

Walls of our public realm

A study of frontage use and design in relation to location

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“Only the right frontage in the right context, with the right design, the right inhabitation, and the right attitude to the city will become part of the ecosystem of trust and interaction that supports public life.”

- C. Kickert

Abstract

The gap between the buildings and their surrounding urban environment, termed street-level architecture, though vital in shaping urban life, is not always adequately planned or designed to consider the building's location, context, and local needs.

The term "levande bottenvåningar", directly translated to "lively ground floors", is widely used today by planners and other actors in city planning as an ideal quality for an attractive urban environment. The most common strategy for achieving this being 'active frontages', where large transparent frontages allow the interior activity to spill out into the public realm. However, this overreliance on a single strategy causes the envisioned lively ground floors to often turn into vacant or empty retail stores without enough customers, or apartments with the blinds constantly drawn to avoid outside visual intrusion.

As architects, we want to shape our building's ground floors to maximize their potential contribution to urban life, but it's important to note that there isn't a one-size-fits-

all solution that can achieve this. By first recognizing the unique urban configuration and the different opportunities each location affords, can we design functioning street levels, even for streets that are offshoots from the main streets but still in the public eye.

This thesis explores what makes ground floors lively and whether the concept of 'interactive frontages' can be used to achieve this desired liveliness in secondary and background streets, which often do not have enough foot traffic to support commercial activities yet make up most of the street network.

The thesis consists of studies of ground floor architecture in an urban context focusing on the design of the frontage, the program behind it and its local and global location and context. The result is a tool-kit showcasing how to design the right frontage zone in the right context with a resilience spanning decades of urban life. The tool-kit is then implemented, tested and evaluated through a design study in a specific site in Gothenburg.

Keywords: Interactive ground-floor, frontage design, urban design, space syntax theory, street level architecture, public space

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Fig 1. Living room on display

Introduction

BACKGROUND & PROBLEM DEFINITION

A building usually consists of three layers; the base, the body and the top. The body is where the main function of the building exists, the top is what shapes the city's skyline and the base is the connection between the building and the public realm.

The base which we call the ground floor, has been part of the urban public life for a long time. It often hosts what is known as "third places." Cafés, stores, libraries and bars are some of the places considered third places. These are the spaces where people meet outside of their home (first place) and work (second space). These meeting spaces are crucial for a safe, active and inviting city, nurturing the public life which is the essence of urbanism.

When cars took over the city during industrialism urban public life was set aside from the streets. The buildings were surrounded by car traffic and the ground floors were hard to reach. With this new type of movement through the city, less people walked the streets and the ground floor activity decreased. The space for the people became the space for the cars. Today there is an emerging re-negotiating of the streets trying to reclaim the space between the buildings for public life and to re-discover the public realm.

A common term and vision promoted by architects and planners today to achieve this movement are the "lively ground floors", known as "levande bottenvåningar" in Sweden. A common strategy for this today is to make the ground floor as transparent as possible, designing for retail and restaurants and hoping that life will come and spill its activity out on the otherwise dull streets. Unfortunately, several of these spaces either stand vacant, waiting for their purpose to give life and meaning to our public realm or are used for functions they are not designed for. (fig.1)

Lively ground floors depend on much more than just the program and whether there is commerce or not. They need to be designed considering the social-ecological-economical-infrastructure structures. Retail on ground floors is for example very sensitive to location and foot traffic (e.g. Kickert 2022). Research has shown that the development of local markets, pedestrian-oriented ground floor uses, or retail frontages depends on potential for high pedestrian flows created by the centrality and accessibility of their location (e.g. Hillier et al. 1993, Scoppa and Peponis 2005). Just adding store-fronts to buildings will not guarantee the presence or resilience of retail.

To design a good ground floor architecture, we need to look beyond the immediate context. The urban density, proximity to transit, street typology, centrality and many more aspects matter and will affect the amount and type of movement through the area, which will create a variation of possibilities and ways to program the ground floors.

In this re-discovering of the ground floors we also have to be aware of the ongoing shift of use of the ground floors. The “brick and mortar” retail is no longer as big as it used to be due to the contemporary wide availability of online shopping. Spaces made for retail and public activity in the ground floors are therefore bit by bit replaced with residential uses to cover the buildings’ economy. The consequence are homes with visual intrusion and a loss of potential for public activity. While remaining commercial uses tend to cluster on the main street, we need to work on ways to make lively ground floors in the spaces between dense retail streets and private residential areas.

The concept of “interactive frontages” presented by C. Kickert in ‘Street level architecture’ (2022) is one way to look at it. According to him, façades and frontages make up a delicate ecosystem of external forces and internal patterns that affect not only the form but their inhabitation and connotation of trust and care. Ground floors can be activated in more ways than just placing a restaurant or retail on the street. It is about the interaction created when frontages address the street. It can invite to interact physically with openings, design and detail which will make an impact on us physiologically. An interactive frontage is constructed with the human scale in mind and the built can engage our senses with smell, sound, touch and vision, making the space more exciting and a preferred destination to pass through (Kickert, 2022).

The ground floor architecture is the one part of the exterior that we can touch and experience close up. How the architecture is shaped will therefore impact how humans feel about the space, it will suggest how to behave and what the pace of the space is. A walk along a closed non-programmed façade can feel endless, monotonous and repetitive, while a walk with variations in the façade and context can feel short. It is not about the actual distance, but about the perception and feeling of distance.

We see attempts to make monotonous façades interactive today. Wall paintings and vertical gardens are hiding the blank wall that was once designed. While these are good attempts to make the city more enjoyable, a wall shouldn’t be left blank from the start. It is a consequence of a problematic placement or design of the building.

The book street level architecture also claims that a good street-level architecture is both about the hardware and software of the city. Considering that the lifetime of the structures we create are 40-100 years, while the economy can turn upside down every five years, and the population changes every ten year, the buildings we design have to be resilient.

AIM & PURPOSE

The aim of this thesis is to gain knowledge on how we as architects can plan and design for lively ground floors based on location, context and needs.

The purpose is to avoid a generic “one-solution-fits-all” situation with only transparency as measurement of activity, but rather provide diverse **interactive design and program solutions** that build upon the potentials and sensitivities of the location and context. This will help avoid empty rental spaces, visual intrusion of private spaces and will fill the knowledge-gap on how to design for lively ground floors in in less central urban areas and streets, that do not have the affordance of commercial activity.

The findings will be translated into a **tool-kit** that can contribute to the discussion about the design and use of ground floors. The tool-kit will include strategies based on contextual, social, functional and aesthetic aspects. The tool-kits purpose is to give architectural guidance and strategies for future projects. Lastly, the tool-kit will be evaluated through a design study based in Gothenburg.

DELIMITATIONS

- Economic aspects are very important for the possibility of many establishments to occupy ground floors. However, this thesis has an architectural and design approach to ground floor activity and will therefore only acknowledge the economic aspect but not explore it further.
- The manual will not suggest how to design the context, such as density or street network for active ground floors, but rather suggest how to design based on that context.
- The thesis will focus on the urban fabric where the building frontage is a prominent part of the public realm and the design of the frontage therefore plays an important part of making the space pleasant.
- The design study will cover the design of the ground floor frontage zone but not the rest of the building.
- The different user groups of the street level is an important factor to consider when we talk about lively ground floors. However, this thesis will be based on the amount of people rather than specific socio-economical groups of users, as the thesis focus on the built form which will stand through different social and economical changes.

How do we design for lively ground floors in dense areas that can't afford commercial activity, without the risk of empty rental spaces or visual intrusion?

Sub-questions:

What are the categories of lively ground floors and can they be enriched and diversified to activate different types of areas and streets? Can we update the mainstream architectural programme of lively ground floors?

How does the design of the frontage-zone impact the space around it and how can it be considered when designing new urban areas?

THESIS OUTLINE

Chapter one – Introduction

In the first chapter, the thesis subject and aim are introduced. It defines the problem presenting the research question and explains the overall methodology for the thesis, terminology and delimitations.

Chapter two – Theory & Method

The second chapter goes through relevant theories and research that lay the foundation of the work for the thesis. It explains the current meaning of a lively ground floor and the importance of public life that it both supports and is supported by. Further, it introduces the space syntax theory which highlights the value of understanding the location, urban configurations and the potentials for movement created in a city, a fundamental aspect of urban activity and street liveliness. In order to recognize the use of ground floor beyond commercial activity a broader view of activity is introduced. Lastly the theory of affordances and interactive frontages are introduced to expand the understanding of what a lively ground floor is or can be.

Chapter three – Reference / Analysis

In chapter three the theories' respective methods are used to analyse and compare active and inactive street levels in Gothenburg depending on location and context, as a reference for the tool-kit. The analysis stretches from the macro scale looking at the global location to the local context looking at the street layout and configuration, to the micro scale where the use and design of the ground floor are analysed. The aim of the analysis is to identify the main variables that need to be included in the tool-kit.

Chapter four – The tool-kit

A tool-kit is based on the discoveries made in the reference analysis, the research and theories. The tool-kit is developed as an informative and practical tool that can be used by architects, urban designers and planners when developing street levels. It consists of four steps where one is to identify the situation in question through an analysis of spatial and physical structures on different scales to then find a suitable use/program of the ground floor and identify its demands on the frontage design. Lastly, different design strategies are proposed to enrich the interactivity of the frontage for more lively ground floors at different contexts, locations and programs.

Chapter five – Evaluation

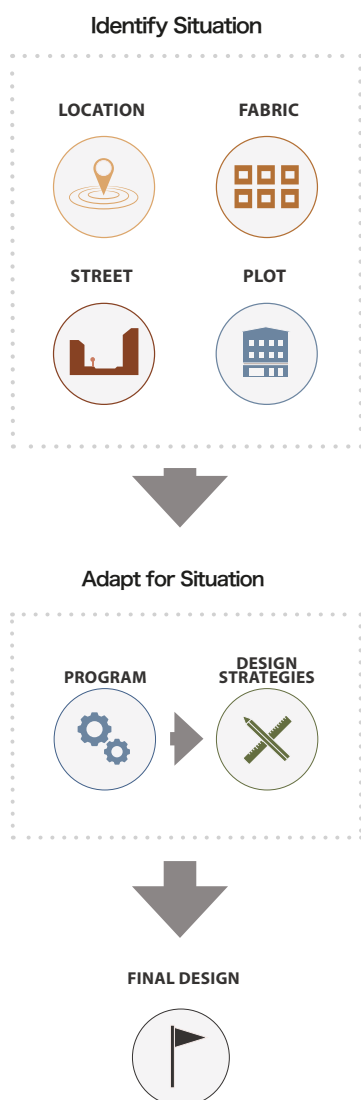
In chapter five the tool-kit is tested and evaluated by applying it on a design study in Gothenburg. The design project is a planned dense area of Södra Änggården. Throughout the design process the use of the tool-kit will be reflected on. Lastly, the process of developing the tool-kit and the use of it will be reflected upon and evaluated and potential adjustments will be discussed for further work.

TERMINOLOGY

| | |
|----------------------------------|--|
| Street level architecture | A zone that includes the interior program facing the street, the design of the frontage facing the street, the activity on the outside and the street layout |
| Ground floor architecture | The part of the street-level architecture that regard the building |
| Public Realm | Exterior urban spaces that are publicly accessible |
| Streetscape | A term for everything that make up a street. Width, height, movement lanes, sidewalks, buildings, greenery, furniture, lighting etc |
| Interactive Frontage | Ground floor façades that stimulates our senses and interest through interaction. It can be both active and passive |
| Active Frontage | Ground floor façades with high transparency and permeability to promote the inside activity outwards for a lively street level. Mainly designed for retail and restaurants. |
| Lively ground floor | A general concept and vision for an inviting, interesting and safe street level. |
| Affordances | Opportunities for action offered by the environment in relation to the action capabilities of the actor |
| Natural movement | The proportion of movement on each street that is determined by the structure of the urban grid itself rather than by the presence of specific attractors or magnets. (Hillier et al. 1993.) |
| Street network Centrality | How connected each street is to all other streets. The more connected the streets and street segment are; the higher their centrality. |
| Integration Value | Describes how connected the street segments are to the rest of the network |
| Betweenness centrality | Describes how often each segment fall in the shortest path that connects two segments in relation to the rest of the network. |
| Multiplier effect | More central streets attract more pedestrian and vehicular movement and in turn attract more activities, which in turn attract more people |

METHOD & PROCESS

Toolkit-outline



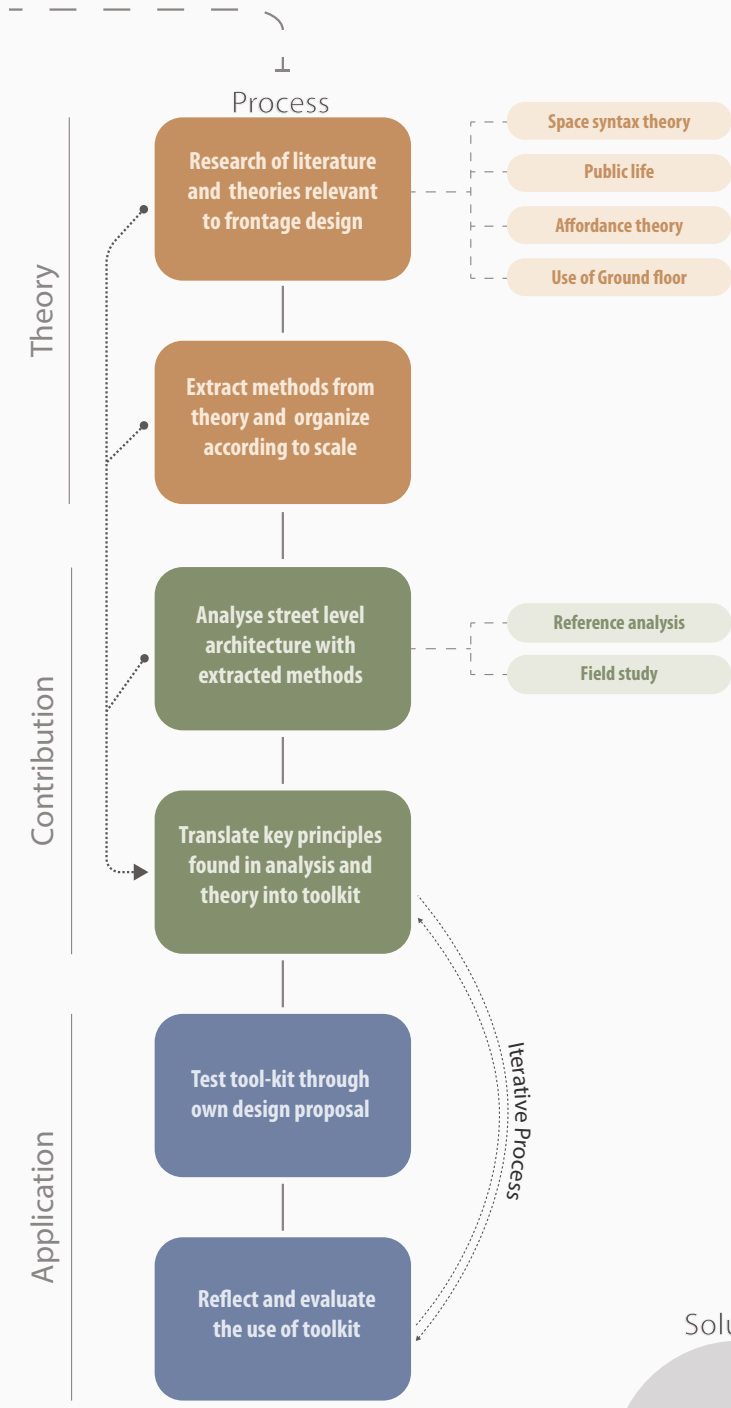
The thesis is done through research for design and research to inform design and follows a multi-scale approach. The thesis will be conducted by using both relevant qualitative and quantitative methods for analysing the built environment. During the early phases of the thesis a literature study is done to strengthen the theoretical and methodological base for the project.

Spatial analyses in multiple scales, such as network centrality and density analysis will help to understand the possibility for movement created by the location, the street configuration and the urban fabric and thus identify the different possibilities for ground floor program and design.

Reference analysis of urban blocks with appointed aims and strategies for lively ground floors will also be conducted to explore different strategies to achieve interactive ground floors.

By performing an interface mapping, studying design and programme of the frontage-zones in urban areas, together with behavioural observations, the thesis will get guidance and references on how the ground floors are used today.

An iterative process of research and explorations will be followed, aiming to create a tool-kit consisting of a framework and design strategies on how to design the frontage zone for lively ground floors, taking into account location and context. The tool-kit will be tested on a design study to then evaluate its function.



THEORETICAL APPROACH

The thesis will approach active ground floors from four directions.



Space syntax theory

One will be based on the **Space syntax theory** (Hillier 1996, Hillier and Hanson 1986), the notion of Cities as movement economies and the Theory of Natural movement (Hillier et al. 1993), which relates the urban locations to activity potentials by way of their placement in the primary structure of movement, that is the street network. It supports the notion that each location in the city creates different conditions for the development of uses, since it first creates different potentials for movement. Each location creates potentials for movement because of its place in the fundamental urban structure - the street network.



Theory of affordances

The other approach will be based on the **theory of affordances** (Gibson 1979) from environmental psychology. According to his theory, perception of the environment inevitably leads to some course of action. Affordances are clues in the environment that indicate possibilities for action, and are perceived in a direct, embodied, immediate way. Perception drives action. The theory of affordances will be linked to the applied concept of **Interactive frontages** by Kickert (2022).



Study of public life

The third approach will be based on the **study of public life**. Observational studies of public life have been made by several architects and planner through time such as Jane Jacobs, William Whyte and Jan Gehl. These studies can tell how people move and use the public spaces which every frontage will face.



Use of the ground floor

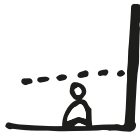
The fourth is about the **use of the ground floor**. Observation and analysis of activities that can take place on the ground floor beyond commercial activity are discussed by Molnar (2018) and Sevtsuk (2020). There is also research on how programs can be categorised in other ways than its function (Kretzer 2023), which is the default measure today. Depending on the purpose of the program and the use of that program, meaning its frequency and user, we can get an indication of the liveliness the program creates rather than its specific activity.



Fig. 2 Interactive blank

Research & Theory

The thesis will approach lively ground floors from four different fields of study which are the study of public life, mainly influenced by J. Jacobs (1961) and J. Gehl (2010), Space syntax theory developed by B. Hillier (1996), affordance theory by J. Gibson (1979) and the study of the ground floor activity. This chapter will go through the research performed within these fields and their relation to the street level architecture and active frontages.



Human scale

Design for the human dimension and experience

THE VALUE OF LIVELY GROUND FLOORS

Living cities

The desire for livable and vibrant cities today is mainly influenced by the work of Jan Gehl and his study of public life, together with other urban theorists as Jane Jacobs and William Whyte.

The Danish architect Jan Gehl has long emphasised the importance of improving the quality of urban life through people's experience of the built as public life depends on pedestrianism, the most accessible way to experience a place. According to Gehl, the main strategy to achieve a lively, safe, sustainable and healthy city is essentially to increase concern for the **human scale** of city planning.



Eyes on the street

Passive surveillance of the street

In *Cities for people* (2010) Gehl suggests that a ripple effect for strengthening lively cities starts when people are invited to walk, bike and stay. When more people move and stay in the city space the potential for a safe city are strengthened. A safe city encourages more people to walk and bike which potentially increase the public health. The use of green transportation such as public transport, bike and walking potentially increases as well, leading to a more sustainable city. In other words, creating pleasant public realms where people are promoted to walk and stay, potentially lead to better cities, moving towards the sustainable development goals such as global health and sustainable cities.

According to E. Heffernan (Heffernan et al. 2014) successful public spaces are those which are comfortable, sociable, accessible and active and which are appreciated by those who use them. Successful active frontages contribute to successful public spaces.

One of the early urban theorist Jane Jacobs stressed the importance of visual connection between inside and outside in her book *The Death and Life of Great American Cities* (1961). By visual connection you'll have "**eyes on the street**" which means a passive surveillance of the streets improving the public safety. This principle is used today to strengthen active frontage policies.



Interactive Frontage

A frontage which stimulates our senses both active and passive

Policies for active frontage

Policies and requirements for active frontages inspired by the theories of Jacobs and Gehl are promoted as best practice for lively, secure, attractive and sustainable street levels today. The requirements are often stated as "Large glass sections towards streets to demonstrate the publicness of the ground floor, intended for cafés and retail" (Göteborgs stad 2015) or "(...) commercial frontages towards street for an attractive and safe street level" (Göteborgs stad 2022). What one can note is that active frontages, and the policies for lively streets are highly connected to the existence of street commerce.

Design beyond main streets and transparency

One factor that is often forgotten when talking about active ground floors is the ground floors outside of the main streets and frontage design beyond transparency.

The different policies, guidelines and strategies that can be found today for active ground-floors mainly refer to streets with an already high activity, such as shopping streets and central streets with a lot of natural movement throughout the day. The streets that do not live up to that standard, which is a majority of the streets in a city, are left out design-wise.

INTERACTIVE FRONTAGES

Affordances

All built environment offers a variety of possibilities of action. A transparent wall offers a visual action looking into another space, an entrance offers the action of entering a space, opening and closing spaces and a bench can offer actions as seating, laying down or jumping from it. The environmental psychologist J. Gibson initiated the term of **affordances** in 1977 (Gibson 1979). The purpose of understanding affordance was to better understand how we perceive the environment in which we find ourselves. The theory suggests that the environment constrains what the individual can do and that every object and surface have something to offer, something to provide or furnish; an affordance. Affordances are relative to the individual and are properties taken with reference to the observer. They are neither physical nor phenomenal.

Gibson suggests that places also have affordances. When we as architect chose material and layouts we do it based on the affordances we want the place to have. What type of window we use between two spaces can have different affordances. Should it afford transmitting both illumination and information, but not permeability, or should it only afford transmitting illumination, for instance?

Frontage encounters

"We have plenty of time to look as we walk, and the quality of the ground floor façades we pass close by at eye level, is particularly important to the quality of the tour." - Jan Gehl

The urban frontage is a powerful component of the street level. It acts as a border between the public realm and private built and thereby serves as a connector between the two. Through design it will provide or prohibit interaction and enable or constrain privacy and publicity. (Kickert, 2022) In a dense urban structure, the frontages are encountered in several ways; we move parallel or through them, we pause around them when lingering, waiting or enjoying and we observe them as walking pace allows intimate visual contact with the façade design and the bordering activity. (Gehl et al. 2006) The human has a horizontal plane of view, which means that the frontage of the building is what we will experience the most since it is in our immediate field of vision. The frontage thereby has more emotional impact on us than the rest of the building as it engages more senses than just sight; we can smell the wood, feel the heat reflection, and touch the materiality. It gives us both bodily, physical and visual experience.



Fig. 3 The interior program is parking and there is no transparency or permeability. But the frontage afford interactivity either way because of the frontage design with a setback allowing for seating and enjoying.



Fig. 4 A vertical garden can engage our senses through smell, touch and vision.

In the book *Street level architecture* (Kickert 2022) Kickert introduces the concept of interactive frontages, taking these sensorial stimulations into account. According to him, "(...) interactive frontages bring life to public spaces, create destinations, please the eye, encouraging socialization and reinforce safety." We interact and read the buildings as we pass them, and when a frontage addresses the streets we sense trust and care.

Frontage attributes

There are indefinite ways to design an interactive frontage, but among city guides and theorist such as Gehl and Kickert (e.g. Kickert 2022) there are some key design attributes to apply on frontages to strengthen the potential for a lively and pleasant street-level.

One design attribute which is frequently mentioned is the rhythm. Vertical façade articulations break up the frontage in smaller sections which potentially makes the walk along it feels shorter, more interesting and related to the human scale (e.g. Duncan et.al. 2013).

The diversity of a frontage is another strategy to impact the pedestrians perception of a walk along the frontage. Through diversity such as materiality, detailing, lighting, texture and colour we can make an otherwise blank wall interesting and functions can be defined.

Jan Gehl often emphasize the importance and strengths of a soft edge (e.g. Gehl 2010). The soft edge acts as a buffer zone, a soft transition between inside and outside, public and private. It can be achieved through design strategies such as front yards and setbacks but also through transparency and permeability, allowing one space to take part of the other.

Importance of function

Both Kickert (2022) and Sevtsuk (2015) underline that the function behind the frontage is of equally importance as the form. The ground floor function is what feeds and inhabits the street and should be considered with care. Interactive frontages based solely on transparency and commercial activity thereby limit the potential and affordance of the frontage zones. In general transparency is necessary for social and commercial exchange and consumption while it can be a problem for logistics, production and private spaces (Dovey, 2015).



Fig. 5 A setback as a soft edge of the ground floor frontage can create an inviting space for walking.



Fig. 6 Rhythm in facades provided by plot division and multiple entrances.

STREET LEVEL FUNCTIONS



Fig. 7 Backplan, a car oriented inward facing shopping mall from 1969.



Fig. 8 The parcelbox, a new function entering the street level due to growth in e-commerce.

Renegotiation of ground floor use

The rapid motorization and highway constructions during mid-20th century caused a car-oriented urban planning, where the accessibility by car was of highest priority. Retail and public life moved in to enclosed inward-facing suburban shopping malls, leaving the streets inhabited by cars only. However, there is an ongoing reversal, a re-discovering of the perks of a liveable and walkable city. People prefer amenities that are close to home or workplaces accessible by foot and public transit rather than remote shopping centres.

At the same time, the availability of e-commerce threatens the growth of physical stores today. The convenience of having services and retail access by foot as you get in mix-use cities is challenged by the convenience of access it all directly from your home, which you get from e-commerce. But Sevtsuk argues that the experience is part of the sell, as we for instance want to feel the avocados before buying them or get guidance from the staff. So even though routine shopping increase online, the optional and social shopping are likely to grow, where the social interaction and opinion, and the possibility to palpably inspect and personally choose the goods are the key force (Sevtsuk, 2020). It is evident that trends and the society's development affect the commercial playground through history and the street-vitality must have room for them to come and go.

Importance of location

The most significant factors explaining street commerce location are proximity to recreational areas, closeness to other shops, reach of built areas, accessibility and weight of public transport (Sevtsuk 2020). It is also important to have good visual exposure, such as corner shops. Commerce draws much of its customers from impulse shopping and therefore tend to cluster along streets with high flow of pedestrians moving through the space, capturing the potential unplanned impulse customers.

Retail on ground floors is thereby very sensitive to foot traffic and for it to stay in business it needs to bring enough revenue to justify a continued existence. Retail location rely fundamentally on accessibility to customers and this demand limits the availability of potential locations for successful street commerce (Sevtsuk, 2020). Having street commerce as a key part for an lively ground floor would be limited. We therefore have to broaden our view and understanding of what activates the ground floor.

Cultural and social activity

Commercial activity is mainly referred to when discussing interior ground floor use, but ground-floor interiors are activated by far more than just commercial activity. In the paper '*Effektanalys av sociala och kulturella verksamheter i bottenplan*' by S. Molnar (2018) establishments such as citizen associations, art and culture, public services and circular economy are recognized as contributors for activating ground-floors. The common factor of these establishments is that they don't have economic profit as their main goal. The establishments are therefore not categorized by sector but rather by if they have a cultural or social direction.

The social establishments aim to work with social aspects and activity to help inclusion, such as public sector, social service, healthcare and education. But It can also be spaces for gatherings, sport facilities and circular activities such as rental, sharing and second hand. The cultural establishments aim to work with and make room for culture and art. This includes production of culture such as ateliers and rehearsal spaces, consumption of culture such as theatres and venues, and sale of cultural artefacts.

The cultural and social establishments are important attractors to the public realm. Many of them are places citizen will visit continuously regardless of their economic situation, adding value to their context by making them health promotive, safer (more eyes on the street) and attractive with its increased accessibility to social and cultural activity.

Streetscape

The design of a streetscape will affect the liveability and attraction of the space. According to the 'Design Guide for Smart streets' (Ståhle et al. 2022) there are several factors which contribute to this such as greenery and traffic safety. Greenery can make a space more inviting and pleasant and traffic safety, by way of decreasing speeds and prioritize pedestrians, will increase the feeling of safety and thereby attract more pedestrians promoting liveability. The speed and distribution of activity on a street is decisive for its functionality. It will directly impact the security, safety, accessibility and use of the streetscape.



Fig. 9 The corner provides visual exposure which benefits commercial activities



Fig. 10 A small gallery hosting contemporary exhibitions



Fig. 11 Form follows function

Residential

Even though there are numerous cultural, social and transactional functions that can inhabit the ground floor, the majority of urban frontages are actually occupied by residential function. Street level dwellings can be a heavy contributor to a lively street level if it is designed for it, if not, it could do the opposite. Frontages need to offer visual relief and daylight for the residents while remain in refuge of privacy, while simultaneously create a welcoming and interactive frontage zone. It is a delicate balance of the public and private life.

Creating a space where the privacy of the home is disrupted by visual intrusion potentially makes the public realm not feel public, but rather as trespassing someone's private space. The blinds become a coping mechanism for maintaining privacy from the public gaze which signal distrust and is an indicator for when that balance between public and private is not fulfilled.

There are some residential shared spaces that afford transparency, such as common entrances to apartment buildings, the laundry room and common rooms. These functions could favourably be places towards streets for interactivity.



Fig. 12 Shared laundry spaces can contribute to a more interactive street-level

Entrances

Kickert states that the entrance zone and front yards is a space where the dweller can express their aesthetics and character to the city which in its turn creates a more lively and safe street level as they communicate care, homeliness and safety (Kickert 2022).

In a study of frontages through the years (Kickert 2022) we can clearly see how new constructed areas add fewer entrances than before, due to the efficiency and economic aspects of having more apartments connected to fewer stairwells. This leaves parking, storage and other inactive function to inhabit the frontage zone with their blank walls.

LOCATION, NETWORK AND DENSITY

To make cities more sustainable and lively we must base our planning and design decisions on a wider understanding of them. We often refer to the cities' physical form, but it is also important to understand its network configuration, the urban grid in a city. The urban grid supports urban movement,

both vehicular and pedestrian and the way we move in a city is highly influenced by the configuration of the urban grid by the way of the street network layout and configuration. The street network is what takes us from everywhere to everywhere else.

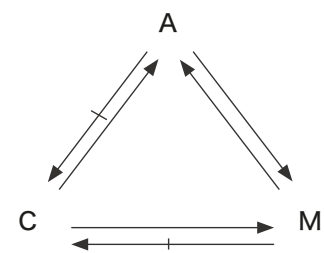
In space syntax theory developed by Hillier and Hanson (1986) the notion of '*Cities as movement economies*' (1996) and '*The theory of natural movement*' (1993) were introduced. The research relates potential activity to urban locations depending on their placement in the fundamental urban structure, the street network. It argues that every location in the city has different conditions for development of uses, because of the different potentials of movement in that location.

The term Natural movement proposed by Hillier (1993) describes the relation between the structure of the urban grid and the movement densities along its lines. The natural movement is the movement determined by the location in the urban grid rather than by attractors or magnets. It may therefore not always be the main contributor to the total movement, but it is the most pervasive. The natural movement of a street is formed by the properties of the global system, how well connected the street is to the rest of the area and the area to the global network will influence the level of movement for that street.

The theory of natural movement has been empirically tested in different cases showcasing the strong relation of the street network configuration to the attraction and distribution of movement in the city in global and local scales.

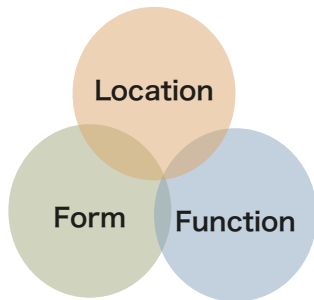
The physical form of the city, the fabric, is what feeds these urban networks. According to the paper "*Development of urban types based on network centrality, built density and their impact on pedestrian movement*" (Berghauser Pont et al. 2019) density of the fabric is a good indicator of the intensity of activities and movement in a city.

The space syntax theory and measures for density will be used in the thesis to further understand the potentials for movement afforded by a location and thereby be able to activate and design the street level architecture according to it.



Triadic relation between Attraction, Movement and Configuration (Hillier 1993)

Understanding the ecosystem of street level architecture



The three cornerstones of street level architecture

There is no doubt that there is engagement and desire for lively ground floors. We seem to know how to create lively ground floors where the preconditions are generous, where a wide range of people will move, and commercial activity would thrive, or where residents can take ownership of the space around their home to signal trust and safety. But where the frontage can't afford any of these preconditions is where we find the blank walls and vacant storefronts. It is an 'everything or nothing' situation; either active transparent frontages or the frontage is left unplanned.

The research shows that the street level ecosystem is a multi-scale system stretching from the small details such as design of a door to the large urban structures and the cornerstones of this ecosystem are location, form and function.

Location

Where the project is located in relation to the larger context will affect the potential and level of movement to and through the space and thereby will create different opportunities for the ground floor to become a part of the urban life.

Urban Fabric

The density of an area can indicate the intensity of movement, activity of the space and give an understanding of the footprint and presence of the built at street level.

Street Typology

A neighbourhood usually A street can look and function in many different ways depending on its location and centrality. A neighbourhood usually consist of multiple types of streets with different potentials for movement. Travel speeds and proportions of the street relate to street types and together set the conditions and opportunities for ground floor activity. of multiple types of streets with different potential for movement

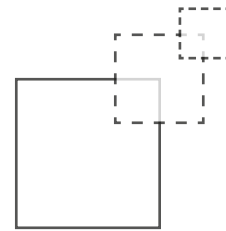
CITY

NEIGHBOORHOOD

Macro scale


This chapter will try to contextualize and break down this ecosystem into six categories of spatial and physical structures organised by scale. The first four categories location, fabric, street and plot shape the situation and possibilities for the ground floor activity, while the last two categories; program and design are what use those possibilities for potential ground floor interactivity. This is where the toolkit will intervene.

Each category's role and importance for the street level architecture will be explored through analysing existing urban areas in Gothenburg with methods extracted from the theory and research. The sites will be of different location, typology and density to give a broad understanding of the street level ecosystem.




The street level architecture is shaped by many scales

Plot



While the street network is what distributes activity, the plot and its building is what feeds it. The buildings typology will impact the activity hours of the area and the plot structure, land size and division of the ground floor will affect the level of variation in use and design.

Program



The interior of the street level can be activated by many different types of programme depending on the situation. The activity of the programme can vary in user groups, access, frequency and demand for movement depending on the type of establishment.

Design



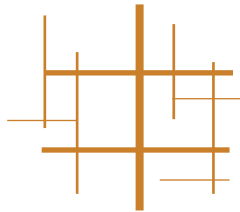
How the frontage is designed will inform how the space can be used, for whom it is for and can create a pleasant environment even if interior activity is absent. It is about designing in relation to location.

SITE

Micro scale

METHODOLOGY

To analyse and get a better understanding of the ecosystem of street level architecture, several methods have been used. The methods are mainly about studying the preconditions for ground floor and frontages in relation to movement through space and the physical form of the space. This will be done through spatial analysis in GIS with the help of place syntax tool, and a field study of interface mapping and observations.

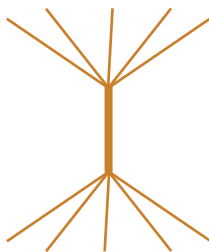


Integration Centrality

Spatial analysis

Location

Space syntax theory introduced by B. Hillier and Hanson (1986) is used in the thesis as a method to identify relative locations in the larger urban context: location being defined in relation to the urban networks and structure. Space syntax provides different ways to analyse the urban networks for different purposes. By translating every street or street segment to a node in a network of streets, one can measure the connections this segment has to the rest of the network. This value is called network centrality; the more connected the street and street segment the higher the centrality.



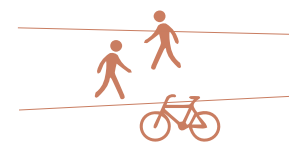
Betweenness Centrality

The thesis will work with two types of **network centrality**, angular integration (i.e. angular closeness centrality) and angular betweenness centrality. The **angular integration** measures the angular distance of a street segment to all other street segments, and thus its connectivity to the rest of the network. Each street segment in the analysed network is assigned an angular integration value, which tells the total amount of angular degrees you have to turn to reach all the other street segments of the street network. Each segment is considered as a destination or origin. The value is relative and indicates the level of estimated movement to the segment in relation to all other segments. That means that segments with high integration value are expected to attract more pedestrian movement than those with lower integration value, following the theory of Natural movement introduced in the Theoretical background. Angular integration highlights centrality cores and clusters of centrality related to centres and local centres in the city. This value can then be visualised in a map of the street network representing the level value of integration with a colour spectrum from red to blue with red as highest integration and blue as lowest.

The **angular betweenness** measures the shortest path between all the possible pairs of street segments in the network and counts how many of these paths pass through each other segments. The shortest path is the one with least angular distance (i.e. total degrees turned). When these values are visualised important streets to move through the network can be identified. Angular betweenness highlights centrality paths and

corridors through the city that mediate all movements in local and global scale. The angular betweenness is often visualised by the thickness of the lines, where the thickest line is the one with the highest angular betweenness.

The angular integration and betweenness can be measured on both **global** and **local** scales; where the global includes the majority of the streets in the city and the local only includes the streets within a smaller radius around each street or location. In this thesis the local centrality will be measured at a radius of 2k which covers the relations of each street with all other streets in a local neighbourhood context and the potentials for movement distributed within a neighbourhood. The global centrality is measured with a radius of 5k in this thesis which covers the relation of each street, location and urban area within the global connections in the city.



Non-motorized network

For this thesis the centrality is calculated for the **non-motorized network** which includes all the paths accessible for walking. In the location category the analyses are made observing the whole network, meaning that the analysis includes all of the segments and the visualisation of results colours them according to it. The map then shows the big variations of centrality between areas of the city, but not the variation within smaller areas and neighbourhood which might not be visible. These local variations will be addressed in the 'street' section.

Urban Fabric

By analysing the built form in a city, we can get an indication of the density of an area and thereby estimate the amount of people living and moving in that area. There are two measurements for density, ground space index (GSI) and floor space index (FSI).



GSI

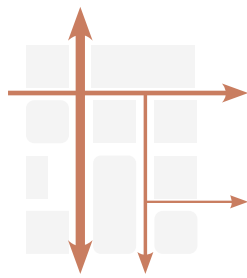
GSI is used to describe the division between built and non-built land in an area and is calculated on the buildings footprint. **FSI** is used to describe the total amount of floor space in an area and is calculated on the gross floor area of the building. (Berghauer Pont. et al. 2019) A division between different building types can be made by using FSI and GSI. These measurements can be made to give each building their value separately but by calculating the built density reached within 500 m from every location we can identify the building fabrics, and thereby the experienced density of an area when one walks in its streets. These measurements are called **Accessible GSI and FSI**.



FSI

Street typology

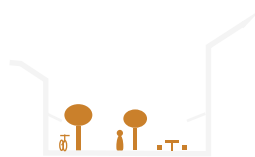
To identify different streets and their potentials for movements within a certain neighbourhood we need to isolate the centrality



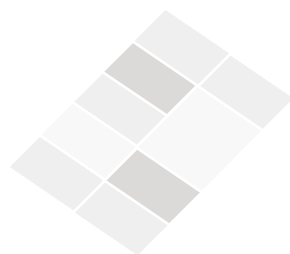
Street Hierarchy



Multispeed Street



Pedestrian Street



Land use

values of the neighbourhood from the rest of the network. This means that the integration centrality and betweenness centrality of each segment is still calculated in relation to the whole network but is only visualized in relation to the smaller chosen part of the network that will be analysed. This analysis will then show the most integrated segments where you'll find a majority of retail and services, and the less integrated areas where the primarily residential functions are located. (Hillier et al. 1993)

The analysed streets are categorized according to the street types introduced in '*Development of urban types based on network centrality*' (Berghauer Pont, et al. 2019) as a result of a cluster analysis of street centrality. According to the paper there are four types of streets, the **city street** which have a high angular betweenness on global scale, indicating its importance of movement through the city. The **neighbourhood street** has a general high betweenness on most scales but drops on the smallest and highest scales indication its importance for movement in-between neighbourhoods. The **local street** only has a high betweenness on the local scale which indicates its importance for the movement within a neighbourhood. Lastly the **background street** which are represented by its low betweenness values at all scales.

The speed of the streets is also observed in the analysis since this is the most fundamental factor affecting the streetscape according to the '*design guide for smart streets*' (Stähle et al. 2022), and the speed decides the type of activity the street can hold. There are four general types of speeds; **High speed-street** (<50km/h), **Low speed-street** (<30km/h), **pedestrian-street** (<10km/h) and **multispeed-street**. The speed of the street can imply the width and proportion of the street but it is not determined by it, meaning a multispeed street and a pedestrian street can have the same width and proportions.

Plot

Another important parameter to include in the analysis is the **land use, land division** and the **plot structure** in urban areas. The land division and plot structure are important for the use and activation of ground floors, where the more plots the urban block is divided in, the higher the diversity potentials of these plots are (Bobkova et al. 2019). When the urban block consists of only one plot, the typical result is monofunctional blocks. When there are more plots in a block these can have different functions, but also different building types, architectural styles and so on increasing diversity of the ground floors along the streets. The plot is immaterial, but still plays an important role in designing cities and ground floors. It sets the rules for how the space can and will be used both with its dimensions and occupation.

The **main occupation** of a plot and in relation the main building use will indicate what type of movement it might attract or generate. A residential building will only feed the streets with the residents it hosts while non-residential buildings attract potential pedestrians from a large radius. The distribution of movement during the day is affected as well, where non-residential host movement throughout the day and residential uses mainly during morning and evenings (Sevtsuk, 2020).

Field study of mapping and observation Program

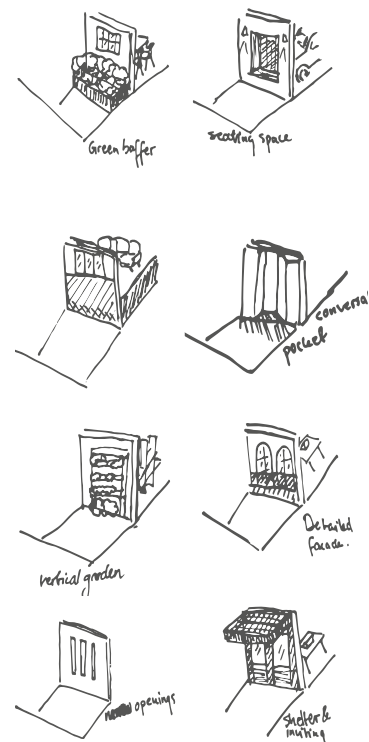
An interface mapping is used to investigate synergies between the different street-level components. By relating the function of the ground floor to its spatial conditions in relation to its placement on a specific street, fabric and location, we can get an indication of the distribution and affordance of ground floor activity.

In *"Public/private urban interfaces: type, adaptation, assemblage"* (2015) Dovey explains the frontages function as a mediator through separating and connecting different levels of socio-spatial hierarchy such as individual/collective, self/society and public/private. When mapping the frontage, these relations and connection should be considered. What we often measure as the level of publicness, openness and connectedness that the interface provides is the visual connections, by way of the amount and size of windows; the **transparency**. But the interface openness, connectedness or publicness can also be measured through **permeability**. The question of who is able to access both sides of the frontage is equally important for the activity of the ground floor. For example, a healthcare centre is a very public activity, and both sides of the interface are therefore public with high permeability. But even though the establishment is publicly accessible, most of the activity inside is private and demands less transparency to cover it from public gaze. There are many degrees of permeability and transparency, as well as different combinations of the two.

Design

The interactivity of the frontage is one of the key factors for lively ground floors (Kickert 2022). It can be achieved through high transparency and permeability, but not all ground floor activities can afford it. Through design strategies for visual, sensory and physical affordance the frontage can be interactive independent from the functions demand of the frontage.

Such design strategies or lack of it is annotated for the interface mapping to identify the impacts of the frontage design in relation to the frontage demand.



Early sketches of potential strategies for interactive frontage design

Reference analysis

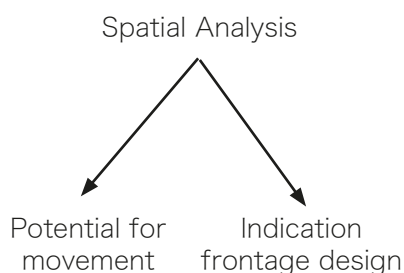
Spatial analysis and field studies have been conducted on different sites in Gothenburg with respective methods. By analyzing the street level in reality, we can identify the main variables that need to be included in the tool-kit.

Six different locations (fig.13) in Gothenburg have been selected based on their density and their location, to compare the street levels in different situations. As already stated, the thesis focuses on urban areas of high and medium density.

The demographics of the sites are of similar range with mainly families, elderly and young adults. However, the site 'Inom Vallgraven' differ from the other due to its central location and lack of residential land use, making it a more exclusive location.

The spatial analysis is done on a global and local scale. The field study will look further into some on the sites to be able to relate in more detail the frontage design and program to the spatial conditions created by location, urban fabric and street typology.

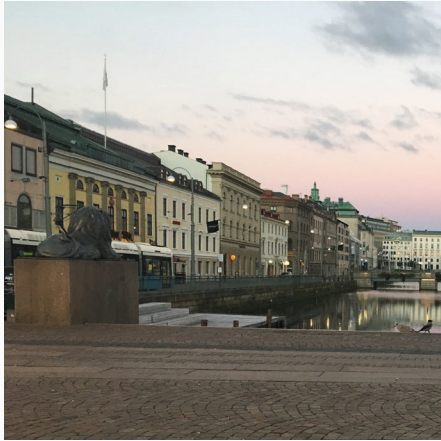
SPATIAL ANALYSIS



To identify different locations for reference we start by analysing the global angular integration of the non-motorized network (fig.14) in Gothenburg and the accessible FSI (fig. 15). Here we get an indication of where the most integrated part of the city is located, what the surrounding areas' integration value is in relation to this, and where the denser areas are located.

Looking closer at the selected sites on a local scale (fig. 16) we can discover more layers and variations within and between the sites. To measure the centrality of the locations and streets, the sites have been analysed within the whole network but is only visualized in relation to their nearby context within a radius of 0.5k from the centre of the neighbourhood. This way the local variations of centrality within the sites and the local hierarchies between the different streets are identified. Thus, the potential of each street to generate and attract movement can be described.

Fig. 13 The analysed sites



Inom Vallgraven



Majorna



Kvillebäcken



Brämregården



Lunden



Möln dal

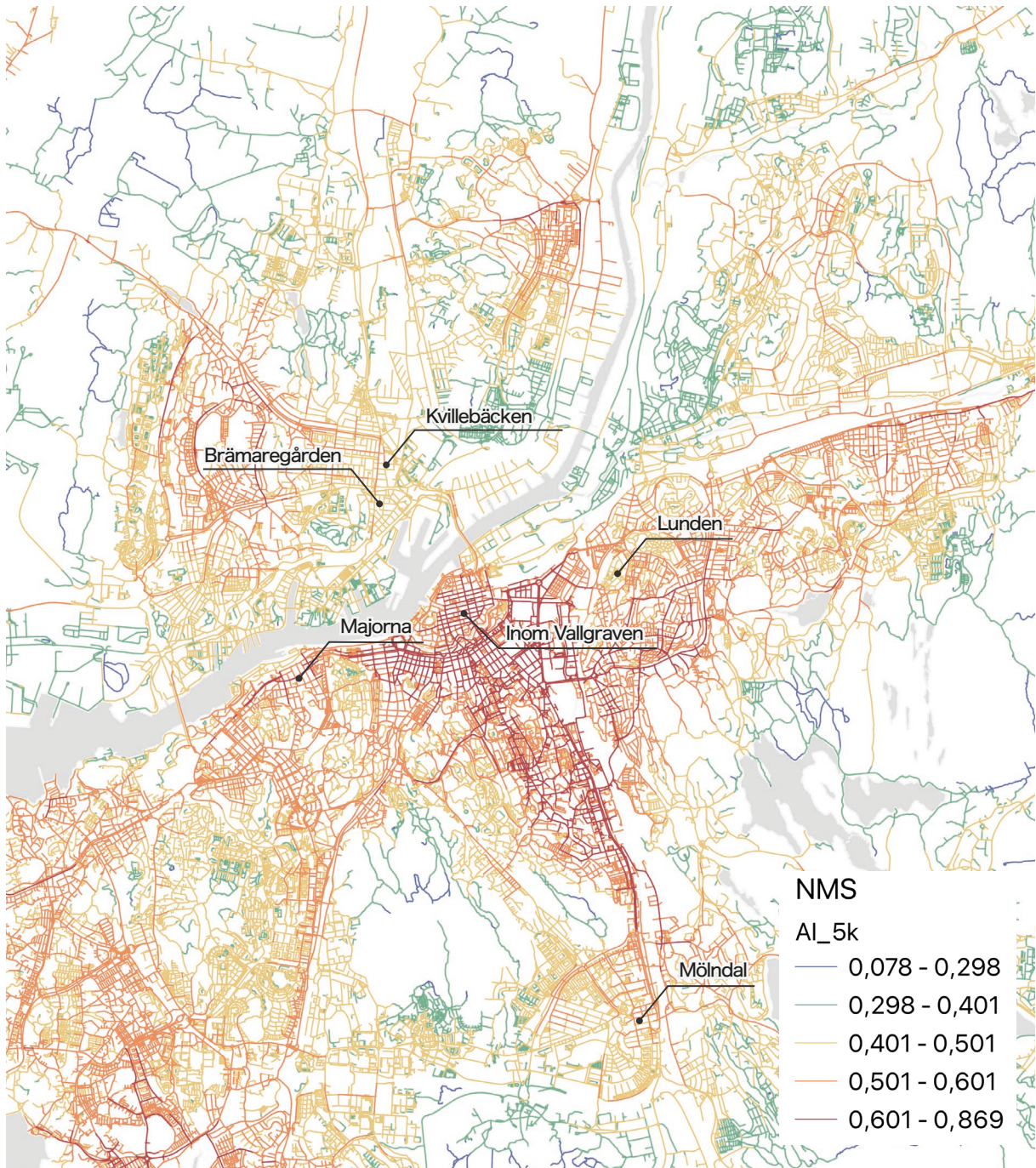


Fig.14 Global Centrality - AI 5k - Non-motorised network

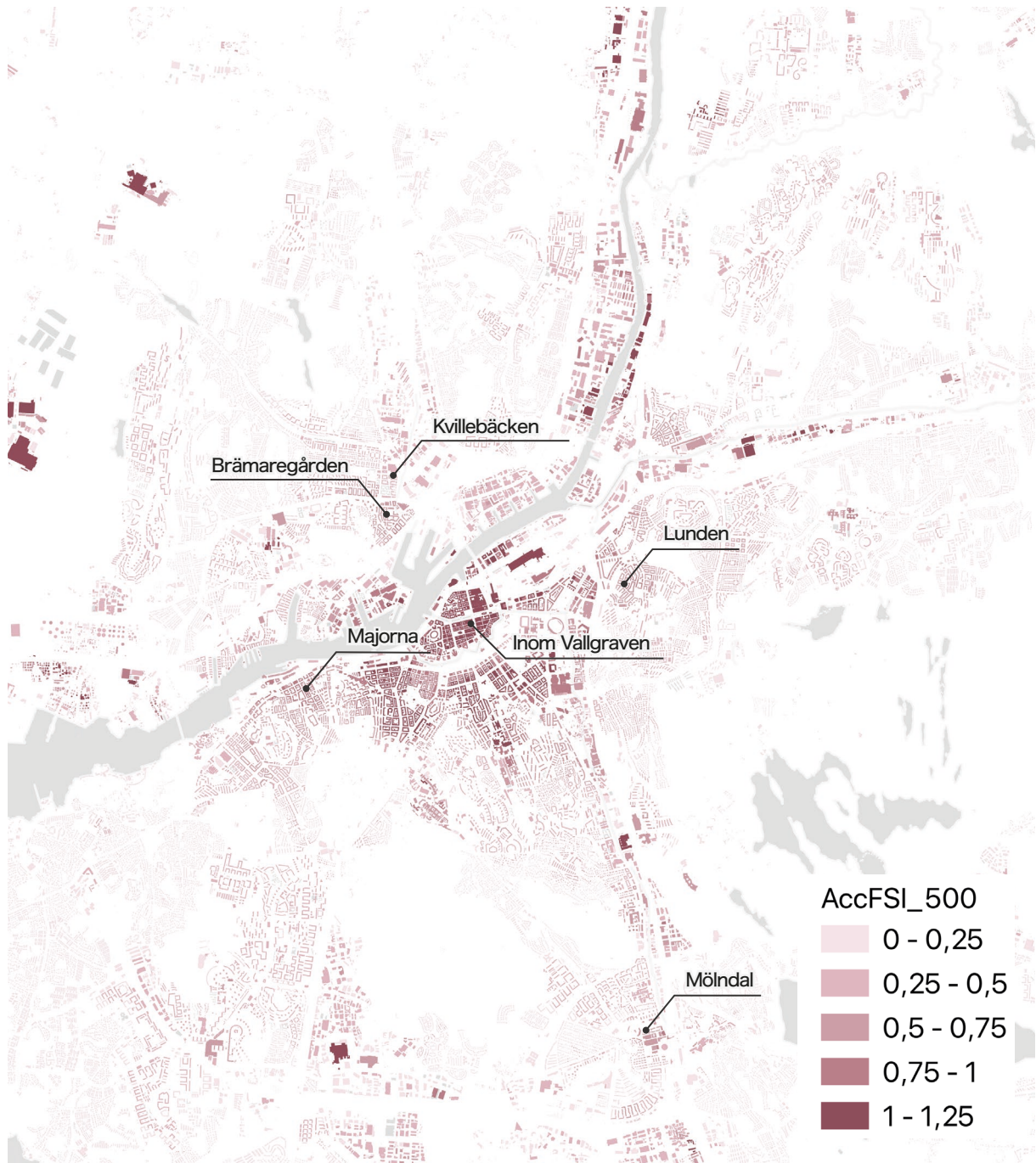
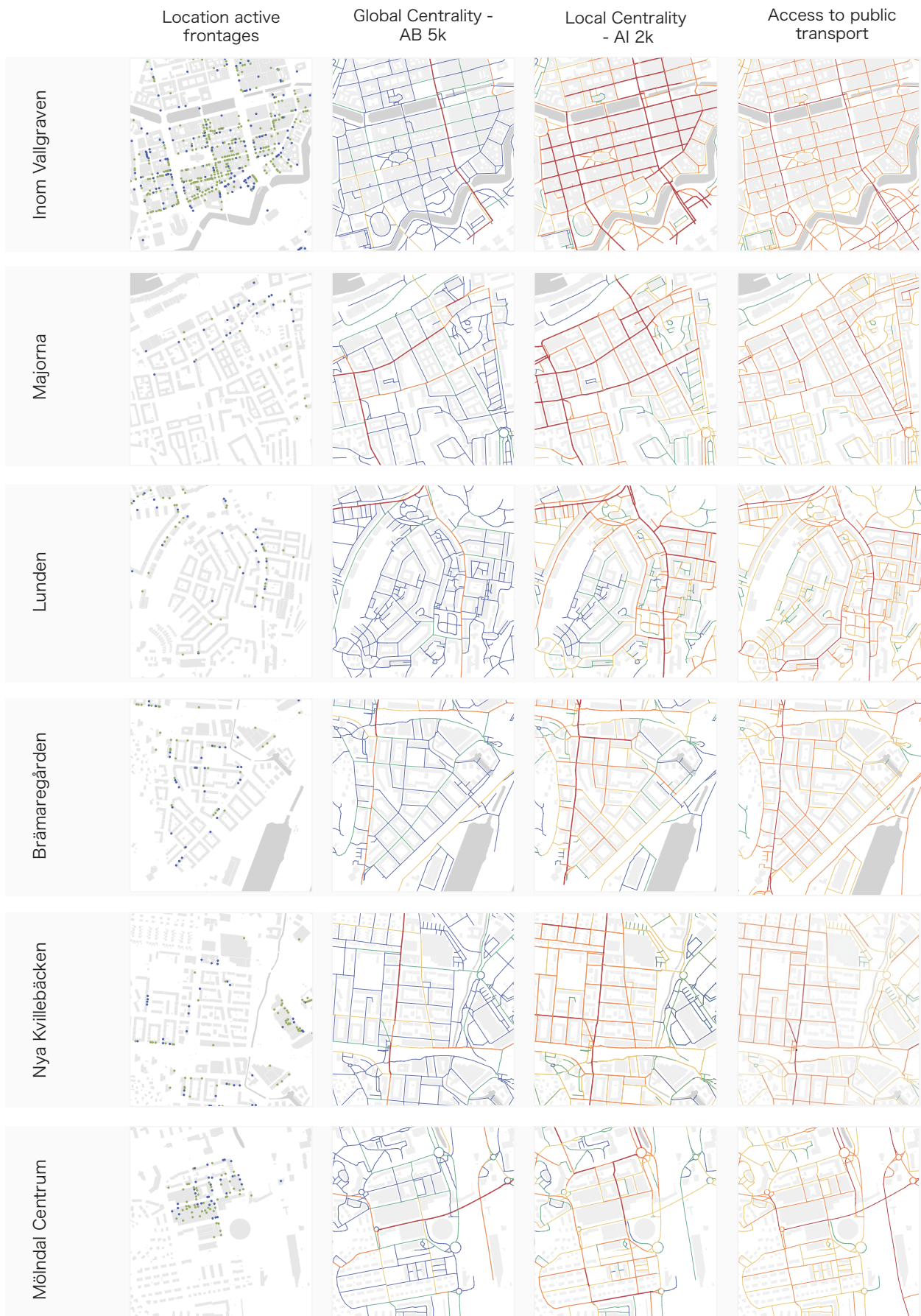


Fig.15 Density - Accessible FSI within 500m

Fig. 16 Matrix of Analysis on local scale





GLOBAL ANALYSIS - LOCATION & URBAN FABRIC

Observation

The inner city, '**Inom vallgraven**' is one of the sites we will look closer at as a reference since it is the most active and integrated area in Gothenburg. This is also the area with the highest accessible FSI in Gothenburg.

Further, **Kvillebäcken** is a newly built area with an aim for lively ground floors (Göteborgs stad 2009). **Brämaregården** from the 1930s is situated next to Kvillebäcken and therefore has similar centrality, which is rather low compared to the centre. Both areas have a medium FSI value which is higher than the nearby areas if one doesn't include the industrial buildings.

Majorna and **Lunden** are residential areas which have less integration than the centre, but higher than Brämaregården and Kvillebäcken. The areas have a medium FSI value and are located in the outskirts of the denser central areas.

Lastly, **Mölnadal** is a planned local centre in the suburbs of Gothenburg with a low global integration. It is a dense island of medium FSI, with a majority of low FSI areas surrounding it.

A general observation is that the global integration and density of the areas are largely related, except for the industrial areas where the integration drops significantly as the street network is not well connected.

The highest density is found in the centre and decreases successively the further away we get. However, it tends to increase at a certain distance from the city centre, to then rapidly decrease again.

Reflection

The low integration values of Brämaregården and Kvillebäcken can be a

result of them being situated across the river from the centre with poor connections to it. The sites are also situated in an area where the overall network has lower centrality.

As Majorna and Lunden have a relative high centrality and density and are located with close proximity to the city centre they potentially reach more pedestrians and afford a more diverse selection of activities.

Mölnadal is situated in a outer ring of density. This density may be a result of the distance from the city, being at a breaking point for when it is too far to the city centre for shopping and other services, and instead develops a local centre for commuters.

Three different types of locations with high density can be identified through this analysis. (fig. 17)

A&B - The Central; the main junction of the city with the highest centrality, where everything can be accessed on foot.

C - The semi-central areas; where you have easy access to city centre on foot or by bike, and therefore easy access to the everyday retail and services in the centre. But they are also locally accessible for many and can host more niched activities.

D - The Local centres; commute junction for people living further away from the city centre and with its own centre with everyday retail and services.

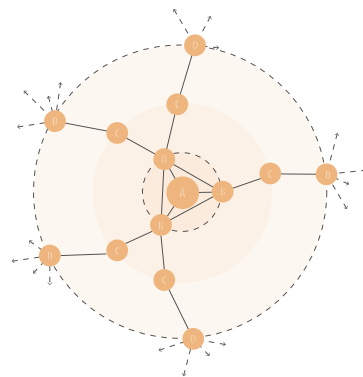


Fig. 17 Location typologies

LOCAL ANALYSIS - STREET & BUILDING

Observation

Looking at the selected sites on a local scale we can discover more layers and variations within and between the sites. We selected Angular betweenness in a global scale (5k) and Angular integration in a local scale (2k) as representative measures to describe global and local centrality. As described previously, global angular betweenness highlights potentials for global through movements and local angular integration highlights potentials for attracting local pedestrian movement.

By looking at the sites individually on a local scale we can confirm a distribution of centrality locally as described earlier.

Every site has one street with high global centrality, where most of the through-movement is expected to take place. Along these streets is where the public transport is located as well.

In the city centre (Inom vallgraven) a majority of streets have a high integration value, and a high number of the activities are also spread out along all these streets.

In most cases the streets with high local integration are also the ones with high global betweenness, except for Mölndal. Here the two streets differ. The street with highest betweenness is an important connector above the highway and railway for both pedestrian and vehicles. This is also where the bus terminal and commuter parking are located. The street with the highest local integration value is for pedestrians only. This can indicate that the speed, traffic and priority travel mode of the street is of importance when planning active frontages.

In Kvillebäcken we can see a large cluster of active frontages to the east, which is the car-oriented shopping area Backaplan. The area is also limited by a river separating Kvillebäcken from Backaplan. This could be

a possible explanation to why the activity and integration isn't continuous between these areas.

Brämaregården has a triangular shape and we can see that the active frontages are located on mainly three streets surrounding the area with both global and local centrality.

Reflection

It is clear that the majority of the commercial activity is located along the one or two streets with highest centrality. This indicates that the majority of the frontages need other strategies to be active or interactive.

The areas of medium density which lie in the outskirts of the main city centre only afford limited activity even on the street with high centrality, while the main centre and the local centre can have a wider spread of activities.

As seen in the global scale, Majorna and Lunden lie in close proximity to the center, which makes it easy to go there for various activities and services since the offer is significantly wider there. This might indicate for fewer active frontage in their own location.

The speed of the street is important. A street with high global centrality will most times be the most activated, but if it has heavy traffic, activity will decrease.

Squares connect several streets and give an open visual overview for several frontages. It is a preferred location for establishments and increase probability for clustering of activities.

FIELD STUDY

For the field study, two of the previous analysed sites, Kvillebäcken and Brämaregården, are looked further into. These two sites lie next to each other with a city street dividing them. The sites are constructed with almost a decade between them, where Brämaregården with its 'Landshövdingehus' from the 1930th and Kvillebäcken was built in the late 2010th. Their similar location and thereby similar potential for movement makes them an interesting case for a closer observation of their frontages. By exploring these two different, but also alike areas I'm hoping to find some key points on what makes a lively ground floor and not.

Through this field study, I have done an interface mapping, locating entrances, mapped the use, transparency and permeability of the ground floor and observed the streetscape, all in relation to the street typology which is determined by its centrality.

Plot structure

If we have a look at the facades of three streets in this area, we can get a good indication of how plot division contributes to a variation of the frontage along a street.

With one plot per block it is up to the architect to contribute with variation and expression within the volume. This can be seen on the vertical facades to the left in fig. 18 where one is perceived as multiple buildings with a lot of variation along the facades while the other is perceived as one large monotone building.

However, looking at the facades of the horizontal facades there is already variation provided through the plot division.

Frontage demand

The frontage functions as an edge and is thereby able to create socially distant but physically close spaces.

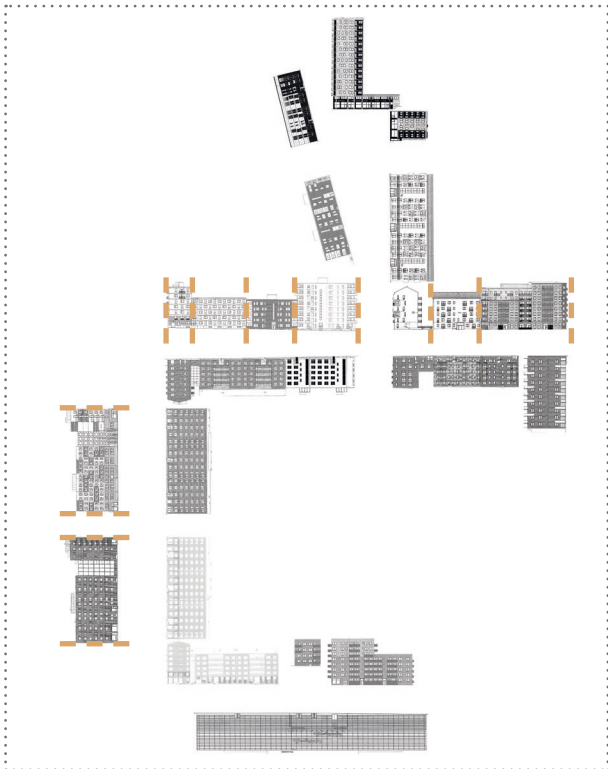


Fig. 18 Facades and plot division in Kvillebäcken

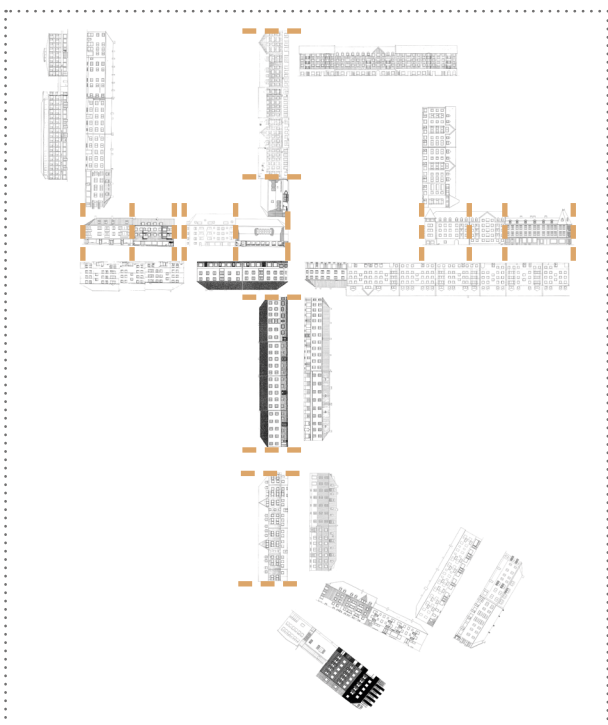
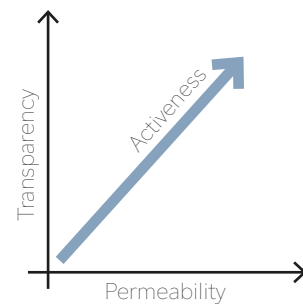


Fig. 19 Plot division in Brämaregården

Depending on the activity of the two sides and their need for publicity or privacy certain demands are established for the frontage. Through **transparency** and **permeability**, the frontage can achieve that demand by separating and connecting different levels of socio-spatial hierarchies, visually and physically.

The **permeability** decides the accessibility of the interior space; if it should be open and public or restricted and private. The extent of the permeability can give an indication of the potential movement and its intensity.

The **transparency** decides the visual connection between the inside and outside; if it should invite the public gaze with large store fronts or retreat from it. Transparency can help activate a space while absence of transparency can make a space feel empty and unsafe.



The matrix in fig.20 synthesises ideas from Dovey (2015) and Kickert (2022) regarding different levels of permeability and transparency, together with my own reflections and observations. This resulted in four main levels of interaction between the spaces through permeability and transparency of the frontage.





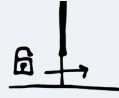



| | Permeability | Transparency |
|-------------|---|--|
| PUBLIC |  <p>Open access External audience can enter during open hours, often has automatic or large doors for easy access</p> |  <p>Full exposure Large opening with clear vision of the interior, often for functions which benefit from the public gaze</p> |
| SEMI-PUBLIC |  <p>Addressed access Some limitation in access. Open for certain groups such as workers, students, guests, and/or residents. Often accessed with code or card</p> |  <p>Visual exchange Openings which provide visual interaction while preserving some privacy for functions such as work places and schools</p> |
| PRIVATE |  <p>Restricted access Access is restricted and only a few are permitted to enter, such as residents to their home. Often restricted with a door key.</p> |  <p>Visibility no exposure Openings for daylight and visual relief while preserving its privacy, for functions such as residential and healthcare.</p> |
| BLANK |  <p>Impermeable Functions with an internal entry or door which is not used daily such as emergency exits and back doors.</p> |  <p>Enclosed No visual connection between inside and outside often function such as storage, waste room, parking and maintenance.</p> |

Fig. 20 Matrix of permeability and transparency measures

INTERFACE MAPPING - KVILLEBÄCKEN

Street typology & program

Two vacant spaces are identified, both situated on background streets. There is no other space assigned for public activity in their plot, but both have commercial activity across their street.

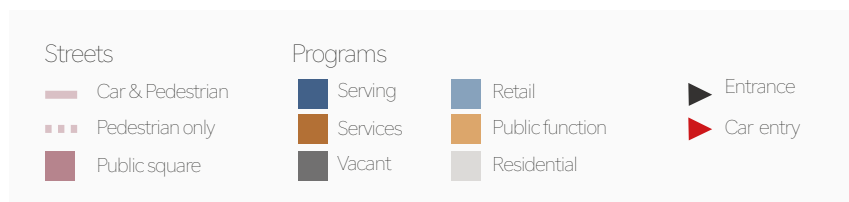
As the theory and spatial analysis indicated most active frontage is found along the Neighbourhood street.

A majority of the identified ground floor functions are different services, followed by serving.

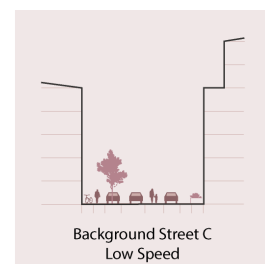
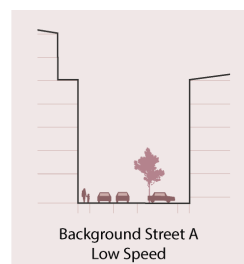
Streetscape

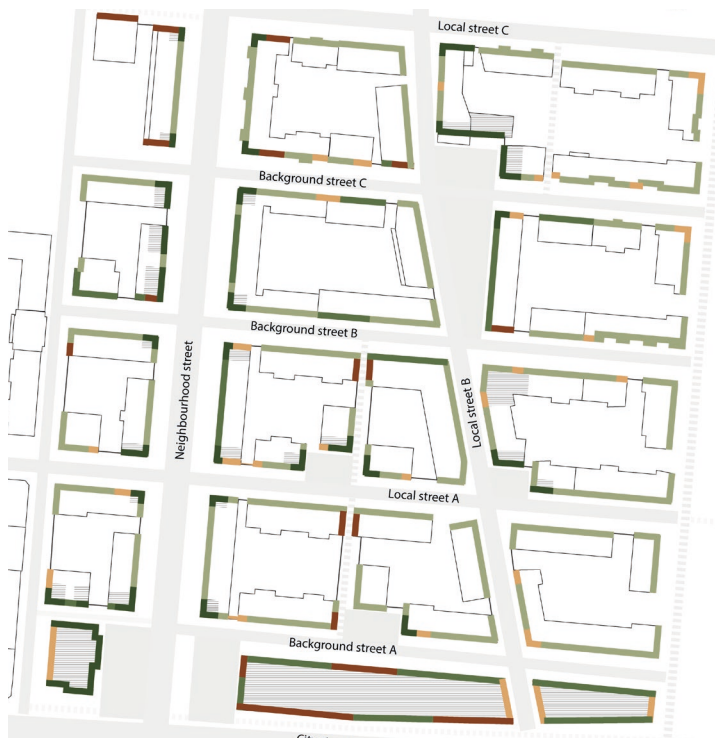
Every street has vehicular traffic which makes it feel more unsafe and effect the potential for liveliness of the street.

There is also an extensive number of street parking and garage entries along each frontage advocating that it is a space for cars rather than public life.



Street sections



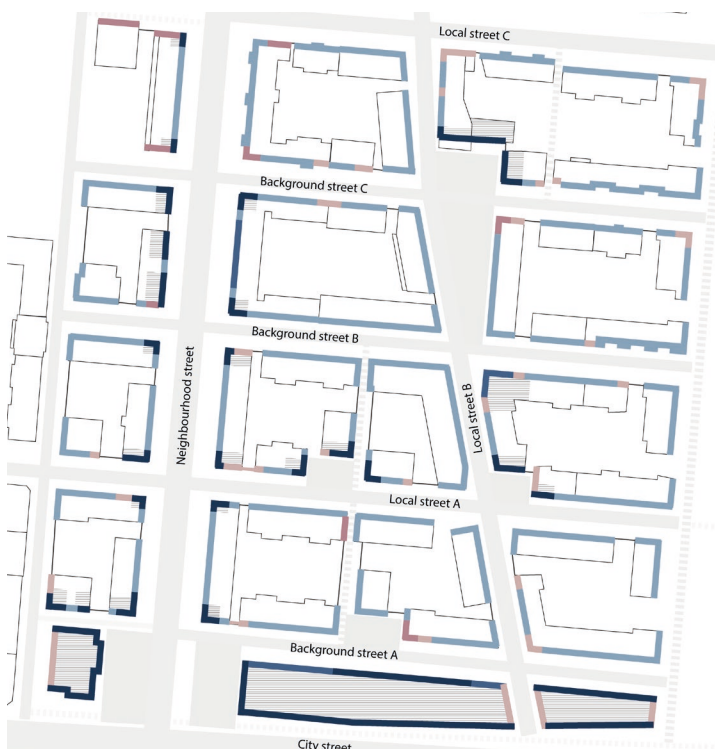


Transparency

Most frontages of public activity have full exposure regardless of the type of activity. This results in drapes or opacity to cover from the public gaze for functions which demand less transparency.

The public building, (in the south) has the most enclosed frontages and no full exposure. This creates a contradiction to the use and access of the space, making it feel uninviting and communicate a distrust to the public.

- Full exposure
- Visual exchange
- Visibility no exposure
- Enclosed - logistics
- Enclosed - Blank
- Public activity



Permeability

The most accessible and public functions are placed on corners and along the streets with high centrality.

Impermeable frontages are brief and mainly located along background streets.

- Open access
- Addressed access
- Restricted access
- Impermeable
- Vacant
- Public activity

INTERFACE MAPPING - BRÄMAREGÅRDEN

Street typology & Program

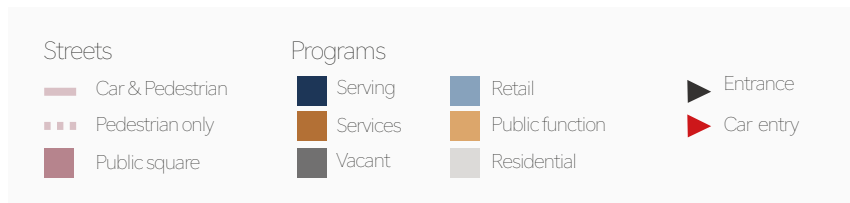
There is a clear clustering of activities on several places; along local street B&C, the square and the neighbourhood street. These are also the street with higher centrality.

The area has a diverse ground floor activity with mainly 'serving' followed by 'service'.

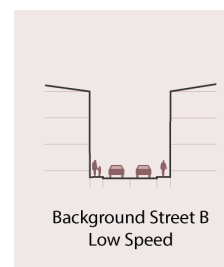
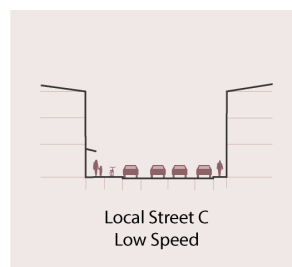
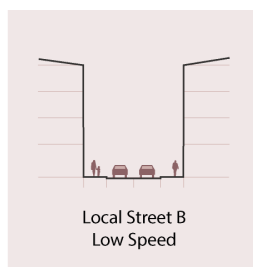
Several frontages where there is no public activity have only a few or no entrances, resulting in monotone and potentially more unsafe space.

Streetscape

Vehicular access is prioritised with the possibility of parking along every street. The pedestrian pavement is narrow (1.5 m) along most of the frontages except in the Northwest of the neighbourhood street and along the Local Street B.



Street sections





Transparency

Most enclosed frontages are found in connection to the retail, such as grocery and convenience stores where most enclosed frontages are found.

The public functions mainly have a visual exchange but no full exposure. When this occurs, it is often concealed behind drapes or blinds. None of the residential at ground floor are exposed. This is due to the building typology "landshövdingehus" in this area which provides an elevated base.

- Full exposure
- Visual exchange
- Visibility no exposure
- Enclosed - logistics
- Enclosed - Blank
- Public activity



Permeability / Access

The impermeable frontages are mainly located along background streets in connection to commercial functions. For example, the impermeable frontages north of the square are goods intake for the restaurants and retail facing the square.

Most accessible functions are placed along high centrality streets and on corners.

- Open access
- Addressed access
- Restricted access
- Impermeable
- Vacant
- Public activity

FRONTAGE DESIGN ANALYSIS - KVILLEBÄCKEN

Demand and Affordances



Local street
 Personal care services don't always benefit from large transparent frontages. Often, they are covered to remain privacy for customers during treatment, and the opening is used for branding instead of visual connection.



Local/Background Street
 Frontages are covered up when the location cannot afford commercial activity and is instead used as an home. There is then a contradiction between the frontage design and program demand.



Background street
 Private programs such as residential benefit from setbacks from the pedestrians, as a buffer zone/soft edge is created between private and public which can limit visual intrusion to the private home.

Frontage Attributes



Neighbourhood street - West side

This frontage is filled with variations. There are a large variety of materials defining both ground floor-area, public spaces and entrances. The entrances and public spaces are also defined with an extruded frame creating a inviting space in the frontage-zone. Residential on the ground-floor are elevated half a floor to avoid visual intrusion from the pedestrians passing by.



Neighbourhood street - East side

This frontage are quite monotone with subtle variations in the brickwork to resemble columns along the first two floors. Other than the size of the windows, there are nothing indicating invitation or activity, even though there are public spaces in parts of the ground-floor. The residential windows are in the same height as pedestrians walking right outside which can lead to visual intrusion of the private homes on the ground floor.

FRONTAGE DESIGN ANALYSIS - BRÄMAREGÅRDEN

Demand and Affordances



Background street
Policies sometimes demand certain transparency level for active frontages which might result in a contradiction between the program and design. Here for example we have a large opening into a ventilation system.



Local Street
Functions such as convenience- and grocery stores don't need transparency for activity, but rather visibility through signs and location



Local street
A disadvantage of elevated residential function is the possible large monotonous frontages due to the lack of visual interaction you'll otherwise get from a frontage with functions at eye level.

Frontage Attributes



Neighbourhood street - West side

This frontage have a clear design for activity. The frontage zone is covered by a roof with signs on for the public activities. The entrances are setback and there is a differentiation in the ground material between in the frontage zone. There are only public activities in the ground-floor with large window, but still room for facade details.



Neighbourhood street - East side

This frontage is quite monotone overall but have a variation in colour between the ground-floor and the other floors. There are a subtle setback for the entrances, and the majority of the ground-floor are housed by public activities.

CONCLUSION REFERENCE ANALYSIS

The main take away from the theory and analysis is that the main influence for lively ground floors through are the potential for movement and the frontage design.

The potential for movement can be measured by identifying the centrality and density of the site. This is what feeds and distributes the potential pedestrians.

This value then informs on what type of ground floor use the site and street affords, which in turn puts a demand on the frontage design this type of use has.

Here we use two properties, transparency and permeability, which indicate the level of publicness and activity the potential program can offer to the public realm.

Not all public activity improves the liveability of a street by extensive transparency, as a fully transparent frontage put such high demand for visual interactivity from the inside program itself to the public realm.

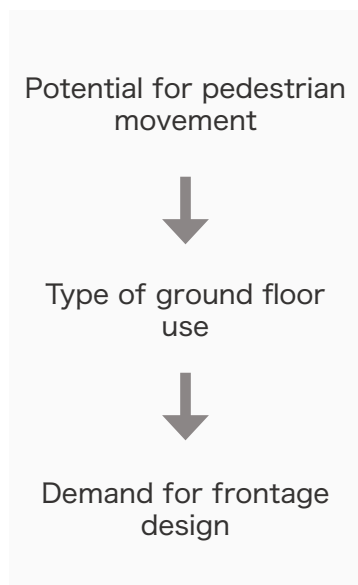
Programs with fully transparent facades need to offer something to the street; cafés have the seated public and stores has its merchandise. When a program doesn't have the potential for, or demand transparency, the store fronts are instead left behind or covered.

A majority of the ground floors is occupied by the most private space, the home. The analysis shows that this sharp encounter between private and public can be designed in many ways leading to either lively, inspiring and safe spaces or the complete opposite.

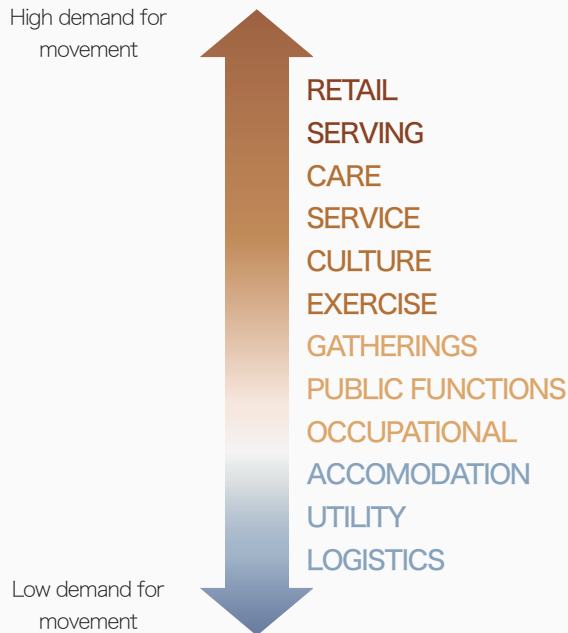
When both transparency and permeability are low as it is for residential use or technical spaces, there is a need for innovative solutions such as interactive frontages, where the frontage itself engages and makes an impact by stimulating our senses and interest. It can be both active and passive.

There are several other factors affecting the activity of ground floors, but for the tool kit the measurements of centrality, density, transparency and permeability will be the main guidelines.

“Only the right street-level inhabitant with the right mindset will bring a transparent, permeable space to life” - C. Kickert

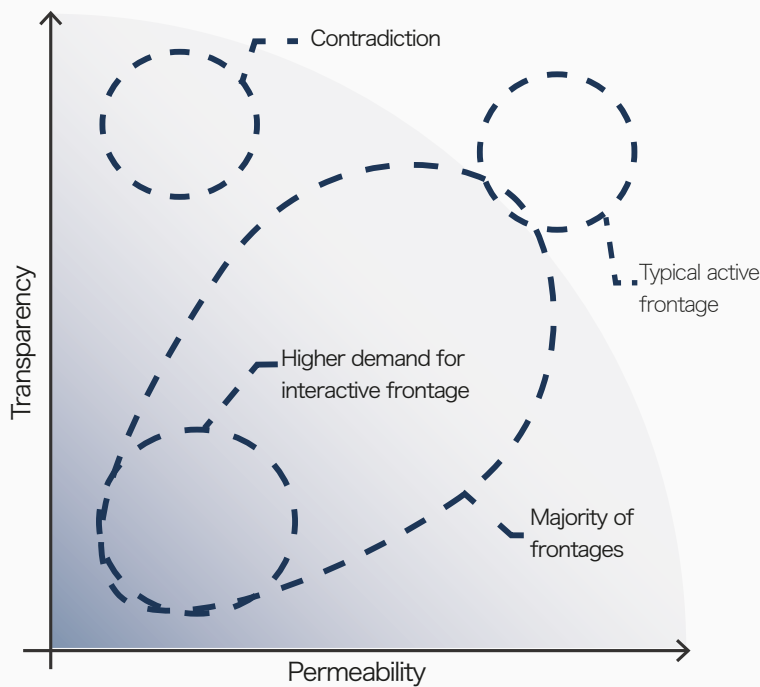


Program demand for movement



As a commercial function depend on its customers to survive, it demands more movement whereas accomodation doesn't demand movement but rather benefits from less movement to avoid public gaze.

Program demand on frontage

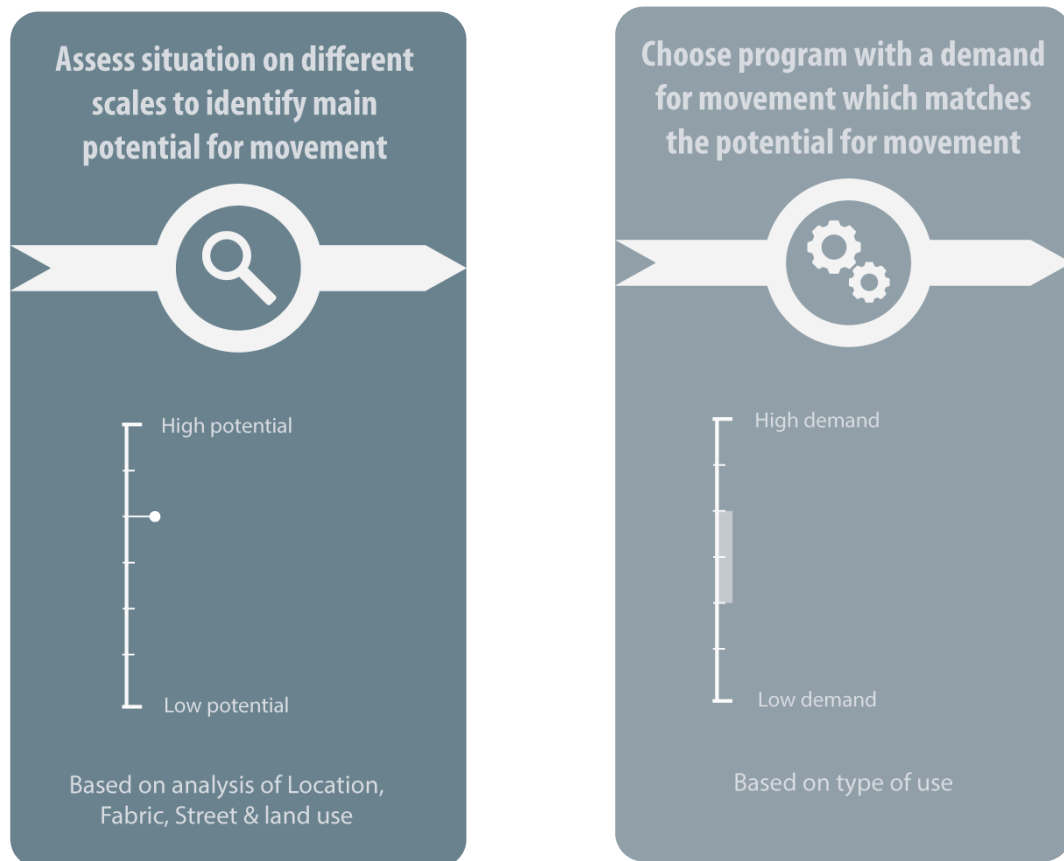


Spaces with low permeability such as a home do not afford high transparency, it becomes a contradiction when something private is fully exposed. The transparency is then often covered by the user to fit their need.

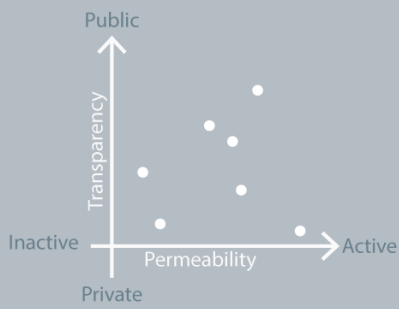
The Tool-kit

Based on spatial assessments such as location and context, the tool-kit can give guidance on the program of the ground floor and design of the frontage zone.

Below is a summary of the tool-kit, followed by a detailed description of how to use it following the four steps.



**Identify the demands for
frontage design based on
selected program**



Based on type of use

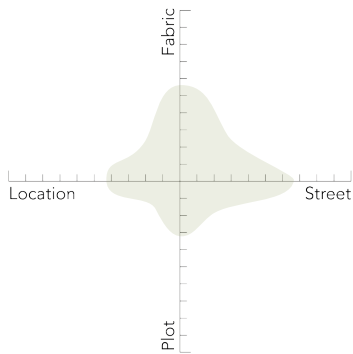
**Enrich frontage design with
strategies to increase interactivity
based on frontage demand**



Based on frontage demand



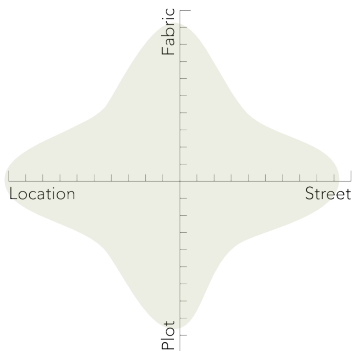
EX. Sannegårdskajen
Assessment



Mean value



EX. Kungsgatan
Assessment



Mean value



Assess and summarize

The aim with the first step of the toolkit is to get to know the site and its relation to the rest of the urban structures as well as identify structures within the project site by analysing the site through the four categories of location, fabric, street and plot. The assessment will support an estimation of the potential for movement for the neighbourhood in general, but also for a specific frontage.

To simplify the estimation, every category can be given a value from one to ten. We can then visualize these values together as a star to then summarize a mean value for the specific site which will indicate the potential for movement.

In fig 21 are some guiding marks for the assessment as each category has one main factor which indicate the potential for movement, these are based on findings from theory and the reference analysis. There are other factors to consider which might affect the potential for movement, examples of these other factors are presented together with the main factor in the next page.

Fig. 21 Guiding marks within each category





Guiding questions for each category



Location

Main factor:

What level of global integration does the site have to the rest of the network? (AI 5k)

Other factors to consider:

What is the reach to attractors such as shopping, recreation & public functions?



Fabric

Main factor:

What is the level of accessible FSI for the site?

Other factors to consider:

What is the general building typology of the site? Perimeter, tower or lamella block?

What are the expected user groups of this area?



Street

Main factor:

What is the typology of the street bordering the frontage in relation to global and local centrality?

Other factors to consider:

What dimensions and lanes does the streetscape have?

What is the speed of the street?

Are there any environmental qualities bordering such as a park, water or good sun exposure?

Does it function more as a destination or thoroughfare?



Plot

Main factor:

What is the main land use of the plot?

Other factors to consider:

How prominent are the frontages? (GSI)

What are the dimensions of the building?

What is the land division?



Guiding questions

- Which programs already exist in the area?
- Are there any function missing in the area?
- Does the area have an identity or user group which promote a certain type of program?

The programs

In the theory it was argued that ground floor activities demand different amount of movement, such as retail which is often dependent on foot traffic to survive while public functions are more stable. The functions demand for movement in this illustration is based on research, theory and personal observations.

The functions are based on the Statistical Classification of Products by Activity (CPA) and the order of the functions' are structured between the sub-categories based on their general demand for movement. The sub-categories are classified on **main function** and **frequency/usage** pattern. Occupational are functions which are necessary rather than optional for example offices, accommodation and education.

Each subcategory has some **examples**, which are not ordered after demand for movement. These examples simply work as reference for an easy identification and navigation of some possible potential programs.

The "other" category are complementary functions often found on ground floors in relation to another function such as parking for residential or entrance lobby for an office complex, and does not in itself demand movement.

To choose potential program

From the assessment of the site one will have a value between one to ten, this value estimates the potential for movement and can thereby give an indication for which program matches that potential. The value can point to the range of potential programs. If for instance, it is four then it likely has the potential to host services, but also all the activities with lower demand for movement.

Retail does not need the maximum value for potential movement as that would mean that only city centres would afford it. Based on the test assessment on various locations in Gothenburg one can argue that the value should at least be above five to afford retail, above four to afford services and three for leisure activities.

Every new area will demand some specific programs such as grocery store and restaurant, and if a program is already decided for an area, hopefully this graph can assist in the decision on where to place it based on its demand for movement.

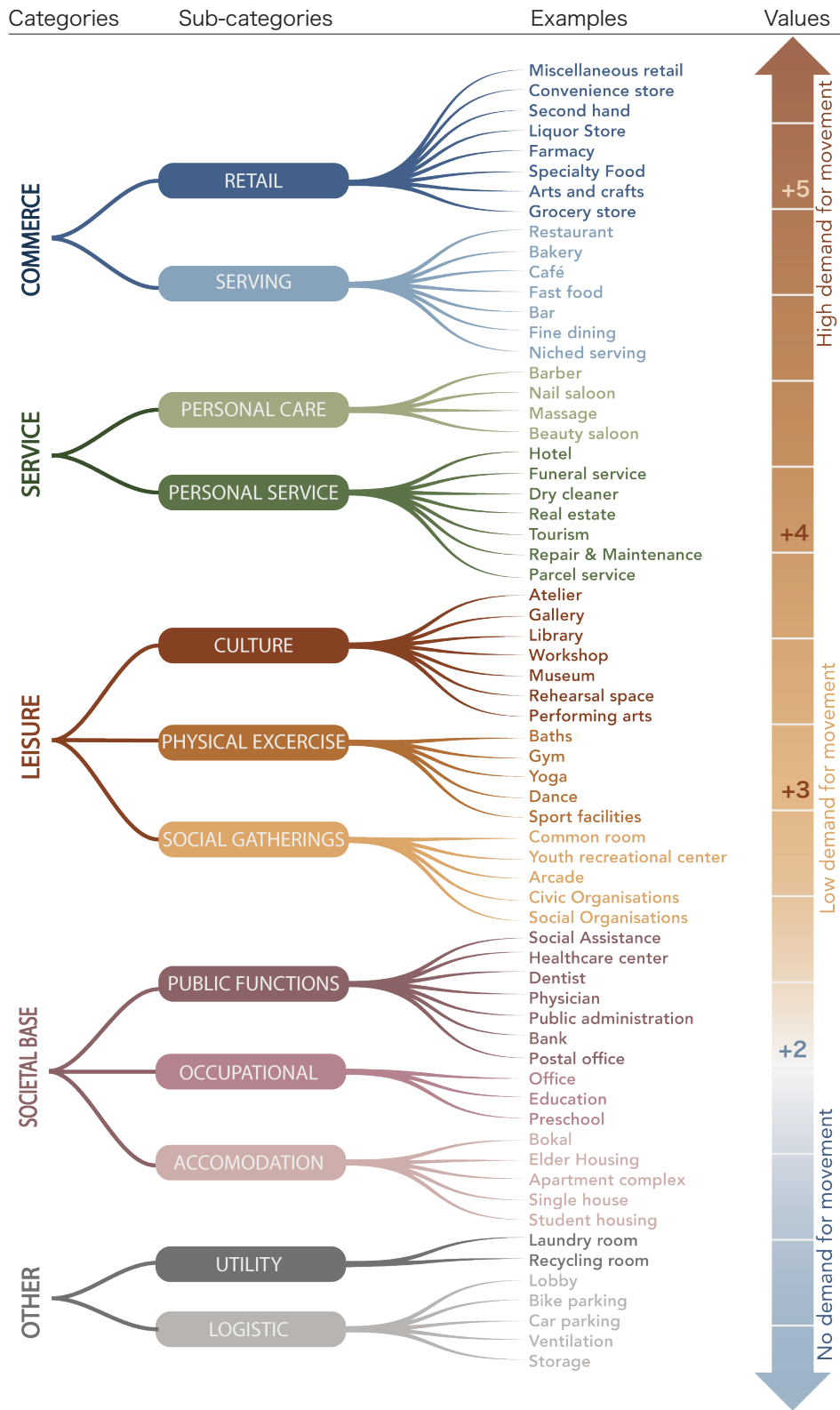


Fig. 22 Examples of programs and their estimated demand for movement



Fig. 23 Examples of programs and frontage demand

| Category | Example program | Permeability | Transparency |
|-----------------------|---------------------------|--------------|--------------|
| RETAIL | Miscellaneous retail | High | High |
| | Convenience store | High | High |
| | Second hand | High | High |
| | Liquor Store | High | High |
| | Farmacy | High | High |
| | Specialty Food | High | High |
| | Arts and crafts | High | High |
| SERVING | Grocery store | High | High |
| | Restaurant | High | High |
| | Bakery | High | High |
| | Café | High | High |
| | Fast food | High | High |
| | Bar | High | High |
| | Fine dining | High | High |
| PERSONAL CARE | Niched serving | High | High |
| | Barber | Medium | Medium |
| | Nail saloon | Medium | Medium |
| | Massage | Medium | Medium |
| PERSONAL SERVICE | Beauty saloon | Medium | Medium |
| | Hotel | Medium | Medium |
| | Funeral service | Medium | Medium |
| | Dry cleaner | Medium | Medium |
| | Real estate | Medium | Medium |
| | Tourism | Medium | Medium |
| | Repair & Maintenance | Medium | Medium |
| CULTURE | Parcel service | Medium | Medium |
| | Atelier | Medium | Medium |
| | Gallery | Medium | Medium |
| | Library | Medium | Medium |
| | Workshop | Medium | Medium |
| | Museum | Medium | Medium |
| | Rehearsal space | Medium | Medium |
| PHYSICAL EXERCISE | Performing arts | Medium | Medium |
| | Baths | Medium | Medium |
| | Gym | Medium | Medium |
| | Yoga | Medium | Medium |
| SOCIAL GATHERINGS | Dance | Medium | Medium |
| | Sport facilities | Medium | Medium |
| | Common room | Medium | Medium |
| | Youth recreational center | Medium | Medium |
| PUBLIC FUNCTIONS | Arcade | Medium | Medium |
| | Civic Organisations | Medium | Medium |
| | Social Organisations | Medium | Medium |
| | Social Assistance | Medium | Medium |
| | Healthcare center | Medium | Medium |
| OCCUPATIONAL | Dentist | Medium | Medium |
| | Physician | Medium | Medium |
| | Public administration | Medium | Medium |
| UTILITY ACCOMMODATION | Bank | Medium | Medium |
| | Postal office | Medium | Medium |
| | Office | Medium | Medium |
| | Education | Medium | Medium |
| LOGISTIC | Preschool | Medium | Medium |
| | Bokal | Medium | Medium |
| | Elder Housing | Medium | Medium |
| | Apartment complex | Medium | Medium |
| | Single house | Medium | Medium |
| | Student housing | Medium | Medium |
| | Laundry room | Low | Low |
| | Recycling room | Low | Low |
| | Lobby | Low | Low |
| | Bike parking | Low | Low |
| | Car parking | Low | Low |
| | Ventilation | Low | Low |
| | Storage | Low | Low |

Program demand & potential

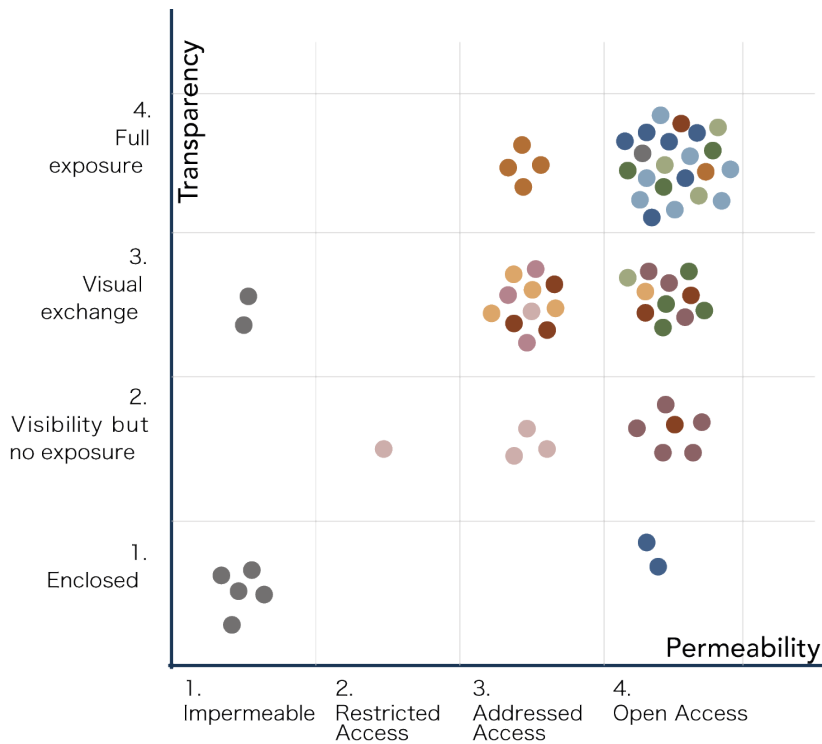
There are several variables to consider when choosing a program, for example its frequency, the reach, purpose and user group. What will affect the street level the most according to research is the demand and potential for transparency and permeability. These are the basics demand of a frontage design and decides the level of interaction between outside and inside, and thereby the basic contribution for interactivity.

In fig.23 the examples of programs mentioned earlier are listed. The values for transparency and permeability are an estimation based on personal observations and theory and reflects the potential and demand for each program.

- Guiding questions
- What is the required level of transparency and permeability based on the type of program?
- What is the appropriate combination of transparency and permeability?
- What is the level and type of interaction between inside and outside (i.e. ground floor use and street space) needed?



Fig. 24 The relation between permeability and transparency based on program demand in fig. 23

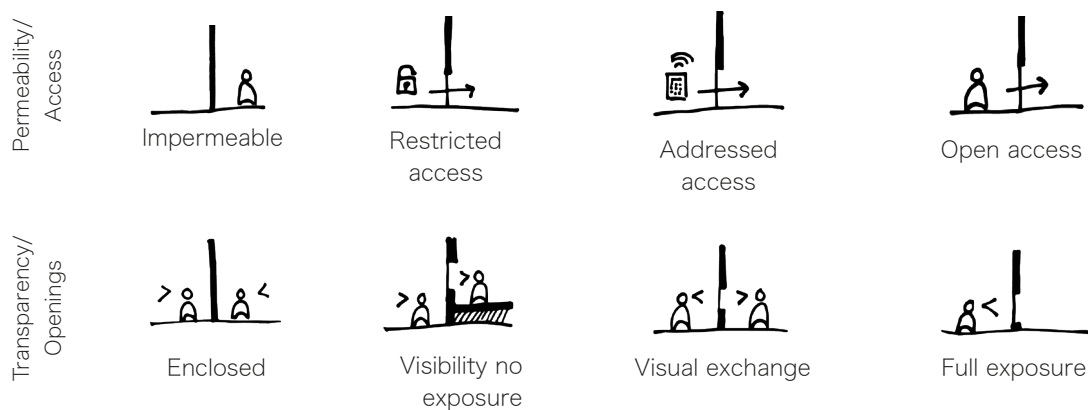


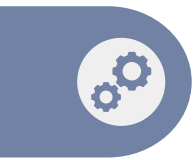
Transparency & Permeability

Within every sub-category there are some variation of demand for transparency and permeability. A museum demands less transparency than a gallery even though they are both cultural activities, and while a miscellaneous retail demands transparency for exposure of wares, supermarkets often cover all openings due to shelves and advertisement. But as the diagram illustrates, they do approximately fall in the same ranges as clusters.

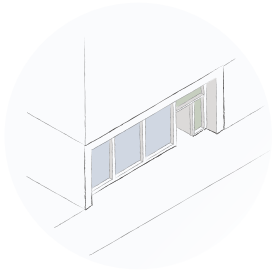
- Retail
- Personal care
- Culture
- Public functions
- Utility
- Serving
- Personal service
- Physical exercise
- Daily occupation
- Logistics
- Social gatherings
- Accommodation

Frontage demand



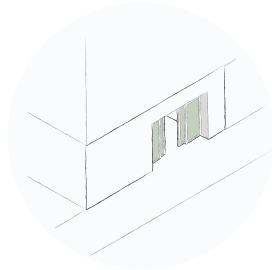


Examples of combination with permeability and transparency



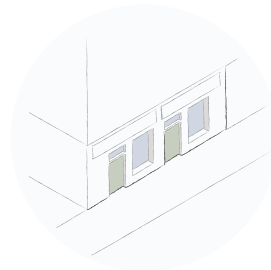
Restaurant

- Open access
- Full exposure



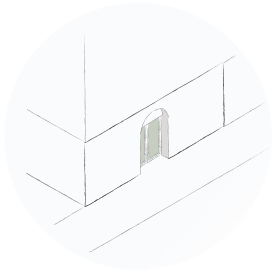
Supermarket

- Open access
- Enclosed



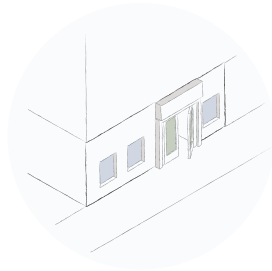
Hairdresser

- Open access
- Full exposure



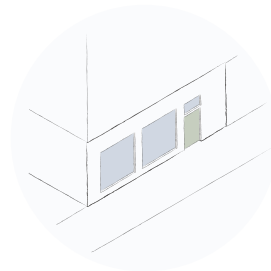
Museum

- Open access
- Enclosed



Education

- Addressed access
- Visual connection



Wellness

- Addressed access
- Full exposure



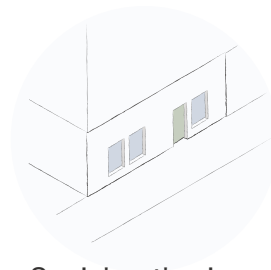
Apartment building

- Addressed access
- Visibility but no exposure



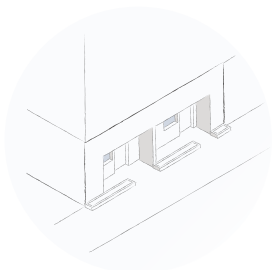
Healthcare centre

- Addressed access
- Visibility but no exposure



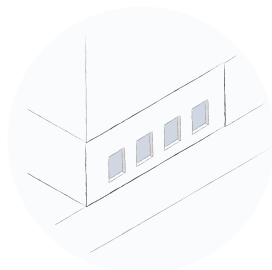
Social gatherings

- Addressed access
- Visual connection



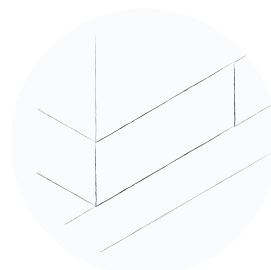
Ground floor dwelling

- Restricted access
- Visibility but no exposure



Laundry

- Impermeable
- Visual connection



Parking

- Impermeable
- Enclosed

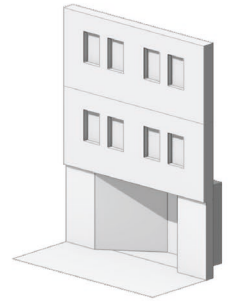
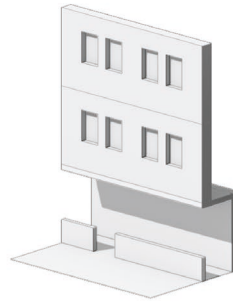
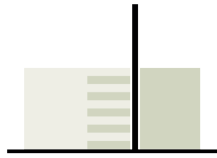


Examples of design strategies

Soft edge

Strategies such as frontyard, setbacks and buffer zones.

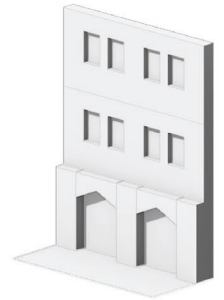
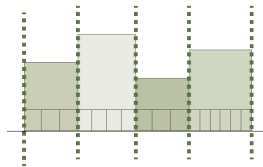
The example of combinations are with physical affordances



Rhythm

Strategies such as niches, columns and arcades.

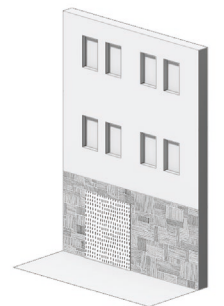
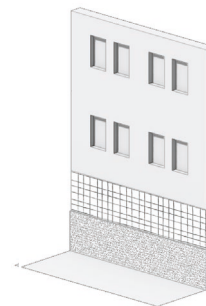
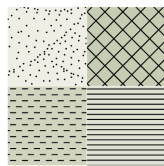
The example of combinations are with soft edges



Diversity

Strategies such as variation in color, material and detailing.

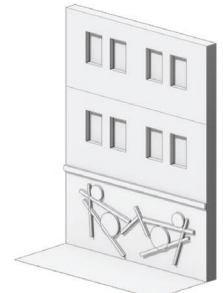
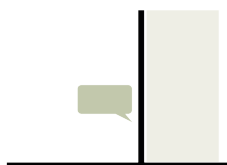
The example of combinations are with rhythm

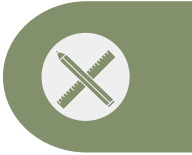


Physical affordances

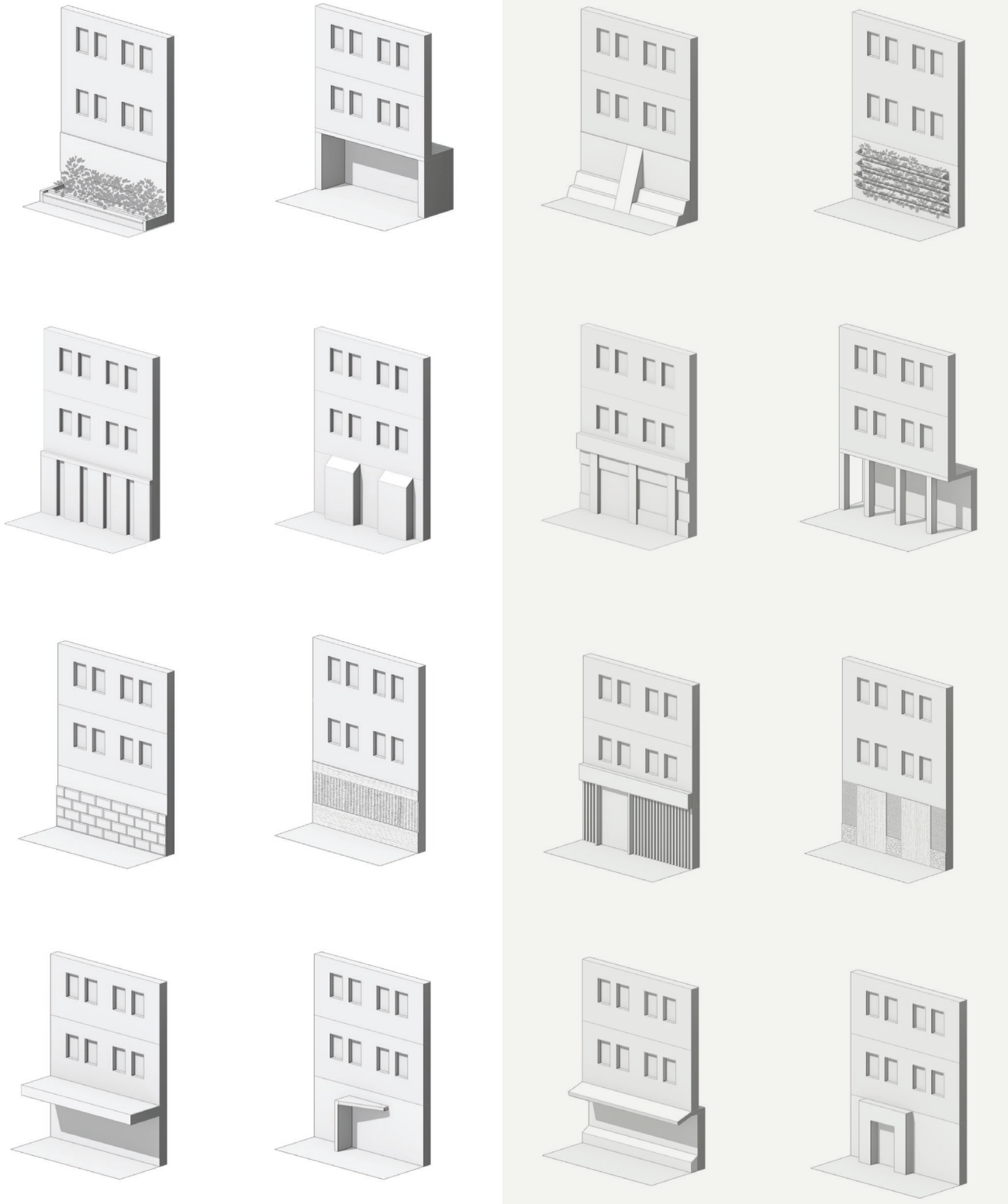
Strategies such as shelter, seating, art and lighting.

The examples of combinations are with diversity





Combinations



Design Project

INTRODUCTION

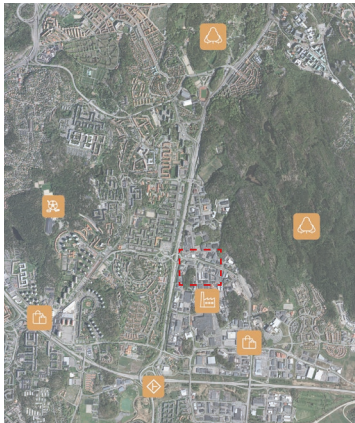


Fig. 24. Orthophoto of area with marked out key attractors and areas. © Lantmäteriet

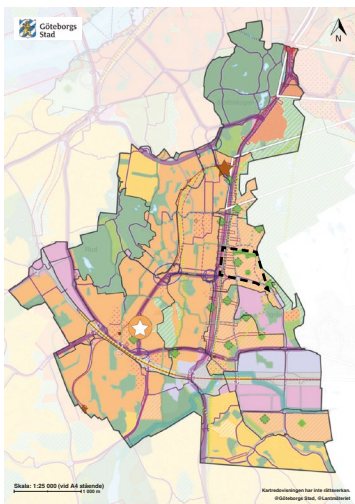


Fig. 25 Masterplan for larger area, site marked out in black. Göteborg stad, 2022.

Södra Änggården

In order to test and evaluate the tool-kit further it will be used for a design study on the site Södra Änggården. Södra Änggården is a planned neighbourhood which will be built during the next couple of years. It is located 5km south of Gothenburg city centre and will house around 2000 new inhabitants.

According to the detailplan, this new neighbourhood will contain apartments of different sizes and townhouses. Social functions such as kindergartens and housing for elderly are planned as well. The expected user groups of the area can thereby be both families, elderly, single parents, young adults and couples.

The neighbourhood is a part of a larger urban development and conversion area where previous industrial and bulky retail will be replaced with a dense mix-use neighbourhood with mainly residential use. The larger area will include 8 000 – 11 000 new inhabitants and will be placed along the highly trafficked street Dag Hammarskjöldsleden which likely will be transformed into a boulevard with tram and potentially train. (Göteborgs stad 2022)

The site is located on a rather isolated area bordering a heavily trafficked road to the west, industrial area to the south and a nature reserve east and north. This might encourage car use for the inhabitants in a larger extend than is desired from the city.

'Active frontages' is a requirement from the planning office to achieve a lively ground floor and will exist in almost every block of the neighbourhood with a coverage of 22% of the footprint area of all built in the plan, and 63% of the footprint area along the main street. As a reference in the detail plan they compare it to Linnéstaden which has 36% active frontages, Gamlestaden at 9% and Sannegården/Lindholmen 5%. (Göteborg 2022) The frontages are intended to be activated by transparency, commerce and public functions such as school and preschools.

In the detail plan it is already noted that the requirement for the total of 'active frontages' is above what is viable according to a commerce analysis of the site. The construction time until the whole area is completed is also mentioned as a challenge to activate the frontages as intended.

Why this site?

The plan's overambitious placement of a large share of 'active frontages', as is typical for many detailed plans today. The plan's requirements for the frontages depend a lot on the completion of other surrounding developments since there is close to nothing at the site or surrounding today.

The site is current as the detail plan got approved a year ago and construction will begin later this year (2023).

The site is part of a larger urban development and needs to be resilient for a long period of construction until the site and surrounding reaches the conditions it is designed for.

The site location is isolated and bordering a highway, industry and nature reserve. An isolated location has shown earlier in this thesis to restrain the possibility to integrate and connect the area to the larger network and thereby reduces the possibility for high movement flows and for active frontages.

Södra Änggården is planned for the same number of inhabitants as Kvillebäcken, which was part of the reference analysis earlier in this thesis. Despite Kvillebäcken's semi-central location and requirement for 'active frontages', it did not succeed and is today often referred to as a failure. (GP, 2016. Arkitekten, 2019.) Södra Änggården has similar requirements and location.

The site has a lot of challenges to be able to achieve the 'active frontages' it aims to have and is therefore a good example for when the tool-kit is meant to come in handy. The aim is that the tool-kit can help design the ground floors in relation to their location and to hopefully broaden the activity of the ground floors beyond commerce.

The plan's focus on commerce and public functions to activate ground floors could be diversified with the concept of interactive frontages.

The Tool-kit

In the following pages this site will be analysed according to the tool-kit to then suggest potential program and design for the frontages of one block with help of the tool-kit.



Fig. 26 Orthophoto of area, 2009. © Lantmäteriet

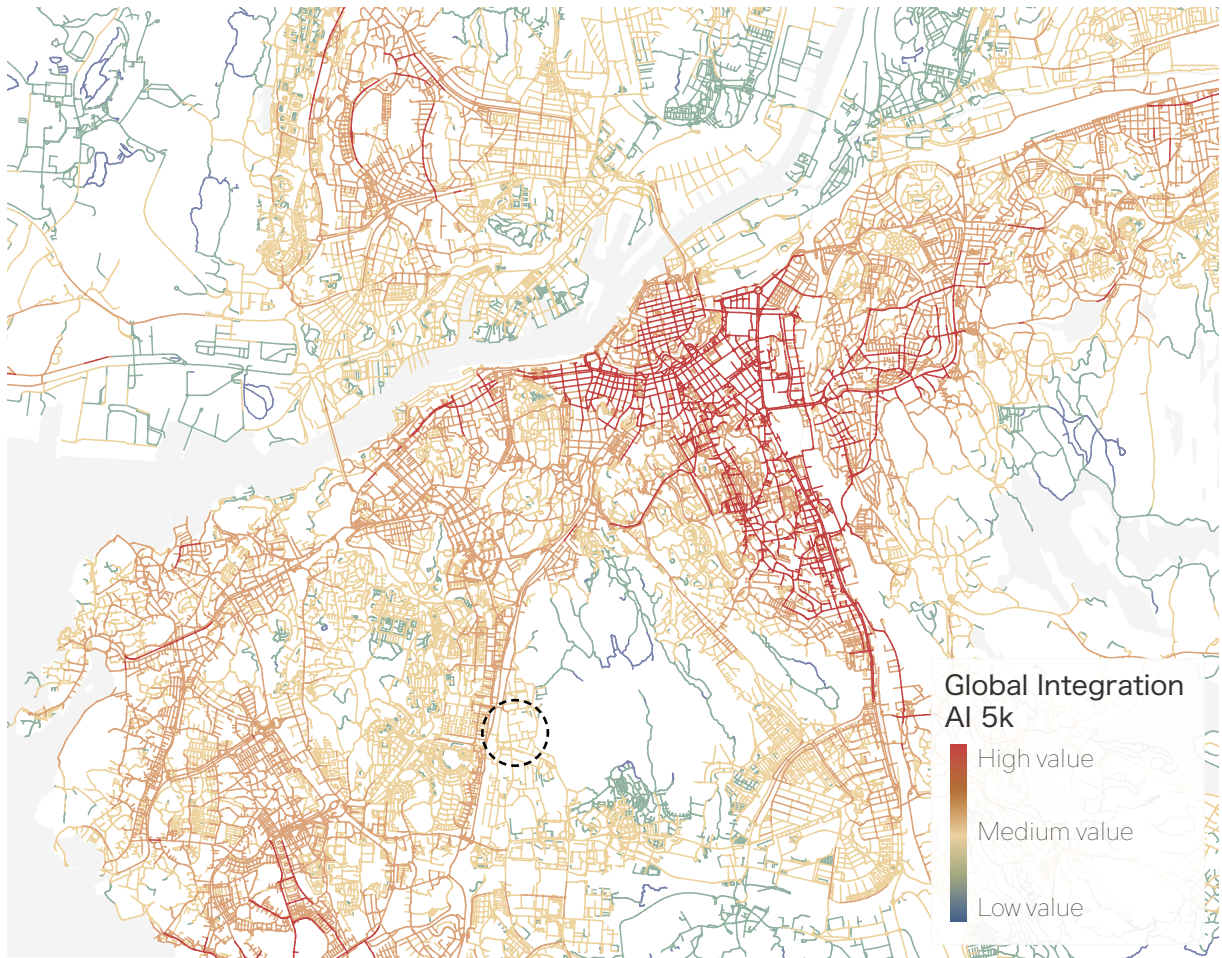


Fig. 27 Illustration of new development. Göteborg stad, 2019.



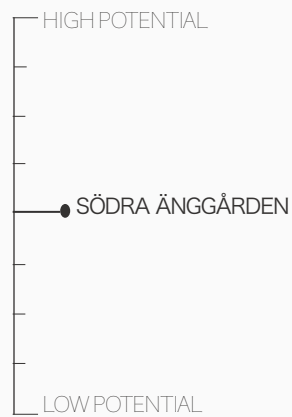
STEP 1 - ASSESS SITUATION & POTENTIAL FOR MOVEMENT

Location



A zoom in on the marked out area of Södra änggården.

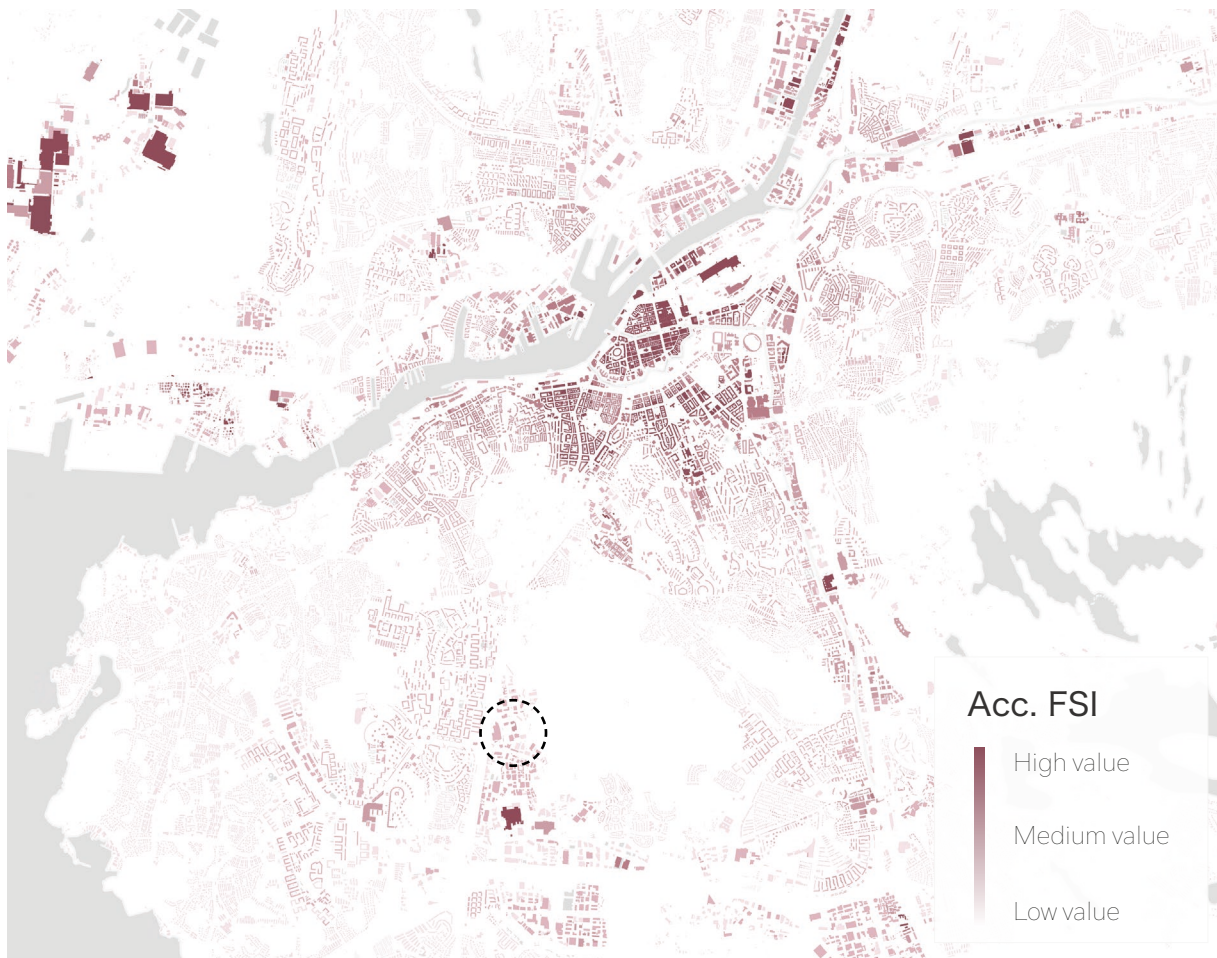
Potential for movement based on location



The site has a medium integration in relation to the city and is located semi-central.

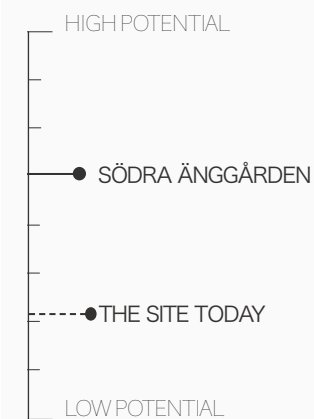
Even though the larger development potentially will increase the integration of the area- we can observe that the site has an edge condition, bordering a nature reserve which will restrain further integration.

Fabric



A zoom in on the marked out area of Södra änggården.

Potential for movement based on density



The value of the site today will change when the larger development and densification of mix-use neighbourhoods housing 11 000 new residents south and west of the site is finished.

The value is therefore an estimation based on the information provided in the detail plan and with Kvillebäcken as a reference for the neighbourhood's density which has similar building typology.

Street



Legend

Global centrality - AB 5k

- Low
- Medium low
- Medium
- Medium high
- High

Local Centrality - AI 2k

- Low
- Medium low
- Medium
- Medium high
- High

Acc. public transport - AD

- 0 - 50m
- 50 - 200m
- 200 - 400m
- 400 - 1000m

The site is one of the first to be constructed within the larger development. Besides the development of 11 000 new residents a new boulevard connecting the areas are currently being developed and will potentially be constructed in the next decade. The local spatial analysis of Södra Änggården has therefore been done on two possible scenarios, with (scenario 2) and without (scenario 1) the boulevard.

We can however identify a strong horizontal (east-west) connector south of the area in both scenarios. The vertical street on the west side of the area is a strong connector today, but its centrality will potentially decrease with the boulevard. This street also hosts the public transport today in scenario one, which research has shown is a good asset for potential activity at street level. The public transport would however move to the boulevard in scenario two.

With Änggårdsbergen to the east there are limited potential for further integration there, the site will always have an edge condition. This indicates that the horizontal street within the site will probably never connect to another area. This street will thereby mostly contain to-movement rather than through-movement, and it will likely only consist of people living in the area.

Plot structure & Street typology



Streets

- Car & Pedestrian
- Pedestrian only
- Public square
- Plot outline

Use Groundfloor

- Commerce
- Education
- Sport facility
- Non-residential
- Residential
- Parking garage

The street segments within the area can be categorised in relation to their centrality and potential for movement based on the information provided by the spatial analysis.

The plots sizes are generous as they include a whole perimeter-block each. This implies that the variation of the frontages within the block is up to the architect.

The new area consists of mainly residential occupation with an office complex in the west, a parking garage in the north west and a school with sport facilities to the east. The suggested placement for 'active frontages' are in accordance with the analysis results, meaning that they are places on the more central streets. However, the suggestion for commercial activity in all of these spaces does not line up with the estimation of potential for movement it affords.

Summary assessment

The design study will focus on three situations within a block at Södra Änggården. This block is situated next to the parking garage in the north west of the area.

All streets surrounding the building host vehicular traffic and street parking, but the speed of the streets varies between them, where the local street, situation 1, has the highest speed which is still low. The only factor separating these three situations is the street value, as they have the same location, fabric and plot. The mean value is thereby somewhat similar, but still proposes different potential of functions.

We can once again identify that the suggested location for retail in situation 1& 2 does not reach the demand of potential for movement. A program with a lower demand for pedestrian movement should be considered.



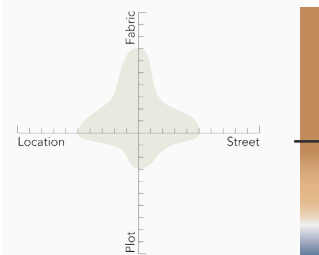
Siteplan of assessed block with mentioned situations

Streetscapes surrounding building

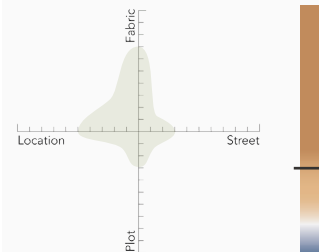


Potential for movement

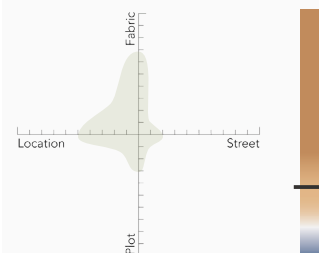
1. On Local street B



2. Corner of background street B



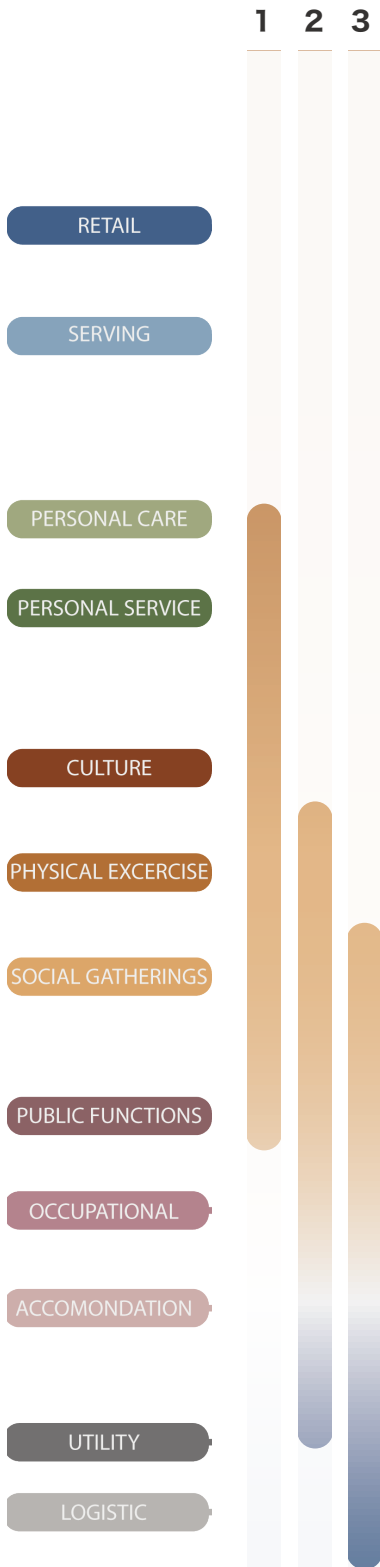
3. On background street C





STEP 2 - CHOOSE PROGRAM WHICH MATCHES POTENTIAL FOR MOVEMENT

Mean values and potential functions



Situation one - On local street B

This situation has the higher potential for movement out of the three, but is still relative low. According to the detail plan, this ground floor will be occupied with retail which the situation according to the tool-kit assessment, does not afford. According to the tool-kit, this situation reaches the potential for service functions but could also be occupied by leisure activities and public functions. For this design project it will be occupied by personal service such as a hairdresser, maintenance or masseuse.

Situation two - Corner of background street B

This situation has a low potential for movement as it is on a background street. The situation however is located relatively close to the public transport and a junction of important connectors, which increase the integration value of the street. It is also a pedestrian street making it more attractive for walking. The detail plan suggests retail for this situation, but according to the tool-kit this situation reach the potential for leisure functions and accommodation. For this design project It will have a hybrid occupation of production of culture such as an atelier and apartments.

Situation three - On background street C

This situation has the lowest potential for movement out of the three. It is situated on a background street with vehicular traffic and street parking. The situation is not proposed to have a public ground floor according to the detail plan. Even though the tool-kit suggest a reach to the potential of social gatherings, for this design proposal the situation will be consisting of accommodation to evaluate the tool-kit guidance on ground floors with only residential use.



STEP 3 - IDENTIFY FRONTAGE DEMAND BASED ON PROGRAM

Situation 1 - Services & leisure



Frontage demand

Services & leisure



Permeability
- Public access



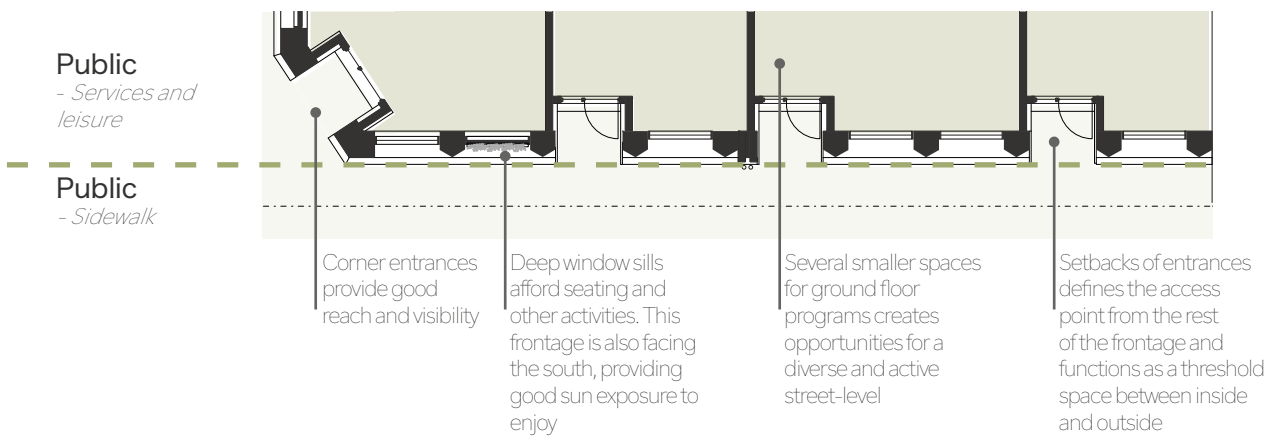
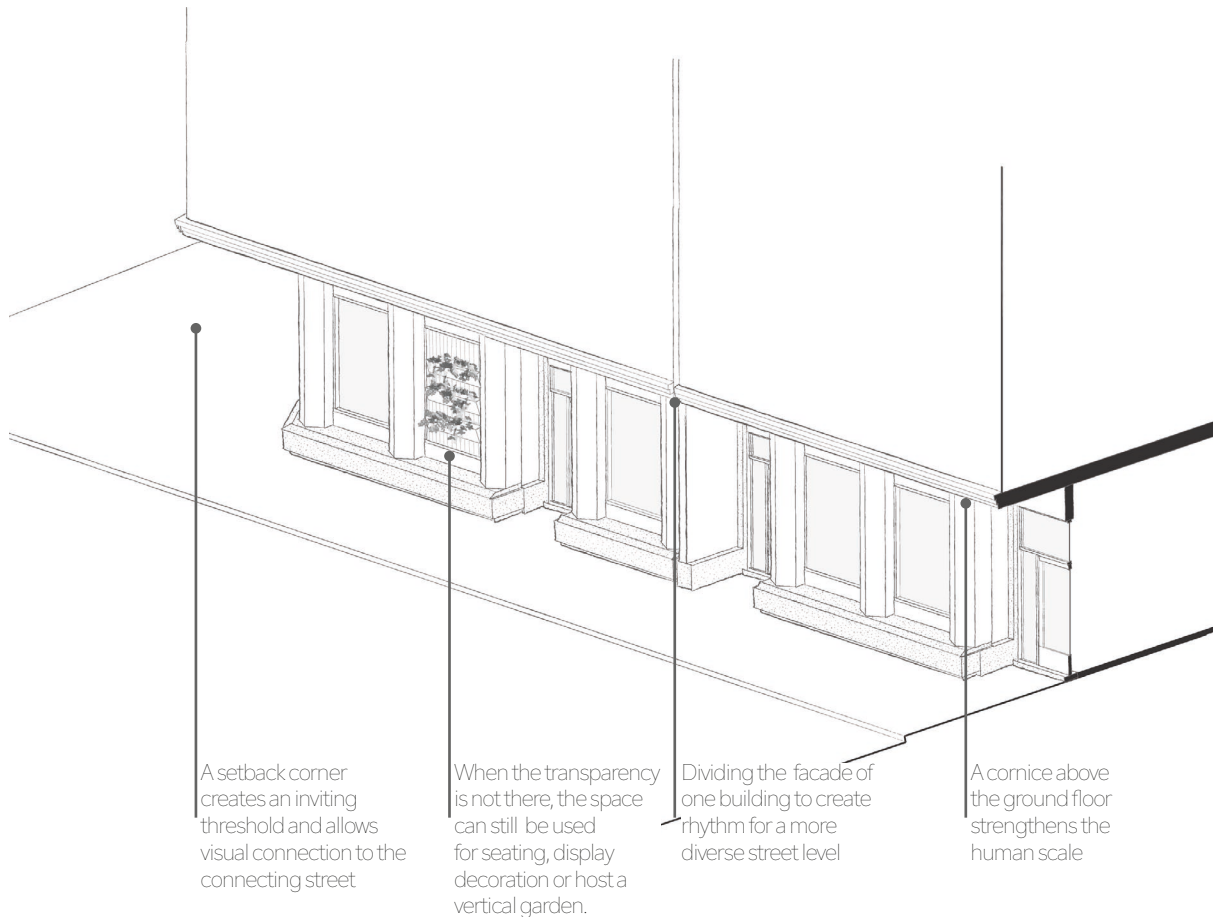
Transparency
- Visual exchange

Flexibility to afford enclosure and exposure

The frontage demand for services and leisure can vary a lot. Even though both have public access, a hairdresser need full exposure for marketing while a masseuse demand privacy for the customers comfort. The frontage therefore need to be flexible and designed to afford both **exposure** and **enclosure**. For this example, the frontage provides unconventional attributes such as shelter and seating spaces.



STEP 4 - ENRICH FOR AN INTERACTIVE FRONTAGE WITH DESIGN STRATEGIES





STEP 3 - IDENTIFY FRONTAGE DEMAND BASED ON PROGRAM

Situation 2 - Hybrid use



Frontage demand

Residential and an atelier



Permeability
- Addressed access



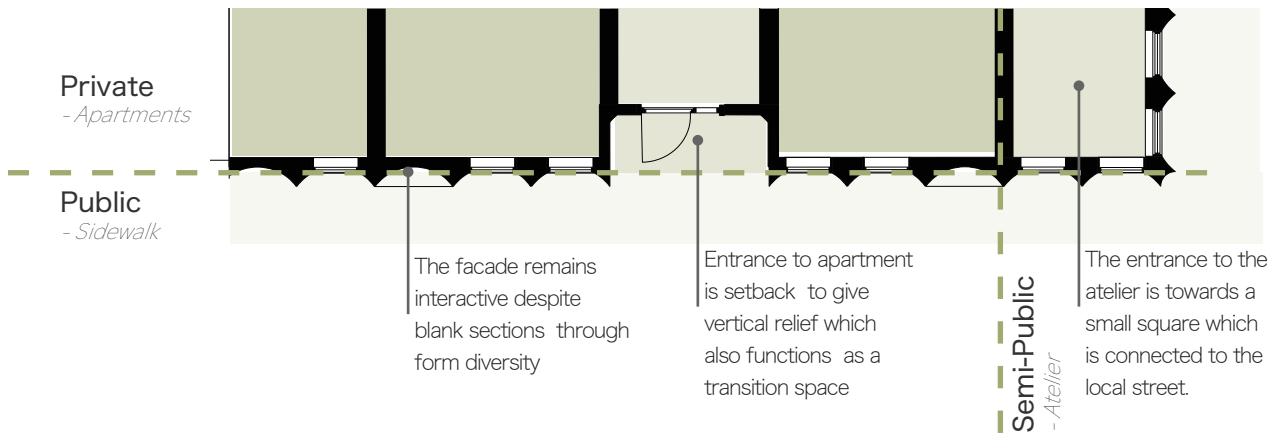
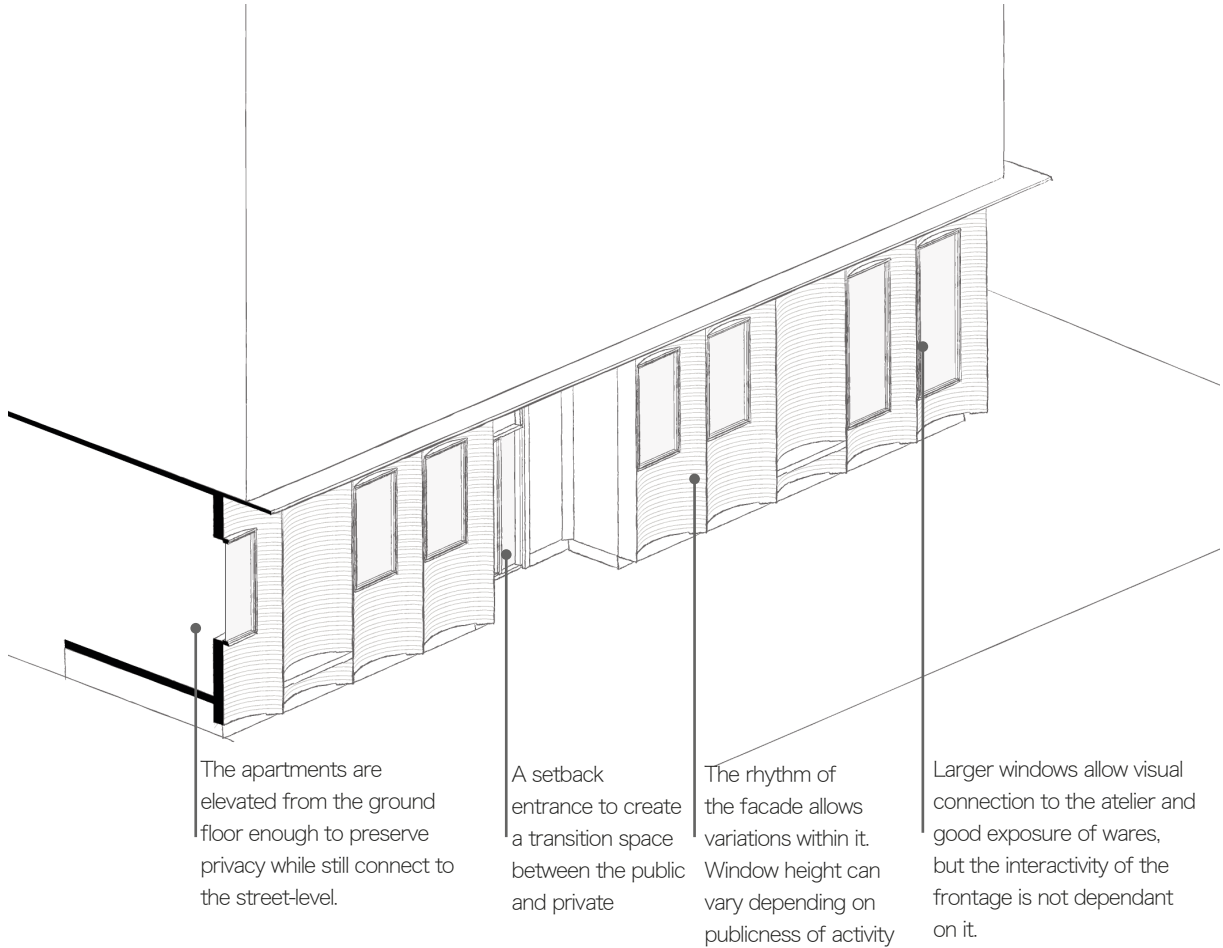
Transparency
- Visual connection
& no exposure

A hybrid and adaptable ground floor

Sometimes the ground floor is occupied with both public and private functions. The frontage must then be able to adapt to their different demands. In this example, the residential functions are elevated to achieve the demand for transparency without exposure. The corner towards the local street host an atelier at ground level. The atelier is a function which demands addressed access but allows full transparency for exposure of wares. The frontage design thereby allows both larger and smaller window sizes.



STEP 4 - ENRICH FOR AN INTERACTIVE FRONTAGE WITH DESIGN STRATEGIES





STEP 3 - IDENTIFY FRONTAGE DEMAND BASED ON PROGRAM

Situation 3 - Residential use



Frontage demand

Residential with private entrances



Permeability
- Restricted access



Transparency
- No exposure

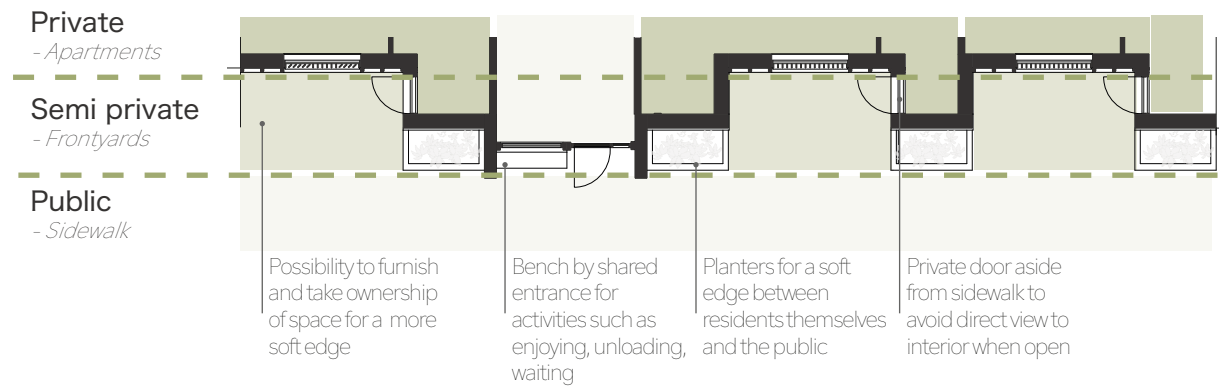
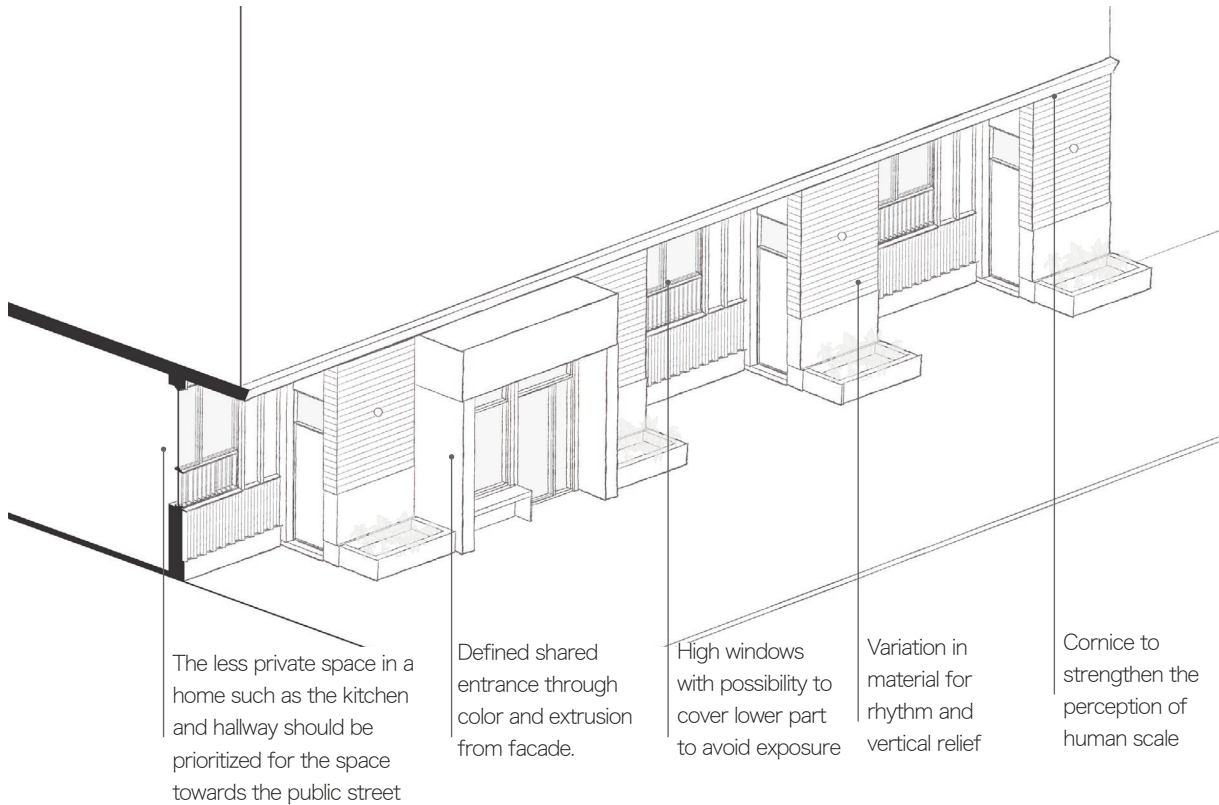
A private frontage with a personal touch

Residential at ground floor is a private function and has therefore restricted access with individual entrances at street level. The program demands retreat from the public gaze and has thereby in this example windows placed higher with an adjustable semi-transparent lower part.

The shared entrance to the upper floors is extracted from the frontage to separate the more public entrance from the private ones.



STEP 4 - ENRICH FOR AN INTERACTIVE FRONTAGE WITH DESIGN STRATEGIES



Discussion/conclusion

What was the aim/purpose/intention?

This Master's thesis is an investigation of the buildings' ground floors and their importance for the street space and public realm. It departs from the term 'lively ground floors' which is widely used in relation to urban design and development today. We seem to seek street-life vitality, safety and liveability, primarily through adding transparent shop fronts often refers to as 'active frontage'. Since the vehicular dominance of the street space, architects and planners have listened to urban theorists such as Jacobs, Gehl and Whyte about the importance of public life and open frontages. But it feels like the theories have been taken to the extreme. Without adapting to the potential of the location, context and urban fabric this 'one-solution-fits-all' often times results in inappropriate ground floor programming and frontage design, or even to vacant ground floors, empty rental spaces and stores, store fronts covered or adapted for other functions, residential windows blocked with blinds and curtains throughout the day to avoid visual intrusion from the street, blank walls and inactive streets.

This is the result of policies and strategies for 'active frontages' used horizontally, shaped for 'main streets' but applied on the secondary and background streets, which make up the majority of the streets in a city.

The frontages lack the fine tune architecture, the reflection of the function they host, and the public realm they border. As Kickert writes, "many dreams of transparency still wait to find life that gives it meaning" (Kickert 2022).

After observations and research at today's ground floors, it is clear that there is no lack of interest or intention to create lively, functioning and pleasing street levels, there is just a question on how to achieve this aim, when the location and street don't afford commercial activity.

The aim of this thesis is to gain knowledge on how we as architects can plan and design for lively ground floors based on location, context and needs. The purpose is to avoid a generic "one-solution-fits-all" situation and provide diverse design and program solutions that build upon the potentials and sensitivities of the location and context. This will help fill the knowledge-gap on how to design for lively ground floors in less central urban areas and streets, that do not have the affordance of commercial activity.

What have I done for a project, how can it be used in the future?

This master's thesis main product is not a design project. The literature research of relevant fields of studies, combined with field studies and reference analysis, spatial analysis and interface mapping of real cases, have resulted in a tool-kit which proposes a workflow, programming and design strategies for the creation of interactive frontages and lively streets based on the spatial conditions created by the location, urban fabric and street. The design study of this thesis is a method for testing and evaluating the tool-kit's work flow.

This tool-kit is the end-product of the thesis and can potentially be applied on many different situations and processes, for the design of all types of interactive frontages, not just the commercial ones.

How can the tool-kit further develop?

The tool-kit could be further developed with more parameters for the choice of program. There is a large economical aspect around the occupation of the ground floor, which is actively not incorporated in this thesis due to its architectural orientation.

The expected user group of the street level is an important parameter to consider when programming the ground floor as different socioeconomic groups and demography will affect the use and liveliness of the space.

Further, the program's reach and density is also a parameter which could guide the user of the tool-kit further in choosing a program for the ground floor.

The tool-kit thereby only suggests programs and examples to give an indication of the potential of the space, and not to suggest that the user solely chooses the program based on the tool-kit indicative list.

What are some limitations of the method?

The space syntax theory was used for the thesis since it has been tested through empirical testing which has shown to be quite accurate, and thereby give a good indication for the potential for movement created by location and street configuration. This method of course has its limitations as it assumes that most people take the shortest and straightest routes. However, we also know that destinations can affect patterns of movement. Pedestrians enjoy certain spaces more, and we preferably avoid height differences. The detours can be a result of wanting to take a more pleasant route or visit something on the way, it can be the desire for a quieter, greener or more interesting route.

What has been the most challenging during the process?

The most challenging part of the thesis has been to merge the different fields of study and choose simple but still informative way to extract information from them into the tool-kit. In the 'assessment' section of the tool-kit one can be overwhelmed with information that can be gathered and can affect the potential for the frontage. However, through analysis and research it was evident that the need for potential movement was the most grounded information one could take with to the choice of potential program to suit it.

Moreover, the categorisation of the programs was a challenge as well since there are numerous way to structure and divide them. Even though the tool-kit suggest some overall categories based on 'demand for movement'

there are still variations to find within and between them.

Was the tool kit useful for the design process?

The use of the tool-kit through the design study was helpful for me. Even though I've studied the research, it was supportive to have something to lean back on when there was uncertainty on what to do next and important factors to think about.

Do we produce better grounded informative design with the tool-kit?

By the use of the tool-kit one is forced to analyse and evaluate the site in different scales and aspects. I believe that process helps to build a deeper understanding of the site in question.

The workflow of the tool-kit potentially guides the user through the design process in a clear sequence so that the most important factors are considered first, which potentially help produce better grounded and informed designs.

What have I learned?

It is a challenge to create a lively city starting from scratch. The lively ground floors we love are in places that has been around and moulded for decades, have an identity, people know it, people care for it and people feel safe in it.

What could I have done differently?

There is only so much time for a thesis, but I am overall satisfied with the outcome. If I were to do it again I would look wider on references for ground floors. There are great examples for interactive frontages both in Copenhagen and Amsterdam that could help and strengthen the thesis further. A discussion with the city planning office would also be helpful to shape the tool-kit knowing more about how it works today with policies and regulations, to then adapt the tool-kit for an easy use.

Closing remarks - The role of the architect

All frontages where pedestrians potentially pass by should be interactive regardless of the intensity of the movement, maybe even more so if the intensity is low. The policies today for active frontages build on the existence and quantity of people, meaning less centrality – less people – less lively. Most of the year, we do not have people sitting in parks, no outdoor serving – this leads to less people and less liveliness. The architecture must sustain these variations in quantity of people, and with consciously planned interactive frontages, we as architect can achieve that.

With this thesis I hope to begin a broader discussion about the street-level and its importance and potentials through all scales and locations. To redirect the focus on the small category of commercial active frontage and discover the potential of wide interactive frontage, because every frontage has the potential to be interactive, while only a few can be commercially active.

“The streets we want to turn a corner for have great street-level architecture with both great buildings, and great programs, both great form and function, both hardware and software, that interacts with us, giving us a sense of trust, care and safety.”
- C. Kickert

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Images

Fig. 24&26 based on: Lantmäteriet (2009) Göteborg. Flygfoto [Kartografiskt material] <https://minkarta.lantmateriet.se> [2023-04-05]

Fig. 25 *Göteborg stad (2022) Översiktsplan - Fördjupad för Högsbo-Frölunda med Dag Hammarskjöldsleden*
<https://goteborg.se/wps/portal?uri=gbglnk:gbg.page.bb7386fd-1152-47cb-9da4-d06bd7780a77&projektid=BN0896/16>

Fig. 27 *Göteborg stad (2019) Detaljplan för Stadsutveckling vid Olof Asklunds gata inom stadsdelen Högsbo i Göteborg, en del av BoStad2021.*
<https://goteborg.se/wps/portal?uri=gbglnk:gbg.page.bb7386fd-1152-47cb-9da4-d06bd7780a77&projektid=BN1337/15>

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