Norwegian University of Life Sciences
Faculty of Landscape and Society
Department of Urban and Regional Planning

Philosophiae Doctor (PhD)
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The Building-Street Relationship – Investigating the Art of Compact City Building in Contemporary Norwegian Practice

Bygning-Gate Relasjonen – Kunsten å Byggje den Kompakte Byen i gjeldande Norsk Praksis

Anja Kristin Standal

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Now that this chapter of life is close to its end, I think It has been the opposite of madness, possibly cleverness. And I am looking forward to developing the family's journey of knowledge further, into new adventures for the whole team.

Anja Standal

Oslo 22th November 2021

Contents

Preface

Throughout my career as an architect and urban planner, I have been concerned with the connections between the small and large buildings and spaces in which we live and move, how they provide a framework for how we live our lives, and how we perceive and experience our built environment. The motivation of this thesis comprises this urban experience and the research is morphological. I want to contribute to the knowledge for building better cities and to build a bridge between realised projects (urban development) and future visions (urban planning), between buildings and cities, and between private and public space in the building–street relationship. The relation and interface between the private and public realm have been of great interest to me since I was introduced to the field of Urban Morphology as an Architecture exchange student in Delft, the Netherlands in 2004. In a course about urban densification in the small-scale city of Dordrecht, we approached the site from a morphological perspective. In the same year, I was also introduced to the map *Pianta Grande di Roma* (1748) by Giambattista Nolli, an Italian architect and surveyor. In this map, Nolli created the city of Rome as an enormous mass that he carved out to create public space (white) and private space (black). This early map presented public and semi-public buildings as part of the urban realm and went beyond the physical boundaries of the front wall and façade to show the functional boundary of public space. It has had a great impact in my professional career and is still an important form of guidance when thinking about the city, its urban form, and the relationship between the public and private realms.

My educational background includes a bachelor's degree in Construction and Engineering from Høgskolen in Ålesund (2000) and a master's degree in Architecture from the Norwegian University of Science and Technology (2007). I have over 15 years of professional experience in the fields of planning and architecture, from both the public and private sectors. Throughout the entirety of my professional background and work practice, I have continuously focused on the topic of my PhD research. My first job after finishing my Master in Architecture was at a landscape architecture office in Oslo. I was particularly interested in how buildings connected to the related urban space and learned a great deal about the importance of centimetres when it came to the outcome of the project. Particularly crucial to this was the development and location of the building at an early phase. In my next job, which was for another Oslo-based architecture office, I had the chance to develop and investigate spatial connections through urban design solutions and planning regulation. Later, I worked for four years in the planning authority of Ålesund, a coastal town on the west coast of Norway. The townscape and built form of Ålesund have a very compact character with high heritage value, from which I learned much about how to address the challenges of universal design requirements in a protected urban situation, often addressing the relationship between private buildings and public space. I was the case officer for a large redevelopment area in the town centre, where we sought to develop regulations and guidelines to create a compact addition to the existing urban fabric.

This included a focus on the spatial development of urban spaces, on the intermediate level between building and plan. At the same time, the zoning regulation included micro-morphological demands of entrance density and levels of transparency. My experience in public sector planning demonstrated to me that the outcome of planning cases is often determined by the abilities and skills of the individual case officer, rather than by strategies and tools for effective implementation or knowledge implemented in the system. It enabled me to build a strong knowledge base for grounding my practical work within the Norwegian context; however, there were few examples and those available were normative. When I was given the chance to investigate this topic further through PhD research, I was very glad because I hoped that my research might contribute to the Norwegian practice.

In the process of my PhD, I have worked in parallel with developing a monography and paper publications, with research and teaching, as well as in professional consultancy. In addition, I have prepared a landlord case and acted as a legal representative in a lawsuit about property rights in the land tenure court. Taken together, these activities have enabled me to test, present, and discuss my findings and reflections in knowledge development, research dissemination, and practice. My thesis is comprehensive and broad. It includes a range of empirical sources assessed through mixed methods and spatial knowledge production. The value of this comprehensive approach brings relevant connections and knowledge into the critical activity of compact city building – through the field of Urban Morphology. I have published four papers in international academic journals as well as three popular scientific papers in Norway. In addition, I have presented my work at a range of academic and professional conferences as well as participated in a national competition comprising research dissemination. This combined approach to producing a thesis has been both exhausting and rewarding and provided me with a solid foundation for further research and knowledge production. I am looking forward to taking this new knowledge further, into practice, teaching, and research, as I believe it is in the combination of these activities that the implementation of knowledge has the best potential effect – namely the knowledge of the art of compact city building.

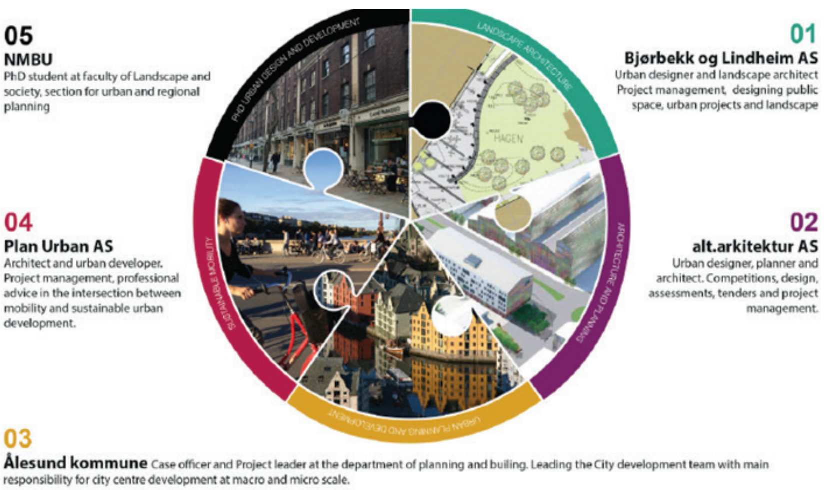


Figure 1 Professional background - focus on the building street relationship in public municipality and private consultancy

Abstract

Cities comprise constantly changing elements and patterns of human interventions. Patterns which we experience, evaluate, and continuously develop through an ever, ongoing range of decisions. This thesis asks questions about how we can build the city in a way that responds to our urban experiences by operationalising this experience into knowledge as a basis for city building, the thesis delves into the details of what we perceive as urban – the relationships between buildings and cityscape, between private and public, and the unavoidable detailed close relationship between buildings and streets. These micro-morphological details embody the preconditions and dynamics of a living city, manifest through urban form, and the processes and decisions which define it.The title *'The Building–Street Relationship: Investigating the Art of Compact City Building in Contemporary Norwegian Practice',* presents the main content and principles addressed throughout the thesis. It engages in the *production of urban form*; its core focus and units of analysis include the boundary between the physical entities of *buildings and streets* and how these morphological units interrelate, researched through the field of Urban Morphology. *Relationship* addresses the link between these two spatial units, but also a main ontological understanding, namely that of investigating urban form as being relational rather than about objects. This indirectly includes the users of space – human beings – and their experiences, behaviour, and decisions as well as their relation to built form and space. By *city building,* I refer to the implementation of plans, which provide urban quality, while *the Art of* refers to the professional skills and methods required to address this complexity, as well as to the craft included in the 'making disciplines' of city building. *Compact city* refers to both the sustainability model, which this thesis engages with as a current and actual model for implementation within the Norwegian sustainable urban densification agenda of land use policy, and as 'built form' inspired by the traditional city. This is all underpinned by the main field of investigation of this thesis – the field of Urban Morphology. Finally, *Contemporary Norwegian Practice* addresses the actuality of the thesis, its context of investigation, and the institutional framework and legislation used in implementing its physical results.

The thesis' overarching problem includes compact city building (what is it-how is it built) and the process of urban development (how to govern city building). The main research questions are stated as following: How can we understand and conceptualise the building–street relationship as an interface between public space and private building in a way that can improve current practice and policy? How has the morphological building–street relationship been implemented in a Norwegian context? How can we use new knowledge to solve the problem and secure effective compact city building?

The study is based on mixed method research including three empirical studies; two directed content analyses and a case study. The first directed content analysis is a study of the building-street relationship as form and structure. Through a visual analysis of a range of 'frontage types' a typology is established. The term 'Façade threshold' is

suggested as a term for building-street relationship provided for use in planning. The second content analysis is a review of Norwegian planning and building law from 1924 until today along with associated technical regulations. This study of the 'frontage rules' (chapter 6) tells the story of how micro morphological units have been addressed by legislation over time, whilst explaining the degree of enforcement that these social structures have on the shape of the city. Both content analyses also define analysis methods that have been used in the case studies. The case study (The production of the Facade threshold, chapter 7) consists of six different cases with compact city ambitions in three Norwegian cities: Oslo, Kristiansand and Stavanger. The cases address three typical morphological urban tissues: the pre-existing, the new, and the transformed tissues.

The results of the thesis reveal that modernist ideals have had a significant impact on Norwegian planning practice, determining built form, produced regulations and implementation in such a way that we might say, that we have lost knowledge of compact city building. In the case study projects, we see a strong tendency to build the image of the compact city rather than structures that provide and facilitate compact city qualities. The result of which is often that the territorial structure of the facade threshold is turned inside-out– creating an insular outcome for built form, with severe challenges for interaction between public and private. Another key finding is that planning and building legislation develops more slowly than the politics of planning and has been little influenced by critics of modernism. One result being this is that the urban micro morphological aspect has disappeared from spatial planning instruments. Other results reveal that ambitions for compact urban quality in regulations and planning documents are primarily described through a desired visual expression, whilst the study shows instead that the legal lines and provisions of zoning plans are actually the defining planning tools for compact urban development. Under which, technical regulations for buildings, function as a kind of 'hidden' planning system where general regulations of details and constructions of buildings determine the outcome of planning and urban form. The results of the study also reveal a tendency for building control processes to override ambitions for compact urban quality in planning documents, so that the transition from planning intention or intended outcome to built reality is rarely delivered.

The dissertation proposes six measures to influence and solve the problem of building the compact city. This includes promoting an urban micromorphological knowledge base with analytical tools and methods on micro-meso and macro scales, as well as implementing a new Norwegian term for describing the building-street relationship- the facade threshold. In addition, these recommendations include redefining planning instruments for zoning by developing space with a focus which emphasises the importance of relationship and form, not just use. This reintroduces the building line as a renewed and redefined tool for city building which helps to reintroduce lost knowledge into urban technical regulation. Finally, the study proposes a larger knowledge-based discretionary practice in the building control process.

Norsk samandrag

Byar er sett saman med ei byform av ei rekkje stadig skiftande mønster, formelement og strukturar, som er danna som eit resultat av tallause menneskelege handlingar og inngrep. Desse mønstra kan vi oppleve, evaluere og kontinuerleg utvikle gjennom ei rekkje avgjerder. Denne oppgåva spør korleis vi kan byggje byen på ein måte som tek omsyn til våre urbane erfaringar og bruke desse erfaringane som grunnlag for kunnskapsutvikling om bybygging. Oppgåva fokuserer på dei mikro-morfologiske detaljane i det som vi oppfattar som urbant; på samanhengen mellom bygning og by, mellom privat og offentleg og dei uløyselege relasjonane mellom bygningar og gater. Desse detaljane legg føresetnader for å skape ein levande kompakt by, og som ein kan undersøke gjennom å studere byens form og prosessane som definerer denne forma.

Tittelen på denne oppgåva, '*The Building–Street Relationship: Investigating the Art of Compact City Building in Contemporary Norwegian Practice*' presenterer hovudinnhaldet og prinsippa som vert teke opp i avhandlinga. Det overordna problemet for denne avhandlinga inkluderer kompakt bybygging (kva er det) og byutvikling som prosess (korleis ein legg rammer for bybygginga). Studieobjektet og hovudfokuset i avhandlinga er relasjonen mellom bygningar og gater, og korleis desse morfologiske einingane heng saman. Ordet *'Relationship'* (relasjon) omhandlar koplinga mellom desse to rommelege einingane, samstundes presenterer det oppgåva sitt ontologiske perspektiv, nemleg å utforske byen som ei relasjonell eining heller enn som ei samling av objekt. I tillegg tek ordet omsyn til brukarane av byen, menneska og deira erfaringar, åtferd og avgjerder, samt deira forhold til byform og byrom. Med *'the Art of City Building'* (Bybygging) viser eg til dei faglege ferdigheitene og metodane som ein treng for å ta omsyn til kompleksiteten med bybygginga, samt handverket ein tek i bruk i dei praktiske fagfelta som er relevante for denne oppgåva. *'Compact City'* (Kompakt by) viser både til modellen for berekraft som dannar bakteppet for denne oppgåva, til den gjeldande arealpolitikken i Norge og som fysisk byform inspirert av den tradisjonelle byen. Alle desse komponentane er sett frå ein ståstad som dannar hovudfeltet for denne oppgåva, bymorfologi (Urban Morphology). Til slutt viser ordet *'Contemporary Norwegian Practice'* (gjeldande norsk praksis) til oppgåva sin aktualitet og den konkrete konteksten for undersøkinga, med det institusjonelle rammeverket og lovverket som vert brukt for å implementere bybygginga.

Hovudspørsmåla for forskinga er som følgjer:

1. Korleis kan vi forstå og definere bygning-gate relasjonen som eit grensesnitt mellom offentleg rom og privat bygning, på ein måte som gjer at vi kan betre gjeldande praksis og politikk? 2. Korleis har den morfologiske bygning-gate relasjonen vorte implementert i den norske konteksten? 3. Korleis kan vi bruke ny kunnskap for å løyse problemet og sikre kompakt bybygging med kvalitet?

Studien brukar kombinerte metodar (mixed method research) med tre empiriske delar; to styrte innhaldsanalyser og ein case studie. Den første innhaldsanalysa er ein studie av forholdet bygning-gate som form og struktur. Gjennom ei visuell analyse av ei rekkje eksempel på typar ('Frontage types'), vert det utvikla ein typologi. Omgrepet 'Fasadeterskel' er foreslått som ei nemning på forholdet mellom bygning og gate, og er utvikla for bruk i byplanlegging. Den andre innhaldsanalysa er ein gjennomgang av norske plan- og bygningslover med tilhøyrande tekniske forskrifter frå 1924 og fram til i dag. Denne studien av reglane for bygning-gate relasjonen ('Frontage rules') fortel historia om korleis mikromorfologiske einingar har blitt skildra gjennom lovgivinga over tid, samtidig som den forklarar grad av handheving som desse sosiale strukturane har på byform. Begge innhaldsanalysane utviklar også analysemetodar som har vorte brukt i Case studiet. Kapittelet *'The Production of the Facade-threshold'* presenterer case studiet med seks case som delar ambisjon om kompakt bybygging. Desse ligg i tre norske byar, Oslo, Kristiansand og Stavanger, samt i tre typiske morfologiske byvev; det eksisterande, nye og transformerte.

Resultata frå avhandlinga syner at modernistiske ideal har spela ei avgjerande rolle innanfor norsk praksis, som byform, produserte forskrifter og gjennomføring. På ein slik måte kan vi seie vi har mista viktig kunnskap om kompakt bybygging. I prosjekta frå case studien ser vi ein sterk tendens til å byggje biletet av den kompakte byen framfor dei strukturane ein treng for å legge til rette for kompakte bykvalitetar. Resultatet av dette er ofte at den territoriale strukturen til fasadeterskelen vert snudd inn og ut, noko som skapar byform med eit introvert resultat, og med store utfordringar for samhandling mellom offentleg og privat. Eit anna sentralt funn er at plan- og bygningslova vert utvikla mykje seinare enn planpolitikken og har vore lite påverka av modernismekritikarane. Eit resultat av dette er at dei mikromorfologiske elementa har vorte redusert eller nærmast forsvunne frå planinstrumenta. Andre resultat i avhandlinga syner at ambisjonar om kompakt bykvalitet i forskrifter og plandokument i hovudsak er skildra gjennom eit ønska visuelt uttrykk i reguleringsføresegnene. Avhandlinga syner i staden at det er dei juridiske linjene saman med føresegnene som faktisk er dei definerande planverktøya for kompakt bybygging. I tillegg syner avhandlinga at det tekniske regelverket for bygg fungerer som eit 'skjult' plansystem der generelle reguleringar av detaljer og konstruksjonar av bygningar i forskrifta har direkte effekt på både planlegging og byform. Eit anna resultat av studien syner også ein tendens til at kontrollprosessar i byggesakshandsaminga overstyrer ambisjonar om kompakt bykvalitet definert i plandokument, noko som gjer at overgangen frå planintensjon til realisert byform ikkje samstemmer.

Avhandlinga foreslår seks grep for å kunne påverke og vere med å løyse problemet med å byggje den kompakte byen. Eit av desse grepa handlar om å fremje ein mikromorfologisk kunnskapsbase som omfattar analytiske verktøy og metodar på mikro-meso-makro skala Eit anna grep er å implementere eit norsk omgrep for og typologi av bygning-gate relasjonen, definert gjennom ordet fasadeterskel. Andre foreslåtte grep er å: redefinere planinstrument for reguleringsplanar og sette eit sterkare fokus på relasjon og form og ikkje berre arealbruk, å gjeninnføre byggelinja som eit fornya og redefinert verktøy for bybygging, samt å gjeninnføre tapt kunnskap i ei byteknisk forskrift. Til sist foreslår avhandlinga ein større kunnskapsbasert skjønnspraksis i byggekontrollprosessen.

PROBLEM, CONTEXT, METHODOLOGY

PART I

CONTENTS

THE PROBLEM OF COMPACT CITY BUILDING

Chapter 1 THE PROBLEM OF COMPACT CITY BUILDING

This chapter presents the overall problem of compact city building that the thesis engages in. It explains the overall theme, focus, problem area and research field as well as contributions to policy, practice, and research of the thesis. Section 1.1 explains the overall theme comprising the art of city building, addressing the cities as organised complexity addressed through relational theories. Section 1.2 presents the focus and unit of study for the work, comprising the building–street relationship seen as the quintessence of urbanisation. Section 1.3 explains the problem area and relevance in compact city building, addressed through policy, practice and research. Section 1.4 presents the research field of Urban Morphology, the international interdisciplinary field and its fundamental basis, as well as the research fellowship this thesis engages in. Section 1.5 address the contributions of the thesis to policy, practice, and research. Finally, section 1.6 presents the whole structure of the thesis with its four parts and nine chapters.

Cities comprise constantly changing elements and patterns of human interventions. Patterns which we experience, evaluate, and continuously develop through an ever, ongoing range of decisions. This thesis asks questions about how we can build the city in a way that responds to our urban experiences by operationalising this experience into knowledge as a basis for city building, the thesis delves into the details of what we perceive as urban – the relationships between buildings and cityscape, between private and public, and the unavoidable detailed close relationship between buildings and streets. These micro-morphological details embody the preconditions and dynamics of a living city, manifest through urban form, and the processes and decisions which define it. Our experience of the city is both visual – we obtain information through what we see – and tectonic – how we sense the materials, smells, and sounds. It is also bodily – experienced by how we move, feel frictions, and perceive obstacles – and interpretable – meaning how we combine these experiences to orient ourselves within the cityscape.

Today, an often-used expression in Norwegian urban planning practice is the term 'active façades', which requires the ground floor to be principally commercial to ensure a lively street. The term ties back to the work of architect and theorist Jan Gehl and his focus on the human being as part of the urban space and providing via the active façade the linkage between the form and life of the city. This thesis seeks to demonstrate that this term is overly simplistic because the building–street relationship is much more complex than being reliable through openings for commercial activities.

Only through an investigation of what is built and realised is it possible to review previous insights, decisions, and acts, thus enabling new knowledge to be developed. Through this new knowledge, we can renew the act of implementation. This thesis complements the approach of current discussions on the link between the physical characteristics of urban compact space and its effect on human behaviour, experience, well-being, and use. Knowledge of urban experience is valuable and has been researched by a range of scientists, both in Norway and abroad. However, if we are to plan, develop, and build the capacity for these urban qualities in current city building, it is critical to understand how to do so by exploring the link between urban form and society through operational theory and methodology in the field of urban morphology.

1.1 THEME – THE ART OF CITY BUILDING: CITIES AS ORGANISED COMPLEXITY ADDRESSED THROUGH RELATIONAL THEORIES

My point of departure in understanding the art of city building is journalist and activist Jane Jacobs' account of cities in her seminal book *The Death and Life of Great American Cities* (1961). This book was developed out of her active engagement as a user in the city, by observing, being, and interacting with the spaces of her neighbourhood in central New York. She used her experiences to see and analyse her own city into an understanding and knowledge base that have become a corner stone of urban theory.

In the book, she describes the city as being a *problem of organised complexity,* 'organisms that are replete with unexamined, but obviously intricately interconnected, and surely understandable, relationships' *(Jacobs 1961, p 572)*. In her perspective, cities address situations where a range of quantities are all varying simultaneously and in subtly interconnected ways (Jacobs 1961). As such they are not one problem of organised complexity, but rather many interrelated problems forming a whole.

Jacobs' perspective underlies my approach and understanding of the art of city building. I address organised complexity by delving into the examination of relations rather than objects. By contextualising this in relational theories, I consider the city as a complex assemblage which is relational in material forms and socio-spatial practices. As such, the city is an assemblage of human and nonhuman, social and material, and legislation and form. If city building is addressed by linking people and understanding perceptions, behaviour, and economic preconditions, then we are not studying things but relations.

Another aspect that Jacobs highlights in her quest to understand the art of city building, and one that is highly relevant to my approach, is what she terms the 'microscopic or detailed view' (ibid.). An interrelated micro-view of the city equates to the important tactics for understanding the whole of the city. By understanding the micro-aspects of cities, it is possible to understand the systems of organised complexity, which can then scale up to meso- and macro-aspects. My thesis addresses this seemingly ambiguous relation – namely answering macro city wholeness through microscopic relational elements of urban form.

Jacobs also describes the important cities of *processes*. The objects that make up cities, buildings, streets, and parks can have radically different effects depending on the circumstances and contexts in which they exist. She claims that the essence of cities includes both 'city processes and the catalysts of these processes' (ibid. p 575). In my interpretation, processes include both the urban life and organisation of society, whereas the catalysts of these processes can include the capacities that the different objects deliver. As such, urban form can be understood both as an object with formal properties and as capacities that deliver interrelated relations and contribute to a larger whole. In addition, studies of urban form should consider the processes relevant to delivering the physical object. These include a focus on the organisation of society through different decision frameworks, such as law and regulation, developed to enable the art of city building.

1.1.1 *Dialectic of urbs and civitas – The overall relationship between form and city organisation*

Jacobs' work on the core principles of city building, through aspects such as organised complexity and micro-macro perspectives of urban form, can be traced back to the dialectic of what Spanish civil engineer and urban planner Ildefonso Cerda presented as *urbs* and *civitas,* which represent the physical city and the city society, respectively. Cerda is known by many as the founder of *urbanism as a professional field.* Although Cerda is mostly recognised as the developer of Barcelona's city expansion plan (Eixample, 1859), his *Teoría General De La Urbanización* (1867) was the first work to present urban form as an integrated part of the social and economic prerequisites of the city (Soria y Puig & Serratosa 1999). In his theory, *civitas* represented the inhabitants as a thinking and communicating urban society, whilst *urbs* represented the physical territories where this society lived. As such, *urbs* was the *container* and *civitas* the *content* interrelating through socio-spatial dependencies. Cerda's dialectic of urbs and civitas can therefore be translated as one of territory and society. In my interpretation, Cerda's dialectic can comprise both the *knowledge of urban form* read through the field of *urban morphology* and the knowledge of *city* *organisation* through a *legal framework in urban planning and development*. The physical territory is both an impression of the spatial organisation of the society as well as a prerequisite for society's existence and development. The two structures are interdependent – one cannot study one without considering the relation it has to the other.

The art of city building approaches urban development and planning through the *making disciplines* of architecture, planning, and urban design. City-building skills require both the design of actual built form and the design of processes to be able to build it, the territory, and society. As such, city building comprises a *dialectic design process* that needs to be seen from both perspectives. In these disciplines, I highlight the importance of professional craftmanship as a vital component requiring a combination of interdisciplinary skills, methods, and experience to approach the complexity both in the detail and the whole.

In search of an understanding of what professional planners do, architect and planning researchers Elin Børrud and Marius Grønning categorised a variety of themes and subjects that consider society and territory in spatial planning processes. Whilst these themes that can be studied and explored individually within different disciplines, they are integrated within the field of spatial planning – bringing society and territory together across and between subjects. The concepts of society and territory therefore present suitable terms for describing spatial dependencies: as concepts, they make it possible to explore and explain the relationship between the socio-political content of the planning area and the physical structures; as such, the dialectical relationship between them can elucidate what the planner is doing (Børrud & Grønning 2018).

Urban designer Matthew Carmona's theory of *design governance* provides the next building block in the framework of understanding the art of city building in this thesis. Carmona defined design governance as 'the process of state-sanctioned intervention in the means and processes of designing the built environment in order to shape both processes and outcomes in a defined public interest' (Carmona 2016). Thus, he emphasises the design of the process as an important decision-making environment that influences how the actual physical design outcome is made.

> 'The challenge is to design a decision-making environment that in its turn positively influences how decisions about design are made and ultimately how outcomes are shaped.' (Carmona 2016, p 719)

His theory corresponds with and further develops Jacobs' emphasis on *city processes*, framing Cerda's notion of *urbs and civitas* as well as Børrud and Grønning's *territory and society* into an operative framework by which we can read the city. In essence, design governance is political; plans, regulations, and legislation are societal constructs created so that we might make decisions. Steve Tiesdell and David Adams defined *decision environments*, which deal with the processes and organisation of the city. *Decision environments* are typically created by plans, strategies, and frameworks among other things, but also by the deployment and modulation of incentives and disincentives, such as financial subsidies, discounted land, and infrastructure provision (Tiesdell & Adams 2011). The authors indicate that such decision environments are generally overseen by the public sector and act similarly to design governance; however, their scope can be wider. Both spatial planners and urban designers operate within and contribute to the design of the decision environments within which other development actors operate, extending into real estate and property for example.

City building as urbs – Relational organised complexity

The physical forms of city building are embedded in the morphological context that they are a part of. They are the result of history, development traditions, and practices. City building as *urbs* sees existing cities develop over centuries through slow-growth building on tradition, through an accumulation and aggregation of decisions developed over time. It also includes the development of new towns, through the rapid implementation of utopian ideals, based on societal ideas of progress, health, and the urge for change in which decisions are implemented over a much shorter timeframe. As such, both time and history play vital roles in the physical outcome of city building.

Common to all types of cities are the elements, forms, and structures by which they are produced, interlinking a range of forms and structures in the whole. The German geographer and urban morphologist Michael. R. G. Conzen defined the fundamental components of the physical city as *streets*, *plots*, and *blocks/buildings* (Conzen 1960). For Conzen, these components interlink and define structures that establish preconditions for a range of activities and initiatives. The container of the physical city comprises *streets and street structures*, *plots and plot structures*, and *buildings and building structures*. In addition, modernist city plans include *parks and green structures* (Børrud & Røsnes 2016). These components and their structures offer preconditions for societal actions such as *mobility and distribution*, for *public and private initiatives*, for *function and use*, as well as for *sport and recreation* (Conzen & Conzen 2004; Panerai et al. 2004).

These forms are components interlinked through *structures*, *scale*, and *time*. Micro-elements such as entrances and windows connect to macro-structures of urban tissues such as streets and urban blocks through an aggregation of components that define different typologies, building types, streets, and neighbourhoods. These scalar relationships are vital in the constitution of the city as a whole (Alexander et al. 1977; Conzen 1960; Soria y Puig & Serratosa 1999).

While Cerda systematically explored, described, and named the fundamental elements and elementary cells of physical city building operating at the meso- and micro levels, Jacobs highlighted the microscopic view of the city as vital based on her own experience and perspective as a resident. Cerda addressed the *urban ways of streets* as vital structures with dual functions connecting ways and buildings. According to him, the networks of ways connected to movement define spaces isolated by ways connected to stopping, which correlates to what Conzen described as spaces connected to mobility and distribution (Conzen & Consen 2004). His term for these spaces was *intervia* (interways), which he defined as *primary elements* of a city that exercise 'an extraordinary, crucial influence on its whole constitution and organization' (1861, TVU, §127 in Soria y Puig & Serratosa 1999).

> 'The existence of the interways as constituted in today's urbanization cannot be conceived without the co-existence around it of an integrative or complementary zone that serves simultaneously as a way and as a courtyard providing light and views. It requires no effort to understand that this zone cannot and must not, for each interways, fail to extend as far as the centreline of streets which bound it, nor can it or should it pass one hair's breadth beyond without transgressing the laws of strict equity. If, then, in considering the interways, we are unable to ignore this essential appendage, an integral complement to its being, if the two strictly form a single whole, it is only just that we give to this whole a denomination and none appears more appropriate, suitable and precise than that of **inter-axes**, since these are its determining limits' (1867, TGU, II, 685 in Soria y Puig & Serratosa 1999).

Whereas the interways form the smallest constituent parts of the city, Cerda described the *inter-axes* as forming the defining elementary cell. Through this term, he defined 'the whole' as formed by the interways plus the perimeter half-streets. Cerda emphasised that the interways (the urban blocks) cannot be conceived without the co-existence of an integrative or complementary zone that serves simultaneously as a way and as a courtyard providing light and views, thereby demonstrating the interdependence of street and block.

This vital distinction and relation between the interways and the inter-axes – between the element and the cell, between the constituent part and the smallest unit of life – play a vital role in the definition of cities as *urbs* employed in this thesis. It is crucial to highlight that in this definition, the objects and elements of the city are not fundamental aspects alone, but rather the relationships between those objects provide them with a vital role. City building therefore concerns building in capacities for relations in and between such objects. As such, the *properties, capacities, and aggregation of objects* and *their position in relation to each other* are of vital importance.

American architect and design theorist Christopher Alexander contributed to a vital aspect of my perspective of the city. He suggested understanding cities as connections, as *overlapping semi-lattices* in which a range of relations exist (Alexander 1964). Beneath them are the abstract underlying ordering principles of form and a large collection of many different systems that make up a larger and more complex system, namely the city as a whole. Over his long career, Alexander's work has focused on the creation of *wholes* and the nature of the *aggregation of parts in the wholes* (Alexander 1979). For Alexander, city building and architecture as scientific fields are heavily engaged in the theory of '*wholeness*'. According to him, wholeness is a structure that recurs in space and matter and is reflected in human minds and cognition. Wholeness is the global structural character of a given configuration that exists in space (Alexander 2003). In his co-authored book *Pattern Language* (Alexander et al. 1977), he develops concrete examples and specific designable qualities of the built environment that reflect his perspective on wholeness. The book presents 273 patterns that link the city together as a whole, from micro to macro scale. Organised into a scalar hierarchy for designing regions, cities, district, neighbourhoods, buildings, and interiors, a vital foundation of Alexander's patterns is that each of them is connected to other patterns in the hierarchy, thereby comprising and interlinking physical objects in space.

By reviewing the comprehensive topic of city building, we have now examined the understanding of form as relation, of the micro and meso scale as fundamental scales of city performance, and of organised complexity as sets of wholes and their structuring. As such, the forms of the physical city present an agency with preconditions and possibilities for how the city can work. This approach can enlighten the way in which we organise our cities through societal ideas of institutional frameworks.

City building as civitas – Societal constructs of the institutional system

Tiesdell and Adams (2011) included the frameworks of law, planning, and regulation as part of their *decision environments*, which represent a type of second-order urban design that takes place before the urban designer's actual design activity and physical proposal. The decision environments shape designs and development processes by creating *decision frames* for actions. In the art of city building, it is vital to understand the societal constructs of *civitas* to be able to understand how the city is produced – that is, how design governance helps or hinders city building activities. Every city society establishes legislative tools by which it governs the art of city building. These political acts provide the practical implementation tools for actual building on the ground. French architectural and urban historian and theorist Françoise Choay conducted a literature review

(Choay &Bratton 1997) of two seminal works, namely Leon Battista Alberti's architectural rule book *De re aedificatoria* and Thomas More's idealising projection of *Utopia*, to examine how those authors described a city. Choay's study pointed to two main types and processes/ways of building a city, one based on model thinking and one based on regulation (Choay & Bratton 1997). She defined the terms culturalist and progressive as two traditions in the approach to city building (Choay 1969), where culturalists react to changes by pointing to and relying on existing solutions already built and progressives develop from future visions and models for social progression through utopian ideals. She also drew a distinction between two ways to govern territory and build those realities, defining the two concepts of the *rule* and the *model*. *Models* dictate attributes and properties of form through a utopian-like framework of what the city *should be*, presenting the city as an idea/project. *Rules* emphasise process and offer an operational method through a system of principles that allow creative responses to existing physical and social contexts, responding to differences in time and individuals (Cavaco 2009). We find these two ways of thinking in current discourses within the fields of architecture and planning as well as in the approach to defining decision frameworks for city building.

In the Norwegian context, legal regulations and the planning system represent constitutional constructs that have resulted from Norwegian history, legal traditions, and practices (Røsnes 2005). They have two main aims: to set out the strategies for development and to undertake the production of the built environment. Legislation provides a two-way perspective on the production of the built environment: the planning system works from a top-down perspective of intentions, whereas legal regulations for buildings work through bottom-up project realisation. The Norwegian planning system, in essence, is *prescriptive*, but it also includes a range of discretionary tools and aspects that are vital in planning implementation (Holsen 2019). As such, the Norwegian legislative framework includes both perspectives presented by Choay, namely a system that defines a framework of what the city/project should be as well as operational principles for the implementation of urban form.

The overall legislative framework – Legal system as societal constructs

The legal system comprises a range of acts and their complementary regulations. In Norway, the most important act for the art of city building is the Planning and Building Act (PBL; *Plan- og bygningsloven* 2008) as well as its corresponding technical regulation for buildings (TEK17) and its processual regulation (SAK10). In addition, there are a range of special laws and regulations that determine implementation, such as the Cultural Heritage Law, the Road Act, and the Neighbour Law. Legal revisions of planning laws form part of the continuous process of adapting legislation to contemporary needs (Kule & Røsnes 2010). The legal framework includes regulatory instruments for design and specific regulatory tools one can use to create the decision frameworks for the intended result.

Through the PBL (2008), the Norwegian Legislature (*Storting*) has given the municipalities the authority to manage the country's land use development. The purpose clause presents the main overall considerations concerning sustainable development, land use, building control, the planning and building process, as well as universal design and architecture. Municipalities adopt area plans, conduct building control, grant exemptions, expropriate, and conduct illegality checks of built projects. One vital part in this legal framework is *dispensation (exemption)*, which provides a discretionary power in the legal system and the building control process. Two main conditions must be fulfilled for dispensation to be granted: regard for the considerations behind the regulations (both in law and plan) and for the considerations in the main purpose of the law. In addition, the benefits of granting dispensation to exempt a case from following the letter of the law or regulation must be demonstrably greater than the disadvantages through an overall assessment.

Top-down planning intentions – A city-building image

The Norwegian planning system is regulatory and operates under unitary state control (Røsnes 2005). In such regulatory systems, plans that constitute a valid basis for permission are legally binding for land use, providing a top-down hierarchical system based on zoning with discretionary demands. As a market-oriented planning system (Lind 2002; Mäntysalo 1999), Professor of Real Estate Economics at KTH Royal Institute of Technology in Stockholm Hans Lind placed the Norwegian planning system under *The New Nordic Model,* which is characterised by a strong vision and legal right to determine land-use granted by local government, but in practice a weak financial resource for implementation (Lind 2002). This system is based on compromises with private real-estate investors who provide the private capital that local governments need to implement visions. As such, these conditions determine local government's role as one which is project focused, detail-oriented, and responsive rather than offensive (ibid).

The *decision frames* (planning instruments) of the Norwegian planning system comprise a regulatory system based on legally binding regulations that grant building permission for controlled development, where building applications conform to the already-adopted plan (Kule & Røsnes 2010). The regulatory framework is based on zoning with land-use specification and written provisions on a site-specific context. The coloured map of the zoning plan stitches borders together into a system of clearly defined rules. As such, the art of city building is implemented through a decision environment where an already adopted zoning plan exists with regulations concerning the use, protection, and design of areas and the built environment. It is a context-dependent plan (a basis map) regulated by *land-use purpose, zones requiring special consideration,* and *provisions* connected to various types of *spaces, boundaries,* and *points/lines*. Within this system, regulation is based on an *institutional exercise of boundary setting* to define land uses and regulations between different areas, some of which are renewed and updated periodically. The lines that define boundaries limit, define, and divide, working as ways to secure interests and define development rules.

Bottom-up project realisation – City-building tools

Technical regulations for the details and construction of buildings can have a direct effect on urban form. These technical regulations are legislatively on top of the legally enforceable system, in a *site-nonspecific* context, and have critical effects on the built result and the potential of city building. They operate within s*ystems of building control*, where the outcomes of the control processes are *decisions* that result in the granting of permission for or the rejection of development projects. The systems of building control include legally binding procedural steps from the initiation of the project with its stated intentions to the final certificate of completion/realised intention in the real-life project. These technical relations comprise qualitatively expressed functional requirements for achieving the main goals of buildings and outdoor spaces. Their functional demands define minimum standards for finished building projects and amount to the most powerful regulatory framework for ensuring adherence to building codes. They often represent a performance-based tool based on requirements for fulfilment but do not (always) specify its physical solutions. In 1997, the system of building codes changed from prescriptive to performance-based through defining qualities rather than solutions in building projects. The motive for this change was to stimulate an increase in the quality of buildings and a reduction of building defects. Despite the intentions, the Norwegian regulations were not purely function-based in 1997 and nor have they been since. The current technical regulations for buildings (2017) provide operational requirements in addition to functional requirements. However, this main transition has increased the demand for operational standards and design guidelines for technical and material aspects of the building (Skatland 2018). Furthermore, a whole range of such documents currently provide preaccepted solutions for functional demands. Figure 2 shows a sketch of the Norwegian regulatory system seen from two perspectives: the relation between top-down planning of zoning plans and the bottom up system of rules for buildings. These two perspectives work together in the production of urban form.

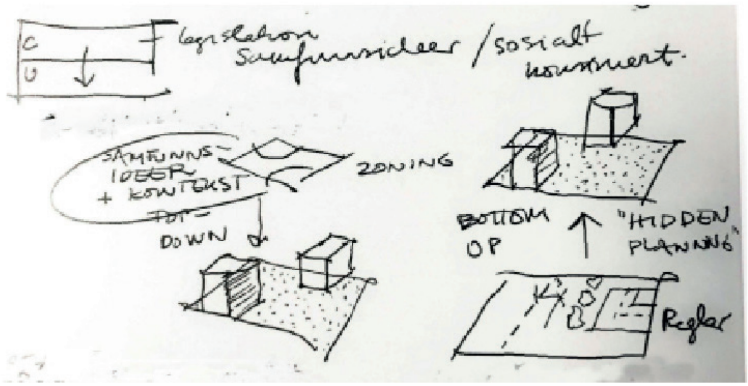


Figure 2
Sketch of a two-way perspective on the Norwegian regulatory system (source: author)

1.1.2 *Dialectics of public and private – Public–private interfaces in the built environment and city society*

In addition to the dialectic of physical urbs and societal civitas, a territorial dialectic exists that is relevant for the building–street relationship, which was highlighted by Jane Jacobs in her seminal work *The Death and Life of Great American Cities*. This territorial dialectic is the relation between *public and private interests*. This public–private dialectic adds another important framework to the approach of this thesis. Cities are built up, layer by layer, of private and public interests and relations, which provide the key organising principles that shape the physical space of cities and social life as well as the institutions and organisations of citizens. The public–private interface creates both territorial distinctions and overlaps as well as the basis of institutional, economic, and social decision environments. Implicit in the art of city building is the negotiation between public and private interests, between actors, buildings, spaces, and territories, either in the understanding, development, or implementation phase or in general use. These aspects are all inter-relational and depend on each other.

In his book *Public and Private Spaces of the City,* architect and planner Ali Madanipour states that '[t]he public and private only make sense in relation to one another – as they are interdependent notions' (Madanipour 2003p 3). Through his work, Madanipour advances an integrative approach when examining public–private interfaces in the city, which is critical to what he claims are usual approaches to this topic. For example, he challenges the one-sidedness that each territorial side applies to the other, either by standing in the public sphere and viewing the private sphere as intrusive or by standing in the private sphere and viewing the public sphere as disturbing the privacy. As such, he emphasises the link and relation between the two as a vital city-building capacity. With Madanipour's perspective in mind, a range of public–private interfaces that impact the art of city building must be considered.

In the art of city building, public–private interfaces exist between different scales, plots, and plot structures as well as between *public space and private building*. We must assume that the interface of the building–street relationship comprises overlapping layers of physical space that mediate between public and private in the urban fabric at street level, as Giambattista Nolli's map *Pianta Grande di Roma* (1748) demonstrated. With this map, Nolli defined the city as an enormous mass, which he carved out to create public space in white and left private space black. This figure-ground map represents the urban fabric depicting the voids and volumes of Rome, including interiors of churches and other public accessible institutions within the white (i.e., the public). This map, which presents public and semi-public buildings as part of the urban realm, goes beyond the physical boundaries of the wall to show the functional boundary of public space. Furthermore, it explores how the relations of public and private space can move beyond the physical properties of a wall, of a building, and emphasises the importance of the capacities of openings and spatial overlaps between public and private.

In addition to physical public–private interfaces, complementary *institutional interfaces, property rights, and use interfaces* form part of the societal art of city building (civitas). One such vital interface is that between private development and public regulation, which represent two different rights; specifically, one governs through decision frameworks of planning/regulation and the other develops through real-estate implementation (Børrud 2005). While the developer has private *development rights*, meaning the right to initiate and the means to implement, the government has public *regulation rights,* meaning the right to politically decide and govern development based on land-use plans. The challenge of planning goals in governing both public and private parties is presented in the PBL §12. On one side, the law should facilitate private development though an *efficient planning process* that acts for the developer. On the other side, the law must safeguard *area-based common goods* (resources and rights), placing an emphasis in the plan on securing area quality and sustainable development (Børrud 2018a).

Another crucial public–private interface is that between private property rights and public commons (i.e., public goods). This interface legally defines territories of control and access. The public–private interface between privately owned plots and public space presents different sets of rules that affect both the development and management of property. Private property rights, whether connected to physical plots or as a right of use connected to another man's land (servitudes), can affect the art of city building to a great extent. A territory right gives not only a legal entitlement to control the land but also a responsibility to manage the property and keep it in good condition. Within the planning act, the possibility exists to regulate the territory as public or common – as an extra layer supplementing public or private property rights. Private properties can be regulated and registered as common areas for the public, giving property owners the responsibility of maintaining the area and opening it up for public use and responsibility. These regulations can also be registered in the legal system. Thus, the public–private interfaces of property connect to both the economy and management. The territorial public–private interface is also connected to the cultural and societal use of urban territories, namely private and public use as part of urban life. Measures of the quality of urban life have become critical indicators for determining the attractiveness of a city. These measures are heavily influenced by public–private interfaces through the active use of these transitions. Today, the term *active façade* is often used to define such a measure in the building–street relationship. An active façade aims to create a good relationship between private and public use and life and essentially means a façade where interaction between public and private is possible. The physical, institutional, territorial, and use interfaces work together as overlapping layers that are intricately connected and defined by a range of boundaries.

1.1.3 *City building as a boundary-setting exercise between public and private spaces*

This section examines the complex nature of boundary-setting that developed from the simplistic *active façade* in city building. Between all of the different types of public–private spaces, there are boundaries of a different nature that relate one to another. Madanipour reconciled city building with the act of boundary-setting between public and private realms as follows:

> 'City-building is therefore partly a boundary setting exercise, subdividing space and creating new functions and meanings, establishing new relationships between the two sides' (Madanipour 2003 p 240).

> 'By establishing a flexible and elaborate boundary between the two realms, urbanism can be enriched and the dangers of encroachment by private interests into the public realm and the threat of public intrusion into the private sphere can be both minimized and carefully managed' (Madanipour 2003 intro).

These excerpts point to an essential aspect of city building – it crosses territory and society, public and private interests, as well as form, regulation, and implementation. As such, the boundary-setting exercise is fundamental to the art of city building, comprising both territorial and societal acts as part of its creation. In my view, Madanipour refers to boundaries as the core elements of city building and as a way to appreciate the full scope of public–private dynamics in the city. This requires an understanding of a variety of characteristics connected to the boundary, such as *the act* of boundary setting, *the properties* (of 'flexible and elaborate boundaries'), *the capacities* (of 'relationships'), the *effects* (such as 'enriched urbanism', 'dangers of encroachment', or the 'threat of public intrusion'), and finally *the implementation and management* ('carefully done'). City-building boundaries in the interface between public and private are therefore both *processual* through their creation and management as well as *substantial* production properties, capacities, and effects. To successfully approach public–private interfaces in the building–street relationship, boundaries must be addressed. If we add and multiply fundamental elements such as boundaries into an assemblage, then we create networks of boundaries, networks of spaces to be within, and networks of relations that connect it all.

The physical boundary-setting exercise can be addressed through the field of urban morphology, where morphological boundaries define physical spaces on different sides, while between these spaces exist important relations which manifest as openings of different character. Landscape architect and urban morphologist Karl Kropf considers these components to be the minimum elements that constitute a built environment (Kropf 2017). Boundaries and spaces are co-dependent on each other in the same way as public and private are interdependent notions. Openings through the boundary and between the spaces build in capacity for access and movement. Kropf defined this as *occupation* (one opening), *through movement* (two openings) and *distribution* (three or more openings). Such openings are vital to the structure of built form and for making cities work. Taking our cue from Madanipour, we can also link the art of *physical* city building to forms and activities that define form, including *the act, properties, capacities, effect, and management* of spatial demarcation, of form and space, and of structural relations.

The societal boundary-setting act can form part of the institutional planning framework through zoning maps, regulations, or legislation – or as ownership and plot definition. This presents challenges of defining how, where, and when to set a boundary, and also of determining which considerations guide the exercise of boundary setting. An example is the boundary unit of *area* when used as a distinct category in the planning instruments of the area zoning plan (see Chapter 4). Area as a unit differs from other units such as property/plot or council demarcation because it is not connected to a distinct juridical or political decision; an area can have any delimitation or size (Børrud et al. 2018). Therefore, defining area as a unit in the institutional boundary-setting activity is a crucial job requiring an understanding of and skills in the two pair of dialectics presented here: the urbs & civitas and public & private. For the art of city building, setting these institutional boundaries in a manner that emphasises relations rather than objects is critical. Whereas the journalist Jacobs focuses on the intricately interconnected relationships in the city, the planner Madanipour presents the boundaries that define relational spaces, and the urban morphologist Kropf emphasises the openings in the boundaries that make relations work; yet, they all conclude the same thing in different ways: relationships are vital for making cities work. As such, the institutional boundary-setting exercise is an activity and a design governance tool of vital importance that must be further highlighted and developed.

In this section, I have presented the main theme of my thesis: investigating the art of city building through a relational approach. I have highlighted two pairs of dialectics (urbs & civitas and public & private interfaces) that can help in approaching cities as organised complexity and in framing the scope of my research. I have also presented various interfaces of a physical and nonphysical character as well as proposed boundaries as being vital in defining those interfaces. My focus in this comprehensive field is to focus on what Jacobs refers to as the microscopic view, which is vital for addressing organised complexity and the building–street relationship. In this relationship, private building meets public space, private developer meets government regulation, and private life meets public life.

1.2 FOCUS – THE BUILDING–STREET RELATIONSHIP AS THE QUINTESSENCE OF URBANISATION

In the previous section, I discussed Cerda's approach to city building, which included the *interways and inter-axes*. In the link between them, Cerda captured the importance of the small micro-morphological units that connect houses to streets as forming the core foundation of the city. In his work, he delved deeply into the origin of the streets and their tight, indissoluble relationship with the buildings they serve, both as an entity *connecting ways and buildings* and simultaneously as an economic and legal challenge of *city production* and financing (1867, TGU, I, 538 in Soria y Puig & Serratosa 1999). Thus, Cerda demonstrated that he was seriously concerned with this relationship in city-building processes, claiming that it represents the '*quintessence of urbanisation'(ibid.)*.

However, what does this mean to the question that I raise in this thesis? Cerda advanced the smallest urban relation in the city as being the quintessential linkage of interactions between public space and private buildings, namely the building–street relationship. This link can seemingly establish the preconditions for how active a façade can be, and it can go even further to provide a framework for how much urban life a street has and with that an area's attractiveness. A busy street is not necessarily attractive but could be. The building–street relationship is vital to the art of city building given that, as Cerda defined it, the street is an essential, inseparable, constituent part of the house (1861, CPE, §21 in Soria y Puig & Serratosa 1999). As such, this relationship cannot be overlooked in urbanism. I therefore address the building–street relationship as potentially presenting a vital variable for good city building and the production of urban quality.

The public–private interface of the building–street relationship comprises overlapping layers of physical space, which mediate between public and private in the urban fabric. These include both micro-spatial *components* of urban form and various *configurations* of form in the building, in addition to their relation to the meso-scale block and the macro-scale neighbourhood/city. From one perspective, the interface is private in that it belongs to the façade of a house, while it is simultaneously part of the city's public space. The interface forms the vital area where interaction between people occurs, where one greets and says goodbye to one's friends or customers, where one's exposes or conceals one's private life to the public, and where goods are displayed and exchanged (Zoller & Wüstenrot 2014). The interface includes a range of tangible and intangible boundaries of space. These boundaries can be places of strict control and separation, of vague and dissolved definitions, or they can be vibrant spaces for communication. Furthermore, they can be spatial or symbolic and physical or functional; some are easy to map (building boundaries [physical, legal]), while others are 'fuzzy' and difficult to define (psychological, sociological). The interface represents the relationship between buildings and streetscape; it is a negotiator between private and public as well as inside and outside. Its potential connections include dimensions of both a physical and an institutional character.

As a physical-form element, the building–street relationship forms the container of the physical forms and structures of the urbs: *street and street structures*, *plots and plot structures,* and *buildings and building structures* as well as *parks and green structures*. While these elements and their capacities are often investigated separately, such a task is impossible for successfully working with the building–street relationship. As Alexander described, relationships in the complex city concern the overlaps between different forms and structures (Alexander 1964). The building–street relationship overlaps all of these structures and includes aspects of the street, plots, and buildings as well as structural relations that lie between these elements. By studying a small part of the city with such overlaps, it is possible to find answers that can highlight the art of city building as whole.

The building–street relationship can also be addressed as institutional boundary creation. The micro-spatial element of the building–street relationship goes further and overlaps territorial rights, institutional purpose boundaries, and technical regulations. The decision framework for this element includes institutional boundaries defined through the zoning plans and property structure, dividing the interface into its various responsibilities, economies, and agendas. The decision framework also includes technical regulations concerning the components of the building element or street segment.

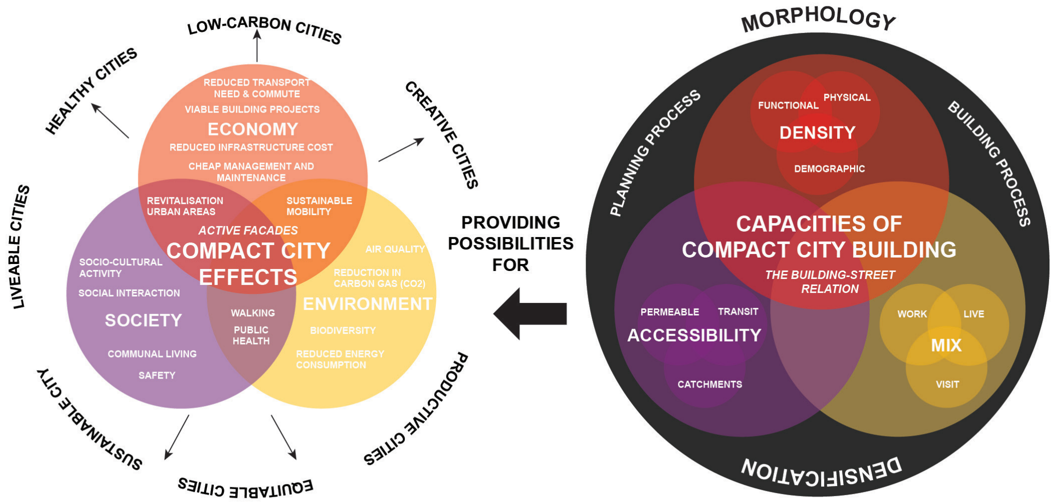
In sum, the capacity of the building–street relationship is one of overlaps –

overlaps between forms and structures and between institutions, properties, and regulations, which can be addressed through different models of city building and various tools and systems for implementing built form. The art of compact city building requires knowledge of this and its successful implementation in design and planning practice.

1.3 PROBLEM AREA AND RELEVANCE – COMPACT CITY BUILDING

Jane Jacobs was interested in how cities work and considered the core principles for design and planning, such as the *need for concentration*, *mixed primary uses,* and *small blocks* (Jacobs 1961). Australian planners Kim Dovey and Elek Pafka built on Jacobs' three factors to develop their concept of '*the Urban DMA*,' which comprises *dense, mixed-use,* and *accessible* spaces (Dovey & Pafka 2019). They

Figure 3 Compact city effects depending on capacities of city building: Effects and concequences have been researched in the Norwegian compact city development discourse, but research gap include the capacities providing preconditions for such effects (Source: author inspired by Dovey & Pavka [2019])



set out a clear distinction between walking and the capacities of walkability, and also between the effect and the capacities enabling this effect. Their perspective provided a vital building block in my approach to the compact city as problem area, highlighting the transition from policy to the effect of this policy, and through this the understanding and knowledge regarding the possibilities inherent in the properties and capacities of urban form. Compact city policy sets out the preconditions for compact city effects in the ambitions and capacities of compact city building. As such, compact city policy and its capacities as well as the impact of policy on compact city effects are related to the difference between the capacities of walkability and actual walking as an effect.

Figure 3 presents this link between the preconditions and capacities of compact city building and the compact city effects that these preconditions might achieve. Compact city capacities are defined by morphological characteristics connected to the urban DMA and the implementation process by which the capacities are regulated and developed in the planning and building process. Compact city effects are defined by sustainable effects in society, the environment, and the economy, and together they can achieve healthy, liveable, and equitable cities.

This section introduces the problem area of the thesis, namely *compact city building*. It focuses on the investigation of contemporary urban forms and the institutional framework for responsive solutions in compact city policy. This includes an interpretation of the accepted ideal in contemporary projects, both as built form and process in the city's planning-design governance. Sustainable urbanism professor Michael Neuman presented this as a one-or-the-other strategy, emphasising process as most important (Neuman 2005). I, however, present them as a vital dialectic in my approach to researching the topic – as integrated and mutually supportive. As such, my thesis considers the architectural and environmental outcomes of municipal densification strategies and policies within compact city building, and the connecting institutional framework as a source of possible explanations for these outcomes.

There are three main aspects to consider when addressing the compact city as a model for sustainability: the intentions of compact city ideals in *policy*, their contemporary implementation in *practice*, and the complementary perspectives as well as gaps highlighted in *research,* all of which represent the gaps that this thesis seeks to address. These three aspects are discussed in the following subsections.

1.3.1 *Compact city ideal in policies – Results of densification processes*

The term *compact city* refers to the sustainability model that this thesis addresses, as a current and actual model within Norwegian sustainable urban densification policies. In 2021, the concept of compact cities is deeply interwoven into the concept of *sustainable development* as an alternative to urban sprawl and for reducing the transport need, and it is generally accepted as being such an alternative. The aim of a compact city is twofold: (1) a lower impact on the climate and the environment through preserving green and agricultural areas around the city, thereby reducing the impact on biodiversity and ecosystems; and (2) improved public transportation and mobility, thereby reducing carbon gas emissions and energy consumption as well as improving air quality. In addition, compact cities strive for a liveable, walkable, vibrant, and diverse environment achieved through revitalising city areas and creating positive effects by concentrating people and activities. Thus, compact cities improve inhabitants' quality of life by increasing social interaction, community spirit, and cultural vitality through proximity to transport and services and opportunities for safe walking and cycling. In addition, dwellings for an increasing urban population are constructed as economically viable projects with good profit margins and cheaper management and maintenance (St.meld no 18[2016-2017], Kommunal- og moderniseringsdepartementet 2014).

The 1987 publication of the Brundtland report titled *'Our Common Future',* established urban *densification* as the foundation of European and Scandinavian planning policy and guidance (OECD Organisation for Economic Co-operation and Development 1987). Within this framework, *urban densification* was introduced as a strategy for reaching the future goals and has come to be regarded in Norway as the most sustainable urban growth strategy. A range of white papers from the Norwegian Parliament (St.meld. no 31 [92-93], no 58 [96-97], no 23 [2001-2002], and no 18 [2016-17]) have announced government policies for land use and urban development. In these papers, densification has aimed to produce '*dense and concentrated cities'* and more recently *'compact cities'.* Current *'state planning guidelines for coordinated housing, area and transport planning'* (Kommunal- og Moderniseringsdepartementet 2014) as well as the *National expectations for regional and municipal planning 2019–2023* (Kommunal- og Moderniseringsdepartementet 2019-2023) have enhanced a compact development pattern. These and other governmental guidance documents have focused on the potential for *densification with quality*, aiming to exploit the opportunities within densification in the planning of urban housing areas (Guttu & Thorén 1999; Guttu et al. 2008; Guttu 2011).

Housing and housing quality have been paramount in current policies and debate and, together with densification, are the key aspects of the current growth strategy. The link between the two aspects has mainly been presented in terms of challenges to sun and daylight conditions, lost views, and living conditions (Guttu 2011; Schmidt 2014), but also in terms of offering potential preconditions for good urban life and the vitality of the city (Røtnes et al. 2016). Here, one inherent, repeating conflict is the distinction between dense meaning cramped (negative) or dense meaning accessible (positive). The latter aspect reviews the positive attributes of a dense and accessible urban environment as part of more vibrant and attractive cities, whereas the former focuses on the negative aspects of dense and cramped situations.

While densification is a *process* that can have different outputs, the compact city is a *dense result* of one type of these outputs (Børrud 2018b). Within the Norwegian context, the terminology in policy regarding the *result* of densification have, over the last two decades, changed from the aim of building *dense* to building *concentrated* and finally to building *compact* (Børrud 2018d). In 2014, the term *compact city* was used explicitly for the first time in Norwegian state guidance as a result of urban densification policy and a goal for built form. The following year, the term was established in the national expectations for regional and local planning (Kommunal- og moderniseringsdepartementet 2015) and later in the White Paper on Sustainable Cities and Strong Districts established the term (Børrud 2018b). Current national expectations from the government (2019) continue the intentions of growth and development in compact and clearly defined areas, both in the larger urban context and the city centre, working toward a place of short distances with a mix of functions in which the need for cars is reduced and walkers and cyclists are prioritised.

In this agenda, the current focus on active façades has emerged as an answer for ensuring vital, safe, and attractive space, enhancing walking, public health, and social interaction among others (Oslo kommune 2014; Gehl Arkitekter 2014). Even in Norway's national expectations on planning from the government, this term is presented as a vital aspect for enhancing sustainable cities. As a term, *'active façades'* relies on the effect of the policy rather than the capacities required to achieve that effect. The term is largely used in relation to ground-floor commercial units for ensuring a lively street. Related policy describes open and inclusive façades and active ground floors with publicly oriented activity and premises as means to contribute to streets and urban spaces feeling like safer and more attractive places to stay (Kommunal- og Moderniseringsdepartementet 2019). The frequency of the term has increased parallel to the ambition to develop more vital and compact cities. The term *active façades* include expectations of specific effects of a form, rather than it being an operational tool to be used in planning and building cases. The term is neither a precise description of an architectural element nor specifically useful in dealing with legal and economic issues, making it difficult to implement with the desired effect.

This review of compact city policy reveal a key term in this compact city agenda, namely *density*. As a concept, this often produces substantial confusion as to what it comprises. It might equally relate to morphological, functional, or demographic density; involve perceived or measured density; or be measured as net density or gross density (Dovey & Pafka 2019). For the clarity of this thesis, I employ Børrud and Røsnes' (2016) approach whereby compact city building depends on the following combinations of density: demographic, physical, and functional. I further employ physical/morphological density in assessing my unit of study. Physical density defines the size of buildings and space in relation to a given area. It has an intricate relationship with the field of urban morphology; that is, it plays a crucial role in creating urban form.

In Norway, the implementation of densification strategies for physical density is governed by rules set out in the technical regulations for buildings and the supplementary guidance document *'Grad av utnytting'* (*Degree of utilisation*). These documents present the relevant densification measures for compact city building through images of detached houses with pitched roofs located in the middle of the plot, and not through diagrams of buildings in urban environments. Similarly, building typologies presented in the document are mainly represented by detached or terraced houses, but lack a larger scope of urban typologies for city building. The intricate relationship between density measures and urban form has little focus on current legislative regulation, providing challenging decision environments for the physical implementation of the city. Density is critical in compact city building, but it is the nature and design of density that determines whether the capacities of a compact city are achieved rather than just an aggregation of buildings next to each other. As such, understanding the complex nature of density through urban morphology is vital.

1.3.2 *Compact city ideals in practice – Implementation of the building–street relationship*

The compact city densification of existing built environments is not a new idea. Compact city ideals draw heavily on knowledge from before the industrial revolution when cities were typically built and rebuilt within existing urban walls. Despite this historic precedent, studies on the current realisation of new urban form within the existing built fabric in Norway have highlighted some problems in city building (Børrud 2005a; Zurovac 2020). It may seem as though the contemporary compact city form treats the urban block as an *a priori* entity and not as a system of relationships that define spaces and connections in the urban structure. Even in new urban areas considered good urban projects, self-contained urban blocks divided by streets seem prevalent. Børrud discussed this problem of urban forms, revealing a tendency towards forming introspective cells, which help contribute to a fragmented city developed through an incremental nature (Børrud 2005). The cells activate the core of their urban plot/block instead of their edges, interfaces, or structural connections towards the public street network. Zurovac's recent research revealed the same problem today, which she demonstrated through the passive/closed built façades facing the public streetscape providing a 'backside' character (Zurovac 2020). Based on the aforementioned studies, it is relevant to observe how urban densification policies are intertwined with a *market-oriented development* system. As described in Chapter, the PBL in Norway allows real-estate developers to initiate and build politically desired land-use plans according to detailed zoning plans. Public authorities control overall strategies and can sometimes define detailed land-use plans themselves. There is a tendency for real-estate developers to typically play it safe, repeating patterns of production and building methods as well as reusing previously sold products (Nordahl et al. 2012). This tendency includes patterns of previously built projects that are repeated with little focus on placemaking and context, but rather on the quality of the unit and on the block within its plot. Therefore, the aim of the market is to develop and densify available urban plots, with private developers focusing on their own plot through speculation and development, seeking to maximise utilisation. As such, the developer seems to work solely within their plot, making the plot boundary a physical divide between block and street. Value- and risk assessments from real-estate developers may set crucial parameters for architectural solutions, which are produced and developed within the constraints of detailed project-based regulation. Such risks are generally connected to variables such as (remote) *location* (Røsnes & Storflor 2009), (risky) *process* (Barlindhaug & Nordahl 2005; Carmona & Tiesdell 2007), and (repeated) *product* (Nordahl et al. 2012). Because the developers work incrementally, their main concern is with the realisation of the building and not with the aggregation and relation between buildings. As such, the small seemingly unimportant details and relations between plot and street are given little consideration.

Public actors, legislative systems, and land-use plans comprise *the institutional frameworks* that control private development. These frameworks face severe limitations in providing the institutional decision frames with the ability to deliver compact city goals. The planning framework previously worked well (post-war) when controlling newly built areas on open grounds, but its limitations were discovered when the focus shifted to the existing city, and urban densification became the main policy of growth (Engelstad et al. 1977). The practice of implementing contemporary urban form through planning instruments of the current institutional system seems to present challenging results for city building. However, there might be an inherent potential in redeveloping planning instruments such as zoning plans and technical regulations for buildings.

In contemporary compact city development, site-specific and predefined zoning plans with provisions and site-nonspecific technical regulations for buildings are the main planning instruments. The zoning plans define spaces divided by land-use boundaries and do not generally include the potential for different spatial overlaps and relations that the compact city comprises. These boundaries limit connection and interaction in these important in-between spaces of the city. The land-use boundaries often correspond to the plot boundary, which through development often becomes a physical form directly shaped as a result. Technical regulations for buildings are site-nonspecific regulations that are overly focused on the built form and building project rather than the unbuilt void of outdoor spaces and regulations; furthermore, they crucially lack a focus on the relationship between built and unbuilt. Regulations set a range of functional requirements and complexities with a wide range of measures, guidelines, regulations, and interdependencies, which might be complicated to negotiate, leaving planners and designers with little scope for innovation to define the built reality of city qualities.

1.3.3 *Compact city ideals in research – Lack of research on the capacities of compact cities*

Within Norwegian discourses on densification strategies and the compact city, there are different perceptions and values concerning the goals and effects of such development. They often agree on the main goal of compact city development while disagreeing on the impact, objectives, and strategies for achieving this goal as well as on the positive and negative effects.

In Norwegian doctoral research, I found a few contemporary theses that have directly examined aspects of densification strategies and the compact city as a context and ideal (Hernández-Palacio 2018; Hofstad 2013; Mouratidis 2018; Zurovac 2020). In addition, Saglie's thesis was an earlier investigation into the effects of densification policies (Saglie 1998), while Børrud's thesis investigated the project-based city development process seen through the field of urban morphology (Børrud 2005a). However, a few theses have also examined aspects of urban theory tangential to the focus of the present thesis, such as urban attractiveness/city life (Bergsli 2015), market-oriented planning (Hanssen 2013), and urban environments (Ellefsen 2017).

Hernández-Palacio (2018) indicated the feasibility and effectiveness of urban densification in Norway, revealing densification as feasible but where the effectiveness of compaction depends on a combination of various factors and not merely density. Hofstad linked compact city strategies with their effects on public health and social sustainability (Hofstad 2013). Mouratidis addressed the role of urban form on subjective well-being in compact city policies. His main focus was subjective well-being, whereas urban form was more briefly handled through types of compact/urban sprawl (Mouratidis 2018). A recent thesis by Zurovac investigated the urban form of a densifying city, that is, a compact city in the making (Zurovac 2020). Zurovac, Børrud, and Ellefsen have conducted research in the field of urban morphology, addressing questions in the context of project-based development (Børrud 2005), harbour city development (Ellefsen 2017), and the architectural output of densification strategies (Zurovac 2020). In addition, urban morphology as addressed through space syntax was addressed in a PhD investigation of housing layouts (Manum 2006) and road effects on commercial location (Van Nes 2002). The most relevant Norwegian PhD study to the present thesis is Zurovac's work (2020), which investigated the architectural influence of densification strategies on the intermediate scale of the urban block.

A comprehensive but nonexhaustive account of contemporary Norwegian compact city discourse was presented in the anthology *Kompakt byutvikling* ('Compact city development') by Hansen, Hofstad, and Saglie (Hanssen et al. 2015). Their overview reveals how the built-in tensions and conflicts in densification are inherent in the planning and decision-making system. The authors also examine the effects of densification policy on environmental and societal sustainability. They discuss which considerations govern urban development and how this manifests in the actual result in built structure and blue-green structure. Their anthology is divided into five main parts, the first of which considers the idea and phenomenon of the compact city within a Norwegian context. The next four parts deal with the planning process and its effects on environmental and social sustainability, as well as negotiations between different considerations in compact city development. Within this anthology, one chapter concerns the morphology of the compact city (Marjanovic, G. nee Zurovac 2015). Said chapter forms part of Zurovac's thesis (2020), which is the most relevant to the present research.

Within the topic of compact city development as a planning process, there are discussions that concern the relationship between economic forces and municipal governance as well as that between stakeholders and interests. Here, the real-estate developer is often presented as a 'negative' stakeholder, an actor with little regard for the world around him/her who develops projects with a sole focus on the highest possible economic output. This narrative concludes with the profit-maximising developer disappearing when their overheads are presented (Hanssen et al. 2015; Schmidt 2014), a narrative constantly repeated in media and social media debates. Other research revealed that developers are interested in design quality, but that it often takes second place as a result of the frames and risks under which they operate (Børrud 2005a; Nordahl et.al 2012).

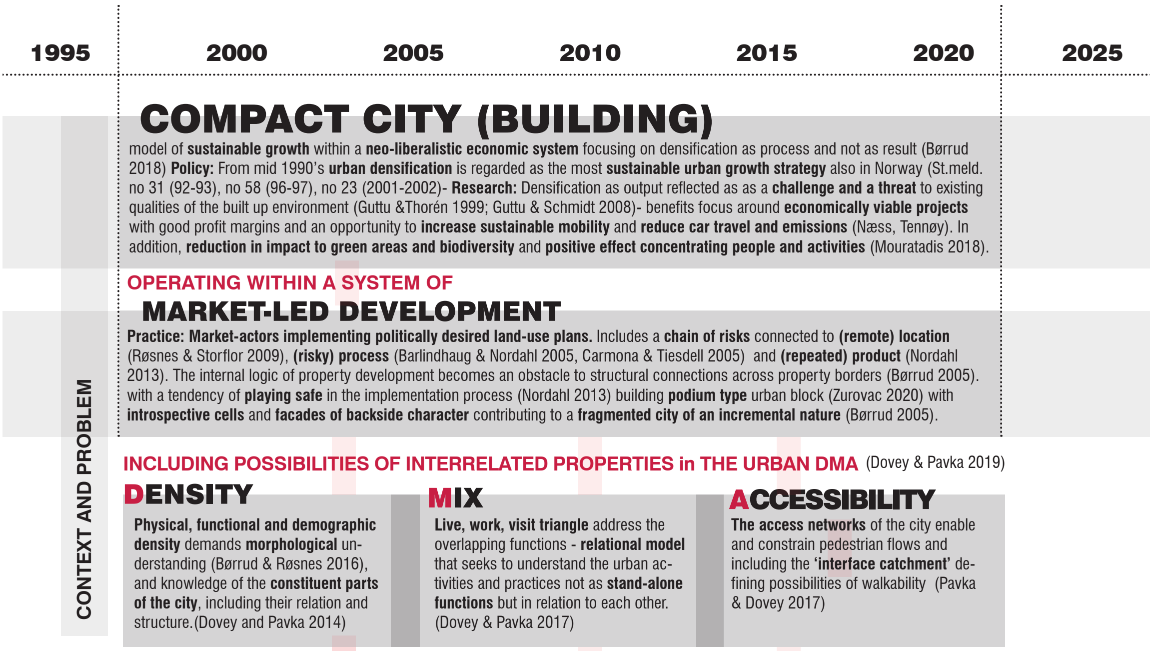
Several discourses have highlighted the consequences and effects of the compact city on environmental and social goods, such as green structure, natural diversity, climate change, sustainable transport, housing qualities and social sustainability, public space, and public health. One such discourse emphasises the positive effects of compact city patterns on *transport needs and land-use patterns*, which lead to increased sustainable mobility and reduced car travel and emissions (Næss 2012; Næss et al. 2020; Næss 2006; Tennøy 2010). In this scenario, densification and compact city patterns are valued for their potential for sustainable mobility.

Another discourse considers the impact of compact city policies on the existing environment. Disregarding assumptions that regard the compact city as the most sustainable growth pattern, his discourse present its impact in terms of conflict and threat. Such research on urban housing focuses on housing standards, size, number of rooms, daylight, and accessibility to outdoor space and how conflicting relationships between market-led interest in property development and public interest in common goods (Hanssen et. al 2015) present a threat to the urban environment through the reduction of open space and daylight and increase in noise and pollution (Guttu &Thorén 1999; Guttu & Schmidt 2008). Topics such as private balconies overlooking private flats and closed curtains on ground-floor flats are mentioned and only briefly addressed, even though they are often perceived by residents as *more problematic* than difficult sun and light conditions, which are actually the preoccupation of planners (Saglie 1998; Schmidt 2007). These points relate directly to the boundary between public and private in the building–street relationship. It is not investigated as a capacity of densification outputs, but rather as an effect where researchers typically suggest solutions based on ideas rather than discussing morphological knowledge. Some researchers in the Norwegian context have claimed this to be a 'new' problem that is not currently addressed in the planning process and casework (Schmidt 2007). However, evidence suggests that this micro-spatial understanding has been a vital aspect of international urban design and planning practices for decades – possibly centuries.

Combined, these discourses differ in how they present the story about the *dense environment*. The first discourse considers densification to mean *dense or cramped with a negative connotation while simultaneously achieving the goal of reducing transport needs.* The second discourse *advances a more positive dense and accessible space* and urban environment, achieving the goal of developing more vibrant and attractive cities. The prevalent qualities and negative connotations are connected to the size of outdoor areas for recreation, lack of sunlight and daylight, increasing noise, and overlooking views. These conditions are presented as bad for public health and quality of life.

Common to most of the different research outputs is their focus on the *effects of densification policy*, not on the actual characteristics and capacities of urban form for achieving such effects by addressing potential causal links between one

Figure 4
Literature review of the context and problem



and the other. In addition, urban form is understood and explained in a limited manner, as only a visual aesthetic and a physical entity (an *a priori* element) with certain functions (Mouratidis & Hassan 2020), not as the sum of complex systems of relations and decisions that are continuously developing. Exceptions are the thesis of Børrud (2005) and Master theses connected to her professorship (Berg 2019; Carlson 2019; Levin 2016; Syvertsen 2011; Åmdal 2019), as well as Zurovac's (2020) thesis on the morphology of the urban block in Oslo. This thesis complements and addresses these Norwegian morphological works by developing morphological research to address the micro-aspects seen in relation to the processes of their creation.

Figure 4 presents a synthesis of sources defining the context and problem this thesis engages in. It addresses compact city as model of sustainable growth operating within a system of market-led development, addressing possibilities of interrelated properties in the urban DMA: Density, Mix and Accessibility.

1.3.4 *The problem revealed - From problem area to research need*

The previous section revealed how the knowledge of *compact* city development in contemporary Norwegian discourse, policies, and practice has mainly been limited to the societal and environmental effects of *densification policy*. This provides us with knowledge about a range of societal aspects that affect the sustainable outcome of healthy, low-carbon, creative, productive, and equitable cities. However, what questions are not asked in this discourse? What are the gaps in contemporary Norwegian knowledge on urban densification strategies? What kind of research is required to complement existing research and answer problems about compact city building?

We have seen little research that focuses on the architectural outcomes of densification strategies in Norway. What if we do not regard densification as a process that causes an effect, either as a threat or a good, but rather aim to understand the composition of the dense compact city as result of different densification processes? Inherent in the term *compact city* is the need to realise a dense result achieved through closely connected buildings with mixed functions. The knowledge of properties and capacities in a material context in contemporary discourse is often simplified into considering form as *a priori* entity, focusing entirely on its visual appearance and capacity as a passive background for activities and experiences, rather than on the active precondition for future interaction. As such, understanding density requires knowledge about the constituent parts of the city, particularly their relations and inter-structure. Herein lies the quintessence of city building, as debated by international researchers and practitioners through time, namely the building–street relationship.

Furthermore, inherent in the term *densification* is the nature of a densifying process, which emphasises the various processes inherent in producing a dense result – such as planning, building, and real-estate processes. The successful implementation of compact urban form requires professional skills and methods to address the organised complexity found in the making disciplines of city building, planning, architecture, and development. It seems as though the art of building compact cities is currently neither implemented within private market mechanisms of risk reduction and housing provision nor identified or regarded as a specific element in the intentions of public institutions/bodies. There is a need to develop knowledge about both the material and institutional reality and address the highlighted gaps to realise the full potential for wanted sustainable effects in compact city building. Within these two main themes, I present and explore three suppositions in this thesis.

My first assumption for the thesis is that there is a *knowledge and research gap* in the understanding and production of urban form, both generally and specifically with regard to building–street relations. The contemporary output of urban form meets severe challenges in relating buildings and streets such that they do not contribute to compact city qualities or effects addressed in policies. Examinations of current types of urban blocks highlight this knowledge gap and the need to study urban form at both meso- and micro-levels. This includes current limitations on the understanding of micro-spatial elements of building–street relations addressed as an effect (active façade) rather than a capacity of relations.

My second assumption is that there are *implementation gaps* connected to the institutional framework through which urban form and building–street relations are produced. This includes current legislation, regulatory tools/zoning plans, and discretionary decisions, which have significant impacts on urban form. First, I see the implementation of technical regulations as having a crucial lack of the urban design aspects required for compact city building. It is problematic that existing technical regulations and legislation are over-focused on the built (form) and building projects rather than on the unbuilt (void) of outdoor spaces. Furthermore, it is equally problematic that these regulations completely lack a focus on the relationship between built and unbuilt. Such regulatory tools focus on plans (detail-, area-, municipal-) or buildings and lack a focus on the intermediate level of the spatial urban realm and the micro-spatial elements of the building–street relationship. It is also problematic that zoning plans do not consider spatial overlaps and relations that the compact city consists of, thus preventing meaningful connection and interaction in these in-between spaces of the city.

My third assumption addresses the problem that vital parts of the outcome of planning and building cases can be determined by discretionary decisions in the building control process and sometimes by one individual case officer, addressed using the tool of *dispensation*. As such, the abilities and skills of the individual case officer can alter overall planning strategies in an unintended and problematic manner. This becomes particularly apparent at the micro-level, where small, seemingly unimportant regulations of building–street relations are often overlooked while the achievement of other regulations is perceived as more important.

These three focus areas are based on assumptions from both professional experience and gaps revealed in the literature, some of which can to a certain degree be tested, proved, or disproved to find answers, while others can be explored to find tendencies and patterns. They form a research need that can complement contemporary research. As such, this thesis engages in compact city building as a physical result that is dense, mixed, and accessible (urbs), and on the potential to regulate and implement this result though process (civitas). The relevant research field for addressing this dialectic is within the international scientific field of Urban Morphology. The next section presents this research field as a scientific approach to city building and the research fellowship of the International Seminar on Urban Form.

1.4 RESEARCH FIELD – URBAN MORPHOLOGY

> 'Urban Morphology is the study of the physical (or built) fabric of urban form, and the processes shaping it (Moudon 1997).

1.4.1 *Urban morphology as a scientific approach to city building*

This thesis addresses the *art of city building*, the centrality of the *building–street relationship*, and particularly the problem area of *compact city building*, which defines *Urban Morphology* as my research field.

Urban Morphology, an international interdisciplinary field of research, studies the city as human habitat through its physical urban environment (Moudon 1997). It is a young field when compared with urban theories such as urban sociology, urban economics, urban geography, and urban transport research (Ståhle 2008). In Urban Morphology, urban form is regarded as a result manifested in the ground and the process that define this form. It links directly to the dialectics of urbs and civitas that this thesis addresses, to the form and micro-morphology of the city, and to the process of shaping this form within legislation and planning.

1.4.2 *The fundamental ideas of the field*

> 'The city is the accumulation and the integration of many individual and small group actions, themselves governed by cultural traditions and shaped by social and economic forces over time' (Moudon 1997 p 3).

The theoretical basis of Urban Morphology as a field is a consensus that a city can be read and analysed through the medium of its physical form. In addition, agreement exists that the main principles in morphological analysis are *form, scale, and time (Moudon 1997)*. In addition, Børrud considered *decisions* a core part of morphological analysis (Børrud 2005), thereby linking form to the actions and processes that shape it. There are three fundamental elements that determine *form*: (1) buildings and their related open spaces, (2) plot or lot, and (3) streets. Here, form can be understood at different levels of scale, including four common levels: the building/lot, street/block, city, and region. Furthermore, urban form can only be understood historically with time since the elements that comprise it undergo continuous transformation and replacement (Moudon 1997).

1.4.3 *The research fellowship of the International Seminar of Urban Form*

The International Seminar on Urban Form (ISUF), founded in 1994, aims to bring together the different schools of urban morphology, provide a basis for an interdisciplinary field, and establish common theoretical foundations. Among its goals are the international and interdisciplinary sharing of ideas, methods, and findings concerned with urban form. ISUF organises conferences, publishes the journal *Urban Morphology*, and provides an international framework for communication between members. Beginning in 1994 with the coming together of some 20 architects, geographers, planners, and historians, representing four different language areas, it now has some 600 individual and institutional members from approximately 50 countries. Members come from several disciplines, including architecture, geography, history, sociology, and town planning. As such, the resultant variety of research material concerning urban form is wide and comprehensive.

Urban Morphology grew out of three distinct schools of morphological thoughts, namely the Italian, English, and French schools, which emerged and developed over decades of research (Moudon 1997). These schools comprised scholars from different professional fields, which broadly speaking were geography (English), architecture (Italian), and urbanism (French). In addition, individual researchers from a variety of other countries have contributed to the field. Professor of Architecture, Landscape Architecture, and Urban Design and Planning University of Washington Anne Vernez Moudon (1997) distinguished these three schools by their different intentions in theory building efforts. First, the study of urban form for descriptive and explanatory purposes has the overall aim of developing a theory of city building and has its roots in the British school of morphology; second, the study of urban form for prescriptive purposes has the overall aim of developing a theory of city design and is rooted in the Italian School; and third, the study of urban form for assessing the impact of past design theories on city building has its origin in the French school.

Moudon's early distinction of the schools has been further developed in later work. Canadian planners and geographers Pierre Gauthier and Jason Gilliland proposed a four-field scheme for identifying, classifying, and interpreting (or 'mapping') individual contributions to the study of urban form according to their respective theoretical or epistemological perspectives (Gauthier & Gilliland 2006). They claimed that contributions arising from these three seemingly different theoretical schools are intrinsically similar because they contribute to the development of an *internalist* perspective, referring to studies that consider

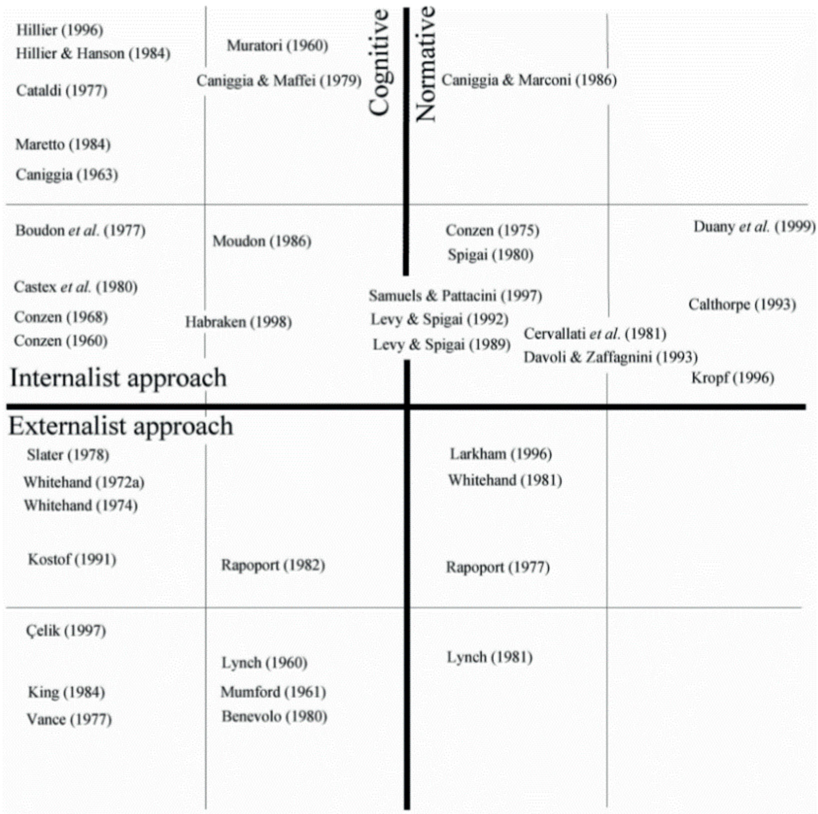


Figure 5
Mapping Urban Morphology: A Classification Scheme for Interpreting Contributions to the Study of Urban Form
(Source: Gauthier & Gillilan 2006:)

urban form as a relatively independent system. This perspective is distinct from *an externalist* perspective, which comprises studies in which urban form stands as a passive product of various external determinants. They also distinguished between *cognitive and normative* perspectives, where cognitive studies provide explanations and/or develop explanatory frameworks and normative studies determine modalities according to which the city *should* be planned or built in the future. The seemingly different strands of process typology/structure morphology and Conzenian morphology/elemental morphology share a range of similarities and refer to the scientific field of urban morphology as a *cognitive-explanatory* and *internalist perspective*. Gauthier and Gilliland stated the following:

> 'From an epistemological perspective, the commensurability of the cognitive-explanatory theoretical frameworks developed under the auspices of the three schools of urban morphology lies in their common internalist perspective' (Gauthier & Gilliland 2006 p 45).

They also defined what they consider the most critical contribution of the scientific field, namely how the built environment can be understood as a system of relations submitted to rules of transformation. They stated that contributions to urban morphology from seemingly different theoretical approaches are intrinsically similar in their treatment of urban form as an object of enquiry.

Swedish urban designer and morphologist Alexander Ståhle linked the processes of urban morphology to scientific urban theory described by numerous sociologists, such as Harvey, Castells, Sennet, Sassen, Davis, and Lefebvre, and economists such as von Thünen, Alonso, Christaller, Lösch, Garreau, and Florida. He emphasised the spatial dimension of morphology as being connected to social and economic issues critical to urbanisation and urban densification (Ståhle 2008). This correlates strongly with Cerda's investigation into the origin of the streets and their tight, indissoluble relation to the buildings they serve, which he saw as not only an entity (urban form) connecting ways and buildings but also as an economic and legal challenge to city production and financing (process). Ståhle further explored the problems at the neighbourhood level as linked to architecture theory and separated their theories into two main camps: *elemental* morphology and *structural* morphology. Whereas elemental morphology focuses on the description and prescription of how cities have been built and designed, structural morphology focuses on the performance and capacities of urban form. Structural morphology such as space syntax has typically been preoccupied with space rather than shape, addressing spatial morphology rather than 'material' morphology. Karl Kropf made a further distinction including the following approaches to the field: spatial-analytical, configurational, process typological and historico-geographical. (Kropf 2009). Each of these approaches focuses on slightly different aspects of urban form and uses different methods and tools for understanding and analysing. The *spatial-analytical approach* stems from the research of Michael Batty at University College London and seeks to understand the spatial structure and dynamics of cities as complex, emergent phenomena, in which a global structure develops from local processes. The *configurational approach* seeks to understand the spatial structure of settlements through a range of analytical methods and stems from space syntax and the work of Bill Hiller and Julienne Hansson from UCL (Hillier & Hansson 1984) . The concepts and analytical methods used in this approach focus on the voids of a structure and the arrangement and position of spaces within the structure of the configuration as a whole. The *process-typological approach* stems from the work of Italian architects

Saverio Muratori and Gianfranco Caniggia and seeks to inform architectural and urban proposals with an understanding of the built environment by examining its detailed structure and the historical process of its formation. The spatial form includes an abstract set or schema of component subdivisions that form a hierarchy: elements, structures of elements, systems of structures, and organisms of systems, which work as cultural entities rooted in, and specific to, the local process of cultural development. The *historico-geographical approach* is rooted in the work of the geographer M. R. G. Conzen and exemplified in his seminal 1960 work on Alnwick in the United Kingdom (Conzen 1960). The analysis in this approach explains the geographical structure and character of towns through a systematic analysis of their constituent elements and development over time. It starts with five general aspects, namely site, function, townscape, social and economic context, and development, which are further analysed and developed into form complexes (town plan, land utilisation pattern, and building fabric) and plan elements (e.g., street system, plot pattern, and building pattern). The four approaches can be summarised by distinguishing their pertinent features and the relationships between them (Kropf 2009):

- Spatial-analytical (patch, aggregate cluster, matrix, fractal)
- configurational (line, space, network)
- process typological (module, modular hierarchy)
- historico-geographical (area or patch, patch hierarchy, palimpsest)

I propose that the spatial analytical and configurational approaches are grounded in the structural camp of morphology, whereas the process typological and historico-geographical approaches are rooted in the elemental camp. Although

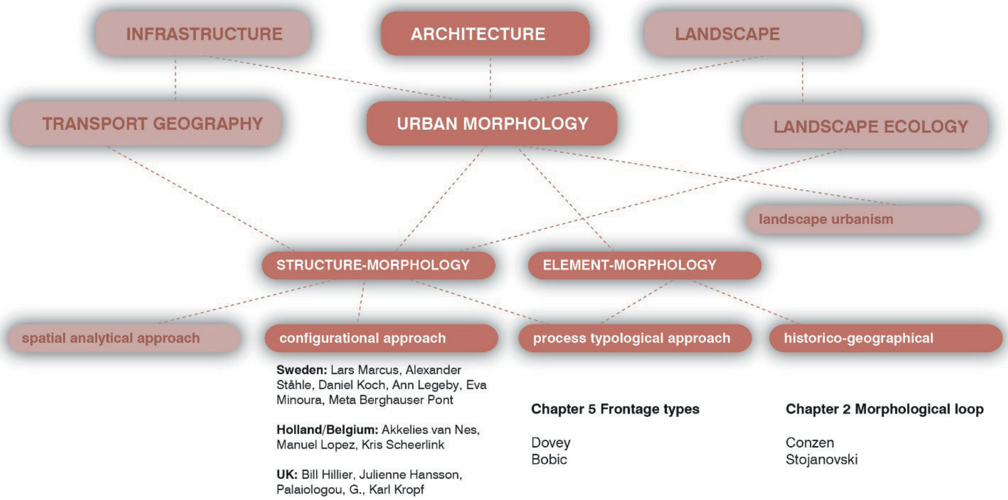


Figure 6
Relations to the fields of Urban Morphology. Fields central to this thesis are highlighted (source: author, inspired by Ståhle [2008])

overlaps occur between the different approaches, all of them exhibit a main tendency to emphasise the internalist cognitive-explanatory field of epistemology as presented by Gauthier and Gilliland.

1.4.4 *A thesis research family tree*

The foundations of urban morphology as a field, its researchers, and epistemological perspectives provide this thesis with its scientific approach to reading and understanding form and the processes of creation and transformation.

In his thesis, Ståhle mapped the closest relations to the field of urban morphology as being between infrastructure, architecture, and landscape (Ståhle 2008). I was inspired by this approach in the development of my own scientific family tree (Figure 3), in which I have placed this thesis and relevant research from across the field.

Whilst the Norwegian morphological research is limited, we need only look to our neighbours in Sweden to find a range of relevant morphological research. The spatial morphology group at Chalmers University, Gothenburg and researchers at KTH Stockholm have addressed the city's form, spatial structure, and impact on human behaviour as well as urban processes such as segregation, local markets, and ecosystems. The Swedish morphological tradition is heavily influenced by quantitative morphology, often from the field of space syntax. Researchers from Sweden such as Alexander Ståhle, Eva Minoura, Ann Legeby, Daniel Koch, and Todor Stojanovski from KTH as well as Meta Berghauser Pont and Lars Marcus from Chalmers have influenced and inspired the content of this thesis.

This thesis utilises three aspects of the morphological approaches distinguished by Kropf: the historico-geographical, process typological, and configurational approaches. My first approach addresses the historical development of urban form in Norway/Oslo and includes figure ground analysis presented in a chronological time series (Chapter 2). This chapter is influenced by Conzen's seminal Alnwick study from 1960 as well as Panerai et al.'s investigation of urban blocks over the last century. My second approach describes the development of types as building–street relations, influenced by the works of Habraken (1998), Dovey & Wood (2015), and Bobic (2004). My third approach draws in the understanding and development of structural connections seen through the concept of the generic structure diagram (Kropf 2009) along with vital measures from the field of space syntax. Combining these approaches has particular benefits when addressing relations and links across building boundaries and helps bring a new perspective to the relationship between buildings and streets as well as to the relation of planning and rules.

This basis enables the discussion of the relationship between architectural production and the legal framework. While discourses concerning urban form may have been criticised for addressing the physical output and not the societal, economic, and political dimensions and their process of development over time, this thesis addresses this dialectic dimension in particular. The focus on tangible results of social and economic forces implemented in an institutional plan, as a study the outcomes of ideas and intentions as they take shape on the ground, is implicit in this. As such, this thesis employs a *'cognitive explanatory'* urban understanding, namely a knowledge-based explanation of how urban form is and has evolved and not a normative description of how the city should be, and it is connected to a scientific field with a long tradition.

A key variable in the Urban Morphology framework is the importance of scale. Researchers such as Whitehand (Whitehand 2001), Moudon (2002), Groth (2004), Chen (2012), and Palaiologou (2016) have used the term *urban micro-morphology* to address micro-spatial aspects in their research. This term has otherwise been scarcely used and emphasised in a manner that might develop its content and potential, even though a range of research handles aspects of urban micro-morphology. In Chapter 4, I present this term as a subfield along with my theoretical framework for addressing aspects concerning the building–street relationship in this thesis. Urban micro-morphology is useful for examining both form and the structural relations and processes that create it. It connects the micro-spatial elements of building–street relations with a macro-spatial understanding of city building (Standal 2018).

The starting point of the thesis is the observation of the architectural and micro-morphological output of compact city strategies within the Norwegian context. It includes a study of both the form of the building–street relationship (architecture/morphology) and the processes that create this form (planning and regulation) from a micromorphological perspective. As such, it highlights the field of tension between planning and building, and potentially contributes to building a bridge between the two.

1.5 CONTRIBUTIONS – RESEARCH, PRACTICE, AND POLICIES

The aim of this thesis is to provide new methodological and theoretical knowledge on the art of city building, addressed through urban form and the processes by which form is created. This thesis specifically examines what the micro-morphological element of the building–street relationship contains and how it is currently developed and managed through legislation and planning. The relevance of this thesis in the Norwegian compact city discourse lies in its contribution to urban morphology *research*, city building *practice*, and *policy* making and legislation. The following paragraphs explains the contribution further:

Research: This thesis aims to provide new knowledge of the architectural output and physical results of compact city policy in Norway. It contributes to compact city research through the field of Urban Morphology by bringing international research into the currently limited Norwegian context, while simultaneously bringing Norwegian morphological research into the international sphere. In particular, it investigates and develops the subfield of urban micro-morphology, linking the internal capacities and structures of buildings with the external structures of streets and structures to address that crucial gap in the Norwegian context. The thesis also contributes to planning research, highlighting the decision frameworks by which planning strategies of compact city development are implemented.

My aim is for this knowledge to contribute and provide important buildings block in defining a more solid urban morphological research base within the Norwegian context, as well as to connect this base to a Nordic and international scientific field. This include developing the link to the Swedish research groups of spatial morphology at KTH and Chalmers, as well as being linked to International Seminar on Urban Form (ISUF).

Practice: The thesis seeks to develop operational knowledge relevant for practice, thereby helping to fill the implementation gaps revealed. Current operational legislative tools are assessed and addressed to attempt to bring a new perspective to the current city-building approach, and also to develop new methods for assessing and developing the art of compact city building. It considers law and regulations as a foundation for explaining the architectural outcome of densification projects, both for understanding and developing planning instruments such as zoning plans, including land-use purpose and drawing tools as well as discretionary aspects of consideration zones in planning and dispensation in building control. It also contributes new terminology (in Norwegian) and typology connected to compact city building in the building–street relationship.

This thesis also contributes a method of reading and assessing urban form through morphology to practice. My aim is for this method to provide an analytical tool (as implemented in this thesis) and also for it to be developed into a design method for micro-morphological aspects in the active design process, which would be relevant for both practicing architects and planners.

Policy: This thesis aims to contribute to the general discourse concerning what compact city quality is and how it is developed through legislative framework and policy. It is one of the first theses within the Norwegian context to concentrate on the architectural and environmental outcomes of municipal densification strategies. It starts with an assumption that if we are to build compact cities as a mean for addressing sustainability goals, then there are certain characteristics of and significant strategies for actually building a compact city with inherent urban qualities. This thesis develops these characteristics and strategies by contributing knowledge about the properties and capacities of a critical element in the implementation of compact cities, namely the quintessence of urbanisation. In particular, it digs into the current discourse and policy about urban quality and 'active façades', aiming to provide answers for enhancing and implementing the intended city. My aim is that both politicians and legislators will benefit from the knowledge in this thesis. Potentially it will be used when the topic becomes the subject of national white papers, national expectations, and guidance documents, as well as in more local decision environments regarding city building at the municipal level, including municipal plans and building implementation. In addition, my aim is for the knowledge produced to inform revisions of legislative framework concerning city building.

1.6 STRUCTURE OF THE THESIS

This thesis is divided into the following four main parts:

- *Problems, background, and methodology (Part I)*

- *Theory development (Part II)*

- *Empirical case research (Part III)*

- *Discussion and impact (Part IV)*

Part I has three chapters concerning the *problems, background, and methodology*, the remainder of which are organised as follows:

- Chapter 2 presents a background story from pre-industrial cities to today, telling a story of change through general societal ideas, urban form, and legislation. This story provides the contextual background for the problem and concludes with a problem statement and the research questions that are addressed.

- Chapter 3 presents the research design and reveals the methodological components of the research strategy and how they relate to answer the research question.

Part II has three chapters concerning theory development, frontage structure, frontage type, and frontage rules. These chapters form the vital research activities and output for the empirical case studies.

- Chapter 4 presents an extensive literature review of operational theory, synthesised and developed into a framework/method for assessing urban form.

- Chapter 5 presents empirical work that developed a typology of building street relations. This typology serves as terminology for specific morphological types of interface as well as a method for analysing micro-spatial components.

- Chapter 6 presents empirical work at the top level of the legislative hierarchy through an investigation of the Planning and Building Act. It tells the story of how micro-morphological units are addressed in legislation over time, and it also explains the level of enforcement that these legislative societal constructs have on urban form.

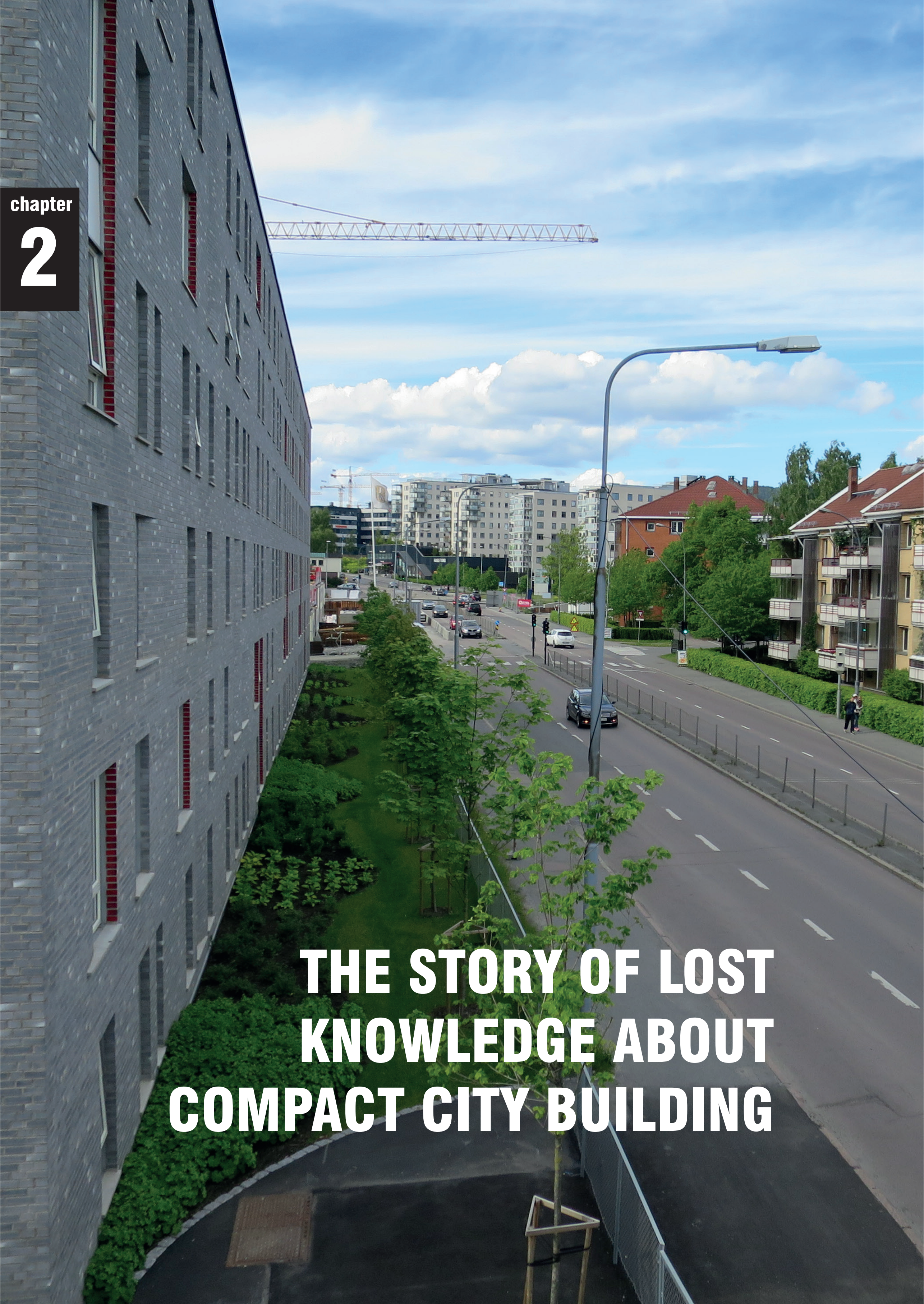
Part III has two chapters that focus on the current situation of compact city building processes.

- Chapter 7 explains the case study process and its results.

- Chapter 8 presents cross-case conclusions based on findings from the different cases.

Finally, Part IV has one chapter. Chapter 9 presents the final reflection and concluding remarks. It suggests actions for impact that help to address the problems revealed by this research

These four parts and their nine chapters correspond to the distinct parts of the research design presented in Figure 3. This research design is thoroughly explained in Chapter 3 (Methodology).



chapter 2

THE STORY OF LOST KNOWLEDGE ABOUT COMPACT CITY BUILDING

Chapter 2 THE STORY OF THE LOST KNOWLEDGE OF COMPACT CITY BUILDING

This chapter presents a contextual story and the background to the problem presented in Chapter 1. The chapter comprise three contexts and hypotheses through which the problem can be investigated: (1) seminal thinkers; (2) urban form in Norway – the development of housing in Oslo; and (3) an exploration of the legal planning and building framework.

Choay's conceptualisations of *culturalist* and *progressive* paths in urban development throughout time (Choay 1969) form the main approach to presenting the content of this chapter. The conceptual paths include her emphasis on the *rule* and the *model*, two principal formulations addressing the constitutive role of architecture in the founding and transformation of human institutions over time (Choay and Bratton 1997). Four key sources inspired the contextual reflection that forms the background paths of this chapter. The first is Panerai et al.'s book titled *Urban Forms: The Death and Life of the Urban Block* (2004), which traces the stages of morphological transformations as an effect of modern urbanism. The second source is Elin Børrud's hypothesis of the effect of housing agenda on the morphological pattern of the urban block in Oslo (Børrud 2013). The third source is Marius Grønning's overview and reflection of the Norwegian legal framework that enforces the implementation of form (Grønning 2017). The fourth and final source is Jørgen Skatland's investigations into the Norwegian building codes (Skatland & Lohne 2016; Skatland 2018).

2.1 INTRODUCING THE CHAPTER – MORPHOLOGICAL FOCUS OF FORM AND LAW

In the late 1970s, at the National School of Architecture of Versailles n France, a seminal book appeared concerning the relationship of ordinary buildings to the urban form (*Formes urbaines: de l'îlot a la barre* [1977]). This was translated into English and republished in 2004 (*Urban Forms: The Death and Life of the Urban Block*), presenting a morphological account of the development of the dwelling and the city throughout the last century. Panerai et al. (2004) provide a morphological account of what happened in the transformation of the urban block through well-known examples from Paris, Amsterdam, Stuttgart, and London. These examples highlight the historical transformation of the block, placing emphasis on its *relation to the street*. Furthermore, they demonstrate the various ways in which buildings remove themselves from the street; over time and how the building–street interface disintegrates. By describing the different steps of this transition from perimeter block to free-standing slab block, Panerai et al. present a means of understanding how form and structure are vital in framing everyday lives and urban experiences.

> 'The urban block is not an architectural form, but a group of independent building plots. It has a proper meaning only when it is in a dialectical relationship with the road network' (Panerai et al 2004 p 161).

The street block can be defined as *'the areas within the town plan unoccupied by streets and bounded wholly or in part by street-lines'* (Conzen 1960 p 5). Plots are interlinked by the streetscape, the layout of which determines the relationship of the site, the centre, and its capacity for extension. Panerai et al. investigate the urban block as an approach to understanding complex relationships between plot and built form, between streets and buildings, and between forms and design practice. They demonstrate that thinking of the block as a whole is to miss the point, reducing it to a homogeneous built-up area surrounding an empty centre. As such, they demonstrate how the dialectical relationships between street and built plots are vital components for creating and transforming the urban block. Their book also addresses the effects of historic processes of change on the development of the urban block, first by *opening up the form and expanding the city* (through garden city ideals), and second by *differentiating functions and isolating the house from the city* (through modernist ideals). The book suggests how modernist thought contributed to dissolving the housing–city relationship through its abandonment of the street grid and presentation of buildings as free-standing objects (Panerai et al. 2004). Børrud presented a hypothesis that applied Panerai et al.'s approach to the development of Norwegian housing through selected examples of Oslo housing projects. These two voices form the backdrop to a more thorough investigation of the morphological patterns of housing, which is presented in Section 2.3. In addition, changes to the built fabric have been categorised through *morphological* (Sonne 2009) and *syntactical* (Hanson 2000) patterns of transformation. Julienne Hansson (2000) used space syntax analysis to retrieve a structured history of design ideas within a UK/London context, revealing a *shift in design paradigms* over time. She highlighted a syntactical

1) This chapter is a refined and expanded version of a conference paper presented at ISUF 2019 in Nicosia, where the morphological story of the Norwegian urban block formed a background for investigating Frontage Rules affecting micro-morphological building-street relation. (Standal 2019).

(structural) change *from streets (*which operate relatively similarly to each other) *to housing estates (*which operate very differently) and demonstrated this through the first social housing scheme in London, namely the boundary estate of Arnold Circus built in 1902. Crucial differences between the original tissue and the planned estates were revealed through a range of *opposite pairs* directly linked to the building–street relationship addressed through morphological characteristics. In summarising the structural history, Hansson concludes that ‘the whole story is one of a ruptured interface between dwelling and street’ (p113).

2.1.1 *Progressive movement – Dilution of the city–interface rupture*

Choay (1969) presented a two-path framework for understanding these historic processes of change, responding to the problematic solutions of dense, unhealthy urban fabric within the rapid urban growth in industrialisation. She highlighted two paths of thoughts emerging through different ideals and defined them as *culturalist* and *progressive* approaches (Choay 1969). The culturalist approach reacts to changes by pointing to and relying on existing solutions, whereas the progressive approach develops from future visions and models for social progression through utopian ideals. Thus, the progressive frame of thought looks forward for solutions within an intentional future form, while the culturalist frame of thought looks back for solutions within existing realised urban form.

The most well-known and first to emerge was the radical path of the progressive model, comprising utopian ideas that contributed to moving the urban tissue from a dense continuous pattern to a discontinuous pattern of sprawl. Choay (1969) traced this model back to the revolutionary vision of sociologists and architects such as Robert Owen, Charles Fourier, Etienne Cabet, Arturo Soria y Mata, Tony Garnier, Le Corbusier, and Hilbersheimer as well as movements such as Bauhaus and the rationalist architecture of CIAM (Congrès Internationaux d’Architecture Moderne). In Norway, this approach was represented by the PAGON group (Progressive Architects Group Oslo Norway) established in 1952 by leading professionals (Guttu 2011), including Sverre Fehn, Geir Grung, P A M Mellbye, Christian Norberg-Schulz, Arne Korsmo, and Håkon Mjelva. The future was inspired by a vision of social progress and reflected a will to eradicate social inequality. Air, light, and greenery became symbols of progress, and the dispersal of form was essential to personal hygiene.

The urban form changed radically as the visions of social progress were realised as physical form on the ground. From a collective urban system where the different pieces worked together, the urban tissue moved into individual relations founded on association. Large, imposing buildings were grouped discontinuously according to their function and houses were separated from recreation and work.

The utopian ideas of modernism and societal solutions of light, air, and better hygiene introduced a morphological transformation of compact urban form dispersed into elements in the open, presenting a shift from solids to voids in which constructed elements had burst apart (Panerai, Castex et al. 2004). The Versailles book presented the morphological transformation based on modernist and utopian ideas in explicit and direct ways. The typological dilution of the urban form also led to an interface rupture in the building–street relationship, presenting a result of modernist ideas in which planning was split apart from architecture. This dilution was including a focus on objects of form and land-use space and neglecting the relations that kept these objects together in the building–street relationship. As such, the spatial aspect of urban knowledge disappeared. Choay (1969) placed the ambiguous garden city ideals of Ebenezer Howard, vital for the development of Norwegian practice, in the middle of the two paths. One side was connected to the progressive model through the concept of *country in the city* and as a satellite connected by transport and implementation of area zoning instruments. However, on the other, Choay also connected the ideals to the culturalist model based on its precise limitation in space, condemnation of standardisation, and encouragement of variety in relating space and building as well as individual houses coexisting with related constructions (Choay 1969). Howard's conceptualisation of the garden city is one of the most influential utopian models, which brought conceptual thoughts to the table with the aim of reforming society, finding the golden middle way between the country and town. His model was not defined in a physical context but rather as a conceptual diagram, and aimed to achieve a new type of entity, combing social advantages of the city and healthy advantages of rural countryside. Howard's ideas were transformed into form by a range of architects, but the most influential was Sir Raymond Unwin, who designed the first garden city. Unwin used the conceptual diagram but simultaneously borrowed heavily from Sitte's layouts of paths, intimacy in space, and diverse building among other concepts.

In Norway, the garden city movement played a critical role in searching and aiming for handling issues of urban growth and housing provision, and it was the first step in a split between housing and the city. Panerai (2004) highlighted form effects of these conceptual ideals when it comes to the building–street relationship. An example was the so-called *close*, a pocket in a cul-de-sac street arrangement that removed building from street by introducing a type of space between public realm and private space. Settlement was both one step removed from the city, and private space was one step removed from the streets. Garden cities introduced the first step in the gradual movement out of the city, that is, a form dilution process.

2.1.2 *Modernist movement critique – The building–street relationship as a vital topic*

The culturalist approach examines the advantages of reforming the existing city (Choay 1969). This retrospective model emerged from criticism of the existing urban situation of rapid urban growth. The model is retrospective and views the past of the pre-industrial city as a model to be *improved* rather than *radically changed.* Chaoy (1969) traced the model back to the visions of historians and architects such as John Ruskin, William Morris, Violet-de-Luc, and Camillo Sitte, and to movements such as English New Towns. Sonne (2009) presented a discourse on the broad international movement that criticised anti-urban models based on utopian ideas and propagated a metropolitan way of dwelling. The aim of this international movement was to reform urban blocks and to develop a metropolis which had the advantages of a real city and simultaneously improved conditions for housing. He presented the reformed urban block as a durable model from the end of the 19th century until today, which was only neglected during the short period of the 1950s and 60s and can be understood as a culturalist approach.

The city form had well-defined limits and a *continuous* urban fabric. Within this close-woven fabric there was variety, irregularity, and asymmetry while standardisation was condemned (Choay 1969). A vital voice in this path was Sitte and his theory of the art of building cities according to artistic principles (Collins et al. 1986). Choay presented the main features of a Sittesque spatial model, including *continuity* in the constructed elements, enclosure, diversity, asymmetry, irregularity, and *connecting elements which are significant in themselves*. One answer from the culturalist approach was the reformed perimeter block*, built up at its edges and fronting the street with an urban façade* as well as delivering green spaces and light, with a large planted inner courtyard (Sonne 2009).

My approach to the thesis, supported by the emphasis highlighted by Sonne, is that the retrospective perspective takes its inspiration from the pre-industrial city and can act as a blueprint of what we today perceive as the real compact city, which can act as model for the sustainable compact city. As such, the compact city ideal belongs to the last tradition, a retrospective approach which learns from existing urban form and its processes of creation.

2.2 THE DEVELOPMENT OF CITY BUILDING IDEALS – SEMINAL THINKERS ON THE BUILDING–STREET RELATIONSHIP

This section is structured as a historical literature review that focuses on how theories and ideas in urban design have addressed the building–street relationship in their development over time. The review starts from the founder of urbanism Ildefonso Cerda in the mid-19th century and ends with The Congress of New Urbanism at the end of the 20th century, through the development of historical trends in urban space and city building. The literature review includes voices such as Sitte from the 19th century, who played a vital role in identifying the urban space as human habitat. It also includes the central voice of Le Corbusier (as thinker within the CIAM movement) in the 20th century and the critiques that fought against his and other thinkers' ideals from the modernist approach. These voices include architecture and urban design theorists such as Gordon Cullen, Jane Jacobs, Kevin Lynch, Venturi and Scott Brown, Rowe and Koetter, and Christopher Alexander. In particular, the review examines how the voices from the 1960s approached contexts and situations within a modernist planning paradigm and how they responded when housing moved back into the city again. These seminal thinkers were included because of their critical role as voices addressing the urban space and the building–street relationship, which have contributed to the physical city today and can provide a perspective for future engagement. They have been vital in forming the founding ideas within the field and, as such, are sources we continue to draw from in urban studies.

The ideals of city building have changed over time in response to societal concerns and physical results in the urban fabric. Discussions about city building and space have moved in different directions from the clearly embedded and continuous urban tissue to the functional and individual need of housing qualities.

2.2.1 *The building–street relationship in ideals – Seminal thinkers*

> 'The corridor-street should be tolerated no longer, for it poisons the houses that border it and leads to the construction of small internal courts or "wells"' (Corbusier 1929 p 163).

> 'If the street is the space that remains free between two rows of house, it is natural and logical that we should say something of those constructions which give it shape and define its look graphically. We know full well that living, rational beings have their dwellings within these houses, that they receive vitally important services from the street, of such a nature and of such moment that urban life would be impossible without them. And we also know that these relations are not to be passed over in silence; on the contrary, they require the most conscientious and detailed study because they are, if it can be said thus, the quintessence of urbanization' (Ildefonso Cerda, 1867 in (Soria y Puig & Serratosa 1999 p 320)]).

As presented through the morphological account, emphasis and understanding of the building–street relationship has changed drastically over time. The stark difference in views between the two thinkers Cerda and Le Corbusier reveals radically different approaches. While Cerda (1869) claimed that the relation between the house and the street was the most vital and quintessential for urbanisation, Le Corbusier (1924 – the city of tomorrow) abandoned the street and believed that housing should be removed from the street to get away from noise, dust, and light deprivation. While these two voices contrast with each other radically in their approach to the building–street relationship, both were driven by the intention to reform society and to achieve good (housing) qualities. Both had grand ideas: Cerda wanted to invent a whole new discipline of urbanism through a systematic and thorough approach, whereas Le Corbusier wanted to create machines for living and to develop the ideal utopian city (Corbusier 1929). This is where their similarities end, beyond which their understanding of design and implementation as well as that of the city differed to a large extent.

2.2.2 *Streets serving houses – The building–street relationship as the quintessence of urbanisation*

Cerda, the founding father of urbanisation as a professional field, concerned himself with the capacities and relationships in city building, both between domains and as relations between parts. In his theory of urbanisation (1869), he defined *urbs* and *civitas* respectively as the physical city and the city organisation in a dialectic and reciprocal dependent relation. Cerda focused on the urban block as a vital city building piece. He used the term *intervía* (interway) to underline the *close relationship between the road system and building*. The *intervía* did not only include buildings but also the space between buildings and, more importantly, the relationships that buildings, public (open) spaces, and streets have with each other. Cerda delved deeply into the origin of the streets and their tight, indissoluble relation to the buildings they served, not only as an entity *connecting ways and buildings* but also as an economic and legal challenge in city production and financing (1867, TGU, I, 538). At that time, Sitte was developing a model of spatial organisation based on a thorough and systematic analysis of the compositional elements that came into play in the preindustrial city (Collins et al. 1986). Space was continuous, and *buildings only had meaning in relation to one another*. This knowledge about relationships forms an overarching understanding in his work, where buildings form space, space enables good housing, and individual buildings are related to place through *constituted street and façade lines defining the urban space*. Like Cerda, Sitte developed a theory of urban planning that he called '*the art of building cities according to artistic principles*', inspiring an urban design movement in the early 20th century.

2.2.3 *Streets poisoning houses – The building–street relationship abandoned*

In Corbusier's approach, Sitte's theories were not only in the past – they *'were the past'*. He heavily criticised thinkers from the pre-industrial city who presented a culturalist approach, particularly Sitte and his ideas concerning urban space. Corbusier believed in diminishing the number of existing streets to minimise the total number of crossings, which he perceived as an enemy to traffic, and criticised Sitte 'for transforming all kinds of pathways into roads and streets in such a way that there were too many of them' (Corbusier 1929). In his perception, the city and its urban spaces were too old and could not address the changing condition of society: 'The city is crumbling, it cannot last much longer; its time is past. It is too old' (ibid). Corbusier was a radical futurist voice seeking what he called *'a brutal and overwhelming step in evolution'*, a step where modern town planning would be born. In this step, he believed in burning bridges to the past to find a new radical way to address the current situation:

> 'Decorative art is dead. Modern town planning comes to birth with a new architecture. By this immense step in evolution, so brutal and so overwhelming, we burn our bridges and break with the past' (Corbusier 1929 p 5).

One particularly radical idea was Corbusier's abandonment of the street, in which he emphasised all available means to destroy the relation to the house. In his ideal world, the street was dead and the ground floor functions should be removed from the ground. Parks and set-backs should remove the houses from the street and instead define a contact between building and the open space. He said the following:

> 'We must build in the open' and '[t]he "set-backs" supply an architectural motive which takes us far from the "corridor-street"' (Corbusier 1929 p 238).

Corbusier was a vital early voice in the CIAM movement, organising a range of events and congresses across Europe with the aim of investigating, developing, and spreading modern movement thoughts. The Athens Charter, published by Le Corbusier in 1943, was the edited form of discussions developed by the CIAM group in 1933 about the principles of 'The functional city', developing their scope from architecture into urban planning and proposing that the social problems faced by cities could be resolved by strict functional distinction.

2.2.4 *Streets overlapping houses – Patterns and organised complexity in the building–street relationship*

From the late 1950s, an increasing number of voices and thinkers challenged modernist urban space and looked back to the earlier realised city, drawing their ideals from pre-industrial times, which represented the culturalist approach.

Utopian ideas received heavy critique in the 1960s and 70s as thinkers such as Cullen, Jacobs, Lynch, and Alexander challenged the modernist ideas of functional distinction and suggested different approaches in city building and in the building–street relationship. Common to all of them was their critique of the deconstructed city, instead emphasising a connection of built form and spaces and the enhancement of relations and good urban design. British architect and urban designer Gordon Cullen picked up the visual aesthetic aspects from the culturalist movement, finding inspiration in Sitte's work. In his book *The Concise Townscape*, he emphasised the *art of relationship* as a complementary criterion to the art of architecture (Cullen 1960). His approach to townscape focused on the urban space and the powerful visual effect of micro-aspects. Cullen stated the following: 'Note that the slightest deviation in alignment and quite small variations in projectings or setbacks on plan have a disproportionally powerful effect in the third dimension' (Cullen 1960 p 17). As Cullen focused on the visual aspect of urban space, American urban planner Kevin Lynch addressed visual form at the urban scale based on objective criteria, thereby offering principles of city design (Lynch 1960). He developed the city images into five elements, namely paths, edges, districts, nodes, and landmarks, concentrating on their legibility, which meant the ease with which the different parts could be recognised and *organised into coherent patterns*. His concept of *edges* defined the boundaries between two areas as edges of development or walls. Such edges may be barriers, more or less penetrable, which close one region off from another, or they may be seams, meaning lines along which two regions are related and joined together. British-American architect and design theorist Christopher Alexander, in his conceptual article titled *A city is not a tree (1964),* challenged the tree-like structures of hierarchical thinking in the modernist ideas and suggested an understanding of cities as overlapping semi-lattices where a *range of relations take place* (Alexander 1964). Alexander cooperated with British architect and interior designer Serge Chermayeff on a seminal book titled *Community and Privacy*, addressing a process of organising space into ordered territorial sequences from community to privacy through the following six domains of urbanity: urban-public, urban semi-public, group-public, group-private, family-private, and individual-private (Chermayeff & Alexander 1963). The authors listed 33 basic requirements connecting the city to dwellings through these domains, and analysed housing layouts according to their degree of privacy. Slightly more than a decade later, Alexander translated these concepts and domains into 253 concrete and operative patterns that can be experienced and designed in the built environment (Alexander et al. 1977). Organised in a scalar hierarchy for designing regions, cities, districts, neighbourhoods, buildings, and interiors, a vital foundation of Alexander et al.'s patterns was that each of them was connected to other patterns in the hierarchy – either to larger patterns at a higher level and/or smaller patterns at a lower level. The underlying understanding and idea of the book, namely that components and patterns at the micro-level belong to and affect the macro-level and vice versa, is of great importance to the present PhD research. The particular patterns of interest connected the indoor to the outside as follows:

> '...within the buildings wing, lay out the entrances, the gardens, courtyards, roofs and terraces: shape both the volume of the buildings and the volume of the space between the buildings at the same time– remembering that indoor space and outdoor space, like yin and yang, must always get their shape together' (Alexander et al. 1977 p 26).

All of these culturalist voices criticised the modern movement and its abandonment of the city. Over time, the most significant critique was that of Jane Jacobs. Her seminal 1961 book titled T*he Death and Life of Great American Cities* is an extensive critique of the problems inherent in city development from utopian ideals and modernist thoughts. The book covers the whole picture from a theoretical consideration of what type of problem the city is to the institutional framework of the problems of certain planning tools/zoning in the city-building process. Jacobs proposed that professionals should engage in the science of complex systems and relations, presenting prospects for a better understanding of how cities work (Jacobs 1961). In particular, she highlighted the importance of the micro-aspects of the city. This includes her famous quote *'eyes on the street'*, whereby she addressed social surveillance and safety being best achieved through certain urban forms. In the term *eyes*, she addressed the people she called the natural proprietors of the street, who live and act in the street. She directly emphasised that *buildings must be oriented to the streets* if they are to be equipped to handle strangers and ensure safety for all: *'They cannot turn their backs or blank sides on it and leave it behind' (Jacobs 1961 p 45)*. She also emphasised the clear demarcations between public and private space, a concern that has become unclear in modern built form. She highlighted that '[p]ublic and private spaces cannot ooze into each other as they do typically in suburban settings or in projects' (ibid). Her form-direct and clear qualities of a successful street provided a vital critique of the built form of her time – ideas that are as current now as they were 60 years ago.

Denise Scott Brown and *Robert Venturi* were critical of the modernist doctrine that dominated architecture at the time. In his 1966 book *Complexity and Contradiction*, Venturi argued for a more eclectic architecture which used more historic references, often referred to as his 'gentle manifesto'. Over time, it has come to be viewed as part of postmodernism, which was then developed in his and Scott Brown's book *Learning from Las Vegas*. The bookhighlights the contradictions between inside and outside, which were common in architecture before the modern movement. Particularly in urban and monumental architecture, the ‘billboards in space’ formed false fronts between inside and outside and were usual in buildings (Venturi et al. 1977). Venturi and Scott-Brown exemplified these false frontswith Baroque domes, which are symbols as much as spatial constructions, made larger in scale and higher outside than inside to dominate their urban setting and communicate their symbolic message. The false fronts of Western stores did the same thing: they were larger and taller than the interiors they fronted to communicate the stores’ importance and to enhance the quality and unity of the street. The authors observed similar things in Las Vegas, where the same kind of false fronts disengaged buildings and their related space, also by turning signs sideways/perpendicular to the highway. Venturi and Scott-Brown’s approach highlights the *symbolic and iconographic* aspect of the urban façade, connected or disconnected to building and space. This is related to the 1930s and 40s debate on *monumentalism* in CIAM, which was spearheaded by Sigfried Gideon in response to critique that CIAM did not differentiate buildings and provided no landmarks.

2.2.5 *A move towards new urbanism – Building and streets configured*

In the early 1970s, an influential book about public life and spaces was published by Jan Gehl, a Danish architect and urban design consultant, titled *‘Life between buildings’*. This classic book highlighted the importance of designing urban public space with the fundamental desires of people as guiding principles (Gehl 1987). Gehl was heavily influenced by Jane Jacobs and her approach to studying reality and learning from the city. He related human experience with urban form through principal elements that connected to primary needs such as walking, standing, sitting, seeing, and hearing. One of his most important elements was the introduction of the concept of the soft edges that comprise front yards/forecourts/porches to provide improved opportunities for staying in public spaces for residents of all ages. His thoughts about soft and hard façades have played a valuable role in the Norwegian discussion about the building–street relationship, and they currently represent the most influential approach within compact city building in Norway.

At the end of the 1980s, designing a city with a focus on people first, a city where development patterns were formed around walking people, formed the basis of a movement. This movement, which appeared in the USA, had a set of ideals concerning more traditional city building. It was formalised through the Congress for the New Urbanism in 1993, where a Charter for New Urbanism was published (% 2000). This charter aimed to restructure public policy and development practice to support principles such as diverse neighbourhoods, walkable communities, physically defined cities shaped by accessible public spaces and institutions, as well as urban places framed by architecture and landscape design with local history and considerations of climate, ecology, and building practice. The charter specifically emphasised principles affecting the regional, neighbourhood, and street levels. Vital relational aspects of the principles included a strong focus on linking individual architectural projects to their surroundings as well as the establishment of safe, comfortable, and interesting streets and squares that are 'properly configured', enabling a community and encouraging walking.

The new urbanism approach has a direct connection to the current compact city ideal. Both are planning approaches that were proposed to address the phenomenon of urban sprawl by using regulation to define form and land use that promote mobility. While new urbanism has its origin in North America, the compact city ideal has been developed in Europe, particularly by British scientists such as Jenks. The main difference between the two concepts is that in the US, the focus has mainly been on the relationships between urban micro-scale characteristics (e.g., road network structure, bicycle and pedestrian infrastructure, urban furniture, density at the neighbourhood level, and local accessibility) and travel behaviour, whereas in Europe, most studies have focused on urban macro-scale (e.g., city density, distance to centre, and land use mix; The Marie Curie project NEWCOMPACTISM).

I started the chapter by addressing the fundamental difference between Cerda and Le Corbusier. In Cerda's search for a grand theory, his focus was also on the micro-morphological small units that connect houses to streets. Claiming that this interaction is the *quintessence for urbanisation* provides a ground for a thorough investigation into the mechanisms and processes of understanding city building. This opposite approach to the building–street relationship can to a certain degree be explained by the changing nature of the ways of the street, moving from a pedestrian, horse-driven quality to a motor-driven problem in the 1920s. We can understand this when reading Corbusier's emotional reflection of his past experience:

> 'After the emptiness of the summer, the traffic was more furious than ever. Day by day the fury of traffic grew. To leave your house meant that once you had crossed your threshold you were a possible sacrifice to the death in the shape of innumerable motors. I think back twenty years, when I was a student; the road belonged to us then; we sang in it and argued in it, while the horse-'bus swept calmly along'.

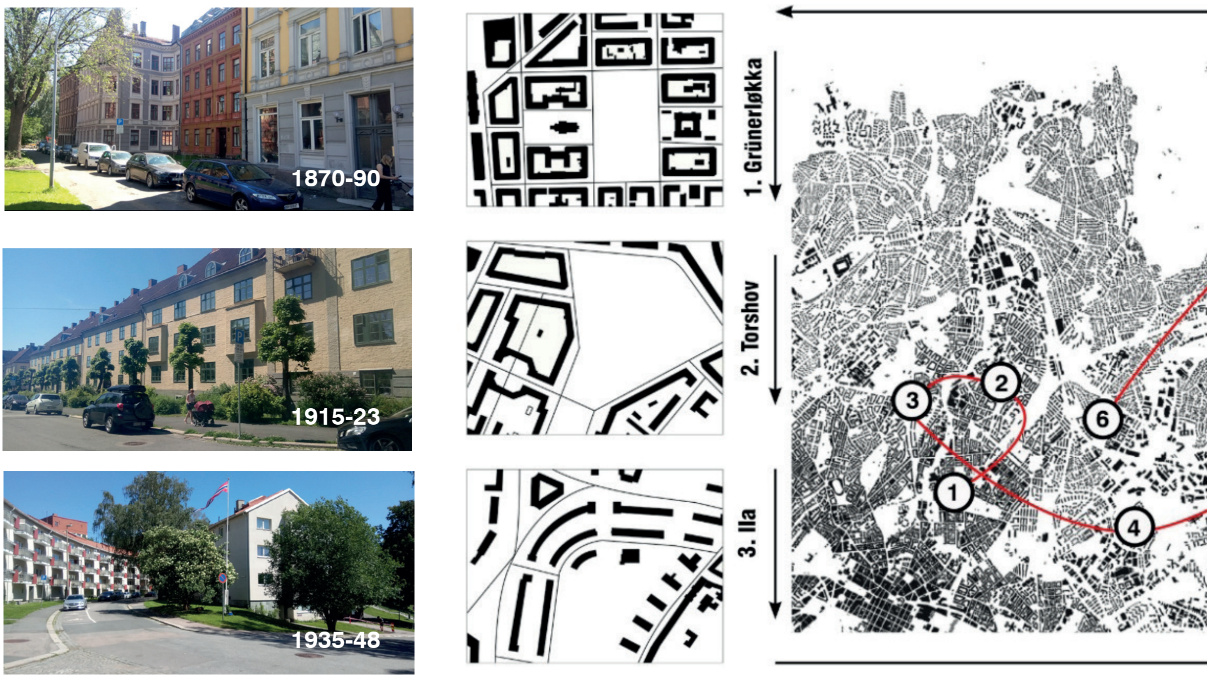
These different perspectives can help provide an understanding of the implementation of urban form and different morphological outputs of the building street relationship through time. In the next section, I present the development for the urban block in Oslo from the end of the 19th century and until today, and how the building lost its relation to the street in the housing development projects of last century.

2.3 THE DEVELOPMENT OF THE URBAN BLOCK* IN OSLO – A HISTORY OF A LOST BUILDING–STREET RELATIONSHIP

*) The definition of the Urban Block used in this thesis is direclty related to Cerdas term *Interways*, the space bounded by streets.

Børrud (2013) presented a hypothesis that the *housing question* (‘*Boligsaken*’) was solved through a range of examples and morphological steps moving out of the city centre and into suburban solutions, but at the same time establishing the problem of today’s compact city building. Her examples from lectures are here developed further to explain this problem. These examples are Grünerløkka (1870-1890), Torshov (1915-1923), Ila (1935-1946), Valle (1953-1960), Romsås (1970-1974) and Ensjø (2000-), all neighbourhoods in Oslo. These steps were based on the ideals of the garden city movement and the modernist progressive agenda. Housing demand and provision became the most critical societal task in response to problematic conditions related to industrialisation that developed as the urban fabric densified (Ridderstrøm 2015). This industrial climate presented the impetus for the first step in a gradual morphological transformation of the urban housing block.The Norwegian housing question has been thoroughly described in the theses of Rolf H. Jensen and Jon Guttu (Guttu 2003; Jensen 1980). The housing question was closely linked to poverty and the housing situation for the working classes as a result of industrialisation. As a part of the political agenda in the Western world, the main aim in response to this situation was to provide good housing for the working class. The housing cause played a vital role in removing housing from the city, the street and street structure.

The presented hypothesis by Børrud is influenced by and responds to the ideas presented by Panerai et al. regarding the typological dispersal of urban form



(Panerai et al. 2004). The urban expansion towards the suburbs was highly influenced by the garden city movement, and typologies changed according to modernist ideals of light, air, and views, resulting in urban sprawl (ibid). While transformation of the urban block in countries such as the United Kingdom occurred at the local and urban block scale and not to the same degree at the urban scale (Hanson 2000), patterns of transformation in Norway were somewhat different. Morphological transformation occurred both as a *rupture in the interface of the building–street relationship* as well as through a *planned city expansion and a functional distinction between house,work, and-leisure.* As such, I present three main effects of this Norwegian morphological transformation: *interface rupture, geographical displacement, and typological dilution.*

Examples of the transition process in the housing blocks from the late 19th and early 20th century up to current examples are investigated further in this section while addressing and exploring one core aspect, namely *the transformation of the building–street relationship.* This exploration can be illustrated by what I call a morphological loop from the *realised compact city of relations, through urban expansion and urban sprawl,* and returning back to *urban densification and an intended compact city of relational ambiguities.* Each of the examples presented was investigated through the development of a *figure ground pattern*, *structural maps* (*urban, street, block, and plot structure)*, and *type maps* (*façade, entrance type,* and *the type of model* they address). Thus, they are part of what is described as a typo-morphological analysis, which defines patterns, structural relations, and types. Typo-morphology is an approach that understands cities and their evolution through types and typological processes (Moudon 1994; Stojanovski 2019).

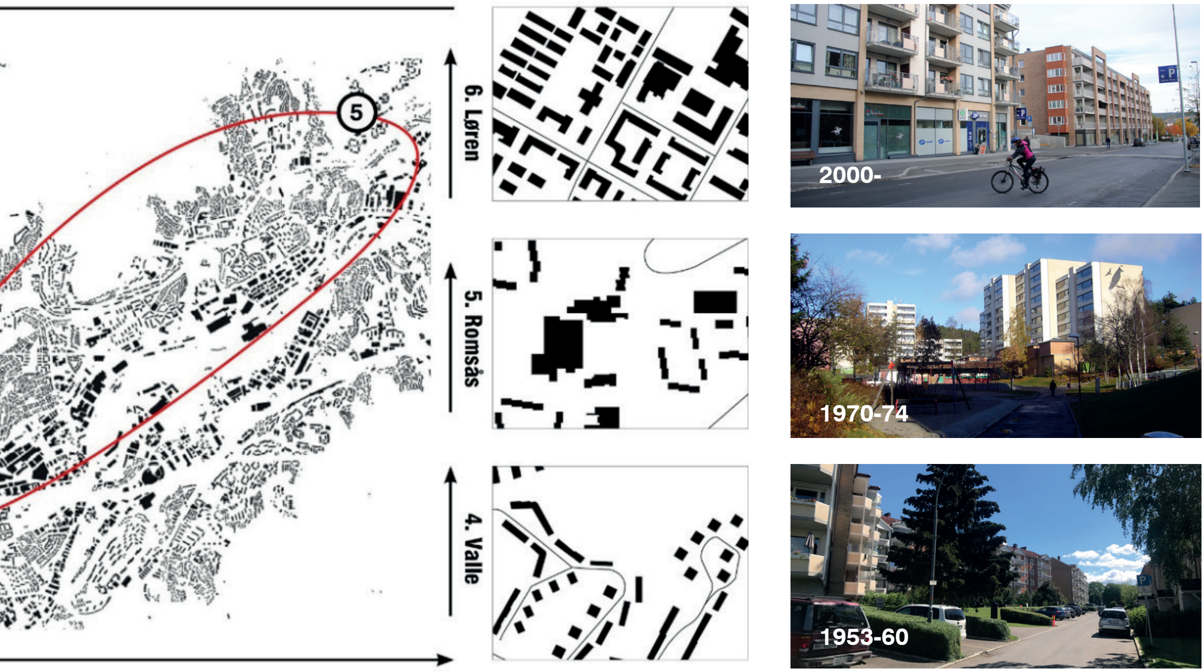


Figure 7
Morphological loop from the realised compact city of relations to the intended compact city of relational ambiguities

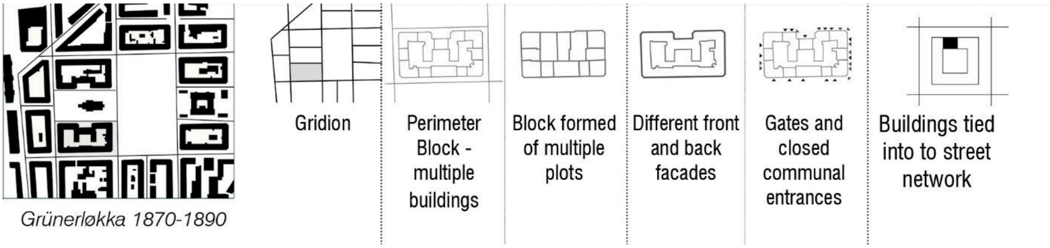


Figure 8 Structural analysis Grünerløkka - enclosed urban form of the perimeter block

2.3.1 ***Buildings related to the street - Urban expansion with garden city ideals***

The starting point of the morphological loop is the *realised compact city,* which is an example where current development, policies, and governance often draw inspiration from compact city ideals. The enclosed *urban form of the perimeter block* was the first morphological type of urban block, which is characterised by a clearly defined form that is closely knit with the street network. The structure of the urban tissue includes a grid structure, which is regulated for development. The plot structure of the block is formed of multiple plots, sold and speculatively built as individual units next to each other *facing the street*. The urban block forms a defined space with an inside and an outside, with different façades facing yard and street, and with a clear boundary between residents and society. The outward-facing functions such as shops face the street with direct entrances from street to room, and the residential blocks are accessed through a gate with a communal closed entrance room. Parking is provided in the related street network. An example that illustrates this initial step is Grünerløkka , a borough of Oslo, originally built as rental blocks and dwellings for workers from the different mills and factories along the Aker river. The Grünerløkka area was built between 1870 and 1890 over a grid plan in the traditions of the time. The blocks had a high demographic density and the utilisation of flats and space created a dense, unhealthy environment. The courtyards were functional yards with workshops and factories and sometimes included housing to maximise the use of the plot's space.

Figure 9 Relation between building and street - Paulus' plass Grünerløkka

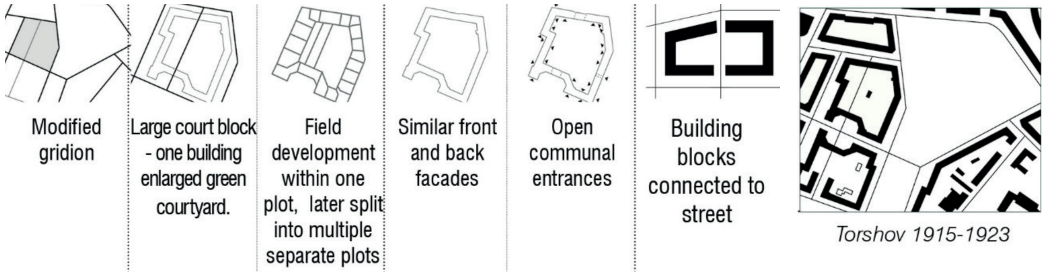


Figure 10 Structural analysis Torshov - large court block with an enlarged green courtyard

A *large court block with an enlarged green courtyard (Fig x)* was the second step in the loop of urban housing form within the Norwegian context. This is an example of the reformed urban block and highlights a retrospective approach to city building (Sonne 2009, Choay 1969). A key difference from the first type is that these blocks took the form of publicly owned and governed housing provision developed on a single plot. The characteristics of this form include the urban structure of a *modified gridiron*, often including curves that react to landscape elements and parks, views, and squares, all of which have a certain hierarchy. The buildings of the block are connected to and define the street. The block has open communal entrance rooms, and the façades and entrances of residential flats are similar with both facing the street and yard. The relation between resident and society is still clearly defined, but public openness is more focused than in the previous example. The development is almost purely residential, including just a few shops and functions connected to the dwellings. The housing standard of the dwelling and its related space/yards was increased while parking was provided in the related street network and in some of the yards. We can find examples of this form in Torshov, in the borough of Sagene in Oslo. Reforms of city planning and an increasing focus on the housing agenda contributed to this change from perimeter blocks to large court blocks. Torshov is one of the most important examples of publicly governed social housing. The council bought the area and established a municipal housing administration with its own architecture office led by city architect Harald Hals, housing director and head of regulation in Oslo for many years. He viewed the urban reformed block as a split from the previous perimeter type, which he called '*the coercion of the chessboard*'. The model of the large court block was the first small step in the loop of housing moving out of the city centre, and thus, the distance between the dwelling and the city increased.

Figure 11 Relation between building and street – Johan Svendsens gate Torshov

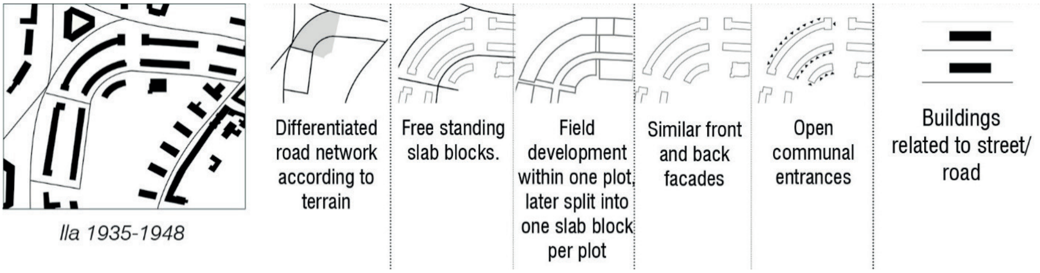


Figure 12 Structural analysis Ila - Street-related slab blocks in the landscape

Street-related slab blocks in the landscape were the third type in the morphological housing loop. This urban structure consists of a differentiated road network placed into an existing landscape. The streets are no longer an integrated part of the urban structure, but instead create their own internal patterns. Continuous urban blocks such as the ones described at Grünerløkka and Torshov are left behind and the street-related slab blocks have communal entrances from the street whilst buildings and streets remain connected. The micro-aspect of the building entrance often removes itself from the street, either as a setback or as sub-access. All three of these urban block types are still somehow related to the street, even if the typology changes. The façades of the street- and park-side are equal, and buildings form – to a lesser degree than previously – a defined yard or a communal garden but are rather related to an open space or park. There is no plot division, and the area appears as a morphologically clear unit, easily defined as an urban tissue. Parking is provided in the related street network. An example of this form is at Iladalen, a city centre suburb an approximately 20-minute walk from the centre of Oslo. This development started before the war and was completed after. The slab blocks are built up and around an embracing central park landscape. The municipality started to buy plots in the area in 1920 and developed a masterplan for the building project, which was again developed by the head of regulation Harald Hals.

Figure 13 Relation between building and street – Søren Jaabæks gate Ila

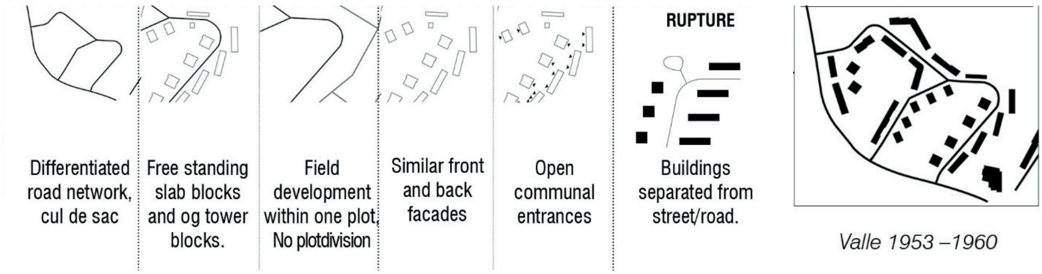


Figure 14 Structural analysis Valle - Post-war free-standing lower slab and tower blocks

2.3.2 *Urban sprawl with modernist ideals – Interface rupture in the building–street relationship*

In terms of the building–street relationship, the three initial urban blocks all relate to the street, albeit at different distances and despite the form, plot division, and street network changing. Post-war developments from the early 1950s onwards saw a shift from the focus on relations to the street to a focus on buildings as free-standing objects. This shift occurred at the same time as functional distinctions developed between home life and work, which resulted in increased car use and a transformation from streets to roads. Another vital aspect in the typological dilution of the urban block was increased requirements for the size of housing units, which increased the demand for housing with separate rooms for children and adults as well as upgraded kitchens.

Whereas the first three types of urban blocks were built within close vicinity of the city centre and workplaces, the next two types – presented in the following paragraphs – further removed housing from the city while separating functions into housing, work, and leisure.

Post-war free-standing lower slab and tower blocks were the fourth step in the morphological housing loop, which provide a clear example of the interface rupture between building and street. This type emerged as housing moved further away from the city. Built as a housing estate on the outskirts of the city centre and the first suburbs of Oslo, slab and tower block buildings, known as mixed development, were placed more freely in the landscape. The roads formed separate systems beyond the existing street network, serving only as a functional connection and not as a defined space. The road networks comprise cul-de-

Figure 15 Relation between building and street – Lillebergveien Valle

sacs and a hierarchical system of roads. No form-dependent relationship exists between building and street, and the accessibility to urban functions is reduced and removed. Housing qualities viewed as contributing to good health, such as the requirement for daylight, air, and access to open green areas, began to be demanded, while the interrelating qualities of the city disappeared. Parking is provided in separate areas or in garages.

In one example in Valle, Oslo, private land was bought by the municipality in 1915 and developed as housing in 1953 by the developer OBOS (*Oslo Bolig- og Sparelag*). From 1935, OBOS acted as the building organisation for the municipality. This building model was inspired by the Swedish model of housing cooperatives in which the organisation built cheap dwellings for its members. The establishment of *Husbanken* (the housing bank) immediately after the war in 1946 created an efficient model for housing provision, whereby the municipality provided plots, the housing bank provided loans, and OBOS built the housing. The enormous number of projects of this type indicate its prevalence in post-war social housing (Kronborg & Brodey 2013).

In the 1960s, the same principles of field development continued while density increased, and Oslo received a range of high slab-blocks and tower blocks, such as Ammerud and Haugenstua, which were all based on the rationality of the building process and prefab elements. Both internationally and nationally, modernist ideas and rational building processes received a great deal of criticism in the 1960s and 70s. In Norway, discussions focused on environments in which children could grow up, neighbourhood connections could occur, and a favourable residential environment could be provided. While housing quality was a prime focus, as it had been previously, the housing environment's quality now became a critical parameter. Housing provision continued to occur outside of the city centre and as field developments, but it started to be organised into manageable units of communities (i.e., greenfield developments).

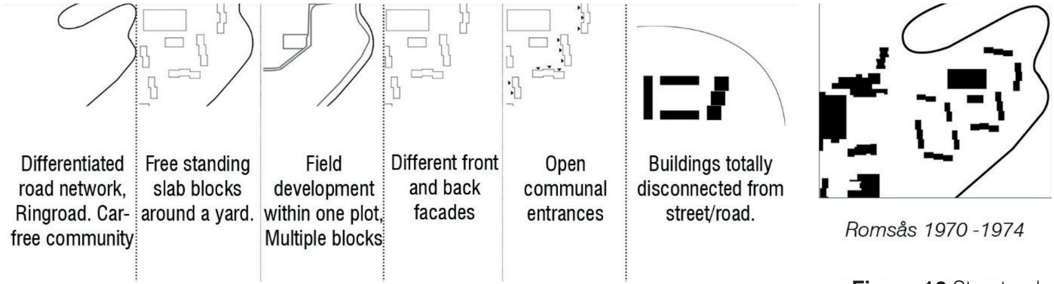


Figure 16 Structural analysis Romsås - aggregated slab blocks and tower blocks around a yard

Finally, *aggregated slab blocks and tower blocks around a yard* were the last step of the detachment of buildings and streets in the morphological housing loop. Their structure of accessibility is dominated by a differentiated road network, including a functional split with a ring-road for cars outside of the development and a car-free pedestrian community inside. Traffic security was a crucial parameter when planning the different areas. The buildings of both smaller units and tower blocks were mixed and formed sequences of yards in a natural landscape, and the developments formed complete satellites of the city. Roads and buildings were placed according to the landscape; schools and nurseries were plotted in a similar manner; and shops were concentrated in a local centre around a tube station. The façades were similar and communal entrances continued to face the various yards, but the building–street relationship was totally abandoned. Preference was instead given to defining entrances in relation to internal-facing communities and building groups. The area had no plot division and was built as a large greenfield development in the woods. Parking is provided in separate parking houses served by the ring-roads. Romsås, a residential neighbourhood northeast of Oslo, is an example of this morphological type, which was built by OBOS. Romsås was built on the idea of building communities based on brutalist and structuralist thoughts, organising buildings into clusters, and serving areas with local service functions close to a mobility node.

Figure 17 Relation between building and street – Odvar Solbergs vei Romsås

Societal problems of housing provision after the industrial revolution and the Second World War was gradually solved by removing housing from the city and for context to the current densification policy, to achieve more light, air, and views. The housing problem was solved through this morphological journey, and a positive outcome was knowledge regarding how to build dwellings that were not damaging to people's health. However, this knowledge of housing quality increased at the expense of the knowledge of urban quality. Did these solutions to the housing question lead to building–street relations losing their capacity for compact city qualities? The aforementioned examples demonstrate a tendency towards such a conclusion; however, whether this tendency is supported can be determined by investigating contemporary cases.

2.3.3 *Urban densification with compact city ideals – Ambiguous building–street relations*

In my presentation of the morphological loop, the last step is the shift in the focus of development back towards the city centre at the beginning of the 1980s. This also included a shift back to a street relation, but in a different and more ambiguous form than in the example from the realised compact city. OBOS and other large housing developers continued with their greenfield developments outside of the city through satellite developments such as Holmlia and Bjørndal. Housing policies opened up for private development at the same time as deregulation and deindustrialisation occurred. A range of smaller privately owned plots and larger transformation areas within the city centre were freed up, and project-based development began (Børrud 2005). This movement back into the city centre prompted a new wave of compact city building in which the urban block changed according to policies, processes, and societal conditions in the urban realm. The primary assignment for planning was the sustainable agenda and the green shift. In this paradigm, less consumption and denser living became core demands within the city environment. Policies informing the development of a sustainable dense city resolved not to continue the morphological withdrawal from the city as in the last century, but rather to focus within the existing urban fabric.

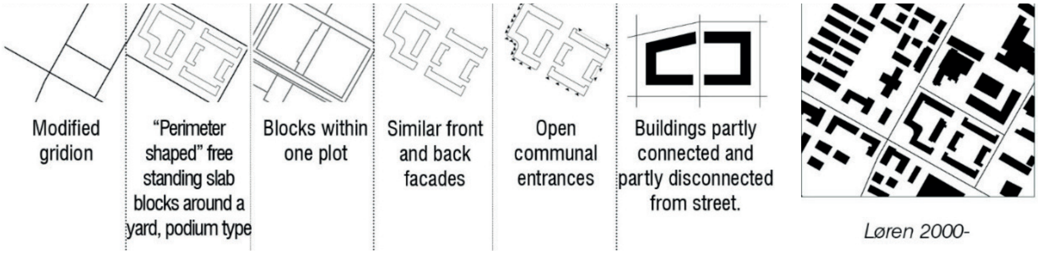


Figure 18 Structural analysis Ensjø - aggregated slab blocks around a yard on top of a podium

One example of the land use transformation area is the hybrid urban form of *aggregated slab blocks around a yard on top of a podium*, which are one of the many types of housing now being implemented in the city (for a detailed account of this and other current types, see Zurovac 2020). The urban structure comprises a regulated and modified grid. Buildings consist of street-related slab blocks around a yard, forming the image of the perimeter block and on top of a garage . As such, the parking provides a raised platform, a type of *podium* (Zurovac 2020) for the block, which is partly lined by functions facing the street and partly closed. As such, buildings both separate and connect with the surrounding streetscape. Within this morphological context, there is also a functional divide between parking and pedestrian entrances. When arriving by car, the main entrance to the private unit is through lifts and stairs inside the building, while pedestrian movement is solved by communal entrances facing the streets or most apparently the courtyard. The façades have a similar visual expression on different sides of the block, but they are often oriented with balconies facing south, providing private outdoor space based on sun, light, and view. Private outdoor space on the ground floor generally faces or is included in the courtyard of the urban block. An example of this form is at Løren, an urban expansion project and city centre suburb approximately 20 minutes from the centre of Oslo. This development began in 2002 and is still ongoing. The aggregated slab-blocks exhibit a figure ground pattern inspired by the traditional urban blocks of Grünerløkka. The municipality started to buy plots in the area in 1920 and developed a masterplan for the building project, which was again developed by the head of regulation Harald Hals.

Figure 19 Relation between building and street – Lørenveien Løren

The standardisation of building elements promoted the simple slab for the developer, and their aggregation into a perimeter form can – on a figure ground drawing – look similar to the pre-existing urban forms of Grünerløkka. However, the implementation of parking as a part of the house rather than a supplement outside radically changed the structural conditions of the urban block by disconnecting it from street. Parking, as a critical functional issue, is regulated by local, regional, or national institutional norms. When housing moved out of the city, there was enough space to build separate units for the parking function. However, when housing blocks were built within the city, scarcity of land moved cars into buildings and garages under the blocks. Their formal expression manifested in an underground solution or a raised platform, on a podium, where the communal life of the urban block was necessarily moved one level up from street (Zurovac 2019; Zurovac 2020).

New blocks in transformation areas have the logics of the perimeter block with built volumes at the plot boundary and a courtyard in the middle. The positive aspects comprise and include density, privacy, legibility of form, definition of street fronts, and a distinction between the street and the courtyard. However, problems include a difference in scale between traditional and new, a challenge in *connecting street and buildings* closely related to single-plot developments, and challenging plot parcellation, which defines outdoor areas that are not related to the street. The crucial role of the blocks in defining the street, reflected in the way buildings relate to street fronts for their scale and openness at street level, is not always implemented in land-use transformation areas and highlights an implementation gap to be addressed.

2.3.4 *Has the knowledge of the urban block and its building–street relationship been lost?*

This section presents Oslo as an example of how the housing question changed the urban form and the building–street relationship. The aim is to investigate the assumption that our quest for solving the housing problem in the 19th and 20th century not only moved the housing (typologies) away from the city centre but also ideologically away from the ideal of the urban – from compact city to urban sprawl. This morphological loop highlights the journey from the *realised compact city* with its perimeter block and defined street, through *urban expansion* based on garden-city ideals, *urban sprawl* of the suburban free-standing slabs, and back into an *intended compact city* often implemented as perimeter slabs in a podium type. The examples from Oslo demonstrate a changing approach to city building, to defining the urban block, and to implementing the building–street relationship in the search for good dwellings. Based on this I will claim that we have lost the knowledge of city building, the urban block, and its building–street relationship in contemporary practice.

This is also demonstrated by Zurovac (2020) that analysed the morphological urban tissue transformation under densification policy in Norway through the case of Oslo. Her research analysed growth patterns of the urban tissue, which are mainly characterised by the intensification of the use of previously existing delimited urban tissue, either through the insertion of new development into existing tissue or the brownfield transformation of land use in larger areas (Marjanovic 2015) <nee Zurovac>. She highlighted four main groups of tissue types where densification policies have been implemented, namely traditional tissue, modernist tissue, mixed tissue (all three variants of *pre-existing tissue*), and *land transformation tissue*. In addition, another group of tissue types not included in her study includes the *new urban tissue* represented by harbour developments on open land. Børrud presented an approach to reading the following three main areas based on their capacities: *homogeneous areas for consolidation* (corresponding to pre-existing tissue), *clarified areas of change* (corresponding to new tissue), and *unclarified areas of change* (corresponding to land use transformation tissue) (Børrud et al. 2018). Zurovac presented a variety of urban block types in response to those three main tissues. Her findings highlighted a large correspondence between the traditional and modernist tissue and the type of built form consolidation. Both of these tissues present a high degree of context sensitivity, where building projects follow the logic of the pre-existing urban form. As such, the traditional tissue enhances urban blocks with street fronts, building lines, and height, in which they are thoroughly profiled and utilised, whereas the modernist tissue enhances a strong planning concept that includes free-standing slab blocks. In the mixed pre-existing tissue, the answer is not that clear, and urban blocks are only partially consolidated. However, the street fronts, spatial organisation, and built form are diversely defined (Zurovac 2020).

The characteristics of a loop are that it meets and that lessons are learned through time and progress. Bringing the loop back to its start, it is natural to discuss the link between the realised compact city of Grünerløkka and the intended compact city of Løren. In current debates, these two examples are often investigated comparatively (Selvaag et al. 2019). Grunerløkka was chosen because of its capacity for being a neighbourhood that combines urban life with a high number of houses. It is also known to be an attractive area in which to stay and live, and furthermore, it is an area for the city as a whole. Løren was chosen as an area that has been built under densification strategies and compact city ideals. Selvaag (2019) presented a thorough comparison between the two – addressing land use characteristics, density, functions, as well as spatial form (specifically active façades). This section digs deeper into the structural transformation of the urban tissue, highlighting these two examples as physical results of different knowledge of city building and how this gets lost over time. The resultant hybrid urban form

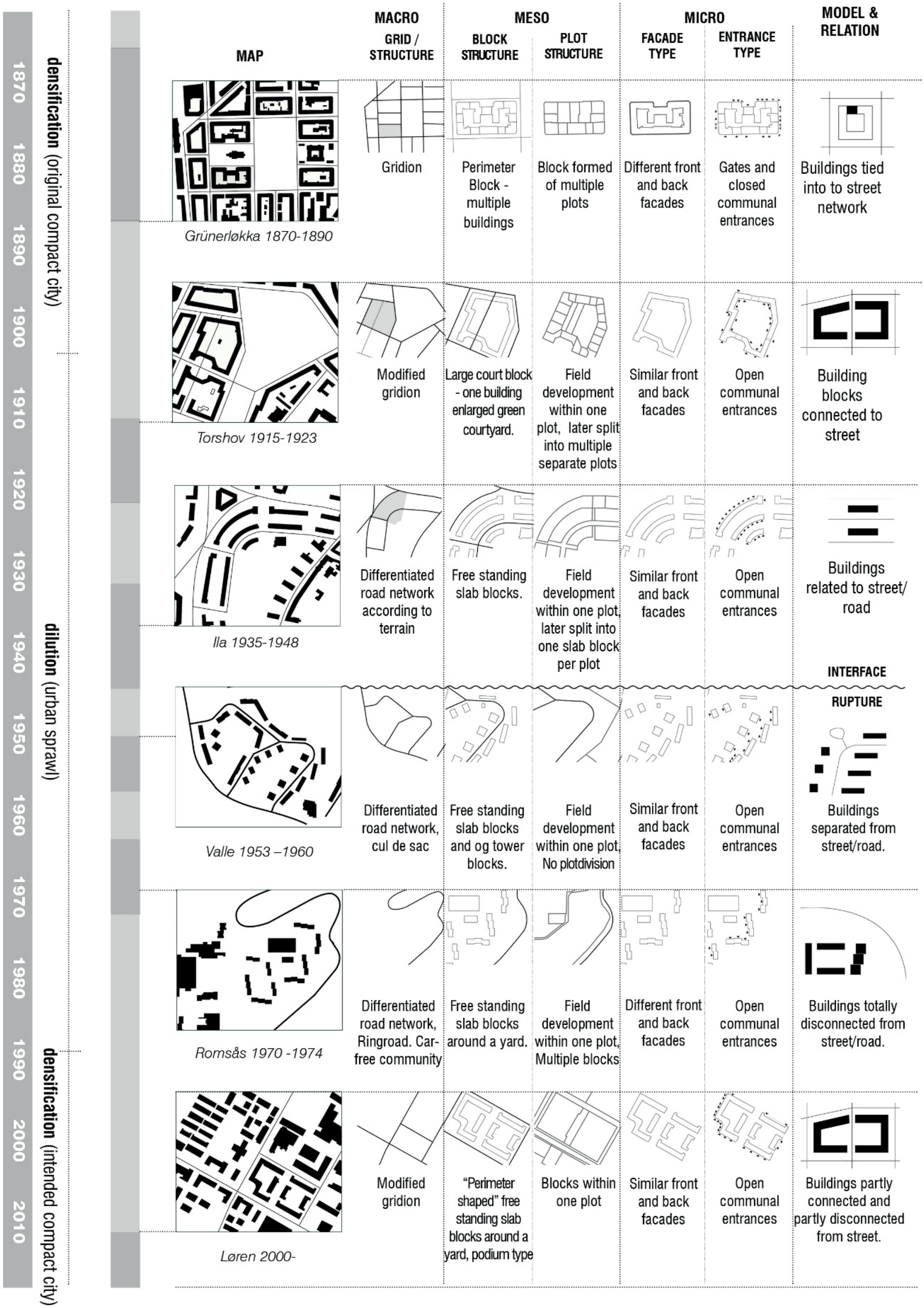


Figure 20: Comparison of the different housing developments in the morphological loop related to timeframe of implementation

at Løren (and to a certain degree within all the current urban tissues in compact city building) demonstrates a lack of quality relating private building and public space.

Lessons from the history of urban form do not represent knowledge of a form as a *goal* on its own, but rather as *a resource* for solving societal issues. When form is the only goal, a danger exists that development projects risk exhibiting an *outward appearance of well-perceived urban form (aesthetically)* without ensuring the *structural connections and spatial relations that make them work*. The aspect that presents the greatest challenge for urbanity is the story of a *ruptured interface between building and street*, which is ambiguously addressed in current urban block creation.

This section has presented critical assumptions and background for questions about the contemporary Norwegian practice of compact city building. These assumptions and questions provide a reasoning for the current thesis – building knowledge about the art of compact city building through focusing on the production of the building–street relationship.

2.4 LEGISLATION IN TRANSITION – SOCIETAL IDEAS THAT AFFECT THE BUILDING–STREET RELATIONSHIP

Can the examples from Oslo explored in the previous section be understood in light of Norwegian legislation? This section addresses the problems revealed by the morphological loop concerning the urban block, considering them in light of changing planning paradigms. It examines the transition of societal ideas as implemented in legislation, building codes, and rules for the production of the urban built environment over the last 100 years in the Norwegian context. This section also presents the Norwegian story of modern planning through an exploration of how the regulatory description of the building–street relationship has developed over time. It studies the nature of interaction and the relation between society, built form, and regulatory development. The investigation is based on the history of the Norwegian regulatory system, from pre-industrial legal frameworks through modern city planning from 1924 to the present day, described through changes in the PBL and its related technical regulations.

Marius Grønning presented an overview of the main characteristics of the Norwegian PBL regarding governance style, main goal, expertise, and strategic area pattern (Grønning 2017). His distinction forms the basis and background for investigating the story of legislation within a Norwegian framework. This introduction to the history was further researched and developed through direct content analysis, which is presented in Chapter 6.

As we have seen, the morphological history of the urban block in Oslo and the building–street relationship is a result of societal ideas of its time. Its rules, codes, and regulations are social constructs derived from the dynamic relationship between society (civitas) and the built environment (urbs), which forms one of the highest levels of societal consensus in the organisation of city society. They represent collective societal ideas embodied in a legal framework, which is used to determine the production of the building–street relationship.

2.4.1 *A shift from the defined city to the open form*

Various Norwegian cities developed their respective building laws in the first half of the 19th century. The first building law for the whole country was introduced in 1845, which included a range of aspects of Oslo's law of 1827 – the first for the capital. The 1845 law required grid-plan development, which was to be a provision of all new city plans and development, defining the patterns of new streets, dimensions, and block structures. This law promoted the urban growth of rental housing in perimeter blocks. These laws were related to the 1860 health law, which was defined in the same year as the building law. The basis for the definition of urban form in historical role models was architectural style on the one hand and regulation and technical matters on the other. Functional demands increased with regard to health through regulations of room and window size among other factors. At the same time, the city was to be organised in different zones. The principles of grid planning and perimeter blocks were still demanded by law; however, it became opened for regulation to depart from this (Ridderstrøm 2015).

The power of legislation in reflecting societal ideas and affecting urban form can be demonstrated by presenting and comparing the first two national building acts. In the introduction of this contextual chapter, I discussed the two approaches drawn from societal ideals in the progressive and culturalist perspectives. In the first national building act for cities (Bygningsloven 1924), the main aim of city building was to produce urban fabric with all façades facing the street, following the building line of the streets, and placing them next to each other to form the f*rontage* of the streetscape. Here, lines of built form coincided with the street line. This law complied with the earlier aim of keeping earlier urban form in a grid structure, and in this sense, it presents a culturalist perspective. The next national law was enacted in 1965 for the whole country and was the antithesis of the 1924 principle; that is, buildings were to be *free-standing objects*. This radical change in legislation reflects changes in ideas that occurred due to the modernist movement and represents a turn towards a progressive perspective of urban form (see Chapter 6).

Technical regulations for each of the laws were defined to further legally enforce certain qualities in built form. These regulations focused on a range of detailed requirements of the building, but little was included regarding the building's effect on the urban space. In the historical perspective of housing provision, after intense urban growth following industrialisation and the Second World War, the focus of technical regulations included legislation for enforcing good, healthy dwelling conditions.

2.4.2 *Breakthrough for modern city planning in Norway – The 1924 Building Act for Cities*

The first overarching building act for Norwegian cities, namely the 1924 Building Act, represented a breakthrough for modern city planning in Norway. It differed from earlier laws from the 19th century and presented a dramatic expansion in the scope of the law. While the first laws were mainly directed towards fire prevention, the 1924 law included a range of rules and regulations concerning economic, functional, social, and aesthetic characteristics. Its development included a long and thorough process that responded to new urban ideals, increased suburban development, sought to stimulate the building industry, and increased the will for governance (Aspen 2003).

The scope of the law covered cities, their development, and housing programmes forming part of the governance of a socio-liberal political regime. Technical skills vital for the implementation of the law, which embraced a land-use pattern of compact-city expansion, included urban definitions and building belts (Grønning 2017). The School of Architecture and Engineering at NTH Trondheim (founded in 1910) provided the technical expertise necessary for the implementation of the law. The 1924 Act included a range of quantified regulations that directly affected the micro-morphology of the urban frontage environment. It defined corresponding boundaries between street, plot demarcations, and building lines where all façades should face the street. Relations between private buildings and public space were regulated through form-direct and absolute regulations. Street width, setbacks, windows, and doors among others were all established as rules highlighting and increasing the technical understanding of building in city development. This knowledge about the different elements and city building became embedded in regulations and rules.

The law from 1924 had two related technical regulations – one from 1928 and the next from 1949. The first technical regulation focused mainly on material quality and built structures and presented load bearing formulas for calculating and designing safe buildings. In 1949, the technical regulation's calculation rules and technical fire definitions became part of the regulation. These rules and definitions covered a range of functional and quantified regulations concerning structures such as balconies, loggias and projecting façades, doors, gates, and windows as well as various types of rooms and buildings such as assembly halls and garages.

2.4.3 *A radical shift in the 1965 Act*

In the morphological story, this shift in focus from street relation as continuous urban fabric to built object within land-use zones reflected a wider change from prescription and regulation to more discretion and planning under the 1965 Act (Bygningslov 1965). The 1965 Building Act *represented a major radical shift from the 1924 Building Act*. It was the first time that an *elected* decision organisation was given the opportunity to represent the planning government towards project initiators, recognising the rights and interests of different stakeholder groups. While the 1924 Act focused on regulating detailed technical solutions within an urban context, the 1965 Act introduced the use of planning types, such as general plans and regulation plans, across the whole country. This act formed a national system of planning comprising three levels in a hierarchical structure: the state, the region, and the municipality.

These were essentially indirect regulations formed as functional requirements and included as part of the need to provide satisfactory levels of daylight and fire prevention as well as recreation, play areas for children, and parking; however, they were largely only implemented in settlements outside of the city centre. Direct regulations included the demand for fences to be erected between streets and buildings and minimum distances from neighbouring plots to be set.

Around the time that the 1965 Act was decided, major plans to demolish and renew old residential areas in the city centre began to be developed. The municipality wanted to reconstruct healthier environments within the urban core with new and more functional dwellings for residential life. In 1967, a new law for the decontamination ('*sanering*') of dense urban areas was decided and implemented. Nine years later, in 1976, this law was replaced with a law about the renewal of dense urban areas, which was essentially the opposite of the former law. This radical change in attitude and understanding included an urban renewal programme for Oslo's city centre (Guttu 2003).

The law from 1965 had two related technical regulations, namely one from 1969 and the other from 1985 (just before the implementation of a new law). The 1969 regulation expanded the earlier regulations to include general regulations, utilisation, and settlements in addition to the rooms of the building, their structures, and material/static qualities. This regulation also added requirements for how to calculate utilisation and included more specific rules concerning buildings and their micro-morphological aspects. One example is the regulation that stairs, fencing, and posts are not to be placed in front of the street line. Elsewhere, detailed solutions about setbacks or projections of the façades could be accepted by the building commission. Daylight regulations were quantified, and floors of flats were not to be built below the outdoor terrain. Some of the requirements of the 1924 act were included in the technical regulations in 1969, such as doors, gates, or windows not being extended more than 300 mm beyond the street line.

The PBL of 1985 reflected the increasing attention towards the protection of existing environment in the 1980s (Plan- og bygningslov 1985). While the 1965 law presented regulation plans to '*regulate* utilization of land and settlements', the 1985 law defined regulation plans as 'regulating utilization and *protection* of land, water, sea, settlements and the outdoor environment'.

The changes in law from 1965 to 1985 were mainly processual, developing different systems for governance. Local democracy was strengthened in this act and the municipality now operated to govern land use. Furthermore, private developers' right to initiate detailed plans to be politically approved by politicians in the municipality were strengthened. State government could also deliver formal opposition to locally decided plans, requiring negotiations. Socio-economic planning and physical planning were integrated (coordination), and the plans were now to be updated every four years. However, the regulation and knowledge of the building–street relationship were hardly changed from the former act.

2.4.4 *Current legislative framework – A blast from the past*

The PBL from 2008 is the current act of the Norwegian planning system (Plan- og bygningsloven 2008). A range of new topics were included in the last revision of the law, including universal design, sustainability, public health, and human rights. While the 1985 law presented regulation plans regulating the 'utilization and protection of land, water, sea, settlements and the outdoor environment', the 2008 law defined regulation plans as 'indicating use, protection and design of land and physical surroundings'. The mission statement for the law included a strong focus on universal design and the aesthetic design of the environment. Its preparation responded to new and different challenges producing a rather comprehensive change in the legal frameworks. A crucial backdrop to this was the shift away from urban expansion towards densification as the main land-use policy, defined as compact city development. This change was difficult in many municipalities with development pressure because the planning tools were adapted and designed for urban expansion.

The principle of land-use zoning continued in this revision, but the flexible mechanisms introduced in 1985 were refined and discretionary mechanisms such as mixed-use purpose were formally introduced along with different zoning boundaries. The new land-use purpose included a mixed-use zone defined as 'city centre functions'. In addition, a new discretionary zone requiring special consideration was introduced into the law.

Within the densification strategies, much of the city-building initiative was utilised by market actors, making land-use planning largely dependent on private actors, property rights, capital, and owners' own will for planning implementation. This challenge was answered by the introduction of a municipal planning strategy for each four-year political period as well as a demand to develop a planning programme for plans with major effects on the environment and society. However, these tools alone were not sufficient for dealing with the challenges of the 10 last years. Since the 2008 revision of the planning act, we have seen the development of different planning tools that operate outside of planning law with the aim of establishing an improved basis for negotiating in meetings with private developers. The planning tool VPOR (*Guiding plan for public spaces*) was developed by the Oslo municipality with the aim of obtaining a better overview of what public roads, parks, and urban spaces will require in terms of investment. VPOR acts as an implementation tool that aims for greater realism and the creation of a foundation for development agreements.

The current Norwegian planning and building system comprises a legal framework, acts, and regulations and represents the most relevant societal ideas for the production of urban form. Legislation and legal revisions of planning laws have formed part of the continuous processes of adapting legislation to contemporary needs (Kule & Røsnes 2010). These processes present rules that affect morphological outcomes in both form-direct and form-indirect ways (Talen 2012). The legal framework includes design regulatory instruments and specific regulatory tools one can use to create the decision frameworks for the intended result as well as the utilisation of urban form.

The Norwegian planning system is hierarchical, forming different mechanisms at different government levels. Planning in Norway follows a three-tier model in regard to territorial jurisdiction, namely the central state level, the regional level of the county, and the local level of the municipality (Røsnes 2005). These plans all connect and tie together in the planning description of local plans. At the municipal local level, there are two main planning levels with three main categories of local plans: one at the strategic level, which includes the whole municipality, and the other two at a more detailed level, including area development plans and building development plans. The municipal and overall local plans consist of two parts, namely a societal part that covers municipal public activities and a land-use part connected to the physical environment. There are certain requirements for the content of the physical environmental plan. The detailed plans include the area zoning plan for areas of some extension (e.g., areas covering two or more properties or lots), which are defined and addressed in the municipal plan, and a detailed zoning plan for actual development projects. There are no technical differences between the plans, except for different time perspectives, but it is implicit that one is more strategic and the other is more realistic. In an evaluation of the current PBL, EVA Plan, Børrud suggested that the former is project independent and the latter is project dependent (Børrud 2018c). She highlighted ambiguities in developing the area zoning plan when local government wants to use the tool/plan for more detailed control, independent of a demand in the municipal plan. She addressed the challenging task of defining an area without juridical or political demarcation. Such demarcation can be approached in many different ways, all of which play a deciding role in the definition of the problems that the plans must address.

The project-dependent detailed zoning plan is connected to an area of juridical demarcation. As such, it is a privately initiated zoning plan. Norway appears to maintain a degree of freedom in regard to choosing the most suitable category of detailed local plans for its actual situation rather than extending the repertoire of regulation methods at this level (ibid). The detailed local zoning plan is dedicated to project implementation. This type of plan can be initiated by private stakeholders, whereas the area zoning plan is owned by the council, although with different approaches to public–private cooperation. There are no formal demands regarding the quality of the plan, except for formal requirements for documentation and that it should not be in conflict with plans higher up in the hierarchy. As such, the quality demands in different councils are variable, and therefore, it is often the practice and building control of the plan that are vital for the control and decision process (Børrud 2018a).

Systems of building control through the building application process are conducted on the basis of legal rules that set out a statutory framework in advance (Kule & Røsnes 2010). As such, they are opposed to discretionary case-by-case systems such as the British one, where decisions are made when development projects are initiated. Development plans and regulations are legally binding on all citizens, and planning control can be understood as a series of legally specified procedures that decide whether certain land-use developments can be implemented. Policies and plans adopted at a high administrative and territorial level can be considered necessary preconditions for the regulatory framework for permission (of the system of building control). As such the procedures of building application play a vital role in the implementation phase of the project.

Systems of building control the outcome of planning processes and are decisions that result in development projects being granted or rejected as a result of a specific building application. The systems for building control include legally binding procedural steps from the initiation of the project with its stated intentions to the final certificate of completion/realised intention in the real-life project. These systems create the conditions for realising building works. The procedural steps of the building code and its demand for documentation are systematically defined in the regulations related to building application (the building application regulations) SAK10. First, this includes a preliminary conference between the authorities, developer, and architect prior to the submission of applications. The aim is to clarify the project's assumptions (including an account of the project's content, scope, siting, progress, and relevant contractors) and the framework for further processing (including plans for land use, infrastructure, relevant acts, regulations and guidelines, documentation requirements, requirements concerning the siting of the project, and the need for coordination with relevant authorities). The next procedural step is the outline permission application and the outline permit, where the developer presents an outline of the concept and solution and the municipality controls the solution according to plans and regulations. The third step is building permit applications and building permits, where the developer presents the design solution and responsible actors involved in the implementation and the municipality checks them according to the legal framework. The responsibility is maintained and checked through pre-accepted classes from 1 to 3 regarding the complexity of the built project. The last step is the actual implementation and as-built project, where the developer builds and the municipality controls the as-built documentation – and sometimes the real-life result.

Reduction of the building–street relationship as both a regulatory and societal concern over time

The aim of this section is to explore the assumption of legislation and planning systems as a vital reason for the urban form output. I started this chapter by introducing legislation reflecting societal ideas as determining urban form. The development of this legislation over the last 100 years has exhibited a shift from understanding *planning as a product* to an understanding of *planning as a process*. Through this investigation of the different planning and building acts and their related technical regulations in relation to the morphological development of urban form, it became apparent that societal ideas integrated in law define and affect urban space to a great extent. These regulations that accumulate through the different acts have rarely been removed. As such, they unsurprisingly still define the framework and outcome of built form and hamper challenging implementations of current policies. Societal processes of change outside of the planning system have developed faster than the revisions of the different acts, while planning has developed slower than policies. Evaluations of the acts over time have demonstrated an early focus on the urban building–street relationship as a priority, which has reduced over time as both a regulatory and societal concern. The relationship between changing regulation and the morphology of frontage informs the societal ideas and concerns that determine today's urban form. The story of legislation affecting the urban tissue is a story in which the technical knowledge of city building has gradually disappeared. In this, rules that define form, about societal ideas of legislation, have gradually transformed compact to sprawl by increasing standard demands. This transformation has removed attention to the micro-morphological elements of urban tissue, with legislation disregarding any concern for the building–street relationship. Legislation transforms the focus from form-direct (sizes in design of setback) to form-indirect in the way it addresses building–street relations (through universal design and noise etc.).

The investigation reveals a change from legislation on *city building* to legislation on *land use planning*, from technical knowledge of morphology to processual knowledge and land-use. The progressive ideals emphasised by a range of modernists took place in both thoughts and legislation – and have survived through this system up to the present day. However, the current ideal of compact city building presents a policy shift back to culturalist ideals – a shift from the open form back to the defined city. I claim that history can offer us an interesting path for investigating whether we wish to be able to implement current ideals. One of the tracks to investigate further is the legislative system by which we build our contemporary cities.

2.5 PROBLEM STATEMENT REVISITED – CHAPTER SUMMARY AND RESEARCH QUESTIONS

This chapter has aimed to explain the background to my problem statement by contextualising the problem over time. It has considered how we arrived at our current point, where compact cities are the aim for sustainable reasons, but also where we have successively added knowledge and ideals from the progressive model, which are in conflict with those current aims.

Today, policies and practice embrace the compact city, but it seems as though we have forgotten how to build it. The morphological account of Oslo's housing transformation demonstrates that knowledge about and the implementation of *compact city building* have been lost, through both the legislative framework and the architectural practice of urban form production. The account of these two contexts presented in this chapter highlights a lack of a morphological capacity in the Norwegian planning vocabulary to link the building with the street. Concepts such as houses and city streets are clear architectural terms, but the architectural relation between them is not defined by current discourse. This lack of terminology is further highlighted through the laws, in which it is difficult to find any relational aspects. As such, the lost knowledge about the building–street relationship, both in morphological properties and capacities as well as legislative instrumentation, supports the knowledge gaps highlighted in the introduction.

My investigation of ideals highlights the culturalist approach as an interesting avenue to explore for developing the knowledge base and vocabulary required for compact city building practice. Whilst a range of seminal thinkers have specifically emphasised these relational aspects in architectural thinking, as well as their importance in connecting buildings and streets, this has not been taken up into architectural practice or planning regulation. As such, the modernist ideals in Norwegian practice have continued to play a dominant role in current regulation and implementation. It was not until the current climate of the compact city ideal that the need for a more grounded approach to architectural practice and understanding emerged. Thus, there is a higher focus on the contribution of these key sources, such as Jacobs and Gehl, for helping to guide the compact city building process.

2.5.1 *Research question and subquestions*

My assumptions of finding these answers fits into the *culturalist* tradition as presented by Choay (1969), which involves looking to the past to reveal knowledge of the future. It starts with an assumption that only through an investigation of what is actually built is it possible to find previous and develop new knowledge. My approach considers urban form as both the result of and the precondition for compact city building. This chapter developed assumptions that we have lost city-building knowledge and forgotten how to build the building–street relationship and thereby the compact city as Cerda describes it. The aim is to highlight this loss and bring back knowledge about city building through the exploration of regulation techniques and institutional instruments for planning and building. This thesis addresses the problem revealed through a morphological account, studying the urban form (a part of what Cerda defined as the *urbs*) and processes relevant to creating this form (a part of city organisation, what Cerda defined as *civitas*). As such, two overall aspects are addressed in the research:

What is? – Understanding the physical city

How is? – Implementing the physical city

The background and contextual story have further developed the knowledge and implementation gap presented in the introduction and revealed a need to research this topic. Based on the purpose and background stated in this chapter and the previous one, my specified research questions (RQs) for the thesis are as follows:

RQ 1: How can we understand and conceptualise the building–street relationship as an interface between public space and private building in a way that can improve current practice and policy?

RQ 1.1 How can we develop the theoretical foundations of micro-morphology to address building–street relations?

RQ 1.2 How can different solutions of building–street relations be categorised as types and morphological variants?

RQ 1.3 Can we develop a precise concept that describes this micro-morphological part of the city?

This main research question and its subquestions are aimed at developing and properly understanding a topic that has been addressed more intuitively rather than theoretically, particularly within the Norwegian context. The contextual story of morphology and legislation reveals that we lack a morphological understanding of the relationship between public space and private building in the Norwegian vocabulary and implementation. Building elements such as houses, streets, and city have defined the content, but the understanding of the building–street relationship reveals a range of different tracks. These questions are answered through morphological assessment, empirical work, and theoretical synthesis.

RQ 2: How has the morphological building–street relationship been implemented in a Norwegian context?

RQ 2.1 How has the regulatory description addressing the building–street relationship developed over the last century? (past)

RQ 2.2 What is the impact of legislation on urban form as revealed through the production of the building–street relationship?

RQ 2.3 How is the building–street relationship designed and implemented in a current Norwegian compact city context? (present)

RQ 2.4 What are the planning tools and building codes active in the implementation of urban form?

This main research question and its subquestions are aimed at understanding the nature of interaction between legislation and urban form, thus addressing the implementation gap stated in this chapter both through the past and the present. It is answered through a selective reading of the four main PBLs relevant for the production of urban form as well as an empirical investigation of the intended and realised form in six current compact city building projects.

RQ 3: How can we use new knowledge to solve the problem and secure effective compact city building? (future)

RQ 3.1 How can the institutional framework better facilitate and maintain the relationship between private building and public space in compact city building?

RQ 3.2 What are the planning tools and building codes that can help to implement strong building–street relations?

This main research question and its subquestions are aimed at addressing potential alternatives to action, to feed knowledge back into both theoretical understanding and – even more vitally – into planning and building practice. The relevance of doing so includes an answer to the implementation gap as well as the agencies relevant for decisions that will be studied by future morphologists in the realised projects of what is actually built.

2.5.2 *Research aim*

The overall issue that this study deals with is the understanding and production of urban form. The purpose is to provide *new and expanded insights into* the interface between public space and private building in compact city development, thus *renewing and improving the practice of implementation*, including the design and governance of physical design (regulation and development).

The aim of the research is to establish knowledge based on both theory and empirical research and to develop tools for use by private agencies and public bodies in densification-strategy implementation within compact city building processes. The result should be more effective methods of securing and appreciating the morphological qualities connected with the art of compact city building – for everyone, whether they are developers, users, planners, or politicians.

2.5.3 *Scope and delimitations*

This research addresses an interdisciplinary field where complex mechanisms between form and society intersect. A city is always composed of the physical city and the city society – what Cerda called *urbs* and *civitas*. The scope of my research focus is on the understanding and production of physical urban form in compact city building and its dialectic relationship with the societal urban context addressed through urban planning and regulation (law).

It focuses on the knowledge of form *(morphological),* design *(planned intentions)*, and building *(realised intentions)*. The main perspectives are material (through urban morphology) and institutional (through regulations). As such, this research does not address social capacities such as use, interaction, and behaviour or psychological aspects such as meaning or perception of the building–street relationship.

The audience of my study is stakeholders (developers), policy makers, legislators, practitioners (architects), and researchers who handle planning issues regarding compact city building.

This and previous chapter have delved into the problem and context of the thesis resulting in the research need, aim and questions for the thesis. The following chapter presents the methodology including ontological and epistemological approach, as well as research design and research strategy.

AN INQUIRY INTO THE BUILDING-STREET RELATIONSHIP

Chapter 3 **AN INQUIRY INTO THE BUILDING–STREET RELATIONSHIP**

This chapter explains the methodological approach applied in the thesis. The aim is to introduce the ontological and epistemological perspectives for the research and present the methodology used to find answers to the aforementioned research questions. Section 3.1 discusses the philosophy of science comprising the world as a set of assemblages investigated through spatial knowledge production. Section 3.2 presents the mixed-method approach applied in the thesis, comprising research strategy and case study research. Section 3.3 explains the research design, the organisation of and the relations between the different methodological working agendas in the research process.

3.1 **PHILOSOPHY OF SCIENCE**

When Jane Jacobs presented the city as a problem of organised complexity, she highlighted the interconnected relationships between quantities as many problems interrelated into a whole (Jacobs 1961). As such, cities cannot be understood as causal but rather as multiple. Cerda highlighted the relationships between material forms and socio-spatial practices (Soria y Puig & Serratosa 1999), and Alexander presented cities as connections – as overlapping semi-lattices where a range of relations occur and define different wholes (Alexander 1964). These three perspectives all address the ontological perspective with which I engage in this thesis.

3.1.1 ***The world as a set of assemblages***

My thesis examines relations rather than things. It takes a stand in relational theories and considers the world as directly linked to natural and cultural processes. The argumentation is not causal but multiple and is based on the ontology of assemblage thinking, highlighted by American/Mexican philosopher Manuel Delanda (DeLanda 2019) and founded on the relational philosophy of Gilles Deleuze and Felix Guattari (Rydin 2014). In this ontology, the city is understood as a complex assemblage, as relations between material forms and socio-spatial practices by humans and nonhumans. The assemblage ontology focuses on relations between scales without assigning any priority. City production consists of both top-down and bottom-up processes that can be equally powerful. As such, assemblage thinking provides an understanding of part–whole relationships that are nonhierarchical. The unique spaces and places are results of complex interrelations between parts. Assemblage thinking is nonreductionist and does not presume cause–effect relationships, but highlights and addresses a multiplicity of relations, synergies, alliances, and symbioses.

DeLanda introduced assemblage thinking as a part of realist ontology, a stance usually defined by a commitment to the mind-independent existence of reality (DeLanda 2019). He presented (a range of) assemblages as:

> '...wholes whose properties emerge from the interactions between parts, (and) can be used to model any of these intermediate entities: interpersonal networks and institutional organizations are assemblages of people; social justice movements are assemblages of several networked communities; central governments are assemblages of several organisations; cities are assemblages of people, networks, organisations, as well of a variety of infrastructural components, from buildings and streets to conduits for matter and energy flows; nation-states are assemblages of cities; the geographical regions organised by cities, are the provinces that several such regions form' (DeLanda 2019 p 5 & 6).

He discussed this world view in relation to other part–whole approaches such as those of Hegel, Giddens, and Deleuze. While Hegel developed an understanding of relations of interiority, where component parts are constituted by the relations they have with other parts of the whole, Giddens argued for the mutual constitution of part and whole (agency/and structure) and a continuous flow of actions. Deleuze argued for assemblages to be seen as wholes and characterised by relations of exteriority. By this, he distinguished the properties of constituent parts (Hegel) from their capacities to interact with other parts, where it is the relationships between elements that are important and not the aggregation of their properties. These relations imply that a component can be detached from its assemblage and connected into another assemblage where interactions are different. Relations can change without the properties changing. Relations of exteriority also imply that the properties of the component parts can never explain the relations which constitute a whole.

In the last decade, there has been an emphasis on relational thinking within planning (Purcell 2013; Rydin 2014), urban design (Dovey & Ristic 2015; Dovey & Wood 2015), and urban morphology. Mark Purcell argued that planning would benefit from a greater engagement with the works of Deleuze and Guattari, opening up for normative questions about what planning is and whether it should exist at all (Purcell 2013). British Professor in planning Yvonne Rydin highlighted assemblage thinking as a (re)emergence of a realist ontology, and a flat ontology where causation does not move from one level to another, or from general to specific, from a high to low scale following hierarchical patterns.

Instead, causal influences come from all levels simultaneously and have a mutual impact (Rydin 2014). Kim Dovey and Stephen Wood emphasised the ontology of microspatial analysis in urban research, highlighting assemblage theory as a useful framework for investigating micro-morphological relations (Dovey & Wood 2015). Their article '*Public/private urban interfaces: type, adaptation, assemblage*' thoroughly explains the ontological perspectives that are relevant for my thesis. The ambivalence of the building–street relationship has a twofold nature as a mediator between public and private space and as highly relevant for micro-spatial knowledge production.

3.1.2 *Spatial knowledge production*

The epistemological views of this thesis consider both empirical data and reasoning as a necessary means of developing knowledge. Urban theory addresses complex phenomena and defines a range of wicked problems. These problems are difficult to solve because of incomplete, contradictory, and changing requirements that can be difficult to recognise. The wicked problems in urban planning and development have been much elaborated. Rittel and Webbers' seminal article *'Dilemmas in a General Theory of Planning'* highlights planning as an essentially different approach to 'standard' scientific problems, thus requiring different strategies to linear processes that strive for definite solutions. Planning and urban development are instead a transdisciplinary scientific field where science is rather formed by argumentative process and logics instead of linear causal application (Rittel & Webber 1973).

My thesis belongs to the making disciplines in urban studies through design studies. The epistemological approaches relevant for my work include spatial knowledge production through empirical data and reasoning. Dovey and Pavka argued that spatial knowledge production considering relations is fundamentally linked to diagrams and maps (Dovey & Pafka 2019). In the academic traditions, spatial knowledge production has largely been produced through verbal/textual accounts. Whole books are written about space without including any representation of it. Images, maps, and diagrams are seen as serving an illustrative role without any agency or power connected to them. However, a range of philosophers and scholars have highlighted the importance of diagrams and maps as vital contributors to science. Dovey and Pavka (2019) highlighted the importance of expanding the language of urban thinking into graphical agents such as diagrams and maps. They suggested that '..the language of urban thinking also includes the knowledge embodied in diagrams and maps which are central to the discourses of spatial knowledge. Diagrams and maps are fundamentally relational rather than reductionist; particular layers of data are selected to reveal general patterns of sociality and spatiality' (p 14 2019). They also highlighted mapping knowledge production as being of less importance for scientists trying to prove cause–effect relationships, but rather as a tool for the science of the making disciplines where multiple causalities appear. Research mapping can act as a vital tool for urban research as mapping is a type of spatial knowledge production, often diagrammatic, and embodies a spatial logic which cannot be reduced to words and numbers (Dovey et al. 2017).

Norwegian architect and urbanist Lene Basma defined three main perspectives on the use of diagrams in urban studies: as part of analysis, as part of presentation, and as part of thinking (conceptual). These three types of diagram can include certain characteristics such as abstraction, connection and systems, and transaction (Basma 2012). The analytical perspective includes general comparative analysis and the analysis of territorial context, which include similar graphical layers to look for and compare similarities or differences. The presentation diagrams often include contextualising maps, concepts, strategic maps, ideal/typical solutions, or ideograms. The thinking approach is what Basma called 'a new facet' of diagrammatic understanding. Diagrams are employed to describe a specific understanding of the workings of the world and can be used as a theoretical concept and a way of seeing. Basma's perspective was influenced by the ideas of Deleuze and Guattari, who used diagrams as a core concept in their philosophy. Their concept of the 'abstract machine' embodies the immanent and productive forces of an assemblage:

> 'An abstract machine is in itself not physical or corporeal, any more than it is semiotic; it is diagrammatic (it knows nothing of the distinction between the artificial and the natural either). It operates by matter, not by substance; by function, not by form. Substances and forms are of expression 'or' of content. But functions are not yet 'semiotically' formed, and matters are not yet 'physically' formed. The abstract machine is pure Matter-Function – a diagram independent of the forms and substances, expressions and contents it will distribute' (Deleuze & Guattari 1988 p 141)

Spatial knowledge production through diagrams and maps can reveal interconnections between properties and presents the city as a space of possibilities rather than causes. As diagrams form a set of productive relations between forces that are immanent to an assemblage (Deleuze and Guattari 1988p 164), diagrammatic thinking in urban research reveals ways in which the city works as abstracted from the particulars of singular spaces (Dovey et al. 2017). Thus, mapping is a type of knowledge production that links diagrammatic thinking of relations to spatial representation. As such, methods of mapping develop theoretical knowledge relevant for understanding the organised complexity of cities as investigated from a microscopic view.

3.2 A MIXED-METHODS APPROACH

The complexities and relational characteristics of city building and my ontological and epistemological understanding of the organised complexity of relations provided the grounds for adopting a mixed-methods approach as my research approach. Both quantitative and qualitative aspects highlighted the reciprocal and dependent link between material and socio-spatial practices. This PhD research comprised a variety of research data, components, and methods for assessing and analysing both theory and empirical data. The research design was characterised by an interdisciplinary approach and an iterative research process through mixed research methods. It consisted of both explanatory and exploratory approaches using mixed-methods research. The iterative approach comprised various methodological elements that informed each other throughout the various stages of the research process.

A mixed-methods strategy of qualitative and quantitative parameters is employed to combine research strategies with the aim of avoiding the weaknesses of each research strategy if they were applied on their own. This approach has recently been advocated in many professions, highlighting its potential for providing appropriate checks against weak points while enabling benefits. Advocates of mixed-methods research are particularly active in fields that involve a dynamic interplay with creative practice. These fields depend on a dynamic relationship between thinking/knowing and acting/doing (Groat & Wang 2013). This PhD thesis aims to contribute to knowledge production for addressing this relation of knowledge between practical and academic discourses.

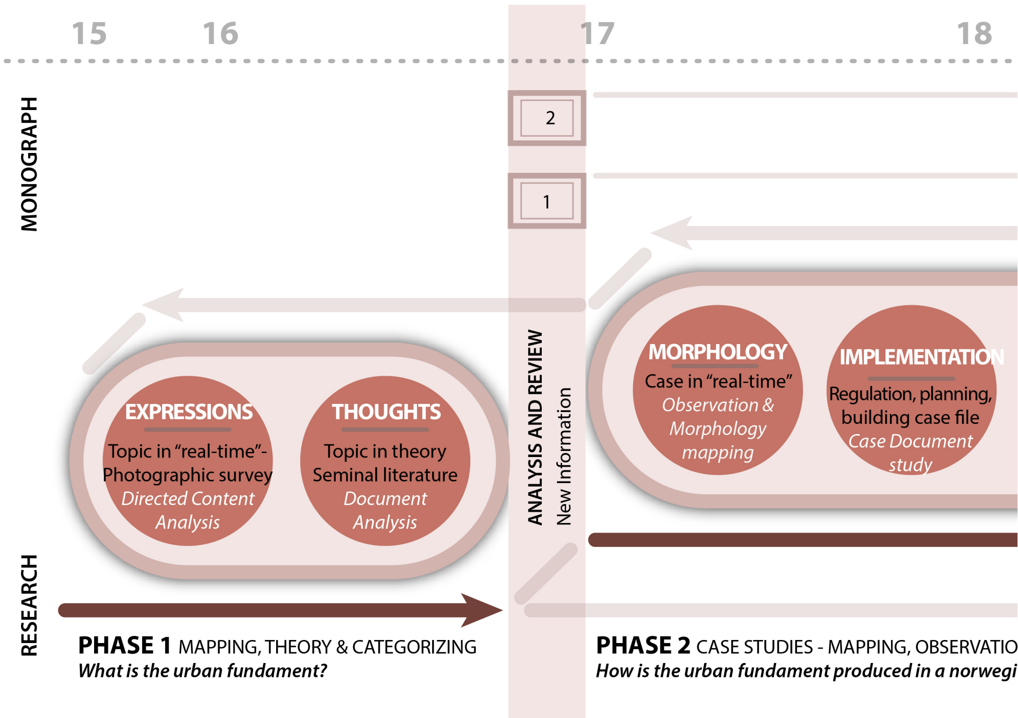
Linda Groat and David Wang presented three general models that are suitable for discussing types of mixed-methods research strategies: the two-phase approach, the dominant–less dominant design, and the mixed-methodology design. The mixed-methodology design represents the most complete level of integration among two or more research designs (Groat & Wang 2013). The empirical research design for this thesis started as a distinct two-phase design but in the process became a more integrated and combined mixed-methods strategy. The findings in different steps and strategies continuously fed back into the research strategy and developed both theory and analytical tools parallel to and as part of the empirical knowledge production. The challenge of combining different strategies is in practically linking the development and implementation of theory and analytical tools. Different analytical methods were conducted through directed content analysis and cross-case analysis based on variables developed throughout the thesis. Empirical data were produced and collected through a range of research procedures, providing for the development of both theory and the case analysis method.

3.2.1 *Research strategy*

Early in my research process (Fig 21), I defined an approach for conducting the research that comprised three main phases with iterative loops back and regular status updates. The figure is a schematic presentation of how the different parts of the research work connected and corresponded with each other. However, my approach to collecting, producing, and sorting the data to facilitate development, understanding, and interpretation was not a rectilinear process.

The research comprised three main paths: the first (A) developed background information, theory, and empirical data into a theoretical perspective, as a way to read the relationship between private building and public space. The summary of this path is discussed and implemented to answer the research question. The second path (B) investigated the six empirical cases based on criteria defined in path A. The research comprised a variety of data within a complex context, and the first path was vital for enabling me to understand and define a theoretical perspective – that is, a way to approach and analyse the data in the second path.

Between these two paths, there were a range of connections that included the definition of assumptions and establishment of an analytical model. The model worked as a relevant tool for looking for specific stories and specific



findings based on my ontological and epistemological view. The analytical model implemented in the different cases was developed and concretised as a result of interaction with executive research material as well as case material itself. The analytical model structured the data material and helped to define the selection criteria for cases.

Swedish Landscape Architect and researcher Rolf Johansson highlighted three aspects vital for making methods explicit in scientific research: validation, selection, and generalisation (Johansson 2004). First, triangulation provided an important method for ensuring the validity of the research. Second, the selection of empirical data was analytical and purposeful. Third, generalisation from limited cases was analytical and based on reasoning. The most exhaustively discussed, critiqued, and questioned aspect was the possibility or impossibility of conducting generalisations from a single or limited number of cases.

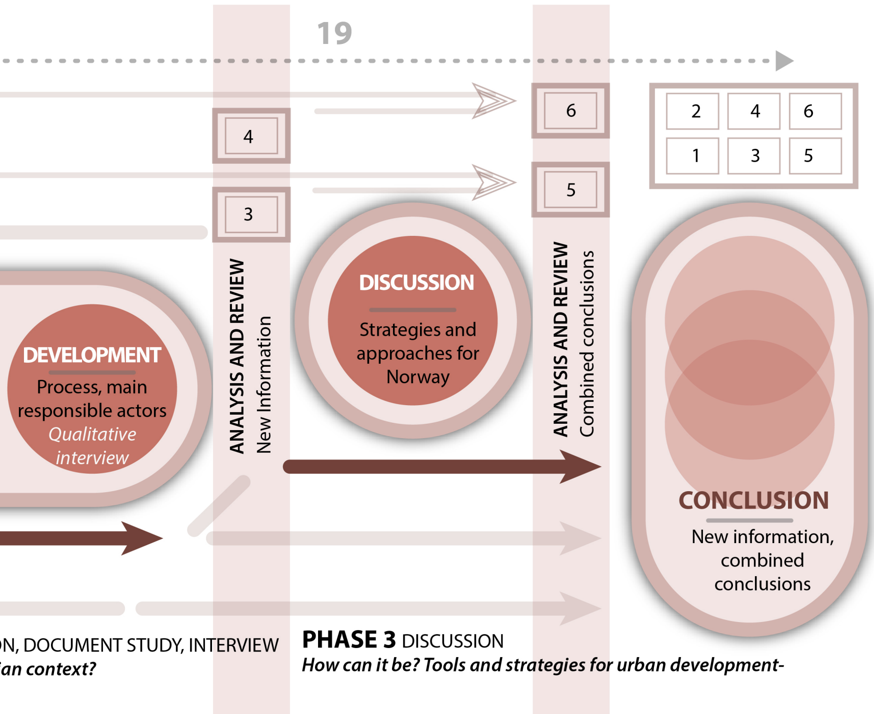


Figure 21 Research strategy - timeline guiding the different steps in the process

3.2.2 *Case study type – Instrumental multiple-case design*

My case study research consisted of holistic and multiple-case designs where I investigated a single unit of analysis, namely the production of the building–street relationship. The analysis was based on the new knowledge and analytical tools developed in part 2 but applied to a limited number of cases. The case areas for the research were three compact cities in Norway, namely Oslo, Stavanger, and Kristiansand, which are presented in detailed descriptions under the different case study material.

The goal for the study was to understand the design and type of the building–street relationship and mechanisms that have decided and implemented the production of a real-life result. I investigated spatial and structural relationships at the different morphological levels in the various case studies within the objectives relevant for my research question. I wish to highlight the following thematic approaches that are directly connected to my research objectives. My aim in this phase was to understand how the building–street relationship is produced and implemented in compact city building processes (exploratory), and not why cases turned out the way they did (explanatory). As such, my thesis focuses on the tools and strategies relevant for the actual built reality and not on the ideas of a future vision.

3.2.3 *Analytical generalisation – Expanding and generalising to theory*

My case study research was instrumental in nature, where the cases themselves were of secondary interest to the generalisations, strategies, and theory that could be established in the process. However, a challenge existed in the possibility of generalising from case study research, which has been widely discussed in scientific literature over the last half a century. How can we go from a practical real-life case to theoretical knowledge? Generalisation is the act or process of generalisation as opposed to particularisation.

Qualitative researchers commonly promote an understanding of two classes of generalisation: the first includes a specific group or population and is usually applied in surveys and polls, while the second contains the nature of a process and is usually applied in field research (Gobo 2008; Payne & Williams 2005). These two classes of generalisation have completely different sampling requirements and processes. While the first is based on a statistical mode of reasoning, the second is based on theoretical sampling and a different type of reasoning. In this case study, the cases were selected based on theoretical sampling – knowledge production in the contextual backdrop and a theory development phase informed the selection of cases included in the research.

Triangulation – Ensuring the validity of the research

A major feature of the research methodology is that different methods were combined with the purpose of illuminating empirical data from different angles: to triangulate knowledge by combining methodologies. Triangulation involves the utilisation of a variety of data sources, multiple investigators, and a combination of data collection techniques in order to cross check data and interpretations (Groat & Wang 2013 p 84). A major strength of case study research is its use of many sources of evidence, the most crucial advantage of which is the development of converging lines of inquiry. The triangulation metaphor used in research is derived from construction, surveying, and navigation at sea and is based on the idea of using two known points to locate the position of an unknown third point by forming a triangle (Britannica, 2000). The intention in research is to use two or more aspects of research to strengthen the design to increase validity and the ability to interpret the findings. For the purposes of the present study, the material was triangulated through theory (morphological and legislative perspectives), data collection/production (case documentation, observation, and interviews), methods (mapping, case and archive), and aspects (within morphology as well as planning).

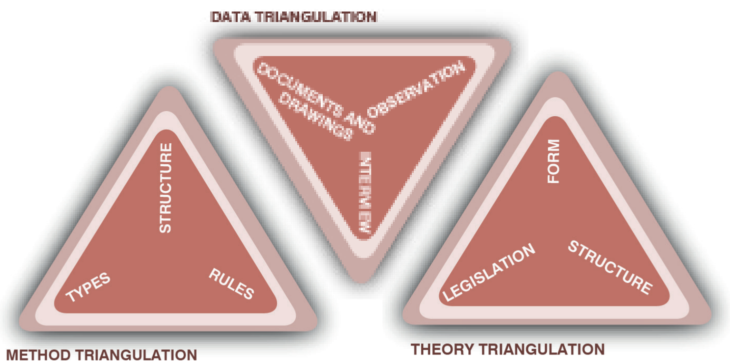


Figure 22
Four types of triangulation in the research material; data, method, theory and aspect

Selection – Purposeful selection vital for analytical generalisation

The purpose of using overlapping datasets and overlapping methods in the manner outlined here is to take advantage of both the qualitative and quantitative strengths of the methods. Each of the methods has descriptive potential on their own but serves an explanatory purpose when combined. The selection of empirical data in this study was analytical and purposeful. It can, for example, be based on information-rich, critical, revelatory, unique, or extreme cases as opposed to cases selected within a representational sample strategy.

This thesis concentrates on the architectural outcomes of urban design and planning processes and included three types of empirical data as part of the

research design. First, these outcomes were documented using a huge variety of photos from both Norwegian and international projects; second, the planning instruments within the legislative framework vital for the production of these outcomes were investigated; and third, a limited selection of cases from three Norwegian cities defined the framework for the investigation of contemporary Norwegian practice. As such, the empirical input for this study consisted of photos/pictures, building projects mostly limited to housing floor space, and finally rules and regulations that will have an impact on where, when, and how to build. The first type of data comprised an image database of over 3000 pictures and examples of building–street relations randomly sampled, documented, and produced in several cities around the world. The context was not assigned any significance, but was rather typical and general to reveal and potentially generalise a universal typology of building–street relations. In addition, this process helped to reveal some selection criteria for the limited selection of Norwegian cases in addition to the criteria already defined by the problem statement. I did not delve very deeply into the cases but rather searched for the relation between public space and private building as well as the framework that affects this aspect.
The selection method for my cases was connected to the theory and context developed in the two first part of the thesis. First, I defined a timeframe for contemporary projects built under urban densification policy between 2000 and 2017 and selected both early and later projects within that timeframe. This was to observe whether there was a development in outcomes and institutional frameworks relevant for that outcome. Second, I selected the cases that presented an ambition of building a compact city – often revealed in planning descriptions. The problem statement highlighted the problem of building the compact city where contemporary urban form exhibits the tendency to develop introspective cells, helping to contribute to a fragmented city developed through an incremental nature rather than the building of a compact city. Third, I included new built projects in different morphological contexts to observe if the production process and legislation were different within the different urban spaces. In addition, the outcome of the photographic mapping highlighted a range of Norwegian projects mostly sharing similar characteristics concerning the building–street relationship but that also presented particularities. The final selection criteria comprised the programme of the projects comprising multi-residential blocks of flats with a variety of ground-floor functions. This was to observe how different programmes related building and street, both in form and in legislation.

Generalisation – A challenge in knowledge production from case to theory

The challenge of generalising on the basis of qualitative research has engaged scholars since the early development of the first case study research. The issue of generalisation has undergone a process of development from purely universal generalisation, that is, the classic approach (Kaplan 1965, as referred in Lincoln & Guba 2000), to a multitude of approaches. It includes a whole range of positions from anti-foundationalist, which claims that generalisation is neither possible nor desirable (Denzin 2009), through diverse intermediate positions with degrees of generalisation (Payne & Williams 2005; Stake 1995; Yin 2009), and to a proponent of generalisations through social representativeness (Gobo 2008). This development of thought concerning generalisation in a historical context provides a structural backdrop for understanding degrees of generalisation that can be applied in research. Between the understanding of no generalisation to the understanding of universal generalisation, a range of moderated concepts of generalizability exist (Gobo 2008). These include concepts such as transferability (Lincoln & Guba 2000), naturalist generalisation (Stake 1995), analytical generalisation (Flyvbjerg 2006; Johansson 2004; Yin 2009), extrapolation, and moderatum generalisation (Gobo 2008) and define degrees of generalisation from case to case or to theory and not to the population or universal world as such.

Analytical generalisation has the goal of expanding and generalising theories and is the most relevant approach for this thesis. When generalisations from cases are analytical, they are based on reasoning. Johansson defined the nature of analytical generalisation and described three main modes of reasoning: *deductive, inductive, and abductive*. Analytical generalisations can be made using one or a combination of these principles. The principals of reasoning have different procedures, results, and generalisations. Deductive reasoning generalises from a hypothesis and fact to a validation of theory (hypothesis testing); inductive reasoning generalises from facts in a case to theory (theory generation); and abductive reasoning generalises from cases to a case (naturalistic generalisation) and/or from facts in the case and a theory to a case (synthesis of a case).

The research conducted for this thesis employed a diverse approach, comprising aspects of inductive, deductive, and abductive logics. As presented, knowledge creation is based on both reasoning and empirical data. This thesis employed three types of empirical data: (1) a large database of photos randomly selected and mainly analysed through inductive logics; (2) a historical account of planning and building acts (PBLs) seen in relation to historical patterns of urban form and analysed through deductive logics – aiming to find causalities between the two; and (3) six current empirical cases analysed through abductive logics, generalising from cases to the next case. The procedure of analysing these empirical data involved an abductive approach, where knowledge from a case was fed back into the next case as an iterative loop. The process included both hypothesis building and knowledge production, and the final cross-case analysis that fed into the discussion included both inductive and deductive reasoning. Pragmatist philosopher Charles Sanders Pierce defined abduction and claimed that scientific work is dependent on this mode of reasoning (Johansson 2004). Johansson exemplified the process as a detective mystery with the crime novel as the literary form of abduction. The basis of the novel is a mystery, a surprising fact that can only be understood when it is clear what has happened (ibid.). Abduction involves qualified guessing and benefits from being tested by deductive and inductive reasoning. This interdisciplinary character of the approach to this thesis, aiming to achieve generalised knowledge through analysis, was based on abduction as a method of reasoning. The abduction process allows new hypotheses to emerge through the procedural steps of the research process (Johansson 2004; Patton 2002). This approach underlines that most of the questions that spatial planning is supposed to answer are not connected to one certain scientific truth but rather to what is probably or possibly true given specific situations and conditions.

The three modes of reasoning (deductive, inductive, and abductive) are combined when we assess practical and theoretical problems, and when the different logics work together, they are dependent on each other.

3.3 COMPONENTS OF THE RESEARCH DESIGN

The research design model presents the organisation of and relations between the different methodological working agendas (WAs) in the research process. The model comprised four distinct WAs dedicated to different topics, theories, and methodologies that are closely interlinked. The first WA included problems, the background, and the methodology and consisted of three chapters. The second WA comprised theory development and consisted of three chapters on frontage structure, frontage type, and frontage rules. The third WA focused on an empirical investigation of the current situation of compact city building processes. The fourth and final WA focused on the discussion and impact, what the knowledge can teach us, and how it is relevant for policies. The different units overlap and serve each other through feedback and iterative loops of knowledge creation. A closing discussion in one unit has an impact on the development of the next.

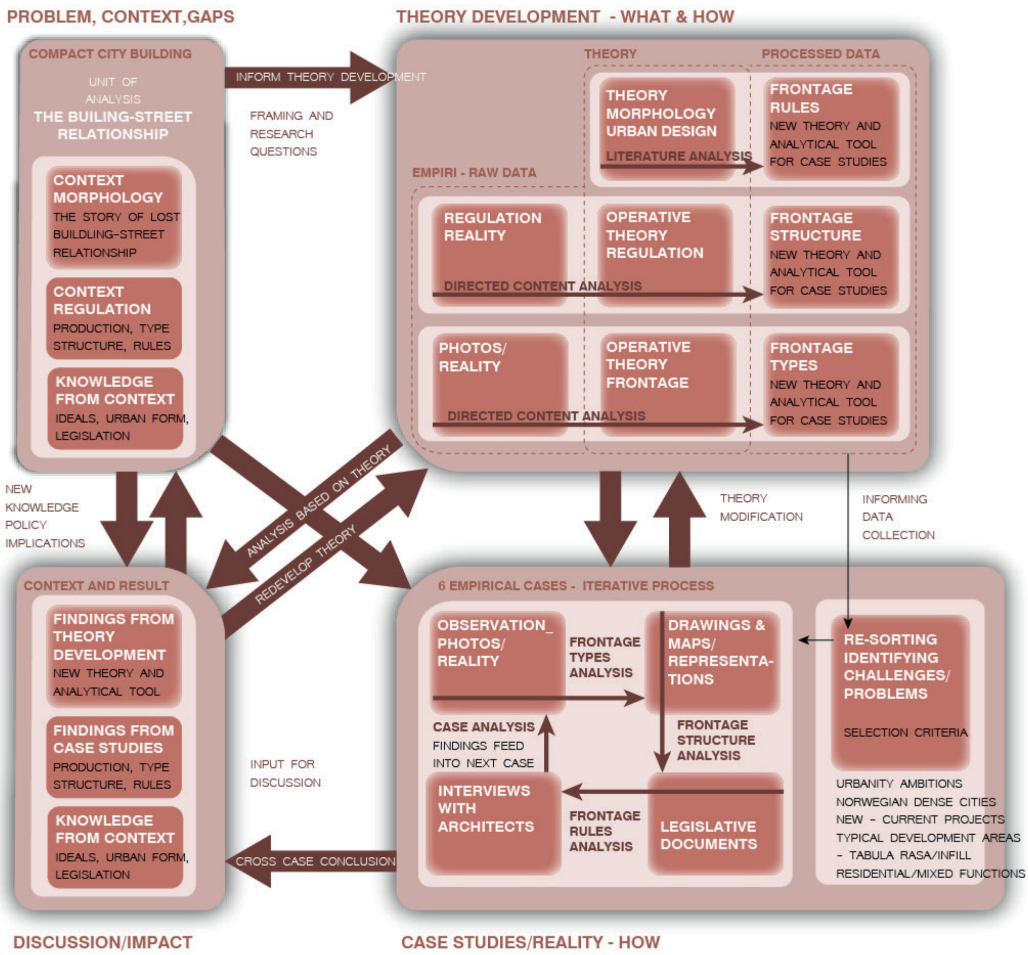


Figure 23 Research design with four distinct working agendas

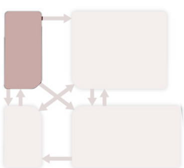
Part 1

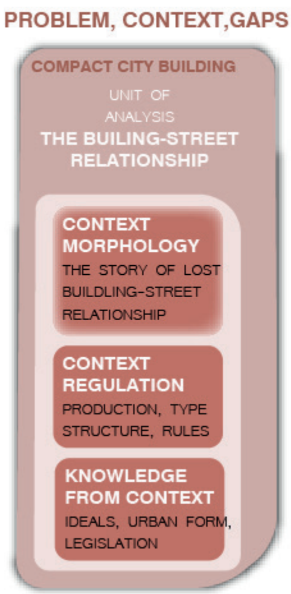
3.3.1 *WA1 Problem – Context – Methodology*

The first part (Chapters 1, 2, and 3 in the thesis) frames the thesis through an introduction of the research problem, existing knowledge, knowledge gap, as well as the problem statement and research question. In these three chapters, I highlight the scientific field that I used to address the scientific problem, namely the field of urban morphology, and then present the ontological, epistemological concerns and the methods applied.

Chapter 1 comprised a literature review of the problem and research gaps. It examined theories and research within the compact city framework and narrowed to a focus on the relationship between urban form and the processes that have created it through the scientific field of Urban Morphology. Chapter 2 delved into the contextual background for the thesis, digging into the historical context and development of ideas, physical form, and legislation. The data in this component were mainly based on a literature review of seminal thinkers' approaches to the building-street relationship or the legislative ideals represented in law. However, the morphological loop of housing form within an Oslo context comprised empirical data such as photos (observation) and maps (representations) to enable the analysis of the morphological transformation over time. Chapter 3, the present chapter, comprises a thorough presentation of the methodology of the thesis, including ontological and epistemological concerns as well as procedural steps in the different empirical research processes. The framing laid out in WA1provides the foundation for the three other parts, namely theory development, empirical case work, and impact/discussion.

Figure 24
WA 1 Problem, context and methodology





Part 2

3.3.2 *WA2 Theory development – Defining ways to read and understand data*

The main aims of the second part are to develop ways to read and understand the research problem and problem statement, to be able to define and develop clear and measurable criteria for the morphology of building-street relations, as well as to be able to read the planning implementation process. This part defines criteria and tools for measuring and mapping the building of compact city qualities in the building-street relationship, focusing on a morphological and legislative approach.

As such, this part comprises theory development (Chapters 4, 5, and 6) relevant for answering research questions and providing analytical tools for assessing the different empirical case study data. Within this extensive part of the methodology, there are three theoretical components: the first is based on theoretical investigation and literature analysis regarding the building-street relationship through the lenses of urban micro-morphology as well as the planning instruments that produce them. The other two chapters are based on empirical data that are analysed through directed content analysis, using both existing theory and data to guide the analysis. The processed theory and data in this part provide theories comprising knowledge about and analytical tools for reading and assessing frontage types, frontage structure, and frontage rules. These are brought in as analytical tools in the next part, namely the case study analysis.

Figure x presents the content and structure of this part comprising the three theoretical components (chapters) that they address. It answers questions of what and how: What are the different theoretical approaches to the building-street relationship? What are the characteristics of the building-street relationship? What aspects of the legislation address the main unit of analysis? The horizontal rows present the three different components (structure, types, and rules), through their empirical data, theory, and processed data and the type of analysis implemented. The vertical rows focus on the type of empirical (raw) data that the theory investigates and the processed data together provide new knowledge and analytical tools for the next part.

The empirical data applied in this part of the research comprised two different datasets: the first was from the observation of reality through photographic documentation, and the second was the legislative framework of the PBL from 1924 and the corresponding technical regulations from 1924 onwards. The first dataset involved the production of photo documentation and the sampling of existing examples of the building-street relationship through observation. The data material was extensive, including more than 3000 photos randomly selected in several cities around the world, with a focus on Europe. Context was not assigned any significance as I addressed the typical and general and not the site-specific. The second type of empirical data comprised the PBLs from 1924 onwards and their related technical regulations. These were all the result of societal ideas manifested in text in different planning regimes. The theories applied in this part are what I call the 'operational' theory, which comprises topic-specific theory aimed at defining effective tools for assessing current empirical cases and helping to define a methodology for addressing the building–street relationship.

Procedure and analysis – Frontage structure, frontage types, and frontage rules

The three different theoretical components comprised rigorous and systematic procedures with a range of different steps. The procedure of the first theoretical component, namely frontage structure, included a literature review and synthesis of how the building–street relationship has been treated in urban design theory as well as in planning, architecture, and morphology, with the aim of finding an operational theory. The literature review employed a range of tactics and steps to find relevant research as well as to synthesise theories into perspectives and operative tools for answering the research questions. It started as word-checks in various library resources, online databases, and online to find relevant articles and books. The next steps included reference checks and a search for relevant sources to expand the knowledge base. The collection of theory continued throughout the whole research process, with a more solid knowledge base added step by

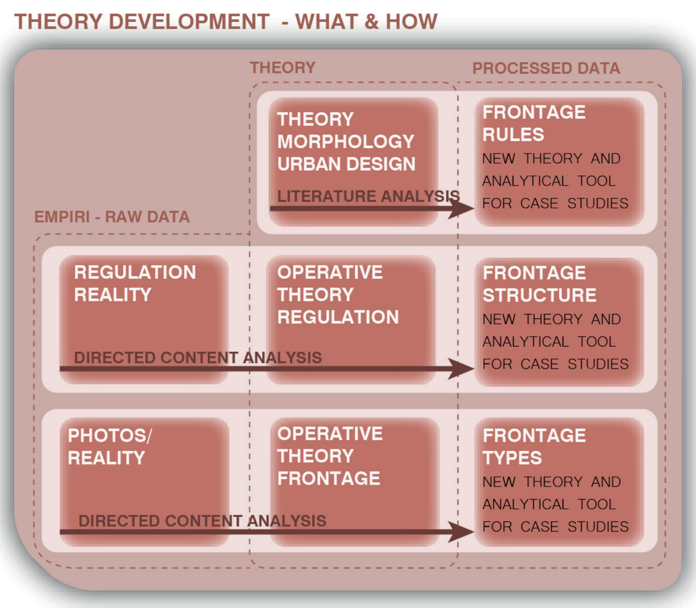
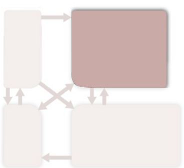


Figure 25
WA 2 Theory development - developing operational theory and tools for analyses



step. I developed a method of systematic literature analysis through matrix mapping of what, where, the method used, RQs, and relevance for the thesis. This mapping was sorted into different thematic and morphological topics and finally synthesised into a compact literature review for the thesis.

In investigating the empirical data of frontage types, photos were sorted and interpreted through a systematic process of coding and type and pattern identification with the purpose of refining existing typology and developing a synthesised approach. This approach to categorisation can be described as directed content analysis (Riff et al. 2006). Using existing theory or prior research, researchers begin by identifying key concepts or variables as initial coding categories. The operational definitions for each category are determined using theory. Data that cannot be coded are highlighted and analysed later to determine if it presents new categories or subcategories of an existing code. Directed content analysis presents some challenges in that using theory has some inherent limitations, such as researchers approaching the data with an informed but nonetheless strong bias.

The procedure for investigating frontage rules included three main steps for reading and analysing the data. First, the text was read with three different purposes, namely an overview, analytical assessment (unit of analysis), and sorting. Second, the sorted data were visualised into sequences of a matrix, and finally, this process was repeated for all of the different acts and regulations since 1924 and placed in a time-series diagram as a collection of comparable diagrams showing the volume and modality of the unit of analysis.

All of these procedures helped me to define what I call the processed data that defined new theory as well as a toolbox for application. The theoretical synthesis and empirical research in part 2 helped to define an analytical model defining criteria for analysis and a method for applying to empirical cases. This model comprised the two main research questions of the thesis – namely what and how. In addition, this part helped to define the selection criteria for the empirical cases.

Part 3

3.3.3 *WA3 Empirical cases – Learning from current implementation*

The third part consists of the study of contemporary practice, the production of the building-street relationship investigated as studies of empirical cases. Knowledge from the empirical development and a matrix of frontage types together with the contextual aspects of part 1 defined the selection criteria for the cases.

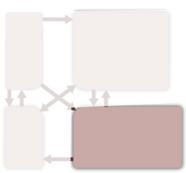
The case study procedure consisted of four distinct activities, two of which focused on morphology (observation/field visit and drawings/maps) and two that focused on the process of its production (legislative documents/interview). Each of the activities comprised data collection/production, data analysis, and question generation/answering, as well as a case analysis, which were fed back into the next case.

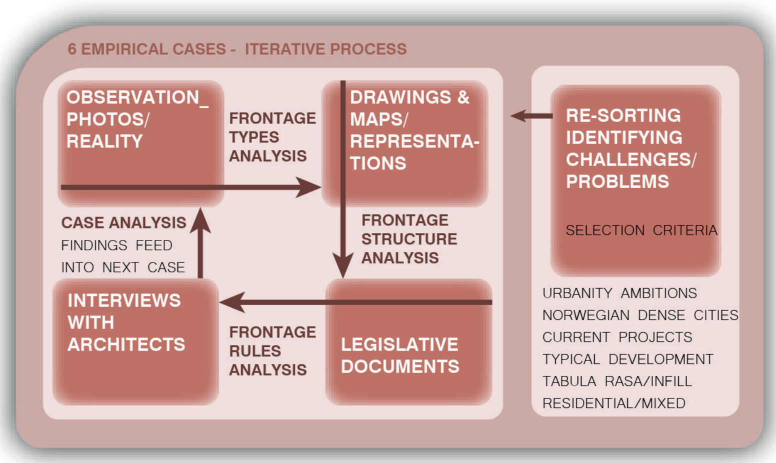
A range of scholars have investigated and written about the case study methodology. One of the most important, most read, and most used is Robert Yin, who defined a case study as

> '... an empirical inquiry that – investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident' (Yin 2009).

The case study methodology is a rigorous method of research that can help one to appreciate the complexity of organisational phenomena and physical artifacts. Rolf Johansson defined it as follows:

Figure 26
WA3 Case study of contemporary practice answering two main questions: what & how





CASE STUDIES/REALITY - HOW

> 'The case study should have a 'case' which is the object of study. The 'case' should: – be a complex functioning unit, – be investigated in its natural context with a multitude of methods, and – be contemporary' (Johansson 2004).

Theory plays a critical role in the design of case studies and in generalising from them. The case study combines different research strategies and relies on theory development in the process leading up to the analysis. Groat and Wang (2013) defined five specific characteristics of case studies: (1) they include a focus on either single or multiple cases; (2) they are studied in their real-life context; (3) they have the capacity to explain causal links; (4) theory development in the research design phase is important; and (5) they rely on multiple sources of evidence with data converging in a triangular manner, providing the power to generalise to theory.

Case study procedure

The empirical cases had different geographical contexts and addressed three types of morphological urban situations, namely harbour transformation within new street structures, land-use transformation projects within hybrid street structures, and infill projects within existing street structures responding to existing tissue. The study of the building–street relationship was addressed through observation and drawings (urban morphology), through the study of legislative framework within planning and building case documentation (urban planning/law), and through the study of the design/development process (compact city building) through interviews.

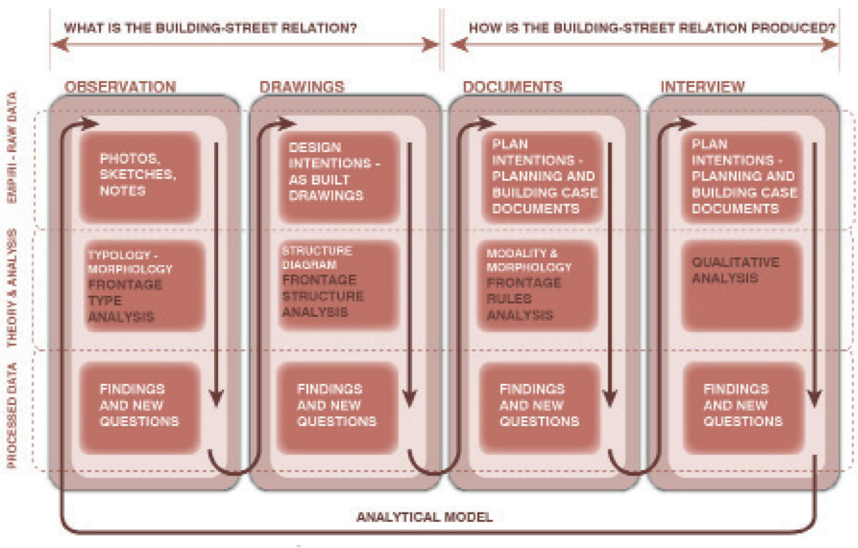


Figure 27 Case study procedure Empirical cases, iterative process including data analysis and feeding new findings into next case

The case study process of data production and collection as well as successive analysis informed the next case study investigation of the project. The case study process was therefore an iterative process including repeated cycles of operations. This process aimed to be convergent, coming closer to a desired result as the number of iterations increased.

The cycle of each case study included a range of loops where raw data, produced or collected, were successively analysed through different analytical frameworks developed as part of theory development in the PhD project. Morphological studies start by addressing existing built form through observation. The first two procedural steps in the cycle answered the question of what the building–street relationship is. First, the production of data from observations of realised projects (step A) was analysed through frontage type analysis – based on new knowledge and a new analytical tool produced as a part of the theory development in part 2. This development included a catalogue of interface types on the building–street level (Standal & Børrud 2019), presenting a method of morphological characterisation. The findings in this first procedural step fed into the next, where collected data in existing drawing material (the mapping of representations of the building–street relationship in step B) were analysed through frontage structure analysis, which included the synthesis of a developed generic structure diagram (Kropf 2009; Standal 2016) as well as structural analytical tools addressed in the space syntax methodology. These two steps answered the question of what the building–street relationship is in the different cases. The third and fourth component in the cycle addressed the question of how the building–street relationship is produced. Public legislation and building case files were used to implement the case project that described and highlighted the problem of this PhD thesis. This legislation and framework for the building process were analysed through frontage rules analysis, including a focus on the modality/morphology framework developed in Chapter 6. All three of these processes defined hypotheses and questions to include in a specific interview guide (step D) to use in the following interviews. Chapter 7 – the empirical investigation – explains this cycle of successive case studies thoroughly. The last component of the case study procedure (step E) included qualitative data from interviews with the main responsible designer of the built projects. These data provided detailed insights and developed the overall understanding of how the building–street interfaces in the cases were characterised, designed, and built as well as how the planning systems worked in practice for these cases.

Part 4

3.3.4 *WA4 Findings and new knowledge – Discussion and impact*

The cross-case conclusions from the empirical cases are then brought into the last part, namely the discussion, which ties together findings from theory development, case studies, and contextual investigations. This final part collects, analyses, and discusses the problem, problem statement, and research questions as well as discusses their relevance of and that of the building of new knowledge. The synthesis feeds new knowledge into the knowledge gaps and highlights potential implications for future research, practice, and policies.

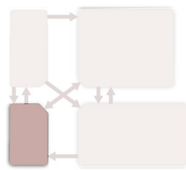


Figure 28
WA4 Findings and result – discussion and impact

3.3.5 *The important links – Connection between components*

The various components of this research fed into and interacted with each other. The knowledge of the problem and context highlighted in part 1 formed a foundation and fed into all of the different work, thus framing the thesis and informing the selection of data and empirical data relevant for the development of the operational theory. It also provided perspectives to help in the mapping and selection of the empirical cases. Finally, it heavily tied into the last part of the thesis, where the problems revealed are answered through theory and empirical data. The knowledge established in part 2, namely theory development, were vital for the definition of the selection criteria for empirical cases (part 3). Mapping and analysis in this part helped to reveal a selection of cases, and the developed new knowledge and analytical tools were directly applied in the various analyses. The findings were also directly fed into the final part to address the main research agenda.The mapping and analysis of empirical cases in part 3 helps to inform and modify the theory development in part 2, and also provides cross-case analysis and findings to be addressed in the last part – the discussion. Finally, the last part ties all of the different building blocks of the thesis together, answering and reflecting findings and knowledge produced through the process.

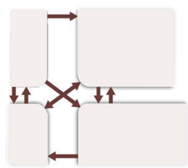


Figure 29
Links between the different Working agendas (WA)

This chapter forms the last chapter of Part I - framing the thesis. The following three chapters *Frontage Structure, Frontage Types* and *Frontage Rules* comprise Part II - Theory development The aim of this part is defining ways to read and understand data. The following chapter - *Frontage Structure* - presents an extensive literature review and the development of operational theory, synthesised and developed into a framework for assessing urban form.

PART II

CONTENTS

Theory development

FRONTAGE STRUCTURE

Chapter 4
Frontage structure

Chapter 4 **FRONTAGE STRUCTURE – URBAN MICRO-MORPHOLOGY AS FRAMEWORK TO ASSESS BUILDING-STREET RELATIONSHIP**

This chapter investigates and develops a theoretical framework for the thesis. The aim is to introduce the ontological and epistemological perspectives for the research and present the methodology used to find answers to the aforementioned research questions. Section 4.1 discusses the philosophy of science comprising the world as a set of assemblages investigated through spatial knowledge production. Section 4.2 presents the mixed-method approach applied in the thesis, comprising research strategy and case study research. Section 4.3 explains the research design, the organisation of and the relations between the different methodological working agendas in the research process.

I previously highlighted Jacobs' focus on the *microscopic and detailed view* in addressing complex urban problems. In addition, I engaged in Cerda's theoretical approach of the dialectics between *urbs and civitas* to be able to investigate the capacities of city building. This chapter addresses and develops these core foundations through the field of urban morphology, the study of urban form (urbs), and the processes creating this form (civitas). It develops important operationalised theoretical trajectories for this thesis that bring ideas, concepts, and studies to the table that are relevant to the core unit of analysis of my PhD – the understanding and production of the building–street relationship. I engage in a theoretical study about the *what*-and-*how* questions of my thesis, addressing the knowledge of the building–street relationship. This chapter includes and further expands the theoretical foundations published in the double-blind peer-reviewed paper *'Urban micro-morphology as framework to assess physical public-private interfaces at street level'* (Standal 2018), which investigated micro-morphology as a theoretical framework for assessing the building–street relationship. In addition, it presents and develops a theoretical framework for reading and analysing planning tools that are vital for the production of form.

The relationship between building and street has been described in many of the classic works of urban design, planning, and architectural theory as well as

chapter
4

in recent research over the last several years. However, little research has been conducted to develop a framework for assessing and systematically analysing the *micro-scale* formal properties (morphological) and spatial relationship (syntactical) in the boundary between buildings and streets, particularly within the Norwegian context. There is a need for morphological and institutional rethinking of the boundary in the relationship between building and street for understanding the urban element that links these two spatial units; for developing valuable tools for improving urban-development processes; and for policy and legislative frameworks in compact urban-development. This chapter argues that one important step in this direction is to establish a framework for formal properties and spatial relations between the micro-morphological public and private realms. Only by being able to describe, analyse, and challenge the institution of planning tools, such as planning boundaries and their role in defining the building–street relationship in zoning plans, will we be able to address the vague terms and concepts currently provided by policy and guidance, which result in an ambiguous urban form. In addressing these relationships, this chapter provides some answers to the following research questions: *How can we understand and conceptualise the building–street relationship as an interface between public space and private building in a way that can improve current practice and policy? (RQ 1) How can we develop the theoretical foundations of micro-morphology to address the building–street relationship? (RQ 1.1) What planning tools and building codes are active in the implementation of urban form within the Norwegian context? (RQ 2.4)*

4.1 THEORY DEVELOPMENT THROUGH LITERATURE ANALYSIS – METHODOLOGY

The literature review employed a range of tactics and steps, both to find relevant research and to be able to synthesise theories into perspectives and operative tools for answering the research questions. I engaged in a thematic literature search and also in background research of secondary sources, namely existing data that other researchers have collected, recorded, and analysed, including background research of fundamental concepts and theoretical approaches. Through doing so, I evaluated their research though developing a critical understanding of the aspects involved. This literature review describes theoretical perspectives in my research interest and should help readers to familiarise themselves with the topic by highlighting previous research findings of relevance to the research question. Overall, it examines morphological perspectives in relation to the public–private interface of the building–street relationship.

Procedural steps in the literature review – Five steps of analysis

The literature review was an iterative process of continually finding, including, and excluding theoretical sources important for learning something new and for answering the research questions. The iterative process included clear and distinctive steps that were constantly developing. These steps included *word search*, *reference search*, *overview-article/book review, and summary*, *sorting,* and *synthesis*.

In step A, I conducted a word search in research databases. The literature review looked for various terms used to describe the building–street relationship in scientific research and was developed into a sorting and summarising exercise of the findings. I conducted a word search for the terms in the following scientific research databases: Google Scholar, Oria, Taylor & Francis Online, and WorldCat. Examples of words applied in the first search included *public-private interface, building edge, micro-interface, active façades, edge zone,* and *boundary zone.* I conducted the research both in the English and Norwegian languages to reveal the importance of the context of the investigation. This exercise was repeated throughout the doctoral period and was updated when I discovered new terms that covered aspects of the core unit of analysis. In step B, I conducted a reference search of the articles and books most relevant for highlighting the topic and for answering my research question. First, I read the table of contents and the abstract and then looked through the figures and tables. If these were relevant, I then read the introduction and conclusion, which provided the background to the research questions and the main findings of the paper. For the most relevant articles and books, I read the entire text. In step C, I produced a systematic account of and reviewed the most relevant books and articles. I developed a table of the various main characteristics including *what* (name of source and author), *where*, and *when* it was published. I also included a brief account of the content, a summary of the *methods used* in the research, and the *research question* it posed (if I was able to extract it from the text). Finally, I analysed the relevance of the different works for my thesis. This analysis extracted knowledge about the building–street relationship and highlighted if and how it was relevant for the frame I had established for the thesis. I also included important quotes as the table developed and expanded.

In step D, I sorted the data in two different ways, namely by morphological focus and time. I developed a timeline and placed the different topics/dimensions of the building–street relationship on it, focusing on the main capacities they explained, including the depth and the façade interface. The timeline highlighted an increase in international literature concerning the topic of my research within the last decade and demonstrated the current relevance for the research. This sorting process also helped to inform the development of typologies, which is further explained in the next chapter (Chapter 5 – Frontage Types). In step E, the final step of the literature review, I synthesised all of the sources into a diagram that sorted through specific containers relevant for answering the research questions. This included a focus on the morphological capacities of the building–street relationship (the *what* question of urban form) and the development process for producing this relationship (the *how* question of legislation and regulation).

The information in Figure 30 and 31 present my literature review on the research relevant to this thesis, revealing an increase in international literature concerning my research topic over the two last decades as well as the current relevance of this research. It becomes clear that this topic is at the core of current discussions of how to build a dense city of quality.

Figure 30
Literature review of the building-street relationship

BUILDING-STREET RELATIONSHIP

WITH

a range of **Morphological capacities** of **form** (Bobic 2004, Samules et. al 2004, Gehl et a. 2006, Zoller 2014, Palaiologou &Vaughan 2014, Dovey & Symons 2014, Dovey & Wood 2015, Kickert 2016, Palaiologou 24016, Wir-Konas& Wook Seo 2017), **structure** (Hillier&Hansson 1986, Hansson 1998, Hansson 2001, Lopez&Van Nes 2007, van Nes 2008, Scheerlink 2010, Koch 2013, Koch 2015, Koltsova, Beirão 2015, de Andrade, Berghauser Pont & Amorim 2018) and **iconography** (Venturi Scott-Brown 1972, Dovey, Wollan, Woodcock 2018) within different **scales** (Kropf 2014) **and time (**van Nes &Lopez 2007, Wir-Konas& Wook Seo 2017) bounded by a **Legal Framework** of **planning system, planning instrument and guidance (**Mac Donald 2003, Zoller 2014) and seen in relation to **Social capacities** as **liveability/liveliness** (Koltsova, Beirão 2015), **use/activity** (Andersson et.al 1986, Can 2012, Kickert 2014, Palaiologou 2015, Minoura 2016)**, crime** (Newman 1972, van Nes & Lopez 2007) and **perceptive capacities** such as **Experience** (Nooradin 1996) and **Behaviour,** (Hillier&Hansson 1986, Lopez 2003)van Nes, Lopez 2007) and **Territory**(Habraken 1998, Scheerlink 2010, Koltsova, Beirão 2015).

AS PRODUCED, A THESIS FOCUS ON

URBAN FORM

(WHAT) - RELATION

FUNDAMENTAL CELL OF URBANIZATION (Cerda 1869, Caniegga, Hillier & Hansson 1984**)** as part of a **THE URBAN BLOCK** and within the **GENERIC STRUCTURE DIAGRAM** (Kropf 2014)

within ***Micro scale:*** **Ornaments/Icons** (Venturi Scott-Brown 1972)**, Grafitti** (Dovey, Wollan, Woodcock 2018), **Types of interfaces** (Standal 2017, Dovey & Wood 2015, Bobic 2004), **Entrance type** (Koltsova, Beirão 2015), **Transparency** (van Nes & Lopez 2007), **Permeability, Topological depth** (van Nes & Lopez 2007)

within ***Meso scale:*** **Entrance density** (Palaiologou 2016, Koltsova, Beirão 2015), **Inter-visibility** (van Nes & Lopez 2007), **Constitutedness** (van Nes & Lopez 2007), **Street permeability** (Koltsova &Beirão 2015, Pafka & Dovey 2016)

within ***Macro scale:*** **Route map analysis** (Kropf 2011), **Place syntax method** (Ståhle et.al 2005), **Accessibility of streets** (Oliviera 2013), **Physical distance from other streets (**Koltsova, Beirão 2015)

REGULATION

(HOW) - DECISION FRAMES

within the Norwegian planning and building system (Røsnes & Kule 2010, Falleth 2017, Grønning 2017 conference, unpublished paper, Grønning 2015), a **market-led planning system** (Lind 2002; Maäntysalo 1999) acting as framework for **design governance** (Carmona 2017)

It is consisting of **planning legislation** with operative **zoning instruments in the plan** (Holsen 2019) and **building codes in the technical regulations** (Skatland, Møystad & Lohne 2018, Skatland & Lohne 2016, Stenstad 2014) and with **an international perspective** (Carmona 2016, Heijden, J 2009, Meijer, Visscher & Sheridan 2002) on **rules** (Talen 2012) that affect form. It also includes a planning system with **design regulatory instruments (**Adams and tiesdell 2012) and **design codes** (Carmona 2016) affecting utilization of urban form through building heights and site coverage including **building line (built-to-line)** and **building boundary (built-behind-line).**

DEVELOPMENT

(HOW) - DELIVERY

The real estate development process is a production process that creates the built environment, **within a Norwegian development context** (Nordahl 2013), including the internal logic of **Property development** within **including** a **chain of risks** connected to **(remote) location** (Røsnes & Storflor 2009), **(risky) process** (Barlindhaug & Nordahl 2005, Carmona & Tiesdell 2005) and **(repeated) product** (Nordahl 2013).

The development process includes **Property creation** (Ramsjord 2015) through development of physical property units, by **plot parcelization** (Tiesdell & Adams 2013), **plot amalgamation** and **plot transformation**, and/or rights connected to these (Røsnes 2014)
Property, plot, rettigheter og styringsregiment (Kropf 2018)

4.2 THE BUILDING–STREET RELATIONSHIP – FORM, STRUCTURE, AND FUNDAMENTAL ELEMENTS

4.2.1 *Synthesis of theory – Structural and formal approach to the building–street relationship*

The physical public–private interface of the building–street relationship at street level comprises overlapping layers of physical space that mediate between public, collective, and private in the urban fabric. It comprises the morphological capacities of *form* (Bobic 2004; Dovey & Wood 2015; Gehl et al. 2006; Kickert 2016; Palaiologou et al. 2016; Panerai et al. 2004; Zoller & Wüstenrot 2014), *structure* (Habraken & Teicher 1998; Hanson 2000; Hillier & Hanson 1984; van Nes 2008), and *iconography* (Dovey et al. 2017), working within different scales (Kropf 2017) and times and bound by a legal framework of laws, a planning system, and regulation (Talen 2012). The building-street relationship has a relation with and correspondence to social capacities such as urbanity, *liveability/liveliness* (Beirão & Koltsova 2015; Macdonald 2005; Palaiologou & Vaughan 2014), *walkability* (Dovey & Pafka 2019), *use/activity* (Anderson et al. 1978; Kickert 2014; Minoura 2016; Palaiologou 2015), *behaviour* (Hillier & Hanson 1984), and *prevention of crime* (van Nes 2008) as well as perception qualities such as *experience* (Nooraddin 1996) and *territory* (Beirão & Koltsova 2015; Habraken & Teicher 1998; Scheerlinck 2010). From one perspective it is private, belonging to the façade of a house while simultaneously forming part of the city's public space. The building-street relationship forms a vital area where interaction between people occurs, which is where one greets and says goodbye to one's friends or customers, where one exposes or conceals one's private life to the public, and where goods are displayed and exchanged (Zoller & Wüstenrot 2014).

Within the Norwegian context, very few studies have investigated this urban element. Architect and urban planner Hoshiar Nooraddin studied the relationship between the applications of the '*al-fina*' concept and the characteristics of the street environment of Islamic cities in the Middle East in his PhD thesis from the Norwegian University of Science and Technology NTNU (Nooraddin 1996). The *al-fina* concept represents the in-between spaces of the building–street relationship, or what Nooraddin calls *'a third sort of space, connecting private indoor space and public open space'* (p2, 1996). The interface area of al-fina is considered an area bordered by the passage and the building, However, Nooraddin claimed that in design and use, its influences extend from the inner space of buildings adjacent to the street to the border of the passage in the street.

4.2.2 *A structural approach to the building–street relationship*

Within the Scandinavian context, we find a few more sources addressing the building–street relationship through a structural approach. In Sweden, a discourse focuses on structural links in the urban fabric – between inside and outside, which is a discourse mainly grounded in the field of space syntax, a quantitative structural approach for measuring integration and relations in the urban fabric. Daniel Koch has focused on the building–street relationship through investigations of depth and configurational patterns (Koch 2013; Koch 2015). He has explored how internal configurational properties set up an interface description, emphasising the internal configuration of the building with regard to its exterior and how it thus describes directionality and priorities. In 2015, Koch explored the term *avoidance* through spatial configuration, performativity, encounter patterns, social structuring, and spatial behaviour.

In her PhD thesis titled *Uncommon Ground: Urban Form and Social Territory*, Eva Minoura investigated the negotiations between public and private interests in shared yards of multifamily housing schemes (Minoura 2016). Her theoretical approach and analytical tool for assessing the spatial yard include a development of the *generic structure diagram* established by morphologist Karl Kropf (2009). This structure diagram is also a vital framework for my thesis and is thoroughly described later in this chapter. Minoura's theoretical investigations included commons theory and a differentiation between the four territorial types that she included in her discussion of the shared yard. These Swedish sources have emphasised the *structural relations* between buildings and streets and is thus relevant for the theory development in this chapter.

Within a similar structural approach to the building–street relationship, we find a range of influential work developed in the Dutch context (Bobic 2004; Habraken & Teicher 1998; Hertzberger 2005). Herman Hertzberger used a relational approach to connect spaces of occupation and movement, a method and example presented in the book *Lessons for Students in Architecture,* first published in 1991. John Habraken, in his book *The structure of the ordinary*, presented the term *territorial depth* to relate buildings and streets with territorial aspects of access and control. Territorial depth defines the relations of openings in a structure and comprises the access and control of boundaries (Habraken & Teicher 1998) indicated that the relations between opposite sides of the boundaries are asymmetric; that is, one may always exit from bed to bedroom, from bedroom to house, from house to street, and from street to city. However, moving in the reverse direction, one is subject to scrutiny at each door or gate, unable to enter whenever one pleases. Habraken also investigated the part-to-whole hierarchy, reflecting the way complex artefacts are assembled. Both concepts defined crucial prerequisites for the development of Kropf's generic structure diagram (Kropf 2011; Kropf 2014; Kropf 2017). Milos Bobic dedicated a whole book to investigating the structural and permeable interface and defined a typology based on structural relations of depth (Bobic 2004). His work heavily influenced the typology development presented in Chapter 5. Akkelies van Nes and Manuel de Lopez investigated micro-spatial relationships approached through the public–private interface as a means of researching its influence on street life and crime (Van Nes & López 2007; Van Nes & López 2010). The analytical parameters they addressed helped me to define the morphological method that I used to analyse the contemporary projects presented in Chapter 7. As such, both the Swedish and Dutch contributions to knowledge production had vital influences on the theoretical development of this thesis. In addition, some British research within the field of space syntax has contributed heavily to the importance of understanding the structural aspects of the building–street relationship, particularly work from the Space Syntax Laboratory at University College London (Hanson 2000; Hillier & Hanson 1984; Palaiologou et al. 2016).

4.2.3 *The form (façade) approach to the building–street relationship*

The most influential research within the general professional environment in Norway is the work of Danish architect and researcher Jan Gehl and his focus on combining urban form and psychology (Gehl 1987; Gehl & Gemzøe 1996; Gehl et al. 2006). Many currently implemented terms in policies and practice in Norway, such as *'active façades', 'edge zones', and 'soft and hard edges',* have been derived from his work and have for years been the leading demands for fulfilling policies of compact and vital cities. The term *active façades* presents an ambition concerning the effect of the form element, rather than concerning the characteristics and properties that the element comprises. The other term that has started to emerge in the Norwegian professional climate is the *edge zone*, which is also derived from Gehl's work comprising soft and hard edges. A recent publication from the Planning and Building Agency in Oslo (2019) formally introduced this term to address the building–street relationship. The main properties of this edge zone include the *surface, façade, and function* inside the building. This work was heavily inspired by the Copenhagen policy where the terminology was grounded over years. The surface presents the spatial characteristic of the outdoor zone, the façade represents the boundaries that define the inside and outside, and the function represents the use. Within this guidance, the Copenhagen municipality developed the terminology of façades from active façade into open façade and from open façade to transparent façade, and the edge zone includes a heavy focus on the spatial design and characteristics.

Australian planner Kim Dovey has, together with a range of other researchers, published a range of relevant articles concerning micro-spatial aspects of form, the properties of the building–street relationship, and the ontology of spatial knowledge production (Dovey & Ristic 2015). Together with Felicity Symons, Dovey investigated how to reassemble public/private interfaces in Melbourne's Southbank hinterland, a former industrial area (Dovey & Symons 2014). Based on a typology of five types, they mapped their distributions and suggested potential adaptations of interface types based on existing market-based practices, including the infill of setbacks, appropriation of public space, and reuse of car-parking space. In cooperation with Stephen Wood, Dovey presented a typology for the mapping and analysis of urban interfaces, drawing on mappings of the mixed morphology of the Australian inner city (Dovey & Wood 2015). These approaches played a vital role in the ontological framing of this thesis as well as its theoretical framework for analysis.

Elisabeth MacDonald investigated street-facing dwelling units and their relation to liveability (Macdonald 2005). She particularly examined new building types that integrate ground-floor townhouses into very large buildings in new high-density residential neighbourhoods around downtown Vancouver. Her findings suggested that some design characteristics of ground-floor dwelling units and the streets on which they are situated contribute substantially to encouraging life on the street. This hybrid building typology presents an interesting approach for the analysis of this thesis.

4.2.4 *Fundamental elements of the built environment: Spaces, boundaries, and openings of the building–street relationship*

In Chapter 1, I highlighted Madanipour's definition of city building as a *boundary-setting exercise defining spaces and openings* for establishing relations between them (Madanipour 2003). Kropf employed a similar approach to understand built form and wrote very precisely about the minimum elements of morphological research. He emphasised that the building–street relationship includes the fundamental elements of *the surface, boundary, and opening* (Kropf 2017). These terms all have a range of meanings and potential ambiguities. In this thesis they are defined mainly morphologically, but also include territorial or institutional approaches. Their definitions are provided in the following paragraphs.

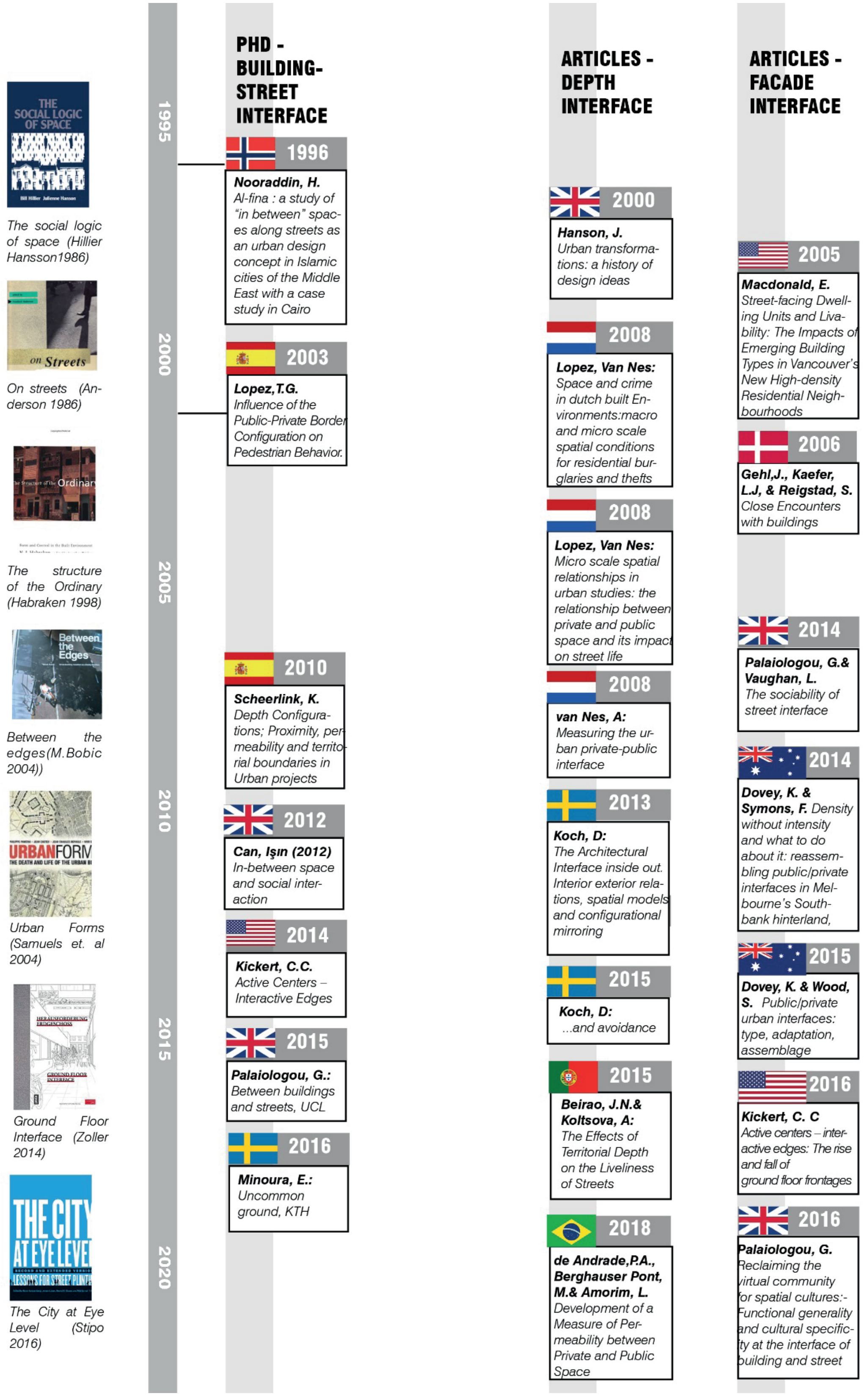


Figure 31
Timeline of relevant books, PhD theses and articles the last two decades about the building-street relationship

Spaces

Morphological spaces: The first fundamental element is structured surfaces that imply a space/void and are co-dependent on the boundaries that define them. A morphological space includes a limited extent in one, two, or three dimensions, measured by distance, area, or volume (Merriam-Webster retrieved 30.07.19).

The building–street relationship comprises three main spaces as the first fundamental elements. When the structures' spaces or voids of the surfaces are constituted by a built structure, three types of voids occur: *street spaces, open areas, and rooms* (Kropf 2017 p 39).

Territorial spaces: Spaces under control are territorial (Habraken & Teicher 1998). Territorial spaces include the structured spaces and voids assessed through public, collective, and private territories. A city is always organised along various types of public–private lines. Transitions and connections between these spaces define vital criteria for good urban development (Kropf 2017). Jacobs (1961) emphasised the distinction and transition between public and private spaces in urban development. Ali Madanipour dedicated a whole book to the study of the relationship between public and private spaces in the city. He is critical of what he views as usual approaches to the topic in research and literature. In his book, he challenges the one-sidedness that each perspective often takes towards the other, either standing in the public space and addressing the private space as an intruder, or standing in the private space and addressing the public life as a disturbance to private life (source). Madanipour encourages an integrated approach to the public–private spaces and claims that *'[t]he public and private only makes sense in relation to one another – as they are interdependent notions'* (Madanipour 2003). The duality between the public and the private – interdependent and overlapped – is a critical characteristic of collective space or commons. A range of researchers have debated and argued strongly for a focus on the communal aspects of development. An important book of its time was *Community and Privacy* by Alexander and Chermayeff (1965), which has a strong focus on the balance between community and privacy through clearly articulated domains for all degrees of private and communal living (Chermayeff & Alexander 1965).

Boundaries

Morphological boundaries: The second fundamental element is the *boundary*, defined and created by the differences between spaces. Boundaries can either be diffuse or well-delineated (Kropf 2017). Any distinct space has a boundary. In all contexts, boundaries are either implied, left, found, or constructed (ibid), and they are there to guide experience, behaviour, and use (Madanipour 2003).

The terminology of *boundaries, borders, and frontiers* offer us an initial understanding of a range of different boundary types and their capacities. A boundary line can have *strict and clear limitations*. Sometimes, the morphological boundary corresponds with institutional and territorial boundaries, which occurs when a form is built on a direct building boundary. This type of boundary is common in institutional systems of zoning.

Sometimes, different types of boundaries *overlap*. *Overlapping boundaries* involve one space entering another. These blurred boundaries from one space to another are defined as 'soft', creating zones rather than sharp lines (Scheerlinck et al., 2010). Elin Børrud discussed the width of the border by examining the urbanised landscape as a transition zone, and stated that problems connected to strict demarcation lines in law can be solved by understanding the border as a transition rather than a definite distinction (Børrud 2016).

Territorial boundaries: These appear from the most intimate personal space, through the private home out into the communal and social world (Madanipour 2003). Madanipour (2003) connected territorial boundaries with the process of city building, highlighting a flexible and elaborate boundary between public and private. He pointed to an essential aspect of city building across form, regulation, and implementation. The aggregation of fundamental elements creates networks of boundaries that are stable and physical as well as fluent and social. Boundaries create spaces to be within, spaces where markets can develop. Knowledge of city building includes knowledge for creating, discussing, and disentangling boundaries. *The building–street interface* includes tangible and intangible boundaries of public and private space.

The territorial boundary and relation between these two capacities of public and private highlight a range of ambiguities that must be untangled and broken down to be able to quantify and re-establish them.

> 'The examination of a range of different but extremely common specific types of built form reveals that a rigorous conception of the hierarchy – that allows for the richness of overlapping sets – contains various types of ambiguity. The ambiguities are not anomalies that need to be expunged but regularities of built form that need to be accounted for in a systematic way if we are to understand fully the structure and dynamics of the built environment' (Kropf 2014).

When territories are not clear, where physical elements are spread out, and when definitions of space include fuzzy and unclear situations, spaces of uncertainty occur. Architectural theorists such as Oscar Newman and Jan Gehl (Gehl 1987) have briefly touched on these vague territorial constructs. Alexander Ståhle went much further and investigated the concept of *no-man's land* in his paper titled

'*Exploring Ambi-territory*' (Ståhle 2008). His investigation comprised spatial configurations and space syntax research. He claimed that when territories are contradictory or blurred, an ambiterritory (a no-man's-land) is created. The places he used to discuss this concept were the in-between spaces produced by 20th century modernism. These spaces are accessible for everyone and thus public, yet they are uncontrolled because of their remoteness from public presence and private interventions. These occur mainly in suburbia as a part of modernist estates, but also for a few projects within the city core.

Openings

The last fundamental element in any functioning space is the *opening*, the main capacity of which is to *relate* spaces across boundaries. The number of openings establishes distinct types of structured space in terms of access. Boundary crossings of different types define relations with three main capacities: to occupy (one opening), to move through (two openings), or to distribute (three openings; Kropf 2017). These capacities operate together to create sequences of spaces related across boundaries. While the capacity of occupation can be read as a territorial act that highlights more private territories, the capacity of distribution presents the probability of more common spaces. As such, the morphological structure of relations is vital for the effect of the frontage on urban life and attractivity.

Territorial openings: The territorial dimension of boundaries is linked to aspects of *access and control* and to the model of accessibility it defines through the openings. It connects to the last minimum element of the built environment, namely the openings. Territorial boundaries give one the ability to close a space under control to restrict entry. Territorial control is the ability to close a space – to restrict entry (Habraken & Teicher, 1998). Boundaries can consist of a gradual territorial transition through layers of territorial control, including legal, physical, social, and personal. A plot boundary can be a territorial if accessibility is restricted by a controlling agent, such as a housing plot. However, a plot can also be nonterritorial if the accessibility is not restricted; for example, the 100-metre sea belt open for access in Norway. This built form may suggest territory, but it is the ongoing act of occupation that fixes the actual extent of the (territorial) claim. *Territorial depth* is a concept established by Habraken and 'measured by the numbers of boundary crossings needed to move from the outer space to the innermost territory' (Habraken & Teicher, 1998). Habraken's book *The Structure of the Ordinary* investigates a range of depth configurations in different houses. A vital aspect of gradual transition from inside to outside in a house is asymmetric, with unrestricted freedom to exits being implicitly understood. However, moving in the reverse direction one needs access at each door or gate. In his PhD thesis titled *Depth Configurations: Proximity, Permeability and Territorial Boundaries in Urban Projects*, Scheerlinck took this investigation a step further and developed a mapping tool for assessing territorial depth in urban projects (Scheerlinck et al., 2010).

This section has presented a structural and formal approach to address the building-street relationship through fundamental elements of the built environment. The following section investigates and develops the morphological framework relevant for the analysis of Case studies.

4.3 MORPHOLOGICAL FRAMEWORK FOR ASSESSING THE BUILDING–STREET RELATIONSHIP – URBAN MICRO-MORPHOLOGY

Jane Jacobs addressed the microscopic or detailed view as a means of researching and understanding the complex city as a whole through an understanding of scale (Jacobs 1961). In this section, I develop a theoretical framework to address these micro-aspects of the city through the scientific field of Urban Morphology. In Chapter 1, I presented this field, its fundamental ideas, and the morphological approach used, and I briefly explained the subfield of urban micro-morphology as my approach to operational theory. In this section, I highlight and develop the knowledge base of this field and establish a theoretical analytical tool that was useful for the analysis of the contemporary projects presented and analysed in Chapter 7.

My published paper titled '*Urban Micro-morphology as a framework to assess physical public-private interfaces at street level*' (Standal 2018) developed and further elaborated the concept of *urban micro-morphology* as a theoretical framework. The aim was to demonstrate new directions and assess its relevance to discuss and analyse the micro-spatial components of the building–street relationship and its relation to a larger whole. This paper formed an initial and key theoretical building block within my broader study and doctoral research. In this section, I summarise the main points and further develop its analytical framework (see the generic structure diagram).

URBAN FORM

(WHAT) - RELATION

FUNDAMENTAL CELL OF URBANIZATION (Cerda 1869, Caniegga, Hillier & Hansson 1984**)** as part of a **THE URBAN BLOCK** and within the **GENERIC STRUCTURE DIAGRAM** (Kropf 2014)

within ***Micro scale:*** **Ornaments/Icons** (Venturi Scott-Brown 1972)**, Grafitti** (Dovey, Wollan, Woodcock 2018), **Types of interfaces** (Standal 2017, Dovey & Wood 2015, Bobic 2004), **Entrance type** (Koltsova, Beirão 2015), **Transparency** (van Nes & Lopez 2007), **Permeability, Topological depth** (van Nes & Lopez 2007)

within ***Meso scale:*** **Entrance density** (Palaiologou 2016, Koltsova, Beirão 2015), **Inter-visibility** (van Nes & Lopez 2007), **Constitutedness** (van Nes & Lopez 2007), **Street permeability** (Koltsova &Beirão 2015, Pafka & Dovey 2016)

within ***Macro scale:*** **Route map analysis** (Kropf 2011), **Place syntax method** (Ståhle et.al 2005), **Accessibility of streets** (Oliviera 2013), **Physical distance from other streets (**Koltsova, Beirão 2015)

Figure 32 Literature review of building-street relationship as part of urban form at micro, meso and macro scale

The term urban *micro-morphology* is scarcely used and emphasised in a manner that might develop its content and potential, even though a range of research has handled aspects of urban micro-morphology. Whitehand (2001), Moudon (2002), Groth (2004), Børrud (2005), Chen (2012), and Palaiologou (2016) were found in sources from the *Journal of Urban Morphology* and the *Journal of Space Syntax* as well as a Norwegian book titled *By og byliv i endring.* In my paper, I included information concerning the use of the terms *definition, domain,* and *method* and looked for similarities, differences, and consistency in the approaches. Then, I compared and evaluated the results to expand and develop an understanding of the terms. Urban micro-morphology is useful for examining both *form* and the *structural relations and processes* that create it and the building–street relationship. It connects the micro-spatial elements of building–street relations with a macro-spatial understanding of city building. The theoretical framework of urban micro-morphology is useful for connecting formal properties and aspects of urban form both within and across levels of scale. Thus, a small component or spatial unit is always a part of something larger, thus contributing to the knowledge of city building. The literature survey revealed that micro-morphological research consists of aspects and elements of form connecting beyond their level of scale.

4.3.1 *Operationalising microscopic view on city building: The building–street relationship as the fundamental cell of urbanisation*

I previously presented my understanding of the building–street relationship, addressed through Cerda, as the *quintessence of urbanisation*. Within the field of urban morphology, this relation presents one of the most vital components of city building. The British space syntax researchers Ben Hillier and Julienne Hansson presented this relation as the *elementary cell* (Hillier & Hanson 1984), whereas Italian Morphologists Caniegga and Maffei defined it as the *smallest city component* and as forming the constituent parts of the urban tissue (Kropf 2014).

The *smallest city component* includes the morphological properties of the building and associated private open space within the plot. *The elementary cell* includes an inside space, an outside space, and a connection between the two at the entrance (Hillier & Hanson 1984). A settlement is established as an assemblage of elementary cells in such a manner that the exterior relations of those cells generate and modulate a system of encounters by virtue of their spatial arrangements (Palaiologou et al. 2016). This notion of the elementary cell goes beyond the smallest city component as defined by Caniegga and Maffei and includes characteristics within the plot. *Urban micro-morphology* includes elements within the smallest levels of morphological research. This means that components, configurations, and spaces of a building connect to a related open space on its plot and the street.

The concrete transition between the street and the building occurs at the micro-level and consists of structural connections between public and private, including measurements of topology and boundary crossings. In addition, the form of the transition consists of various landscaping and urban shape elements of different spatial locations. The design of the façade, with the degree of openness or closure – that is, the degree of permeability – is critical.

The underlying structure of the building–street relationship defines first-order principles and links different spatial elements together into a system that works together. The simplest structural phase attenuator is the direct transition between the building and the urban area – the one that occurs directly in the façade's building line and boundary. In this case, no transition zone exists between private and public, and therefore, the transition is strongly defined by the façade's materiality and detailing. The most complex structural boundary room is the overlapped room, which may consist of several delimited spaces with different depths and distances from each other. An apartment building with multiple entrances and collective rooms in the transition between the public and the private room is an example of a border space with greater structural complexity.

Topological depth is a term for measuring the structural transition between private and public. Topological depths between private and public spaces can be recorded by counting the number of rooms one must pass through to get from a very private to a completely public space. If the entrance is directly linked to a public gate, there is no room between public and private and the depth is 0 / null. If the entrance has a front yard between the entrance and the gate, the depth is 1 as there is a room between the closed private space and the public street. Furthermore, the depth can be both 2 and 3 (and so on) depending on how many rooms one must pass through. Topological depth only characterises the relationships while generic structural diagrams provide additional characteristics of the degree of public and collective space. In the structure diagram, the boundaries between the different rooms are also problematised and activated as a resource.

4.3.2 *Scale of morphological interfaces – Part-to-whole: micro, meso, and macro*

A vital component in morphological research is scale. Palaiologou et al. (2016) defined three interface scales between buildings and streets in the street domain: *the building–street, block–street, and street interfaces.* The building–street interface is defined as the space from the building façade to the street domain, where the façade includes the three-dimensional surface and visible/implied activity behind it. The block–street and street interfaces are both aggregates of the building–street interface, with the former facing the same side of the street and the latter facing the same street on both sides. The first interface scale belongs to micro-morphological research (Standal 2018), whereas the other two operate at the meso-level. In addition to these two levels of scales, the urban structure interface plays a vital role in how areas are integrated into one another. This section presents the three different scales and highlight analytical tools to investigate these.

4.3.3 *Micro: Urban micro-morphology as part of the generic structure diagram*

The concrete transition between the street and the building occurs at the micro-morphological level and consists of *form elements, structural relations, and façade characteristics* between public and private spaces. This transition also relates to the core principles and minimum elements of the built environment. Form elements includes the spaces defined by boundaries of façades and with relations and openings. A few researchers have developed sets of typologies for describing this relation more explicitly. In Chapter 5, I develop these typologies further through a directed content analysis of empirical data and theoretical guiding.

As an operational theoretical framework for my thesis, I included and implemented the *generic structure diagram* defined by Kropf (2014, 2017) as a means of addressing and developing the micro-spatial aspects of urban form analysis and for making links between part-to-part and part-to-whole relationships together with other micro-morphological research agendas. This diagram has the potential to reveal the relevant structural components that research on the building–street relationship must include. I argue that a clear link exists between the building–street relationship and the theoretical framework of urban micro-morphology, and I believe that the generic structure diagram is the right tool to develop further. Micro-morphology occupies a large part of this diagram. It includes all levels in the hierarchy at the scale of the individual plot and within the individual plot: materials, structures, rooms, buildings, and plots and their related open spaces (areas and routes/street spaces).

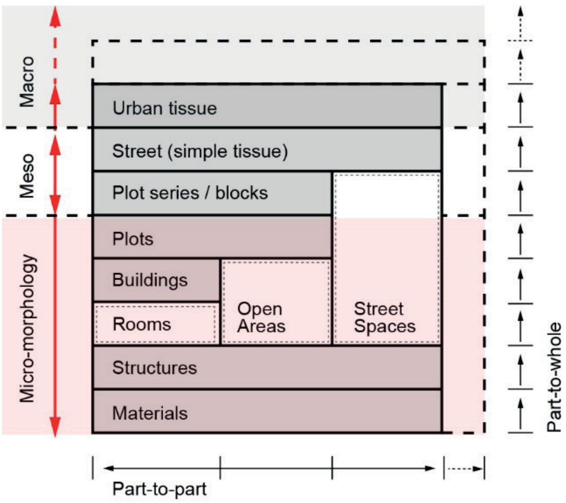


Figure 33 Micro-morphology occupies a large part of the generic structure diagram through micro, meso and macro (Source: author adapted from Kropf 2014)

Kropf emphasised and developed the principles of urban form in his article titled '*Ambiguity in the definition of built form*' (Kropf, 2014). The article focuses on the hierarchical relationship between buildings, plots, and streets and their overlapping aspects and elements. It includes a literature review of the seminal morphological work within the different schools and summarises and combines the approaches into a generic structure diagram. Kropf emphasised different types of ambiguity in the generic structure of built form and suggested a systematic approach for discussing them. He focused on establishing a framework that included different levels of resolution and scale and introduced the generic structure diagram (Figure 2), demonstrating relationships between micro-elements of materials, structures, and rooms and macro-elements of streets and urban tissues. The diagram sets out a way to approach the specific nature of the resolution hierarchy and provides conceptual grounds for a range of different research questions.

A critical distinction in the diagram is the composition of solid and void. There are three distinct types of void embedded in built form, each with a distinct role within the multi-level generic structure – namely rooms, areas, and routes/street spaces. This diagrammatic expression of the relationships between solid and void in built form is important in at least two respects. The multi-level diagram can be seen as a 'vertical section' of generic structure, illustrating the generic types of form comprising built form. A 'horizontal section' through a particular level corresponds to a plan view at a given level of resolution (Kropf, 2014). Kropf exemplified approaches to how the generic structure diagram can be used to investigate different types of buildings. Private terraced or detached houses will in general follow the generic structure diagram with direct access from internal private rooms to external areas and public routes. However, a more complex type in the structure diagram is the multi-story residential block, which includes a topological depth of spaces from the inner rooms of the flat to the outer public space. Kropf explained this as follows:

> 'Rooms are composed into individual apartments, apartments, along with corridors, are composed into floors and the building as a whole has several floors linked by vertical circulation. If the definition were to treat the whole building as composed solely of rooms, the significant, repeating structural order of the apartments and floors would not be fully taken into account' (Kropf 2014, page 51).

Figure 2 presents the structural configuration within a multi-story residential building. Here, one void – namely rooms – in the basic generic structure diagram has become five types of voids: rooms, apartments, floors, horizontal circulation, and vertical circulation. These structural configurations are linked together with strict or overlapping boundaries and include rooms that are not strictly private, but rather collective.

Configurational depth: Spaces, boundaries, and openings of the building–street relationship

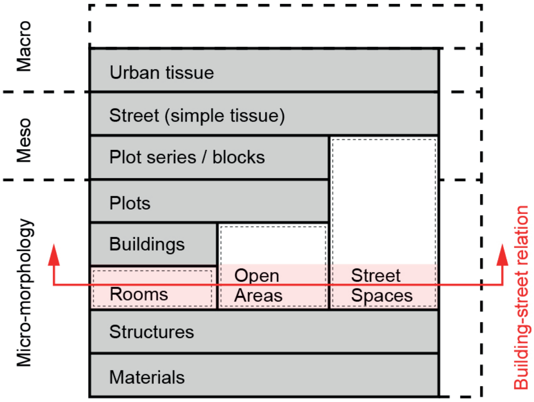


Figure 34
Building-street relationship marked as a cross-section through the voids of the structure diagram

I suggest that in the building–street relationship, the public–private interface of said relationship is placed as a horizontal cross-section through the voids of the diagram, through the relations of rooms, areas, and routes/street spaces. These connections are openings that consist of a range of boundaries and overlapping spaces and form part of micro-morphological research, including spatial relations of physical features and urban form. This section can be interpreted as the *'Nolli section'* and includes all of the relations of open spaces, indoors or outdoors. In 1748, Nolli created the map known as the *Pianta Grande di Roma*, in which he drew the city of Rome as an enormous mass that he carved out to create public space (white) and private space (black). I claim that the red marked area in the synthesised diagram in Figure 7 includes the levels of resolution that can best investigate and explain the morphological building–street relationship. To fully understand said relationship, we must expand our perception and discuss the city as both a built–unbuilt composite and as a configuration of rooms and spaces. The vital point of this interface is not if a room is inside (built) or outside (unbuilt), but rather how the rooms relate to each other in the compositional hierarchy.

The cross-section includes the minimum elements of every room presented earlier in this chapter and vital for Madanipour's definition of city building, including *the spaces, boundaries, and openings*. Research on the public–private interface is placed as a horizontal cross-section through the connections and relations of rooms and voids (white in Figure 11). The various types of voids are clearly embedded in built form and have distinct roles within the multi-level generic structure. The voids include a range of collective spaces that have both different forms and roles in the configurational hierarchy.

As such, Kropf'sdiagram includes both the topological depth known from space syntax theory and the notion of depth configuration included in Scheerlink's work. Every topological step in the part-to-part relation crosses different boundaries, either unambiguously or ambiguously. The diagram includes and problematises boundaries between the different spaces in topological depth and activates them as resources for understanding *physical, territorial, and visual* filters used in the production of the form. Territorial filters include a variety of rights – to use, own, access, control, and function.

Building type's effect on the spaces of the configurational hierarchy

Kropf's generic structure diagram presents *three distinct types of voids* embedded in built form, each with a distinct role and configuration within generic structure: *rooms, areas, and routes/street spaces* (Kropf 2014). It comprises a composition of landscape and urban form elements and space. These rooms or elements have different materials and structures that help to define the characteristics of the relationship.

I suggest that it is possible to develop the theoretical framework even further to include the internal spaces of the flat in a configuration of spaces defined by the level of access/control and circulation. For example, a bedroom can be assessed as a configuration that has a clear (more private) distinction from the more public kitchen and living room. However, for this research, I emphasise the dwelling unit as the smallest configurative unit and do not follow this lead further. The configuration of the three main types forms a network of spaces with distinct boundaries between them. This configuration is the most basic and can include other specific voids of a building–street interface. The generic structure diagram, as depicted in Figure 1, explains types of buildings directly connected to the streets with an external area – a related open space. Private terraced or detached houses will follow this diagram with direct access from internal private rooms to external areas and public routes. However, more complex depth configurations of the public–private interface exist in other building types. The multi-story residential building, a common building type within the Norwegian urban context, is an example of morphological depth configurations being expanded both into interior rooms and sometimes also within exterior areas of the plot.

Figure 3 presents an expanded structure diagram where the internal rooms of the basic diagram include spaces within the multi-storey block of flats, horizontal and vertical circulation space, as well as flats and floors (Kropf 2014). The horizontal circulation directly connects to the rooms of the flat and is shared by the connecting flats on the same floor. It is the first and closest collective space. The vertical circulation is shared by all of the floors and flats in the building and is the next collective space of the multi-residential flat. The same number of people will also share the entrance area.

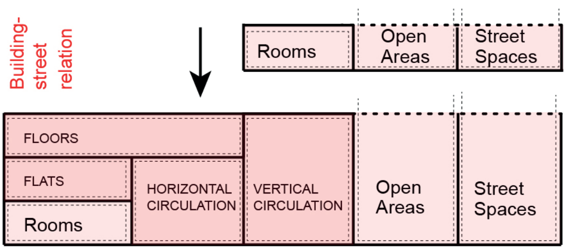


Figure 35
Expanded structure diagram including the internal rooms of multi-storey blocks of flats (source: author adapted from Kropf 2014)

In her PhD thesis titled *Uncommon Ground: Urban Form and Social Territory* (Minoura, 2016), Eva Minoura investigated *the open spaces*, the negotiations between public and private interests, in shared yards of multifamily housing schemes. Her theoretical approach to assessing the spatial yard included developing the generic structure diagram to include this yard. The generic structure diagram presents the voids from private building (rooms) to public street (street spaces), including the open areas relating these two aspects.

In his PhD thesis titled *Urban Form and Mobility Analysis and Information to Catalyse Sustainable Development* (Stojanovski 2019), Todor Stojanovski developed knowledge of *street spaces* into a generic structure diagram. He developed Kropf's void of routes/street spaces into three distinct spaces, namely routes/networks, routes/street spaces, and city block frontage/pertinent strips. This last type of void is closely related to the unit of study in this thesis.

Boundaries between different spaces – Materialised as façades and iconography

Between the spaces (voids) in the generic structure diagram, there are materialised and unmaterialised boundaries. These correspond to physical and social boundaries found in specific examples of the public–private interface, including private space, collective space, and public space (Kropf, 2014, 2017). There are two types of lines between the different voids: solid and dotted. The solid lines correspond to materialised boundaries such as façades with entrance doors or walls, while the dotted lines shows whether the boundary can be materialised.

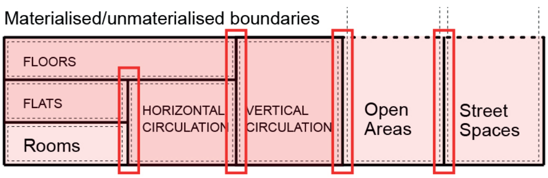


Figure 36
Boundaries between spaces (source: author adapted from Kropf 2014)

Sometimes, boundaries are invisible but comprise legal boundaries between public and private ownership or institutional boundaries between land-use purposes.

The surface of the boundaries between building and street includes visual and permeable connections as well as iconographic solutions. The *façade* of the building is an example of the most important boundaries of the building–street relationship presented in the depth configuration of voids. It is unambiguous and clear and includes the critical capacities of visual and physical permeability. The word façade comes from the French face/façade and addresses the principal front of a building, which faces onto a street or open space. The façade is the negotiator that takes care of the two pairs of capacities, namely *transparent/nontransparent* and *permeable/impermeable*. As such, it is the clearest physical and morphological boundary between inside and outside. Many thinkers and typology makers such as Gehl, Dovey, and Wood have engaged in the boundary of the façade.

Their work is presented in Chapter 5, which reveals a typology. Other important characteristics of a façade include iconographic properties such as colour/material, ornaments, and graffiti. In their seminal work from Las Vegas, Venturi and Brown highlighted the use of ornaments and signs in defining the building–street relationship, addressing high-speed movement corridors. They referred to the contradictions between inside and outside, common in architecture before the modern movement, as 'billboards in space'. They explained this using the example of baroque domes, which work both as symbols and spatial constructions as well as an example of the outside being larger in scale and higher than inside to dominate their urban setting and communicate their symbolic message. Another type of iconographic layer is graffiti. Graffiti adds to urban space by throwing its publicness into contention. Different types of graffiti are mediated by the micro-morphology of the city and become embodied into the urban habitus and field of symbolic capital (Dovey et al. 2017). Scheerlink (2010) defined these iconographic properties as *visual filters,* which work as boundary characteristics in a depth configuration. In addition, he included layers of visual control and surveillance as part of them. Curtains and vegetation define a private visual filter used to change the character of a transparent façade, providing an opportunity for both surveillance and control. The window operates as an exhibition board, a visual filter presenting a display or concealing private goods, including election posters. Visual filter tactics include signs, iconography, visual control, and surveillance (Scheerlinck et al., 2010).

Structural relations across boundaries and space – Linking part to part

The building–street relationship defines a structure transition, an arrangement of and relations between the forms and spaces, between the parts and elements. The structure defines first-order principles, a type of grammar linking various spatial elements together in a system of relations. Three vital terms addressing structure are *depth, topology, and configuration.* Space syntax theory borrows terminology from mathematics and defines this structural transition between public and private as *topological depth (Hiller and Hanson 1994)*. *Topology* defines the way in which constituent parts are interrelated or arranged, and *depth* describes the extent of the parts downwards or inwards *(Van Nes 2008)*. Van Nes and Lopez investigated the characteristics of *topological depth* of the public–private interface and linked this knowledge to societal problems such as crime and crime prevention as well as street liveliness. Hillier and Hanson (1994) argued that too much topological depth can segregate living spaces from public spaces in a way that negatively affects the street space. Topological depth is measured by the number of semi-private and semi-public spaces one must walk through to get from a private space to its public street. This relation has also been expanded through the term *depth configuration* (Scheerlink 2010). This includes the arrangement of parts or elements as a form, figure, or combination defining the configuration of the building–street interface. While *topological depth* only characterises the structural relations and connections between different spaces, Scheerlink's use of *depth configuration* attributed further spatial and territorial characteristics to this relation. In his PhD thesis from 2010, Scheerlink presented depth configurations including territorial layers of public and private spaces with proximity to each other and with boundaries defining territorial, visual, and physical filters in the transition from building to street. He was inspired by John Habraken's concept of territorial depth, a configurational structure including aspects beyond micro-morphology. As such, it complements the generic structure diagram.

Habraken defined the relationship between spaces on opposite sides of boundaries as asymmetric, where one may always exit from bunk bed into bedroom, from bedroom into house, from house into street, and from city into surrounding countryside. However, moving in the reverse direction, one is subject to scrutiny at each door or gate, unable to simply enter whenever one pleases (ibid.).

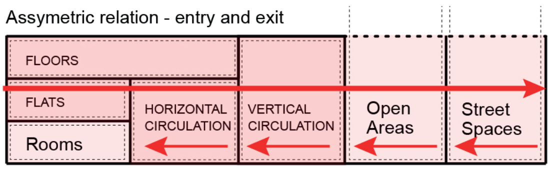


Figure 37 Structural relations across boundaries and spaces - asymmetric relation of entry and exit in territorial depth (source: author adapted from Kropf 2014)

Habraken's term *territorial depth* enhances the idea that each built environment has a specific territorial organisation, a 'live configuration' with various control mechanisms.

Koltsova and Beirao (2014) took Habraken's work of territorial depth further and produced an analytical tool for addressing the correlation between the territorial depth of building entrances and the liveliness of the street. They proposed an approach for measuring the relationship between street life and street configuration by addressing the way in which streets and private spaces connect and how this relationship influences the activity in urban space, similar to the work of Van Nes as well as Hillier and Hanson.

Morphological structure diagram presenting spaces, boundaries, and relations

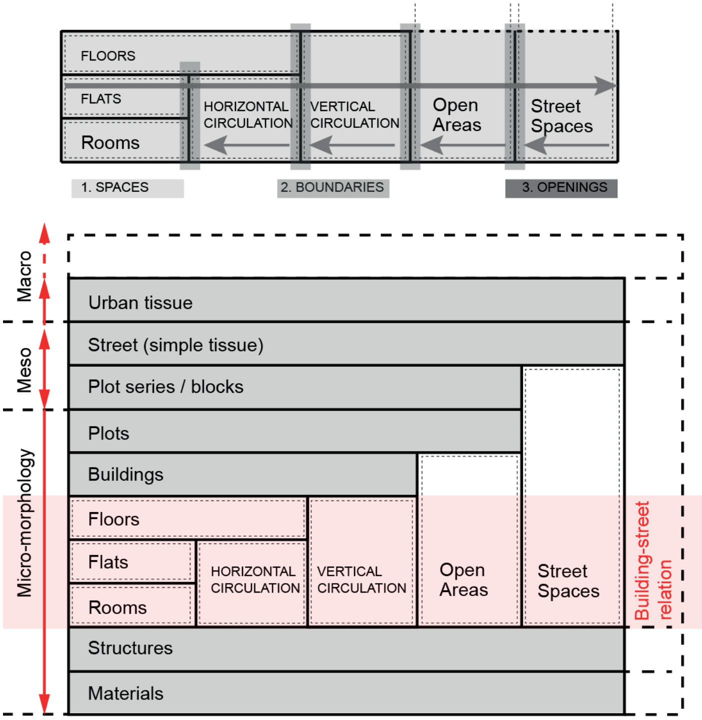


Figure 38
The building street relationship as part of a micro-morphological element in the generic structure diagram of spaces, boundaries and relations (source: author adapted from Kropf 2014)

As Kropf (2014) argued, the diagram allows for a richness of different overlapping sets and includes various ambiguities. The expanded diagram contains an even larger number of ambiguous boundaries. It is in these ambiguous spaces that we need to engage to be able to understand the complexity of the compact city in an informed and systematic manner. The compositional hierarchy is infinitely extensible and there is potentially an unlimited number of levels of configurations as different building types will have morphological varieties and depth. This conceptual diagram can be developed in many ways and provides grounds for a range of research questions.

Research on the physical public–private interface, the building–street relationship, placed as a horizontal cross-section in the micro-morphological part of the generic structure diagram, links horizontal part-to-part relations to vertical part-to-whole compositions. Knowledge about the part-to-part public–private interface includes relations and compositions between solids and voids, rooms and spaces, plots and neighbour plots, and plot and street. In particular, the focus of such knowledge will include the characteristics of the boundaries between these relations. Knowledge about the part-to-whole public–private interface includes its position relative to other elements within a larger structure, from below in the domain of individual parts and from above in the position of the element as a part of the wider composition.

4.3.4 *Meso: The contribution of the building–street relationship to the streets of urban blocks*

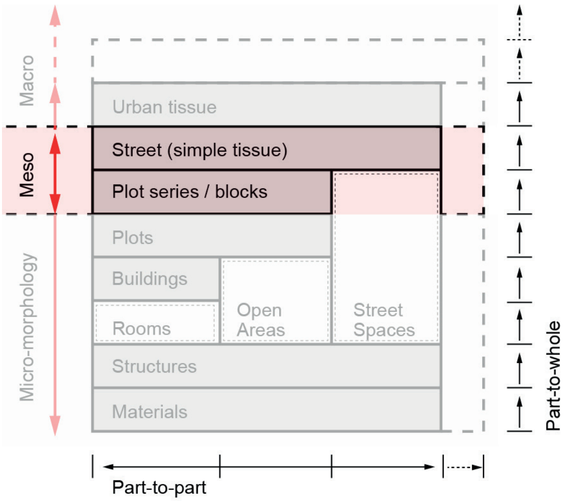


Figure 39 Meso-level in the scalar hierarchy of the structure diagram (source: author adapted from Kropf 2014)

Streets and the urban block comprise the meso-level in the scalar hierarchy presented through the structure diagram. Three core spatial elements are vital at this scale: the spatial relationships within the street as whole, the urban block and plot series framed by street spaces, and the street spaces themselves. The street is vital for micro, meso, and macro scales and has a double function – namely to lead to a building and/or to lead past as part of a higher hierarchy.

Spatial relationships – The street (simple tissue) as a spatial whole

The aggregation and assemblages of building–street relations in a street comprise both part-to-part relations across (opposite) the street and along (next to) the street. Within the field of space syntax, several studies have been conducted on how relationships between different city elements develop and work. Interactive façades as well as physical connection and contact between buildings and public spaces are here referred to *as the constitutedness of the street*, which is a way of defining the street. As previously mentioned, Van Nes and Lopez (2008) investigated the connection between the characteristics of building–street relations and crime in the city from a structural perspective. The morphological focus of their study was defined by buildings' relation to the street network, how entrance doors define the street space, the degree of topological depth from public to private space, and visual contact across the street space. These methods of analysing the spatial relationships between the buildings and the street network are defined through the analytical parameters of *entrance density*, *inter-visibility,* and *constitution*. *Entrance density* (Beirão & Koltsova 2015) or *threshold density* (Palaiologou et al. 2016) and *number of entrances* (van Nes 2008) describe the frequency of entrance doors per street length. There is a clear connection between the number of entrances and the likelihood of someone moving between the building and spaces outside. The more entrances that are connected to a street, the higher the probability that someone will come out from a private space in the building and into the public space in the street. The appearance of this variable is often linked to building traditions between countries. In a typical horizontal building tradition, such as the Norwegian tradition, the entrances from public space to private building are gathered in a few collective entrances, which are again distributed into many individual entrances deep within the building volume. In a vertical building tradition, such as the English and Dutch traditions, the entrances are mainly individual and directly connected to the ground floor. *Inter-visibility* (Van Nes & López 2007; van Nes 2008; Van Nes & López 2010) describes the number of doors that are visible from the doors of the other houses divided by the total number of houses in each street segment, as well as the window and parking spaces visible from the dwellings. It refers to visual observation through building materials and constructions in the building–street relationship. When there are clear visible links and contact between entrance doors and transparent windows within a spatial segment, there is a high degree of inter-visibility. These relations are tied to the way windows and entrances are visible and linked to each other. In a street with good connections between the building and the street space on one side, but few or no connections on the other side, there is a low degree of inter-visibility. Inter-visibility as a capacity in the construction of windows and doors of the building–street relationship can be debated both as a positive aspect, providing social surveillance and safety, as well as a negative aspect, namely overlooking into private property. High inter-visibility from windows and the distribution of burglaries on a street have a strong correlation (Van Nes & López 2010), proving that Jacobs' quote 'eyes on the street' is a vital parameter of city safety. Topics such as private balconies looking into private flats as well as closed curtains on ground floor flats have been debated as a negative result of densification policies (Schmidt 2014). The perception of this issue has an impact on how architects and urban designers understand and define what is a good or decently designed dwelling. This perception is a result of cultural traditions and behaviour, and manifests differently within different contexts. *Constitution* (Van Nes & López 2007; Van Nes & López 2010) defines the street space when a building is directly accessible from the street. This measure captures the adjacency and permeability between buildings and public space (Hillier & Hanson 1984). If the building is directly connected to the street but has no entrances, then it is unconstituted. Constitution addresses the possibility of accessing into/out of a building façade from/to the street. The degree of constitutedness concerns the number of entrances connected to a street divided by the number of buildings located along that street. It depends on the different degrees of adjacency and permeability of buildings to the street. The properties of and implication of these variables play a vital role in the analyses and can help in understanding the relevance or irrelevance for human behaviour by presenting the degrees of probability of desired effects occurring.

The spatial relationships of the street interface comprise the aggregate of building–street and block–street interfaces facing the same street, including both sides of the street and the open space in between (Palaiologou et al. 2016). The early seminal studies on the street interface by Donald Appleyard and Mark Lintell in 1972 linked it with traffic flow, land uses, as well as street width, pavement width, sidewalk width, and average building height (Appleyard & Lintell 1972). As such, structural, spatial, and functional properties represent vital measurements for understanding the street as a spatial whole.

Urban block as systems of relations framed by street spaces

As previously presented, according to Cerda the primary elements of a city are the intervia – the interways defining spaces isolated by ways. As such, Cerda defined the urban block by the capacity of its relation to the urban ways of streets. Conzen presented a similar relational perspective defining street blocks as 'areas within the town plan unoccupied by streets and bounded wholly or in part by street-lines'. This relational aspect of the urban block was further emphasised by Panerai et al. in their book *Urban Form: The Death and Life of the Urban Block* (2014), in which they highlight that

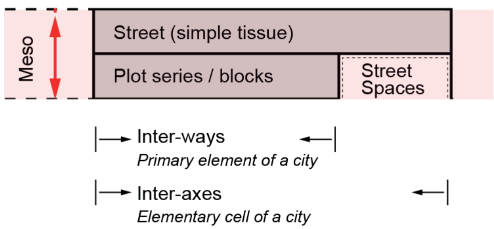


Figure 40
Meso-level in the scalar hierarchy seen in relation to Cerdas concepts of the Inter-ways and the inter-axes (source: author)

> 'the urban block is not an architectural form, but a group of independent build ing plots. It has a proper meaning only when it is in a dialectical relationship with the road network' (Panerai et al. 2004).

They claim that the urban block is not an *a priori* form, but a developing *system* capable of organising parts of the urban territory. The book focuses on investigating the urban tissue as an approach to understanding the complex relationships between plot and built form, between streets and buildings, and between forms and design practice. They connect the production of the urban block closely to interdependent but distinctive plots. These plots provide the basis for a construction process, with a fixed legal and real-estate framework that determines the evolution of buildings and the types of use by the inhabitants.

In both current debates and practice, the urban block is perceived and developed as a whole. Plot parcellation and creation are often defined by the area unoccupied by streets, as one plot and one planning boundary. Panerai et al. claim that thinking of the block as a single whole is to miss the point, reducing it to a homogeneous built-up area surrounding an empty centre. This reductive way of thinking presents a risk of showing only the outward appearance of urbanity without the conditions that allow it to happen:

> 'the dialectical relationship between street and built plots creates the tissue and it is in the continuation of this relationship—capable of modification, extension and the substitution of buildings—where reside the capacity of the city to adapt to the demographic, economic and cultural changes that mark its evolution' (Panerai et al. 2004p 166).

Closed blocks define a clear boundary between private courtyards and public streets, parks, and squares. A dense block where building and street have a strong relationship and dependence on each other provides the basis for transitions that are readable and clear. With the dissolution and disintegration of the block (explained in Chapter 2) comes a number of ambiguities that make the city more difficult to read. The building is separated from the street, public spaces are opened up and made publicly available, and the urban block is changed from having a dependency relationship between buildings and street/infrastructure to being an independent system. New types of transitions emerge, such as from basements to apartments, making the interdependence between the street and the building nonexistent. The transition that remains where the building meets the ground contributes little to the street beyond passing people and cars and leaves a non-area – an edge that is difficult to understand or use.

At the block level, several variables affect the types of transitions that are most commonly used, including *plot structure, building types in the block, entrance types* (related to the building type), and *façade solutions* inside and outside of the quarter and corners. Their definitions are provided in the following paragraphs.

Plot series, structure, and shape: A parent variable is the site structure, including how plots are assembled within the block and which dimensions and width each plot has. This variable plays a crucial role in the type of transition that is natural to use. A long narrow plot will naturally define a type of building, while a large block plot will depend on the design approach. The plot is directly related to the street, and these are clearly related to each other. The plots are interlinked by the streetscape, in which the layout determines the relationship of the site, centre, and capacity for extension. Plot structure, that is, how plots are put together within the quarter and what dimensions and width each plot has, play a role in the type of transition.

Building type: Plot structure and plot form play a role in which building types can be built within the urban block. The different types of buildings will have different shapes, such as slab blocks, tower blocks, or perimeter blocks. Within an urban block, there are a range of building types, from terraced houses to detached and semi-detached houses or townhouses with apartments and maisonettes. Important for understanding the building–street relationship, as seen in the light of the urban block, is to understand the composition and structure built up by collective and individual rooms and buildings. The urban block can consist of a whole range of possible urban form solutions, and it is common that they consist of both collective and individual transitions.

Entrance type: Individual transitions control the relationship between an individual unit or building and the public space. The entrance type is spatially attached to the device and can be designed in many ways. Collective transitions are deeper and more complex transitions from unit/building to street. They arise through a subdivision of the structure within the quarter with a collective zone that acts as an additional layer between the city and unit/building. Collective transitions integrate elements from both the architectural scale and city scale. In a typical Norwegian building, the quarter will consist of a main emphasis of collective transitions – only in a few cases is a residential unit directly connected to the street with its own individual transition. By contrast, in the majority of English and Dutch quarters, we find an overwhelming majority of individual transitions and a high entrance density per unit street segment.

Façade solutions: Another aspect that is typical of transitions in a tight quarter is façade solutions - which are built with a difference between the street façade and the courtyard, thus providing an architectural character inside and outside. I clarify this in the chapter on micromorphology.

4.3.5 *Macro: Contribution of urban structure to the building–street relationship*

The city's overall physical structure consists of a number of streets and urban areas with different hierarchies and positions in relation to each other as well as building mass that fills in between. The position can be described and calculated to better understand what type of building–street relations are more or less suitable. The spatial structure and composition of the street network affect movement patterns and the distribution of shops and functions. To understand the building–street relationship, one must also understand how a street or street segment is related to neighbouring streets or to the city as a whole. Streets that are far from the main streets, the deeper into the structure they are located, are probably more monofunctional and often have residential features. The main streets attract offices, shops, and public buildings, which are often located there.

Within the field of space syntax, several studies have investigated how relationships between various city elements arise as well as what their functions are.

Space syntax includes a set of theories and techniques for analysing spatial connections and contexts. At the macro and city levels, the structure and composition of the street network can be measured using a range of different tools. *Street depth* is a measure of how many times one must change direction to get from a specific street or street segment to the nearest main street. *Street connection* is a measure of the number of connections from a street segment and relates to the possibility of input and output. It provides an indication of possible 'flight routes' from a segment and is a way to quantify the difference between a grid and tree structure (Van Nes & López 2010). *Global integration* is a measure used to study accessibility between the local street for the projects in question and the (closest) main streets. As such, it studies the connectivity between local streets and the main street(s). These measures can be linked to the vitality of streets in terms of functions and facilities for public life and can be used in discussions to characterise what type of urban development the densification projects represent.

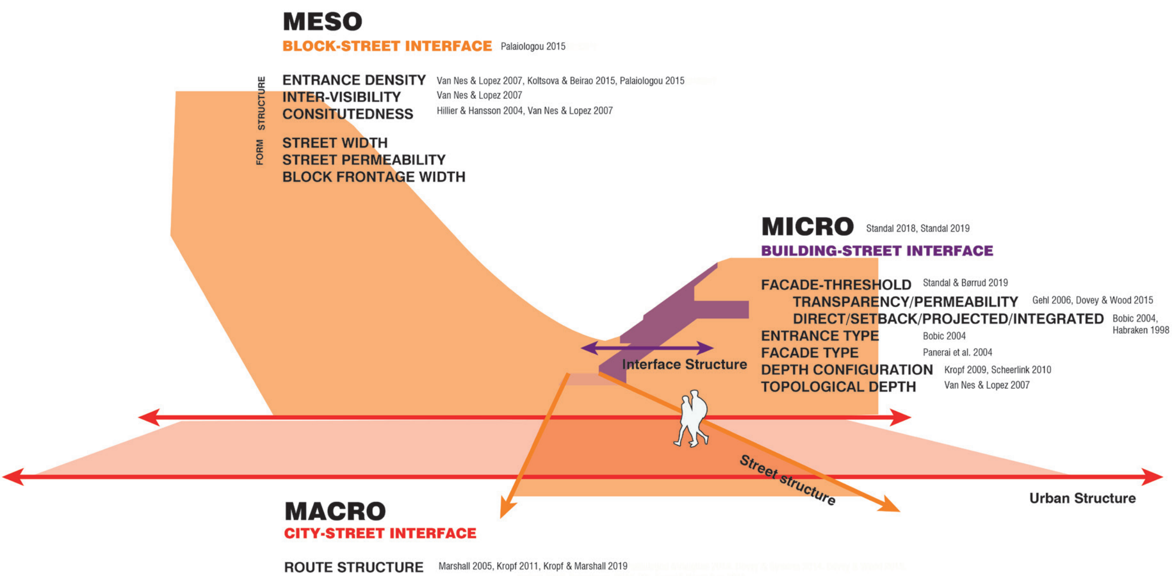
A relevant analytical tool for assessing urban structure is *route structure analysis*, which was presented by Kropf (2011, 2017) and further developed by Kropf and Marshall (ISUF Conference presentation Nicosia 2019). Route structure analysis provides a low-tech, high-intelligence methodology that provides insights into the relationships between route structure, movement, permeability, legibility, character, and growth and for analysing movement. The central principle of the approach is to identify routes in terms of their relation to centres and to other routes, by first identifying centres (service, commercial, port) and then identifying and colour-coding different strategic route types based on their relations to the centre (super-strategic, strategic, semi-strategic, or secondary strategic): thoroughfare routes are connected at each end to different routes, loop routes are connected at each end to the same route, or cul-de-sac routes are connected at one end. Kropf's analytical tool and the hierarchy of types offer an indication of the levels of movement and the likelihood of finding people in different parts of the system. At the strategic level, there is a greater likelihood of finding more people on a primary strategic route than on a semi-strategic one because the primary route connects two centres and the semi-strategic route connects one. Thus, the type of route and their integration determine the probability of people meeting.

4.3.6 *Morphological framework for assessing the building–street relationship*

Figure 41 summarises the various properties and measures presented in this section. A whole range of researchers are emphasised in the matrix, which includes form, scale, and time within the micro, meso, and macro scales.

The contribution of the section also includes a theoretical and analytical framework, which was applied in the case studies of this thesis. The analytical toolset from the published paper and this chapter were also applied in a second conference paper for NAAR, titled *Informing future urban housing through the morphological development of the terraced house with mews*, which discussed the morphological development of the British terraced house with mews from a structural perspective (Standal 2019).

Figure 41 Morphological framework to assess the building-street relationship – properties and measures



4.4 INSTITUTIONAL FRAMEWORK FOR ASSESSING THE BUILDING–STREET RELATIONSHIP – PLANNING INSTRUMENTS

This section presents an overview of the institutional frames relevant in the process of creating the urban form of the building–street relationship within a Norwegian context, including laws and acts, planning, and regulations. It focuses on formal design governance tools, namely the decision frames developed as operative *planning and building instruments*. As such, it does not focus on planning practice or planning culture, power relations, and other societal aspects within the field of planning. This section rather focuses on the *specific frameworks* that define urban form through pre-established decision frames, and the micro-morphology of the building–street relationship. In Chapters 1 and 2, I briefly presented the Norwegian planning system and the history of its development. In this section, I address the various instruments that are relevant for the production of urban form within the Norwegian context, highlighted through the categories of *spaces, boundaries, and relations*, and bring this knowledge into the analysis of the contemporary projects presented in Chapter 7.

Planning and building instruments as formal design governance tools

In Chapter 1, I highlighted the theory of *design governance* (Carmona 2016) as an important decision-making environment that influences how the actual physical design outcome is produced, and as relevant to my approach to the societal constructs of the institutional framework, namely the organisation of city society that affects the physical outcomes of densification strategies (civitas). In his paper titled '*The formal and informal tools of design governance*' (Carmona 2017), Carmona further delves into a typological exploration of the 'tools' of 'design governance'. These formal and informal tools include a range of instruments, approaches, and actions developed as means for shaping processes as well as outcomes in a defined public interest. His design governance toolbox includes the three 'formal' categories of *guidance, incentive, and control* and the five 'informal' categories of *evidence, knowledge, promotion, evaluation, and assistance (ibid)*. As the Norwegian planning and building system is *prescriptive* and under unitary state control, it is relevant to dig into the formal tools based in legislation and their potential link to the morphological output. As such, I present the operational toolset relevant for the outcome of densification strategies.

There is considerable literature on the types of tools already in use, or that can be used, to shape the built environment, whether it is the role of government in influencing the design outcomes, the politics of design regulations, or how land-use regulations shape urban form (Talen 2012). Carmona developed a typology of tools that governments use to shape the built environment (Carmona 2017), which formed an initial understanding of the toolboxes used by public authorities to guide development.

Table x presents an overview of the difference between the Norwegian planning and building system in form of their organisation and by the instruments they apply. It shows the difference of a site-specific zoning plan and the general technical requirements for buildings that every project must fulfil.

4.4.1 *Norwegian decision frames – Planning and building instruments*

Table 1 Difference between planning and building system in form of organisation and instruments applied

	Organisation	Instruments – Formal tools of design governance
Planning system	Top-down hierarchy Site-specific	Planning description Zoning plan; site-specific zoning map (land-use purpose, zone requiring special consideration) Written regulation
Building system	Combined networks Site-unspecific	Performance-based codes Form-based codes Standards of operative requirements Dispensation – the discretionary layer of the building codes

Within the Norwegian context, the zoning plan has regulations that present use, protection, and design or areas and the built environment. It is a context-dependent and site-specific zoning plan *regulated by land-use purpose, zones requiring special consideration, and regulations connected to them*. The base map is the background map that is used as a basis for the plan data. The basic map depicts, among other things, elevation information, place names, and property boundaries from the land. The following two sub-sections explains these two systems and their instruments thoroughly.

4.4.2 *Structure of Norwegian planning instruments – Planning description, zoning plan, and written regulations*

The structure of the Norwegian planning instrument comprises three vital documents relevant for the production of urban form: *the planning description, the zoning plan, and the written regulation*. These three documents work together to regulate the physical outcome of planning intentions. The zoning plan and written regulation are legally binding and the planning description is informative, presenting goals and intentions for the plan. These documents are described in the following sub-sections.

Planning description

The planning description includes the purpose of the plan, its main content, and its effects. All proposals for plans pursuant to the Act shall, by public inspection, have a plan description that describes the plan's purpose, main content, and effects as well as the plan's relationship with frameworks and guidelines that apply to the area.

All zoning plans drawn up under the 2008 PBL shall consist of floor plans, provisions/written regulations, and a plan description. The plan description must be included in the municipality's plan register together with plan maps and regulatory provisions, and it must be updated with regard to the planning solution adopted by the municipal council.

The plan description should describe the plan's objectives, main content, and effects and be adapted to the scope of the individual planning case. In the plan description, the provisions of the plan can be explained, elaborated, and justified. It is therefore important that the description accurately presents the plan proposal and how it changes the plan area and affects the surroundings. To provide the best possible basis for participation and decisions, it is important that the plan description presents all aspects of the plan and correctly describes the plan proposal.

Because the plan description should form the basis for later interpretations of the adopted plan, it is crucial that it provides a comprehensive description of the actual planning solution, which will form the basis for the final plan decision. The plan description must also explain the considerations behind the plan provisions and planning steps to be the basis for interpretation when applying for *a dispensation*. Thus, the plan description must be updated after consultation, public inspection, and subsequent plan treatment to describe the adopted planning solution.

Plan descriptions for regulatory plans should follow a unified main structure and have content that matches their purpose. To fulfil the purpose, the plan description must mention the following:

• The purpose of the plan and the area and properties that it comprises;

• Which overall guidelines apply to the plan area and the current plan status, including the plan's relationship with other plans that apply to the area and whether the plan is in accordance with the overall plans;

• The floor plan with any alternatives;

• The effects of the plan on the plan area and its surroundings, such as children and young people, social security, and natural diversity;

• How the plan should be implemented, including the relationship with sectoral laws.

The plan description should be short and precise to provide better insights for policy makers and others involved as well as to make it easier to process it until it goes to the plan register as part of a fully adopted zoning plan. The plan description must be prepared in writing. Figures, pictures, and illustrations should be included where it makes the production easier. The plan description should have a clear and uniform structure.

Zoning plan

Zoning plan: Zoning is a *set of rules tied to a specific location* (Talen 2012). It potentially includes a range of regulation types such as form and process, but conventionally comprises *use* as its prime topic, which is also the case in Norwegian regulation. The *Norwegian map and planning regulation* (Kart- og planforskriften 2009) defined three main types of mapping tools that affect the development of the zoning plan, two of which are based on spaces, namely land use and zones requiring special consideration. The first type indicates what purpose the land can be used for, while the second type presents capacities of an area, either natural or functional, and contains a restriction or a demand on the potential use of the zone (Ot.prp.nr.32 2008).

In his Master thesis from the Norwegian University of Life Sciences NMBU, planner David Sebastian Belalcazar Calderon (2017) summarised three types of zoning (Calderon 2017): *single-use zoning* (i.e., conventional zoning), *form-based zoning,* and *performance-zoning*. *Single-use zoning* divides different zones in a local municipality into use categories. This zoning type promotes and controls the desired use in the zone and prohibits other forms of use. Single-use zoning is a basic model that has not evolved to create appropriate solutions for the increasing complexity of social, political, and environmental challenges in cities. A range of scholars have pointed to problems including low-density development with a high separation of uses and generators of suburban sprawl with all of its environmental, economic, and social costs (Jacobs 1961). In response, various stakeholders and researchers have promoted the evolution of zoning into a more form-specific approach. The second type of zoning is *form-based zoning.* In recent years, this type has become an alternative to conventional single-use zoning promoting more predictable physical results (Garde & Kim 2017; Talen 2013). Form-based zoning is a regulation that uses physical form rather than land uses as the organising principle for developing codes that are adapted into law. This type of zoning can address the relationship between building façades and the public realm, the form and mass of buildings in relation to one another, and the scale and types of streets and blocks. The tools are both verbal and visual, including diagrams that present relations and types. The codes are *regulatory,* offering another legal tool for enhancing quality in built development. Form-based zoning contrasts with conventional zoning's focus on land uses and control of development intensity through abstract parameters such as FAR (Floor Area Ratio), dwellings per acre, setbacks, and parking ratios. The third zoning type is *performance-zoning,* which is increasingly applied to the public sector as a means of increasing the efficiency and effectiveness of decision making (Baker et al. 2006). The primary objective of performance-based land-use regulation is to tailor land uses to site characteristics. This type of regulation provides for greater discretion in terms of the land-uses allowed while attempting to limit the potential damaging impacts of those land uses through performance criteria.

Urban planner Terje Holsen investigated the development of zoning practice between regulatory zoning and discretionary practice within a Norwegian context (Holsen 2019). He highlighted the discretionary practice and flexible approaches that have recently developed within the traditional (rigid) statutory zoning system and claimed that Norwegian prescriptive zoning today is largely discretionary in character. Holsen highlighted the most common discretionary mechanisms, including conditional/performance zoning, mixed-use development, and form-based zoning. The three aforementioned zoning types are already included in current Norwegian zoning practice. Single-use zoning has developed to include flexibility and mixed-use development; principles of form-based zoning are starting to appear in written regulations; and performance-zoning has developed to include zones requiring special consideration.

Within the zoning plan there are a range of planning instruments available to regulate the site-specific area comprising areas of land-use purpose, zones requiring special consideration, areas of regulation, legal lines and points. These instruments will be described in the following paragraphs.

Areas of land-use purpose: Zoning for land-use purpose is an old tool in the planning of the built environment. The theory of zoning was first presented by Baumeister and Adickes at the German Architectural and Engineering society in 1874, and then two years later in a book by Baumeister (Talen 2012). He traced zoning back to Napoleon's demarcation of three distinct industrial zones bound by protective boundaries. Thus, the first definition and regulation through zoning were by *use.* The next aspect included in zoning regulations was the so-called *bulk-zoning*, which presented two sets of regulation, one for the city and one for the suburbs, and included aspects such as the size and layout of structures, including regulations on open space, lot lines, maximum building height, and maximum floor area ratio.

Land-use purposes are categories that tie up the main features of land use, at both the municipal and zoning levels. The content of the Norwegian zoning plan is characterised through eight statutory categories of land use and the associated zoning provisions (written regulations). It was not until the law of 1924 that

Norway was required to create maps in city plans (Fleischer 1992). Section 24 laid down requirements for city plans to contain floor plans, and Section 25 contained requirements for the map basis including scale and height indication (Building Act 1924, Sections 24 and 25). According to Professor emeritus Fiskaa (2014), the law did not lay down requirements for functional area purposes as we have today, but in the discussion of industrial areas, streets, squares, open spaces, residential houses, and playgrounds, preconditions for later zoning plans were created. It was not until 1965 that Norway received its first system of zoning through the revision of the Building Act. Throughout the 1930s, with functionalism providing a greater impact as ideal in Norway, thoughts about a more systematic zone-divided regulation grew. However, when it was proposed, it was justified by the need for a clearer basis for expropriation (Fiskaa 2014).

The practice of zoning within the Norwegian context has areas defined by land-use purpose. As such, it must a lesser extent include form-based zoning based on morphological criteria and rather continue the ideals of functional distinction that are more vital in the functionalist ideals. Recently, within compact city centres, there has been an opportunity to regulate the city centre purpose including mixed-use functions, providing flexibility of the plan for discretionary decisions.

*Zones requiring special consideration: T*he zoning instrument '*Hensynssone*' (Zone requiring special consideration) was implemented in the 2008 revision of the Norwegian PBL, and thus, it is a fairly new zoning instrument. There are six main zones for consideration (§11-8), including agriculture, nature, danger areas, technical infrastructure, and areas with certain demands because of special legislation. The zones requiring special consideration are marked as hatches in the masterplan with a text description and written regulations. Multiple zones of consideration can overlap with each other and the land-use purpose of the zoning plan.

Calderon (2017) assessed this zoning tool as a symbol/technique (map/cartography) as offering new functions in zoning plans that affect the implementation of a building application. His study indicated that the tool has precedents in earlier planning legislation and can include a number of planning functions and ambiguities. He sorted the six different zones into two main categories: consideration zones as *substantial control* and consideration zones as *procedural control.* Consideration zones with *substantial control* aim to achieve *specific results*. To do so, they impose different forms of land use restrictions regardless of land use. These restrictions have a longer history in the Norwegian planning legislation, especially those related to safety, noise, and danger zones.* Consideration zones with *procedural control* aim to facilitate further planning processes and to coordinate the legal planning system. Several new functions in the 2008 PBL are linked to such procedures: zones with restrictions pending a decision under the PBL or other laws; zones with requirements for joint planning for several properties, including with special forms of cooperation or ownership as well as transformation and renewal; and zones where the current zoning plan will continue to apply unchanged. A range of performance zones are connected to substantial control, which are directly related to the morphological output of the building–street relationship. These include the consideration of safety, noise, and danger zones as well as infrastructure (free view) and the cultural environment.

*Areas of regulation (Bestemmelsesområde****):*** If the municipality chooses to limit the use of performance zones, considerations and restrictions can still be safeguarded. This can be achieved through the tool *areas of regulation* including further provisions for the defined area purposes or subareas as an alternative to the zone of consideration. Thus, this area adds another discretionary layer to the zoning map. This planning tool was introduced in the 2008 PBL and provides the opportunity to regulate overlapping layers, which is relevant for compact city building.

*Legal lines – Purpose and legal boundaries****:*** Information lines and point symbols are part of the legally binding zoning map established though clear drawing rules (Specification for drawing rules 2015). A detailed regulation plan has a range of information lines due to its detailed nature. The legally binding lines include different types of *boundaries*, such as a regulated plot boundary, buildings, planned built form, regulated street patterns, as well as boundaries of area purpose, regulation, protection, or consideration zones and plans. An important principle in the preparation of land-use plans is that purpose boundaries mainly follow property boundaries derived from the land.

One of the more important lines for the production of the building–street relationship is the *building boundary line.* This line demands that buildings shall be placed *within* its boundary. It defines a relation between the line and the built project through its required *distance* to different morphological elements (between development and neighbouring plot boundary or to the midline of the street). Different general distance requirements are defined in both law (Road Act) and technical regulations (TEK) as a protective measure; however, zoning plans can define stricter or less strict building boundaries than the legal framework prescribes. At the building permit level, the council can also allow a building to be placed closer to the active building boundary if there is consent from the neighbour. However, this can only be done though an application for *dispensation* (explained later in this chapter).

An alternative to the *building boundary* (build within/behind line) is the *building line (build to line* – the mandatory location of the building on the plot*).* The distinction between the *building line and building boundary* has not been clearly emphasised or defined in the Norwegian PBL and they are often used in similar and corresponding manners. The building line as a tool has been taken out of the product specification for plans younger than 1985. The legal building line was operating in older Norwegian planning tools before the 1965 law but was then taken out of the planning instrument toolbox with the implementation of this law. In the preparatory work for the 1965 law (Ot.prp.nr.1 1964-65), we find a reason for this change in the law; specifically, there was an aim to correspond to the terminology used in the new *Road Act* at the time. The Heiberg Committee (responsible for the preparatory work) used the term '*byggelinje' (building line)* in their suggestions for the new 1965 Act, but this was changed to *byggegrense (building boundary)* by the government, a change addressed as an *editorial change*. I suggest that this (suggested editorial) change presents a *radical transformation* of a planning instrument that was particularly effective at addressing compact city building. Tiesdell and Adams (2011) presented such a build-to-line tool as a positive design regulatory instrument based on the predictability that it offers to urban form development. They made a distinction between this and *negative design regulatory instruments*, where the tool does not predict urban form. They exemplified this with the two types of building boundaries connected to the build-to line and build-behind line. The build-to line is an important feature in the development of form-based codes for compact city building. It provides the opportunity to control how buildings frame the street. Instead of having setback requirements (using the build-behind lines tool), which make it more difficult to frame the street, the build-to line presents the reverse: a requirement for the building to be close to the right of way. The build-to line tool addresses the street/right of way as something positive where buildings and space are related, whereas the build-behind line tool can address the street as restrictions and problems that the buildings must move away from (i.e., noise and pollution). Over the last years, there has been a revival of the building line in planning; however, it has been removed from legislation. The practice of this tool is still addressed through current planning documents without much consideration for what it comprises or its potential.

Table x sums up and presents the difference between the legal lines *building boundary* and *building line* in terms of their legal definition of buildings in relation to the line and as tool for protection or inclusion.

Table 2 Difference between the building boundary and building line

Build-behind line (Building boundary)	**Build-to line (Building line)**
Buildings placed within its boundary	Buildings placed in line – mandatory location of building on the plot
Protective tool – addresses restrictions and problems that the building must move away from (e.g., noise, traffic, pollution, and fire)	Inclusive tool – addresses relations between building and street
Unpredictable outcome	Predictable outcome

Points: The last type of operative drawing tool in zoning plans is legal points. Legal points in the plan include the following types: road closure, closure of the exit, exit, user, and tunnel opening, which are only included in the legal part of the zoning plan if legal bindings can be determined. A later amendment will require treatment as a minor change in planning and another political process.

Written regulations

Another vital decision framework in the Norwegian planning system is the *legal written regulations*, which complement and add aspects to the zoning plan. The provisions that can be included in the written regulations, in addition to further expanding the zoning plan, are comprehensive. Paragraph 12-7 in the PBL presents, through 14 different points, various provisions concerning land-use objectives and zones requiring special consideration that can be included in such regulations. A few of them concern processual demands that can be included in the implementation of the plan. Approximately half of these present provisions that are relevant for addressing the building–street relationship. A great opportunity exists for regulating the building–street relationship through these existing provisions. However, the only time the building–street relationship is explicitly defined is in the provisions on conserving the value of buildings through protection. Design is explicitly explained through aesthetic requirements, as opposed to through a range of other critical architectural provisions such as structure. The most specific provision that addresses structure is accessibility (and universal design). Connected to this provision are traffic management and parking coverage. An important provision for the building–street relationship, or the public–private interface, is the opportunity to define public or common areas. This can be vital for the management and economy of frontage, and therefore, can affect building–street relations in vital ways.

4.4.3 *The structure of Norwegian building instruments, codes, and incentives*

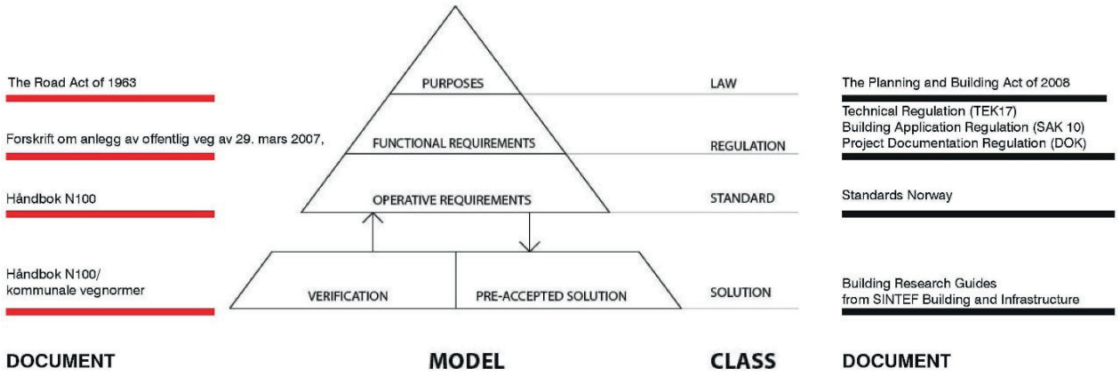
Context-independent building instruments are also relevant for the decision frames of urban design. The structure of Norwegian building codes forms a hierarchical system in which the *PBL together with the Road Act* represent the highest point of the hierarchy. This level focuses on determining the *goals and purposes* for the development and production of the built environment.

The technical regulation of buildings, roads, building application procedures, and building document procedures forms the second step of the hierarchy. Qualitatively expressed *functional requirements* for achieving the main goals for buildings and outdoor spaces are defined in this regulation. The functional demands establish and highlight minimum standards for finished building projects. This is the most powerful regulatory measure for ensuring adherence to building codes. It is a performance-based tool based on the requirements for the building/form to fulfil, but it does not generally specify its physical solutions. Prescriptive codes, on the other hand, would describe how the building is designed and constructed but not how it is used. In Norway, the system of building codes changed from a prescriptive to a performance-based system in 1997. The motive for this change was to stimulate an increase in the quality of buildings and a reduction of building defects. This transition has increased the demand for operational standards and design guidelines for technical and material aspects of buildings (Skatland 2018).

The third level down establishes standards of operative and physical requirements based on the functional demands that can be considered for detailed technical solutions for different constructions, structures, and materials. This can either be done through pre-accepted solutions in the standards and building research guides or as new solutions that require verification. While Figure x presents and describes a theoretical distinction between the levels, the different levels are in reality often mixed. We sometimes find operative requirements in the Act itself or in the technical requirement; however, these operative requirements will, when implemented, define a dissolved urban form of buildings separated from buildings and streets.

In addition to these building codes, there is an extensive network of legislative and guidance documents within the Norwegian system, covering the whole system of physical planning and politically decided land-use/zoning plans. These documents lie outside the scope of investigation in this thesis, but relevant ones are addressed in the investigation of contemporary projects in Chapter 7. The scope of the analysis comprises the two top levels, goals and purposes in the acts, and

Figure 42
The structure of the Norwegian building codes – model adapted from Skatland et.al (2018)



their functional (and sometimes operative) requirements for the production of the building–street relationship.

4.4.4 *Dispensation – The discretionary layer of building codes*

A vital regulatory instrument at the building control level is the right to give dispensation from law or plans (§19-2 in the PBL). This instrument is regarded as a practical tool for implementing development in the split between wide plans of a more general character and specific projects that are more complex and nuanced. A dispensation from the legally adopted plan requires reasoned application. Neighbours of the building project shall be notified and regional and national government authorities whose field of responsibility is directly affected shall have the opportunity to express their views before dispensation is granted from plans, planning requirements, and prohibition. Two main conditions must be fulfilled if dispensation can be granted: the *considerations* behind the regulations (both in law and plan) and the *consideration* in the main purpose of the law. In addition, the benefits of granting an exemption must clearly be greater than the disadvantages after an overall assessment. It is central to evaluate the tool as a control agent in relation to control in planning. This tool provides opportunities for administration, politicians, and lawyers to use discretionary assessment in project implementation. The practice of the tool demonstrates advantages such as viable project development, and often works as a precondition for good project results. Its disadvantages include its high cost, long time-frame, and low predictability of the results (Moen 2015). The aim of the legislator is to provide the opportunity for exceptions when project developments depend on small adjustments in the prescriptive system. However, my professional experience as a planner and case officer suggests a practical use that implies a more general validation of the tool. This assumption can be supported by examining several building application processes of contemporary projects (see Chapter 7).

The scope and opportunity for establishing decision frames for development are much greater in the planning process than in the building implementation process. While planning processes involve and include a range of different actors at the local, regional, and state levels, the building implementation process only includes the neighbours directly affected by the projects. The opportunity to govern in planning is connected to the comprehensive paragraph 12-7, whereas the opportunity to govern though the building application process is only through legal and planning regulations.

4.5 ANALYTICAL MODEL OF FORM AND PLANNING

Table 3 presents an analytical model for addressing the building-street relationship through form and planning. This model highlights the fundamental elements of every space comprising spaces, boundaries and openings. These elements are addressed through their relevant morphological, territorial and institutional frameworks. Together it presents the framework by which this thesis addresses the different components of urbs and civitas.

Table 3
Analytical model for addressing the building-street relation through form and planning

Building–street relationship	**Spaces**	**Boundaries** **(created by differences between spaces)**	**Openings (relations)**
Morphological	Street spaces Open areas Rooms	Walls Fences Façade/iconography	Doors Gates Windows
Territorial	Public - commons Private	Diffuse or well-delineated Personal space, private home -communal -public	Control and access
Institutional	Land-use purpose	Legal lines and boundaries	Points and arrows

In Chapter 5, I further investigate the morphological and territorial building-street relationship and present the empirical work that developed a typology of building street relationships. This typology serves as terminology for specific morphological types of building-street relationship as well as working as a method for analysing micro-spatial components.

1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025

CONTEXT AND PROBLEM

COMPACT CITY (BUILDING)

model of **sustainable growth** within a **neo-liberalistic economic system** focusing on densification as process and not as result (Børrud 2018) **Policy:** From mid 1990's **urban densification** is regarded as the most **sustainable urban growth strategy** also in Norway (St.meld. no 31 (92-93), no 58 (96-97), no 23 (2001-2002)- **Research:** Densification as output reflected as as a **challenge and a threat** to existing qualities of the built up environment (Guttu &Thorén 1999; Guttu & Schmidt 2008)- benefits focus around **economically viable projects** with good profit margins and an opportunity to **increase sustainable mobility** and **reduce car travel and emissions** (Næss, Tennøy). In addition, **reduction in impact to green areas and biodiversity** and **positive effect concentrating people and activities** (Mouratadis 2018).

OPERATING WITHIN A SYSTEM OF

MARKET-LED DEVELOPMENT

Practice: Market-actors implementing politically desired land-use plans. Includes a **chain of risks** connected to **(remote) location** (Røsnes & Storflor 2009), **(risky) process** (Barlindhaug & Nordahl 2005, Carmona & Tiesdell 2005) and **(repeated) product** (Nordahl 2013). The internal logic of property development becomes an obstacle to structural connections across property borders (Børrud 2005). with a tendency of **playing safe** in the implementation process (Nordahl 2013) building **podium type** urban block (Zurovac 2020) with **introspective cells** and **facades of backside character** contributing to a **fragmented city of an incremental nature** (Børrud 2005).

INCLUDING POSSIBILITIES OF INTERRELATED PROPERTIES in THE URBAN DMA (Dovey & Pavka 2019)

DENSITY

Physical, functional and demographic density demands **morphological** understanding (Børrud & Røsnes 2016), and knowledge of the **constituent parts of the city**, including their relation and structure.(Dovey and Pavka 2014)

MIX

Live, work, visit triangle address the overlapping functions - **relational model** that seeks to understand the urban activities and practices not as **stand-alone functions** but in relation to each other. (Dovey & Pavka 2017)

ACCESSIBILITY

The access networks of the city enable and constrain pedestrian flows and including the **'interface catchment'** defining possibilities of walkability (Pavka & Dovey 2017)

CREATING POSSIBILITIES FOR THE

BUILDING-STREET RELATIONSHIP

WITH

a range of **Morphological capacities** of **form** (Bobic 2004, Samules et. al 2004, Gehl et a. 2006, Zoller 2014, Palaiologou &Vaughan 2014, Dovey & Symons 2014, Dovey & Wood 2015, Kickert 2016, Palaiologou 24016, Wir-Konas& Wook Seo 2017), **structure** (Hillier&Hansson 1986, Hansson 1998, Hansson 2001, Lopez&Van Nes 2007, van Nes 2008, Scheerlink 2010, Koch 2013, Koch 2015, Koltsova, Beirão 2015, de Andrade, Berghauser Pont & Amorim 2018) and **iconography** (Venturi Scott-Brown 1972, Dovey, Wollan, Woodcock 2018) within different **scales** (Kropf 2014) **and time (**van Nes &Lopez 2007, Wir-Konas& Wook Seo 2017) bounded by a **Legal Framework** of **planning system, planning instrument and guidance (**Mac Donald 2003, Zoller 2014) and seen in relation to **Social capacities** as **liveability/ liveliness** (Koltsova, Beirão 2015), **use/activity** (Andersson et.al 1986, Can 2012, Kickert 2014, Palaiologou 2015, Minoura 2016)**, crime** (Newman 1972, van Nes & Lopez 2007) and **perceptive capacities** such as **Experience** (Nooradin 1996) and **Behaviour,** (Hillier&Hansson 1986, Lopez 2003)van Nes, Lopez 2007) and **Territory**(Habraken 1998, Scheerlink 2010, Koltsova, Beirão 2015).

AS PRODUCED, A THESIS FOCUS ON

URBAN FORM

(WHAT) - RELATION

FUNDAMENTAL CELL OF URBANIZATION (Cerda 1869, Caniegga, Hillier & Hansson 1984) as part of a **THE URBAN BLOCK** and within the **GENERIC STRUCTURE DIAGRAM** (Kropf 2014)

within ***Micro scale:*** **Ornaments/Icons** (Venturi Scott-Brown 1972)**, Grafitti** (Dovey, Wollan, Woodcock 2018), **Types of interfaces** (Standal 2017, Dovey & Wood 2015, Bobic 2004), **Entrance type** (Koltsova, Beirão 2015), **Transparency** (van Nes & Lopez 2007), **Permeability, Topological depth** (van Nes & Lopez 2007)

within ***Meso scale:*** **Entrance density** (Palaiologou 2016, Koltsova, Beirão 2015), **Inter-visibility** (van Nes & Lopez 2007), **Constitutedness** (van Nes & Lopez 2007), **Street permeability** (Koltsova &Beirão 2015, Pafka & Dovey 2016)

within ***Macro scale:*** **Route map analysis** (Kropf 2011), **Place syntax method** (Ståhle et.al 2005), **Accessibility of streets** (Oliviera 2013), **Physical distance from other streets (**Koltsova, Beirão 2015)

REGULATION

(HOW) - DECISION FRAMES

within the Norwegian planning and building system (Røsnes & Kule 2010, Falleth 2017, Grønning 2017 conference, unpublished paper, Grønning 2015), a **market-led planning system** (Lind 2002; Maäntysalo 1999) acting as framework for **design governance** (Carmona 2017)

It is consisting of **planning legislation** with operative **zoning instruments in the plan** (Holsen 2019) and **building codes in the technical regulations** (Skatland, Møystad & Lohne 2018, Skatland & Lohne 2016, Stenstad 2014) and with **an international perspective** (Carmona 2016, Heijden, J 2009, Meijer, Visscher & Sheridan 2002) on **rules** (Talen 2012) that affect form. It also includes a planning system with **design regulatory instruments (**Adams and tiesdell 2012) and **design codes** (Carmona 2016) affecting utilization of urban form through building heights and site coverage including **building line (built-to-line)** and **building boundary (built-behind-line).**

DEVELOPMENT

(HOW) - DELIVERY

The real estate development process is a production process that creates the built environment, **within a Norwegian development context** (Nordahl 2013), including the internal logic of **Property development** within **including** a **chain of risks** connected to **(remote) location** (Røsnes & Storflor 2009), **(risky) process** (Barlindhaug & Nordahl 2005, Carmona & Tiesdell 2005) and **(repeated) product** (Nordahl 2013).

The development process includes **Property creation** (Ramsjord 2015) through development of physical property units, by **plot parcelization** (Tiesdell & Adams 2013), **plot amalgamation** and **plot transformation**, and/or rights connected to these (Røsnes 2014) Property, plot, rettigheter og styringsregiment (Kropf 2018)

URBAN MORPHOLOGY - URBAN FORM AND PROCESSES CREATING THIS FORM

Figure 43 Synthesis of literature review for the problem, context of the building -street relatonship addressed through Urban Morphology

FRONTAGE TYPES

Chapter 5 **FRONTAGE TYPES – UNCOVERING THE BUILDING–STREET RELATIONSHIP THROUGH SAMPLING AND CATEGORISATION OF MICRO-MORPHOLOGICAL SOLUTIONS**

This chapter addresses the problem of realising the potential of the urban experience in the details of what we perceive as urban – the relationships between buildings and cityscape, private and public, inside and outside – through urban form in the public–private interface of street frontage. It asks how we can develop a random sampling and categorisation of micro-morphological solutions at street level into fundamental knowledge of an urban typology, which would work as a tool for creating urban form. This chapter presents, develops, and further expands the knowledge that we (my supervisor Elin Børrud and I) published in a conference paper presented at the XXVI International Seminar on Urban Form in Nicosia, titled *The frontage: Uncovering the public-private interface through sampling and categorization of micro-morphological solutions at street level* (Standal & Børrud 2019). It provides a more thorough presentation of the methodology, procedure, and results, including detailed subcategories of the types in addition to the categorisation of types established through directed content analysis. By developing existing theories of interface typology into coding schemes through a process of coding and type and pattern identification, I here present a survey of photographic examples as a basis for refining and extending them, thereby exploring the relationships between defined categories.

‘) Our paper presented at ISUF 2019 (Standal & Børrud 2019) and a raffined Norwegian version in Plan (1/2021) presents an English and a Norwegian summary of the empirical work in this chapter. It presents a new typology and terminology for the transition between public and private., Terminology and language. A main aim for this part of the thesis was to contribute both a typology and present a terminology to fit the Norwegian context.

5.1 **FROM URBAN EXPERIENCE TO URBAN KNOWLEDGE – INTRODUCTION**

This chapter addresses the problem of realising the potential of the urban experience through urban form. With urban experience, we understand the content of what we, with reference to Ildefons Cerda, perceive as the quintessence of urbanisation, that is, the relationship between buildings and streets (Soria y Puig and Serratosa 1999). A common expression in today’s urban planning practice is ‘active façades’, which refers to a lively street and the facilitation of commercial activities. The frontage of a private building faces the public domain, but the public–private interface at street level is much more complex than just openings for commercial activities.

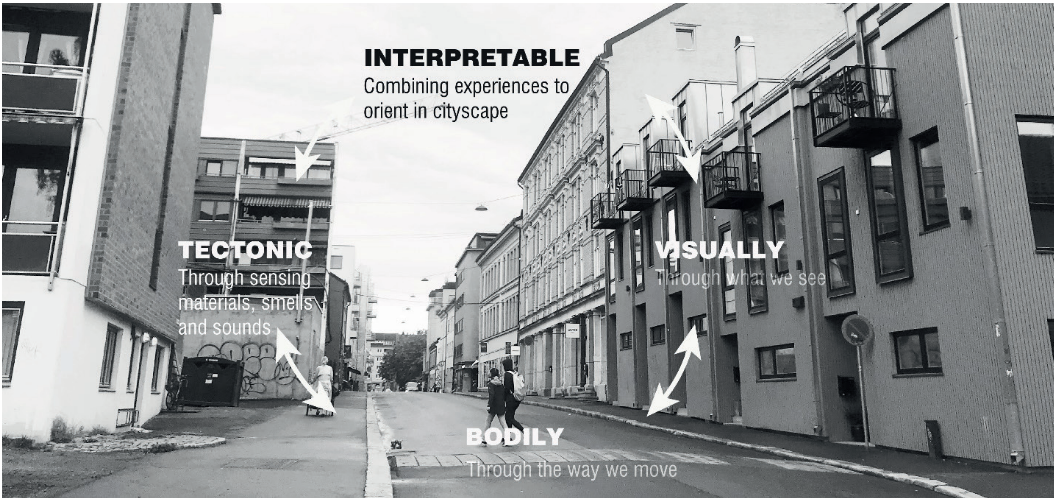


Figure 44 From Urban experience to urban knowledge

Our experience of this particular part of the urban morphology is firstly *visual* – we obtain information through what we see. Furthermore, it is *tectonic* when we sense the materials, smells, and sounds. However, it is also *bodily* through how we move and feel frictions and obstacles, and it is also *interpretable* through how we combine these experiences to orient in the cityscape (Fig. 1). The frontage represents the relationship between buildings and cityscape, a negotiator between private and public urban space, and thus, between inside and outside. Frontages define the street and present possibilities for encounters between different territories – between home and city. These potential connections include dimensions of both a material and a social character.

This chapter discusses this interface as micro-morphological urban types. Therefore, it is not the street frontage as such but rather the making of a typology comprising micro-morphological solutions for the public–private interface that occur at street level, thus becoming foundations of our urban experience. Figure 1 demonstrates how a whole range of micro-morphological solutions in just a small part of the street create the spatial conditions for our experience. This chapter discusses whether it is possible to operationalise urban experience into a tool for current design practice. The research questions that are addressed are as follows:

How can different solutions of the public–private interface at street level be categorised as types and morphological variants? Can we develop a precise concept that describes this micro-morphological part of the city?

5.2 TYPOLOGISATION THROUGH DIRECTED CONTENT ANALYSIS – METHODOLOGY

5.2.1 *Sampling photos and sketching theory*

This empirical component of the PhD thesis developed a new theoretical framework for reading and understanding the building–street relationship. It highlights and answers another aspect of the research question about what the building–street relationship is. The research questions for this chapter were investigated in parallel and along two directions: The first direction was an empirical component comprising photo documentation and sampling of existing examples of this urban element; and the second direction was to conduct a literature review to address how this urban element has been treated in urban design theory and textbooks in urban planning and architecture, with the aim being to find an *operational theory* (Fig. 2). These two components were researched and developed iteratively in a process of self-informing loops.

Based on an analysis of the photos and a critical reading through 'sketching the theories', the photos were sorted, categorised, and viewed in relation to the relevant operational theory. Type development and categorisation were based on an image database of over 3000 picture examples of building–street relations that were randomly sampled, documented, and produced in several cities around the world, where the context was not assigned any significance. We searched for the typical and general, not the site-specific. The operational theory of typologies provided a theoretical framework that directed the research, results, and analysis. The raw data/photos were sorted and interpreted through a systematic process of coding (sketching), sorting, pattern identification (through categorisation), and cataloguing them into processed data. The aim was to refine existing types, develop new types, and reveal a typology. This approach to categorisation can be described as *directed content analysis*, where existing theory helps to establish and identify key concepts or variables as initial coding categories (Riff, Lacy et al. 2006).

5.2.2 *Typologisation – The act of revealing types*

The method for developing types and typologies is situated in the making disciplines of design and architecture, bringing in an understanding of design through diagrammatic reasoning – that is, through drawings and diagrams. This production of spatial knowledge in my thesis involved the diagrammatic development of types produced through relational thinking and drawing, inspired by Australian planner Kim Dovey (Dovey & Ristic 2015). Theories were interpreted and drawn into visual categories as recognised through the analysis of the empirical material. By sorting the material and analysing the characteristics of this material into diagrams of types, a typology was synthesised and developed. This process included activities such as abstraction, connection and systems, and transaction (Basma 2012). As such, the method of creating drawings accompanied the whole process from raw to refined data, which comprised sketching the initial coding scheme, drawing categories, analysing and developing diagram types, and synthesising the typology. While the academic tradition largely produces spatial knowledge through verbal and textual accounts (with images, maps, and diagrams only playing an illustrative role), a few researchers have recently called for a more comprehensive approach, including visual development and reasoning. Dovey and Pavka (2019) suggested that the language of urban thinking also includes knowledge embodied in diagrams and maps central to discourses of spatial knowledge. These diagrams are fundamentally relational rather than reductionist. Revealing general patterns of both sociality and spatiality, they can contribute to the description and development of morphological types connected to urban complexity and urban experience.

Here, it is interesting to address the understanding and act of typologisation and its implications in spatial production. In general, types describe groups of objects, events, or people characterised by a set of criteria, which are different for different people and are dependent on culture and experience (Bobic 2004). Types are things, events, or people organised into classes. More specifically, morphological types describe groups of forms, objects, and structures using the same formal structure (Moneo 1978). The morphological typological process presents the possibility of grouping objects by certain inherent structural similarities and criteria. The idea of a formal structure includes criteria relevant for grouping things, events, or people into classes or categories These criteria can include geometrical, social, physical, and temporal characteristics. Knowledge regarding the type and model includes a history of changing perspectives on typologisation. In his 1978 article, Moneo provided a detailed account of the development of the understanding of type within the fields of architecture and morphology. This account spanned from type being addressed as abstract characterisations and an *a priori form* absolute – as *frozen descriptions of the models* – as a working instrument and as morphological methods of analysis, to an a posteriori operation deducted from reality (Moneo 1978). Moneo's brief historical classification presents a scope that typologisation, typologies, and types can address. Within this scope, there has been opposition to the use of typologies, including the critique of typologies as comprising a 'frozen mechanism' that denies change and emphasises automatic repetition. By contrast, types as diagrams provide a much more dynamic mechanism. A diagrammatic type has, on the one hand, the characteristics of describing, analysing and thinking, but on the other hand it is a way of designing and transforming – it is an active principle that can relate to the site-specific context. Based on history, nature, and use, the type is distinguished from the model, which is seen as the mechanical reproduction of an object. Types express a permanence, in single and unique objects, of features that connect it with the past and act as perpetual recognition of a renewed identification of the condition of the object. As such, typologies of types can develop as well as change generalisations. In addition, typologies can describe as well as help produce a physical environment (Moneo 1978). A typology of the building–street relationship can be used to analyse a site-specific context or act as a general principle for developing a project. Typologies can imply and address both change and transformation.

5.2.3 *Terminology – Developing vague descriptions of a morphological building element*

A main characteristic of the type is that its definition is clearly connected to language. The act of naming an architectural form include a process of typifying (Moneo 1978). As such, language per se implicitly acknowledges the concept of a type. Bobic claimed that type is established when a general agreement about its name is reached and becomes a part of the codified language (Bobic 2004). He exemplified this by highlighting the Dutch term *de stoep* as the margin and borders that indicate culturally specifically words for describing various aspects of morphological elements. A similar description of cultural type is the British English word '*mews'* for street, which morphologically defines a back street within an urban block, yet it was named after a historical event connected to this type, which described houses for birds in the royal stables. Another approach to developing terms and types is through the characteristics of the concept being defined. Conzen applied a specific morphological focus to developing professional concepts through terms and terminology. According to him, terms should present concepts as precisely as possible within the limits of the language. He explored the roots of words and connected them to the core characteristics of the concept that he was describing (Whitehand 2001). Thus, the act of creating terms was dialectically related to the creation of concepts.

The output of the typologisation developed in this chapter includes a diagrammatical understanding of the classified material as well as a new theory. As a result of this process, I suggest a new term to define the specific urban element that includes the aspects revealed through research.

')In the process of developing the typology and terminology presented in this chapter, we have also worked within the Norwegian language aiming to develop a more precise terminology that can be operationalised in practice. This parallel process has presented potential challenges when developing a terminology, as the Norwegian language is lacking words and concepts that are already more thoroughly developed in English. As such, the approach to create new terminology has been inspired by Conzen, aiming to develop the characteristics of the concepts

5.3 **Typologies of the building–street relationship – Operational theory**

Our conference paper titled *The frontage: Uncovering the public-private interface through sampling and categorization of micro-morphological solutions at street level* (Standal and Børrud 2019) provided a brief account of the main sources included in the empirical work relevant for typology creation. In this chapter, I expand and develop this theoretical framework as well as highlight relevant PhD theses that have worked with relevant aspects of typology creation of the building–street relationship. These works are presented in table 4:

Table 4
Literature review of sources relevant for this chapter

Author/Year	Journal/Book/Thesis	Method/Variables	Typology
Milos Bobic (2004)	'Between the edges – Street–building transition as urbanity interface' (Book)	Morphological, social, and psychological analysis	Seven-step typology of permeable interface (40 sub-types) building line
John Habraken (1998)	'The Structure of Ordinary' (Book)	Connecting the interior and exterior – connecting different levels in the spatial hierarchy	Permeable entrances and gates on all scales – in building line/territories
Jan Gehl*, Lotte Johansen Kaefer, and Solvejg Reigstad (2006)	'Close Encounters with buildings' Journal: URBAN DESIGN International (2006) 11, 29–47)	Morphology, psychology, and value assessment: Transparency, activity, diversity, design quality and grain size	Five-step typology from A_soft (social, permeable, active, small grain, good details) to E_hard (asocial, blank, large grain, no details)
Kim Dovey and Stephen Wood (2015)	Public/private urban interfaces: type, adaptation, assemblage (Journal of Urbanism)	Accessible/inaccessible, Direct/setback, Opaque/transparent, Car/pedestrian	Five-step typology focusing on the physical transition zone
T.G. Lopez (2003)	Influence of the Public-Private Border Configuration on Pedestrian Behavior. The Case of the city of Madrid (Thesis)	Rhythm, permeability, and irregularity	Six-step typology – two connected to physical permeability (integration), four connected to visual permeability (transparency)
Conrad Kickert (2014)	Active Centers – Interactive Edges (Thesis)	Combination of function, form, and connotation: ground-floor functions categorised as physical transparency, functional permeability, and connotative hospitality	Four-tier typology of frontage interactivity

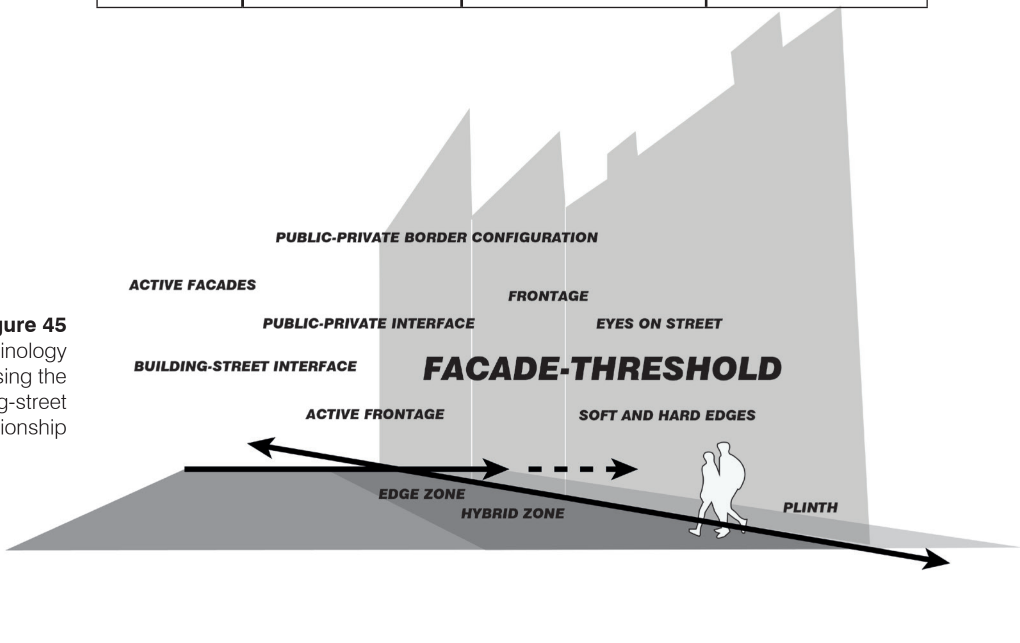


Figure 45
Existing terminology addressing the building-street relationship

The challenge and problem of the building–street relationship as an urban element under investigation lie in it belonging to neither the building nor the street; rather, these two main forms and structures overlap and relate in the urban tissue. As such, it does not include typologies of buildings or typologies of street, but specifically typologies of the relations between buildings and streets – a typology that overlaps these morphological structures.

The literature review (Fig. 2) revealed different typologies that address the micro-element of the building–street relationship, which formed the precedents for this research (Habraken and Teicher 1998, Bobic 2004, Gehl, Kaefer et al. 2006, Dovey and Wood 2015). These included two PhD dissertations that delved into the creation of building–street typology, providing relevant aspects included in the analysis (Kickert 2014; Lopez 2003). In addition to these six typologies, a range of researchers have contributed aspects and elements that can be included in the typologies (Palaiologou 2015; Scheerlinck 2010). I presented a more comprehensive literature review of these sources in Chapter 4.

The four typologies relevant for the direction of this research focus on different aspects of the building–street relationship (Fig.2), presenting opportunities to move through or along the physical boundary of the building wall. The most detailed and thorough typology in the operational theory is described in Milos Bobic's (2004) book *Between the Edges – Street–building transition as urbanity interface'* (Bobic 2004). He defined a typology that focused on the *permeable* link between the house and the street, in the entrance and sequences from public to private. The book offers a detailed characterisation and development of seven main types and 40 sub-types of interfaces. They are based on a mix of

Figure 46
Literature review of the Facade threshold

morphological, social, and psychological analysis; are determined by the way they function; and consist of the distinction between individual and collective interfaces.

Another typology of permeable access was developed by John Habraken in his book *The Structure of the Ordinary* (Habraken and Teicher 1998). He developed a multi-scale typology of entrances and gates on all scales from interiors of rooms of a building up to nations based on how they negotiate movement and flow between different types of social and legal territories. His two main variables in typological development were (1) whether entrances connect interior and exterior and (2) whether they connect different levels in the spatial hierarchy (i.e., the public–private interface).

While Bobic and Habraken were mostly concerned with the permeable movement through the façade, Jan Gehl was mostly concerned with the varying relations between inside and outside the façade (Gehl, Kaefer et al. 2006). His façade typology has had a large influence in the Norwegian practice comprising soft and hard façades as well as the movement along the frontage with varying relations between inside and outside. This design-driven typology mixes aspects of morphology, psychology, and value assessment on different scales in one combined approach, where the building–street interface is classified along a five-step axis from '*A - soft*' (social, permeable, active, small grain, good details) to '*E – hard*' (asocial, blank, large grain, no details). The factors he used to create this typology were transparency, activity, diversity, design quality, and grain size. The typology aims to create attractive streetscapes with life and security, and to eliminate empty, passive, and antisocial façades. Thus, it is normative and defines a diagnosis that can be cured by intervention.

Kim Dovey and Stephen Wood (2015) also developed a five-step typology focusing on the physical transition zone, namely the public–private interface (Dovey and Wood 2015). Their typology includes the legal cadastral boundary, but not the physical building line as included by Bobic, Habraken, and Gehl. Dovey and Wood developed their five-step typology to be purely descriptive rather than normative. They focused on the physical transition zone along the legal cadastral boundary. Thus, their typology differed from the previous typologies. Four different pairs of variables, all of which defined different continuums, formed the basis for their typologies: *Accessible/inaccessible, Direct/setback, Opaque/transparent, and Car/pedestrian.* Within these variables, they presented five fundamental types that all represented different degrees of accessibility and visibility across the interface.

In addition to the four aforementioned published books and scientific papers, we found two relevant PhD research dissertations that delved into the creation of building–street typology. T.G. Lopez's dissertation (2003) examined the influence of public–private permeability on pedestrian behaviour. His investigation of the configuration of the public–private border defined three different variables: rhythm, permeability, and irregularity. These aspects were measured and related to street length. As such, they were all related to the meso-level of the street interface, as presented in Chapter 4. Rhythm deals with the arrangement of building units and is measured by the number of entrances/access points per 100 linear metres of street. Irregularity assesses the configuration of the border space and looks at the relation between the increments of the edge length on the ground floor in relation to the total façade length. Finally, his typology of permeability included six types, two of which were connected to physical permeability (integration) and four were connected to visual permeability (transparency). This typology focuses on the interrelation between public and private spaces and is measured by the weighted average of permeability indexes (Lopez 2003).

Conrad Kickert's doctoral thesis (2014) addressed the organisation of in-between spaces and how they affect social interaction in different urban patterns in the United States and Europe. He created a typology of frontage interactivity based on the combination of function, form, and connotation. He emphasised form and connotations as affordances of function. The categorisation of 16 different ground-floor frontages defined the basis for his typology. These were connected to a typology of frontage interactivity through a study of transactional values, where certain land values were more prone to interact with public space than others. The level of total interactivity consisted of ground-floor functions categorised along the continuums of physical transparency, functional permeability, and connotative hospitality, which consisted of the perceived threshold between a frontage and public space. His research defined four tiers of interactivity from completely transparent, permeable, and hospitable frontages aimed at high traffic (1) to completely opaque, impermeable, and inhospitable frontages with no transparent windows or pedestrian entrances.

In addition to these six typologies, a recent research study from *Wurstenroot Stiftung* (*Wüstenrot Foundation Society of Friends German Home-Ownership Association*) in Germany addressed and analysed the role of the ground floor in a densely built-up area as a connecting element between the urban space and private residential use (Zoller and Wüstenrot 2014). A typological study of the ground floor zone in dense housing developments in Germany and other countries formed the basis of the typology. The researchers addressed the challenge of coordinating specific individual interests in private housing with the conditions and aims of the municipal authorities for safeguarding social infrastructure.

Theories summarised: Bobic and Habraken were most concerned with the boundary configuration, namely the depth of the structure in the boundaries of the threshold, whereas Gehl and Lopez were most concerned with the boundary permeability, presenting different types of visual and permeable relations between inside and outside. For Kickert, function was a prime concern for what he described as transactional values. Dovey and Wood combined the permeability of the façade and the depth of the structure. All of these sources have presented aspects that I included in the iterative coding schemes that were developed in parallel to the photographic survey throughout my research and analysis.

5.4 RESEARCH & ANALYSIS – A MATRIX OF BUILDING–STREET RELATIONS: CONFIGURATION AND PERMEABILITY

The directed content analysis included a seven-step systematic procedure, iteratively developed as new theories and data were brought into the data. This process included the following steps: A – operational theory – creating an initial coding scheme of depth configuration; B – coding and sorting raw data in the initial coding scheme; C – refining the coding scheme based on the processed data; D – operational theory – introducing levels of visual and physical permeability; E – defining the matrix – synthesised knowledge developing types; and F – defining the typology – diagrammatic representation of types for generating an analytical tool. The following subsection presents these procedural steps through the included data; the following section analyses the content of these steps though their main typological characteristics and develops a matrix of building–street relations; and the final section synthesises this knowledge into a typology as well as terminology.

5.4.1 *Procedural steps in the research – Seven steps of analysis*

In step A, I developed a theoretical direction and an initial coding scheme for depth configuration (Figure 47). In this step, the initial coding scheme was developed through diagrammatic development and sketching of the theory. The operational theory provided variables and elements that determined the initial coding schemes as well as the relationships between different types on different scales. The sorting of the photographic data began by focusing on spatial interaction and depth, which was inspired by Bobic's typology of seven main interface types as the most detailed study available (Bobic 2004). Our first exercise in the initial coding development was to draw up the various types from theory as a set of section diagrams – as principles considered in relation to their configuration. This provided the first translation tool for understanding and sorting the various configurations in the next phase. Another part of this drawing exercise was to define precise Norwegian terminology for the different principles.

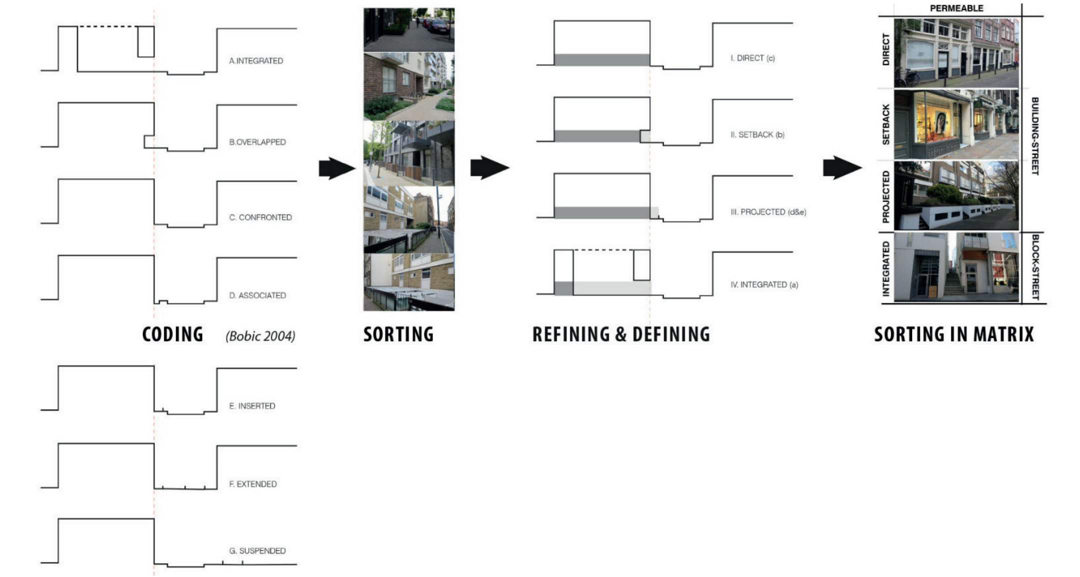


Figure 47
Coding scheme for depth configuration - Process of coding, sorting, refining and defining and sorting in matrix

Step B comprised the coding and sorting of raw data in the initial coding scheme, focusing on the permeable configuration (Figure 48). The raw data included more than 3000 pictures of building–street relations that were randomly sampled, documented, and produced, and then uploaded in a cloud-based image database. The images were named and sorted according to the initial coding scheme directed by the theoretical investigation of Bobic's typology. Two main concerns arose in the sorting procedure: First, the raw data focused on the building–street relationship while the coding-scheme focused on the building–spatial-context relationship. Since this thesis focuses on the urban tissue and its fundamental unit, these could be highlighted as other categories and moved from the coding scheme. The second aspect that arose from sorting the photo material was that different degrees of visual permeability were not included in the initial coding scheme as Bobic's focus included only physical permeability. These two concerns were taken into account in the two next phases by refining the coding scheme based on data and introducing new coding categories that included degrees of visual permeability.

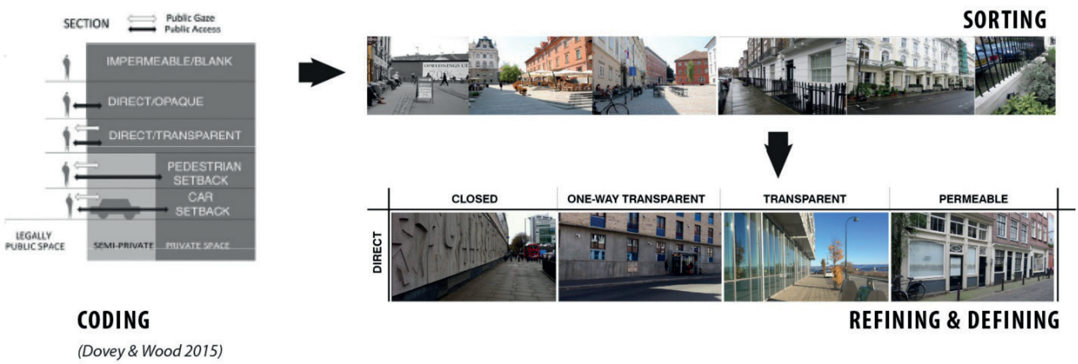


Figure 48
Coding scheme for permeable configuration - Process of coding, sorting, refining and defining and sorting in matrix

Step C refined the coding scheme based on the processed data. As a result of the sorting process, the categories of the permeable building–street interface could be revised and refined into four main categories, namely *direct, setback, projected,* and *integrated* types. Three of these categories operated at the building–street scale, whereas one category operated at the block–street scale and included layers of overlap, which must be considered when using materials and tools other than photographs and a matrix. Some of the examples included spatial contexts other than the street, and this concern was brought into the general theoretical understanding of spatial contexts in this thesis (see Chapter 4). Two of Bobic's typological categories were merged into one morphological type according to their morphological classification of depth and configuration.

Step D introduced and including levels of visual permeability in the process. Different degrees of visual permeability defined an additional part of the coding scheme that was added and included as part of the process. This part of the coding scheme was inspired by Gehl's façade evaluation typology and the five-step typology of Dovey and Wood. The façade is the negotiator that takes care of these two pairs of transparent/nontransparent and permeable/impermeable. This step of the process refined the different façade characteristics into four distinct types, three of which were developed through photos, and two pairs are presented.

In step E, I synthesised the two coding schemes into a matrix presenting depth/configuration and visual permeability (Figure 49). I named these two dimensions *Depth and spatial interaction of the threshold* and *Visual and physical permeability of the façade.* By establishing a matrix that synthesised these two different dimensions, it was possible to provide a combined representation of both depth/configuration and permeability of the threshold and the façade. This matrix also provided the backdrop for establishing a new morphological term for the element that connects buildings and streets. The development of such a term was motivated by the limited vocabulary within the Norwegian context for addressing vague terms such as active façades, edge zones, or hybrid zones. It was developed as a Norwegian term by my supervisor and I with the aim of addressing the two morphological capacities revealed by the matrix in this step as well as presenting a morphologically clear term where vague and woolly terms prevail. We attempted to translate it into English to discuss the well-established term 'frontage' in urban morphology. It is an essential part of the complete transition that contains both depth/threshold categories and façade categories.

In step F, I re-sorted all of the images into the synthesised matrix once more. This final sorting step revealed some interesting findings that were relevant for the selection of cases of contemporary Norwegian projects. First, Norwegian examples of permeable entrances are nearly always placed in the bottom part of the matrix, as part of a block–street interface dependent on collective entrances and deep structures. Another finding confirmed the development of the one-way permanent type; most of the raw data sorted into this category came from the contemporary Norwegian context. The final sorting of data revealed data that were difficult to code into one of the categories. These were highlighted and analysed later to determine if they presented new categories or subcategories of an existing code, but most often they revealed more complex and combined patterns that overlapped with the developed categories.

In step G, I developed a diagrammatic representation of the main principles into types and generated an analytical tool (Figure. The last step in the procedure established a new typology, theory, and analytical model by reducing the main characteristics of multiple visual images into typological diagrams. I drew all of the different types in axonometric sections placed into the matrix and described their main characteristics. Based on two paths of the matrix, I invented a mapping tool that was useful in the morphological characterisation as well as in the later analysis of the contemporary Norwegian projects.

The aforementioned procedural steps have briefly demonstrated the analytical approach in the research, suggesting that the interface relationship occurs in two main dimensions, namely depth and spatial interaction of the threshold and visual and physical permeability of the façade. Each of these dimensions includes four main types with numerous morphological variations. I explain the analysis more thoroughly in the following section.

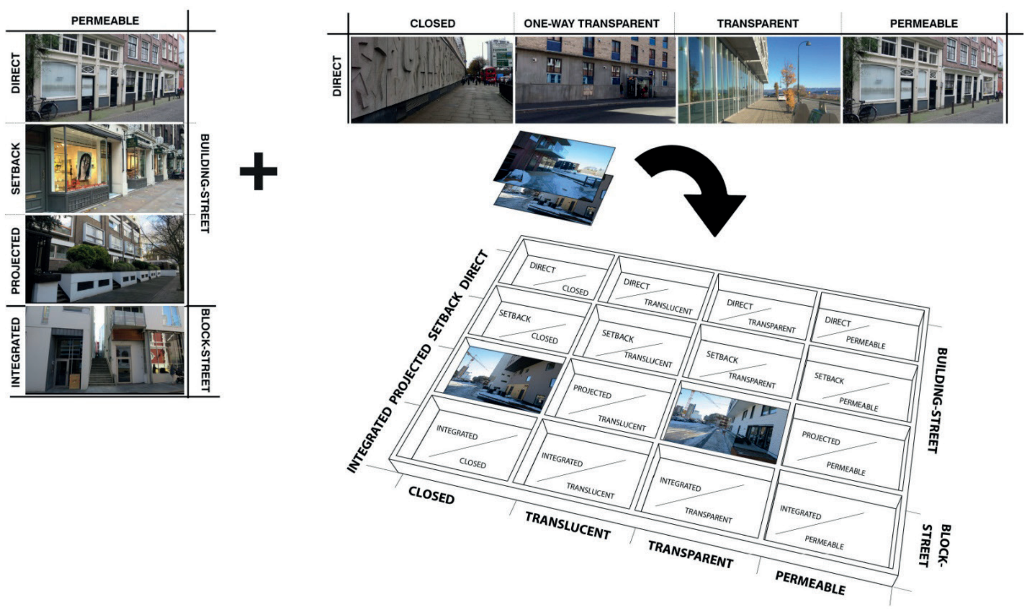


Figure 49
Re-sorting the images into the synthesised matrix

5.4.2 *Depth and spatial interaction of the threshold*

As presented in the procedure, the dimension of *Depth and spatial interaction of the threshold* was a synthesis of the photographic data inspired by Bobic and Habraken and their typologies of permeable entrances. Through the directed content analysis, it became clear that the relational aspect of the physical boundary between inside and outside required a morphologically clear term. The term *depth* presents a universal relation that is not tied clearly into the morphological elements as such. The same applies to the term *configuration*, which also presents the positioning of parts in a relation but does not define an element. We suggest the term *threshold*, presented in the dictionary as 'a point of entry or beginning' and 'a strip of wood or stone forming the bottom of a doorway and crossed in entering a house or room' (Dictionary.com). Thus, the threshold is formed of both a built object and a relation – it is formed of both the spatial element of form and the configuration and spatial interaction through structure. The duality presented in this term highlights the morphological potential of terminology.

This threshold allowed us to address the physical wall through configuration and different steps of depth. It includes either topological and/or territorial steps from the street to the house/flat and from the public to the private. As such, the threshold is directly connected to the structure, syntactical arrangement, and relation between different steps. Within this dimension, and in dialogue with Bobic and Habraken, we developed four main types of depth and spatial interaction that define and present structural connections and configurations between private unit/block and public space, as described through diagrams. These four types include a range of sub-types that present a range of formal types and examples of spatial interaction between form and space. Three of the types operate at the micro-morphological level, describing the transition of the building on its plot in relation to the street (direct, setback, and projected). The last main type operates at the block–street level (integrated) and describes a deeper transition from public to private space. This deep threshold type has numerous sub-types and topological steps, which were investigated further through the structure diagrams of depth configuration developed as part of Chapter 4.

The direct type is the strictest and clearest transition between public and private space without any sort of overlap or spatial transition. The spatial transition consists of the façade only and is therefore dependent on how it links, works, and is physically designed. Building, plot, and territory meet in the same line facing the street directly, thus defining the street physically. The design of the façade determines if the direct type also defines the street visually and structurally.

The setback type (subtraction of building mass/space) includes a zone of overlap

Figure 50 Four main categories of the depth and spatial interaction of the threshold

setback from the building line within the building mass. The setback creates a covered area physically connected to outdoor public space, a space that defines distinct rooms sometimes with specific materiality for the roof, walls, and floor. It also provides a longer façade length and has often been used as an expansion of shop windows on smaller plots. This type presents a visual expansion of the streetscape from the public into the private domain. The physical subtraction of building mass can occur at street level, over- or under-connected by steps. The distinction and demarcation of public and private spaces are not as clear as the previous type because public and private spaces share territories.

The setback type can include a range of sub-types including raised street (e.g., Vika Terrace in Oslo or Chester in the UK), under building (known as part of modernist ideals and removal of the ground floor), colonnade (a classic example known from Greek stoae and antique buildings), carport (open space under buildings for cars, usually in current terrace house development), loggia, alcove (individual entrance in a shallow building recess that creates a distance between public and private space), and niche (a collective transition zone including physical overlaps between public, collective, and private territories).

The projected type (addition of building mass/space) includes a zone of overlap outside the building line. The main building line includes a zone or a margin where building elements (permanent and/or temporary) are added to the line, sometimes within the plot and sometimes outside into the pavement and public space. The elements can be attached to the building in two ways: by a physical projection out towards or into the public pavement (e.g., bay windows) or by a space/element creating a distance between the building and public space within the private plot (e.g., front gardens). The projected type is more complex than the setback, and to a higher degree it is more connected to usage within or outside property – or to building boundaries. It includes the whole span from spontaneous appropriation (though the placement of plants and children's toys) to permanent structures such as steps out into the pavement. Therefore, this type presents ambiguities, including the practice of appropriation as well as legal distinction.

The projected type can include a range of sub-types, including appropriation/furnishing, edging, material change, levels, steps, projection, expanded house, shallow front yard, small front garden, areas, veranda, deep front garden, large garden, and linear buildings.

The integrated type includes several layers of overlap between private building/home/office and public space. This type consists of spatial connections and transitions integrated in and as part of the urban block. It occurs though a subdivision of the urban pattern when public and/or collective space breaks through the urban form of the block. Buildings and entrances relate out and around a surrounded collective space such as an inner street/mews, courtyard, or arcade, which again connects out to the street. The transitions are complex with a range of layers from public and collective to private and can be further investigated through configuration analysis using the developed *generic structure diagram* (see Chapter 4) and topological investigations through topological depth (van Nes 2008). It is a very common type within the Norwegian context, often presenting collective permeable entrances towards the street. The streetscape is still largely defined by the building line, but the private space is much further removed.

The integrated type can include a range of sub-types including the court, courtyard, side yard, or entrance patio as well as the backstreet, inner street, or side street. The investigation of this deep structure can also include the collective transition within the building such as vertical and horizontal circulation, which was more thoroughly addressed through the development of the generic structure diagram in Chapter 4. The courtyard configuration is very familiar within a Norwegian context, developed through the perimeter block or large court block. This type includes a room on the ground or above a parking level that is embraced and defined by buildings, creating an enclosed space that is either open/accessible or closed with gates. The side yards are familiar in typologies of different types of terraced housing with examples in Holland or as part of the x house in Argentina. The court consists of an area that opens towards one side of the street and next to buildings. It works as a visual and physical expansion of the streetscape. The entrance patio is an open inner courtyard. Backstreets are familiar in the typical British mews street defined by low-rise, high-density terraced houses within an existing urban block accessed through either gates, entryways, or alleyways. The inner street (known as an arcade) is a covered street included within the buildings of an urban block. It connects larger streets within the urban structure with an inner connection. Sometimes it is a passageway with a window roof to provide light to the inner street, while sometimes it acts as a sort of tunnel through a building. Examples of this type can be found in a range of cities worldwide, including Oslo (e.g., in Folketeaterpassasjen). Side streets are similar to inner streets, breaking through an urban block through an alley under and between buildings that form a block. This type occurs quite widely for many reasons, in coastal cities in smuggler zones and in urban spaces for x, and creates informal collective structures that work as an extra access point across urban structures.

5.4.3 *Visual and physical permeability of the façade*

The process of refining the photos revealed different degrees of visual and physical permeability that could not be included in the dimensions of depth and spatial interaction of physically permeable interfaces. Thus, these different an additional dimension was added to the analytical process, namely that of visual and physical permeability of the façade, which was developed as a synthesis of the photographic data inspired by Gehl's typology of soft and hard façades and Dovey and Wood's typology for the public–private interface. We present this dimension and transition between inside and outside through the term façades, presented in the dictionary as 'the front of a building' and with its origin in the Latin facia, meaning 'face'. The transparency and permeability of the façade includes different degrees of contact between the street and the house/flat – and thus between the public and the private. As such, the façade is directly connected to the material performance of the façade and its form, components, and properties, and thus, to the capacity to create relations through visual and bodily senses. The façade is the negotiator that takes care of the two pairs of capacities, namely transparent/nontransparent and permeable/impermeable. Thus, it is the clearest physical and morphological boundary between inside and outside.

Through the directed content analysis, we developed four distinct types of façade characteristics with different capacities and degrees of permeability. These four main types within the dimension defined and presented visual and physical degrees of connection between the private unit/block and public space, which were described through diagrams. These four types were *permeable, one-way permeable, transparent, and closed.* The nontransparent and impermeable types were sorted under the same category, namely the closed type. However, the data sorting revealed a specific type exemplified through the contemporary Norwegian examples, namely *the one-way permeable type.* The fourth type presents a one-sided relation from the inside to the outside, either as transparency or as permeability. This type was not addressed through operational theory or the synthesised coding schemes, and thus, it was a finding that was highly relevant for the later analysis of contemporary Norwegian projects.

The closed type of façade exhibits no visual or physical relation between the inside or outside. As such, it has no capacity for transition but can include tectonic experience through rich material details and/or iconographic elements such as graffiti or ornamentation. This type of façade could be interpreted as being unable to support urbanity; however, we present this type as engaging a different capacity of socio-spatial relation. Thus, the properties that this morphological type presents needed to be thoroughly investigated to address the rich variety of urban experiences that urbanity presents. The opaque window is a type of closed

Figure 51
Four main categories of the visual and physical permeability of the facade

translucent façade defining the transition between the closed and the next main type, namely the transparent type.

The transparent type of façade creates visually accessible openings between inside and outside. This type includes a range of transparent elements, from a small window to a whole glass façade, presenting various possible connections and degrees of visual permeability. The properties of this type include the capacity for relating the inner life of a building with the public life of the street. Visual interaction and visibility are vital parts of this type.

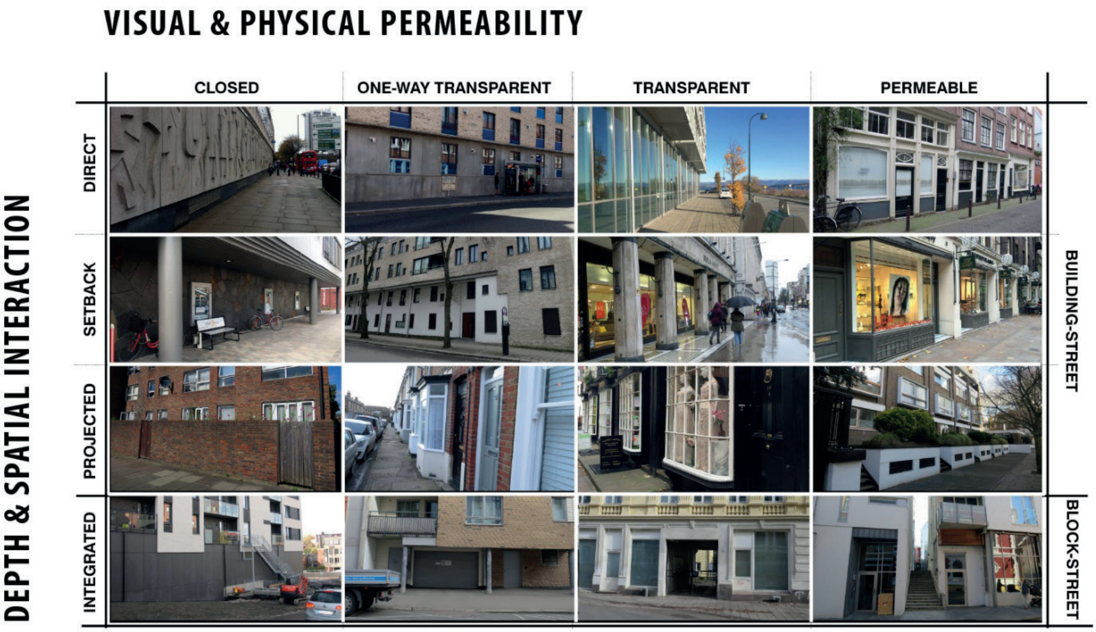
The permeable type includes physical openings in the façade between inside and outside. There are a range of possibilities within this category that we experience when moving along the street. For example, we can measure the density of permeable physical openings, the entrance density, by counting the number of doors per street length to find the index of permeability along the street (Palaiologou, Griffiths et al. 2016). Such knowledge presents a probability of socio-spatial encounters. In addition, counting transparent and permeable types on both sides and across the street presents degrees of inter-visibility, which is a relevant capacity for experiencing safety and control (van Nes 2008). Morphological traditions in different countries exhibit different approaches to the connective element of the building–street interface. In Norway, the connective element is often included in and as part of the buildings and flats, which are stacked on top of each other. By contrast, in terraced houses in England, the connective element relates to the outdoor street where housing is stacked next to each other. Therefore, the different permeable types are collective in the first example and individual in the second example, presenting higher inter-visibility as well as a higher entrance density.

The one-way permeable/transparent type presents one visual or physical relation from inside to outside – from private dwelling out into public space – and works as a way to secure private interests. This relation becomes physical through materiality, as a window with properties defining one relation known from interview rooms, or through the use of different floor levels and/or indoor furnishings such as curtains and plants. It is a very common method of securing private interest in the Norwegian context when built form fails to address the territorial transition between public and private interests. The one-way permeable type is common in a range of current Norwegian urban projects where balconies of flats are designed in the same manner as further up, thereby not making use of the potential to connect elements in a two-way relation that the ground-floor level provides. The presented examples are from recent projects in Sørenga, Oslo.

5.5 TYPOLOGY: THE FAÇADE THRESHOLD

5.5.1 *Defining the typology of the façade threshold*

In our conference paper, we suggested that the two main dimensions and their main types can be presented in a matrix of types, which refers to a combined and synthesised representation of relations. This matrix included not only the physical boundary that defines inside and outside (façade) but also the configuration of space that moves this boundary in or out of the building line (threshold). As such, it linked various theoretical perspectives into one combined and comprehensive approach, defining 16 unique types including both façades and thresholds. The linkage we addressed through the development of the matrix offers a new, combined, and precise concept describing this micro-morphological part of the city.



We defined this concept of interrelating types as the *façade threshold*. This term was developed to be able to precisely address the two main dimensions of interface relationships that our research revealed. In addition, it links form with structure, objects, and relations. The term includes and develops the dimensions of the established *Conzenian* terminology of frontage and advances the more general term of public–private interfaces into a morphologically clear and comprehensive proposition. The concept of façade threshold provides a substantial alternative to the rather vague terminology of active frontages/active façades that currently dominate, particularly in the Norwegian context.

Figure 52 Matrix of the two core capacities of the Facade-threshold: Depth and spatial interaction as well as visual and physical permeability

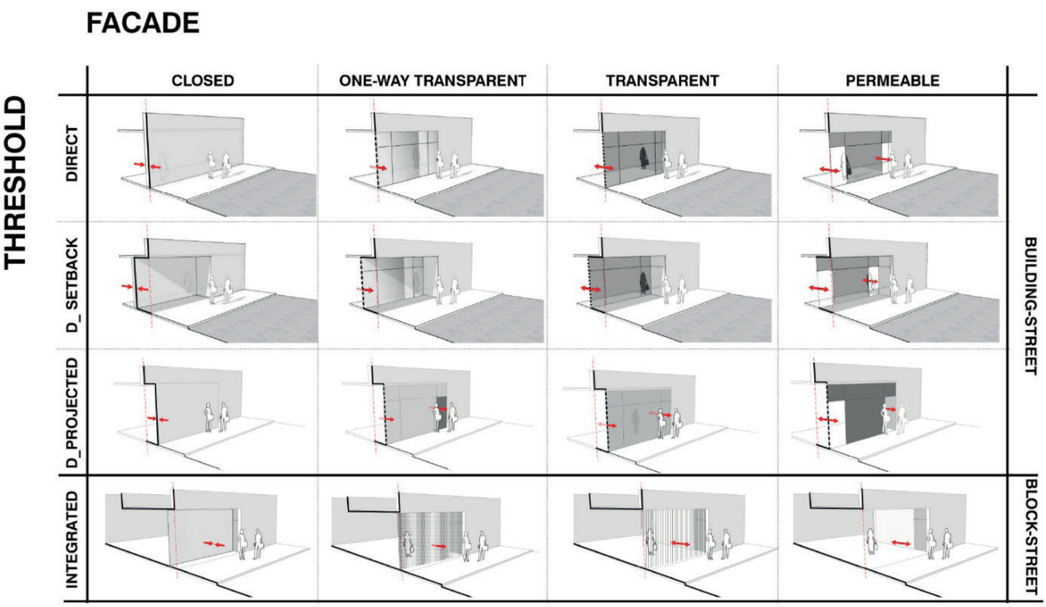
5.6 SUMMARISED DISCUSSION AND CONCLUSION

The final step in the content analysis was to reduce the sorted and categorised images into typological diagrams. We drew the main characteristics of the photographs into different types as perspective sections and placed them in the matrix of categories. This typological process reduced the different photographs to various patterns, which were highlighted as subcategories. Finally, we refined and synthesised the characteristics into main types of relations, that is, into a range of façade thresholds. The process of categorisation and type creation enabled us to understand the complexity of the streetscape as an unlimited combination of variations within 16 main types of building–street relations. The façade threshold as a concept enabled us to focus directly on design solutions for that particular urban element, thus breaking down the strong boundary between building design and urban design.

We established the typology of façade thresholds as presented in the matrix of interdependent relations and presented it in a catalogue of interface types that provides defined morphological knowledge. The matrix of typologies could be used as a part of our mapping/analysis, part of our presentation, or part of our thinking (conceptual); that is, it provided a way to see, present, and understand the world. The categories of typological variations of public–private not only displays the range of possible solutions but also the hidden complexity in urban development. The public–private interface is not alike all over but addresses various questions about property rights and overlapping spatial use and ownership, and thus, several dissimilar economical commitments and opportunities.

The aim of this chapter has been to problematise the urban experience of walking in a city and to contribute to the development of better design solutions through an understanding of the influence of urban micro-morphology. Our experience of how walkable a city is relates to the building–street relationship. In new project developments, infill, or larger building structures, there are often demands for achieving qualities described through the vague terminology of *active façades*. This term aims to give form an agency without being able to clearly define the characteristics that comprise it. The value-loaded term presents expectations of a future lively streetscape where buildings are developed through the intention of *'eyes on streets',* which is known from Jacobs' seminal work. We introduced the façade threshold as an urban element with its own characteristics, agency, and value, arguing that it presents the first step in developing a more precise and focused discussion on how to secure this character and quality in both the building design process and the urban design and planning process. The term also

Figure 53
Typology of Facade Threshold



presents an opportunity for making complex relations manifest in types and a typology, which again can help in developing legislation and regulation that affect planning and implementation and the link between them. In addition, it can help in understanding the rights connected to both objects (land/buildings/facades) and relations (access, territory, threshold).

This research has presented interface relationships comprising two main dimensions, namely the depth and spatial interaction of the threshold and the visual and physical permeability of the façade, each of which include four main categories with variations. We defined this as the façade threshold through a matrix of interdependent relations with interface types that provide a defined knowledge of this relationship, which could contribute to the understanding and development of better design solutions where urban micro-morphology influences our urban experience. We suggest that the typology and terminology developed through this research can operationalise solutions that present favourable conditions for urban experience. The façade threshold belongs neither to the building nor the street, but to the city and – following Cerda – an element that might be understood as the quintessence of urbanisation.

This investigation provided a new terminology and typology for characterising and reading the morphological types of the building street interface. In addition, it provided grounds for a mapping tool based on empirical investigation and that is applicable in frontage-type analysis, which was relevant in the case studies. Specifically, the 16-field typology matrix was converted into a mapping tool to be used in the analysis of case examples.

The output of the research was a typology of morphological building–street interfaces, which aims to succinctly describe and analyse the urban context. Another aim for this component was to develop precise Norwegian terminology for the different types of building–street relationship; thus, we sought to develop a descriptive catalogue without adding value to the different morphological variants of the transition.

In Chapter 6, I dig deeper into the assessment of the Norwegian building codes, presenting fundamental aspects of lost knowledge and the legislative framework as well as defining a methodology for assessing written sources of regulation through morphology and modality.

FRONTAGE RULES

Chapter 6 FRONTAGE RULES – SOCIETAL IDEAS OF LEGAL REGULATION AFFECTING THE BUILDING–STREET RELATIONSHIP

This chapter develops and further expands the knowledge presented in a conference paper presented at the XXVI International Seminar on Urban Form in Nicosia, titled *Frontage rules: How societal ideas of legal regulation affect micro-morphological solutions at street level* (Standal 2019). It includes a thorough presentation of the methodology, procedure, and results. A part of the paper formed the foundation for the content presented in Chapter 2, emphasising the historical development of the legal framework seen in relation to an analysis of the morphological output of the Norwegian urban block, exemplified though six different block types in Oslo.

Three main sources inspired the contextual background of this chapter. First, as an overall perspective on the relation between rules and form, Emily Talen's book *City Rules* provided insights into both planning and building rules within an international context. Second, *August Røsnes* provided a framework for addressing the Norwegian planning system and its instruments. Finally, *Jørgen Skatland's* articles addressing the Norwegian building codes as societal consensus and his methodology of regulation modality inspired the research and theory development addressed in this chapter. This approach also defined the method for assessing building regulations in planning documentation.

This chapter researches the descriptions and modalities of the Norwegian building code, addressed through directed content analysis and the morphological structure diagram presented in Chapter 4. Finally, a summary of the chapter is presented, providing knowledge and methods for addressing the case projects investigated in the following chapter (Chapter 7) on the production of the façade threshold.

6.1 DECISION ENVIRONMENTS ESTABLISHED BY SOCIETAL CONSENSUS – INTRODUCTION AND BACKGROUND

Rules, codes, and regulations are social constructs derived from the dynamic relationship between society and the built environment, forming one of the highest levels of societal consensus in the organisation of city society defining decision environments. Tiesdell and Adams included the frameworks of law, planning, and regulation as *decision environments* as well as a type of second-order urban design that occurs before the actual design activity and physical proposal of the urban designer. The decision environments shape designs and development processes by *creating frames for acts* and can heavily influence the direct design and urban form (Tiesdell and Adams 2011).

Embedded in the legal framework, decision environments determine the production of *the façade threshold* (Børrud & Standal 2019) thus creating conditions for urban experience. Planning and design regulations are tools devised to guide development and to achieve the desired results.

In Chapter 2, I presented and explained the development of the Norwegian planning laws through a historical account and background research. In this chapter, I address the same legal frameworks through their *written regulations*, addressing them as empirical data to select, code, sort, and analyse using diagrammatic tools such as a matrix and timelines. As such, this section explores the nature of the relationship between built form and regulatory development, as assessed through the Norwegian building codes. This investigation is based on the development of the Norwegian regulatory system over the last century, through the PBL and related technical regulations. These are analysed using assemblage theory and conventional content analysis, exploring the following two dimensions in the legal text:

What: a description of the micro-morphology of the façade-threshold

How: the modality/strength of recommendation (degree of enforcement)

The chronological development of regulations affecting the façade threshold formed the basis for the analysis. It revealed an early focus on the urban frontage as a priority, which reduces over time as both a regulatory and societal concern and informs the societal ideas and concerns that determine today's urban form. The history of legislation, rules, and codes and their morphological outputs has been reflected on in a range of research addressing rules (Talen 2012), laws, and technical regulations (Lai 1988; Skatland & Lohne 2016) within the building control (Punter 1986; Punter 1987; Punter 2004; Punter 2010) and Norwegian planning history (Grønning 2017; Ridderstrøm 2015), whereas morphological changes of urban form have been investigated through morphological (Panerai, Castex et al. 2004, Sonne 2009) and syntactical (Hanson 2000) patterns of transformation. Lai's early book titled *Law in urban design and planning: the invisible web* explores the determinative effect of law on the design and social quality of the built urban environment (Lai 1988). He presents ... When the book was first published in 1988, little research existed on this relationship from the perspective of the architectural outputs that it created, but rather as purely legal ideas. Since then and in recent years, the attention paid to this relationship has increased. American planner Emily Talen is one of the crucial contributors to this topic. She combined morphological results and legal ideas, connecting the effect of rules on urban form as a type of social history where rules reflect values embedded in the legal framework (Talen 2012). She highlighted that the assemblage of rules, modest in their individual capacity, presents physical outcomes that affect patterns and forms explicitly and directly. British professor of urban studies John Punter has investigated the history of aesthetic control in the UK from 1909 to the present day (Punter 1986, Punter 1987, Punter 2010) as well as the history of development regulation in Sydney since 1912 (Punter 2004). In addition to the sources described in Chapter 2, Norwegian architect Jørgen Skatland presented a method and approach for investigating the development of the Norwegian legal planning and building system. His approach heavily influenced the investigation of the legal framework in this chapter and is further described as part of the method for directed content analysis.

6.2 METHODOLOGY – DIRECTED CONTENT ANALYSIS

I investigated the research questions through a directed content analysis of regulatory documents covering the top level of the building codes and related to urban form development in the last century, looking for the effect that it has on and how it is affected by this urban form. The empirical sources include the Norwegian PBLs with technical regulations as well as the 1965 Public Road Act. The legal regulations and planning system are constitutional constructs based on Norwegian history, legal traditions, and practices. They provide a two-way perspective on the production of the built environment, planning system, and legal regulations for buildings (Røsnes 2005). This investigation considers the regulation and uncovers a 'hidden' planning system by which the regulation of details and buildings has a direct effect in determining the urban form. They form site-unspecific regulations at the highest level of Norway's legally enforceable system, which focuses mainly on built objects rather than unbuilt space, and it crucially lacks a focus on the relation between built and unbuilt. The data include the regulatory documents covering the top levels of the building codes, four Acts with eight Regulations, plus the Road Act. The method was a directed content analysis with a coding, sorting, refining, and defining procedure, which aimed to investigate the chronological development of changing regulation and morphological development.

6.2.1 *Research & analysis – Matrix of modality and morphology*

My method for the investigation comprised directed content analysis and diagrammatic development. Directed content analysis emphasises how a text makes its descriptions explicit and enables the opportunity to evaluate how building regulations reflect an interaction and relation between built environment and society. The spatial knowledge production in my research comprised the diagrammatic development of matrixes and timelines produced through relational thinking and drawing. Kim Dovey and Elek Pavka suggested that the language of urban thinking includes knowledge embodied in diagrams and is central to discourses of spatial knowledge.

They emphasised that the development of diagrams is fundamentally relational rather than reductionist and reveals general patterns of both sociality and spatiality (Dovey and Pafka 2019). As such, this method relates well to an assemblage perspective within the research.

The procedure of the directed content analysis involved a process of four main steps of drawing out and into types through reading and analysing the data: (A) operational theory: creating a coding scheme of modality and morphology – the how and the what; (B) reading text with three different purposes: overview, analytical assessment, (unit of analysis), and coding and sorting into a coding scheme; (C) sorting data: visualising it into sequences of the matrix; and (D) placing the visualised, sorted data into a time-series diagram as a collection of comparable diagrams, presenting the volume and modality of the unit of analysis. These four main steps are described in detail in the following subsections.

6.2.2 A: Operational theory – Defining the coding scheme of what & how

The first main step of the directed content analysis was to highlight the features addressed in the analysis by describing both what (about the object) the building code describes and also how it describes the object. This type of spatial knowledge production is influenced by recent work from Skatland (Skatland & Lohne 2016) as well as Kropf's generic structure diagram (Kropf 2014).

WHAT: Description of the micro-morphology of the façade threshold

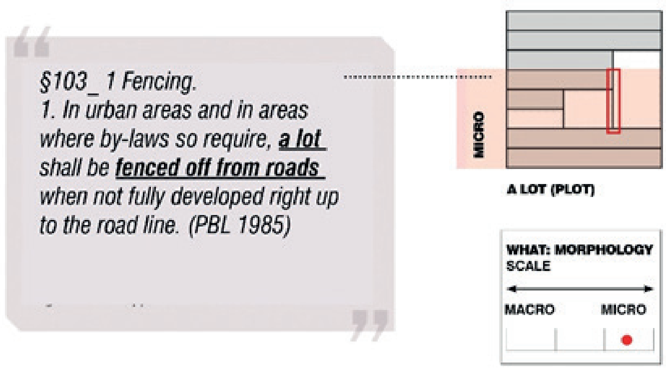


Figure 54
Coding scheme of morphology in the legislative text

One aspect of the coding scheme includes selective coding and sorting data into macro-, meso-, and micro-morphological aspects. Macro aspects include the urban tissue, the grid, and the structure of the built form; meso aspects comprise the simple tissue/street, the urban block, and plot series; and micro includes materials, structures, spaces, and buildings within the individual plot. The classification is a simplification inspired by Kropf's generic structure diagram (Kropf 2014; Kropf

2017) presenting relations consisting of part-to-part and part-to-whole connections in the built environment. I explained and developed this diagram as part of the theory development in Chapter 4. The inclusion of this approach in the coding scheme presents an aspect of using written accounts to analyse morphological spaces, boundaries, and relations (openings).

HOW: Modality/strength of recommendation

The other aspect of the coding scheme revealed the degree of explicitness, recommendation, and/or enforcement in the morphological description of the regulations affecting urban form and the production of frontage. This part of the coding scheme includes the *linguistic modal degree, revealed through the verbs included in the sentences and paragraphs.* I used Skatland's approach of four distinct degrees to express an interval spanning from vague possibility to unambiguous necessity, namely *recommendation, cohesive recommendation, absolute regulation, and quantified regulation.* Recommendation (R) sets recognisable requirements that can be interpreted in several ways. Cohesive recommendation (CR) presents clear requirements but does not make a recognisable 'must' claim. Absolute regulation (AR) sets clear requirements that the object cannot legally be built without. Quantified regulation (QR) describes the legal necessity by prescribing the interval of detailed quantification of the built necessity to which the built environment must comply with to be legal.

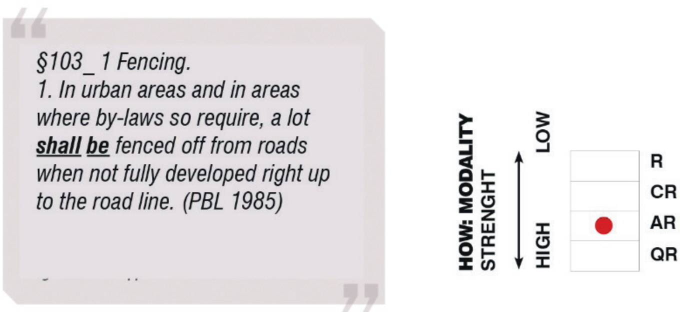


Figure 55
Coding scheme of modality in the legislative text

Matrix of what & how – The coding scheme

In the second step, the data were sorted, refined, and visualised into a 12-field matrix, representing what (three categories of morphological scale) and how (four categories of modality) it describes. As such, this methodological tool further develops Skatland's levels of modality investigated through verbs to

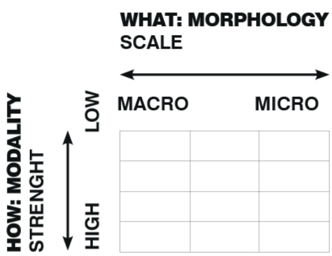


Figure 56
12-field matrix representing what (three categories of morphological scale) and how (four categories of modality)

include a more precise morphological description of the subject of the regulations based on theoretical development.

6.2.3 *B: Multiple read through of documents with three different focuses*

Investigating the frontage rules as an analytical parameter requires a step of selective and analytical reading with three different purposes: *an overview of the whole legal framework, analytical assessment, and coding*. The core work of this content analysis included a selective reading of the legislative document in a three-step process, which is detailed as follows.

1 – General overview: The procedure of this empirical work started with an initial reading through all 11 + 1 of the documents. The aim of this first general read-through was to obtain a general overview of the changes in legislation and thus the changing societal ideas over time. Parallel to the quantitative aspects of the content analysis and as a part of the first procedural step, I also assessed the different laws through their content pages. This included a qualitative comparison between the different chapters at three different levels: the first level was the *chapters'* overall table of contents, which was similar for all of the different laws and addressed six overall topics, namely general regulations, the planning part, the implementation part, the building part, management and economy, and final regulations. The second level was the *chapter topics* in the different chapters being analysed and compared. Finally, the third level was the individual chapter paragraphs and sentences, which also comprised the quantified content analysed through the established matrix.

2 – *Analyse relevant topics:* Second, I highlighted the different topics and elements that I analysed as being relevant for the production of the public–private interface, including both form-direct and form-indirect. I wrote notes in the various documents and sketched the form-direct legislations as diagrams. I selected the relevant paragraph and gave the sentences individual numbers to make them easy to return to.

This part of the procedure included an analytical approach of selection and relevance. I aimed to be broad in my approach to be able to include the range of legal components that could be vital. The task was placed into a morphological scale-definition from micro (building–street relation), through meso (block–street relation), and to macro (urban street system) based on the knowledge produced in Chapter 4. These categories can be directly placed in the generic structure diagram.

3 – Define and sort into a coding scheme/matrix: All of the marked paragraphs in my analysis were extracted, numbered, and placed in an Excel spreadsheet. They all received a unique number and were sorted according to their (1) morphological scale and (2) degree of modality in a matrix developed for the analysis. In addition, I coloured the form-direct paragraph red and the form-indirect paragraphs blue. This matrix defined the sorted raw data, which were further refined and placed in a time-series analytical tool.

6.2.4 *C: Visual representation of raw data*

The numbers in the different boxes of the matrix were counted and assigned a colour/size according to the number of times they appeared in the different categories (14 × 6). The transparency of the colours indicated the intensity within their morphological scale and type of recommendation. The matrix could also be added into a row of modality strength or a column of morphological scale in the selected paragraphs. These visual representations can highlight different aspects and focuses in the regulations, such as information about the focus on morphology or the focus on modality.

6.2.5 *D: Time-series analysis*

The process of reading, sorting, and visualisation was repeated for all of the different acts. Then, the diagrams were distributed chronologically to be able to read them as a process. Finally, the visual representations of the different data from the different laws were then placed in a time-series diagram – on a timeline from the start of the legislation process to the current and last document from 2017. When combined together, it became possible to analyse the development of the focus of the public–private interface clearly. This allowed the inspection of how legislation evolved over time and provided a reflective component useful for understanding the impact of societal values on the production of the public–private interface in our built environment. Chapter 7 explains the findings of this empirical work.

The following section describes the story of legislation through the changes of regulation content in the PBLs ana technical regulation from the 1924 building act for the cities to the current 2008 planning and building act for the country.

PLANNING AND BUILDING ACT

BUILDING ACT 24

First Building Act for all the cities. Al
connected in urban blocks

TECHNICAL REGULATION

TEK28

Ministry of Social Affairs 06.10
1928

BUILDING ACT 24

§23 Byggelinjer faller sammen med gatelinjen for så vidt ikke annerledes bestemmes

§23 I forbindelse med gaters regulering bør avgjøres hvor stor del av gaten tenkes reservert til fortåg

§23 Bebyggelsens karakter (åpen eller tett), bygningenes avstand fra nabogrensen og i hvilken utstrekning den indre del av kvartalene skal kunne bebygges

§26 Bebyggelsen skal anordnes på en arkitektonisk tiltalende måte, og således at den nye og gamle bebyggelse kommer i harmoni med hinannen

§26_c Gaters bredde retter seg etter ferdselens krav

§26_c Gater med sterk forretnings-eller gjennomgangstrafikk, bør ha en bredde av minst 15 m

§26_c For andre gater (hovedgater i småbyer med mindre trafikk, sidegater eller utpregede beboelsesgater med lett eller åpen beyggelse) graderes bredden nedover e

§26_d Avstanden mellem byggelinjene bestemmes under hensyn til ildsikkerhetens og sundhetens krav og med det for øie å frembringe tiltalende og behagelige bebo

§26_i Forholdet mellem bebygget og ubebygget areal i de forskjellige strøk bør fastsettes: 1.Ved avstandsbestemmelser for de enkelte bygninger. 2.Ved bestemmelse

§65_1 I tettbebygget strøk skal enhver bygning til gaten opføres umiddelbart i grenselinjen mot nabotomt, således at hele tomtens fasadelinje utbygges

§65_2Bygningsrådet kan dog tilstede undtagelser herfra, når der skaffes sikkerhet for at sidefasadene på begge bygninger gis en tilfredsstillende arkitektonisk utformn

§65_3Bygningsrådet kan i tilfelle opstille nærmere betingelser for undtagelsen, og f.eks. påby atbygningene knyttes sammen ved lavere partier, bueganger eller lignen

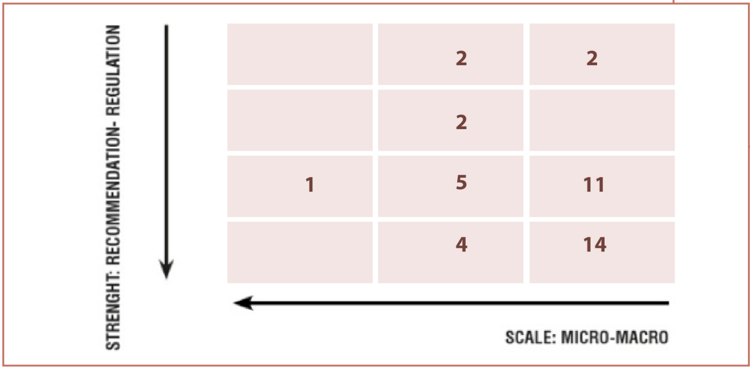
§66_1 Hvor der er regulert byggelinje, skal enhver bygning opføres med 1ste etasjes ytterflate i denne.

§66_2Fremspring og tilbaketrekning av enkelte deler av fasaden kan tillates av bygningsrådet, hvor arkitektoniske hensyn taler derfor, og avstanden til bygning på den

Figure 57
Synthesis of procedure in the research

BUILDING ACT 24

Form/Scale	Modalities 1. Recommendations (kan)	2. Cohesive Recommendations (bør)	3. Absolute Recommendatio
A. Micro (PPI)	37, 40	12	13, 23, 28, 31, 33,34, 36, 38, 39, 4
B. Meso (Block-street)	2, 9	3, 11	1, 5, 10, 26, 27
C. Macro (Structure)			



l built form should be

BUILDING ACT 65

First Planning and Building Act for the whole country. All built form should be freestanding Governance and support

PBL 1985

Revised Planning and Building Act. Governance and negotiation. Planning from private actors included

PBL 2008

Current Planning and Building Act. Governance and interaction

TEK49

Ministry of Local Government and Labour 15December 1949

TEK69

Ministry of Local Government and Labour 01.08 1969

TEK85

Ministry of Local Govern-ment & Labour 15.111984

TEK87

Ministry of Local Government Labour & Ministry of the Environment 27.05 1987

TEK97

Ministry of Local Government and Labour & Ministry of the Environment 22.011997

TEK10

Ministry of Local Government and Labour 26.03 2010

TEK17

Ministry of Local Government and Modernisa-tion 19. 06 2017

efter gatens karakter

elsesstrøk. Avstanden bør i almindelighet ikke være under 12 m.

om hvor stor brøkdel av hver enkelt tomt skal kunne bebygges. 3.Ved byggelinjer i det indre av kvartalene. I fo

ing, og det heleutformes således at gatebilledet ikke skjemmes.

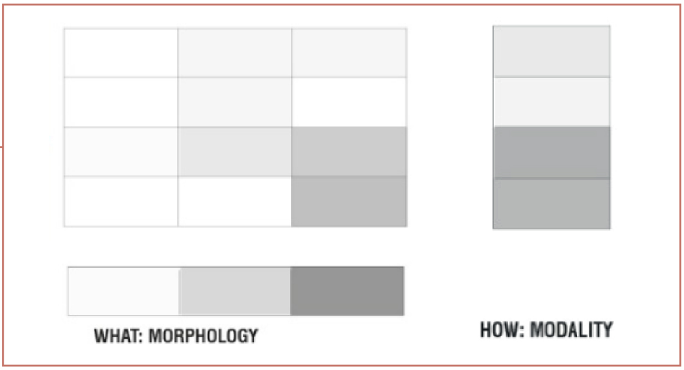
de # alene, eller i forbindelse med treplanting

annen side av gaten ikke blir under 12 m.

PARAGRAPHS §

ns (må/skal)	4. Quantified recommendations (kan/bør/må/skal + nr)
2, 43	14, 15, 16, 17, 18, 19, 20, 21,22,29, 30, 32, 35, 41
	6, 8, 24, 25
4	

WHAT & HOW



6.3 STORY OF LEGISLATION THROUGH THE CHANGES OF REGULATION CONTENT

The 1924 building act – Urban technical regulations

The first overarching building act for Norwegian cities, namely the 1924 Building Act, consisted of 14 different chapters that addressed six different overall topics. It included rules and regulations about street patterns, façade lines, building lines, and plot division as in previous city-specific regulations, but also introduced economic, functional, social, and aesthetic characteristics. It set stronger quantified and absolute regulations directly affecting the micro-morphology of the urban frontage, including setbacks and projections from the building line, as well as windows and doors which were defined by intervals, minimums, or maximums. Examples of rules producing the façade threshold at the meso-level included the location of the building in relation to the street, where building lines must coincide with the street line. In the 1924 Act, knowledge about city building, buildings, and their relations was clearly embedded in regulations and rules. These defined corresponding boundaries between streets, plot demarcations, and the building line where all façades face the street in the frontage. Relations between private building and public space were regulated through form-direct and absolute regulations.

The most vital chapters revealing critical frontage rules were in the *planning (Chapter 3) and building parts (Chapter 8)* of the law. In § 23, *the planning chapter* (Chapter 3) presented important aspects of the location of *buildings* connected to the width, height, and building lines (a) as well as to the character of the built structure (open/dense), distance to neighbouring plot, and how much of the urban block can be built (b). In addition, building heights (c) and wooden buildings (d) were addressed. This chapter defined the vital regulation of the *building line*: '§23 a Building lines coincide with street lines when nothing different is decided'. In §26 there were other vital regulations affecting frontage production, all of which related the urban plan to the character of its *built environment*. Regulations included the character of the streets, expedient access structures, street width related to use demands, design, number of floors, relation built/unbuilt areas, distance requirements, percentage of utilisation, and building lines.

The building chapter (Chapter 8) is a detailed chapter that includes more than 60 different paragraphs, covering the whole span from access structure and plot, through buildings' relation to the street, to technical details of materials and structures. The first part of the chapter includes form-direct regulations addressing *façade lines of buildings on the plot* and *building lines with setback and projections* out into the streetscape. Paragraphs §65–69 present form-direct regulations and decision frames at the legal level affecting the production of frontage in explicit manners.

	MACRO GRID, URBAN STRUCTURE	MESO STREET, BLOCK, PLOT STRUCTURE	MICRO FACADES, ENTRANCE TYPE	
LEGISLATION **BUILDING ACT1924** **TEK28/TEK 49**		*§26_The relation between built and unbuilt space should be established: By distance regulation for the independent buildings, By regulation of site coverage, By building lines in the inner yard of the blocks.*	*"§124_4 The Building Council may issue special rules for roof shapes, height and architectural equipment in addition to specific areas or parts thereof*	**R**
FIRST BUILDING ACT FOR ALL THE CITIES. ALL BUILT FORM SHOULD BE CONNECTED IN URBAN		*§23 The character of the buildings (open or dense), the distance from neighbouring plot and how much of the inner yards can be built*		**CR**
(G) (P) (I)	*§26 Buildings shall be organised in an architecturally apealling way, and in such a way so that the new and old buildings are in harmony with each other*	***§23a Building lines coincide with street line when nothing different is decided***	***"§70_1 Railings, poles, rejects, buffaloes and the like. must not be placed in the street or pavement without the building council's permission. "***	**AR**
(B) (ME) (FR)		*"§71_1 ..., the building height shall not be greater than the distance between the building lines and no place exceede 15 m unless otherwise determined by the regulation."*	*"§66_2 If the building line coincides with the street line, projections must only be allowed for columns, portals and such, and the projection must not be larger than 50 cm without the permission of the building council."*	**QR**

GENERAL (G) PLANNING (P) IMPLEMENTATION (I) BUILDING (B) MANAGEMENT & ECONOMY (ME) FINAL REGULATIONS (FR)

Figure 58
Analysis of the 1924 Building Act as morphology (what) and level of enforcement in legislative text (how)

First and more specifically, all buildings in dense areas shall be built directly in the boundary to the neighbouring plot in such a way that the whole façade line is built. If exceptions are granted, there shall be clear demands that the architectural design is good and built in such a manner that *the streetscape is not negatively affected*. The law even presents examples of morphological structures to be able to address such exceptions: lower parts to connect buildings, colonnades, or planting. These structures offer a way to provide visual protection and demarcation between the streetscape and the 'ugly parts within (courtyards, fire gables)' §65_4.

Second, buildings' lines within the law regulate the location of the ground floor of each and every building. Setbacks and projections are allowed when architectural considerations support this and when the distance to the next side of the street does not become smaller than 12 m. There are different varieties connected to building lines and projections/setbacks. If the building line and street line coincide, then the maximum projection into the streetscape is 50 cm without the permission of the building council. If building lines and street lines do not correspond, the maximum distance between the two would be 2 m. The façade length is further regulated by dimension/distance and connection to neighbouring plots. In addition, the relations between *building lines and projections* such as balconies, baldachins, and bay windows are regulated quantitatively by dimensions related to height from ground, distance to wall, and façade length. *Projections into the streetscape* are specifically regulated through design (rounded corners of steps), dimension (60 cm projection), and slope distance (not exceeding 2:3). Access to a basement and opening for light (areas) are also regulated as part of this projection. The corners of urban blocks are addressed as separate regulations, and railings and hedges are not allowed for urban plots.

The 1965 Building Act – Radical change from connected street to separated buildings

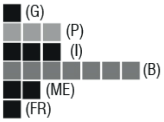
The 1965 Building Act changed the decision frames significantly, presenting an antithesis of the previous act, even though the structure was similar. The act was the first building act to cover the whole country. It consisted of 17 different chapters that addressed the same six overall topics as the previous law.

As in the 1924 law, the most vital chapters revealing important frontage rules were in the *planning (Chapter 4 – zoning plans) and building parts (Chapters 9–12)* of the law. *The planning part of the law* (Chapters 2–4) was expanded to include *overall plans and local zoning plans*, marking a change from *urban plan* in the 1924 law. Twelve different paragraphs (§22–33) presented regulations vital in the zoning plan. §25 *Purpose and §26 Other regulations* were the most vital for the regulation of the frontage. The zoning purpose addresses six different area purposes that can be regulated through the plan, the most vital of which is the building areas (1) and traffic areas (3). *Other regulations* defined in §26 included the slope distances of roads (a); the character of the built environment (including connected/open and distance to different amenities) (b); height and location of the buildings as well as plot parcellation, building development plan, and outer and inner boundaries (c); the relation between built and unbuilt areas on plots (d); areas of fire considerations (e); and access road, court yard, and other common areas for multiple plots (f).

The building part of the law (Chapters 9–12) expanded in chapters, but radically reduced in paragraphs and regulations from more than 60 to approximately half that (29). The content of the paragraphs also changed radically, particularly addressing the built project/buildings. The only paragraphs directly relevant as frontage rules included regulations about the location of buildings and distances from other buildings, neighbouring plots (§70), public road and its location on the plot (§71), building height and number of floors (§72), and plan layout and design (§74). A few relevant paragraphs for frontage appeared in more general regulations at the end, including fencing (§103), unbuilt areas in densely built environments (§104), lighting and cleaning (§105), and signs and advertisements (§107).

The chapter defined the vital regulation of the location of buildings on plots that presents the total opposite of the previous act of the building line: '§70 Buildings shall be free-standing, where nothing else is established in masterplan'. With this paragraph, the act defined an offset between street, plot, and building line in which buildings were defined as free- standing objects on a plot of land with defined land use. Distance requirements to the neighbouring plot and to buildings on the same plot formed vital regulations in the paragraph. The demands connected to building lines transformed into regulations about building boundaries. The reg-

	MACRO GRID, URBAN STRUCTURE	MESO STREET, BLOCK, PLOT STRUCTURE	MICRO FACADES, ENTRANCE TYPE	
LEGISLATION **BUILDING ACT1965** **TEK69/TEK 85** FIRST PLANNING AND BUILDING ACT FOR THE WHOLE COUNTRY. ALL BUILT FORM SHOULD BE FREESTANDING. GOVERNANCE AND SUPPORT	*§79 The building council may prohibit buildings which, by their nature or size, deviate significantly from what is common in the district, when,..,make it difficult to properly develop the district in the future*	*§69_2 the municipality may agree that a common area be set aside for two or more properties.*	*§103_1 The municipality may require hedges or other planting instead of fences facing a road.*	**R**
	§74_2 ..any work that is subject to the provisions of this Act is planned and carried out in such a way that, in the municipality's opinion, it satisfies reasonable aesthetic requirements both in itself and in relation to the surroundings.		*74_2 Unsightly colours are not permitted and may be required to be changed.*	**CR**
	§66 can only be split or built if the building site (s) is either secured by legal access to road open forordinary traffic, or by registered document or otherwise secured road connection ,...	***§70_1 Buildings shall be free-standing, where nothing else is established in masterplan***	***§103_ 1 Fencing. 1. In urban areas and in areas where by-laws so require, a lot shall be fenced off from roads when not fully developed right up to the road line.***	**AR**
			§70_2 Detached building shall have a distance from neighboring boundary which at least corresponds to the building's half height and not less than 4 m	**QR**



GENERAL (G) PLANNING (P) IMPLEMENTATION (I) BUILDING (B) MANAGEMENT & ECONOMY (ME) FINAL REGULATIONS (FR)

Figure 59
Analysis of the 1965 Building Act

ulations secure the implementation of building boundaries addressed in the road act, where areas were not regulated. With building boundaries defined in zoning plans, the building council can agree that buildings are *placed further in* on the plot. This also represents an opposite approach to the 1924 Act, which established a maximum distance from street to building line. Furthermore, in cases where the building boundaries were not established in the zoning plan, the municipality can decide where the building should be located on the plot.

What happened in this radical change – The Heiberg committees' effect on the legal framework for urban form

The Heiberg committee was appointed in 1954 to discuss the modernisation of the building act. This committee presented their reasoning for developing a new law in the 1960 recommendation (part IV, page 31; (Heiberg 1960). In the committee members' opinion, there were formal and real weaknesses in the 1924 law, and they found the need to establish a more *rational* and current foundation for the public control of building developments in Norway. They presented the purpose of the building legislation as providing the authorities rule over the design of the physical framework, within which urbanisation and building development must occur, thus giving them legal authority to implement their intentions as they expressed themselves in the plans being adopted. Some of the weaknesses they addressed were the detailed urban plans and the lack of overall planning for municipalities. As such, they presented a recommendation for a new legal building act including the whole country. In this operation, a range of city technical demands disappeared. The committee addressed the importance of developing a law that considered building and fire technical solutions as well as health and aesthetic considerations. However, they claimed that there were hardly any goals for the law to prevent or stimulate *specific solutions* of a regulatory and aesthetic nature, nor when it included the main layout or details. They also suggested that deciding how to most effectively solve these problems must be the concern of different professionals and governments at all times to fulfil the changing needs of times and places, and that the law must therefore be as general and elastic as possible. With these claims, the technical knowledge of city building seems to have disappeared from the law, with the responsibility of city building rather being transferred to professional and governments. Technical demands of the city were perceived as *concrete and specific solutions* rather than principles vital for effective city building.

The committee claimed that it was different with technical demands of the buildings because they presented more concrete problems that were only slightly dependent on discretion – *they built on exact and measurable results* of experience and research. With this claim, they prescribed detailed norms for *minimum* requirements that must be set. Their concrete solution for the law was to transfer detailed provisions into technical regulations (of buildings).

Part V pkt 2 Regulations explained the suggestion of transfer from law to regulations. This was already to a certain degree implemented as part of a revision of the law in 1949. Noteworthily, the legal paragraphs most vital for the regulation and control of the façade threshold were those that the committee suggested removing from law and putting into regulation: §23 and 26 (concerning guidance in the development of an urban plan), §65–69 (concerning details about the design of façades facings streets), and §71–73 and 75 (concerning building height, design of roof-facing streets, and buildings' distance to neighbour, depth, and height), as well as §134 about the location of the building and §149 about the front garden. An investigation into the regulation revealed that most of these paragraphs did not move, but actually disappeared. It is clear that these paragraphs were not evaluated as necessary for inclusion in the regulations. Another vital change, briefly addressed previously, is the sublime change in terminology and thus also concern. Terms such as *forhage* (front garden), *byggelinje* (build-to line), and *gate* (street) transformed into new meaning or disappeared in the regulations. Street was included in the term 'roads', building lines became building boundaries, and front gardens disappeared as a regulatory concern in legislation.

	MACRO GRID, URBAN STRUCTURE	MESO STREET, BLOCK, PLOT STRUCTURE	MICRO FACADES, ENTRANCE TYPE	
LEGISLATION **PLANNING & BUILDING ACT 1985** TEK87/TEK 97 REVISED PLANNING AND BUILDING ACT GOVERNANCE AND NEGOTIATION. PLANNING FROM PRIVATE ACTORS INCLUDED	*§105 The municipality may lay down provisions concerning lighting and clean-ing of yards, passages, stairways, and lighting and ventilation pits, and for the placing and design of house numbers.*	*§69_2 the municipality may agree that a common area be set aside for two or more properties.*	*§103_1 The municipality may require hedges or other planting instead of fences facing a road.*	R
	§74_2 ..any work that is subject to the provisions of this Act is planned and carried out in such a way that, in the municipality's opinion, it satisfies reasonable aesthetic requirements both in itself and in relation to the surroundings.		*§74_1 1. Any building with rooms intended for human habitation shall be satisfactorily arranged, with sat-isfactory lighting, insulation, heating, ventilation and fire prevention.*	CR
(G) (P) (I) (B) (ME) (FR)	*§104 In urban areas, undeveloped land shall be kept tidy and in prop-er condition.*	***§70_1 1. The location of the building, including the level of location, and the height of the building shall be approved by the municipality.***	***§103_ 1 Fencing. 1. In urban areas and in areas where by-laws so re-quire, a lot shall be fenced off from roads when not fully developed right up to the road line.***	AR
			§ 70_2 Unless otherwise decided..., the distance of the building from the boundary of adjoining property shall be equal to at least half the height of the building and not less than 4m.	QR

GENERAL (G) PLANNING (P) IMPLEMENTATION (I) BUILDING (B) MANAGEMENT & ECONOMY (ME) FINAL REGULATIONS (FR)

Figure 60
Analysis of the 1985 Planning and Building Act

The 1985 Planning and Building Act – Processual expansion and new planning levels

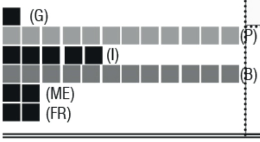
The PBL from 1985 expanded in terms of chapters compared with the previous PBL, from 17 chapters to 21. The main expansion occurred in the planning part included as three new chapters. The previous overall planning was transformed into different chapters of national, regional, and municipal planning. The expansion also included a greater focus on information and cooperation with the public.

Even though the law changed in size, the relevant chapters for frontage rules included the same six chapters, one in the planning part and five in the building part. Twelve different paragraphs (§22–33) presented regulations vital in the zoning plan. §25 Zoning purpose and §26 Written Regulations were the most vital for the regulation of frontage. In the building part, there was an actual reduction in the number of relevant paragraphs. The content in this law concerning frontage rules was similar to the 1965 act. However, three paragraphs about the buildings were deleted and the main relevant ones included §70 location, height, and distance from neighbouring plot and §74 plan layout and aesthetics. As in the 1965 act, there were more general regulations at the end, including fencing (§103), unbuilt areas in densely built environments (§104), lighting and cleaning (§105), and signs and advertisements (§107).

Significant changes from the 1965 Act were largely processual, whereas the content comprising the building–street relationship from the former act hardly changed. The small number of paragraphs regulating micro-morphology and the location of a building in relation to its plot became a processual responsibility, leaving the decision to the municipality to accept or decline.

LEGISLATION
PLANNING & BUILDING ACT 2008
TEK10/TEK17

CURRENT PLANNING AND BUILDING ACT. GOVERNANCE AND INTERACTION.



MACRO GRID, URBAN STRUCTURE	MESO STREET, BLOCK, PLOT STRUCTURE	MICRO FACADES, ENTRANCE TYPE	
*§ 29-1 each and every project shall be designed and carried out so that it is given a **good architectural design** in accordance with its function*	*The municipality may approve that building be placed closer to/in the neighboring boundary a) when owner has given written consent or b) erecting garage/ outbuildings/similar minor measures*	*The municipality may prohibit storage or other use of undeveloped land, when, ..., it will make a stay or traffic dangerous, seem highly disfiguring or be of considerable disadvantage.*	R
*§29_2 ...,project shall be designed and carried out so that,..., it maintains **good visual qualities** both inherently and with regard to its function and its constructed and natural surroundings and location.*	*§28_5 Undeveloped land in built-up areas must be kept in a tidy and proper condition*		CR
*§29_3 Projects pursuant to Chapter 20 should be **universally designed** in accordance with regulations specified by the Ministry. (TEK)*	***§29_4 The location of the structure, including the level of location, and the height of the structure shall be approved by the municipality.***	***§28-4 Making fencing safe In urban areas and in areas where a plan so requires, a lot shall be fenced off from roads when not fully developed right up to the road line.***	AR
	§29_4 Unless otherwise decided..., the distance of the structure from the boundary of adjoining property shall be equal to at least half the height of the structure and not less than four metres.		QR

GENERAL (G) PLANNING (P) IMPLEMENTATION (I) BUILDING (B) MANAGEMENT & ECONOMY (ME) FINAL REGULATIONS (FR)

Figure 61 Analysis of the 2008 Planning and Building Act

The 2008 Planning and Building Act – A focus on architectural, visual, and universal design

The 2008 PBL is the current act of the Norwegian planning system. It introduced a range of new topics, including universal design, sustainability, public health, and human rights. It expanded radically from 21 to 35 chapters, including new processual demands in the planning and building process. The relevant frontage rules are found in the parts on planning and building. The planning part developed into 12 chapters, including new types of planning documents, such as planning strategies and planning cooperation. Chapter 12 presents the zoning plan that consists of 17 paragraphs. The main ones concerning frontage types include *Zoning purpose, regulations,* and *zones requiring special consideration*, a new type of tool implemented in this revision. Another relevant revision includes the definition of two main zoning plan types at the local level, namely *area zoning and detailed zoning* (for more information on all of these tools and planning types, see Chapter 4).

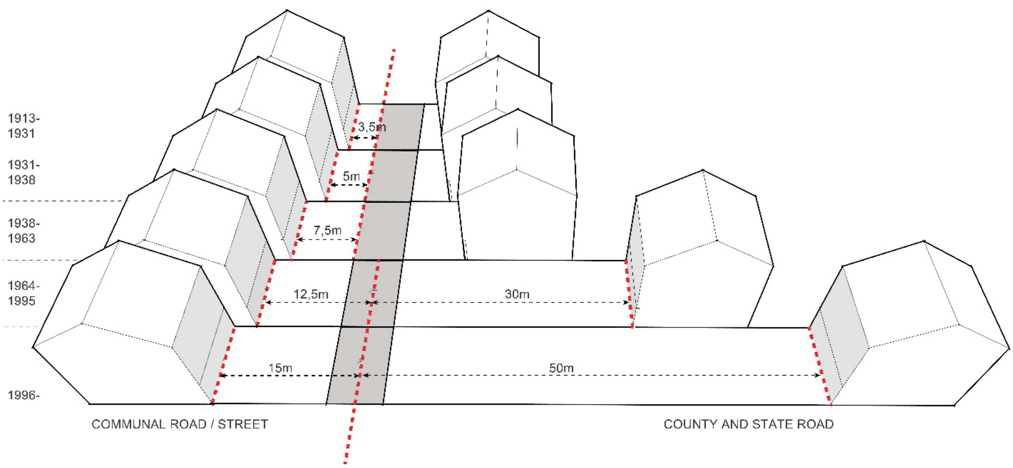
The mission statement for the Act has a strong focus on the *universal design and aesthetic design* of the environment. In the building part of the act, we see this focus in regulative paragraphs. Similar to the previous acts, relatively few rules are directly relevant to frontage (including a focus on location to the neighbouring plot). The 2008 Act includes rules about the *design of the project, visual qualities, demand of universal design,* as well *as technical and material demands*. The rules demand that every project shall be developed and implemented to obtain a *good architectural design* according to its function (29_1), and (in the opinion of the municipality) *good visual qualities,* both inherent and regarding its function, constructed and natural surroundings, and location (29_2). In addition, projects should be universally designed in accordance with regulations specified by the ministry.

Further frontage rules for the building–street relationship are hardly addressed by current legislation, and the main change is the focus on universal design. The regulation of universal design and accessibility include the relation of moving from one place to another, and represents the main area affecting the production of frontage in current regulation. Technical regulations are vital for addressing the new demands of universal design. Elsewhere, regulations indirectly affecting the façade threshold typically relate to an activity; for example, fire prevention is dependent on relations such as access road, entrances and movement, and emergency egress (windows and doors).

6.3.1 *The Road Act – A special law defining vital aspects of the frontage–building boundary*

Another example of this historical radical development is the Norwegian regulation for building boundaries related to roads. The interface between buildings and streets have been highly affected by a radical increase in demands within the road legislation – from 3.5 m between buildings and streets in 1917–1931 for three classes of roads – communal, county, and state roads – to today's demand of 15 m for communal and 50/50+ for county and state road. The road law regulated a minimum distance from the street edge to the building, increasing to a minimum of 15 m for communal and county roads, and more than 50 for state roads in cases where no other regulations decide.

Figure 62
Changing size requirements between buildings and streets from 1913 and until today in the Road Act



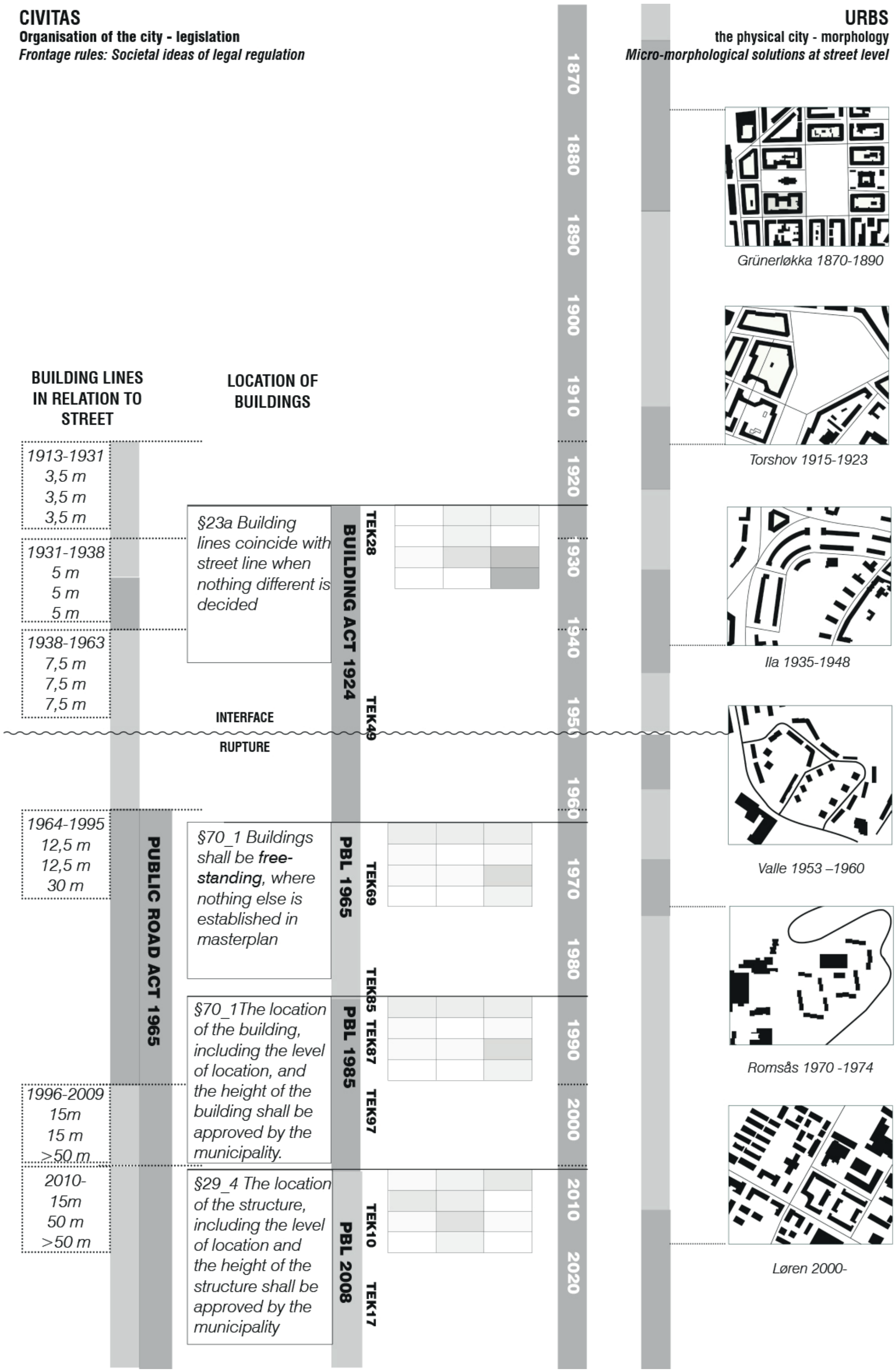


Figure 63 Synthesis of the analyses of the legislative text and seen in relation to the morphological development of urban block

6.3.2 *Story of legislation through the lens of directed content analysis*

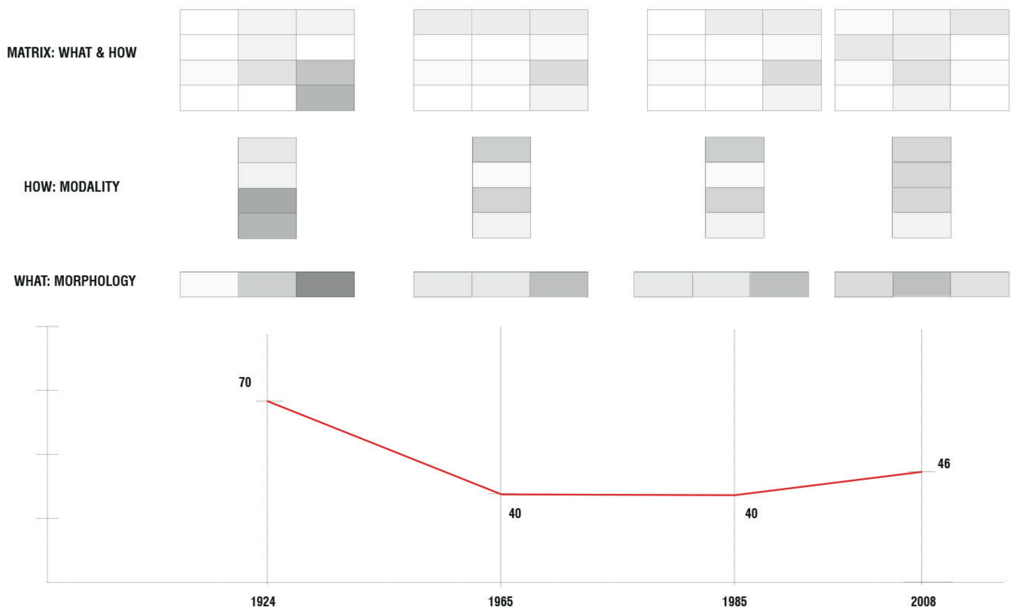
The directed content analysis of the 1924 Act (Figure 58) revealed an abundance of both absolute and quantitative regulations addressing the micro-morphological form components relevant for the production of the frontage. The 1965 Building Act changed the decision frames radically, from a focus on urban relation to a focus on separated buildings (Figure 59). The difference between the two acts indicates that the detailed focus on the building–street relationship disappeared as the act shifted the focus to size regulations and the individual built objects instead of technical city knowledge. This shift in focus from buildings with a street relation to built objects within land-use zones next to roads reflects a wider change from prescription and regulation to the first steps of discretion and recommendation in the 1965 Act. I suggest that this act provided a change where the legislation of city building transformed into legislation about city planning. Subsequently, technical demands and knowledge shifted toward processual knowledge of the planning process. While the 1924 Act focused on regulating detailed technical solutions within an urban context in urban plans, the 1965 law shifted focus to the use of planning types, such as general and regulation plans for the whole country. The prescriptive demands of the 1924 Act transformed into more discretionary demands within the law but included the option of using prescriptive zoning and land-use plans.

The manner in which the regulations of urban frontage transformed into recommendations corresponds with Skatland's conclusion that the main tendency in regulations develops from high to lower specificity as an interaction between a society and its built environment (Skatland & Lohne 2016). As such, the 1965 Act included to a lesser extent regulation that affected the micro-morphology of urban frontage. Knowledge about the micro-morphological frontage element decreased in the Building Act, through both the implementation of ideas from changes already built in the urban block and societal ideas of good housing provision through zoning and size regulations (presented in Chapter 2). Within this, some absolute regulations prevailed or were added, with examples concerning the location of the buildings on the plot. These included form-direct demands to build fences between streets and buildings in urban areas and saw increases in minimum distances to neighbouring plots among others. Form-indirect recommendations concerned the provision of daylight and places for outdoor recreation, such as play areas for kids and parking, being implemented in legislation.

Parallel to this, a radical shift to requirements for building lines occurred in the 1964 Road Act, where the minimum distance from mid street-line to building line was 12.5 m for communal and county roads and 30 m for state roads (Figure 62). This presented another size increase in the frontage regulation, affecting the building–street relationship.

My analysis and synthesis of the regulatory description addressing frontage rules revealed that the body and scope of legislation have increased in size and content, and the focus has changed from form to process (Fig 2). Legislation has transformed from a focus on form-direct regulation to form-indirect recommendations. This indicates that the clear early focus on the urban frontage has reduced over time both as a regulatory and societal concern. Absolute and/or quantifiable regulations directly addressing components and spaces of the frontage developed into vague recommendations, requiring discretionary interpretation and adjudication. Loss of the capacity for prescription based on technical knowledge in the 1924 Act was gradually replaced by the opportunity to prescribe by zoning plan, based on processual knowledge from the 1965 Act onward. Within these zoning plans, size requirements for objects such as land, buildings, and streets became focused at the expense of the relations between these objects. With the 1965 Act, the main form of current planning legislation for development emerged, whose regulations survive today through subsequent revisions as persistent legal structures. These revisions have added new paragraphs and new topics (such as accessibility), while very few earlier aspects have been removed. This revelation supports Talen's view that rules once put into law are not easily gotten rid of, even where policies change and new development paradigms appear. Within this, the building–street relationship is one of those relations, quintessential for urbanisation, that has lost its place and terminology within the current legal framework.

Figure 64
Comparison between the different legislative acts



The developed and used method has provided an opportunity to address the subject of the regulations through a more specific understanding of the morphology. Existing regulations exhibit a vagueness in their approach to provisions addressing frontage. Strong architectural design and visual qualities are not further addressed, and thus, the predictability of the rules on the outcome becomes more difficult as regulations become vague recommendations.

6.3.3 *Decision frames analysed – Controlling the development of the frontage*

Both the planning instrument and building codes define crucial decision-frame tools. While the plan provides information and shapes the context for decision making, the regulations affect decisions by restricting sets of choices available and thereby placing limits on a developer's opportunity space (Tiesdell & Adams 2011). The scope and opportunity to establish decision frames for development are much greater in the planning process than in the building implementation process. While planning processes involve and include a range of different actors and neighbours, at the local, regional, and state level, the building implementation process only includes the neighbours directly affected by the project. I have previously presented the challenge of urban design implementation in the planning and building traditions of Norway, where the top-down instrument of the land-use plan presents prescriptive regulations and zoning tools and the bottom-up instrument includes the building codes of technical regulation. The production of the frontage is affected, often indirectly, by both of these controlling mechanisms, yet they are directly addressed very rarely.

The zoning tools of conventional zoning plans were demonstrated to be a challenging tool for controlling compact and mixed-use development (Talen 2012). They pose a challenge in addressing relational aspects in the link between building and street. The inherent characteristics and practice of tools such as building boundaries and minimum size requirements have the potential to lead to sprawl (Talen 2013) as well as to split buildings and streets apart (Standal 2019).

In recent years, we have seen a reform of zoning in a range of cities and countries, particularly in the US, and many cities are starting to adopt more form-based codes as the basis for developing sustainable built environments (Garde and Kim 2017). The general difference between form-based codes and conventional zoning regulation is that the codes focus on the physical form and a *predictable* outcome of the regulation occurring on the ground, whereas the conventional zoning regulation focuses on use and presents a more vague and abstract result on the ground. There are aspects of form-based regulation in conventional zoning; however, the form codes regulate to achieve specific physical outcomes which address '*the relationship between building façades and the public realm, the form and mass of buildings in* *relations to one another and the scale and types of streets and blocks'* (FBCI .n.d. p 2). Form-based codes are carefully written to emphasise the difference in physical context and are highly dependent on morphological understanding and development. This instrumental shift in U.S. planning and building control is an example of recent moves in planning theory towards a 'material turn' (Rydin 2014). The planning theories of the late-20th century were dominated by governance and collaborative planning theory, but recently they have been challenged by new ideas. Complexity thinking is finding its way into the aim to solve sustainable development, and a range of works have emphasised the relational philosophy of Deleuze and Guattari (DeLanda 2006, Rydin 2014, Dovey and Ristic 2015, Dovey and Pafka 2019). The planning focus is both relational and material rather than cultural and discursive as was previously dominant. In these approaches, spatial planners are building bridges between the real and the possible, exploring multiple trajectories.

6.3.4 *Frontage rules: How societal ideas affect micro-morphological solutions at street level*

Rules, codes, and regulations are social constructs derived from the dynamic relationship between society and the built environment, forming one of the highest levels of societal consensus in the organisation of city society. Embedded in the legal framework, they determine the production of the façade threshold (Standal 2019).

This chapter has highlighted a relational approach to a critical aspect of city building, namely the production of the façade threshold. The assessment of relevant paragraphs forming frontage rules in the content analysis was challenging. Due to a lack of clarity of the concept in the legal text as well as a decrease in consideration of the urban space through time, the building–street relationship was somewhat difficult to address. Clear, technical regulations in the early law translated into bulk and distance requirements as well as regulations of planning and building processes in the later acts. As such, the interpretation of the regulation text highlighted two main concerns: the challenge of addressing verbal accounts where the concept of frontage is not apparent presents a potential *variety of analytical interpretations*, but also reflects *a knowledge gap to address*. My approach for addressing the potential limitations of this analytical process was to ensure high levels of clarity and reliability in the coding and sorting of the various sentences and paragraphs. As every paragraph received an individual and specific number that was sorted into the matrix, it was possible to trace the selection, coding, as well as sorting. Thus, the process can be repeated to validate the analytical steps.

The chapter has demonstrated that the current production of urban form remains governed by ideas implemented by legislation decades ago, with ever-increasing size requirements that work in direct opposition to the aspirations of the compact city (Fig. 4). Simultaneously, current projects present a renewed focus and intention to connect house and city. As the research through history tells us, legislation responds to morphological results and societal ideas already present, moving slower than ideas and policies. Therefore, legislation affects and is affected by urban form; it is both a result of and provides prerequisites for the development of form. The aspirations presented by current building projects have the potential to inform the next revisions of legal constructs. I suggest that the patterns revealed and knowledge produced through this chronological journey of the complex relationship between form and society, as read through legislation, can contribute to the revision of the legal framework, thereby ensuring enhanced future city building. I also suggest that the current technical regulations for buildings should be supplemented by a technical regulation for city building, which should be able to address relations that govern urban experience. In the future, the façade threshold in legislation has the potential to be implemented and precisely regulated in a manner that supports Cerda's idea of the quintessence of urbanisation. The first Norwegian Building Act of 1924 presented important regulations and recommendations that can inspire such a revision.

This chapter forms the last chapter of Part II - Theory development. The following two chapters comprise Part III that focus on the current situation of compact city building processes. The following chapter – the production of the façade threshold (Chapter 7) explains the case study process and its results.

PART III

CONTENTS

Case studies

THE PRODUCTION OF THE FAÇADE THRESHOLD

Chapter 7 THE PRODUCTION OF THE FAÇADE THRESHOLD

This chapter marks the start of Part III of the thesis, which delves into the investigation of compact city building through contemporary Norwegian examples. As such, it highlights real-life projects within the problem area of this thesis. This part comprises an investigation of six empirical cases presented through morphological and institutional perspectives. Projects were selected, characterised, mapped, and analysed through the different analytical methods presented and developed in Part II, which provided the theory development for the thesis. Through these investigations, I reveal findings that answer the research questions posed in Chapter 2.

This chapter presents the case-by case findings according to the research questions and the methodology implemented. The second chapter of Part III, Chapter 8, develops a cross-case analysis of the findings based on a synthesis of the findings into morphological and institutional knowledge.

First, I present an analytical model with three main analytical approaches that helped me to structure the analysis and discussion in this chapter. The morphological discussion presents the project through micro-morphological aspects highlighted in Part II. The legislative discussion discusses the most crucial decision frames for presenting the stated intentions and guiding the realisation and implementation of the project. Section 7.1 presents the method and selection criteria for choosing the cases, section 7.1 introduces an overview of the different cases as seen through their morphological area types. Section 7.3 – 7.5 present and analyse cases according to the analytical model of the chapter and organised through their morphological contexts: new street structures (section 7.3), existing street structures (section 7.4) and hybrid street structures (section 7.5).

7.1 METHOD AND SELECTION – REALISED AND STATED INTENTIONS

The empirical cases were assessed through systematic processual steps (explained more thoroughly in Chapter 3), aiming to address two main topics: the *intended project* and the *realised project*. As morphological analysis always starts with the built form as it takes place on the ground, the observation of *realised intentions* formed the first step in the process. The iterative process revealed the steps that were most vital for understanding project intentions.

Here, I briefly repeat the main steps of the methodological procedure and present the questions. The empirical investigation for each case consisted of four distinct activities, two of which focused on morphology and the other two on the process of its production. I investigated the *realised project* through an investigation of the built project in its context through field visits and observation, as well as a desk-based assessment of drawings and maps relevant for addressing the research questions posed. I investigated the intended projects through planning and building case documentation. Each of the activities comprised data collection/production, data analysis, and question generation/answering before the case analysis, which was fed back into the next case. The data I assessed comprised the *detailed zoning plan* and the *building outline permission documents*. The zoning plans included a planning description (describing the main intentions and solutions), planning provisions (the rules that ensure a project fulfils its ideas), and a zoning map. The building outline permission documents included minutes from the preliminary conference, outline application, project description, drawings, potential dispensation applications and the outline permission, as well as the as-built drawing (when accessible). In many of the cases, there were guidance standards concerning topics such as parking and aesthetic demands, which are highlighted for their contribution to the form but not addressed directly.

The empirical cases were analytically selected and based on the theory development and background context developed in the two first parts of the thesis. The aim was to investigate cases due to their morphological and institutional characteristics and within the problem area they address. The selection criteria included new Norwegian urban projects (built between 2000 and 2017) built within different urban morphological contexts (new built, transformations, and infill) and with ambitions of contributing to building the compact city. The projects comprised mixed multi-story residential properties with varying ground-floor use. The selection of the cases was also based on knowledge developed through an analysis of photographic data in Chapter 5 (Frontage types).

7.1.1 *Theoretical perspectives – Cases addressed as types, structures, and rules*

The output from Part II (theory development) provided methodological approaches and analytical tools that served as a combined analytical model for the empirical investigation of real-life cases. The model presents a strength for addressing different procedural steps in the case study investigation through observation, drawings, legislative documents, and conversations with architects. The analytical model included the following:

- *Frontage types matrix* (Chapter 5), which formed a combined mapping and analytical tool for the types of façade thresholds included.

- *Frontage structure analysis* (Chapter 4), which comprised a representation of the realised intentions analysed through diagrams and maps, from micro to macro scale. The generic structure diagram formed a vital component in this analysis and was complemented with variables such as interface structure, entrance type, façade type, building structure, plot structure, street structure, and grid structure.
- *Frontage rules analysis* (Chapter 6), which comprised the mapping of drawing tools in the zoning plan, content analysis, and summary of provisions for the plan as well as an assessment of relevant documentation in the project intentions, such as dispensations, hidden implementation, and case discussions revealed by documents.

In addition, supplementary talks with the architects in three cases, as well a developer in one of the cases, helped to support the conclusions drawn but were not treated as main data in the investigation. I also addressed structural and programmatic parameters for analytical support. These include studying the accessibility between the local street for the projects in question and the (closest) main streets, connectivity between local streets and the main street(s), and vitality of the streets in terms of functions and facilities for public life and characteristics/status of urban places, parks, and functions. These points were addressed to characterise what type of urban development the densification projects represent; whether they represent a continuation and enhancement of the existing urban qualities; or if they are expanding the urban built-up area in dense islands like urban satellites.

7.1.2 *Morphological contexts – New, transformed, or existing street structure*

The selected cases are examples of contemporary compact city building projects that address three typical *morphological contexts* and urban tissues: the *pre-existing, the new, and the transformed* (see Section 2.3). These three contexts have distinct characteristics, properties, and capacities that provide different morphological and institutional preconditions for the cases they include:

- The *new urban tissue* includes areas with new street, block, and plot structures, planned as a new (tabula rasa) development and presenting areas *clarified for change*. Three of the case projects in this chapter present development in this urban tissue. These projects comprise top-down planned harbour redevelopments from industry to residential use (Siriskjær, Kanalbyen and Sørenga).
- The *pre-existing tissue* includes existing street, block, and plot structures, where projects are consolidating the existing types of built form and include a high level of context sensitivity following the existing morphological logics of the built fabric. As such, these urban tissues are

homogenous areas for *consolidation*. The *pre-existing tissue* addressed provides examples of the *traditional tissue* (different from modernist or mixed tissue), a pre-modernist tissue where the buildings are placed along the streets and define street fronts, occasionally with small gaps in between, forming an urban block with open spaces in the middle, accessible from the buildings. Two of the case projects in this chapter address development within the existing urban structure, within smaller plots and existing streets (Hollenderkvartalet & Kirkegata 2).

- The *transformation tissue* is found in brownfield land-use transformation and presents areas *unclarified for change*. One of the case projects in this chapter presents development in this tissue, addressing the brownfield transformation of industrial land, both including and excluding aspects of the previous structures and use. In these areas, old buildings are removed from the site and the street layout is preserved, with the occasional addition of smaller access roads (Sigurd Hoels vei, Ensjø).

7.1.3 ***Places of research – Three cities in Norway: Oslo, Kristiansand, and Stavanger***

The selected cases also have different *geographical contexts* and present projects in three different cities. The aim was to determine whether vital differences exist in planning- and building-control practice, and in the use of legislative tools and approaches to the decision-frames included in the project examples. The three cities share common morphological characteristics such as the variety of morphological contexts, including harbour development (as all three are fjord cities) and compact traditional inner-city forms.

Oslo is the largest city and capital of Norway, forming the economic and governmental centre, and it is a hub for trade, banking, industry, and shipping. Oslo occupies an arc of land at the northernmost end of the Oslo fjord, located in the southeast of Norway. The fjord lies to the south, while in all other directions Oslo is surrounded by green hills and mountains. The city comprises a range of morphological contexts that were already investigated and presented in Chapter 2 (pre-existing tissue and land-transformation tissue). In addition, there has been a large harbour transformation linking the city and the fjord known as the Fjord City (Fjordbyen).

Kristiansand is the fifth largest city in Norway located in the south-county municipality of Agder. It is strategically located on the Skagerrak, a strait running between the southeast coast of Norway, the west coast of Sweden, and the Jutland peninsula of Denmark, connecting the North Sea and the Kattegat sea area, which leads to the Baltic Sea. *Kvadraturen* is the city centre of Kristiansand defined by a regular grid based on Christian IV's town plan with 56 rectangular squares with five long streets north to south and eight cross streets east to west, along with a variety of building types within the different blocks. This urban structure is surrounded by a fringe of recent harbour transformation, linking the old city centre with the newer residential blocks and the sea.

Stavanger is the fourth largest city and third largest metropolitan area in Norway (through conurbation with neighbouring Sandnes) and the administrative centre of Rogaland county located on the Stavanger Peninsula in Southwest Norway. Stavanger's core is to a large degree 18th- and 19th-century wooden houses that are protected and considered part of the city's cultural heritage. This has caused the town centre and inner city to retain a small-town character with an unusually high ratio of detached houses and has contributed significantly to spreading the city's population growth to outlying parts of Greater Stavanger. Stavanger has more recently transformed and developed its harbour areas, mainly for residential purposes, to the east of the city core and known through the project Urban Seafront (*Urban Sjøfront*).

7.2 OVERVIEW OF THE EMPIRICAL CASES

In this section, I present a brief overview of the empirical cases. The different empirical projects are first described through a brief introduction of their location, development history, and what the finished project comprises, and furthermore, the important processes central to the development of the façade threshold are highlighted. First, I present the projects developed within new street structures and clarified areas of change, which include the projects of Kanalbyen (Kristiansand), Sørengautstikkeren (Oslo), and Siriskjær (Stavanger).

7.2.1 *New street structures – Harbour transformation in clarified areas of change*

Sørenga – Oslo

The project on the Sørenga peninsula is part of the large harbour transformation

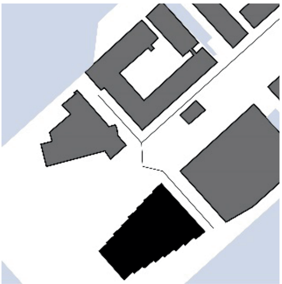


Figure 65
Location of case Sørenga in the Oslo harbour and figure ground map of the project in its context

of Bjørvika and part of the larger Fjord City transformation in the city centre of Oslo. The Sørenga peninsula was formerly an old container dock consisting of man-made land for quays. Over the last two decades, these quays have been transformed into a residential neighbourhood with service functions and restaurants facing the west and a large new seawater pool working as a recreational spot for the whole city. In 2007, the company Oslo Harbour Property sold the whole area to the developer company Sørenga Utvikling KA; 90% of the area is residential properties. The area was regulated by a masterplan in 2004 for the whole of Bjørvika and a building development plan in 2008 specifically for Sørenga peninsula. The building, located at the tip of the peninsula, has a volume stepping down towards the water as well as following the trapezoidal limits of the site, which are defined by heritage sightlines between the medieval part of Oslo and the convent at Hovedøya (an island just 5 minutes from the city centre). The project is next to the harbour promenade and urban seawater pool. The plot has views to Akershus fort, Ekeberg hills, and Hovedøya. The case comprises 60 units of high-end apartments with both commercial spaces and residential units on the ground floor. The building process started with an outline permission in 2012. In the middle of the process, the contract of the first architect was terminated and two new architect companies assumed responsibility for its completion.

Kanalbyen – Kristiansand

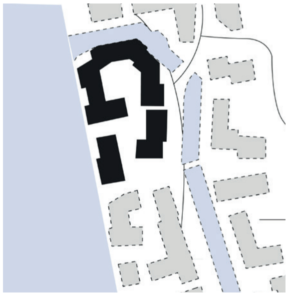


Figure 66
Location of case Kanalbyen in the Kristiansand harbour and figure ground map of the project in its context

Kanalbyen is a new development area for housing located on the island of Odderøya in close vicinity to the city centre of Kristiansand in the south. The development project is built on land that has been active for harbour use since the 1920s. The history of the quay includes it being used for transporting grains to the US and dried and salted cod (bacalao) to South America. In 2003, the Kristiansand municipality decided to move the harbour business to an area with more space and open up for developing a new urban area, namely a densification project with characteristics of an urban satellite. In 2005, the area was defined as an area for development in the municipal masterplan. The Kristiansand Port Authority, the owner, developed a planning initiative in 2007 that was politically decided in 2010. The owner's intention of the subsequent process was that private property actors would realise the building projects defined by the plan. However, the interest among private developers was remarkably low and the municipality decided to revise the plan to attract commercial interest and make it more realisable. One of the steps in the new process was to define a property company for the project. This company was half-owned by the municipality and half-owned by a private developer. In 2015, the masterplan for Silokaia was politically decided, and in 2016 the outline permission for the project of Kanalbyen was granted.

Siriskjær – Stavanger

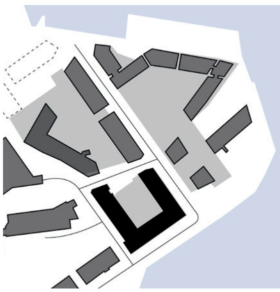


Figure 67
Location of case Siriskjær in the Stavanger harbour and figure ground map of the project in its context

Tou Park is part of the *Urban Seafront* development in Stavanger's eastern centre Siriskjær. The area is located southeast of Vågen in the extension of Stavanger city centre. It is a new harbourside development of mixed residential use. The Siriskjær area forms a part of the urban regeneration programme 'Urban sjøfront', a nonprofit stock share company comprising 22 property owners and renters in the area. Siriskjær was formerly a port and industrial area that struggled with a negative reputation and had complicated and complex ownership structures. The industry here was largely sea-related, with sardine factories and shipbuilding, in addition to Tou Brewery. The development area includes the preservation of Tou Brewery, which now houses a cultural institution called Tou Scene.

The project has 286 apartments as well as commercial spaces at street level. The buildings are designed in a compact shape, with high insulation standards and energy-conscious use of glass in the façade. The buildings comprise a continuous perimeter with clear demarcation towards the street spaces and open up towards a playground and a park.

These three projects, within the same morphological context but different cities, share the same characteristics of harbour transformation development. In the next section, I present projects that have been developed within pre-existing urban tissue, with *existing street structures* acting as *areas of consolidation*. This includes the projects Kvartal 57 (Kristiansand) and Hollenderkvartalet (Oslo).

7.2.2 ***Existing street structures – Infill projects responding to pre-existing urban tissue***

Kvartal 57 – Kristiansand

Kvartal 57 (Quarter 57), formed of *Kirkegata 2B, C, and D* as well as *Strandpromenaden 21*, is a new residential project located centrally in the historic urban grid in Kristiansand. The project is close to the city and the sea, providing good views

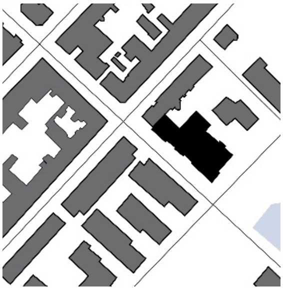


Figure 68
Location of case Kvartal 57 in Kristiansand and figure ground map of the project in its context

and connections to both. The development was built on four former plots with existing buildings demolished as part of the project. The aim of the project was to develop residential properties of a high standard for senior residents.

The masterplan for the urban block was politically decided on February 12th, 2014, the same day as the overall municipal plan for *Kvadraturen* was decided. The planning case included a range of remarks and complaints from the neighbours, both before and after planning and the project decision. The plan was challenged by neighbours, but the county governor maintained the final decision later that year. The case was subsequently brought to the ombudsman for a final statement.

The preliminary conference for the building project was held in late October 2014. From the minutes of the conference, there was a clear recommendation from the municipality that the developer should follow the requirements of the plan without dispensation applications. This is because of the potential of comprehensive neighbour protests that would extend the process considerably. An outline application was sent on December 23rd, 2014, and outline permission for the project was granted on May 18th, 2015. The outline application did not comprise any applications for dispensations.

Hollenderkvartalet – Oslo

This property is part of the historic Dutch Quarter of Grønland, Oslo. The conservation area has a varied urban form and buildings with protection value as well as new buildings. The project comprises combined residential and commercial (ground floor) buildings with a total of 62 new apartments distributed in three buildings. The buildings are 5–7 storeys and are located along Schweigaards gate and Hollendergata, centrally in East Oslo. The building at No. 40 is adjacent to existing brick buildings at Hollendergata 2A. Between the two buildings in Nos. 42 and 46, there is an existing brick building as well as stables. The backyard area borders a common area for the whole block.

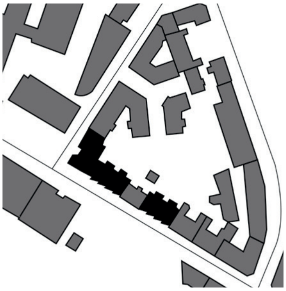


Figure 69
Location of case Hollenderkvartalet in Oslo and figure ground map of the project in its context

The masterplan for the whole block started in 2005 and was politically decided on September 26th, 2012. As with the other infill project in Kristiansand, the case was challenged by neighbours and a decision was made by the county governor in late 2013. On March 19th, 2015, the preliminary conference for the project was held with representatives of the developer, architect, and planning agency. Another second preliminary conference was held on March 3rd, 2016 to establish the project's connection with an ambitious environmental programme for the property and to discuss underground parking. The application for outline permission was sent on April 18th, 2016 and the outline permission was granted on September 21st, 2016.

The aforementioned two projects, within the same morphological context but in different cities, share the same characteristics of development in pre-existing tissue. In the next section, I present a project developed within the transformation tissue in unclarified areas of change.

7.2.3 *Hybrid street structures – Land-use transformation projects responding to hybrid tissue*

Ensjø – Sigurd Hoels vei – Oslo

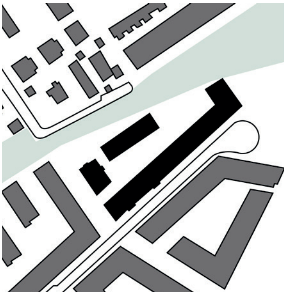


Figure 70
Location of case Sigurd Hoels vei in Oslo and figure ground map of the project in its context

This property is a part of the former Tidemann tobacco factories in Ensjø, a land transformation area in the northeast of the city centre. For many years, Ensjø has been transforming from a district dominated by car dealers to an urban place with up to 7,000 new homes as well as parks, squares, and green gardens. Kindergartens are being built as part of developments, and the need for schools and sports facilities is assessed on an ongoing basis.

The masterplan for the empirical case is called the *'Tidemann factory'* and was decided December 17th, 2008. Outline permission for the project was granted on March 4th, 2016, and the finished permission was granted on May 24th, 2019. The project consists of five residential buildings with 158 dwellings and underground parking. Parking access to the block is through south-facing street yards. The property was regulated to housing through a zoning plan after the 1985 act. The outline permission highlights the urban structure and building's location towards the street.

In the next section, I present all of the empirical cases thoroughly. The various empirical projects are first described through their realised intentions and morphology, and then through their stated intentions, highlighting the important processes central in the development of the façade threshold.

7.3 NEW STREET STRUCTURES – HARBOUR TRANSFORMATION: CLARIFIED AREAS OF CHANGE

7.3.1 *Sørenga – Oslo*

The investigation of Sørenga was the first of six empirical investigations that I conducted. As such, this investigation formed a pilot study and offered vital information about what type of data were vital for the core unit of analysis. Through a thorough and systematic process, this first step in the iterative empirical investigations offered critical feedback that enabled me to conduct the other five cases in a more focused manner. This was particularly crucial for the selection of data addressing stated intentions in planning and building documents, as these checked in and out of the investigation and provided clear ideas for the data analysis.

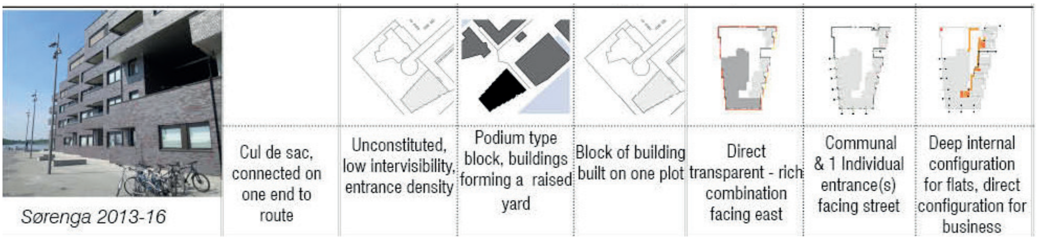
Realised intentions – Podium type with deep integrated façade thresholds

Frontage type and frontage structure

The frontage type analysis revealed a vertically terraced and stepped building type with setbacks and one-way permeable balconies at the ground-floor level. There are four main types of permeable façade thresholds: the collective setback entrance that functions as a main pedestrian entrance for all of the different flats facing southeast; the commercial premises with direct transparent and permeable connections; and one flat on the ground floor with direct access to a permeable type of setback. Furthermore, two integrated, permeable façade thresholds face both southeast and northwest of the building. The southeast-integrated façade threshold comprises a vertical-circulation staircase leading up to a shared courtyard with individual as well as collective entrances. The northwest façade threshold leads up to the same shared yard through a ramp system. In addition, the frontage types include both transparent and closed façade thresholds, mainly presented through direct and setback thresholds.

The frontage structure analysis revealed a variety of depth configurations from the street to flats or commercial property in the development. The most direct relation is the commercial premises at the ground-floor level facing south and west. These consist of *direct permeable façade thresholds* and are accessed through one topological step. The project consists of one flat with a direct relation to the harbour promenade facing northeast. This comprises a *setback permeable façade threshold* and an individual entrance type accessed through two topological steps, from promenade to canal to flat. There are five ground floor flats connected to the promenade through a collective entrance type with deep configurations, where one must pass through long corridors of horizontal circulation and topological steps. Balconies form the private outdoor space and are faced directly adjacent to the public outdoor space, that is, the harbour promenade. The façade thresholds consist of *setback one-way permeable types*. This coinciding boundary between the most private and most public creates territorial ambiguities of the space. The flats on the second floor and above are defined by a deep structural configuration that comprises *integrated permeable façade thresholds* facing the harbour prom-

Figure 71
Morphological analysis Sørenga

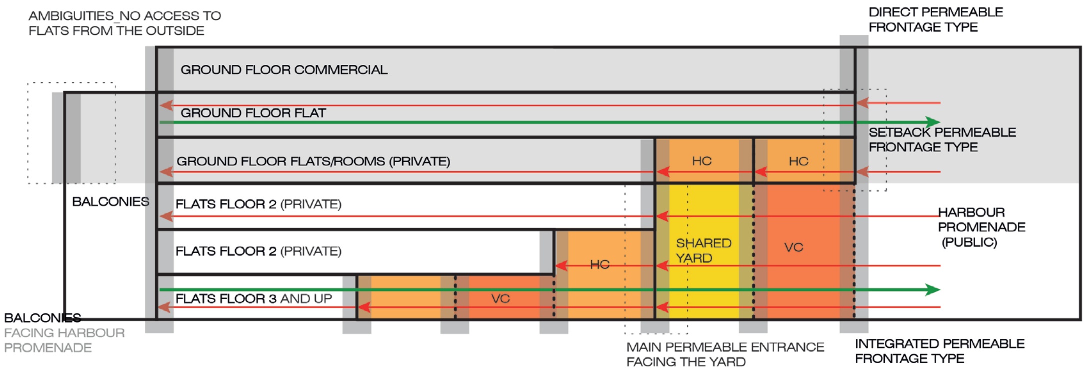


enade, leading up to a small open shared yard with direct access to five flats, two of which are duplexes, and a deeper configuration through horizontal circulation to the other six flats on that floor. The other flats of the building have the deepest configuration through topological layers of horizontal and vertical circulation.

The building/urban block is *boundary-built*, creating spaces that physically and visually help to define the street and the harbour promenade. The building has one main entrance facing the harbour promenade to the southeast, presenting a very low entrance density. There is no inter-visibility in the street structure because there are no facing buildings that relate directly to the project or promenade. The building is placed in the *purpose line* and *property line* of the plot and defines the space physically and visually all around.

All flats except for one are structurally removed from the street with a deep configuration, and there is a low constitution of the street even though there are a few access points. The public spaces to the west have buildings facing this space visually, but they have no entrances towards the space. As such, the inter-visibility, entrance density, and constitution are low, even though buildings define the space physically (formally) and visually. *The plot structure* includes the whole block as one plot. There are also parking structures linked to the different properties but they overlap and go across the different building sites. The vehicular access point to the project is through a route structure of a cul-de sac connected to a route at one end. This route links into one of the main strategic routes of primary characteristics. The pedestrian access route includes the harbour promenade, linked along the harbour.

Figure 72
Structure diagram of the building-street relationship at Sørenga



Stated intentions – sun- and view conditions as vital parameters

Frontage rules – Appearance of wholeness through materiality and visual expression

The aim of this plan is to develop Sørenga into an attractive residential area with quality housing, high aesthetic quality, and homogeneity in façade materials and expressions. It focuses on optimal conditions for quality living, including good *sun and view conditions* for all flats and their private outdoor area. A core element in the plan is the harbour promenade, which is shown as a continuous promenade along the seafront. Towards this promenade and a central park in the middle of the plan are buildings located in the purpose boundary line, ensuring defined façades facing these areas. The urban blocks shall be designed with openings that provide access to courtyards from common areas and traffic areas. The plan draws on design guidance from Gehl, which the architects developed to inspire the actors in the development of the area where specific topics connected to the building–street relationship are emphasised: the design of the ground floor, entrances, and façades. All of these perspectives are secured in the plan.

The land-use purpose for built-up spaces is regulated with the *combined purpose of housing, business, office, catering, and nonprofit (culture, education, and sports)*. The open spaces are regulated as a common exit area, common square, and harbour promenade. The plan is defined through legal lines such as a purpose boundary for the land-use areas as well as a heritage sightline facing the harbour promenade, which protects a visual link between the medieval park in Oslo city centre and Hovedøya with Hovedøya Abbey, a medieval Cistercian monastery.

The provisions of the zoning plan highlight a holistic design of the area comprising buildings, the quay front, canals, a park area as well as streets and the harbour promenade, emphasising the creation of a wholeness through visual expression. Buildings should be located *within* the legal lines of the purpose boundary and sightlines where façade elements such as balconies, bay windows, canopies, and similar can be projected from the purpose boundary over 4.5 m above the average terrain level facing public pedestrian/common areas. No projections are allowed over sightlines. There is a strong emphasis on the private outdoor area/balcony, both in size (minimum 20% of residential unit) and quality (direct sunlight on private outdoor space).

The project presented for outline permission was in contravention of the zoning plan and therefore depended on dispensations to obtain such permission. The building application included seven dispensation applications, all of which were connected to the design and use of the volume (depth of residential flats, a stepped down volume, public attraction, banisters, and roof extension) and building height, two of which were directly relevant for the building–street relationship. One dispensation application was connected to the potential of building terraces at the ground-floor level for the five ground-floor apartments facing southeast (attachment B-05). To prevent visibility from the promenade and simultaneously ensure residents an attractive view, the apartments were raised 0.5 m from the public space outside. As the harbour promenade along the northeast side of Sørenga is 6 m from the façade line of the block, the architects argued for some smaller terraces in front of the ground-floor apartments to increase the living quality of the apartments and add life and activity to this semi-public-zone-facing public space. Another relevant dispensation was connected to building boundaries of the land-use purpose.

The outline permission granted dispensation from the plan for six applications, one of which affects the building–street relationship facing northwest, by redefining the building boundary as a stepped line giving views and light to the use of balconies. In the second application of ground-floor terraces, the authorities highlighted that the project was revised in relation to the impact on the Eastern Harbour Promenade so that no terraces or building part could break through the sightline from the medieval park through Lohavn towards Hovedøya. This also meant that balconies that were originally at ground level on part of the Eastern Harbour Promenade were removed.

7.3.2 *Kanalbyen*

Realised intentions – Deep integrated permeable façade thresholds and territorial ambiguities

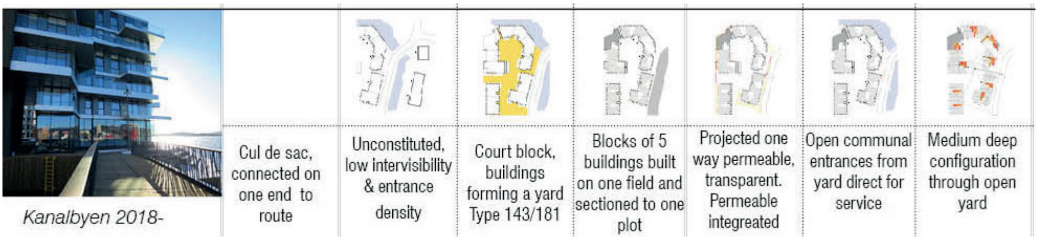
Frontage type and frontage structure

The building–street interface consists of types placed in the matrix of façade thresholds, including transparent and blank façades. There are only two permeable façade thresholds facing the street and those are for cars for the parking garage facing the street and one facing the showroom. Otherwise, the other permeable interfaces facing streets only serve technical functions. In the courtyard, there are a range of permeable interfaces, mainly thorough the collective deep entrances, but also 18 garden terrace entrances.

The entrance types of the residential properties comprise open communal entrances facing the shared yard inside the building block. The only direct entrances from public paths such as the street and the harbour promenade are to the commercial premise facing the harbour promenade and to the showroom facing Sjølystveien. I analysed the observational data through the frontage-type matrix, which revealed a prevalence of *deep façade thresholds*. I analysed them through both topology and depth configuration. The topological investigation quantified the number of steps/spaces one must go from the most public to the most private and was represented on the map of interface structure. These topological steps were spatially represented in a (spatial) structure diagram presenting the depth configuration, including space, boundaries, and openings. Sjølystveien is the most public space and internal flat is the most private. Two main depth configuration diagrams are vital for the façade threshold. First, there is the ground floor flat, including spaces of horizontal circulation in the communal entrance areas and front gardens, garden terraces, and balconies. Second there is the >1st floor flat, including both horizontal and vertical circulation as well as private balconies. The ground floor structure in the Kanalbyen development presents a few ambiguities when it comes to the potential to enter or exit.

Between the street and the yard, there are open, publicly accessible boundaries where anyone can enter or exit. Between the yard and the internal common entrance, there is a closed common boundary with access only for the property owners of that unit. Between the horizontal circulation of the ground floor and the upper flats, a vertical circulation occurs to the closed private boundary of the private unit. This diagram reveals two main considerations: the common entrances facing the yard and the ambiguities of the restricted access of entering or exiting through the front garden/terrace. Even with a direct projected connection between the street and the flat, there is no opportunity for entering or exiting between the two adjacent spaces. The private terrace physically and visually connects the street and the flat, but structurally disconnects them. The visual and physical design of the façade threshold defines and addresses the street but does not constitute the street structurally. The very close physical relation between the most public(street) and the most private (front garden/balcony) creates the potential for territorial challenges. The consequences of this structural disconnect are low inter-visibility and low entrance density. Similar consequences can be found in the relation between the public harbour promenade and the private flats. The yard, however, is constituted by all of the communal entrances providing entrance density and inter-visibility. Garden terraces are linked to the yard with physical opportunities to enter and exit, but the design includes a territorial definition with a physical boundary of a gate. The development presents an inside (in the yard) and an outside (street or harbour promenade).

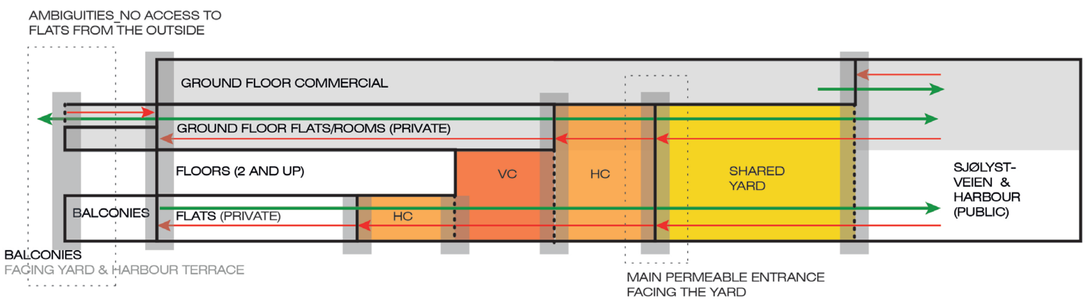
Figure 73
Morphological analysis Kanalbyen



The spatial context is currently characterised by a building site, and the project observed is the first step of a large urban residential project. The building complex is mainly boundary-built, creating spaces that physically and visually help to define the street. However, at the first corner where building meets street structure, a range of functional and technical elements split the building and the street. These include waste, entrance to parking, and technical rooms. Spatial connections are not optimal currently but will increase with further development. There is a very low/no entrance density facing the main street. Furthermore, there are no entrance points from the street and directly into the residential unit, even if they are directly connected at the ground-floor level. All entrances to the private residential units face an inner communal courtyard. The inter-visibility of the street is low and since there will be both a road and a canal between the currently built units and the future built ones, the distance will be fairly high to be able to define inter-visibility. Within the complex, facing towards the courtyard, there is inter-visibility, and communal entrances (nine in total) face each other and the yard. In addition, windows and garden terraces face the same yard. The flats have entrances to the garden terraces from the inside. The buildings face the street, and as such they define the street; however, since no entrances face the street, there is no constitution.

The development was built on one plot and later sectioned/divided as free-hold units. The entrances are communal and all flats have individual entrances through a communal entrance hall (where the postboxes are). The development is divided into 11 buildings with different façade expressions. There are two main public movement channels and entrances into the area, either along the pedestrian harbour promenade or the street Sjølystveien, which has been transformed to fit the project in this phase. Route structure analysis revealed that the routes connected at the lowest integrational point – as a cul-de-sac – are connected on one end of the route only. The project expands the urban built-up area in a dense island that works like an urban satellite.

Figure 74
Structure diagram of the building-street relationship at Kanalbyen



Stated intentions- appearance of urban environment and variation.

Frontage rules – Ambiguities between intentions and provisions of the zoning plan

The aim of this plan is to develop an urban housing project in a *multifunctional district with variety and urban life*. It aims to achieve this by defining an *urban street sequence* with *active façades on each side defining* the space. In addition, the planning description presents the aim of achieving *'the variety that the 'dense city' traditionally has'*. The solutions for achieving this is to develop continuous urban blocks consisting of different buildings with different visual expressions in the façade and limited façade lengths. It also states that the façade *expression* of each individual building must be visually *connected to the ground*. The main principle for achieving this is to make sure that the perimeter of all buildings coincides with building boundaries (of the plan) and that connected urban areas and streets provide defined rooms. The front gardens, urban spaces, and building projections will be able to create variation in the street sequences and the spatial experience of the place.

The land-use purpose for built-up spaces is regulated with *city centre purpose*. This is presented by the colour brown in the land use plan and includes shops, services, residential developments, offices, hotels/overnight, and catering. The open spaces are regulated as public roads and a common square as well as pedestrian paths. In addition, there are a range of *areas of provisions*, defined by boundaries, to set context-specific provisions that work as overlapping and supplementary regulations on the land-use purpose. The planning instruments most relevant for the regulation of the façade threshold define the location of buildings regulated by building boundaries and the area *within* where they must be placed. In addition, a land-use boundary is used to specifically place the buildings where no building boundaries are defined. Finally, arrows are used to specifically define the exits/entrances to the parking garage. As a supplement to these arrows, there are spaces of consideration connected to a free view.

The provisions of the zoning plan reveal a high prevalence of *absolute regulations* affecting all scales relevant for the production of the façade threshold. Quantified recommendations defining aspects vital for the micro-morphology include *minimum sizes of spaces* for front gardens or private outdoor space, including depth and width, as well as a provision forbidding main entrances for apartments from the street (o_V2). Absolute regulations include aspects of *relations* such as access to technical rooms, car access to properties, or restricted access to front gardens/ the main street. In addition, they include regulations connected to the different *boundaries* and legal lines such as façades with setbacks or projections across building or purpose boundaries. Recommendations include the opportunity or allowance for building projections above purpose boundary lines, planting boxes, and technical installations. Provisions at the meso-level are mainly absolute, with clear definitions of the buildings' location *within* building boundaries, defining urban spaces and yards, and also including contact/relation to street spaces. A range of provisions also affect the production of the façade threshold, including the macro–urban structure. Some of these are cohesive, presenting absolute demands (*shall*) but with a range of potential interpretations. An example is the regulation in §2.1, including urban design of high architectural quality designed for interaction between buildings, spaces, and infrastructure, both for aesthetics and use. Another example is the demand on how the buildings *shall appear*: as singular buildings set next to each other in a row that forms urban spaces and courtyards.

The building application fulfils the regulations from the zoning plan and provisions to a great extent. There is only one dispensation, one that is not affecting the production of the façade-threshold. A declaration about rights of use har the potential of affecting the use of the common areas in a way that might affect the use, but not the production of the façade-threshold. This declaration states: 'The public represented by Kristiansand municipality is *at all times entitled to free movement and stay* on the property' (translation by author). The projects therefore include screens of vegetation in the common yard to shelter private space from public use, but at the same time locating furniture strategically so that it allows for a stay.

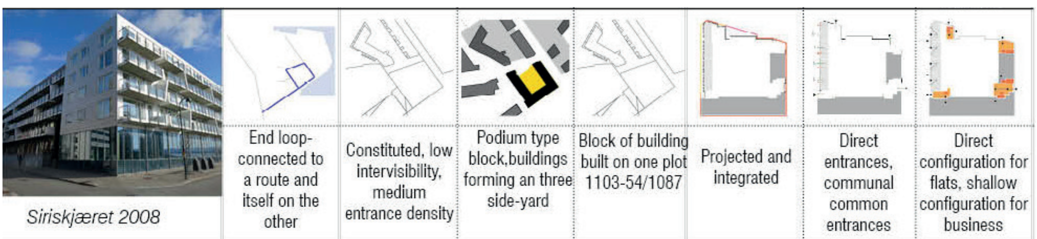
7.3.3 *Siriskjær – Urban Seafront Stavanger*

Realised intentions – A podium block with direct permeable and deep integrated façade thresholds

Frontage type and frontage structure

The façade thresholds of this project consist of a variety of direct permeable and integrated deep structures. The façade facing Siriskjæret to the south as well as most of the façade to the east comprise direct transparent façade thresholds connecting the inside and outside visually. The ground-floor level and the street level differ by 1.3 m, creating a visual and physical barrier between the two levels around the whole block. The north-facing façade is dominated by an integrated permeable façade threshold of a ramp leading up to the shared yard. On the short

Figure 75
Morphological analysis Siriskjær

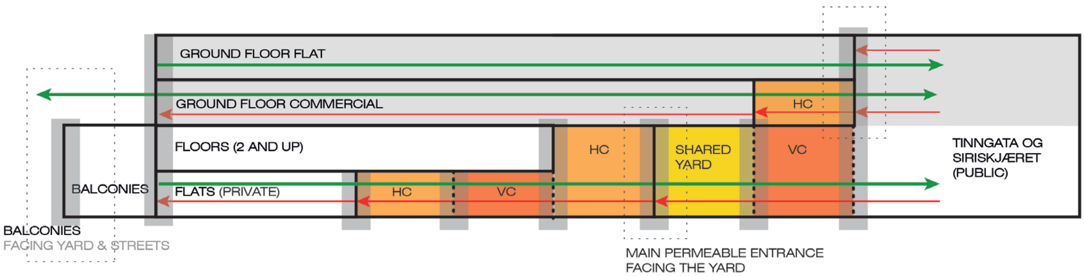


end of the U-block, there are direct permeable types. In Tinngata facing east, there are projected front terraces, both permeable and one-way permeable. These are, similar to the rest of the ground floor interfaces, raised 1.3 m and thus create a difference in elevation. As such, the terrace defines both a front garden and a garden terrace. This type is rare under the current demand for accessible living units and does not fulfil the demands of universal design.

The structure diagram (Fig. x) and configuration analysis revealed one-sided flats at the ground-floor level facing Tinngata (west). As such, the front terrace entrance is also the private outdoor space and therefore has a hybrid and ambiguous nature of both access and stay. The ground-floor commercial units are connected to the street by a medium-depth configuration, including lifts and stairs up 1 m and a horizontal circulation space. The flats on the second floor comprise two main configurations, namely direct entrances to the shared yard for flats facing west and south and deep configurations for the flats facing east. The shared yard consists of both front terraces with direct entrances to flats and a garden terrace.

The block is boundary-built on one plot in the property line. The block of buildings comprises 104 different units that form a U-shape, embracing a three-sided yard on top of a parking podium as well as opening up towards the north. A zig-zag ramp fulfils universal design demands and a staircase connects the street level (Tinngata) and the yard one level up. This ramp and staircase are the main entrance for 12 flats directly linked to the yard. This ramp also forms a secondary entrance to the other flats in the building complex. Within the block there is one façade (west-facing) that actively constitutes the street with four individual entrances and one collective. This direct configuration ensures a high façade density on this façade; however, the rest of the façades in the project provide a large variety from high to none. The three other façades of the block clearly define the street physically and visually but do not constitute it structurally. The south-facing façade has no permeable entrances, while the others have communal entrances at the ground-floor level connected through the lifted ground floor through half-floor lifts. There is low inter-visibility on all of the different sides of the project because of openings in the facing urban form or blank walls and parking garages.

Figure 76
Structure diagram of the building-street relationship at Siriskjær



Stated intentions – Intentions of constitution – dispensation leading to a radical effect

Frontage rules – Mismatch between urban intentions and discretionary implementation

The purpose of the plan is to facilitate the environmentally conscious development of a complex urban development with a variety of functions and an emphasis on housing, offices, and business purposes, as well as a local centre to facilitate the development of housing, cultural, and commercial activities and related common and public areas.

The land-use purposes for built-up spaces comprise housing presented in yellow in the land use plan and combined purpose including housing, commercial units, and offices. The ground floors of the built fabric are reserved for trade and public-oriented activities. The open spaces are regulated as public roads, walking paths, and cycling paths as well as common play areas. The plan is defined through a variety of legal lines such as a plan boundary, purpose boundary, building boundary, free-view line as well as internal walking and cycling paths. Arrows indicate vehicular exits to parking.

The provisions of the plan emphasise universal design as a vital basis for the design and preparation of the plan area. All outdoor areas and buildings must be given an aesthetically pleasing design, and the buildings should be presented with a varied architectural expression. The design of buildings and material use should reflect the function of the buildings and harmonise with the surroundings. Buildings should be located in the purpose boundary unless otherwise shown in plan. The size of private outdoor space per residential unit is a minimum of 4 m^2, with proven good sun conditions, defined as sun exposure on a minimum of 50% of the area during equinox at 15.30. The most vital provisions affecting the façade threshold in the stated planning provisions are the *location of the building* (within the purpose boundary – resulting in boundary-built projects), the *size of private outdoor space* with proven sun conditions, as well as *parking requirements* (defining podium-type urban blocks).

The project intentions were revealed through an analysis of the outline application ground floor plan as well as the supplementary perspectives following the outline application. This plan reveals an emphasis on and the intention of developing a building that connects inside and outside at the same height level. The ground-floor plan of the outline application presents a project intention where the *entrance density* is high, facing east (three communal entrances to flats above as well as four direct entrances for commercial premises), south (four entrances for commercial units), and west (four direct entrances for residential units, one communal entrance to flats, and one commercial entrance). However, as the morphological analysis revealed, these project intentions have not been implemented. Instead, there has been a radical change from the intentions to the implementation. Why did this happen? As part of the applications for building permits in the process there was a need to apply for dispensations from provisions. The application causing such a radical effect for the façade threshold was a technical demand concerning construction that required the underground base plate to be raised by 1.35 m and the cornice height by 0.5 m. As a result, the ground-floor level was raised 1.3 m above the outdoor ground-floor level. The reason for this application was to be able to fulfil the demand of *full parking coverage within the plot*. This raising of the floor led to a change in the internal entrance situation for the residential units sorted through lifts. The effect of the dispensation was minimised in the dispensation application argumentation and it was granted without any objections. The interesting aspect in this dispensation was that the only *provision* directly affected concerned the increase in cornice height. The provisions had no regulations concerning the ground floor other than technical requirements concerning universal design, and radical changes from the project intentions could be accepted through discretionary decisions in the building case. However, this increase in ground floor height at street level changed the direct permeable entrances such that they no longer fulfilled demands of universal design but were accepted as exceptions from the regulations.

7.4 **EXISTING STREET STRUCTURES – INFILL PROJECTS RESPONDING TO EXISTING TISSUE**

7.4.1 ***Kvartal 57 – Infill Kristiansand***

Realised intentions – Projected permeable façade threshold in a constituted project with inter-visibility

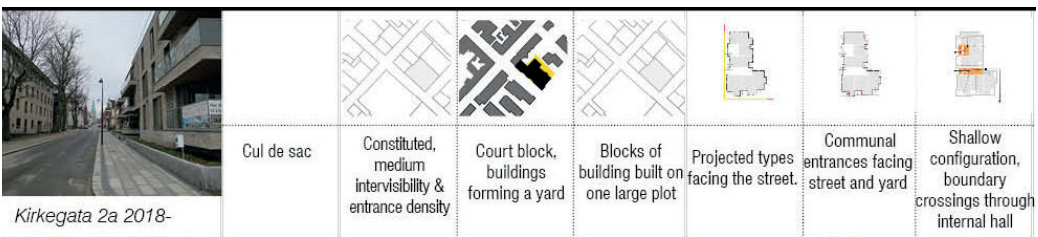
Frontage types and frontage structure – Projected permeable façade threshold

The main types of depth and spatial interaction of the frontage types include the projected façade threshold, including all of the types of visual and physical permeability. Within the built volume there are setbacks, which means that the façade threshold includes both a projected buffer zone/boundary as well as a setback within the volume. Therefore, the distance from the street to the internal rooms has an even greater visual depth and creates a visual and physical distance between public and private territories.

The entrance types of the residential properties comprise two closed communal entrances facing the street projected out from the building line towards the street as well as a communal entrance facing the yard.

The depth configuration from the street to the flats comprises medium-depth façade thresholds. Since the entrances face the street, they are constitutional and there is a greater relation between the street and residential properties than observed in other case studies in this thesis. Two main diagrams of depth configuration define the structure of the façade threshold. Regarding their relations to the street, these different depth configurations are structurally equal and thus include the same type of façade threshold. The balconies from the second floor up have the same configuration as those on the ground-floor level. They are projected one-way permeable frontage types with visual interaction. The depth is different, however, including a deeper configuration of the common internal spaces. The development presents an inside (in the yard) and outside (facing street and beach promenade).

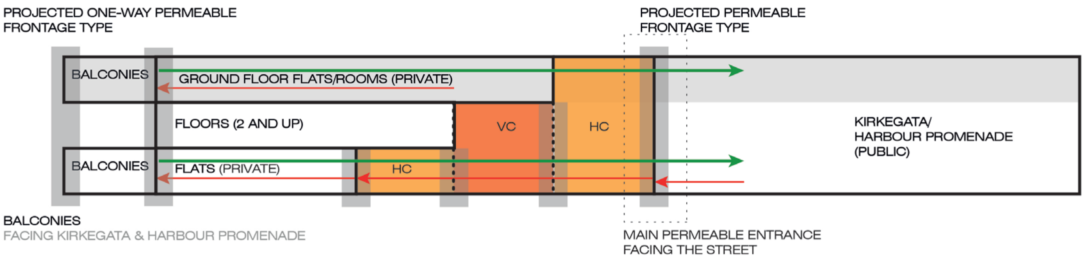
Figure 77 Morphological analysis Kvartal 57, Kirkegata



The spatial context comprises one of the last blocks of development in the classic grid structure of Kristiansand. It is connected to both the grid and its fringe – the harbour context of Kristiansand. Spatial distinctions are defined by existing urban railsi building lines following existing building lines in the historic structure. Thus, a zone exists between the buildings, the street, and the promenade, giving grounds for the projected frontage types. The new project contributes to a medium entrance density within the spatial street structure, including two entrances by street and thereby constituting the street, addressing the main circulation of the building facing the street. The project also contributes to favourable intervisibility conditions; however, the facing building focuses its attention towards the yard rather than the street. The plot structure is multiple – a block is defined by plot series of multiple plots, which leads to a variety of building types and appearances naturally created by the plot. The project defines a yard accessible for all but with a clear territorial distinction. Some of the flats also face the yard, and a few small flats are one-sided and only face the yard.

The route structure analysis revealed that Kirkeveien is linked closely to the main central core, but through a vehicular cul-de-sac. If we include the harbour/beach promenade – the pedestrian route – then the connection is much more integrated and is part of a pedestrian through loop.

Figure 78 Structure diagram of the building-street relationship at Kvartal 57, Kirkegata



Stated intentions- Constituted urban tissue and sea level defining location

Frontage rules

The purpose of the plan is to upgrade an existing residential area to a new one, where senior inhabitants live in flats near to the city centre that are well-connected and designed with good universal design principals.

The land-use purpose for built-up spaces comprises housing presented in yellow in the land-use plan and combined purposes including housing, commercial units, and offices. The open spaces are regulated as parks, public roads, public pavements, outdoor areas, and zones of special consideration (i.e., noise and heritage). The plan is defined through a variety of legal lines such as plan boundaries, purpose boundaries, planned buildings, and property boundaries to be abolished. Arrows indicate vehicle exits to parking. Access to parking is regulated mire widely when facing the street to maintain a free view between street and building. There is also a zone of consideration related to noise, which affects the production of the façade threshold.

The intentions of the planning description are not clearly described in in the provisions. All new housing units must satisfy the requirements for available housing, which include one parking space allocated per 100 m^2 of business/office and one space per residential unit. All parking must be established in common garage facilities under terrain defined by an arrow in the zoning plan. The main topics that affect the development of the façade threshold in the provisions include a green buffer zone between the house and the street, outdoor area and sun conditions, noise levels, and environmental conditions such as weather and sea rise. The location of the buildings is a result of *existing built form in the street defining a green buffer zone between house and street and between private and public.* The façade line of the new project follows the placement of the neighbouring building in the urban grid (Østre Strandgate). This location creates a green buffer zone between building and street, which the planning description describes as a green 'garden' zone, in which the intention is to create a *green screen* between private and public, defined by planting. There is a demand for a 25-m^2 outdoor area for each residential unit, which could include private balconies and common roof terraces. Apartments in Kirkegata within the yellow noise zone must be two-sided and the terraces must be glazed on for the bottom three floors. Changing weather conditions, which lead to water rise and storms, affect the location (height) of the ground floor; thus, the lowest metre height allowed for the ground floor units is 3 m, which has created a difference in level between public and private space.

The preliminary conference was crucial for clarifying and extending the scope of the built project. Supplementing regulations from other plans concerning balconies include allowing projections up to 1.2 m above the building line towards the street. Requirements for glazing in relation to noise are considered irrelevant as the requirement for outdoor living space per dwelling unit is maintained with common ground-level garden facilities facing the courtyard. There are no legal lines defining planned development, and therefore, it is assumed that the project owner can act freely within the building area. An interesting aspect is the recommendations to follow the zoning plan without dispensation applications. Experience shows that deviations in this area will lead to extensive neighbourly protests, which will significantly lengthen the process. As such, the outline application complied with the zoning plan and supplementary regulations in the overall planning frameworks and was granted outline permission.

7.4.2 *Hollenderkvartalet – Infill Oslo*

Realised intentions – Open commercial premises and deep residential configurations

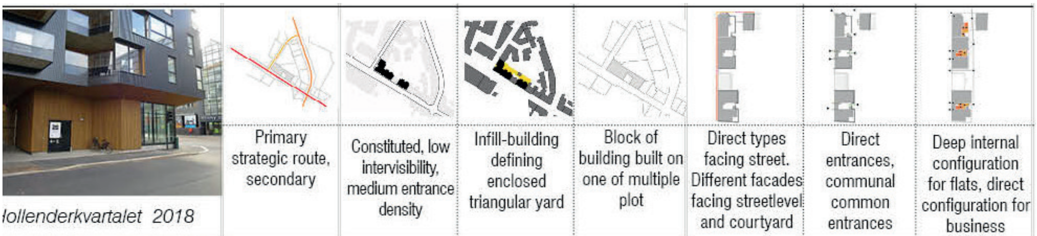
Frontage types and frontage structure – Physical and structural constitution with deep as well as shallow façade thresholds

The project at Hollendergata has very different frontage types facing the street and yards. The façade threshold is open towards the streets using large windows that connect inside and outside, whereas towards the yard it is closed with entrances set back from the building line, and the façade is covered in wood. The observed morphology reveals a clear conceptual idea of an open front towards Schweigaards gate, with direct permeable entrances and a transparent field of windows. Toward Hollendergata there is a direct transparent façade threshold of bike parking. On this street segment, there is also a transparent and permeable integrated façade threshold leading to the residential properties of the project. While the façade thresholds towards the street are direct with projected balconies covering the narrow pavement, parts of the façade thresholds facing Hollendergata are defined by setback types of both a closed and open character as well as direct transparent. The corner entrance is set back from the building line, thus creating more space on the pavement.

The building facing Schweigaardsgate has a direct permeable façade threshold and shallow depth configuration to commercial functions from the street. Entering and exiting occur through one boundary crossing of transparent doors. The façade facing Hollendergata consists of an integrated permeable frontage type with a very deep depth configuration. There are five boundary crossing from the most public (the street) to the most private (the flats), three of which are locked and accessible for property owners only, while the other two are open boundaries between vertical and horizontal circulation. Figure x presents a generic structure diagram for the frontage structure at the micro level.

The infill project has filled in a vital part of the quarter, built on one of multiple plots within the urban block and forming the last part of an enclosed triangular yard. The plot structure is a composite of different plots of varying sizes, help-

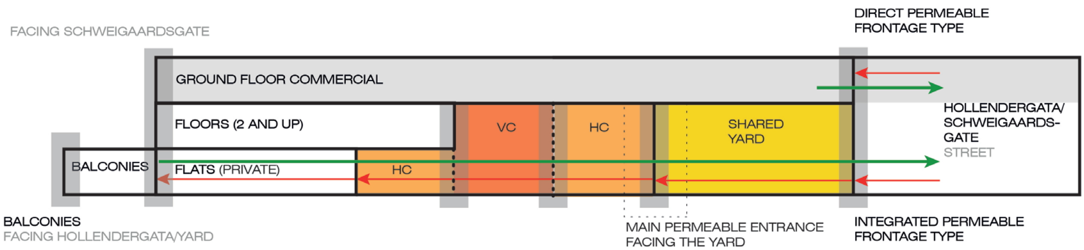
Figure 79
Morphological analysis Hollenderkvartalet



ing to create a natural variety of built form in the urban structure. As such, the infill project has a range of both formal and structural aspects to relate to in the pre-existing urban tissue. The infill building forms the last part of an enclosed triangular yard. The building is placed as a continuation of the building lines of the block and thus defines the street both visually and physically. In addition, it has entrances from the commercial unit directly to the street in such a way that it constitutes the street. The street spaces include plots and buildings that face the two different street-facing façades of the project. The adjacent building line of the street space of Schweigaardsgate is characterised by a void in the built structure toward the trainline. Towards the street segment of Hollendergata, there is a slab block that has a blank side facing the street. As such, it is physically and structurally removed from the street space. No entrances face directly towards the project from the adjacent properties/buildings, which leads to low inter-visibility within the street segment. At the back of the building facing the yard, there is also low inter-visibility between the various buildings. Furthermore, the entrance density of the project is medium.

The route structure analysis revealed important strategic routes that define the block on all three sides. Schweigaardsgate is part of a *primary strategic route* connecting Oslo city centre with other settlements nearby. It connects to St. Halvards gate and Strømsveien leading out of Oslo, originally to a farm in the settlement of Rælingen. Grønlandsleiret is one of the oldest streets in Oslo connecting the medieval city of Oslo with the grid plan of the 15th century. It is a secondary strategic route in the grand scale of things, but within Oslo's city structure it is of vital importance. Hollendergata connects the primary and secondary strategic route and, as such, it is a pericentric tertiary route connecting both of the more strategic routes.

Figure 80
Structure diagram of the building-street relationship at Hollenderkvartalet



Stated intentions – Constituted tissue and commercial/residential split at the ground-floor level

Frontage rules

The purpose of the plan is to facilitate a housing programme through improvement and renewal by creating environmentally friendly dwellings with high architectural value and a good living environment for different communities while maintaining the cultural heritage value of the block. An environmental programme defines environmental goals for the block. The plan's main approach is to strengthen the block structure through development along the street.

The land-use purpose for built-up spaces comprises combined development and construction: residential, business, office, catering, and other types of buildings and facilities (environmental station). Nos. 40 and 42 are regulated for the purposes of housing, business, offices, and catering, while No. 46 is regulated for housing, business, offices, catering, and other types of buildings and facilities (local area station) in zoning plan S-4660, which was adopted on September 26th, 2012. The stable building at No. 44 is located in field S2 and is regulated for residential use. The open spaces are regulated as public roads, pavements, and zones of special consideration (i.e., medieval grounds and protection of the cultural environment. The plan is defined through a variety of legal lines such as purpose boundary, building boundaries, and boundary zones of special consideration. Arrows indicate vehicular exits to parking. The land-use plan is complex and includes a range of layers in addition to the land-use patterns. The vital layers include three different zones of consideration related to the importance of heritage and cultural values in the area. These include H730_3 – zone with bonding under the Cultural Heritage Act (medieval grounds) and H570 – zone of special consideration – conservation of the cultural environment and area covered by clarified national cultural monuments.

The provisions of the plan emphasise the constituted tissue, stating that buildings should adapt to adjacent buildings and façades in the conservation area through good façade design, use of materials, colours, façade structure, heights, and volume distribution. A few specific regulations affect the production of the façade threshold directly. Provisions are clear about corresponding building and street lines (§3.1.5). There are also clear provisions that define businesses facing the street with an open public façade, that is, with an open design. In addition, housing entrances are regulated to be separated from business entrances. Above ground-floor level, from 3.5 m and up, there are opportunities to either project the building out and above the building line or to build a setback within the building from the building line. This recommendation is not absolutely regulated but provides the project developer with the opportunity to be flexible in their design. In addition to direct regulations and recommendations, a few paragraphs affect the production of the façade threshold indirectly. These include the minimum size of private outdoor space (3.1.3), adapting and relating built form with neighbouring built form (with heritage value) (3.1.6), the opportunity to build underground parking and access to it (3.5), and access between dwellings' common outdoor space (noise and water management).

The intended development of the properties was difficult to fulfil with the existing zoning plan, and the preliminary conference was used to discuss the land use plan and regulations. For the production of the façade threshold, the main concerns at the preliminary conference were exits and parking. A free view and sightlines have direct consequences for the design of the interface. The outline permission was granted with dispensations for building height, parking coverage, apartment distribution, apartments on the quiet side, noise limits on outdoor living areas, and building boundaries. Regarding parking, current regulatory provisions were considered not to be in line with the current overall guidelines, whereas a significant reduction in the number of parking spaces was considered to be in line with expected future city development.

7.5 **HYBRID STREET STRUCTURES – TRANSFORMATION RESPONDING TO HYBRID TISSUE**

7.5.1 *Tidemann Fabrikker – Ensjø Transformations*

Realised intentions – Defined and inter-visible but not constituted façade thresholds

Frontage types and frontage structure – Physical and structural constitution without street constitution

The frontage type mapping and analysis revealed an urban block that is visually and physically related to the street but structurally removed. The different frontage types comprise one direct façade threshold facing the street; however, this direct connection is only once perforated by a permeable connection facing the street and one collective entrance facing the living street (Bertram vei – *'gatetun'* (no)). The main characteristic of the frontage is a closed permeable appearance, but there are a range of transparent relations, such as direct-transparent types. In addition, there are three setback one-way permeable connections, all of which provide a relation to the street and include a private small terrace directly connected to the most public space.

Regarding the *micro building–street relation,* the structure diagrams and configuration analysis revealed that most of the ground-floor flats are one-sided flats

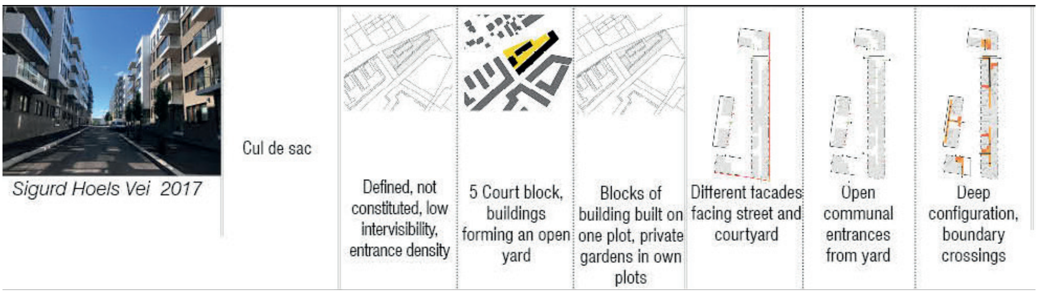


Figure 81
Morphological analysis Sigurd Hoels vei

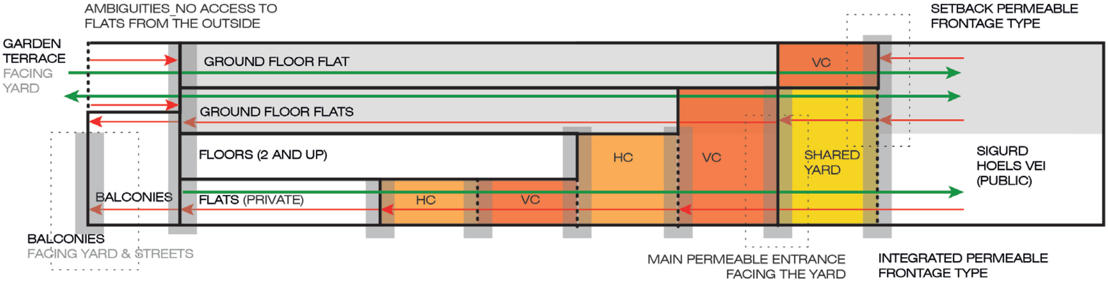
facing Sigurd Hoels vei (southeast) as well as the courtyard, and also include some corner flats. These have their main access point from a collective entrance and corridor in the horizontal circulation space. As such, the individual entrance to each flat is deep within the structure. One must go through several rooms to get from the street to the apartment – first into a side street, then into a backyard, and then into a collective entrance, and then into a stairwell, and finally into a private apartment with a garden terrace or balcony. Thus, the topological relationship is very deep. The private outdoor space is accessed from the flat through a one-way permeable façade threshold. This principle is used for flats facing the street as well as those facing the courtyard.

There are open communal entrance types mainly facing the yard or living street. There is only one communal entrance facing the street, and no entrances facing the green pedestrian structure. The façades facing the different sides of the street types as well as the courtyard are different. The street and living street façades are divided into sections using different materials and projections above the ground-floor level. The courtyard façade has the same character, material, and type of balconies within the yard – different from the outward-facing buildings.

Regarding the *block–street and street–street relations at the meso-level,* the plot structure includes one main plot for the buildings as well as private plots for the courtyard terraced gardens. The urban block is boundary-built and comprises five buildings, with three connected in an L-shape and the other two forming a yard with openings between, used as access points to the yard.

The types of access routes defining the urban block include the public street, a living street, and pedestrian paths. The project is directly related to the public street *Sigurd Hoels vei*. The block has a low constitution – there is only one entrance facing the street, and this entrance also has another door from the courtyard. Across this street is another urban block of housing, the design of which directly affects the inter-visibility of the street. Regarding the *city–street relationship at the macro-level,* there is a structural disconnect between block and street. The street is a cul-de-sac, an end route.

Figure 82
Structure diagram of the building-street relationship at Sigurd Hoels vei



Stated intentions – building line and entrances relating to street

Frontage rules

The main principles for the plan comprise the two seemingly conflicting terms of urbanity and openness. These include urban qualities along streets and a new urban square as well as openness to green structures and a view; a main street that structures the area; and a connection to the existing urban tissue. The aim for the built structure is presented by the concept of *naturban,* where green nature and urbanity meet as complementary characteristics in the plan. Within this concept, intimate urbanity must be created internally in the area with green nature embracing it. At the same time, historic patterns and existing and planned surroundings should be woven into the same plan. The actual buildings should provide favourable sun conditions for all of the different residential units but, by the nature of their configuration, will have sun at different times of the day. The planning description highlights a clear distinction between public and private areas to be able to make efficient use of the area. From this perspective, the description highlights that *'the content of the first floors must not be under-estimated'.* The description also highlights the importance of entrances facing the public streets within all of the different built structures that frame it. These public streets are considered to make up the *urban backbone* of the plan, where the dimensions of the streets, accesses/entrances directly from the street, and the combination of hard surfaces and elements of green/overwater will ensure intimacy and urbanity.

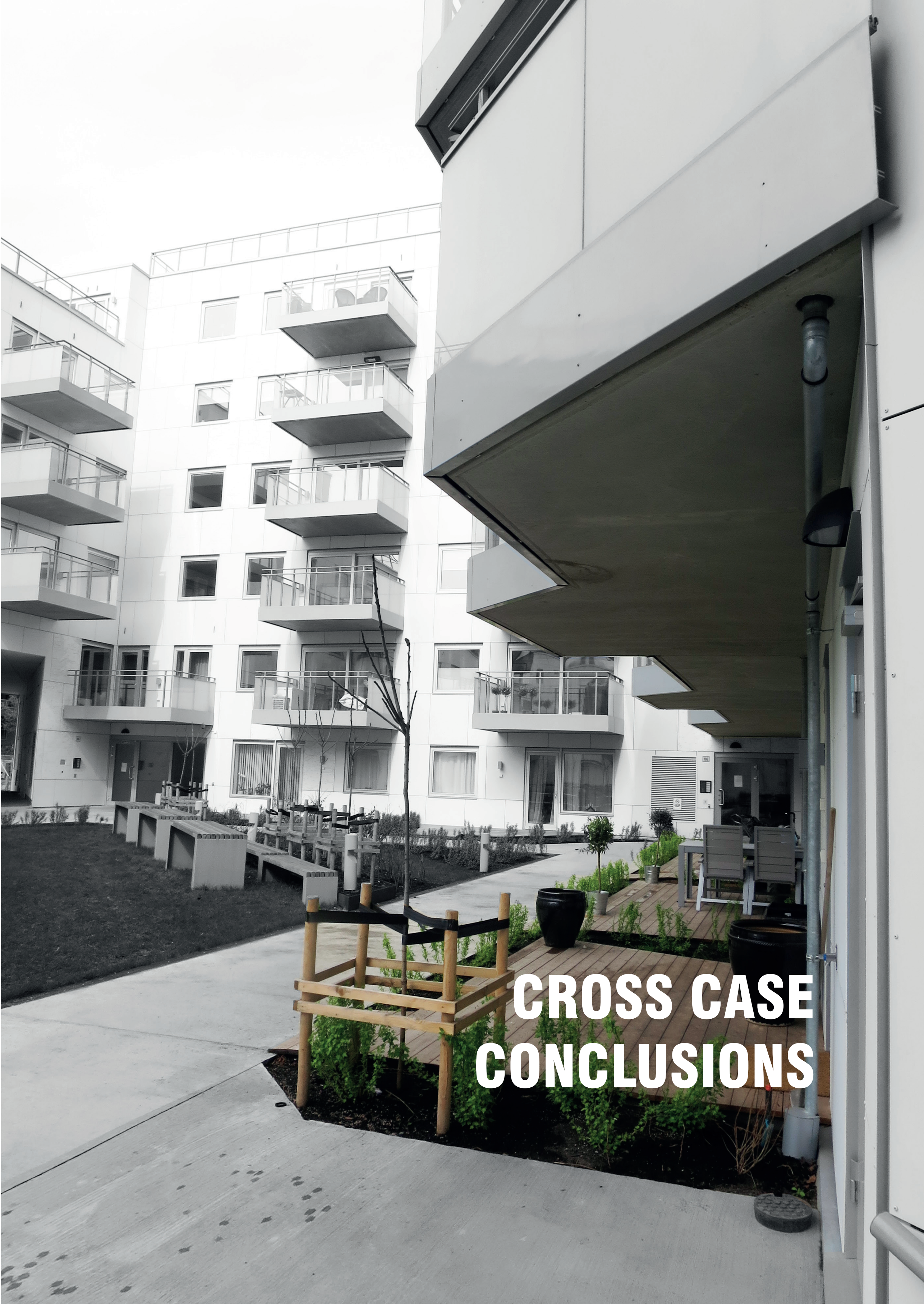
The land-use purpose for built-up spaces is housing. The open spaces are regulated as public roads, pavements, squares, living streets, and walking trails. The plan is defined through a variety of legal lines such as purpose boundary, building boundaries, building line, and height line. Thus, the different lines include both building lines and building boundaries, the first of which is connected to the street as a living street, and the second is connected to green areas. The mix of functions is highlighted in the planning description for its capacity to give life to the street. However, no commercial premises are included in the zoning of this project. There are no zones of special consideration connected to it either, as this project is decided under the previous planning law. However, the purpose of the special area (similar to zones of consideration) is part of this plan and connected to the urban square.

The written provisions include a range of different aspects relevant to the building–street relationship. The most relevant regulations concern *location and height*, *minimum outdoor area,* and *design*. In addition, aspects such as regulated exits, parking, and overwater management play a role in the definition of the space. In accordance with the planning description are the building line and building boundary, both of which are used as legal regulatory tools for linking the building to its context: *'The building must be within building lines and within building boundaries as shown on the zoning plan'.* These lines are further emphasised by the opportunities to build outside them, as projections over public space if they are built above 3.5 m from the street surface and do not address setbacks. The regulation emphasises a clear distinction between public and private land, where private or common outdoor areas adjacent to public areas should be separated by vegetation, level differences, altered material use, or other means. Buildings adjacent to regulated public road or space shall have access/an entrance from public road/space, façades should be broken up or treated to avoid monotony, and galleries are not allowed.

The outline application presented the project through a range of drawings and statements on various topics and went systematically through the built project seen in relation to the written regulations. However, it did not highlight some of the more crucial aspects related to the building–street relationship. It presented a project that followed building lines towards streets and living streets and were more freely placed within building boundaries towards the green structures. At the ground-floor level, the proposal included three small setbacks from the building line, and seven projections above street level in plan 2. In this initial proposal, there were no entrances facing the street and only one facing the living street. As such, the regulations were not fulfilled. An indirect entrance through a gated room provided access to the inner courtyard, where the rest of the entrances faced. This lack of entrances towards the street was picked up by the building control authorities and highlighted in a correspondence between them and the architects; however, the output of this discussion led to only one entrance along the whole façade-length of the building. The outline permission was given without dispensations from regulations.

Concluding remarks

In this chapter, I have presented the different cases that were selected to be studied. The descriptions of the cases presented similarities and differences within the parameters of form and regulation, morphological and geographical context, planning intentions, and building control. In the next chapter, I link these cases and present a cross-case analysis and conclusions derived from the case material. As the cases were analytically selected, the findings when combined present analytical generalisations of answers that reveal tendencies or paths, rather than conclusive answers. As such, the topic is well-suited for further research – to verify answers and supplement tools and paths relevant for effective compact city building.



CROSS CASE CONCLUSIONS

Chapter 8 **CROSS-CASE CONCLUSIONS – EMPIRICAL CASES SYNTHESISED AND ANALYSED: MORPHOLOGICAL, LEGISLATIVE, AND DISCRETIONARY CONCLUSIONS**

The six empirical cases revealed a range of smaller and more significant findings related to the understanding and implementation of the façade threshold within compact city building. The conclusions revealed through the empirical cases were focused towards the suppositions presented, updated, and renewed through the process as well as the research questions posed. This chapter *synthesises* the scope of aspects relevant for both the *characteristics and capacities of* as well as the *implementation of* the building–street relationship revealed by the empirical cases. By choosing six empirical cases, I was able to highlight a range of different approaches to the questions at stake, some of which showed general tendencies towards knowledge creation while others provided a comprehensive toolbox of ways to complement this micro-morphological unit. Second, the chapter *analyses* the characteristics that can be read as more general knowledge across the different cases. All of the empirical cases that I investigated are unique, and therefore, it was challenging and sometimes not possible to find exact answers to the research questions posed that would be relevant in all of the cases. However, the material that I analysed contained aspects that can be interpreted as tendencies because they were repeated in different cases along with examples that were unique for each case, thereby presenting a scope by which the topic can be read and implemented. In addition to sharing the same selection criteria (Norwegian case studies; new urban projects [2000–2017]; ambitions to be a compact city; within different morphological contexts; and infill, new built, and transformations), the cases also shared morphological and/or geographical contexts. The aim was to determine whether these parameters played a vital role in affecting the building–street relationship, either in a morphological, institutional, or discretionary manner.

8.1 **THE MORPHOLOGICAL PERSPECTIVE – INTENDED AND REALISED PROJECTS**

In this chapter, I synthesise and discuss the different cases to determine their commonalities and differences. I highlight and analyse the findings and synthesis to reveal general topics relevant for confirming or rejecting the hypotheses and answering the research questions. The assumptions revealed through the inves-

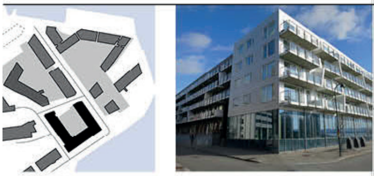
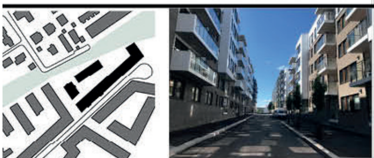
	MACRO	MESO			MICRO			
MAP	GRID / STRUCTURE	STREET STRUCTURE	BLOCK STRUCTURE	PLOT STRUCTURE	FRONTAGE TYPE	ENTRANCE TYPE	INTERFACE STRUCTURE	
 Kanalbyen 2018-	Cul de sac, connected on one end to route	Unconstituted, low intervisibility & entrance density	Court block, buildings forming a yard Type 143/181	Blocks of 5 buildings built on one field and sectioned to one plot	Projected one way permeable, transparent. Permeable integreated	Open communal entrances from yard direct for service	Medium deep configuration through open yard	NEW TISSUE - NEW STREET STRUCTURE - TABULA RASA
 Sørenga 2013-16	Cul de sac, connected on one end to route	Unconstituted, low intervisibility, entrance density	Podium type block, buildings forming a raised yard	Block of building built on one plot	Direct transparent - rich combination facing east	Communal & 1 Individual entrance(s) facing street	Deep internal configuration for flats, direct configuration for business	
 Siriskjæret 2008	End loop-connected to a route and itself on the other	Constituted, low intervisibility, medium entrance density	Podium type block,buildings forming an three side-yard	Block of building built on one plot 1103-54/1087	Projected and integrated	Direct entrances, communal common entrances	Direct configuration for flats, shallow configuration for business	
 Kirkegata 2a 2018-	Cul de sac	Constituted, medium intervisibility & entrance density	Court block, buildings forming a yard	Blocks of building built on one large plot	Projected types facing the street.	Communal entrances facing street and yard	Shallow configuration, boundary crossings through internal hall	PRE-EXISTING TISSUE - EXISTING STREET STRUCTURE - INFILL
 Hollenderkvartalet 2018	Primary strategic route, secondary	Constituted, low intervisibility, medium entrance density	Infill-building defining enclosed triangular yard	Block of building built on one of multiple plot	Direct types facing street. Different facades facing streetlevel and courtyard	Direct entrances, communal common entrances	Deep internal configuration for flats, direct configuration for business	
 Sigurd Hoels Vei 2017	Cul de sac	Defined, not constituted, low intervisibility, entrance density	5 Court block, buildings forming an open yard	Blocks of building built on one plot, private gardens in own plots	Different facades facing street and courtyard	Open communal entrances from yard	Deep configuration, boundary crossings	MIXED TISSUE TRANSFORMATION

Figure 83 Cross case analysis of the morphological aspect in realised projects within three morphological urban tissues

tigation of the morphological loop of the urban block of Oslo indicated that the knowledge of compact city building has been lost, and that current city building is characterised by introspective cells. In this section, I first systematically present the combined morphological characterisation of urban form before providing the synthesis and analysis. This morphological characterisation comprises macro, meso, and micro aspects.

8.1.1 *Morphological perspective and synthesis*

Macro: Grid structure – Cul-de-sac as the main residential urban grid

The different projects share similar characteristics of urban structure. Four of the empirical cases have urban structures connected on one end to the route, known as a cul-de-sac. Three of them are far removed from the main street within their urban tissue, whereas the project at Kirkegata is directly connected to the main square of the city and is therefore more directly integrated within the existing urban tissue. These four cases are defined by the street on one/two sides, and by either the sea or a green area on the other. The building types within these cases all have a residential programme at the ground-floor level, and two of them have commercial units at strategic corners. The different cul-de-sacs in the grid structure operate within all three morphological contexts. However, both the new urban tissue of harbour development and the mixed-tissue transformation of the Ensjø development have the most detached cul-de sacs. The densification projects in these two morphological contexts represent an expansion of the built-up area in dense islands and work as satellites of the urban core. The cul-de-sac at Kirkegata has a strong connection to the main streets of the grid structure, a range of functions and facilities for public life, as well as an active harbour promenade adjacent to the building project. As such, the densification project in this morphological context represents a continuation and enhancement of the existing urban qualities.

The Siriskjær project in Stavanger shares similar overall characteristics with the four cul-de-sacs, representing an expansion of the built-up area in dense islands/satellites of the urban core; however, it is characterised as an end-loop connected to a route and to itself on the other. Thus, this case is defined by streets on all four sides but is still removed from the main street or city centre and built as a dense island and an urban satellite. The case at Hollendergata connects primary and secondary strategic routes and is therefore the most integrated case in my investigation.The ground floor programme is commercial, which presents other potentials and challenges for the façade threshold.

Different urban structures provide different preconditions for developing the building–street relationship. The cul-de-sacs have little through-traffic and are therefore most relevant for residential programme, not only because of privacy but also because of adjacent ground-floor functions such as commercial premises, offices, and other facilities for public life.

Meso: Street, plot, and block structure

The projects also share similar characteristics in terms of plot, street, and block structure. The four cases built within new urban tissue and mixed tissue are all boundary-built urban blocks built on one plot or a larger field. The plot often corresponds to the façade line as well as the land-use purpose in the zoning plan. Therefore, they are generally defined by the plan. The case built within the pre-existing tissue is built on one available plot within an urban block of multiple plots, creating infill projects that correspond to the existing urban fabric. As such, the different morphological contexts set different preconditions for the development of blocks.

The investigation revealed three main block types built on two main types of plot in the empirical cases, namely the *podium-type block* (Sørenga and Siriskjær), *the court block* (Kanalbyen and Sigurd Hoels vei), and *infill blocks* (Kirkegata and Hollendergata). In the podium-type block, the buildings are boundary-built and form a raised yard. Thus, the different ground-floor units/flats in these projects face one side, defining a configurational logic where the most public entrance is in the deepest part of the building and the most private outdoor space is next to the public street or path. Noteworthily, these two cases were the oldest cases in my empirical investigation. The plans that provided the legislative framework for these cases are connected to the 1985 law. Both podium-type projects have residential entrances from a raised yard that is publicly accessible; therefore, they both have deep façade thresholds. The programme in the raised area comprises parking and commercial premises. The two more recent *open court blocks* comprise different buildings on the ground floor, forming an open ground-floor yard. Parking facilities and storage are provided under the whole plot – that is, under the ground-floor yard and buildings. These two projects are more recent than the podium-type one and provide different capacities for establishing façade thresholds; that is, by offering the potential for flats that face two sides. However, this potential has not been implemented in the project at Ensjø. The last two cases are *infill blocks*, built on one of multiple plots in the urban block. These two buildings are built within the pre-existing tissue and existing street structure. The infill block at Hollendergata faces both primary and secondary strategic routes and helps to form an enclosed triangular yard. The infill block in Kristiansand faces a cul-de-sac that forms an open yard facing the sea. The built projects in Hollenderkvartalet, Sørenga, and Kirkegata all have passages into a common courtyard, although it is only Hollenderkvartalet that has a physically locked entrance gate.

These residential common areas are accessible for the public, either through a declared right or physically through the open form.

Furthermore, half of the cases are constituted while the other half are not. Thus, they provide different possibilities for access into and out of their building façade from and to the street. In addition, and unsurprisingly, the same projects share similar characteristics concerning entrance density. The projects built within the existing street structure as well as parts of the urban block at Siriskjæret are all constituted and share the characteristic of high entrance densities, with the project at Hollendergata having the highest. The highest residential entrance density among the empirical cases is at Siriskjær. This building has commercial premises at the ground-floor level and a range of entrances facing the primary strategic route.

The different degrees (percentage) of inter-visibility in the cases is directly affected by the way entrances and windows are positioned towards each other across the street – the street width and physical definition as well as the positioning of windows and doors play vital roles. A general finding was that most of the projects share degrees of low inter-visibility. The reason is low street definition, which is due to the different façades of the projects either facing an open area such as the sea (Sørenga), a gap in urban form (Hollenderkvartalet), or a green area (Sigurd Hoels vei), or the street-facing buildings have blank walls without windows or entrances (Siriskjær). The highest inter-visibility is found where the buildings face each other and define a street, and where windows and doors relate to one another. Therefore, I found the highest inter-visibility among the empirical cases at Sigurd Hoels vei and Kirkegata. The infill project in Hollendergata relates to buildings with a small number of facing windows and a gap in urban form; thus, the project has medium inter-visibility from related urban form. However, because this case is located at a strategic route connecting the city centre to other settlements, the street is active and visible.

Micro: Entrance type, frontage type, and interface structure

In addition, the projects share entrance type, frontage type, and interface structure characteristics. All six empirical cases have communal and collective entrance types leading to residential units. Four of them share characteristics of communal entrances to residential units at the ground-floor level (as well as the units from the 2nd floor and up). The case at Siriskjær has individual entrances at the ground-floor level for four residential units. In addition, the case at Hollenderkvartalet has individual entrances to commercial premises at the ground-floor level. The collective entrances comprise frontage types with deep integrated façade thresholds. In five of the cases, these include a transition from the street to a collective yard, through a collective entrance and within a horizontal (and vertical) circulation space before entering the private unit. As such, the depth configuration from the street to the private residential units at the ground-floor level is deep. However, the depth configurations can be characterised further into two subtypes. The first subtype comprises deep vertical circulation within the building, through long corridors and one-way-facing residential units, examples of which are found at Sørenga and Ensjø. The second subtype comprises a shallow depth configuration within the building, sometimes accessed directly from the street (Kirkegata) and other times accessed through the yard (Kanalbyen). The case at Kirkegata links the ground-floor units through collective entrances and shallow depth configurations constituting and facing the street. In addition, Sigurd Hoels vei has one collective entrance facing the street that works in addition to the communal entrances from the yard.

The cases present a variety of frontage types and façade thresholds defining the micro-morphological element. Four of the cases have residential units with one-way permeable façade thresholds facing the street, from inside and outside – but not vice versa. These frontage types are designed as private balconies, attached to the ground floor, and fulfil the planning demands of private outdoor space. As such, the most public area (the street and communal entrance) and the most private areas – one-way permeable balconies, front gardens, and garden terraces – are directly next to each other. The project at Siriskjær has both permeable and one-way permeable façade thresholds facing and thus constituting the street.

The yard forms a vital part of the permeable depth configuration in contemporary Norwegian practice. As such, cases reveal a focus and emphasis on inside the plot rather that in the relation between two plots – that is, inside the purpose boundary rather than in the relation between two land-use purposes. The analytical measures used to assess the building–street relationship could also be implemented within the yard. For example, two of the cases have a high entrance density and constitution within the yard (Kanalbyen and Ensjø), while they exhibit the opposite towards the street. This finding corresponds to research on introspective cells, providing qualities for housing but not for the city.

8.1.2 *Morphological findings revealed*

The morphological findings from the empirical cases can be summarised under the following subheadings: *physical and visual definition and structural disconnection between building and street; deep integrated permeable façade thresholds; ground-floor balconies as one-way permeable façade thresholds; the residential interface turned inside-out and outside-in – territorial; and commercial, direct, permeable, and transparent façade thresholds.*

Physical and visual definition and structural disconnection between building and street

A major finding from the morphological analysis is that a majority of the contemporary urban blocks are generally boundary-built, creating spaces that physically and visually help to define the street. However, these boundary-built projects are most often structurally disconnected from the street and thus also the city. The structural links between buildings and streets are normally addressed through the internal courtyard.

The most extreme example of structural disconnection revealed through the case material was found in the case project in the residential street Sigurd Hoel vei at Ensjø in the land transformation tissue. The building line and street line are the same, and the different urban blocks help to define a clear street space, but the project only has one direct entrance between the building and the street, while the other structural connections occur through a semi-public yard. The realised solution differs from the intended capacities of the project. Provisions of the plan state clearly that for all buildings that face public streets, there must be entrances facing the street. However, in the building implementation case there is reason to believe that the universal design requirements of the technical regulations have trumped the planning provisions.

A similar structural disconnection from the street can be found in the Kanalbyen project in Kristiansand and the residential part of the Sørenga case, both of which are within the new urban tissue. Instead of creating a building–street relationship, these projects present a building–yard relationship, placing an emphasis on the internal communal space rather than the public space of the street. As such, the façade threshold is deep and integrated within the urban block.

There are a few exceptions to this finding. Most of the commercial premises at the ground-floor level have direct and structurally connected links between building and street. As such, the land-use purpose affects the structural connections of the façade threshold. In addition, one of the residential projects at Siriskjær has one façade structurally linking and constituting the street through individual entrances.

Deep, integrated, permeable façade thresholds

All six cases are configured as deep integrated façade thresholds, which sometimes comprise a large courtyard and other times are deep inside the building. This corresponds to findings revealed in the investigation of frontage types (Chapter 5). The deep façade thresholds occur as deep sequences of relationships between apartments and the street. In these façade thresholds, one must go through several rooms to get from the street to the apartment, first into a side street, then into a backyard, and then into a collective entrance, and then into a stairwell, and finally into a private apartment. As such, the topological relationship is very deep. The most extreme example of the deep façade threshold was found in the development at Sørenga. The topological steps from the collective entrance include sequences of corridors and doors before reaching the private entrance to the flat. The vital relationship between public street and private entrance has become a matter of privacy, entering deep into the building structures.

Ground floor balconies as one-way permeable façade thresholds

Four of the cases have one-way permeable façade thresholds addressed through ground-floor balconies, front gardens, and/or garden terraces. These private outdoor spaces provide the most direct relationship between apartment and street. They provide direct contact between the most private outdoor space, as a one-way permeable type of façade threshold, and the most public outdoor space, namely the street. These ground-floor relationships revealed through the morphological analysis of the cases present ambiguities in territorial definition between public and private; they very directly connect private and public and are territorially demanding. These findings are connected to the demand for private outdoor areas as well as the prevalence of one-sided flats.

The residential interface turned inside-out and outside-in – Territorial

The combination of a deep integrated permeable entrance space and shallow one-way permeable private living space of the ground floor balcony, as seen in the residential façade threshold, presents a classic building–street relationship turned inside-out and outside-in. In theories of good territorial transition from public to private, that is, the classic public–private relation, there is a focus on a gradual sequencing from public to private. This type is known from English terraced houses (individual entrances) and residential blocks facing the streets, such as Iladalen or Finnmarksgata. The entrance spaces in these projects are directly related to the street, address and define sequences of semi-public space, and belong to both the street and the building. The private living space is defined through a private garden or a balcony deeper in the structure. In the case examples, this type of interface is reversed: the public entrance space is placed in the deepest place in the structure, while the private balcony or garden is related directly to the public street at the ground-floor level. The structure analyses of the different cases reveal a clear tendency for implementing this twist, thus revealing that the (often public) entrances to the flats structurally become the most private space, while the (often private) gardens/balconies become the most public space in the interface structure. The tendency to define structural connections and main communal entrances through the yard rather than the street also supports the implementation of this interface twist. The cases demonstrate that this inside-out, outside-in interface defines territorial ambiguities and challenging façade-thresholds and highlights an implementation gap, which demands morphological and structural understanding along with the planning tools and codes required for implementation. The cases also highlight and confirm the assumption of a knowledge gap addressing the focus and understanding of structure as part of the definition of the façade threshold.

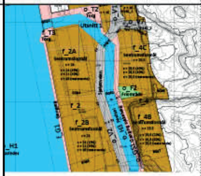
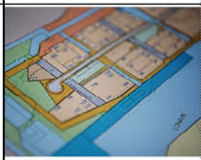
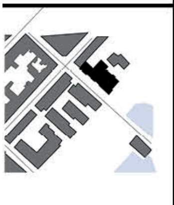
The commercial direct, permeable, and transparent façade threshold

Four of the cases have commercial premises as parts of their ground-floor use, all of which are boundary-built. Their façade thresholds are direct permeable or direct transparent. As such, they merge public and private spaces into an open inside–outside relationship. Shallow interfaces, few setbacks, and projections define the spaces. This commercial direct façade threshold corresponds to the municipal demands of open, public, and active façades, helping to create street life. However, field observations revealed that the commercial ground-floor premises are often empty or inhabited by temporary use, while residential premises are filled with use. This even occurs at the most strategic route in Hollendergata and indicates a challenging relationship between intentions (of active facades) and realisation (of empty facades).

8.2 THE LEGISLATIVE PERSPECTIVE IN INTENDED PROJECTS

The assumption revealed through the frontage rules defined legal prescriptions of building lines, maximum sizes, setbacks, and projections as relevant for compact city building. Their prevalence in the provisions of the plan, that is, in the verbal regulations that legally define the control of the implementation process in the empirical cases, is crucial to highlight. In this section, I synthesise the legislative findings from the empirical cases, focusing on both planning and project intentions and how the process has affected the result of urban form.

The empirical cases are defined by two different laws as well as different planning types. These laws have plans with different capacities and characteristics. The two types of detailed plans include *the development plan* for areas of some extension (e.g., areas covering two or more properties or lots – from the old plan) and the *detailed zoning plan* for development projects (i.e., the plan for a specific project, small or large – from the new plan). There are no technical differences between the plans. The oldest plans were implemented under the previous law, namely the 1985 planning and building act. These are the plans of Siriskjær (2006), Ensjø (2008), and Sørenga (2009). The other three plans have been implemented under the current 2008 law, namely those of Hollendergata (2012), Kvartal 56 (2014),

MAP	PLANNING INTENTIONS: PLANNING PERMISSION	PLANNING INTENTIONS: PLAN ID DECIDED LAW	PLAN/REGULATION: PLANNING DESCRIPTION	PLAN/REGULATION: ZONING PLAN	PLAN/REGULATION: PROVISIONS OF THE ZONING PLAN	
	 Kanalbyen 2015-	1400 SILOKAIA 16.09.2015 PBL 2008 City centre purpose, parking (underground)	Urban design All urban spaces for public access & stay technical infrastructure ground floor. Building boundaries/lan-use boundary Front gardens	**P:** public road, common square and pedestrian path, Zones of regulation **L:** ***purpose boundary, building boundary,*** regulation boundary. **A:** vehicular exits	**Lo:** Within defined building boundaries **OA:** Min 25 m2 pr residential unit (p/c) **P&E:** Free view-according to local road norms **D:**Urban design, architectural quality, interact aesthetically and use with streets/outdoor **P/S:** Not allowed over street, max 2,5 m above 6 m, max 40% facade length in purpose bounday (sea), max 20 m facade length **G/T/B:** Min 2 m street &2,5 m sea, max 3 m yard **E:**No main entrance from street	NEW TISSUE - NEW STREET STRUCTURE - TABULA RASA
	 Sørenga 2012-	S-4099/ 18709 15.06.2004/ 26.08.2009 PBL 1985 Combined Housing, business, office, catering, non-profit (culture, education, sports)	**Heritage sightline** built boundary facing harbour promenade no projections- sightline Balconies, terraces or front garden 20% of flat BRA with direct sun, protection from noise/ pollution	**P:** Public road, walking and cycling path, common play area **L:** ***purpose boundary,*** building boundary, ***heritage sightline line*** **A:** vehicular exits	Location of buildings Private/common outdoor area Exits Projections/setbacks Front garden/garden terraces/balconies Housing qualities	
	 Siriskjæret 2010-	1785 B9 19.06.2006 PBL 1985 Combined purpose housing, commercial, offices	Land-use boundaries apply as building boundaries. Private/common outdoor area: 4 m2 with proven good sun conditions access parking (arrow)	**P:** Public road, walking and cycling path, common play area **L:** plan boundary, ***purpose boundary,*** building boundary, free view line, internal walking- &cycling path **A:** vehicular exits	Universal design Location of buildings Private/common outdoor area Exits Design Parking Local climate Flats	
	 Kirkegata 2a 2018-	1307 KVARTAL 57 12.02.2014 PBL 2008 Housing, commercial and offices	**Green buffer zone between house and street** access parking (arrow) Noise (ZoC) Private outdoor space(minimum) Building boundaries?	**P:** Public road & pavement, outdoor area, zones of special consideration: noise & heritage **L:** purpose boundary, ***planned buildings,*** boundary zone of consideration **A:** vehicular exits	Universal design Location of buildings Private/common outdoor area Exits Design Parking Local climate Use and Heights	PRE-EXISTING TISSUE - EXISTING STREET STRUCTURE - INFILL
	 Hollenderkvartalet 2018	S-4660 26.09.2012 PBL 2008 Combined - residential / business / office /catering / other types of buildings and facilities (environmental station)	Flats with quiet side Private balconies Location in purpose boundary and within building boundaries Projections 1,5 m Setbacks 2 m Noise dema nds greywater system	**P:** public road & pavement, zones of consideration: medieval ground, cultural environment **L:** ***purpose boundary,*** building boundaries, boundary zone of consideration **A:** vehicular exits	**Lo**cation of buildings Private/common outdoor area Exits Projections/setbacks Entrances/windows Design Parking Climate	
	 Sigurd Hoels Vei 2017	S-4420 17.12.2008 PBL 1985 Housing	**Entrances facing street** **Building line** Physical street definition by direct frontage type	**P:** public road & pavement, square and living street, walking trail **L:** purpose boundary, building boundaries, ***building line,*** height line **Arrows:** vehicular exits	Location of buildings Private/common outdoor area Exits Projections/setbacks Entrances Design Parking Climate ~~Public private~~	MIXED TISSUE TRANSFORMATION

Lo:Location of building - **OA**:Outdoor Area - **PE**:Parking &Exit - **D**:Design - **P/S**: Projections and setbacks - **G/T/B**: Front Garden/Terrace/Balcony - **E:** Entrances

Figure 84 Cross case analysis of the legislative aspect in intended projects within three morphological urban tissues and Kanalbyen (2015). As such, some planning tools in these three plans were not applicable in the first law, including *zones of special consideration* (although such considerations were implemented in the provisions) and *city centre purpose* (applied in Kanalbyen). In the following sections, I present a synthesis and discussion of planning intentions through the implemented drawing tools of the zoning plan as well as the provisions of the plan.

8.2.1 *Drawing tools of the zoning plan – A synthesis of spaces, lines, and points*

Three main types of drawing tools are used in the legal plan that, together with the written zoning provisions, provide site-specific regulations for the different areas. These main types include *spaces* (defining land use purpose, zones of special consideration, and zones of regulation), *lines* (defining location, relation, and spaces), and *points* (defining specific locations; i.e., arrows).

The first type of drawing tool is connected to the spaces of the plan and include *land-use purpose, zones of special consideration, and zones of regulation*. The different types of *land-use purpose* implemented in the cases include the whole span from *rigid* singular purpose such as *housing* (Ensjø), to *combined* purpose such as *housing, businesses, offices (among others)* and *merged* purpose such as *city centre functions* (Kanalbyen). All of the empirical cases in my investigation are essentially residential projects with different degrees of commercial purpose. Thus, they span from a purely commercial ground floor plan (Hollenderkvartalet) to purely residential ground floor plans and projects (Kvartal 56 and Ensjø). The three cases defined under the current PBL all have spaces of overlapping zones including *zones of special consideration* and *zones of regulation*. Since this was a new planning tool in the 2008 revision of the planning act, only three plans have these marked as specific zones. Hollenderkvartalet and Kvartal 56 have zones of special consideration connected to *heritage,* the former being connected to medieval archaeological structures as well as the cultural environment, while the latter is connected to the built form and block structure of Kvadraturen. In addition, they both have zones of special consideration connected to *noise* levels. In the plan at Kanalbyen, there are eight *zones of regulation*, which provide extra provisions over an already defined land-use purpose. These are defined more specifically in the zoning provisions and include aspects concerning both the design of spaces (play areas) as well as facilitating relations (e.g., green physical and visual connection and access for utility traffic etc.).

As previously mentioned, it was the revision of the planning act in 2008 that provided the opportunity to add overlapping layers within the rigid and combined land-use purpose as well as to define a new discretionary layer in the city centre purpose. However, it is noteworthy that Kanalbyen – which has implemented the more recent planning tool of city centre functions – is the mixed residential project with the fewest commercial premises at the ground-floor level, whereas Hollendergata – which has implemented combined functions – has the most.

The second type of drawing tools are connected to the different *lines* of the plan. Within the empirical cases, a range of different *lines* have been used to define spaces for written provisions in the plan, as well as for defining the height and bulk characteristics of the intended project. All of the different plans share line tools such as *purpose boundary* and *building boundary. These define the spaces for land-use purpose and the location of the built form within.* In addition, there are specific lines addressing contextual aspects such as sightlines, property, and planned buildings. At Sørenga, a heritage *sightline* acts as an absolute measure that defines the location of buildings as well as restricts projections to break this. In Kirkegata, there are lines that suggest *planned buildings*, *deleted property boundaries,* and *removed buildings*. The plan at Siriskjæret includes lines that suggest the *location of an internal walking and cycling path* through the built form. In addition, the cases implement lines defining overlapping *zones of special consideration* or *zones of regulation* (first implemented through the 2008 act). At Ensjø, in addition to building boundaries, there are *building lines* that define the specific location of buildings, as well as *height lines* that define the maximum cornice height for different units.

All of the aforementioned reveals a large range of line types that can be used to define location, spaces of use, and spaces of protection, as well as to inform. Some of the line types are specifically defined and can be read directly from the plan; that is, building boundaries or building lines that define the location of buildings within (relation) or in the line (defined). Others require further provisions and can be used in different ways, such as a purpose boundary defining space, but are also often used as either building boundaries or building lines relevant for the location of buildings. As such, the lines have certain characteristics, but it is the subtle distinctions of how the lines are presented and further described in the provisions – as minimum or maximum, as percentages or metres, or in relation to other lines – that defines their operative aspects. The lines are both independent of and dependent on specific distinctions in the planning provisions.

This comprehensive range of lines is not exhaustive but is of a sufficient breadth to provide interesting types for the discussion and output. The lines vary from being absolute and specifically defining mandatory placement to being more flexible and defining spaces for supplementary provisions or location suggestions. These lines are vital in defining the subtle microscopic connections and relations of the building–street relationship, and therefore, they are presented and discussed more thoroughly later in the presentation of the provisions and conclusions.

The last type of drawing tool used in the different plans is connected to the *points* defining specific locations. Within my empirical data, this tool is used in one specific way only – as *arrows* defining the area of vehicular access/exit for an underground parking garage. The arrows are sometimes also connected to extra provisions concerning a free view to adjacent public roads and pavements. As such, this topic is directly relevant for the building–street relationship and is often discussed in the building case, either as part of the preliminary conference or in a dispensation application. How the point is used in the empirical data includes denoting mandatory parking locations.

The wide range of drawing tools and their characteristics help to define a legal visual and site-specific framework, coded with rights and opportunities for realising a planned intention. However, the map cannot work without the supplementary provisions of the zoning plan providing further information to be able to highlight both land-use zoning, bulk, and height requirements.

8.2.2 *Provisions of the zoning plan – Synthesis of general and specific topics through subtle distinctions*

Section 12-7 of the PBL provides an exhaustive overview of the provisions that can be used to specify the land-use purposes and zones of consideration in the zoning plan. As such, the different empirical cases share a range of topics that can be synthesised and addressed as a whole. There are a range of aspects that I have not addressed as they, in my interpretation, do not directly affect the building–street relationship or the production of the façade threshold. The cases were first mapped and analysed through content analyses based on the method developed in Chapter 6. Thus, my selection of relevant provisions is highly systematic and can be addressed, verified, or reinterpreted by other researchers. Second, these provisions were synthesised into main topics that are presented in this section. The frontage rules analysis revealed a prevalence of absolute and quantitative measures.

There are a variety of ways in which the different plans address provisions that help to produce the façade threshold relevant for effective compact city building. In their planning descriptions, the different projects highlight ambitions such as good housing qualities or compact city building. Some provisions are thorough and present a comprehensive overview, while some are more simple and must depend on other overall plans or discretionary decisions in the implementation. The most developed and thorough provisions in the cases were found in the plan for Kanalbyen, the aim of which has been to *implement urban design of good architectural quality designed for interaction between buildings, spaces, and infrastructure, in terms of both aesthetics and use.* The plan includes provisions that relate to some of the aspects previously addressed in the 1924 act, such as the definition of setbacks, projections, and façade length.

The aspects most relevant to building–street relations that all of the plans define in their provisions are *building location*, *size of outdoor area*, *parking and exits, noise provisions,* and *design*. In addition, some of the cases include highly relevant provisions connected to *projections and setbacks*; *front gardens, terraces, and balconies;* and *entrances*. Finally, the plans provide local and site-specific aspects that are directly relevant to the building–street relationship, such as *territorial classification and declarations of rights*.

Lines of location – Variety of types and uses

The provisions concerning the location of buildings define two main ways to define the built structure, either specifically placed *in a line or within/behind a line*. The cases at Kanalbyen, Sørenga, and Siriskjæret are defined by lines that buildings should be placed *within,* whereas the cases at Kirkegata, Hollenderkvartalet, and Ensjø are defined by lines that buildings should be placed *in*. The *type of line* most used to define the location of buildings facing the street in the cases is the *purpose boundary*. This line is used to define the space of the land-use purpose as well as to locate buildings specifically in and within. The *building boundary* is also frequently used in the studied cases. This line has specific characteristics of defining spaces to build the project within. Site-specific contextual lines such as *sightlines* (Sørenga) and existing built form in *street lines* (Kvadraturen) are vital for defining the location of buildings where heritage concerns apply. Finally, the *building line* is used at Ensjø to define the mandatory location of buildings facing the street.

This repertoire presents both types and the use of lines and has subtle and vital distinctions that are relevant for addressing the microscopic views of city building. The subtle distinction of the wording of *in/within* is an example of such vital distinctions, which are discussed further later. As such, the different plans all have regulations concerning the location of the buildings in relation to other boundaries. The only plan that specifically defines a *building line* is that of Sigurd Hoels vei. However, the regulations use both building lines and building boundaries, demanding that buildings must be built *in the building line* and *within the building boundary*. All of these examples address a multiple approach to the definition of built form on their plot and in relation to the street. They also highlight tools that are used quite differently.

Common outdoor area – Subtle distinctions of min and max

The demand for private and/or common outdoor areas is another topic with vital and subtle distinctions that is relevant for the building–street relationship. Most of the cases exhibit a *minimum* demand for outdoor space, whereas one of cases exhibits a specific defined quantity (Kirkegata). Furthermore, there is a broad range of demanded degrees of private and/or common areas. The cases at Sørenga and Siriskjæret define private areas, the former as a minimum percentage of residential units (20%) and the latter as a minimum m² per unit (i.e., 4 m² with proven good sun conditions). The other cases combine private and common areas in the provisions, including both the minimum percentage of total housing area (Hollenderkvartalet = 16% and Ensjø = 25%) and m² per residential unit (Kanalbyen & Kirkegata 25m2). The variety of definitions of outdoor areas reveal subtle distinctions that often can affect the building–street relationship.

Parking and exits

All cases have provisions connected to *underground parking* as well as specific exits for cars. Parking demands are defined in two different ways – as a specific quantity connected to the residential unit/commercial premise (m²) or connected to the applicable parking norm of the place (Oslo). Some of the cases (Kanalbyen and Siriskjær) have provisions concerning soil and drainage at the top surface of the parking floor with the aim of providing green parks or spaces. In addition, at Kanalbyen, parking is not allowed to be exposed as a façade to public-facing urban spaces and parks. However, it is allowed near/behind waste-disposal zones, return points, and pumping stations among others when assigned a special quality in design and/or materiality. Vehicular exits are specifically located (with arrows in the zoning plan), generally in demand of free view, and sometimes related to relevant road norms for the place.

Noise zone and minimum size of private outdoor space

In all of the cases, noise provisions affect the design of façades, balconies, outdoor spaces, and residential units. As such, they play a vital role in the building–street relationship because *the street* is often the main source of noise. The main zones that affect the façade threshold in explicit ways and thus require special consideration are noise zones. Within these zones, conditions must be satisfactory according to technical regulations and specific guidelines. In the infill projects in Kristiansand and Oslo, parts of the project are bound by specific demands on noise requirements. As such, noise defined balconies and building projections to be closed off with sound-proof glass. In Oslo, this consideration was taken into account and all of the projections are transparent and closed from the second floor and up. In Kristiansand, this consideration was negotiated by the total amount of private outdoor space per unit and, as a result, the balconies could be open towards the street. These findings reveal a relationship between the minimum size of private outdoor space and the design of street-facing balconies that might be affected by and require protection from noise.

Design – Architectonic expression and visual qualities of the façade

The provisions concerning the *design* of the different cases cover the whole span from housing quality to urban design, from harmonisation to variation, and from material expression to functional interaction. As such, the overall aim of the different developments includes intentions of good living qualities as well as aims of urban experience. Common to them is the requirement for *architectural quality*. Three of the cases focus on adaptation and harmonisation while the other three focus on variation and façade sequences. The three cases at Sørenga, Kirkegata, and Hollenderkvartalet focus on comprehensive design that adapts and harmonises with the context. Sørenga focuses on material qualities established as an overall concept in the whole area (e.g., certain types of bricks), whereas the other two cases focus on adaptation and harmonisation to adjacent protected buildings through masonry material, façade design, use of materials, colours, façade structure, heights, and volume distribution.

Furthermore, the three cases at Kanalbyen, Siriskjæret, and Ensjø focus on *varied architectural expression and façade sequences*. The aim is to provide measures that avoid monotony by visually breaking up façades. The provisions at Kanalbyen highlight the urban design of high architectural quality, designed such that buildings interact with space, both aesthetically and in use. Buildings should be designed with interaction with streets, street corners, squares, and outdoor areas, as in *'a traditional urban environment',* and also have the *appearance* of singular buildings with variation set next to each other in sequences of façades brought down to the ground. Likewise, the provisions at Ensjø highlight measures to visually break up long façades through design and to avoid monotony by using bay windows, material differences, and windows. The provisions at Siriskjær focus on the presentation of a varied architectural expression.

It is interesting to reflect on the wording used to address variation and urban experience in the design of the densification projects. A subtle difference exists in highlighting that a building project should *appear as* or be *presented as* projects of variation as in an urban traditional environment, rather than stating that it should *work* as such. By choosing wording such as appearance and presentation, the planning intentions emphasise visual aesthetic considerations rather than structural active interaction in the built form. The findings reflected a focus on visual qualities and varieties of façades but did not include a focus on the structural capacities linked to the traditional environment that provided the inspiration. As such, when aesthetic considerations of the urban block comprise the main goal for the development, a danger exists that projects risk presenting an outward appearance of well-perceived (aesthetic) urban form without ensuring the structural connections and spatial relations that make it work.

In addition to the general aspects that all cases address, a range of cases include provisions connected to aspects such as *projections and setbacks*; *front gardens, terraces, and balconies;* and *entrances,* which are directly relevant for the development of façade thresholds. These are often linked to the other provisions such as building location, outdoor area, noise, and design.

Setbacks and projections with minimum heights above street level

Setbacks and projections provide an opportunity to further develop the building line and make it more elastic. Most of the case projects have regulations that allow for façades that include setbacks or projections that cross building- or land-use purpose boundaries. These setbacks and projections have a distance requirement on the height between the projection and street level. As such, they address the utilisation of buildings above the ground floor and street level, thereby creating elasticity in the building line further up.

All case provisions, except for the case at Siriskjær, have measures to control the elasticity of the façade line through projections and/or setbacks above the ground-floor level. A few cases also provide provisions connected to projections at the ground-floor level including front gardens, garden terraces, and balconies. The cases revealed that building setbacks are generally defined by minimum sizes and building projections as maximum sizes, or they are defined and regulated through the percentage of façade length and maximum metre length. Above ground level, the provisions are used to control ***maximum*** projections and ***minimum*** setbacks. The most common ways to do this are using maximum metre distance (depth) from the purpose boundary and minimum height distance. In addition, Kanalbyen presents two other ways to control projections/setbacks. The first is maximum percentage of façade length that can be projected from the building boundary to the purpose boundary (facing the sea), and the second is the projected maximum continuous metre façade length allowed. As such, the relation between building boundary and purpose boundary creates setbacks and projections in the façade. This approach to defining sizes is a flexible tool that can inform a renewed approach to developing the elasticity of a building line, thereby defining façade thresholds.

Front gardens and other projected spaces - **Subtle distinctions of min and max**

Provisions for setbacks and projections at the ground-floor level are not usual in the empirical cases, but provisions for front gardens, terraces, and balconies providing ground-floor projections that affect the building–street relationship were found in three of the cases, namely Kanalbyen, Sørenga, and Kvartal 57. First, the case at Kanalbyen has the clearest absolute regulations concerning front gardens, terraces, and balconies. Front gardens are demanded for all housing units at the ground-floor level that face the public road as well as housing units that face the common pedestrian path, while garden terraces are demanded as part of the courtyard. These gardens are required to be clearly defined by hedges, fences, or similar. Balconies are not allowed to project over the street but can over pedestrian paths and within the courtyard. The projections are regulated through a specific distance facing the different contexts. The front gardens facing the street and the pedestrian path are regulated by a *minimum depth* of 2 and 2.5 m, respectively, while the garden terraces facing the yard are regulated through a *maximum depth* of 3 m. The minimum requirements help to control outdoor space for the flat but do not control the location of the building facing the street or the pedestrian path. The maximum requirements help to control the design of internal space without defining building boundaries among others. As such, the minimum requirements are effective tools for regulating aspects of housing quality, but not for regulating the city street definition. The use of the minimum distance from building wall to street does not offer predictability for urban design. The use of a maximum tool facing the street could offer predictability for the street, thus helping to control the definition of space, similarly to how the project provided predictability of the internal courtyard.

The provisions at Sørenga and Ensjø have more general demands for balconies, front gardens, and terraces for all residential units. At Sørenga, there are demands that private outdoor space should be formed as balconies, terraces, or front gardens. These form-direct demands are further defined through functional demands such as access to sunlight and protection from noise and air pollution. At Ensjø, the provisions emphasise a clear distinction between public and private land and demand that private or common outdoor areas adjacent to free areas should be separated by vegetation (e.g., hedges), level differences, material use, and other means.

Here, it is interesting to reflect on the use of terminology reflected in *front gardens* (facing the street and path) or in *garden terraces* (facing the courtyard), as in the case at Kanalbyen. As the structure analysis of these two types of outdoor space revealed, *garden terraces* have a permeable link to the courtyard, whereas front gardens are closed to the street with a one-way permeable façade threshold. Even more interesting is that flats facing the main street are not allowed to have their *main entrance* through the *front garden*. Pragmatic solutions regarding municipality management and snow shovelling have helped to form this regulation, which addresses a limited focus on the street as the active interface area and more as a technical zone to make city management work. Implicit in the term *front* garden is a front area between the building and the street at the *front* of the property.

The capacity of this term includes, in most instances, a structural link between the building and the street, creating a semi-public transition between public and private (Alexander/Chermayeff). However, as we have seen in Kanalbyen, front gardens are defined with similar characteristics to balconies with no structural link to the street, whereas garden terraces facing the yard have this built-in capacity.

Permeability of the façade: Location of entrances and passages

Another measure that is scarcely treated is provisions concerning *entrances.* The cases differ in the degree to which the locations of entrances and windows are regulated. The clearest regulation addressing the structural relations of the façade threshold in residential projects is revealed in the transformation project at Sigurd Hoels vei, Ensjø. In the planning description, there are clear intentions regarding the location of entrances: entrances must primarily be positioned facing the street to create activity and life in the streets. There is also an *absolute demand* in the regulations that buildings adjacent to public roads or spaces *shall* have access and an entrance from there. By contrast, Kanalbyen's provisions contain an absolute demand that flats *shall not* have their main entrance from the street or through the front garden. The planning regulations prohibit this relation because of winter management, when the pavement is too narrow for snow clearance (source: interview with the architect). These pragmatic management considerations, valid for a few months of the year, affect the constitution and entrance density of the urban street space on a permanent basis. In Hollenderkvartalet, there is a demand that commercial units shall have entrances and windows facing the street and be presented with an open character. In addition, there is a demand that entrances to housing shall be separated from these commercial premises. As a result in both cases, the residential entrances must be placed in the courtyard. Thus, the provisions of these two cases correspond to the deep residential integrated façade threshold revealed by the morphological analysis. The other projects address the buildings' orientation towards the street, but without further definition of what this orientation entails specifically or structurally.

Another way to regulate the permeability of the façade is through provisions of physical permeable links between the courtyard and street/public space. Three of the cases have regulated such passages, either specifically located or as a demand with flexible location. In Kanalbyen, a physical pedestrian access through the urban block is defined as an absolute regulation, providing opportunities for the public to enter and exit from the private courtyard to the private harbour promenade; that is, from private property through open accessible passages through the built form. This is to ensure the contact of the courtyards with the sea, pedestrian paths, and spatial sequences between different built areas. In addition, zones of regulation are used to create contact between the street and sea. At Ensjø, there are provisions of two passages between the residential courtyards, public street, and living street. These are defined by minimum requirements of width and height of 5 m and 5 m, respectively. At Siriskjæret there are provisions for flexibly located internal walking and cycling paths, established as common passages that connect common areas/courtyards with public areas either in a split between two separate buildings or through the building.

In addition to the general aspects that all of the cases address, a range of cases include provisions connected to other relevant topics of a case-specific nature, including *territorial classification and declarations of rights*.

Territorial classification of land-use purpose

§12.7.14 in the 2008 PBL provides the opportunity to define which spaces are public purpose or common areas. Ownership information is compulsory (required) for property on different land-use purpose areas in a zoning plan when *provisions on ownership form have been provided in regulations* §12.7.14 in the PBL is relevant for all purposes and is important for making a distinction regarding which areas are of *private character* (common) and *owned by the public*. As such, there is a variety in territorial classifications of the different spaces and purposes in the empirical cases.

Hollenderkvartalet provides only one instance of public ownership information in the plan – that is, for the nursery. The other cases comprise a private plan with no further public spaces to be managed by the municipality. Kvartal 57 defines the beach promenade, roads, and pavements as public spaces. Furthermore, access to parking is common. The plan of Kanalbyen presents a difference and a distinction between the access routes that address the site. The road is classified as *public* (o_V2) and will thus be managed by the municipality. When spaces and roads are public and owned by the municipality, they comply with the management norms and demands of the local road authorities, including form-direct demands. The regulations include specific qualitative demands for public spaces in relation to the norms (outdoor spaces, road, and water/drains) of the municipality. The pedestrian path of the harbour promenade and the squares that delineate it are classified as *commons*. The adjacent properties are therefore responsible for the preparation, management, and maintenance of the area. The common spaces are regulated through the plan, including aspects such as minimum distance requirements, holistic expression, and height down to the sea.

A noteworthy aspect of the plan of Silokaia (Kanalbyen) is its territorial distinction between public and common areas through private *ownership and thus management*, as well as its regulation of *public use* of all urban spaces and important connections in and through the plan area. According to the plan, these areas are *accessible for all* and have the *possibility of staying*. As such, there is legally no public–private distinction addressing the use of the property, except for the private balconies that have defined as separate property units.

Declaration of rights

The *statement of rights in real estate* document that follows the building application is even clearer. It states the following: 'The public (represented by Kristiansand municipality) is *at all times* entitled to *free movement and stay* on the property. The right does not entail any management or maintenance obligation on the property'. As such, the ambiguities that I have presented as the *interface inside-out, outside-in* are applicable here in the whole area. All façade thresholds designed as private balconies, garden terraces, or front gardens at the ground-floor level will face publicly accessible spaces where everyone can stay and move at all times. The use of declarations of rights regarding private space is not exceptional as it can also be found in the private courtyards of Sørenga. However, the provisions of Kanalbyen bring this right into the planning provisions and the following building case – a statement that has vital consequences for territorial distinction in the respective cases. The problems of ambiguity concerning territorial distinctions revealed at the building–street level are also relevant within courtyards and on pedestrian paths. This topic that should be investigated further in future studies.

8.2.3 *Project intentions: Preliminary discussions, outline application, and building permit process*

In addition to the planning intentions, there are specific project intentions that are assessed through the building case documentation. As presented, the empirical cases are defined by two different laws and different planning types. As such, there are also different technical regulations that apply, namely TEK 07 and TEK 10. The most current regulation, TEK 17, has not been applied in any of the building cases. Five of the projects have received a certificate of completion, but one case (Hollenderkvartalet) has a temporary use permit for residential units but not a certificate of completion yet (as of July 2020).

The main considerations addressed in the mapping and synthesis of project intentions concerning the building–street relationship are the aspects that do not comply with the current plan as well as specific project intentions at the ground-floor level. These include topics for *preliminary discussions* between the developer and authorities at the beginning of the project development, application for/granting

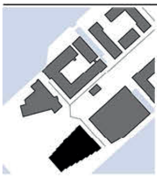
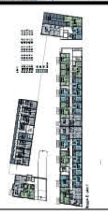
	PROJECT INTENTIONS		TEK/VEDTEKT/DISPENSATION			
MAP	PROJECT OUTLINE PERMISSION	PROJECT ID OUTLINE PER-MISSION	RELEVANT FOR FACADE-THRESHOLD	PRELIMINARY CONFERENCE	DISPENSATIONS	
		Silokaia Kanalbyen felt 2A 150/1833 29.03.2015 TEK 2010	**Waste management** Requirement to be close to the street No dispensation	- **Fire regulations** needs two stairwells - **Balconies** projecting over building boundary. - **Ventilation system** at ground floor.	One dispensation application in the building case that does not affect building-street relation.	NEW TISSUE - NEW STREET STRUCTURE - TABULA RASA
		Søreng-Utstikkeren felt D1B-7 234/82 02.08.2012 TEK 2007 Blokk/ bygård/ terrassehus	**Waste management** Requirement to be close to the street Design guidance Bjørvika		Seven dispensation applications, two of which are directly relevant for building-street relation. **- building boundaries of the land-use purpose.** **- terraces over regulated sightlines.**	
		Tau Næringspark 54/1057 14.09.2010 TEK 2007 Nybygg boligblokk, forrtenings- og kontordel, felles	**Parking requirements** Ground floor level 1,3 meter above street level- as result of dispensation		Five dispensation applications connected to location of vehicular exit, utilization, max cornice height number/size of housing and raised level. **- vehicular exit** **-raising the underground base plate** 1,35 m and the cornice height with 0,5 m. -leads to a change in the internal entrance situation for the residential units sorted through lifts.	
		Kirkegt 2B_C_D Strand-promenaden 150/1565_ 1563_620_621 1808 14.09.2010 TEK 2010	**Noise demands on private outdoor space**	- **Balconies:** projections max 1.2 meters above building line facing street - **Noise:** Requirements for glazing non-relevant - Lines for "planned development"	No dispensation	PRE-EXISTING TISSUE - EXISTING STREET STRUCTURE - INFILL
		Schweigaards Gate 40, 42 og 46 230/279 21.09.2016 TEK 2010	**Parking norm Oslo** **Waste management** close to the street **Ground floor program** No permission before use	**Exit:** Difficult free view according to street norm **Parking I:** Parking norm demands two levels under terrain **Parking II:** alternative without underground parking, wit bike parking and el-car collective	Four dispensation applications: heights and location, parking, distribution of apartments and building boundaries. **- Parking dispensation** 2 car sharing places combined with registered right to 10 places in nearby parking garageas well as bicycle parking with a minimum of 2 spaces per.dwelling	
		Tidemannsbyen Bertrand Narvesens vei, felt F 128/158 04.03.2016 TEK 2010	**Universal design -** Entrances defines by topography and not planning regulation	Split in the building block **One-sided flats at basement level:** not recommended **Exits:** PBE are sceptic about moving exit - considerations of space are more important than length of the ramp.	No dispensation	MIXED TISSUE TRANSFORMATION

Figure 85 Cross case analysis of the project intentions in the building permit process within three morphological urban tissues

of *dispensation* from the plan in the different stages of the process (with an emphasis on the outline application), as well as topics not treated as dispensation in the process but that are relevant for the building–street relationship. In addition, this section presents specific topics revealed by technical regulations. As the cases are unique and the focus of the building cases is even more specific, much greater variety exists in the data and topics treated than in the planning intentions, and the synthesis is more focused on the specific relevant findings than on the tendencies revealed by multiple cases. The ground plan drawings (and supplementary project drawings) and the project statement (and supplementary statements) in the outline application present the project intentions through drawing and text. For all of the cases, this material is comprehensive, and therefore, I focus on the representation of the building–street relationship in the ground floor plan as well as on the written aspects not revealed in the plan but rather in the statement of project intentions.

The building permit application and decision process was presented in Chapter 4. Through the iterative process of case investigation, I defined the most relevant documents and used them when comparing and assessing the projects. These documents were *notes from preliminary conferences*, *drawings, main statements from the outline application*, *dispensation applications* (either as part of the outline application or the building permit process), *and outline permission*. In addition, I read though the specific documentation of each case and picked out relevant aspects for the hypotheses and research questions. When the morphological output deviated from the intended project, I dug further into the case documentation to determine if there were obvious answers to the stated planning and project intentions.

Preliminary conferences – Clarifications between developer and government

Preliminary conferences cover aspects concerning technical regulations (including fire, ventilation, and noise), norms and statutes (such as parking norms and design guidance), as well as current active plans. Most of the cases used the preliminary conference to discuss alternatives to the current zoning plan. Some of the conferences provided clear recommendations or disapproval for project solutions, while others demanded dispensation as a process tool to be able to decide.

Drawings and main statements from the outline applications

The different plans of the outline application present different intentions regarding the building–street relationship. Mapping the number and type of permeable entrances as well as the types of façade thresholds provided an overview of the relational focus in the project intentions. As a general synthesis, the residential entrances in the project intentions were mainly communal and deep, whereas commercial entrances were mainly individual and direct. The morphological analysis revealed the realised built project more thoroughly; therefore, this sections focuses on cases where the intentions differed from the morphological output. The morphological results at Kanalbyen, Sørenga, Kirkegata, and Hollenderkvartalet corresponded to the intentions presented in the outline application. However, the projects at Siriskjær and Ensjø exhibited variations from the intentions in the physical results. In the project intentions at Siriskjær, the ground-floor interior was directly linked to the exterior and presented with a range of doors (10 doors in the plan) linking commercial premises to the outdoor space; four individual doors linking building and street; as well as five communal entrances for the residential units above. In the morphological results, there were no direct commercial doors, and access to commercial premises was solved through common entrances and half floor lifts. The four individual entrances were raised five steps up and accessed through direct permeable entrances, which were not universally designed. The reason for this is connected to dispensation. The project at Ensjø had no entrances facing the street in the project intentions or ground-floor plan, but it had one entrance in the morphological output.

Dispensation – Subtle for provisions of intentions, radical for realised façade thresholds

There were two cases without dispensations in the empirical material, namely Kirkegata and Ensjø. Kanalbyen had one dispensation concerning the energy system, but it was not relevant to the building–street relationship. As such, there were three cases where dispensations were applied to be able to fulfil regulations that are to a certain degree relevant. At *Sørenga*, there were seven dispensation applications, two of which are directly relevant to the building–street relationship. One of these was connected to *building boundaries of the land-use* purpose, whereas the other was connected to *terraces over regulated sightlines*. Six of the applications were granted in the outline permission, one of which affected the building–street relationship facing northwest, by redefining the building boundary as a stepped line giving views and light to the use. The second relevant dispensation for this thesis included an application of ground-floor terraces breaking through the sightline from the medieval park through Lohavn towards Hovedøya. This aspect was revised in the process seen in relation to the Eastern Harbour Promenade and was not included further in the project.

At *Siriskjær*, there were four dispensation applications in the outline application, one of which was directly relevant to the building–street relationship and connected to the location of vehicular exits. However, the most relevant and radical dispensation affecting the building–street relationship occurred as part of the building permit process. This included the need to raise the underground base plate by 1.35 m and the cornice height by another 0.5 m. The argument for doing so was that it would enable full parking coverage according to the planning demands within the plot. The consequences of this dispensation were described as minimal when it came to the provisions in the plan – 'just 0.5 metres' – as the floor heights would be reduced.

'...Increasing the base / basement level will result in a change in the interior access situation for the homes. However, the changes are minor in nature, and all accesses are maintained in a universally designed manner. By introducing elevators with access from two sides that safeguard the possibility of good half-plan solutions...

...with the current solution, the four housing units on the U-floor (entrance level) will not be able to be established with universally designed access. In our interpretation, these houses comply to the exemption provision, since the entrance to the respective homes is not shared by more than four dwellings (10-21, 1.ledd). The raising of the building entails, among other things, that the planned grocery store is discontinued and the commercial premises as such will be more suitable for the office and any showroom than business...' (from the application – translated by the author).

The application for increasing the cornice height by 0.5 m was granted by the municipal council for urban development. This raising of the floor led to a radical change in the different entrance situation for all of the different residential and commercial units. The dispensation application focused on the minimal effects for the planning provisions, raising the cornice height by 0.5 m only. However, this dispensation has had, in my interpretation, a maximum effect on solutions concerning the building–street relationship and the aim of building an *urban seafront*. Even though the provision was not critically compromised, it reveals a lack of understanding and focus when it comes to the relation between a building and its context.

At Hollenderkvartalet, there were four dispensation applications concerning height and location, parking, distribution of apartments, and building boundaries. The dispensation concerning *parking* was the most relevant for the building–street relationship and was granted in the outline permission. This led to a radical change in the number of parking spaces for the project as well as the redefinition of a corner of the ground floor to include bike parking rather than a vehicular exit. From the solution of double-floor underground parking, the project solution included two car sharing spaces combined with a registered right to 10 spaces in nearby parking garages as well as minimum bicycle parking of two spaces per dwelling.

8.2.4 *Hidden planning – Dispensation, discretion, and technical regulation*

An investigation into the correspondence and documents of the building cases revealed two interesting aspects concerning the production of building–street relations, including aspects concerning the *commercial land-use purpose* at Hollenderkvartalet and the *(lack of) focus on street-facing entrances* at Ensjø.

Commercial premises with public open façades – A challenging programme

The façade thresholds of commercial units, often defined in planning with the aim of creating active and lively urban spaces, are challenging in building application processes if there are no actors and thus no clear distinction of the future use of the property. As such, open ground-floor units with direct transparent façade thresholds have the potential to present empty and dark façades. As part of the application for a certificate of completion at Hollenderkvartalet, there has been a pending case in the building permit system. The challenge has been to define the specific use for the premises, thus enabling the project to fulfil the demands in technical regulations and the outline permission. The residential units were granted a temporary use permit on August 17th, 2018. The first application for a change in the commercial premises of the outline permission was delivered to the authorities on May 29th, 2018. This comprised the furnishings of commercial areas on the ground floor. Since then, the case has been pending in the system for almost two years and finally received a certificate of completion in July 2021 . The application for a change in outline permission was repeated October 17th, 2018 and March 18th, 2020. It was granted on June 5th, 2020, and on June 25th, 2020 the architect applied for a building permit – this time for offices. Here, it is interesting to reflect on the impact of these planning intentions on urban form. The project at Schweigaards gate is strategically located on the most integrated urban structure route. It is very central and has a high volume of people moving past it. However, this project has struggled to fill the ground-floor units and the façades are not active. As such – with good intentions and a challenging realisation – this aspect is relevant to address more flexibly.

Lost in implementation – Nonadapted planning requirement affecting façade thresholds

The Ensjø project revealed strong planning intentions and absolute regulations concerning the structural relationship between building and street, aiming to provide life and activity. However, this requirement became lost in the implementation. The first drawings of the projects revealed a façade facing the street with no such demand fulfilled; all the entrances were mainly located on the internal courtyard, not on the street. The case documentation revealed a discussion about the topic between the architect and the authorities, first as a request from the authorities to address this demand in new drawings and to include entrances facing the street, which the architect fulfilled. However, in the next revision, the entrances of one building facing the street were once again moved away from the street, *this time without a request for dispensation.* It was not possible to extract the reason for this change; however, the case documentation offered a hint of challenges connected to accessibility and universal design. Legally, planning regulations and technical regulations should correspond, and when a regulation is not fulfilled it necessitates dispensation with strong argumentation. In this case, a dispensation application is not submitted and the intentions in provisions that directly address compact city building in the description and regulation are not implemented. This lack of implementation reveals an understanding that does not emphasise structural connection but rather highlights potential challenges with universal design requirements. Another interesting reflection concerns the nonquantified statement that 'entrances shall face the street'. If this regulation is not quantified, either by a specific location or by bulk characteristics, the number of entrances will depend on the size of the building project. At Ensjø, the building is long and therefore the statement can be interpreted as including only a demand for one entrance.

Discretionary perspective in intended and realised projects – Reflection on intentions and implementation

The investigation into the project cases demonstrated that discretionary decisions occur throughout the whole planning and building process, both through defined tools such as city centre purpose and dispensation as well as being a part of more 'hidden' discussions in the process. My assumption addresses the discretionary decisions and tools in the control process as vital for the architectural outcome of planning and building cases. Some of the six empirical cases strongly confirmed my assumptions, while others followed planning intentions to a great extent. The architectural outcomes of micro-morphological solutions and densification projects have been affected by the knowledge, abilities, and skills of both the architect and the individual case officer. The project at Siriskjær presented the most radical discretionary decision within the case material when it comes to the effects on the building–street relationship. It revealed a strong emphasis on urban qualities and the building–street relationship in the project intentions, which were lost in implementation.

8.3 CROSS-CASE DISCUSSION – LEARNING ASPECTS AND CONCLUDING REFLECTIONS

How is the building–street relationship implemented in contemporary Norwegian practice? What are the planning tools and building codes active in the implementation of this urban form? As revealed through the investigation of the six different empirical cases, I here summarise the main conclusions and learning aspects that address the hypotheses and answer the research questions.

Contemporary Norwegian practice presents urban form and building–street relations...

...as physical and visual definition and structural disconnection (the majority of the cases)

By this, I highlight the contemporary visual aesthetic architectural output – buildings that visually and physically define the street but are structurally removed from it.

...with deep integrated permeable façade thresholds (within all of the empirical cases)

This connects to the current building typologies of mixed residential projects where one must go through many rooms or spaces from the public street to reach private residential units.

...where the residential interface is turned inside-out, outside-in (the majority of the cases)

This connects the interface structure where the public entrances for residential units are deep within the private building, and the private outdoor spaces are immediately next to the public street – a territorial morphological twist.

...where front gardens are ground-floor balconies and one-way permeable façade thresholds (the majority of the cases)

By this, I highlight the prevalent private outdoor space facing the street, implementing the logic of balconies on the ground-floor level where preconditions for structural links are different.

...where commercial interfaces are direct permeable and transparent – and empty (in two of the cases)

This includes a reflection on the open facades highlighted for their capacity to create urban life, although with built-in capacities and problems with implementing a programme.

The art of compact city building depends on the planning tools as well as the planning and project intentions that affect the implementation and architectural output of the building–street relationship. The contemporary Norwegian art of compact city building (the building–street relationship)...

…emphasises lines of location – within or in

By this, I highlight the different approaches applied to define either a building or a city, based on the *type* of lines used and the *way* this line is used.

…addresses the elasticity of the building line – projections and set-backs as balconies, front terraces, or gardens

This includes the different ways of creating variety and elasticity in the building–street relationship, through distance requirements, percentage façade length – at the ground-floor level or above.

…presents the image of the compact city – visual-aesthetic considerations of appearance and expression

By this, I highlight the current focus on appearance and expression of the compact city, instead of addressing the capacities vital for making it work.

…depends on subtle distinctions in language – sizes of maximum or minimum outdoor space protected from noise and embraced by sunlight

By this, I highlight the different approaches to defining a building or a city, based on the type of line used and the way it is used.

…highlights the permeability of the façade: the location of entrances, windows, and parking

This aspect includes different ways of regulating permeability though the built form – either as specific or flexible demands – using spaces, lines, and points.

…defines public, common, and private areas of ambiguity

This aspect includes the territorial classification of land-use purpose and declarations of rights – helping to implement the territorial twist – in the architectural interface inside-out, outside-in.

…is lost in implementation – and by universal design

By this, I highlight the hidden stories and decisions in the building control process as well as technical regulations concerning universal design.

…embraces dispensation – for both subtle and radical interventions

> This aspect includes the powerful tool of dispensation when it comes to affecting microscopic relations in city building.

What is the relevance of urban tissue, new, transformed, or existing street structure, in the empirical findings? The summary highlights the different capacities built into the three morphological contexts. Projects in the new urban tissue of the harbour development and the mixed-tissue transformation share some characteristics that affect the building of the façade threshold, that is, the art of city building. First, these four projects are to a lesser extent than the pre-existing tissue *constituted* – they visually and physically define the street but are structurally removed from it, boundary-built with main access points removed from it. One exception is the Siriskjær project in Stavanger, which is defined by streets on four sides and has projected permeable façade thresholds facing the street. The cases in pre-existing tissue, namely the residential project in Kirkegata and the commercial premise in Hollendergata, both have permeable façade thresholds facing the street. Another aspect, which is not addressed thoroughly in this thesis but was revealed through the case documentation, is the level of opposition and feedback in planning and building cases. The cases in pre-existing tissue receive more complaints as well as attention in planning and building cases.

What is the relevance of place – Oslo, Kristiansand, and Stavanger, in the empirical findings? The different locations have different planning and building authorities as well as local overall plans and guidance, and therefore, it is interesting to reflect on the impact of geographical location. In my interpretation, this aspect does not play the most vital role for the realisation of the project. However, one aspect that is treated differently between the geographical locations is *dispensation*. While the cases from Oslo reveal a high demand for dispensation applications (i.e., when small discrepancies exist between the plan and provisions), the cases from Kristiansand have a low demand. Here, the developers are recommended and encouraged to avoid this. Another aspect is the use of the preliminary conference as a decision framework. The outputs are very different between the cases and projects. Again, the cases in Oslo are the most thorough and specific in their feedback.

This chapter forms the last chapter of Part III - Theory development. The following and last chapter (Chapter 9) comprise Part IV focusing on the current situation of compact city building processes and presents the final reflection and concluding remarks for the thesis. It suggests actions for impact that help to address the problems revealed by this research.

REFLECTION AND IMPACT

PART IV

CONTENTS

Chapter 9 The Production of the Facade Threshold

REFLECTION AND IMPACT

Chapter 9 REFLECTION AND IMPACT – PRODUCING FAÇADE THRESHOLDS RELEVANT TO COMPACT CITY BUILDING

This chapter concludes the thesis and ties together the findings from the contextual investigations, theory development, and case studies. The findings include problems or challenges that need to be resolved to help develop the art of compact city building in contemporary Norwegian practice.

Table 5
The general findings from the research material

	Context	Theory development	Case studies
Morphology Morphological loop of Oslo Frontage structure Frontage type Empirical case **Hypothesis 1**: Knowledge gap - urban form &micro-spatial units	Lost knowledge about compact city building, typological dilution and geographical displacement lost knowledge about building-street relation – interface rupture Architecture production is innovative city production is progressive or culturalist As Progressive (planned, intended, future) or Culturalist (built, realised, past)	Micro-morphology as valid tool to assess the building-street relation The structure diagram of the façade-threshold Analytical tools addressing the façade-threshold: entrance density, constitution & inter-visibility Urban Micro-morphology of the building-street relation: the terminology of the façade threshold 16 distinct types of façade-thresholds	-Physical and visual definition and structural disconnection between building and street -Deep integrated permeable façade-thresholds -Ground floor balconies as one-way permeable façade-threshold -The residential interface turned inside-out, and outside-in -The commercial direct permeable and transparent façade-threshold
Process: **Legislation & Discretion** Frontage rules Empirical case **Hypothesis 2**: Implementation gaps – zoning and regulation **Hypothesis 3**: Discretionary decisions and hidden planning	- a shift from understanding planning as a product to an understanding of planning as a process. -lack of terminology in law lack of a morphological element/capacity in the Norwegian planning vocabulary in linking the building with the street. -modernist ideals in Norwegian practice have formed a strong path with long life of regulation and implementation, in planning & architecture. -modernist critique & knowledge production of 60s/70s has not been adapted to or implemented in practice.	- an early focus and priority on the façade-threshold reducing over time both as regulatory & societal concern -informs on societal ideas &concerns which determine today's urban form -radical change in legislation history defining urban form happened with the implementation of the 1965 act, from… …street & form to building & land-use … city technical regulation to land-use planning …relation between building & streets to detached objects on a plot …maximum to minimum sizes …inclusion of street to protection from road …predictable outcome to flexible plan	-emphasis location lines, within or in -addresses elasticity of the building line – projections and setbacks as balconies, front terraces or gardens -presents the image of the compact city – Visual-aesthetic considerations of appearance and expression -depends on subtle distinctions in language – sizes of maximum or minimum outdoor space protected from noise and embraced by sunlight -highlights permeability of the façade; entrances, windows & parking -defines public, common and private areas of ambiguities - lost in implementation & universal design -embraces dispensation – for both subtle and radical interventions
Knowledge about compact city building have been lost, through legislative framework and in architectural practice of urban form production. Compact city is highlighted for sustainable reason, with successively added knowledge &ideals from utopian model of social progression. The role of urban form – effect of and precondition for legislation			

chapter 9

9.1 FINDINGS AND RESULTS: NINE TEACHINGS FOR POLITICS, RESEARCH, AND PRACTICE

The general findings from the research material are illustrated as a summary in Table 5. It presents an overview of the findings of my thesis under the themes of *context* (Part I), *theory development* (Part II), and *case material* (Part III), which are addressed through the two aspects morphology and legislation and related to the main assumptions of the thesis. These comprise empirical components, a theoretical investigation, and synthesis.

Nine main findings underpin the discussion of the three research questions, which are restated as follows:

- ***How can we understand and conceptualise the building–street relationship as an interface between public space and private build-ing in a way that can improve current practice and policy?***
- ***How has the morphological building–street relationship been implemented in the Norwegian context?***
- ***How can we use new knowledge in answering the problem and securing good compact city building?***

I first describe and explain the nine findings and then discuss their effects on the research questions. Finally, I reflect on how they affect the assumptions presented in the introduction chapter.

The nine main findings of this thesis are as follows:

1) Modernist ideals have provided the defining path and have a significant legacy within Norwegian practice, in the built form, produced regu-lations, and implementation in a way that we have lost knowledge of compact city building.
2) There is a strong tendency for building the image of the compact city rather than structures that secure compact city qualities.
3) The territorial structure of the façade threshold is often turned out-side-in – that is, the private is out and the public is in.
4) Planning and building legislation in Norway have developed more slowly than policy and have been influenced little by modernism critics.
5) The urban micro-morphological aspect has disappeared from spatial planning instruments in legislation.
6) The legal lines and provisions in zoning plans are the most vital plan-ning instruments for compact city building.
7) Ambitions of compact city quality in provisions and planning docu-ments are primarily described through a desired visual expression.
8) There is a tendency that building control processes overrule ambitions of compact city quality in planning documents.
9) Technical regulations for buildings work as a ‘hidden’ planning system

where regulations of details and constructions of buildings have a direct effect on both planning and urban form.

These nine findings are discussed in detail in the following subsections.

9.1.1 *Modernist ideals have provided the defining path and have a significant legacy within Norwegian practice, in the built form, produced regulations, and implementation in a way that we have lost knowledge of compact city building.*

This thesis has presented the historical journey from the realised compact city with its perimeter block and constituted street, through urban expansion based on garden-city ideals, the urban sprawl of suburban free-standing slabs, and back to an intended compact city, which is often implemented as perimeter slabs in introspective cells (Chapter 2). The outcomes of this journey present a clear tendency of a *lost knowledge* in city building, both for the characteristics and capacities of the urban block as well as the form and structure of the building–street relationship. This loss can be seen as the biproduct of the search for good dwellings, where the modernist ideals of daylight, views, and sun were vital parameters and key considerations. The empirical investigation revealed that modernist ideals have provided the defining path and have a significant legacy within Norwegian practice, in terms of built form, produced regulations, and implementation. The dilution of the urban block during the 20th century let to the development of a spatial pattern based on the continuity of solids into a pattern based on the continuity of voids, into which the built elements dispersed. This dilution presented preconditions for the *façade-threshold rupture* that occurred between building and street. As buildings became larger, free-standing objects and streets became wider and increasingly car-based, and this relationship became increasingly compromised and absent. The investigation of the urban blocks of Oslo, the morphological loop from Grünerløkka out to the suburbs of Romsås among others, parallels the gradual transition of the building–street relationship from constituting the street to dissolving it. The focus of attention in Oslo's housing development can be said to have moved from the city centre to the suburbs and back again, and with this geographical displacement, the knowledge of house building and housing qualities increased while the knowledge of city building and city qualities diminished. When the focus of housing arrived back in the city centre in the early 1980s, this presented some new challenges. Good dwellings, regulated within demands for open space and light, parking, and recreation, met the dense city, a morphology that was entirely unsuited to the density of the compact city. From generosity of space to restricted space, this created new morphological forms with increasingly challenging relationships disconnecting dwellings and the city as regulation and legislation made continued efforts to safeguard goods such as light, air, and space.

9.1.2 *There is a strong tendency for building the image of the compact city rather than structures that secure compact city qualities.*

A major finding from the morphological analysis was that the layout of the majority of contemporary urban blocks are generally *boundary-built* (i.e., built in the plot boundary), thereby creating spaces that physically and visually help to define the street. However, these boundary-built projects typically end up being structurally disconnected from the street and thus also the city. Structural links between buildings and streets are normally determined in relation to the internal courtyard rather than the street or surrounding context, making them introspective cells that seek to activate the core of the plot/the courtyard rather than their relation to the public street network. This finding is not new but supports Børrud's early findings from 2005 as well as those of Zurovac's thesis (2020). It stems from the first implementations of urban form in the constituted urban tissue in the early 1980s, which led to the city building of urban blocks of introspective cells. Plots were smaller, parking demands were similar to those in the suburbs, and qualities such as sun, light, view, and privacy provided the defining framework for new densification projects. The investigation of frontage types in urban projects – internationally and nationally, past and present – confirmed the view that contemporary Norwegian urban projects rarely manage to structurally connect buildings to their wider context, and in so doing do not contribute the compact city qualities sought by policy. This critically confirms the main challenge of compact city building as needing to be addressed through an investigation into the micro-spatial aspects of recent examples from current practice. This lack of externalised structural relation prevents contributions to compact city qualities such as walkable, liveable, and lively urban environments sought by contemporary densification policies.

The chosen cases from contemporary Norwegian practice revealed that the understanding of micro-spatial interventions that link and relate the building to the city and vice-versa are often limited or nonapparent. Being internally or courtyard-focused, the Norwegian cases generally revealed communal deep configurations from private buildings to the street, which highlights the need to consider urban form at both the meso- and micro-levels.

9.1.3 *The territorial structure of the façade threshold is often turned outside-in – that is, private is out and public is in.*

Another major finding of this thesis concerns residential façade thresholds that have turned the building–street relationship inside-out and outside-in. The morphological façade threshold of this territorial twist comprises a deep integrated permeable façade threshold from the street to private residential units on the ground floor (entrance) and a one-way permeable façade threshold from the residential unit facing onto the street. In all of the empirical cases, there are deep integrated permeable façade thresholds with a transition from the street to a collective yard, through a communal entrance and within a horizontal (and vertical; i.e., stairs) circulation space before entering the private unit. There is also a tendency to build one-way permeable balconies and front gardens facing directly onto the street. The combination of two types of façade thresholds connecting the same residential unit, namely deep integrated permeable entrance space and shallow one-way permeable private living space through the ground-floor balcony, represents the classic building–street relationship turned inside-out and outside-in. The structure analyses of the different cases revealed a clear tendency to implement this twist, by which the (public) entrances to flats deep in the building structurally become the most private space, whereas the (private) garden/balconies become the most public space. This tendency to define structural connections and main communal entrances through the yard rather than the street also increases the likelihood of this interface twist being the output of the built project. The cases revealed that this *inside-out, outside-in* building–street relationship creates territorial ambiguity through its challenging façade thresholds, which must be addressed through a morphological and structural understanding as well as the creation of appropriate legislative tools in future projects.

9.1.4 *Planning and building legislation in Norway have developed more slowly than policy and have been influenced little by modernism critics.*

The way that modernist ideals in Norway were defined by the 1965 act formed a strong path with long-life regulations and implementations in planning and architecture. These ideals informed societal ideas and concerns, which determined today's urban form as the planning system had effectively just been augmented and developed following the 1965 Act. The last two revisions (1985 and 2008) of the PBL retained the same basic structure as the 1965 Act but grew from 17 to 35 chapters, specifically focusing on *universal and aesthetic design*. They were most concerned with regulating objects and spaces, although some relationships between building and streets appeared in regulations for *universal accessibility* and design, overwater management, and fire escape routes. Since the radical change of the acts in 1965, very few paragraphs have been removed or altered, whereas many have been added, demonstrating that social ideals from the 1960s remain current as planning and management tools in the current framework. There is very little focus concerning the development of the façade threshold, and the implementation of good compact city form is to a great extent left to the discretion and abilities of the individual developer and the planner of the zoning plan. As such, we see that modernist critique and knowledge production that was already emphasised in the 1960s/70s, and that is vital for current compact city policies, has not been implemented in the Norwegian planning and building system. We therefore build compact cities based on planning instruments that helped split the city apart. The findings indicated increasing distance requirements of building boundaries from the street. The transition from *maximum* to *minimum sizes* helped to remove the building from the street, thus destroying the façade threshold as a crucial urban element. These increasing size requirements work in direct opposition to compact-city building. An example of this is the change in the Road Act's requirements for building boundaries in different eras over the last 100 years – a law that applies if zoning plans have not set or drawn up building boundaries with smaller distance requirements facing roads. In addition, a range of minimum sizes and distance requirements are connected to the protection from fire and noise, with major physical impacts on compact city building. As such, the formal output defined by law (the Road Act and PBL (§29-4)) will build a fractured city based on protection where subtle distinctions in distance requirements cause unwanted effects. Legislation still provides opportunities for regulating built form back into city building through the land-use plan and its provisions (§11 & 12 in the PBL), but the planning instruments required for achieving current policy will benefit from reappraisal and redevelopment if we are to be able to achieve compact city qualities.

9.1.5 *The urban micro-morphological aspect has disappeared from spatial planning instruments in legislation.*

The thematic change in legislation history from the building–street relationship to the construction of detached objects within land use zones was paralleled by a change from rules to discretion – from knowledge of city building to knowledge of urban planning. In this change, many urban technical tools concerning city building were removed and/or moved into other types of regulations and codes, and the façade threshold disappeared as a defined urban element (see Chapter 2). The findings from the earliest overarching Building Act for cities in 1924 revealed an abundance of both absolute and quantitative regulations addressing the micro-morphological form components relevant for the production of the façade-threshold. The Building Act defines frameworks for placing the building line in the street line, with façades interacting with the street space. It facilitated projections and setbacks as critical characteristics to highlight building–street interactions. The 1965 Building Act defined the exact opposite: all buildings were to be built as detached objects on a plot with a distance between the street line and building line. The detailed city-technical knowledge of the relationship between building and street disappeared or changed in importance as the law changed to focus on size regulations and individual built objects and their land use.

The investigation of the changing acts and their contexts seen in relation to current development, addressed in the empirical cases and morphological history, also addressed and confirmed the challenge of creating introspective cells of development. This might be a direct effect of the law, but the opportunities for developing zoning plans to address form-direct issues of the façade threshold are still vital. §12-7 in the Norwegian PBL provides the opportunity to regulate a range of both form-direct and -indirect aspects, offering the potential to relate the building with the street. However, from being a demand in law – that is, mandatory technical knowledge of city building – it has become a result of professional decisions in a planning process and is thus dependent on professional skills and abilities concerning urban form. This fact is not surprising as it was also the aim of the committee (Heiberg 1960) that affected the city-technical regulations the most. In its evaluation of the 1924 Act, the committee interpreted the early regulations as being too specific and a product of their time, and not being general enough for changing times and ideals.

If the façade threshold is mainly a part of the city and not the building or the plot, then the emphasis needs to address how to create predictable outcomes of this micro-morphological part. The findings indicated great potential in learning from the past. One example would be to address old tools that have disappeared through argumentation regarding correspondence with the Road Act on terminology such as building lines and streets. Other tools that were intended to be part of the regulations but were not included in them are setbacks, projections, and façade lengths. The argument for removing them was to emphasise the power of the plan and to move legal prescriptive demands into a plan-by-plan development where the implementation of such city building tools would be up to the ideals of the time. As such, it was interesting to investigate current projects to determine if these tools have survived in the current planning of compact city building, thereby helping to form a predictable outcome. The frontage rules analysis highlighted answers to the assumption presented through the frontage rules-defined legal prescriptions of building lines, maximum sizes, setbacks, and projections as relevant for compact city building. As such, their prevalence in the provisions of the plan, in the verbal regulations that legally define the control of the implementation process, was of great interest to reveal in the empirical cases.

9.1.6 *The legal lines and provisions in zoning plans are the most vital planning instruments for compact city building.*

The findings from the different cases highlighted that different approaches are applied to locate and define the building in the city, based on the *type* of lines used and the *way* they are used. As such, there is no clear focus or approach in the legislative toolbox concerning one of the most vital topics for city building. The provisions concerning the location of buildings address two main *ways* to define and locate the built structure, either specifically placed in a line or within/behind a line, and three main *types* of line, either in the purpose boundary, in/within the building boundary, or in the building line (even though this line has been removed from the planning instruments of today). The repertoire of lines addressed in planning provisions have subtle and vital distinctions relevant for addressing the microscopic views of city building. The wording of *in/within* is an example of such a vital distinction: whereas *in* offers predictability for city building by specifically locating the building in the legal line, *within* does not offer predictability as buildings can be placed anywhere within a pre-defined area. This tool has its origin in the need for protection from unwanted externalities such as noise and fire, and it works as a protective regulation rather than a tool for city building; therefore, it plays a vital role in the art of city building as highlighted through the transformation of the legal acts.

The legal lines locating buildings on the plot are supplemented with different approaches for creating variety and elasticity in the building–street relationship. This can be achieved by emphasising the relation between the building boundary and purpose boundary to create setbacks and projections in the façade, or through maximum and minimum distance requirements for these as well as percentage façade length. At the ground-floor level, this elasticity includes provisions of front terraces or gardens; on the second floor and up, it includes balconies regulated through distance requirements and percentage façade length. These approaches to defining sizes, highlighted as different concepts in provisions, represent flexible tools that can inform a renewed way of developing the elasticity of a building line, thereby defining façade thresholds.

9.1.7 *Ambitions of compact city quality in provisions and planning documents are primarily described through a desired visual expression.*

As the morphological findings (Chapter 2) highlighted, the *building* of the image of the compact city, the legislation, and the provisions also correspond to this. Current plans focus on the *appearance and expression of the compact city,* instead of addressing the capacities vital for making the city work, which was a prevalent finding in the provisions of the cases. A crucial difference exists in stating that a building project should *appear as* or be presented as projects of variation as in an urban traditional environment, rather than saying that it should work as such or providing the mechanisms for making a building work as part of the city. By choosing wording such as appearance and presentation, planning intentions and provisions emphasise visual-aesthetic considerations rather than structural active interaction in the built form. The findings reflected a focus on visual qualities and varieties of façades but did not include a focus on the structural capacities linked to the traditional environment that it is inspired by. As such, when aesthetic considerations of the urban block comprise the main goal for the development, a danger exists that projects risk presenting an outward appearance of well-perceived (aesthetic) urban form without ensuring the structural connections and spatial relations for making it work.

An aspect that represents the greatest challenge for urbanity in this visual-aesthetic focus is the story of a ruptured permeable interface between building and street, which is ambiguously addressed in current urban block creation. The findings indicated little focus on the permeability of the façade, location of entrances, or windows. The most prevalent opening regulated in the case material was access to parking for cars and bicycles. One of the case examples had provisions demanding entrances facing the street. However, this provision had little impact as the façade length of the building comprised the whole block–street relation, and the morphological result comprised one entrance in the whole street segment.

9.1.8 *There is a tendency that building control processes overrule ambitions of compact city quality in planning documents.*

The investigation into the project cases revealed that discretionary decisions occur throughout the whole planning and building process, both through defined tools such as *city centre purpose* and *dispensation* as well as through being part of more 'hidden' discussions in the process but affecting compact city qualities in both subtle and radical ways. The cases revealed a tendency that when ambitions regarding compact city qualities are weighted against other demands, either those described in technical regulations or planning provisions, then city qualities are not prioritised. A radical discretionary decision (dispensation) within the case material concerning the effects for the building–street relationship was found in the case at Siriskjær, where parking demands were prioritised in the building control process, a project that had a large emphasis on urban qualities and the building–street relationship in the project intentions, which was lost in implementation. A more subtle discretionary decision was found in the Ensjø case, where the provision of building entrances facing the street, thereby providing preconditions for urban life, was reduced to a minimum (one), while the main appearance of the entrances was facing the courtyard.

9.1.9 *Technical regulations for buildings work as a 'hidden' planning system where regulations of details and constructions of buildings have a direct effect on both planning and urban form.*

The investigated cases revealed that technical regulations comprise bottom-up rules affecting city building with both direct and indirect effects, in such a manner that I present these as a 'hidden' planning system where regulations of details and constructions of buildings have direct effects on urban form production. The building control processes of the cases revealed challenging relations between technical regulations and *universal design* as well as between the *land-use purpose* of commercial units at the ground-floor level. In the project at Hollendergata, commercial premises were demanded at the ground-floor level but there was a challenge in defining the specific use for the premises due to the lack thereof, so the project could fulfil the demands in technical regulations and be granted outline permission.

In sum, these nine findings provide answers to the research questions as well as confirms and further develop the suppositions for the thesis. In the next section, I discuss the impact of these findings on the research questions and reflect on how they affect the suppositions.

9.2 REFLECTION AND DISCUSSION: MORPHOLOGICAL, LEGISLATIVE, AND DISCRETIONARY OUTPUTS OF COMPACT CITY STRATEGIES

How do the aforementioned findings feed into the problem of compact city building? In this section, their implications are discussed in relation to the morphological outputs of compact city strategies as well as the legislative and discretionary tools that produce this output.

9.2.1 *Morphological outputs of compact city strategies*

The overall research question concerning morphology in this thesis was as follows:

How can we understand and conceptualise the building–street relationship as an interface between public space and private building in a way that can improve current practice and policy? (RQ1)

From this research question, the following subquestions were developed: How can we develop the theoretical foundations of micro-morphology to address building–street relations? How can different solutions of building–street relations be categorised as types and morphological variants? Can we develop a precise concept that describes this micro-morphological part of the city?

This first main research question and its three subquestions were stated to help develop and properly understand a topic that has previously been addressed more intuitively rather than theoretically, particularly within the Norwegian context. These questions relate to my first assumption concerning morphology, namely that contemporary Norwegian city building presents outputs of urban form with challenges when it comes to relating buildings and streets. Essentially it regards built-form work as an internalised dynamic focused within the development area. This results in a fractured urban context in which there are little relational dynamics between building and street. This lack of relation does not contribute to compact city qualities or effects addressed in contemporary densification policies and reveals a significant *knowledge gap* about compact city building within contemporary Norwegian practice.

This morphological assumption was to a large extent confirmed by the theoretical investigation, contextual studies, and empirical material in this thesis. The first three findings address the morphological outputs of compact city strategies. We lack a morphological understanding of the relationship between public space and private building in contemporary urban projects within the Norwegian context, in terms of knowledge of the topic, terminology, and typology. As such, current Norwegian practice operating within compact city strategies comprises a *lost* *knowledge of city building* where modernist ideals have provided the defining path and left a significant legacy within Norwegian practice – in the built form, produced regulations, and implementation. In addition, the creation of urban blocks forming *introspective cells* with their *façade thresholds turned inside-out, outside-in* does not relate buildings with streets. As a response to compact city policies, there is rather a strong tendency for building the image of the compact city rather than structures that secure compact city qualities.

To develop knowledge and respond to this concern, this thesis developed *theoretical foundations of urban micro-morphology* through a systematic literature analysis and synthesis – clearly situated in the field of Urban Morphology. It has developed and further elaborated this theoretical framework to demonstrate new directions and assess their relevance to discuss and analyse the micro-spatial components of the building–street relationship and its relation to a greater whole. In addition, this thesis developed *new terminology and a typology of the façade threshold* (see Chapter 5). As previously mentioned, new project developments often have demands for achieving an urban building–street relationship through the vague terminology of *active façades*. In current efforts to address the lack of communal interaction in compact city building, this term has emerged as the answer to ensure vital, safe, and attractive space, promoting walking, public health, and social interaction, seeking to give form an agency of interaction without clearly defining the characteristics that comprise it or how it will be achieved. *Active façades* is a value-loaded term, presenting expectations of a lively streetscape with buildings developed through the intention of *'eyes on streets',* a la Jane Jacobs' seminal work. This term focuses on the effect of compact city policy rather than on the capacities required to provide it. The alternative *façade threshold*, proposed by this thesis, provides a morphological urban element with its own characteristics, capacities, and value, promoting compact city quality. The morphological capacities of the façade threshold provide a first step in developing a more precise and focused discussion on how to secure interaction and other qualities in building design and urban design. This new term is particularly relevant for the Norwegian context as there is currently no specific term in the vocabulary addressing this element. The façade threshold belongs neither to the building nor to the street but to the city, and in the words of Cerda, it is an element that might be understood as the quintessence of the urban. It provides the opportunity to make complex relations manifest in types and a typology, which again can help to develop legislation and regulations affecting planning and implementation and a link between these. The investigation that led to the term revealed 16 unique types of façade threshold that address two main dimensions – namely the physical boundary between inside and out (the façade) as well as the cross between public and private through this boundary (threshold). The term and typology offer a new, combined, and precise concept describing this micro-morphological part of the city and have the potential to help understand the rights connected to both objects (land/buildings/facades) and relations (access, territory, threshold).

9.2.2 *Legislation and discretion producing output of compact city strategies*

The overall research question concerning legislation in this thesis was as follows:

How has the morphological building–street relationship been implemented in a Norwegian Context? (RQ2)

From this research question, the following subquestions were developed: How has the regulatory description addressing the building–street relationship developed over the last century? (RQ 2.1) What is the impact of legislation on urban form as revealed through the production of the building–street relationship? (RQ 2.2) How is the building–street relationship designed and implemented in a current Norwegian compact city context? (RQ 2.3) What are the planning tools and building codes active in the implementation of urban form? (RQ 2.4)

These questions relate to the second and third suppositions concerning legislation and discretion and were aimed at illuminating and understanding the nature of interaction between legislation and urban form from past to present, and also to answer knowledge and implementation gaps both posed and further revealed. They concern current planning legislation, regulatory tools/zoning plans, and discretionary decisions, as well as their great impact on the implementation of urban form, and also the output of discretion in the building control process. Within this there are large *implementation gaps* in the institutional framework through which urban form and the building–street relationship are produced. These legislative and discretionary suppositions were to a large extent confirmed and further developed by the theoretical investigation, contextual studies, and empirical material in this thesis. The last six findings address the legislation and discretion producing the output of compact city strategies.

Current implementations of urban form remain to a large degree *governed by ideas presented in legislation from decades ago*. Planning and building legislation in Norway has developed more slowly than policy and have been influenced little by modernism critics. In particular, this includes the ever increasing minimum size requirements which work in direct contravention of the aspirations of the compact city. This corresponds to the assumption that the current use of technical regulations is characterised by a crucial lack of the urban design knowledge necessary for compact city building. As such, the urban micro-morphological aspect has disappeared from spatial planning instruments, and existing technical regulations and legislation are overly focused on either the built (form)/building project and the unbuilt (void) of outdoor spaces rather than the relationship between built and unbuilt that links them. These technical regulations for buildings work as a 'hidden' planning system where regulations of details and constructions of buildings have a direct effect on both planning and urban form. The findings also demonstrated an early focus and prioritisation of the façade threshold, which reduced over time as both a regulatory and societal concern. The shift in the legal framework from 1924 to today presents a backdrop for addressing the challenges of current compact city building and the building–street relationship – and it is vital to the definition of urban form.

The *legal lines of the zoning plan and their provisions* act as the most vital planning instrument for city building in the site-specific plan. These impacts on these legislative tools, as revealed through the production of the building–street relationship, present vital contributions to the art of compact city building. This zoning plan tool generally does not address spatial overlaps and relations within the compact city and thus limits connections and interaction in these in-between spaces of the city. However, this knowledge presents a potential to develop the tool into an operative tool that can address the knowledge of effective compact city building.

The art of city building is addressed through *the image of the compact city* by emphasising visual-aesthetic appearance and expression over structural links, which make buildings work as part of the city. Ambitions of compact city quality are primarily described in provisions and planning documents through a desired visual expression.

The building control of the six empirical cases revealed that the focus on the building–street relationship is *lost in implementation by discretion*, creating both subtle and radical interventions. There is a tendency for the building control process to overrule ambitions regarding compact city quality in planning documents. This corresponds to my assumption that the architectural outcome of planning and building cases at the micro-spatial level can be determined by discretionary decisions and tools in the control process, sometimes overseen by one individual case officer. As such, there is an implementation gap in the building control practice through which urban form and the building–street relationship are produced. This discretionary layer manifests through the tool of dispensation (building control) and city centre purpose (planning purpose). Thus, the abilities and skills of the individual case officer can affect the overall planning strategies in an unintended and challenging way, particularly at the micro-level, where small, seemingly unimportant regulations of building–street relations can be overlooked to prioritise other regulations.

9.2.3 *Relationship between morphological conclusions and legislative and discretionary aspects*

The morphological conclusions relate closely to the legislative aspects in current urban form production. They demonstrate the need for a relational approach to aspects of compact city building as a precondition for vitality and city life in the production of the façade threshold. Compact cities are the current goal for built form and the intended result of urban densification policy. The compact city is assumed to be the optimal model for reasons of sustainability, but compact city building is currently a physical result of successive layers of knowledge and ideals derived from the utopian model of social progression manifested in the 1965 Act.

The modernist critique from the 1960s and onwards, which addressed the perceived negative aspects of modernist ideals, has not generally been implemented in practice, and neither has it been implemented in legislation nor in the implementation of form. The comparison of three contextual trajectories in the history of city development (seminal thinkers, the morphological loop, and legislative history) revealed a *mismatch between thoughts, form, and legislation*. Key seminal thinkers highlighted relational aspects in architecture and a variety of characteristics and effects critical in connecting buildings and street, as discussed in Chapter 2, which do not necessarily translate into practice. Morphological and legislative development over time has demonstrated that this modernist critique has a tendency to not be adapted in architectural practice, and even less so in planning and building regulations. Even though the legal framework has maintained the same structure over time while accumulating a range of new chapters, the focus on and tools for addressing city building have radically reduced. Whilst the current production of urban form remains governed by ideas implemented by legislation decades ago, the ever increasing size requirements – which work in direct opposition to the aspirations of the compact city – will make the art of compact city building ever more difficult to realise.

Contextual research of urban form and legislation indicates that legislation responds to morphological structure and societal ideas already present but moves slower than ideas and policies because of the time required to implement it. As such, legislation affects and is affected by urban form – it is both a result of and prerequisite for the development of built form. Therefore, the aspirations presented by current building projects have the potential to inform subsequent revisions of legal constructs by learning from the present. The knowledge developed by this thesis provides legal advisers with a base for updating legislation according to current ideas and policies. This knowledge base, relevant for addressing compact city building, can and should learn from the past, particularly from the legislative tools of previous city-building agendas. The future of the façade threshold in form legislation can potentially be implemented and regulated in a way that contributes to Cerda's idea of the quintessence of urbanisation. Furthermore, the first Norwegian Building Act of 1924 provides important regulations and recommendations that can inspire such a revision. This reflective interpretation of city building fits with the morphological foundations and culturalist approach presented by Choay, where this main type and ways of building a city are based on regulation and not model thinking. While architecture production is generally innovative, planned and intended for a utopian future, it is relevant to discuss city production in light of this. City production under a compact-city agenda is culturalist and based on knowledge from the built and realised past.

This thesis found that only through addressing real-life cases investigating urban tissue is it possible to understand the complex relationships between plot and built form, streets and buildings, and such forms and design practice. Having investigated the complex relationship between form and society, through legislation and urban form, I suggest that the patterns revealed and findings based upon then (i.e., the chronological journey, the development of terminology/typology, and the empirical cases) can contribute to revisions of the current legal framework and the renewal of implementation in practice (implemented by drawing tools and provisions). I also suggest that current technical regulations for buildings should be augmented by technical regulations for city building, which have the capacity to address relations in city building. Parallel with the general trend of internalised blocks as introspective cells, we see current projects presenting a renewed focus and intention to connect house and city, which reflect the slow transfer from academic thought into practice and implementation. With this in mind, these aspirations in some current building projects reflect a potential to inform the next revisions of legal constructs.

What do these discussions mean to the art of city building? My main suppositions for the thesis included aspects of morphology, legislation, and planning as well as discretionary practice in the building control process. My empirical findings from the contextual studies, theoretical development, and case studies have confirmed and further developed those suppositions. Furthermore, the findings have confirmed that knowledge of compact urban form has decreased over time, indicating that the institutional framework established in a different planning paradigm is currently affecting urban form in direct and explicit ways. They also reveal that discretionary layers in the building process directly and explicitly affect the physical outcome of urban form. As such, the aim of achieving a compact city lacks the understanding, knowledge base, and tools of implementation, which can help to build the capacities required in this context. The city needs planning tools that are relational and include, rather than protect, tools that enhance complexity rather than simplistic zoning and tools that are flexible to change as well as being predictable. A core characteristic of the city is that it is constantly changing.

9.3 IMPACT: HOW TO TEST POTENTIAL IMPLEMENTATION AND KEYS IN THE CAPACITY OF BUILDING A COMPACT CITY

The overall research question concerning impact in this thesis was as follows:

How can we use new knowledge to answer the problem and secure effective compact city building? (RQ 3)

From this research question, the following subquestions were developed: How can the institutional framework better facilitate and maintain the relationship between private building and public space in compact city building? (RQ 3.1). Moreover, which planning tools and building codes can assist in implementing a strong building–street relationship? (RQ 3.2)

The aim of these questions is to address potential alternatives of action; to feed operative knowledge back into theoretical understanding, planning, and building practice; and to answer implementation gaps both posed and further revealed. As presented, my audience for this thesis comprises both thinkers and doers – researchers and practitioners. However, as a practitioner within the Norwegian context, I have been particularly motivated by the potential for developing a knowledge base in which to ground practical work, in a context where examples are few and those available are typically normative. As such, this last section presents reflections which can directly contribute to current practice. I discuss the impact and solutions of the knowledge developed in this thesis as well as potential alternatives of action to be able to address the production of façade thresholds, thereby bringing back lost knowledge and developing the art of compact city building. The problem of compact city building can be addressed through reconsidering the art of city building, in part by unlocking the potential capacity that compact city building has. This is the capacity of urban form to inform on preconditions for effective city building and through this achieve the goals of current compact city policy. Delivering this capacity can best be achieved through the field of Urban Morphology in the knowledge of form and structures, their spaces, boundaries, and openings as well as the processes that create this form.

I start my reflection by revisiting Ali Madanipour's quotes about city building, which I introduced at the start of this thesis. The quotes capture the relational focus required in future city building – a focus that highlights desired effects such as compact city qualities and is vital for making cities work. Madanipour stated the following:

> 'City-building is therefore partly a boundary setting exercise, subdividing space and creating new functions and meanings, establishing new relationships between the two sides' (Madanipour 2003 p 240).

> 'By establishing a flexible and elaborate boundary between the two realms, urbanism can be enriched and the dangers of encroachment by private interests into the public realm and the threat of public intrusion into the private sphere can be both minimized and carefully managed' (Madanipour 2003, intro).

The façade threshold comprises the smallest city-building element, a micro-morphological unit addressing space, boundary, and opening that is vital in city-building activities. The production of the façade threshold includes the *acts of* setting a boundary (performed by the designer or planner), defining the *properties of* this boundary (what its characteristics are) that provide the *capacity of* the boundary (the latent potential of something to happen). As such, the micro-morphological boundary-setting exercise entails the understanding, facilitation, and realisation of the façade threshold, providing capacities for compact city building.

In this final section, I propose *strategies* for developing façade thresholds to create good compact city qualities. These strategies address morphological, legal, and discretionary aspects and highlight the potential to update the legislative framework by learning from past and present examples of urban form. The legislation and the planning system contain opportunities that can and should better safeguard the way we build an actual compact city of buildings, spaces, and relations – a city with more than just an aggregation of private buildings. There are already a range of planning and building instruments that have the potential to facilitate better relationships and interaction between public spaces and private buildings, which are not currently fully optimised. My proposal includes both methodologies for assessing and analysing urban form and façade thresholds as well as hands-on practical planning instruments and the technical regulations used to control the implementation of the built environment. My main conclusions for building in capacities of compact city development include the definition of a knowledge base and tools for implementation. Overall, I suggest six distinct strategies. The first two concern the development of a knowledge base and the last four are tools for implementation, including planning instruments (3 & 4), a technical regulation (5), and discretion (6). My six strategies and alternatives to action are as follows:

1) Promote an urban micro-morphological knowledge base – analytical tools and methods at the micro-meso-macro scale.
2) Implement a Norwegian term for and a typology of the façade threshold.
3) Re-define planning instruments of zoning by developing spaces of relation and form.
4) Re-introduce the building line as a renewed and redefined tool for city building.

5) Re-implement lost knowledge in a city technical legislation.
6) Propose a knowledge-based discretionary practice in the building control process.

9.3.1 *Promote an urban micro-morphological knowledge base – analytical tools and methods at the micro-meso-macro scale.*

I advocate the promotion of an urban micro-morphological knowledge base that can help inform planning intentions in the planning process and discretionary decisions in the building control process. The theoretical framework of urban micro-morphology is useful for connecting formal properties and aspects of urban form both within and across levels of scale. It connects the micro-spatial elements of building–street relations with a macro-spatial understanding of city building.

This base starts with my method for designing, analysing, and assessing urban form, developed through empirical data and theory. The relevant knowledge base comprises built form from the micro-scale through the meso-scale to the macro-scale, which can inform policy that builds compact cities from the inside and out, through all of the different projects that become more than just buildings – through the aggregation of buildings that relate and become a city. I suggest that this base focuses on relational capacities and structural links as the main approach in addition to formal properties and visual aesthetic considerations. This method and its knowledge base emphasise the microscopic view – the micro-spatial aspect that can be designed, analysed, and interpreted in compact city building – and through meso and macro its relationships and part in the whole.

Therefore, a small component or spatial unit is always a part of something greater and can thus contribute to knowledge about city building. The development of a micro-morphological knowledge base has been vital in establishing the theoretical framework and developing methodologies for addressing the building–street relationship within a compact city. The micro-morphological framework in this thesis further develops Karl Kropf's generic structure diagram, which was presented earlier in Chapter 4. The dialectic relationships of part-to-part, building-to-street, and part-to-whole – of building–street to the urban tissue – have been developed into methodologies for addressing city building in this thesis, alongside the development of typologies and terminology.

These tools include a focus on micro/meso/macro analysis that can be linked to the application of the generic structure diagram relevant in the micro-morphological framework.

Micro: Building–street relationship

In the building–street interface, the following variables comprise the analytical toolset: Entrance type includes the distinction between individual and collective entrances. Individual transitions control the relationship between an individual unit or building and the public space; it is spatially attached to the unit and can be designed in many ways. Collective transitions are deeper and more complex transitions from unit/building to street. Façade type comprises the difference between street façade and courtyard façade. Depth configuration and topological depth are similar concepts addressing the structural transition from private unit to public space. Depth configuration is spatial (and related to the generic structure diagram), while topological depth is based on numbers (and related to space syntax). Topological depth is measured by the number of semi-private and semi-public spaces one must walk through to get from a private space to a public street. Depth configuration includes the arrangement of parts or elements as a form, territory, or combination defining the configuration of the building–street interface.

Meso: Block–street relationship

The relevant analytical parameters at the meso-level include structural concepts such as plot structure, block structure, and street structure. The last concept includes variables such as inter-visibility, entrance density, and constitution. Inter-visibility describes the number of doors visible from the doors of the other houses divided by the total number of houses in each street segment, as well as the window and parking spaces visible from the dwellings. This analytical tool presents a capacity relevant for an experience of safety and control. Entrance density comprises the number of doors per street length, resulting in an index of permeability along the street, and presents a capacity relevant for social encounters. Constitution captures the adjacency and permeability between buildings and public space, addressing the possibilities to access into/out of a building façade from/to the street. Other relevant tools not used in the analysis but relevant in the morphological toolbox are form elements such as street width, street permeability, and block frontage width.

Macro: City–street relationship

At the macro level, route structure analysis forms the main approach, identifying routes in terms of their relation to centres and to other routes (Kropf 2011, 2017). The main steps include identifying centres, colour coding different strategic route types based on their relation to centres (super-strategic, strategic, semi-strategic, and secondary strategic), and finally identifying routes in terms of their relation to other routes.

9.3.2 *Implement a Norwegian term for and a typology of the façade threshold*

I developed the term *façade threshold (no: fasadeterskel)* as a morphological concept of interrelating types in the relations between building and street to be able to define a distinct but relational morphological element that can be used in legislative tools. It comprises two main dimensions of interface relationships concerning depth and spatial interaction of the threshold and visual and physical permeability of the façade, and it links form with structure and objects with relations. The term includes and develops the dimensions of the established morphological terminology of frontage and advances the more general term of public–private interfaces into a morphologically clear and comprehensive proposition. The typology of 16 distinct morphological types (as well as subsequent subtypes) of façade threshold provide opportunities in the production of the compact city. City building processes are increasingly governed through stricter legislation as a way to secure policies of good compact city quality. Many people have asked whether it is possible to regulate quality and good architecture through legislation and provisions. My claim is that we need a distinct terminology and typology for relational built form to be able to do this. As such, I suggest implementing this developed knowledge in planning instruments by using the terms in provisions and the types in form regulation.

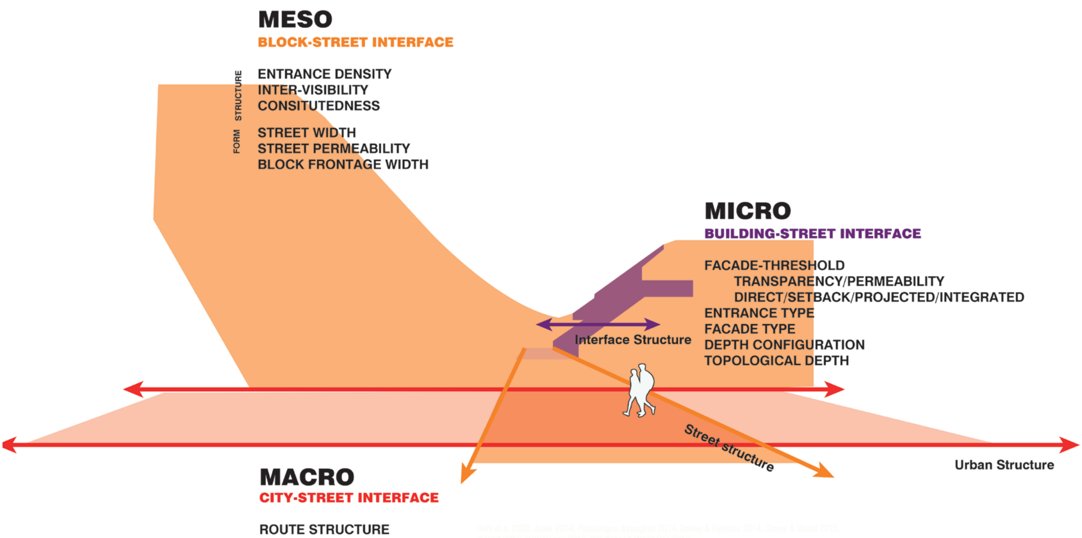


Figure 86 Morphological framework to assess the building-street relationship – in micro-meso and macro scale

9.3.3 *Re-define planning instruments of zoning by developing spaces of relation and form*

The Norwegian legislation and planning systems contain planning instruments that can and should be developed to enhance the art of compact city building. They have the potential to facilitate good interactions between public spaces and private buildings. I suggest that *planning instruments in the land-use plan* have the potential to support working with the complexities of urban compact city building needs if their implementation is reappraised. Renewed attention to the knowledge base defining morphological capacities of façade thresholds can be implemented within these existing planning instruments, but the focus must go beyond the current classification and definition of land-use purpose as defined *spaces*. To a much greater extent, the *boundaries and lines* that demarcate and define these spaces and their interaction should be refocused on. Last but not least, a focused implementation of the *openings* that interrelate everything is required.

The core principle of zoning is the *regulation of a site-specific area*. These defined spaces have the potential to develop further, from rigid zoning via form-based zoning to relation-based zoning. As discussed in Chapter 6, zoning is a field of many tracks and characteristics, and the zoning system has recently developed from earlier rigid zoning to include both form-based zoning and discretionary practice. I suggest that the implementation of form-based zoning can go even further and develop into what I define as *relation-based zoning*. Thus, greater emphasis on the structural capacities of the city would be captured in the operative planning instrument. This can be achieved in several ways to better facilitate the relational focus of compact city building within zoning plans, with benefits for *streetscape zones, merged land-use purpose, form-based zoning, and substantial relational zones of consideration.*

- *Emphasise merged land-use purpose – A discretionary practice*

The complexities of compact cities present a need to develop combined and diverse land-use purposes such as the merged city centre purpose, including a range of combinations of land-use purpose. The city centre purpose was implemented in the last legislative change in the 2008 PBL and includes decisions of a discretionary nature. The merged land-use purpose provides flexibility for a city to adapt to different needs and will to a greater extent be dependent on zoning devices other than land-use only, such as form-based or relation-based zoning. Drawing upon the discussions of Jacobs (1961) and Dovey and Pavkas (2019) regarding city building as dependent on *mixed-use functions,* my claim is that a combined and merged land-use purpose in planning instruments can play a vital role in this city-building activity. This potential in the drawing tools of the legislation must be further understood and developed to enhance its full potential.

- *Further implement form-based zoning – Enhancing the microscopic view*

I recommend a greater focus on form-based tools within the operative planning instruments to be able to work with the microscopic view in the development of the city. Form-based tools create opportunities for regulating land development to achieve a specific urban form. Form-based codes foster predictable built results and a high-quality public realm by using physical form as the organising principle, with a lesser focus on land use, through municipal regulations. As Holsen (2019) highlighted, such codes are already used in Norwegian practice to control and predict architectural outcomes of planning. Form-based tools are particularly relevant in compact city building, where micro-spatial outputs are vital in determining macro-spatial effects. Form-based tools can be included in the provisions of the plan *(PBL §12-7 point 1*: *design, including aesthetic requirements, and use of land, buildings, and installations in the planning area)*, which is a vital planning instrument for urban form in current legislation and includes diagrams such as maps or principles.

- *Develop substantial relational zones of consideration*

I previously covered the performance zones connected to substantial control that directly relate to the morphological output of the building–street relationship. These include considerations of safety, noise, and danger zones; infrastructure (free view); and the cultural environment. Such substantial performance zones all share the intentions of protection and safeguarding, seeking to prevent unwanted effects occurring. My suggestion is that this zone can be developed to have a relational focus by considering overlapping areas between rigid boundaries in land-use patterns, thereby connecting building and streets. In this way, it is a zone that can build capacities in for the *desired* effects to occur. Drawing on Jacobs' (1961) discussions regarding the *city as a process of organised complexity,* my claim is that performance zones and areas of regulation are planning instruments with a vital role in this city building activity.

One solution in creating preconditions for organised complexity could be a type of substantial relation-based zone that works in addition to the land-use boundary, which includes prescriptions for important relations between form and space. Naturally, any such processual performance zones include the requirement for joint planning for several properties, including special forms of cooperation or ownership, transformation, and renewal. A substantial performance zone can therefore provide preconditions for predictable city-building activities.

- *Enhance the potential in the area of regulation*

An alternative approach for achieving similar effects as the substantial consideration zones is to further develop the tool of *area of regulation*, which was implemented in the 2008 law. This regulatory tool comprises legal lines defining areas independent of land-use zones with written provisions that can be further emphasised through the developed terminology and as a relation-based tool in the art of city building. This new approach to area definition creates a potential supplement for the future of land-use purpose in zoning plans. The relational focus in boundary settings of legal lines will cut across distinct land uses and help create the overlaps that a compact city comprises.

An example of using this tool could be the creation *of streetscape zones* where the definition of areas/spaces under zoning regulation could be defined in a way that focuses on streetscape rather than buildings/blocks or streets alone. Boundary-setting emphasising the zone of the street (including the related buildings connecting to this street segment) could also make it possible to further parcellate plots to include other mechanisms for implementation, supporting the building–street relationship relevant for the art of city building. The zone would therefore not necessarily be defined by its land-use, but by its relational structure and how the building works and contributes as part of the city. Approaching zoning in this way can supplement rigid land-use zoning while simultaneously developing tools for addressing recent changes in combined land-use patterns such as city centre purpose.

9.3.4 *Re-introduce the building-line as a renewed and redefined tool for city building*

A strong emphasis should be placed on the legal lines and points of the zoning plan. While the land-use purpose is currently regarded as the most critical component of the area plan (*reguleringsplanveileder*), I suggest that the legal lines and points are the most valuable tools for regulating compact city building.

Drawing upon Madanipour's (2004) discussions of *city building as a boundary-setting exercise,* my claim is that institutional boundary setting, through planning instruments, plays the most vital role in this city-building activity. In Chapter 6, I presented the main types of boundaries and lines relevant for implementing urban form. These can be developed in the institutional land-use plan and re-introduced, renewed, and redefined in legislation and practice. Legal points can also be further developed to offer predictability for street constitution and to relate the building to the street.

Within the repertoire of legal lines, I hereby suggest that the governance tool most directly relevant for planning at the zoning level and the implementation of the façade threshold is the *building line.* This line should be re-introduced, renewed, and redefined to address micro-spatial relations of form and façade thresholds, including setbacks, projections, and visual and permeable façades. The core idea of the building line is the *duty of locating the building façade on the line*. This *build-to line* presents an opportunity to define urban spaces at zoning, which with correct implementation can help to define morphological characteristics such as street definition, proportion, and scale. This specific planning tool was taken out of use as an active term in the 1965 Act. However, the possibility of defining legal lines addressing the location of buildings remained in later laws, and there are quite a few examples of the use of the terminology in current plans even though it is no longer a valid planning tool (see email from the KMD, 04.06.20). The specific location of buildings can still be maintained in the legal framework through the legal lines of the *purpose boundary, planned development,* or *building boundary,* but these need extra written specification, further content, and clarification through the provisions of the plan. As such, they often present no specific properties and are dependent on written regulation to complement the tool in implementation. The building line is a specific drawing tool that enhances city building on its own.

In addition, I suggest that the current planning system lacks both *knowledge about* the potential *properties* and *capacities of* this important design regulatory instrument for urban form and compact city building. I suggest *re-introducing* this tool to provide a greater likelihood of connecting buildings to street and thereby delivering the potential of achieving the qualities of city life sought by compact city policy. The characteristics of this line are of vital importance and need to be addressed, both morphologically in respect to what it contains and legally in respect to where and how the tool is used. I have two main suggestions for developing the building line. The first is to use it as a tool for enhancing the *structural* connection between building and street. Today, this structural link is addressed through the provisions of the plan, if it is mentioned at all. The empirical data show that this consideration lacks a particular focus when other provisions are in conflict. The line has the potential to include the morphological capacities of street definition such as inter-visibility, entrance density, and constitution. I suggest that the building line can be supplemented by bulk provisions, defining the entrance density and thereby enhancing the constitution of the street. Inter-visibility is dependent on visual and structural relations across the street and can be quantified and determined as bulk provisions. Case studies using slogans such as ‘eyes on the street’ in their planning documentation seek such a tool, which can define capacities in the way to secure predictability and enhance compact city building through bulk characteristics.

My second suggestion for develop the building line is to address *micro-spatial* relations of form. I suggest that the building line can be developed to include morphological characteristics defined through morphological types of façade threshold (see Chapter 5), such as setbacks and projections as well as visual and permeable façades. Thus, the line can present both explicit and mandatory requirements for street definition and simultaneously allow elastic opportunities with room for the spaces, overlaps, and structural links that are crucial for territorial distinction between public and private. As such, it can achieve what Madanipour highlighted by *establishing a flexible and elaborate boundary between the two realms*. The case findings of this research revealed different ways to address setbacks and projections providing *elasticity* of the building wall. These include usual *distance requirements*, *percentage of façade length,* and *metre façade length* as interesting ways of creating elasticity. I suggest that distance requirements can help to create a planning tool that is both rigorous and elastic, as well as predictable and flexible. As such, the micro-morphological façade thresholds revealed in the typology can be included in the definition of the building line and affect streets and urban spaces in direct and explicit ways.

The renewed building line has the highest potential for implementation in the strategic area zoning plan. This is because this plan has the potential for defining compact city building through characteristics of a *project-independent* nature (Børrud 2018). The implementation of the renewed building line in the area zoning plan can secure constituted streets and permeable façade thresholds with entrance densities, which have potential for inter-visibility across the streetscape. Thus, renewed planning tools for addressing the building–street relationship at the area zoning level can be *re-introduced and re-defined through the building line.* This tool also has scope for further classification through *openings,* providing morphological capacities at the meso-level, in the streetscape, and in the block. I suggest that, as in the 1924 Act, the building line should be defined by maximum distance requirements between buildings and street, and not minimum distance requirements as is usual in building boundary definition, where the intention is to protect against noise and roads. Understanding the vital distinction between these two types of boundary lines will allow us to plan for more predictable outcomes of the urban space. Future boundary setting in compact city building, through the renewed building line, should focus on the streetscape and consider buildings in the setting of their space visually, physically, and *structurally*. As such, building lines have the potential to develop the façade threshold, allowing discretionary decisions by being both strict and flexible.

- *Legal points focusing on openings and façade thresholds as part of a project-independent nature*

Planning instruments connected to openings are the least represented morphological aspect regarding the minimum elements of space within the institutional framework. *Openings* structure and relate spaces that provide occupation (one opening), move through (two openings), and distribution (three openings), and are vital for making cities work. As my cases have revealed, specific access points regulated in land-use plans always include the access/exit to/from parking (often together with zones of free view). However, these points/arrows are not currently used to realise their potential as a tool for other structural links from the building to the street. Thus, the zoning plan offers opportunities to use points and arrows for also defining entrances to buildings. This tool can be developed to offer greater predictability for street constitution and can act as a demand to relate the building to the street in a manner that promotes city building. Provisions can allow for a certain flexibility within the scope of the arrow. However, a good understanding of the logic of a building project is required to be able to place the entrances accordingly. It is therefore most relevant for use in the project-dependent plan (detailed plan). An alternative to these specific openings would be to use the tool of building lines regulated by bulk characteristics of entrance density within the provisions. Such quantitative regulations can also work in the project-independent plan (area plan).

9.3.5 *Re-implement lost knowledge in city technical legislation*

Regulations complementing the PBL should include city technical knowledge lost in the transition from city building to city planning and developed in the current research. I propose the development of *city technical regulations* including prescriptive codes for city building (form- and relation-based codes) as a way to develop functional requirements of contemporary technical regulation into predictable results. Alongside the zoning plan and their provisions, the *Regulations on Technical Requirements for Building Works* (TEK) are the most crucial city-building tools in Norwegian legislation. This regulation focuses either on buildings or space, and crucially overlooks the relation between the two. Renewing these regulations to bring back forgotten knowledge of compact city building that addresses this interrelation would fill this gap. For example, such a city regulation could promote relations in urban form, density, typologies, structures, and form – a regulation where micro-morphological aspects are considered as vital for the urban qualities as the overall planning instruments. Considering the urban technical skills that disappeared in the transition from city building to city planning, between the 1924 Act and the 1965 Act, would be a key place to start. These renewed technical regulations can be augmented by new prescriptions developed from the morphological knowledge base presented earlier. City technical regulation can enhance predictable built results to produce high-quality city building. It also has the potential to include typologies of façade thresholds similarly to how typologies of buildings are presented in current regulation.

I suggest that current technical regulations can be supplemented with a new chapter for city building that specifically relates buildings (Chapter 12) with the outside environment (Chapter 8). This new chapter should include prescriptive codes for city building (form- and relation-based codes) as a way to develop functional requirements into predictable results for city building. The defining feature of the streetscape is the arrangement of private *plots and buildings* facing or fronting onto the public *street* and defining distinct areas of public and private space. City technical regulations can enhance this extended street perspective and present it as a *spatial* unit, a city 'interior', and not limit the regulations to the *surface* only. Tools such as height-to-width ratios, front-to-front dimensions, inter-visibility, entrance density, and constitution can be included as general mechanisms in such a regulation.

One of the key reasons for adding a layer of city technical provisions in the legislation is to provide an alternative to the functional requirements in existing regulations that work against city building. As highlighted by this thesis, current legislation has its origin in a different planning paradigm where provisions of quality in sun orientation, daylight, and view have played key roles. A new city regulation should address and provide urban alternatives to the potential conflicts in buildings that are not achieving functional requirements such as solar or wind orientation. An alternative provided through such city technical regulation would help move us beyond the need for dispensation in city-centre planning from regulations designed for another paradigm.

9.3.6 *Propose a knowledge-based discretionary practice in building control processes*

Last but not least, I recommend the scope for dispensation as a vital 'hidden' planning tool to be addressed in compact city building. Dispensation is a processual tool in the law which grants significant power to deviate from prescriptions and regulations, as revealed through the cases in this thesis. I suggest that 'seemingly unimportant' micro-morphological aspects should not be compromised through a dispensation without a thorough foundation in knowledge. The legislation already makes strict demands about this. However, empirical evidence from practice reveals that this is not necessarily adhered to. If the conditions for granting a dispensation are met, then it is an *application of law*. Whether a dispensation is to be granted when the conditions are met is a *discretionary exercise of authority*.

I propose that the knowledge base developed in this thesis can provide criteria for the art of compact city building that can and should be implemented in the *discretionary exercise of a dispensation*. Discretionary decisions on micro-spatial aspects based on dispensation can play vital roles in the art of compact city building and must be highlighted and emphasised when at stake in dispensation cases. As such, discretionary practice in compact city building as implemented through the tool of dispensation should emphasise micro-morphological knowledge frameworks as they play the quintessential role in urbanism.

To sum up, these six alternative actions can help operationalise the quest for understanding and implementing the art of compact city building. As the planning and building system as an institution developed under a completely different planning paradigm than the one we see today, which contributed to many of the problems discussed in this thesis, my initial thought was to challenge the whole system and suggest a total restructuring based on the ideals of today. However, after digging into the actual operative tools by which the system works and has worked in the past, I instead suggested ways to reintroduce, reinvent, and renew the tools.

Reintroduced or reinterpreted tools have different potentials for addressing various levels in the planning hierarchy of the current PBL. Drawing upon Børrud's (2018) distinction between the project-independent area zoning plan and the project-dependent detailed zoning plan, where the former is more strategic and the latter more realistic, my claim is that this understanding provides an effective framework for addressing the implementation of new and renewed planning instruments in different planning types. As such, I consider the 'top-down' planning instruments as well as expand and develop the 'bottom-up' rules in the TEK through learning from previous city building regulation. Within both is a renewed focus on the power of implementation by using dispensation as a mechanism in building control processes.

9.4 CONTRIBUTIONS, LIMITATIONS, AND FINAL REFLECTION – HOW TO KEY IN CAPACITIES FOR COMPACT CITY BUILDING

The aim of this thesis has been to contribute to the art of city building within the compact city model through which it engaged. For me, this means that it should be read by people who affect the architectural outcome of densification strategies, including architects, planners, developers, legal advisors, and politicians. The theoretical and empirical data are intended to provide a comprehensive approach to the building–street relationship, a vital piece of the city, not only by developing the knowledge base but also by developing methods that can be used as design tools, analytical tools, and a legislative framework.

In this last part, I have contributed some conclusions and reflections that can be used to discuss a renewed approach to city building within the existing legislative framework. My contribution provides a morphological knowledge base that acts as new terminology, analytical tools, and methods, and develops a legislative toolbox for digging into the operative planning and building instruments that have the potential to help define a compact city. This practical operative approach was derived from my starting point, namely the desire to unlock the potential to implement urban form that 'closes the gap' between buildings and street, that builds a city rather than an aggregation of buildings, appraising the compact city as something more than a dense environment. My suggestions are neither exhaustive nor exclusive, but they rather demonstrate my starting point for this thesis – the aim of being able to contribute to practice and actual implementation. As such, there are a range of ways to address the morphological/legislative link of city building from a comprehensive transformation of the whole planning system to incremental changes to existing planning tools. I cannot conclude that the new knowledge and suggested renewed tools will definitely provide the desired effects of compact city quality, as such effects require the involvement of actors and users of the city. What I am able to conclude is that the micro-morphological knowledge base and operative legislative toolset will provide the potential and capacities for achieving these effects. I can also conclude that when these capacities of building relations are not understood or built into contemporary urban form, the likelihood of achieving compact city qualities is minimal.

Even though my thesis is intended to be as thorough as possible, there are many parallel aspects that I have not been able to address that might complement and expand the understanding of the art of city building and the production of the building–street relationship. One close, complementary theme is the understanding of real-estate development and property as contributors to urban form solutions. This has been a relevant parallel throughout my whole PhD process and is addressed in the literature review as well as to some degree in the empirical case studies. One example of this is the production of certain housing types at the ground-floor level being determined by pragmatic and economic considerations of risk reduction. Another example is the legal agreements arising from demands of territorial classification (PBL 12-14). Registration (tinglysning) of servitudes providing public rights to private land was revealed in two of the case studies and affects the production of the building–street relationship – sometimes in quite a challenging way. Other questions that I have come across but not thoroughly addressed include the comprehensive planning system and planning practice and culture, with all of its different actors, processes, and analyses. I chose instead to dig into the operative instruments of the planning system (planning description, planning provision, and zoning) and their operative tools and to explore their capacity for implementation in the building control process.

Finally, I want to revisit the main problem addressed in this thesis. It concerns knowledge of and the production of urban form within a compact city framework. My starting point was that only through an investigation of what is actually built and realised is it possible to reveal previous knowledge as well as develop new competence. This represents the core of urban morphological research, investigating built form and the processes that have created this form – through the core characteristics of form, scale, and time. As such, it also fits into the *culturalist* tradition as revealed by Choay (1969), defined as urban changes, by pointing at and relying on existing solutions already built. An overall assumption in the topic is the capacity of the compact city to deliver an effective model for a city that is dense, diverse, and accessible as well as walkable, liveable, and that promotes good health. The compact city model is therefore the most relevant current model for sustainable development in the Norwegian context and delivers on current policy and guidance. In building this sustainable compact city, private housing projects are implemented with a tendency to develop introspective cells and are focused on activating the core of the urban plot, rather than on addressing the context. Building the street and externalities of a current compact city has proven challenging to implement because of private market mechanisms of risk reduction, through current housing provision and public institutional intentions and regulations. In addressing this problem, I have considered *knowledge* about the smallest micro-morphological element connecting private buildings and public space, which I have presented through developing the term *façade threshold* and a typology of unique types for this element. This physical façade threshold represents the key relation between the private realm of the developer and the public sphere. I have focused on the *implementation and realisation* of progressive *intentions* through public regulations as defined and addressed in planning and building processes.

I started my thesis with Jane Jacobs' perspective on the *art of city building*, of cities as *organised complexity,* with the different urban elements intricately *interconnected and related*. I also mentioned her perspective on the process and catalysts of these processes depending on *a microscopic or detailed view*. My thesis has in one way been an investigation of and contribution to these core foundations of her urban theory. My thesis contributes knowledge to the discourse on the compact city, emphasising the aspects of *compact city building*, driven by my passion for building better cities with an understanding of what can be achieved through the knowledge of building and practical tools for implementation. As such, this thesis provides *practical, academic, and societal* contributions to the professional field by building knowledge about a vital – but vaguely described – aspect of compact city building. Within the national context, this thesis defines a precise morphological terminology with the potential to develop the existing use of value-loaded terms such as *active façades, edge zones, and soft edges. The theoretical synthesis, the established* terminology, and the developed typology serve as a practical toolset and methodology for assessing and analysing the micro-morphological component. This knowledge also contributes to a new understanding of the relation between urban form and legislation within a Norwegian context. Finally, this thesis highlights the importance of urban morphology in practical work. Within the Norwegian context, morphological knowledge of urban form is hardly addressed systematically, and this thesis addresses a cognitive explicative field to define a neutral analytical understanding of the urban environment that practice requires. This contributes to scientific research within the compact city field and involves thorough knowledge building into the effect on the rules of urban form within a Norwegian context. It also fills a gap within Norwegian research about densification and compact city building by contributing to urban planning through the field of urban design and morphology. In an international context, it presents an account of Norwegian form and legislative framework to a larger audience, within which it brings new knowledge and theoretical development into the international field of Urban Morphology, particularly to the emphasis on micro-morphological research.

Finally, my foundation for exercising and developing knowledge for the profession and practice stems from an aim to be able build in the capacities of developing better cities – that is, better cities in terms of social interaction, public health, walkability, liveability, and good places to be. This is where I hope my thesis will make a difference.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FIGURES AND TABLES

APPENDICES

APPENDIX 1 FRONTAGE RULES ANALYSIS CHAPTER 7

<table>
<tr>
<td rowspan="8">FRONTAGE RULES:

SØRENGA

Construction of a continuous and stepped housing block from 7 to 1 floor and ground floor in field D1b-7 at the far end of Sørengutstikkeren in Bjørvika. The building encloses a small

courtyard, and it is arranged for parking under parts of the project.

All balconies are designed with universal access, business premises on the quay level are step-free.

access from patios and promenade and commercial premises on level 1 has step-free access from park via ramp

with slope of 1:20.</td>
<td>Planning description: Intentions</td>
<td>It is a goal that the Sørenga should be developed with high aesthetic quality and intentions of homogeneity in façade materials and expressions. Good residential area with housing qualities. Towards the harbour promenade and the central park is the building located in the purpose boundary line ensuring a defined façade facing these areas. The urban blocks shall be designed with openings that provide access to courtyards from common areas and traffic areas. The harbour promenade is shown as a continuous promenade along the seafront. A design guidance from Gehl architects was developed to inspire the actors in the development of the area. In this specific topics connected to the building-street relation are emphasised: design of ground floor, entrances and facades. All these perspectives are secured in the plan.</td>
</tr>
<tr>
<td>Zoning plan: area of purpose, zones of consideration, lines and points of regulation</td>
<td>Purpose: Combined purpose; Housing, business, office, catering, non-profit (culture, education, sports) common exit area, common square and harbour promenade.

Lines: purpose boundary, Heritage sightline facing harbour promenade

Arrows:</td>
</tr>
<tr>
<td>Provisions of the zoning plan: Content analysis micro-morphology</td>
<td>Housing qualities: The plan area shall be given a comprehensive design with buildings, quay front, canals, park area as well as streets and harbour promenade

Location of buildings: Within purpose boundaries and sightlines

Private/common outdoor area: Minimum 20% of residential units

Projections/Setbacks: projections of façade elements such as balconies, bay windows, canopies and similar from purpose boundary above 4,5 m over average terrain level facing public pedestrian area/common area. No projections are allowed over sightlines. Balconies are allowed over building boundaries in courtyard.

Front gardens/garden terraces/balconies: Balconies, terraces or terraces as outdoor space should be found for all residential units (min 20%), with direct sunlight on the individual outdoor space. These areas should be shielded from noise and air pollution.

Common exits: Common exit (field FA3) shall be designed with driving lanes up to 6 metres wide and 4 meters wide where the lane meets public traffi– area - street with sidewalk.</td>
</tr>
<tr>
<td colspan="2"></td>
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<tr>
<td>Preliminary conference

Project specific information and negotiations</td>
<td>Fire regulations needs two stairwells at points where firetruck has no access. Discussion about the frequency of balconies projecting over building boundary.

Some of the ventilation system will take place on ground floor.</td>
</tr>
<tr>
<td>Outline application; Dispensation from planning tools,

Technical regulation

Standards of operative requirements</td>
<td>Description: The project is in contravention of the development plan and depends on an dispensations to be able to get the outline permission.

Dispensation: The building case have seven dispensation applications, two of which are directly relevant for building-street relation. One connected to building boundaries of the land-use purpose. The other connected to terraces over regulated sightlines.

Waste management: Not delivered but accessible for inspection

Noise: No problem

Fire:

Local climate: buildings organised to have good contact with public and private outdoor space when it comes to prevailing winds, cold air drainage, sun / shade, green structure and air quality. Dispensation of volume provides very good solar conditions into the block

Declaration about servitudes/rights:

Outdoor area in application: 23,6 %

Courtyard as outdoor access to duplex flats</td>
</tr>
<tr>
<td>Outline permission</td>
<td>Dispensation granted for six applications, one of which affects the building-street relation facing north west, by redefining the building boundary as a stepped line giving views and light to the use. When it comes to the second application of ground floor terraces the authorities highlight that project is revised in relation to the Eastern Harbour Promenade so that no terraces or building part breaks through the sightline from the medieval park through Lohavn towards Hovedøya. This also means that balconies that were originally at ground level on part of the Eastern Harbour Promenade have been removed, so that the remark from Bjørvika Infrastructure is no longer a current issue.</td>
</tr>
</table>

FRONTAGE RULES: **SILOKAIA KANALBYEN:** Construction of 126 housing units spread over 11 buildings (9 rises), as well some commercial units at ground floor, in field f_2A.	**Planning description:** Intentions	Multifunctional district with variety and urban life, urban street sequence with active facades A variety that the dense city traditionally has such as: continuous urban blocks, visual appearance of variety and façade expression, front gardens
	Zoning plan: area of purpose, zones of consideration, lines and points of regulation	**Purpose:** City centre, public road, common square and pedestrian path, Zones of regulation **Lines:** purpose boundary, building boundary, regulation boundary. **Arrows:** vehicular exits
	Provisions of the zoning plan: Content analysis micro-morphology	**Urban design:** All urban spaces for public access & stay. The buildings will be designed with contact to streets, corners, squares and outdoor areas, as in a traditional urban Environment. technical infrastructure ground floor. The buildings shall appear as singular buildings set next to each other in a row that forms urban spaces and courtyards. **Location of buildings:** Building boundaries/land-use boundary **Private/common outdoor area**: minimum 25 m2 pr residential unit **Projections/Setbacks:** 2,5 m projections from land-use boundary and above 6 m facing street, 40% façade length in purpose boundary facing the sea, 20 % façade length projected from 2nd floor and up, maximum continuous façade length for projections 20 meters. **Front gardens/garden terraces:** All residential units shall in the whole length of the unit at ground floor level have front gardens facing the street of *minimum* 2meters, facing the pedestrian path of minimum 2,5 meter, and maximum 3 meters within the yard. These shall be demarcated from public and common areas with hedges, fences or similar. Flats shall not have their main entrance from the street through the front garden. **Balconies:** can be projected 2,5 meters from building boundaries and pointwise 2 meters from the land-use purpose. **Exits with free view and design according to local road norms**
	Preliminary conference Project specific information and negotiations	Fire regulations needs two stairwells at points where fire truck has no access. Discussion about the frequency of balconies projecting over building boundary. Some of the ventilation system will take place on ground floor.
	Outline application; Dispensation from planning tools, Technical regulation Standards of operative requirements	**Description:** The project fulfils the regulations from the zoning plan. Technical infrastructure for the entire area at ground floor level. **Waste management:** Not delivered but accessible for inspection **Noise:** Yellow noise zone. Outdoor areas facing the street might need local screenings or glazing and/or location of bedroom towards quiet side of the building. **Fire**: Apartments with access to only one stairwell shall be available to the fire service height implements. Apartments that are not available for the fire brigade must have two stairwells. Fire sinks are laid out on the main road and the distance from the installation site to fire sinks shall not exceeding 50 meters. **Declaration about servitudes/rights:** "*The public represented by Kristiansand municipality is at all times entitled to free movement and stay on the property"*- Vegetation use provides shelter and distance to private land at the same time as the furniture is of such a character that it allows for a stay. **Entrances:** Because of requirements in the provisions of no main entrances to apartments from o_V2,are all main entrances to the homes from the common courtyard. **Dispensation:** one application in the building case that does not affect building-street relation.
	Outline permission	

FRONTAGE RULES: **SIRISKJÆR:** .	**Planning description:** Goal defined in planning provisions	**Purpose:** The purpose of the plan is to facilitate an environmentally conscious development of a complex urban development in a variety of functions with emphasis on housing, office and business purposes as well as the local centre. The purpose of the zoning plan is to facilitate the development of housing, cultural and commercial activities as well as related common and public areas.
	Zoning plan: area of purpose, zones of consideration, lines and points of regulation	**Purpose:** Housing, Combined purpose housing, commercial, offices (The ground floor must be reserved for trade and public-oriented activities), Public road, walking and cycling path, common play area **Lines:** plan boundary, purpose boundary, building boundary, free view line, internal walking- and cycling path **Arrows:** vehicular exits
	Provisions of the zoning plan: Content analysis micro-morphology	**Universal design:** The principles of universal design shall form the basis for the design and preparation of the plan area**.** **Parking:** One car space per dwelling and per 100 m² of other use area shall be established. Parking should be placed under terrain and buildings. **Location of buildings:** Unless otherwise shown on the plan will purpose boundaries apply as building boundaries. **Private/common outdoor area**: Minimum private 4 m2 with proven good sun conditions **Design:** All outdoor areas and buildings must be given an aesthetically pleasing design. The design of buildings and material use should reflect the function of the buildings and harmonize with the surroundings. The building should be presented with a varied architectural expression. **Local climate:** Sun: Required play and outdoor areas must have sun on at least 50% of the area during equinox at. 15.30. **Flats:** Apartments must have at least one side facing public street or outdoor area and at least one side facing private or shared outdoor space. Exceptionally, apartments of less than 60 m2 can be one-sided. **Internal walking and cycling paths**: internal pedestrian and bicycle paths shall be established as common passages connecting common areas with public areas, either in a distinction between two separate buildings or through the relevant building. **Exits** with free view and design according to local road norms- *Kommunalteknisk veinorm for Nordjæren.* Access from Tinngata to parking facilities under FL1 and FL2 must be one-way and used only as driveway.
	Preliminary conference Project specific	Not relevant
	Outline application; Dispensation from planning tools, Technical regulation Standards of operative requirements	**Entrances:** Ground floor plan of the outline application reveals a project intention where the entrance density is high, both facing east (3 communal entrances to flats above as well as 4 direct entrances for commercial prenises), south (4 entrances for commercial unit) and west (4 direct entrances for residential units, 1 communal entrance to flats and one commercial entrance). **Description:** The project does not fulfil regulations from the zoning plan and needs dispensation. **Dispensation:** four dispensation applications connected to location of vehicular exit (§2.7), utilization (§4.1), max cornice height (§4.2) and number/size of housing. The first of these dispensations does directly affect the building-street relation. **Noise: Fire**:
	Outline permission	All the different dispensation applications were accepted in outline permission and in later political meeting (Kommunalstyret for byutvikling)
	Building permit process	**Dispensation:** As part of the applications for building permits in the process there was a need to apply for other dispensations, raising the underground base plate with 1,35 m and the cornice height with another 0,5 m. Reason for this is to be able to have full parking coverage within the plot. This raising of the floor leads to a change in the internal entrance situation for the residential units sorted through lifts.

FRONTAGE RULES: **KIRKEGATA** residential block with 4 floors above ground with associated outdoor facilities as well as parking floor / basement, etc. under terrain.	**Planning description:** Intentions	**Aim:** upgrade existing residential area to a new, where the older inhabitants gets flats near to the city centre well connected and with good universal design principals. Establishment of a green buffer zone between the house and the street, building orientation, outdoor area and sun conditions, noise levels and environmental conditions such as weather, sea rise.
	Zoning plan: area of purpose, zones of consideration, lines and points of regulation	**Purpose:** Housing, Combined purpose: housing, commercial, offices, park Public road, public pavement, outdoor area, zones of special consideration: noise and heritage **Lines:** plan boundary, purpose boundary, planned buildings, property boundary to be abolished, buildings to be removed, boundary zone of special consideration **Arrows:** public vehicular exits
	Provisions of the zoning plan: Content analysis micro-morphology	**Universal design:** All new housing units must satisfy the requirements for available housing. **Parking:** One car parking space is allocated per 100 m² of business / office and 1 space per residential unit All parking must be established in common garage facilities under terrain. **Location of buildings:** *Defined by existing built form in the street (Murbyplanen)* **Private/common outdoor area**: 25m2 for each residential unit. Terrace / balcony can be counted as a living area **Design:** The facades must be adapted to masonry material use with colours that harmonize with it existing protected buildings. The facades against it the public side of façade use should have a mix of facade tiles and delete fields. **Noise:** The apartments in Kirkegata that are within the yellow noise zone must be two-sided and the terraces be glazed in for the bottom 3 floors. **Use:** Ground floor of the apartment building along Kirkegaten can, in addition to Housing purposes, be used for smaller shops, offices, social institutions and common areas for residents of the apartment building. **Heights**: Height on the ground floor cote +3.0.The building shall have a basement. **Exits** to parking basement with free view and design according to Kristiansand road norms
	Preliminary conference Project specific	**Active plan:** The present zoning plan - plan maps and regulations - will override the Murby Plan and the Municipal Plan in case of any deviation. **Balconies:** §6.3 of the plan description and provisions to the adopted Municipal Plan for the Kvadraturen §3.16, as this is not mentioned in the regulations. Balconies are therefore allowed with projections up to 1.2 meters above the building line towards street. **Noise:** Requirements for glazing in relation to noise will be irrelevant, as the requirement for living space per person. dwelling unit is maintained with common ground level garden facilities (§1.1.3 of the Regulations). **Planned development:** Lines for “planned development” have not been mentioned / explained in the regulations, and it is therefore assumed that the project owner can act freely within the building area. **Dispensation:** PBE recommends that the applicant to follow the zoning plan without dispensation applications. Experience shows that deviations in this area will lead to extensive neighbourly protests, which will significantly lengthen the process.
	Outline application; Dispensation from planning tools, Technical regulation Standards of operative requirements application received on 23 December 2014	**Inside/outside:** necessary setbacks and openings for large balconies, windows, etc. Glass and window surfaces are designed from floor to ceiling to optimize viewing conditions and create good contact between outside and inside. **Outline application plan:** Shows 3 entrances to building (outside) and 6 entrances to flats (inside) at ground floor level, as well as “builing bpundary/line (facadeline) **Section:** shows ground floor level at c +3 and street level at c +1,48 **Dispensation:** The project will stay within the adopted zoning plan as well as overall plans, and the application thus contains no dispensations **Access:** The project gives new / changed access. The plot has access to a municipal road that is prepared and open to ordinary traffic. Exit permit is granted.
	Outline permission	Aesthetic demands, location and heights, Outdoor space must be common to all dwellings and cannot be added to the individual by sectioning.

FRONTAGE RULES: **HOLLENDER-KVARTALET**	**Planning description:** Intentions	Aim: Facilitating a housing programme through improvement and renewal. Environmentally friendly dwellings with high architectural value and a good living environment for different communities are maintained as well as cultural heritage values in the block. An environmental programme defines environmental goals for the block. The plan's main approach is to strengthen the block structure through development along the street. New façades facing the street are being established in line with existing housing estates being preserved. The middle part of the block remains undeveloped.
Residential block with 62 flats and three buildings at Schweigaardsgate 40, 42, and 46 Height of 5–7 storeys	**Zoning plan:** Area of purpose, zones of consideration, lines, and points of regulation	**Purpose:** Combined development and construction – residential / business / office /catering / other types of buildings and facilities (environmental station), public road, pavement, zones of special consideration: medieval ground, protection of cultural environment **Lines:** Purpose boundary, building boundaries, boundary zone of special consideration **Arrows:** Vehicular exits
	Provisions of the zoning plan: Content analysis micro-morphology	**Parking:** Parking for cars and bicycles shall be established in accordance with all applicable parking norms for Oslo. Underground parking is allowed. **Location of buildings:** The building shall be placed within the **purpose boundary** towards the street and within building boundaries and heights as shown in the plan. **Private/common outdoor area:** 16% of total gross area for the building project. Common roof terraces with access for all apartments on the property are included as a basis for calculating the living area. All apartments should have a private outdoor area such as balcony or terrace. It must be a total area of activity of a minimum of 1000 m^2 with traffic-safe access from all units. **Projections/setbacks:** Balconies and bay windows: maximum 1.5-m projections from the land-use boundary and above 3.5 m facing the street, maximum 2.5 m from the wall towards common areas and the courtyard. Setbacks a minimum of 2.0 m from the street line and a minimum of 3.0 m from the courtyard. **Entrances/windows:** Commercial units shall only have entrances and windows facing the street with an open character. Entrances for housing shall be separated from the commercial premises. **Design:** The buildings will adapt to adjafaçadeonservation-worthy buildings tfaçade façade design, use of materials, colours, façade structure, heights, and volume distribution. **Noise:** Recommended noise limits for outdoor living areas (T-1442, or later guidelines replacing them) must comply with the implementation of the project. All flats must have a quiet side. **Exits:** The plan area should have an exit as indicated by arrows on the plan map. To the parking basement and field B5/B6 through underground parking.
	Preliminary conferences: Project-specific 19.03.2015 03.03.2016	**Noncorresponding plan and provisions:** Setback 2 m (provisions) or 1,6-1,8 (plan), building boundary 13 m (provisions) or 12,64-12,84 (plan) – needs dispensation applications. **One-sided flats:** Not accepted by Planning and Building Authorities(PBE) – needs dispensation application **Exit:** Difficult free view according to street norm – PBE can accept deviations if justified. **Parking I:** Parking norm demands two levels underground; requires dispensation to just build one. **Parking II:** Principle sketch of an alternative without underground parking, with large parking for bikes and electrical car share – PBE opens for a dispensation application. **Universal design:** Statement must follow outline application.
	Outline application: Dispensation from planning tools, technical regulation; standards of operative requirements	**Dispensation:** The project does not fulfil regulations from the zoning plan and requires dispensation. These include heights and location, parking, distribution of apartments, and building boundaries. Parking dispensation is the most relevant for the building–street relationship. Two car sharing spaces combined with the registered right to 10 places in nearby parking garages as well as bicycle parking with a minimum of two spaces per dwelling. **Noise:** Noise zone leads to stricter requirements for the façade's sound insulation, windows, and balconies due to high noise levels from traffic, especially from passing buses. **Universal design and visual qualities:** Continuous façades facing the streets, balconies facing Schweigaards gate and Hollendergata with light steel structures and façade glass railings. Bay windows on both sides provide good façade lengths that ensure much daylight.
	Outline permission	Dispensation granted for heights, parking coverage, distribution of apartments, apartments on the quiet side, noise limits on outdoor living areas, and building boundaries. Parking: Current regulatory provision is considered not to be in line with current overall guidelines, and a significant reduction in the number of parking spaces is considered to be in line with expected development. Noise limits on balconies facing Hollendergata covered by overrepresentation of the common area.

FRONTAGE RULES: **Ensjø**	**Planning description:** Intentions	**Urbanity and openness:** Urban qualities along streets and a new urban square as well as openness to green structures and view, a main street that structures the area, connection to the urban tissue: existing structure in the west and planned structure in south east leads to the main street, with both green structure and pedestrian structure is woven into the built form
	Zoning plan: purpose, lines and points	**Purpose:** Housing, public road, pavement, square and living street, walking trail **Lines:** purpose boundary, building boundaries, building line, height line
Five residential units with 158 flats and underground parking	**Provisions of the zoning plan**: Content analysis micro-morphology	**Parking:** Parking for cars and bicycles shall be established in accordance with applicable parking norms for Oslo. If parking is placed at ground floor, it should not be exposed in façades. **Location of buildings:** The building must be placed in building lines and within building boundaries and maximum cornice heights as shown on the floor plan. **Private/common outdoor area** The minimum outdoor area (MUA) shall be a minimum of 25% of the BRA of total housing purpose. Outdoor area on a roof terrace / balcony can be included **Projections/Setbacks:** Smaller building parts, canopies and similar are allowed to cantilever up to 1.2 metres outside building boundaries / building lines / boundaries between different heights and above 3,5 m facing the street, 1,8 m other places and minimum 3 metres above terrain. No balconies are allowed over public green areas. Bay-façades should have a limited scope and comprise a maximum of 20% of the façade. **Entrances:** Buildings adjacent to regulated public road or space shall have access / entrance from public road / space. A passage between the residential courtyards and public street shall be established. Similar, a passage shall be established between the street yard in the southwest (Field GT2) and the residential courtyard. These shall have a minimum width/height of 5/5 m **Public/Private area:** clear distinction between public and private land, where private or common outdoor areas adjacent to free areas should be separated by vegetation (for example, hedges), level differences, altered material use or with other means. **Design:** High architectural quality in the design of buildings and outdoor areas. Long façades should be broken up or treated to avoid monotony and galleries are not allowed. **Noise:** Recommended noise limits for outdoor living areas (T-1442, or later guidelines replacing them) must comply with the implementation of the project. **Exits** The plan area should have an exit from field GT2 to field F
	Preliminary conferences Project specific 22.10.2015	**Split in the building block facing GT 2:** The Planning and Building Agency thinks this is in accordance with current regulatory regulations, this solution provides better light and sun conditions on outdoor areas. **One-sided flats at basement level:** The area marked 'reduced top floor' has regulated throughput or housing over 2 floors, one-sided apartments. Section 9 states 'Housing units on the ground floor in the area marked' reduced top floor 'shall be continuous or go over two levels.' The reason for this is that the apartments should have better lighting conditions. One-sided apartments in plinth floor is not a good solution and the Planning and Building Agency does not recommend the solution shown. **Exits**: PBE are sceptic about moving exit to Tiedemannsplassen, considerations of the space are more important than the considerations of the length of the ramp.
	Outline application; Dispensation, Technical regulation Standards 18.12.15	**Dispensation:** The project fulfils regulations in the zoning plan and doesn't need dispensation. **Ground floor:** The ground floor follows the terrain **Bay windows:** Used to get variation in the façade and light into the flats. According to regulations in TEK; noise, waste, fire, electricity, heating
	Outline permission	*The project is in accordance with current regulatory provisions.* Building takes into account the building structure in the area, is adapted to the terrain of the site, does not affect cultural heritage / antiquarian values, meets all requirements of accessible housing unit and provides architectural qualities: long façades should be broken up or treated to avoid monotony.
	Building permit process	*initial proposal there were no entrances facing the street, and only one facing the living street. As such, the regulations where buildings adjacent to regulated public road or space shall have access / entrance from public street was not fulfilled directly.*

APPENDIX 2a CROSS CASE ANALYSIS FRONTAGE RULES CHAPTER 8

DRAWING TOOLS	Kanalbyen	Sørenga	Siriskjæret	Kirkegata
Purpose	City centre, public road, common square and pedestrian path, Zones of regulation	Housing, business, office, catering, non-profit	Housing, Combined purpose housing, commercial, offices (The ground floor must be reserved for trade and public-oriented activities), Public road, walking and cycling path, common play area	Housing, Combined purpo commercial, offices, park pavement, outdoor area, z consideration: noise and h
Lines	purpose boundary, building boundary, regulation boundary.	Purpose boundary, Heritage sightline	purpose boundary, building boundary, free view line, internal walking- and cycling path	purpose boundary, planne property boundary to be a to be removed, boundary consideration
Arrows	exit		exit	exit
PROVISIONS				
Location	<u>**Within**</u> defined building boundaries. Where building boundaries are not shown this is equal to the purpose boundary	<u>**Within**</u> building boundaries/purpose boundaries and sightlines	<u>**Within**</u> purpose boundaries. Unless otherwise shown on the plan does the purpose boundaries apply as building boundaries. (§4.6 1785)	*Defined* <u>***by existing built***</u>
Outdoor area	<u>**Minimum**</u> 25 m2 pr residential unit (private and common)	<u>**Minimum**</u> 20% of residential units (private)	private <u>**minimum**</u> 4 m2 pr unit with proven good sun conditions, outdoor areas must have sun on at least 50% of the area during equinox at. 15.30.	25m2 for each residential common)
Exits	free view and design according to local road norms	driving lanes up to 6 meters wide	free view and design according to local road norms	free view and design acco norms
Projections/Setbacks	<u>**maximum (up to)**</u> 2,5 m over purpose boundary above 6 m (street), **maximum** 40 % facade lenghts in purpose boundary (sea), **maximum** 20 % façade length projected from 2nd floor and up. **maximum** continuous façade length for projections 20 meters.	Projections over purpose boundary above 4,5 m, **No projection**s are allowed over sightlines. Balconies are allowed over building boundaries in courtyard.		*projections* <u>***maximum***</u> *(u above the building line tov (murbyplanen)*
Front gardens/terraces/balconies	garden depth facing the street of **minimum** 2meters, facing the pedestrian path of **minimum** 2,5 meter, and **maximum** 3 meters within the yard.	All residential units shall have balconies, terraces or front gardens as outdoor area with direct sunlight and protected from noise/pollution		
Design	Buildings, outdoor areas / urban spaces and transport facilities shall be given an **urban design** of **high architectural quality** and designed so that they **interact both aesthetically and in use**. The buildings will be designed with regard to streets, street corners, squares and outdoor areas, as in a traditional urban environment.	**Housing qualities** and comprehensive design (helhetlig)	**Presented** with a **varied architectural expression**. principles of universal design shall form the basis for the design and preparation of the plan area.	be adapted to masonry m colours that **harmonize** w protected buildings. All ne must satisfy the requireme housing.
Parking	**Under terrain:** Joint parking facilities shall be established under terrain or in mountain. Parking facilities are not allowed exposed as a facade to the publicavailable urban spaces and parks, with the exception of waste disposal zones, return points, pumping stations andlike. These facades should be given a special quality in design and / or materiality. **max 1 car** parking space per dwelling unit and **max 1 car** parking space per 100 m² BRA business / office.	**Under terrain:** Parking facilities and necessary structures are allowed to be constructed under adjacent traffic areas, **maximum 0.8 cars** per 100 m2 BRA. common exits, walkways, common areas and building areas.	**Under terrain**: Parking should be placed under terrain and buildings. Common parking basements are allowed under the common play areas. **One car space per dwelling** and per 100 m² other use. At least 60% of the common play area must have a minimum of 1 m growth medium and drainage layer in total. Where the areas are adjacent to public traffic areas, they must be stepped down and have good contact with them.	**Under terrain:One car pa allocated per residential** must be established in co facilities under terrain.
Local climate	Minimum one bedroom should have window to quiet side. All apartments should have private outdoor space on quiet side or easy access to common outdoor area where the noise limits are given in table 3 of T-1442/2012 is satisfied.		Noise mitigation measures shall be carried out in accordance with T-1442 "Guidelines for the treatment of noise in land use planning",	within the yellow noise zo sided and the terraces be bottom 3 floors.
Entrances	Flats shall **not have their main entrance from the street** through the front garden.	x	x	
Other topics affecting building-street relation				Height on the ground floor

	Hollenderkvartalet	Ensjø	ANALYSIS
se: housing, Public road, public zones of special heritage	Combined development and construction - residential / business / office /catering / other types of buildings and facilities (environmental station), public road, pavement, zones of special consideration: medieval ground, protection cultural environment	Housing, public road, pavement, square and living street, walking trail	One pure housing regulation - the other combined or city centre purpose.
ed buildings, bolished, buildings zone of special	purpose boundary, building boundaries, boundary zone of special consideration	purpose boundary, building boundaries, building line, height line	Types of boundaries used to define built form - purpose boundary, sightline, building boundary and building line.
	exit	exit	exit only
form in *street line*	**In** the **purpose boundary** facing street and within building boundaries and heights as shown in plan.	The building must be placed **in** building lines and **within** building boundaries	Both specifically located in boundary and within building boundaries
unit (private and	**Minimum** 16% of total BRA for the building project (private and common)	**minimum** of 25% of the BRA of total housing purpose. Outdoor area on a roof terrace and / or balcony can be included in this.	Minimum size - can be more, difference on how this is counted - as private or common
rding to local road	The plan area should have an exit as shown by arrows on the plan map. To parking basement and field B5/B6 through underground parking	The plan area should have an exit from field GT2 to field F	free view - arrows
p to) 1.2 meters vards street	Balconies and bay windows: **maximum** 1,5 m projections from land-use boundary and above 3,5 m facing street, **maximum** 2,5 m from wall towards common areas and courtyard. Setbacks **minimum** 2,0 m from street line and minimum 3,0 m from courtyard.	Smaller building parts are allowed to cantilever **maximum** (up to) 1.2 meters outside building boundaries / building lines above 3,5 m facing the street, **maximum** 1,8 m other places and **minimum** 3 meters above terrain. Bay windows should have a limited scope and comprise a maximum of 20% of the facade.	maximum projections (most relevant), minimum setbacks - as m distance, % facade lenght and max m lenght
		Clear distinction between public and private land, where private or common outdoor areas adjacent to free areas should be separated by vegetation (for example, hedges), level differences, altered material use or with other means.	minimum between street and facade - can be bigger - tool to regulate housing quality, but not city street definition. Maximum towards the yard - helps controlling the space
aterial use with ith existing w housing units ents for accessible	The buildings will **adapt to** adjacent conservation-worthy buildings through **facade design, use of materials, colours, facade structure, heights and volume distribution**.	High architectural quality in the design of buildings and outdoor areas. **Long facades should be broken** up or treated to **avoid monotony** and galleries are not allowed.	Urban design of high architectural quality, varied architectural expression, avoid monotony (break up long facades) , adaptation and harmonize, Housing quality - appearance as singular buildings with variation in sequence of facades. Facade expression be lead down to the ground. - 3 adapt and harmonize as a whole - 3 as appearance of variation and avoid monotony
rking space is unit All parking mmon garage	Parking for cars and bicycles shall be established in accordance with all applicable parking norms for Oslo. **Underground parking is allowed.**	**:** Parking for cars and bicycles shall be established in accordance with applicable parking norms for Oslo. If parking is placed at ground floor, it should **not be exposed in facades.**	All under ground - one not built. Difference between early and later projects
ne must be two- glazed in for the	Recommended noise limits for outdoor living areas (T-1442, or later guidelines replacing them) must comply with the implementation of the project. All flats must have a quiet side.	Recommended noise limits for outdoor living areas (T-1442, or later guidelines replacing them) must comply with the implementation of the project.	Noise on outdoor living area is vital. Being solved by creating addtitional common outdorr area on quiet side.
	Commercial units **shall only have entrances and windows facing street**, with an open character. **Entrances for housing shall be separated** from the commercial premises.	Buildings adjacent to regulated public road or space **shall have access / entrance from public road / space**. A passage between the residential courtyards and public street and between the street yard in the southwest (Field GT2) and the residential courtyard shall be established. These shall have a minimum width/height of 5/5 m	2 projects that are not allowed to have entrances from streen, one that must have entrance from street
r cote +3.0.			

APPENDIX 2b CROSS CASE ANALYSIS FRONTAGE RULES CHAPTER 8

PROJECT INTENTIONS	Kanalbyen	Sørenga	Siriskjæret	Kirkegata
	Fire regulations needs two stairwells at points where firetruck has no access. Discussion about the **frequency of balconies** projecting over building boundary. Some of the **ventilation system** will take place on ground floor.			**Balconies:** §6.3 mentioned in the projections up to building line towa Requirements for the requirement f with common gro Lines for "planned been mentioned / and it is therefore owner can act fre
Preliminary conference		??	No data	
Outline application				
Description	Declaration about servitudes/rights: "*The public represented by Kristiansand municipality is at all times entitled to free movement and stay on the property"*- Vegetation use provides shelter and distance to private land at the same time as the furniture is of such a character that it allows for a stay.	The project is in contravention of the development plan and depends on an dispensations to be able to get the outline permission.	The project does not fulfil regulations from the zoning plan and needs dispensation.	The project fulfils plan and doesn't
Dispensations	One dispensation application in the building case that does not affect building-street relation.	Seven dispensation applications, two of which are directly relevant for building-street relation. One connected to **building boundaries of the land-use purpose**. The other connected to **terraces over regulated sightlines**.	Four dispensation applications connected to **location of vehicular exit** (§2.7), utilization (§4.1), max cornice height (§4.2) and number/size of housing. The first of these dispensations does directly affect the building-street relation.	No dispensation a
Outdoor plan				
Ground floor plan (intentions)	Two commercial entrances facing street, x facing yard	2 communal entrances to residential units, 1 individual to flats, no entrances drawn for commercial units	10 commercial entrances, 5 communal entrances, 4 individual entrances facing street	2 communal entr private courtyard
Outline permission				
	Dispensation granted	Dispensation granted for six applications, one of which affects the building-street relation facing north west, by **redefining the building boundary as a stepped line giving views and light to the use**. When it comes to the second application of ground floor terraces the authorities highlight that project is revised in relation to the Eastern Harbour Promenade so that no terraces or building part breaks through the sightline from the medieval park through Lohavn towards Hovedøya. This also means that balconies that were originally at ground level on part of the Eastern Harbour Promenade have been removed, so that the remark from Bjørvika Infrastructure is no longer a current issue.	All the different dispensation applications were accepted in outline permission	x
Building permit process				
			Dispensation: As part of the applications for building permits in the process there was a need to apply for other dispensations, **raising the underground base plate with 1,35 m** and the cornice height with another 0,5 m. Reason for this is to be able to have **full parking coverage within the plot.** This raising of the floor leads to a change in the internal entrance situation for the residential units sorted through lifts.	
Ferdigtillatelse?				

	Hollenderkvartalet	Ensjø	ANALYSIS
Municipal Plan as this is not regulations. allowed with 1.2 meters above the ards street. **Noise:** glazing will be irrelevant, as or living space is maintained ound level garden facilities. d development" have not explained in the regulations, e assumed that the project eely within the building area.	**Non-corresponding plan and provisions:** setback 2m (provisions) or 1,6-1,8 (plan), building boundary 13 m (provisions) or 12,64-12,84 (plan) **One-sided flats:** Not accepted by PBE **Exit:** Difficult free view according to street norm - PBE can accept deviations if justified. **Parking I:** Parking norm demands two levels under terrain **Parking II:** Principle sketch of an alternative without underground parking, with big bike parking and electrical car collective	**Split in the building block facing GT 2:** in accordance with current regulatory regulations, solution provides better light and sun conditions on outdoor areas. **One-sided flats at basement level:** One-sided apartments in plinth floor is not a good solution and the Planning and Building Agency does not recommend the solution shown. **Exits:** PBE are sceptic about moving exit to Tiedemannsplassen, considerations of space are more important than length of the ramp.	**Technical regulation: fire** - two stairwells, **ventilation** floor, **Noise** on outdoor area: glazing or supplemented o area, **sun**: better light conditions with different solutions **Vedtekter: Local plans** - Projections allowed. **Parking r** not in correspondance with political ambitions
s regulations in the zoning need dispensation.	The project does not fulfil regulations from the zoning plan and needs dispensation.	The project fulfils regulations in the zoning plan and doesn't need dispensation.	Declarations about rights
applications	Four dispensation applications: heights and location, parking, distribution of apartments and building boundaries. **Parking dispensation** is the most relevant for the building-street 2 car sharing places combined with registered right to 10 places in nearby parking garageas well as bicycle parking with a minimum of 2 spaces per. Dwelling.relation.	No dispensation applications	
rances facing street, 1 facing	5 entrances in commercial premises, 1 communal entrance from street to flats, 1 entrance to bike parking	5 communal entrances - one for each building - all but one facing yard. The other facing living street	Variing focus on entrances
	Dispensation granted for: heights, parking coverage, distribution of apartments, apartments on quiet side, noise limits on outdoor living areas, building boundaries. Parking: Current regulatory provision is considered not to be in line with current overall guidelines, and a significant reduction in the number of parking spaces is considered to be in line with expected development. Noise limits on balconies facing Hollendergata covered by overrepresentation of common area,	x	
	Commercial premises: demand of publikumsåpen facade makes case pending - Endringssøknaden gjelder innredning av næringsarealene i første etasje i nr. 46 til kontor	In initial proposal there were **no entrances facing the street**, and only one facing the living street. As such, the regulations where buildings adjacent to regulated public road or space shall have access / entrance from public street was not fulfilled directly.Hidden topic - that should have dispensation??	In the process----

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