



THE MISSING LINK

A proposal for how to make the harbour cranes dance again

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Chalmers University of Technology
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CHALMERS
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THE MISSING LINK

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ABSTRACT

The Missing Link

The city's visions for the development around the river in Gothenburg is to strengthen the regional core, to make the city meet the water and to build a city open for everyone. This thesis explores what the practical take on those visions could be and how a missing link can connect the city, the water and its people. From defining city scale strategies for why a connection over the water is needed, to design of a masterplan at a missing link in the new identified central core. The area for the masterplan is Lundbyvassen/Cityvarvet a site strongly connected to Gothenburg's history and identity as a shipyard city. An industry, with its elements, that is most likely to disappear from the city within the near future.

The design proposal for the master plan is relating to the site's history and location. The cranes are back in business and the area is full of activity again. Since the area is a part of the new central core the focus lays on creating a vibrant city that is enjoyable for people. New access routes and types of transportation are introduced as well as a diverse and dense program. With its location next to the water the master plan is giving examples for how to adapt to future flooding as well as how the water can be a social activator in the city.

PREFACE

This thesis is written as part of the completion of the MSc Design for Sustainable Development at Chalmers University of Technology, Gothenburg, Sweden. It was undertaken during the fall semester 2015 within the Department of Architecture.

The thesis confronts with some of the challenges and possibilities the city of Gothenburg stands in front of today with large areas in the center of the city, just next to the river, to be developed within the next decades. Growing up in Gothenburg, the city itself and its future development is of great personal interest and dealing with the future development of areas and elements that are highly connected to the city's identity, like the river and the shipyard of Cityvarvet with its cranes, was both exciting and difficult since I do know the areas importance for the city and the people. But even more I felt that I wanted to contribute, to give one idea about what direction the area could take in the future. Previous work experience from the City Planning Office in Gothenburg has also given me knowledge about the City's visions, processes and frameworks for forming the city. Thank you Eva Carlford-Mattsson for taking time to share your knowledge and experience about this to me.

The master program has opened my eyes within the field of architecture for a sustainable development. It has taught me foremost what sustainability isn't and it has given me a deeper insight in how to, through a holistic approach, integrate strategies towards it in everything we do, design and build. Interest in

water related question has come through dealing with flooding strategies in the previous studio Design for a Sustainable Development in a Local Context as well as competing in the design competition Biomimicry Student Design Challenge, through where inspiration from nature led to a design concept of how create awareness around our water - food - waste systems. Thank you Anna Maria Orru for your support during this competition and for being an inspirational source from that point and on.

I would like to thank my examiner Inger Lise Syversen and tutor Mikael Ekegren for your guidance during this master thesis. Thank you Maja Kovács for coordinating it and to Lena Falkheden for your knowledge and inspiration during the whole master program. Also many thanks to my fellow student colleagues, especially Anna, for your constructive discussions and support during this semester. And thank you Juras for caring about me and my work, for your thoughts and support.

Hanna Johansson, January 2015

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INTRODUCTION

This thesis initiates with the question of what a bridge can do for a city and for Gothenburg in particular where the Göta Älv river is today both a physical, mental and social barrier in the city. From that city scale analysis a defined strategy for how and where to connect the city over the water is formulated. There is also the question around what happens where the bridge is landing; how to take care of the new integrated area of Lundbyvassen that now is a part of the city's central urban pattern, how does the visions and strategies take form in the design of a masterplan. With this there are also global environmental challenges that needs to solved on local and site-specific premises. The rising sea water levels and pressure from more extreme weather are two of those global challenges that this thesis is exploring of how to adapt to through site specific design.

The aim of this thesis is to show what a bridge can do for the city, how, where and why the future central core of Gothenburg should form around the water and how then a post industrial site strongly connected to the city's old identity can be a vibrant part of the central core in Gothenburg.

PROCESS

The aim for this thesis is to have a project based work process. To take part of, and keep a discussion around, relevant theories and strategies for the topic and test these through design. Personally I find it interesting to see how that link can be made, how theoretical ideas can be explained through design of physical form. The theoretical questions are often complex and core values has been tried to be found to keep the concept and purpose of the design clear.

The thesis starts with a discussion in the bigger context of sustainable development. What challenges we are facing and how I see my role and my thesis work in this context. It follows by a discussion on a city scale level and what challenges and possibilities Gothenburg have within this.

DELIMITATIONS & CHOICES

The goals for the project and its central location next to the river in Gothenburg awakens many complex questions and aspects to look deeper into, questions that are dealing with social, infrastructural, environmental and planning problematics in different scales. The take on this is though to show this complexity and variety to as far extent as possible and with main goal that it is a research based design project as a result product of this thesis. Due to time delimitation this leads to that important aspects and questions has been identified but without always going into depth with its origin. Following choices have been made to keep the project going forward and to make sure the wanted result was achievable within the time period of one semester:

A general discussion around climate change impacts we are facing, both local and global, has been made.

The history of the harbour in Gothenburg, its importance to the city's identity and its visions for the future has been summarized. As well as the shipping traffics influence on the region and the city today. Without going into depth into its different national interests, which are within both for example export / commercial and natural interests, the main take on weather more bridges over the river in Gothenburg is appropriate is that bridges can be opened and that the city needs more connections over the water. Soil- and water contamination due to the shipping industry has not been studied in depth more than defining that it is one of the highest contaminated areas in the central city. Space Syntax is introduced and has been used as a

The design process starts with defining a strategy for how the city can connect over the water and what synergies that connection can create. At an identified important site in this context, it is then explored how to respond to identified challenges and possibilities through design. Theoretical studies have been summarized and reformulated to design strategies implemented in the design of a masterplan.

Reflection and questioning has been a part of the work process which has formed the result and way to get there. Many of the questions has been tried to be answered through design and formulation of strategies. This design process is a part of the result and is documented in the end of this booklet.

tool to analyse what a connection at chosen location would do for the integration of the north riverside in the urban city environment. A discussion around the analysis result has been made without going into depth with the background and theory behind a Space Syntax analysis.

Strategies for social sustainability in forms of how and why to build dense, how to create a liveable city district, why to develop public transportation that puts pedestrian and biking traffic foremost in the center of the city are based on theory and reference studies and the strategies are within themselves rising questions around the challenges of Gothenburg.

Strategies for flooding and how to use the water as a social activator in the city are based on research and reference examples. Site specific flooding information has been summarized from the municipality's action plan towards future floodings in the river area.

The interest of creating a project that spans between research and design, social and environmental issues, regional and site specific strategies made this project reach out in many directions. It is though of interest to show this complexity, to rise many problematic questions next to each other and see what the result could be. The challenges we are facing are demanding a more holistic approach to the future development of our cities.

CHALLENGES WE ARE FACING

THE BROADER CONTEXT

The notion of how our lifestyle is directly affects greenhouse emissions and climate change has been known for decades by scientists and politicians. With Al Gore's film *An inconvenient Truth* in 2006 the fact came more "commercial" and known by the general public and only in the latest years we can see a great increase in awareness, initiatives taken and change of lifestyle among people. Technical innovations are made and there is a grass roots force; a progression forward for a more sustainable living and development of our cities. So the knowledge, participation force and technical innovations are all there, or at least on the way to be.

In the United Nations Climate Change Conference in Copenhagen 2009 countries from all over the world agreed to mark out that a 2 degrees warmer planet is the maximal, the dangerous level of the greenhouse effects. We are today seeing an increase of 0.7 -0.8 degrees and already experience extreme impacts. Business as usual would put us on a warming prognosis of 4-6 degrees Celsius, a border which the models don't account for according to Naomi Klein, author of the book *This Changes Everything: Capitalism vs the Climate*, since scientists feel it's impossible to predict its consequences. Thermal expansion and melting of land ice, as a result of a warmer planet, is seen

to be main factor of global mean sea level rise that is projected to rise + 0.2 to + 0.5 meters within the hundred years according to IPCC, Intergovernmental Panel for Climate Change. In order to prevent and adapt to this we need the radical technical innovation and both global and individual actions. But what Klein is arguing is that we can only take in those radical things only if it's based on radical political and economical initiatives. Something that is seen and highly relevant today, when political and economical forces can not keep up the speed of the inhabitants interests and needs, and where frustration comes as a result. Demonstrations leads to riots, ambitions to failure.

This leads to the notion of time and duration. The planning today can be seen as consisting of either fast or slow processes. They are contradicting and creating frustration among inhabitants. In one end, the tools for communication we have today through social networks, smartphones etc. the world is small and the decision making very fast. We tend to do things our own; we use Kickstarter to finance our new innovation, we take part in car-sharing pools online, we stay at a stranger's couch for free, we meet people, we communicate. In these medias new initiatives and innovation take place, and it happens fast. So fast that municipalities and governments can not keep up with

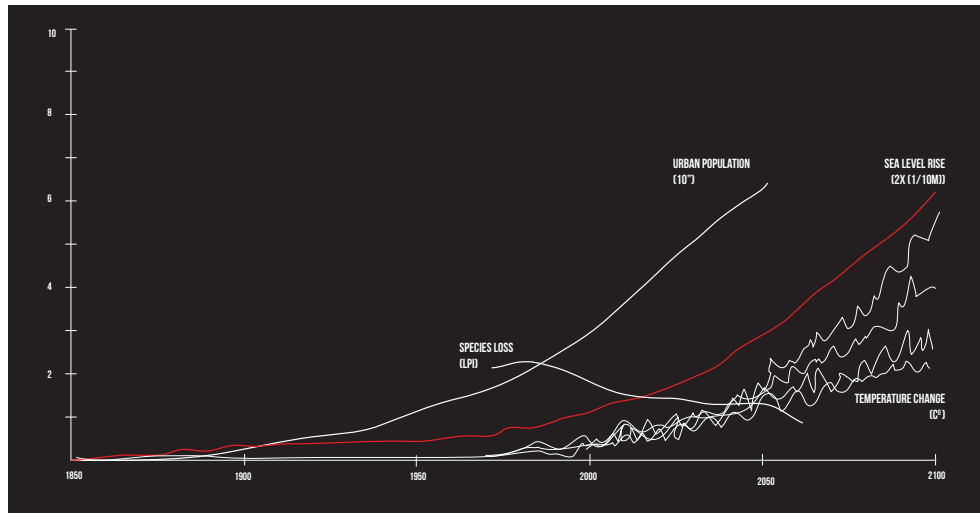


Diagram 1. Representing the increase of some of the most crucial environmental challenges we are facing. Based on illustration from Kate Orff, landscape architect Scape Architects, NY.

the tools they are using today. We are using the tools from a planning of the 19th century to solve the problems we are facing in the 21st, as Dan Hill a designer and urbanist at Future Cities Catapult formulates it. The detail planning process in Sweden is very long, according to the City Planning Office in Gothenburg the average time for a new detail plan in Gothenburg is 33 months (18 months if it is made with a simple planning process). This in high extent because of long public consultation time and appeals. The way you consult with the public is also questionable, a small add in the back of the local newspaper, or a note on a lamp post is not the most efficient way to do it in the 21st century and with the tools of communication we have today. So the political forces; in municipalities, governments and global collaborations, needs to keep up the pace of its inhabitants and especially when it comes to climate change related initiatives, laws and or processes since we are already behind and have no more time, nor resources, to waste. Many initiatives or radical technical innovation can be made fast but are hold back from long processes today.

For Gothenburg, which stands in front of its biggest development process in the central parts of the city since the mid 19th century, and in an area that is under big risk for future floodings - it is a possibility

and a need to be innovative, open and not afraid to face the challenges we are facing. What if the new development planning processes can be a role model for the planning of the 21st century, the new development an arena for innovative and radical solutions to meet our environmental challenges and an arena that deals with fast and slow processes, changing conditions, possibilities for the inhabitants to act and take responsibility.

What architecture does, is to create physical frames for our social process and networks as Jan Gehl puts it in his book *Life Between Buildings*. When this physical framing is interrupted or destroyed, by either man-made or environmental disasters, the social processes within are of course affected. And the importance of the community's resilience and its capacity to get back to normal is crucial. The impacts of climate change are thus directly connected to social sustainability; to the life between the buildings. It is a question of equality and culture, of the importance of a community to be diverse and inclusive and its ability to sustain its social processes and life. In relation to climate change we need to design for these spaces where actions towards climate change, equality, diversity and inclusiveness are allowed to take place.



The city and its barriers

Gothenburg has today many barriers in form of both heavy infrastructure and a wide water channel in between the old town to the south and more recent development to the north. It is a city that is in need of connecting its city parts and people through activities, built form and effective public transportation.

The water area in central Gothenburg takes up almost 20% of the land area. Due to the heavy infrastructure and few physical connections over the water it is today the city's most inaccessible access for the city and its inhabitants and it is time for introducing a blue masterplan for the city where the city develops around and with the water.

This thesis explores this connection between the built environment and the water, implemented on the post-shipyard site of Lundbyvassen that has the potential to become the missing link for the future central core in Gothenburg.



BACKGROUND GOTHENBURG

Figure ground drawing over central Gothenburg

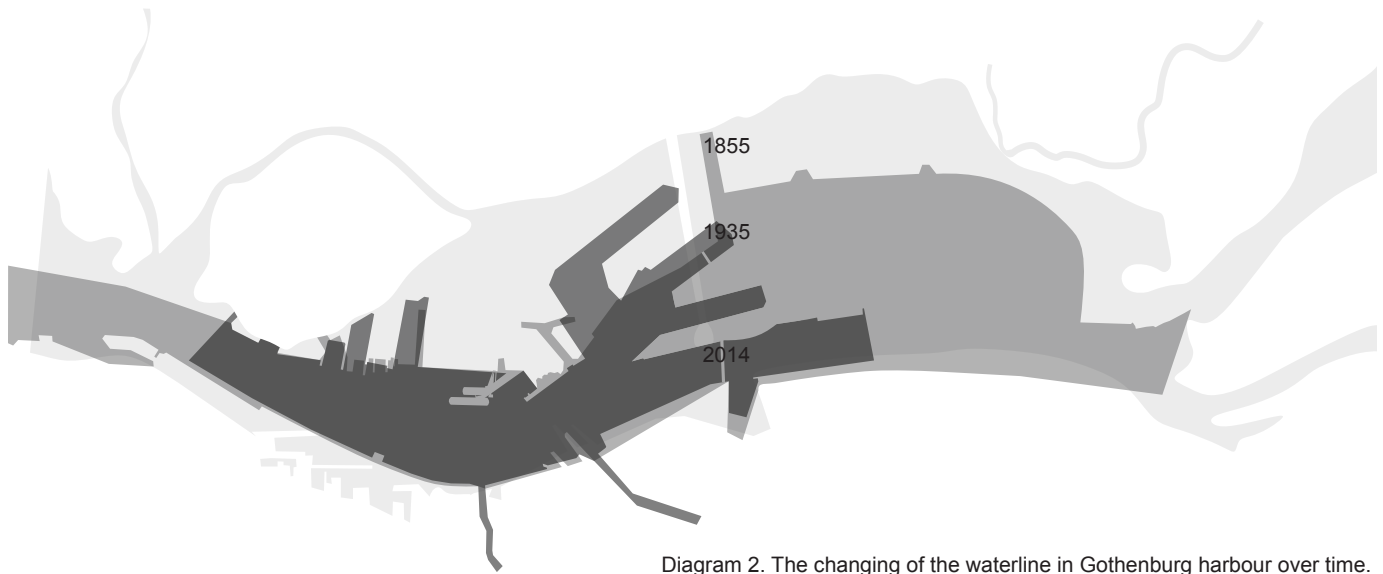


Diagram 2. The changing of the waterline in Gothenburg harbour over time.

HISTORY & IDENTITY

Gothenburg and its harbour

Gothenburg's first habitation was formed in 1604 when the Dutch came to Gothenburg and started settlements on Hisingen. A decade later these settlements were burned down and the year 1621 the Swedish king Gustav II Adolf pointed out 'here should the city be' and Gothenburg was officially formed and got its city rights. The city which was growing because of its location by Göta Älv and the North Sea, and where fishing and trading were major industries for many centuries. Global trading with goods like tea, porcelain, spices and silk from the Far East, made the city an important node in north Europe during the 18th century. At this time, many Dutch, English and Germans were living in Gothenburg and the city was growing.

Until the middle of the 19th century Gothenburg was characterized by its trading and shipping industry. During this time many mechanical and shipyard industries were formed, the three largest shipyards in Sweden was in Gothenburg. At the beginning of

the 20th century Gothenburg was the most important export harbour in Scandinavia, the shipyards and the water was the nerve in the city and later industries like Volvo and SKF were established. The big domination of heavy industry resulted in that Gothenburg was hit hard by the shipping crisis in the 1970ies. The big shipyards, Götaverken, Lindholmen and Eriksberg, almost disappeared from the city's industry and around 18 000 workers were affected when the shipyard were phased out.

The shipyard city of today?

Cityvarvet is the last remaining piece from the shipyard history of Gothenburg, a reparation shipyard with two docks and four landings, with the capacity to repair ships up to 75 000 tons (dead weight tons) in central Gothenburg.¹ Founded in 1841 it is today the last part of the city's previous nerve and identity.

The question is what will happen now. The municipality and citizens in general like to keep the shipyard

1

Göteborgs Hamn, <http://goteborgshamn.se/>

industry in city, that it is a characterizing element in the city's appearance and identity. The cranes and docks are well known icons for the city. But according to the previous owner Damen Shipyard Group there is no market for a shipyard at this central location in the city due to high demands on environmental aspects, noise and accessibility. So whether the city itself wants its shipyard there is a high risk for that this will not be the case in a longer perspective and Gothenburg can not anymore identify itself with the shipyard industry. The question is if it really has been able to do that since the major crisis in the 1970's.

In the recent vision for the city, formulated by the municipality and in dialogue with the inhabitants, it is stated that it should be shipyard industry at this site within the next 20 - 30 years. Maybe the 20 employees can take over the shipyard and continue the work for now, but it is neither up to the citizens nor the municipality to decide these market forces. What we can do is to show how this site, with its history, can be developed as a central node in Gothenburg. Creating a new identity for the city that tells a story about its past.

Cityvarvet's time line year 2000 - 2014

2000 / The global Dutch company Damen Shipyard Groups takes over Cityvarvet

2013 / 53 out of 124 employees are fired from Cityvarvet

24th April 2014 / Damen Shipyard Group informs that Cityvarvet will be phased out, the remaining 60 employees have to go and the shipyard's liquidity, for example cranes and docks, will be sold out.

19th September 2014 / Twenty employees from the shipyard Cityvarvet in Gothenburg, which a couple of weeks earlier was informed that it will be phased out, wants to buy the shipyard from their present owner Damen Shipyard Groups, a Dutch company owner of 40 shipyards globally and employing 8000 people worldwide.²

Post industrial areas

Gothenburg stands in front of development time, an epoch that will have great impact on the city's future appearance and structure. Due to its history the city has huge post industrial areas in the middle of the city that these days are formed by visions and program for future use. Although, old shipyard areas have already

been transformed. In the 1990 - 2000's big parts of the north side Eriksberg and Sannegårdshamnen, old shipyard industry areas, where transformed under a relatively short period of time. With focus on housing for high income groups there is a lack of a mix of functions and integration to other city parts. Just next to this, at Lindholmen, schools, companies and university form a work- and education hub to where 20 000 people are commuting every day.

But still there is space. Housing and office space for 15 000 people is planned at Frihamnen, Skeppsbron is under development with new buildings and tram connections, STENA ferry terminal at Masthuggskajen will move and open up for a large area connecting the city to the water. East of Hisingsbron at Ringön, which today is a small scale industry will be developed with emphasis to the existing industry that is there and is more about in the planning regulations allowing new actors instead of taking existing actors away. Just across the water from Ringön, Gullbergsvass that today is disconnected and mainly existing of infrastructure will get new possibilities when infrastructure is taken under ground.

Segregation

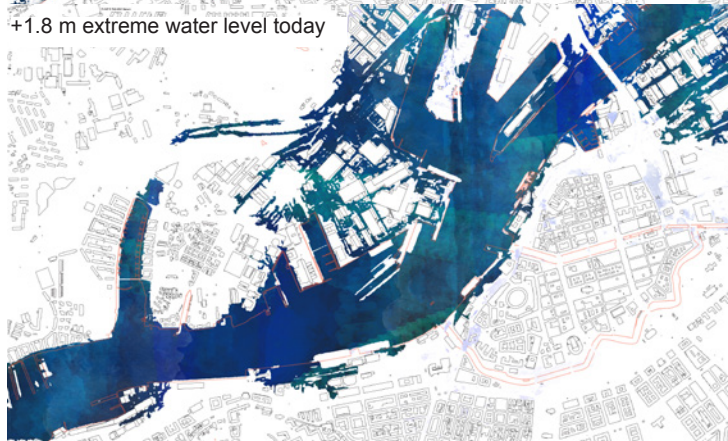
Gothenburg is one of the most non-dense cities in Europe, with post war city planning ideologies several satellite city parts were built in the perferia of Gothenburg city. With ideas about better and affordable housing for everyone, garden cities, small local city centers and separation of cars and people - these city structures are today an elements of segregation and socio-economic related problems. The city needs to connect these satellites cities with the central city with built form. For this dense and lively urban areas need to be formed, good public transportation, low- and middle class income housing in the central parts of the city, public and free attractions etc. are some actions on how to connect the city and its people. areas and for to ensure a sustainable development when it comes to transportation, environment and social life.

² Damen Ship repair Group <http://www.damenshiprepair.com/>

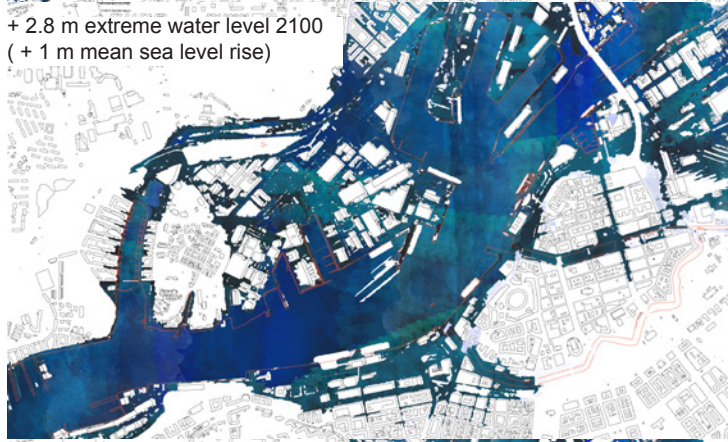
Normal water level today



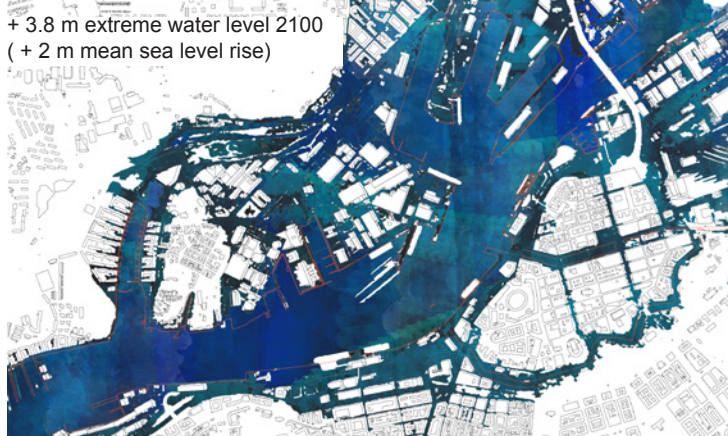
+1.8 m extreme water level today



+ 2.8 m extreme water level 2100
(+ 1 m mean sea level rise)



+ 3.8 m extreme water level 2100
(+ 2 m mean sea level rise)



Flooding scenario Gothenburg

The illustrations shows how central Gothenburg is affected by expected sea level rise and pressure from more extreme weather conditions. According to the Intergovernmental Panel on Climate Change (IPCC) the mean sea level is expected to rise with one meter until year 2100. The calculations are based on scenarios and are therefore unsure figures, that is why the consequences of a +2 m sea level rise is calculated. *Illustrations are based on the City of Gothenburgs calculations through Agency 9 Cityplanner digital tool.*

Diagram 3. Illustrations showing the impact of expected water level rise in central Gothenburg. Both pressure from sea level rise and occation of heavy rainfall is considered.

1. THE WHOLE CITY

A socially mixed population, variation in housing types, mixed program, keep existing qualities and identity, the new with the old, the dense with the sparse, open up for new ideas and initiatives and engage the people.

2. STRENGTHEN THE CORE

The regional core, the dense and mixed central city that meet over the water, overbuild barriers, a global perspective, innovative networks and new international working force and students

3. MEET THE WATER

Continuous walk- and bikelanes along the river, meet the water in creative ways, the border between water and land is blurred, access, shipping and citylife, climate change adaption as a driving force, the river city as a testing arena.

The three visions for "Vision Älvstaden" formulated by the city of Gothenburg

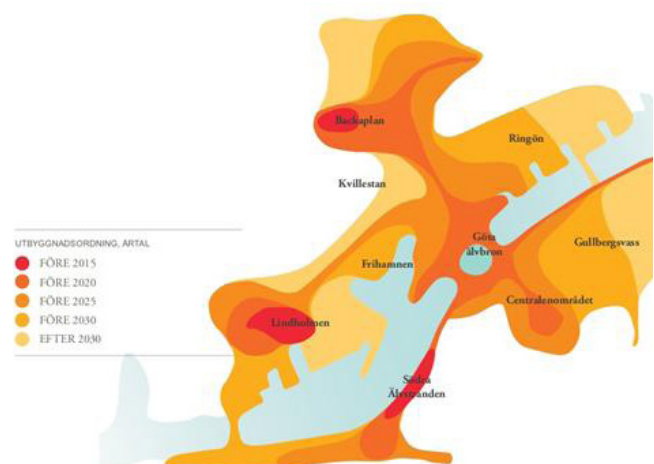
CHALLENGES AND POSSIBILITIES

The expected population growth of Gothenburg is expected to be in average 6200 new inhabitants per year, this means that Gothenburg in year 2025 has 608 000 inhabitants, compared to 540 000 today ¹. There is today a lack of housing in Gothenburg, especially affordable housing for students and low income inhabitants. Although, Gothenburg has a unique position with both big post industrial central areas that are going to be developed within the next 20 years. And there is also a need for connecting satellite city's with the central city through built environment. So the time the city stands in front of is exciting. It is the first time in 150 years that the inner city of Gothenburg is expanding at this scale. Last time, in 1860, the city parts of Vasa- and Linnéstaden were developed. The challenges we are facing are demanding new knowledge and methods for ensuring a sustainable development.

One of the biggest challenges for the city is the fact that big parts of Gothenburg is under great risk of future floodings due to heavier rain and rising sea water levels. The water level in Göta Älv's intake is +0.1 meters and the docks in the central gothenburg has an hight around +2 meters. In municipal plans it is stated that new buildings should have the ground floor at the lowest + 2.8 m over sea level to meet the sea level rise. In Ludbyvassen this would mean that new buildings should at least have their ground floor at + 2.9 m, approximately one meter above the ground level of the docks today.

The city has now, with their position of undeveloped water close areas in the center of the city and the future risk of floodings, an opportunity to in creative ways adapt to the rising water levels. The municipality is showing effort in taking in the inhabitants in the planning process through participatory design processes, a very important effort for this large scale development in the middle of our city.

The diagram below illustrates the city's vision for the development phases in the river area. Red areas are expected to start development before 2015 and lightest beige areas after 2030.



¹ Gothenburg Municipality, dept of "Samhällsanalys och statistik"

MUNICIPAL PLANS

1 LINDHOLMEN

What: To mix the homogen educational and business hub with housing. A 240 meter high tower, Karlavagnstornet, with shops, hotel and housing.

Timeline: Detail planning, competition for tower year 2013. Goal to have the tower built to 2021.

2 FRIHAMNEN

What: Approximately 9 000 apartments for 18 000 people and 15 000 workplaces. A dense city part in central Gothenburg, housing for different socio-economic groups, built for everyone, big park, connection to water, climate change adaption.

Timeline: Program for acceptance fall 2014. Year 2021 there will be at least 1000 new apartments and workplace for 1000 people working

3 BACKAPLAN

What: Hisingen's center. A dense mixed city with focus on retail, office and housing.

Timeline: Ongoing structure plan and division of stages.

4 RINGÖN

What: Successive development, let existing small scale industry mix with new development. Plan after the areas own premises. Timeline: Short time and long time perspective; on short term make the areas qualities visible, on long term create mixed use area.

5 GULLBERGSSVASS

What: 150 ha area close to the water and the central station but today divided by heavy infrastructure. Focus on how it can connect to the city and central station and to create a pathway along the water and a larger park in the area. Timeline: Pre-study over how the River City's visions can be implemented will be presented in beginning of 2015.

6 CENTRAL STATION AREA

What: New bridge and densification between the central station and the water.

Timeline: Bridge built to 2021. Rest of area start with program 2020-2025.

7. SKEPPSBRON

What: The new meeting place for the citizens in Gothenburg, tram connections and piers, a new commuting hub by the water.

Timeline: Under construction

8. MASTHUGGSKAJEN

What: STENA ferry terminal has decided to sell the land back to municipality, this will open up for a large area and possibilities to connect the city to the water.

Timeline: Ongoing idea competition for an urban plan, presentation in December 2014. Detail planning started.





Ongoing plans and timelines for the development in the river area of Gothenburg, summarized from Gothenburg's City Planning Office

SHIPPING TRAFFIC IN GÖTA ÄLV

Gothenburg has today two physical connections over the water with a distance of more than 6 kilometers between them, besides that there are commuting ferries taking commuting people over the water everyday, mainly during office hours. The two bridges are for cars and public transportation and not pedestrian or biking friendly due to their height and heavy traffic. The bridge Hisingsbron is also the only main connection for public transportation which is vulnerable due to that 60 000 people are passing over the bridge with public transportation every day, that is 75 % of the total commuting according to Gothenburgs public transportation company Västtrafik. They are also expecting that in 2030, due to new development areas at Frihamnen and Backaplan, that number has increased to 150 000 people per day.

The ferry's that are used today for public transportation has low capacity both in time schedule and number of passengers. If you miss the last ferry between Rosenlund and Lindholmen today, you need to bike 35 minutes to get across the water to the other side. With a new bridge at this location that would be a 2 minutes bike ride. So, the city is in need of more bridges over the water, both for taking pressure of the public transportation at Hisingsbron and also for pedestrian and biking across the water.

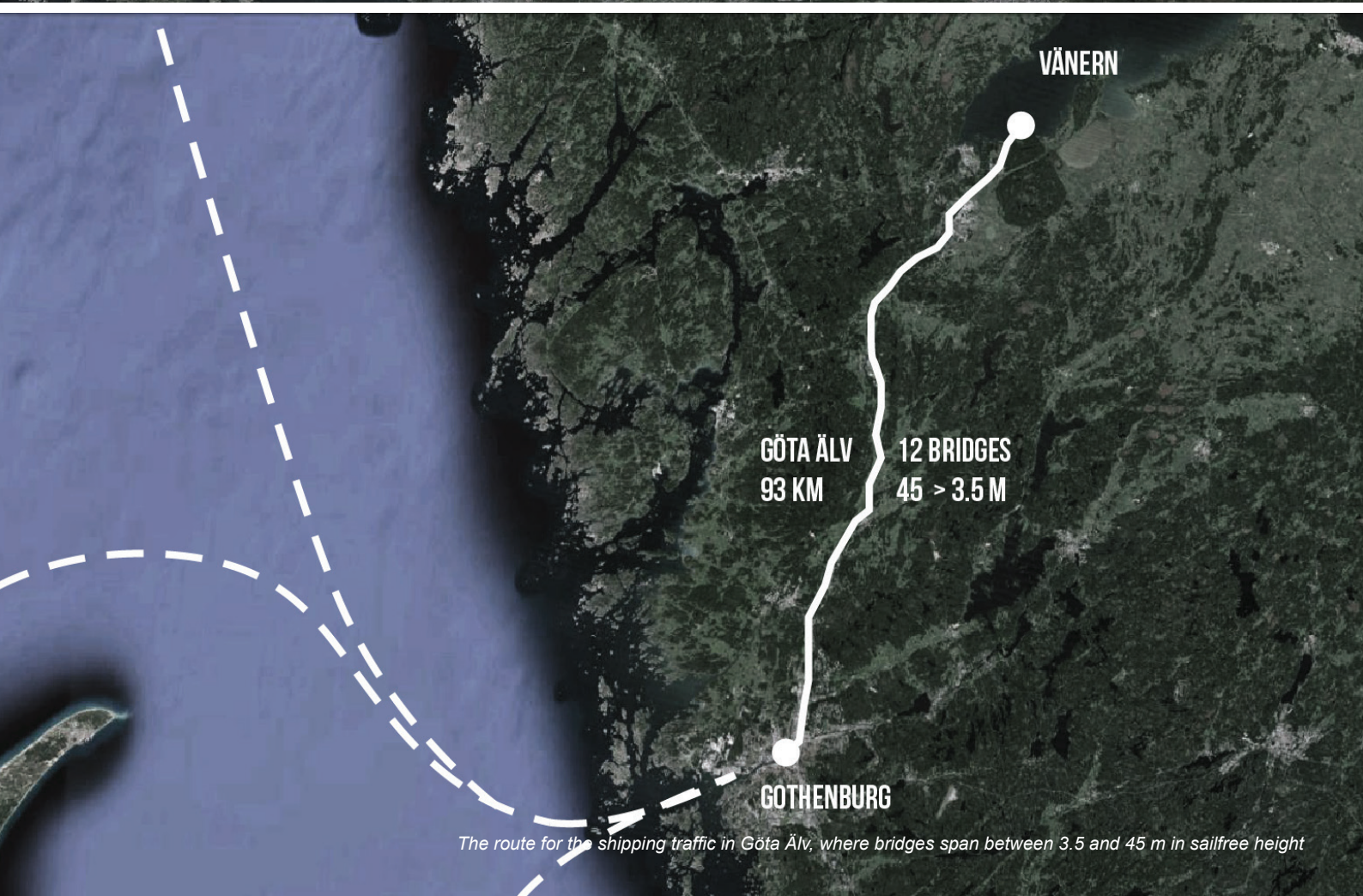
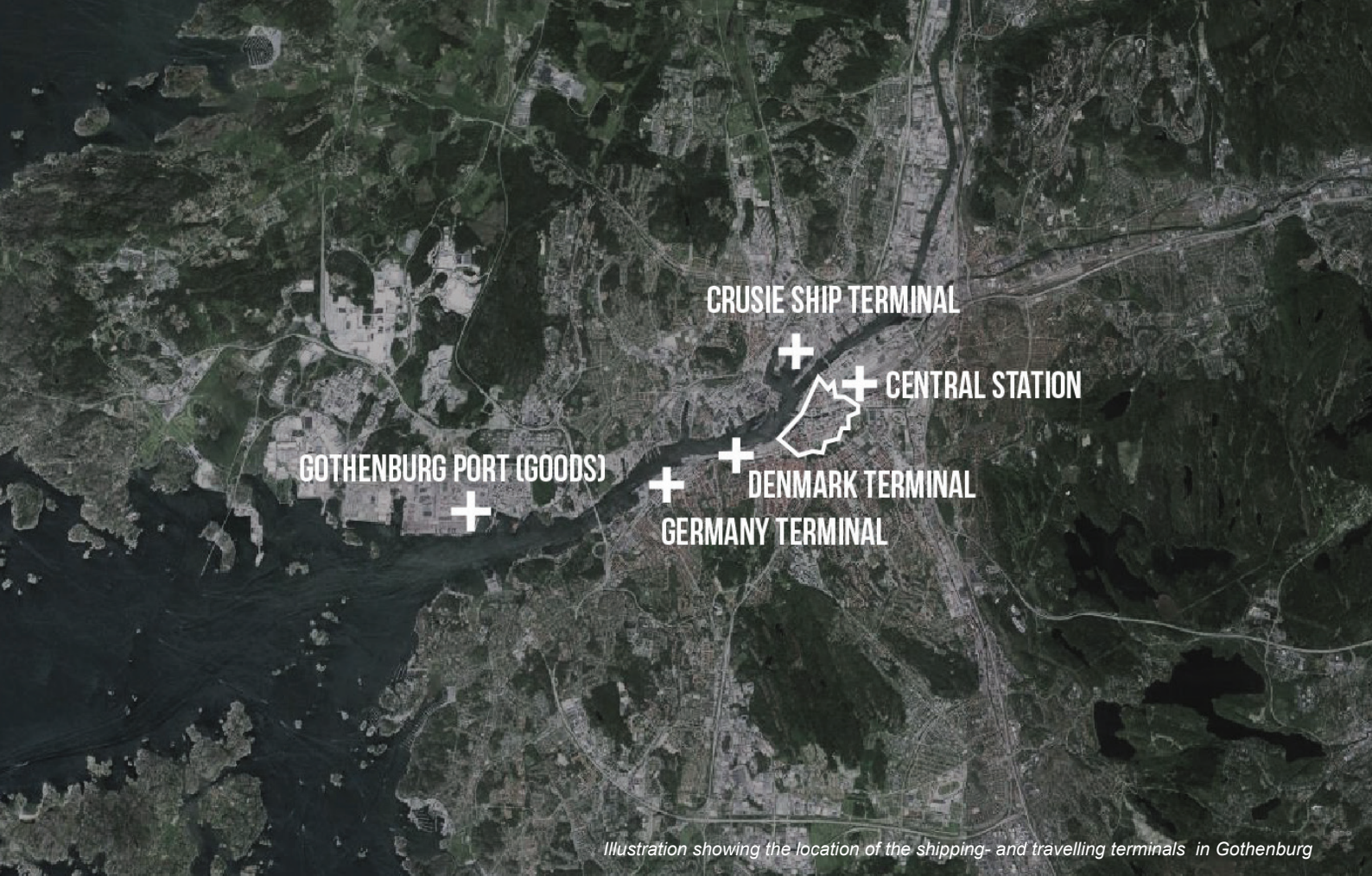
In history the north riverside and Hisingen was mainly shipyards and only workers were commuting there with boats. There were also a pedestrian bridge between Frihamnen and where the Opera is today. But now the situation is different, Gothenburg is and have been expanding over the water and a big part of the central city is now Hisingen. People are commuting not only for work, but for living, leisure and school during all time of the day and night.

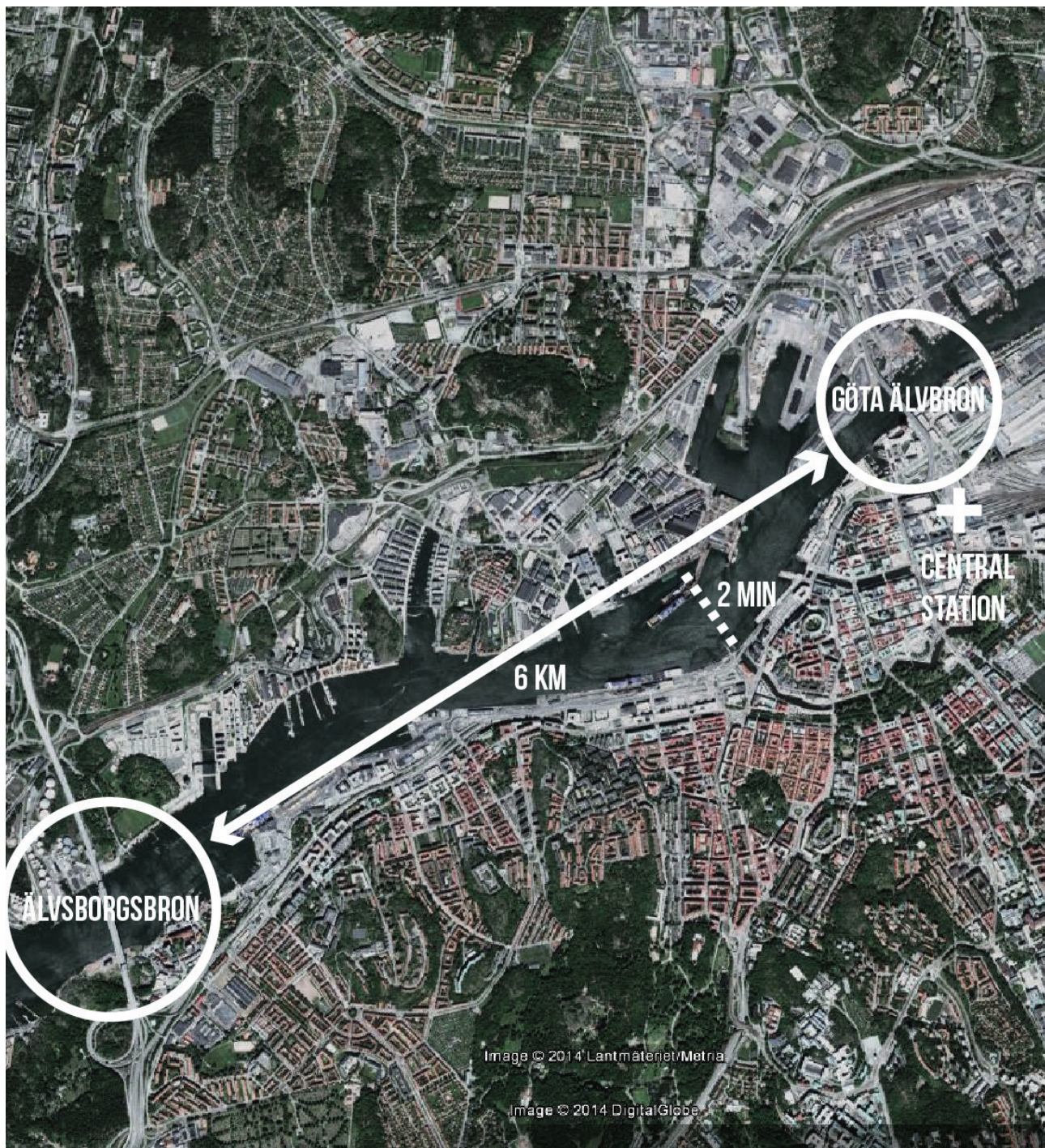
The biggest resistance towards more bridges over the water is the importance of the sea shipping traffic going up in Göta Älv, and that this would be disturbed if more bridges would be built over the water. There have been long-going plans of building a pedestrian bridge across the water from the Opera to Frihamnen, where there once were a bridge, but these plans got turned down in the Environmental Court due to that the national interest of the shipping traffic was seen to be too much affected.

But bridges can be opened. And the question whether if not a well connected city with good public transportation and an effective network with bike lanes across both riversides should be seen as important as the shipping traffic. In average 5-6 ships are passing by Göta Älv bridge today, demanding a bridge opening 2-3 times per day.

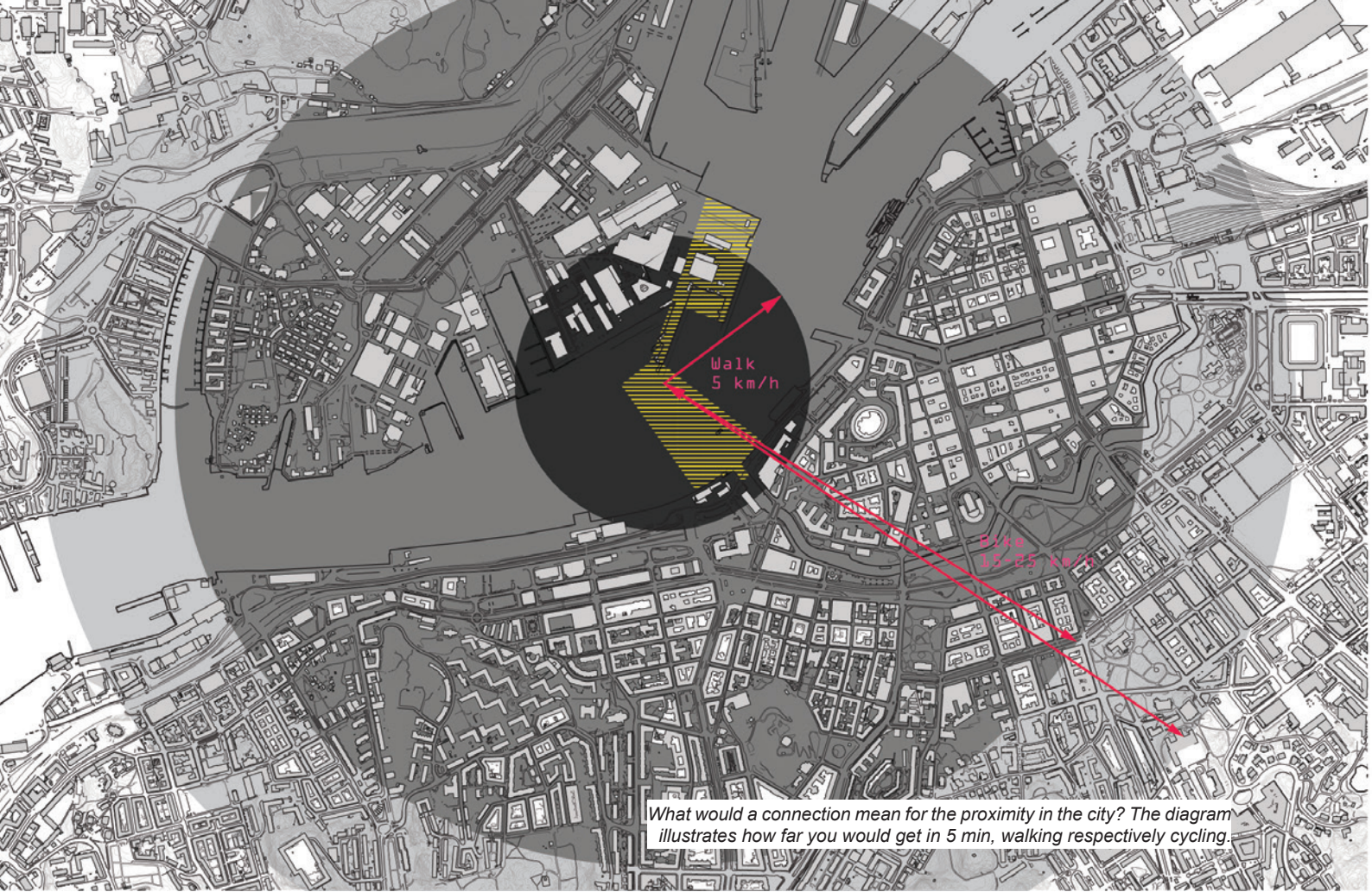
It is not the bridges in Gothenburg that are limiting for the shipping in Göta Älv today. In Trollhättan the bridge 'Klauffbron', to where 76 % of the ships passing by Hisingsbron reach, has a height of 3,5 meters and therefore has to open for every ship. It is not the bridges that are limiting how many ships that pass in Göta Älv but the water gates further up the river that has a capacity limitation of one ship per hour. It is also these water gates that are limiting the size of the ships to a maximal length of 89 m, width 13.6 m and depth 5.4 m. There are two different future scenarios for these water gates in Trollhättan since they are in need of renovation according to Trafikverket: One, the water gates are rebuilt and that the Shipping in Göta Älv can increase to around 3000 ships per year. Two, the water gates are closed for shipping with goods and the shipping traffic in Göta Älv stops.

The shipping traffic in Göta Älv is a national interest and Gothenburg an important port for importing and exporting goods to all over the world. According to the organization Sveriges Hamnar it is by far the largest port in Gothenburg and the 10th in the whole Europe compared with container volume as index. For the city it is a characteristic element and something Gothenburg always have and still identify itself with to a high extent.





The distance between the two only bridges over Göta Älv in Gothenburg is 6 km. Over 60 000 people are commuting with public transportation over Göta älv bridge today, it is the only main public transportation connection over the water which makes the whole public transport network vulnerable.



How could a connection over the water look like?

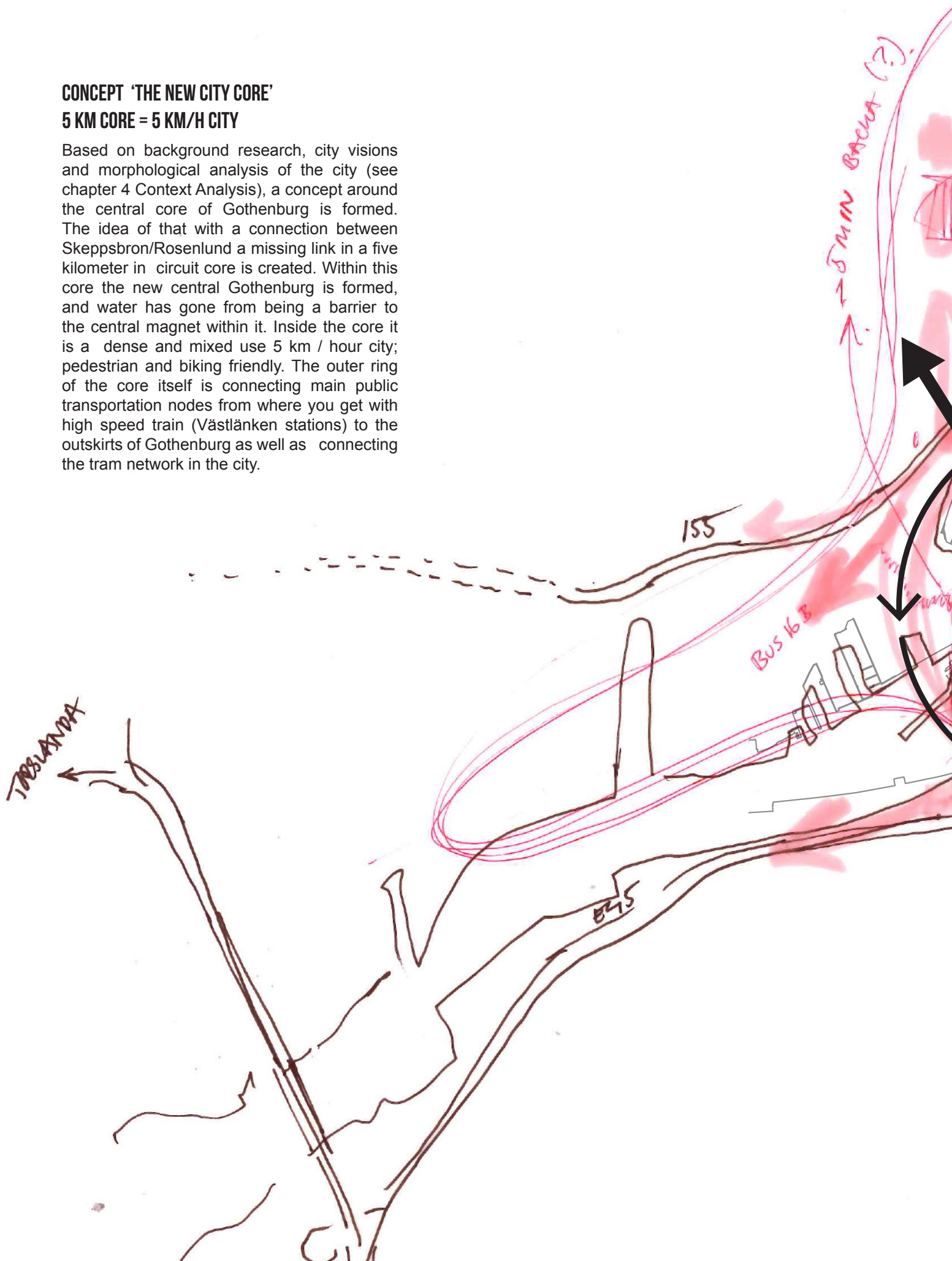
THE MISSING LINK

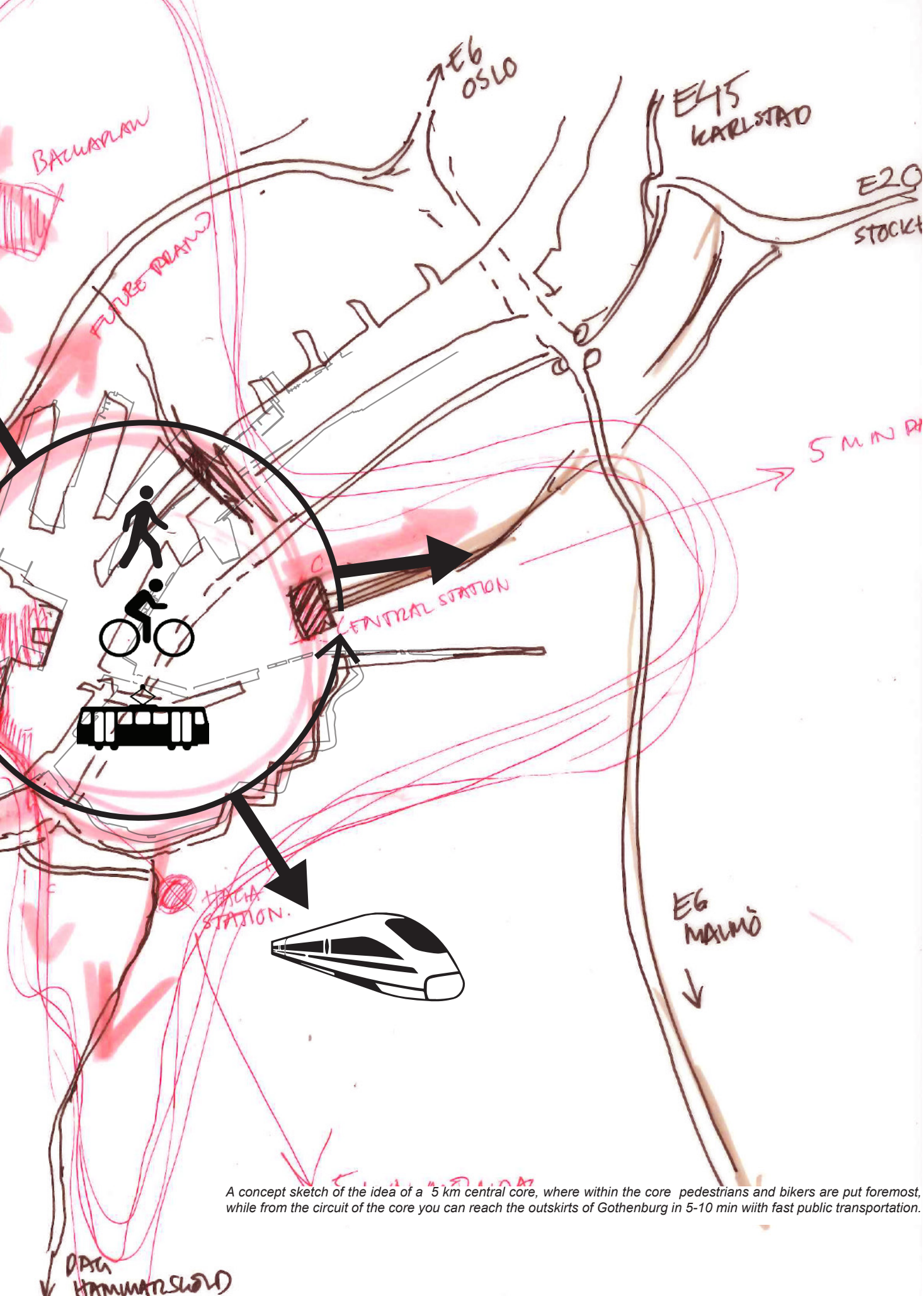
The missing link is the link between the central city and the north riverside and Hisingen. With a link at this location you could reach bigger parts of the whole city with a bike. It is no longer “a project” to go across the river, it is just a continuous bike ride over the water. What if also this link would create something else? What if the city itself would continue over the water and as a pedestrian you feel that you are walking within the central city, with the water as a view, over to the north riverside and further out to Lindholmen, Kville or Backaplan. The diagrams to the left are representing the ideas around this, the top one illustrating how far you would get in five minutes of walking respectively biking, if there was a bridge, and the illustration below questioning why not the city frames themselves can extend and continue over the water.

CONCEPT 'THE NEW CITY CORE'

5 KM CORE = 5 KM/H CITY

Based on background research, city visions and morphological analysis of the city (see chapter 4 Context Analysis), a concept around the central core of Gothenburg is formed. The idea of that with a connection between Skeppsbron/Rosenlund a missing link in a five kilometer in circuit core is created. Within this core the new central Gothenburg is formed, and water has gone from being a barrier to the central magnet within it. Inside the core it is a dense and mixed use 5 km / hour city; pedestrian and biking friendly. The outer ring of the core itself is connecting main public transportation nodes from where you get with high speed train (Västlänken stations) to the outskirts of Gothenburg as well as connecting the tram network in the city.





A concept sketch of the idea of a 5 km central core, where within the core, pedestrians and bikers are put foremost, while from the circuit of the core you can reach the outskirts of Gothenburg in 5-10 min with fast public transportation.

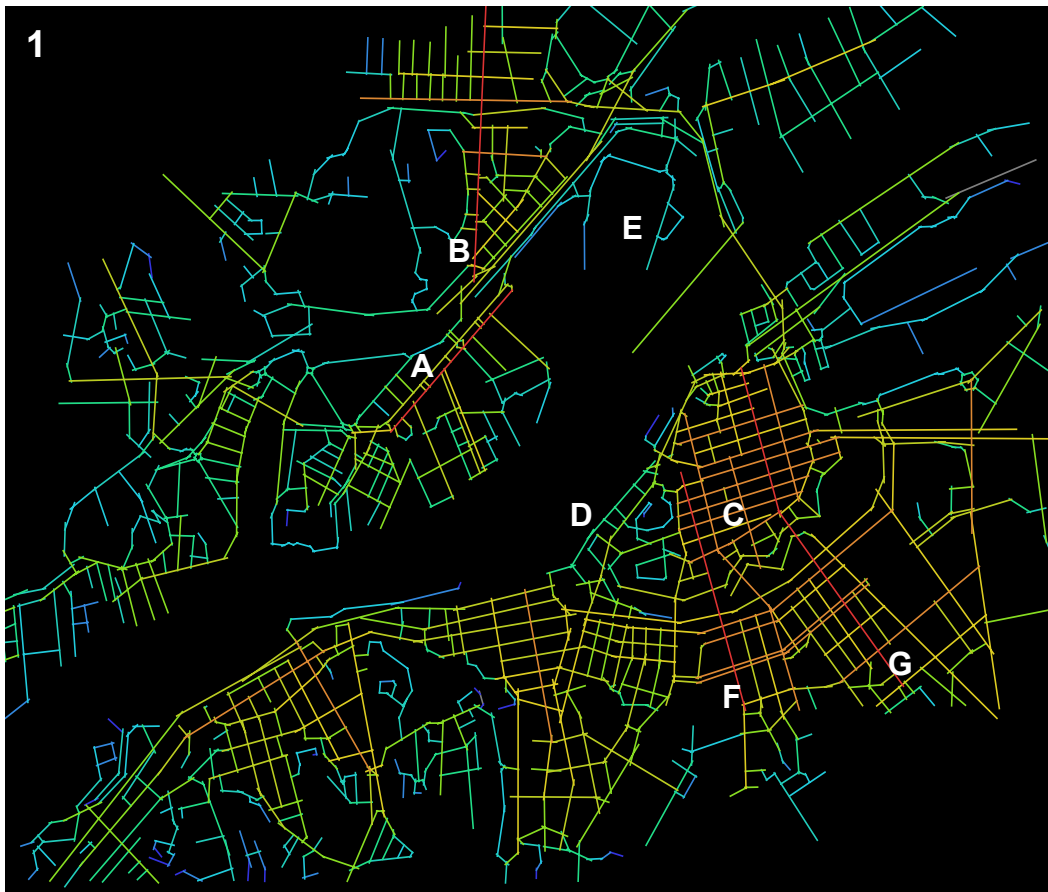


Diagram 4. Space Syntax axial integration analysis over central Gothenburg

1. Situation today
2. Proposed bridge connection

Red = High integration
Blue = Low integration

- A. Lindholmsallén
- B. Myntgatan / Hisingsgatan
- C. Södra Hamngatan / inside Vallgraven
- D. Skeppsbron
- E. Frihamnen
- F. Magasinsgatan / Viktoriagatan
- G. Kungssportsavenyn

SPACE SYNTAX

Purpose

Space Syntax is here used as a tool to see the expected consequences a bridge would have at chosen site between Skeppsbron and Lundbyvassen in Gothenburg. Through a Space Syntax axial integration analysis it is possible to analyze the effect of a new connection when it comes to integration in the urban city pattern and expected people flow. Since there today are only two, none of them designed for pedestrians foremost, connections over the water the north riverbank is disconnected from the urban city life existing south of the river. The purpose of this Space Syntax analysis is to see what one more connection over the water can do and if the area of Lundbyvassen would be more integrated in the urban pattern. Through connecting the area to Skeppsbron, the distance to the highest integrated areas in Gothenburg is very short and a higher integration of the north riverside is to expect.

Background

The term Space Syntax was presented the first time in 1976 by Bill Hillier, Julienne Hanson and colleagues at The Bartlett School of Architecture at University College London, as a tool to analyze the relationships between spaces within our built environment. The idea behind it is that spaces within our physical environment can be broken down into components, analyzed as a network of choices and then represented as maps and graphs that are representing the connectivity and integration of the space. Some of the conditions for a vibrant and mixed city is to ensure high people flow, good accessibility by foot and spatial understanding, parameters that can be measured by a Space Syntax analysis (Ekelund & Koch, 2012)

Two important concepts of the Space Syntax is 'Axial line' and 'Integration analysis'. An axial line represents a room in a system where many axial lines create a network, an axial map. The axial line is described as the shortest distance between linked spaces and can be seen as a sightline. When the space (a road) is disconnected through a turn at that degree that it is not possible to draw a continuous straight line, the axial line breaks and another overlapping line continues in the new direction. The axial map is the base for many Space Syntax analysis and the one that has been used for the integration analysis on the left page.

The integration analysis is the point of interest for this study. It is an analysis that is based on the axial map and its axial lines where the integration can be seen as an average index of the topographical closeness between spaces within a system.

Every axial line, depending on its surrounding connections and position in the network, get an average index where high figures correspond to high integration and low figures the opposite. High integrated streets and spaces are represented with red and low integrated spaces with blue. A high integrated street has a high potential of people flow in our built environment, and a low integration has in that turn a low potential for high people flow. This is why the red axial lines (streets) often are pedestrian streets with shops and restaurants in the very center of the city. In that sense the Space Syntax analysis can be a supporting tool for analyzing future development plans and programming of that space.

Analysis

The axial integration analysis over central Gothenburg presented in image 1 and 2 on left page is illustrating the effect of a physical connection between Skeppsbron and Lundbyvassen. Image 1 illustrates the situation today where the highly integrated city inside the ditch Vallgraven (C) is readable as a high amount of orange and red colors. Also Lindholmsallén (A) and Myntgatan (B) north of the river comes out as high integrated streets while the water close areas are more represented with green and blue colors as they are less integrated areas. Image 2 is illustrating the effect of a bridge between Skeppsbron and Lundbyvassen. What can be read out is that the high integrated city inside Vallgraven is increased and also spreading out to the new connection over the water and further on to the high integrated Lindholmsallén. With the connection over the water both the north and south riversides are more integrated and change color from green/blue to yellow in many areas.



Within the core a dense urban pattern would be found on both sides of the river, putting the water as the central element in the city.

Reflection

The analysis was made to see if the bridge at this location would have the expected effect as I wanted when it comes to connecting the city and people over the water. If the high integrated city south of the river would spread over to the north riverside through this missing link. The result is clear, a connection over the water at this place has an effect to Lundbyvassen and makes it more integrated in the urban pattern. The water itself is a barrier and less integration of the streets next to it is to expect, what is interesting though is that the connection not only gives effect on the north riverside but also the south; Skeppsbron (D) gets more integrated as well as the whole central city inside Vallgraven gets more streets with high integration. There is also a potential for creating a long ongoing street / boulevard from Södra hamngatan (C), over the bridge to Lindholmsallén (A), which shows that the bridge itself has potential to become a street with activities and high people flow. Not only a transport method across the water but a public space where people go because they want to enjoy it.

Although, it was expected an even higher integration of the area in Lundbyvassen and it is a bit surprising to see that Lindholmsallén (A) and Myntgatan (B) comes out as highly integrated streets already in the situation as it is today. This might be a result of that the Space Syntax analysis doesn't make difference between pedestrian streets and traffic intense roads as Lundbyleden for example, which is to be seen as a barrier more than a connection today.

With the future development in Frihamnen (E) it would most certainly have a greater effect on Lundbyvassen and the fact that this site and bridge is a missing link in the future city core becomes more clear.

The analysis method of Space Syntax is accepted but also met with some skepticism, it is seen to not live up to its full potential yet. The skepticism is around how the axial lines are divided, for example if a street has a low degree curve it would in the axial analysis have to be broken up with several axes, something that would be negative towards its overall integration. Also questions around topography and height differences are not taken in consideration. For this analysis all major streets, pedestrian and traffic roads, were analyzed together and the commuting ferries over the water not taken in consideration due to that they are not physical connections.



The chosen site of Lundbyvassen with possible connections over the river

BACKGROUND

THE AREA

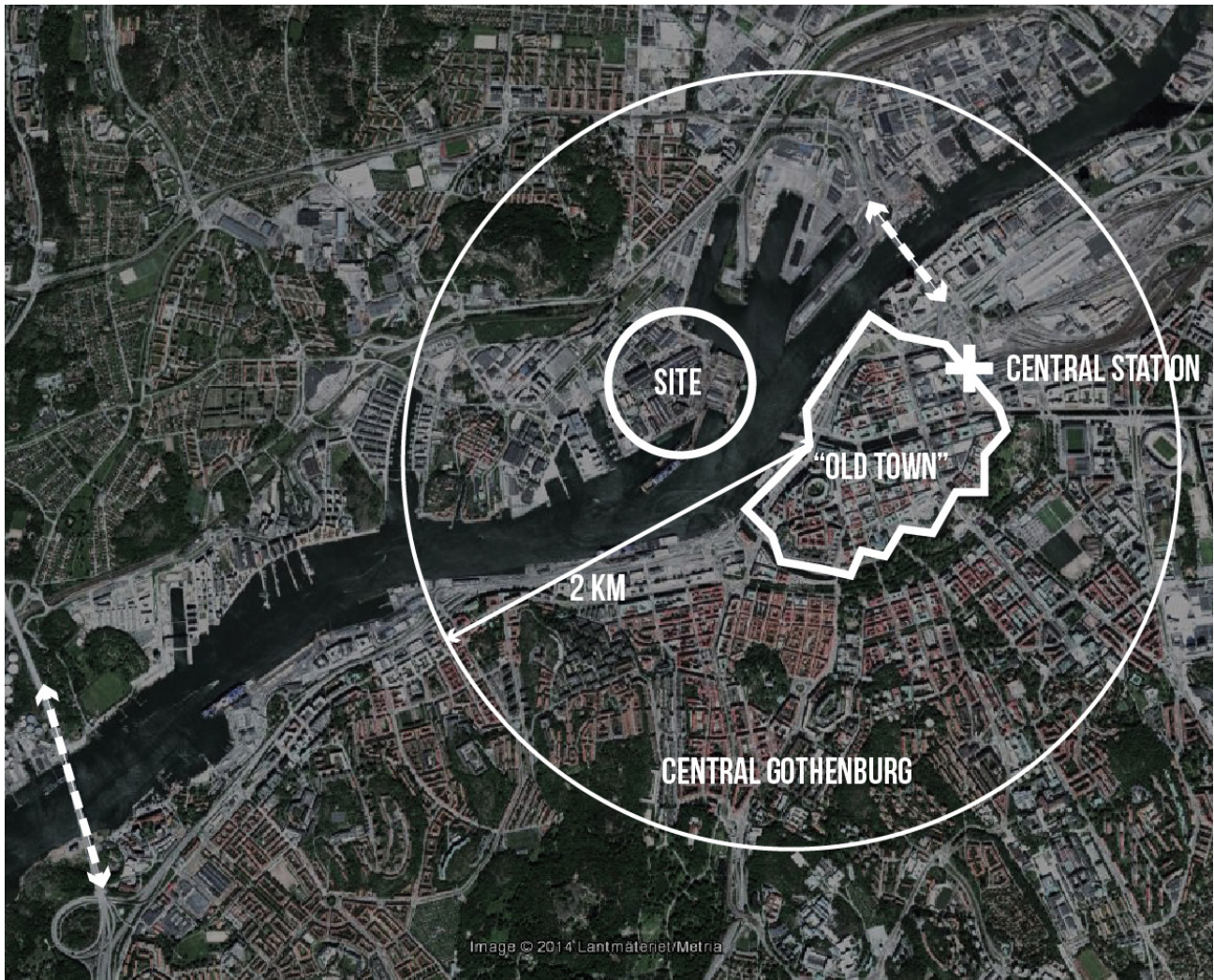


Illustration showing the site's location in the city with the two existing bridges, the old city, the definition of central Gothenburg and the central station marked out.

LUNDBYVASSEN / CITYVARVET

In the city scale context it is now identified that there is a missing link to reach the vision around that Gothenburgs future central core should meet around the water. But this link or proposed bridge is landing on both riversides and the question is how it does that, how does the new integrated area on the north riverbank take form?

For this the thesis is focusing on the future development of this landing site on the north riverbank. On the south riverbank there are new development being built today and the connecting city parts like the old town, Vasastaden and Linnéstaden is considered to be Gothenburgs most dense and mixed use areas. What if the bridge would create synergies and make this vibrancy and city life continue over the water.

The site is in the very center of Gothenburgs new central core and for this it has to go through some transformation; from being an industrial site with shipyard and small scale industry to a vibrant city part that meets the vision of the river city. The hypotheses is that the shipyard industry can not take place here anymore due to that there is no market for a shipyard at this location in the middle of a city. What is left is an area in the middle of the central city, strongly connected its previous function as a shipyard area and in that extent also to the identity Gothenburg has been holding on to for most of its existence.

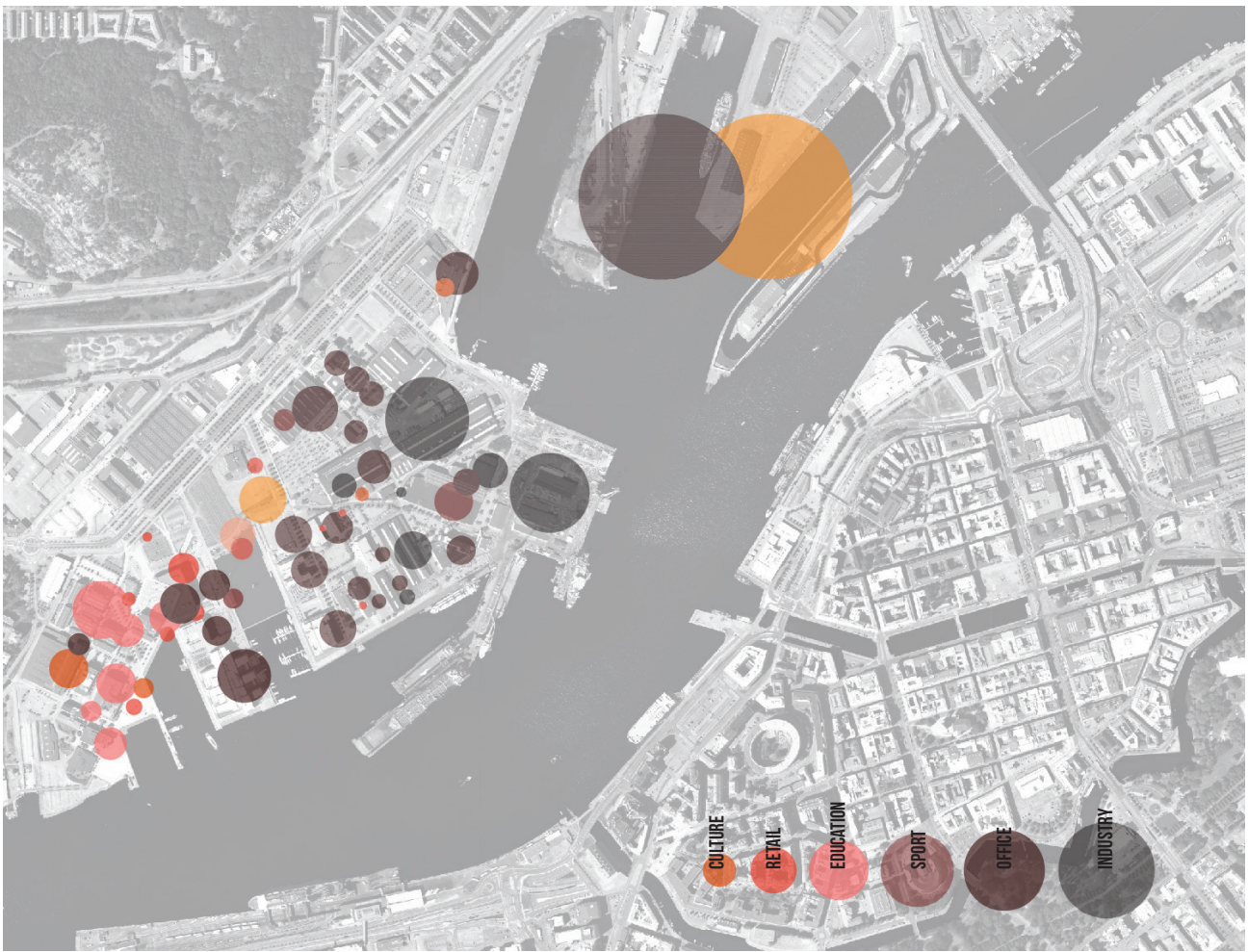


Diagram 5. Mapping of different functions within and next to the area of Lundbyvassen

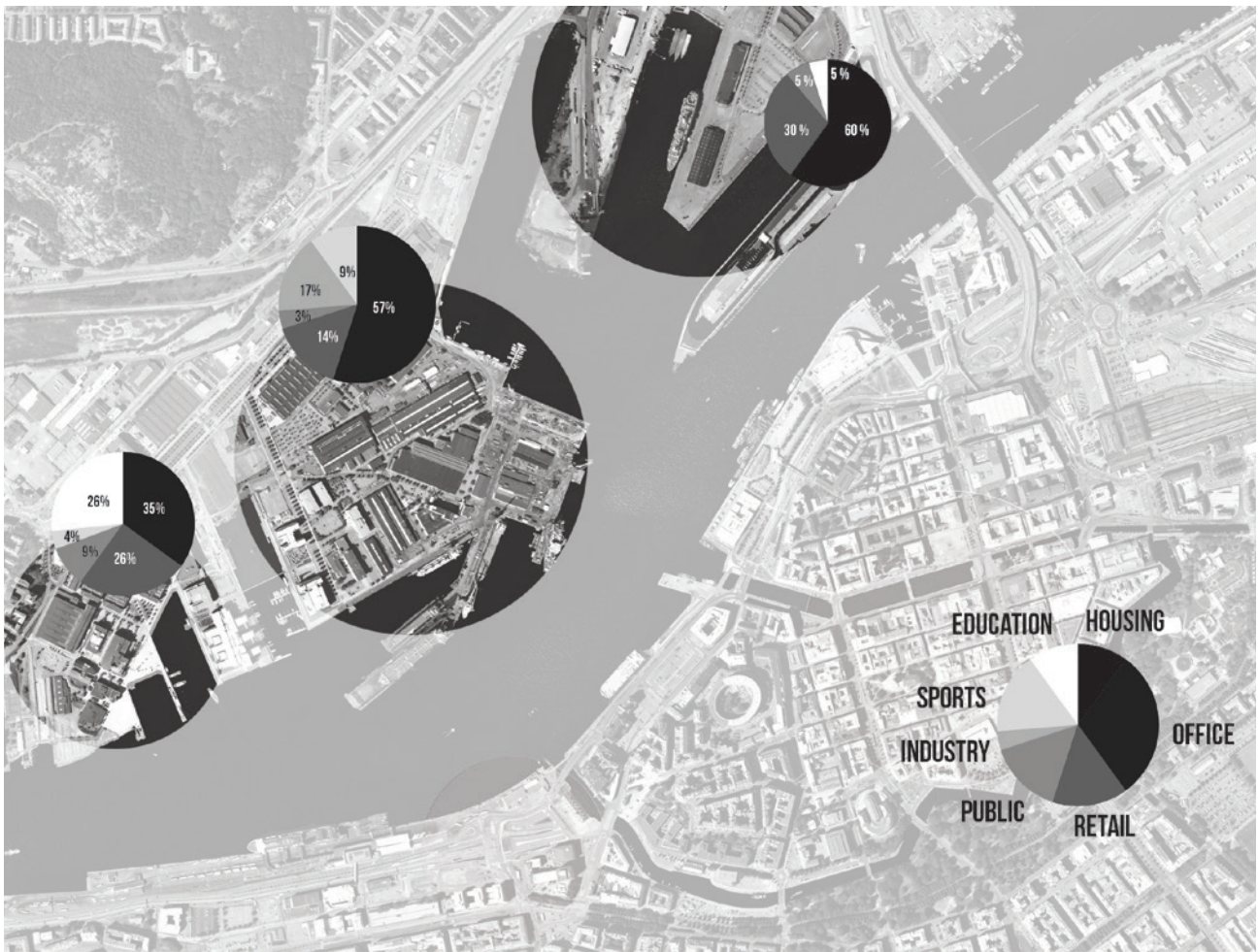


Diagram 6. Distribution of program within and next to the area of Lundbyvassen

CONTEXT ANALYSIS

Program, north of river

Mapping of existing functions around Lundbyvassen, what can be seen is that there is almost only office space in the old magasin buildings at the site today as well as small scale industry. Just west of the site at Lindholmen there is a big office and education hub to where around 20 000 people commute everyday (Göteborgs Stad, 2012). This education node contains both high school, practical education and university education next to each other. In the area there is the culture institution and theatre Backa Teatern and close by is Gothenburg Film Studios. The Swedish radio and TV is also located here, just north of the site.

Southeast of the river there is the old town with a high rate of retail and offices. It is also here the central station and one of the largest public transportation nodes, Brunnsparken, is located. Dividing the old town from the surrounding central city is the ditch and green areas. Just south of the site and along the riverbank STENA ferry terminal is located and taking up a big wharf area and demanding heavy infrastructure around it. As it seems this terminal will move further out and make place for new development (Göteborgs Stad). On the other side of this terminal-barrier there is Järntorget, a vibrant square and another important node for public transportation within the city. Next to this is the streets Långgatorna and the city district Linnéstaden which is seen as a good example of a dense and mixed use area in Gothenburg with both housing, retail, restaurants, culture and offices.



Diagram 7. Recreational space bigger than 0.25 ha in central Gothenburg.

Recreational space

With “recreation” means the possibility to rest or physical activity. The architectural firm Scapescape (2007) which focus on urban morphological studies states, based on their previous experience, that places with many and different recreational values are many inhabitants favorite places in the city and are used by many different groups. The illustration above is based on an city life analysis made by the municipality in Gothenburg (2012) where public areas bigger than 0.25 ha is represented. The result from this analysis is that the parks Slottskogen and Trädgårdsföreningen are the most versatile recreational places in the city, offering different recreational values. The analysis also shows that there are very few recreational places along the river which is strange because the water itself has high recreational values. There is a need for creating recreational access to the water.

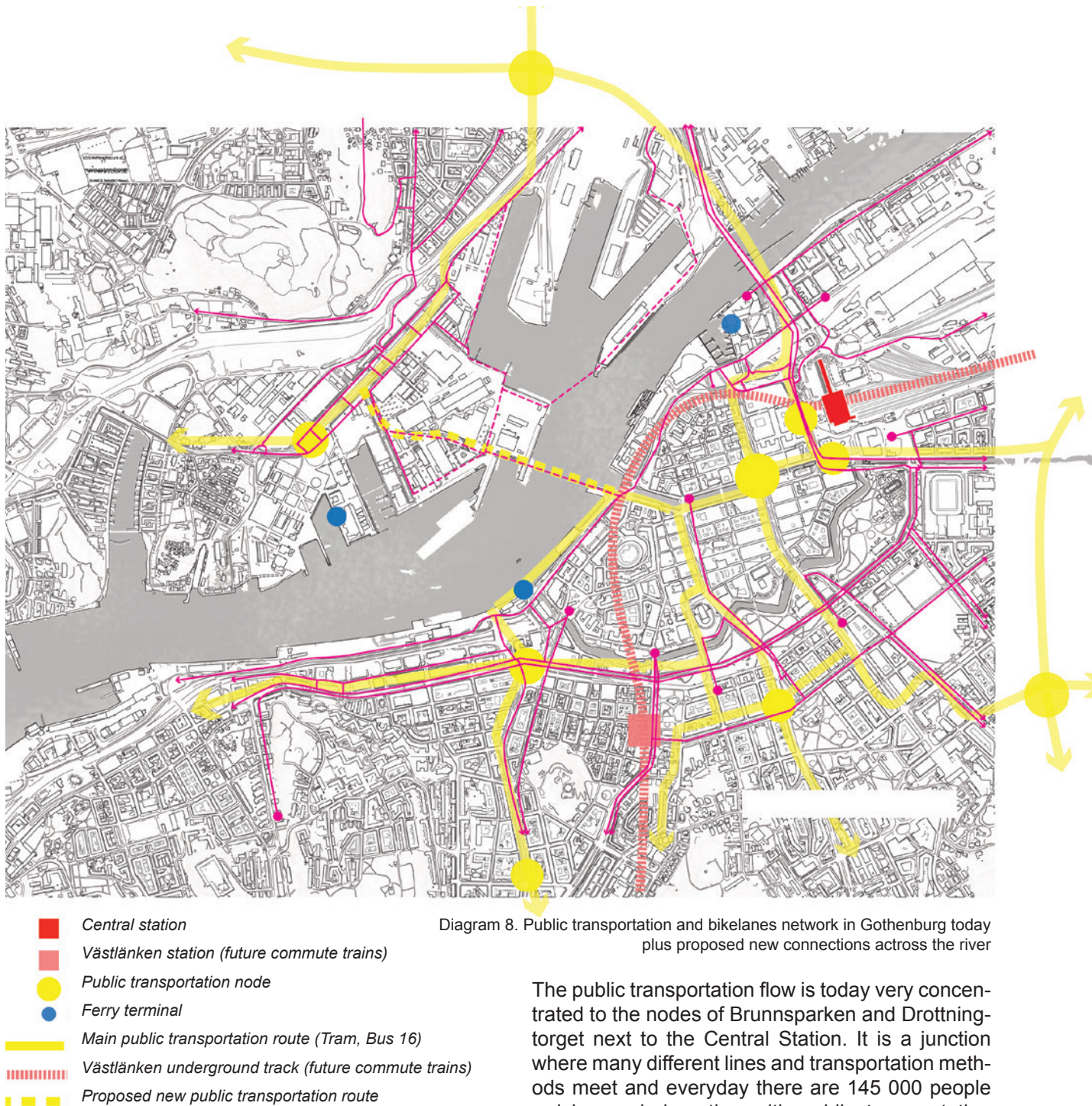


Diagram 8. Public transportation and bikelanes network in Gothenburg today plus proposed new connections across the river

Public transportation

It is expected that the public transportation will double its capacity within 15 years (Göteborgs Stad, 2012). The public transportation is already today dealing with high concentrations of people in the main public transportation nodes, all which have a big part of the city life in the central parts of Gothenburg. This means that the public transportation is one of the most important element for the city life and the distribution of movement and public life in the city.

The public transportation flow is today very concentrated to the nodes of Brunnsparken and Drottningtorget next to the Central Station. It is a junction where many different lines and transportation methods meet and everyday there are 145 000 people arriving and departing with public transportation at these two nodes (Göteborgs Stad, 2012). Also like mentioned before the only primary connection over the water is the Göta Älv Bridge over where 60 000 people are commuting everyday, that is 75 % of the total amount of all passengers in central Gothenburg. The dotted lines above are proposed new connections over the water, either at Skeppsbron pier or at Rosenlund. With effective public transportation a dense and lively city can be built where pedestrian and biking is highly prioritized above cars.





HISTORY & IDENTITY

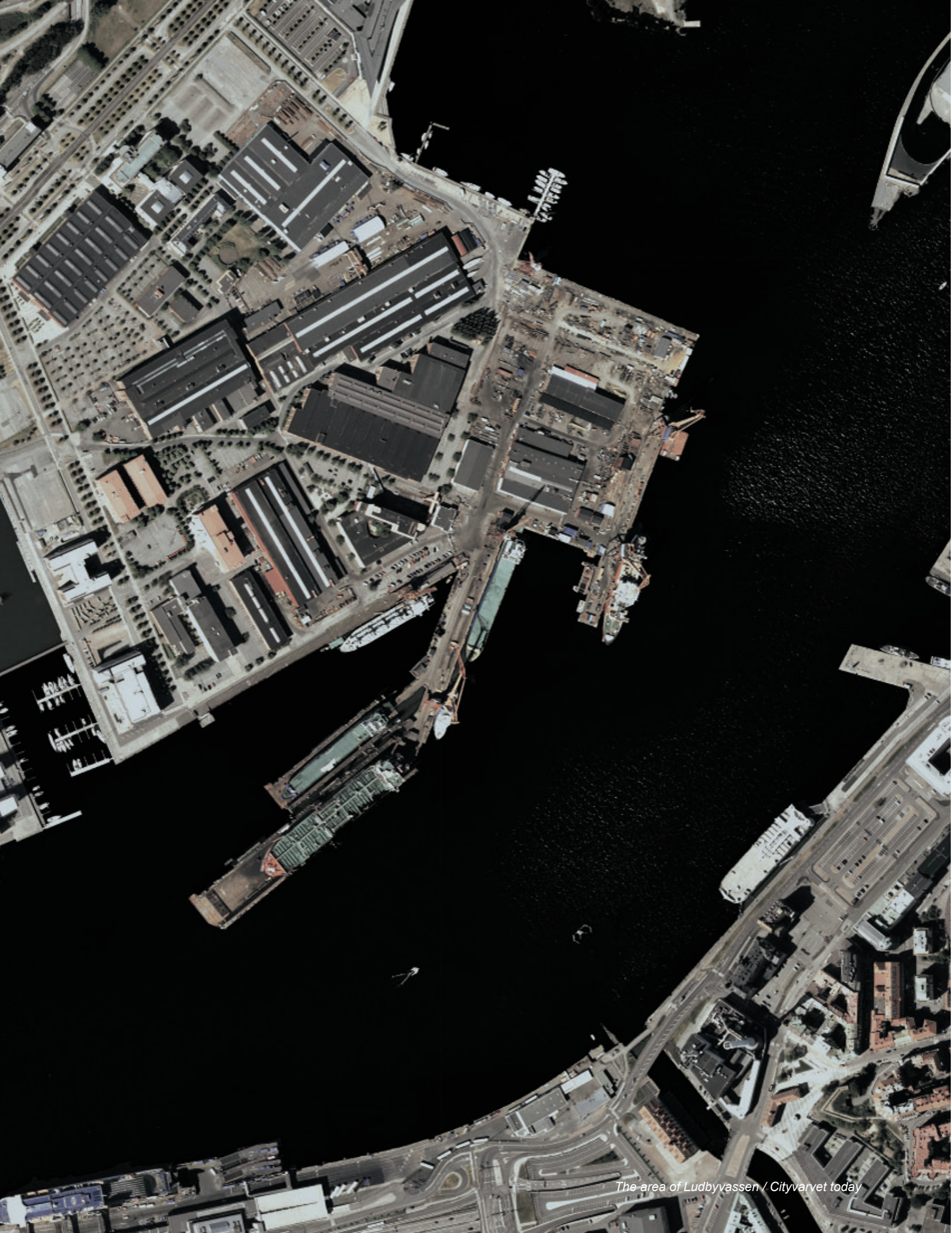
The site's historical function as a shipyard is still very obvious today. The big magasins built by brick are today containing mostly offices. They are closed on the first floor which strengthens the large scale of the buildings. It is long facades without apertures or divisions. It is mainly brick buildings with a couple of industrial buildings of steel. The existing small scale industry on the site is enhancing the feeling of the previous shipyard. So the scale is large, both when it comes to the building but also to the open space and sightlines towards the river. It is rustic and charming in a way, although the human scale is missing due to closed ground floors. There are a few lunch restaurants here, all which only has open during lunch hours and are closed on weekends.

There are voids between the buildings that are creating interesting space, small scale within the big and a feeling of that the buildings did just

happen without planning from above. According to the organization Varvshistoriska Föreningen there were a strong community feeling among the workers and the shipyards were functioning as a city within the city.

How to relate to this history and the site's identity today?

The big scale and rough industrial feeling is of importance, and how to work with this as in the same time open up ground floors and makes the scale more human. Many of the buildings are valuable buildings representing their epoch and should for that be kept, but they are not protected and can to their size and style also handle additions that enhance them.



The area of Ludbyvassen / Cityvarvet today



SITUATION TODAY

In the area today there are to a large extent offices, both in the old magasins and newer development. There are a few lunch restaurants (only open during weekdays and lunch hours) and a radio museum. The previous shipyard Cityvarvet takes up a big part of the area and the waterline, also fenced small scale industry next to this is creating barriers. Close to the site there are development going on, just across the water at Skeppsbron a new city part with the goal to be "Gothenburg's new meeting place" is constructed. And west of the area there is a new Hotel and planned area for housing. Further west is Lindholmen Science park, an education and innovation hub as well as conference space.

FLOOD RISKS

The climate is changing. There are two different aspects of why an area is under high risk for flooding and what strategies to use. The first is the fact that the mean sea water level is expected to rise with approximately one meter within the next century. This is a constant state of the water level and the strategies for floodings need to be planned according to this; it is a long term perspective action with high investments like for example lifting up ground floors and access routes, building barriers, rethinking the program of vulnerable areas etc. The other thing is the temporary stress on an area, these are pressure from heavy rainfall and storm which not only rises the sea water level but the heavy rain also create a lot of surface water that need to be taken care of. Lundbyvassen is under risk for future floodings (see diagram 10) due to both of these aspects.

Rising sea water level at Göta Älv

The infill ground has an level around +2 m above sea water level. The municipalities guidelines today is that the ground floor on all new development need to be at +2,8 m, or that the buildings are designed to adapt to flooding. There is also a safety buffer that should be less than +0.5 m, which makes the guideline at +2,8 m in the risk zone because expected highest sea water level (in the 100 year span) is +2,65 m, in this figure the rising mean sea water level and rain pressure during storms are considered.

So in other words, during a stormy November night in the year 2114 the water level in Göta Älv is expected to be 2,65 meters higher than it is today.

Surface water during heavy rainfall

Since the land at Lundbyvassen is made by infill land there is almost no possibilities for the ground to infiltrate water and due to mainly hard surface areas the runoff of surface water is high. See diagram 9 below. When the pressure from surface water is expected to be higher in the future the area need strategies for how to take care of this in the future.

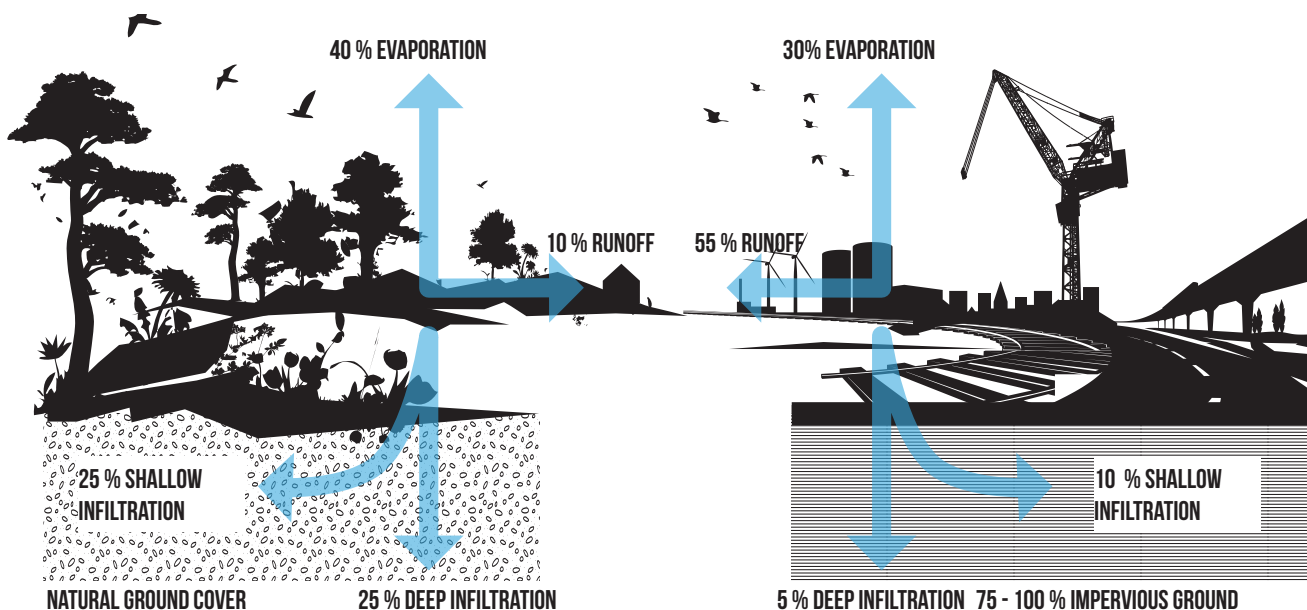


Diagram 10. Surface water flow - Natural vs impervious ground cover

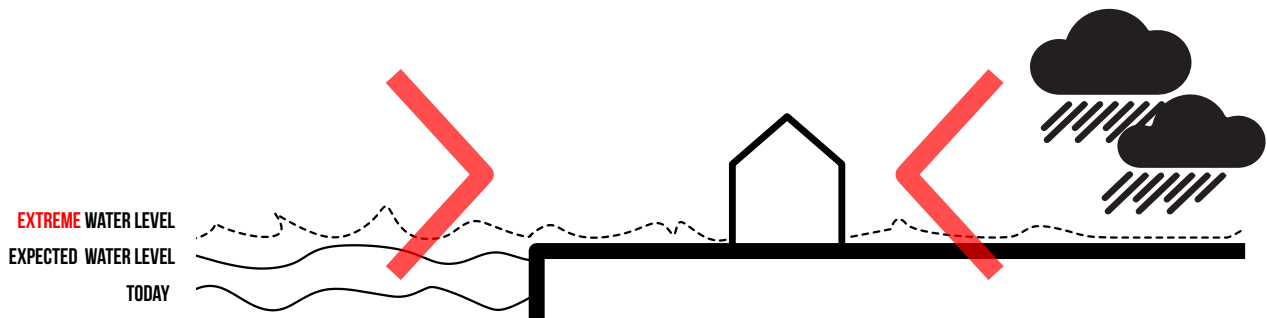


Diagram 10. Rising sea water level and heavy rain storms makes the harbour areas under pressure from both sides as the rain water must be able to exit into the harbour while in the same time making sure if that the rising sea level does not run into the city.

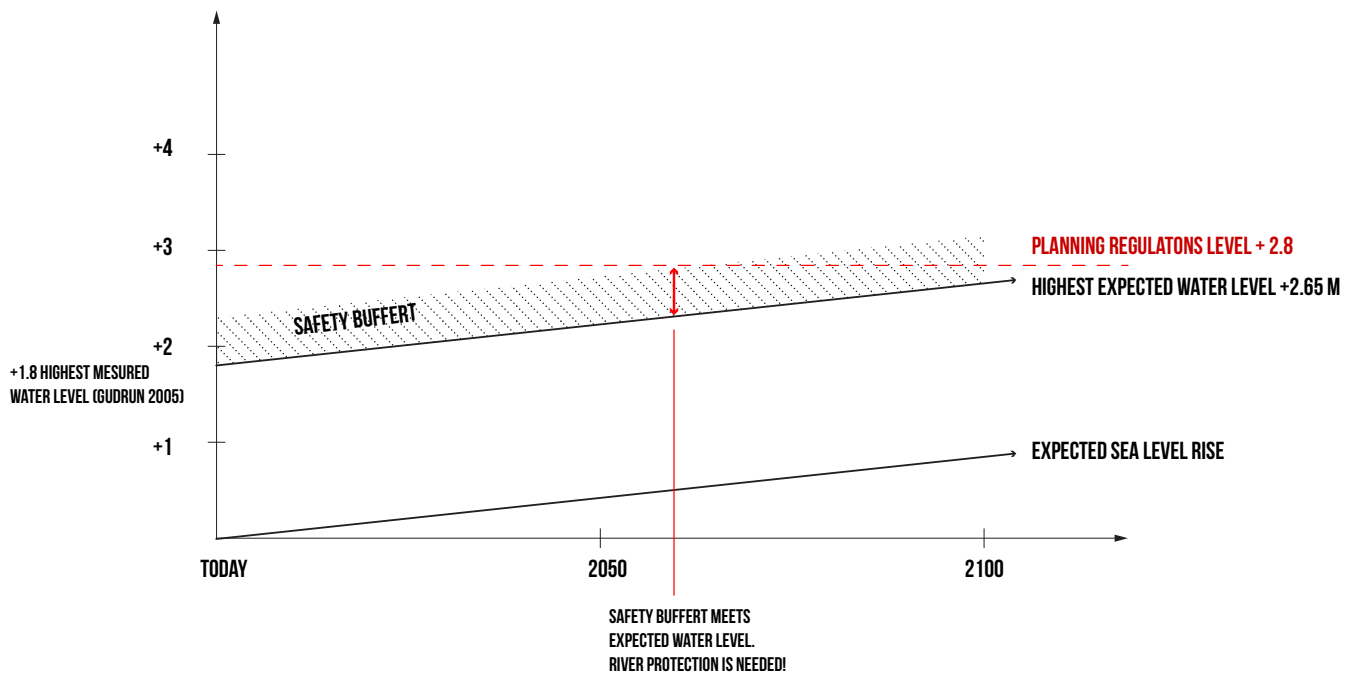
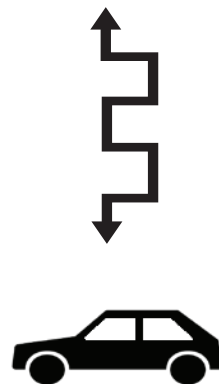
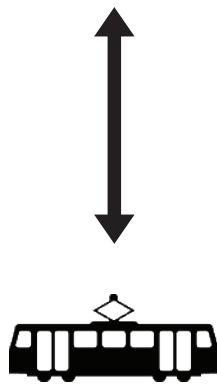
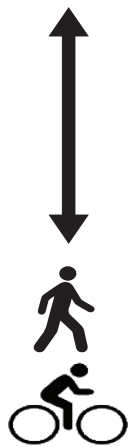


Diagram 11. The expected extreme water level rise of the river in Gothenburg in relation to planning regulations level of today.



DESIGN THEORY

THE HUMAN ENJOYMENT OF THE SPACE

How do we translate the ideas from urban sociologists and planners as Jan Gehl into a more three dimensional city structure? Can the qualities from a small scale neighborhood be experienced in a dense city structure? For to explore that ideas from urban theorists like Jan Gehl and William Whyte has been studied and interpreted.

Processes and projects

Architecture is the physical frames for within the social processes take place. The social process are not only depending on the physical form, yet the architecture can help to encourage the social process and networks.

Clear transition from private to public

By having clear division between the type of different social processes/spaces provided; from private (e.g. living room) to semi private to semi public to public (e.g. town hall), a feeling of belonging and security is created. You get to know your close neighbors and spend everyday life with them, you are also familiar with the neighborhood and feel a belonging to that. And from there to the rest of the city, the most public, it is not far.

Communication and senses

How we experience a space is more than anything related to our senses; sound, smell and sight are factors that play in and affects our feeling of the space. Vision is indeed important, we see what happens on eye level in a 90 degrees angle to the sides. We register and take in inputs. We tend to miss things that are happening below us, and even more so above us. From that point we recognize a friend on the street, it takes 30 s before we are next to each other. During those 30 s (40 m) we register signals and read in an image. So speed is also an very important factor, at walking or running speed (5-15 km/h) we are able to register what happens around us, going faster than that we miss details and its hard to keep up the track.

Street life and the importance of duration

It is not only about the number of people and events going on in a street but for the time spent there. The goal is to make people stay longer, to stroll and walk slower, to observe and interact. People tend to sit where there are places to sit, preferably in the sun and with a view over what other people a doing. To be able to observe the social processes that take place on the street. It does not matter how well designed a square or other public space is, if there is no pleasant

place to sit there will be no people staying there a longer time.

The human scale

The most economically beneficial height of new buildings is 6 floors according to David Sim, Gehl architects in the film The Human Scale. That is also a human scale because it is able to provide sunlight on the street the distances between the buildings becomes bigger the higher they are. The human enjoyment of the space becomes less as we tend find it harder to understand the space with our senses. People are spread out and not meeting each other. Big and empty areas are especially a problem when it comes to safety at night.

The question is who we are designing our cities for and how does the physical frames adjust after this. A city designed for pedestrian is a city with narrow streets and low height buildings, the distances are short and everything is close to each other, see example for Rome in diagram 12. A city designed for cars needs more space because of their size and speed. There is need for bigger radius for the roads, parking garages and intersection junctions. A city designed for high speed trains would be even more spread out, although with effective public transportation clusters of human scaled city structures could be formed at its stations.

URBAN PATTERN - THE PEDESTRIAN VS THE CAR CITY

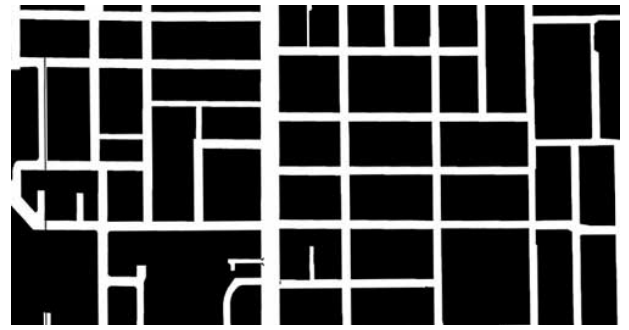


Diagram 12. The human scale and its urban pattern - The illustration to the right shows an urban structure for a city built for pedestrians (Rome), the illustration to the left illustrates a city built for cars (Toronto).¹

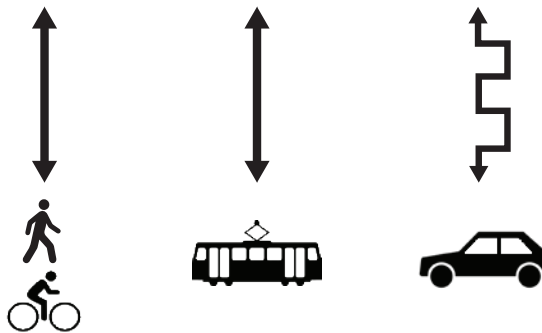


Diagram 13. A city where walking, biking and public transportation is faster than driving

TRANSITION BETWEEN PRIVATE AND PUBLIC - COMPARING DIFFERENT URBAN BUILDING STRUCTURES

A) 4 floors housing blocks, ground floor commercial in Haga, Gothenburg.

B) 6-7 floors housing blocks, ground floor commercial and offices in Olivedal, Gothenburg

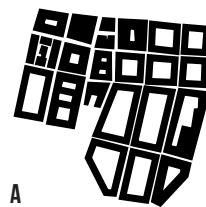
C) 7 floors tower blocks housing, Masthuggsterassen Gothenburg

D) Old building block, 4 floors Nyhavn, Copenhagen

E) 3 floors housing blocks / row houses in Østerbro Copenhagen

F) 5 floors housing blocks, Blågårdspads in Nørrebro Copenhagen

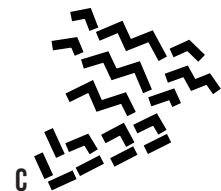
G) 3 floors row houses + 8 floors housing block in Borneo, Amsterdam.



A



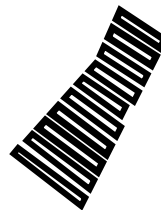
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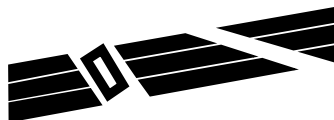
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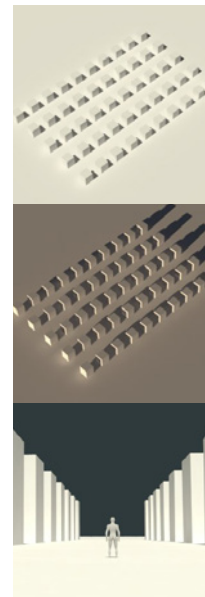
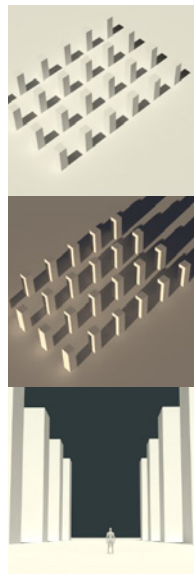
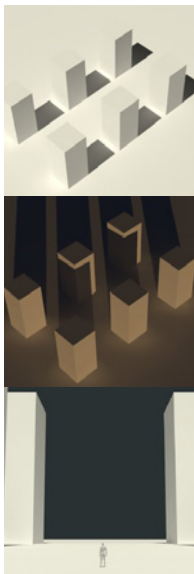
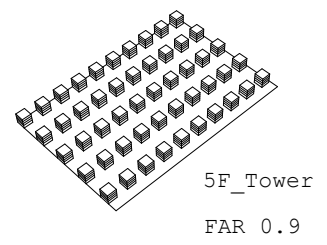
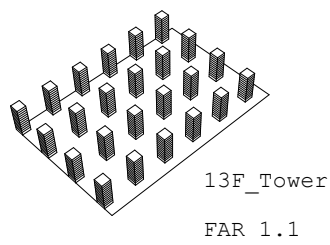
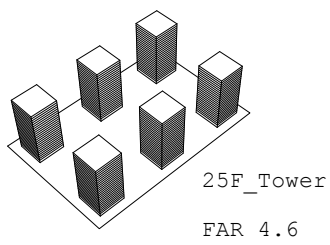
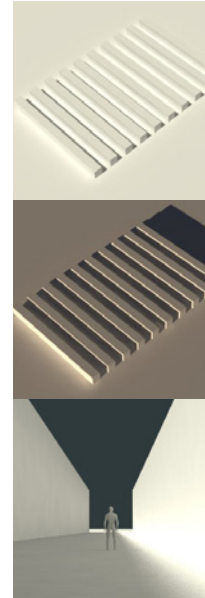
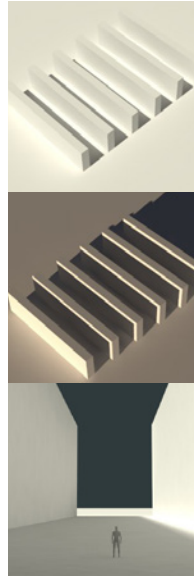
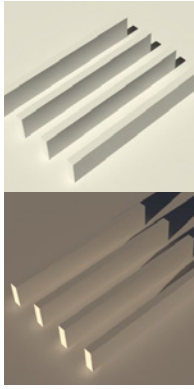
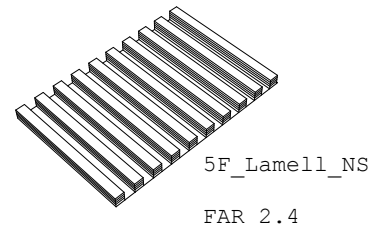
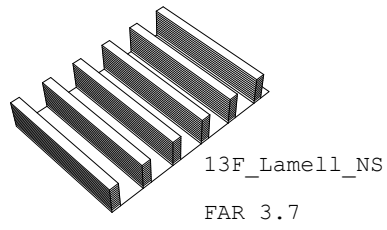
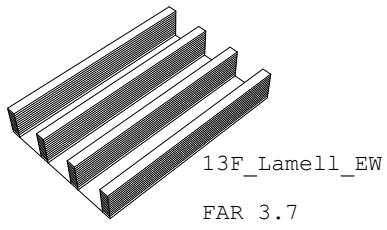
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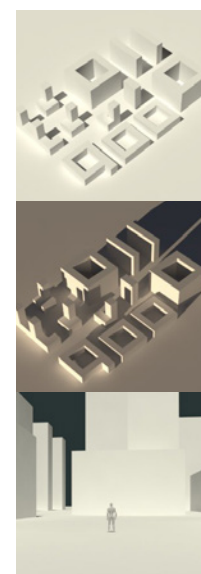
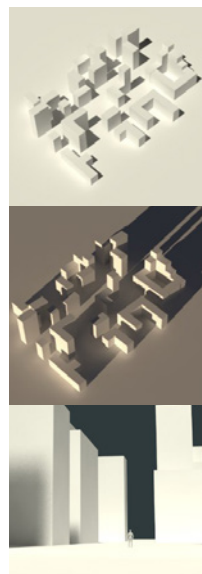
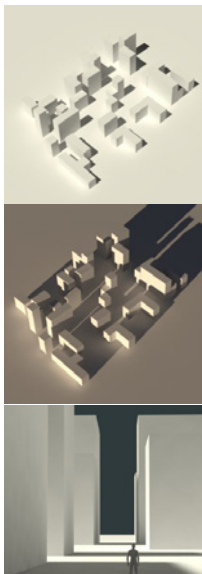
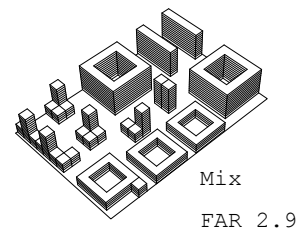
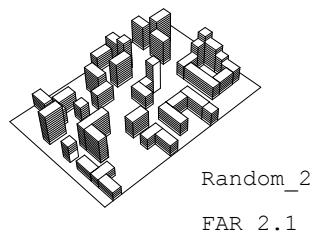
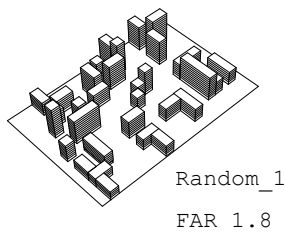
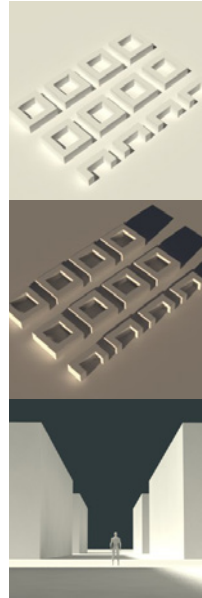
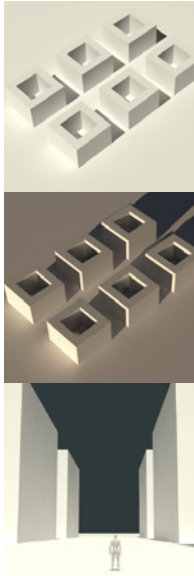
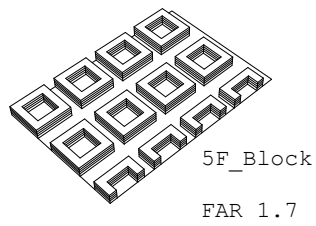
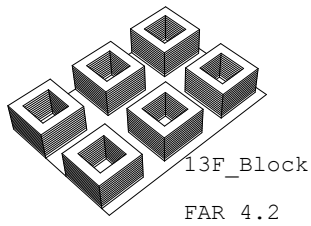


G

Diagram 14. Examples of different housing block styles

¹ <http://www.bricoleurbanism.org/ideas/urban-fabric-form-comparison/>



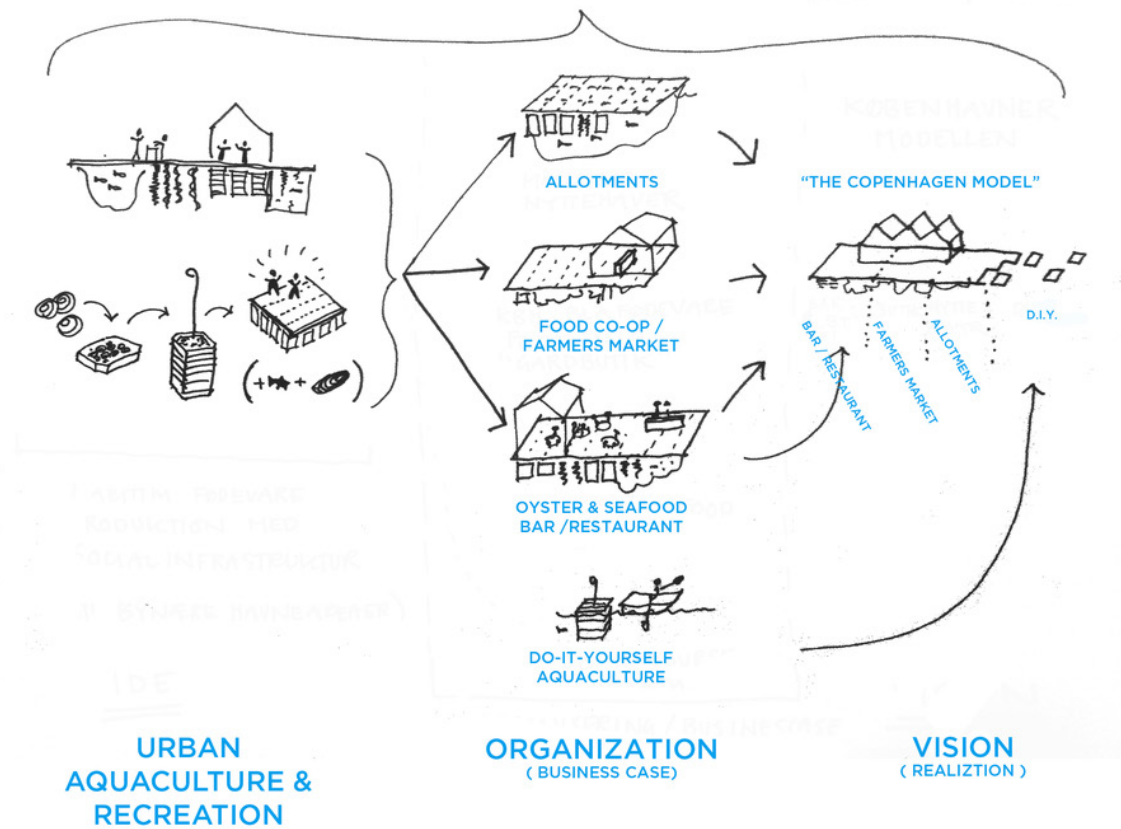


STUDIES ON DENSITY

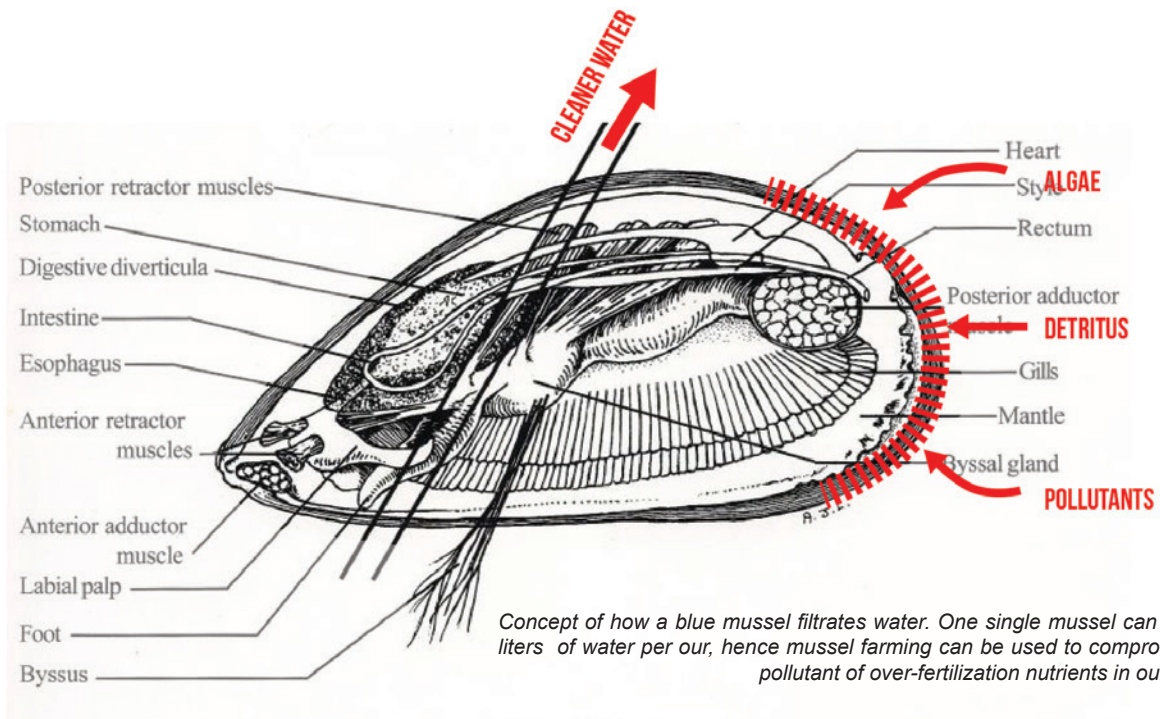
FAR (Floor Area Ratio) is a figure used for measuring the density of an area or district. It equals the buildings total floor area divided by the total land area it is built upon. The different studies focus on exploring how dense different building structures are in relation to their layout and height. The width of the streets is based on the building's height and the restriction that the street must have direct sunlight at some point. Bird view renders showing the scenarios for summer respectively winter solstice. The street view render explores the human scale for each building typology.

The result from the studies is that building blocks with courtyards is the most efficient when it comes to FAR as well as creating a human scale at street level. The study also show that a mix of building types have possibilities to create high densities while in the same time creating more interesting spaces on street level.

IDEA HARBOUR FARM



Concept of a harbour farm, EFJEKT Architects Copenhagen.



THE MUSSEL HEROES

The problem - Eutrophication of our waters

Constant infusion of nutrients like nitrogen and phosphorus has increased the production of plankton and algae in our sea waters. This over-fertilization leads to many negative effects to our marine ecosystems e.g. muddy waters, toxic bottom waters, loss of biodiversity and overgrown creeks. According to Gothenburg University's Marine ecology department around 80 % of the nutrients that diffuse into our waters come from leakage from agriculture, forestry and fallout of nitrogen from traffic pollution.

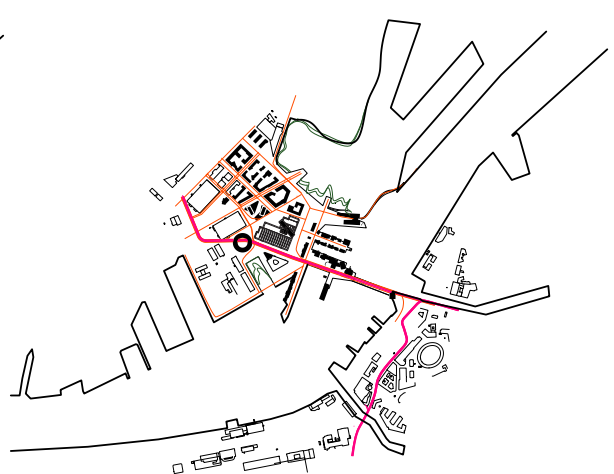
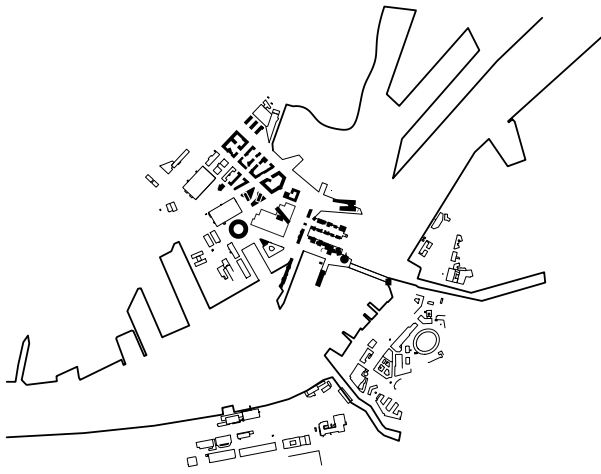
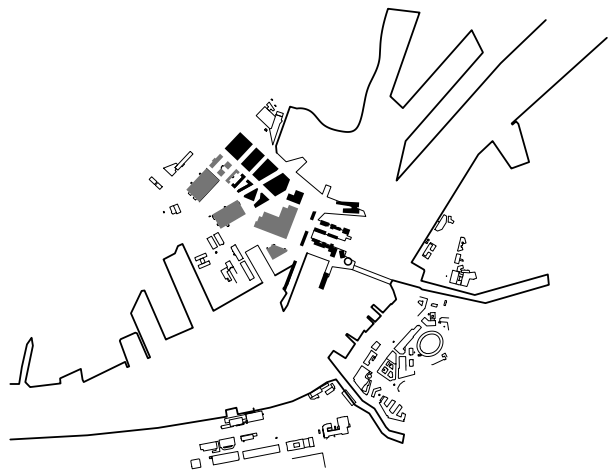
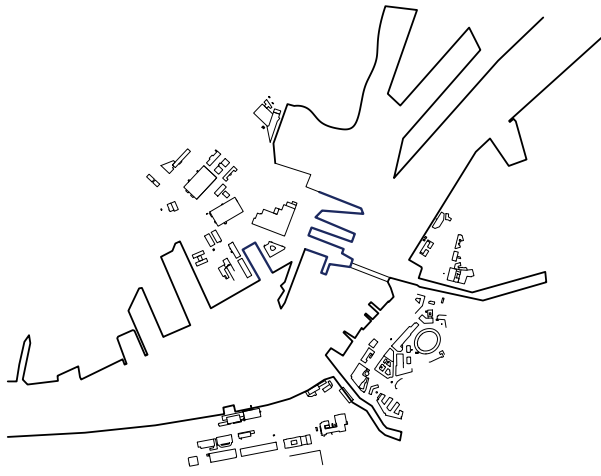
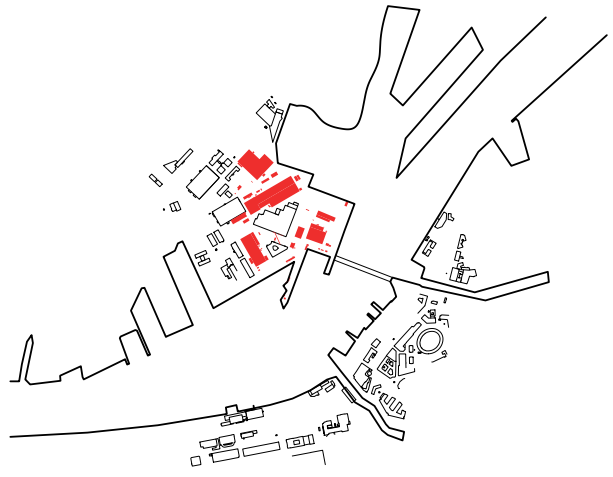
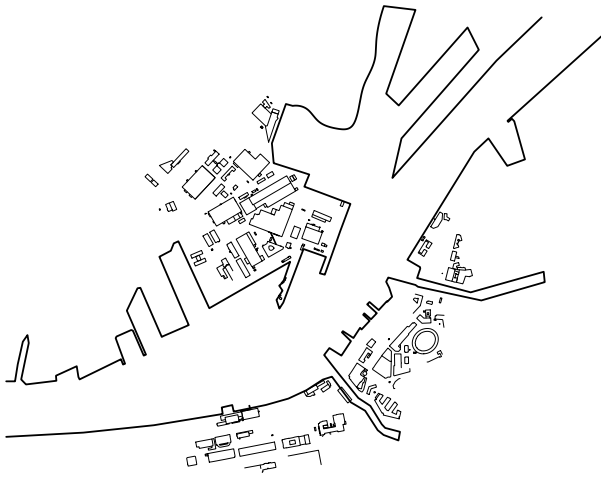
To lower the amount of nitrogen and phosphorus that reaches our waters we need to retain the water and slow down its way before outlet in our sea and lakes. Nature does this in a natural way through wetlands, dams and dikes, but with increase of hard surfaces and loss of wetlands this natural process is not taking place in and close by our built environments today.

The mussel heroes

Mussel cultivation is an example of an action that can be used to compromise the pollutant of nutrients in our coastal areas. The blue mussels are effective filterers since their main nature is from the plankton that benefits from the over-fertilization nutrients in our waters. Under good conditions, a 5-6 centimeter

big mussel can filter five liters of water per hour and in general removes all microscopic particles and bacteria according to the marine ecology department at Gothenburg University.

The concurrence of suitable space for the mussel spawns to attach too is limiting in our coastal areas, which can be used by the mussel cultivating by offering "cultivating ropes" that the mussel spawns can attach too. Even though a mussel cultivation is artificial it is a natural part of the ecosystem and has a natural function. At a 0,4 ha area (a football court), 120 tons of mussels can be harvested after one year, which then contain almost 1 tonne nitrogen and 60 kg phosphorus. When water is free from toxics around two thirds of the harvested mussels can be for human consumption, the rest which contains broken and small mussels, can be used for fodder and fertilizers for the agricultural sector. In that way a closed system loop, between our food - water - waste system, so called 'agro-aqua-loop' is created.



Development strategies for Lundbyvassen.

DESIGN STRATEGIES

Strategy

Based on the background research, analysis and theory research a strategy and identified design criteria for the new development been formulated. The strategy is to focus on two different aspects of the new development; the people and the water, and their relation to each other. The design criteria are formulated from mapping out what services are wanted, what actors (ingredients) these need to exist and how introduced design components can provide these. See diagram 15 and 16 on following pages.

The development strategy starts with adding a bridge between Skeppsbron and Lundbyvassen. According to previous Space Syntax studies and other city analysis this connection would increase the integration and people flow at Lundbyvassen. The area have the potential to become a well integrated part of the city core.

But a bridge is not enough, what happens where it lands and how to program the area to ensure the city qualities it has potential for?

The strategy is that low quality industrial buildings are replaced with dense and varied housing, offices, retail, culture and other public buildings, to create diversity and densify the area. To open up ground floors to public functions. The existing buildings are closed on their ground floors and the program is today to a very high extent offices.

SOCIAL SERVICES - A VIBRANT CITY

To create a vibrant new city district the focus of the new plan will be how to build dense and create a place of belonging for both people who live there and those who visit. What elements are needed for to create this vibrancy?

Below are listed what services that are identified to support these strategies to create a vibrant new city district. The service diagram to the left is mapping out what ingredients (actors) the wanted services need and how these actors can be provided through introduced design elements.

DENSITY

Dense; creating urban vibrancy, liveliness and intensity that comes from the pressure of a large amount of programme and people compressed into a small area.
Measurment FAR, Floor Ratio Area

EVOLUTIONARY GROWTH

Evolve; the overall character is determined by an incremental process of adaption and optimization of local conditions. Organic and bottom-up development, reflecting changing needs, wishes and habits of the people shaping it over time.
Continuity of investment or development in an area

INFORMALITY

Informal; accept the spontaneous and improvised additions and modifications made by their inhabitants. These modifications are necessary relaxed and small in scale, reflecting the desires of individuals, functioning within - but often challenging - the guiding principles of an overall plan.
The presence of individual additions or ad-hoc spaces.

INDIVIDUALITY

Individual; allow space for the personal and unique, creating a secluded and discreet counterpoint to the constant gaze of collective living.
Freedom of expression

IDENTITY

Identity; every community has an identity, offering a coherent reflection of the characteristics of its inhabitants, culture and programme and lifestyle through a particular physical form. Collective identity engenders mutual social pride based on integrity, recognizable both by its inhabitants and visitors.
The strength of the identity measured by its overall visual coherence and recognizability.

Human scale; offering a proportional, material and spatial intimacy that is appropriate for dwelling and organising daily life. Spaces of social encounter and engagement; healthy civic space.
Spaces that are low in height, narrow and modulated can be considered human-scaled.

COLLECTIVITY

Collective; offer the feeling of being part of a safe and mutually supportive group, with shared ways of living, ambitions, characters and qualities, tied together by a dense social fabric. Spatially often organised around a semi-public common space, with shared facilities and resources.
The mix of private to public space and the presence of common programmes

[COMMUNITY]

“A group of people living in the same place or having a particular characteristic in common.”

The community “The people of a district or country considered collectively, especially in the context of social values and responsibilities; society.”

Ecology “A group of interdependent plants or animals growing or living together in natural conditions or occupying a specified habitat.”

[DENSITY]

“The quality or condition of being dense”

“The number of individuals, such as inhabitants or housing units, per unit of area.”

“The degree to which something is filled, crowded, or occupied.”

thefreedictionary.com

FLEXIBILITY

Flexible; accept the inevitability of changing needs and wishes over time. Extensible and adaptable which allows for responsiveness to immediate needs using the resources available as prototypes for future possibilities.
The ability to modify one's own surroundings

DIVERSITY

Diverse; embrace the eccentricities and plurality, preferring complexity and juxtaposition over monotony and repetition. Inhabitants embrace each others' cultures and desires, together contributing to a layered and rich whole.
Percentage of different programmes, styles or building scales in a particular area.

PUBLICNESS

Public; free and open offering space for social activities, collective debate and even dissent. Well-considered public space carries the power to reinforce the democratic values of an open society. *Publicness can be measured simplistically as the proportion of space dedicated to common functions compared with private functions, (this overlooks the importance of social networks in shaping the quality of the public realm).*

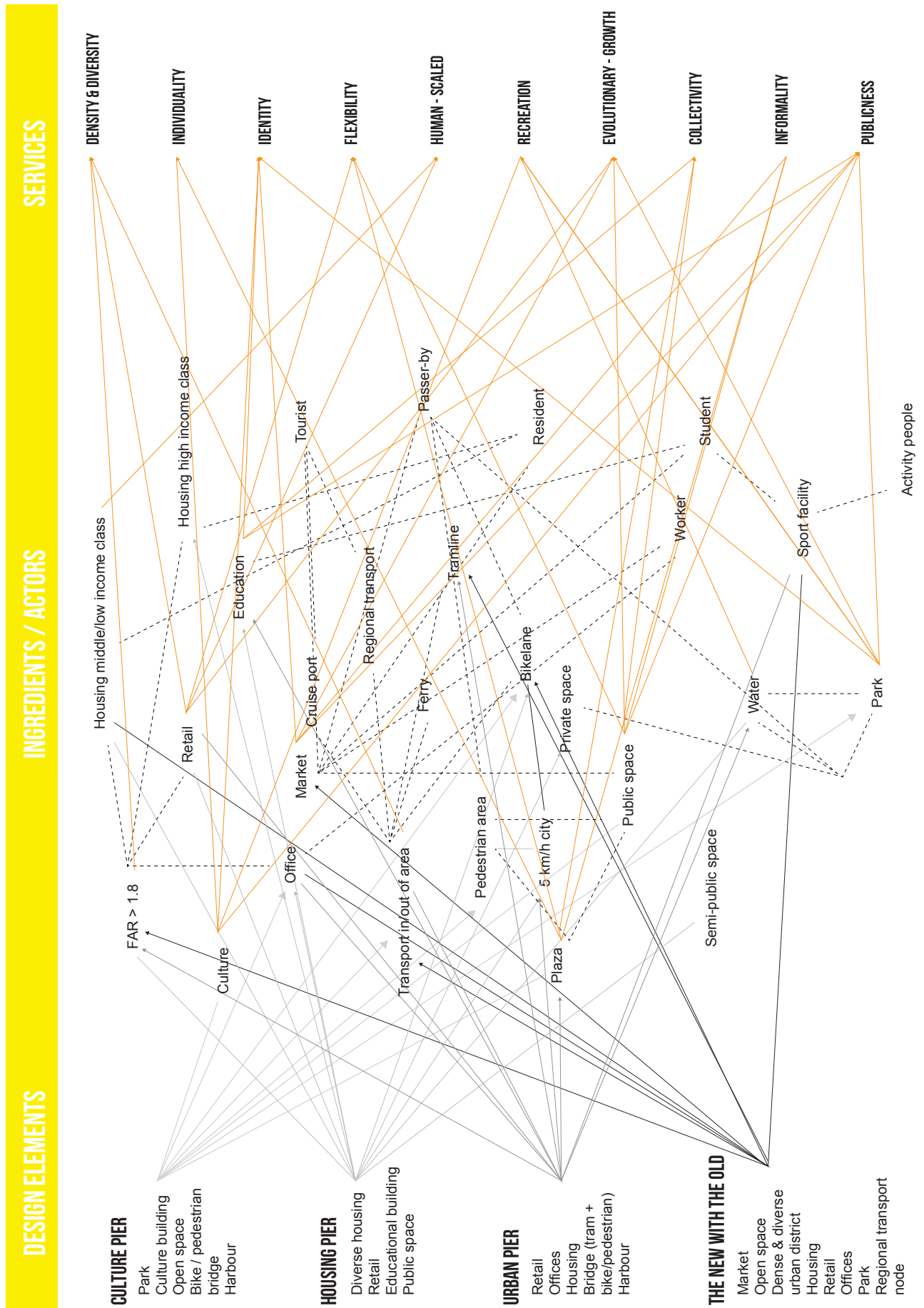


Diagram 15. Social services system diagram

BLUE SERVICES - LIVING WITH WATER

The strategy for the blue plan is to qualify the life in the harbour and the water's potential. Both when it comes to adapting to flooding, increasing the marine biodiversity and creating possibilities to interact with the water. The focus is on water surfaces - how to adapt to and interact with them, on Edges - how to design the edges and create accessibility to the water and on Connections - how connect across the water and create new movement patterns.

Below are listed services that are identified to support these strategies for living with the water. The service diagram to the left is mapping out what ingredients (actors) the wanted services need and how these actors can be provided through introduced design elements.

ACTIVITY

Why; the water as a magnet, take use of its possibilities and appreciation. Innovative use of the water. Respect existing activities, e.g. shipping.
How; introduce new activities and connections over the water and still respect the important existing ones.

RECREATION

Why; by taking use of the water's recreational qualities the water will be a even more appreciated and accessible element within the city.
How; create places where the water's recreational qualities are enhanced and accessible.

IDENTITY

Why; the water and the harbour, with its industry, is strongly connected to Gothenburg's identity.
How; make the identity of the place easy to recognize and that the area tells a story about its own history. Keep open areas and sightlines out to the horizon.

BIODIVERSITY

Why; The loss of marine biodiversity (variety of life in coastal and ocean environments) is a global problem that needs to be solved on local premises. The result, better water quality and rich marine biodiversity.
How; Elements and artificial water landscapes that support the local marine ecosystems, to support them to get back to "normal". Create educational space and increase awareness about these questions.

LOCAL FOOD PRODUCTION

Why; Use the water to provide locally produced food. There are both educational, health and sustainable values in distribution of locally produced food.
How; Visualize and create awareness of the local water- food -waste system. Ensure good water quality, which also is connected to food production through mussel farming.

RESILIENCE

Informal; rising water levels and heavier rainfall puts the site in a high risk for future floodings. It is crucial to deal with the site's ability to recover after these events. Possibilities to make the site as a role model and testing ground for climate change adaption.
How; less hard surfaces - more green, water retention and buffer zones for surface water, soft and hard flooding barriers, climate adaption technologies.

SAFETY

Why; the area is under a risk for future flooding, it is important to plan the area for how it can be used during pressure from high water levels.
How; plan and program the area with safe zones and accessibility routes so it is possible to get to and from important functions even during flooding.

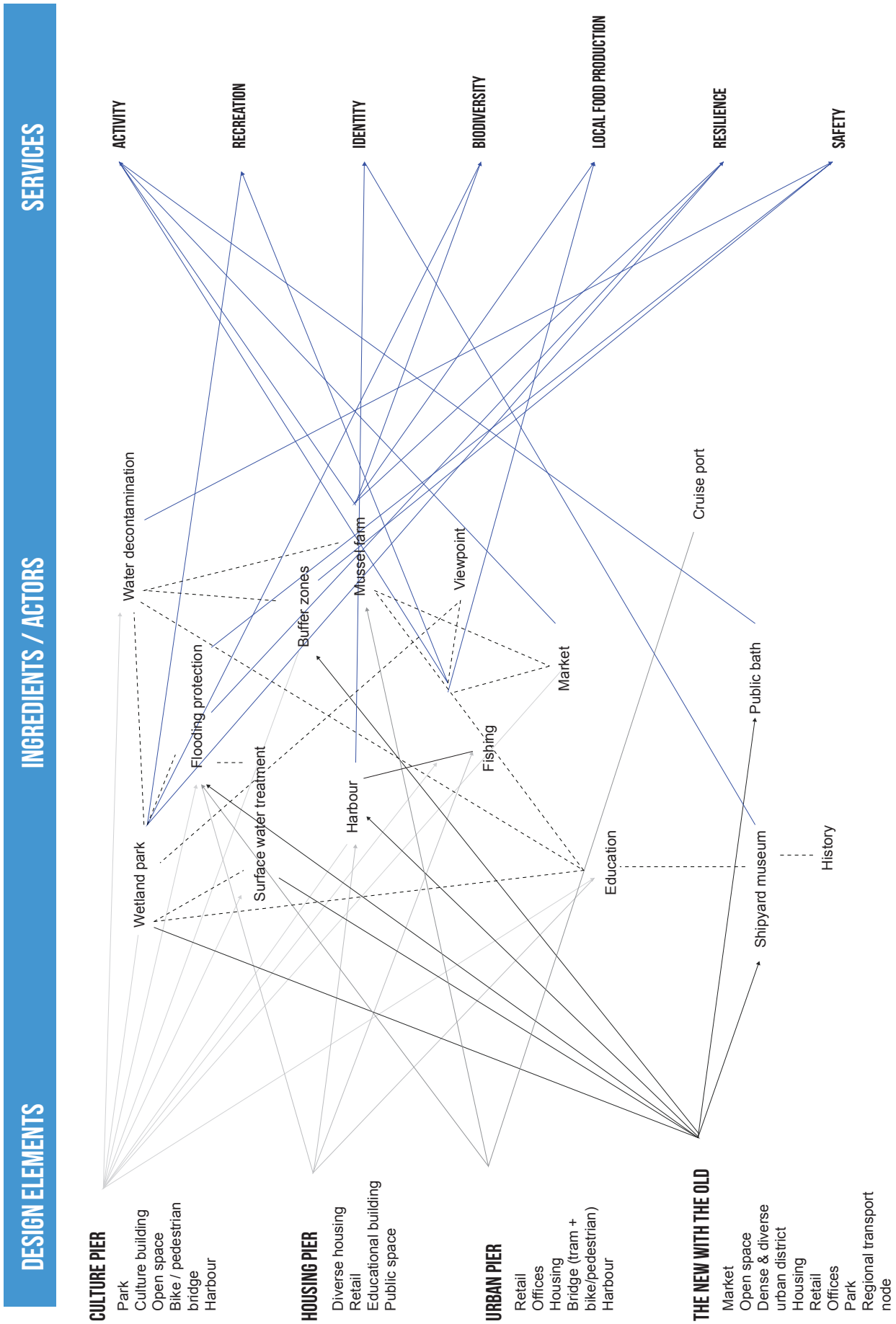
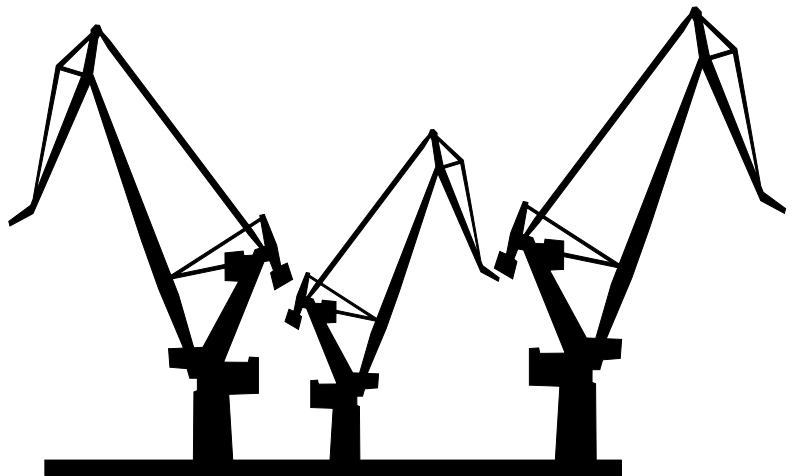


Diagram 16. Blue services system diagram

IDENTITY - SCALE, VOIDS, CRANES AND EDGES

CRANES

The cranes and the shipyard's reparation dock are strong signatures for Gothenburg, visible in its silhouette and used as signum elements that represent the city. They are highly connected to the identity and the history of Gothenburg as a shipyard city. It is a big risk for that these elements will be sold together with the shipyard industry in a near future, if they not find another use.



EDGES & PIERS

The formation of the site and the waterline is man made and has been changing after the needs of the shipyards and industry before. To relate to this identity of the site, and to utilize the water in the whole area more, the coastal line is changed and three new piers are created. the piers are like three fingers, each with different focus; culture, housing, and urban, and with a public building at the end meeting the water.



VOIDS

The existing buildings are creating interesting spaces and voids between them, a characteristic for the site that should be kept.

URBAN FABRIC

The urban fabric is dominated by big scale buildings and narrow spaces between. A strategy for how to relate to the scale is to break up the interior space of the existing big volumes as well as to make new development, with smaller scale, together build up larger scale structures that corresponds to the existing volumes.

Strategy for how to relate to the scale



Interior
break up
Whole >
Small Scale

Exterior
build up
Small scale
> Whole

SCALE

The illustration to the left shows examples of the big scale at the site through comparing it with well known building volumes in Gothenburg.



Housing block Olivedal
45900 m²



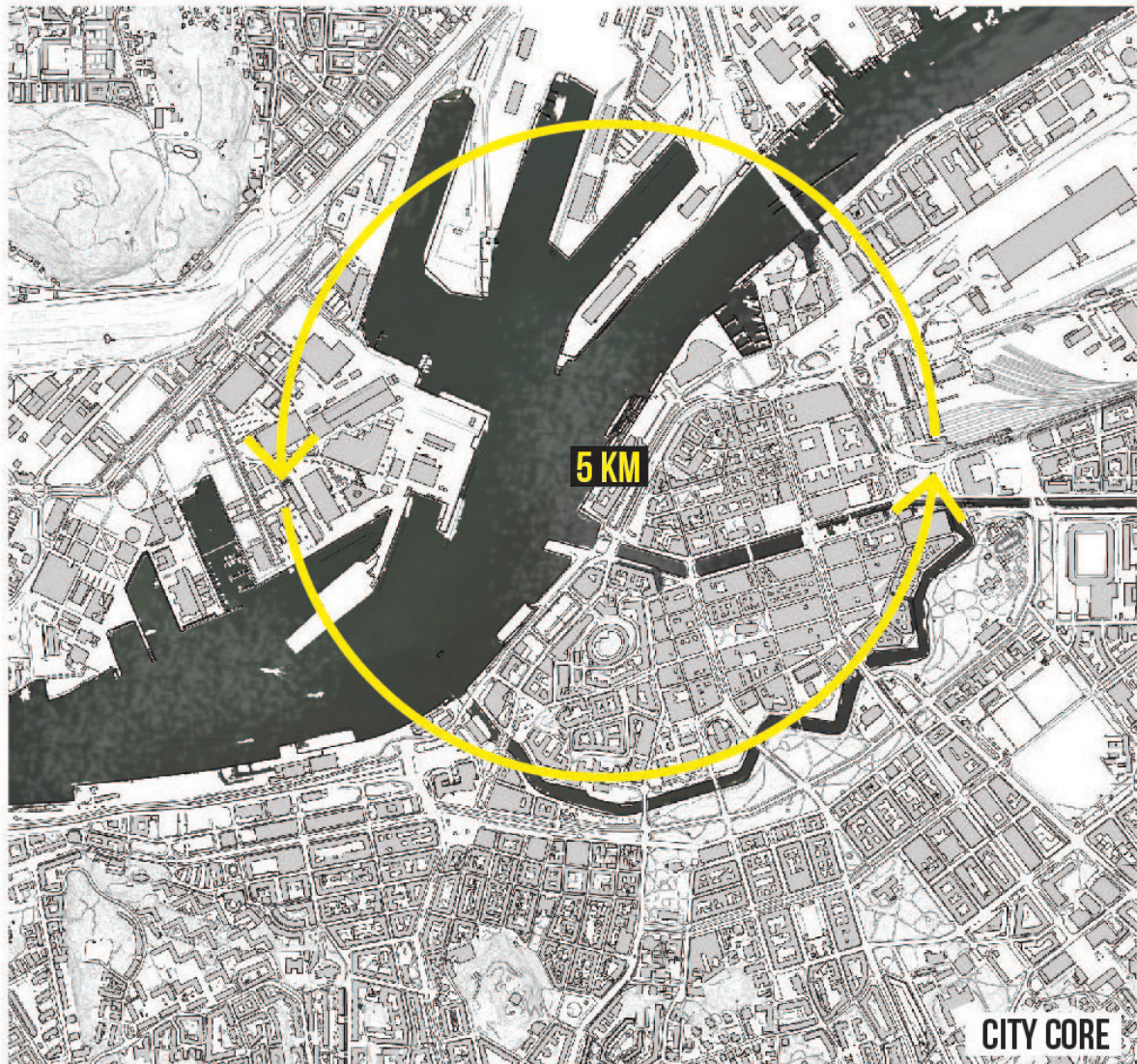
Gothenburg Opera
6800 m²



Gothenburg University of
Economics main building
9720 m²



Gothenburg municipal building
6240 m²



The concept of that a new connection over the river and a dense urban development at lundbyvassen creates the missing link in a 5 km city core of Gothenburg

OBJECTIVES

A VIBRANT CITY DISTRICT

INTRODUCE NEW FUNCTIONS, ACCESSIBILITY ROUTES AND HOUSING TO MAKE PEOPLE FROM DIFFERENT PARTS OF GOTHENBURG MEET AND INTERACT

CREATE A DENSE AND VIBRANT CITY DISTRICT THAT TELLS A STORY ABOUT ITS PAST HISTORY AND IDENTITY AS A SHIPYARD

ACTIVATE THE SPACE - MAKE FRAMES FOR LIFE ON THE STREETS AND SPONTANEOUS ACTIVITIES

LIVING WITH THE WATER

ACTIVATE THE WATER IN INNOVATIVE WAYS AND MAKE IT ACCESSIBLE FOR PEOPLE

MAKE THE SITE'S CONNECTION TO THE WATER NOTICEABLE WITHIN THE WHOLE AREA

SHOW DIFFERENT STRATEGIES FOR HOW TO ADAPT TO FLOODING, MAKE THE AREA A TESTING ARENA FOR INNOVATIVE SOLUTIONS

CREATE AWARENESS AROUND CLIMATE CHANGE IMPACTS AND SUSTAINABLE DEVELOPMENT

IMPROVE WATER QUALITY AND INCREASE MARINE BIODIVERSITY IN THE HARBOUR



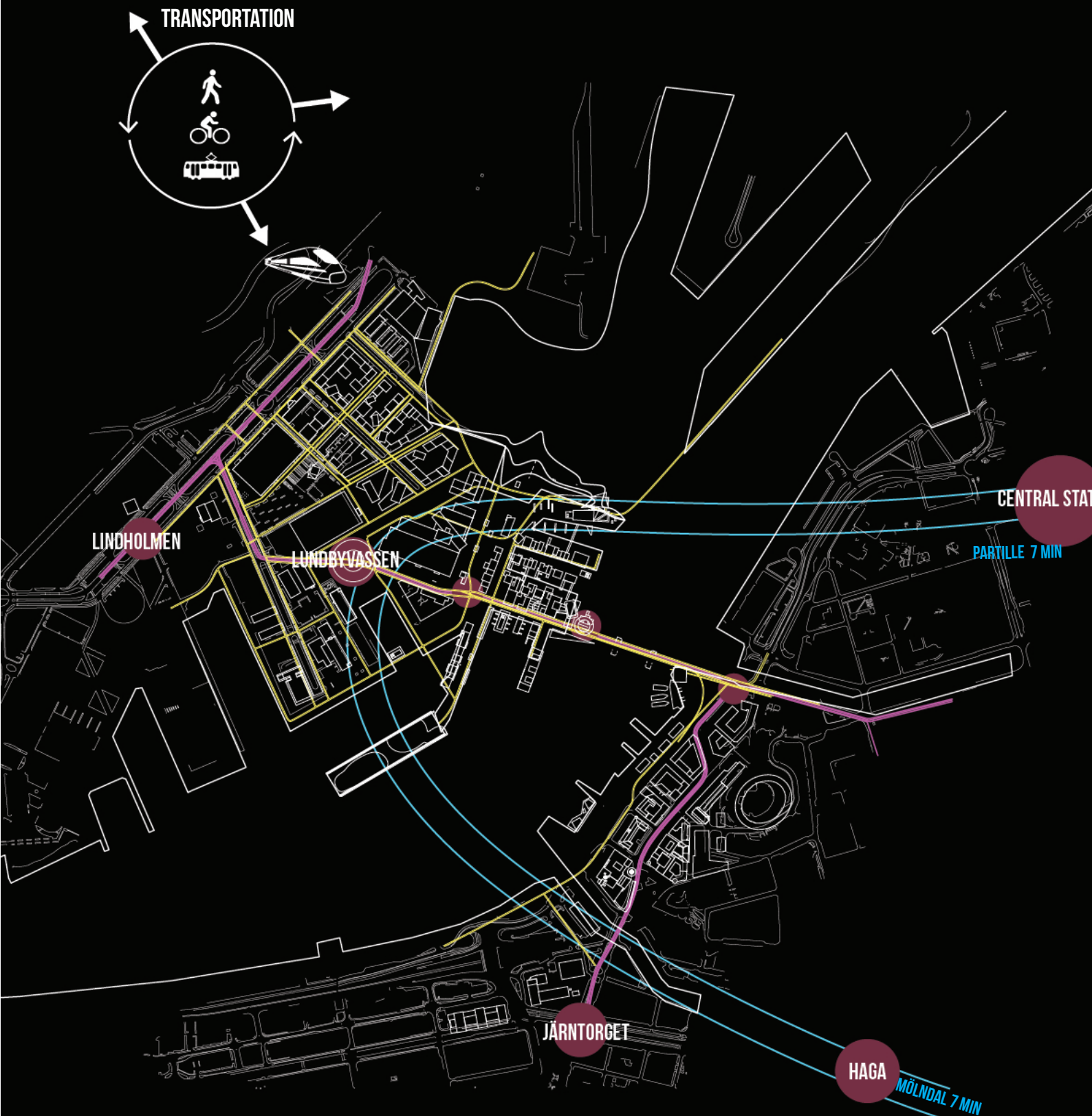
DESIGN

MASTERPLAN

PROGRAM



Introduced program . Today there is, besides the small scale industry, an area maily existing of offices. Focus for new development lays on comple-
menting this with new housing, commercial and public functions.



Concept for the public transportation within and to the new area. Based on the main concept about the central core with a dense network of bikelanes and where from its circuit you find fast public transportation (e.g. Västlänken) to the outskirts of Gothenburg.

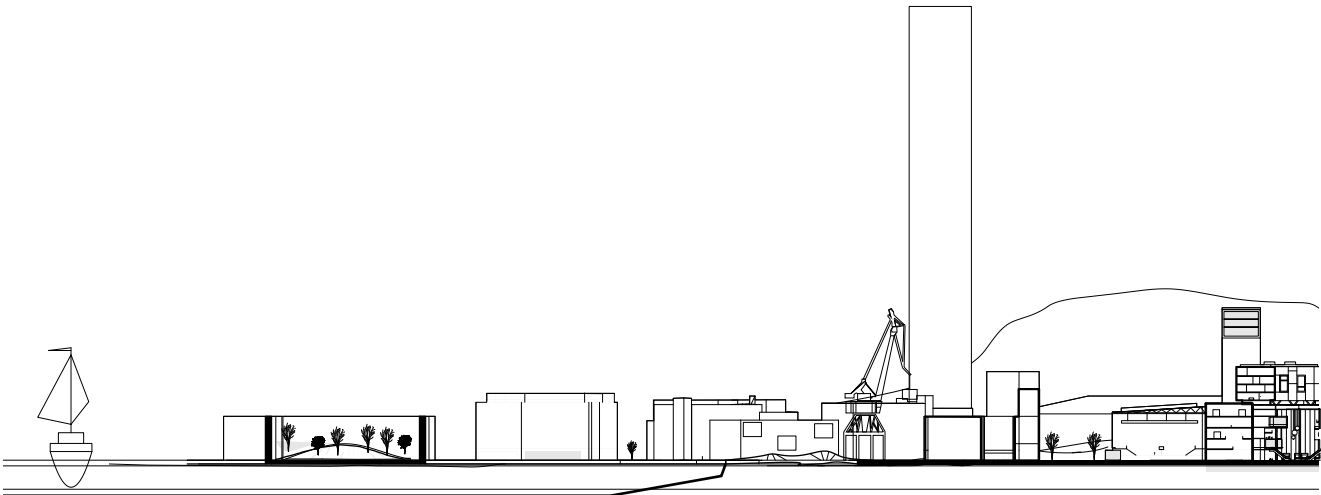
- BIKE LANES
- TRAM LINE
- VÄSTLÄNKEN / METRO



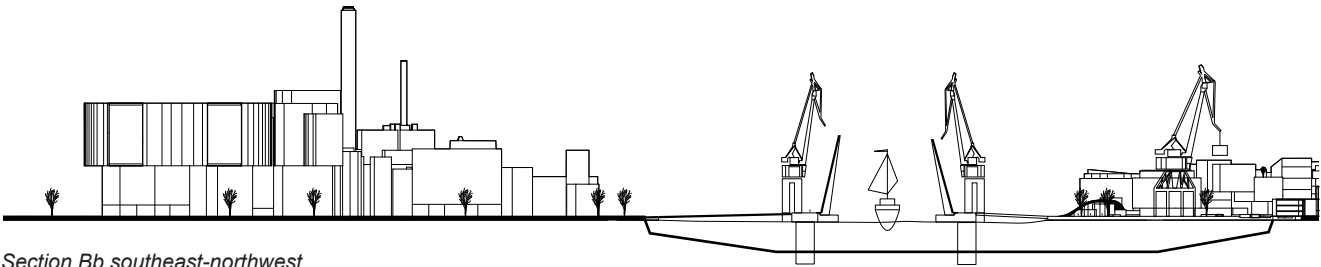


ILLUSTRATION PLAN 1:4000

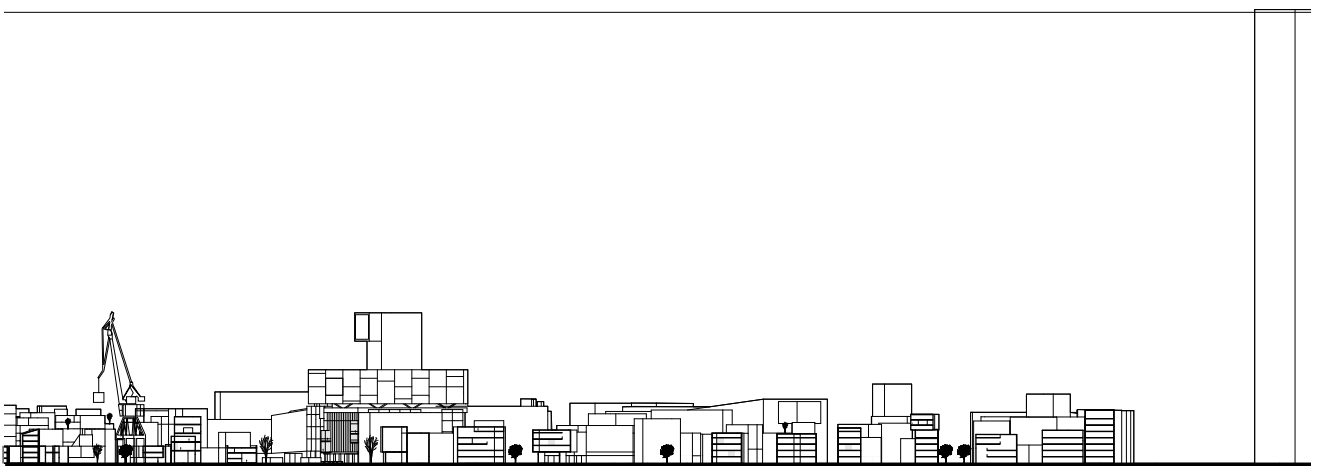
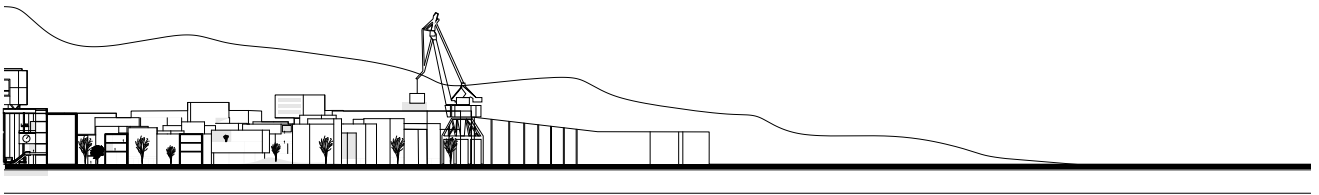
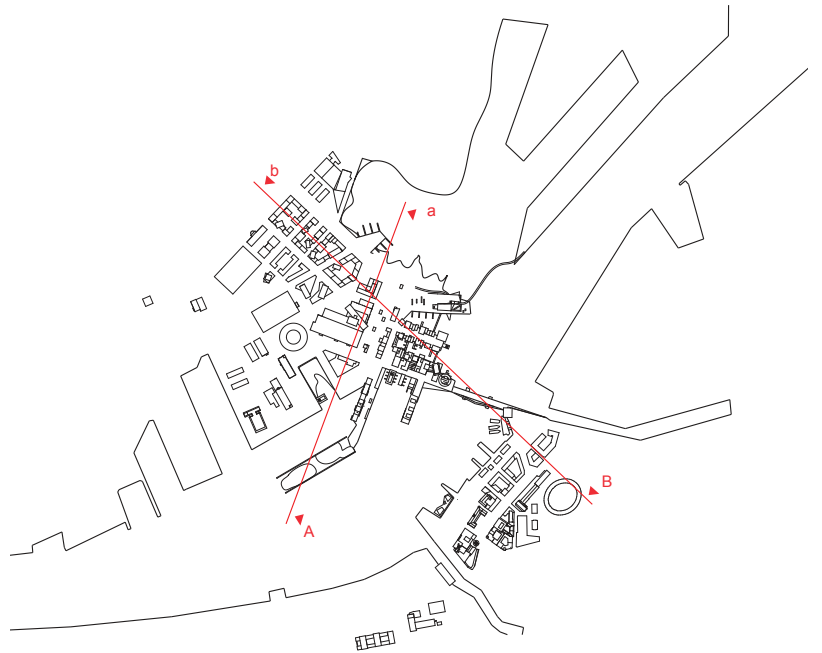
SECTIONS 1:4000



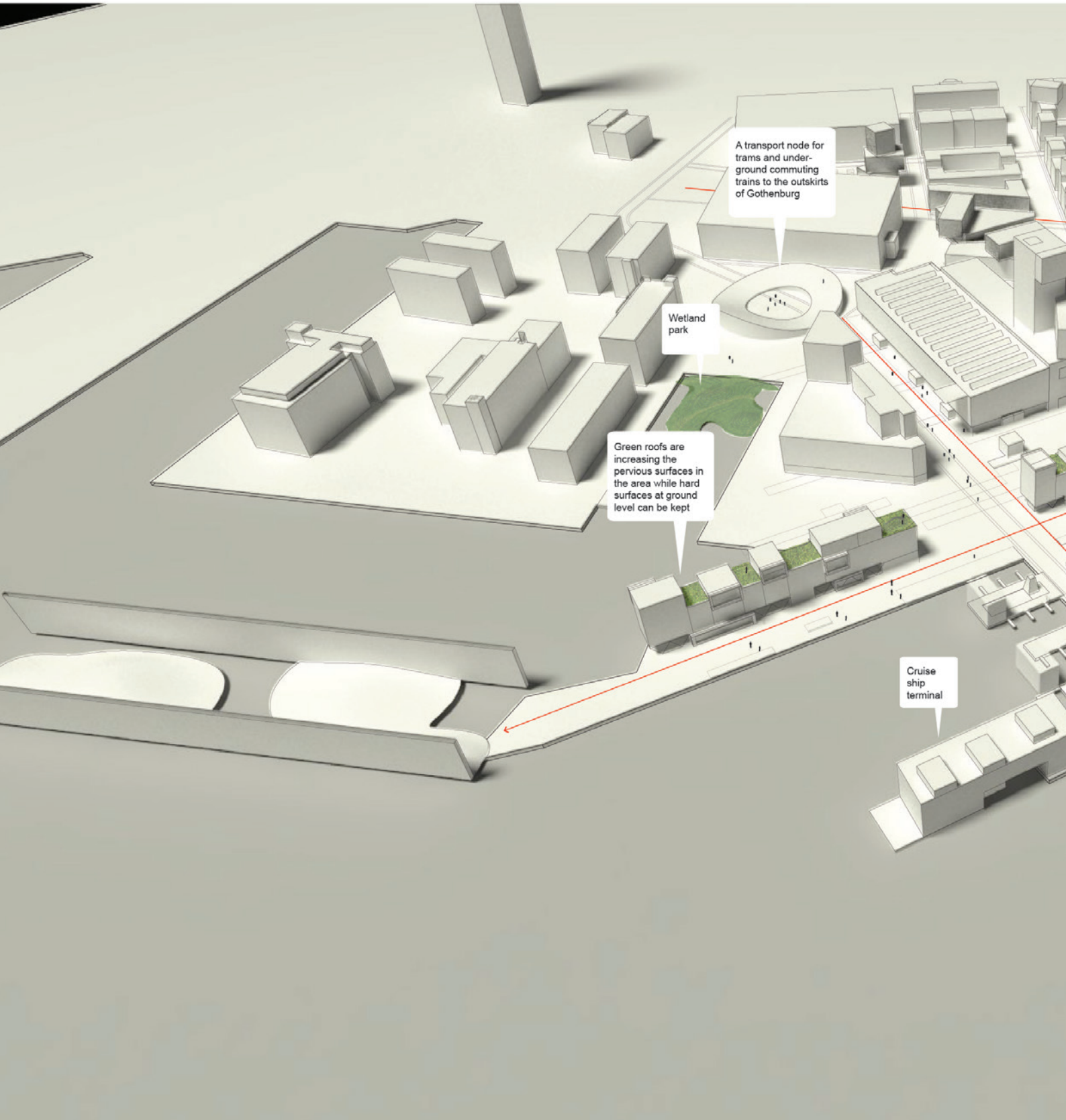
Section Aa, southwest-northeast



Section Bb southeast-northwest



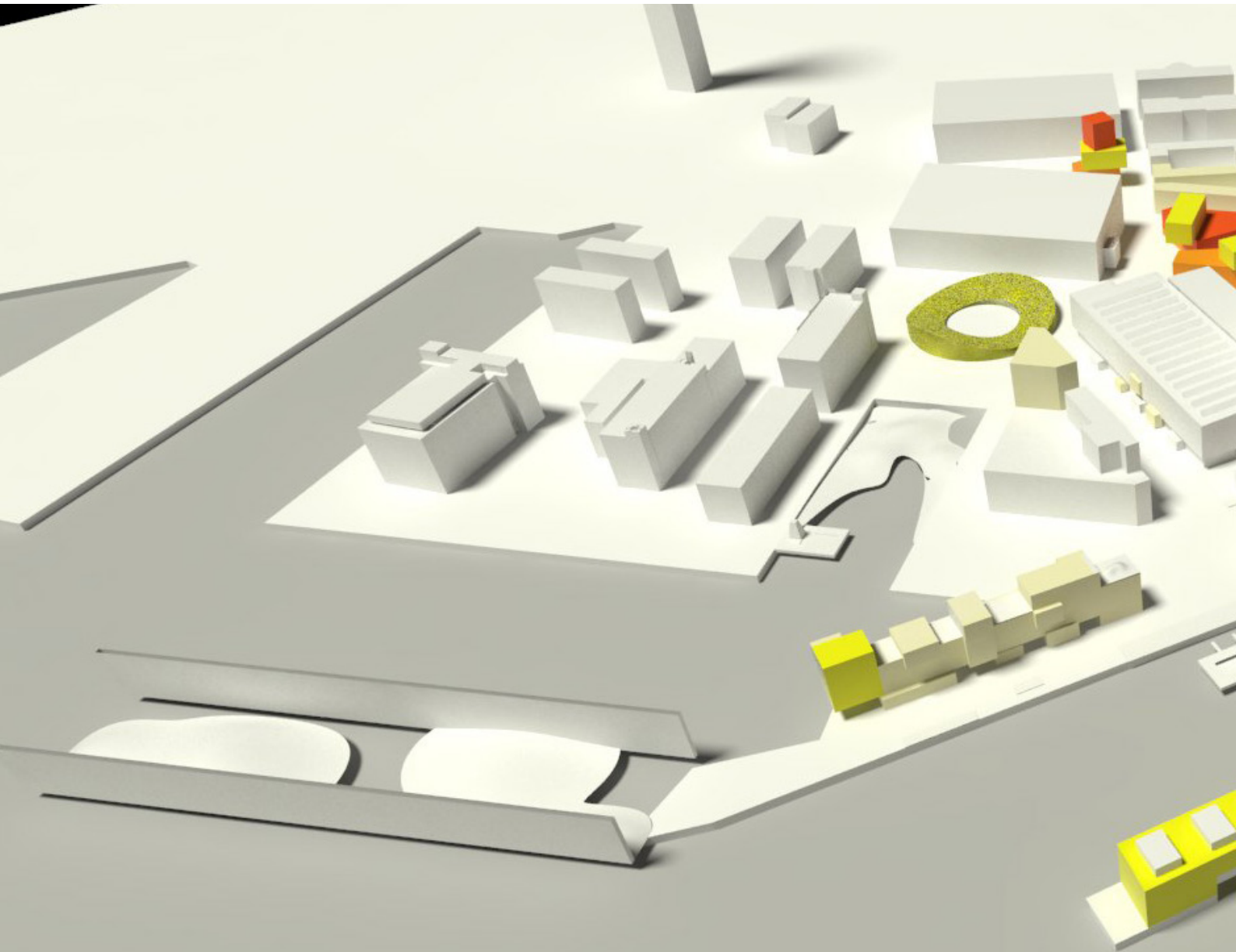
AXONOMETRIC





VIBRANT CITY

_MIXED PROGRAM



Housing



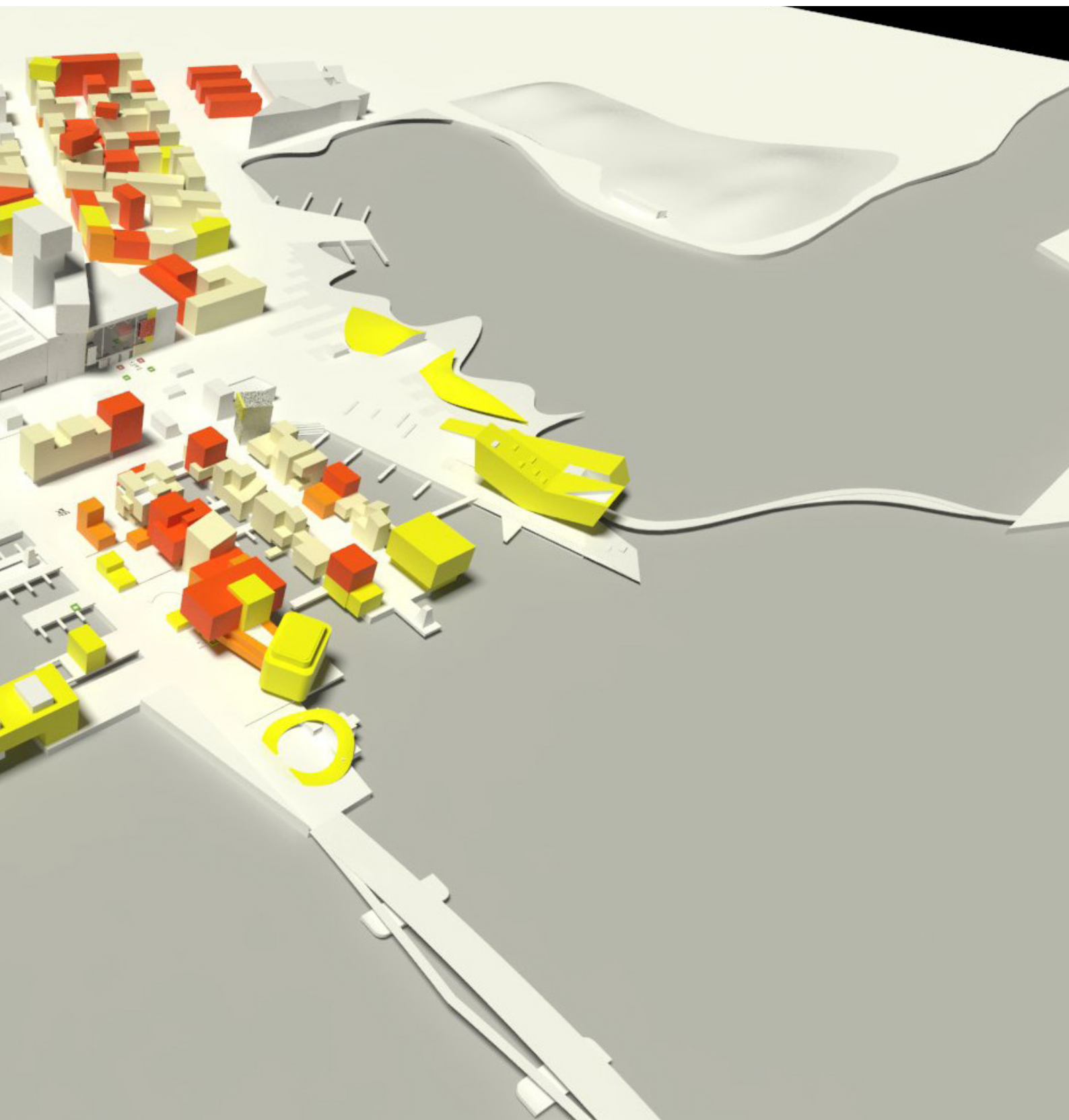
Retail



Office



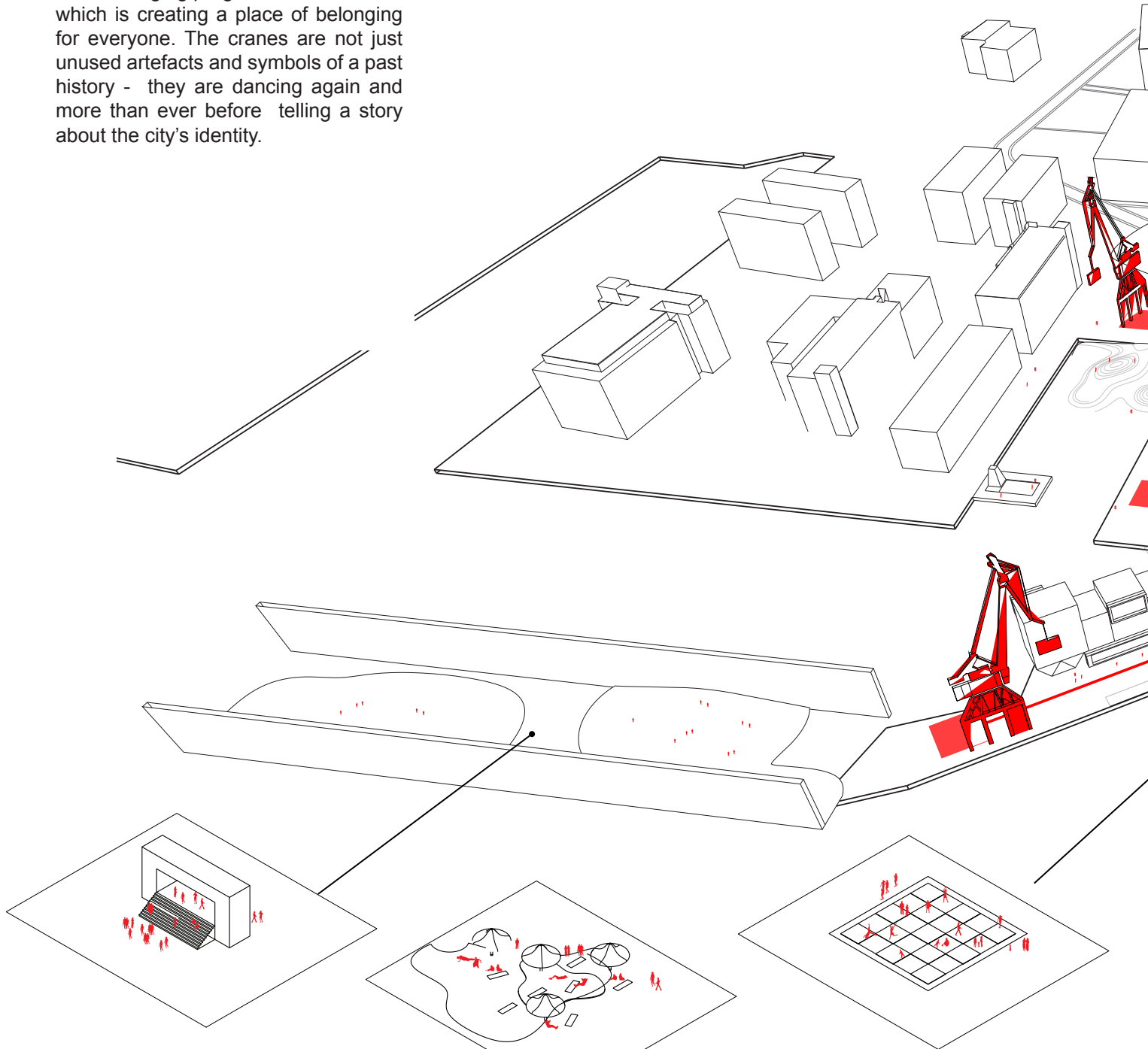
Special program



VIBRANT CITY

_THE CRANES AS ACTIVATORS

The big open areas create opportunities for spontaneous and public events. The cranes get new access routes, spanning across the whole area, and with their capacity they are able to create different scenarios of what is happening in the place. There is now life and movement here, changing program and conditions which is creating a place of belonging for everyone. The cranes are not just unused artefacts and symbols of a past history - they are dancing again and more than ever before telling a story about the city's identity.



Different program and activities can take place thanks to large open areas and use of the cranes

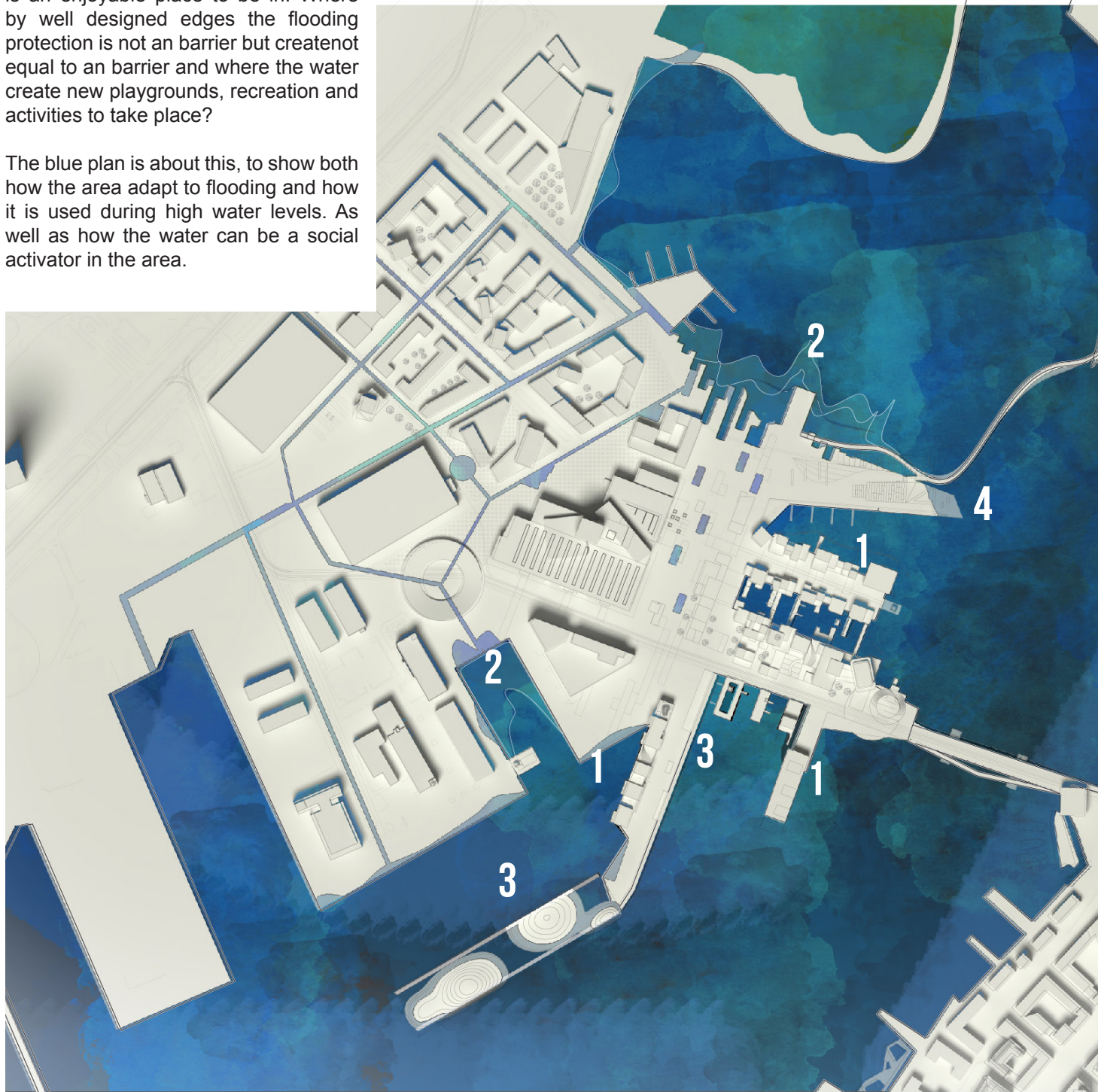


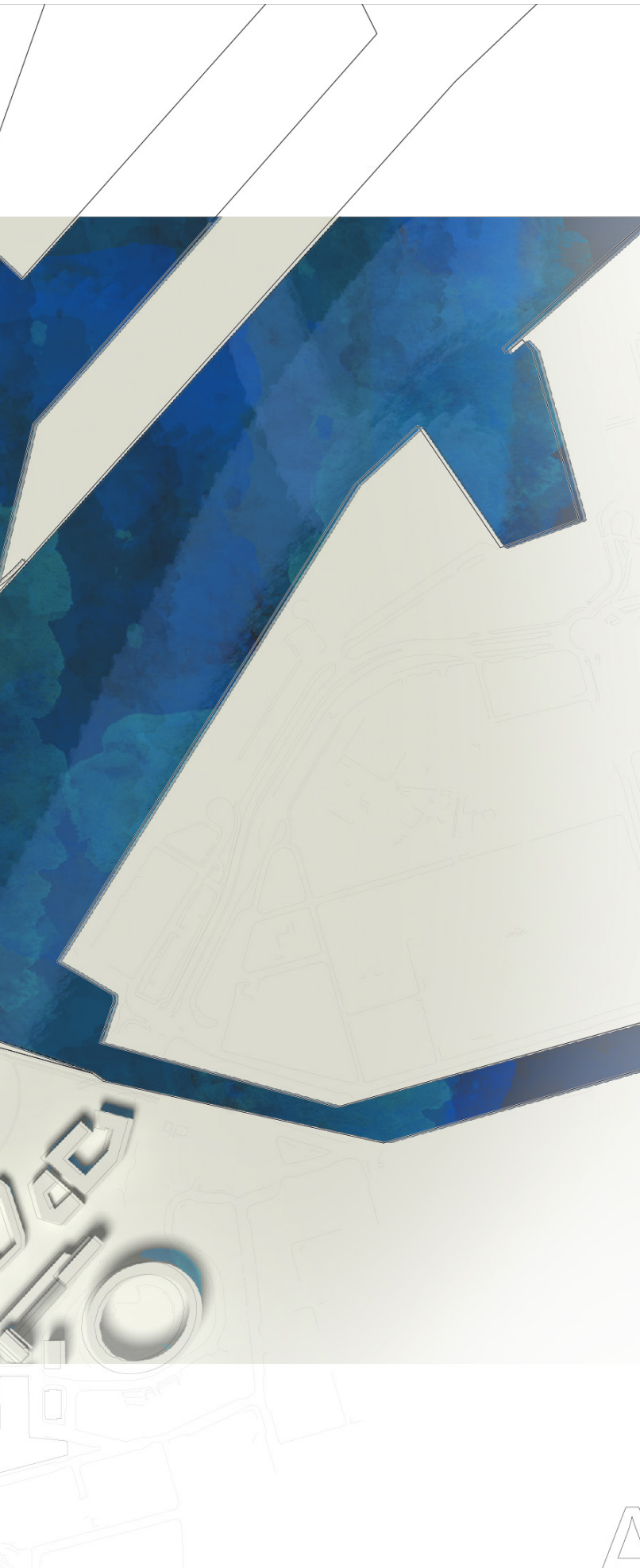
THE BLUE PLAN

_LIVING WITH THE WATER

What if, even when at an occasion of high water level and heavy rain, the city is an enjoyable place to be in. Where by well designed edges the flooding protection is not an barrier but create not equal to an barrier and where the water create new playgrounds, recreation and activities to take place?

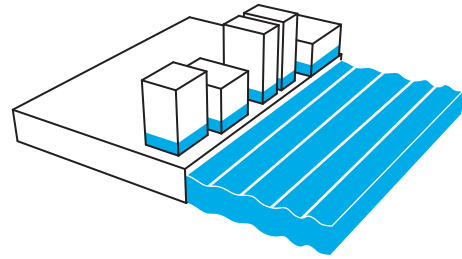
The blue plan is about this, to show both how the area adapt to flooding and how it is used during high water levels. As well as how the water can be a social activator in the area.





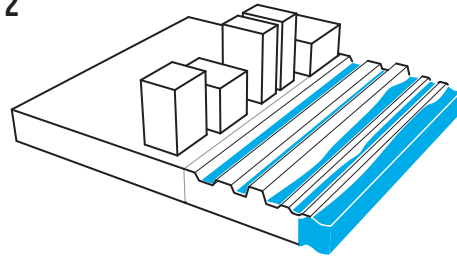
STRATEGIES - RISING SEA LEVEL

1



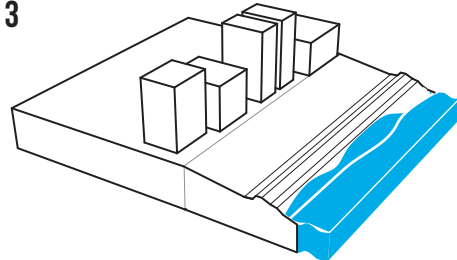
Buildings are planned and designed for that ground floor can be flooded.

2



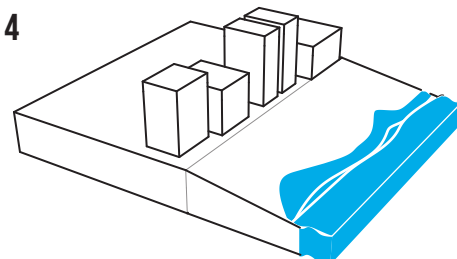
Soft flood protection through a park that can be flooded. ' Also creating buffer zones for storing and delaying surface water which leads to duration of the water flow and natural filtering before outlet in the harbour.

3



Integrate and activate the barrier in the landscape. Work with the barrier's transition and program.

4



Turn the height difference into an open public space where the height difference of the water level during different weather conditions is enhanced.



Diagram 17. Flooding plan for the area. The amount of surface water is reduced through introducing the different strategies *Delay, Buffer, Resist, Adapt* and *Discharge*.

FLOODING STRATEGIES

The strategies in the flooding plan are designed after the two different types of flooding:

1. Rising sea level
2. Surface water from heavy rainfall

For the rising water level in the river the edges are programmed with hard and soft landscape. At chosen parts of the piers the buildings are designed to adapt to flooding by either be floating or that divisions of the first floor can be flooded. The access to these buildings are from a safe entrance at a higher ground level on the piers. In the streets, a network of open drainage channels and greenery is creating possibilities to both store and direct excess the rainwater from the streets. The channels are designed with height differences so that the water follows a controlled excess route. Green roofs are introduced to be able to keep large and open hard surfaces (creates possibilities for activities to take place and connecting to the shipyard identity) and still decrease the surface water runoff. This because of that the greenery delay and store the rainwater. At strategic points pumps are also placed out to have the possibility to pump out the water at extreme rainfall.

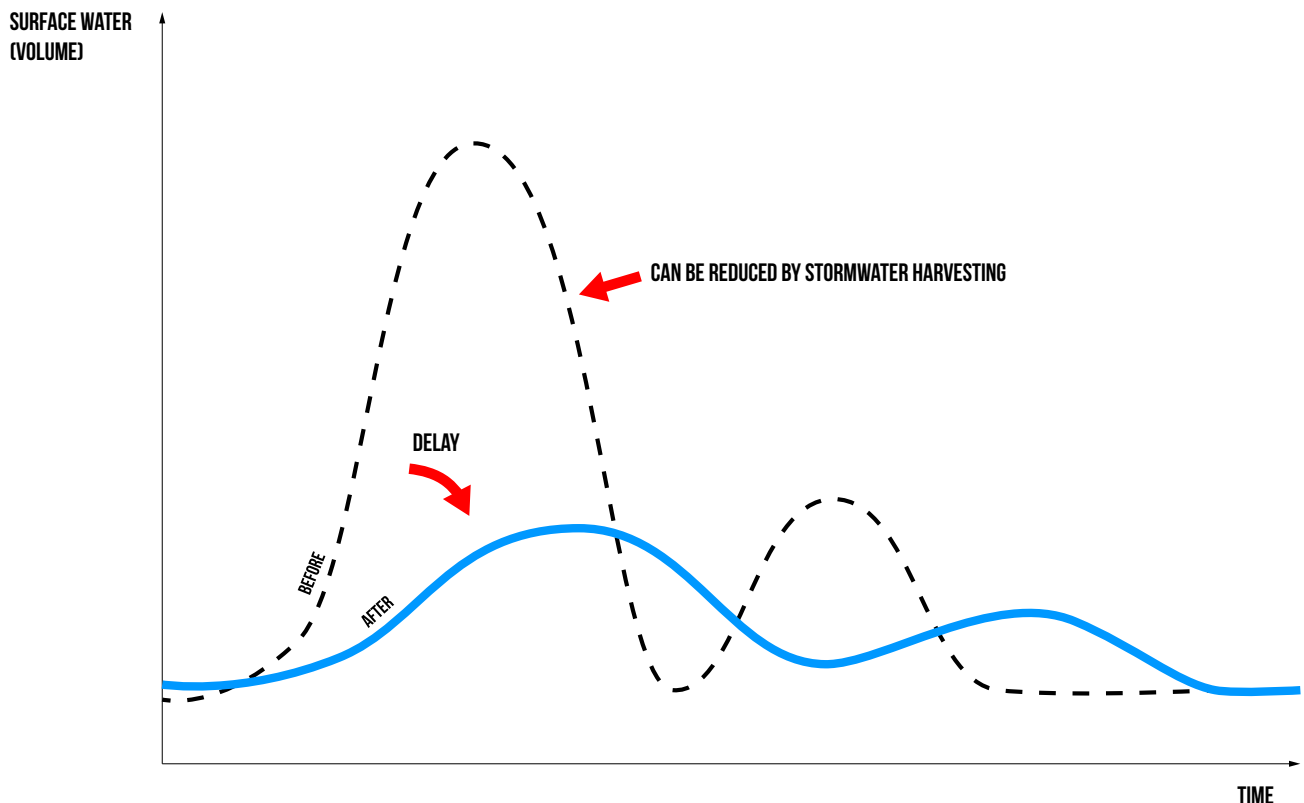
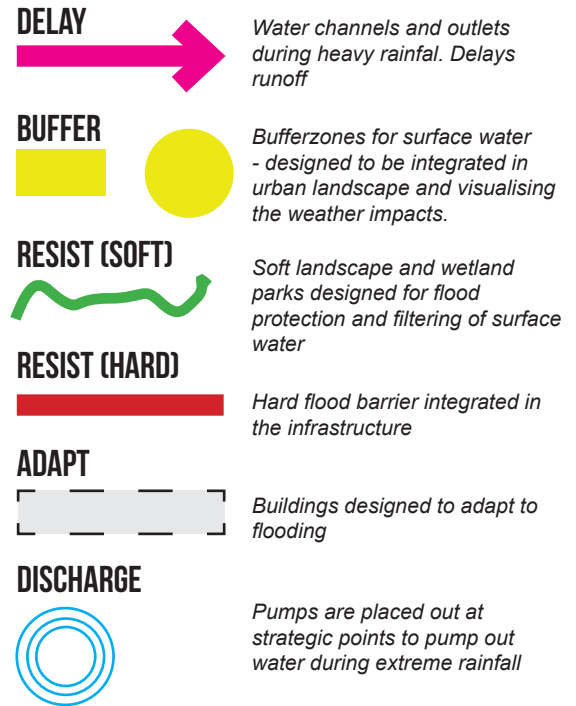
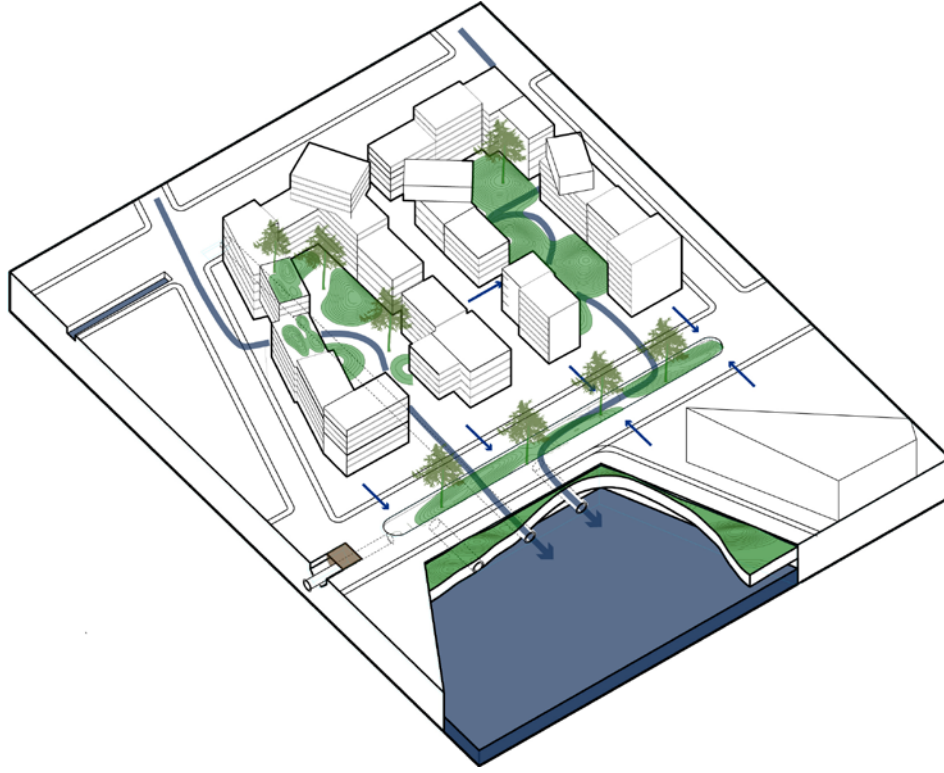
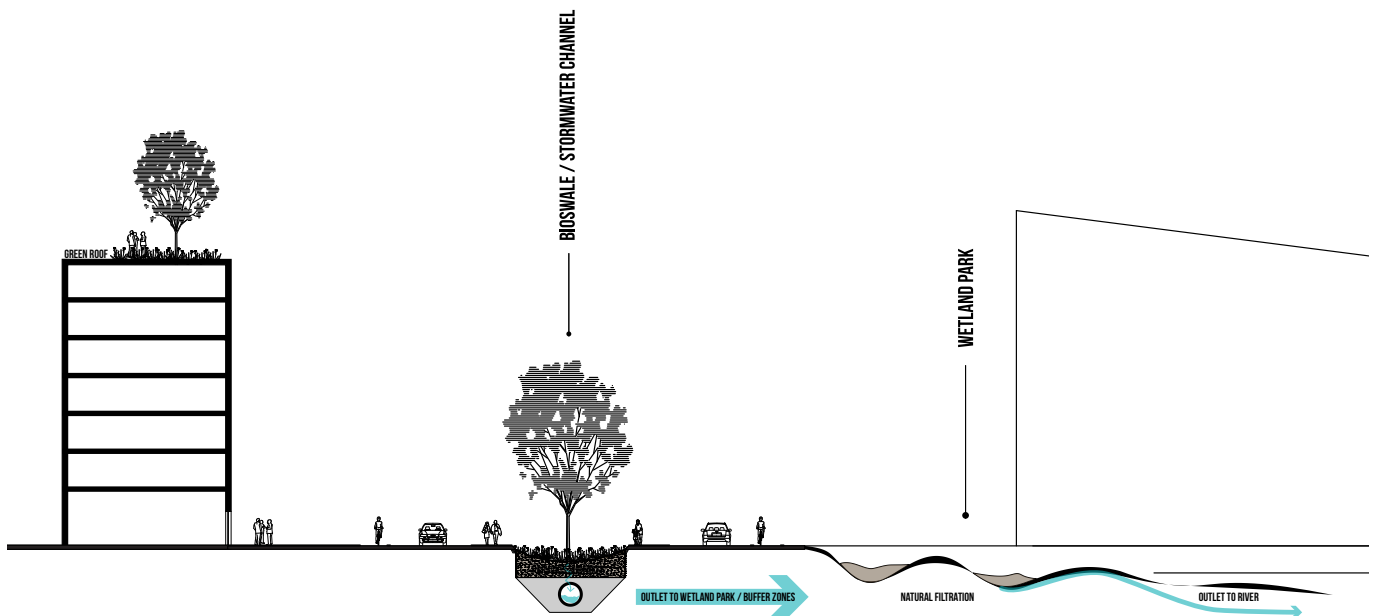


Diagram 18. By working with buffer zones and stormwater channels the amount of surface water can be reduced and delayed during a flooding occasion, with a more controlled flooding scenario as a result.

BUFFER ZONES AND NATURAL FILTRATION



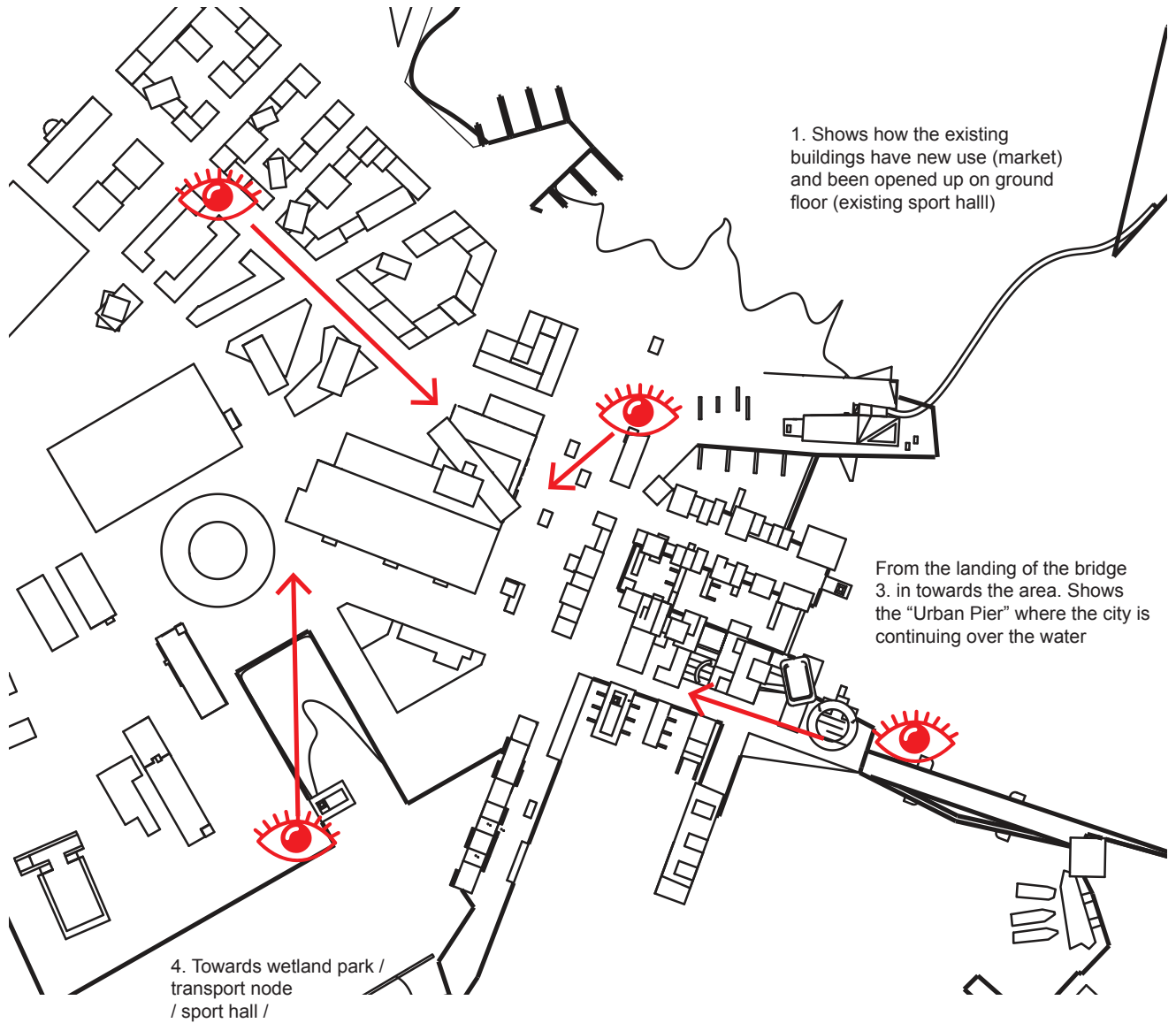
Idea of how to work with hard vs soft bufferzones depending on if its in the public streetscape or semi-private courtyards.



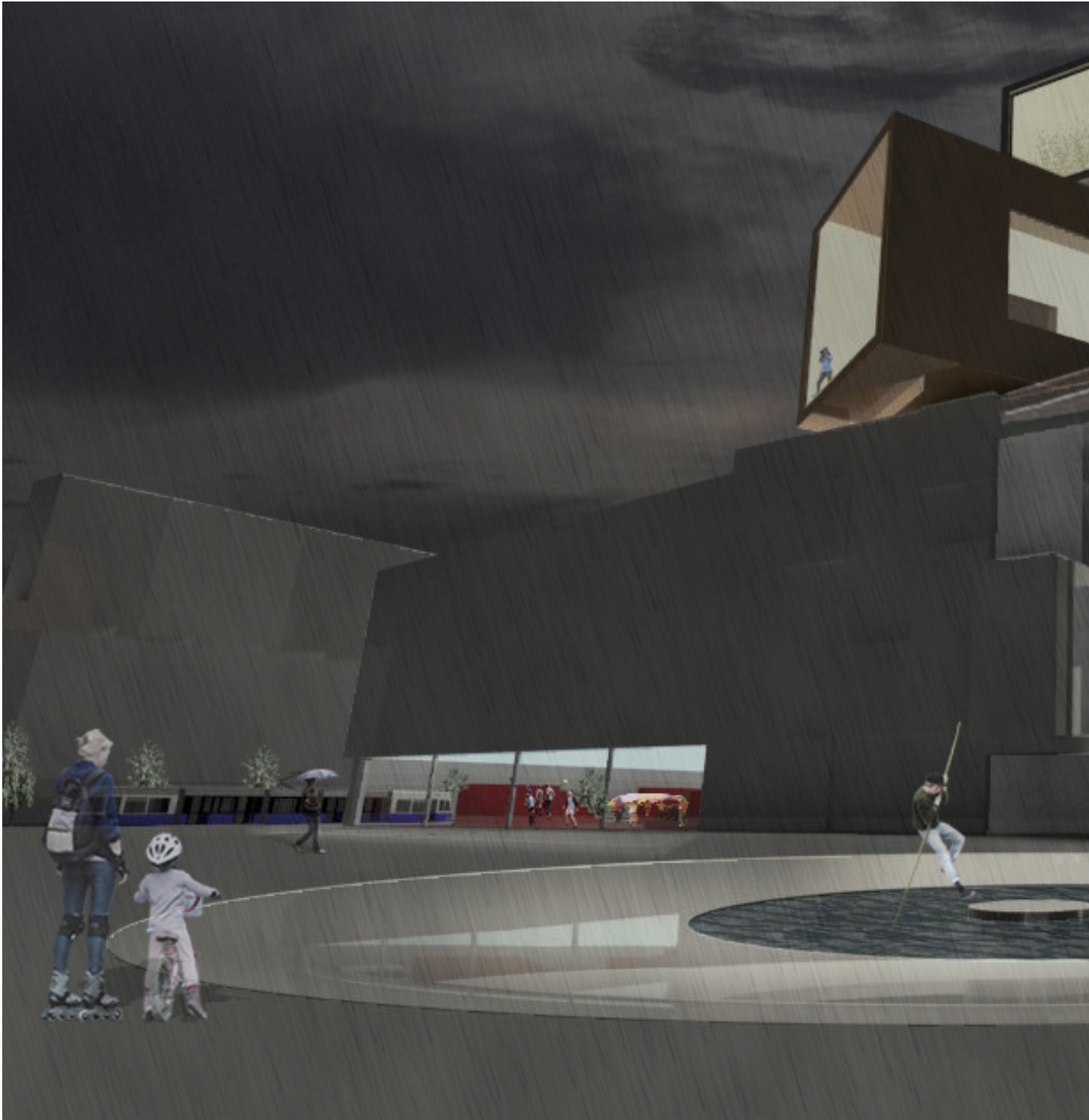
Section illustrating the design of open stormwaterchannels in the street scape and how the surface water is transported and naturally filtered before outlet in the river.

VISUALIZATIONS

2. Through housing blocks with retail on ground floor towards market. Shows the diversity and scale of the housing blocks

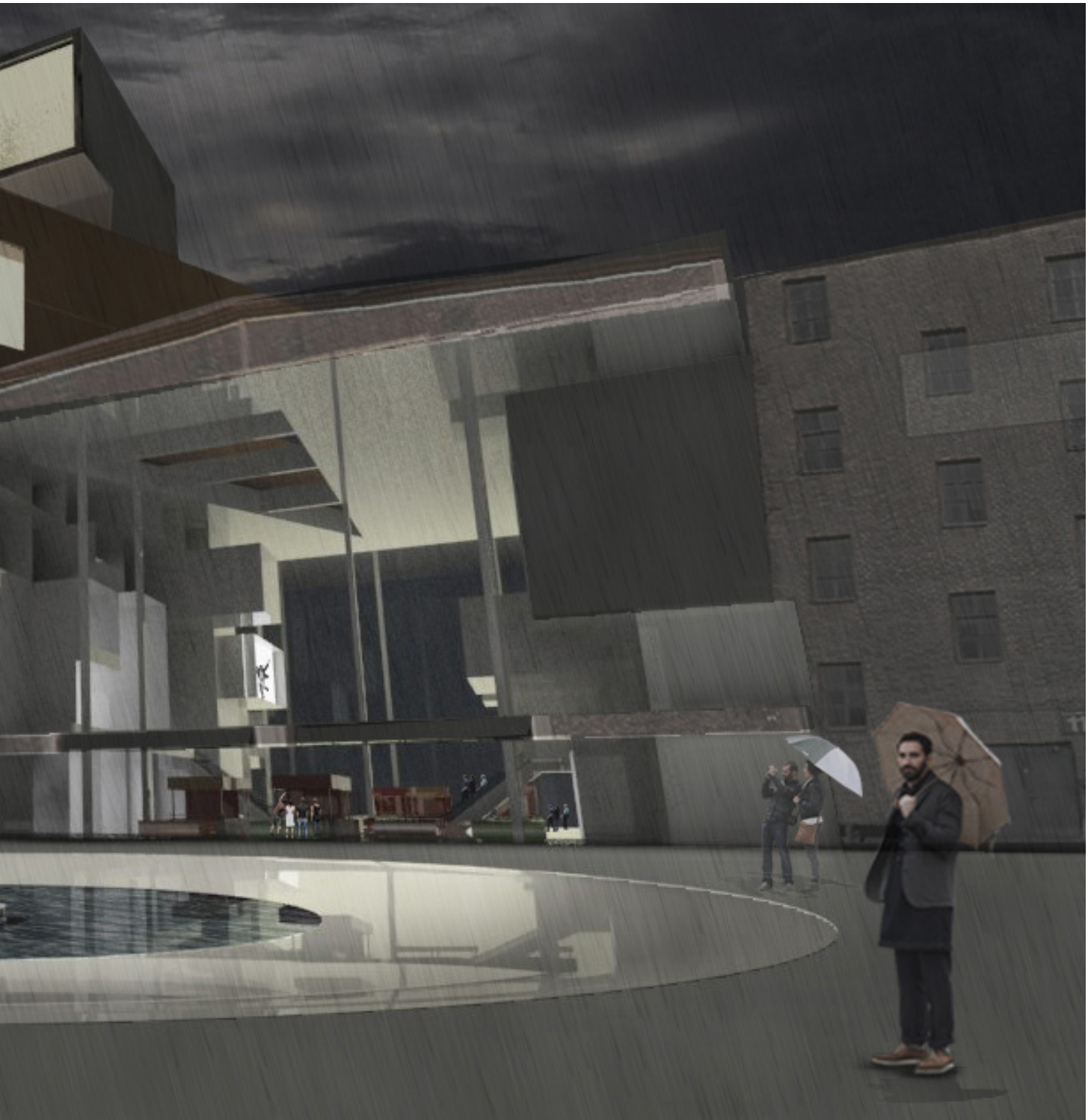


CITYVARVET MARKETHALL

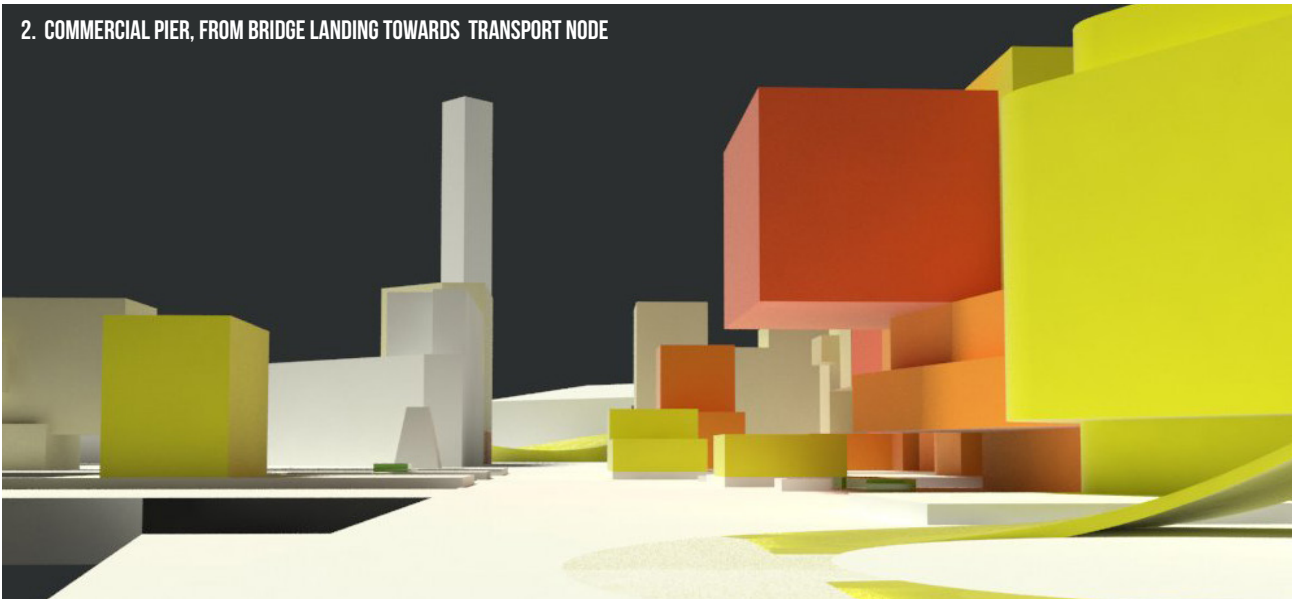


In the old magasin building in brick, which used to belong to Cityvarvet, there is now a markethall providing both retail, restaurants and studios for rent. The magasin has been opened up on both sides and the markethall is a semi indoor public space as well as access route to the other side. Next to the market the sporthall Lundbyhallen has been opened up on street level to show the activities that already take place there today.

To enhance the old magasin buildings and work with their scale in innovative ways, additional buildings has been placed on top of the magasins. Additions that figures as lighthouses and landmarks for the new city district of Lundbyvassen. In front of the markethall there is a large buffer zone for collecting rainwater. The buffert is designed as a big but narrow bowl, working as a public space and social activator both when it is filled with water and when it is not.



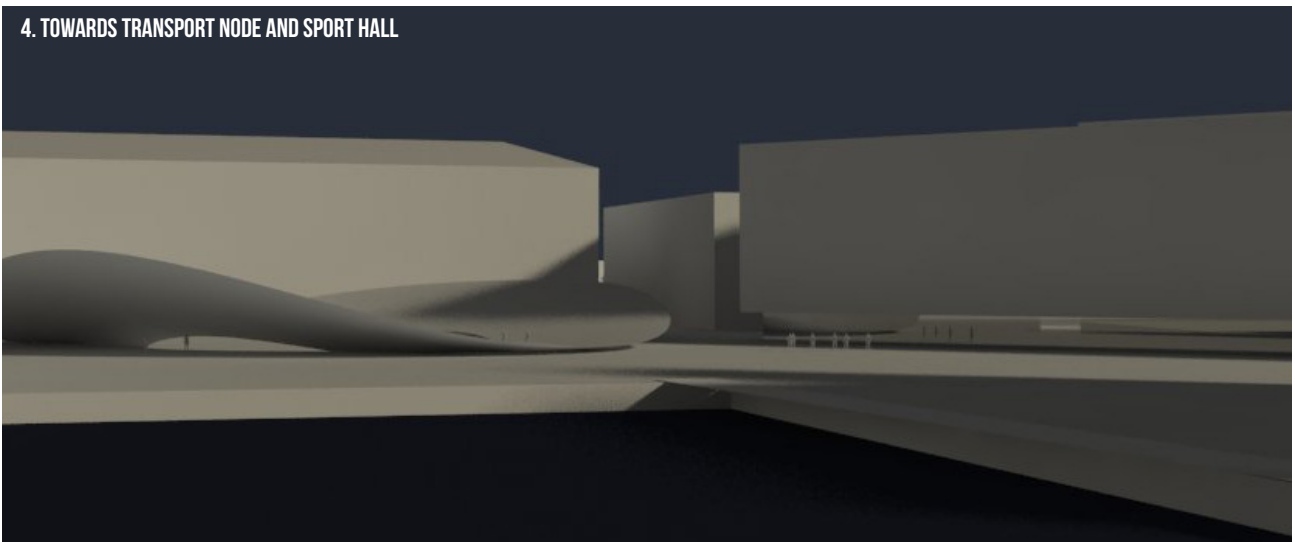
2. COMMERCIAL PIER, FROM BRIDGE LANDING TOWARDS TRANSPORT NODE



3. HOUSING BLOCKS WITH GROUND FLOOR RETAIL, VIEW TOWARDS NORTH SIDE OF MARKET



4. TOWARDS TRANSPORT NODE AND SPORT HALL



PROJECT CONCLUSION

The thesis started out with asking the question of what a connection over the water can do for the city of Gothenburg. How the city core can with that connection meet around the water and where the water is no longer a barrier but the central element and the magnet in the city. Easy to cross and full of different activities. That question then lead to a insight in that a connection between Skeppsbron and Lundbyvassen would create synergies for the rest of the city and create a five kilometer circuit circle, where the interior of that core is a city for pedestrians and bikers, and at the range of it you can reach to the rest of the city and as well as the outskirts of Gothenburg with Västlänken train. That analysis is a part of the design proposal but it also lead to the question what happens where bridge is landing. If the post industrial area of Lundbyvassen are seen to be a part of the central core - how would that take form in program and design. The hypothesis was that the shipyard Cityvarvet will disappear from this site, and with that also elements that are highly connected to Gothenburg's identity like the cranes and the dock. Will these silhouette symbols for the city disappear or how can they be taken into use again so it might be worth for the city to keep them.

The analysis of the city scale is resulting in a masterplan for Lundbyvassen, where challenges that the city is facing; need for more housing, dealing with flooding risks and improved public transportation is dealt with in the masterplan.

REFLECTIONS ON THE PROCESS

The process for this thesis has been everything but straight which mostly depends on a very open starting point without a clear framework for what the project would be. Questions have came up along the way and they have formed the project and choices that were made. From starting with how to activate the water connect the city over it, to focus on building an habitable bridge and that the city would reach out into the water (which it to some extent is doing in this proposal too), to sketching around what happens at the piers where the bridge would land, to looking at the whole area and its connection to surrounding areas like Lindholmen and the plans for Frihamnen.

At this point, at the very end of the thesis I can see why the design process took the turns that it did. How the answers of some questions lead to new ones which then also made the scale of project grow. With that

The hardest part of the design has been to relate to the very large scale of the existing buildings and piers and in the same time create an environment for people where the scale is human and the street scape a nice place to be within. The concept for this was to initially work with the scale of the existing buildings but then to break them up, both internally and externally. The existing buildings that are kept are valuable magasin building that are telling a story about it's history, but they are not protected and my take on this is that by adding building volumes and introducing new program their qualities can be even more enhanced.

said, I am happy about the process and the choices I made, although I wish that I would have been faster with taking decisions in the beginning of the process so I would have had more time to go in depth with the masterplan.

PERSONAL COMMUNICATION

Aronsson, Bo., Swan, Åsa; Executive for urban planning unit at Älvstranden Utveckling. 2014. Interview in Gothenburg 16th of September.

Eisenberg, Tara. Rebuild by Design Initiative in New York. 2014. Interview through Skype on the 9th of October.

Valén, Caroline. City planner at the city planning office in Gothenburg, focus on climate change adaption. 2014. Meeting on the 28th of November.

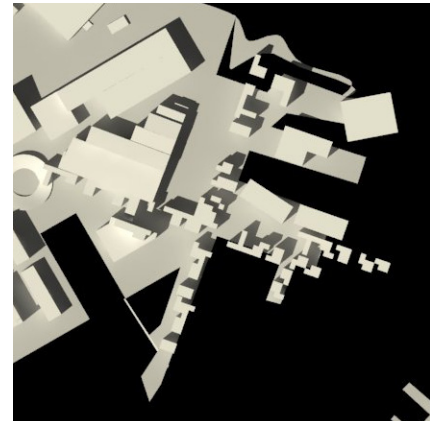
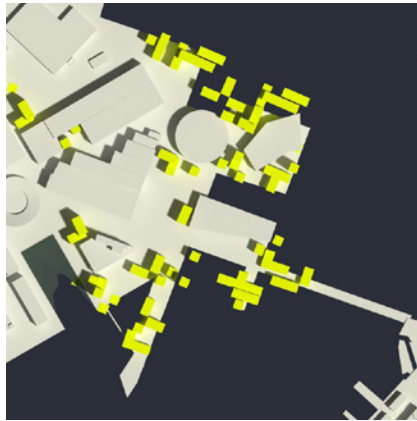
GRAPHICS

All graphics and photos are done/taken by author unless otherwise stated.

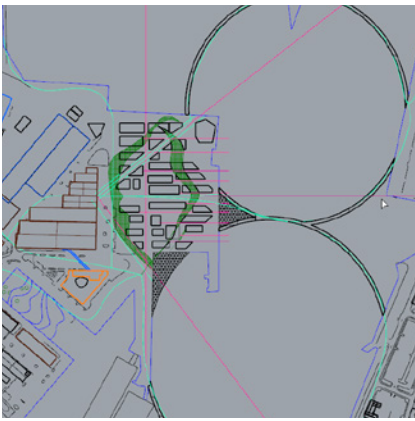
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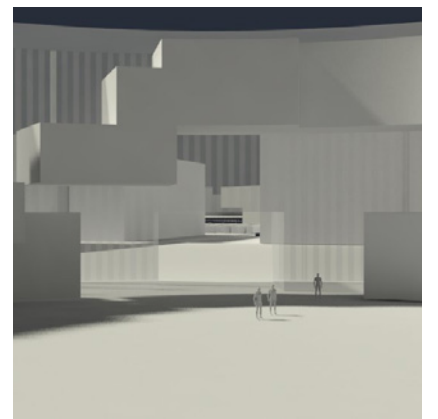
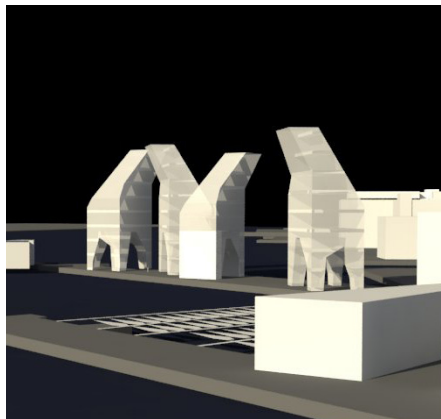
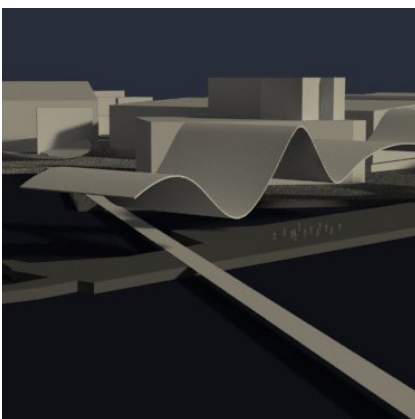
APPENDIX



Exploring of what happens where the bridge is landing, how to relate to the scale of the existing buildings



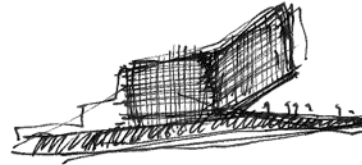
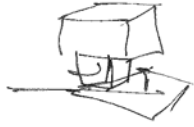
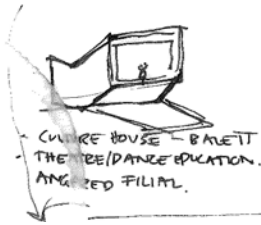
Early design sketches, sightlines and bridge(s) over the water



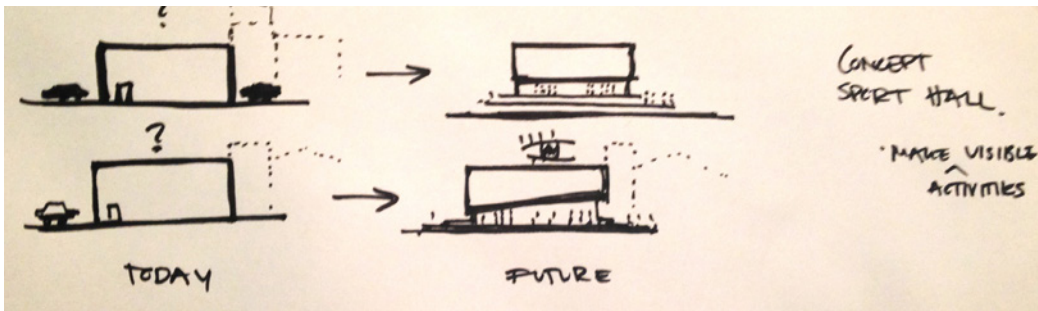
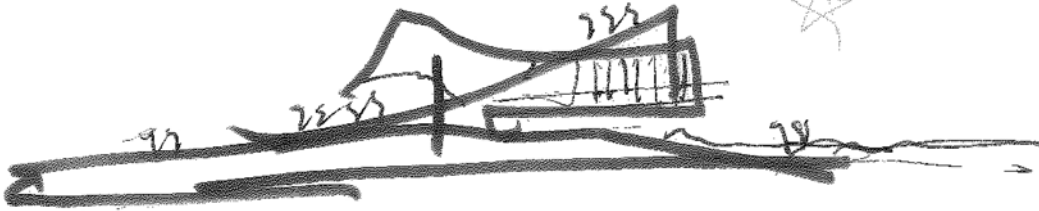
Buildings on the pier out to the dock?

Internally breaking up the large scale

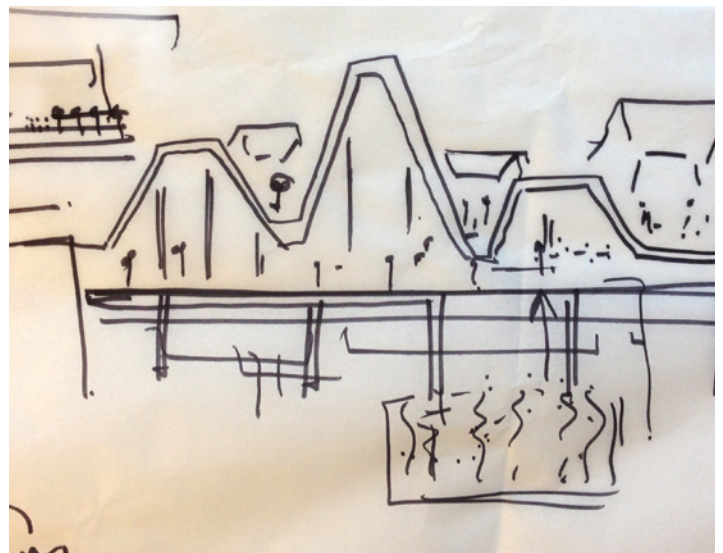
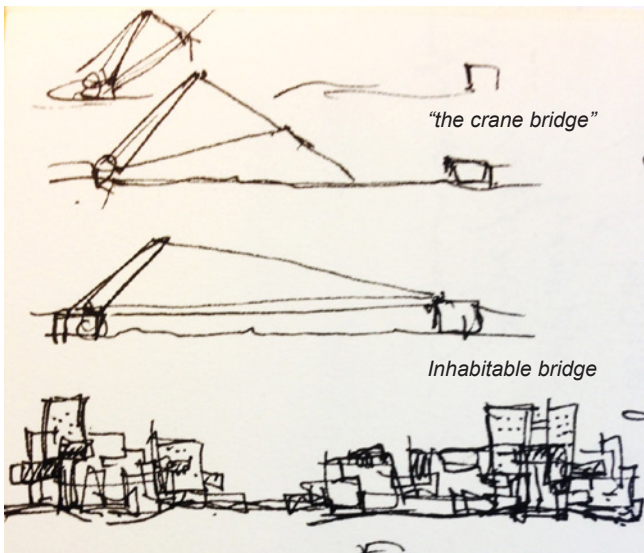
PUBLIC PROGRAMS:



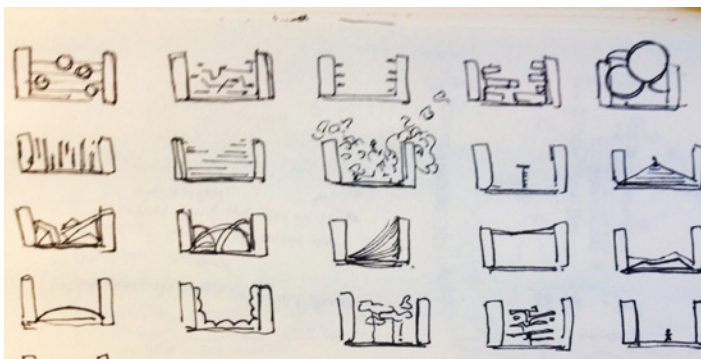
Concept for the culture building:
it points out and faces towards
the opera house - which then
also becomes the backdrop
behind the scen.



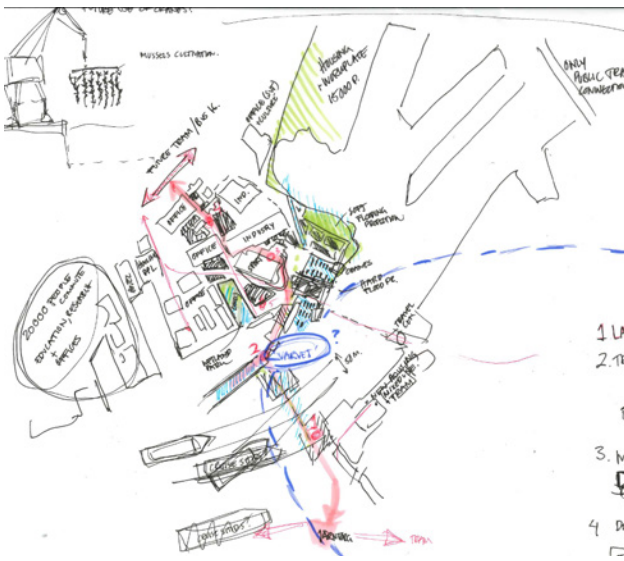
Open up first floor of the sport
hall to make the activities and
life visible.



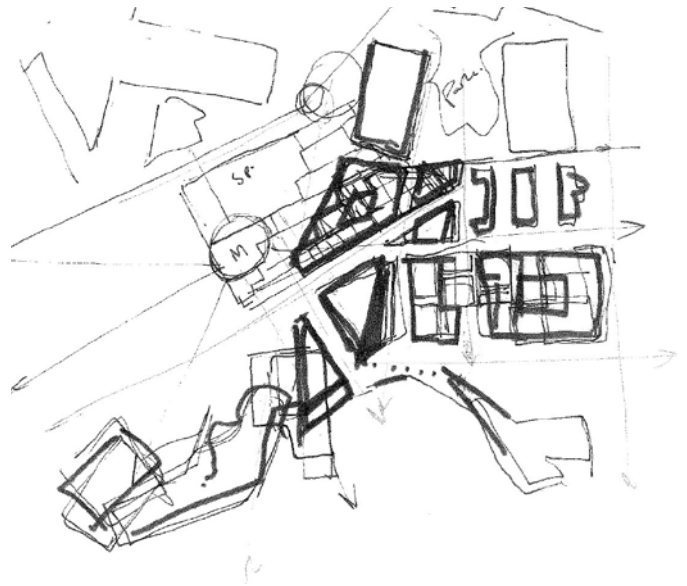
Idea for buildings on the pier
and mussel farming



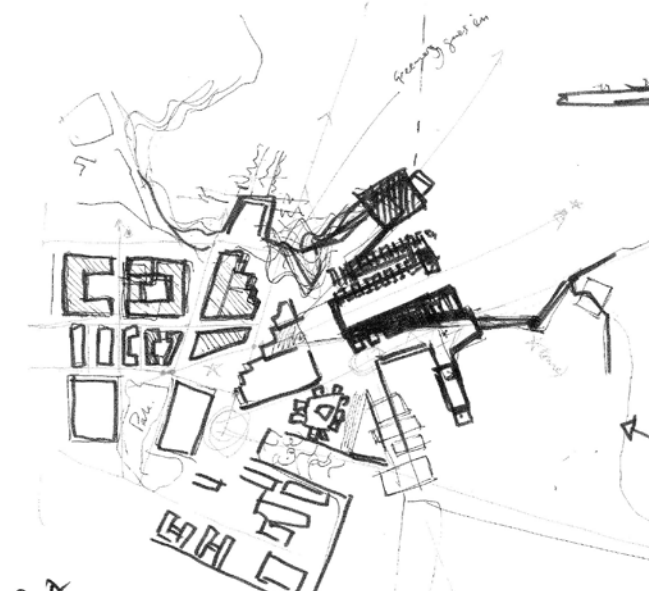
What can take place in the dock?
Temporary structures, public barh,
concert arena, ice skating?



Early sketch of the masterplan where the bridge is connecting between Rosenlund and Lundbyvassen



Design sketches for the masterplan



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