THE CONNECTION

House Survey on the Ground Floor Zone of Multi-Family Apartment

Ningxin Xu
Chalmers University of Technology
Department of Architecture and Civil Engineering
Examiner: Ola Nylander
Supervisor:Kaj Granath

CHALMERS
UNIVERSITY OF TECHNOLOGY

The Connection -- House Survey on the Ground Floor Zone of Multi-Family Apartment

Ningxin Xu, Gothenburg 2020
Chalmers University of Technology
Department of Architecture and Civil Engineering
Master programme of Architecture and Urban Design
Examiner: Ola Nylander
Supervisor:Kaj Granath

ABSTRACT

In a multi-family housing, ground floor together with the surrounding space, which is called the ground floor zone, is the place where residents go through every day. This area works as a “buffer zone” between indoor and outdoor, private and public space. To some extent, there are various intersections happening within it, including different people and environments.

The thesis focuses on the typologies of the ground floor zone in multi-family apartment in Gothenburg, and how it changes in different time, location and housing typologies.

The aim of this thesis is to explore the ground floor zone as a connection and discover the possibility to provide a more desirable transition space by design of the ground floor zone of housing.

By literature research, case study and also comparisons between them, this thesis will come out with a chronology of the ground floor zone of multi-family apartment in Sweden by the analysis of space attribute of different functions.

Based upon this analysis, a further research will be carried out to look at the ground floor zone of apartments with different typologies and in different locations specifically. The result will be the analysis of ground floor zone of multi-family apartments with different typologies and in different locations.

Keywords

House survey, Ground floor zone, Chronology, Typology, Location, Multi-family apartment

STUDENT BACKGROUND

Education

2013 - 2018
Bachelor in Urban planning
Zhejiang University, China

2018 - 2020
Master in Architecture and Urban design
Chalmers University of Technology, Sweden
Studios: Material and detail, Spatial morphology, Architecture and urban design

Related Projects and Experience

I have done some projects in architecture design scale, including a street hybrid façade reconstruction and a future house design. Through these projects, I gained the ability to design or analyze space from architectural perspective, which allows me to analyze the ground floor plan and make comparisons between them.

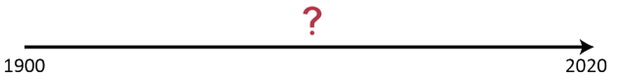
What's more, the study of urban planning and urban design allows me to expend the scope of my research from architecture plans to its surrounding areas.

CONTENTS

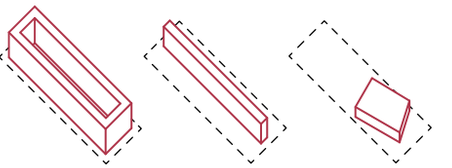
INTRODUCTION

Research Questions

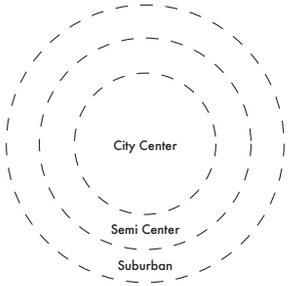
#1. How does design of the ground floor zone of multi-family apartment change from functional perspective at different times?



#2. How does the ground floor zone of multi-family apartment vary in different housing typologies?



#3. How does the ground floor zone of multi-family apartment vary in different locations?



Background

According to the book, 20th-century architecture, Sweden, the whole research scpoe could be divided into 7 period:1900 - 1920, 1920 - 1930, 1930 - 1940, 1940 - 1960, 1960 - 1980, 1980 - 2000, 2000 - 2020.

1900 - 1920

This is a period of transformation, not only architectures, but also the whole society. The growth of industry also drove the development of economy and society. The development of tram expanded the scope of towns quickly.

Architects at that time began to have new attitude and new aesthetic sense but still inspired by Swedish traditional architecture.

However, the whole society was strictly divided into differentiated levels. Housing investigation in some towns showed that differences between classes were obvious and living conditions for working class were poor.

Under such conditions, housing and land policy became a central concern. In 1904, the parliament introduced national loans to support the construction of owner-occupied homes. Theses houses were mainly built for famers' family in the country area, but also available to working class around towns. At the same time, the government also tried to integrate different classes together.

1920 - 1930

During 1920s, Sweden experienced a crisis and also an uninterrupted period of steady economic growth. Industry became to take place of agriculture and the country became literally electrified. The popularity of motor vehicles and railways also helped the developement of industry. Due to rise of wage and purchasing power, trade and commerce became prosperous.

Background

In order to improve efficiency and reduce the cost of construction work, systematic standardization work was introduced so as to create good patterns for joinery work that could be made industrially. Prefabricated apartments and apartments of small size but standard quality became popular because its controllable costs and rapidly developed resolutions of types of plans.

“Landshövdingehus”, a typical dwelling type, was created in 1870s and became a donimant type during this period. It's a three-storey building, the bottom floor built with brick and two upper floors built with wood. It has two apartments per landing, with kitchen facing to the yard and other rooms facing to the street side.

1930 - 1940

This period was mainly occupied by crises and a high unemployment in society.

Lack of housing in good qualtities still remained a question, both socially and politically. Standardisation was considered as one of solutions to solve this problem. Technical developments together with further studies of housing space functions, layouts and function divisions of apartments were resembled. For example, small apartments for working class families were dark and narrow before , but they were equipped with kitchen corners seperated from dining rooms during 1930s.

And bathroom started to be standard of apartment, taking place of public water closet shared by other neighboors.

Daylight was also an important indicator for dwellings during this period. In order to get more daylight, the building had to be thinner with two apartments on each floor landing. But for ecnomic reasons, this type of apartment mainly appeared in suburban areas, where land prices were relatively lower.

Background

1940 - 1960

Shortage of housing and other problems remained as a central part of social issues. In order to solve this series of problems, the social goals of Swedish housing policy were established by the riksdag that the whole population should be furnished with good, hygienic housing at reasonable prices. At the same time, the rent was expected to be controlled at an affordable level and the standard of living condition was expected to increase.

From 1945, economic activity, employment rate and levels of salary developed rapidly in the next 15 years and the number of dwellings also increased about one third. And in 1954, the National Housing Board released a booklet of norms about Swedish housing standards and it kept developing until 1990s.

The flexible apartment plan was developed to satisfy the demand for different families. As an effective typology, a large amount of linear block was built from 1930s and this led to a criticism that people want to see more varied urban plans.

In 1944 – 1946, the first honeycomb buildings were erected to achieve a more economical variant layout. They angled it to make room for a third apartment on each landing, which created a star or honeycomb pattern. This pattern was copied in Sweden and abroad.

1960 - 1980

During this period, Sweden modernized both economically and socially and was deeply influenced by American development model. The building sector was also characterized to build large-scale programs.

Due to a persistent housing shortage and rapid urbanization, there was still a huge demand for dwellings.

The million program is the most representative program during this period. It planned to build one million residential buildings during 1965 to 1974.

Background

In order to improve the efficiency of construction, architects tried hard to develop industrialized buildings. Some apartments in Järnbrott are typical experimental buildings during that time. In apartments in Järnbrott, a system of movable walls was introduced to create potential for flexible space for different families. A non-bearing cladding of corrugated asbestos sheeting was also applied to protect buildings from this windy and rainy weather. The industrialized buildings reduced uncertainty of qualities, limited numbers of variants.

1980 - 2000

Affected by oil crisis and industry transformation, building industry was no longer the mainstream for economy. As the fuel inflation during 1980s and denationalization of society, construction industry suffered an unprecedented blow and the era of large-scale programe was over.

Instead of building new constructions, renewal of old industrial areas and working-class housing areas became a new trend. The right-bank site called Norra Älvstranden was one of the biggest urban-renewal projects in Gothenburg during 1980s. Although reparation and reconstruction programmes can improve living environment, the cost was enormous and gentrification might occur at the same time.

Due to the crisis, the public sector had to succumb to the private sector and the volume of new constructions reduced dramatically.

Background

2000 - 2020

Social segregation has been one of the most essential problems from 21th century. Increasing the variation of housing structure is thought to be one of the solutions of social segregation. Dwellings with fences, locks and gates might be another form of exclusive. This kind of exclusion led to the reduction of mobility and accessibility of urban space(Grundström, 2017). What's more, because of lack of housing, a large amount of temporary housing in poor quality were built. This also contributed to the social segregation.

Another topic in housing design for the past two decades is sustainability. As a large amount of housing were built in 1960s and 1970s, there are a big demand for housing renovation nowadays. Instead of demolition, renovation and repair are more sustainable for environment. Renovation measurement and material selection still need to be investigated. What's more, social sustainablity should also be taken into consideration. Refurbishment always means the rise of rent. It would force the poor to move out and social segregation intensified(Lind et al., 2016).

Purpose & Aim

"Access describes the path from the public to the private sphere and the space it occupies, which begins with two thresholds: the first is the transition into the building; the second leads into one's own apartment." (Heckmann and Schneider, n.d.)

The ground floor zone, which works as the first threshold, also plays an important role in housing as a connection between different spaces and people.

In order to improve the quality of housing design and to provide a more desirable transition space by indoor and out door, research about the ground floor zone is necessary.

This thesis will study in depth of the ground floor zone by literature study, case study and making comparisons between them. The aim of the thesis is to come out with a choronology of the ground floor zone of multi-family apartment in Sweden and the ground floor zone in different housing typologies and different location.

Methdology

There are several criteria need to be taken into consideration when choosing case studies: geographical location (distance to city center); realization time span and then search for projects with different morphology and typology (Semprebon and Ma, 2018). Both building typology and the ground floor zone typology will be taken into consideration.

Under these criteria, projects from 1900 to 2020 will be selected decade by decade. To cover as many different types of ground floor zone as possible, 5 to 10 projects would be chosen for each decade. And then, comparisons between projects will be carried out to draw conclusions.

The space of the ground floor zone is divided into 8categories: apartement, parking, storage, commerial, serive, greenery, urban space and transition space. And under service space, there severl sub-categories:common space,restaurant & kitchen, storage, garbage and service. Transition space mainly serves for residents while urban space can be used by other passerby. Not all projects can include these seven types of space. The comparisons between them will be conducted by the proportion of different categoried of space.

Districts in Gothenburg is divided into three groups: city center, semi center and suburban. Considering the amount of different housing typologies in Gothenburg, this thesis select three typologies with the most projects: perimeter block, linear and solitaire. The same comparisons will be conducted to analyze the ground floor zone of multi-family apartment in different location and with different housing typologies.

As for the data source of case study, all of projects comes from GÖTEBORGS STAD Stadsbyggnadskontoret Verksamhetsstyrning (Gothenburg City Planning Office).

Delimitations

The ground floor zone is considered as “a spatial and social buffer between a complex, anonymous public space and the intimate, individual environments of the residents.” (Heckmann and Schneider, n.d.)

The boundary of the ground floor zone might be defined and delimited by some physical components, such as doors, steps, entrances. Within these boundaries, the ground floor zone might contain elements such as seats, small gardens, vases of flowers. (Bardeesi, 1992) However, it's hard to find a solid boundary in a suitable distance of every project.

According to Lawson(2001), 4m is the dividing line of public distance and social distance. Once over 4m, people might be ignored and no need of acknowledgement. To make it more comparable, the boundary would be 4m extension from the building' exterior walls.

The chronological analysis starts from 1900, which is consider to be the beginning of mordern housign, to nowadays.

And then, further study of transition space will be taken to see how does it work as a connection.

Different urban context and building typology can shape different ground floor zone. However, the aim of the ground floor zone is to provide places for people to have various activities and a safe, comfortable transition for residents.

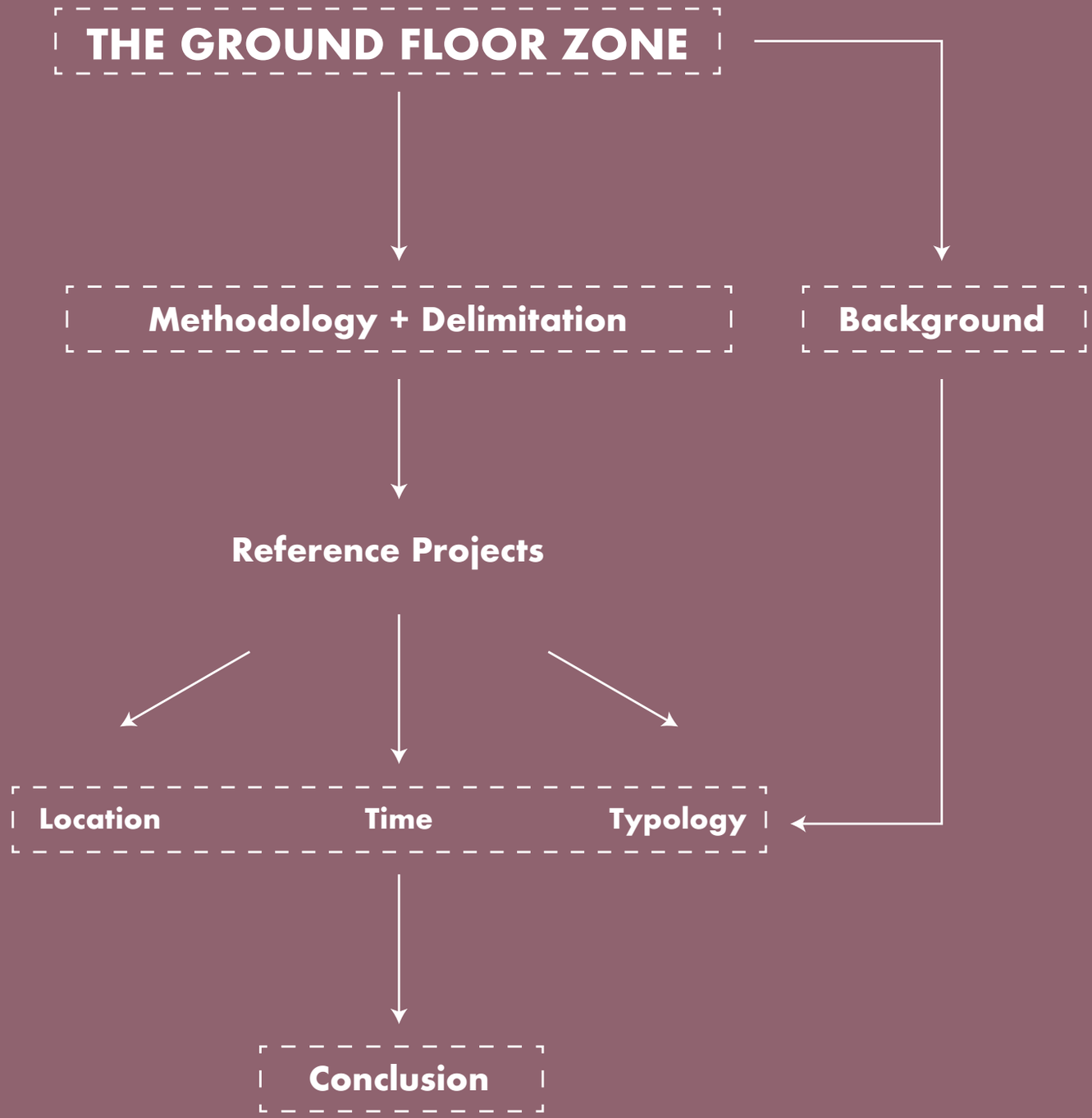


Fig 1. Working Progress

CHRONOLOGY OF THE GROUND FLOOR ZONE

Selection of Case Study

The scope of choronology research of the ground floor zone start from 1900 to 2020, a total of 12 decades. Considering the number of new-built housing in each decade, change of housing policy and housing market, the book 20th-Century Architecture, Sweden, the 12 decades are divided into seven periods: 1900 - 1920, 1920 - 1930, 1930 - 1940, 1940 - 1960, 1960 - 1980, 1980 - 2000, 2000 - 2020. In order to minimize the impact of factors, such as policy and culture, on cases from the same period, all the projects will be picked within Gothenburg, Sweden.

According to Chey (2018), there're 7 typologies of multi family apartment in urban cities: back-to-back, perimeter block, linear block, block edge, solitaire, space-enclosing structure and high-rise tower. In fact, there're 3 main typologies of multi family apartment in Gothenburg, including perimeter, linear and solitaire. However, their frequency is also related to the location to some extent. For example, perimeter block mostly exist in the city center while solitaire usually appear in suburban area.

All illustrations of ground floor plan are in appendix. The scale is 1:750.

Legend

- Apartment
- Common place
- Restaurant & Kitchen
- Transition space
- Greenery
- Storage
- Garbage
- Service
- Parking
- Commercial
- Urban space

Period	Name of Property	Typology	Location	Year
1900 - 1920	Inom Vallgraven 37:10	Linear	City center	1900s
	Inom Vallgraven 61:12	Linear	City center	1900s
	Bagaregården 4:7	Perimeter	Semi center	1910s
	Haga 9:6	Perimeter	City center	1910s
	Masthugget 9:12	Perimeter	City center	1910s
	Majorna 324:9	Perimeter	Semi center	1910s
1920 - 1930	Kålltorp 38:20	Perimeter	Suburban	1920s
	Bagaregården 38:10	Linear	Semi center	1920s
	Bagaregården 9:8	Perimeter	Semi center	1920s
	Haga 6:1	Perimeter	City center	1920s
	Gårda 744:525	Linear	City center	1920s
	Bagaregården 4:1	Perimeter	Semi center	1920s
	Olivedal 9:6	Perimeter	City center	1920s
	Kungsladugård 17:5	Perimeter	Semi center	1920s
1930 - 1940	Bagaregården 27:3	Linear	Suburban	1930s
	Johanneberg 23:4	Linear	Semi center	1930s
	Krokslätt 85:13	Perimeter	Semi center	1930s
	Majorna 341:14	Linear	Semi center	1930s
	Sandarna 2:2	Linear	Suburban	1930s
	Lorensberg 6:10	Perimeter	City center	1930s
	Kungsladugård 35:11	Perimeter	Semi center	1930s
	Sannegården 19:2	Linear	Suburban	1930s
	Kommendantsängen 4:10	Perimeter	City center	1930s
	Kungsladugård 33:8	Perimeter	Suburban	1930s
1940 - 1960	Masthugget 12:4	Perimeter	City center	1940s
	Sandarna 5:8	Linear	Suburban	1940s
	Guldheden 5:4	Solitaire	Semi center	1940s
	Krokslätt 15:7	Perimeter	Semi center	1940s
	Järnbrott 126:10	Linear	Suburban	1950s
	Järnbrott 117:5	Linear	Suburban	1950s
	Johanneberg 18:2 A	Linear	Semi center	1950s
	Johanneberg 18:2 B	Linear	Semi center	1950s
	Johanneberg 18:2 C	Linear	Semi center	1950s
	Guldheden 32:1	Solitaire	Semi center	1950s
	Guldheden 27:2	Solitaire	Semi center	1950s

Period	Name of Property	Typology	Location	Year
1960 - 1980	Sannegården 34:1	Perimeter	Semi center	1960s
	Järnbrott 134:18	Solitaire	Suburban	1960s
	Rud 8:10	Solitaire	Suburban	1960s
	Rud 3:3	Solitaire	Suburban	1960s
	Järnbrott 138:6	Solitaire	Suburban	1960s
	Inom Vallgraven 62:12	Perimeter	City center	1960s
	Masthugget 6:19	Perimeter	City center	1960s
	Stigberget 34:14	Perimeter	City center	1960s
	Gårdsten 3:13 A	Linear	Suburban	1960s
	Gårdsten 3:13 B	Linear	Suburban	1960s
	Gårdsten 3:13 C	Linear	Suburban	1960s
	Landala 12:19	Linear	City center	1970s
	Stigberget 23:1	Perimeter	City center	1970s
1980 - 2000	Stampen 6:20	Perimeter	City center	1980s
	Stampen 13:33	Perimeter	City center	1980s
	Bagaregården 32:6	Tower	Semi center	1980s
	Brämaregården 11:16	Perimeter	Suburban	1980s
	Sannegården 28:10	Perimeter	Semi center	1990s
	Olivedal 5:20	Linear	City center	1990s
	Lindholmen 18:2	Linear	Semi center	1990s
	Sannegården 28:1	Perimeter	Semi center	1990s
2000 - 2020	Sannegården 7:9	Solitaire	Semi center	2000s
	Sannegården 28:15	Linear	Semi center	2000s
	Sannegården 28:13	Solitaire	Semi center	2000s
	Sannegården 29:1	Linear	Semi center	2000s
	Sannegården 77:2	Perimeter	Semi center	2000s
	Sannegården 83:1	Linear	Semi center	2010s
	Kyrkbyn 27:7	Linear	Suburban	2010s
	Brämagreården36:6	Perimeter	Suburban	2010s
	Kvillebäcken 73:1	Linear	Suburban	2010s

1900 - 1920

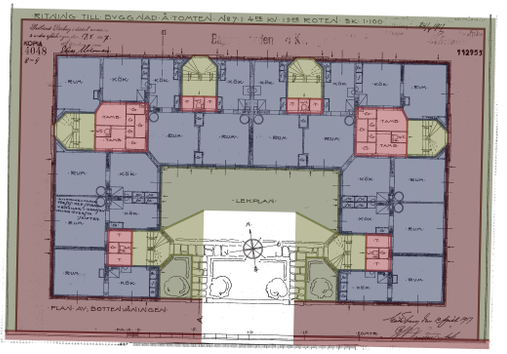


Fig 2. Bagaregården 4:7

Fig 3.Site of Bagaregården 4:7

This project is built in city center area. With a courtyard in the middle, there are staircases both face inward and outward and two apartments per landing. There is no buffer zone for residents as the building is surrounded by urban space.

During this period, apartment, urban space and transition space take the most area of the ground floor zone.

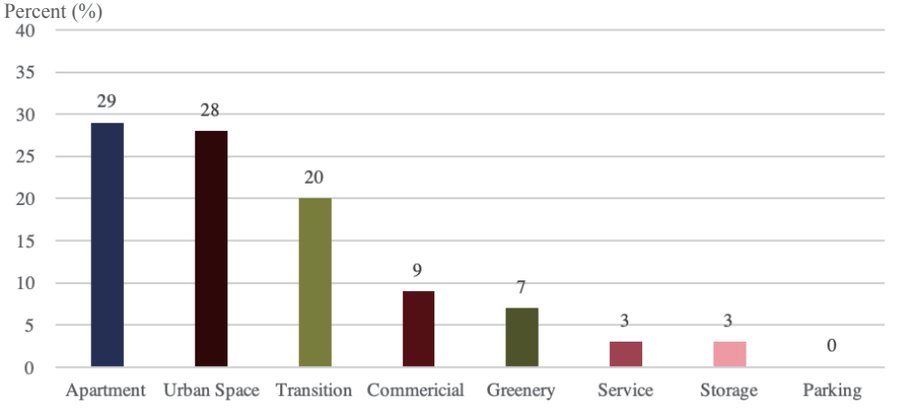


Fig 4.Ratio of Spaces in 1900 - 1920

1920 - 1930

Fig 5. Bagaregården 4:1

Fig 6. Site of Bagaregården 4:1

Compared to last one, there is not much change but more space for service at the corner of the building and more greenery around the building. In this way, residents could have more privacy.

Apartment, transition space and greenery take the most proportion of the ground floor zone during this period.

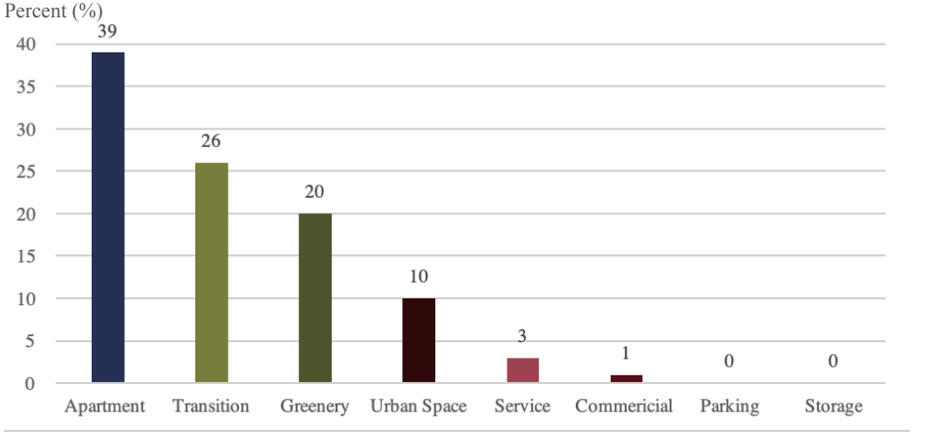


Fig 7.Ratio of Spaces in 1920 - 1930

1930 - 1940

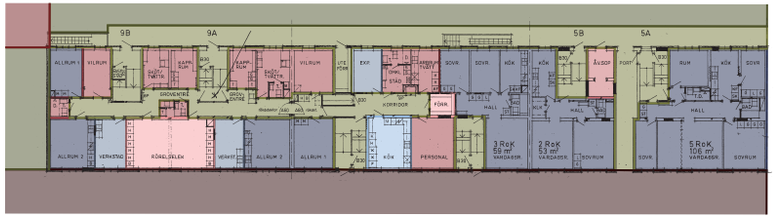


Fig 8.Majorna 341:14

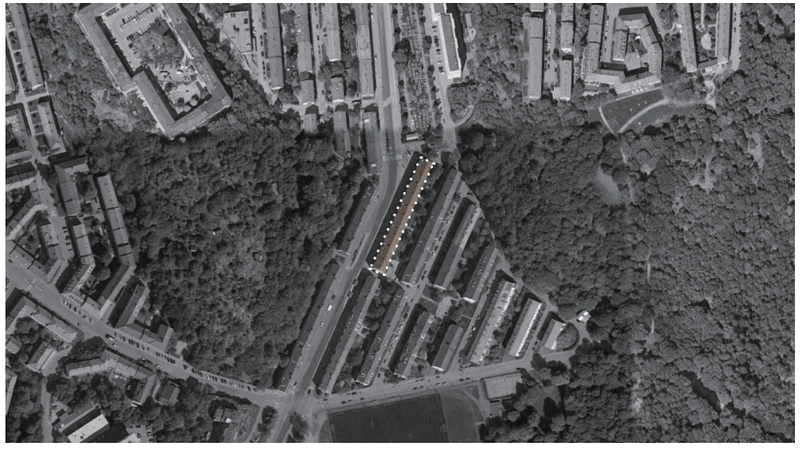


Fig 9. Site of Majorna 341:14

As an efficient housing typology, linear block were built in large amount during this period. For the project on the left, there are entrances on both sides of the building but the main entrance is on the backside with greenery surrounded. Instead of apartment as the main part of the ground floor zone, there are more space for urban space and transition space.

During this period, urban space, transition space and apartment take the most area of the ground floor zone.

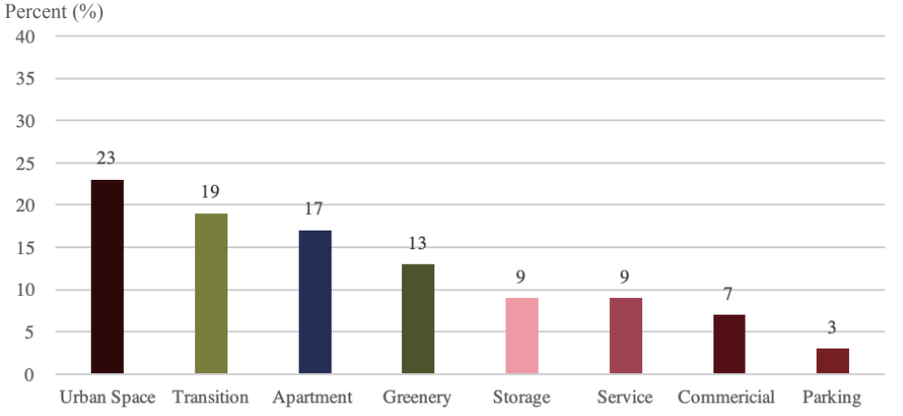


Fig 10.Ratio of Spaces in 1930 - 1940

1940 - 1960

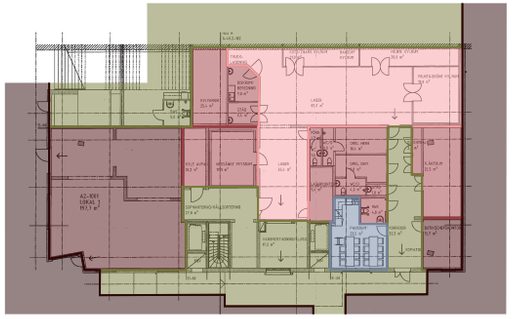


Fig 11. Johanneberg 18:2 A

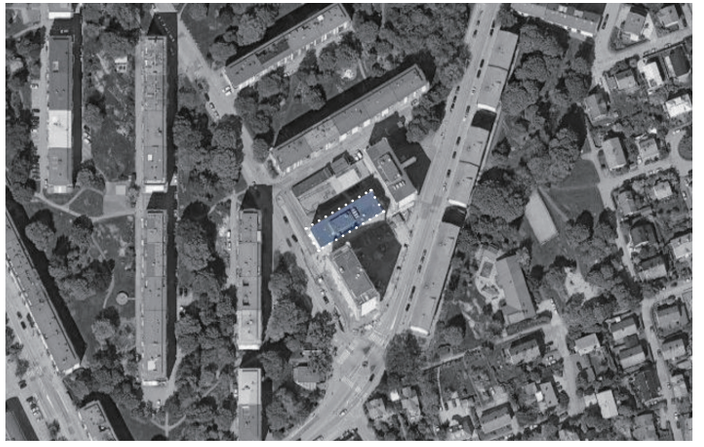


Fig 12. Site of Johanneberg 18:2 A

For projects in this period, like fig 11. shows, service and commercial took part and apartment almost disappeared in the ground floor zone. What's more, the transition space on the southside of the building is the entrance to the underground parking lot.

In this period, urban and transition space and service took the largest part of the ground floor zone.

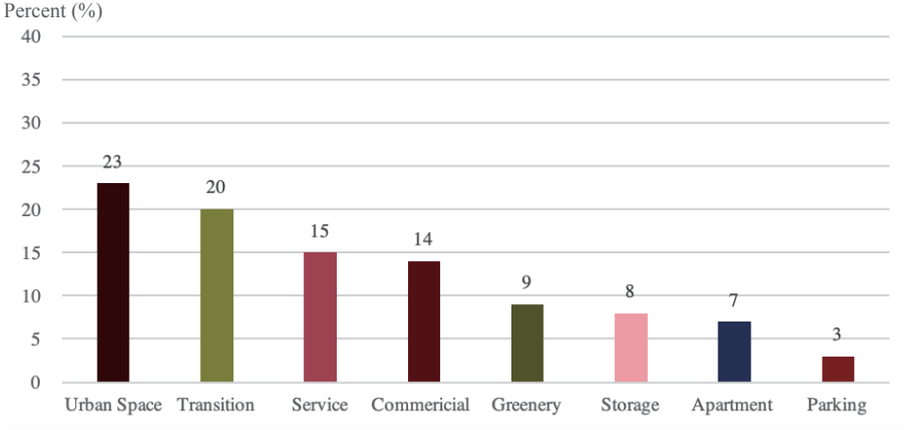


Fig 13.Ratio of Spaces in 1940 - 1960

1960 - 1980

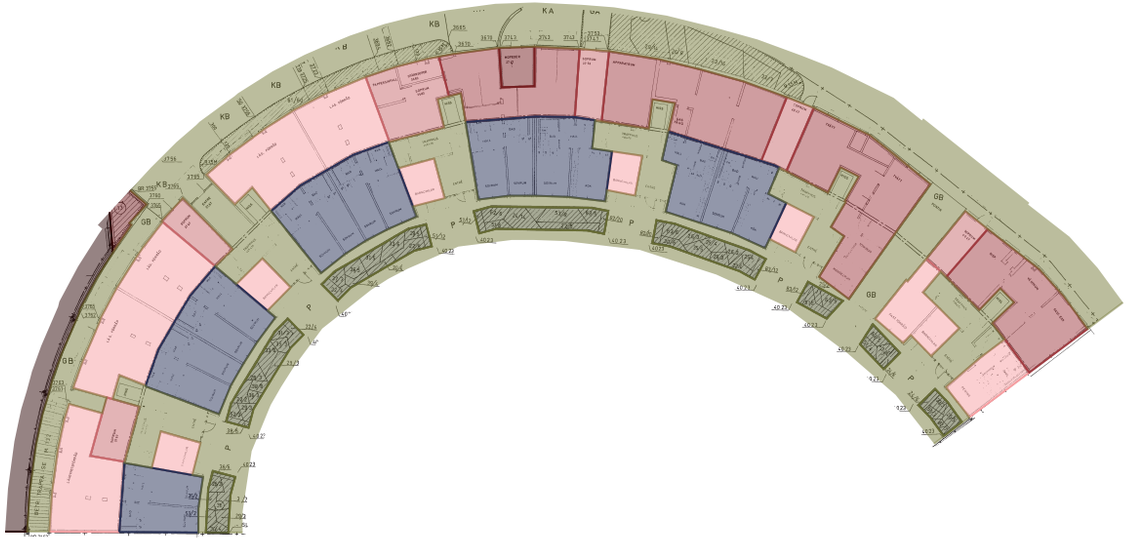


Fig 14. Inom Vallgraven 62:12

Fig 15. Site of Inom Vallgraven 62:12

1960 - 1980

Fig 16. Järnbrott 134:18

In 1960 - 1980, a lot of large programs were built, like the project fig 14. shows. What's more, solitaire block like fig 16. appeared in Gothenburg during this period. With greenery surrounding the building, there is more privacy for residents.Transition space like a core for the floor plan and surrounded by service and storage area. What's more, there is a large vacant space now may work as ventilation or parking space, but it was special shelter which is unique for architectures during this period, after war time.

Transition space, apartment and greenery took largest proportion of the ground floor zone in this time.

Fig 17. Site of Järnbrott 134:18

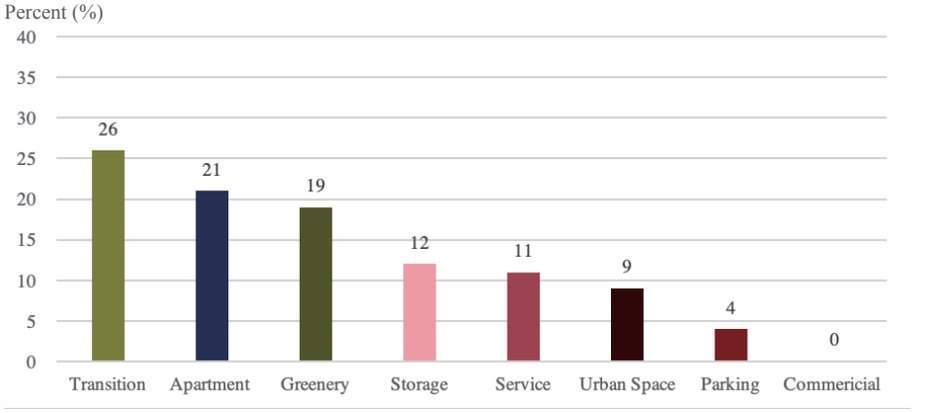


Fig 18.Ratio of Spaces in 1960 - 1980

1980 - 2000

Fig 19. Sannegården 28:1

Fig 20. Site of Sannegården 28:1

Compared to perimeter block built in earlier period, there were more space for parking and service. And transition space was concentrated inside of the building. But there were more entrances that connect urban space and the courtyard.

Transition space, apartment and urban space took the most proportion in this period.

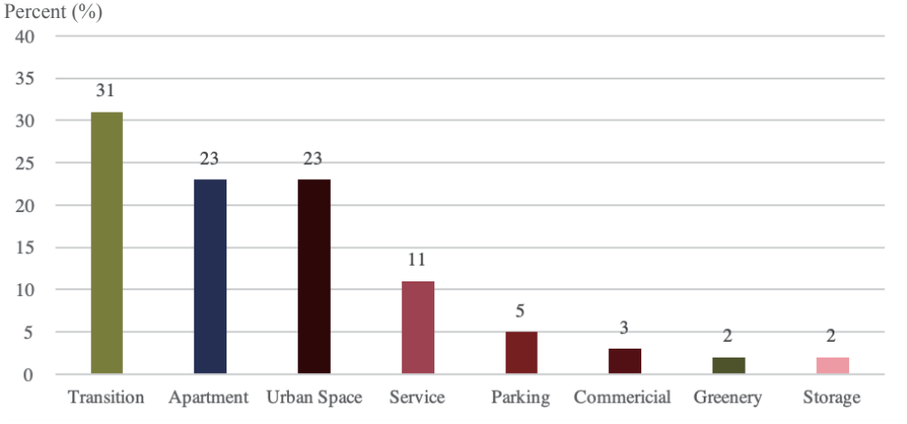


Fig 21.Ratio of Spaces in 1980 - 2000

2000 - 2020

Fig 22. Sannegården 28:15

For the project fig 22. shows, there is greenery as buffer zone between urban space and the building. And all the entrances are in the backside of the building.

Urban space, apartment and transition space took the most proportion in this period.

Fig 23. Site of Sannegården 28:15

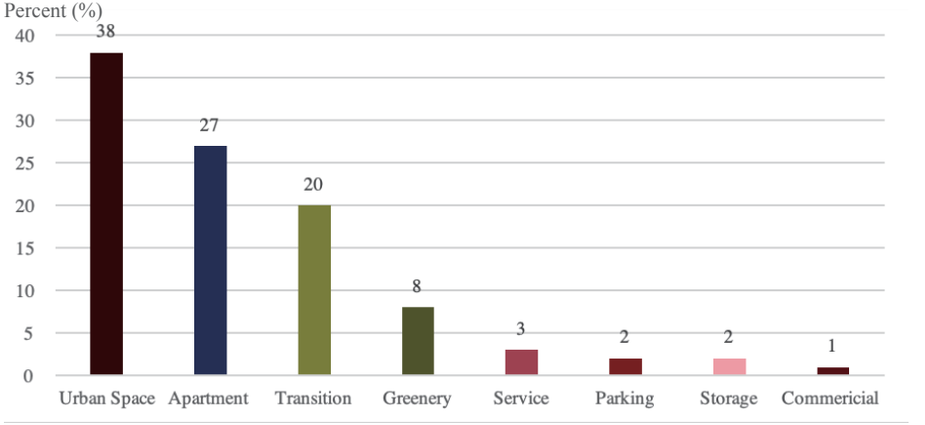


Fig 24.Ratio of Spaces in 2000 - 2020

Conclusion

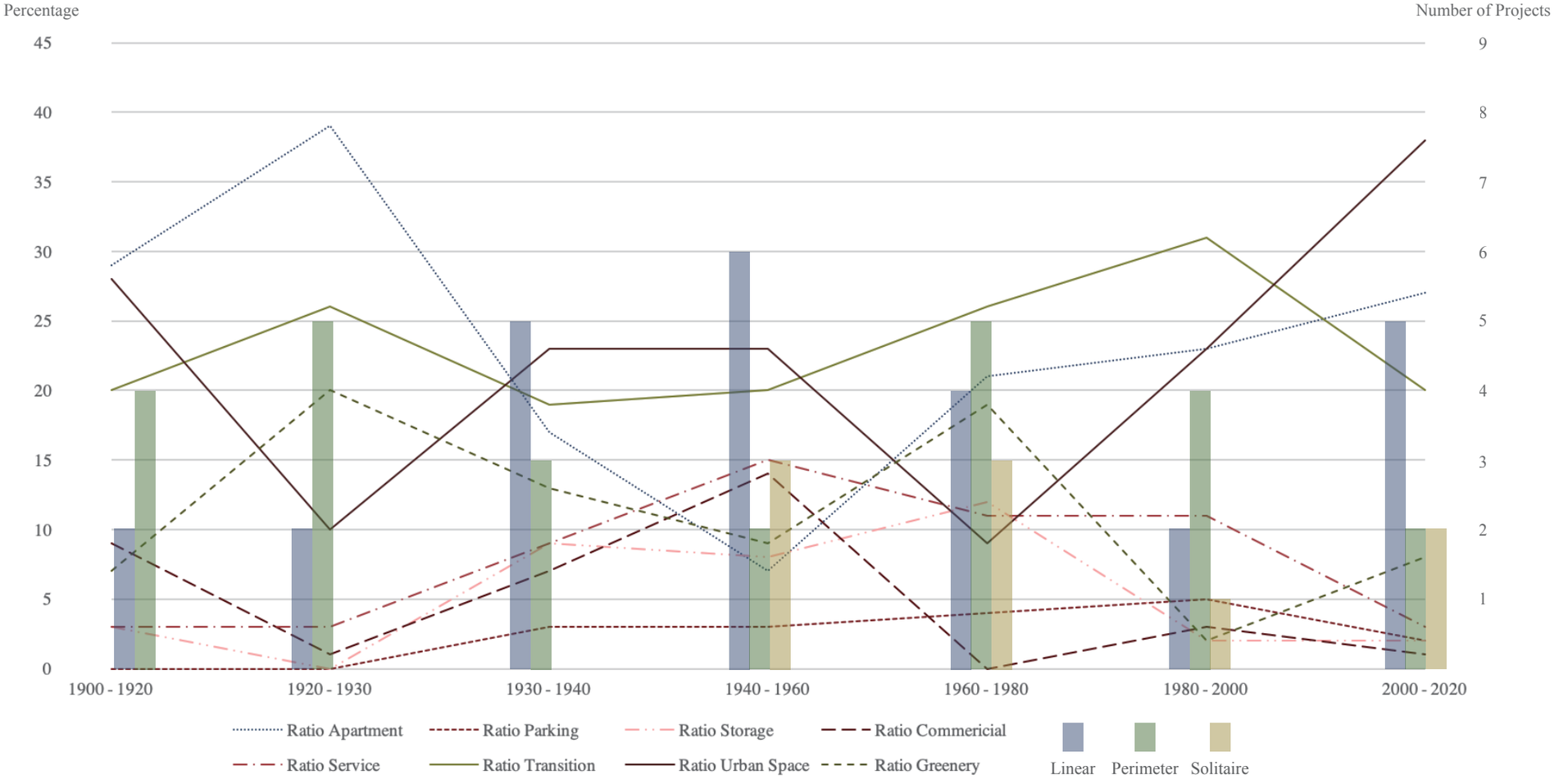


Fig 25. Ratio of Space and number of projects in Different Periods

Conclusion

Fig 25. illustrates how the proportions of these 8 categories of space and numbers of projects with different typologites changed during 120 years.

As fig 26 shows, there're two turning points : one is 1920 - 1930, and the other one is 1960 - 1980. For the proportions of most categories of space, they changed trend at these two points and also large fluctuation occured during 1920 and 1980.

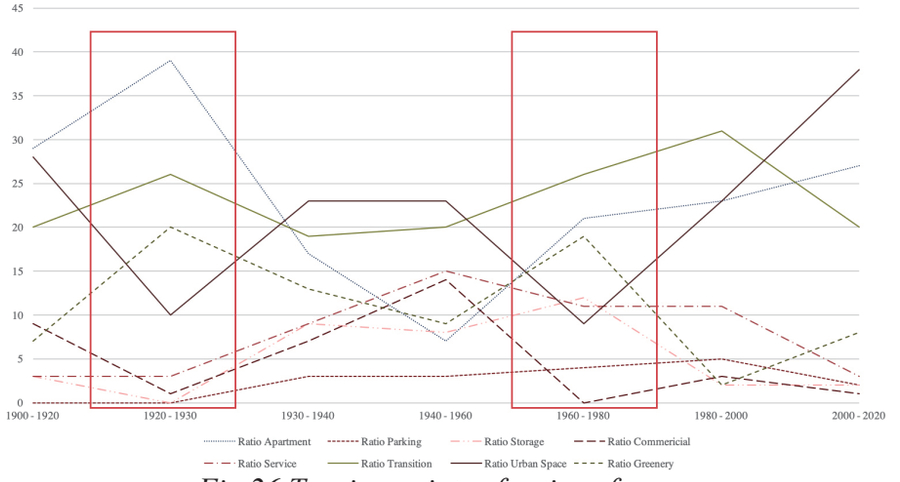


Fig 26.Turning points of ratios of space

The ratio of parking and transtion is relatively stable during the whole period, around 3% and 27% perspectively. However, the ratio of apartment, urban space, commercial and greenery experienced substantial fluctuation from 1920 to 1980.

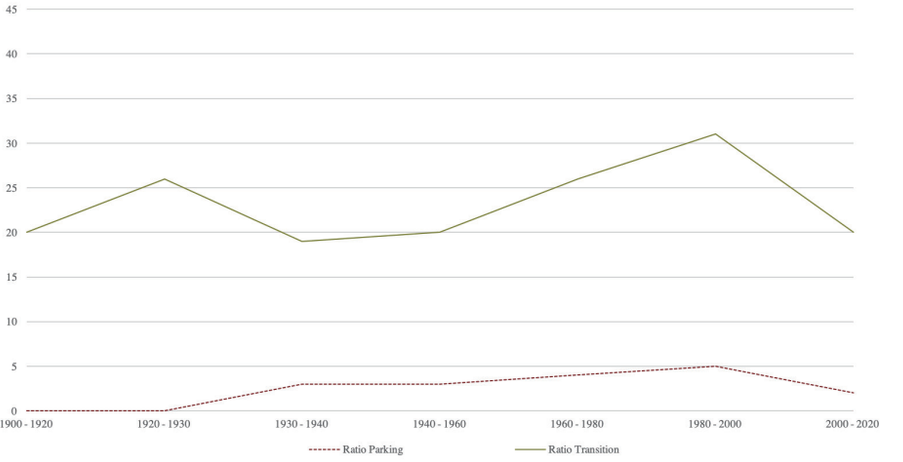


Fig 27.Ratio of transtion and parking space

Conclusion

Ratio of apartment reached a peak in 1920 - 1930, around 40%, and then sharply dropped down to 7% in the next 30 years. Afterwards, it climbed to 21% during 1960 - 1980 and then remained almost steady until today. Ratio of greenery almost experience the same fluctuation from 1900 to 1980 with apartment but at a smaller scale, with peak to 19% and bottom to 4%.

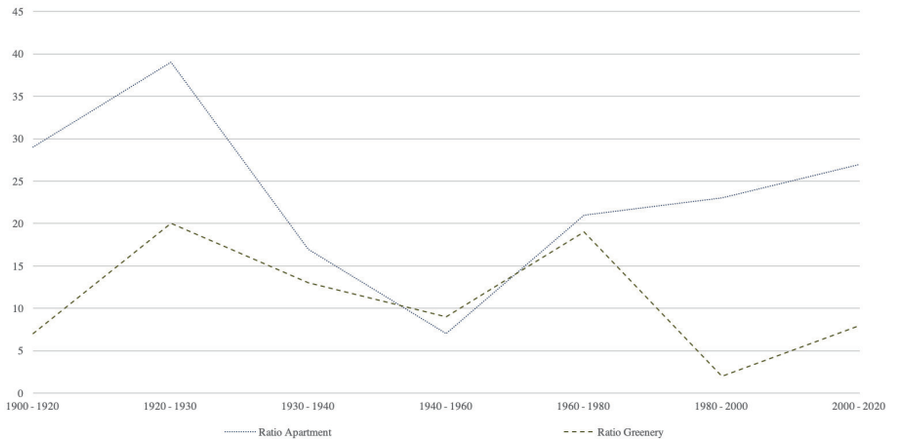


Fig 28.Ratio of apartment and greenery

However, ratio of service and urban space show the opposite trend with apartment from 1900 to 1980. They first reached the bottom in 1920s and then kept increasing until 1960.

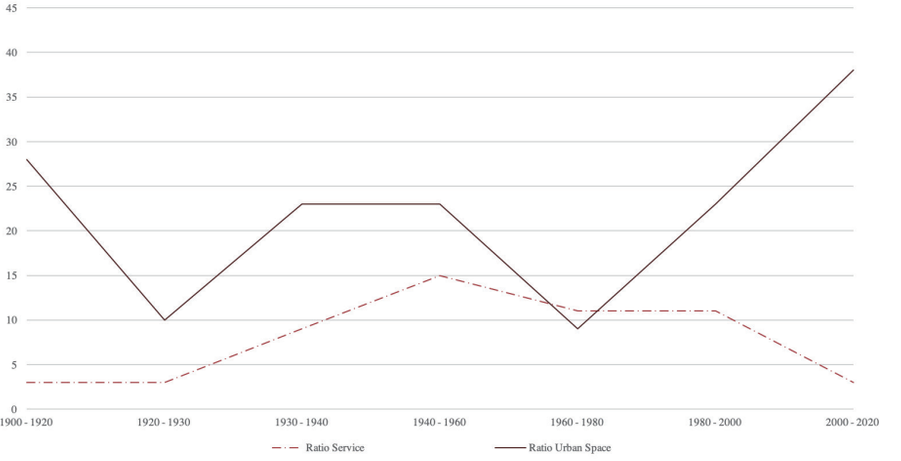


Fig 29.Ratio of service and urban space

ANALYSIS OF TYPOLOGY, LOCATION & GROUND FLOOR ZONE

Analysis of Housing Typology & Ground Floor Zone

Fig 29. illustrates how the proportions of these 8 categories vary with different housing typologies. It's clear to see ratio of some spaces are closely related to housing typology while others are not.

Generally speaking, the ratio of transition space is very stable with different housing typologies, about 25%.

The proportion of storage and commercial show the same trend: it takes the highest proportion in linear block, next in perimeter block, and takes the least proportion in solitaire block. Ratio of parking, service and greenery share the same pattern: it takes the highest proportion in solitaire block, next in linear block and then in perimeter block. Ratio of apartment and urban space share the same pattern: it takes the highest proportion in perimeter block, then the linear block and take the least part in solitair block.

In linear and perimeter block, transition space, apartment and urban space take the most area while in solitair block, transition space, greenery and apartment account the largest area.

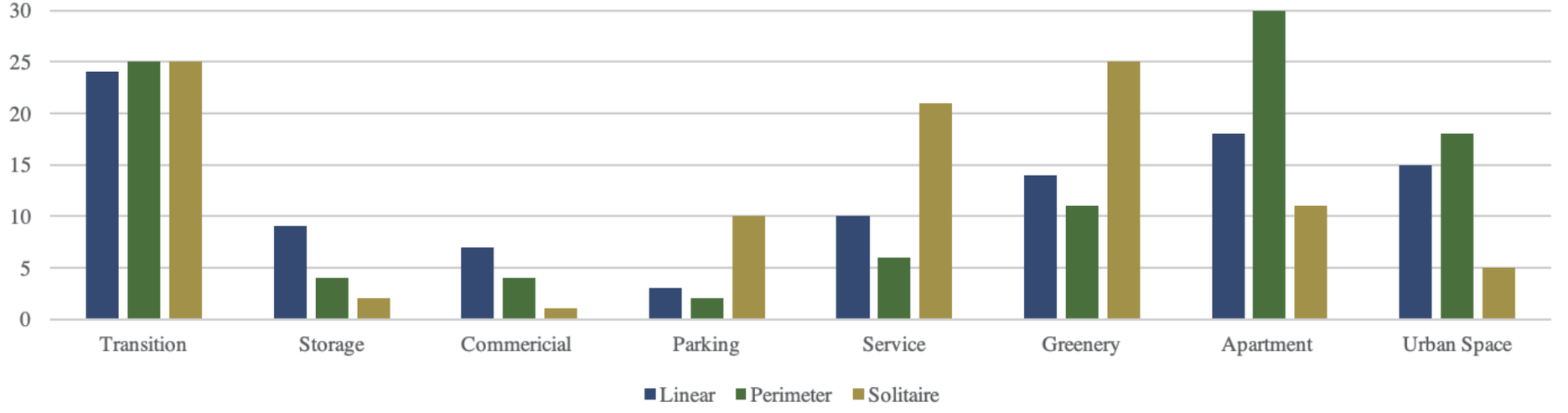
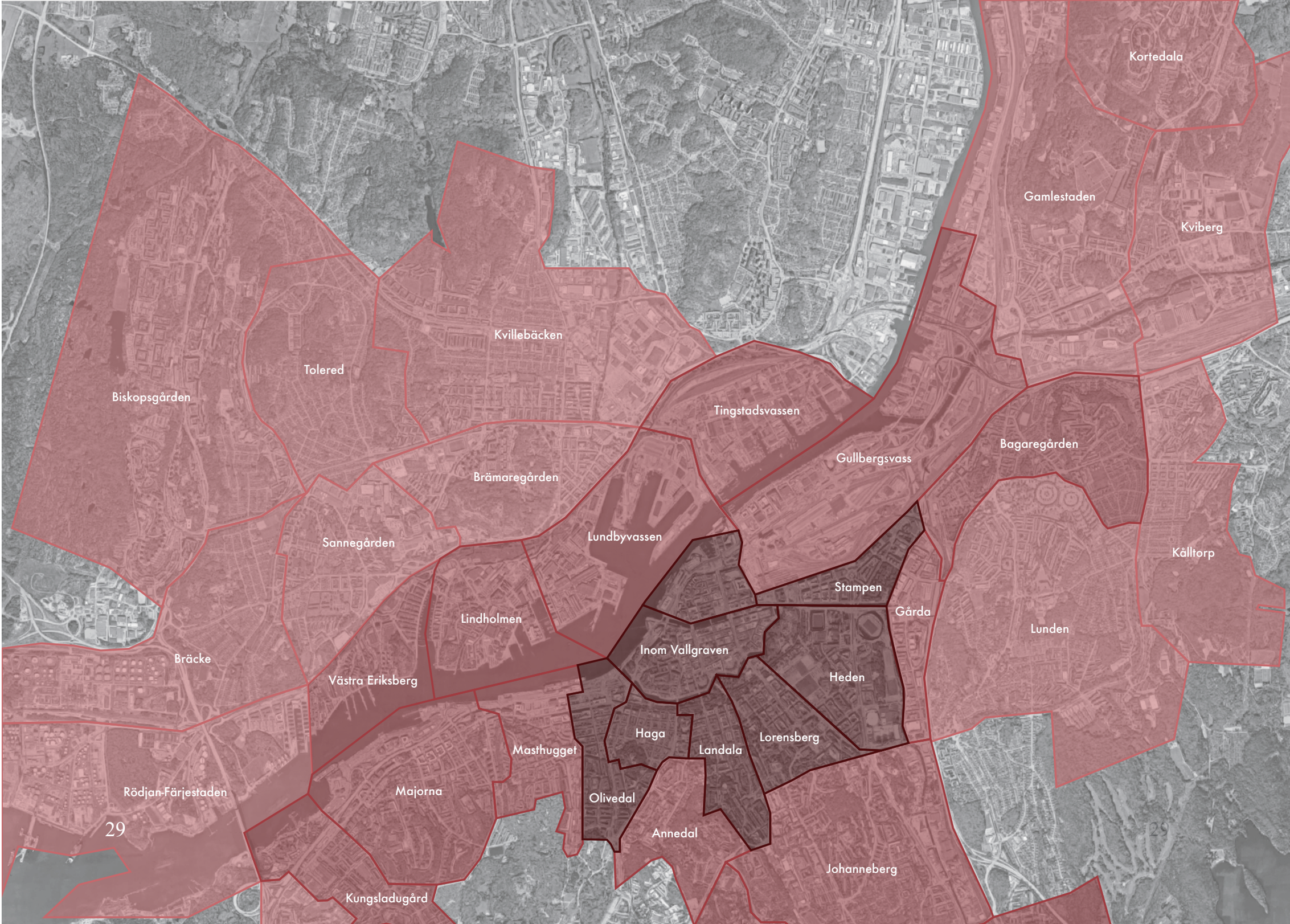


Fig 30. Ratio of Space with Different Housing Typologies


Kortedala
Gamlestaden
Kviberg
Kvillebäcken
Tolered
Biskopsgården
Tingstadsvassen
Gullbergsvass
Bagaregården
Brämaregården
Sannegården
Lundbyvassen
Kålltorp
Stampen
Gårda
Lindholmen
Lunden
Inom Vallgraven
Bräcke
Heden
Västra Eriksberg
Haga
Lorensberg
Masthugget
Landala
Rödjan-Färjestaden
Majorna
Olivedal
Annedal
Johanneberg
Kungsladugård

29

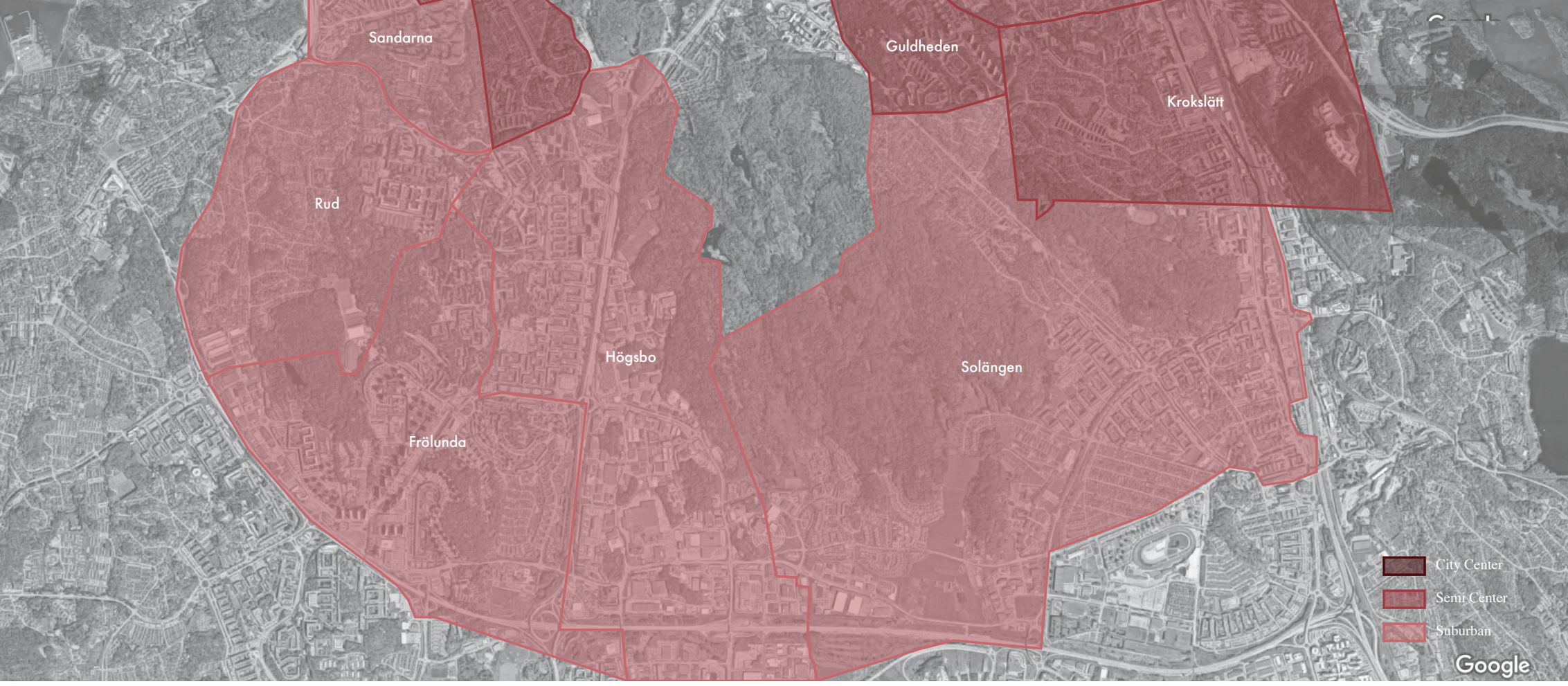


Fig 31. Map of Districs in Different Location

Analysis of Location & Ground Floor Zone

Fig 31. illustrates how the proportions of these 8 categories change in different location. It's clear to see ratio of some spaces are closely related to location while others are not.

Generally speaking, the ratio of parking and transition space are very stable in city center, semi center and suburban. The proportion of storage and service show the same pattern: it decreases as the distance to city center increases, but after reaching the turning point in semi center, it starts to rise and reaches the peak in the suburban.

The ratio of urban space and commercial show the opposite trends with greenery. It declines as the distance to city center increasing while the ratio of greenery goes up. This situation might due to economic considerations, commercial space always has the greastes ecnomic value while greenery has little.

In city center and semi center area, transition space, apartment and urban space take the most space while in suburban, transtion space, greenery and service accout for the largest space.

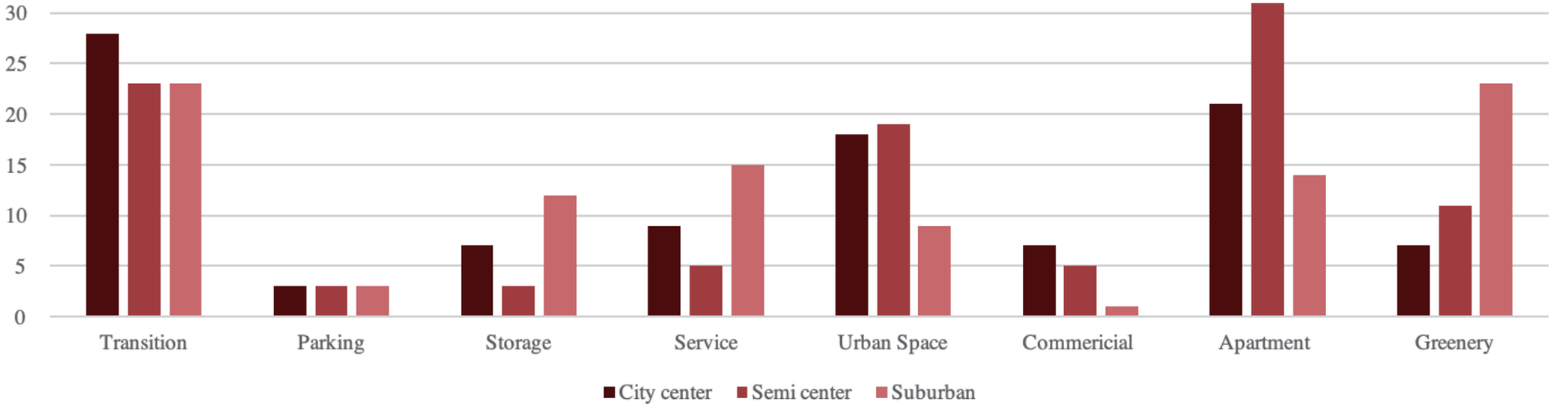


Fig 32. Ratio of Space in Different Location

Future Tense

According to Bueren (2012), there are 7 privacy zones in a neighborhood with multi-storey flats in Delft. Zone 1 are dwellings with the most privacy. Zone 2 is the gallery shared by some flats. Zone 3 are stairwell and lift shared by residents live in one building. Zone 4 are the entrance area in the building and zone 5 are the entrance area outside the building. Zone 6 is the area where the building is located and might be used by some passers-by. Zone 7 is the whole neighborhood. This system could help people to find a boundary for every territory and guide their behaviors.

However, this thesis divides the ground floor zone according to their functions. It's undeniable that there exists some relationship between function and privacy of the space, like apartment always has the most privacy while commercial and urban space has the least. In this way, it will be better to find the location for every function space in a "privacy scale". Then it can help to guide the design of space.

APPENDIX

Glossary

All room - *allrum*

Bedroom - *sovalkov/ s.rum*

Cloakroom - *kapprum*

Commercial - *butik*

Corridor - *korridor*

Cycles/Cycle space - *cyklar/cykelplatser*

Dining room - *matplats*

Doorway - *port*

Dryer/Drying room - *tork/torkrum*

Electronic center - *EL C/elecentral*

Elevator - *hiss*

Equipment room - *apparatrum*

Fridge - *KYL*

Pantry - *pentry*

Garbage room - *soprum*

Goods receptions - *varumottag*

Hallway - *tambur*

Kitchen - *kök*

Laundry room- *tvätt/tvättstuga*

Living room - *vardagsrum/v.rum*

Local - *lokal*

Mangle - *mangel*

Mopeds - *mopeder*

Office - *kontor*

Rest room - *pausrum*

Special shelter - *skyddsrum*

Stairs - *trapphus*

Storehouse - *förråd/lager*

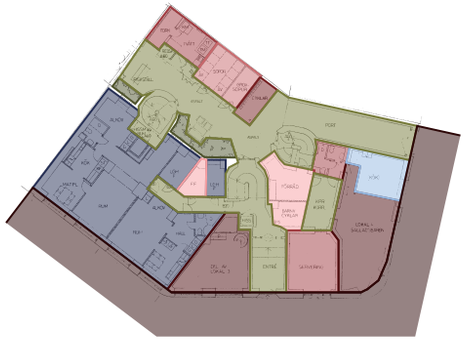
Strollers - *barnvagnar*

Ventilation/Ventilation room - *fläk/fläktrum*

Waiting room - *väntrum*

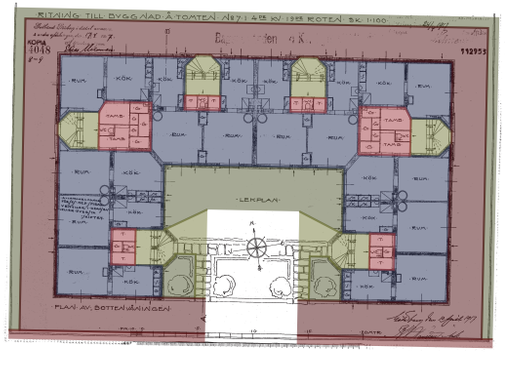
Walk-in-closet - *klädkammare/klk*

1900 - 1920

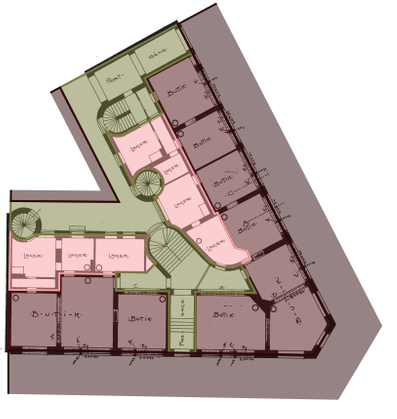


Inom Vallgraven 37:10

Inom Vallgraven 61:12



Bagaregården 4:7



Haga 9:6

Legend

- Apartment
- Common place
- Restaurant & Kitchen
- Transition space
- Greenery
- Storage
- Garbage
- Service
- Parking
- Commercial
- Urban space

1900 - 1920

Masthugget 9:12

Majorna 324:9

1920 - 1930

Bagaregården 38:10

Bagaregården 4:1

Kålltorp 38:20

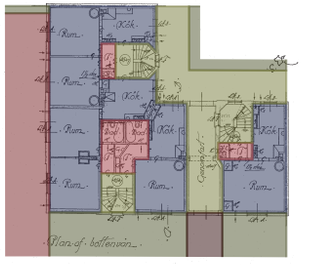
Olivedal 9:6

Legend

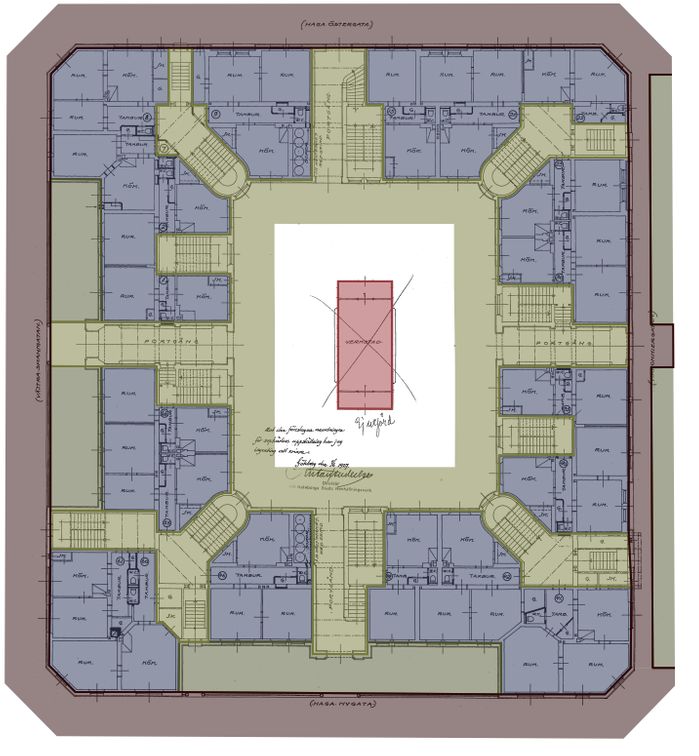
- Apartment
- Common place
- Restaurant & Kitchen
- Transition space
- Greenery
- Storage
- Garbage
- Service
- Parking
- Commercial
- Urban space

1920 - 1930

Gårda 744:525



Kungsladugård 17:5

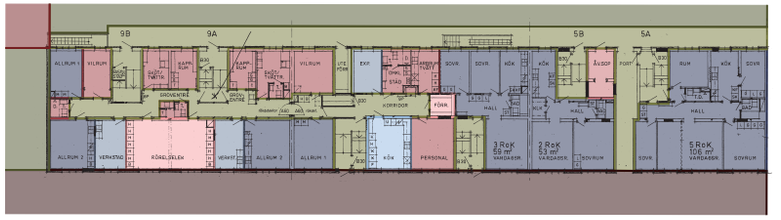


Haga 6:1

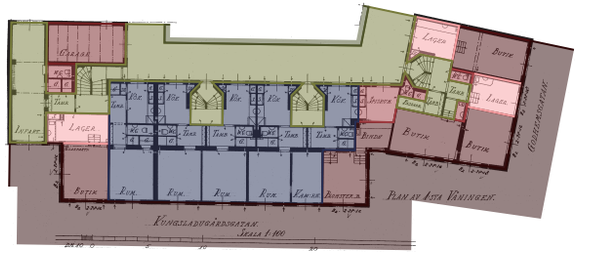
1920 - 1930

Bagaregården 9:8

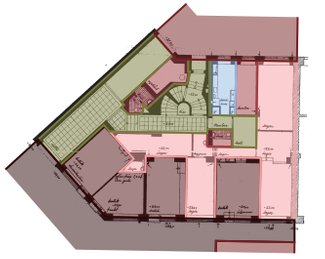
1930 - 1940



Majorna 341:14



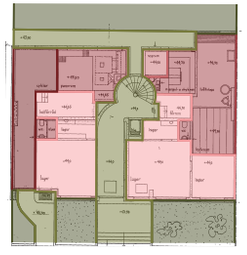
Kungsladugård 35:11



Lorensberg 6:10

Legend

- Apartment
- Common place
- Restaurant & Kitchen
- Transition space
- Greenery
- Storage
- Garbage
- Service
- Parking
- Commercial
- Urban space



Krokslätt 85:13

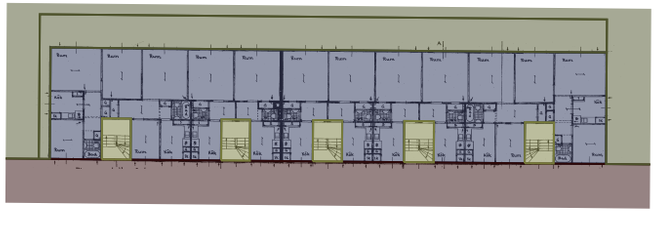
Johanneberg 23:4

Kungsladugård 33:8

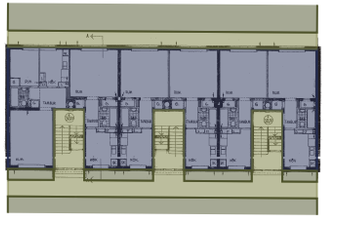
1930 - 1940

Sannegården 19:2

Kommendantsängen 4:10



Bagaregården 27:3



Sandarna 2:2

1940 - 1960

Sandarna 5:8

Masthugget 12:4

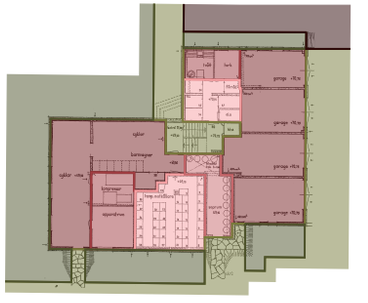
Krokslätt 15:7

Legend

- Apartment
- Common place
- Restaurant & Kitchen
- Transition space
- Greenery
- Storage
- Garbage
- Service
- Parking
- Commercial
- Urban space

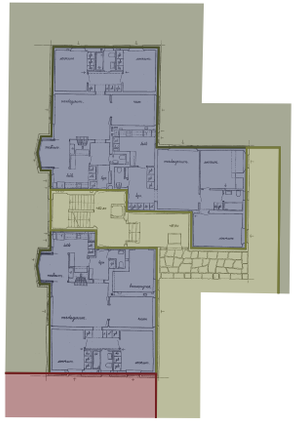
1940 - 1960

Järnbrott 126:10

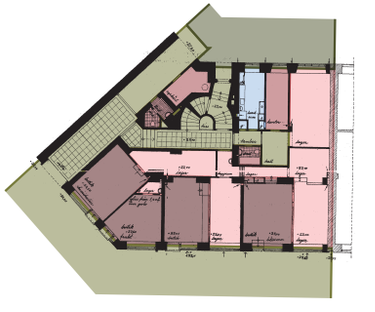


Guldheden 27:2

Järnbrott 117:5

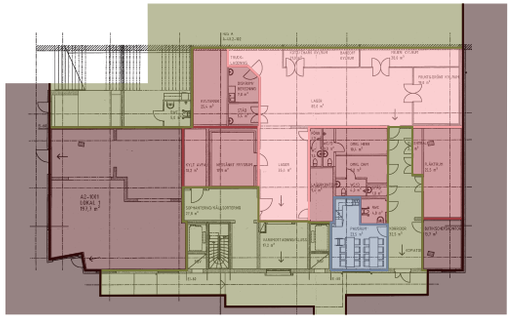


Guldheden 5:4



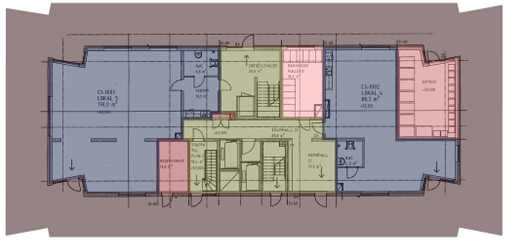
Guldheden 32:1

1940 - 1960



Johanneberg 18:2 A

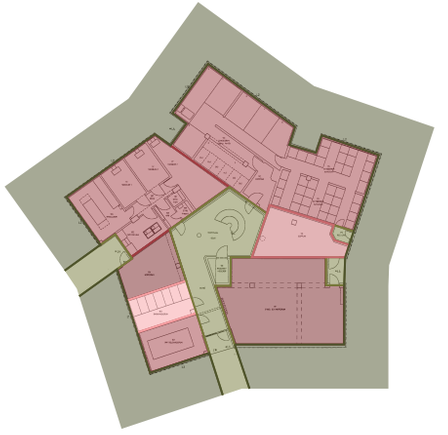
Johanneberg 18:2 B



Johanneberg 18:2 C

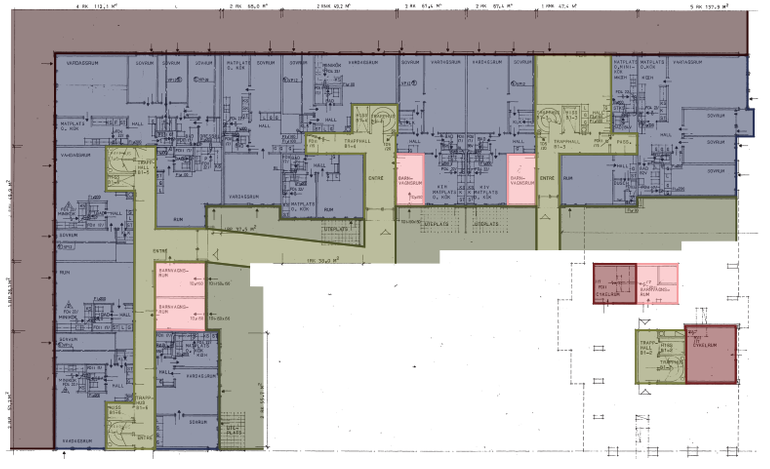
1960 - 1980

Jarnbrott 134:18



Rud 8:10

Rud 3:3

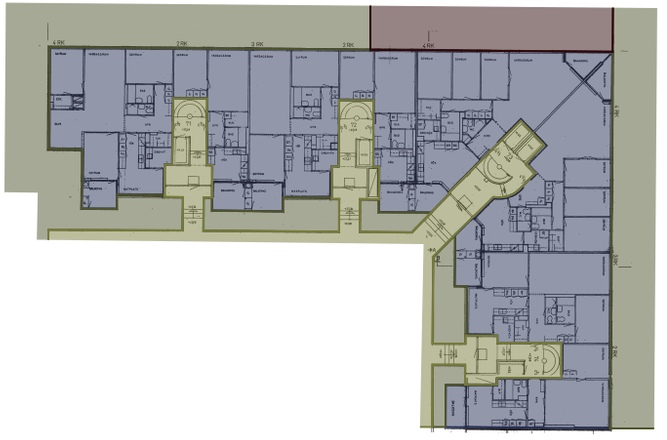


Masthugget 6:19

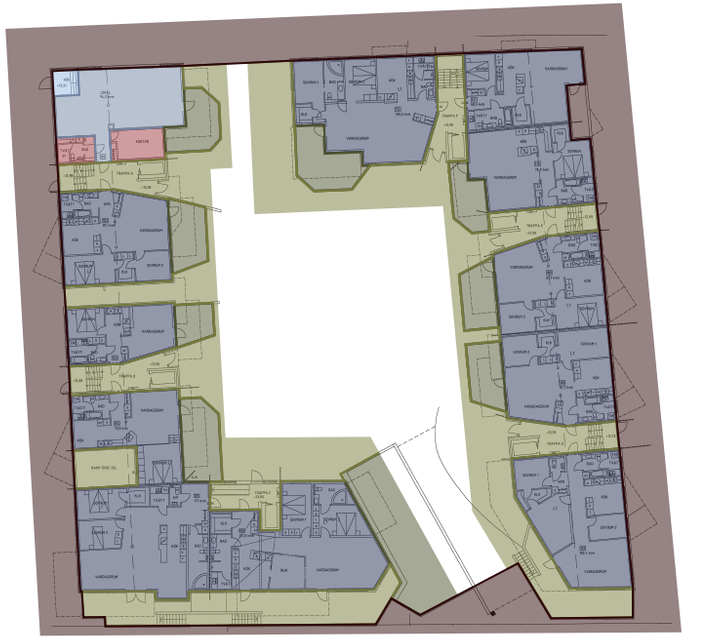
Legend

- Apartment
- Common place
- Restaurant & Kitchen
- Transition space
- Greenery
- Storage
- Garbage
- Service
- Parking
- Commercial
- Urban space

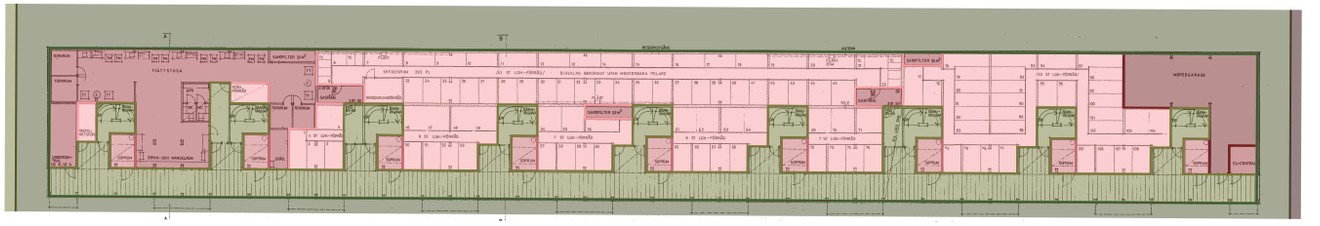
1960 - 1980



Stigberget 34:14

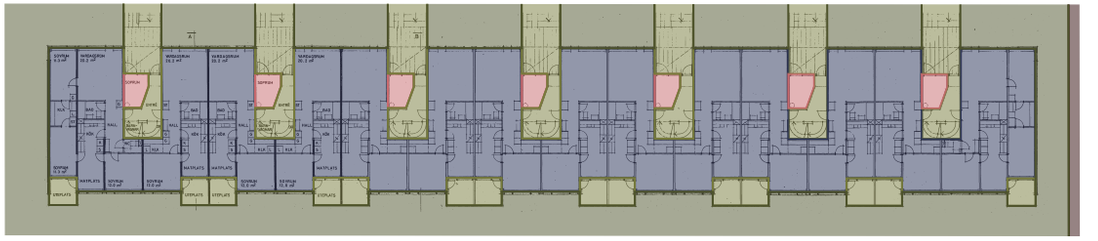


Sannegården 34:1

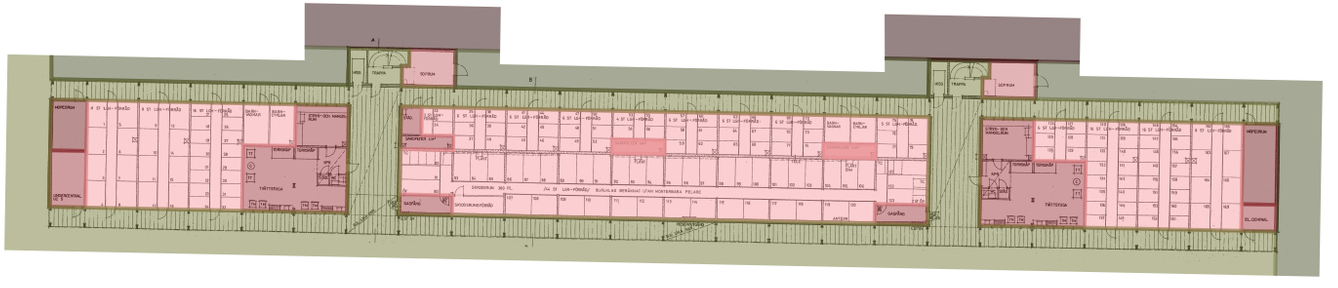


Gårdsten 3:13 A

1960 - 1980

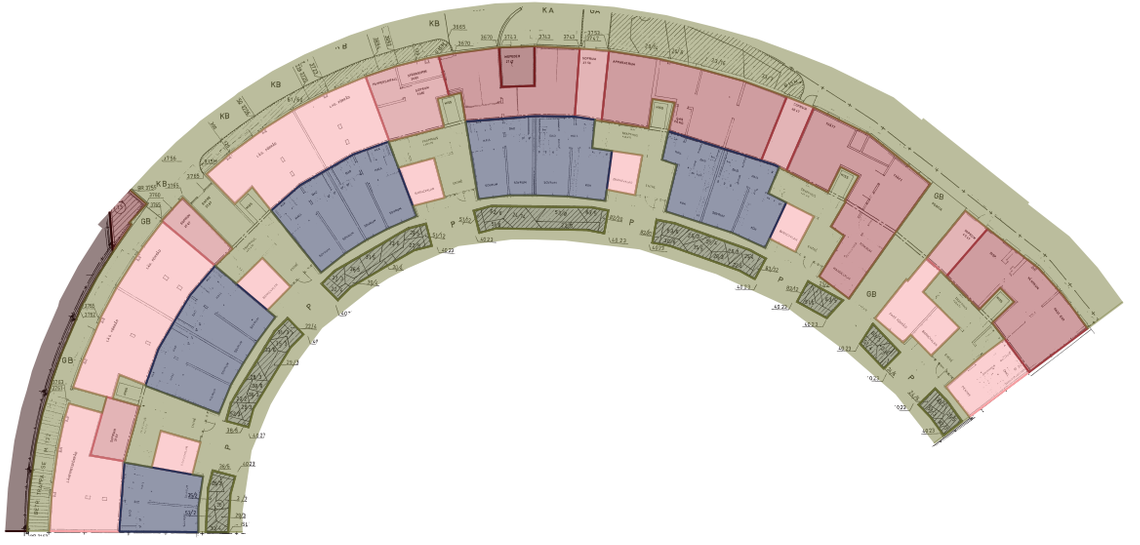


Gårdsten 3:13 B

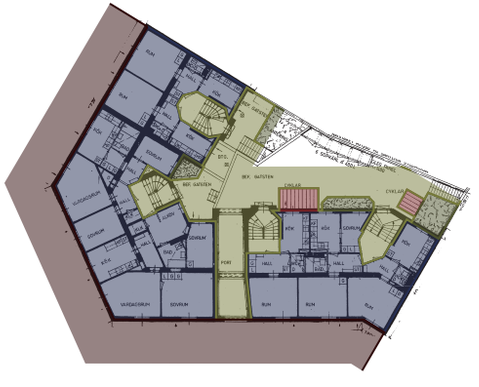


Gårdsten 3:13 C

1960 - 1980



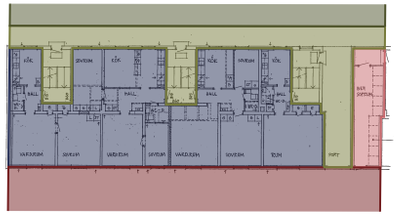
Inom Vallgraven 62:12



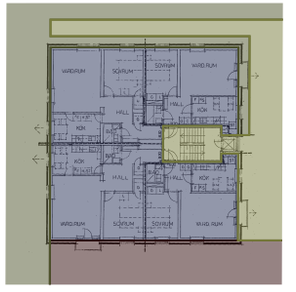
Stigberget 23:1

Landala 12:19

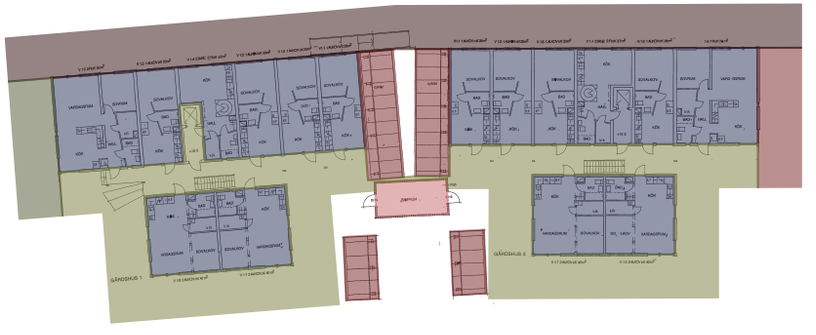
1980 - 2000



Brämaregården 11:16



Bagaregården 32:6



Lindholmen 18:2

Legend

- Apartment
- Common place
- Restaurant & Kitchen
- Transition space
- Greenery
- Storage
- Garbage
- Service
- Parking
- Commercial
- Urban space

1980 - 2000

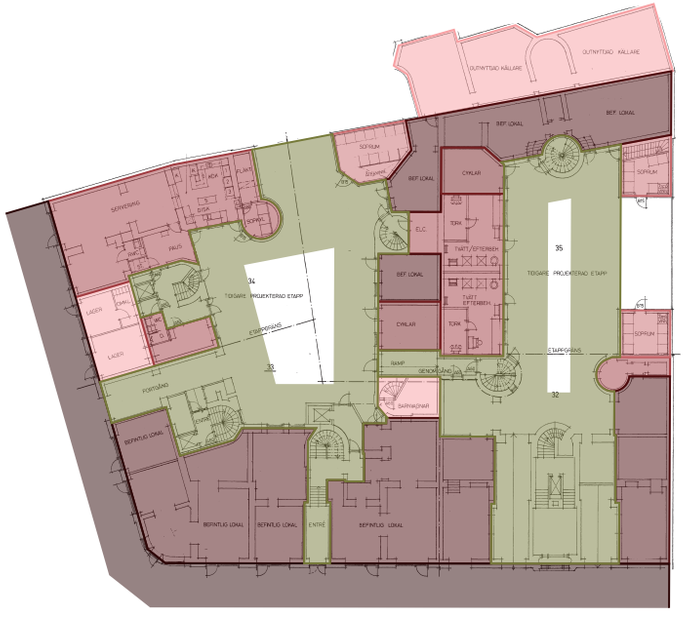
Sannegården 28:1

Sannegården 28:10

1980 - 2000

Olivedal 5:20

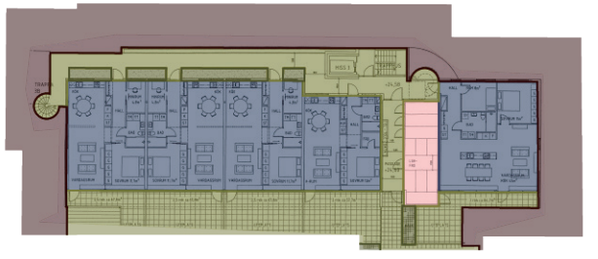
Stampen 6:20



Stampen 13:33

2000 - 2020

Sannegården 28:13



Sannegården 29:1

Sannegården 7:9

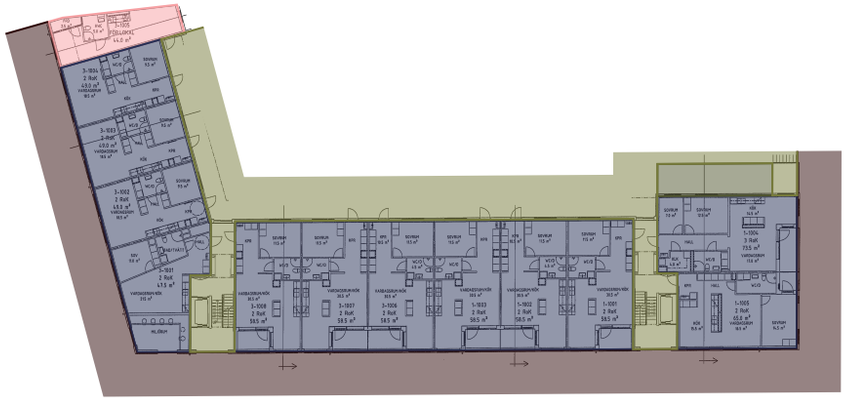
Kyrkbyn 27:7

Legend

- Apartment
- Common place
- Restaurant & Kitchen
- Transition space
- Greenery
- Storage
- Garbage
- Service
- Parking
- Commercial
- Urban space

2000 - 2020

Sannegården 83:1



Brämagreården36:6

Sannegården 28:15

2000 - 2020

Kvillebäcken 73:1

Sannegården 77:2

Period	Name of Property	Area(m²)										
		Apartment	Parking	Storage	Commercial	Service				Transition	Urban Space	Greenery
						Kitchen & Restaurant	Garbage	Common Space	Others			
1900 - 1920	Inom Vallgraven 37:10	203	8	28	79	18	19	0	52	188	220	11
	Inom Vallgraven 61:12	0	0	64	321	21	0	0	20	159	255	198
	Bagaregården 4:7	453	29	0	0	0	0	0	63	96	378	196
	Haga 9:6	0	0	109	262	0	0	0	0	172	283	0
	Masthugget 9:12	20	0	68	125	0	0	0	0	169	88	0
	Majorna 324:9	1860	0	0	0	0	90	0	0	936	1152	216
	Total	**2536**	**37**	**269**	**787**	**39**	**109**	**0**	**135**	**1720**	**2376**	**621**
1920 - 1930	Kålltorp 38:20	104	32	0	49	57	0	0	18	137	149	21
	Bagaregården 38:10	350	12	0	0	102	0	0	107	360	220	223
	Bagaregården 9:8	2682	0	41	102	0	0	0	0	1614	0	1837
	Haga 6:1	1457	0	0	0	0	0	0	56	980	820	349
	Gårda 744:525	140	0	0	32	0	0	0	0	43	73	54
	Bagaregården 4:1	405	0	21	98	0	0	0	19	273	170	243
	Olivedal 9:6	0	66	140	24	0	0	0	9	215	0	44
	Kungsladugård 17:5	206	88	0	0	0	0	0	28	115	13	89
	Total	**5344**	**198**	**202**	**305**	**159**	**0**	**0**	**237**	**3737**	**1445**	**2860**
1930 - 1940	Bagaregården 27:3	458	0	0	0	0	0	0	0	49	233	150
	Johanneberg 23:4	0	0	68	147	0	0	0	10	48	139	91
	Krokslätt 85:13	0	34	109	0	0	5	0	83	101	0	99
	Majorna 341:14	316	16	42	0	19	11	37	118	300	276	177
	Sandarna 2:2	263	0	0	0	0	0	0	0	138	0	90
	Lorensberg 6:10	0	56	87	81	12	0	0	27	82	86	0
	Kungsladugård 35:11	209	26	43	123	0	0	0	26	207	282	11
	Sannegården 19:2	187	0	6	84	0	0	0	0	95	16	326
	Kommendantsängen 4:10	0	0	162	306	0	0	0	9	270	191	0
	Kungsladugård 33:8	272	27	0	0	0	0	0	0	122	90	110
	Total	**1705**	**159**	**517**	**741**	**31**	**16**	**37**	**273**	**1412**	**1313**	**1054**
1940 - 1960	Masthugget 12:4	0	0	33	510	0	0	266	41	463	495	0
	Sandarna 5:8	0	14	142	0	135	34	66	185	628	286	393
	Guldheden 5:4	315	55	0	0	0	0	0	0	166	0	262
	Krokslätt 15:7	0	171	366	65	0	9	0	136	94	539	110
	Järnbrott 126:10	0	44	388	0	0	55	0	257	222	999	256
	Järnbrott 117:5	522	31	85	0	0	20	0	433	152	0	285
	Johanneberg 18:2 A	0	0	176	170	0	0	27	167	374	270	0
	Johanneberg 18:2 B	0	0	0	1236	0	0	0	216	543	365	0
	Johanneberg 18:2 C	265	0	24	0	0	42	0	14	124	472	0
	Guldheden 32:1	0	201	10	34	0	18	0	36	198	0	45
	Guldheden 27:2	0	185	59	0	0	20	0	42	174	44	194
	Total	**1102**	**701**	**1283**	**2015**	**135**	**198**	**359**	**1527**	**3138**	**3470**	**1545**
1960 - 1980	Sannegården 34:1	955	0	0	0	5	0	66	23	631	737	218
	Järnbrott 134:18	0	20	46	0	0	21	0	193	108	66	302
	Rud 8:10	0	102	17	0	0	27	0	242	95	0	411
	Rud 3:3	138	21	22	0	0	23	55	101	313	0	192
	Järnbrott 138:6	0	89	14	0	0	23	0	254	110		0
	Inom Vallgraven 62:12	362	19	348	0	0	117	20	325	1004	57	120
	Masthugget 6:19	917	37	66	0	0	0	0	0	281	410	226
	Stigberget 34:14	484	0	0	0	0	0	0	0	207	88	463
	Gårdsten 3:13 A	0	79	649	0	0	65	0	211	485	19	703
	Gårdsten 3:13 B	913	0	0	0	0	46	0	0	360	21	717
	Gårdsten 3:13 C	0	38	735	0	0	30	0	214	845	142	303
	Landala 12:19	0	301	413	0	0	63	0	65	541	0	51
	Stigberget 23:1	374	10	0	0	0	7	0	0	178	233	23
	Total	**4143**	**716**	**2310**	**0**	**5**	**422**	**141**	**1628**	**5158**	**1773**	**3729**
1980 - 2000	Stampen 6:20	263	153	176	0	38	56	120	477	1374	678	0
	Stampen 13:33	0	47	208	596	0	71	0	282	828	332	0
	Bagaregården 32:6	277	0	0	0	0	0	0	0	116	84	160
	Brämaregården 11:16	264	135	0	0	0	30	0	0	138	0	68
	Sannegården 28:10	1402	0	25	0	0	0	0	0	706	862	0
	Olivedal 5:20	663	46	208	0	0	0	0	38	294	323	249
	Lindholmen 18:2	655	157	0	0	0	21	0	0	468	288	50
	Sannegården 28:1	974	83	14	238	0	50	0	134	731	945	146
	Total	**4498**	**621**	**631**	**834**	**38**	**228**	**120**	**931**	**4655**	**3512**	**673**
2000 - 2020	Sannegården 7:9	141	66	29	0	0	0	0	34	180	128	134
	Sannegården 28:15	600	0	46	92	0	44	37	48	290	586	308
	Sannegården 28:13	0	24	0	0	0	41	0	97	207	143	32
	Sannegården 29:1	363	0	30	0	0	0	0	0	273	364	1
	Sannegården 77:2	2081	59	80	0	0	42	0	4	1023	466	426
	Sannegården 83:1	500	0	33	0	0	6	54	43	640	312	50
	Kyrkbyn 27:7	496	147	106	0	0	0	0	30	555	46	259
	Brämagreården36:6	821	0	42	0	0	0	0	0	323	462	30
	Kvillebäcken 73:1	438	0	33	76	0	0	0	0	269	305	245
	Total	**4181**	**296**	**324**	**92**	**0**	**133**	**91**	**256**	**3168**	**9069**	**1210**

Period	Name of Property	Ratio(%)							
		Apartment	Parking	Storage	Commericial	Service	Transition	Urban Space	Greenery
1900 - 1920	Inom Vallgraven 37:10	25	1	3	10	11	23	27	1
	Inom Vallgraven 61:12	0	0	6	31	4	15	25	19
	Bagaregården 4:7	37	2	0	0	5	8	31	16
	Haga 9:6	0	0	13	32	0	21	34	0
	Masthugget 9:12	4	0	14	27	0	36	19	0
	Majorna 324:9	44	0	0	0	2	22	27	5
		29	**0**	**3**	**9**	**3**	**20**	**28**	**7**
1920 - 1930	Kålltorp 38:20	18	6	0	9	13	24	26	4
	Bagaregården 38:10	25	1	0	0	15	26	16	16
	Bagaregården 9:8	43	0	1	2	0	26	0	29
	Haga 6:1	40	0	0	0	2	27	22	10
	Gårda 744:525	41	0	0	9	0	13	21	16
	Bagaregården 4:1	33	0	2	8	2	22	14	20
	Olivedal 9:6	0	13	28	5	2	43	0	9
	Kungsladugård 17:5	38	16	0	0	5	21	2	17
		37	**1**	**1**	**2**	**3**	**26**	**10**	**20**
1930 - 1940	Bagaregården 27:3	51	0	0	0	0	6	26	17
	Johanneberg 23:4	0	0	14	29	2	10	28	18
	Krokslätt 85:13	0	8	25	0	20	23	0	23
	Majorna 341:14	24	1	3	0	14	23	21	13
	Sandarna 2:2	54	0	0	0	0	28	0	18
	Lorensberg 6:10	0	13	20	19	9	19	20	0
	Kungsladugård 35:11	23	3	5	13	3	22	30	1
	Sannegården 19:2	26	0	1	12	0	13	2	46
	Kommendantsängen 4:10	0	0	17	33	1	29	20	0
	Kungsladugård 33:8	44	4	0	0	0	20	14	18
		23	**2**	**7**	**10**	**5**	**19**	**18**	**15**
1940 - 1960	Masthugget 12:4	0	0	2	28	17	26	27	0
	Sandarna 5:8	0	1	8	0	22	33	15	21
	Guldheden 5:4	39	7	0	0	0	21	0	33
	Krokslätt 15:7	0	11	25	4	10	6	36	7
	Järnbrott 126:10	0	2	17	0	14	10	45	12
	Järnbrott 117:5	34	2	6	0	30	10	0	19
	Johanneberg 18:2 A	0	0	15	14	16	32	23	0
	Johanneberg 18:2 B	0	0	0	52	9	23	15	0
	Johanneberg 18:2 C	28	0	3	0	6	13	50	0
	Guldheden 32:1	0	37	2	6	10	37	0	8
	Guldheden 27:2	0	26	8	0	9	24	6	27
		7	**5**	**8**	**13**	**14**	**20**	**22**	**10**
1960 - 1980	Sannegården 34:1	36	0	0	0	4	24	28	8
	Järnbrott 134:18	0	3	6	0	28	14	9	40
	Rud 8:10	0	11	2	0	30	11	0	46
	Rud 3:3	16	2	3	0	21	36	0	22
	Järnbrott 138:6	0	18	3	0	57	22	0	0
	Inom Vallgraven 62:12	15	1	15	0	19	42	2	5
	Masthugget 6:19	47	2	3	0	0	15	21	12
	Stigberget 34:14	39	0	0	0	0	17	7	37
	Gårdsten 3:13 A	0	4	29	0	12	22	1	32
	Gårdsten 3:13 B	44	0	0	0	2	18	1	35
	Gårdsten 3:13 C	0	2	32	0	11	37	6	13
	Landala 12:19	0	21	29	0	9	38	0	4
	Stigberget 23:1	45	1	0	0	1	22	28	3
		21	**4**	**12**	**0**	**11**	**26**	**9**	**19**
1980 - 2000	Stampen 6:20	8	5	5	0	21	41	20	0
	Stampen 13:33	0	2	9	25	15	35	14	0
	Bagaregården 32:6	43	0	0	0	0	18	13	25
	Brämaregården 11:16	42	21	0	0	5	22	0	11
	Sannegården 28:10	47	0	1	0	0	24	29	0
	Olivedal 5:20	36	3	11	0	2	16	18	14
	Lindholmen 18:2	40	10	0	0	1	29	18	3
	Sannegården 28:1	29	3	0	7	6	22	29	4
		27	**4**	**4**	**5**	**8**	**28**	**21**	**4**
2000 - 2020	Sannegården 7:9	20	9	4	0	5	25	18	19
	Sannegården 28:15	29	0	2	4	6	14	29	15
	Sannegården 28:13	0	4	0	0	25	38	26	6
	Sannegården 29:1	35	0	3	0	0	26	35	0
	Sannegården 77:2	50	1	2	0	1	24	11	10
	Sannegården 83:1	31	0	2	0	6	39	19	3
	Kyrkbyn 27:7	30	9	6	0	2	34	3	16
	Brämagreården36:6	49	0	3	0	0	19	28	2
	Kvillebäcken 73:1	32	0	2	6	0	20	22	18
		22	**2**	**2**	**0**	**3**	**17**	**48**	**6**

References

Books

Bueren, E. (2012). Sustainable Urban Environments. Dordrecht: Springer.

Lawson, B. (2001). The Language Of Space. 1st ed. Architectural Press.

Lindvall, J., Wang, W. and Caldenby, C. (1998). 20th-Century Architecture, Sweden. Munich: Prestel.

Wietzorrek, U. (2014). Housing+. Birkhäuser/Springer.

Zapel, E., Heckmann, Ovb. and Schneider, F. (2017). Floor Plan Manual Housing. Basel/Berlin/Boston: Walter de Gruyter GmbH.

Articles

Grundström, K. and Molina, I. (2016). From Folkhem to lifestyle housing in Sweden: segregation and urban form, 1930s–2010s. International Journal of Housing Policy, 16(3), pp.316-336.

Grundström, K. (2017). Grindsamhälle: the rise of urban gating and gated housing in Sweden. Housing Studies, 33(1), pp.18-39.

Johansson, P., Femenías, P., Thuvander, L. and Wahlgren, P. (2016). Pending for Renovations: Understanding the Conditions of the Multi-family Housing Stock from before 1945. Energy Procedia, 96, pp.170-179.

Lind, H., Annadotter, K., Björk, F., Högberg, L., Af Klintberg, T. (2016). Sustainable Renovation Strategy in the Swedish Million Homes Programme: A Case Study. Sustainability, 8(4), p.388.

Semprebon, G. and Ma, W. (2018). Between city and home: Spaces of transition in London Postwar Housing. Frontiers of Architectural Research, 7(3), pp.257-275.