase leads to the upper floor.

Figure 6.11. Rumah Cendrawasih (A–13–18), 2022

On the ground floor, weathered banners hang between metal columns—one reads "*Angkringan Bu Is*," another shows a cup symbolising drinks. Beneath them are carts and tables that appear unused at times, suggesting a failed or dormant business. These traces reflect the family's entrepreneurial efforts, even if not sustained.

Interestingly, this house also serves as a distribution point for *telor gulung*—an egg-based snack commonly sold by mobile vendors around Semarang Old Town. The family does not produce the food; instead, it buys it wholesale and supplies local sellers.

These examples illustrate how shophouse façades function as spaces of everyday heritage (Giombini, 2020; Mosler, 2019). The

façades, although weathered and partially decayed, are maintained within the owners' financial capacity. They reveal a layering of domestic life above and informal economic activity below. As such, the façade becomes a surface of identity, reflecting the inhabitation within and projecting it outward into the heritage landscape.

The ground floor facilitates entry or activity spillover, reinforcing the façade as a threshold space, where private life intersects with public space through affordable, everyday practices. In this way, the heritage building is not just a structure to be preserved but a home, where daily life continues to unfold.

6.3.2. Claimed by the Informal Practices

This section focuses on the informal inhabitation that continues to exist in Semarang Old Town following revitalisation efforts. These forms of inhabitation range from economic activity in the informal sector to uses that could be considered illegal. Such activities typically attach themselves to *claimable façades*—spaces that are usually part of uninhabited buildings.

According to the façade porosity mapping, these façades exhibit a range of material conditions, but none are pristine. They are stained (2), eroded (3), and often pierced (4) or penetrated (5) by vegetation. Most of the buildings are uninhabited, although some are occupied for use as private offices (1). Their façades are inactive (1), with non-functional doors and windows and no access to the interior. Nevertheless, they are *claimable*, allowing for informal inhabitation (5). These informal practices vary widely, from street vending to informal domestic occupation, and are illustrated through the following examples.

The first example is Kedai Yu Tik (A–1–10). *Kedai Yu Tik* is a small food and beverage stall that inhabits the façade and terrace of an uninhabited house on Jl. Meliwis (Street 10). Initially perceived as an opportunistic occupation of a vacant space, it was later discovered that the arrangement was made with the owner's consent. The owner allowed the stall to operate in front of the house in exchange for informal surveillance and protection, especially to guard the building's high-value teak wood (*kayu jati*). With no immediate plans to occupy or restore the property, the owner preferred a human presence as a deterrent against looting.

Figure 6.12. Kedai Yu Tik (A – 1 – 10), 2022

The façade includes a covered terrace about one metre deep, supported by columns. Beyond the columns lies the pedestrian walkway and street. *Kedai Yu Tik* occupies two-thirds of the terrace; an unrelated informal dwelling inhabits the remaining third. These two occupants exhibit distinct spatial and material

practices. The dwelling uses corrugated metal to create semi-permanent walls and a door, forming a private, enclosed space. In contrast, the *kedai* uses a tarpaulin tent to demarcate its boundary, creating a more flexible structure.

Figure 6.13. 3D scan plan of Kedai Yu Tik, illustrating the layer of spaces from façade to the street, 2022/2023

The *kedai* consists of a stall for food display, tables placed both on the terrace and partly into the pedestrian space, and a semi-permanent corrugated enclosure used as a kitchen. Tarpaulin rolls are hung across the stall to enclose it when closed or extend its spatial use during operating hours. Materials such as nails are used to affix the stall's structure directly to the façade.

The façade itself is inactive: the door and windows are locked and covered by a large banner, effectively severing any visual or spatial relationship with the interior. The terrace becomes a stage for the *kedai* during breakfast and lunch hours, typically serving local workers and residents from the surrounding area.

Historically, many such informal establishments lined Jl. Meliwis (Street 10) and Jl. Kepodang (Street 6). However, most were removed during revitalisation. A few uninhabited façades continue to show active or residual traces of informal inhabitation, such as a drink seller in front of the *Ex-Indische Lloyd Building* (D–15–16) or a small food stall (warung) at the *Ex-PT Perkebunan Building* (I–15–8).

The second example is Nasi Koyor Warung at Marba Building (B–17–5). Although the building functions as an office, the façade facing Jl. Gelatik (Street 5) is not accessible. This façade has long hosted a semi-permanent *warung* selling *nasi goreng*, a traditional local dish. The stall has been operating there for nearly 50 years, becoming a well-known fixture in the area's informal culinary landscape. Interestingly, the warung survived the revitalisation of the area and now features signage sponsored by a cigarette company, giving it a semi-legitimised status.

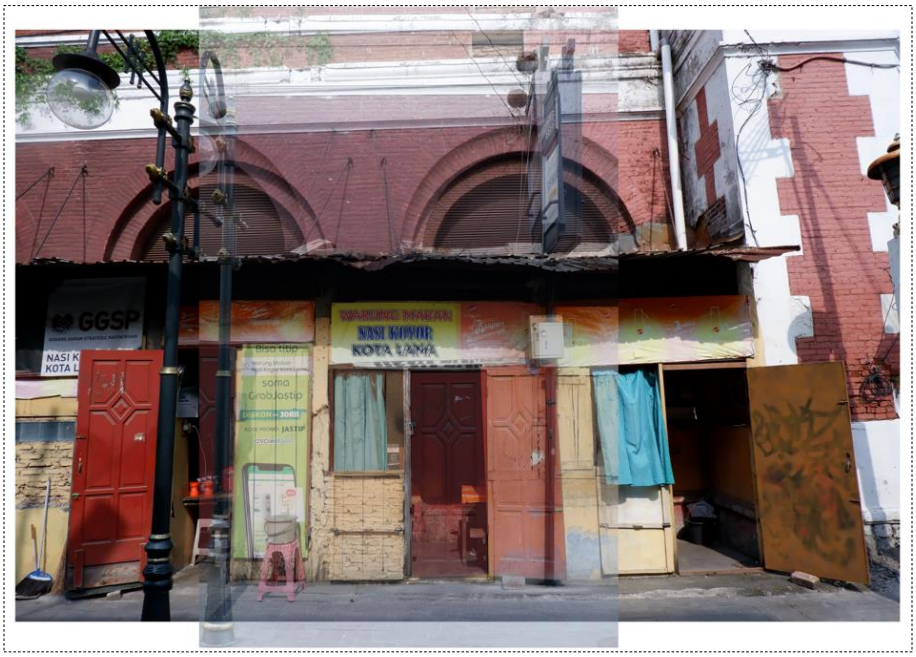


Figure 6.14. Nasi Koyor at Marba Building (B–17–5), 2022

The warung includes a brick wall, a corrugated metal roof, and a façade-side door and window. The roof structure is attached to the building's façade. The façade space, once a passive exterior, is now considered part of the stall's interior. The window ledge is used for storage or cooking, and the layout of the stall follows the composition of the façade. In effect, this *warung* has claimed both the façade surface and the adjacent space, transforming it into an integrated spatial envelope.

Figure 6.15. 3D scan plan of Nasi Koyor, showing how the warung inhabit the threshold spaces between façade and pedestrian, 2022/2023

Beyond commercial activities, informal domestic uses are also found along claimable façades. For example, the Rumah Deret Meliwis (A–7–10) on Jl. Meliwis is a row of uninhabited terraced houses in a visibly decaying state. Residents use the covered terraces of these houses to sell garbage. Additionally, neighbours frequently use these terraces to dry laundry, especially since municipal regulations prohibit laundry racks on the pedestrian path. Ropes are tied to columns to create makeshift drying lines, turning the façade into an informal domestic support space.

Figure 6.16. Rumah Deret Meliwis (A – 7 – 10), 2022

Traces of domestic inhabitation are not confined to recognised residences. In Semarang Old Town, laundry scenes and other domestic activities were observed on façades, extending towards the street. Although the inhabitants themselves were not visible during daytime fieldwork, the material traces they left suggested their presence. Two key examples were documented during field observations in 2022.

The first was located on Jl. Cendrawasih I (Street 19), where the façade of an uninhabited heritage house (B–13–19) displayed

clear signs of domestic use: laundry was hanging, and various household items—bed frames, stoves, buckets, and tarpaulin rolls—were visible along the façade.

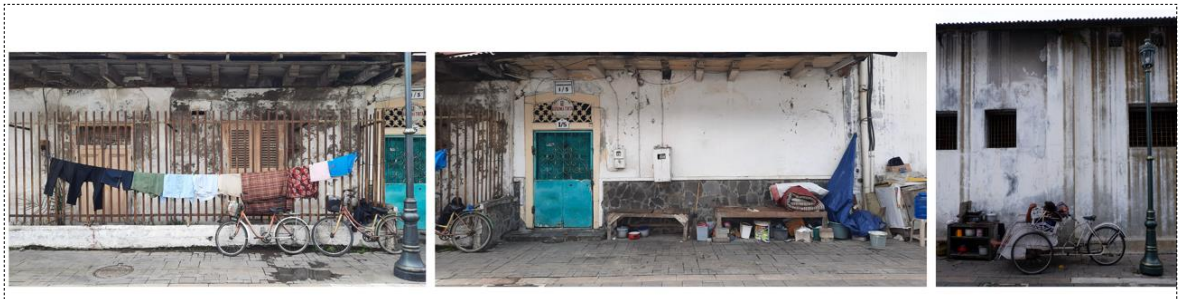


Figure 6.17. Domestic traces in Jl. Cendrawasih I (street 19), 2022

The second example comes from Jl. Garuda (Street 14), in front of the façade of a ruinous, uninhabited house (B–2–14). A public well situated in front of the building is a known water source for former informal settlements in the area. *Tukang becak* (pedicab drivers), many of whom travel from nearby towns to work during the week, also use the well. These drivers often sleep in their pedicabs along the street and return home on weekends. During their stay, they use the well to wash, and some have even been observed entering the abandoned house through a window to change clothes. While technically an act of trespassing, this behaviour is widely understood within the community and appears to be tacitly tolerated, owing to the building's derelict condition.

Figure 6.18. Scene in Garuda Street (Street 14), 2022

These observations illustrate the informal spatial practices that emerge around claimable façades. Such façades are typically inactive, either because the building is uninhabited or because the particular façade is not used for access. As a result, they often lack regular maintenance and become materially porous, showing stains, erosion, and sometimes vegetation growth. Façade-adjacent spaces—whether a terrace or simply a threshold—offer potential for appropriation, from hanging laundry to setting up a stall or even building semi-permanent enclosures. These façades serve as initial contact zones for informal inhabitation, where the occupation expands outwards from the wall surface into the public realm.

This mode of inhabitation often negates the interior—the façade does not offer entry into the building but instead becomes a site of attachment and extension. It reveals a kind of spatial thickness of the façade, encroaching on public pathways or street edges. These informal interventions typically involve self-built structures constructed from materials such as corrugated metal, tarpaulin, or reclaimed wood.

Such façades reflect the continued presence of working-class and lower-income communities, whose spatial practices cater to and reproduce a parallel urban condition, less formalised but embedded in the everyday life of Semarang Old Town.

6.3.3. Claimed by nature

In addition to informal human inhabitation, some façades in Semarang Old Town have been claimed by nature, especially in the case of ruinous heritage buildings. These façades are often dominated by vegetation growth, ranging from small plants in

cracks to entire trees growing on or through the structure. This could be considered a form of unplanned inhabitation (5). While these façades no longer serve their original architectural function—providing access (1)—some still support urban uses, such as the placement of street furniture in the space adjacent to the façade. In these cases, the ruins act as urban backdrops, inadvertently creating public space (4).

An aerial analysis of Semarang Old Town reveals patterns in the presence and evolution of green spaces. These include intentional green belts along roads, formal parks, and informal vegetation in abandoned lots or decaying buildings.

Figure 6.19. Green spaces maps drawn by tracing Google Earth timestamps 2003 and 2022

In 2003, the most significant green space (besides Taman Srigunting (X–11), the central park adjacent to the church) was what is now the Metro Point parking lot (Z–14). At that time, it was an empty, overgrown plot. Other notable green sites included the Ex-Kodam Building (C–6–3), which had a formal garden, and Rumah Akar (L–16–13), already showing signs of arboreal colonisation at roof level.

By 2022, the Metro Point space had been developed into a car park, thus removing a significant green area. However, new vegetation appeared in blocks 1, 2, 5, and 7—mainly in gaps between buildings or on derelict plots. The Ex-Kodam Building, now largely overgrown with vegetation, had trees growing directly out of its façade.

Such scenes project a ruinous aesthetic often associated with neglect and urban decay. For many residents, these places carry a negative perception, becoming zones people avoid, especially at night. The Ex-Kodam Building, for instance, was once a well-known site for informal prostitution, accessed through the broken façade. The 2017 revitalisation programme essentially cleared these activities, but the building remained in a state of ruin.

Figure 6.20. Ex Kodam Building (C – 6 – 3) exterior and interior spaces, 2022

In 2024, a major restaurant group began the revitalisation of the Ex-Kodam Building, aiming to convert it into a branded venue. Aerial views from that year show that much of the overgrowth has been removed and that the building is under active restoration.

Figure 6.21. Ex-Kodam Building under revitalisation (GSV, 2024)

This transformation highlights the ongoing tension between ruination and revitalisation, informality and redevelopment. As façades are claimed by humans or by nature, they participate in

the layered, contested life of Semarang Old Town. These cases serve as material evidence of porosity, not only in physical terms but also in their social and ecological entanglements.

The next significant green space visible from the aerial view is Rumah Akar (L–16–13). What may have begun as limited vegetative growth on this building has since extended to engulf three adjacent buildings, reaching as far as the Barong Building (I–16–6) (Figure below).

Figure 6.22. Three building plots in Jalan Kepodang (street 6), the one on the left is the Rumah Akar, 2022

One of the dominant trees growing on Rumah Akar is a banyan tree, whose interlaced roots and branches weave through the façade wall and windows, anchoring themselves to the façade surface. Other trees replicate this pattern—attaching, cracking, and penetrating the masonry. Their roots create fissures, exposing the porous bricks and inviting moss, which further softens the surface and accelerates the process of vegetal colonisation. The exposed bricks, in turn, invite birds to perch, creating an ecological micro-environment.

Figure 6.23. Rumah Akar and nature, 2022

This scene is sublime: the slow “death” of the façade and the simultaneous thriving of the tree co-exist in a powerful visual and spatial merger, from the narrow lane of Jl. Roda II (Street 13)—itself bordered by the uninhabited façade of the Ex-Indische Lloyd Building (E–15–13)—the perspective is intimate, even visceral. The closeness to the wall, shrouded in vegetation, evokes both awe and a sense of fear of collapse. The tree canopy shades the lane, creating a cool, breezy microclimate—this section of Jl. Roda II offers one of the most atmospheric and emotionally charged experiences in Semarang Old Town.

Figure 6.24. Scene in Jalan Roda II (Street 13), 2022

This unique urban condition has been acknowledged by the municipality, which has installed benches, wall-mounted lights, and waste bins in the space, thereby creating a semi-formal public realm in front of the building. However, due to the unclear ownership status of Rumah Akar, the municipality cannot undertake formal revitalisation. Occasionally, barriers are placed around the trees to prevent visitors from climbing them or getting too close, suggesting both concern for safety and a recognition of the façade's fragility.

Figure 6.25. A line sometimes placed in front of Rumah Akar to give distance and prevent direct contact to the wall while the façade is assessed, 2022/2023

Local tour guide groups have also embraced Rumah Akar, dedicating online resources to it and placing a pin on Google Maps. These groups have created a digital archive of the building, composed of photographs, visitor comments, and conservation messages. They act as de facto stewards of the

site, encouraging respectful behaviour and expressing appreciation for visitors. This grassroots form of conservation highlights the community's role in heritage advocacy.

The scene at Rumah Akar demonstrates how architecture becomes interlaced with nature—a state evocative of Simmel's (1959) notion of "nature's revenge" and the romantic aesthetics of ruin. The porous façade, no longer maintained by human hands, becomes substrate and support for vegetation. As the trees grow within and around it, the façade is inhabited in its thickness—colonised from both the inside and outside. In this state, the façade loses its architectural role as a boundary, no longer regulating access or enclosing space, and instead becomes a sculptural object, a surface for admiration.

Yet, this admiration arises only when nature's aesthetic presence dominates, as in the case of Rumah Akar. By contrast, the Ex-Kodam Building, similarly overgrown, projected a more negative social image, formerly associated with danger and illicit activities. The contrasting perceptions of these two sites suggest that the social effects of ruin are mediated not only by material condition but also by ownership status, aesthetic legibility, and community framing.

The presence of plants growing on heritage walls raises a persistent dilemma: should we prioritise the protection of built heritage fabric or urban biodiversity (Celesti-Grapow & Ricotta, 2021)? In the case of Rumah Akar, the building itself may not be one of the most iconic heritage structures in Semarang Old Town. It holds historical value as part of the ensemble, but not as an architectural landmark. Ironically, it is the tree growing through the façade that has transformed the building into an iconic image. This condition highlights the potential for recognising heritage as ecological and the role of vegetation in placemaking within the

urban heritage context. Rather than being seen solely as a threat to material integrity, plant life might also be viewed as a co-author of urban identity. The case of Rumah Akar challenges the traditional binary between preservation and degradation, suggesting an alternative reading of porosity as a medium of cohabitation between nature, history, and community.

6.4. The Claimable Interior

Building on the previous discussion about façades and plots being overtaken by nature, this section examines cases where informal human practices have appropriated the interiors of ruinous buildings in Semarang Old Town. This is the realm of the claimable interior: interior spaces that are open to informal inhabitation (5). These buildings tend to have façades in various states of decay—stained (2), eroded (3), pierced (4), and penetrated (5) by vegetation. Most are uninhabited, although some serve as offices, which classifies them as private (1). The façades are often partially active (1), with a mix of functional doors (3) and both operable and inoperable windows (2). These façades also allow for spatial extension from the interior (4) and external attachments (5).

Two examples—Suara Merdeka (A–3–2) and Djakarta Lloyd's (A–8–11)—illustrate claimable interiors within occupied office buildings. Both host informal food establishments (such as *angkringan* or *warung*) inside enclosed spaces behind the façade. These interior setups are made available by the property owners and are in place with their permission. As such, their conditions reflect the overall condition of the buildings. For instance, Suara Merdeka underwent revitalisation in late 2022, which included refreshing the branding and spatial arrangement of the attached *angkringan*.

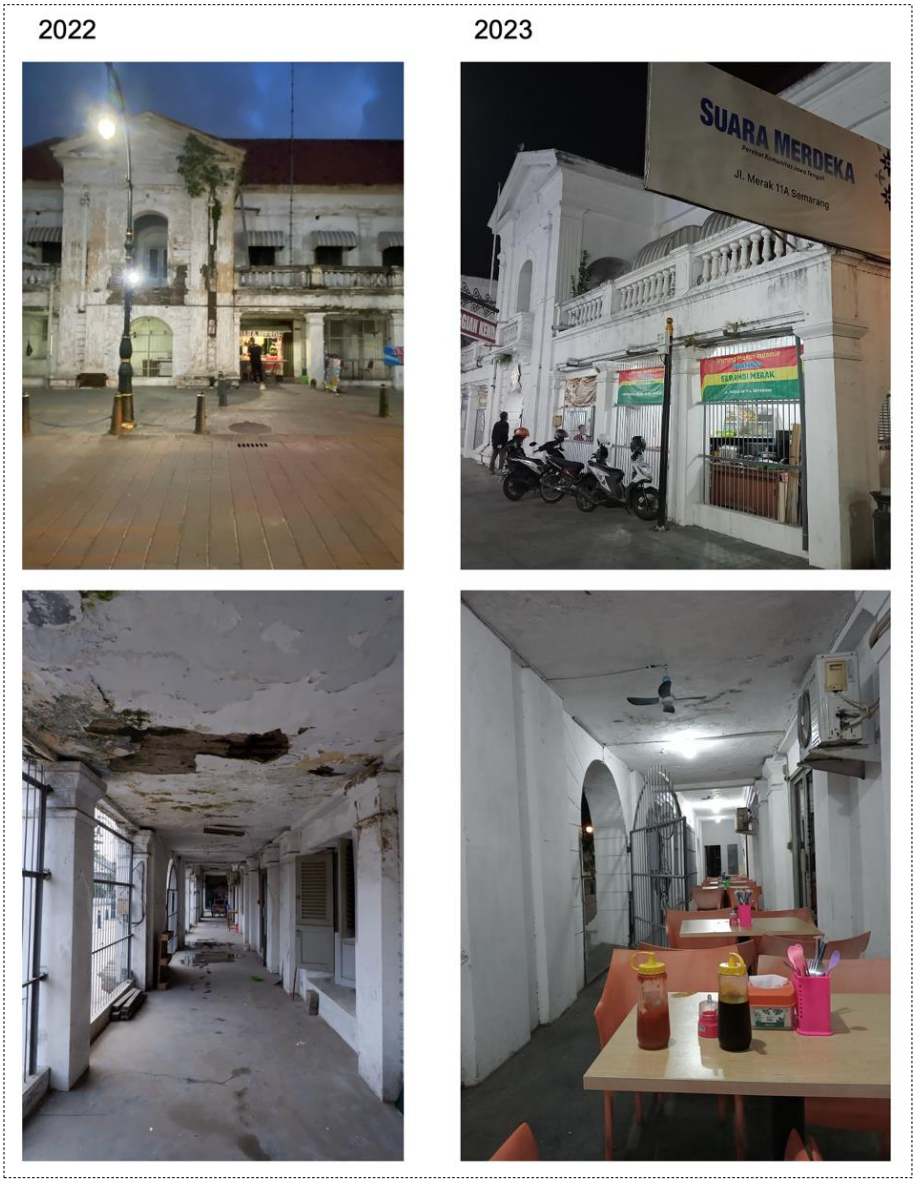


Figure 6.26. Suara Merdeka Building and its angkringan in 2022 and 2023

More complex examples of claimable interiors can be found in uninhabited or partially derelict buildings, such as the Barong Building (I–16–6) and Soesman Kantoor (A(3)–20–6).

The Barong Building is abandoned, with its façade exhibiting advanced decay and overgrown vegetation. Before the 2017 revitalisation, a street vendor operated outside the building. After street vending was prohibited as part of revitalisation policies, this vendor received permission from BPK2L (the Semarang Old

Town Management Board) to move their operation inside the building. Today, the space is home to Warung Makan Sederhana—a modest eatery. The vendor does not pay rent, and the electricity bill is covered by a local philanthropist, who also owns the Monod Diephuis Building (B–19–6), known for its community-oriented uses such as *gamelan* practice for children.

Previously operating in tents on the street, the vendor now appropriates the derelict staircase space of the building. Makeshift improvements include corrugated metal sheets as roofing, tarpaulin for wall partitions, and electrical lighting. As the building has lost its upper storey, the stair void must be enclosed to prevent rainwater intrusion. The staircase spatially organises the warung, with the food counter beneath and the dining area beside it.

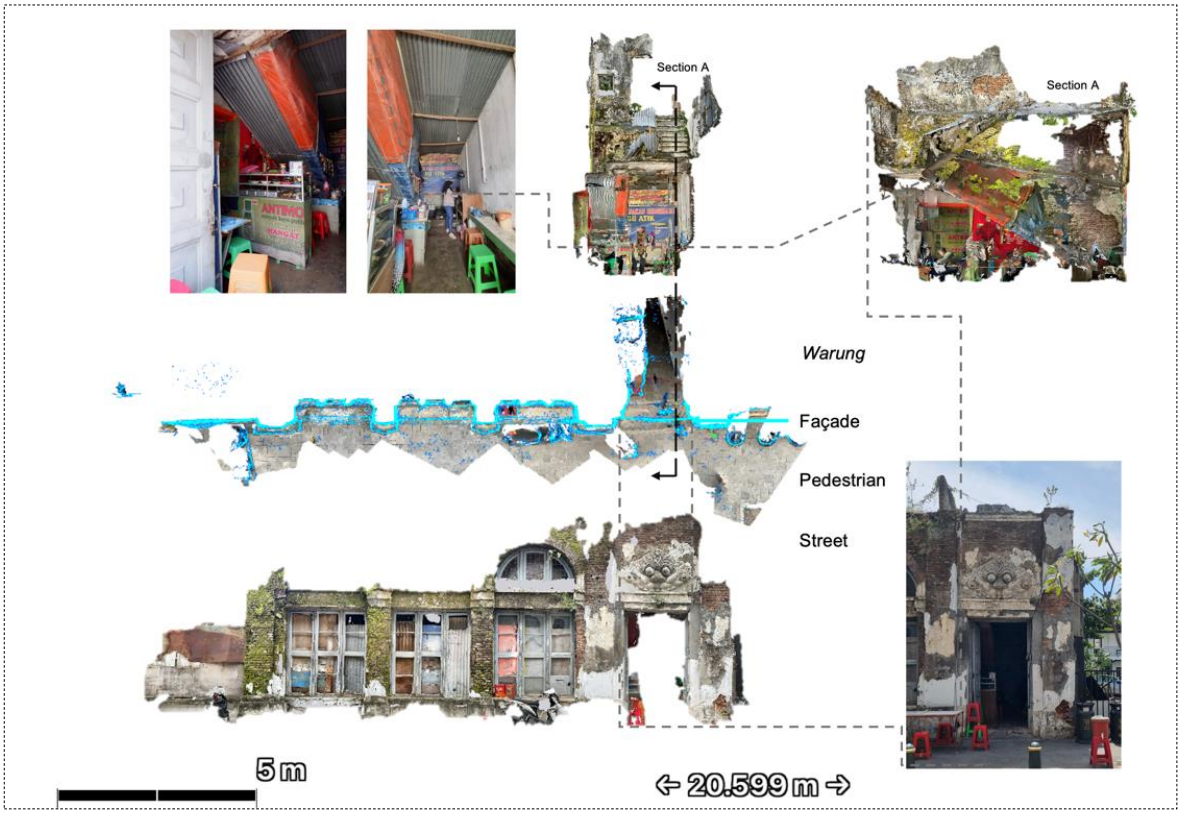


Figure 6.27. 3D scan plan and section of Warung Barong, showing the material condition, layer of spaces, and decay appropriation, 2022

In 2023, a portion of the Barong Building façade began to collapse. The municipality intervened by installing H-beams to prevent further deterioration. However, without identifying the legal owner, the city cannot initiate a complete revitalisation.

Figure 6.28. Metal H beam insertion for structural support in Barong Building's façade, 2023

A similar case exists at Soesman Kantoor, a large building with multiple owners and divided conditions. Approximately three-fifths of the building has been revitalised, hosting a bubble tea café and event venue as of 2022. A middle section, about one-fifth, has been revitalised but remains unused. The final segment, in a state of decay, is occupied by Angkringan 1866, named after the year inscribed on the building's façade.

The owner of this *angkringan* previously operated as a mobile street vendor, pushing a cart through Semarang Old Town. Later, he was granted informal guardianship of the building and was allowed to set up his business within it. The building owner, with no immediate plans for revitalisation, permits the *angkringan* to remain.

Figure 6.29. The three parts of Soesman Kantoor, 2022

Angkringan 1866 operates from late morning into the night. During operating hours, the vendor inhabits the terrace as the central gathering space, furnishing it with tables, chairs, and mats. The window functions as a display shelf for sachet drinks, while a refrigerator is brought out during service hours and stored inside when not in use. An electrical plug runs through the window, powering mobile devices and a speaker for evening karaoke.

While most customer activities take place on the terrace (front region), the kitchen operates in the interior (back region). This

pattern mirrors Erving Goffman's (1956) concept of spatial role distinction in everyday life. On some evenings, a mat is laid out across the street, transforming the terrace into a karaoke stage, creating a vibrant, community-driven public space.

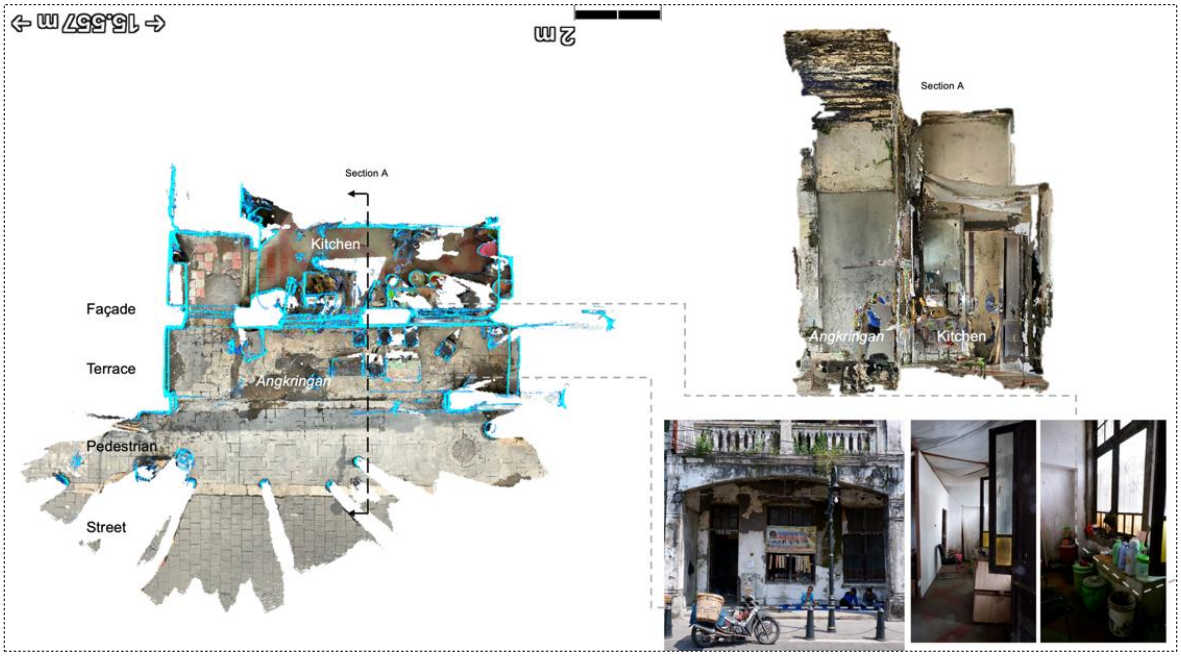


Figure 6.30. 3D scan plan and section of Angkringan 1866 in Soesman Kantoor, showing the layer of spaces, from interior, facade, terrace, pedestrian, and the street, 2022

These examples illustrate how ruinous interiors become spaces of informal adaptation. Whether as a result of formal agreements or informal negotiation, such spaces are reactivated through low-resource, self-constructed inhabitation. The interiors are not merely voids but become sheltered extensions of public life, with façades offering minimal spatial or regulatory barriers.
Claimable interiors demonstrate porosity at multiple levels: structurally, through material decay and spatial openness; and socially, through informal agreements, community support, and creative use. These practices are embedded in the complex ecology of Semarang Old Town's heritage, where ownership ambiguity, economic necessity, and communal ties all shape spatial production.

Figure 6.31. Angkringan 1866 in the evening hosts a karaoke, 2022

The condition of these buildings—specifically their decaying state—plays a key role in shaping the inhabitation of their interiors. Incomplete roofing renders interior spaces partially or entirely uninhabitable without intervention. As in the Barong Building, the *angkringan* at Soesman Kantoor must adapt to environmental challenges, mainly rain. A tarpaulin tent is used within the building, and a roll of tarpaulin is kept ready to cover the terrace. On rainy days, customers sometimes retreat inside. Access to the interior is subtly signposted; a “Toilet” sign with an arrow invites the public to use the functional indoor facility.

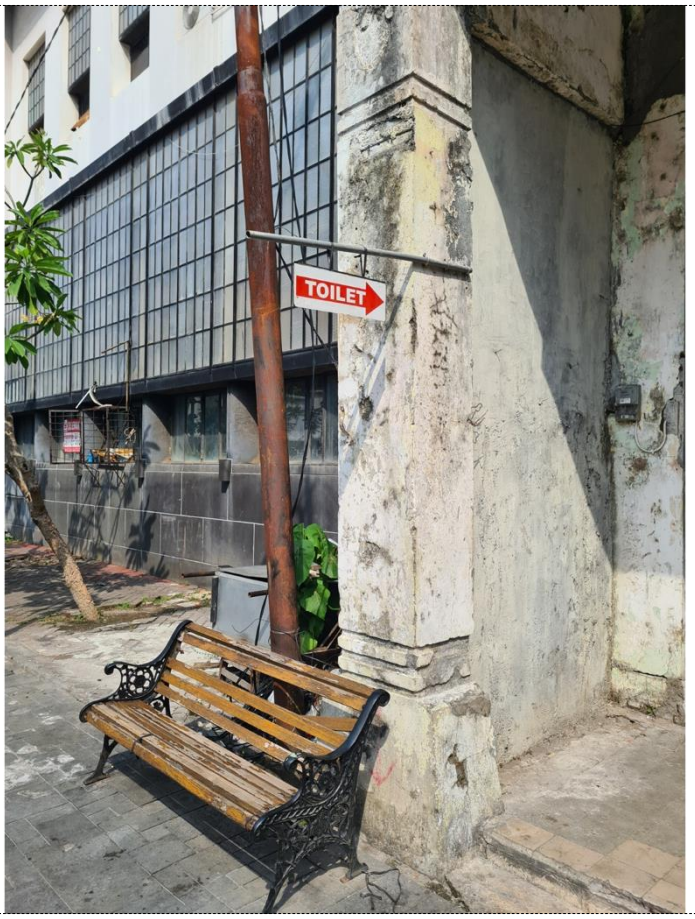


Figure 6.32. Toilet sign on Angkringan 1866's facade, 2023

As with the *warung* in the Barong Building, the *angkringan* at Soesman Kantoor does not pay rent. Utility bills are covered by the same local philanthropist mentioned earlier, who supports informal uses of vacant heritage buildings as a strategy of passive guardianship. Their presence prevents looting or squatting. The clientele includes local office workers, bank employees, motorbike ride-hailing drivers (*ojek online*), and motorcycle enthusiast groups, whose stickers can be found on the fridge.

These decaying façades, rich in moss, mould, and vegetation, starkly contrast with the nearby white-painted, revitalised buildings. They define both exterior and interior spaces in a continuous thickness, inhabited and extended in both directions—outward via product displays and community seating,

inward via informal service areas. These spaces support working-class and lower-working-class patrons, not only for meals but as gathering spaces and destinations for community engagement.

This scene resonates with the idea of “inhabiting decay”, as explored in Sandler’s (2016) concept of counterpreservation. In Berlin, counterpreservation serves as a form of resistance to gentrification, an intentional embrace of decay by politically conscious, often artist-led communities. In Semarang, however, decay is not a strategy but a contingency—the by-product of abandonment and disinvestment. And yet, it offers refuge to informal practices that were otherwise displaced by revitalisation. While these forms of inhabitation remain informal, and often permitted but not legalised, they survive as responses to the spatial and economic exclusions of the formal city.

This contrasts with relocated practices, such as the antique market, which was formalised by the municipality under institutional management. In contrast, the continued existence of *warung* and *angkringan* within derelict buildings is precarious, contingent upon ownership status and revitalisation plans. Once revitalised, these informal uses are usually replaced by formal programmes.

6.5. Conclusion

Porosity in the context of urban heritage begins with material observations—traces left by human intention or its absence. Whether a building is inhabited or uninhabited, whether it is maintained or abandoned, directly impacts its physical state. A recently revitalised building appears pristine; an uninhabited one decays, collapses, and is overtaken by nature.

The 2017 revitalisation project set a new norm for material and spatial intervention: formalised building restoration combined with public realm improvements, such as pavements, drainage, and street furniture. This revitalisation tends to exclude informal inhabitation, displacing unregulated vendors and practices. Many buildings have been revitalised for commercial use, including cafés, restaurants, galleries, and rental venues. A smaller number accommodate small businesses or community spaces, sometimes incorporating formerly informal practices into a formal structure.

This process is mainly top-down, focused on the formalisation of space. Yet, a key variable remains: ownership status. Heritage buildings with unclear ownership or limited investment capacity often stay in a state of decay. Some are listed for sale, while others remain dormant. The municipality, through BPK2L, continues to locate owners and encourage revitalisation, but ultimately, the building's fate rests with its legal custodian.

These underutilised structures constitute porous urban voids—at once development potentials and sites of informal appropriation by human and non-human actors. Their façades reveal their condition: a “for sale” sign, a tree growing through a wall, or the presence of a tent or banner marks the building’s functional or dormant state.

This study has analysed porosity through urban and façade mapping, addressing material, spatial, and social dimensions. These were categorised into three types of façades:

1. Formal Façades – revitalised and materially non-porous, with active spatial porosity regulating the connection between interior and exterior. These façades front commercial

interiors and may support municipal programming in adjacent public space.

2. Claimable Façades – decaying and materially porous, with inactive boundaries, but offering inhabitable surface thickness and adjacent space for informal practices and vegetal growth.

3. Claimable Interiors – materially decaying yet spatially open façades allowing access to derelict interiors, informally inhabited by food vendors and local communities, sometimes extending back into the street.

This typology reveals how façade porosity contributes to diverse spatial practices involving both human and non-human inhabitation. The façade acts not merely as a boundary but as a thickened, inhabited membrane—regulating, enabling, or resisting access, occupation, and transformation.
These findings uncover how various actors—from municipal bodies to street vendors, from vegetation to philanthropists—engage the façade as a porous site. Porosity becomes not just a material condition, but a social and ecological dynamic, shaping the lived and unlived realities of Semarang Old Town.
While revitalisation has addressed much-needed infrastructure and reduced criminal activity, it has also resulted in social cleansing, removing long-established informal uses—the current model, driven by profitability, risks accelerating gentrification and erasing valuable everyday practices.

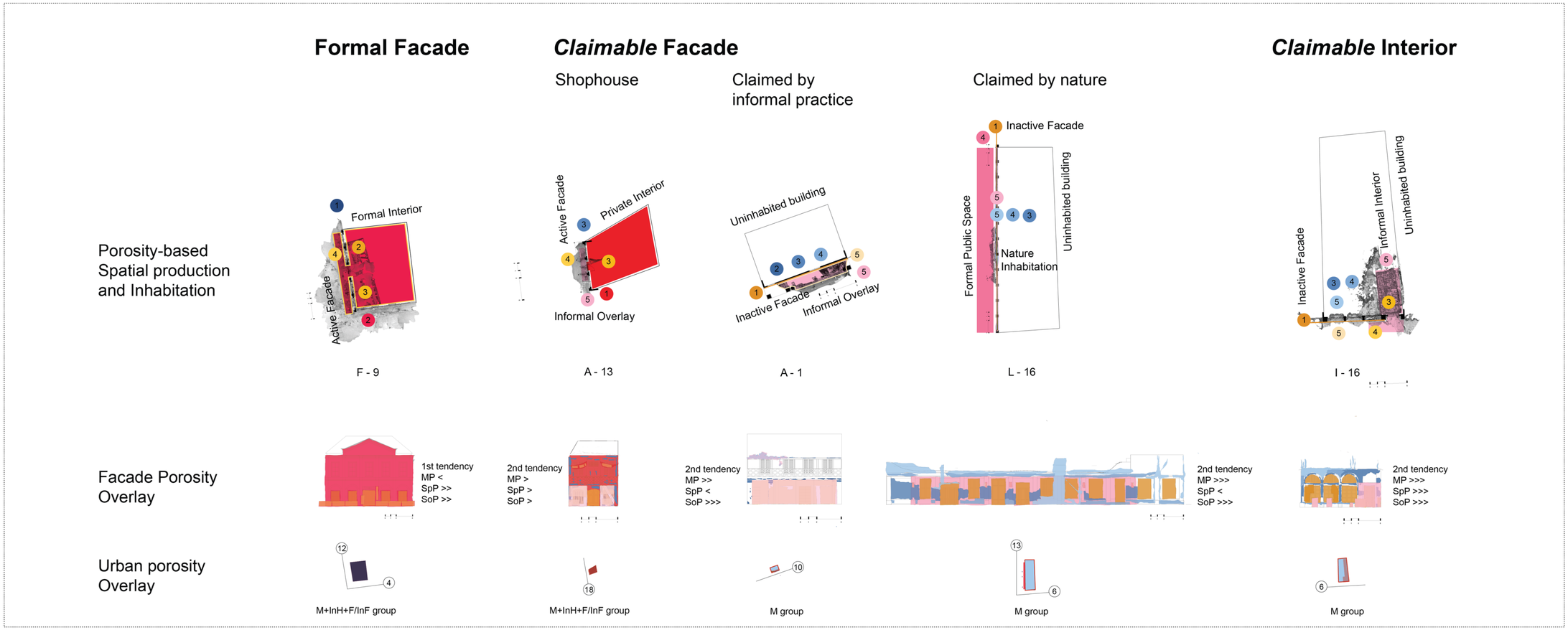


Figure 6.33. Conclusion diagram correlating the porosity overlays and the porosity-based spatial productions and inhabitations.

Yet the examples discussed here offer alternative narratives. Informal inhabitation—such as *angkringan*, *warung*, and *kedai*—can serve not only to safeguard unused buildings but also to maintain social and spatial vitality. Similarly, shophouses, as living heritage, suggest a need for sensitive, differentiated approaches that respect their dual economic and domestic roles. Moreover, nature's presence in these urban heritage areas should be seen not merely as a threat but as a place-making agent, contributing to urban biodiversity and the experiential richness of the city.

Architectural porosity, as a framework, invites a rethinking of revitalisation—one that values flexibility over uniformity, and cohabitation over erasure. Heritage, as Harrison (2013, p. 5) argues, is a "chain of connectivity", not a binary opposition between nature and culture or human and non-human. This study proposes that architectural porosity offers a method for reading and practising urban heritage revitalisation in a way that embraces plurality, material decay, ecological processes, and informal spatial practice—elements too often excluded from dominant heritage narratives.

Chapter 7. On the Significance of Architectural Porosity: A Conclusion

7.1. Overview and Key Findings

This study departs from existing discussions of the term *porosity*, which have primarily been situated within urban contexts. In such discourses, porosity is often associated with notions of flow and accessibility between private and public areas, as well as with the condition of boundaries, both physical and territorial. In architectural design, porosity is sometimes adopted as a conceptual device that generates architectural compositions emphasising connectivity between spaces, particularly between interior and exterior realms.

This research draws inspiration from Walter Benjamin and Asja Lacis's essay *Naples* (1925), which metaphorically employs the concept of porosity to describe the porous stone of buildings, the interpenetrating spaces of the city, and even the indolence of its inhabitants. This study aims to extend interpretations of porosity by situating and framing it as an architectural concept in its own right.

The investigation begins by taking a step back to explore the term *porosity* across various disciplines: from the sciences (including material science, earth science, and biology), to the social sciences (such as heritage studies and archaeology), and the built environment (notably urban and landscape studies) (Chapter 2). This interdisciplinary exploration is guided by key architectural themes—scale, performance, and visual

representation—which serve as a lens through which to unpack the concept. From this, three architectural frames of porosity are articulated: porosity as containment, porosity as a boundary condition, and porosity as coexistence—each addressing the material, spatial, and social aspects of porosity, respectively. These frames form the basis of the theoretical investigation, where porosity is situated within architectural theory, occasionally intersecting with other built environment disciplines (Chapter 3).

From this theoretical foundation, the concept of architectural porosity is proposed. Architectural porosity constitutes a conceptual framework that foregrounds the interrelation of the material, spatial, and social dimensions of porosity—what this study terms the three porosities.

As a conceptual framework, architectural porosity is operationalised into a methodology for empirical application, specifically within the context of Semarang Old Town in Indonesia (Chapter 4), with its dynamic material, spatial, and social practices. The selection of an urban heritage site is justified by findings from heritage studies, which often characterise porosity negatively, as a sign of material degradation and decay. This study instead positions porosity in heritage contexts as an opportunity for alternative perspectives.

The development of architectural porosity into a *porosity reading method*, including the formulation of a porosity index and mapping approach, is informed by related disciplines such as anthropology, archaeology, and urban studies, which share methodological affinities with architecture (Chapter 5). This positions the survey as an interdisciplinary endeavour. The porosity index, grounded in the conceptual model of the three porosities and contextualised through Semarang Old Town, is structured into two analytical scales: the urban and the façade

indexes. The readings derived from these methods reveal the significance of the varying degrees and interrelations of porosity, as expressed through three observed façade practices in Semarang Old Town: the *formal façade*, the *claimable façade*, and the *claimable interior* (Chapter 6). These façade typologies articulate various forms of 'urban voids'—spaces of interaction between material existence, inhabitation, spatial practice, and social relation. This chapter will further discuss the implications of these findings for heritage practice.

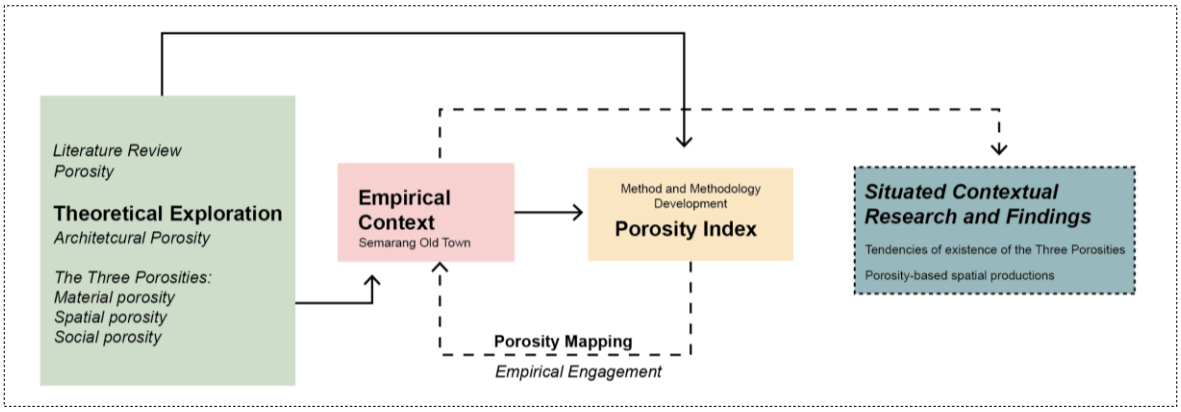


Figure 7.1. Research process diagram

The research process is summarised above. This study has been a theoretical investigation, extended through empirical engagement, and contributes a contextual and situated research framework. The research has answered the questions posed at the outset, with the key findings summarised below.

7.1.1. The Tendencies of the Existence of the Three Porosities

Based on porosity readings using the urban and façade porosity indexes in Semarang Old Town, it is evident that each façade exhibits a unique composition of the three porosities. As the porosity index was not designed to compute an overall 'resultant'

of porosity, the mapping captures instead the tendencies for different porosities to manifest. Two general tendencies have been identified, both centred on material porosity.
The first tendency is associated with façades exhibiting non-porous material conditions. Such conditions generally indicate revitalised and maintained façades. This reflects prevailing heritage paradigms, such as revitalisation and restoration, which aim to return building materials to a pristine, non-porous state, effacing traces of ageing or transformation. These façades typically coexist with active, *porous* façade conditions, permitting access through functioning windows and doors, thereby regulating the interior-exterior relationship. Socially, these are associated with formal, semi-public or public access.

The second tendency is found in façades with porous material conditions, typically found in less-maintained or abandoned heritage buildings. These façades often exist alongside *dormant*, non-porous façades that lack functioning openings and thus preclude access. However, they provide a perceivable material bulk and edge space, creating opportunities for both human and non-human habitation. Socially, these façades are associated with informal forms of inhabitation. This corresponds to urban phenomena in which abandoned buildings become perceived as ‘urban voids’, inviting informal appropriation. In cases of material decay, nature—seen here as a non-human actor—can reclaim the built environment, as described by Simmel (1959), who theorised decay as nature’s ‘revenge’. This second tendency presents porosity as a provocative lens through which to reinterpret heritage practice. It reveals how porous heritage buildings become entangled with informal urban inhabitation and the socio-spatial dynamics prevalent in Indonesian cities.

7.1.2. Porosity-based Spatial Productions and Inhabitations

Further readings into these two tendencies of porosity reveal three façade typologies, each offering distinct voids and opportunities for spatial practice and inhabitation.
The first is the formal façade, derived from the first tendency. It characterises a revitalised building with an immaculate material condition. The façade serves to represent the architectural identity and brand of the building. Its exterior signals a functional interior and mediates access through operable openings. This aligns with conventional heritage revitalisation projects, where historic buildings are repurposed with tourism- or revenue-generating programmes, such as galleries, cafés, or restaurants. Here, the void refers to the revitalised, semi-public, or public interior.

The second and third façade types emerge from the second tendency, relating to less-maintained or abandoned buildings. The claimable façade refers to façades that are dormant, inaccessible, and typically in a state of decay. Such façades are often perceived as residual spaces available for informal appropriation by both human and non-human actors. They offer voids in the form of exterior space immediately in front of the façade, which may be appropriated for street vending, dwelling (e.g., by affixing tarpaulins or arranging furniture), or other informal practices. Additionally, the pores within the material bulk become substrates for vegetation, facilitating the coexistence of natural elements. In some instances, this integration of decay and nature transforms the façade into a picturesque ruin and potential tourist attraction.

The claimable interior describes buildings whose interiors, though structurally deteriorated, become inhabitable voids. These may be occupied informally, sometimes with the tacit or explicit permission of local heritage authorities. Such arrangements illustrate the layered interplay of material, spatial, and social porosity, transforming abandoned heritage interiors into refuges for pre-existing informal street dwellers. This dynamic reveals a negotiation between formal authority and informal practices: informal inhabitation is sometimes tolerated, albeit on official terms. This presents a potential model for bridging formal and informal approaches to heritage use, while foregrounding the latent inhabitation possibilities of abandoned buildings awaiting either revitalisation or further decline.

The spatial practices and modes of inhabitation observed in Semarang Old Town demonstrate how the three porosities—material, spatial, and social—contribute to the *claimability* of heritage façades in an urban heritage context. These porosities expand the conceptual thickness of the façade beyond its material dimension, introducing spatial and social thicknesses that emerge from processes of attachment, biological growth, and accessibility. These are outcomes of various claiming actions enacted by both human and non-human agents.

7.2. Contribution

As outlined in the introduction, one of the primary contributions of this architectural inquiry is to explore how the concept of *architectural porosity* can inform and expand discussions within heritage practice. The investigation of porosity in Semarang Old Town reveals that despite top-down revitalisation strategies—many of which involve the removal of informal settlements—informal inhabitation continues to persist. Local enterprises, such

as *angkringan*, *warung*, and *kedai,* exemplify informal socio-economic practices that utilise urban voids and porous spaces in Semarang Old Town. These often include façades and even the interiors of uninhabited heritage buildings, which are occupied through informal permission. Informality, rather than being an anomaly, appears to be an integral part of the social fabric of the area. This inquiry suggests that such informal practices should be acknowledged and incorporated as legitimate elements of the heritage landscape.

The study also sheds light on the ecological value of material porosity, particularly in its capacity to support non-human life forms. When buildings are abandoned, natural elements frequently colonise available surfaces, turning decaying structures into hybridised environments where built matter and nature intertwine. These phenomena give rise to a different kind of heritage. This ruinous aesthetic not only invites biodiversity into the urban realm but also supports nature-driven placemaking with potential social and environmental benefits. Furthermore, this aligns with the emerging movement of regenerative design or regenerative architecture. One of its fundamental principles emphasises the necessity of co-evolving with nature, stressing the importance of the natural cycle and biodiversity as a foundational element of the design. Viewing heritage buildings from this framework maybe controversial as it entails recognising the state of the heritage building; in instances where these buildings are in ruin with dominant biodiversity, it may be more beneficial to allow them naturally to degrade and enable biodiversity to thrive rather than pursuing restoration efforts. This would spark debate and reinterpretation of heritage values, potentially shifting the heritage conservation paradigm.

The prevailing paradigm of urban conservation and revitalisation in Semarang Old Town typically fails to recognise the significance of both human and non-human informal inhabitation. However, this inquiry demonstrates, both theoretically and through empirical case studies, that alternative models exist. Concepts such as *everyday heritage* and *counterpreservation* provide more inclusive and porous frameworks for heritage practice. These models consider not only material integrity but also the spatial and social dynamics that animate heritage spaces. This highlights the importance of integrating material, spatial, and social dimensions in a holistic approach to heritage.

Heritage discourse has often construed porosity as a detrimental material condition, one that accelerates deterioration. In contrast, this inquiry, through the lens of architectural porosity, repositions porosity as a constructive framework. It enables a re-reading of urban heritage sites, demonstrating how the three porosities collectively shape spatial practices and modes of inhabitation. The findings thus offer an expanded understanding of architecture and heritage as porous constructs, shaped by multiple actors and forces.

This inquiry advances the discourse on porosity in architecture and heritage by advocating for a more flexible and inclusive approach—one that accommodates diverse forms of materiality, spatial use, and social inhabitation. It also provides a preliminary framework for scholars and practitioners working in architecture, urbanism, and heritage conservation who wish to explore alternative paradigms for heritage intervention. In this way, the study provides new insights into how to approach complex urban heritage sites, such as Semarang Old Town.

Methodologically, this inquiry contributes to the development of an architectural framework for reading porosity, drawing on

interdisciplinary perspectives. The resulting porosity index and mapping methodology may be adapted to other urban contexts, including general streetscapes. While this study is situated within the specific conditions of Semarang Old Town, its methodological approach remains flexible and transferable.

Finally, this inquiry contributes to the growing body of research on Semarang Old Town, which has been widely studied by Indonesian scholars in the fields of heritage, architectural history, history, tourism, archaeology, and hospitality. By exploring porosity through an interdisciplinary lens, this study enhances understanding of the area's complexity and its potential for further cross-disciplinary research.

7.3. Limitations and Further Studies

Despite the aim of advancing a conceptual and methodological framework for *architectural porosity* and the porosity index, the findings of this inquiry primarily concern identifying tendencies in the manifestation of porosity and their implications for spatial practices and inhabitation. The study offers theoretical insights and contextual reflections, but it does not delve into the legal and regulatory frameworks that shape heritage practice in Indonesia. Such engagement would require sustained dialogue with policymakers and local stakeholders, as well as the collaborative development of policy guidelines.

A significant methodological limitation stems from the lack—or, in many cases, complete absence—of physical data on the heritage buildings in the area. This necessitated the use of iPads and mobile phones for 3D scanning, which allowed for the basic capture of spatial dimensions and the generation of elevation drawings. However, the resulting data remain general and

architectural, rather than meeting the standards of detailed heritage documentation. As such, the façade mapping presented here functions more as an architectural diagram—a visual heuristic for interpreting the coexistence and layering of porosities—than as a precise record of conservation.

While this study suggests a tendency or correlation among the three porosities in shaping inhabitation, it does not provide sufficient evidence to establish a causal relationship underlying their coexistence. The depiction of spatial practices and inhabitation is primarily narrative and would benefit from additional detailed drawing and analysis. Further work could include object cataloguing, spatial configuration studies, and mapping of activity patterns to provide a more robust visual account of porosity in practice.

The interdisciplinary orientation of this inquiry also opens avenues for collaborative research. Future studies might establish interdisciplinary platforms involving scholars from material science, heritage studies, architecture, anthropology, archaeology, urban studies, and interior design.

For example, collaboration with material science and archaeology could extend the study of material porosity into the microscopic scale. Material samples might be analysed for traces of ageing and decay, leading to a more refined *material porosity index*. Similarly, collaboration with biology and environmental science could investigate microbial and vegetal colonisation, revealing how biodiversity interacts with the built environment and potentially contributing to bioreceptive design.

In terms of spatial and social porosity, partnerships with anthropology, urban studies, and interior architecture could deepen analyses of informal spatial practices, interior

appropriations, and the use of objects. Such work could further distinguish between formal and informal practices, particularly in contexts of urban interior design, and explore how these practices engage with and redefine heritage spaces.

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Appendix

Appendix A – Selected Heritage Building List and Street Names

Selected heritage building list: Here is the list of heritage buildings selected for the façade mapping (part of the Heritage Building List), with their building codes, façade codes (based on the map of study area Figure 5.4.) and building name (if identifiable) or building nick name as reference for this study. The name or nick name of the buildings refer to the heritage building lists and description from BPK2L (the management board), the 2011 Semarang Old Town Grand Design Documents, as well as field observation and google map.

Num.	**Building code** Building – Block	**Façade code** Building – Block – Street	**Building (nick)Name**
1	A – 1	A – 1 – 10	*Kedai Yu Tik*
2	B – 2	B – 2 – 14 (1) B – 2 – 14 (2)	*Rumah Garuda*
3	A – 3	A – 3 – 2 A – 3 – 14	*Suara Merdeka*
4	C – 3	C – 3 – 14	*Angkringan Taman* Garuda
5	D – 3	D – 3 - 14	PTP Nusantara
6	C – 6	C – 6 – 2 C – 6 – 3	Ex Kodam
7	E – 6	E – 6 – 3	H. Subali Raja Sate.
8	A – 7	A – 7 – 10	Rumah Deret Meliwis
9	H – 7	H – 7 – 9	*Kafe Sepur*
10	A – 8	A – 8 – 9 A – 8 – 11	Djakarta Lloyd

Num.	Building code Building – Block	Façade code Building – Block – Street	Building (nick)Name
11	D – 8	D – 8 – 4	District 22
12	C – 9	C – 9 – 16	Semarang Creative Hub
13	D – 9	D – 9 – 16 D – 9 – 4	Borsumij Heritage
14	F – 9	F – 9 – 4 F – 9 – 12	Starbucks
15	A – 10	A – 10 – 17	Oudetrap
16	A – 13	A – 13 – 18 A – 13 – 20	*Rumah Cendrawasih I (1)*
17	B – 13	B – 13 – 20 B – 13 – 19	*Rumah Cendrawasih I (2)*
18	C – 13	C – 13 – 4 C – 13 – 17	Spiegel
19	E – 13	E – 13 – 17	Semarang Contemporary Art Gallery
20	C – 14	C – 14 – 3	*Gudang 3 (unit 2)*
21	J – 14	J – 14 – 4	Alfamart
22	D – 15	D – 15 – 4	*Galeri Kreatif*
23	E – 15	E – 15 – 13 E – 15 – 6	Ex Indische Lloyd
24	I – 16	I – 16 – 6	*Gedung Barong (Warung Makan Sederhana)*
25	L – 16	L – 16 – 6 L – 16 – 13	*Rumah Akar*
26	B – 17	B – 17 – 4 B – 17 – 5	Marba
27	B – 18	B – 18 – 4	Indomart
28	E – 18	E – 18 – 4	Weeskamer
29	K – 18	K – 18 – 6	New Tekodeko
30	A – 19	A – 19 – 8 A – 19 – 6	Puskopad
31	B – 19	B – 19 – 6 B – 19 – 8	Monod Diephuis

Num.	Building code Building – Block	Façade code Building – Block – Street	Building (nick)Name
32	A – 20	A – 20 – 6 (1) A – 20 – 6 (2) A – 20 – 6 (3)	Soesman Kantoor
33	B – 20	B – 20 – 6 B – 20 – 8	Ex Rajawali Nusindo
34	C – 20	C – 20 – 6	Ex Asuransi Bintang
35	D – 20	D – 20 – 6 D – 20 – 8	Hero Coffee
36	E – 20	E – 20 – 8	*Gudang 3*

Street names in Semarang Old Town (case study area)

Below is the list of street names within the study area. The street code is based on the map of study area Figure 5.4.

Street Code Num.	Nowadays' names	Past's names
1	Jl. Tawang	Norderwal Straat
2	Jl. Merak	Norderwal Straat
3	Jl. Cendrawasih	Oosterwal Straat / Komedies Straat
4	Jl. Letjen Soeprapto	De Heeren Straat
5	Jl. Gelatik	Kerkhoff Straat
6	Jl. Kepodang	Hoogendorp Straat
7	Jl. Suari	Kerk Straat
8	Jl. Sendowo	Zuiderwal Straat
9	Jl. Empu Tantular	Westerwal Straat / Pak Huiss Straat
10	Jl. Meliwis	Kortadem Straat
11	Jl. Merpati	Marine Straat
12	Jl. Branjangan	Oude Stadhuis Straat
13	Jl. Roda II / Jalak	Zwaluw Straat
14	Jl. Garuda	Achterkerk Straat
15	Jl. Nuri	Sieburg Straat
16	Jl. Kutilang	Hoofdwacht Straat

Street Code Num.	Nowadays' names	Past's names
17	Jl. Taman Srigunting	Paradeplein
18	Jl. Perkutut	Van den Burg Straat
19	Jl. Cendrawasih I	Konijnen Straat
20	Jl. Kedasih	Bloemen Straat

Appendix B – Google Street View (GSV) Timestamps

GSV timestamps for Urban Mapping 2015

Num.	Current Street Names	GSV Time stamp
1	Jl. Tawang	June 2015
2	Jl. Merak	May 2015
3	Jl. Cendrawasih	June 2015
4	Jl. Letjen Soeprapto	June 2015, April 2015 (Weskammer, Stadhuis)
5	Jl. Gelatik	May 2015
6	Jl. Kepodang	May 2015
7	Jl. Suari	May 2015
8	Jl. Sendowo	May 2015
9	Jl. Empu Tantular	June 2015, April 2015 (Mandiri)
10	Jl. Meliwis	May 2015
11	Jl. Merpati	May 2015
12	Jl. Branjangan	May 2015, May 2017 (Around Stadhuis)
13	Jl. Roda II / Jalak	Dec 2016, May 2015 (Observable from Jl. Kepodang)
14	Jl. Garuda	May 2015, April 2015 (Towards Semarang Gallery)
15	Jl. Nuri	May 2015
16	Jl. Kutilang	April 2015
17	Jl. Taman Srigunting	April 2015, May 2015, Feb 2017 (Infront of Semarang Gallery), Dec 2016 (for

Num.	Current Street Names	GSV Time stamp
		Taman Sri Gunting and Oudetrap Area)
18	Jl. Perkutut	May 2015
19	Jl. Cendrawasih I	May 2015, April 2015
20	Jl. Kedasih	May 2015, April 2015

GSV timestamps for Urban Mapping 2022

For the 2022 mapping, the main visual data are the documentations collected during the field observation in March 2022 as well as some field mapping. However, during the post field analysis, GSV was also used to confirm and refresh my memories of the place.

Num.	Current Street Names	GSV Time stamp
1	Jl. Tawang	Jan 2022
2	Jl. Merak	Jan 2022
3	Jl. Cendrawasih	Jan 2022
4	Jl. Letjen Soeprapto	Jan 2022
5	Jl. Gelatik	Jan 2022
6	Jl. Kepodang	Jan 2022
7	Jl. Suari	Jan 2022
8	Jl. Sendowo	Jan 2022, Sep 2022
9	Jl. Empu Tantular	Jan 2022
10	Jl. Meliwis	Jan 2023
11	Jl. Merpati	May 2015
12	Jl. Branjangan	Jan 2022, Jan 2023
13	Jl. Roda II / Jalak	Jan 2022 (Observable from Jl. Kepodang)
14	Jl. Garuda	Jan 2022, Sep 2022 (Towards Semarang Gallery)

Num.	Current Street Names	GSV Time stamp
15	Jl. Nuri	Sep 2022
16	Jl. Kutilang	Sep 2022, Dec 2022
17	Jl. Taman Srigunting	Jan 2022
18	Jl. Perkutut	Jan 2022
19	Jl. Cendrawasih I	Jan 2022
20	Jl. Kedasih	Jan 2022

Appendix C – Interview list

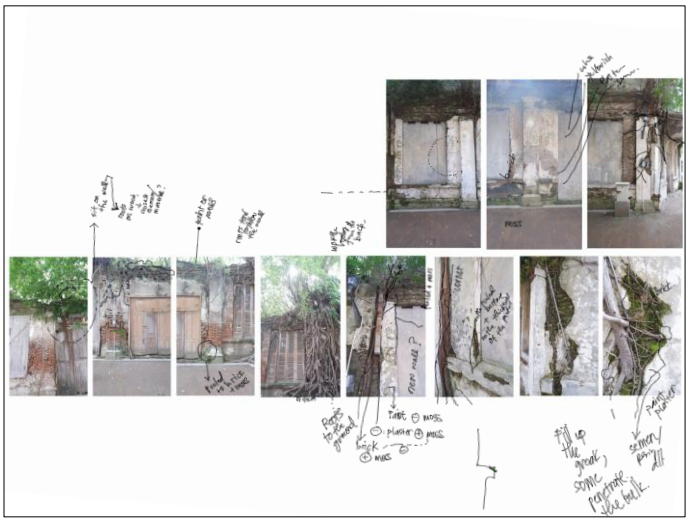
The interview aims to have an informal dialogue with different participants, through on field of online interviews. The interviews are meant to only be a supporting data, which renders the narratives around porosity discussion. At the end, not all targeted participants are interviewed and not many interviews managed to be conducted. The transcript file is currently in Indonesian language.

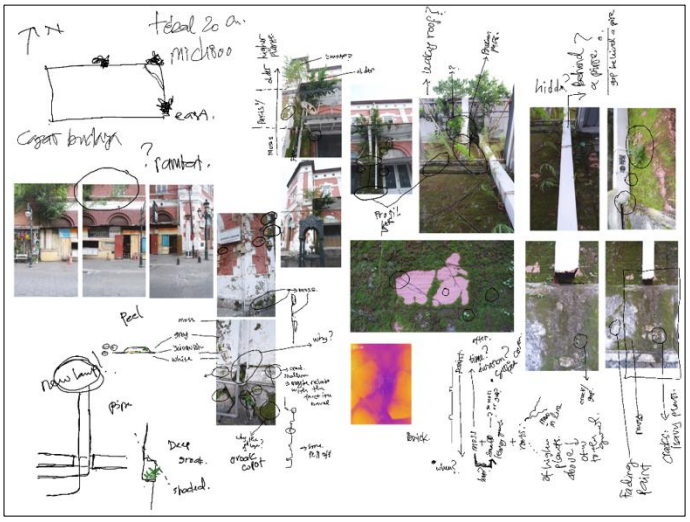
Participant A – Representative of Semarang Municipality
Participant B – Building owners who owns building/house in Semarang Old Town area
Participant C – The Users, of buildings and of public spaces – informal actors
Participant D – Experts on architecture history or heritage

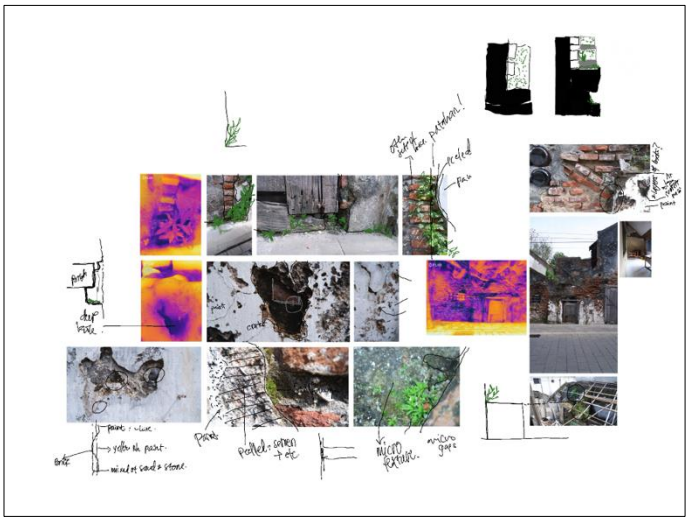
Num.	Code	Participant	Building Related
1	I1	C	C – 9
2	I2	C	C – 9
3	I3	C	A – 20
4	I4	C	C – 9
5	I5	C	B – 17
6	I6	C	E – 18
7	I7	C	A – 1
8	I8	C	A – 7
9	I9	C	H – 7
10	I10	C	A – 3
11	I11	C	E – 20
12	I12	C	A – 13
13	I13	C	I – 16
14	O1	B	B – 19

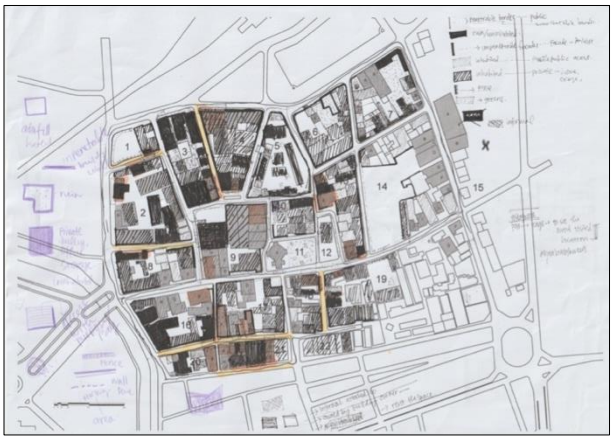
15	M1	A	
16	M2	A	
17	M3	A	
18	M4	A	
19	E1	D	
20	E2	D	
21	E3	D	

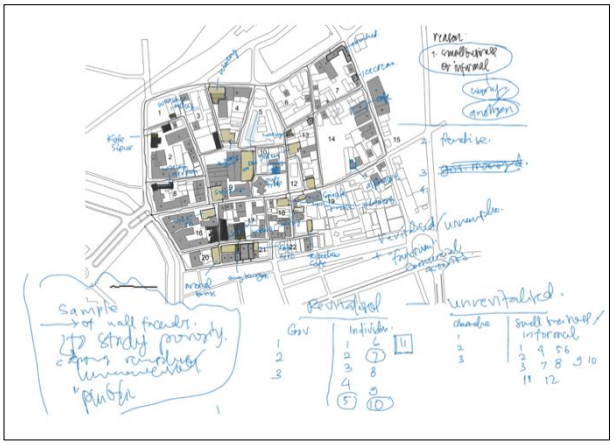
Appendix D – Field Notes and Early Mappings

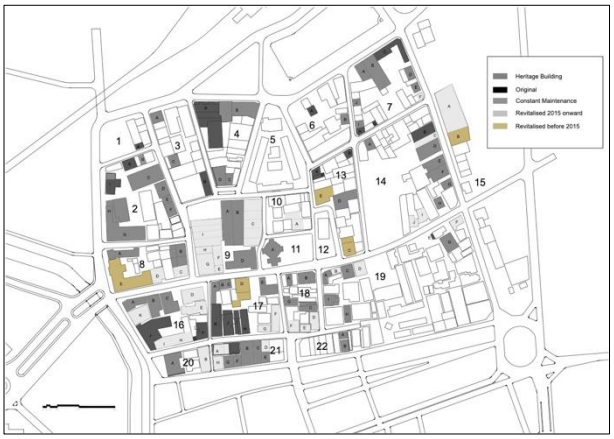


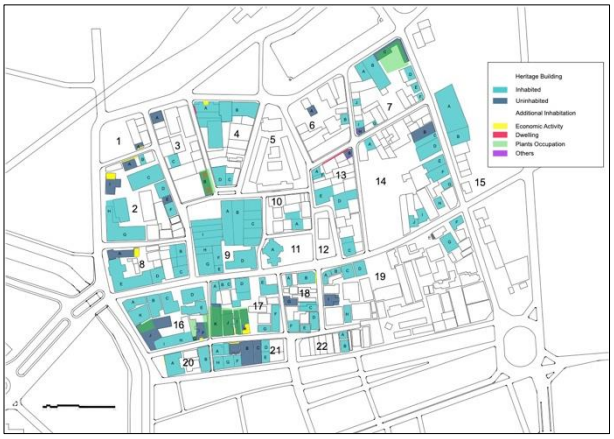




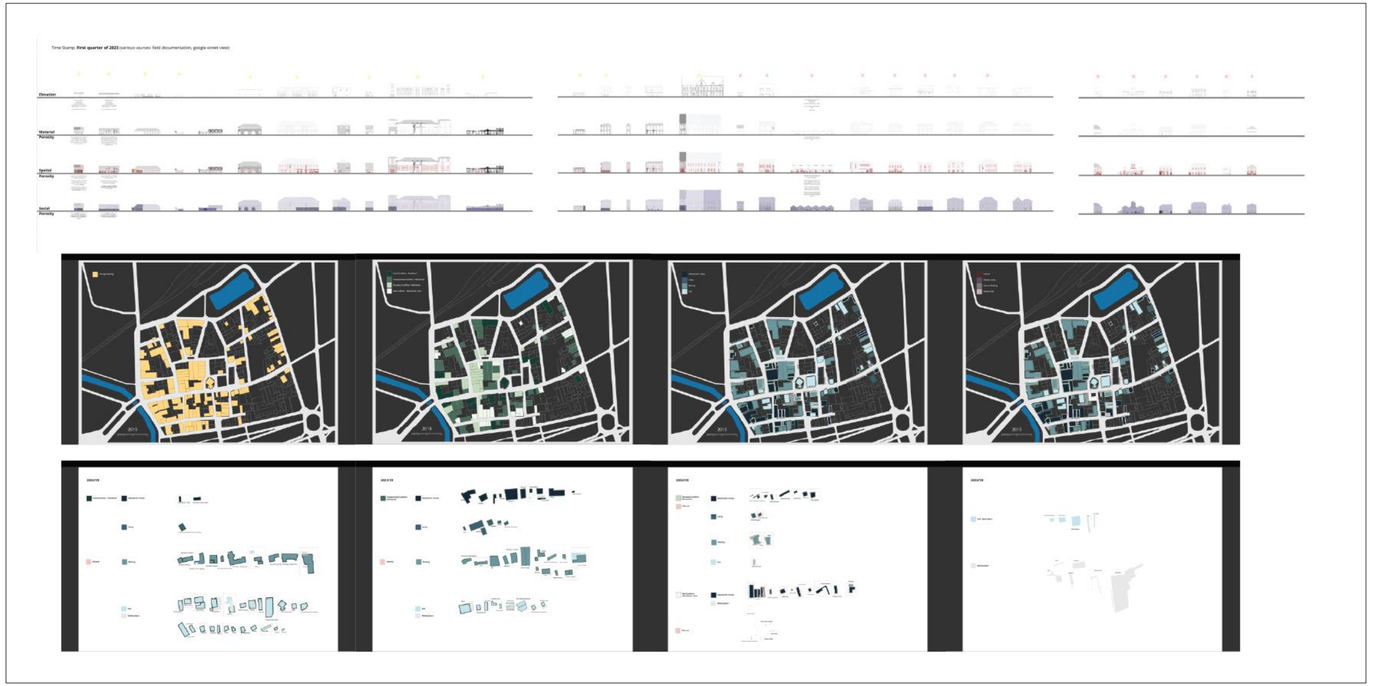


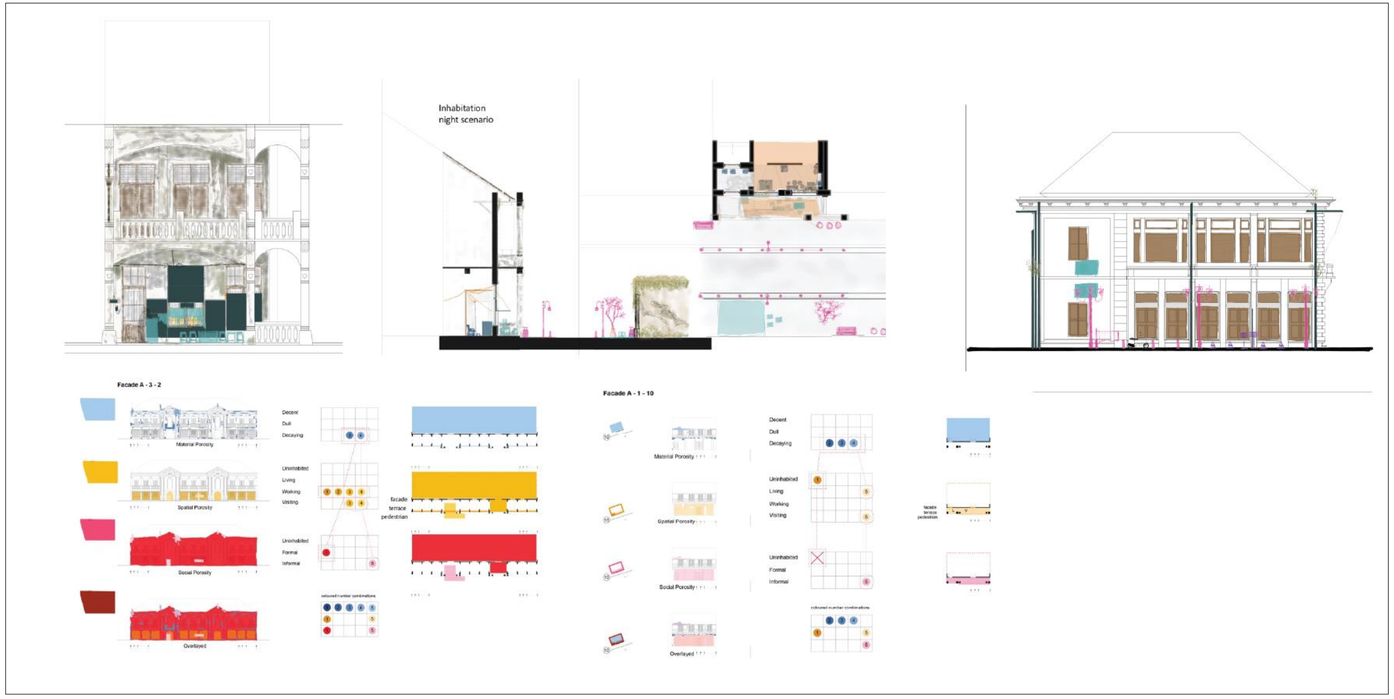



Heritage Building
Original
Constant Maintenance
Revitalised 2015 onward
Revitalised before 2015


Heritage Building
Inhabited
Uninhabited
Additional Inhabitation
Economic Activity
Dwelling
Plants Occupation
Others

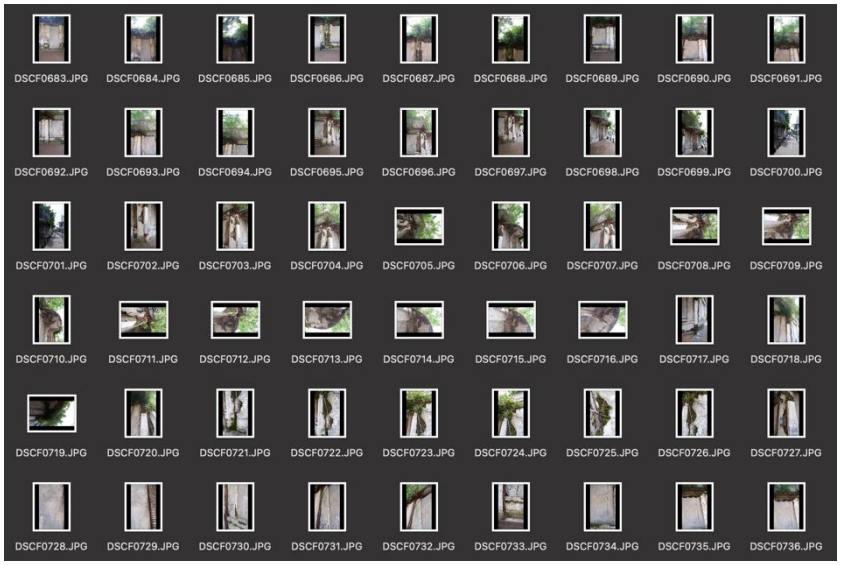
Appendix E – Drawing Explorations Examples

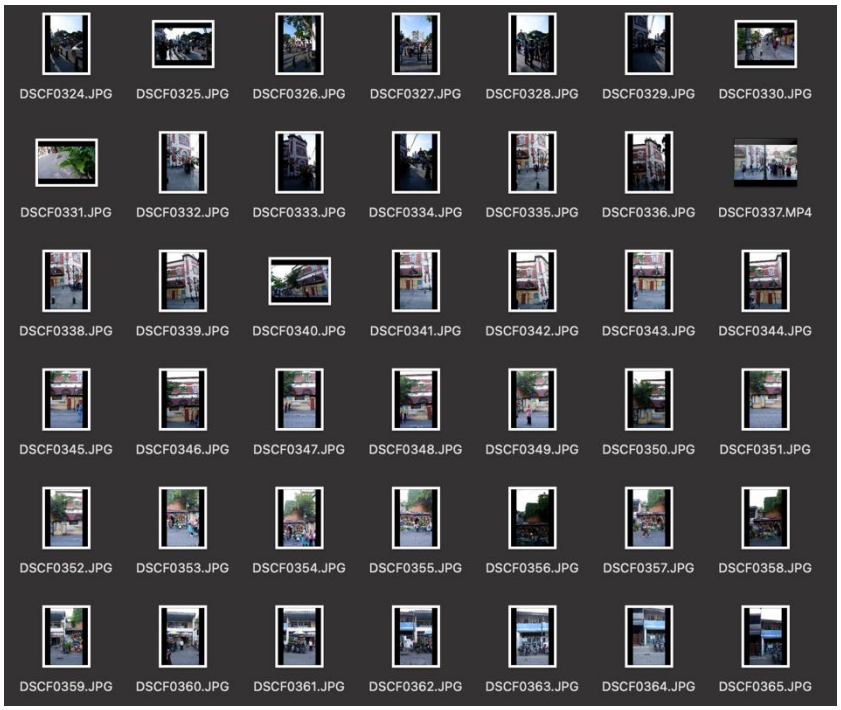



Inhabitation
night scenario
Facade A - 3 - 2
Material Porosity
Spatial Porosity
Social Porosity
Overlayed
Decent
Dull
Decaying
Uninhabited
Living
Working
Visiting
Uninhabited
Formal
Informal
reduced number combinations
facade terrace pedestrian
Facade A - 1 - 10
Material Porosity
Spatial Porosity
Social Porosity
Overlayed
Decent
Dull
Decaying
Uninhabited
Living
Working
Visiting
Uninhabited
Formal
Informal
coloured number combinations

Appendix F – Raw Data Examples

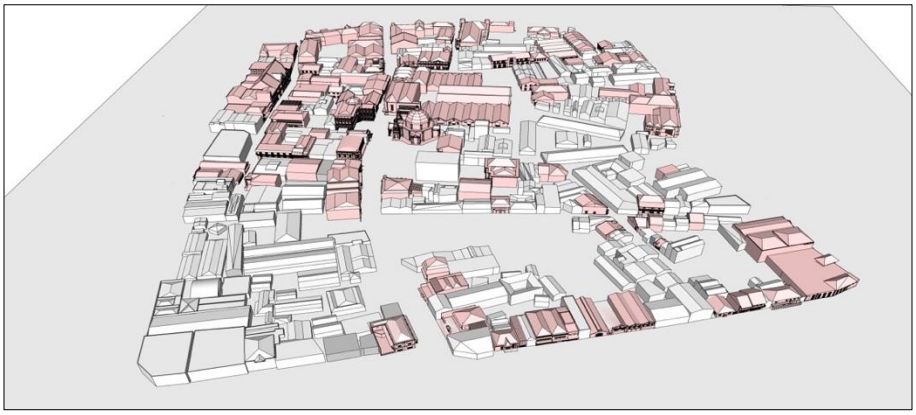
Photo documentations of the area

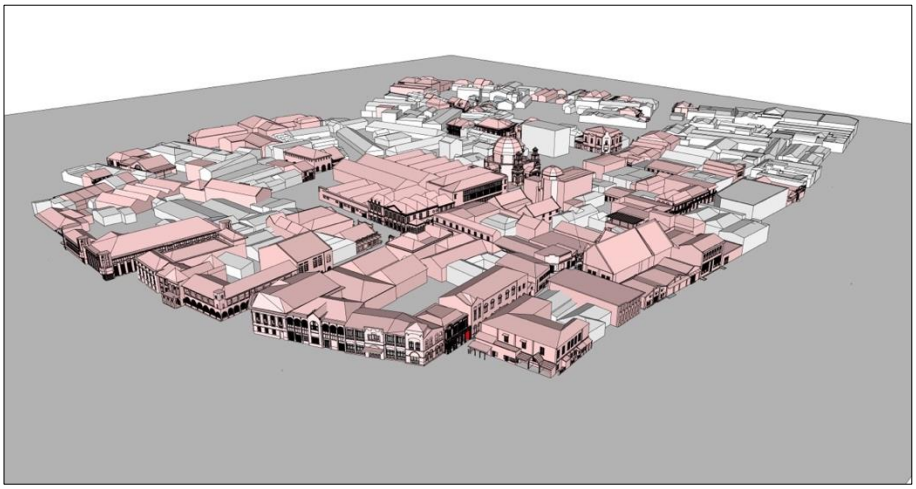


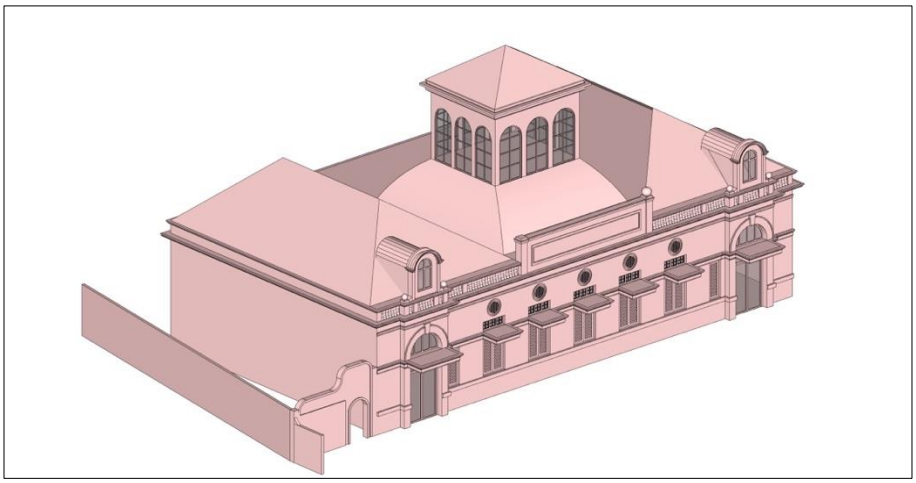


3D scan from 3d Scanner app in IOS and Polycam app in android, processed in SketchUp

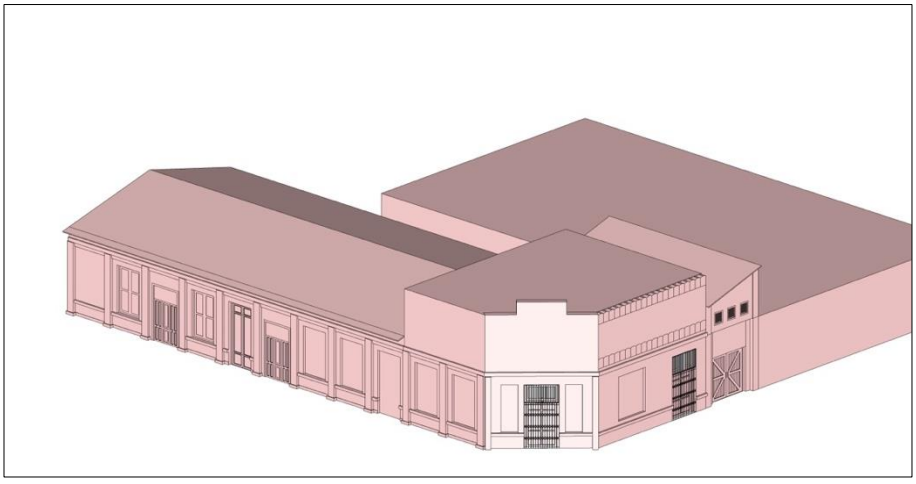
Block Plan 3d on SketchUp, based on the CAD data from the Semarang Municipal. Some buildings' 3d model are publicly available on SketchUp warehouse, some needs to be drawn. The 3d model is only a façade model not a complete building.



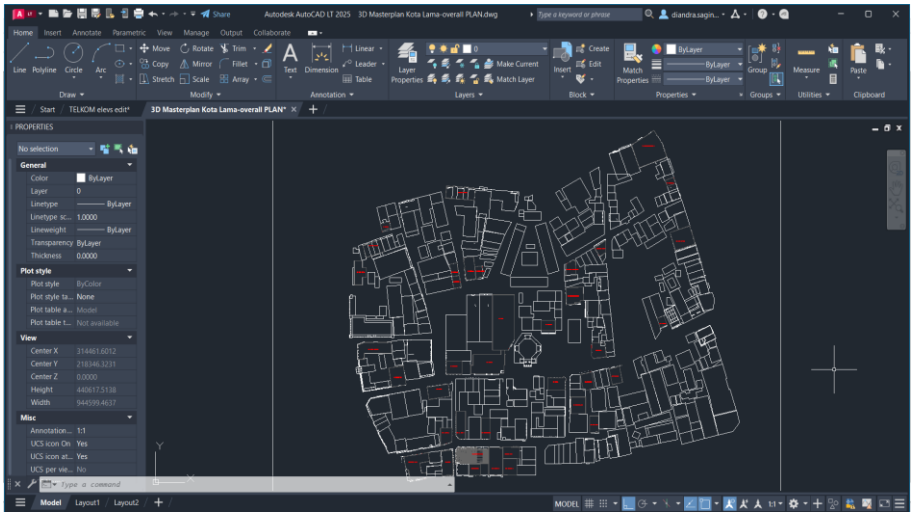


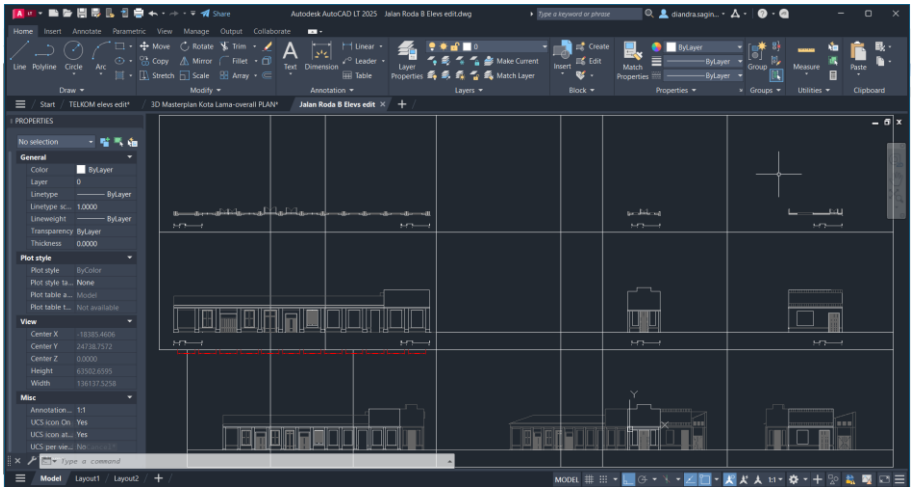


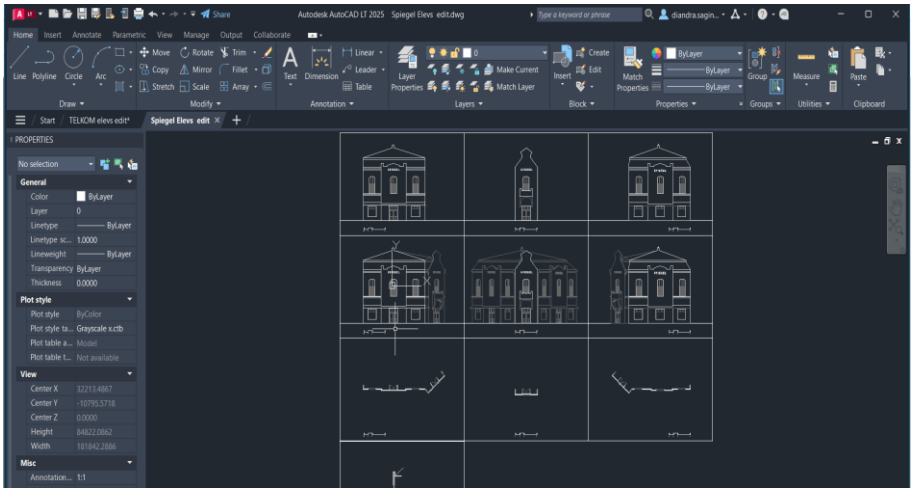
SPIEGEL
SPIEGEL
SPIEGEL



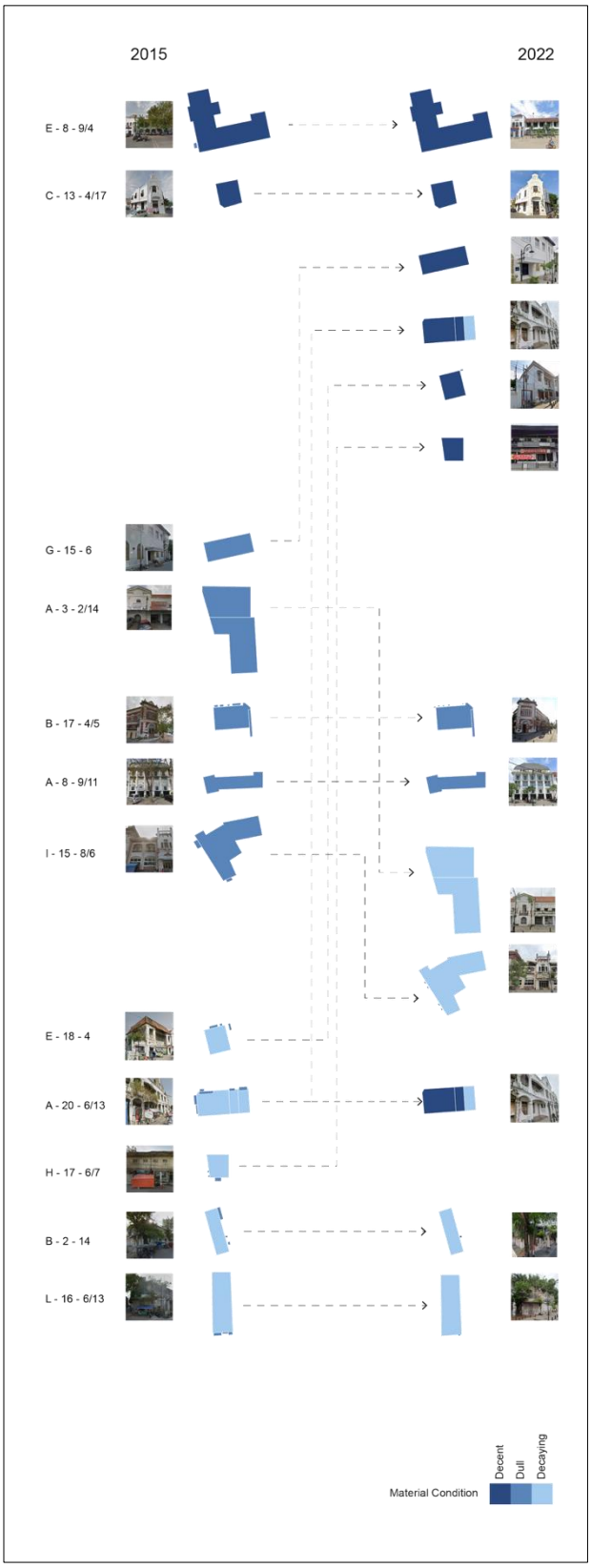
CAD of urban block plan, based on the data given by the Semarang Municipal as the basis for the urban mapping. Some selected façade drawing on CAD as the basis for the façade mapping.







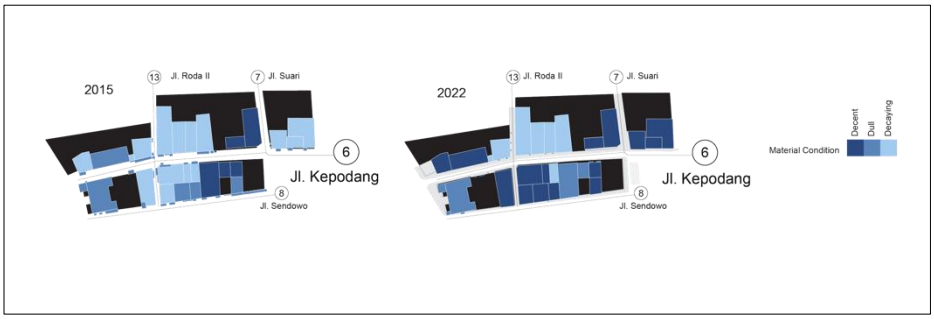
Appendix G – Material Porosity Urban Mapping



The change of material condition of the heritage buildings varied from one building to another (see figure above). There were some buildings that were kept in the decent condition, such as the Bank Mandiri Empu Tantular (E – 8) and Spiegel (C – 13). Some dull buildings such as Mandiri Archive Building (G – 15) were revitalised and became decent, but another such as Gedung Suara Merdeka (A – 3) were decaying further since 2015, before finally revitalised towards the end of 2022. Some decaying buildings were revitalised into a decent condition such as Weeskamer (E – 18) and Pringsewu (H – 17), but some remained in a decaying such as Rumah Akar (L – 16) and Rumah Garuda (B – 2). Those that remained in a decaying condition, such as Rumah Akar (L – 16) and Rumah Garuda (B – 2) were usually having an unknown owner which makes it difficult the municipality to encourage any revitalisation for the buildings or in the case of other decaying buildings, they were still on sale or to let. The ownership status of the building plays important roles for the revitalisation of the building, and building with complicated ownership might have different possibility for the buildings. For example, the Soesman Kantoor (A – 20), which was previously decaying in 2015, has three different owners that were reflected on the building condition in 2022: the first and second part of the building were revitalised, and the third part was still decaying.

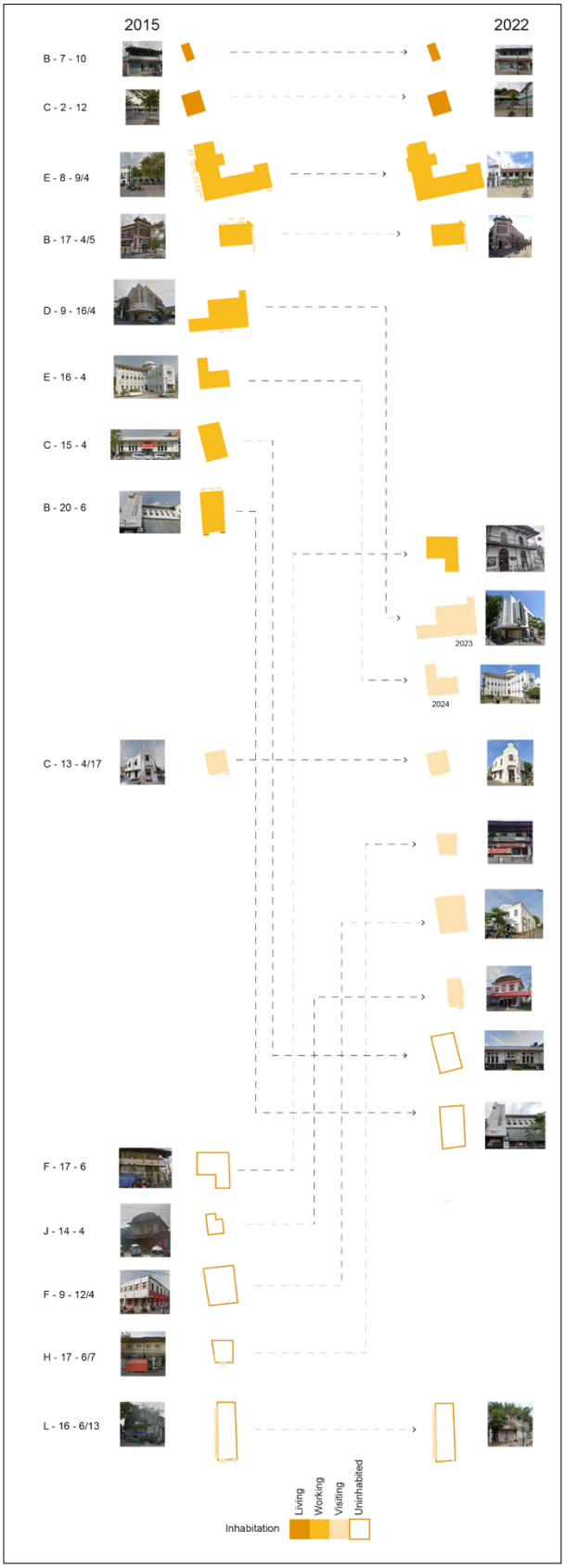
The change in the streetscapes of Semarang Old Town after the 2017 revitalisation project could be considered very drastic. Previously in 2015, there were no pedestrian ways, the streets were edged by an open sewer, and the streets' edges were inhabited by some informal settlements and street vendors. The revitalisation project then mended the drainage system of the area, made it underground, and provide a generous pedestrian way on both sides of the streets, which means the revitalisation

project also remove the informal material existences on the street. Some streets such as Jl. Kepodang (street 6) and Jl. Sendowo (street 8) that previously had street inhabitations, was revitalised by relocating or removing the structures and allocating spaces for pedestrian ways and street furniture (see figure below). Some streets were also dedicated as pedestrian only street such as Jl. Roda II (street 13) and Jl. Suari (street 7).



As a summary, based on the material condition mapping, the 2017 revitalisation project shifted most of the material condition of the heritage buildings, even though some buildings were already revitalised before the revitalisation project, more buildings were revitalised since the revitalisation and therefore more buildings were in decent condition. It also shaped the new streetscape of the area where material existence on the outside spaces were dominated by the street furniture, such as benches, hand washing station, charging station, bins, and streetlamps, and no more of informal structures on the streets as they were removed or relocated.

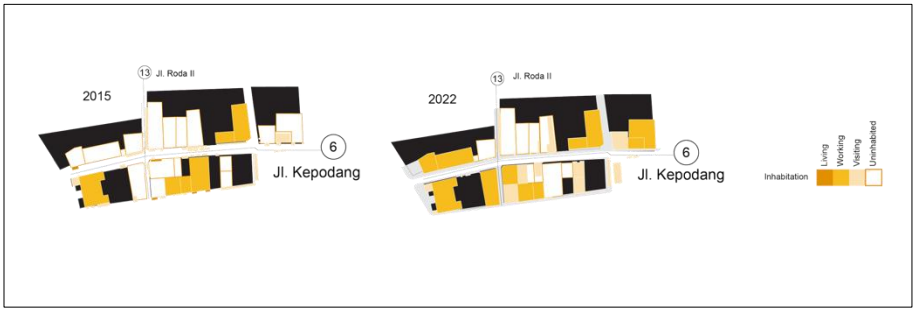
Appendix H – Spatial Porosity Urban Mapping



The change of inhabitation of heritage buildings were varied from one building to another (see figure above). Some residential heritage buildings remained as resident such as the house in Jl. Meliwis (B – 7) and in Jl. Branjangan (C – 2). Some office buildings remained as offices, such as Bank Mandiri Empu Tantular (E – 8) and Marba (B – 17). Some office buildings in the area changed inhabitation or planned to have a change in its inhabitation into visiting inhabitation such as Borsumij Heritage (D – 9, previously it was an office and turned into restaurant in 2023) and Gedung Jiwasraya (E – 16, an office until in the beginning of 2024, the building was planned to be converted to four stars hotel). Some office buildings in the area were also became uninhabited in 2022, for examples, The OCBC NISP Bank (C – 15) and the Rajawali Nusindo office (B – 20). Some uninhabited buildings were inhabited in 2022, for example were the Pringsewu (H – 17, a restaurant), Alfamart (J – 14, a convenient store franchise), Starbucks (F – 9, a coffee shop franchise), Bank Niaga Kepodang (H – 15, a bank), and Bank Mandiri Gelatik (F – 17). The varied inhabitations in 2022 showed the tendencies of the change of inhabitation in the area more towards the visiting type of inhabitation which were arguably align with the planning regulation of the area.

The removal of the street inhabitation, which used to be an informal inhabitation, was very noticeable in 2022. For example, the chicken seller in Jl. Kepodang (street 6) consisted of informal settlements (living) and some tents built for street vending (visiting) (see figure below). This existence expanded to Jl. Roda II (street 13) where the cock fight took place with some street vending as well at the edge of the buildings. In 2022 all of these was removed, the chicken sellers were relocated to the nearby market, the streets were paved with pedestrian ways on both sides with bollards, and even Jl. Roda II (street 13) was made a pedestrian way furnished with benches and lamps. The main

street of the area, Jl. Letjen Soeprapto (street 4), was also paved with pedestrian way and the previously sidewalk parking was removed, again, changed with the street furniture for the visitors.



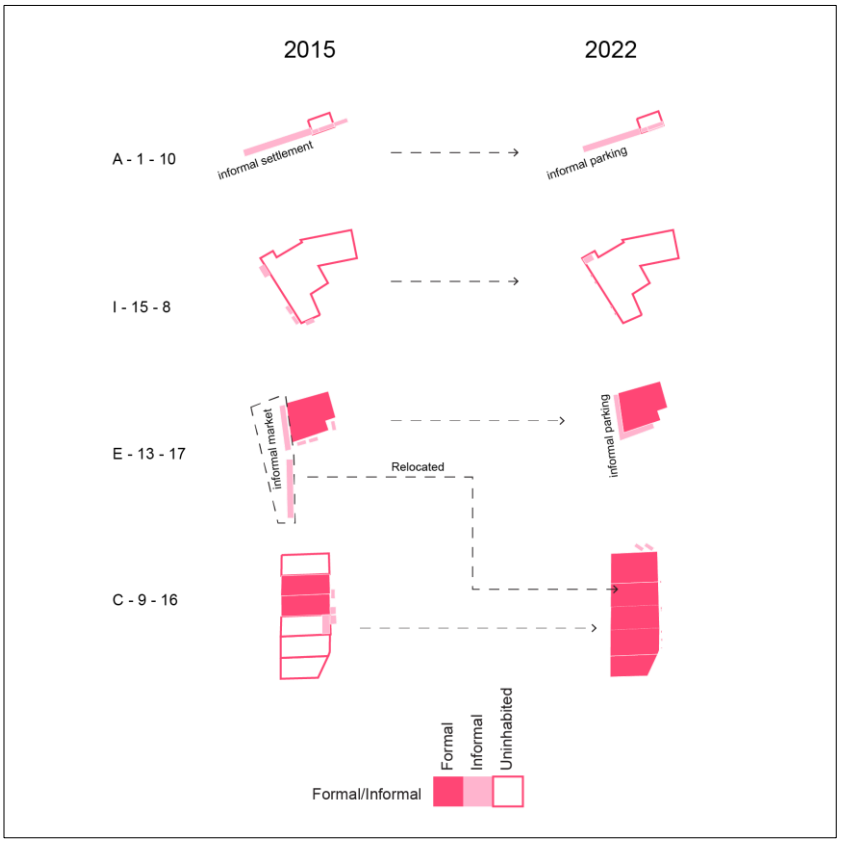
The removal of the street inhabitation seemed to work as most streets now have pedestrian ways and street furniture, however, some of the previously existed inhabitation in the street remained and they attached themselves to some uninhabited heritage buildings or relocated to a newly revitalised heritage building. For example, in Jl. Meliwis (street 10) where it used to have many informal settlements on its side, a residential and a *kedai* (type of stationary street vending) remained in the heritage house A – 1. Another example is the antique market in Jl. Taman Srigunting (street 17) that was relocated to the Semarang Creative Hub (C – 9).

In 2022, it was also observed that there were some changes in terms of the open spaces in the Semarang Old Town (see images below). There are some additional public spaces in the area such as the Oudetrap Theatre (W – 10) and the Jl. Kutilang (U – 20). There were also an increasing formal public parking spaces to accommodate the increased number of visitors visiting, such as the previously unused land in block 14 in now the Metro Point Parking (Z – 14), the Jl. Branjangan Parking (Y – 9) which was previously abandoned decaying non heritage buildings, and the District 22 parking (D – 8), a revitalised building that provide public parking as well. As for the other unused lands, the one in

block 1 was remined unused until a new restaurant was built towards the end of 2022, and the one in block 18, an office was built on the land.

As a summary, based on the inhabitation mapping, the 2017 revitalisation project shifted the inhabitation of the heritage buildings to a more visiting functions and some previously uninhabited heritage buildings were revitalised to be a commercial space. However, there were still some heritage buildings remained as office or residential. It also changed the street inhabitation more as a public space for visitors while also providing more infrastructure for visitors such as public parking. Some previously street inhabitations were either removed or relocated, to other place outside the area or to one of the revitalised heritage buildings in the area.

Appendix I – Social Porosity Urban Mapping

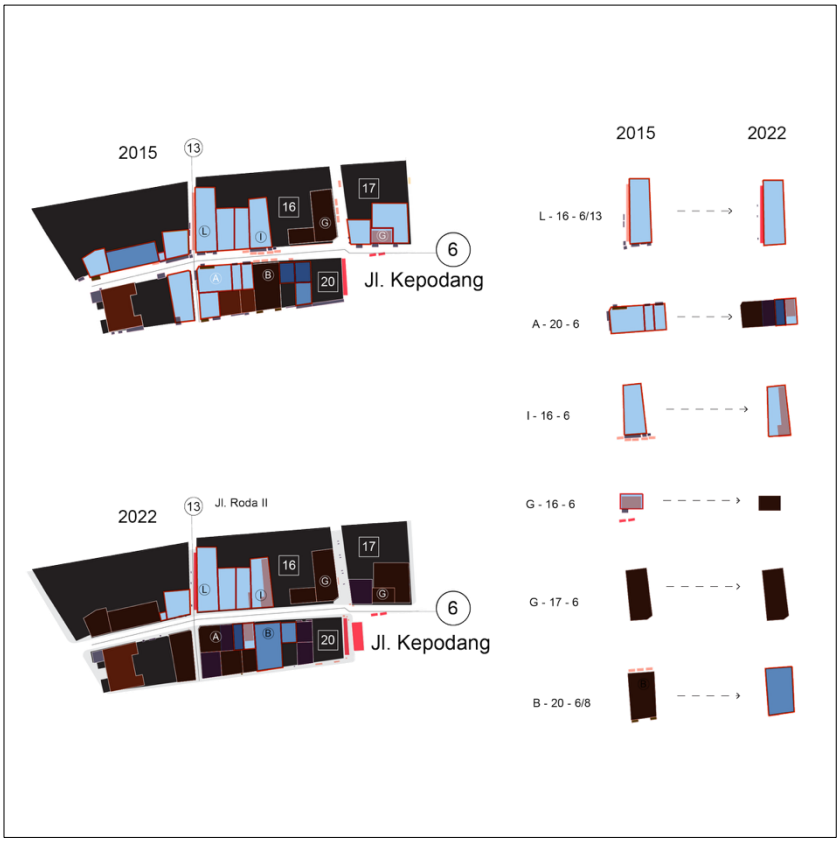


The informal inhabitation, that used to take place on the street, was decreasing as they were all removed or relocated. Some informal inhabitation seemed to stay with uninhabited heritage buildings such as, the house in Jl. Meliwis building A – 1. Some informal inhabitations which previously took the space on the street seemed to insert themselves to the uninhabited heritage buildings. It was not necessarily the same informal inhabitation, but in 2015 there used to be informal inhabitation in front of the Ex-PT. Perkebunan building (I – 15), but in 2022, as they were removed and the space was furnished with benches, an informal inhabitation in the form of *angkringan* (a type of food street vending) used one of the doorway spaces of the building.

Another form of informal inhabitation that still occurred in 2022 was the informal parking that usually use the side of the building where pedestrian ways were not edged by bollards. For example, the side of the Semarang Contemporary Art Gallery (E – 13), on the Jl. Taman Srigunting (street 17), there used to be the antique market but in 2022, it was now used as informal parking space. The antique market was relocated to Semarang Creative Hub, which make the antique market, even though it still informal in a sense of that they consisted of small businesses, but their location and existence was formal now. Another example was in Jl. Meliwis (street 10), where the space that used to be the informal settlement became informal parking space in 2022. The informal inhabitation on the outside spaces shifted into more temporary type of inhabitation, such as parking, and some form of temporary street vending still existed, mostly in the busy part of the area, such as around Taman Srigunting (X – 11) and along the main street Jl. Letjen Soeprapto (street 4).

As a summary, based on the formal/informal mapping, the 2017 revitalisation project shift the inhabitation status into a more formal ones with more heritage buildings revitalised and ‘properly’ inhabited as well as regulating the outside spaces with dedicated public spaces and street furniture. However there were still traces of the informal inhabitation fixing itself in some part of the area as well as in the form of a more temporary informal inhabitation.

Appendix J – Overlayed Urban Mapping



To see these changes, let's look at some part of Jl. Kepodang (street 6) as examples (Figure above) The heritage buildings facing Jl. Kepodang were mostly uninhabited and in decaying condition in 2015, for examples were the Rumah Akar (L – 16), Soesman Kantoor (A – 20), Warung Barong (I – 16), and Bank Mandiri Gelatik (G – 17). Each of them had different situations and change in 2022.

For example, Rumah Akar (L – 16) was in a decaying condition and uninhabited in 2015 with a big banyan tree growing in the side wall facing Jl. Roda II (street 13). Its façade was inhabited by semi-permanent street vendors and informal settlements and the side wall was facing Jl. Roda II (street 13) where the cock fight took place. Basically, it was surrounded by informal

inhabitation. In 2022, its material condition remained the same, however, the outside spaces around the façade and wall changed. The informal settlements and street vendor were removed. Now the front façade met a pedestrian way with some benches right in front of the facades. The wall with the banyan tree facing Jl. Roda II now became a visited public space with benches and lamps with the banyan tree as the centre of attraction. Basically, the inhabitation around the buildings were formalised.

It differs from Soesman Kantor (A – 20). In 2015, this building was in a decaying and uninhabited condition. Its façade was inhabited by informal settlements and semi-permanent street vendors. In 2022, all informal inhabitation on its façade were removed or relocated and changed into pedestrian way. Some part of the building was revitalised and formally inhabited as a café and rented venue, some part was revitalised but remained uninhabited, and some part remained in a decaying condition and supposedly uninhabited, however, it has an informal inhabitation in the building in a form of *angkringan* (a type of stationary street vending). It showed a situation where the informal inhabitations were removed from the street, some managed to go inside decaying buildings. This similar situation happened to warung barong (I – 16) which located just across the street. In 2015, it was decaying and uninhabited, and it had some informal inhabitation outside the façade. In 2022, as the front of the façade became pedestrian way and all the informal inhabitations were removed, there was now an informal inhabitation in the inside of the building.

Another example was the Bank Mandiri Gelatik building (G – 17). In 2015, this building was one of the decaying and uninhabited building that was inhabited on the inside by an informal inhabitation which was a junk seller that seemed to use the

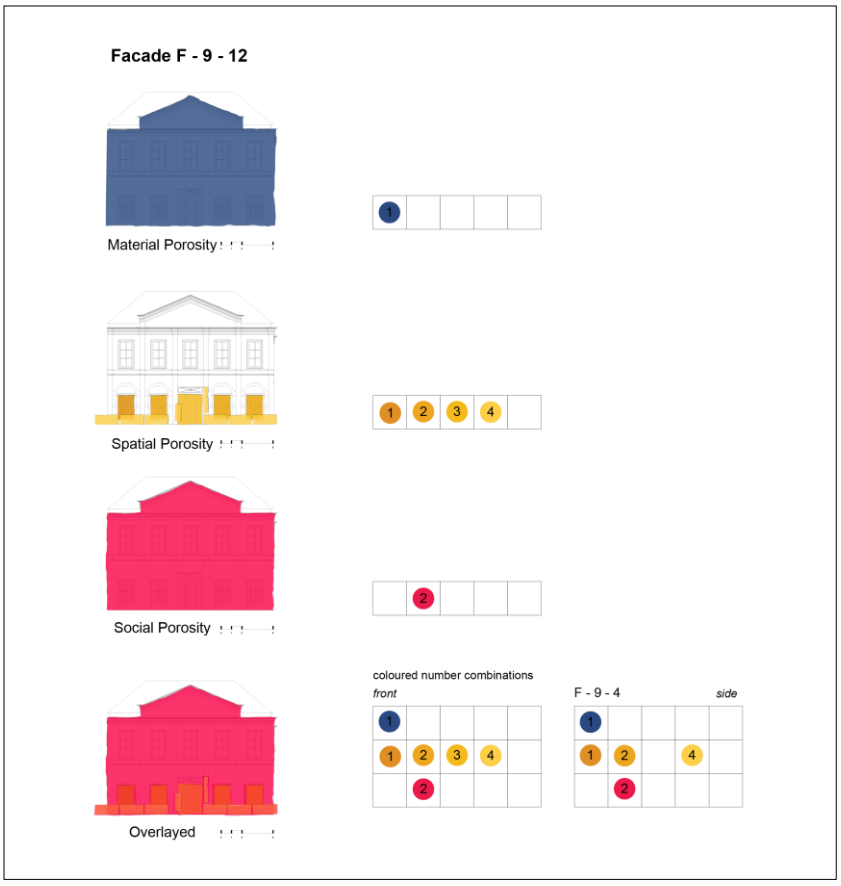
inside space a storage space for the junks they sold. On its façade there was also a semi-permanent street vendor. In 2022, as the building was revitalised all the informal inhabitations were removed from both inside and outside of the building. The building was formally inhabited as an office in 2022.

In Jl. Kepodang, there were also some buildings that were formally inhabited in 2015, some remained inhabited in 2022 just like the Bank Mandiri Kepodang (G – 16) but some became uninhabited in 2022, such as Ex Rajawali Nusindo (B – 20). The 2017 revitalisation project shifted the composition of the three groups of the overlayed map. Not only the number compositions as how the *M* group was decreasing and the *M+InH+F/InF* was increasing, but also the locations or spatial arrangement of them. No types of the groups were disappearing completely after the revitalisation as in 2022, the three groups in the overlayed mapped still existed.

Appendix K – Façade Porosity Reading

First Tendency – Non-porous Material Condition

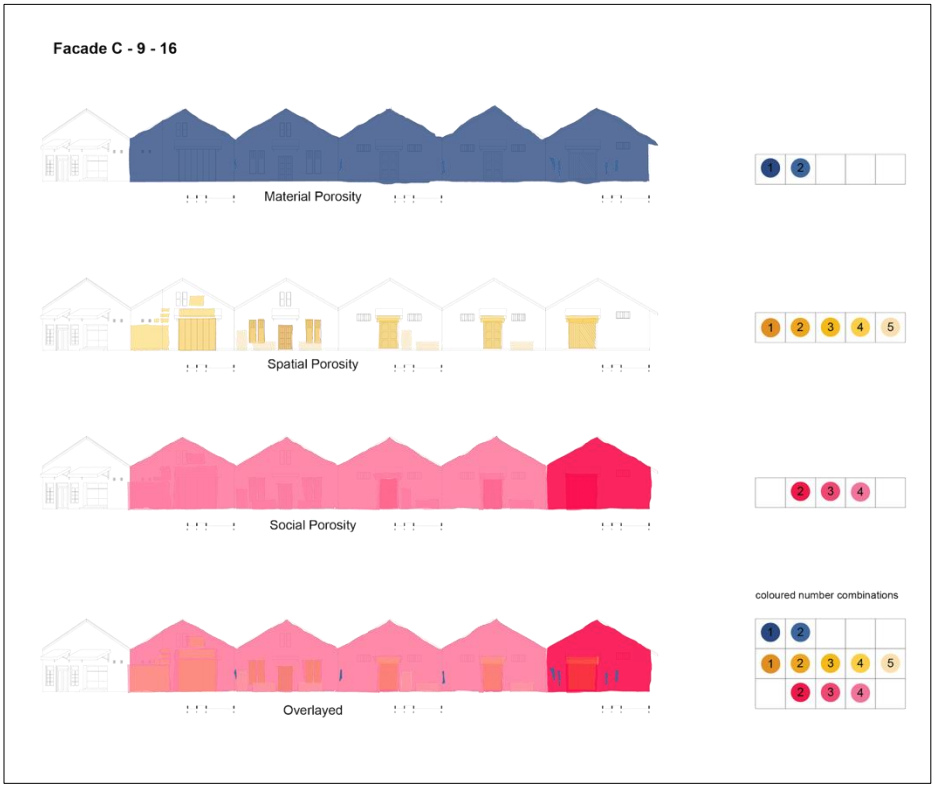
F – 9



For the first examples is the façade F – 9 – 12 and F – 9 – 4 from Starbucks coffee (F – 9). Starbucks in Semarang Old town inhabits a newly revitalised building which makes the material porosity less porous (1). As a food and beverage establishments, Starbucks is considered a semi-public establishment (2) where an economic transaction is required to access the inside space. It consists of two façades facing two different streets, Jl. Branjangan (street 9) and Jl. Letjen Soeprapto (street 4).

The coloured number combinations of the two façades show different level of spatial porosity. The one with more porous spatial porosity is usually the main façade entrance, in this case it is F – 9 – 12. This façade has active windows (2) and doors (3) that allow gaze access to the inside and entrance. It also has covered window (1) due to the spatial requirement from the inside. This façade is also utilised to give an extension space from the inside to the outside (4) where more tables, chairs, and parasols are placed right outside the façade. The façade also utilised to attached Starbucks sign and placed spatial menu board near the entrance. The other façade, F – 9 – 4 is the side façade of Starbucks where it has some active windows (2) and inactive window and doors (1). No entrance and it is where the light box signage of Starbucks attached.

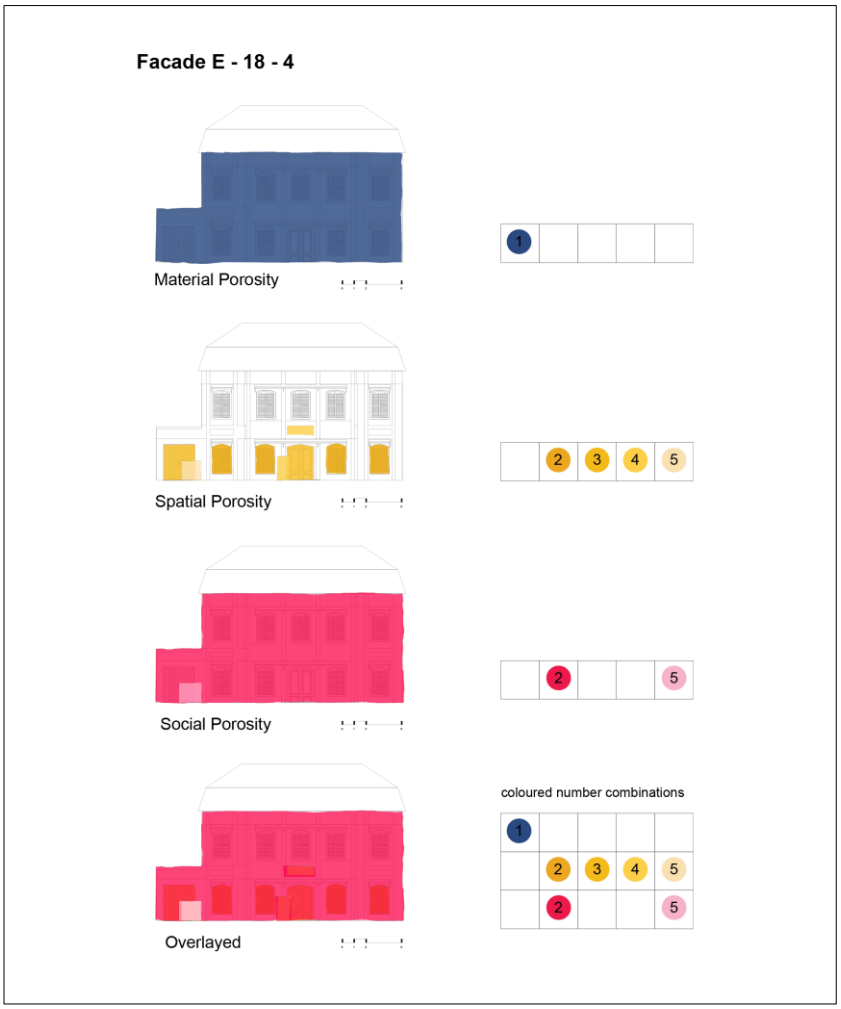
C – 9



Another example is façade C – 9 – 16 of the Semarang Creative Hub. Semarang Creative Hub inhabits 5 warehouses owned by *Perusahaan Perdagangan Indonesia* (PPI), one of state-owned company in Indonesia, revitalised (therefore it has (1) (2) in its material porosity) through joint CRS funds from different banks and companies and managed by the municipal and the ministry of tourism and creative economy. It hosts mixed functions in its social porosity ranging from semi-public and public. It is now the place for small local business and creative economy to sell their products (4). It also hosts the antique market that used to be in Jl. Taman Srigunting (street 17), where the seller can sell for free without rent and bills (3). It also space for a food court (2) which originally hosts the street vendors that used to be on the local streets of Semarang Old Town but now in 2022 most of the tenants were new from outside of the area.

The façade has all the level of the spatial porosity. As it consists of 5 warehouses, it has 5 doors, four of which allow entrances (3) and one does not (1). It has some active windows that allows gaze to the inside (2). The façade is also a space for signage and banners promoting what's inside (4). It also displays AC outdoor units, signifying a working inside space (4). The space in front of the façade is claimed by the municipal to place some street furniture such as benches, potted plants, and hand washing stations (5). The existence of benches makes the font of façade spaces a dedicated public space (4) in its social porosity.

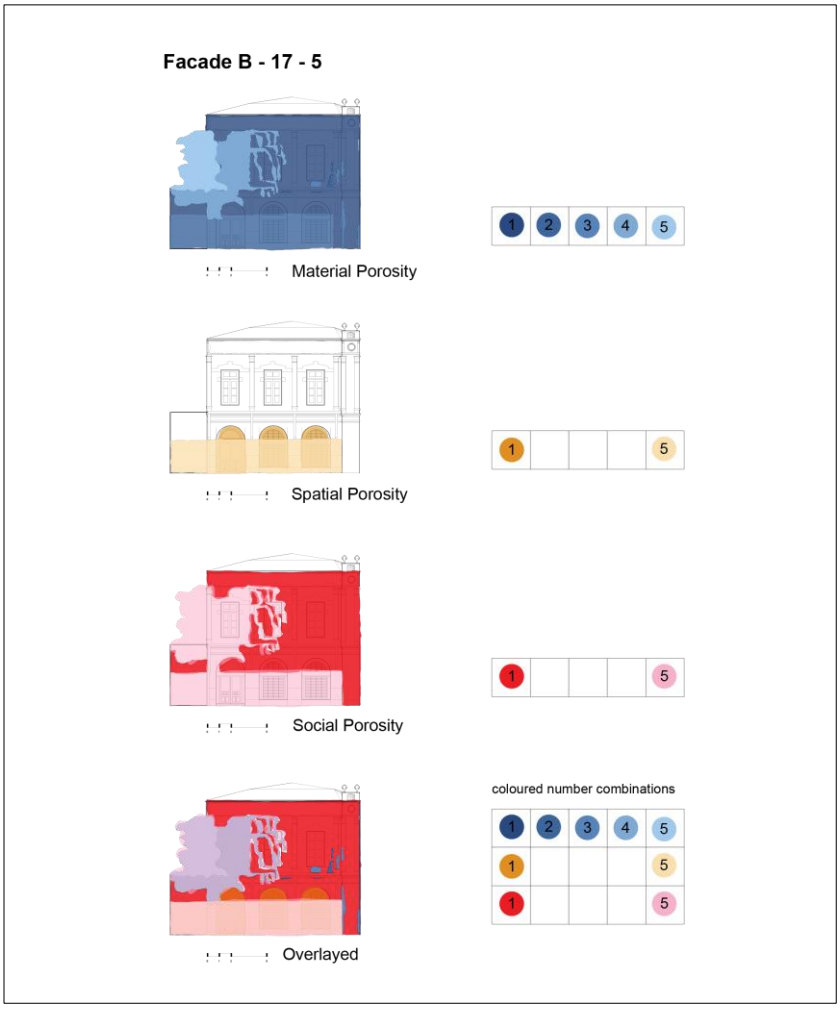
E – 18



The firs example is façade E – 18 – 4 of Weeskamer building (E – 18). Weeskamer building was uninhabited and in a decaying condition before the revitalisation project and its revitalisation was finished in 2019. In 2022, its condition remained impeccable (1). It is owned by the Indonesian Ministry of Law and Human Rights and now it is an event spaces for the ministry, which makes it has a semi-public access (2). Its façade has active windows that are usually open in daytime (2) and active door and gate (3) that allow entrance during events. Its façade also a

space where the name of the building attached (4) and if there is an event, the façade will have banners of the event. In addition to this, the façade is sometimes claimed by a street vendor (5), occupying some part of in front of the gate space. The street vendor is a pushcart street vendor, that usually come in the morning and stays there until the evening where they will go with the pushcart.

B – 17



Another example is the façade B – 17 – 5, the side façade of Marba Building (B – 17). Marba is one of the iconic buildings in Semarang Old Town, as it forms the main streetscape of the

main street, Jl. Letjen Soeprapto (street 4) together with *Gereja Blenduk* (A – 11), the iconic church with a dome shaped roof. This building is well maintained throughout its building life, making it in a decent yet dull condition, showed in the (1) (2) (3) (4) (5) combination of the material porosity. As its façade contain some plants growing on it, it shows that it has an unintended non-human inhabitation, which could be considered informal (5). It functions as an office, which therefore has a private access (1).

Its side façade, the one that face Jl. Gelatik (street 5), has inactive windows, as they have roller shutters on them (1) therefore there is no access to the inside at all. Right in front of this side façade, there are two informal establishments (5), one sells antiques, and the other is a *warung*, like a small restaurant, selling *Nasi Koyor*, rice based local dish. Both informal establishments have semi-permanent structures attached to the side façade. Semi-permanent here refers to a mixed material of half height brick walls, wood, and corrugated metal sheets for the roof, that have been staying there, in the case of *warung Nasi Koyor*, for some decades. This *warung* is one of the informal inhabitations that is kept and not being removed when the 2017 revitalisation happened as it has been there for almost 50 years based on the seller.

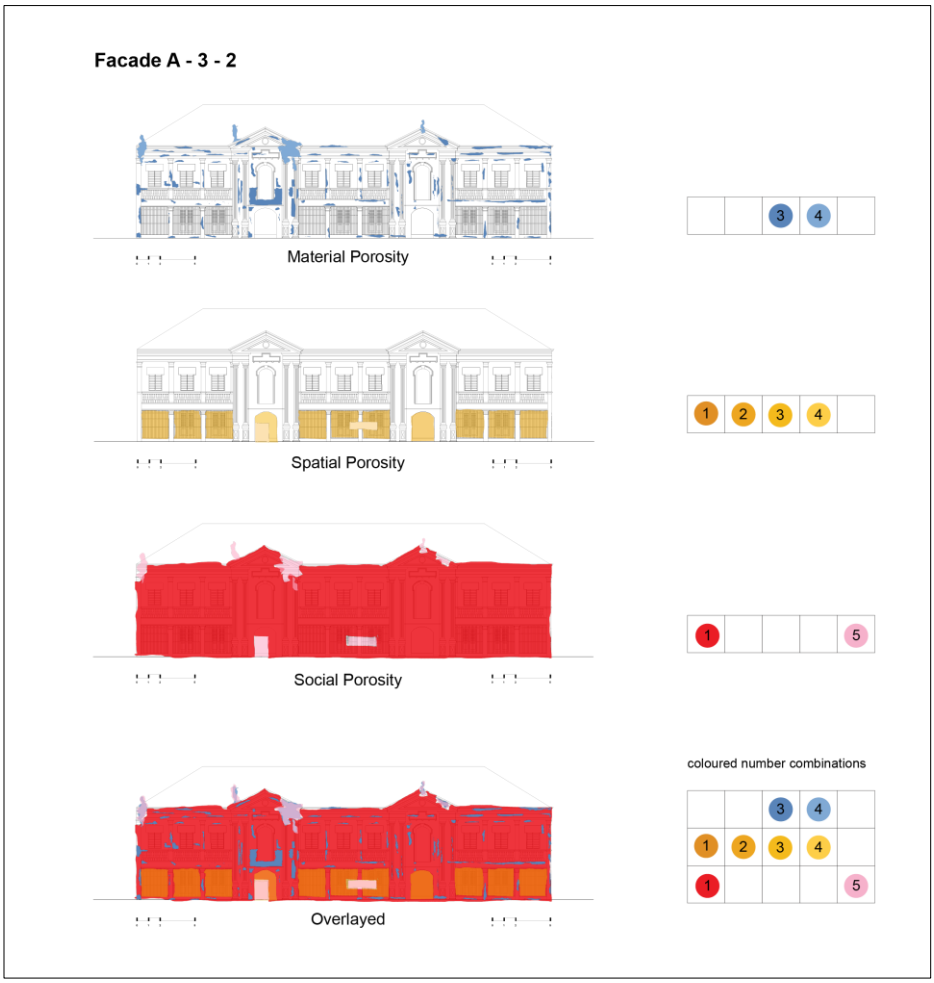
Furthermore, based on the coloured number combination reading, there are also some less porous material porosity façades that exist with the less porous spatial porosity and no social porosity as these refer to some building that are revitalised or in a decent material condition but not yet functioning or inhabited. Some of these façades have a temporary informal inhabitation which makes some of them have social porosity. For example, façade K -18 – 6 of the new Tekodeko café building that was under revitalisation in 2022, showing an impeccable material condition but still uninhabited. Another example is the Ex

Rajawali Nusindo's façades, B – 20 – 6 and B – 20 – 8. The are both in decent conditions (1) (2) (3), but uninhabited as it is on sell or to let therefore there are no access to the building (1). However, the front of the façades is used for informal parking (the one facing Jl. Kepodang (street 6)) and bird selling (the one facing Jl. Sendowo (street 8)), showing the façades host some informal inhabitation (5).

The discussion above shows some examples of the tendencies of existence of the less porous material porosity with the spatial porosity and social porosity. The main take away is that most of the less porous material porosity (with (1) in its combination) exist with a porous spatial porosity (2) (3) (4), indicating a functioning inside space or interior with an active façade in regulating the inside and outside connection. It usually then has a porous social porosity, a formal semi-public access (2) (3). As the spatial porosity progress to the more porous (5), the social porosity seems to also progress to the more porous of public access (4). Some other progress to the most porous spatial porosity which has an informal inhabitation (5) that exist, in the outside space of the façade, as an addition to the formal inhabitation of the building.

Second Tendency – Porous Material Condition

A – 3



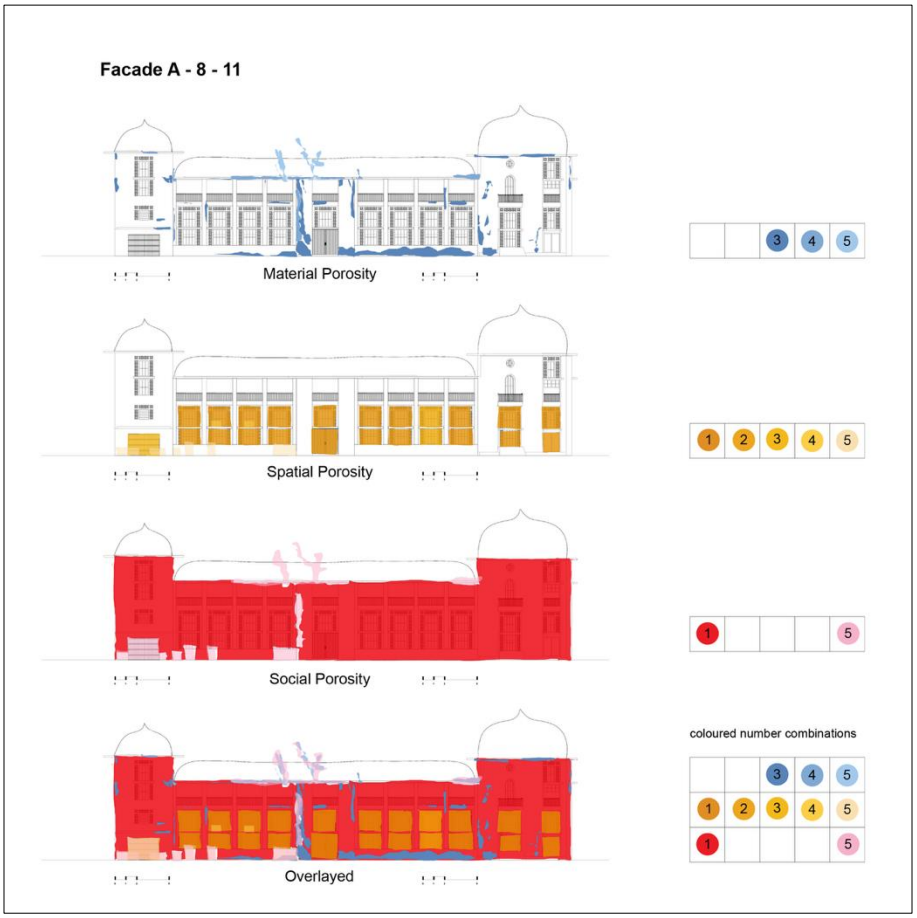
The first example of this first tendencies is the façade A – 3 – 2, the front façade of the Suara Merdeka building (A – 3). Suara Merdeka is one of the national newspapers in Indonesia, and this building is one of its offices (1). The building is continuously inhabited, however, in 2022, the building was in the state of decaying, with mostly eroded surface (3) and some small plants growing on the façade (4) which make the façade is inhabited by an informal non-human organism (5).

The front façade of this building has a terrace space, created by the balcony. This terrace has trellised openings that allow visual gaze to the terrace space (2) and trellised gateways, one is locked and therefore inactive (1), the other is the main access to the building (3). After terrace space, the façade wall is mostly regulated as well with inactive windows and door (1), with only one door access to the inside (3). On the façade, starting in the afternoon, there is an *angkringan,* a street vendor (5) selling food and drinks with a pushcart, in the gateway (4). Apparently, this is part of the cooperative business of the Suara Merdeka's employees. This shows that the informal inhabitation on the façade space of the building in this case is a small business or home industry by the owner of the building (such as in façade A – 13 – 18 and C – 3 – 14, a residential with small business and home industry, inhabit the façade and some of the inside space). Later in 2022, Suara Merdeka building was revitalised with an impeccable material condition, and the cooperative business is also getting bigger as it inhabits most of the terrace space of the building.

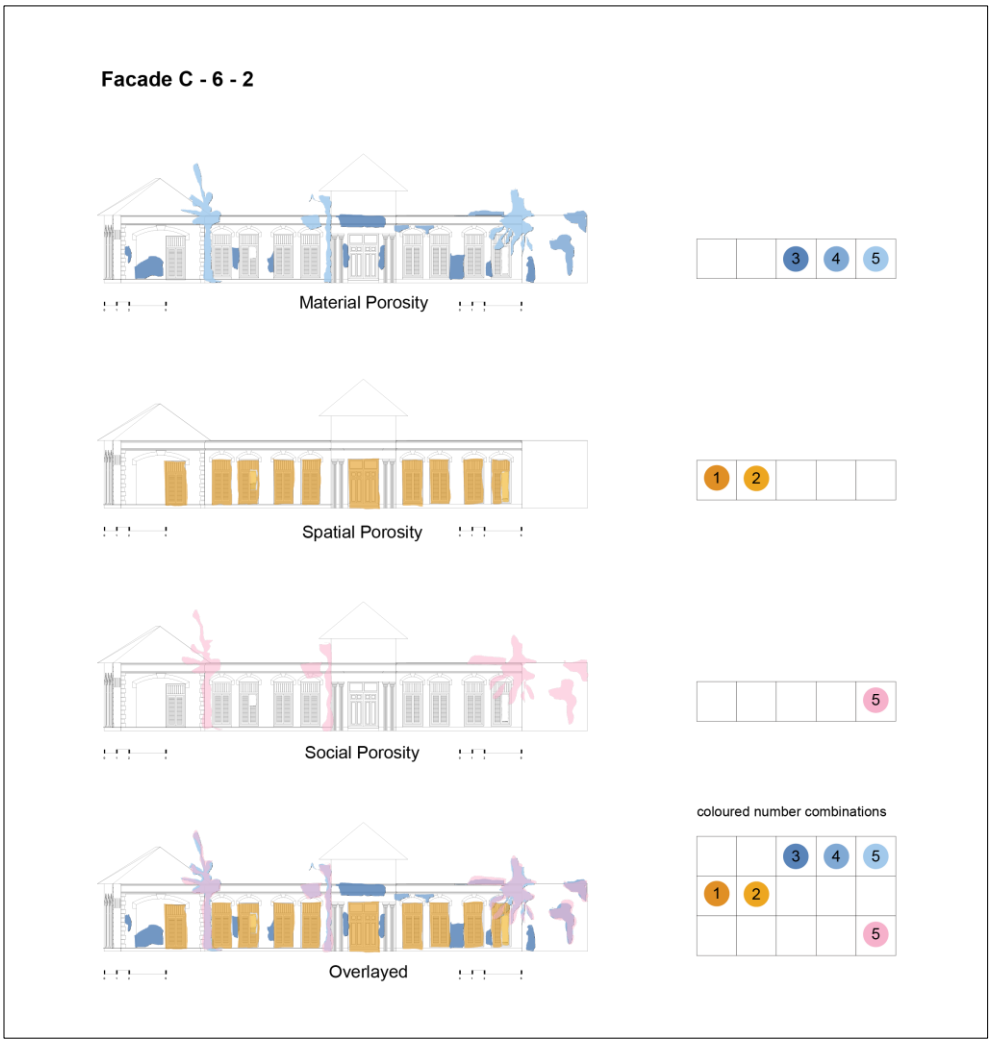
A – 8

Another example of these tendencies is the façade A – 8 – 11, the side façade of Djakarta Lloyd building (A – 8). It has a similar combination with Suara Merdeka (A – 3), it is an office (1) with a decaying condition (3) (4) (5). Its façade has inactive door and windows (1) with some windows allow a gaze to the inside (2). It has one active door (3) that allow entrance to an informal establishment, a *warung*, that sells foods and drinks (5). This *warung* used to be in one of the street corners in Semarang Old Town. But then around 2017, due to the revitalisation, it was removed from the street and the person in charge of the Djakarta Lloyd building allowed this *warung* to inhabit one of its inside spaces for free. In front of the *warung* side of the façade

sometimes is inhabited by informal motorcycle parking and people just sit around on the building edges (5) (5).



C – 6



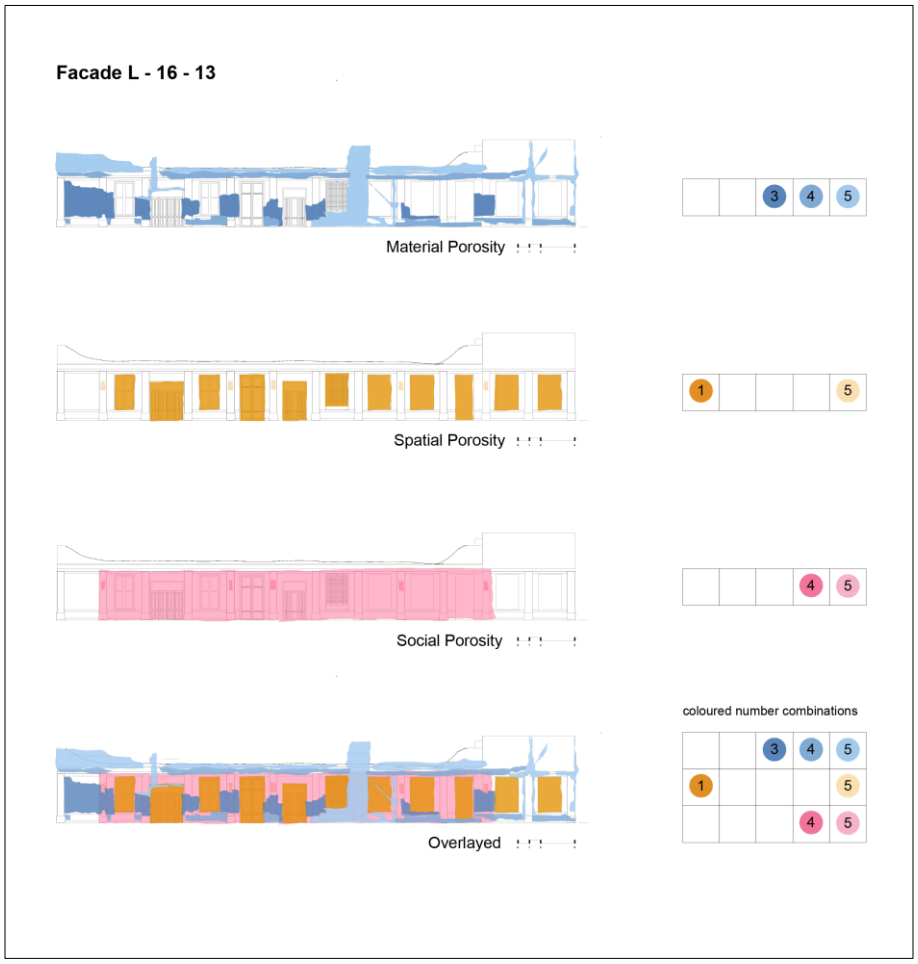
One of the first noticeable situation of the more porous material porosity façades are for them to contain other non-human organisms, such as trees. And sometimes, these non-human inhabitations take over the building plot and the façade. As an example, is the C – 6 – 2, the front façade of Ex Kodam building (C – 6). This building is abandoned and in ruin, its roof has collapsed, with some big trees growing inside the building plot and on its façade (5). Before the 2017 revitalisation, this building was known as a prostitution place where they trespassed the façade to the inside space. After the revitalisation, in 2022, the building is still in ruin, but the prostitution was removed and due to the reactivation of the pedestrian around the buildings with

streetlights and a daily patrol in the area, this negative activity is not coming back. The façade has no active doors and window (1), with some broken windows that allows some gaze to the inside space (2). It has no other inhabitation rather than the trees growing on the plot due to its abandonment, which could be considered as a form of unplanned informal non-human inhabitation (5).

E – 15 and L – 16

There are some other buildings that has these tendencies of existence, where the non-human inhabitations take over the building plot and the façade. There is one area in Semarang Old Town, composed by two 'face to face' façades from uninhabited buildings, E – 15 – 13 and L – 16 – 13, that seems to embrace this more porous material porosity with non-human inhabitations. This is the area in Jl. Roda II (street 13) commonly refers to *Rumah Akar.* Rumah Akar particularly refers to the L – 16 – 13 façade that has a big and old banyan tree growing on the façade (5), its roots intertwined with and becomes part of the façade. The façade across, E – 15 – 13, the façade of Ex Indische Building is also in a more porous material porosity with eroded façade, exposing the brickworks (3) and mossed grow on the surface (4) with some roots from small trees and vines draping from the roof. Both evidently have non-human informal inhabitations (5).

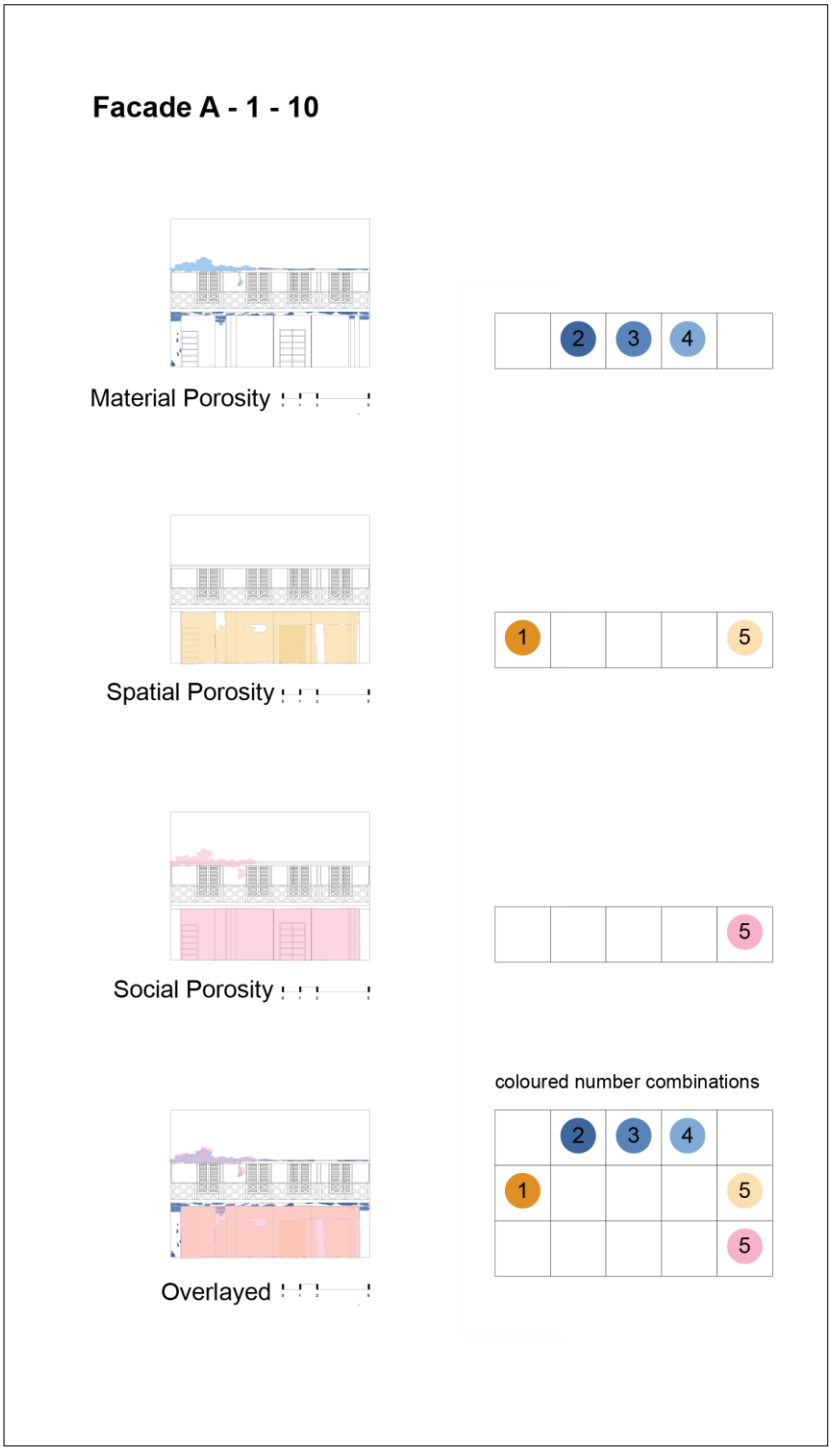
These two façades also have the same spatial porosity, which is the less porous as it has no active doors and windows, therefore no access to inside spaces (1) as the buildings are uninhabited. The 2017 revitalisation made Jl. Roda II as a pedestrian way. It also furnished the part where the Rumah Akar is. It placed benches and bins right in front of façade E – 15 – 13 and attached wall light on both façade E – 15 – 13 and L – 16 – 13 (5), dedicating this are as a public space for the public (4). Nowadays it becomes one of the most visited spots in Semarang Old Town.



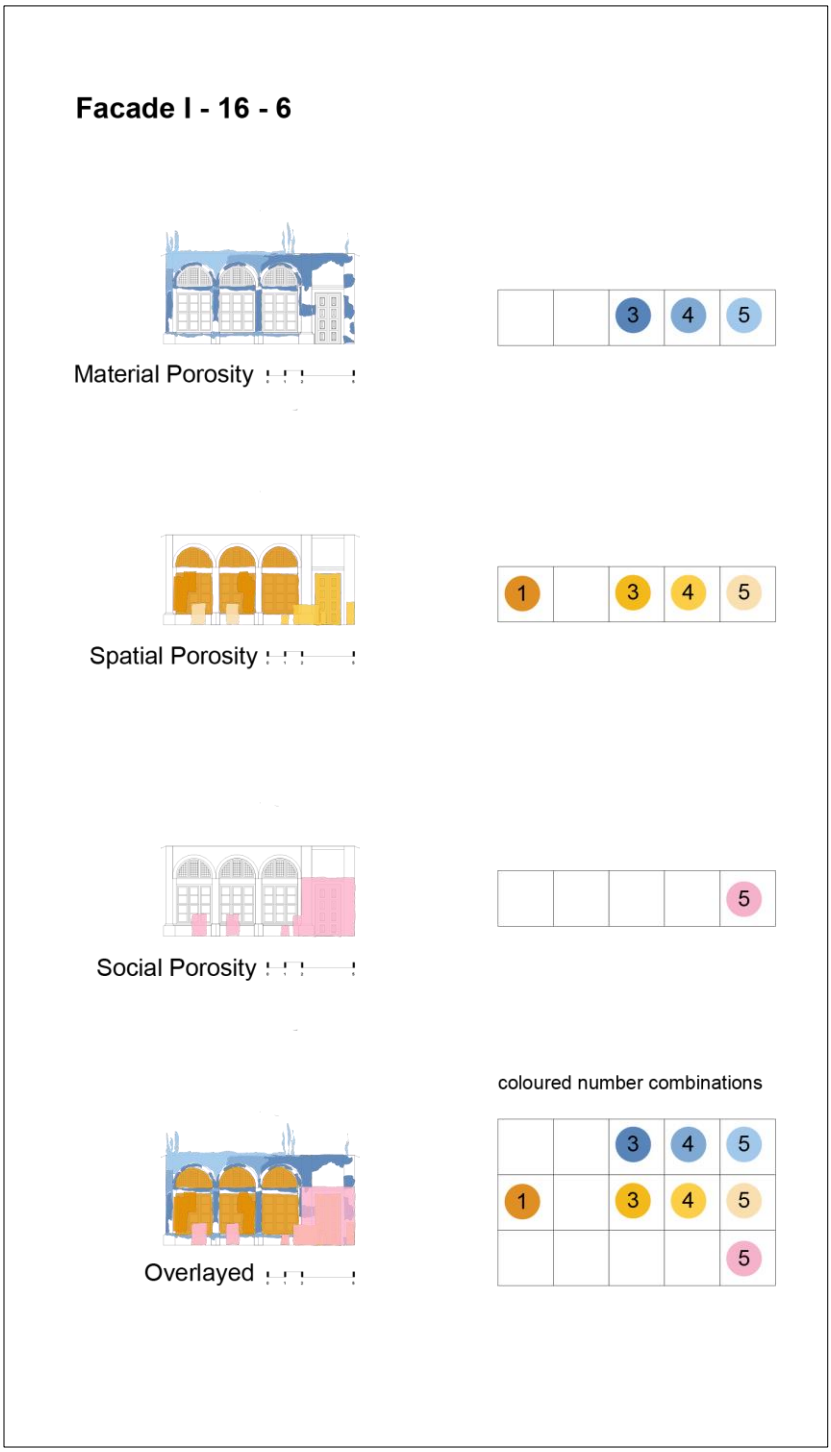
A – 1

The façade A – 1 – 10 that belongs to building A – 1, a house in Jl. Meliwis (street 10). The façade is mostly stained (2), eroded (3), and some small plants is growing on the roof (4). This building is formally uninhabited. The façade has a terrace space due to the balcony that are supported by columns. The façade has no active doors or windows (1) and the façade has two informal inhabitations (5) inhabiting the terrace space (5), one is a *kedai,* another name for *warung* type of informal food and drink seller and the other is an informal dwelling, shaped by mixed material such as corrugated metal sheet and tarp tent. Their existence is known by the building owner that gave them

permission to be there, even the owner sometimes gave them small amount of money to be there. It seems that these informal inhabitations act as protection from further intrusion to the buildings, unlike the next tendency of existence where the informal inhabitation seeping to the inside space.



I – 16



The last tendency of existence from the more porous material porosity is the façade with more porous material porosity (3) (4) (5), formally uninhabited, informally inhabited (5), but not only at the outside of the façade (5), but also the inside space, therefore

the façade is active (3) (4). For example, is façade I – 16 – 6, that belongs to building I – 16 which will be called *barong* building from the *barong* ornament on top of the main door of the building. This building is in ruin, as it used to be two storeys building but now it is only having one floor façade. The façade of the building is mostly eroded (3), with some small plants (4) and some roots start covering the façade (5).

The building is formally uninhabited. Before the revitalisation, there was a street vendor in front of it, selling foods and drinks with a cart and tent type street vending. As the 2017 revitalisation 'cleaned' up the street, any street vendors inhabiting the street were removed. This street vendor, somehow find a way to be given permission to inhabit the inside of the *barong* building. Based on their knowledge, the BPK2L which is the Semarang Old Town Management board gave them permission to go to the inside as it is not allowed to do street vending on the street again after the revitalisation (5) (5). This is how then the façade of the *barong* building became active for the *warung* inhabitation inside. It has functioning door that allow entrance (3) with covered windows (1). During the opening hours, the *warung* extend to the outside of the façade, to the pedestrian space, by placing stools and table sometimes (4).

In the inside space, the *warung* sets up a food counter with some tables attached to the wall and stools. The ceiling is covered with tarp and some corrugated metal sheet. A new electric box was installed, and the bill is paid for them by one of local philanthropist, so they could install some lamps for the inside space.

Appendix L – Ethics Approval and Consent form Samples

Ethics Committee Reviewer Decision

This form must be completed by each reviewer. Each application will be reviewed by two members of the ethics committee. Reviews may be completed electronically and sent to the Faculty ethics administrator from a University of Nottingham email address, or may be completed in paper form and delivered to the Faculty of Engineering Research Office.

Applicant full name Diandra Saginatari

Reviewed by:

Name S11

Signature (paper based only) .....

Date 02/12/2021

- [x] Approval awarded - no changes required
- [ ] Approval awarded - subject to required changes (see comments below)
- [ ] Approval pending - further information & resubmission required (see comments)
- [ ] Approval declined – reasons given below

Comments:

Please note:

1. The approval only covers the participants and trials specified on the form and further approval must be requested for any repetition or extension to the investigation.
2. The approval covers the ethical requirements for the techniques and procedures described in the protocol but does not replace a safety or risk assessment.
3. Approval is not intended to convey any judgement on the quality of the research, experimental design or techniques.
4. Normally, all queries raised by reviewers should be addressed. In the case of conflicting or incomplete views, the ethics committee chair will review the comments and relay these to the applicant via email. All email correspondence related to the application must be copied to the Faculty research ethics administrator.

Any problems which arise during the course of the investigation must be reported to the Faculty Research Ethics Committee

2018-19 academic year only

Ethics Committee Reviewer Decision

This form must be completed by each reviewer. Each application will be reviewed by two members of the ethics committee. Reviews may be completed electronically and sent to the Faculty ethics administrator (Donna Astill-Shipman) from a University of Nottingham email address, or may be completed in paper form and delivered to the APM Hub

Applicant full name …… Diandra Pandu Saginatari……

Reviewed by:

Name M08

Signature (paper based only) ……

Date ……..29/11/21……

- ☐ Approval awarded - no changes required
- ☐ Approval awarded - subject to required changes (see comments below)
- ■ Approval pending - further information & resubmission required (see comments)
- ☐ Approval declined – reasons given below

Comments:

Regarding section 5 of the application form, if you are planning to mention specific roles, you need to give participants justification for why you will be publicising this information so that they can make a fully informed choice whether they want to be identifiable or not. I would also mention in the information sheet that they have the option to consent but to remain fully anonymous in which case you should give a general descriptor of their role/building etc. but nothing that would identify that person.

(This is more for the researcher's protection rather than participants): For the wall observation, will you need permission from building owners/councils etc. for taking samples? Will you be needing access to areas not open to the public?

One particular issue is with the video observation section of this research. Within the information sheet and consent form, you are asking interview participants to give consent to you recording video footage for the observational part of the study. I had the impression that the interviews and observations were separate, and will be recording general members of the public? It needs to be made clear exactly what activities the participants are being asked to do, and only give them information relating to those activities. As I understand it you are filming members of the public/visitors to buildings in and around those buildings as well as conducting interviews with key persons. Whilst you absolutely need building/company owners' consent for filming, the consent form is not the place for this. You'll need separate consent for filming, but you will also need to put up videography notices (the university has some pdfs of this that you may be able to use) along with information about the study and who to contact if people object to being filmed around the area that you are filming for the duration of filming. You'll also need a procedure for enabling the deletion of footage if someone objects. You may also need to do a Data Protection Impact Assessment (talk to the data protection team about this) for measures to protect video data collected in a public place. On a related note, regarding section 6 of the application form, you need to detail where the video/photographic data will be stored and how it will be transferred from the moment of capture. Will it be a handheld video camera? The collected footage needs to be kept with the researcher at all times and data transferred (then deleted from the device) at the earliest opportunity.

I didn't see a copy of the online survey that will be conducted, please attach the questions for the survey.

Please note:

1. The approval only covers the participants and trials specified on the form and further approval must be requested for any repetition or extension to the investigation.
2. The approval covers the ethical requirements for the techniques and procedures described in the protocol but does not replace a safety or risk assessment.
3. Approval is not intended to convey any judgement on the quality of the research, experimental design or techniques.
4. Normally, all queries raised by reviewers should be addressed. In the case of conflicting or incomplete views, the ethics committee chair will review the comments and relay these to the applicant via email. All email correspondence related to the application must be copied to the Faculty research ethics administrator.

Ethics Committee Reviewer Decision

This form must be completed by each reviewer. Each application will be reviewed by two members of the ethics committee. Reviews may be completed electronically and sent to the Faculty ethics administrator from a University of Nottingham email address, or may be completed in paper form and delivered to the Faculty of Engineering Research Office.

Applicant full name Resubmission – D Saginatari

Reviewed by:

Name M08

Signature (paper based only) .....

Date 04/01/2021

- [x] Approval awarded - no changes required
- [ ] Approval awarded - subject to required changes (see comments below)
- [ ] Approval pending - further information & resubmission required (see comments)
- [ ] Approval declined – reasons given below

Comments:

Please note:

1. The approval only covers the participants and trials specified on the form and further approval must be requested for any repetition or extension to the investigation.
2. The approval covers the ethical requirements for the techniques and procedures described in the protocol but does not replace a safety or risk assessment.
3. Approval is not intended to convey any judgement on the quality of the research, experimental design or techniques.
4. Normally, all queries raised by reviewers should be addressed. In the case of conflicting or incomplete views, the ethics committee chair will review the comments and relay these to the applicant via email. All email correspondence related to the application must be copied to the Faculty research ethics administrator.

Any problems which arise during the course of the investigation must be reported to the Faculty Research Ethics Committee

Consent Form – Participant A
Formulir Persetujuan – Responden A

Title of research *(Judul riset)*	In search of Thickness: Porosity of wall as an assemblage of historical, ecological, social archive of urban heritage area
Researcher *(Peneliti)*	Diandra Pandu Saginatari (PhD Student in Architectural Design (Social Science) University of Nottingham)

I confirm that I have read/received a verbal explanation and understand the information within the Participation Information Sheet, containing the purpose of study and the activities involved for the study, for the above project. I also confirm that I have the opportunity to ask questions about the study. *(Saya membenarkan bahwa saya telah membaca/mendapat penjelasan secara verbal serta memahami informasi pada Lembar Informasi untuk Partisipan, yang berisikan tujuan dari studi dan aktivitas yang terlibat di dalamnya, untuk proyek tersebut di atas. Saya juga membenarkan bahwa saya mendapatkan kesempatan untuk bertanya terkait dengan studi tersebut.)*	☑
I understand that the information, narrative and additional data given (such as official reports and drawing documents) will be referred to my position and the name of the institution that I represent, not to my personal identity, within the data analysis and within any form of published and disseminated output of study (for example: journals, conference paper, conference presentation, lecture presentation, mass media articles, or exhibition), and I give my consent for this matter. (If you don't give consent for this clause, please state the reference allowed, including if it is to be anonymous). *(Saya memahami bahwa informasi, narasi dan data tambahan yang saya berikan (seperti dokumen laporan resmi dan dokumen gambar) akan dirujuk kepada jabatan dan nama institusi yang saya wakilkan, bukan kepada identitas pribadi, di dalam analisis data dan di dalam bebagai bentuk luaran dari studi yang dipublikasikan dan didiseminasikan (sebagai contoh: publikasi jurnal dan konferensi, presentasi konferensi, presentasi kuliah, artikel media masa, atau pameran), dan saya memberikan izin terkait hal ini. (Jika tidak memberikan izin pada klausul ini, mohon sampaikan rujukan yang diizinkan, termasuk jika yang diizinkan adalah anonim).)* Consent for reference (Izin untuk rujukan): Personal identity	☑
I give consent to record my interview and to do field observation by taking photograph, drawing and video recording of the area of Semarang Old Town. *(Saya memberikan izin untuk merekam interview saya dan untuk melakukan observasi lapangan dengan mengambil foto, menggambar dan merekam video area Kota Lama Semarang.)*	☑
I give consent to use all the data collected from the interview, field observation and also any additional data that I provided, such as official reports and drawing documents, within any form of published and disseminated output of study (for example: journals, conference paper, conference presentation, lecture presentation, mass media articles, or exhibition), under the agreement of the referential matter as stated in the previous clause and with all	☑

the photograph, drawing, and video recording to be detached appropriately from any reference of human figure. *(Saya memberikan izin untuk penggunaan semua data yang dikumpulkan dari interview, observasi lapangan dan juga data tambahan yang saya berikan, seperti dokumen laporan resmi atau dokumen gambar, di dalam berbagai bentuk luaran studi yang dipublikasikan dan diseminasikan (sebagai contoh: publikasi jurnal dan konferensi, presentasi konferensi, presentasi kuliah, artikel media masa, atau pameran), di bawah kesepakatan terkait masalah referensi seperti yang dinyatakan dalam klausul sebelumnya dan dengan semua foto, gambar dan rekaman video dilepaskan dari figur orang dengan tepat.)*	
I understand that: all digital data collected within this study will be stored in OneDrive storage provided by University of Nottingham as a secure and encrypted storage. The data could be accessed only by researcher and supervisors. A backup copy of all digital data will be on a password protected hard drive and will be stored in a locked filling cabinet. For paper based report will be stored in filing cabinet. All data will not be shared to any other party (except for the recorded interview that will be circulate to a professional transcription and translation services to produce transcription and translation of the interview) and will be kept securely for seven years following dissemination and publication results. After this time, digital files will be deleted and any hard copies will be destroyed. *(Saya memahami bahwa: semua data digital yang dikumpulkan dalam studi ini akan disimpan di OneDrive yang disediakan oleh University of Nottingham sebagai tempat penyimpanan yang aman dan terenkripsi. Data hanya bisa di akses oleh peneliti dan supervisor. Salinan data cadangan akan disimpan dalam pelangkat keras dengan kata sandi dan akan disimpan dalam lemari penyimpanan yang terkunci. Untuk data yang berbasis kertas akan disimpan di lemari penyimpanan yang sama. Semua data tidak akan dibagikan ke pihak lain (kecuali untuk proses traskripsi dan translasi dari rekaman interview yang akan diberikan kepada pemberi jasa transkripsi dan translasi professional) dan data akan disimpan dengan aman selama tujuh tahun setelah adanya diseminasi dan publikasi. Setelah ini data digital akan dihapus dan data berbasis kertas akan dihancurkan.)*	☑
I understand that I am entitled to access the information and data I have given at any time while it is stored in the manner specified above. *(Saya memahami bahwa saya memiliki hak untuk dapat mengakses informasi dan data yang saya berikan kapan pun ketika data disimpan dengan cara yang dijelaskan di atas.)*	☑
I understand that I am allowed to contact any of the people who conducted the study to seek further clarification and information. *(Saya memahami bahwa saya boleh menghubungi siapapun yang melakukan studi untuk mencari klarifikasi dan informasi lebih jauh.)*	☑
I understand that I will not have direct benefit from my participation in this study. *(Saya memahami bahwa saya tidak mendapatkan keuuntungan langsung dari partisipasi saya dalam studi.)*	☑
I confirm that I am over 18 years old. *(Saya membenarkan bahwa saya berumur di atas 18 tahun.)*	☑
I confirm that I am willing to participate in this study with the understanding that my participation in voluntary and I am free to withdraw at any time without giving any reason. (For any withdrawal, please contact Diandra Saginatari as the lead researcher through email diandra.saginatari@nottingham.ac.id or through mobile number +447721629967.) *(Saya membenarkan bahwa saya bersedia untuk berpartisipasi dalam studi dengan pemahaman bahwa partisipasi saya bersifat suka rela dan saya dapat menarik partisipasi saya kapan pun tanpa perlu memberikan alasan. (Untuk penarikan partisipasi, mohon hubungi Diandra Saginatari selaku peneliti utama melalui email diandra.saginatari@nottingham.ac.uk atau melalui nomor Hp +447721629967.)*	☑

Signature of Participant	
Name of Participant	TJAHJONO PRAWIRODJO
Date	
Signature of Researcher	
Name of Researcher	DIANDRA PS
Date	30 – 3 – 22

The University of Nottingham

Consent Form – Participant C
Formulir Persetujuan – Responden C

Title of research *(Judul riset)*	In search of Thickness: Porosity of wall as an assemblage of historical, ecological, social archive of urban heritage area
Researcher *(Peneliti)*	Diandra Pandu Saginatari (PhD Student in Architectural Design (Social Science) University of Nottingham)

I confirm that I have read/received a verbal explanation and understand the information within the Participation Information Sheet, containing the purpose of study and the activities involved for the study, for the above project. I also confirm that I have the opportunity to ask questions about the study. *(Saya membenarkan bahwa saya telah membaca/mendapat penjelasan secara verbal serta memahami informasi pada Lembar Informasi untuk Partisipan, yang berisikan tujuan dari studi dan aktivitas yang terlibat di dalamnya, untuk proyek tersebut di atas. Saya juga membenarkan bahwa saya mendapatkan kesempatan untuk bertanya terkait dengan studi tersebut.)*	☑
I understand that the information, narrative and additional data given (such as official reports and drawing documents) will be referred to my occupation, such as business owner, restaurant owner, music street performer, etc, not to my personal identity, within the data analysis and within any form of published and disseminated output of study (for example: journals, conference paper, conference presentation, lecture presentation, mass media articles, or exhibition), and I give my consent for this matter. (If you don't give consent for this clause, please state the reference allowed, including if it is to be anonymous). *(Saya memahami bahwa informasi, narasi dan data tambahan yang saya berikan (seperti dokumen laporan resmi dan dokumen gambar) akan dirujuk kepada pekerjaan saya seperti pemilik usaha, pemilik restoran, pengamen, dsb, bukan kepada identitas pribadi, di dalam analisis data dan di dalam bebagai bentuk luaran dari studi yang dipublikasikan dan didiseminasikan (sebagai contoh: publikasi jurnal dan konferensi, presentasi konferensi, presentasi kuliah, artikel media masa, atau pameran), dan saya memberikan izin terkait hal ini. (Jika tidak memberikan izin pada klausul ini, mohon sampaikan rujukan yang diizinkan, termasuk jika yang diizinkan adalah anonim).)* Consent for reference (Izin untuk rujukan): _____	☑
I give consent to record my interview and to do field observation by taking photograph, drawing and video recording of my building and space in the area of Semarang Old Town. *(Saya memberikan izin untuk merekam interview saya dan untuk melakukan observasi lapangan dengan mengambil foto, menggambar dan merekam video dari bangunan dan ruang saya di area Kota Lama Semarang.)*	☑
I give consent to use all the data collected from the interview, field observation and also any additional data that I provided, such as official reports and drawing documents, within any form of published and disseminated output of study (for example: journals, conference paper, conference presentation, lecture presentation, mass media articles, or exhibition), under the agreement of the referential matter as stated in the previous clause and with all	☑

the photograph, drawing, and video recording to be detached appropriately from any reference of human figure. *(Saya memberikan izin untuk penggunaan semua data yang dikumpulkan dari interview, observasi lapangan dan juga data tambahan yang saya berikan, seperti dokumen laporan resmi atau dokumen gambar, di dalam berbagai bentuk luaran studi yang dipublikasikan dan diseminasikan (sebagai contoh: publikasi jurnal dan konferensi, presentasi konferensi, presentasi kuliah, artikel media masa, atau pameran), di bawah kesepakatan terkait masalah referensi seperti yang dinyatakan dalam klausul sebelumnya dan dengan semua foto, gambar dan rekaman video dilepaskan dari figur orang dengan tepat.)*	
I understand that: all digital data collected within this study will be stored in OneDrive storage provided by University of Nottingham as a secure and encrypted storage. The data could be accessed only by researcher and supervisors. A backup copy of all digital data will be on a password protected hard drive and will be stored in a locked filling cabinet. For paper based report will be stored in filing cabinet. All data will not be shared to any other party (except for the recorded interview that will be circulate to a professional transcription and translation services to produce transcription and translation of the interview) and will be kept securely for seven years following dissemination and publication results. After this time, digital files will be deleted and any hard copies will be destroyed. *(Saya memahami bahwa: semua data digital yang dikumpulkan dalam studi ini akan disimpan di OneDrive yang disediakan oleh University of Nottingham sebagai tempat penyimpanan yang aman dan terenkripsi. Data hanya bisa di akses oleh peneliti dan supervisor. Salinan data cadangan akan disimpan dalam pelangkat keras dengan kata sandi dan akan disimpan dalam lemari penyimpanan yang terkunci. Untuk data yang berbasis kertas akan disimpan di lemari penyimpanan yang sama. Semua data tidak akan dibagikan ke pihak lain (kecuali untuk proses traskripsi dan translasi dari rekaman interview yang akan diberikan kepada pemberi jasa transkripsi dan translasi professional) dan data akan disimpan dengan aman selama tujuh tahun setelah adanya diseminasi dan publikasi. Setelah ini data digital akan dihapus dan data berbasis kertas akan dihancurkan.)*	☑
I understand that I am entitled to access the information and data I have given at any time while it is stored in the manner specified above. *(Saya memahami bahwa saya memiliki hak untuk dapat mengakses informasi dan data yang saya berikan kapan pun ketika data disimpan dengan cara yang dijelaskan di atas.)*	☑
I understand that I am allowed to contact any of the people who conducted the study to seek further clarification and information. *(Saya memahami bahwa saya boleh menghubungi siapapun yang melakukan studi untuk mencari klarifikasi dan informasi lebih jauh.)*	☑
I understand that I will not have direct benefit from my participation in this study. *(Saya memahami bahwa saya tidak mendapatkan keuuntungan langsung dari partisipasi saya dalam studi.)*	☑
I confirm that I am over 18 years old. *(Saya membenarkan bahwa saya berumur di atas 18 tahun.)*	☑
I confirm that I am willing to participate in this study with the understanding that my participation in voluntary and I am free to withdraw at any time without giving any reason. (For any withdrawal, please contact Diandra Saginatari as the lead researcher through email diandra.saginatari@nottingham.ac.id or through mobile number +447721629967.) *(Saya membenarkan bahwa saya bersedia untuk berpartisipasi dalam studi dengan pemahaman bahwa partisipasi saya bersifat suka rela dan saya dapat menarik partisipasi saya kapan pun tanpa perlu memberikan alasan. (Untuk penarikan partisipasi, mohon hubungi Diandra Saginatari selaku peneliti utama melalui email diandra.saginatari@nottingham.ac.uk atau melalui nomor Hp +447721629967.)*	☑

Signature of Participant Name of Participant Date	Sumarti
Signature of Researcher Name of Researcher Date	