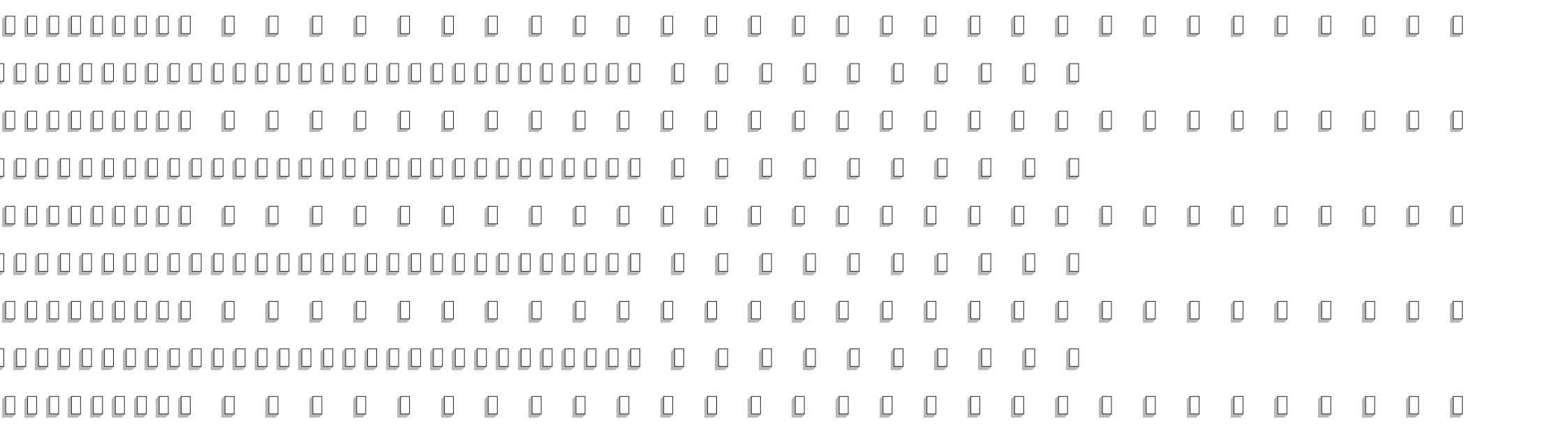


Same, Same, but Different

learning from references when designing
contemporary brick architecture

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architecture

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Abstract

In a time of rapid urban development, the city of Gothenburg is looking to expand both inwards and outwards. This thesis-work is an exploration of what that development could look like on a centrally located plot, in a neighbourhood where the architectural coherency is fairly high.

The design work is driven by the idea of using references present in the surroundings as a tool for creating boundaries for the design, and as a way of enforcing architectural coherency. The process and method are influenced by those used when working in areas or with buildings with an architectural or cultural heritage interest. In line with Pallasmaa's thoughts on phenomenology, the materiality of the material used, in this case brick, is of great importance when detailing and drawing.

By documenting details and façade elements on the existing buildings, strategies for the development of a design proposal are set. A three-part inventory is used to catalogue the already-built structure: façade and plan drawings from the city archives, a matrix sorting and quantifying visible elements of the buildings, and photographs taken on site.

With the result from the inventory, the materiality of brick and the background of architectural heritage a design proposal is developed. With the design proposal and the process, the thesis discusses the need for a context-based, humble, everyday architecture. An architecture that converse with its surroundings, rather than shout "look at me". An architecture that understands that the sum of the built is not a number of buildings, but a city.

the Author

Johanna was born in Stockholm and came to Gothenburg for the studies. She travelled back and forth a lot and started seeing local differences in the urban structure, material and detailing. Where the façades of Stockholm are a multitude of warm orange and yellow hues, Gothenburg's are brick; yellow, brown and red. Understanding this new city was not the easiest. Not only did it look different, it was also structured in a new way, but by slowly realizing the built-in differences to the different neighbourhoods she could also understand where she was and how the city was connected.

Education

Master in Architecture - Design Beyond Sustainability	2017-2019
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Introduction

Gothenburg is expanding rapidly, outwards as well as inwards. With a goal of 80 000 new apartments and the same amount of new working spaces built until 2035, this is a massive undertaking. It includes the single biggest urban development project in any of the Nordic countries ever, the River City development (Älvstaden), but also a large number of smaller developments spread around the city (Göteborgs Stad, 2019). One place where the city is looking to expand inwards and densify is the plot "Plantaget 1", centrally located in Olivedal, where the municipal housing company Poseidon is planning to build apartments (Niklasson, 2019).

A neighbourhood is defined and experienced differently by different people. One of the common things to define a neighbourhood though, is architecture. The style of buildings, materials and design; the street-scape, density, shape of streets etcetera (the Young Foundation, 2010). A neighbourhood in a city mostly have a radius of no more than a couple hundred meters. That is, it is restricted by the distance a person can comfortably walk (Alexander, Ishikawa, & Silverstein, 1977). Neighbourhoods give inhabitants of a city a sense of belonging and of security and it is easier for a person to understand the city as a whole, by dividing it into neighbourhoods. This division is not always positive though, a neighbourhood can also be burdened with negative connotation, such as crime, inequality or run-down buildings (the Young Foundation, 2010).

The current densification trend puts many architects in a position where they need to take a stand on how to relate to the existing built structure. This is, maybe, especially important when it comes to work in an area with a strong coherency to the expressions and

architecture that is already there (Strike, 1994).

There is a somewhat polarized debate going on today on historicism versus modernism. With one side accusing the other for only making ugly shoe-boxes clad with glass and cement that ignores the important connection to its surroundings, while the other side says that the first only want historical pastiches that has nothing to do with construction today.

"Buildings are the 'skeletons of history', a framework around which we can develop an understanding of the past."

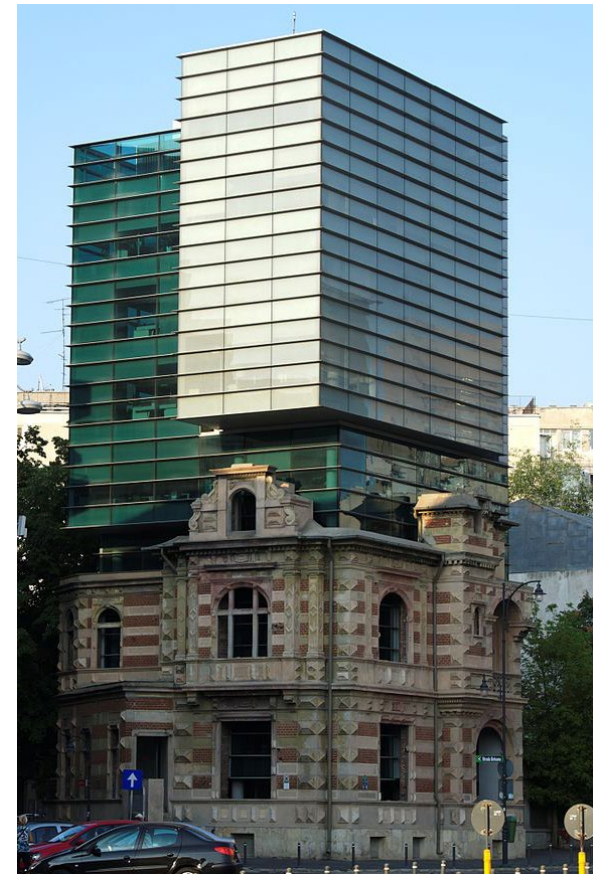
Ken Moth

If the quote by Ken Moth (Littlefield & Lewis, 2007) above is true, which I believe it to be, then why do we see projects like those in figure 1 and 2 (opposite page)? Projects that, rather than embracing the history they are built alongside (or on top of), try to devour it. Showing themselves of as being something more than the previously existing and trying to change the appearance and experience of it.

Buildings are a way to see and understand our history. But they are also a way to see and understand our present. They are not only the buildings of our cities, they are what create the spaces in between. Buildings frame boulevards and parks, as well as alleys and squares. Buildings are the back bone of our cities, and they deserve the care and attention that befits such responsibility.



*Figure 1: Extension to Royal Ontario Museum by Daniel Liebeskind (2007)
Photographer: Gisling*



*Figure 2: Extension, Union of Romanian Architects, Marin & Bogdanescu, (2003)
Photographer: Yelkrokoyade*

Introduction

Purpose and Aim

The purpose of this project is to discuss one way of developing within the already built, what values one can find in the existing and how these values can be used in a contemporary manner, to enhance the site. The work wishes to show a design suggestion with clear references to its surrounding, but at the same time contemporary. Also, sustainability is not only about technical solutions, but the aspect of building materials and appreciation is at least as important. Building components that are a bit more expensive to install or buy, but lasts longer can very well be a better choice in the long run. Both economically and sustainably.

The standpoint is that paying attention to existing design strategies can give a valuable set of rules for a new design, and that there is a need to work beyond short-sighted economical gains. Both for the sake of large scale, urban qualities and small scale qualities to the individual user, as well as environmental qualities in the longer run. If what we draw and build is meant to be taken care of and made from well-chosen materials that age with beauty, we can reduce both the energy and material use in the long run.

Method and Delimitation

This project utilises both research by design and design by research. Literature studies are an important tool to gain knowledge about the properties of brick, its production and construction processes, as well as how work can be carried out within architectural heritage. Sketching and analogue model making is used as tools to develop both an understanding of the site and to develop the design proposal itself.

The work is divided into five different parts: Working in the existing; Context; Brick, Design Boundaries and Design Proposal. The parts overlap and intertwine, but creating this division still helps set the boundaries for the thesis.

Working in the existing

- Theory
- Literature
- Reference projects

Context

- Ongoing discussion
- Plot
- Strength and weaknesses
- History
- Phenomenology

Design Boundaries

- Inventory
 - quantifying
 - photographing
 - drawings

Introduction

Setting boundaries

Brick

Construction
History
Detailing

Design proposal

Models
Sketching
Final proposal

The inventory has been limited to any building with a visual connection to the site. This include buildings from the second part of the 19th century to the 1990's.

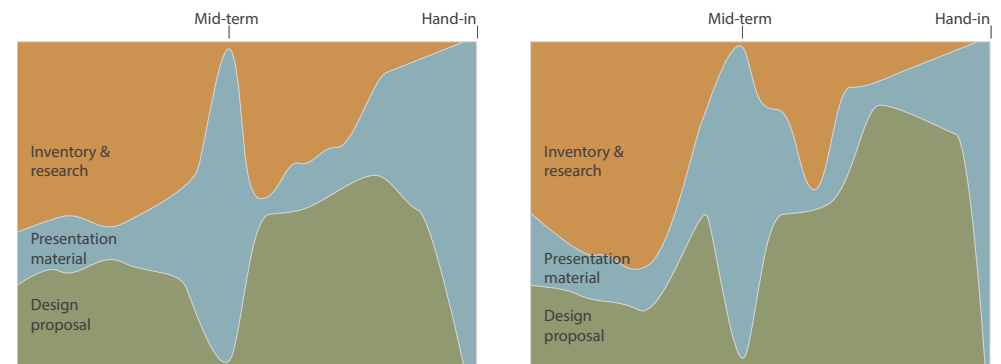
Since the main focus of the project is on façade development and qualities in and connection to the closest surrounding urban structure, the building program is secondary. For the sake of this thesis I decided to draw a suggestion for a building on the site, and to keep with the city's plan of developing the site into housing, but for the sake of the city a deeper analysis might very well give that it would be more suitable to develop a park or a square or a cultural house here. There are important synergy effects between sections, façades and plans that make it impossible to draw a design for a building based solely on the look from the outside. The most important part of the work is not the layout of the different floors though, and therefore the presentation of plans is limited to a small scale, apart from one drawing showing the different wall constructions in a typical apartment.

Process

As with any creative process the time-line has not been a linear one. Plans were made and remade a number of times.

The five parts described under "method and delimitation" are present throughout the process, but the amount of time given to each varies. Early in the process a lot of time was spent on "Working in the Existing" and "Design boundaries", later on more time was given to "Brick" and "Design Proposal"

Up until mid-term focus was on the inventory, literature studies and developing a framework for presentation material. Half-way through, focus shifted more and more towards the design, and the research shifted from working within the existing to brick and its possibilities and restrictions.



Left, figure 3: estimated division of workload at beginning of project

Right, figure 4: revised graph from end of project

Research question

The project centres around the following question:

How can brick materiality and architectural references together inform a contemporary design suggestion in an already-built environment?

Working with(in) the existing

Theory

Most projects carried out by architects are created in an existing context of surrounding buildings, and the architect has to make active choices on how to deal with that context. Some relate to it in one way or another, some don't give a damn. Some think they do give a damn, but others think they don't.

Often there is a detail development plan, or a design program to adhere to, but in many cases they don't restrict much more than the exploitation possible, the use and the height of the building.

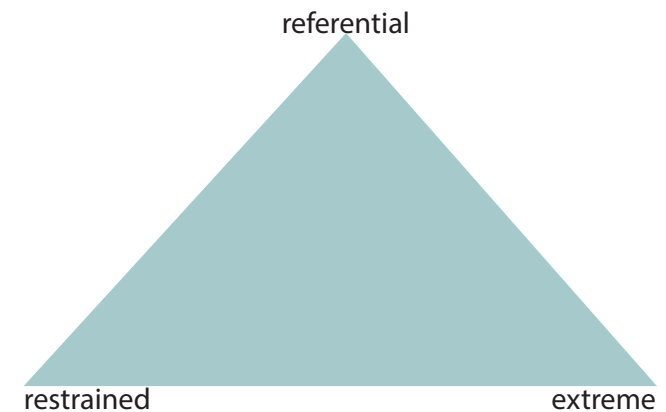
Charles Bloszies describes three ways of approaching additions to the existing in his book "Old Buildings, New Designs" (Bloszies, 2012). He categorizes (subjectively) successful additions into Extreme; Restrained and Referential additions, also saying that for any addition to be viable it must be distinguishable from what was already there.

How close do you have to look though, for it to be distinguishable? Is "House of Brad Lochore" drawn by Tony Fretton in 2009 a failure as far as extensions go because it is an almost seamless attachment to the existing warehouse structure next to it? Or is it just the right amount of "restrained"?

I would argue that the division Bloszies makes is not three polarities, but rather the points of a triangle in which a project can be positioned anywhere. A project can be both extreme and referential, or restrained and not referential at all (fig.5). Where you choose to position your project is purely subjective, as architecture often is, but it should be well argued and substantiated. Tony Fretton's studio extension is definitely restrained, but it is also referential.

Bloszies idea of an extension having to be distinguishable is not a new one. Already in 1877 William Morris described in the Manifesto written at the founding of the Society for the Protection of Ancient Buildings that extensions and restorations should be "wrought in the unmistakable fashion of the time... The results [being] a building in which the many changes. Though harsh and visible enough, were, by their very contrast, interesting and instructive and could by no possibility mislead."

In 1964 the ICOMOS (the International Council on Monuments and Sites) met to set down what became the 1966 Charter, a text on "the principles guiding the preservation and restoration of ancient buildings".



*Figure 5: three ways of approaching extensions
(adapted by author from Charles Bloszies)*

Working with the existing

Article 9 ... [the restorations] must stop at the point where conjecture begins, and in this case, moreover, any extra work which is indispensable must be distinct from the architectural composition and must bear a contemporary stamp...

Article 13 Additions cannot be allowed except in so far as they do not detract from the interesting parts of the building, its traditional setting, the balance of its composition, and its relation with its surroundings.

Article 1 The concept of an historic monument embraces not only the single architectural work but also the urban or rural setting in which is found the evidence of a particular civilisation, a significant development or an historic event...

Article 1 explains that no monument is alone, that it is always part of its surrounding and that it is not necessary for there to be a single building of interest. It might as well be the circumstance that is interesting. With this work I will explore the use of transformation strategies to new construction in the already built urban fabric, and article 1 could be applied to an entire neighbourhood. Article 9 and 13 both concern the actual addition to a building, site or monument. In the case of this project, where the site itself is not of great historic importance, but with a coherent architectural impression, the words of the articles can be taken a bit lighter. Additions should be clearly distinguishable but at the same time not steal attention from the existing building/s.

There are multiple strategies one can use when adding something to the existing. Strike (1994) describes some approaches

dependant on whether the addition shall be made in the existing building or monument, in connection to or in the vicinity of it. When working in the close vicinity of a building or monument or, as in this case, on an empty plot in a neighbourhood, there are some different ways to relate to the surroundings. In one way or another the new building should reference the existing, but these references can take different forms (Strike, 1994). The reference can be that the new building picks up an element or detail from the existing and morphs and exaggerates it into something new, it can be a connection in size, or a general "sensation" of the original building. There is no "one way" that it should be done, but there are methods and approaches that should be assessed before each individual project.

Working with the existing

Built references

All three of the following projects (FIGURES 6,7 & 8) are good examples that architecture can be context based, visually anchored in the existing AND modern. It does not have to be either or. Galerie Bastian in Berlin (fig. 6) by David Chipperfield Architects is clearly something new, but at a closer look it is fairly simple to find common denominators with the buildings connected to it. There are lines and heights that continue from one building to the other, and the use of smeared brick gives a tactility that is similar to the stone structures next. The wooden infill at Carmarthen place in London (fig. 7) keeps to the heights of the surrounding, low brick buildings. With time the colour changes from the orange of fresh

wood to a brown-grey that harmonizes well with the brick. Gunnar Asplund's extension to Rådhuset in Gothenburg (fig. 8) continues the horizontal division of the façade of Rådhuset and uses the rhythm found in the original façade and connects to it colour-wise, while managing to both blend in and be something new. All three examples are connected to an existing building. But the strategies used in the projects can be implemented in any design project carried out in an existing built environment.

The references these examples make use of are treated in different ways. All three of them have used the heights of the connecting



Figure 6: Galerie Bastian, Berlin, David Chipperfield Architects, 2007
Photo: Arild Vågen



Figure 7: Wooden infill, London, Emma Doherty, 2006
Photo: Robert Rimell

Working with the existing

References

buildings as a restraint, while the materials in the surroundings are more freely interpreted. It seems like it has been more important to find a common materiality than to actually use the same material. The examples shows that references can be used in many different ways, just as Strike wrote, and that additions can be made that are modern, without disrupting the coherency of the surroundings.



Figure 8: Extension Rådhuset, Göteborg, Gunnar Asplund, 1936
Photo: Rolf Broberg

Context

The context of a project is more than just the site. The site is part of the physical context but there is also the context within the ongoing discussion about architecture, as well as in theory and philosophy to take into consideration.

There is a large public discussion regarding architecture going on in Sweden right now. With the group "Arkitekturupproret" being one of the main instigators. While I do not agree with much of what they are saying, and especially not with their rhetoric, I can see where it is coming from. As trained architects we have a responsibility towards the public. It is our job to use our knowledge to influence developers and municipalities, and to create the best possible project for each situation, to not compromise quality for short sighted economic gain, and to create buildings that last, both aesthetically and constructively.

Phenomenology

Juhani Pallasmaa wrote "the eyes of the skin" in 1996, arguing that architecture should be built for, and experienced with, more than just the eyes. He claims that the complete experience of architecture is a combination of the experience of all senses (Pallasmaa, 1996). Material is an ever-present aspect of architecture, and understanding a material is crucial to an architect's ability to work with it, but the understanding of a material is also important for a spectator or user. By using materials and detailing that invite the user to not only see, but also touch, listen, smell and maybe even taste the building they can be transformed from a mere spectator to an experienter. Different materials hold different inherent possibilities of evoking reaction from the senses, and for a material to be understandable by the senses it must show its age and traces of human interaction. One material that meet these requirements is brick. Even a person not trained in brickwork can understand how one brick connects to the other and how they, historically, have been placed on top of each other by hand. Brick also age with dignity, another criteria for a good building material according to Pallasmaa.

Context

Site



Figure 9: Gothenburg, site marked in yellow
Scale 1:20 000

The project site is the plot Plantaget 1 (fig. 9) on Linnégatan in Olivedal in Gothenburg, just north of Viktoriahuset (Hagabion). Today there is a street food stand, a service building and a parking lot with approximately 55 parking spaces on the site. It is a prime location, centrally located in an area where the stone and brick city of the mid- to late 19th century meets the development of the 1980's. The plot is approximately 55*40 meters, about 2200 m²

Most of the area was developed in the late 1800's and the first years of the 1900's, and Viktoriahuset (appendix pg. VIII) was the first stone building to be finished in the area, in 1875 (Göteborgs Stad, 1983). It was used as a school from its completion and until 1975. Before the development the area was used primarily as farmland. The area is part of the City of Gothenburg's conservation program, it is a well preserved stone development, and there are a number of interesting buildings from an architecture history point of view. Among them the brick buildings Nordhemsskolan and Oscar Fredrik's church. The housing along Linnégatan was built to be fairly luxurious, while the development along the very steep Nordhemsgatan was more simple.

Brick is the dominant, visible, material in Olivedal, both in the older parts and the newer. The detail development plan for the area is from 1893 and it states that all development in the area should be built out of stone.

The municipal housing company Poseidon was given a promise to develop housing on the plot already in the 1990's but work with changes to the detail development plan has been slow since (Niklasson, 2019).

Context

Site

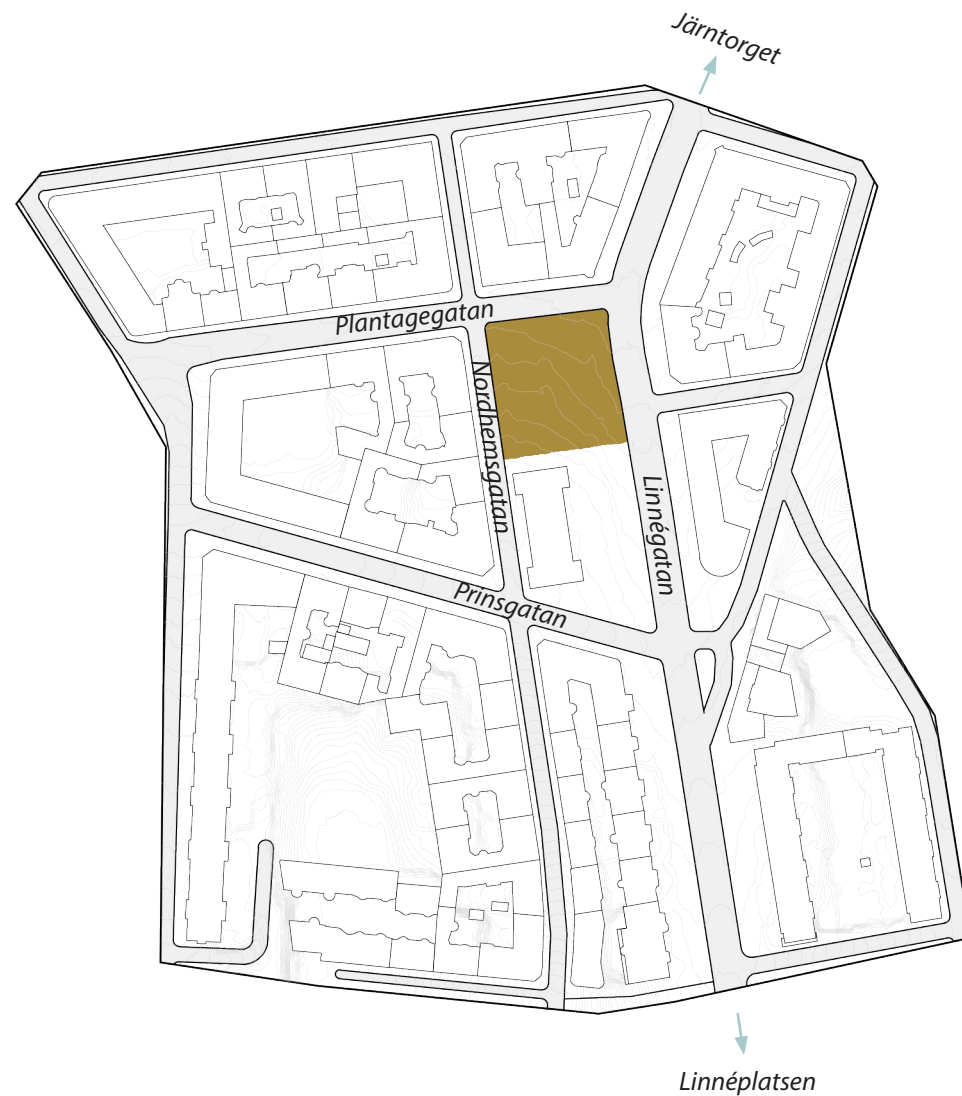


Figure 10: Closest surroundings, site marked in yellow
Scale 1:3000

Qualities and issues

Olivedal is a popular area, both among locals and visitors. There is a pleasant mix of businesses and housing, and it is a central location with good connections to two big commute nodes, Linnéplatsen and Järntorget, giving a steady flow of people along Linnégatan. It is also right next to one of the city's more touristy areas, Haga, and the street-scape is spacious and small-scale at the same time, with lots of coffee-shops with outdoor seating on the sunny side of the street. It is the typical example of "blandstad" (mixed city), a very popular term in urban development at the moment.

The architecture is coherent and appreciated, with room for a variety of businesses, ranging from cafés, restaurants and clothes stores along Linnégatan to more specialized stores like tailors, bicycle shops and music stores on the smaller streets. Apart from the businesses in the ground floors there are mostly apartments in the area, with some of the buildings housing offices as well.

There is a tendency today to look at urban projects in a short-term way, using it as a way to make some money for the municipality to fill in holes in other parts of the budget, ignoring the possible negative effects of the project on a longer time-scale (Kling, 2018). These are projects that make use of all the assets of a site or neighbourhood (infrastructure, popularity, etcetera), but without giving much or anything back to the area. Parks are being demolished and made into housing to create "livelier" neighbourhoods, not considering where the liveliness that happened in the park should take place instead.

Plantaget 1 has great possibilities of being an asset to the city.

The plot is an empty space in the street-scape, a place where you cross but don't interact with the city. This is partly because of its use as a parking lot, but also how it relates, or maybe not relates, to the surrounding and to the open space in front of Viktoriahuset in particular. It is a parking lot and a short cut, but a short cut with potential of being something more. The plot is underused today, and if we are to make infills and densify the city, parking lots are a way better place to start than parks. Wherever densification projects are carried out, careful consideration should be given to the entire area to increase whatever values can be found there, not only make use of them.

On the other side of Linnégatan from the site lies a "systembolag", and it is not at all uncommon to see drunkards sitting on the wall in front of Viktoriahuset, waiting for Systembolaget to open or just hanging around. For a city to be democratic there needs to be room for all kinds of people, and a new design should not actively try to close out people that could be considered uncomfortable.

Brick

the Brick

Brick has been used as a construction material for millennia. From the sunburnt clay bricks of ancient Mesopotamia to industrialized brick production today (Jensen, 2002). It is a massive material that acts as a heat buffer, helping to regulate the temperature both when it is warm and when it cold outside. It is a material that work under pressure, but not under strain. To bridge openings without using other materials, such as concrete, brick must be made into arches.

There are may different standards for what size a brick should be. Common for most of the ones used today is that the sides relate to each other so that 2 headers + head joint = stretcher. Using the Swedish standard a header is 120mm and a stretcher is 250mm, giving a head joint that is 10 mm. The height of a Swedish brick is 62 mm, and the bed joint is normally 13mm. The depth of a brick wall can be measured in stones, where a 1-stone wall has the depth of a stretcher. A wall that is thicker than half a stone (one header) must have both headers and stretchers in the bond it is laid in. The

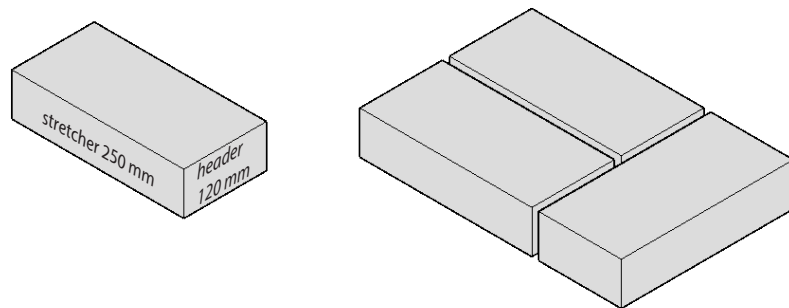


Figure 11: dimensions of a Swedish standard brick,
2 headers + joint = stretcher

headers are what binds the wall together. If a wall is constructed with only stretchers, the only thing that holds it together is the mortar, which would not be enough to keep the wall from breaking apart. It would basically work as two separate walls standing very close together.

In higher buildings it might be necessary to have the wall thicker the closer to the ground it gets. Simply to be able to manage the loads.

Construction

Many of the older brick buildings still standing today are built as massive or diaphragm walls. That is a wall that is brick all the way through or a cavity wall, with bricks bridging the gap between front and back wall, the cavity often filled with rubble or other cheaper stones. These two walls both have a strong materiality due to not making use of other materials and letting the brick be load bearing, with arches and other constructive elements also made from brick (Gustavsson, 2002). With the rationalisation and industrialisation of construction the use of brick changed. It was more and more used as primarily a non-load bearing façade material in combination walls (a cavity wall with a non-brick material in the back wall). With the entrance of these types of walls the clarity of the materiality of brick diminished, load bearing arches became less common as concrete lintels were inserted instead and ornamentation with brick was also reduced as a

Brick

consequence of evolving modernistic aesthetic ideals. The main reason for not building a massive brick construction today are the low insulation properties that a massive brick wall holds, and the work heavy construction method.

A cavity wall gives good possibilities for insulation, and is, because of its massive components in back and front wall, slow to emit and take up heat, adding to a comfortable indoor climate both during winter and summer (Gustavsson, 2008). A traditional cavity wall with both front and back wall in brick would either be too weak to carry its own weight in a multi-story building or to thick to be interesting. The extra time spent constructing the wall compared to a concrete one is partly returned by not having to wait for concrete to dry before beginning interior work. Interior work can be initiated on the lower levels while the upper ones are still raised. There is also a lot gained by using the same material through the wall. The expansion due to temperature changes is more similar in a cavity wall with only brick, and therefore the risk of cracking is smaller, and the risk of cracking due to the long dry-out time of concrete compared to masonry is eliminated by using brick in both front and back wall.

I met with architect August Orrling in early April, to talk about a new invention of his, for the traditional diaphragm wall. It is a wall constructed with brick in both front and back wall and with binders cut to brick-size from foam glass blocks. The idea is to get back some of the material properties of using brick in both front and back wall, while avoiding thermal bridges by using the insulating foam glass as binder. The cavity between the front and back wall is filled up with perlite, or some other non-organic loose insulation.

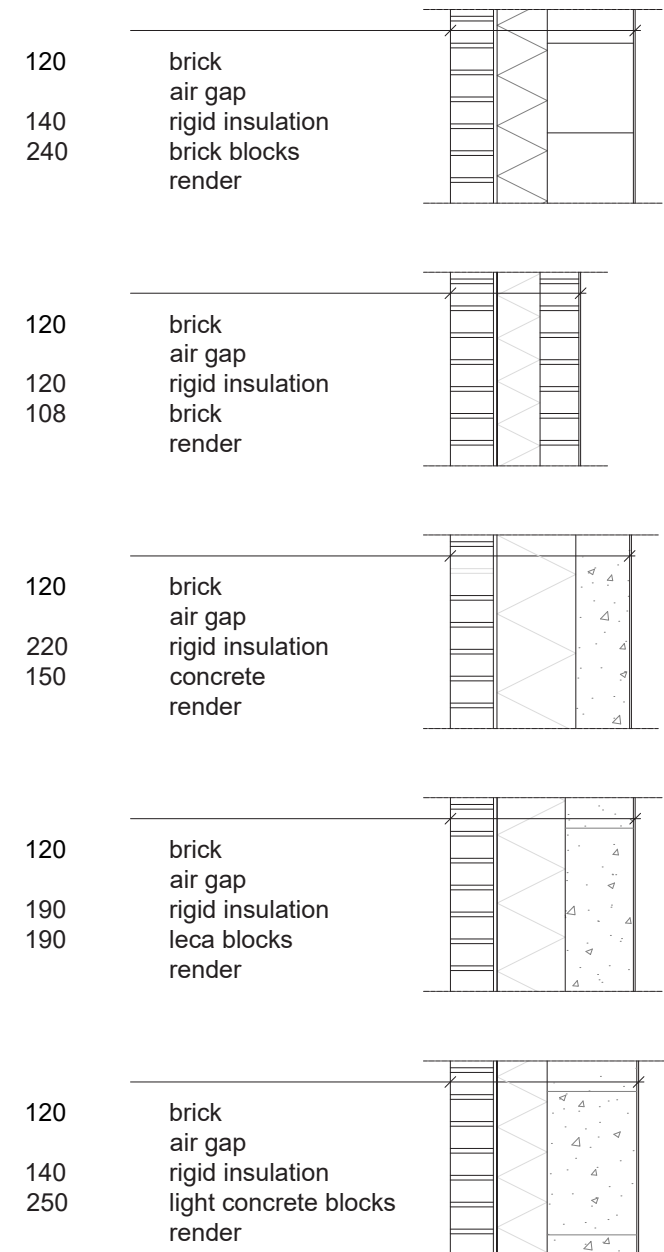


Figure 12: variations of combination walls with a u-value of circa 0.15. After Gustavsson, 2008

Brick



Figure 13 & 14: Test of a diaphragm wall with foam glass binders

Photo: Felicia Andersen

Details

Expansion joints and some other details that come with the use of modern cavity walls are, from an architectural point of view, not very desirable. Some of the unwanted details are possible to avoid by altering the construction method or changing the components. It is possible to decrease the need for expansion joints by using as much lime in the mortar as possible, reducing the length of façades and using bricks that are stronger than the mortar (Gustavsson, 2002).

With a cavity wall there is no constructive use of putting bricks with the header out. In massive walls the header would bind the different layers of brick together, but in a half stone wall it is necessary to cut the stones or make them special size and the use is purely decorative. This is why one can see modern veneer walls with only stretcher courses, it is more time efficient use of the brick, but some of the inherent materiality, what we are *used* a brick wall should look like is lost. Some consider the use of headers in veneer façades false and a lie, others claim that it is an important part of what makes brick beautiful (Gustavsson, 2008).

When building combination walls with a balloon back wall there is a risk of moist related damage that is not present when the wall is non-organic all the way through. To reduce the risk of these damages it is common to open up a number of the head joint close to the ground i.e. leave them without mortar. Doing this gives any excess water that might penetrate the wall in heavy rainfall a way out. This custom has been adopted also in non-organic construction, although it should be quite unnecessary (Gustavsson, 2019).

Brick

Materiality

You say to brick, "What do you want, brick?"

Brick says to you, "I like an arch."

*If you say to brick, "arches are expensive and I can use
a concrete lintel over an opening. What do you think of
that, brick?"*

Brick says: "I like an arch."

Louis Kahn

Materiality are the combined experience giving properties of a material or combination of materials. How a material is perceived visually is often what comes first to mind, but the tactility and the acoustic properties are at least as important (Gustavsson, 2008). How a spectator experiences brick masonry constructions is dependent on a number of parameters; what colour the brick and mortar is, what bond it is set in, the ratio between brick and mortar, if the head joint is larger, smaller or the same size as the bed joint and the structure of the brick surface are some examples. But it also depends on tectonic aspects, and the skill of the individual craftsman.

Brick has been used as a tool for ornamentation, in e.g. Romanesque and Gothic churches, and as ornamentation in itself (Jensen, 2002). With the modernist movement in the early 21th century ornament went out of fashion among many architects. There were a few that kept working with ornamentation and detailing in brick though. Brick expressionism was born around this time, and architects like Peder Vilhelm Jensen-Klint, Fritz Höger and Hans-Heinrich Müller drew brick architecture in a totally new way,

using brick to create both figurative and afigurative decorations. They created ornamented buildings, but completely modern.

Part of what makes brick so interesting from an ornamentation and visual detailing point of view is its restrictions. It is not at all *restricted* as a material, but the strict shape and geometry of the individual bricks set boundaries for how and what is possible to communicate with it (Jensen, 2002). This adds to the recognisability and familiarity of brick with the spectator. Brick is also an exemplary tool for executing what Ruskin described as *changefulness* and *monotony*, the two most important (or even *the two*) elements of architectural composition. Monotony is flat, repetition, stripped, while *changefulness* is ornaments,



*Figure 15: Shadow-play on the façade of Chile House,
Hamburg, Fritz Höger, 1924
Photo: Ajepbah*

Brick

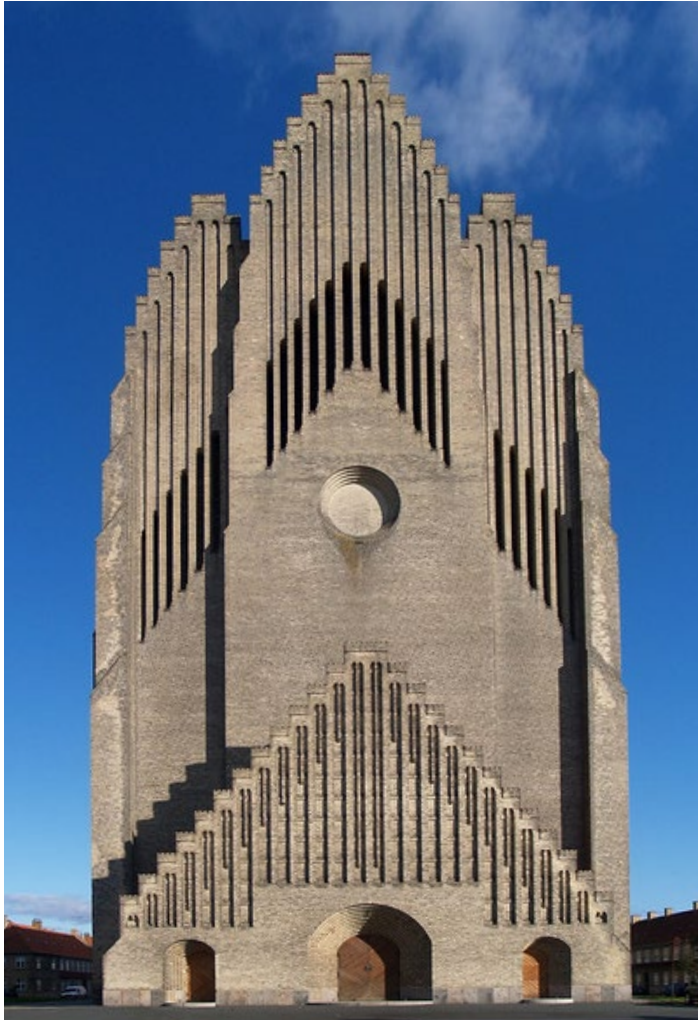


Figure 16: Grundtvig's church, Copenhagen, Peder Vilhelm Jensen-Klint, 1927-1940
Photo: SEIER+SEIER

shadow-play and rich decoration. Each on its own can be a bore or so much it causes a headache but used side by side they enhance each other and create a complete whole.

Another point of interest is the scale of brick. A massive building like the Grundtvig church (fig. 16) is made up of thousands and thousands of bricks. The building itself is awe-inspiring, but thanks to the small size of the individual bricks it never becomes unapproachable.

From the early 2000's and up until today it has been common to use brick as a sort of veneer on façades in combination with a back wall in concrete, and how this façade is experienced differs greatly from façades where the brick is also structural. In most modern brick façades there are no load-bearing arches. They have been replaced with more "rational" concrete filled brick beams, and these beams are telling a lie. Brick does not carry well if laid in a regular bond over a straight opening. It is no longer possible to tell how the wall functions just by looking at it. The brick has been reduced to a wind and rain screen, and the materiality of the veneer brick wall is something completely different from a load bearing, masoned one.

Brick

Production

Historically brick has been made by shaping clay in wooden frames, then taking away the frame, letting the clay dry and firing it. With industrialisation the process of producing brick became more rational, something that has led to giving the finished bricks a much more uniform appearance, also affecting the finished appearance of the construction. There are some ways to counteract this, either trying to mimic the things that gave variations in the first place or controlling the variations within the same method that gives the uniformity.

The two main ways of producing brick industrially is by extrusion or machine-moulding, the latter being closer to the historic appearance of brick (Gustavsson, 2008). When making extruded brick the clay is forced through a rectangular opening, the size two of the brick's sides, and then cut with wire into the right length. With machine-moulded brick the clay is pushed into metal moulds the size of the finished brick, then released from the mould, dried and fired. This gives a brick with greater individual variations than the extruded brick, but smaller variations than hand-moulded brick. With both techniques it is possible to affect the outcome by adding things to the clay-base. Adding certain minerals will change the colour of the brick, and fillers like wood shavings or other things that burn away during firing will make the brick lighter (and weaker).

Sustainability

The sustainability of brick can be argued with both a pro- and a con stance (Gustavsson, 2002). The critique against it involves the amount of finite natural resources used in the production, the high energy use (might also be from finite resources), and the difficulty of disassembling a brick construction. The pro arguments raise that brick structures are very durable, even under hard circumstances, that brick belongs to an appreciated form of aesthetics (as proven by the still standing old brick city blocks in many Swedish cities), that brick improves the thermal comfort of interior spaces and that brick is, in fact, easy to disassemble as long as the right kind of mortar is used.

As with any wall, the amount of insulation is crucial to the energy efficiency, but so is the points where different materials meet. In a massive construction fewer materials are needed and the risk for tricky details is reduced (Gustavsson, 2008). There is no need for plastic sheets in the wall and the small amount of water that might enter the wall through driving rain can diffuse through the brick out again.

Design Boundaries

Documentation and analysis

A combination of three inventory methods was used to set up boundaries for the design work. All three of these methods deal with measurable things like window shapes, arches, use of brick for ornamentation, façade materials and so on. Together they have proven a good tool to deepen the understanding of the physical aspects of the site. The drawings show how it was meant to be built, (not how it was actually built in all cases) and how the plans (might) look today. They show the façades under the things that are easy to take away, like signs and awnings. The matrix (fig. 21) gives an overview of the buildings next to each other, makes them easy to compare, but it is with the pictures that the differences really appear. In all the buildings where brick is the main façade material the brick is set in monochrome bonds. Yet the hues and colour variations between the buildings are huge. The windows can be divided into rectangular and arched, but the colour of the frames and the detailing around set them apart. The full documentation of drawings and photographs can be seen in "INVENTORY", an appendix to this report.



Figure 17: Situation plan showing Olivedal, project site marked in yellow, documented buildings in red
Scale 1:3000

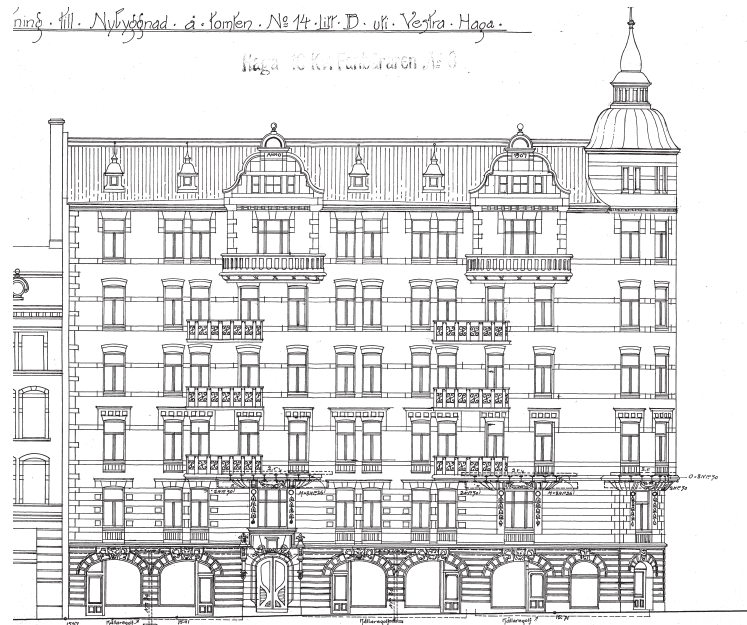


Figure 18, 19 & 20: Façades from the archives of SBK
Without scale

the Drawings

The drawing thought me some things about the history of the area. The majority of the building stock is from the late 1800's and early 1900's, with some exceptions as a result of the sanitation in the 1980's, where a couple blocks of buildings were torn down to make room for new development. The new development is built in accordance with the old, with varying degrees of success. It is obvious from looking at the buildings that the architects were using references from the area to make the new building blend in. But the detailing of the new buildings is often low and/or poorly executed, and rationality has apparently been more important than materiality in many cases.



	length of façade in meters	storeys	façade proportions	functions on ground floor	defined ground floor	cut or rounded corners	varying window with floors	rectangular windows	arched windows	round windows	dormers	bay windows	balconies	towers	monochrome bond	coloured bond	flat arches	round arches	segmented arches	brick direction	brick movement	sculpted brick	sculptural ornaments	expansion joints	primary material	secondary material
Linnégatan no. 21 Viktoriahuset	46 25	3-4	1 3 1																						B	S
Linnégatan no. 16-24	66	8																							B	C
Linnégatan no. 26	33	6+1	1 8 2																						B	S,R
Linnégatan no. 28-30	65	6-7 +1																							B	M,C
Linnégatan no. 36 - 38	78	8+1																							M DS	B,M
Nordhemsgatan no. 29	30	6+1																							B	S
Nordhemsgatan no. 31	18	4.5+1	1 4																						B	S
Nordhemsgatan no. 33	18	4.5+1																							B	S
Nordhemsgatan no. 35	30	6+1																							B	S
Prinsgatan no. 2	34	6+1																							B	S,R
Plantagegatan no. 1	18	5+1	3 12 2																						B	S,M
Plantagegatan no. 3	26	7+1																							B	S
Plantagegatan no. 5	30	5.5+1																							R	B, S
Plantagegatan no. 7	18	7+1																							B	C/S

Figure 21: Façade inventory matrix made February 2nd, 2019

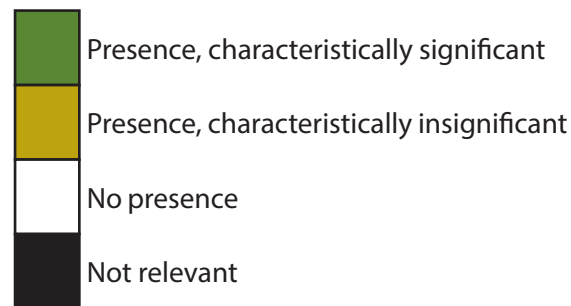
Design Boundaries

Analysis of visual references

the Matrix

The parameters for the matrix were set after what was visible in the area. I made a draft that I brought with me and that I added and took away columns from as I realised things were missing in the matrix or some things were non-existent on the site. Only parameters with some amount of presence were left on the matrix.

The matrix shows how common the different visual design elements are in the buildings in the area of documentation. Some are of greater significance to the character of the building than others, just like some elements are more common than others. The result of the matrix is what could be seen in the façades on February 2nd 2019, some of these things were added long after the



B	Brick
C	Concrete
DS	Dansk sjösten
M	Metal
R	Render
S	Stone

building was first constructed. Dormers and balconies are the two most common examples of additions.

The matrix is a good tool for collecting quantifiable data. By using it you get a quick and easy overview of the area and what it contains. It does, however, lack in its ability to show diversity within the categories, and is therefore best be used together with other two methods of inventory.

From the matrix I could read just how common certain design strategies and choices are in the area, and from that make a more educated choice of how important that was to me in my design. One thing that I found was that all buildings with brick as main material were set in monochrome bonds. Multicoloured bonds only appear in two places, as decoration. When looking at windows I could see that rectangular windows are far more common than arched ones, although more of the arches above the windows are segmented (partly rounded) than flat.

Photographs

Pictures from the site is a great way to show the multitude of different colours, details and styles present. The matrix showed that all buildings with brick as primary façade material had monochrome brick bonds. At first this might sound dull, but the colour variations between different bricks are huge. From light beige via bright yellow and red to brownish red. When adding the different colour mortar to the equation, there is nothing dull left with a monochrome bond!

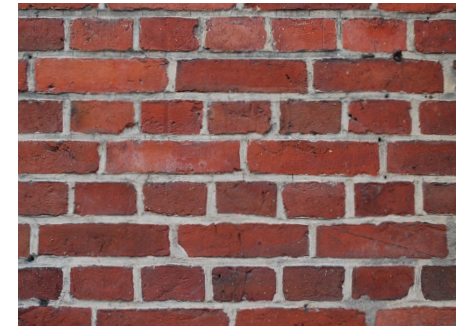
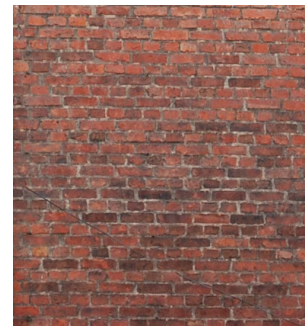
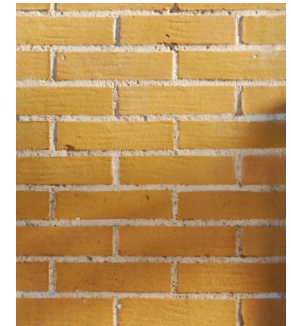
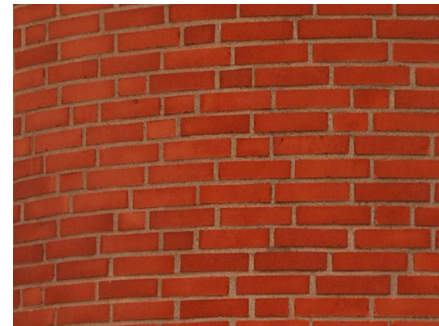
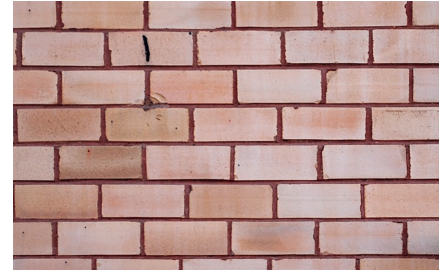


Figure 22: Great variation to brick hues

Design Boundaries

Setting Boundaries



Figure 23: Arched windows

It has been important to understand the purpose of the inventory and how it is best used to bring the project forward. The wish has never been to take the finds and copy-paste them directly onto a new project, but rather to get a deeper understanding of the variations possible within the categories set up for the inventory,

To use the matrix and the other analysis tools to set the design boundaries proved tricky. Architecture is, in the end, a matter of subjectivity. In the greater scheme of things there are very few rights or wrongs. For example do I believe that looking at the old and interpreting what has worked before into something new is the right way to go. The modernists did not.

I gave myself strategies based on the visual analysis and what I learned from the research on brick construction. The boundaries were determined by what I found to be most important, but also most interesting to work with. I chose not to add any new strategies, but rather try to reinterpret the ones found.

Design Boundaries

Setting boundaries

The design boundaries were split into three categories, informed by the research and site inventory. The categories are: constructive and visual boundaries and strategies regarding adding values to the neighbourhood.

Due to modern accessibility legislation some strategies used historically is not applicable. One example is the habit of putting ground floor businesses a few step down from street level, putting an elevator in every entrance of these businesses is not a rational thing to do. This has given the constrain of putting all businesses with direct access from the street.

The municipality wishes to develop housing on the site, and I have chosen to work with that line. There is no detail development plan that allows for this at this time though, it is under development. I believe it would be sensitive to add functions to the program that gives value to the entire neighbourhood. I believe that maximising the gross floor area to get as many apartments as possible increases the risk of killing part of what makes Linnégatan such a nice street to walk on; the combination of spaciousness and a relatable building scale.

Constructive

- **Masonry outer wall**

The outer wall should be non-organic and made from brick all the way through. It should also be load-bearing and the design should enhance the brick's materiality.

- **Wooden intermediate floors**

Intermediate floors are made from massive wood components or a wood beam system.

- **Masonry load bearing internal walls**

The internal walls that need to be load-bearing to handle the relatively short spans of the wooden floor should be made from brick.

- **Constructive arches**

Openings in brick walls should be spanned with arches that lead the forces downwards. In walls that are not made from brick other solutions can be used. Visible arches, e.g. in the façade should be detailed in an aesthetically interesting manner.

Visual

- **Monochrome bond**

The main façade material should be brick set in a monochrome bond. The bond may vary.

- **Defined ground floor**

The ground floor should be highlighted in a way that gives credit to the brick.

- **Balconies**

All apartments should have balconies, they should be open and not glassed.

- **Changing detailing around windows**

Ornamentation and detailing around windows should change depending on what floor it is. This could be the width and height of the window, or how the window is framed

- **Brick as ornament**

As far as ornamentation goes, this should be made from brick. It can be orientation or movement based, but not sculptural/figurative. The ornamentation should be based on the form of a standard brick.

- **Chamfered corners**

Corners can be chamfered or rounded where the building meets a secondary intersection.

- **Division of façades**

As to not make the building too massive an experience, the façade should be divided into smaller parts. This division carries on within the building. No apartment stretches beyond one façade.

Added values

- **Develop a public space that connects to the space in front of Viktoriahuset**

Make use of the existing space by connecting to it. Add seating and places to sit and play.

- **Functions on ground floor**

Make room for small businesses on the ground floor, with entrances from Linnégatan and Plantagegatan.

- **Do not maximise the exploitation of the plot**

The building should not be bigger than necessary to allow the plot to be used by others than the ones occupying the building

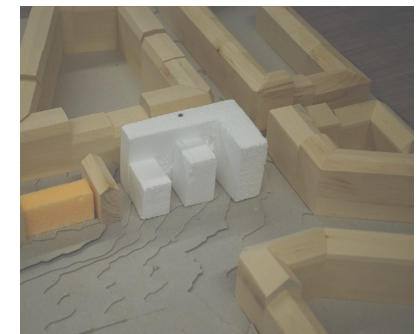
the Design Process

No design process is linear, and it is important to let it take the loops it needs to take to reach the end. Some things will take a lot more time than you think, some decisions will be much easier than you thought, and some will be surprisingly tough to make. I made a time-plan before the project started, and I had to revise it more times than I can count. I did things in an order I did not anticipate and I changed my method from a more model based one to a drawing based one. I did this to be able to get more into detail.

Models

I started the design process with making a landscape model in scale 1:500.

In line with what Pallasmaa is discussing in the *Eyes of the Skin* (1996), when using the hands in working with the design I subconsciously gain knowledge about what I am doing. Some things are more obvious than others. By making the site model I gained understanding of the big height differences in the neighbourhood, but I also learnt about the heights of the buildings, their length and thickness, the width of streets and the shape of roofs, and so on. One thing that I did not consider was what knowledge would be lost by choices I made. I chose not to make all the back yard houses, and had to remind myself many times that the yards are not as open as they seem, making the risk for dark apartments towards the yards bigger than it seemed when looking at the model.

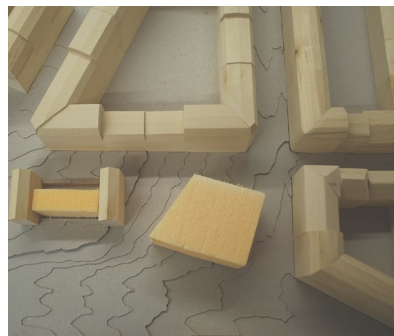


the Design

Process



First volume sketches during the 4th week of the project: The shape of the new building will have to fit in an existing form and structure, not necessarily following the shape of the plot or maximizing the area of it. Experimenting with placing and shape on the site and what it does to create space for public life. Where should the public spaces be? Should there even be public spaces?



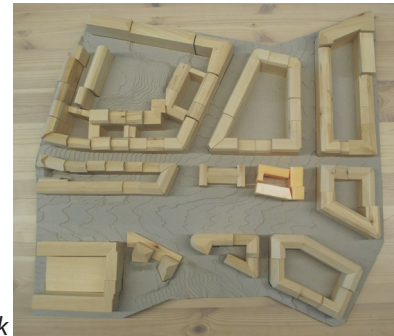
the Design

Process

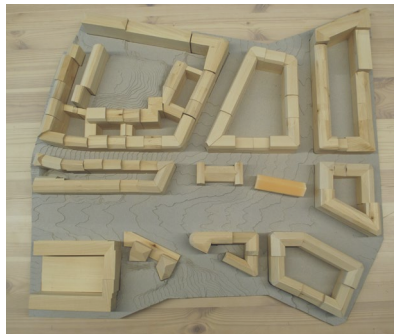
Some typologies have qualities when looked at from certain angles, but lack important qualities when looked at from others. Doing this helped me rule some of them out as potential building volumes.



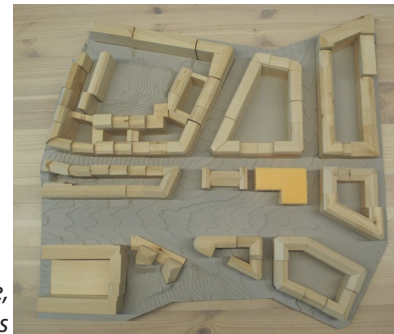
Undeveloped site



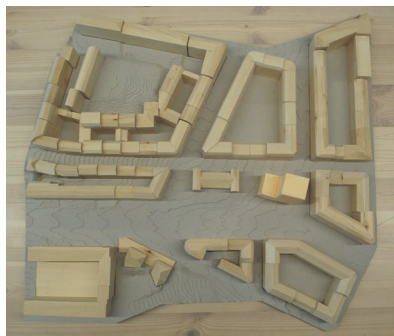
3. Existing typology, courtyard would be dark



1. Low density, defined space behind building



4. Thick volume, dark interior spaces



2. High, not an existing typology



5. Space behind building too small to be interesting

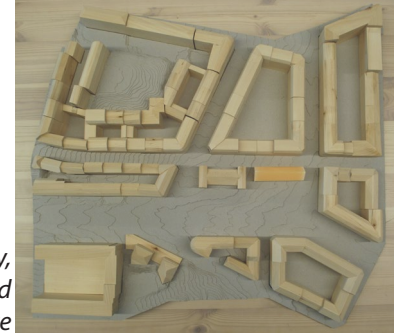
Pictures from model taken during 7th week of project

the Design

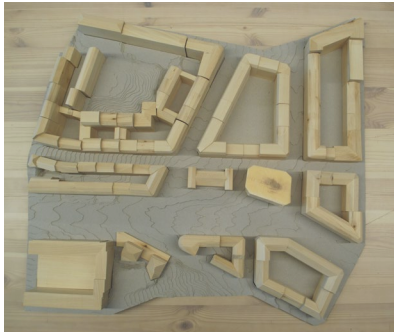
Process



6. *Connectable
open space,
low density*

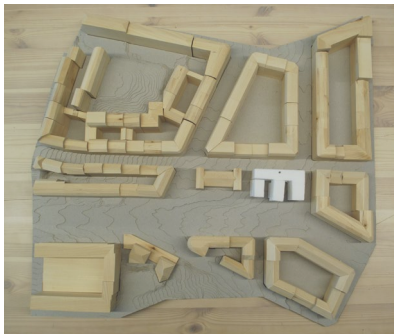


9. *Low density,
large undefined
space*



7. *High
density, dark
interior space*

I chose to remove some typologies that would take too much from the site without giving enough back, such as the tower and the E-shaped lamella (example 2 & 8), and some that would be too thick to be suitable for housing (4 & 7). The other ones I decided to test further by sketching in plan.



8. *High density,
unpleasant in-
between spaces*

the Design

Process

Sketches

When I first sat down to sketch in plan I looked at how the shape of the building would affect the open space in front of Viktoriahuset, and what would remain of the qualities that exist with the openness of the parking lot.

I saw that the site would benefit from spatial boundaries toward Linnégatan, but that a closed block would give a dark yard, and would not add other values than the apartments, since it would take up most of the plot, and close of the yard to anyone no living in the building. This left me with a lamella shaped volume and an L-shaped one. The lamella left the open space floating out onto Plantagegatan and so the choice fell on the L-shape.

The height of the building and the division of the façade in

Closing the surroundings out



Closing Viktoriahuset out

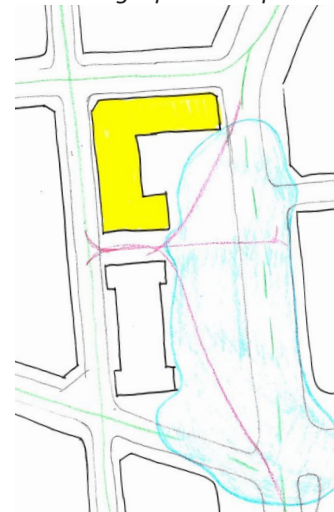


To big open space in connection with Viktoriahuset



Open space floats out along Linnégatan. Undefined

Hard to define if space in front of building is private or public



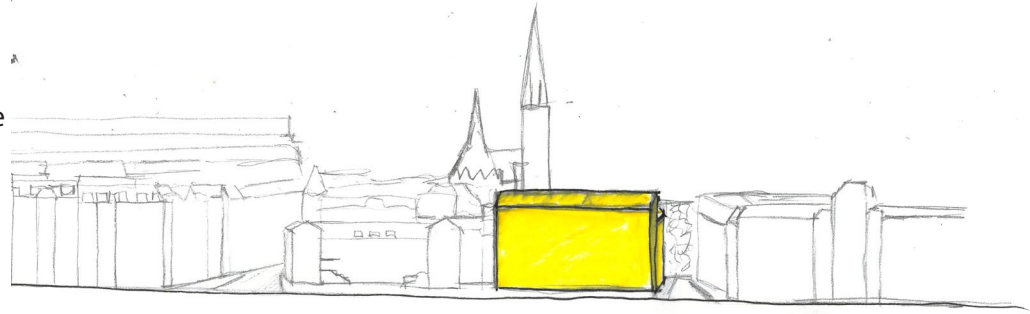
Two separate open spaces. Risk of floating out onto Plantagegatan



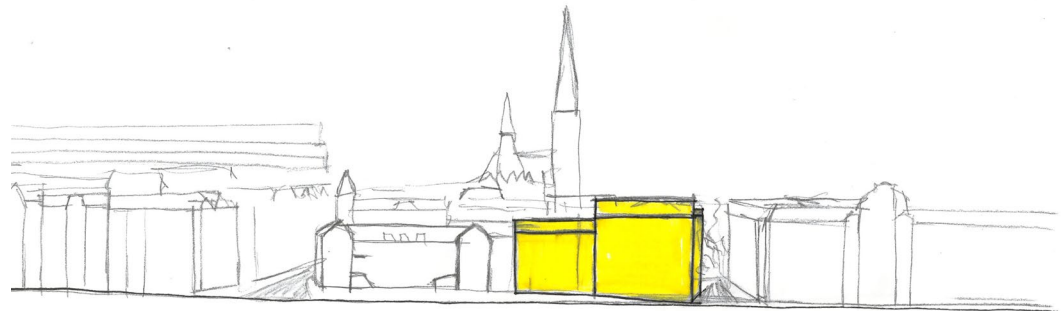
the Design

Process

comparison to the surrounding was further tested in simple street elevations. The part of the building closest to Viktoriahuset is made higher than the other parts to mark that the building volume is its own, and not connected to what goes on in Viktoriahuset.



Two defined open spaces that could be developed into public space



the design proposal



Plantaget 1
Scale 1:500

The L-shaped volume frames a public park that connects to the space in front of Viktoriahuset. This park is part of how the design suggestion is trying to add new values to the area, instead of just profiting from the existing ones. The park can be used by dwellers of the building and by Sunday strollers alike. The park is framed by buildings on three sides, and is accessible from Nordhemsgatan and Linnégatan. By placing the new building volume like this, the positive thing from the parking lot can be kept, allowing Nordhemsgatan, a narrow street, to open up a bit, before closing again after crossing Plantagegatan.

The volume is divided into three building, all made from structural brick masonry, but different in character and colour. Building 1 & 3 have shorter façades, and building 2 a longer one. The buildings follows the natural rise of the site, leaving the roof of building 3 above the other two.

The basements are connected between the three buildings, making it possible to share spaces for storage, a bicycle garage and laundry rooms. The ground floor has business spaces towards the street and apartments, raised half a storey from the ground, towards the park. To further improve the sense of privacy in the ground floor apartments they have a raised small yard between the public park and the façade of the building.

All apartments except the smallest studio apartments have windows in at least two directions, and efforts have been made to orient bedrooms away from Linnégatan.

The attics are also made to house apartments, all storage and

technical spaces are located in the basement.

All load bearing walls are constructed with brick masonry, while non load bearing walls are raised as balloon walls.

Numbers

Plot: 2170 m²

Building footprint: 870 m²

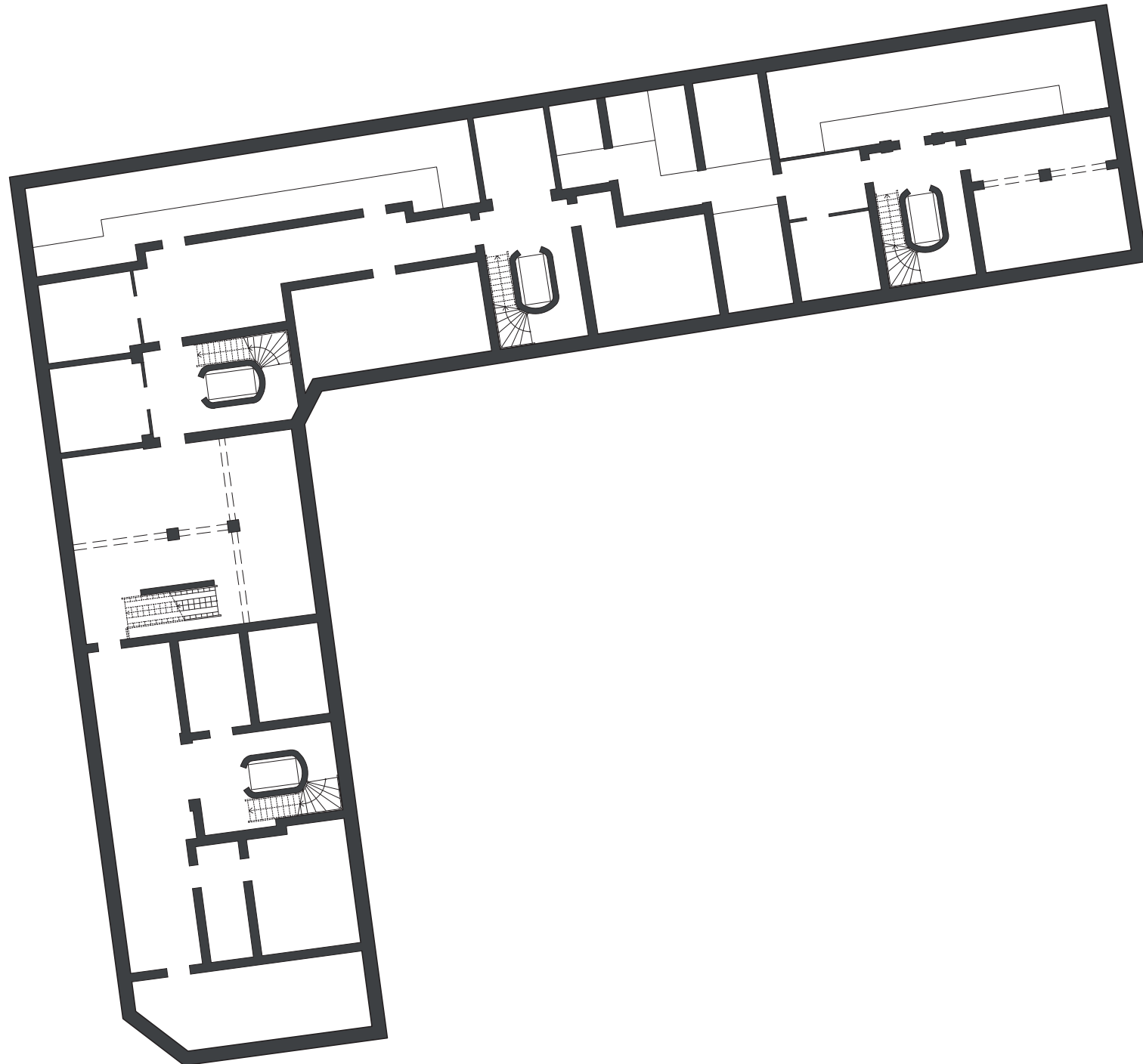
Apartments: 61, ranging from 19.6 to 100 m²

Business spaces: 9, total 400 m²

Gross floor area: 6700 m²

Total living area: 3800 m²

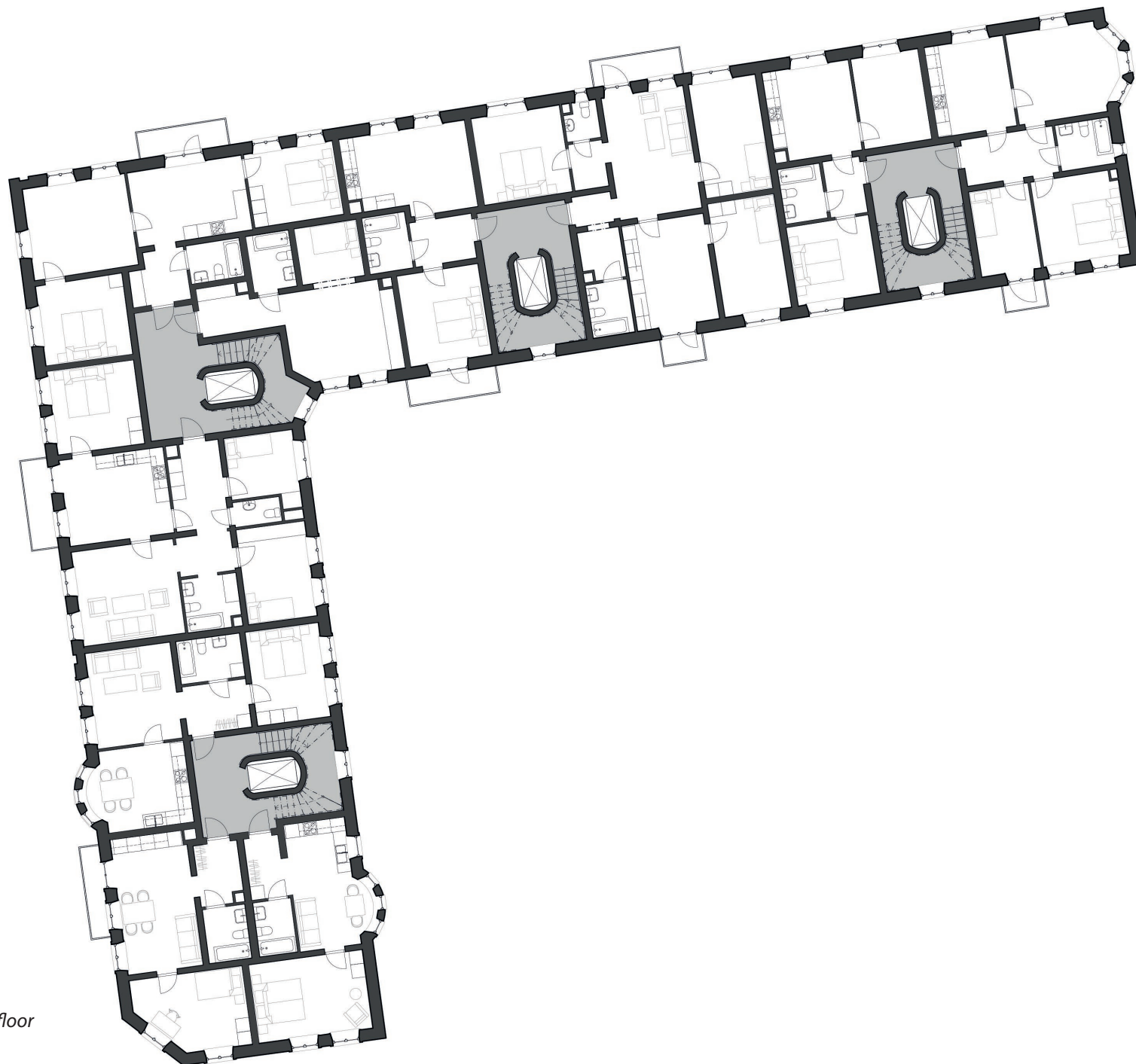
Plans



Basement
Scale 1:250

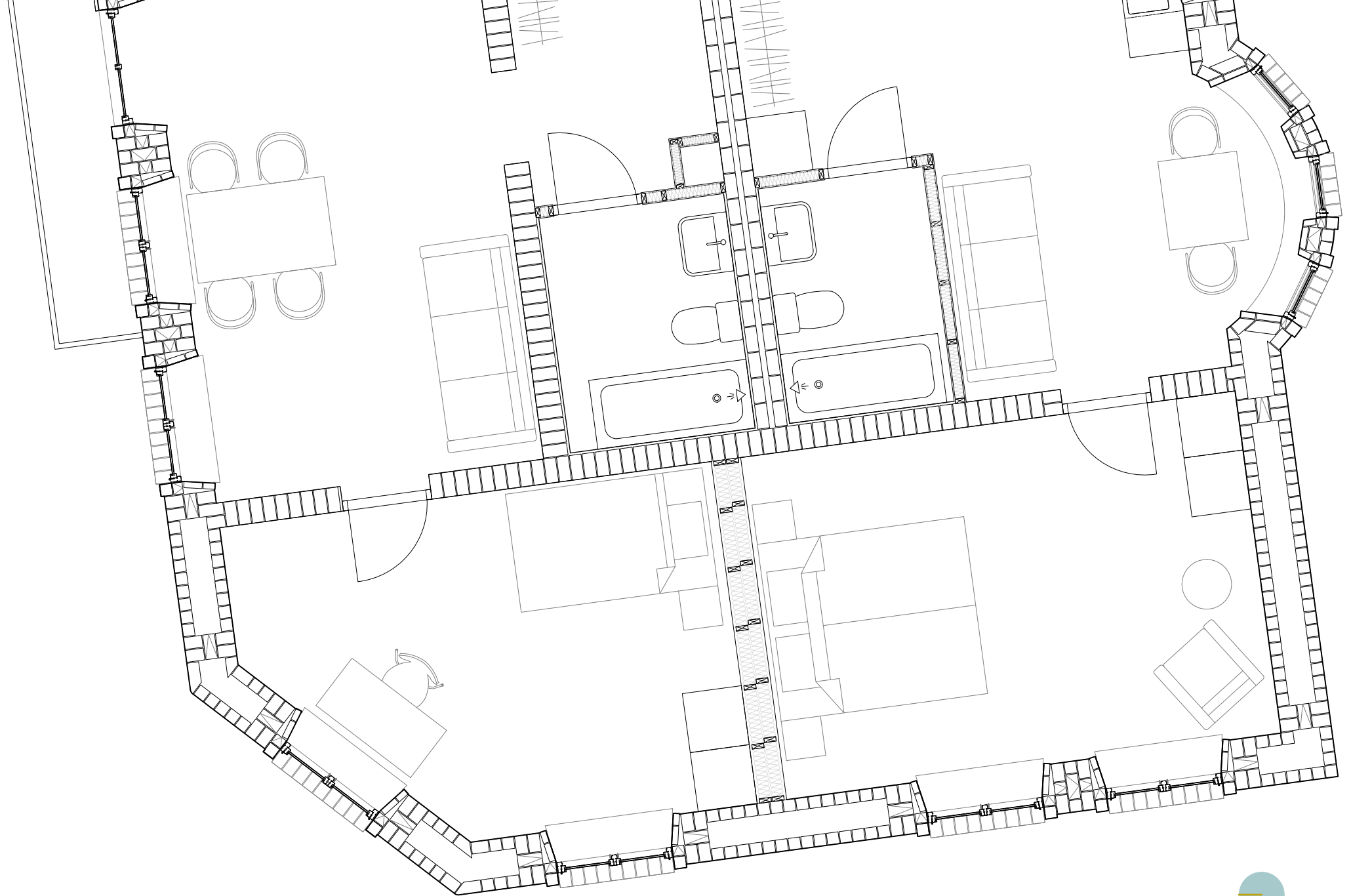


Ground floor
Scale 1:250



Typical apartment floor
Scale 1:250





Part of apartment floor, building 1, showing different wall constructions
Scale 1:50

the Design

Façades



*Façade, building 1 & 2, towards Plantagegatan
Scale 1:200*

the Design



*Façade, building 2 & 3, towards Linnégatan
Scale 1:200*

the Design

Façades



West facing façade
Scale 1:200

The three façades each have their individual character, all based on the size and possibilities of the individual Swedish standard brick. The brick has been a restriction in the separation of openings, as well as the width of openings. It is used for ornamentation purposes as well as constructive purposes.

Building one is set in an English cross bond, in a light yellow colour common in Gothenburg, window frames and sashes are painted a deep green on the apartment floors, and lacquered on the ground level. The mortar on the first and a half floor is a darker shade of grey than on the rest of the building, accentuating the bottom floor.

Building two is raised with a typically “brick red” stone, in a monk bond with standing headers. The headers are protruding slightly from the wall, more of them on the lower levels and fewer the higher you go. The protruding stones are black. Sashes and frames are also red and the balconies are clad with corten steel. Arches are primarily flat, except where they need to span greater length than a flat arch can handle.

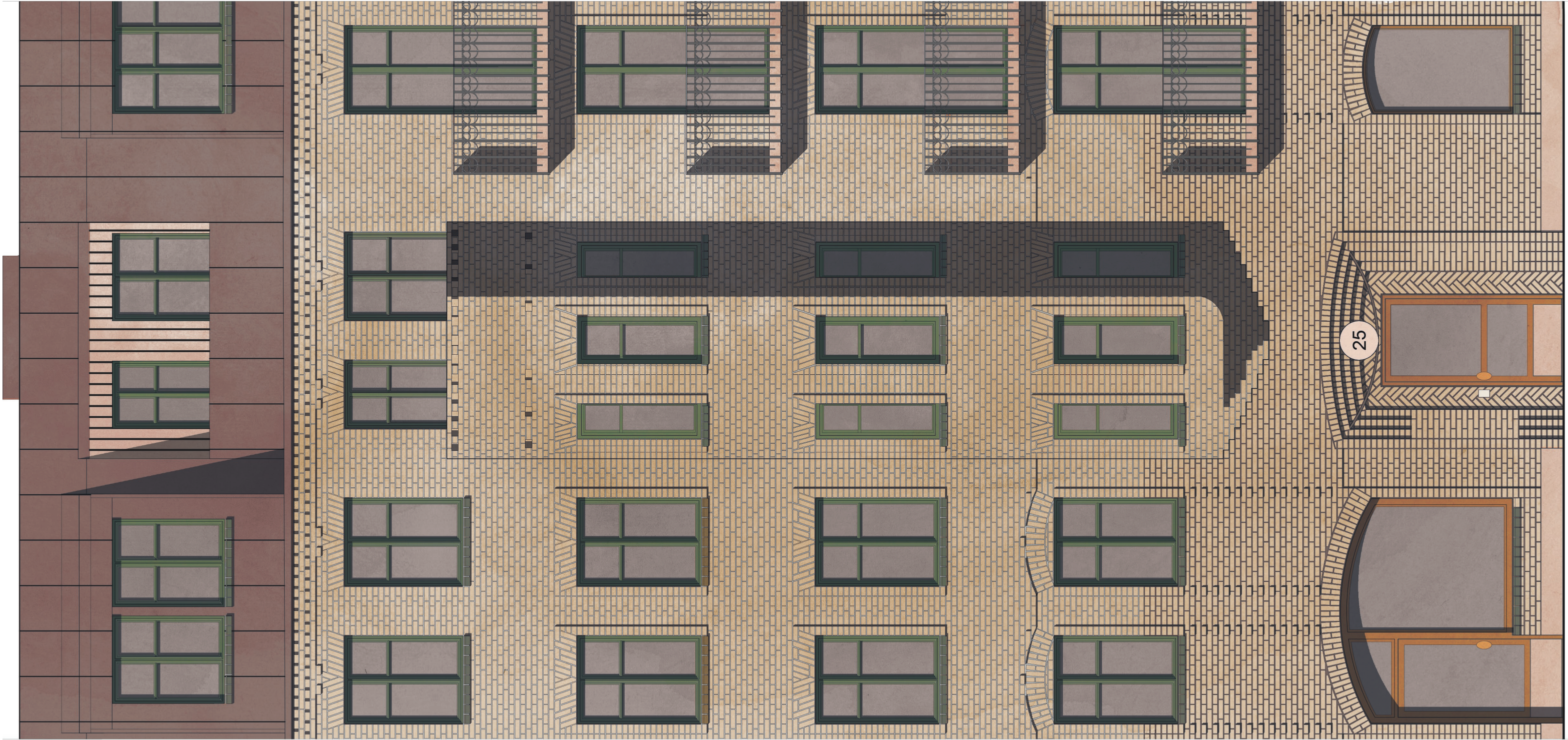
Building three is the darkest of the three, with a dark brow-red brick in a variation of English garden wall bond, with two stretcher courses to one header course. Rounded arches are used for most windows and openings, and ornamentation in the shape of protruding squares can be seen on the first and last levels.

All façades are rendered on the backside, towards the park, a technique that can be seen in many places in the area. Rendering the façades gives a lighter appearance that can be beneficial to the

more enclosed space in the park. It also means that the exactness of the execution of the masonry is not as crucial as on the façade towards the street. The rendered façades still uses the same visible detailing around windows and openings as on the street façades.



*Part of façade of building 1, towards Plantagegatan
Scale 1:50*





*Part of façade of building 2, towards Plantagegatan
Scale 1:50*

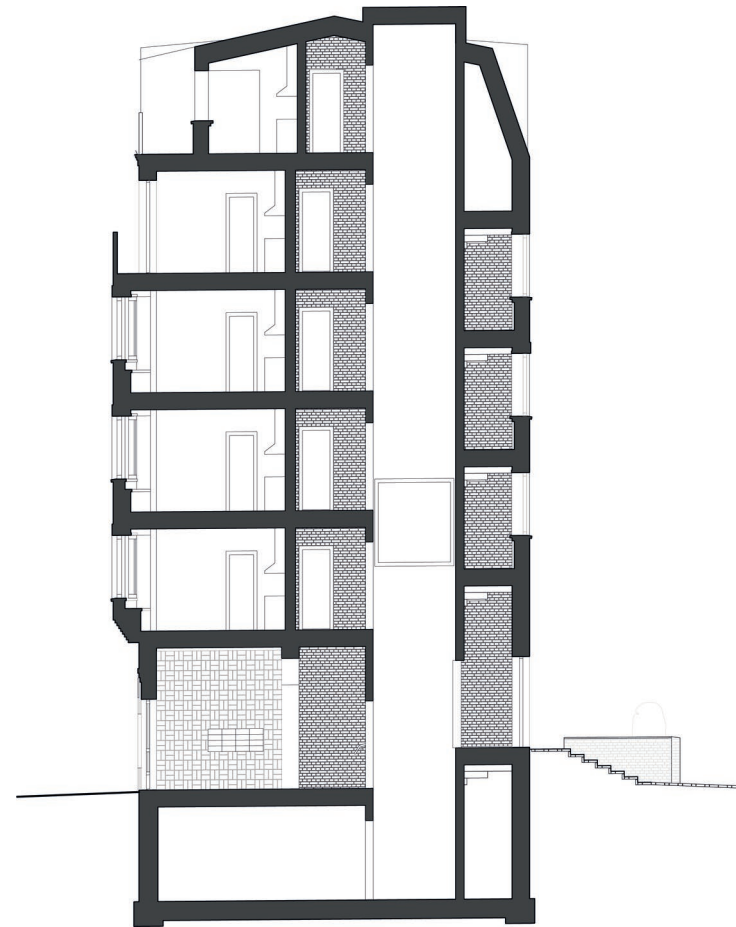




*Part of façade of building 3, towards Linnégatan
Scale 1:50*



Sections

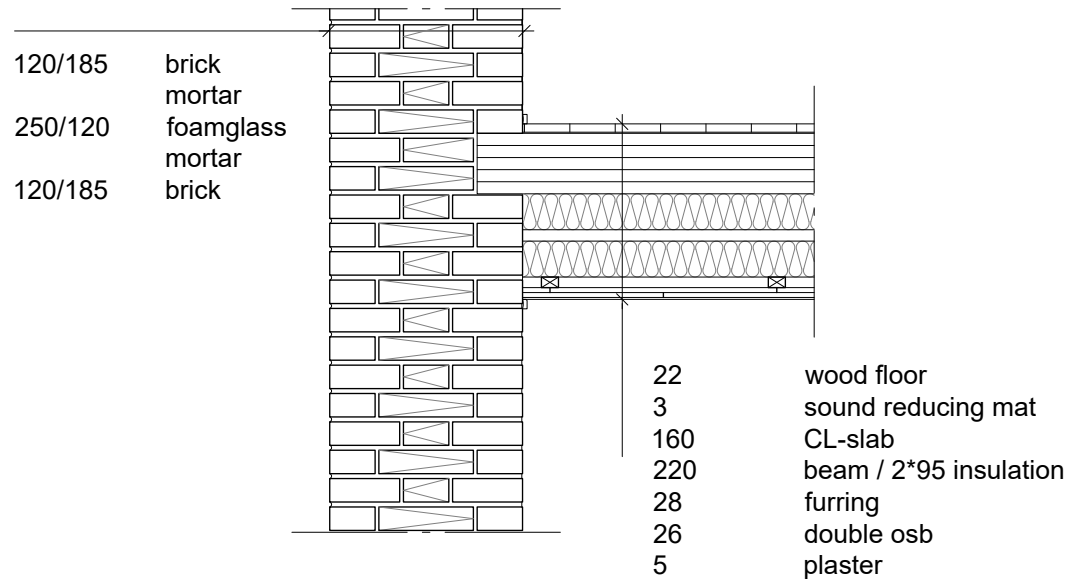


*North-south section through building 1
Scale 1:200*

The back part of the bottom floor, where the apartments are, is half a storey higher up than the non-residential spaces. This is to get the windows of the apartments high enough to get some distance from the public park. All bottom floor apartment have an outdoor space that is also raised in comparison to the park. These patios further help distance the public park from the private apartment.

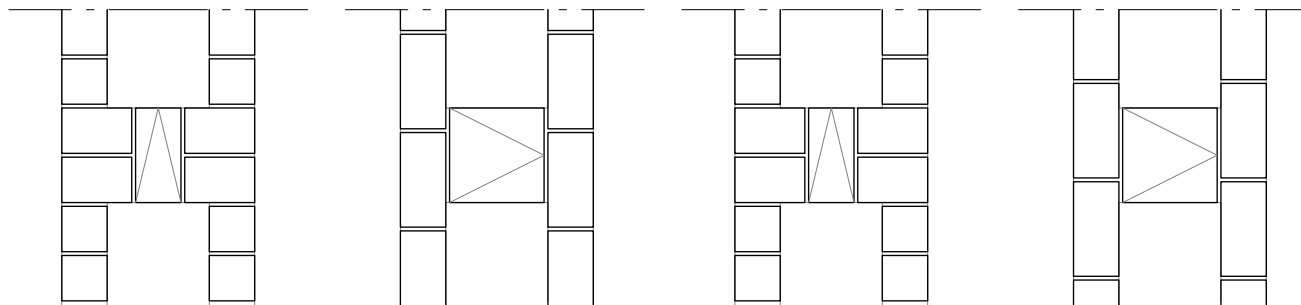
Building 1 is 6 storeys high, including attic, while building 2 and 3 are 7 storeys high. All storeys have apartments on them. There is also a basement under the entire volume that houses a bicycle garage, storage, laundry and technical areas.

Wall



The floor is made up of a CL-slab, resting on the back of the diaphragm wall. For sound proofing a cellulose insulation is put in two layers with some air between, on the underside of the slab. The brick wall helps reduce the noise from walking etcetera, that is a common problem when using massive timber in both walls and floors. It is possible that some other kind of acoustic solution would be needed in the joint between the wall and the slab, as well.

Since the bonds are different in the three parts of the building volume the diaphragms will work in a slightly different way. The details to the left both show the wall on building 1. The bond is an English cross-bond, made up of four courses, alternating stretcher and header courses. With this bond, the binders will always be evenly placed on top of each other. It is the header courses that binds the wall together by overlapping. A 3/4 stone is used for the diaphragm, instead of the 1/2 stone used on most places in the wall. The cavi



Detail of intermediate floor and part of wall with diaphragm binder
Scale 1:10

The U-value in this construction is around 0.14. For an apartment building of this sort it is a totally acceptable U-value, and depending on what type of windows and doors are used the finished building could very well be passive house standard.

	Section 1	λ [W/(mK)]	Section 2	λ [W/(mK)]	Section 3	λ [W/(mK)]	Thickness [mm]
1.	brick	0,800					130
2.	perlite	0,031	brick	0,800	foam glass	0,045	55
3.	perlite	0,031	foam glass	0,045	foam glass	0,045	140
4.	perlite	0,031	brick	0,800	foam glass	0,045	55
5.	brick	0,800					130
6.							
7.							
8.							
				Percentage section 2	Percentage section 3		Sum
				4,0%	4,0%		51,0 cm
				U-value:		0,140 W/(m²K)	

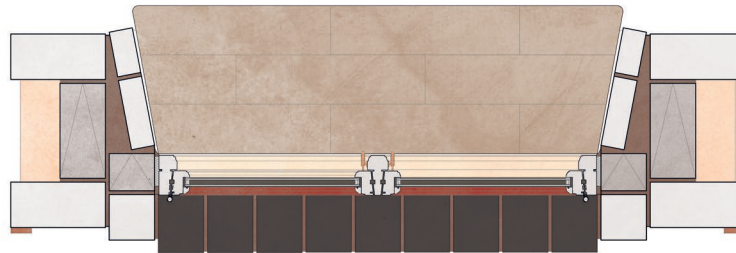
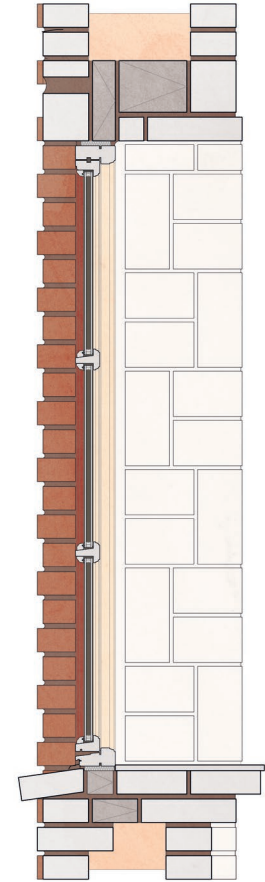
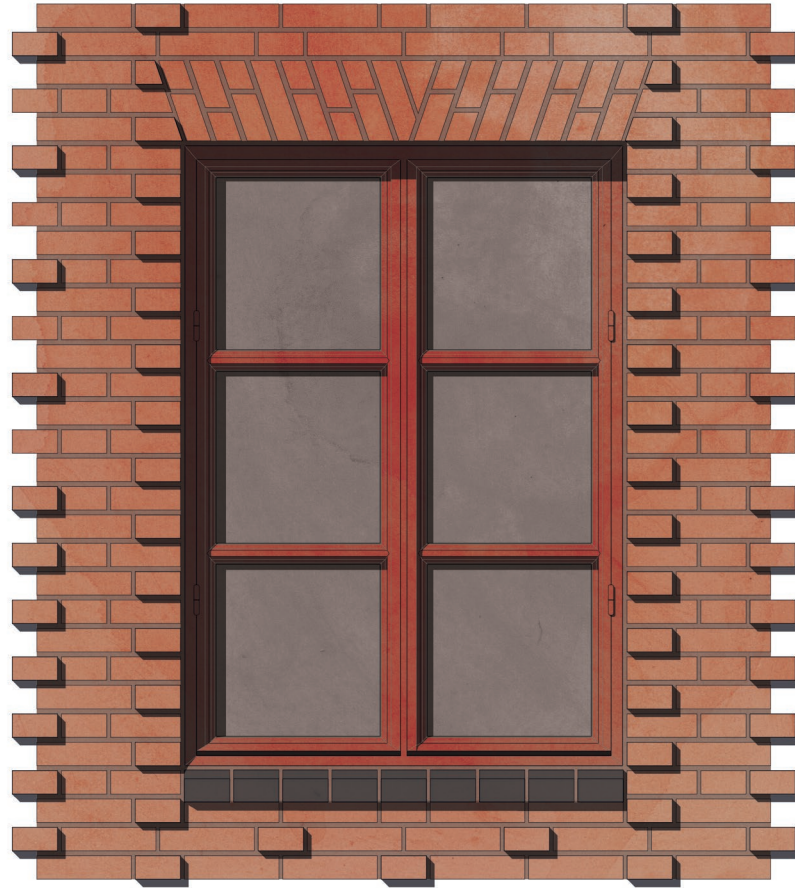
Calculations of U-value for a diaphragm wall with foam glass binders

Windows

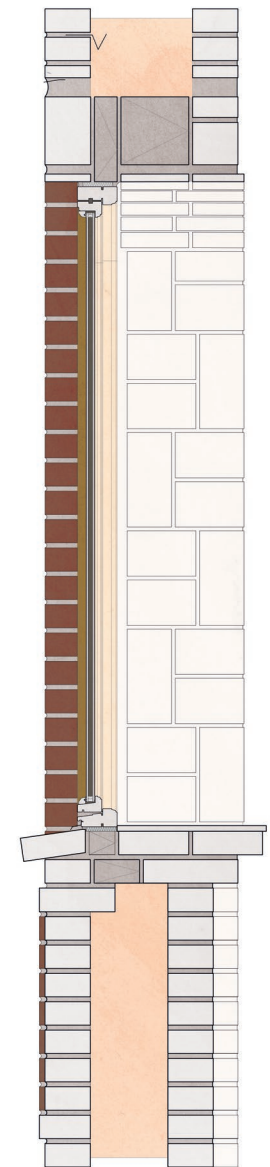
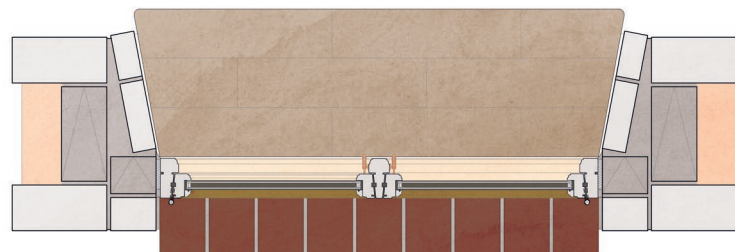
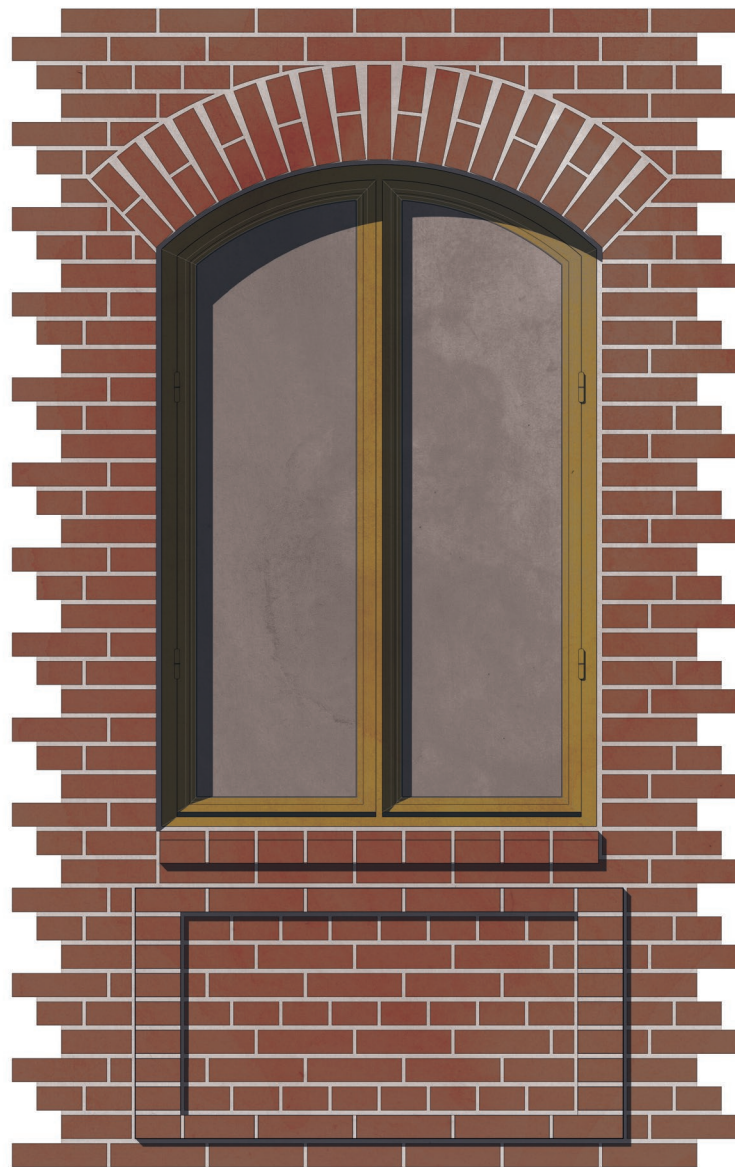
Brick is used internally as well as externally in a way that enhances its materiality. The ornamentation of the façades is made by letting individual bricks extrude outside the main façade line. This gives a pleasant shadow play that changes over the course of a day. Internally the brick is visible in the load bearing walls. The surface, internally, is smeared with a light, thin render.



*Window, building 1
Scale 1:20*



Window, building 2, floor 2
Scale 1:20



Window, building 3, floor 2
Scale 1:20

Discussion and Learnings

Using references has proven a useful tool in bringing this project forward. It has been a way of deepening my understanding of a material and questioning the standard way of building multi-storey buildings today. It is easy to always just go with the same solution in a “this is how it’s usually done” kind of way (concrete everywhere!). But by using constructive references we can learn new (old) ways of doing things as well as get inspiration and understanding of material specific qualities.

I believe that using references can also create a sense of recognition and make the transition from no building to new building smoother. It is however important to not get stuck in copying the existing. Styles in architecture as well as any other isms is a documentation of they were present in. The different styles of buildings in a city help create a historical framework, an understanding for the development, extension and restructure of the built environment.

The way I work to make the inventory needs all three parts to function. Only using the matrix doesn’t give an understanding of the multitude of existing strategies. It is easy to get caught up in the rigidity of the rows and columns, only seeing the quantifiable variables as something homogeneous, when in fact they are not. By going through the drawings from the city archives an understanding of the development and the changing needs in the area could be gained. This showed what has become important over the years. Business spaces transformed into restaurants and balconies were added to almost all buildings that did not have them to begin with

The biggest reason to work with brick in this project was to learn more about the material, and another that the detail development plan states that all buildings must be constructed from a stone material, though studies of reference projects suggest that it is not at all necessary to use the most prevalent material to make a building blend in. Amanda house in Carmarthen place, London (figure 7, pg 12) shows that the opposite might be true as well. A massive wood building is used to contrast the surrounding brick, in line with the ideas about new additions being clearly distinguishable. Whichever method one chooses to use to create the separation between new and existing, it is important to find references to balance the differences with. When using a different material as dominating visual impression it might be sensible to pay more attention to i.e heights of surrounding buildings than when using the same material. There are a number of different references that can be used when creating architectural project, and choosing which ones to work with can be essential for the outcome. That does not mean there is a right or wrong set of references to use, just that they should be used with care and consideration. In the end, architecture is subjective and all architects working with the same constraints will get different results. This is not a bad thing. This is how architecture should work, and it is what gives interesting and varying projects and cities.

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