



C L O U D

PROJECT BOOKLET  
MARULI HEIJMAN

AMS - MID CITY STUDIO  
COMPLEX PROJECTS  
GRADUATION STUDIO

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COMPLEX PROJECTS

2018









# C O N T E N T

## 1 . S t u d i o

A s s i g n m e n t

M e t h o d

## 2 . R e s e a r c h

P . P . S m a r t C i t i e s ' A D I S C O N N E C T T O T H I N G S '

C . O . I P a p e r - O n E n e r g y

A m s t e r d a m C a s e - S t u d y

*D e m o g r a p h y*

*W a t e r*

*W i n d m i l l T y p o l o g y*

N . U . Q . P a p e r o n S m a r t C i t i e s

## 3 . P r o p o s a l / P o s i t i o n

C l o u d , 2 0 5 0 P u b l i c D a t a c e n t e r

## 4 . D e s i g n

D e s i g n S t u d i e s

F i n a l D e s i g n

*U r b a n I m p l e m e n t a t i o n / G r o u p S t r a t e g y*

*D e s i g n*

*B u i l d i n g T e c h n o l o g y*

## 5 . C o n c l u s i o n

## 6 . R e f l e c t i o n







The CP seminar (AR3CP040) is connected with AMS graduation studio and runs parallel to other seminars: the

lecture series Research Methods (AR3A160) coordinated by prof. Tom Avermate and New Urban Questions on Minor Infrastructure (AR3AT060) led by Heidi Sohn, only in Q4. It consists of capita selecta (lecture series on Health, Energy and Mobility- technology and data) and workshops at TU Delft and AMS [Amsterdam Institute of Advanced Metropolitan Solutions].

The aim of the seminar is to:

- analyse and understand how technological innovation and new concepts on health-mobility and energy will affect the development of our cities.
- examine examples of around the world to compare with Amsterdam understanding the effect of data-driven city developments - collect data into research books

## Amsterdam Mid-City

Amsterdam has always been a city based on innovation & technological pragmatism. The city was essentially built from a marshy delta, with an erratic tide and was transformed into a military, economic, and logistically robust urban fabric in only a few centuries.

Bricks, glass, and sunken foundations made Amsterdam a very progressive urban fabric for its time. Fast forward to 2017 and the city is still on the forefront of innovation, recently named Europe's capital of innovation in 2016 for its holistic vision of innovation related to four areas of urban life: governance, economics, social inclusion, and quality of life. Amsterdam however still has many challenges it needs to overcome in the next several decades, such as: maintaining a leading role in European innovation, the damaging effects of mass tourism with no end in sight, Schipol airport's ambitious expansion plans, the post Brexit race to be Europe's next financial centre and the housing shortage and rapid increasing housing prices that leave first time buyers with no possibility to enter the market.

Assuming that large changes will happen in Mid-City of Amsterdam, the current fringe-belts located within the ring zones of Amsterdam Metropolitan City, urban areas where strategic development projects are taking place were selected. In Mid-City there is a room for 50.000 housing projects, that will cause large impact in terms of energy efficiency, climate, noise and air pollution, waste water treatment and mobility. Along already analysed three areas located along the rail-metro line Oostlijn

Amsterdam Centraal, Amstel and Zuidoost; research will focus on a larger area of the Mid- City: additional five locations situated along the fingers of Amsterdam Metropolitan Area. These new locations represent the 'gates' to the City, where the densification process will take place in the next 30 years. In total eight urban areas are selected by Complex Projects and they are part of the development strategy "Koers2025", Space for the City. The ambition of the strategic project of studio and seminar is to develop new urban scenarios and investigate architectural typologies for the City of Amsterdam in a time horizon 2050. Therefore close collaboration with AMS (Amsterdam Institute for Advanced

Metropolitan Solutions) and the City of Amsterdam is establish to guide and fulfil on this strategic research until your graduation. In the coming decade Amsterdam Smart City, will change radically as a result of availability of new technologies. Research will investigate how new technological development, mostly on mobility and connectivity, health care systems and energy resources efficiency, will affect Dutch urban fabric: street profiles, urban blocks, uses of infrastructure, building types and architectural typologies, etc..). AMS MID- CITY aims at classify and compare urban axes, public spaces, blocks, buildings and details according to their current geometry, in order to understand the qualities of the Dutch model and to be able to speculate on their evolutions with the individual graduation projects. The work done by LAN in 2017 on Paris Haussman is taken as a reference for the research approach. (Paris Haussmann Modele de Ville, Pavillon de l'Arsenal, Janvier 2017)

## GOALS

Upon completion of the MSc3 students should be able to incorporate an understanding of the design process attained with regard to the collected data and research conclusions. Based on this understanding, students will be able to further develop the project design in Msc4, and focus on the program, circulation, structure, materialization of buildings, comfort and climate control.

Evaluations will be based on the both individual performance of each student and a group work contribution. The student's performance will be determined by the quality of his or her work, commitment, effort and improvement over the entire course of the semester. Each semester is divided in 4 phases with clear deliverables that students need to meet in each phase. During the course of the semester, specific tasks and assignments will be given according to the overall studio development. In addition to strong conceptual and communication abilities, students must demonstrate strong technical and vocational skills. Student's unable to do so will not be permitted to proceed to the MSc 4 studio.

## METHODOLOGY

AMS Mid-City Studio is paralleled by and interconnected with City Innovation Seminar into a singular graduation assignment. The Seminar focuses on the theoretical background and research, which is then applied to the design process in studio. There will be both individual and group work, focusing on different research topics tested on the same site. Individual studio group consists of 9 or so students, and deals with assigned part of Amsterdam. Each of given sights is 2.1 by 2.1 kilometer large and divided in 9 tiles, so theoretically each student can be dealing with one tile. Every studio group together needs to develop a vision, design scenario for the site, rendered by the individual project interventions. Individual design scenarios and group site visions should be strongly interconnected and constantly inform each other. Students are free to choose thesis topics and encouraged to develop designs individually, and consequently connect them into overall group strategy. Next to the general strategy for the site, each group needs to develop a future vision and prediction of possible growth.







Smart City is the recent buzzing and trending topic within the discourse of urbanism. It is often claimed to be an integrated solution for the ongoing problems that urbanized areas are facing today and therefore cities all across the planet manifest themselves with the notion of smart. Yet the term Smart City is surrounded by ambiguity. Its definition is often vague and misinterpreted in discussion. Furthermore, the Smart City concept raises disconnects in relation to architecture and urbanism. The humanistic and historical aspect seem to be underexposed in this concept that engages in the urbanism of our future cities. This paper will address the ambiguity that surrounds the term 'Smart City' and frames an interpreting reflection on the notion of data driven design in relation to the episteme of territory, discipline and things.

## INTRODUCTION

The debate on the future of our urban development is in many prosperous societies affected by the concept of 'Smart City'. This buzzing and trending topic within the discourse of urbanism is often claimed to be an integrated solution for the ongoing problems that urbanized areas are facing today. Cities all across the planet manifest themselves with the notion of smart. Forefront examples are Singapore, Songdu, Korea and Vienna, Austria. Conditions to claim the rather 'innovative and prosperous' sounding term 'Smart' are vague. This makes the term ambiguous hence raising questions whether something is or can actually be Smart. Furthermore, the Smart City concept is focused on the ICT driven developments in our cities. The collected data that is generated through the ICT network is meant to inform designers, authorities and entrepreneurs in the development of the City. Innovations based around the Smart City concept is often being called: Smart solutions. Hence data driven design, or in a sense 'statistic' driven design might bring us to a richer society. But that depends on how this data is interpreted, managed and used. This paper will address the ambiguity that surrounds the term 'Smart City' and frames an interpreting reflection on the notion of data driven design in relation to the episteme of territory, discipline and things.

## DATA DRIVEN CITIES

Relatively speaking, cities are climates of rapid change and developments. As professor Van Timmeren explains in his paper 'Intelligent Cities. Moving Forward': Cities facilitate an urban environment that allow for fast responsive changes. Its economic interdependence and decentralized government put this type of environment on the front position of experimenting with progressive environmental ideas. Technical innovations are one of the significant drivers for change within cities.<sup>1</sup> Two examples on this are the typologies of the windmill and train station. As a typology these actors never existed in the urban fabric. Though through technological innovation the Dutch enabled themselves to use wind as a

energy source for reclaiming water and sawing wood. Another example is the invention of the steam machine. When the steam technology was combined with railroad travel, western society empowered themselves with the ability to travel faster than before. Creating new objects in the city as the railroad track and the train station. Hence the development of new technologies cause new typologies to emerge in the city. Moreover, professor Van Timmeren describes that cities are forced to compete with each other since they have to meet with neo-liberal paradigms as they seek the attention of global capital from companies to enrich their economies and employment opportunities. But also attract a modern class of mobile talent full young professionals to develop their innovation sector and enrich viability and an overall net value. Constant innovation would be the key to longevity in economic competitiveness. Short term booms were largely gained in cities like Helsinki and Dubai city, but the more key role cities like London, Singapore, Paris and New York have maintained high levels of innovation and sustained prominence over time.<sup>2</sup>

The Smart City concept envisions significant opportunities for the future development and management of our cities by use of digitalization. The Smart City could be perceived as a constellation of sensors on different scales that would be connected by a network creating an intelligent digital layer over the city.<sup>3</sup> In case this generated data would be used in an integrated way for meaningful developments and interventions, a city could consider itself as Smart. Through this discourse all kinds of information of the urban environment are generated. By measuring the movement of people, the growth of greenery and the changes in mobility various information can then be condensed into charts and maps. By doing so, significant and detailed information of large and small scale developments are then made manageable for the cities local government or research institutions. The new digital tools like sensors and camera's that are applied to measure activities and developments are making the cities metabolism quantifiable on a high level of detail. Hence this information, which on large scale is

already generated today in Amsterdam can be seen on the [maps.amsterdam.nl](http://maps.amsterdam.nl). The condensed knowledge and mapped data available on Amsterdam will affect a wide range of involved parties and influence how the city will shape its future.

## CHALLENGES

One of the specific challenges that surround the Smart City concept are most likely its ambiguity. The term 'Smart' that embodies the idea of a fully thought out future which is based on Smart solutions does not contain specific constraints causing debate whether something is Smart or not and also the relevance of the term Smart. Van Timmeren confirms this vagueness by stating that in the current discourse on future cities, the wide range of the word causes overlapping with terms as 'intelligent', 'innovative' and 'creative' that would all connect to technologically led transformations with economic, political and sociocultural change. Van Timmeren refers to Professor Townsend's definition of a Smart City: 'the ones that use ICT solutions to solve the dumb designs of the previous century'.<sup>4</sup> Although this might be true, this condensed definition captures just a part of the uncertainties that are connected with the term 'Smart'. In the article of R G Hollands 'Will the real Smart City please stand up?' he explores to what extent Smart Cities can be understood. He confirms that the term has a great overlap with even terms as 'intelligent' and 'innovative'. The term is also sensitive for marketing purposes since the term does not clearly define itself in image and reality. Moreover, the term by nature implies a positive and rather uncritical stand towards urban development since every city wants to be defined as Smart.<sup>5</sup> Within the Smart City discourse it is important to specify the systems of means behind 'Smart'. In the article 'Smart and Digital City' A Coccia identifies an extended amount of types of Smart Cities including the progressive, knowledge, green, digital, intelligent, learning and inclusive version.<sup>6</sup> Generally speaking, specification will be very important in order to further develop the discourse on Smart Cities.

Another challenge that the Smart City is facing is the potential disconnect with place and identity. Or in still vague words, the characteristic or subconscious intuition one gets that is attached to a place. A generally used term for this notion is 'genius loci'. The Smart City concept is focused on the integration of ICT driven developments with the city to improve our urban environments. When developing visions and architectural proposals within this discourse, one would from an architect position most likely be driven by hard quantifiable data. Not only numbers will hugely influence the architect's position, but also the way one would interpret data would create a craft on its own. In a sense, the craft of statistics could have a huge role within the Smart City concept. Within the discourse of architecture, a certain disconnect emerges between space and place. Hajer in his book *Smart About Cities* points out that:

*'The discourse on the smart city promises an era of innovative urban planning, driven by smart urban technologies that will make cities safer, cleaner and, above all, more efficient.'*<sup>7</sup>

It's the aspect of 'efficient' that might collide with the humanistic part of the urbanism discourse. This most likely is caused by the disconnect of the Smart City concept with history. As Hajer further states:

*'Cities are social organisms. You cannot just 'pop the hood' and fix them. Thus far, smart city discourse is a-historic and has shown little appreciation of the societal contexts in which our cities will have to be built, rebuilt and retrofitted... We need to reconnect the bio-physical to the social domain.'*<sup>8</sup>

Hollands emphasizes this disconnect with the humanistic factor in the Smart City concept by explaining that within urbanism we design the environment for humans. ICT should be a tool to enrich our environment but should not overrule it. He claims:

*In essence the smart progressive city needs and requires the input and contribution of these various groups of people, and cannot simply be labelled as smart by adopting a sophisticated information technology infrastructure ... Cities are more than just wires and cables...*<sup>9</sup>

## **BRIEF BACKGROUND**

The historical background of the Smart City goes back to the last century when the internet was at the early stages of its development. The book Ubiquity and the Illuminated City provides a brief background on this very recent development. In the aftermath of the WOI the field of Cybernetics was developed at MIT by Norbert Wiener.<sup>10</sup>

Cybernetics is the trans disciplinary field that uses sensing and feedback to make model systems and their structures for the purpose of organization and efficient control. Within this field all systems, sensors, subjects and so on could be perceived as a balanced network of data flows which could be represented through equations and become processed in a computer simulation. By doing so the analyst will have his own generalized model of reality and could use this model as a 'sandbox' tool to predict certain scenarios.

This was used for the first time in the US to organize its defense system. Forrester, a contemporary of Wiener's used this knowledge of modeling to resource flows and stock piles of industrial systems where he applied cybernetics to try and identify most pressing problems that American cities were facing. Rather than looking at every city individually, the project attempted to develop a generic system of a model city that could be applied anywhere.<sup>11</sup>

Well known theorist Buckminster Fuller and Mc Luhan also foresaw developments which we see

within the discourse of Smart Cities in a very early stage. Wrigley describes in the article 'Network Fever' discussions between the two intellectuals whom both agreed on the idea that technology is an extension of the human body and in that sense would be a form of nature as well. The two were discussing extensively the importance of networks in the future of cities and the changing perception one could have on cities. With networks they would not only be referring to mobility, but also communication and informational exchange.<sup>12</sup>

Greek architect and town planner Doxiadis stated that cities could be seen as biotechnical organisms being partly biological but also technical. In this early stage of the development of computerized systems Doxiadis already mentioned the importance of Architects involving into the notion of networks. He claims that architects should be as networked as the spaces they produce. Referring to the idea that buildings are mostly shells and that architects should focus more on the things that move through them instead of just only creating shelter.<sup>13</sup>

After the development of Cybernetics, Forrester landed a contract with the city of Pittsburgh where his team was tasked to create forecasts on how changes in public spending would influence the policy decisions in various aspects. Unfortunately the model was too simplistic and its findings ineffective. By the years following, computer technology made enormous steps and IT companies became bigger than before. IT companies decided to give cybernetics another shot which led to their vision that 'in order for cities to meet the challenges of the future gracefully, they will need the help of ubiquity'.<sup>14</sup>

It was until the financial crisis in 2008 that the Smart City concept really came alive. When IBM CEO Sam Palmisano argued that in order for cities to cope, they had to become smarter by becoming more sustainable and economically efficient. Not long after, IBM trademarked the term 'Smarter Cities' for its advertising campaign to promote ICT as a solution to urban problems. IBM is not alone in this ICT driven development, also

companies as Siemens, Cisco, Oracle, Microsoft, Accenture, Toshiba etc. are involved in this new movement. The Smart City market is estimated to be worth  $\square$ 1.2 trillion by 2020. The public perceives the notion of Smart City mainly through marketing. Though the term Smart is added generously on other digital innovations as well. Parallel to this architects, planners, sociologists, anthropologists are portraying their expertise on this urban phenomenon and incorporate their divergent knowledge and skill sets on key issues on this discourse.<sup>15</sup>

## REFLECTION

*'The thing has a history: it is not simply a passive inertia against which we measure our own activity. It has a "life" of its own, characteristics of its own, which we must incorporate into our activities in order to be effective, rather than simply understand, regulate, and neutralize from the outside.'*<sup>16</sup>

Things as E Grosz describes in 'Architecture from the Outside; Essays on virtual and real space' for the dynamism that exists in all matter. A given example is the natural selection principle by Darwin wherein a dynamism in the active world exists that creates obstacles, facilitates questions and means by which life itself could grow. The notion of The Thing embodies the idea that a certain substance facilitate all needs for a symbiotic system to exist upon. This in a way relates on how we can perceive cities. Just like Doxiadis mentioned as a biotechnical component that exists with its own form of metabolism.<sup>17</sup>

The Smart City concept aims on optimize this existing metabolism of the city from a technological angle. It tries to generate efficiency in order to optimize the quality of life existing around the thing. Through a new layer of sensors and components that quantify this metabolism, the Smart City promises a future of better quality and competitiveness. The generated data should enable the Smart City to reproduce in the form of interventions and innovations for betterment. Though I question the betterment of this technological form of metaproduction. As E Grosz claims:

*'Instead of merely understanding the thing and the technologies it induces through intellect, perhaps we can also develop an acquaintance with things through intuition, that Bergsonian internal and intimate apprehension of the unique particularity of things, their constitutive interconnections, and the time within which things exist.'*<sup>18</sup>

The metaproducted interventions caused Smart City concept are based on hard data. Measured movements and quantified information. In my opinion this form of urbanism causes a certain disconnect with the sense of place, with the 'thing' that it conserves or the 'genius loci' it keeps. Just like architects do site visits and investigate all levels of disciplines surrounding a certain project, urbanists are facing the same issues yet on a different scale. But what we have in common is the purpose to design for humans, and with that fact, we design a world for organisms with social and emotional systems. As Hajer already explains that cities are social organisms, the a-historicness and too little appreciation for societal contexts in our cities make the basic praxis of Smart Cities for this discourse weak.<sup>19</sup> These social and emotional values that cities contain could not in every case be translated into data and statistics. Here a certain disconnect emerges. In order for Smart City systems to develop a high quality of life and be meaningful in this discourse it should focus on the human aspect of cities. The power within Smart Cities lies in the way the data or knowledge is shared. Either it be in the hands of the people (open source) or it be in the hands of governments and ICT's. As stated in the Guardian, Smart Cities could break democracy.<sup>21</sup> Hajer states righteous that architects, urbanists, anthropologists and sociologist should steer this development onto the right track for their it is relatively uncertain how the massive amounts of generated knowledge by governments and ICT companies could backfire on society.<sup>20</sup> As Doxiadis already mentioned in the last century the importance of Architects involving into the notion of networks for as architects should not only make buildings that are mostly shells but should focus more on the things that move through them and the networks that relate to them.<sup>22</sup>

## LESSONS LEARNED

Smart City is the recent buzzing and trending topic within the discourse of urbanism. It is often claimed to be an integrated solution for the ongoing problems that urbanized areas are facing today and therefore cities all across the planet manifest themselves with the notion of smart. The Smart City could be perceived as a constellation of sensors on different scales that would be connected by a network creating an intelligent digital layer over the city. Yet the term Smart City is surrounded by ambiguity. The term 'Smart' that embodies the idea does not contain specific constraints causing debate whether something is Smart. The term is also sensitive for marketing purposes since the term has strong overlaps with such as innovative, creative, intelligent etc. The term by nature implies a positive and rather uncritical stand towards urban development since every city wants to be defined as Smart. Furthermore, the Smart City concept raises disconnects in the field of architecture and urbanism. The data driven developments that the Smart City facilitate ignore the humanistic and

historical aspect of the discourse of urbanism causing a disconnect between the idea of Smart Cities and the city as metabolic social organism itself. In order to make the concept of Smart Cities feasible for current cities, a certain understanding of socio metabolic systems should be incorporated. It should be prevented that the massive amounts of hard specific data will be used for economic purposes that potentially cause backfire of the concept. Architects, urbanists, anthropologists and sociologists should enter the discourse and explore how ICT developments could enhance the quality of the urban environment instead of dictate it.

### Footnotes:

- 1 2 3 Arjan Van Timmeren, *Intelligent Cities Moving Forward* (p: 2-4)
- 4 Anthony M Townsend, *Smart Cities*, Norton & Company Inc. (p.19-22)
- 5 9 Robert G. Hollands, *Will the real smart city please stand up?* (p:308-315)
- 6 Annalissa Cocchia, *Smart and digital city* (p.5)
- 7 8 19 20 Maarten Hajer & Ton Dassen, *Smart About Cities* (p.9-40)
- 10 11 14 15 Arjan Van Timmeren, Laurence Henriquez & Alexandra Reynolds, *Ubiquity & The Illuminated City* (p.40-42)
- 12 13 17 22 Mark Wigley, *Network Fever* (p.83-90)
- 16 18 Elizabeth Grosz & Peter Eisenman, *Architecture from the outside* (p: 167-177)
- 21 Steven Poole, *The truth about smart cities: 'In the end, they will destroy democracy'*  
url: [www.theguardian.com/cities/2014/dec/17/truth-smart-city-destroy-democracy-urban-thinkers-buzzphrase](http://www.theguardian.com/cities/2014/dec/17/truth-smart-city-destroy-democracy-urban-thinkers-buzzphrase)

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**THE CHANGING FACE OF ENERGY**

Developments on energy production and the synergy with the city  
Explorations of Amsterdams 2050 renewable energy system

Energy has continuously changed the appearance of our cities and landscapes. Currently the energy sector faces great challenges in transitioning the system from fossil based production to sustainable & renewable based systems. Energy systems world wide are undertaking a critical transition to sustainable and renewable sources. This is providing opportunities to reimagine the relationship between the renewable energy industry and the cities. So how could sustainable and renewable energy interlace with the current built environment of Amsterdam? Within this part of the energy research book this paper investigates the relationship between industry typologies in relation to renewable energy sources and the potentiality to interlace with the current built environment? By doing so Amsterdam is taken as case study and the exploration of this paper will be on the transitions in ways of energy production of Amsterdam to a sustainable and renewable based city for its 2050 ambitions.

## INTRODUCTION

In the course of time energy has continuously changed the appearance of our cities and landscapes. When new technologies are developed, new typologies arise to facilitate space for the generation and distribution of energy. The composition of the urban fabric is in some cases the result of new energy typologies that entered the city, as for example seen in oil based industrial cities. In other cases the composition of the urban fabric could be a driving spatial force for the location of energy typologies as seen in the periphery structures of 1700s Amsterdam where windmills were located on the defense dikes. In present day circumstances we see landscapes transform by the growth of wind turbines. The thin vertical white energy suppliers are changing periphery areas along dikes and the Dutch sea areas in the North sea.

Just as energy is related to supply and demand, it is also related to space and place. In the contemporary discourse, new energy production methods are focused on renewable and sustainable methods. Governments are setting ambitious goals to reduce fossil energy productions and transition to a new form of society based on sustainability and renewability. This general mentality shift on the production of energy challenges the contemporary energy companies like Shell to innovate onto new methods that in essence, won't compromise the future generations. But in parallel, it also provokes urbanists to rethink the role of energy within our urban environments. It potentially creates a long-lasting opportunity for urbanists to develop a greater synergy between industry and city. It might be an opportunity to integrate leisure spaces with productive spaces. Diffusing segregated areas within the city and potentially diminish undesirable areas within our habitats.

Within this part of the energy research team this paper investigates how future sustainable and renewable energy systems will affect the current built environment of Amsterdam? By doing so Amsterdam is taken as case study and the exploration of this paper will be on the transitions in ways of energy production of Amsterdam to a sustainable and renewable based city for its 2050 ambitions.

## **HOW WILL THE FUTURE ENERGY PRODUCTION OF AMSTERDAM AFFECT THE CURRENT BUILT ENVIRONMENT?**

Energy has continuously changed the appearance of our cities and landscapes. When new technologies are developed, new typologies often arise such as windmills, train stations (as spin off effect from the steam invention), oil refineries etc. The new facilitation of space for the generation and distribution of new energy productions hence change the face of cities. A specific example of this are the Dutch windmills. The Netherlands was originally a marsh landscape and changed enormously when its civilization grew and started using wind as it's driving source for energy. This was used to reclaim land from the water, to saw wood into practical parts and to grind grain into flour. The variety of deployment made the windmill a typology that appeared all across the country and changed the landscape for good. <sup>1</sup> Currently the energy sector faces great challenges in transitioning the system from fossil based production to sustainable & renewable based systems. Within this paper, energy is mainly perceived as electrical energy.



Roughly **1170 Windmills** exist in the Netherlands of which most are still operational.



European Union would like to reduce **80-95% Carbon Emissions** by 2050.

## AMBITIONS & PROGNOSIS ON ENERGY

Energy is a driver of civilization. We need it to run our technologies such as phones and laptops, but also our amenities, such as transportation, industry and infrastructure which drive our economies. A greater awareness on the negative effects of the current fossil based energy system on our environment grows steadily. Energy systems world wide are undertaking a critical transition to sustainable and renewable sources. This is reflected in recent governmental papers on ambitions and goals.

The Roadmap 2050 paper of The European Union outlines their ambitions for a 2050 decarbonized based energy system. Its main objective is to reduce carbon emissions by 80-95% by 2050. By doing so, the demand for new energy systems will create a market for future commercial innovation. Due to this it is believed that energy prices will rise onto 2030. When technology is developed a tipping point will come where costs will decline. As a result of this ambition, serious pressure is put on the current energy industry which currently relies mainly on gas, coal and oil technologies. <sup>2</sup>

Hence this ambition can also be seen at one of the front running energy companies Shell which are also represented with an innovation centre on the Amsterdam Centraal group S scale map. Shell confirms the urgent transition in the global energy production. They describe this as 'the transition to a low-carbon future that will unfold at different paces in different places across all sectors of economic

Shell envisions a  
**Combination of** renewable  
and fossil energy sources



activity creating new risks and opportunities'. According to Shell the energy power sector has to transform into a combination of renewable sources of energy, nuclear and natural gas in its cleanest way which they call 'hydrocarbon'. The emissions should then be captured and stored for future energy fuel developments in the so called 'CCS' technology.

Shell takes four main contributions to reducing global emissions which are: supplying more natural gas to replace coal for power generation; progressing carbon capture and storage (CCS) technologies; developing alternative energies; and implementing energy-efficiency measures in our operations. Currently in the Netherlands, Shell is working with policymakers and industry representatives to help determine the shape and speed of the transition to a low-carbon energy future. <sup>3</sup>

Four trusts of the Dutch  
Government:

Wind



Water



Solar



Biomass



In extend of the European policy, the Dutch government also sets ambitious goals to transform into a sustainable and renewable energy system. The Dutch government outlined their ambitions in the 2020/30/50 energy agreement where they confirm to reduce the carbon dioxide emissions by 80/95%. Within the ambitions the government names 4 technologies to achieve her goals. Reducing energy demand by new domestic sustainable technologies, use of biomass, clean energy production (Solar and wind) and the storage of co2 emissions. Furthermore, sustainability and renewability will be achieved on different scales depending on the energy outlet. The Energy Agreement divides this notion into 4 main energy focus areas: energy for city heating, industry, transportation and power/light. These focus areas require a custom approach to achieve sustainability since they can be developed in different scales. Primary opportunities for the Netherlands on sustainable energy would be according to the energy agreement: from wind, water, sun and biomass. <sup>4</sup>

## AMSTERDAM CASE

The argumentation to transform to new energy production systems are evident. So how is the current situation on energy production in Amsterdam and more importantly, what could we expect to change for the future?

To start with, also the municipality has developed ambitions for the future transition into a sustainable environment. The city expects sustainable developments to be a motor for society and economical development. A significant goal of the municipality is to increase renewable energies. It is desired to increase this supply by 20% compared to 2013. On regular energy production, the city wants to reduce this demand by 20%. The city currently spends 1.8 billion euros on energy bills which they want to reduce by 10%.<sup>5</sup> To achieve this they want to reduce the demand of energy. To explore the transition into renewables, the municipality developed a case study on Amsterdam to map sustainable energy potentials called 'Energy Atlas Amsterdam'. In the following paragraphs, three potentials are described based on the information of the 'Energy Atlas Amsterdam'.<sup>6</sup>

### From power plants to wind & solar

The electrical energy of Amsterdam is mainly driven by two power plants. The Sloterdijk power plant which is divided into 3 parts and the Diemen power plant which consist of 2 gas driven electro installations and 1 gas driven central heating installation. Besides those power plants Amsterdam is also driven by the smaller AMC, Arena, VU and Slotervaart Hospital plants. The most likely source of renewable energy to replace all the gas generated energy would be wind and solar energy. The Energy Atlas suggests that if the whole 'build' area of Amsterdam would be covered by solar and wind energy, it would be enough to meet with the cities energy demand.<sup>7</sup> Though there is not always wind and solar energy available, and the times where these would generate the most don't always meet with moments of need. An alternative way of passive energy storages should be developed. This could be a waterpower which empties when energy is needed, or another passive carrier of energy. Though if this is profitable is the question.

### District Heating & Data Centres

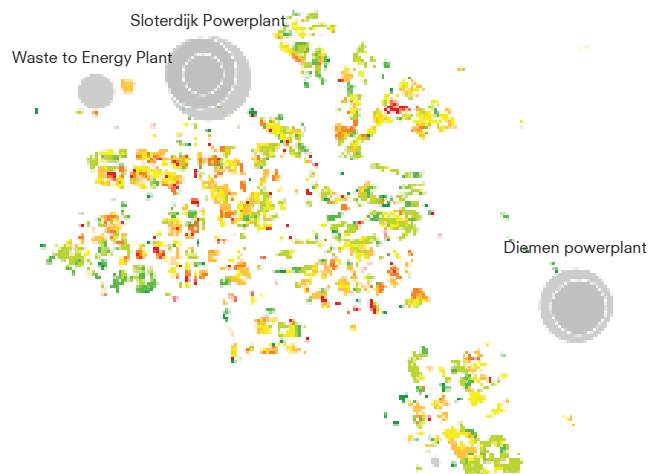
The 'Energy Atlas Amsterdam' maps various aspects of the cities behavior in relation to energy. Remarkable elements of this potentiality analysis is the very small central heating system of Amsterdam that is mostly located on the periphery of the city. District heating is considered



Amsterdam Gas Usage.<sup>11</sup>

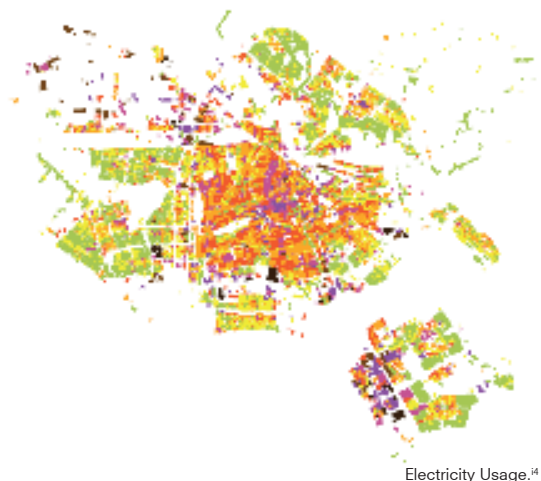


District Heating Grid.<sup>12</sup>



Powerplants & Energy labels.<sup>13</sup>

as a less energy intensive way of heating due to the collective generation of heat which through insulated pipes would be guided to the various homes. The current condition of Amsterdam is that most housings have their own central heating machine which will use gas to heat the cold water for every single moment hot water is demanded. The moment where the central heater will turn on and heat the water until its desired temperature is taking significant energy. On top of this comes the fact that most houses in the centre of Amsterdam are old and in most cases badly insulated. Either due to outdated windows but also bad details as can be seen on the maps of the 'Energy Atlas Amsterdam'. Creating a relationship to an existing producer of heat to create a sustainable district heat system is evident. The loss of heat in Datacenters on the map of the study is striking. A potential could be to guide cold, or even river water of the IJ, through a Datacenter to cool the Data machines and at the same time export the heated water to houses in the old center.

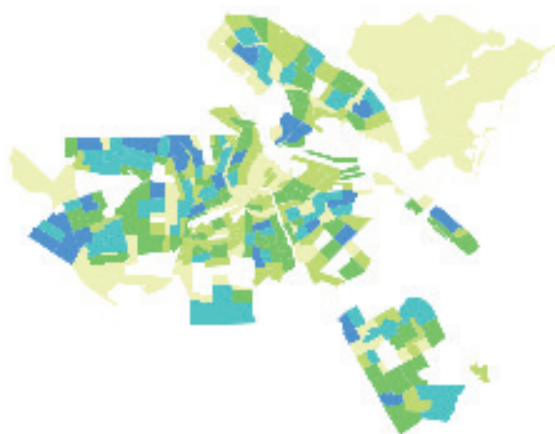


Electricity Usage.<sup>14</sup>



Harbor of Amsterdam Areas

Potential Wind Energy Areas.<sup>15</sup>



Energy Potential Waste.<sup>16</sup>

#### Amsterdam Central Waste & Waste Incineration

The maps also show a high amount of waste being produced in the 'Overhoeks' neighborhood and scattered around the city centre of Amsterdam. This is close to the industrial areas of the Amsterdam harbor and the Amsterdam Central area. Amsterdam currently owns one waste to energy plant that is run by the 'Waste Energy Company' of Amsterdam. This plant now facilitates less than a 5th of Amsterdams electrical power. Waste to energy is by Shell perceived as one method of renewable energy production.<sup>8</sup> A waste to energy plant is taking out the 'useless' waste and converts it into energy by combustion. This would transform waste into fuel for power plants. CO2 would still be emitted but in smaller numbers than coal or oil. An extended plan should be developed for the further CO2 emissions that the waste to energy plant will cause. This could potentially be developed by help of the Shell CCS technology. A waste to energy plant could significantly improve Amsterdam's energy production system since it would make use of the high amounts of waste that exists today. Moreover, the canals could be used as a symbolic infrastructure where this waste would be collected and delivered at a waste energy plant close to the river banks.



Spittelau plant.<sup>7</sup>

## SPITTELAU WASTE INCINERATION PLANT

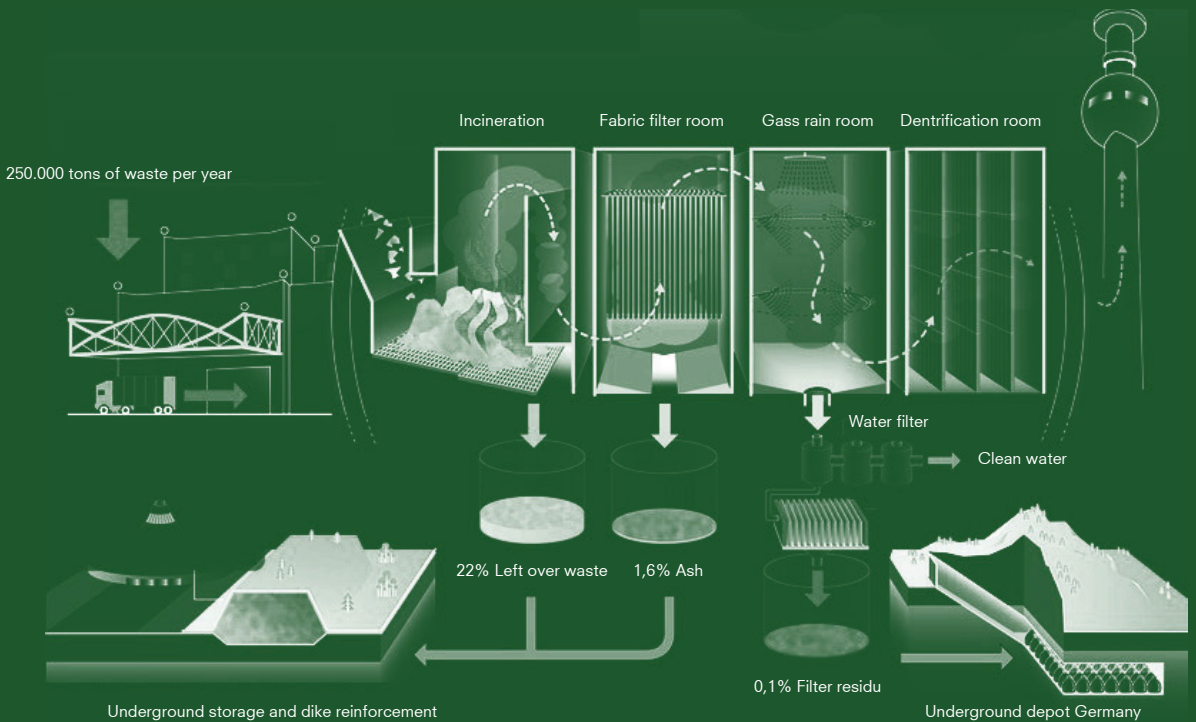
The power plant responsible for the district heating of Vienna processes around 250,000 tonnes of household waste every year. The plant was built in 1969 and 1971. In 1987 the plant caught huge fires and destroyed major sections of the building. Instead of tearing the plant down, the Viennese Municipality decided to rebuild it mostly due to two reasons. The plant was responsible for huge parts of the city and the infrastructure was already present and the waste was being processed right where it was created, in the middle of the city. This location would save large amounts of travel time for waste cars.<sup>9</sup>

Interestingly, the major back at the time, Helmut Zilk, envisioned a plant that was especially set on clean and new standards. In addition, he proposed on making the plant a work of art, changing the typical perception of a power plant. The designer of this plant became environmentalist and artist Friedensreich Hundertwasser. This new design was finished in 1992 and can be seen as an example how industry merges in the city. Behind the facade of the plant, waste is first weighed, categorized and incinerated. The heated gas generated by the waste furnaces are then led

through a heat exchanger creating steam. From this steam, hot water is sent through the district heating grid and energy is created. Recently the plant has been refurbished with new technologies. It is now three times more efficient due to replaced parts of the machine.<sup>10</sup>



Spittelau waste plant from river.<sup>®</sup>



Spittelau plant diagram.<sup>®</sup>

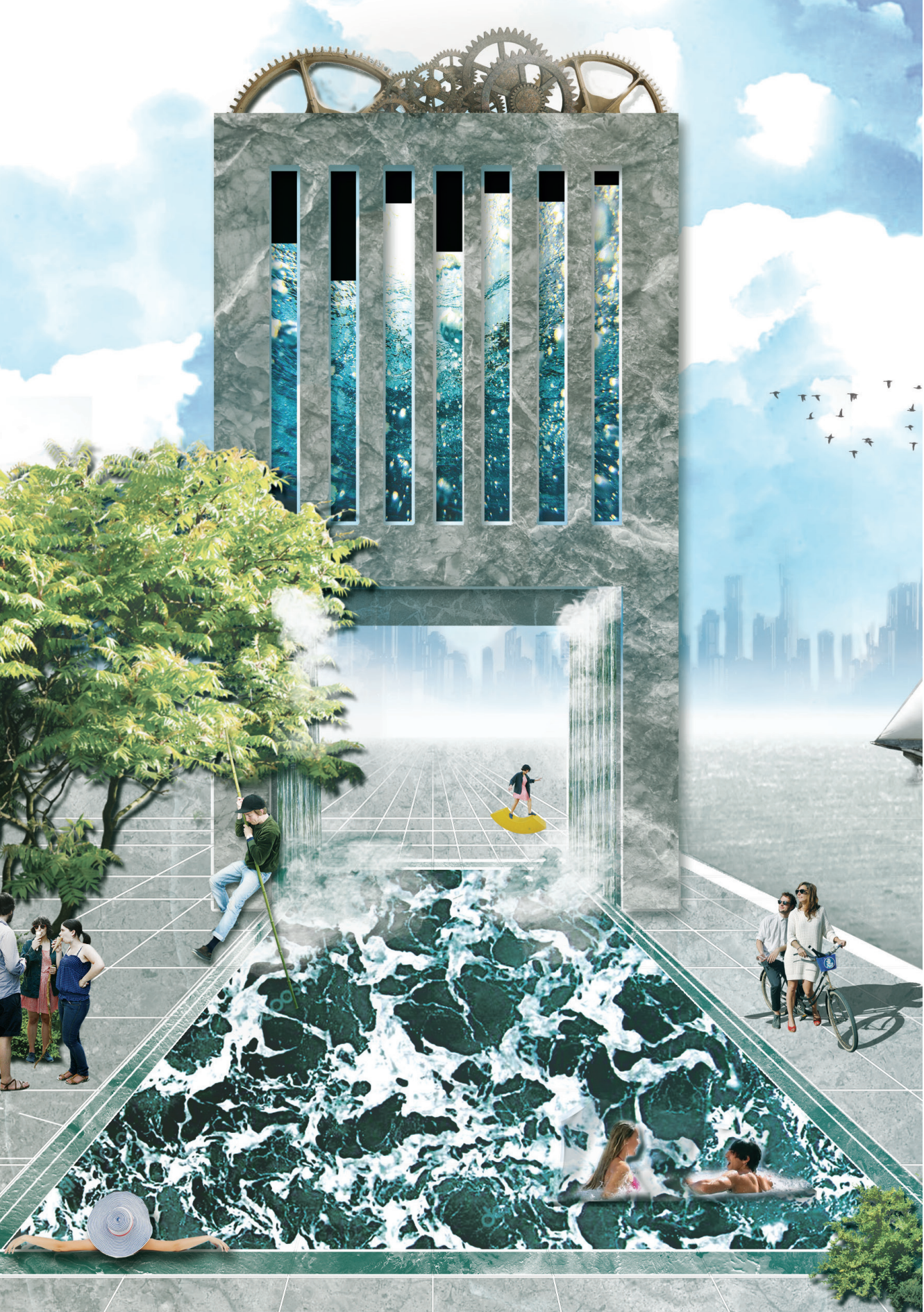
## REIMAGINING INDUSTRY IN THE CITY

Currently Amsterdam is facing lots of urban developments. Along the IJ-river new buildings will appear with are densifying the area. Also the infrastructural strip on which Amstel and Zuid-Oost are located will face dramatic changes either infrastructural as architectural. With new forms of energy production transitioning Amsterdam in the future, this role of energy production within the urban layout is a new opportunity to reimagine. With possible data centers used as heat-hub for the city and waste to energy plants taking care of our garbage, new possible typologies could enter the urban environment. What could be their role? MIT professors Tali Hatuka, Eran Ben-Joseph and Sunny Menozzi Peterson describe this as part of the 'fourth industrial revolution'. This revolution will focus on mainly three developing trends: technology, manufacturing, and cities. The professors mapped these trends into three interlinked dimensions for the future development of industrial areas in cities: geographical proximity, localism, and planning regulations.<sup>11</sup> In regards to the relation of the city and its 'productive' industry the MIT professors state that:

*'Urban manufacturing requires a different approach that recognizes people as a vital factor in the competitive advantage of cities. Instead of single-use industrial parks and stand-alone factories, industrial urbanism encourages the convergence of users and activities to create vibrant economic clusters. The new industrial urbanism should reintroduce humancentred design to manufacturing facilities.*

*Moreover: places where productivity takes place where usually defined and managed by the same systems that were used almost a 100 years ago according to the MIT professors. Through rezoning the supply of industrial land gets reduced and as a result, industrial programs have to fill in sites whenever possible. By focussing reuse of existing urban industrial land, outward sprawl can be avoided as well as potential drawbacks of certain areas.'*<sup>12</sup>

Besides the technical transition, the energy transition would also take into account a human scale transition. With a changing environment, there is also a changing perception of energy. Designing the interface between people and technology in such a way that energy is accepted is a big challenge.<sup>13</sup> Energy is invisible and the technology complex. This applies for changing technologies in our homes as wind turbines covering landscapes or potential solar panels covering fields as energy farms. There is a certain balance to be achieved between the technical and the human/emotional aspect of setting the step to the next civilization.



DEMOGRAPHY / WATER / TYPOLOGY: WIND-MILL



DEMOGRAPHY

This first atlas topic captures population density within the M frame and general demographic numbers on Amsterdam. Based on the data provided by the municipality of Amsterdam the density of each neighborhood within the M-scale frame is mapped. This data is revived from their websites maps.amsterdam.nl and ois.amsterdam.nl. Its visualized in 4 stages of density together with broader data on population and the dimensions of the location of the AMS Mid-city project. Generally the maps show the more dense area towards the city centre and less ones in the north. Though the prognosis indicate that Amsterdam will further grow and the harbor side a long the eye is one of the area's that will densify significantly in population.

The least dense area's within the M-frame are towards the north-east of the significant 'Central Station'. The area around the station itself is also less dense since almost no residential programs are located there. The sharp shaped area on the left bottom side marks the 'westerpark' which is a urban green area which often is used for various events. More denser areas appear spread out on the west side of the location. It is surprising that a significant part of the city centre covers a 2nd degree of density instead of an expected 3th or 4th. This has probably to do with the data generated from registered residents, short stayers and hotel visitors are not taken into account in these population density maps. As expected significant denser areas appear in the city centre. Interesting is the quite hard division in density in the North. The most populated areas seem to be around the neighborhood 'Jordaan' for the south part. Also the 'Java Island' and the west side of the north part seem to be very dense. The maps give a clear overview on the distribution of residents around the city of Amsterdam.

Population per km<sup>2</sup>

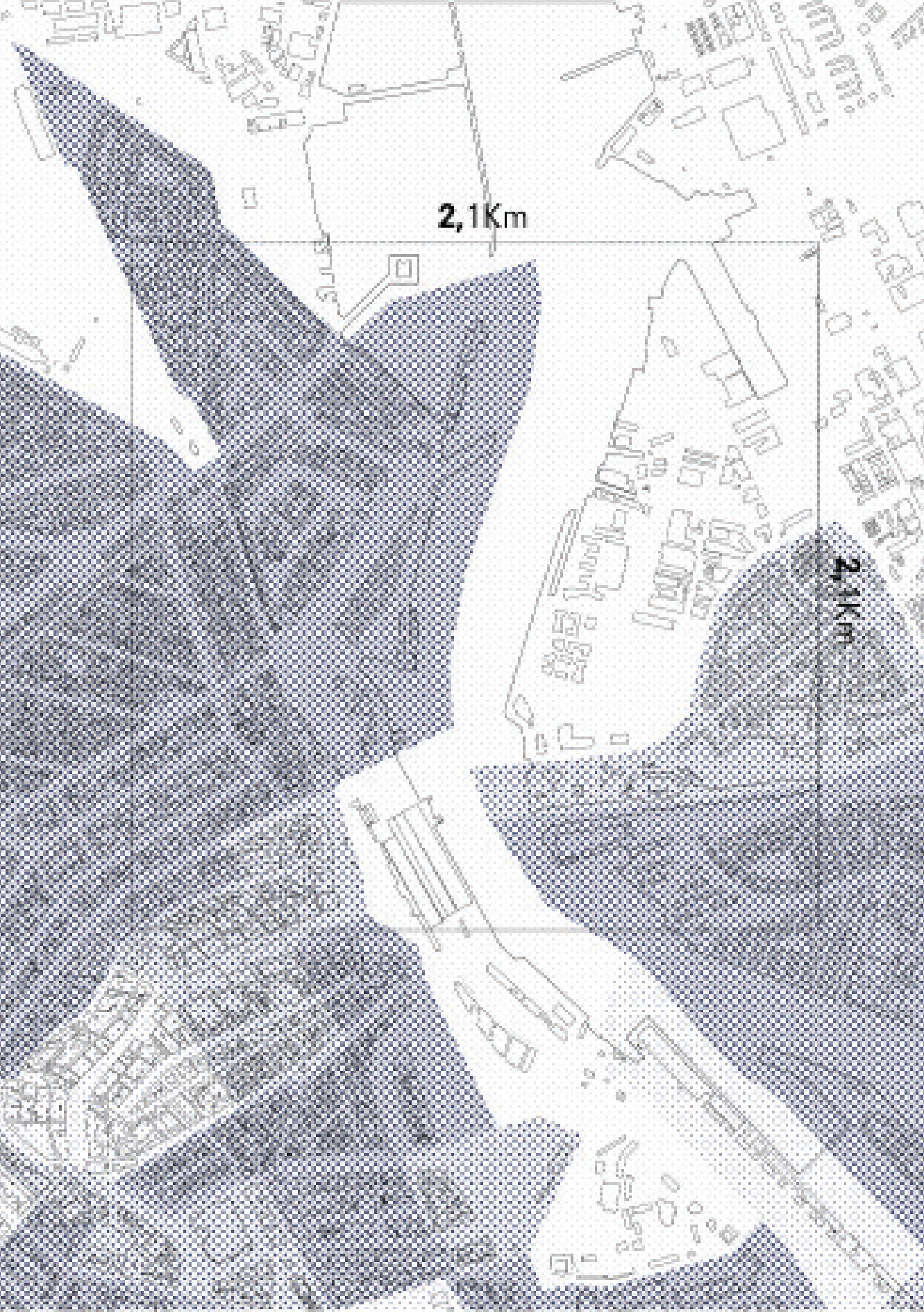
1 - 3,750

3,751 - 7,500

7,501 - 11,250

11,251 - 15,000





2,1Km

2,4Km



RESEARCH  
AMSTERDAM CASE-STUDY

. 2

DEMOGRAPHY / WATER / TYPOLOGY: WIND-MILL

# WATER

## A UNIQUE URBAN LANDSCAPE

Venice of the north is what the city of Amsterdam is often called. The iconic canals within the city centre creates a unique urban environment that attracts many tourists from all over the world. The strong presence of water in the city is not unusual in the Netherlands. The country has a rather unusual relationship with water. Within this chapter we investigate the relationship between Amsterdam and water. Focused on its canals and the river 'IJ'.

## THE DUTCH & WATER

With a significant part of the country below sea level comes an extensive history of water management knowledge. The Dutch are using their water management knowledge world wide in various projects. This knowledge comes from a long and rather hard relationship with the sea and rivers.

First settlements in the Netherlands were based on 'Terpen' or small hills where settlers would build their houses on top of in order to protect themselves of floods. Over the years the Dutch gained the knowledge to build dikes as protection. Amsterdam has earned its name from a dike which was built along the Amstel river.<sup>1</sup>

Through the development of windmills, the Dutch enabled themselves to move water by wind power. This resulted in the creation of polders. These polders are large flat areas that are lying several metres below sea level. Dikes and dunes protect them from flooding.<sup>2</sup>

Over the years this management of water elaborates trough the usage of canals for transportation and the development of the 'Delta' works. A huge artificial walled structure protecting large parts of the country from flooding. It is one of the 7 civil engineering world wonders.<sup>3</sup>

17% of the Dutch land mass is reclaimed land from sea and lakes. With new motorised technologies the Dutch enabled themselves to move land and create it their own. From this the whole province of Flevoland is made which almost fully consists of reclaimed land.<sup>4</sup>

The canals of Amsterdam are Unesco Heritage and part of the 7 wonders of the modern world.

With Rotterdam as one of the biggest ports in the world and Amsterdam being the 4th of Europe, the Dutch have a big economical interest in importing and exporting goods across the globe with rivers and the sea being of economical value. The port of Amsterdam takes 1900 hectares of area and 600 hectares of water ways. In 2008 it employed almost 65,000 people, of which half is from Amsterdam.<sup>5</sup>



Nearly **17%** of the Netherlands is reclaimed land from the sea and lakes. .



Roughly **1170 Windmills** exist in the Netherlands of which most are still operational.



**10,000 houseboats** in the Netherlands and over 2,400 in Amsterdam alone



Per person, the Dutch use **120 litres** of clean water everyday for various reasons.



Living safely below sea level costs everyone residing in the Netherlands some **330 Euros** per year.



Waterschap, the regional water control board per area. There are **27 waterschappen** today.



The waterschappen manage **18.000km dikes** and **225.000km waterways** today.

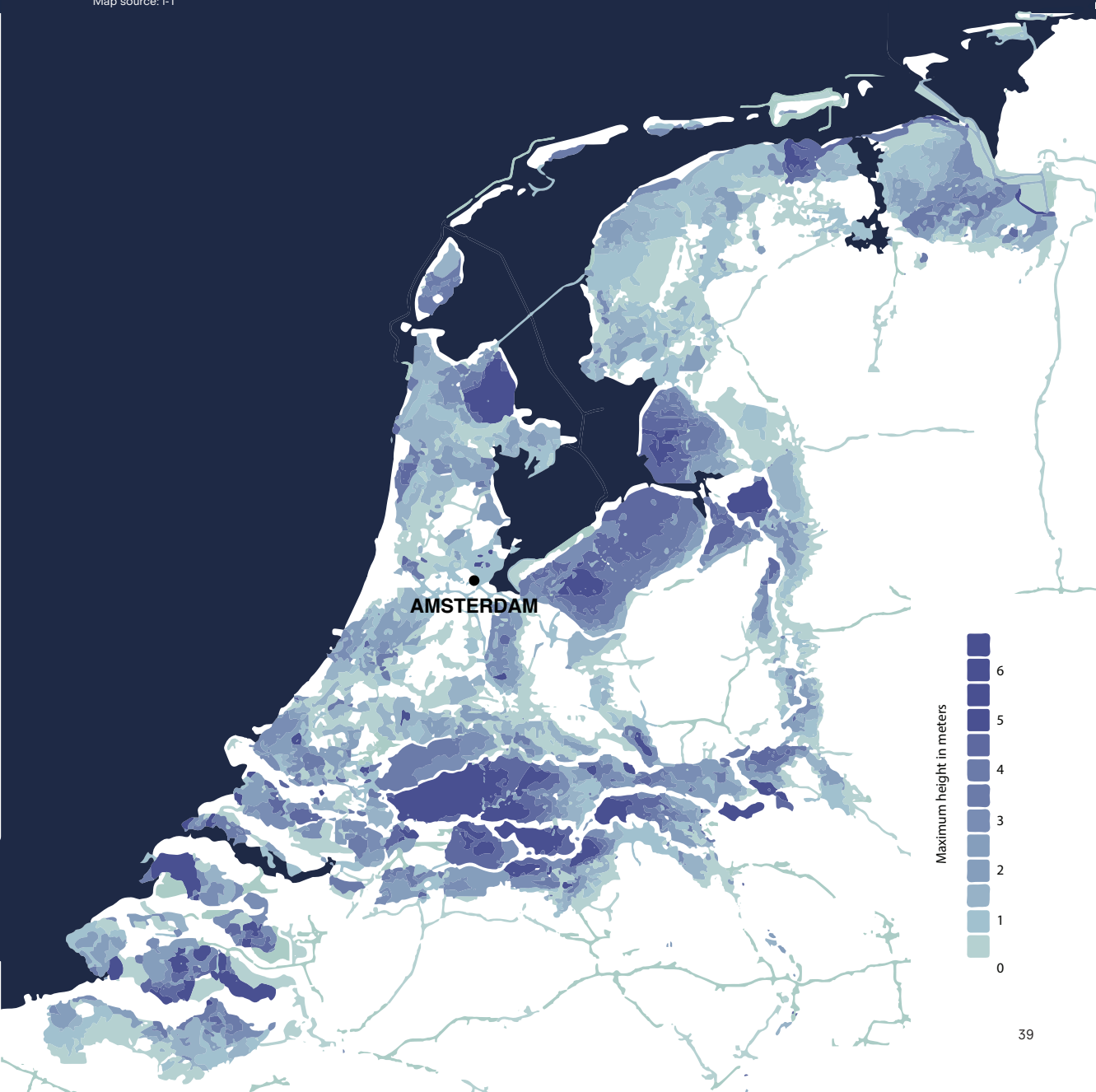
## LIVING BELOW SEALEVEL

In general the Dutch relationship with water is unlike that of any other country in the world. It is a densely populated country situated partly below sea level. Its deepest point is located in the area of the city of Rotterdam, 5,9m below N.A.P. In general, one third of the Dutch territory is actually below sea level. Rising sea levels is a

serious issue for the Dutch considering the areas which could potentially flood in case dikes would fail. Fortunately, Amsterdam is built +/- 2m higher in ratio to sea level and therefore is safer from flooding, though protection from the water will always be needed (See detailed flood map in appendix).

Infographic source: 6

Map source: i-1



**2013**

Maasvlakte project

**2007**

Room for rivers program

**1986**

Deltawerken opening



**1953**

Waterloodsramp

**1932**

Afsluitdijk

**1918**

Zuiderzee works

**1900**

First sewage systems

**1820**

Zuidplaspolder

King William of Orange I was the first to create polders with steampower

**1798**

Founding 'Rijks waterstaat'

Part of the Ministry of Infrastructure and Environment, responsible for watermanagement

**1780**

One of the first significant polders

Beemster & Schermer

**1707**

Pannerdensch canal

Splitted the Rhine in two to improve water traffic efficiency



**1421**

SintElizabethvloed

Large area's of Flanders, Zeeland and Holland where flooded

**1400**

Windmills used to polder



**1287**

SintLuciavloed

**1255**

First official water Authority

Responsible for managing dikes, waterways, sewage treatments



**1170**

All Saints Flood

Creating the 'Zuiderzee'

**1100**

Development of peat-soil

**1000**

First man made dike

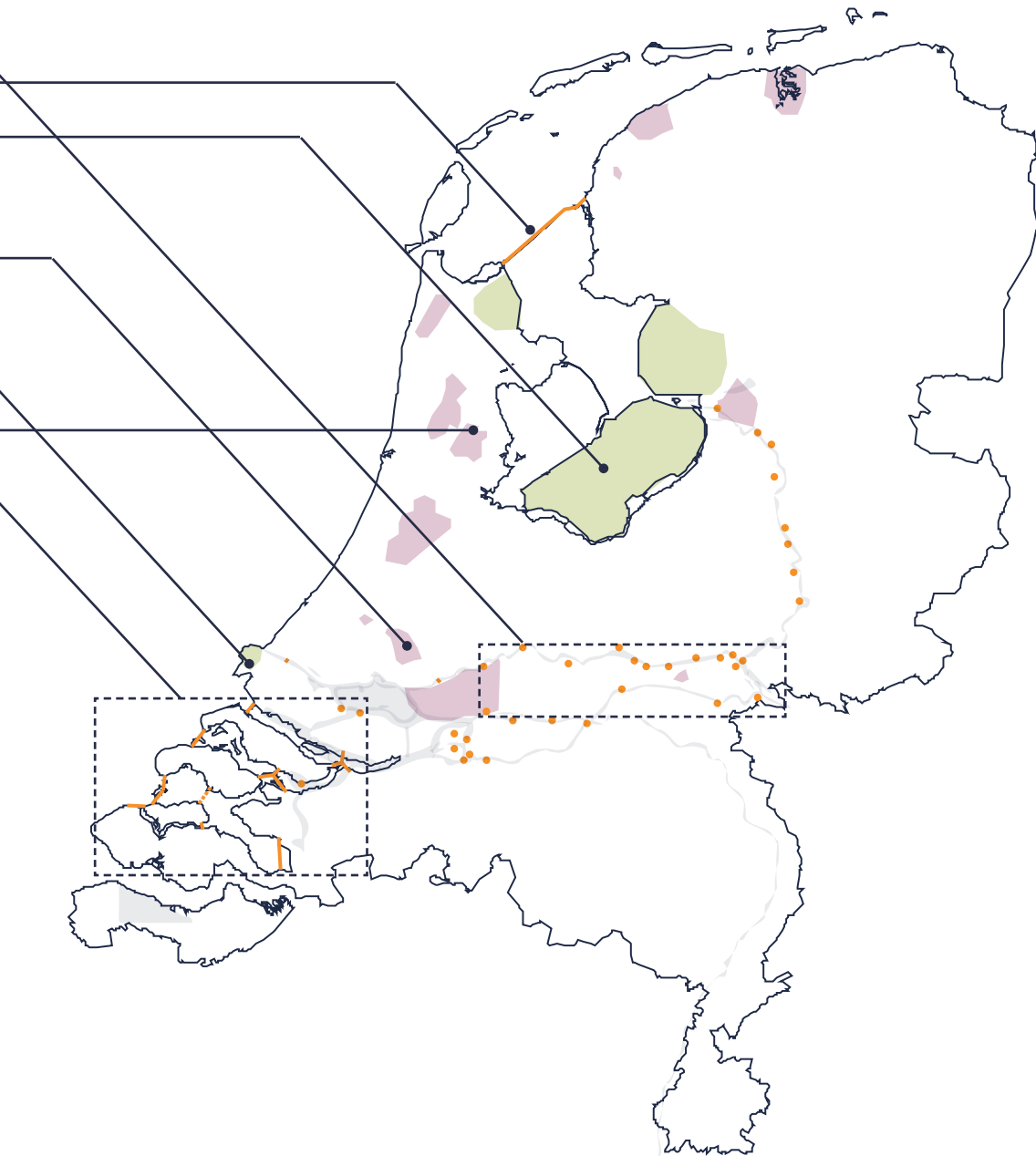
Peins, Friesland

**0**

**-500**

Usage of Terpen

# DUTCH WATERMANAGEMENT INTERVENTIONS



- Reclaimed land
- Polders
- Dams, Dykes, Locks, Storm barriers

Infographic source: 7

## WATER ON SITE

*'The water in and around the city is of one of the qualities that distinguish Amsterdam from most other metropolises. The awareness that this is a huge asset for the city will only grow stronger'.*  
Municipality of Amsterdam

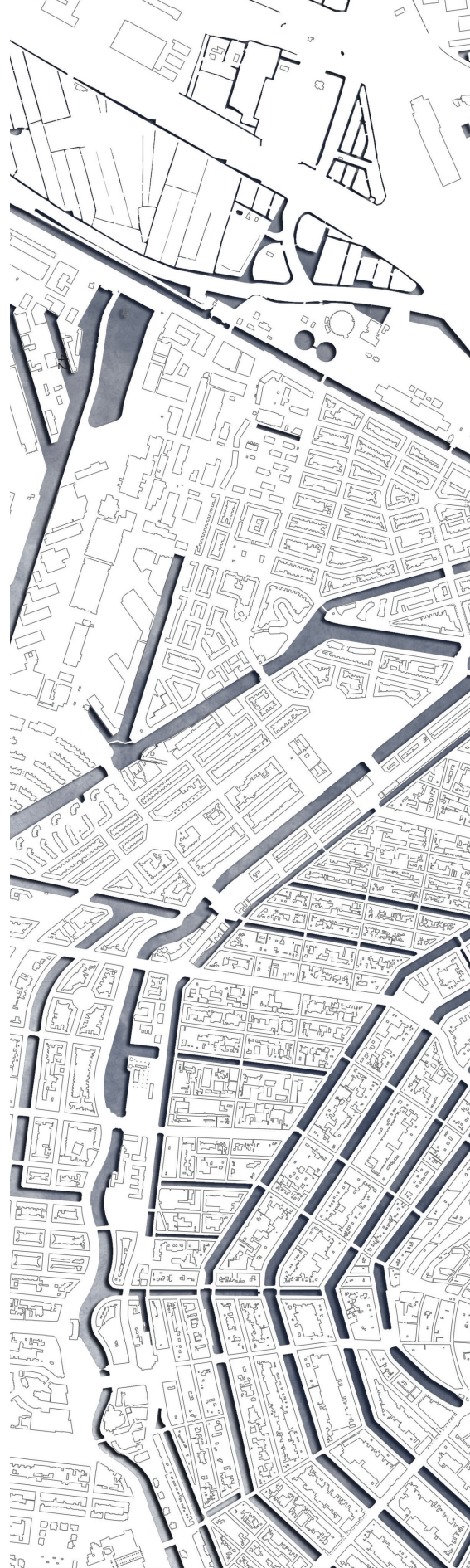
Rediscovering the banks of the river 'IJ' in is one of the main aims according to the municipality's agenda described in the 2040 structural plan. The municipality would like to spread the growth of leisure and tourism over different parts along the water banks, stimulate sustainable usage of water and use business strategies to realize these ambitions. While these ambitions are very broad and vague, the municipality provides several specific aims. These include: creating more swimming areas and recreational places on the riverbanks, introducing new dwelling areas on top of water, furthermore, enhancing the water network for recreational and transpirational shipping, expanding yacht harbours and optimizing the IJ riverbank connections.<sup>8</sup>

### Three Identities

Along the IJ river the municipality mainly distinguishes three identities. In the east the focus will be on water recreation purposes, in the centre the area will be focusing on tourism and the international identity of the city. Using the north waterfront for potential olympic games is in consideration. The west will be focusing on further urbanisation towards the harbour. With the developments along the IJ, the municipality would like to take out all big event activities in the UNESCO area and move them to the 'oosterdok' area which is in south of the Central area. Cargo shipping over water is stimulated instead of trucks through the small UNESCO streets.<sup>9</sup>

### The IJ and Harbour

The IJ is an important connection between the Atlantic and the Ruhr area of Germany, the port of Amsterdam and other Dutch harbours. The port of Amsterdam is the 4th largest within Europe. The municipality expects that ferry traffic will increase and the harbour will grow in its size. They would like to explore options for bridging the North and South for 2020 to facilitate infrastructure for the increase in transportation between the two parts. Overhoeks will be further developed with attractive places for tourists. Along the river banks, space will be made for leisure and sail/yacht harbours.<sup>10</sup>





→ To Harbour & North Sea

Main Navigational Route  
River Amstel & IJssel-lake

  
Cruise terminal

## WATER & CULTURE

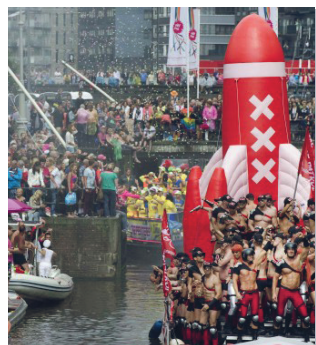
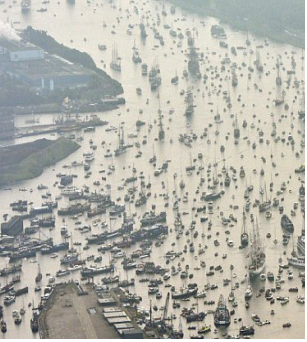
In contemporary Amsterdam, the canals and the river IJ are strongly connected to its cultural activities. Unlike most Dutch cities, the canals are in many cases an area of festivals. During these festivals, many people tend to come together and celebrate certain moments such as Kingsday, Gay Pride, Grachtenfestival and the famous Sail event. In these cases, the canals are filled with boats for recreational purposes but also part of the festival itself.

During the 'Grachtenfestival' stages are built on the canals where artists perform. The ones in the boats have the privilege to sit first row.

Moreover, the canals are the history on which Amsterdam has built upon. What used to be waters for sewage and transportation purposes are now waters that facilitate iconic sceneries for travellers and Amsterdammers. Notorious are the tourist vessels which float through Amsterdam in large amounts.

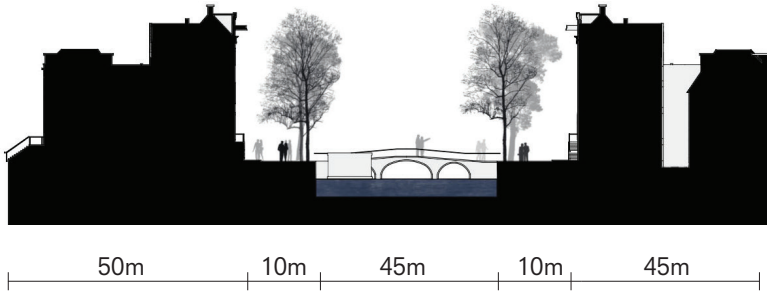
The canals facilitate a public space on which one cannot walk but only float. There are strict regulations if one would like to make use of the canals by boat. This also requires tax payment and docking fees. It is a rather odd form of space within a city but also gives its an exclusive quality as well. <sup>11</sup>



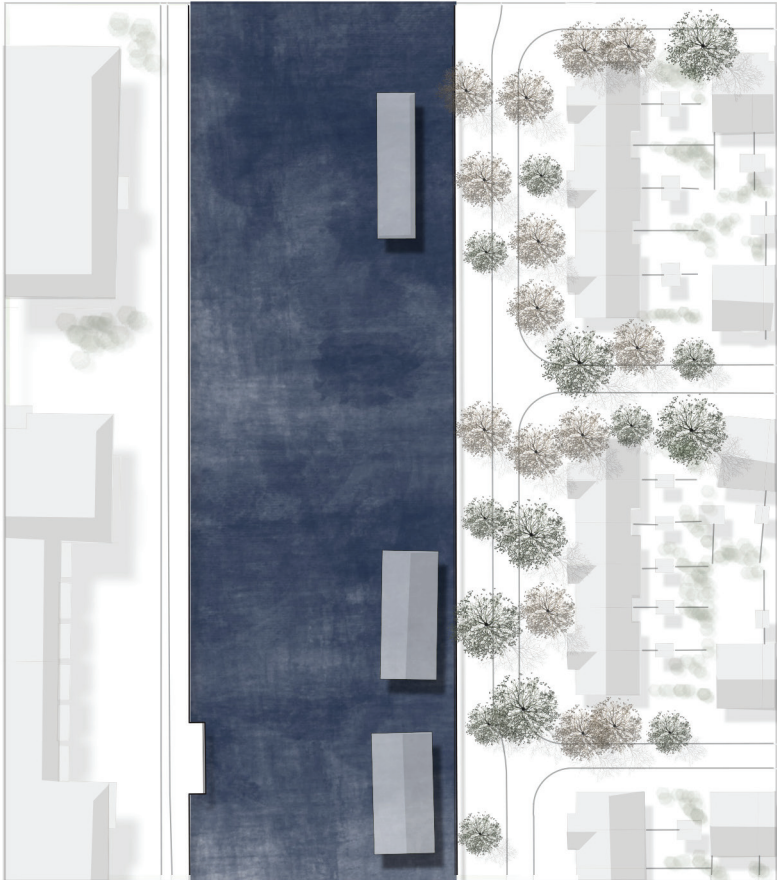
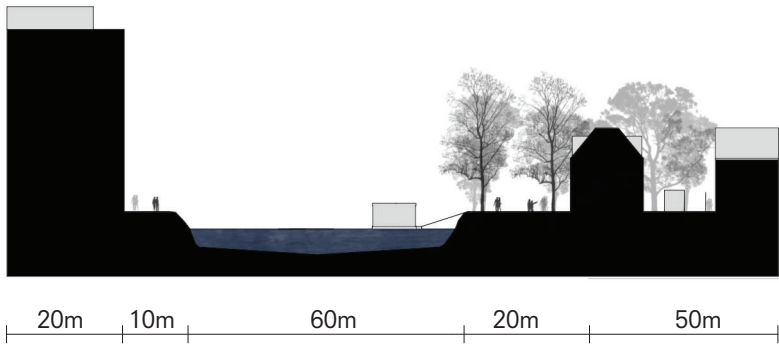


# DIMENSIONS ON WATER

## AMSTERDAM CENTRE CANAL SECTION

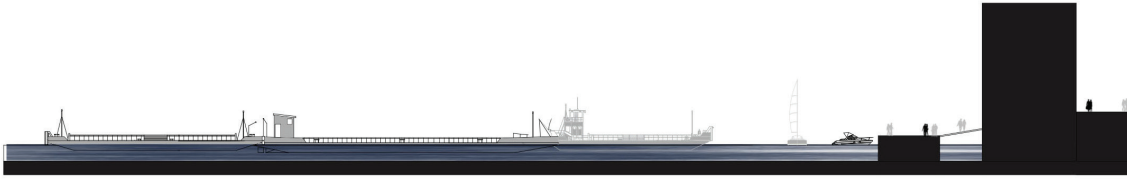


# NORTH CANAL SECTION

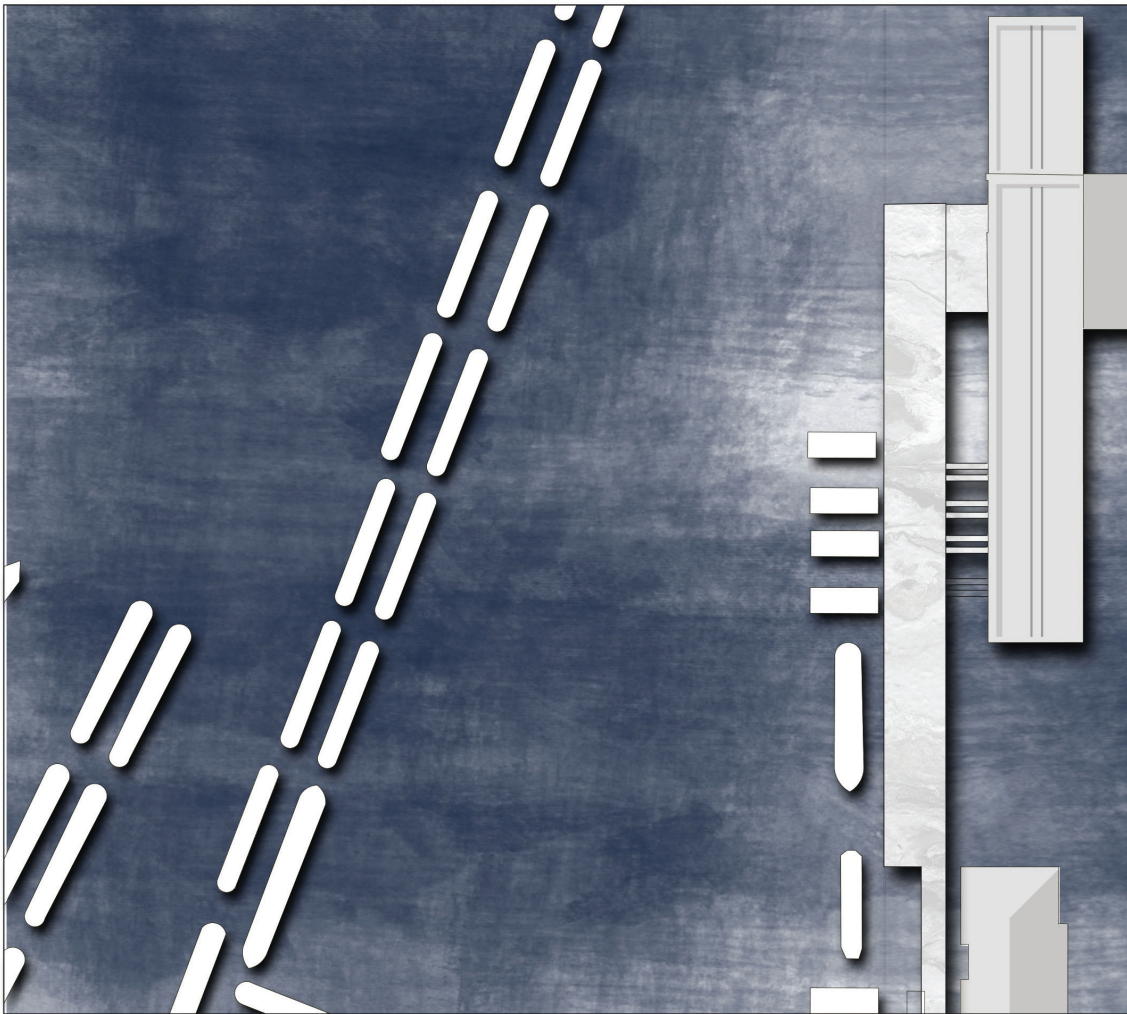


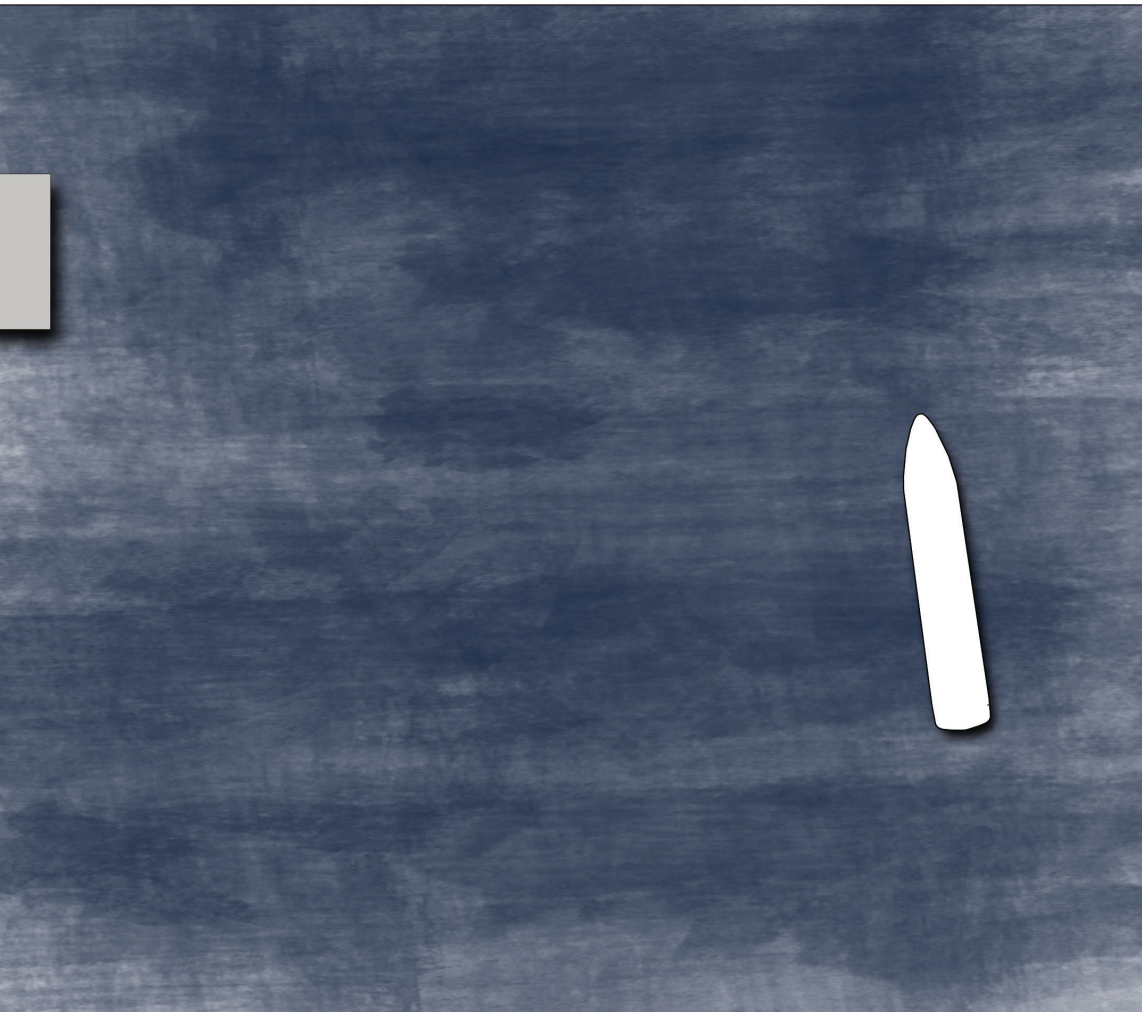
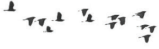
# DIMENSIONS ON WATER

## HOUTHAVENS SECTION



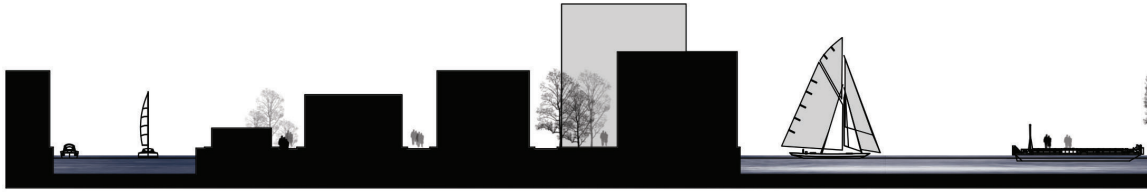
20m 10m 50m





# DIMENSIONS ON WATER

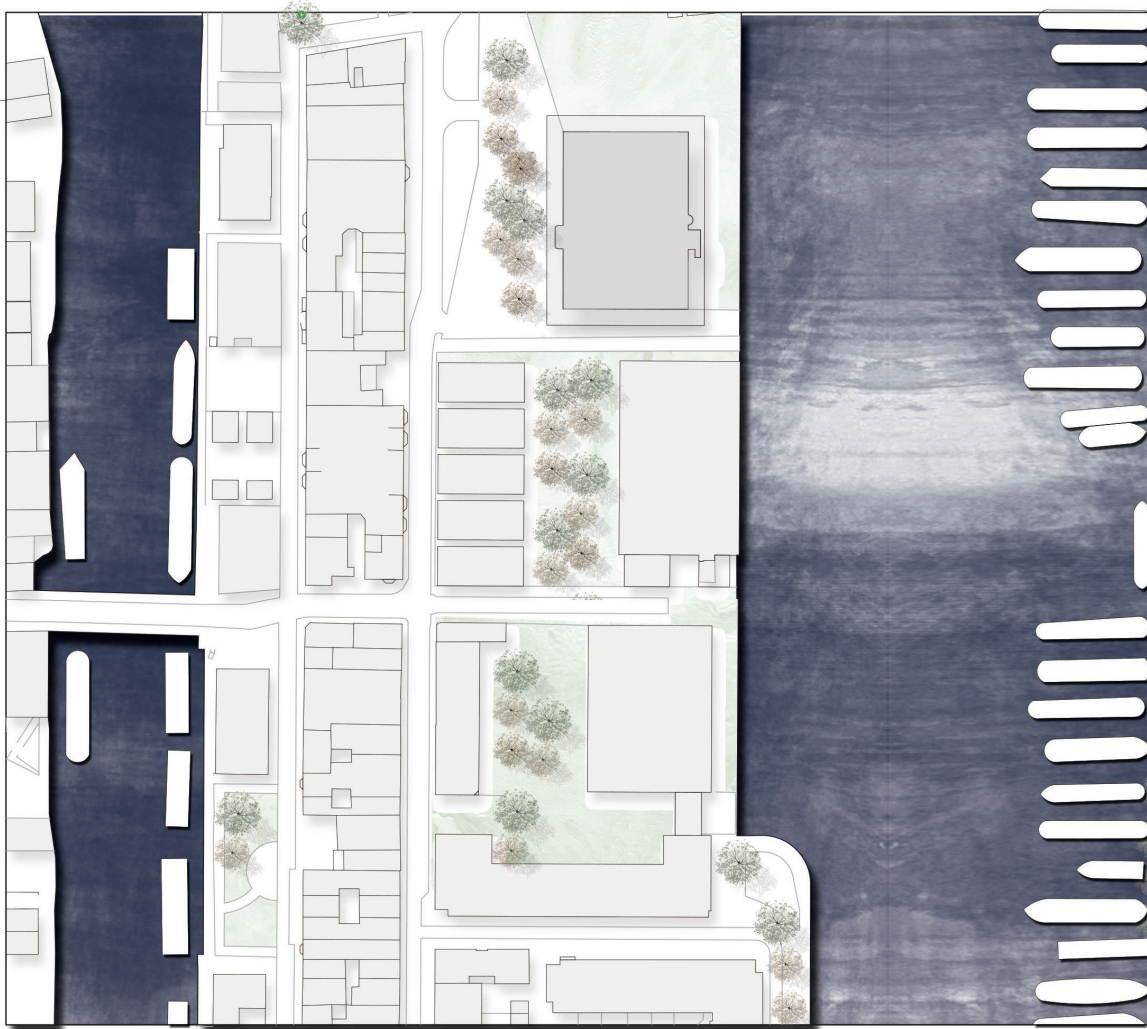
## WESTELIJKE EILANDEN SECTION

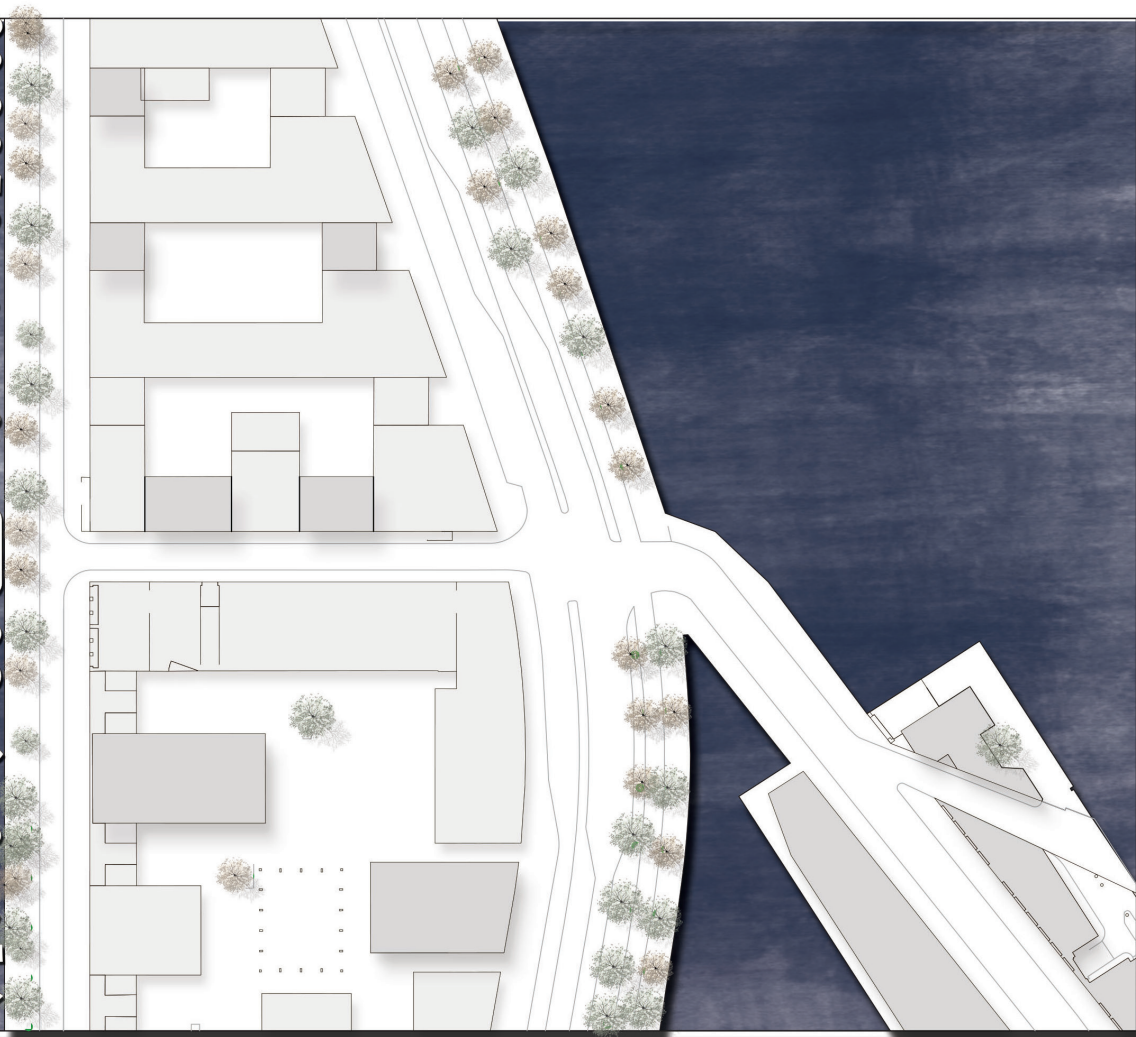
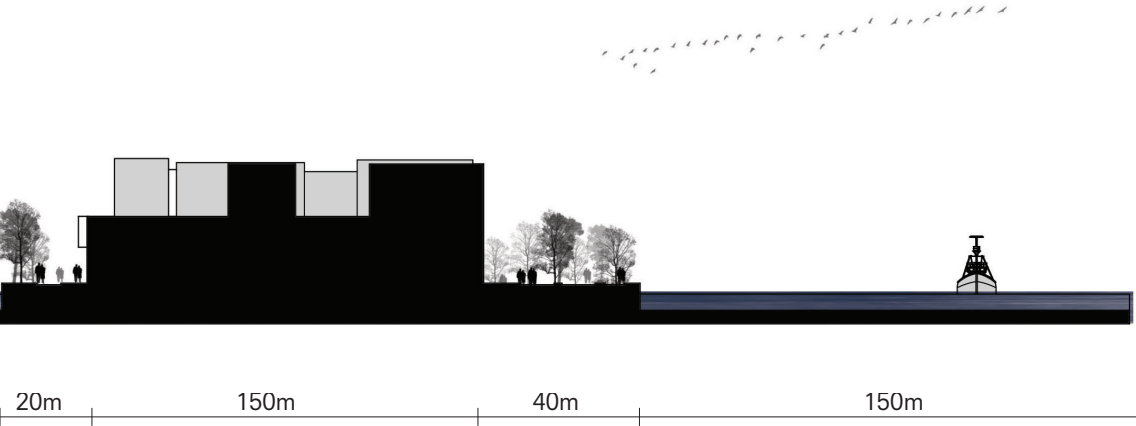


20m

250m

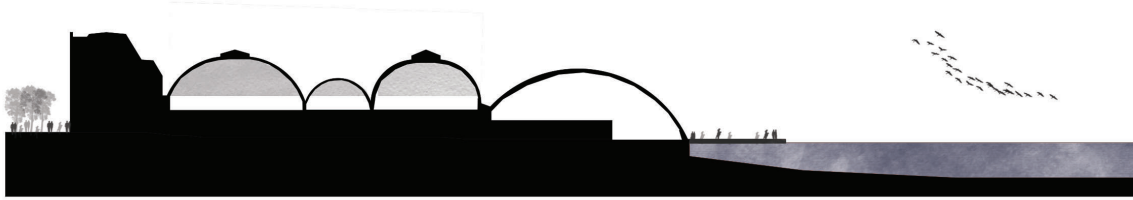
150m





# DIMENSIONS ON WATER

## IJ RIVER SECTION



200m





350m

150m



# **WATER, AN ESSENTIAL ASSET?**

Canals are a unique heritage that Amsterdam gained from its historical relation with water. The municipality believes the water will become a more important asset for the city and wants to elaborate on this element. By connecting the city more to the water through housing and activities, as well as possibly in the future by bridging the North and South. The water on the borders is causing urban parts with different identities. The biggest border being the river IJ. It adds value to the site for its views and is economically important but also a segregator between north and south. Culturally the canals and water are of great importance. Many festivals are being held on these areas of Amsterdam celebrating its identity. Knowing its cultural and historical value, what would be left of Amsterdam without canals?

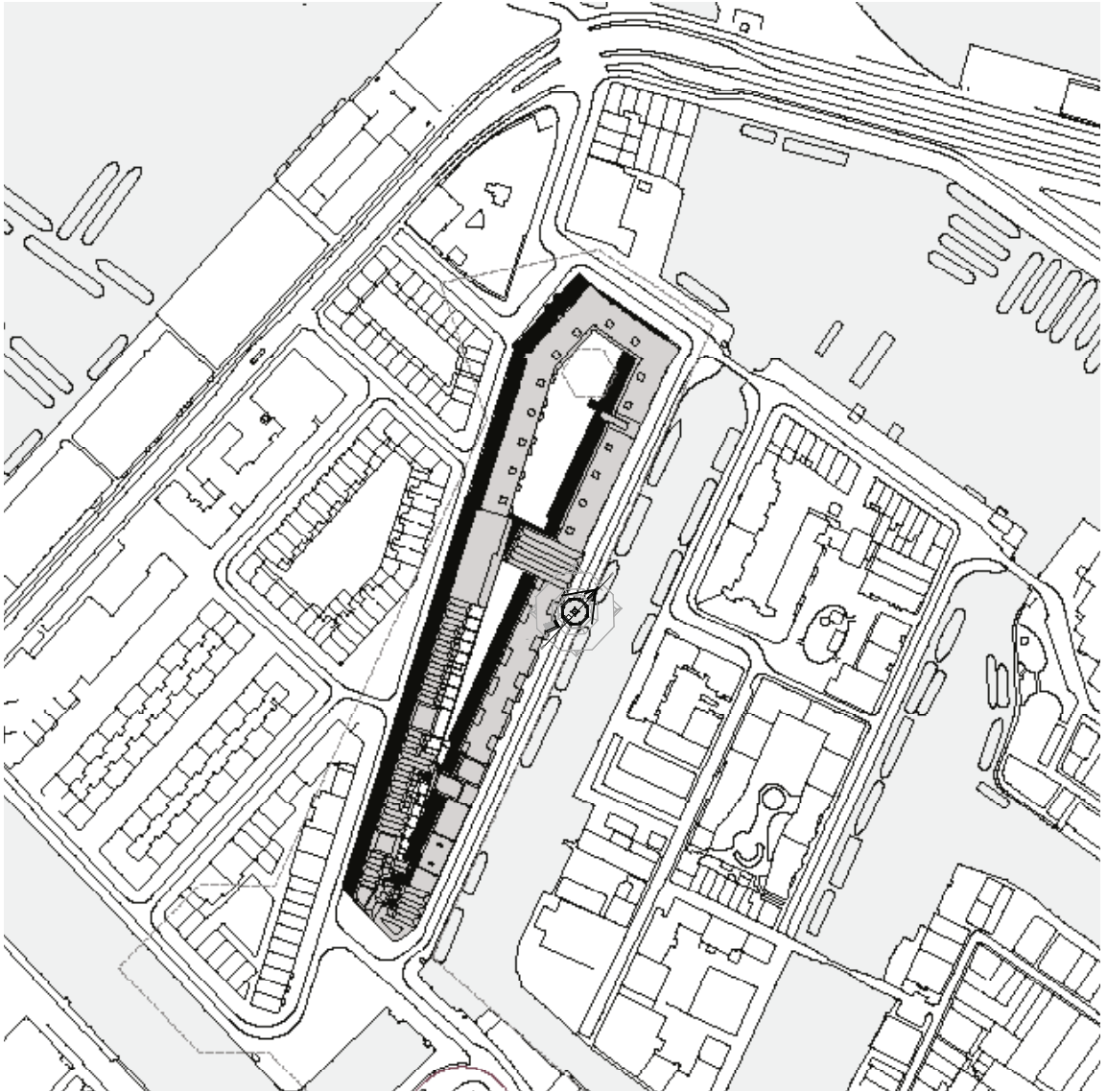




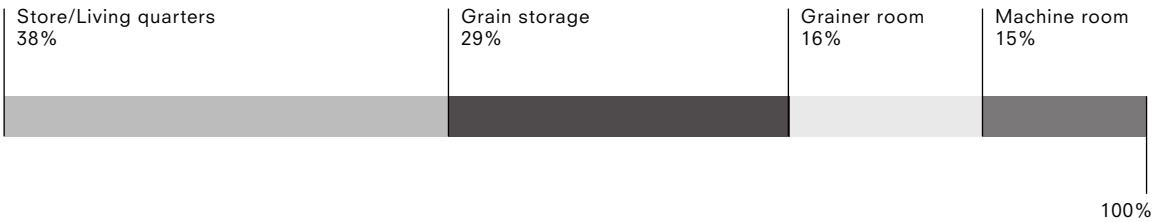
# DE BLOEM

## THE WINDMILL

Strongly associated with the Netherlands are windmills. A historical productive based typology that enabled many civilizations including the dutch to use wind energy to drive useful machines. These include graining seeds, sawing wood, pumping water to reclaim land etc. The windmill transformed the Dutch landscape by their appearance and the results they generate. Most of the land that is under sea level is created by use of windmills. Moreover, food production has relied strongly on windmills as well since they where largely responsible for graining seeds in order to create bread. Within this typology research the grain windmill which was formerly existent on the S scale is mapped. As reference windmill 'De Bloem' is used which exists on the M scale.



Urban context



**GFA: 495m<sup>2</sup>**

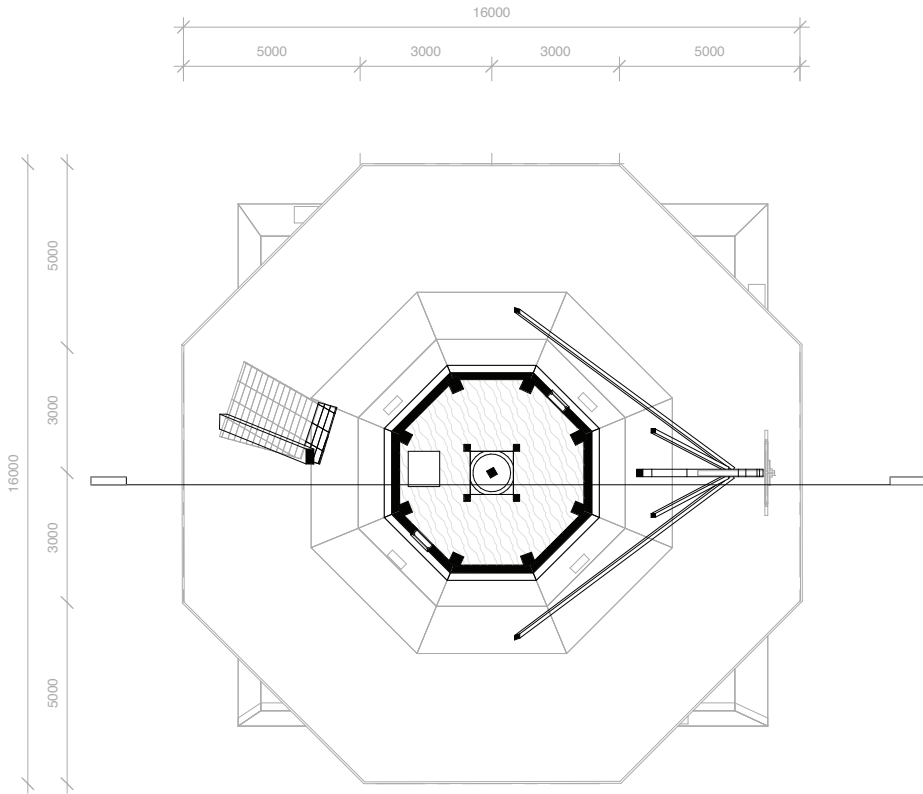
**GIA: 1875m<sup>2</sup>**

**FAR: 1,36**

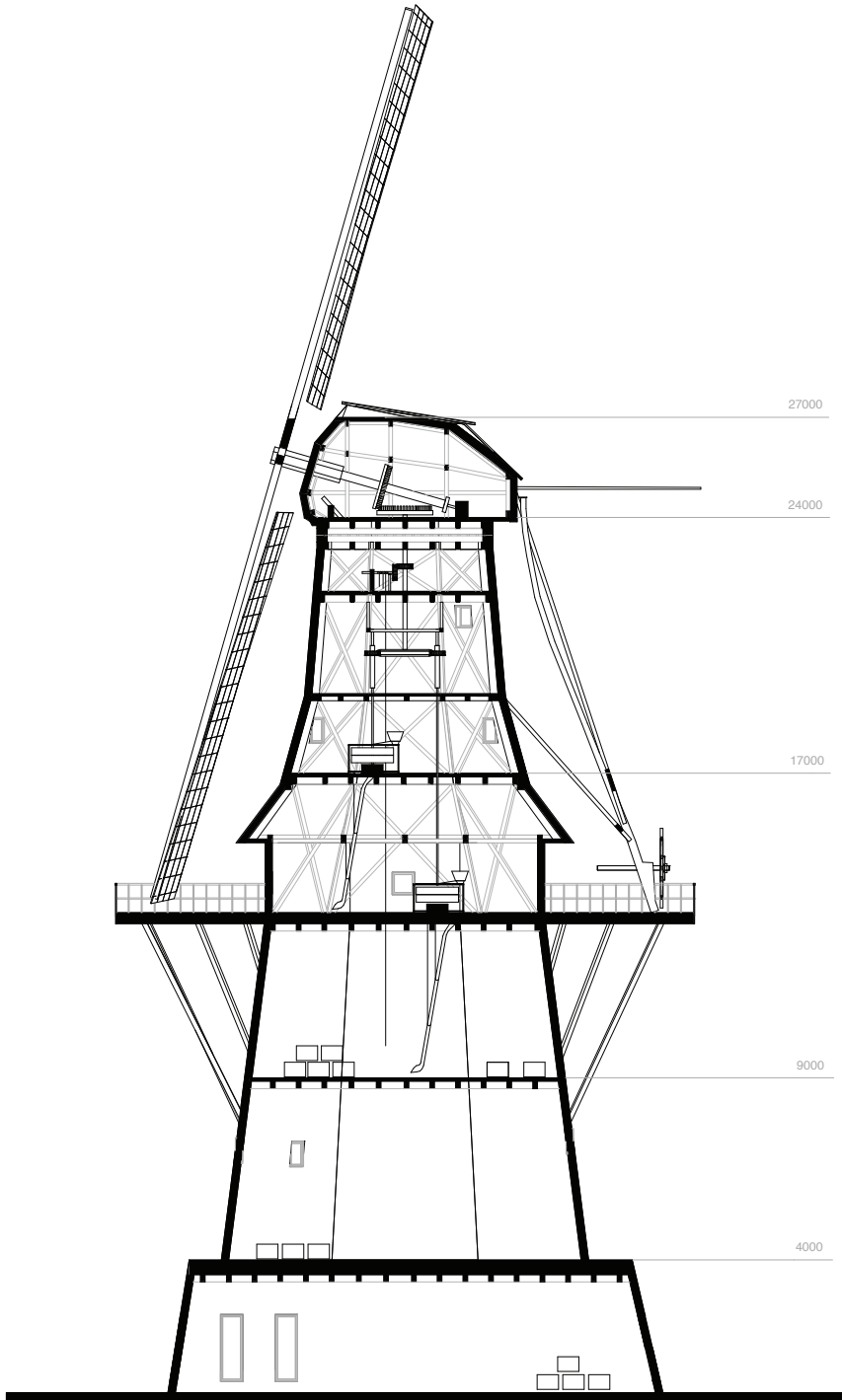
Spatial data



Facade

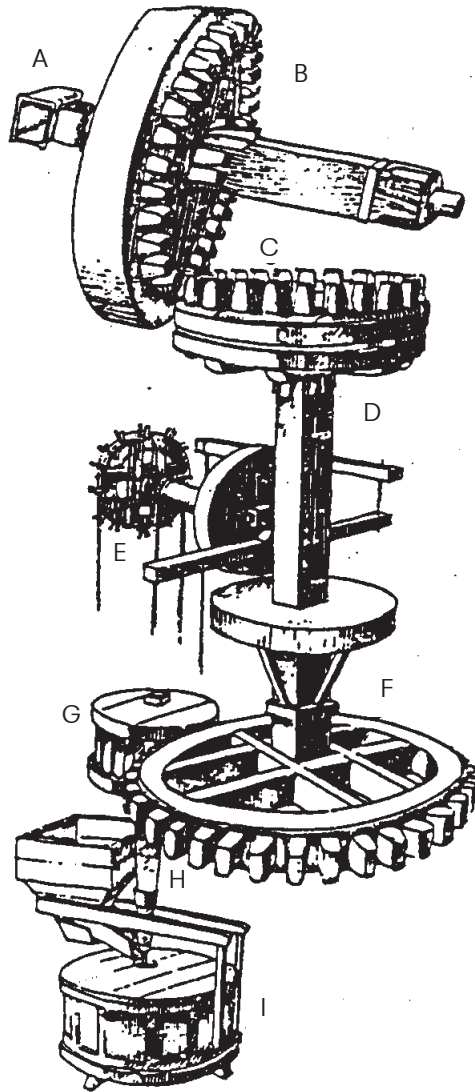


Floorplan



Section



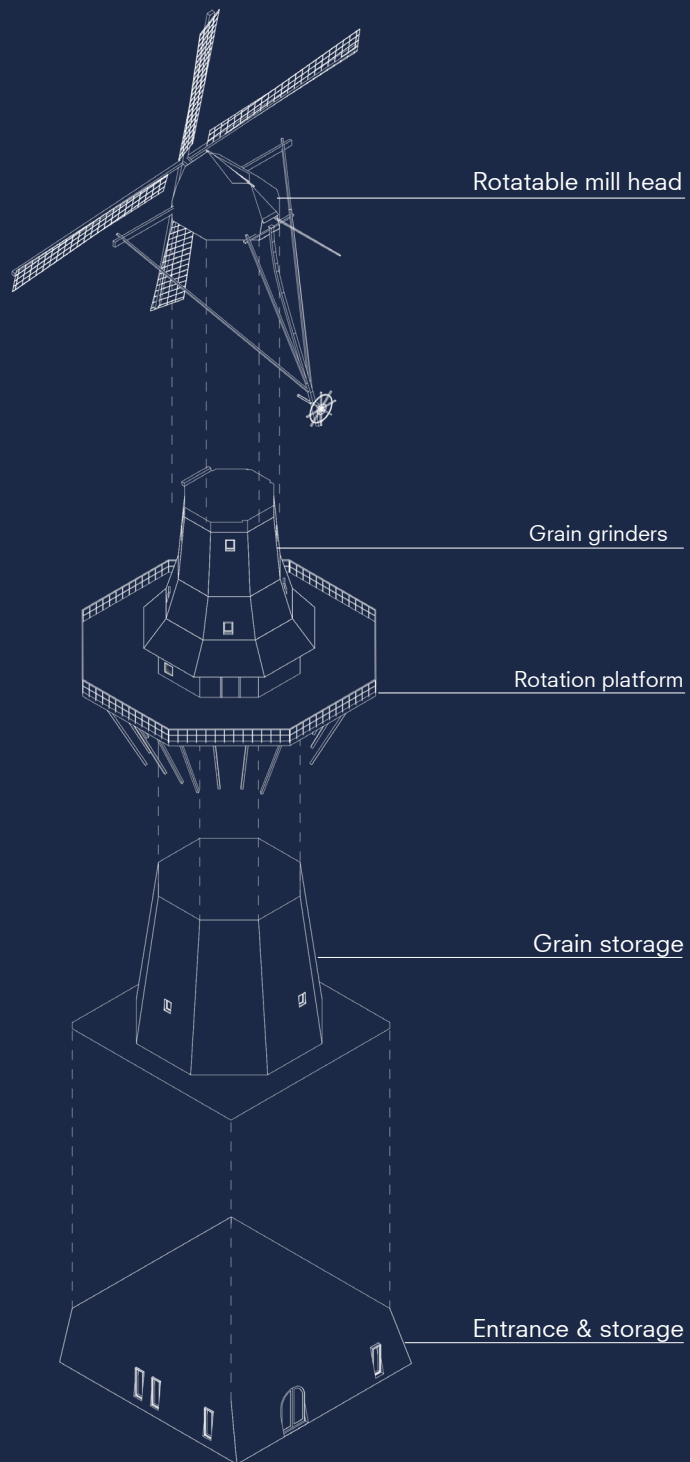


- A Mill Axis
- B Top wheel
- C Top Axis
- D Drive wheel
- E Grain bag crain
- F Main drive wheel
- G Small drive wheel
- H Grain collector
- I Grain grinder

Detail

CC-BY-SA  
© 2008





# R E S E A R C H

## N.O.Q. PAPER ON SMART CITIES

. 2

### BALANCE IN THE AGE OF INFORMATION

A exploration of social values in the concept of the 'Smart City'

Cities of today are facing many challenges in which one is the rise of digital technologies and its information. Never in the history of cities where digital technologies so tangled and was digital data so abundant. The challenge of digital technologies also appears widely within urban planning. The 'Smart City' is a buzzing and trending topic within the discourse of urbanism and often claimed to be an integrated solution for the ongoing problems as mobility, health and energy that urbanized areas are facing today. This should be a solution to efficiency and effectivity, and thus the sustainability in urbanism comes in the concept of 'Smart Cities'. However, therms as efficient and networks and flows where not always guiding therms in the profession. Having in mind that we live in a young era where information has never been so abundant and that the profession of urbanism/city planning was not always driven by information, networks and efficiency, we should keep in mind that urban planning, just like architecture consists partly out of an instinctive and in some sense 'unquantifiable' factor. With digitalization taking part in our lives every day, a certain separation between the net and the self occurs. Occupants are now at two places at the same time, hovering from the digital to the physical, thus eroding the sense of place and space. Digitalization within our urban environment will thus have impactful consequences on the way we experience it. In order to maintain our social and cultural values, solutions for new systems in the city should not only rely on technological improvement, but together with social and cultural values, form a holistic scenario for our future development.

## INTRODUCTION

Cities of today are facing many challenges in which one is the rise of digital technologies and its information. Never in the history of cities where digital technologies so tangled and was digital data so abundant. The individual self can notice this as well through our daily routines. It is not uncommon to experience a certain information overload with all the screens of information, boards and guidelines that fill our public spaces. Impulses from smartphones and screens are also filling up the brain capacity and have altered the lens through which we experience the world and city. One has now the capability to be at multiple times in one moment, meaning the digital and the physical. Or know a city without every having visited it, by using gps driven apps.

The challenge of digital technologies also appears widely within urban planning. The 'Smart City' is a buzzing and trending topic within the discourse of urbanism and often claimed to be an integrated solution for the ongoing problems as mobility, health and energy that urbanized areas are facing today. Forefront examples are Singapore, Songdu, Korea and Vienna, Austria. As a result, the harvested data should form a source of specific quantifiable information which would stimulate meaningful and effective development.<sup>[1]</sup> The lens through which the city is seen is driven by information, networks and statistics, thus potentially underexposing the importance of identity & meaning. Specifically the experience of identity & meaning.

This paper is written from the awareness that we see and understand the world more and more through information and data, but sometimes forgetting that the networks we interact in have all formed out of social constellations. This research paper explores the Smart City concept and its relation to the social and subjective of design and human experience. It attempts to expose frictions between the ambitions to digitalize our urban environment for the sake of sustainability and efficiency, and the social individuals with our awareness and senses we contain in our selves.

## THE SMART CITY

From time to time environments face a period of change. In the early years of the 19th century industrialization changed the cities in Europe and the United States drastically. City walls became unnecessary and were torn down to make way for new amenities and governmental buildings in the city. The 'Ring Strasse' in Vienna for example changed drastically since its walls were torn down and classical buildings combined with parks made their way to the city. In parallel to this process, the world got also introduced to the train. This event brought the rail track and train station to our environments causing huge infrastructural impact on the cities urban formation. In order to prevent the spread of diseases, sanitary systems were installed in the city. A more recent but very impactful development occurred in the 20th century when the car made its way to the public. The city was again drastically reconfigured to make way for highways and road structures.<sup>[2]</sup> These events illustrate how new technologies can have impactful consequences to our urban environments. When looking more specific into these events, they all contain a certain field of friction in which the city can adapt to this new technology, or preserve what it already has.

In the late stages of this era driven by fossil fuels, societies have gained a greater awareness of its negative environmental effects, yet still today these are the biggest driver of our economy. Thus today's discourse on cities involves the notion of sustainability including themes as eco-efficiency, renewable energy systems and recycling of material. Challenges on changing or energy consumption and generation are often topic of debate. We discuss how we can deal with these 'processes' and 'flows' to achieve better efficiency and effectivity. Visionary strategies are developed as can be seen in AMO's 'Roadmap to 2050's energy strategy for Europe. Illustrating a ring of Wind turbine farm energy in the North Sea in order to liberate us from oil driven energy of the middle east.<sup>[3]</sup> Ideas and discussions often include efficiency, reducing energy consumption and improving 'flows' and are focussing on a large scale. The architecture scale here is irrelevant, rather it involves an urban or national scale. This depends on the flows & networks it regards.

A buzzing solution to efficiency and effectivity, and thus the sustainability in urbanism comes in the concept of 'Smart Cities'. With digital technologies popping up all everywhere, a city where 'Big Data' derived from sensors in the city will bring efficient transport, a smarter grid and

driverless cars is being envisioned. Professor A. Van Timmeren emphasizes the impact and growth of ICT's in the world in his presentation on, in his words, 'Illuminated Cities'.

*'Society is entering the most disrupting inflection point in its history as we face many challenges regarding the issues of hyper-urbanization and those regarding our environment, while at the same time our world has become defined by the ubiquity and automation of ICTs.'*<sup>[4]</sup>

The concept of Smart Cities envision a future of innovative urban planning driven by smart technologies in order to make our cities safer, cleaner and above all, more efficient. Thus reducing the need for various kinds of limited resources we have on our planet. To realize these goals the utilization of ICT technologies is required. This comes in the form of sensors, camera's and algorithm based computer simulations that give insight in all that's existing in the city.

By use of algorithm analysis the smart city will 'sense' behavior and development. It will utilize this feedback to manage urban dynamics and fine-tune services. City planning will become an information driven continuous experiment, serving as 'living labs' for new products, strategies and services.<sup>[5]</sup>

Notable proponents of the utilization of digital data sources are MIT SenseLab professors C.Ratti and D.Offenhuber. In the book 'Decoding the City' they state that perhaps one of the most significant developments of the last period for urban planning would be the availability of digital data sources. This availability would help rebuild urbanism as a profession. Hereby reacting on R.Koolhaas statement in 1995 claiming that urbanization is everywhere but as a profession has disappeared. The emerge of 'network science' abstracts cities into spatial social networks of interaction, thus provide urban planning significant new understandings of the city. These would uncover structural commonalities and allow researches to describe and predict how cities evolve and will grow overtime. When systems as GPS are connected to all devices it would allow network science to work as it would provide a real time representation of the urban conditions. This also works vice-versa. Through the network of social media, citizens would gain a role in the development of the city and could have a monitoring or managing role. Social media would enable the citizen to have input in the process of urban planning. In a sense this could lead to a democratization of urbanism as a profession.<sup>[6]</sup>

The ambitions that the Smart City concept wants to realize would be greatly beneficial for society today and could embody the way to a new form of renewable systems and sustainable production and consumption of resources. Having in mind that we live in a young era where information has never been so abundant and that the profession of urbanism/city planning was not always driven by information, we should keep in mind that urban planning, just like architecture consists partly out of an instinctive and in some sense 'unquantifiable' factor. Terms as efficient and networks and flows where not always guiding terms in the profession.

## SOCIAL CONTEXTS

During the academic studies in architecture there often raises friction between the rationale and instinctive of a certain design, proposal or direction one could be going during his project. Looking at urbanism as a similar profession but then on a larger scale, both seem to lack a unified framework of rules like fields of physics, chemistry and aerospace do.

It is argued that this has to do with an implicit playing part in the profession. The role of the instinct, often coming up in terms as feeling, emotion, sense or impression. The human factor some might say. This could be summarized to the in a sense, 'irrational part'. Thus everywhere in the profession designers develop their perspectives on issues that matter. This is embodied in the form of theories or manifests. Yet the two professions cant be seen as the same. 'Where architectural design tends to give us direct answers, urban design offers us a broader view and envisioning of the world as T. Farrell states in 'The City as a Tangled Bank'.<sup>[7]</sup>

*'Planners and architects need to follow the biologists - look, learn and understand and indeed admire the nature of the forces that drive the change, and then with humility and respect work with them to nudge, encourage, anticipate and prepare for where they take us.'*<sup>[8]</sup>

T. Farrell rather advocates that urban planning should not see itself as a profession between engineering and art which the field of architecture often does. It should instead look at nature and understand the complex dynamics of the urban environment through the lens of a biologist. When discussing ICT's in the city, Farrell notes that these technologies up until today give unique new perspectives on the city which urbanists didn't

had before. They are becoming more and more part of the toolset of urbanists. Yet now people, and especially young people, now have the power to be at multiple places at the same time. Either in the digital or the physical, shifting from one to another. He foresees that sense and awareness of the physical presence could be eroding.<sup>[9]</sup>

Cities are the most capable of innovation and change. They form the frontline of sustainable development, but they are social organisms as well. They cant be 'popped out of the hood' to be fixed. Hajer reflects on the concept of Smart Cities as well and states that the Smart City concept is a-historic, ignoring the primary building blocks of the city. Also the concept shows little respect to social contexts in the city.<sup>[10]</sup>

Notable within the profession of sociology and the impact of digital systems on human life are the works of M. Castells. In his trilogy 'The Information Age' he reflects on production, power, and experience and stresses that the ways that people create meaning in their lives through collective action, are irreducible sources of social dynamics must be understood as both discrete and interrelated entities. He foresees a bi-polar existence of humans in the future where one would alternate between the net and the self. Herein the net a person would interact with network organizations, replacing the hierarchical institutions of the last century, and the self where the person would be himself as a social identity and meaning in a cultural landscape. He furthermore states that this network based society changed human experience. It made us enter a time where the suppression of places by networks of information flows is occurring.<sup>[11]</sup>

## BALANCE

Most likely the strive for sustainability by becoming efficient and effective and the ICT network based system of measuring strengthens this lack of the social/subjective in the future of Smart Cities. The large emphasis on the rationale approach based on numbers, facts and abstraction is a trend we have also seen in the last century within Architecture.

During the 18th century, western worldview that supported objective over subjective and idealizes rationality began to have impact on architecture during the 18th century. Works of Durand were forefront examples and helped start the drawings of the modern period into more abstraction of space and became more removed from the experience of occupants. [12]

An example given for this is well illustrated in the painting 'Implosion' by Nancy Wolf. [i-1]

[i-1]



Frank and Lepori claim that this abstraction and way of thinking leads to a separation of experience and the architecture itself. It results into somber anonymous building. The architecture would become a thing on its own. [13] They advocate that in order to restore the importance to lived bodies, materiality and experience, we must strive to a certain interdependence between subjective/objective, reason/emotion and mental/physical. Steven Holl is an example of this belief. By perspective drawings combined with abstract conceptual illustrations, Holl bridges the ideas with the experience of being in the space.

Holl manifests this balance or interdependence in his concept 'intertwining'. In the similar named book he dresses the importance finding essences within architecture and to put those back into existence. These essences should be merged with each other in order to achieve a more holistic environment. Subjects as order, time, geometry, material etc. should individually be building blocks to form a unified design. He notes that within architecture, experimentation remains a constant, thus it should be open to new ideas and aspirations. [14] With this he claims that there is no one solution within architecture. The thought of a final solution should in a way be avoided, rather a certain balance between should be strived for. By doing so he states that:

*'Architecture could gain from the tremendous potential of information technologies as tools to assist in its concern for biological, social and ecological issues... subjective and objective must intertwine'* [15]

Also Hajer points out that if the field of urbanism wants to get the future development of cities right, it should act now and correct the technological orientation of Smart Cities. It should expose the pitfalls of a technocratic approach. He advises that a reconnection to the social domain is needed and therefore a greater awareness of how the cities dynamic is working would be the first task. The urban metabolism what we aim to understand, is actually hidden and requires a broader approach to understand fully. [16]

## LESSONS LEARNED

In the coming decades cities are facing many great challenges. From hyper urbanization to global issues regarding the environment and the emerge of ubiquit digital technologies. In the last period, this last one provided us of abundant information on our environment, behavior and technologies. Within the concept of the Smart City, the aim is to utilize this information to develop solutions for these challenges. The application of digital devices is needed to realize a holistic digital system that monitors, simulates and provides us with options for betterment of the urban environment. Efficiency and effectivity are often directive therms and raise friction against the social and subjective part regarding our environments we live in. How do we value the experience of an environment or the meaning of places? Urban planning does indeed value experience and the facilitation for social networks as well as architecture. Within the field of architecture, various critics oppose to the full use of efficient, rational and objective thinking. It would lead to a disconnect between design and occupant. There rather should be strived for a balance, or combination of different values, objective/subjective, rational/emotional to achieve a holistic design.

By doing so, one should keep in mind that there is no final solution, professions as urbanism and architecture are a continuous experiment and should be open for new ideas and approaches at all time. This applies for the concept of the Smart City as well. While the discourse on Smart Cities do not directly advocate rational/objective thinking as in the times of the modernist movement, one should keep in mind that balance should be strived for. Different values combined result in a holistic design, thus technological solutions should be combined in one way or the other with social values and these apply differently on a local, regional and international scale.

## Footnotes:

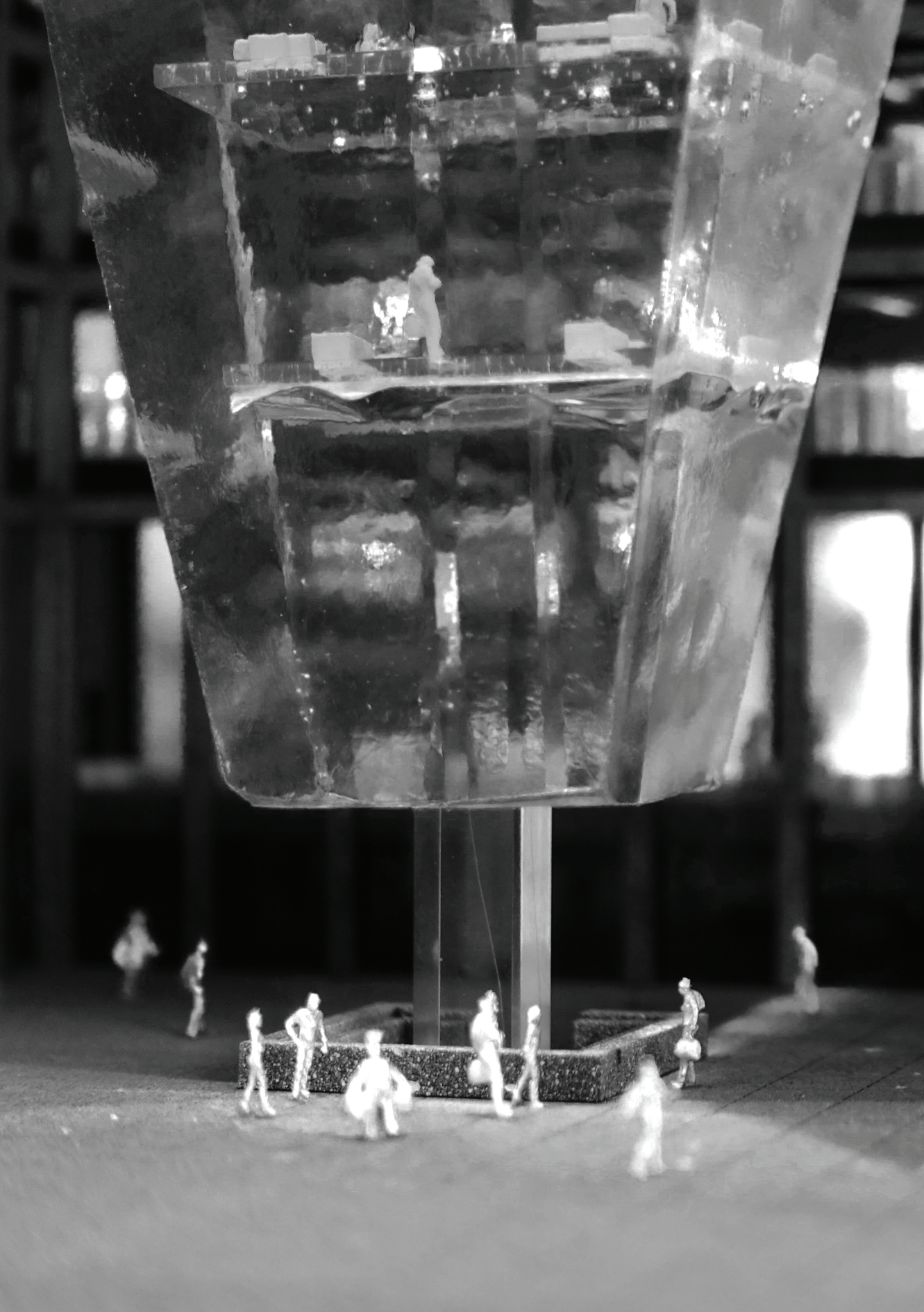
- <sup>11</sup> Castells, M. (2010) p.500-510  
<sup>7, 8, 9</sup> Farrel, T. (2014) p.14,171-180  
<sup>12, 13</sup> Franck K.A., & Lepori, K.B. (2007) p.154-170  
<sup>1, 2, 5, 10, 16</sup> Hajer, M., & Dassen, T. (2014)  
<sup>14, 15</sup> Holl S. (1996) p.9-16  
<sup>6</sup> Offenhuber, D. & Ratti, C. (2014) p.6-16  
<sup>3</sup> OMA/AMO, Roadmap 2050 (2010)  
<sup>4</sup> Van Timmeren A. (2015) p.1-5

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## Images:

- <sup>11</sup> Franck K.A., & Lepori, K.B. (2007) p.154





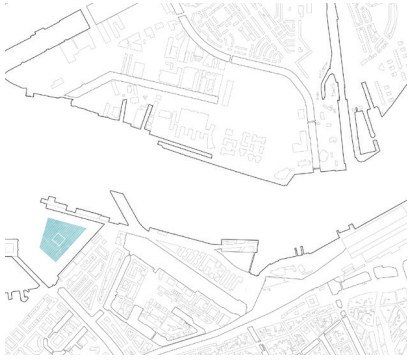
CLOUD  
2050 PUBLIC DATACENTER





Data is expected to be the oil of the future. The amount of information we collectively produce is bigger than ever. Every minute we produce around 5 million Facebook updates, 3 million Youtube views and 2 million Google searches and internet usage is growing every day. Since the introduction of the internet around the 25 years ago it gradually changed all our facilities around us. Internet banking, governmental administration, public transportation usage and supermarket shopping are just a few of the activities we do that leave information about our behavior, preferences and way of doings. It is expected that enterprises will monetize this data that currently is stored on all kind of drivers world wide.

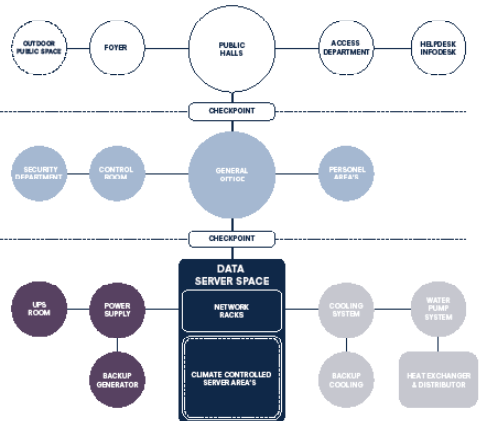
Therefore, a new system is proposed. A national system where significant personal data is managed and stored securely, outside the current open wired internet. Activities like bank information, digi-d and public transportation info etc. created by yourself would be stored in so called 'national datacenter'. This will set a new and more physical relationship with the cloud and its users. Looking at the growing need and importance of datacenter, this project questions: how could we merge and express typologies of data in our future cities, with the ambition to develop a clear relationship between the secure storage of data [cloud] and its users.



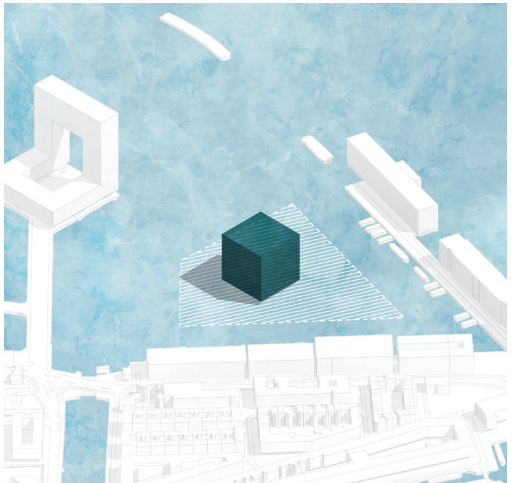
# CLOUD

MARULI HEIJMAN

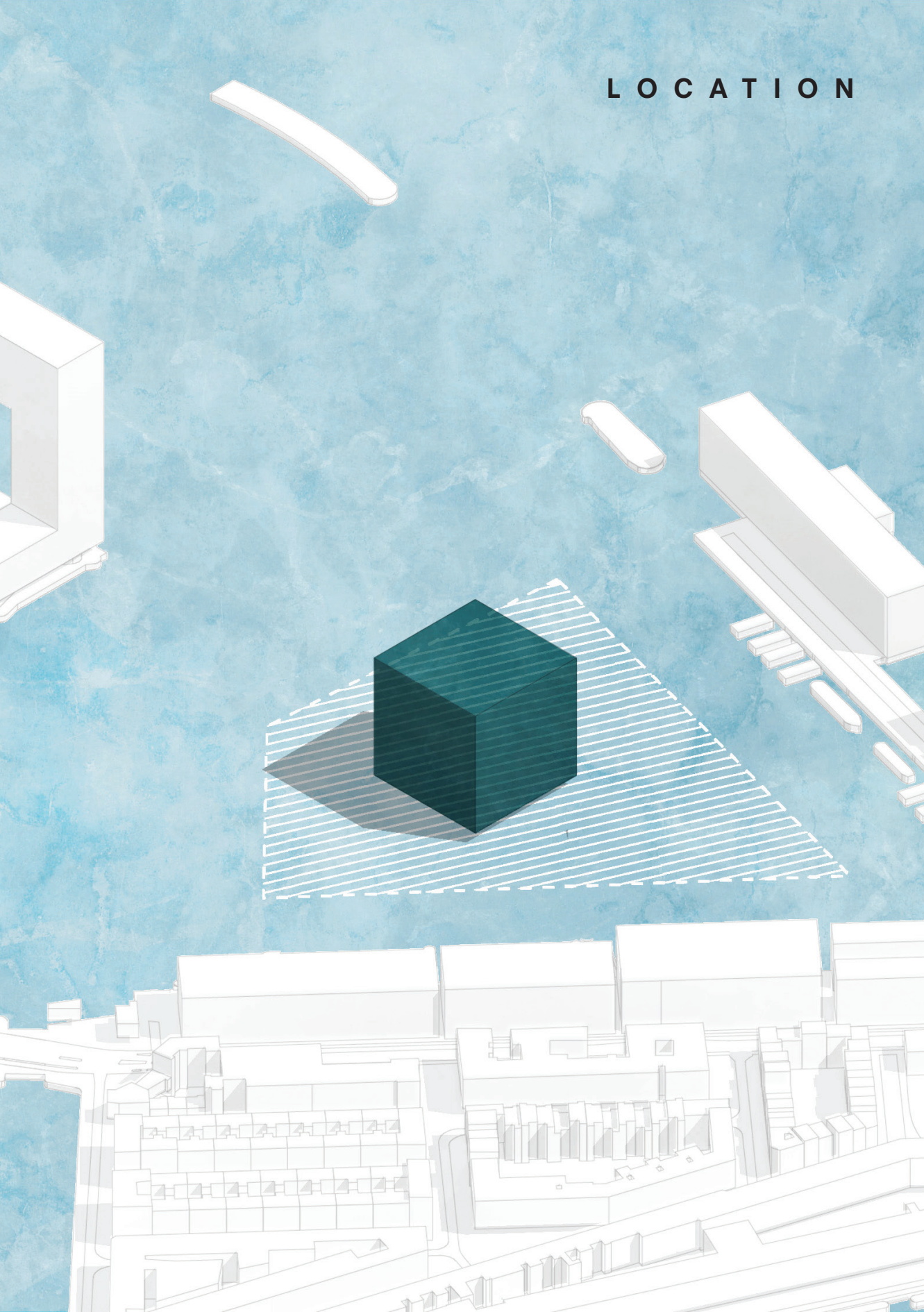
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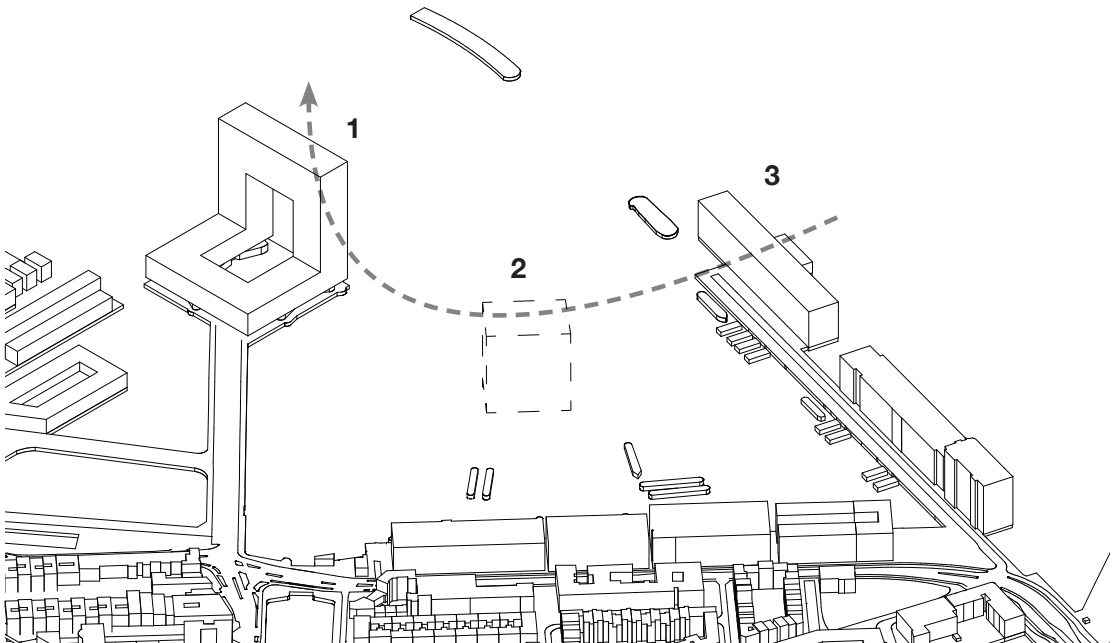
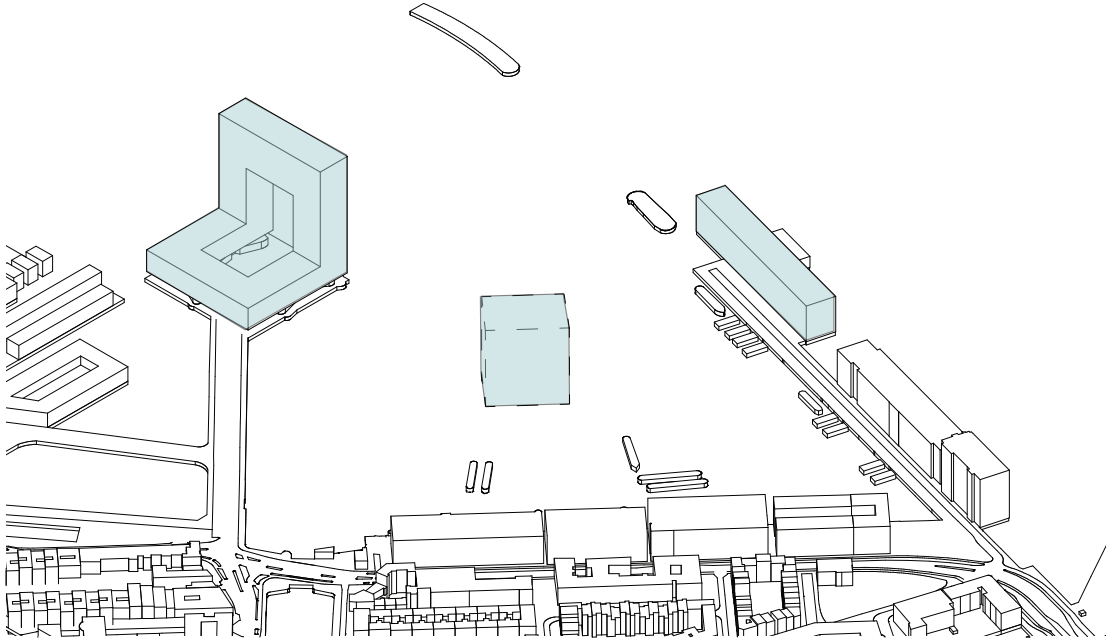


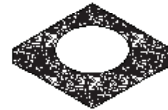
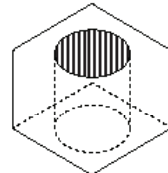
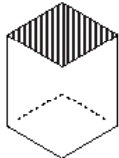
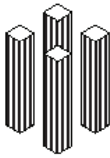
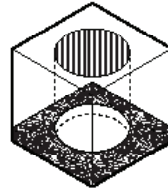
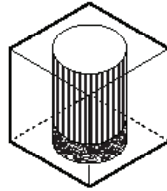
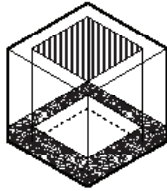
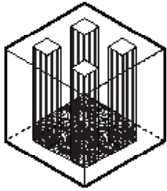
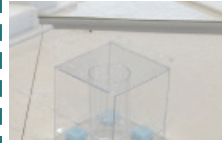
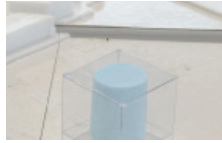
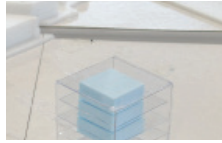
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ACCESS POINT	1200m²
HELPODESK / INFO	1200m²
CONTROL ROOM	2000m²
GENERAL OFFICE	1500m²
SECURITY PERSONNEL AREA	700m²
COOLING & HEATING DISTRIBUTION	700m²
POWER SUPPLY	3750m²
SERVER AREAS	2000m²
NETWORK RACKS	7000m²
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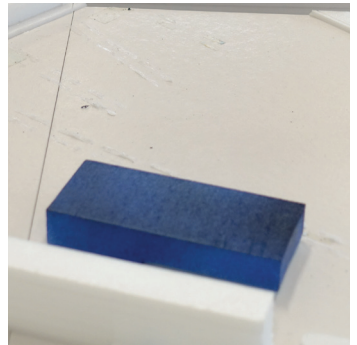
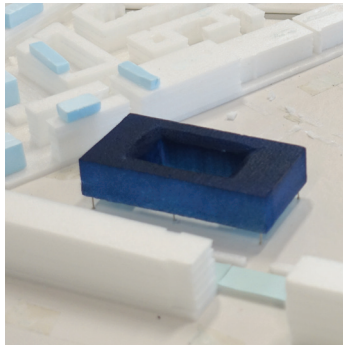
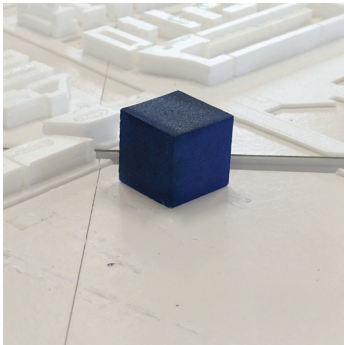
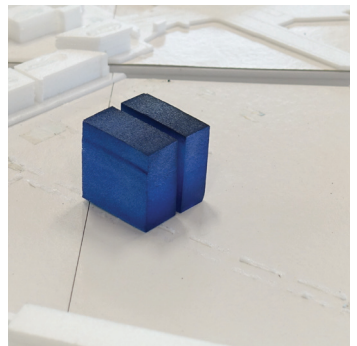
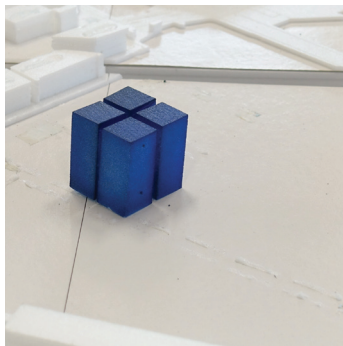
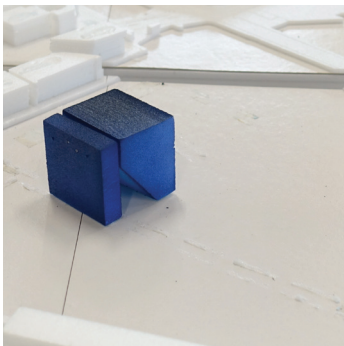
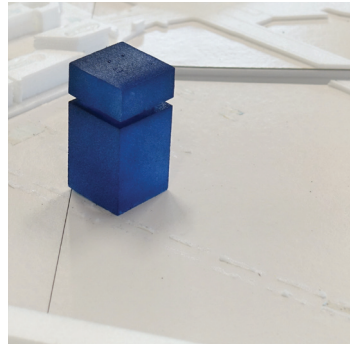
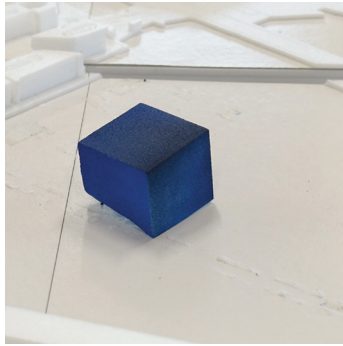
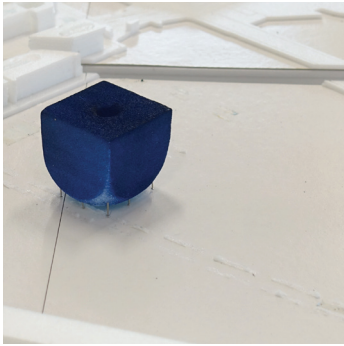
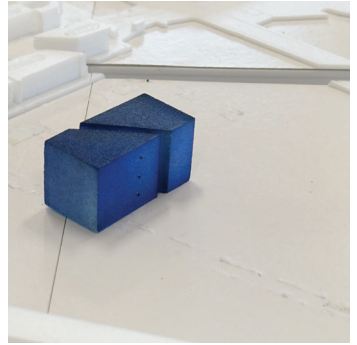
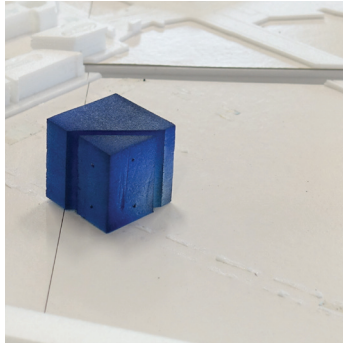
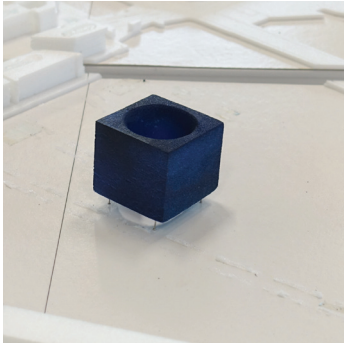


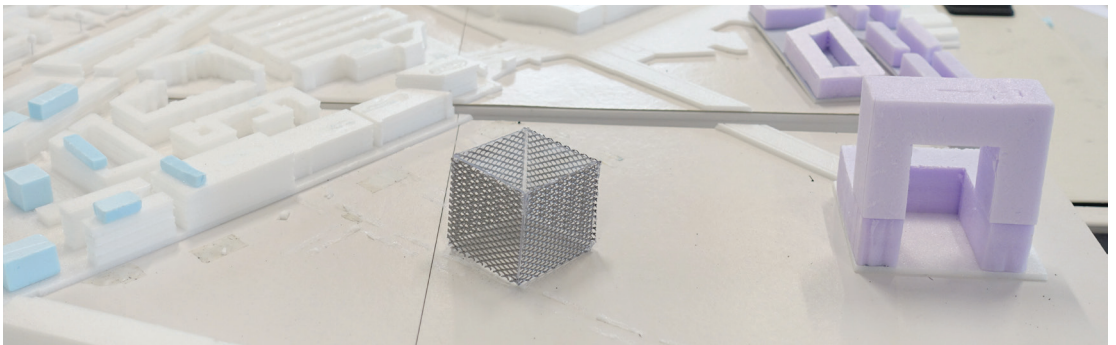
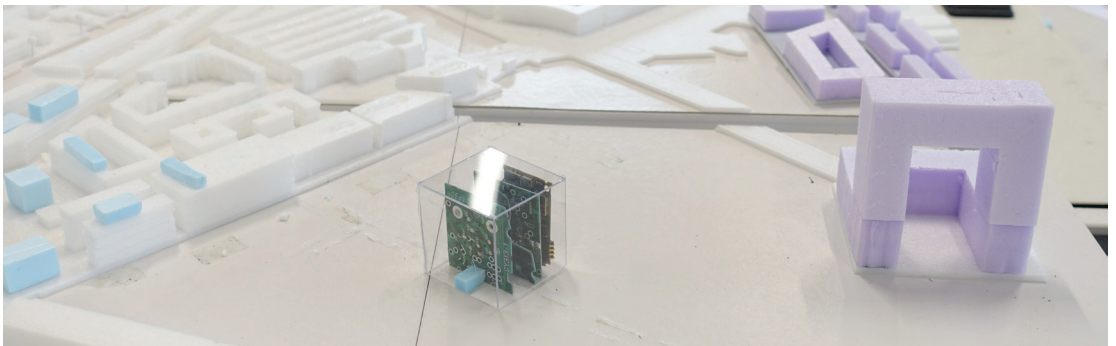
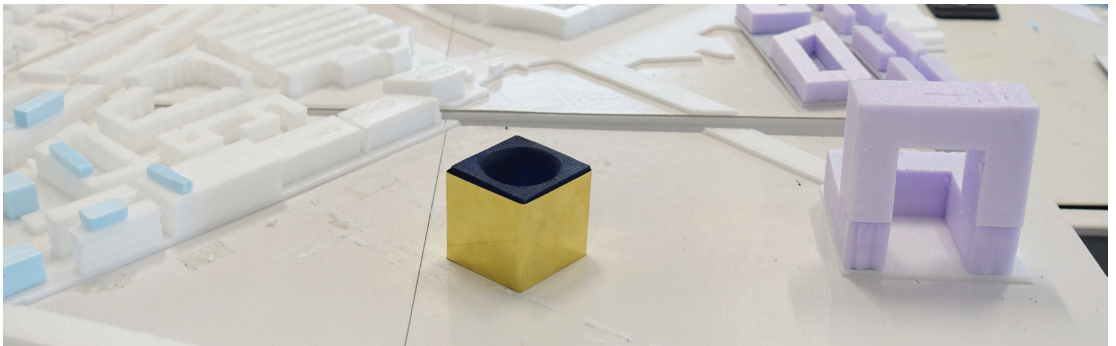
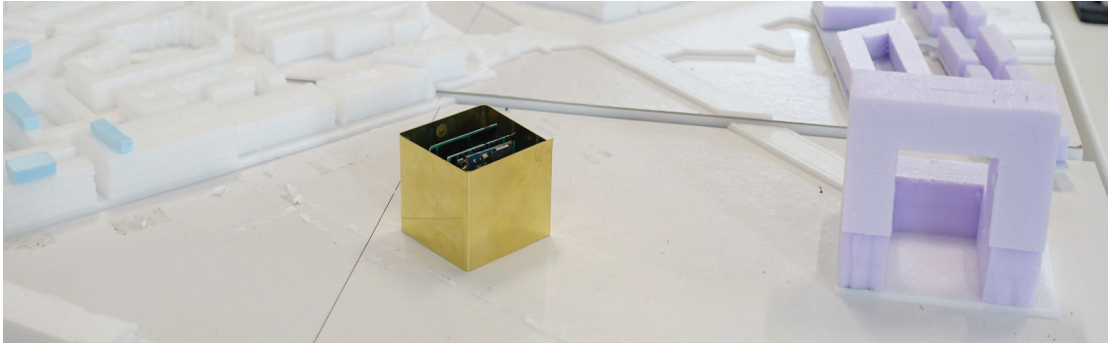
# LOCATION











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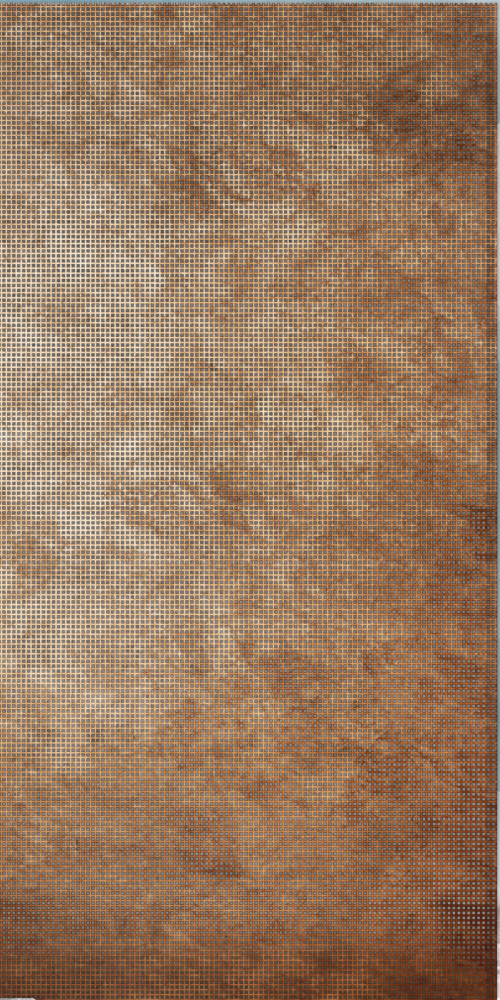
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CLOUD  
PRIVATE DEPOSITORY FOR  
PARTICULAR INFORMATION







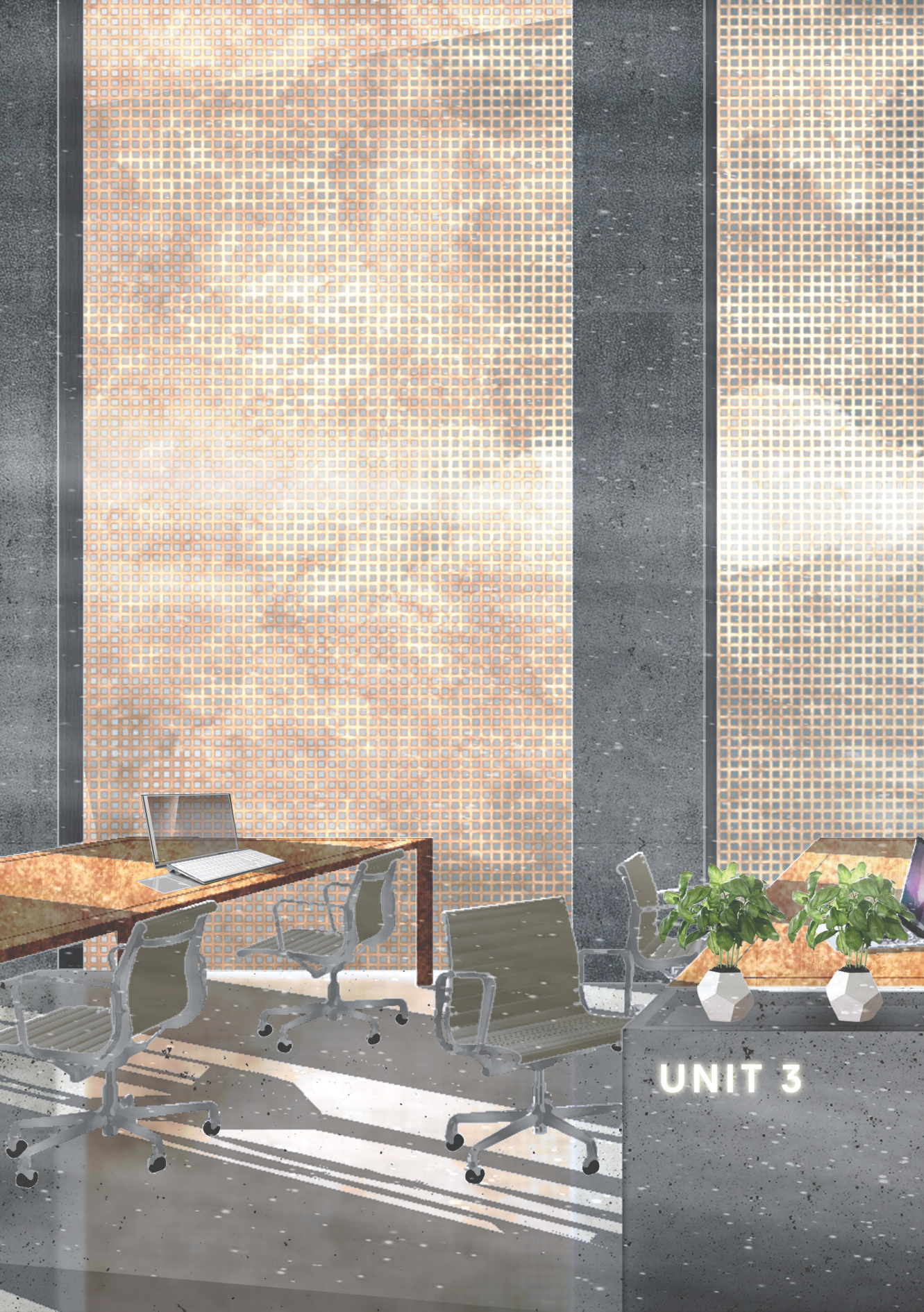








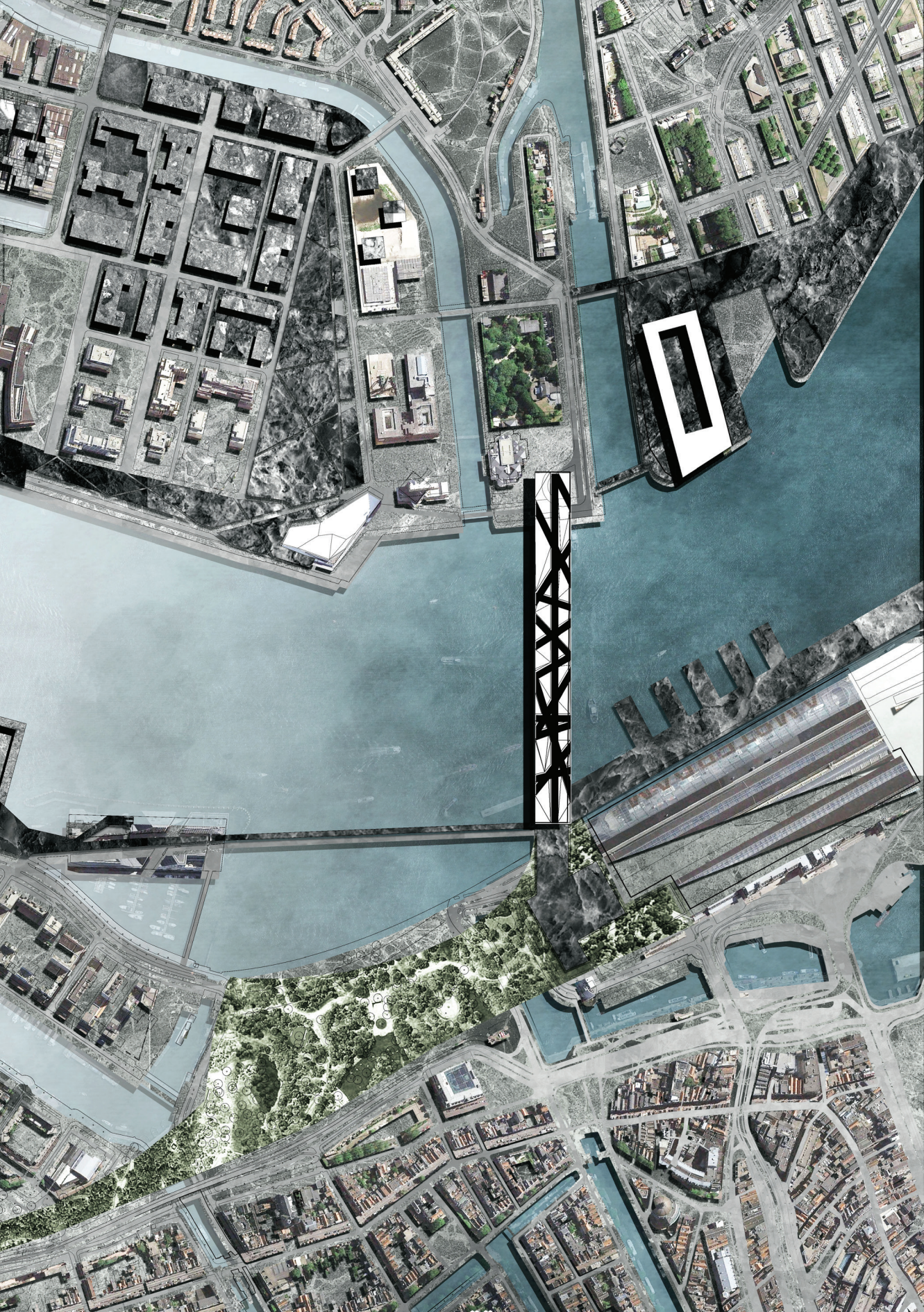




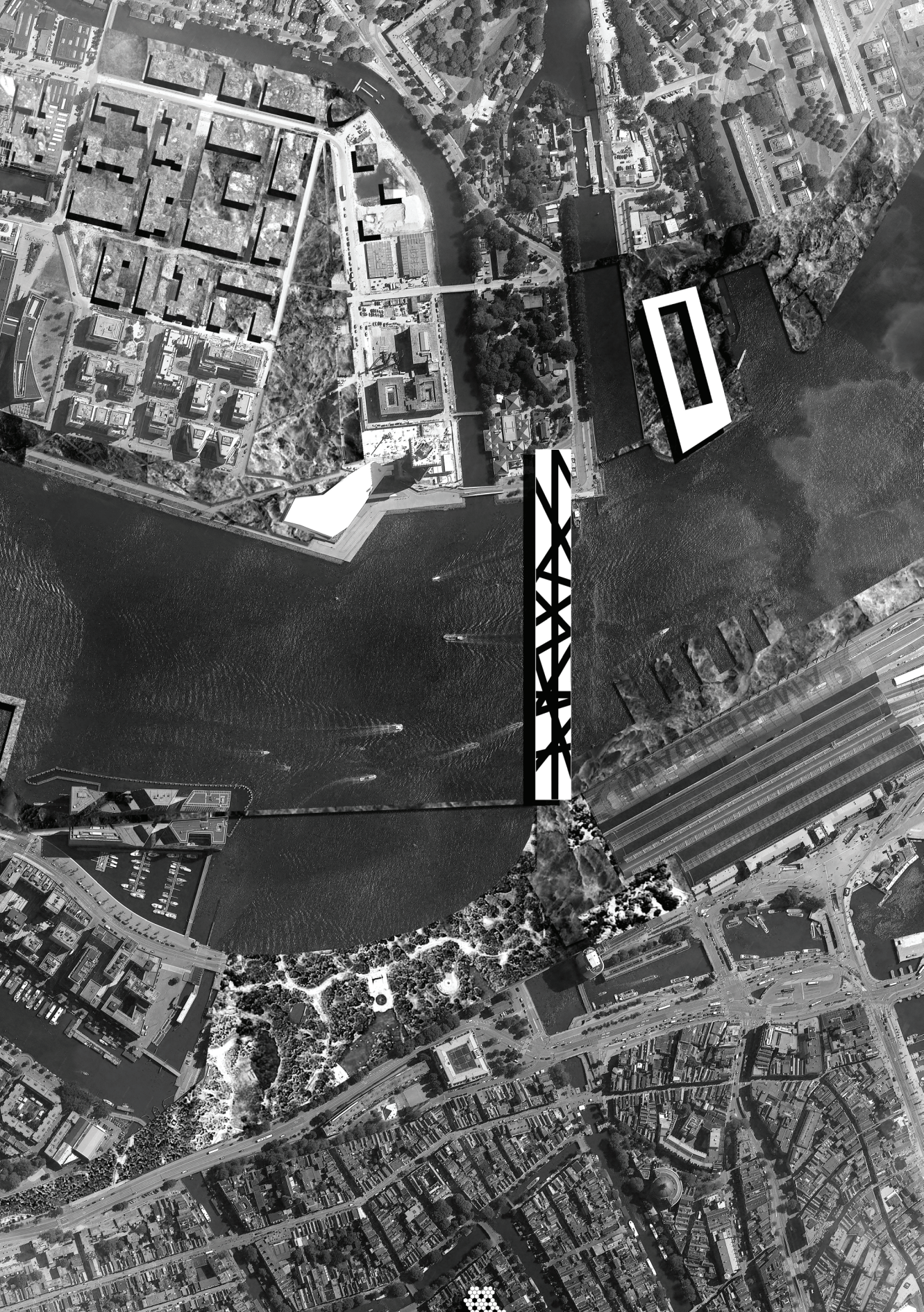
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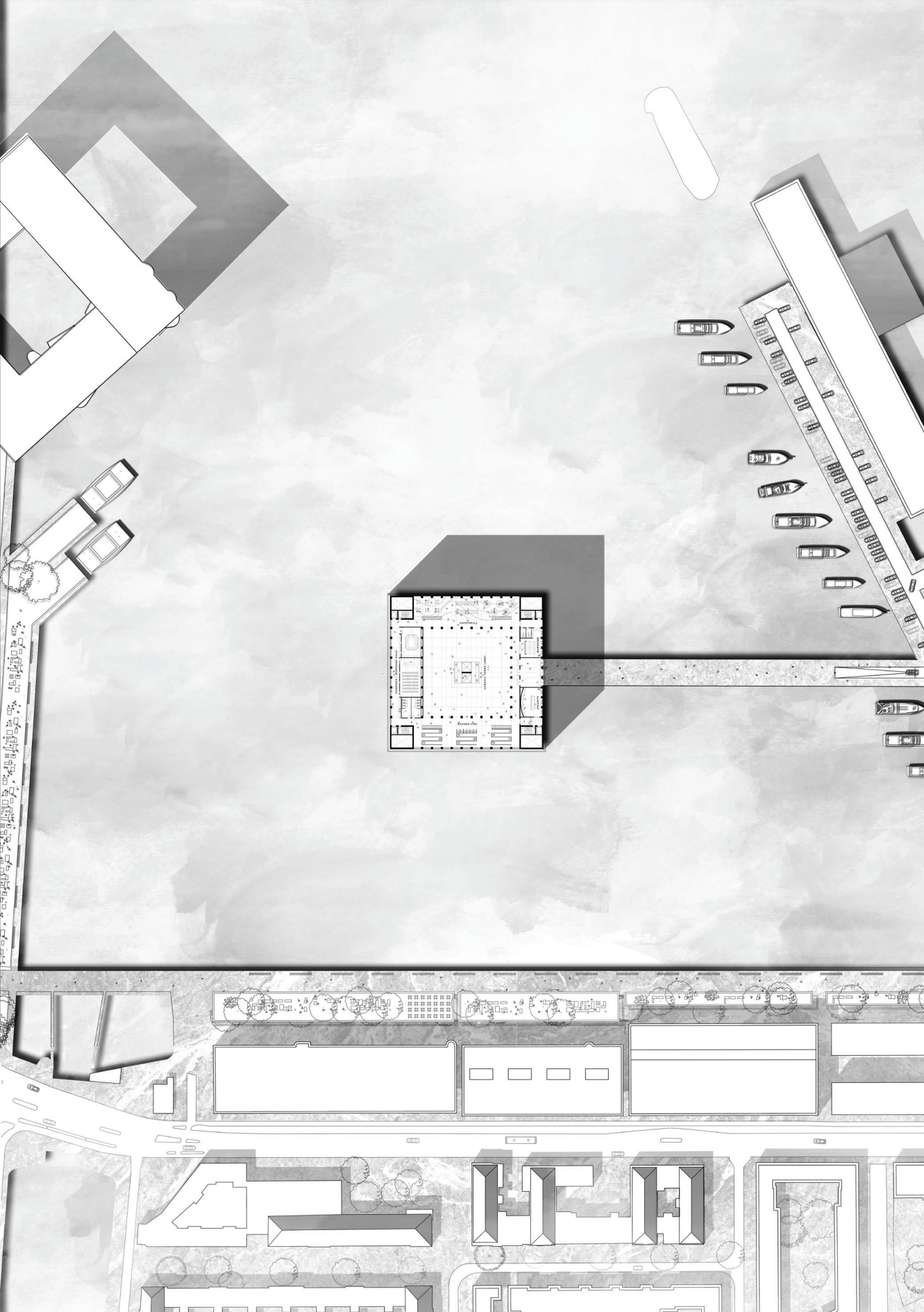


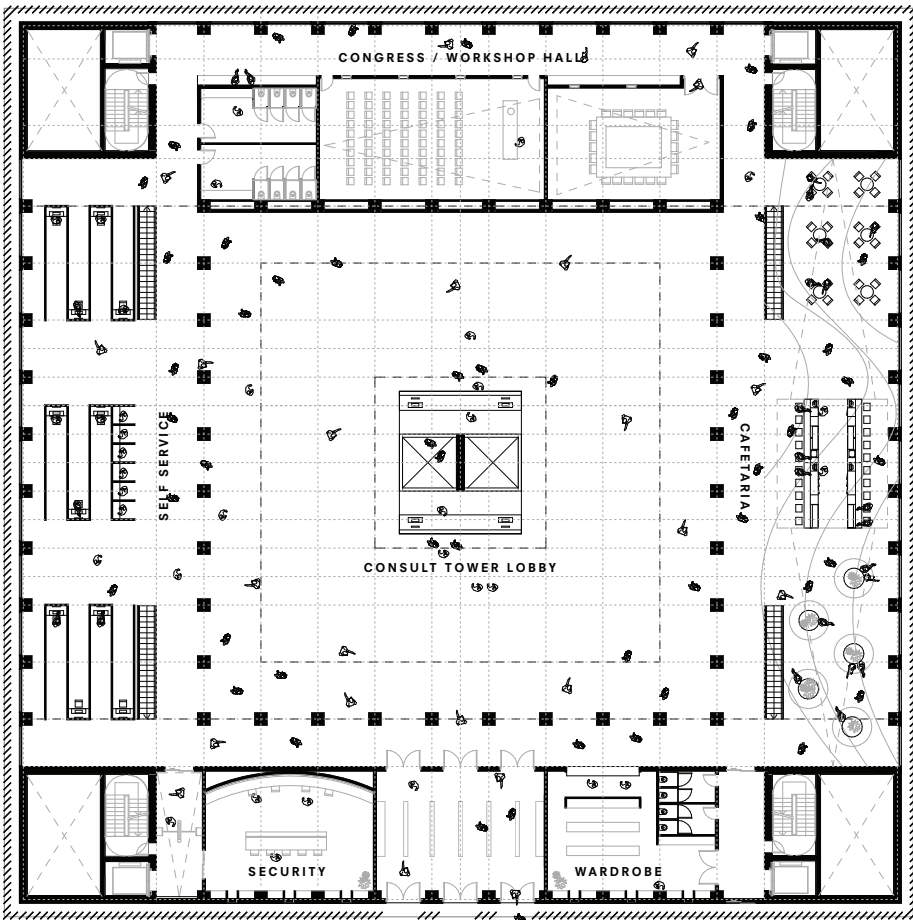


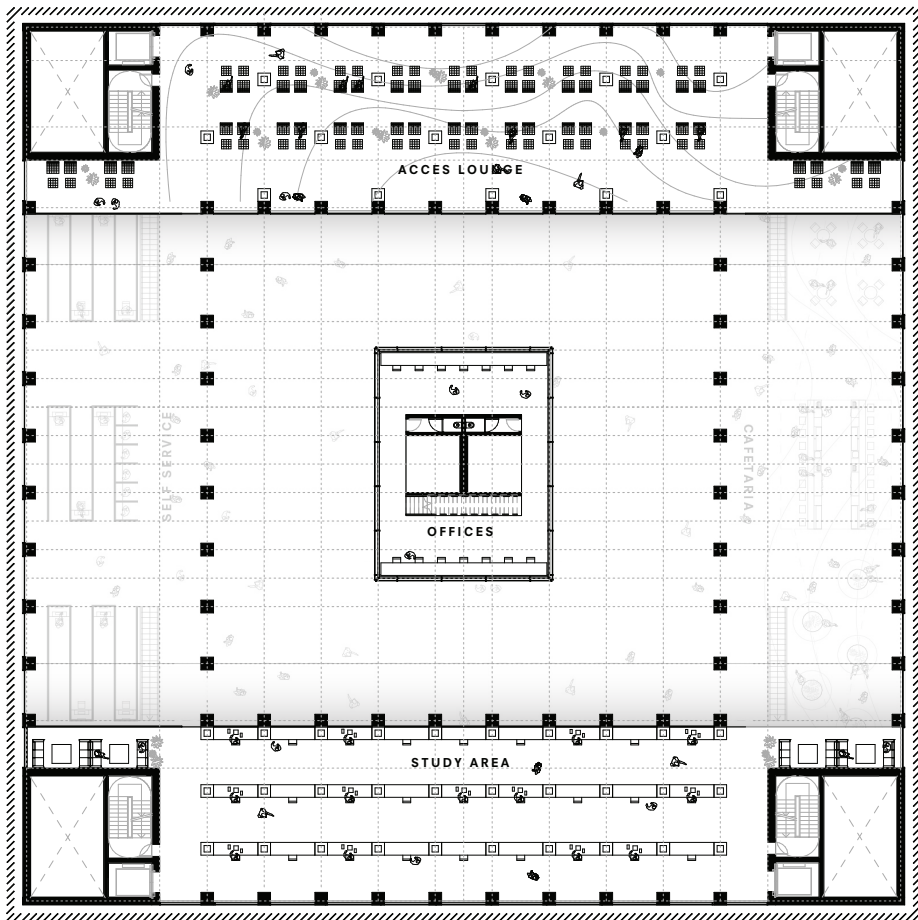


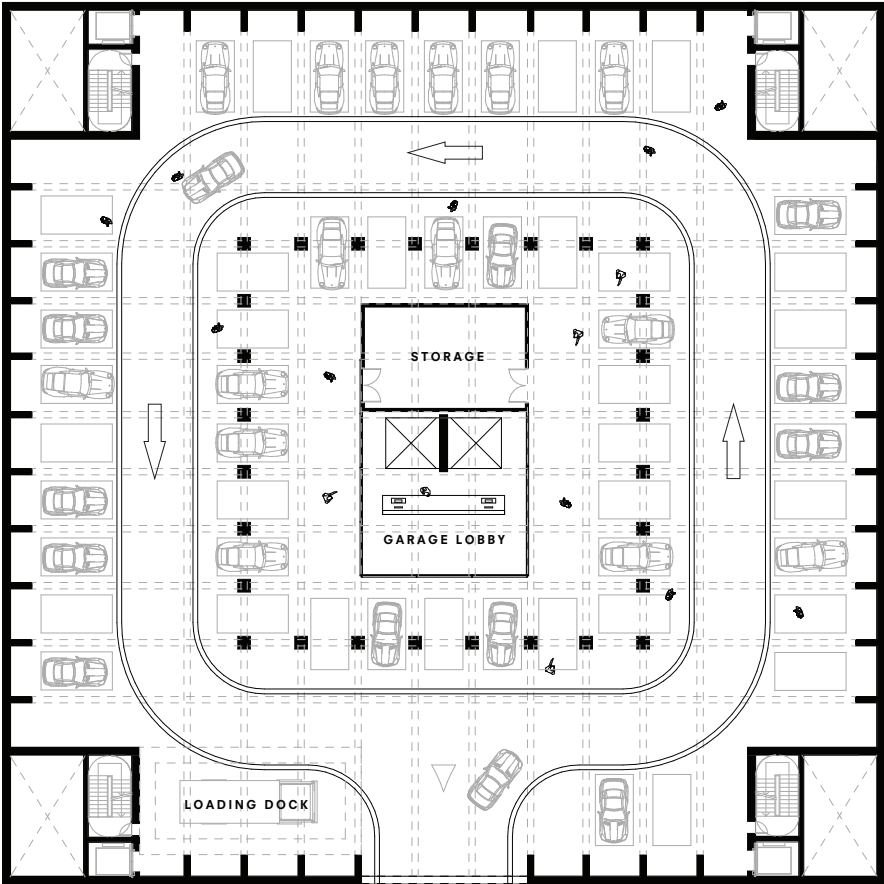


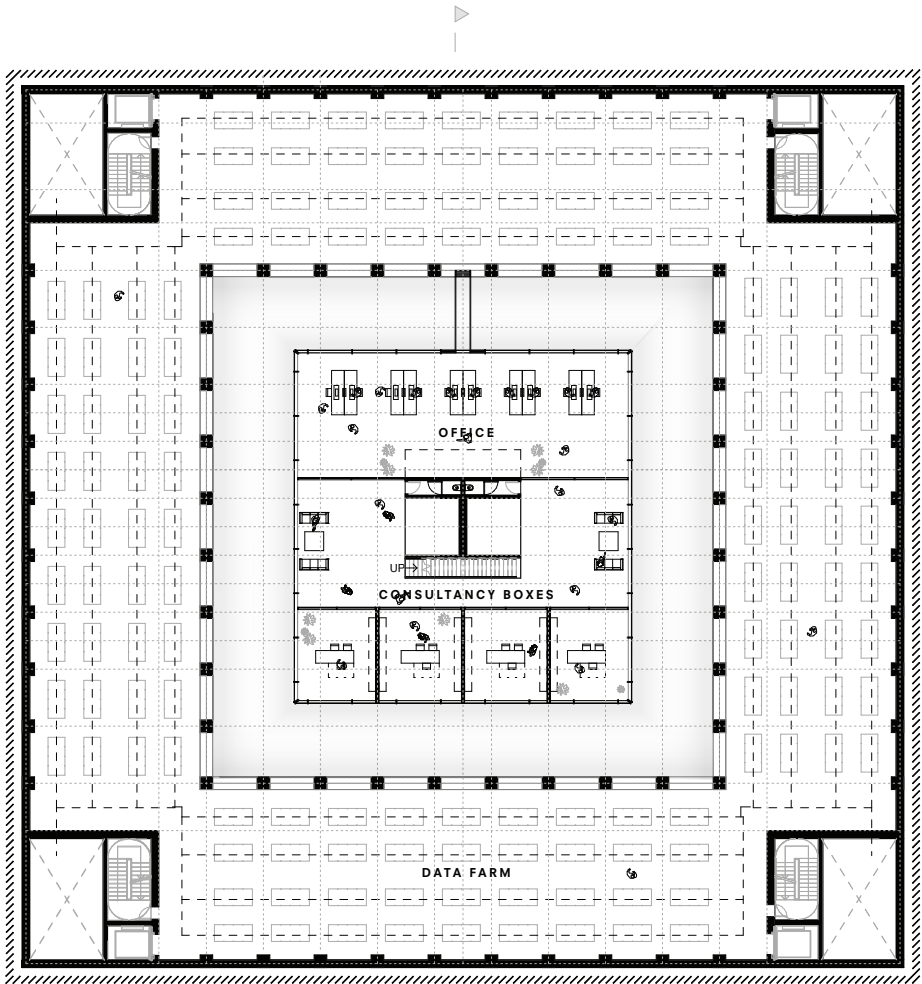


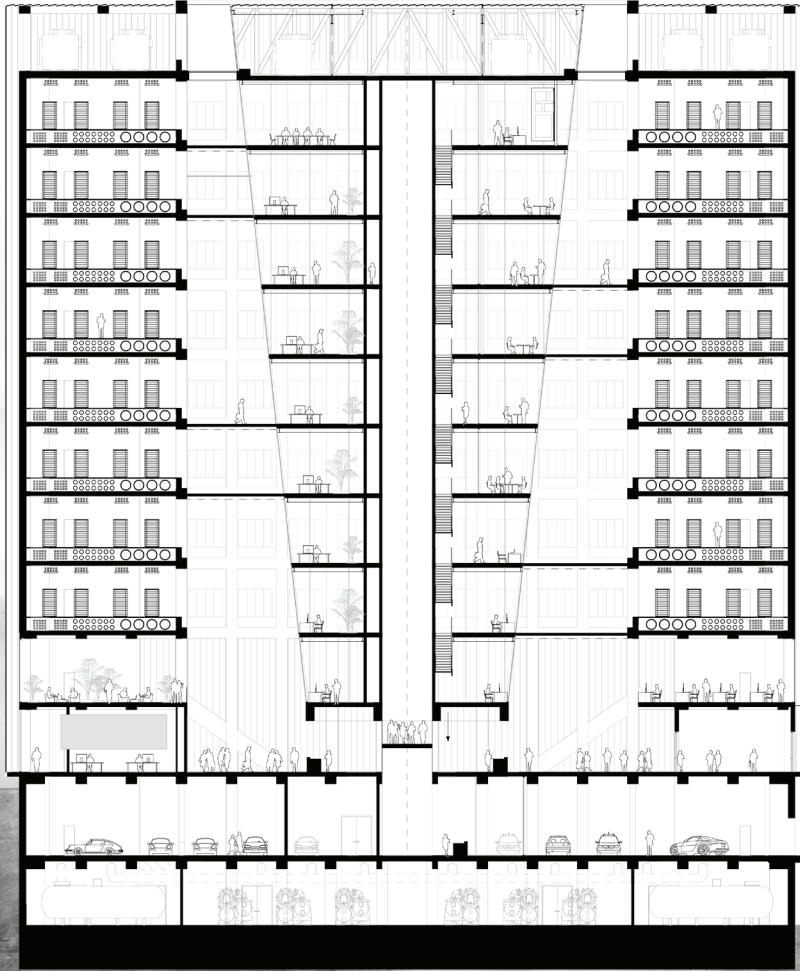


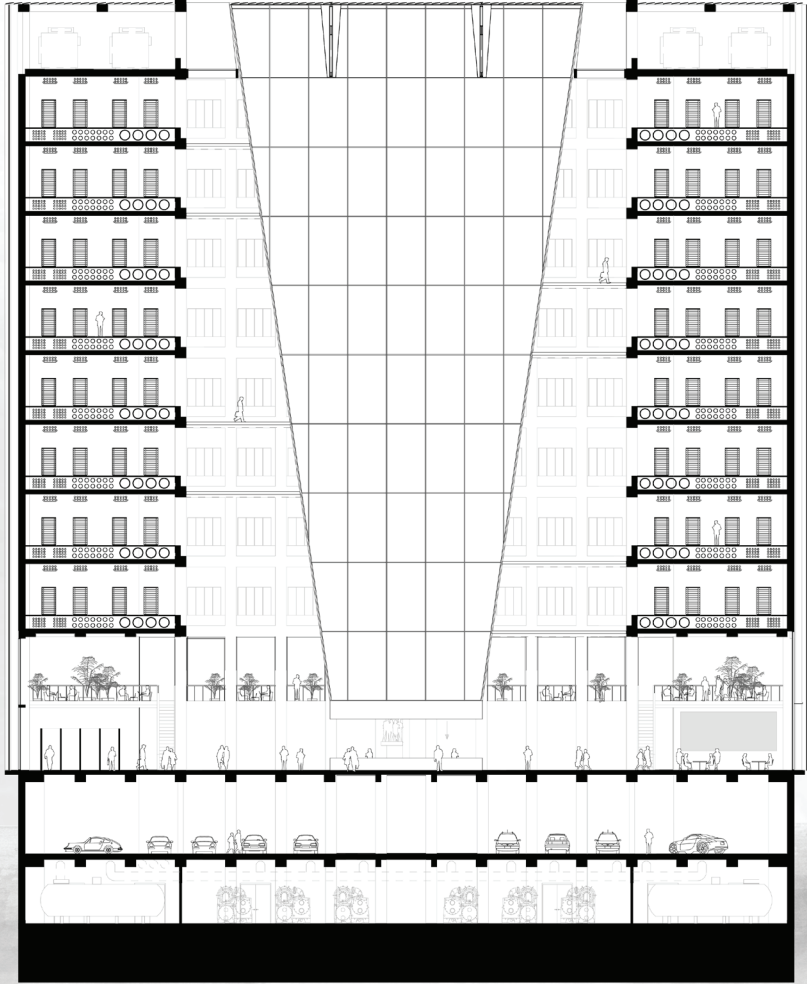


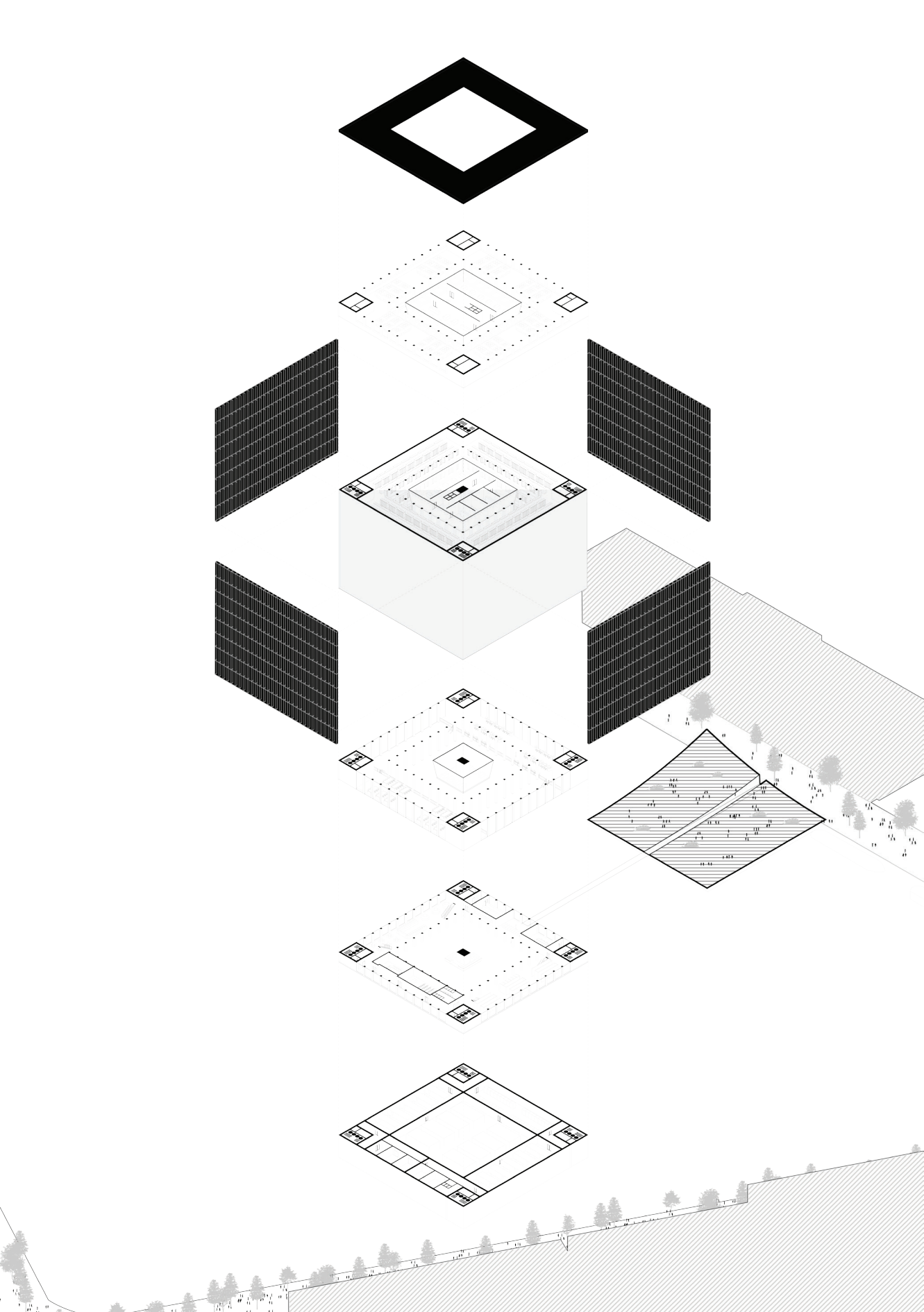


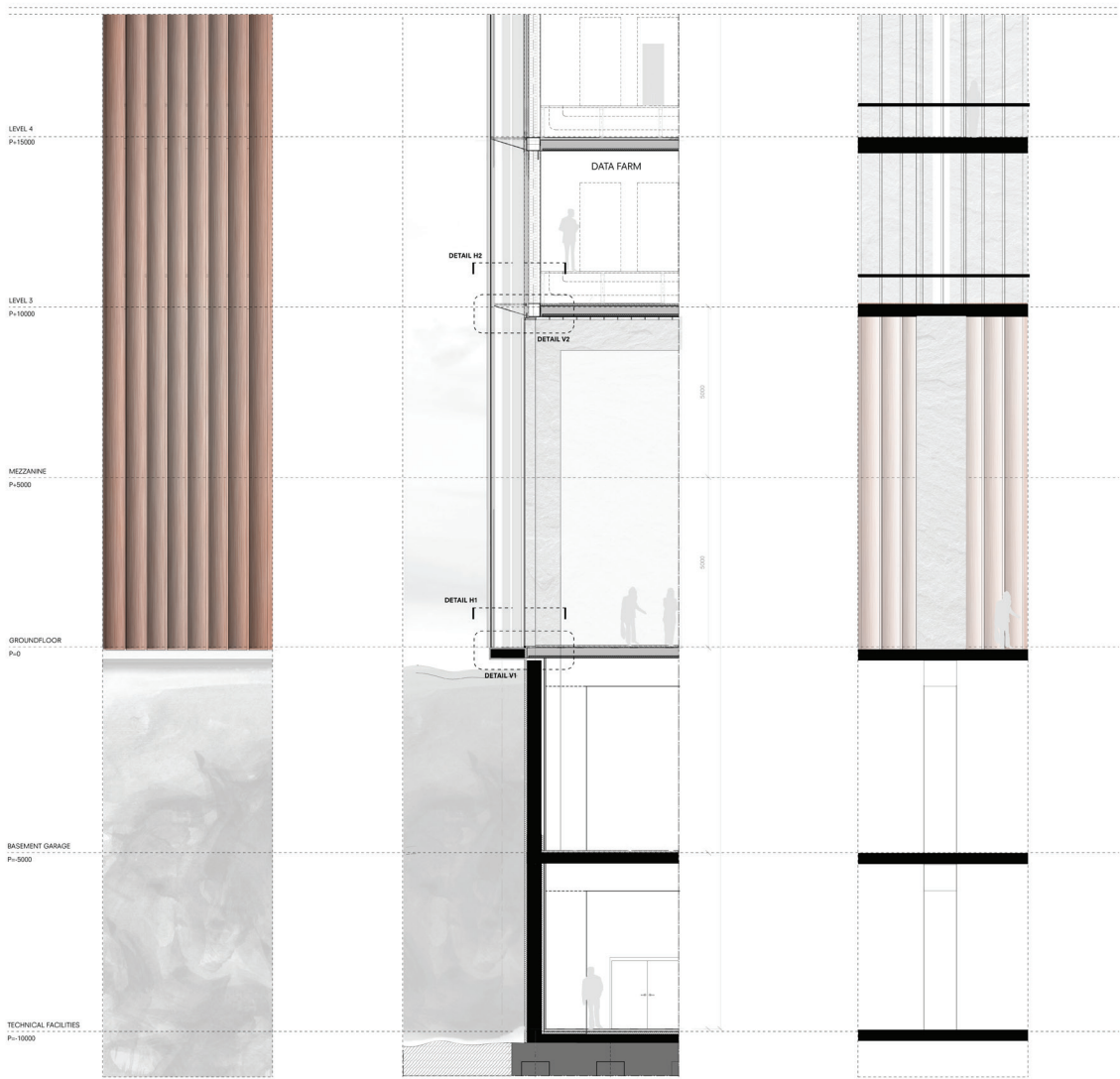
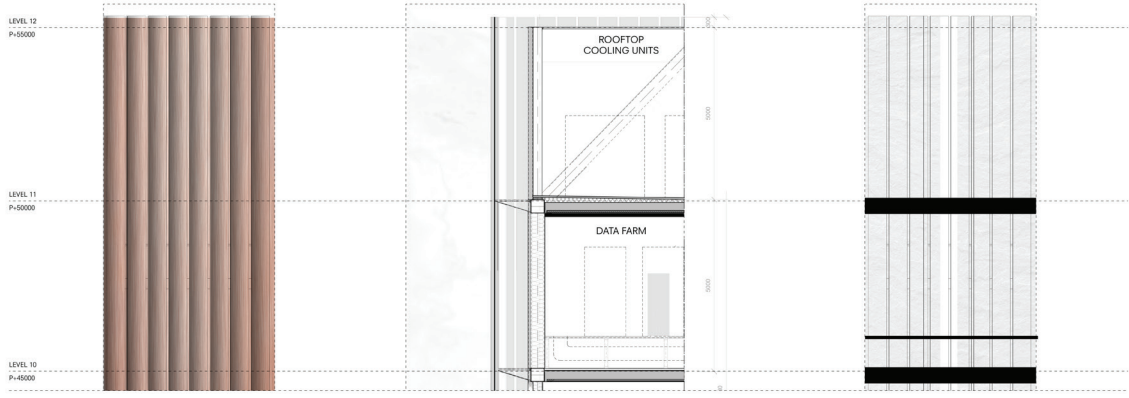


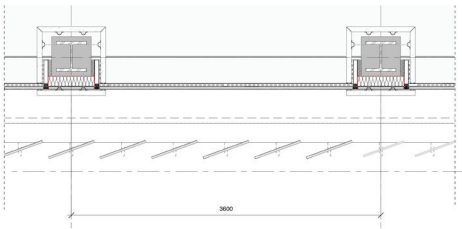
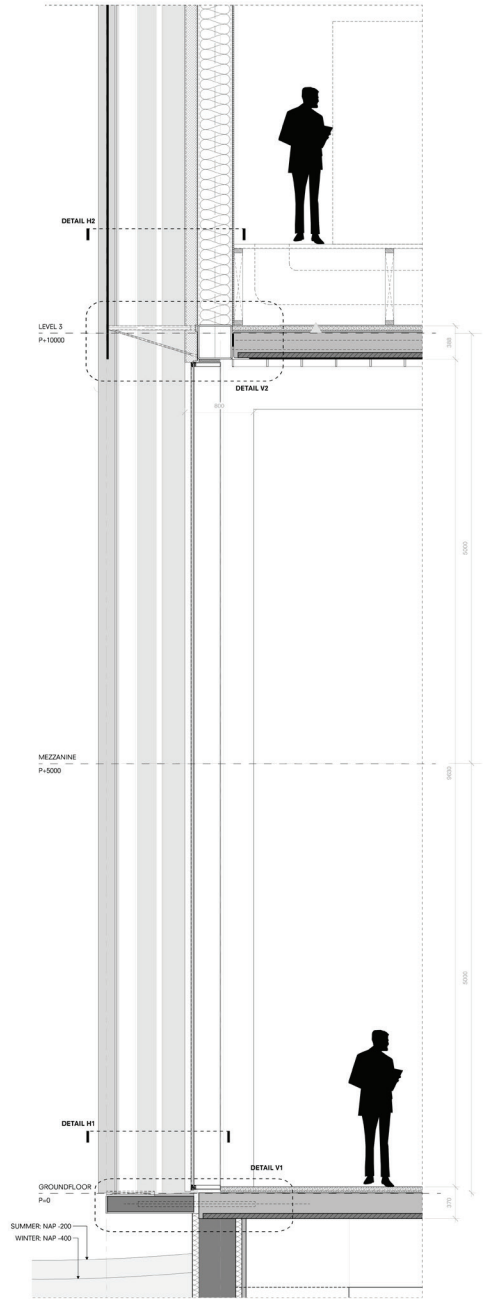
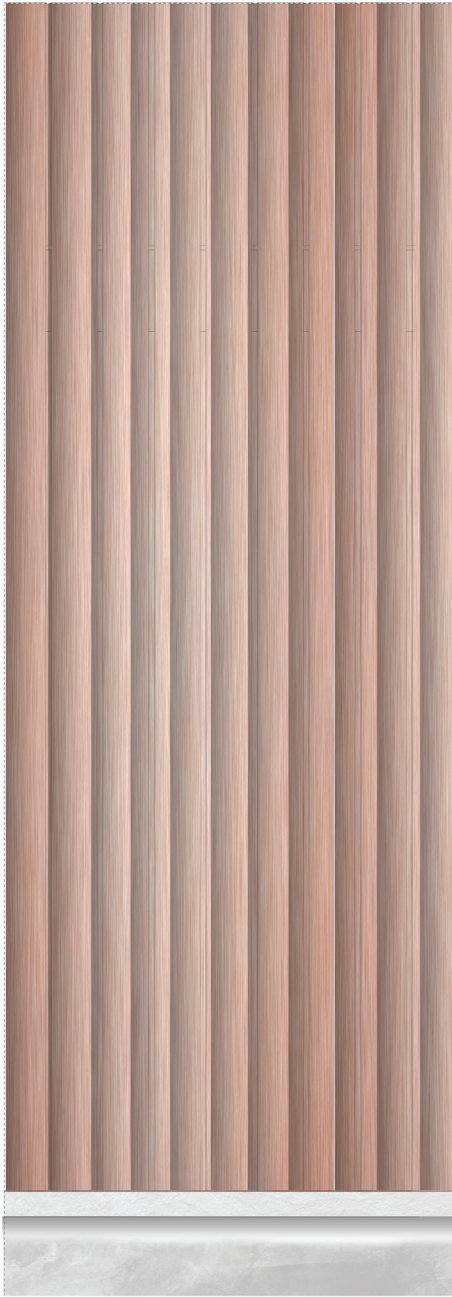


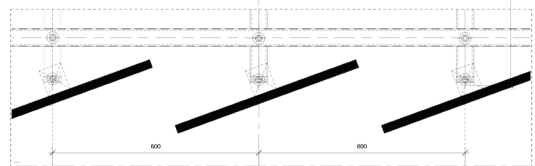
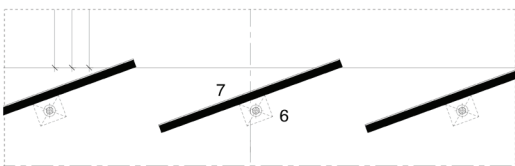
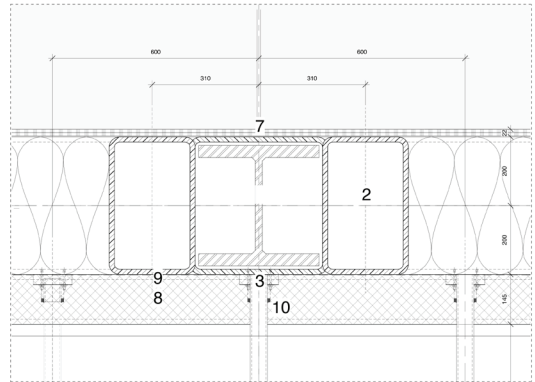
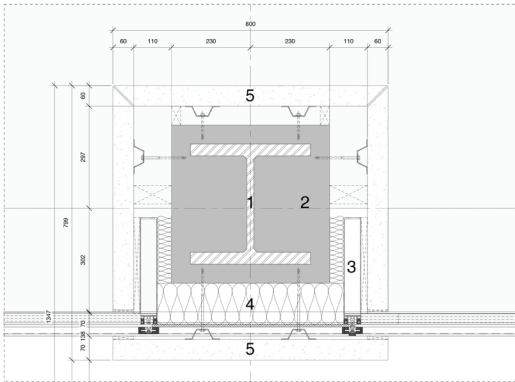
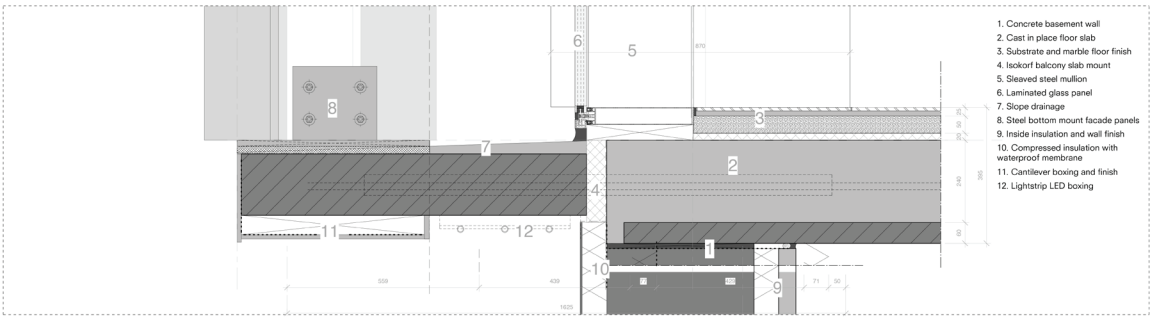
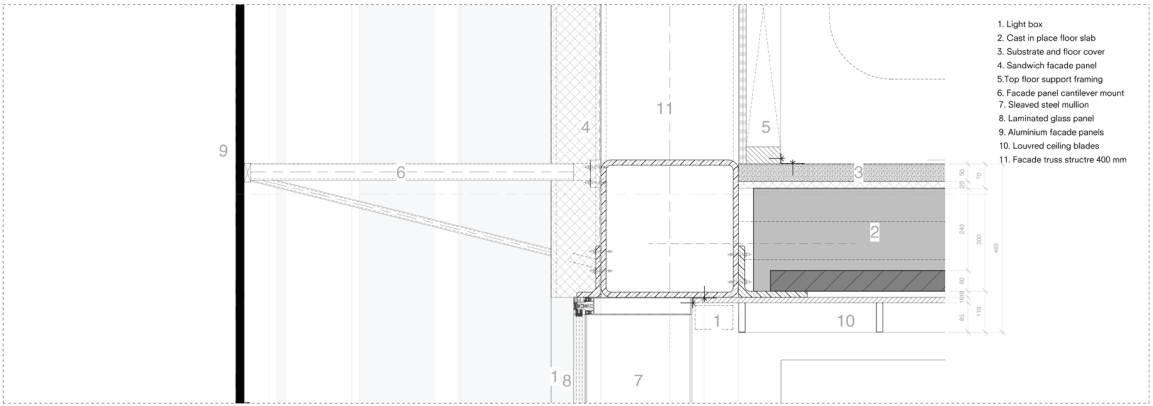
















## DATA &amp; THE CITY

The Economist: Data is becoming the new oil. As a society we are today generating extreme amounts of data by our daily usage and interaction with the internet. This digital data is growing ever since the introduction of the internet back in 1993. Society has been exposed to internet as information source, social platform, communications network for companies or universities and entertainment.

During this usage which today is greater than ever before information is stored based on ones usage and interaction. This means that information about ones behavior, pictures, bank transactions, public transportation services are stored in the internet. The ownership of this information is today a notorious topic of debate.

While the internet seems to be a ubiquitous and immaterial platform for multi-usage, it definitely takes in physical space. Space in buildings that consists of kilometers of wires and datastorage cabinets that currently are growing at a rapid phase. Giants as Google and Amazon are developing datacenters world wide to provide its costumers of Google platforms, Spotify and Netflix for example.

Since the internet is a holistic system of copper wires, storage machines and user devices, information is in theory accessible or hackable by any user. Privacy is for one never ultimately guaranteed. Therefor I would like to propose a new form of network, which is separated of the current 'interconnected' internet, and introduce a new typology where this data will be managed. A vault of valuable private documents. This would replace typologies that are currently making a shift to the immaterial world such as the bank, library and governmental building. It will become a civic structure responsible as communication platform. Hereby I ask the following research question: How could we merge and express typologies of data in our future cities? With the ambition to develop a clear relationship between user and storage of data.

## AMSTERDAM 2050

Within the AMS MiD CiTY Studio this project is located in the central area. The central district of Amsterdam and the left part of the 3 Mid-City locations of the map under.

### Identified developments

In order to develop a clear vision on the city of Amsterdam in 2050 research is done on fields where radical developments are expected in the coming decades. These topics are mobility, health and energy. Parallel to these researches observations and mappings on the central district of Amsterdam were conducted. These activities during first period of the graduation studio led to the following developments affecting the location: Amsterdam will densify drastically. The demand for housing in the unique city centre is enormous and its inhabitants is expected to rise over the million. The way we will move through the city will change. Amsterdam has limited space so it has to be used effectively. This could mean that owning a car won't be a standard, but sharing a collective mobility system could mean a solution to the high demands of mobility. Streets will change and so will the train station change to a more effective and faster way of transportation and transit from one form to the other. Furthermore, the north is very separated from the south. In the coming decades it is reasonable to believe that the way inhabitants commute between north and south will run more smoothly. The barrier that separates these two will also change. The river IJ is now a very infrastructural element, but together with the connection of north and south the connection with the river IJ will also be a potential to be realized. The river could then take part in the city's urban layout instead of merely crossing it as a barrier.

### Expected changes in urban area

The general conclusion of our observations and research on the central district of Amsterdam is that the North Bank of Amsterdam is disconnected with the city centre by the railway infrastructure, the big motorway and the river IJ. In our strategy we envision Amsterdam 2050

as a city that has a focus on connecting the city on the human scale. The strategy is expressed in the urban environment in three large-scale interventions. The first one abolishes the barrier of the railway by putting the railway underground. On top a park will connect the central station with the Westerpark and the south-bank with the inner-city. The second and third are the development of the south and north boardwalk. The southern boardwalk will amplify the headland structure by adding new islands and buildings. The sunny-side of the river, the boardwalk on the North, will be like a green promenade. Giving space for leisure and sport activities. The implementation of these new developments will bring the riverbanks of the IJ closer together. Furthermore there will be more space for pedestrians and cyclists and their for

more space for green and leisure. Parking space will be banned from the public environment and polluting cars are banned from the city center. The use of public transport and self-driving electric pods will be encouraged.

### Icons

The connection with the IJ will be enhanced by some of the group projects and a river walk. Eva and Maruli connect their projects with the south boardwalk by adding public icons to this river walk. Sebastiaan's and Yana's projects are connected with the North Boardwalk focusing on new ways of producing and working appropriate to the strong densification in Buiksloterham and the healthier and more sustainable lifestyle of 2050.

### Connectors

Davide and Victor will focus on the physical connections. Davide with a bridge that crosses the IJ, literally connecting the North with the South and reflecting on Amsterdam in the past, present and future. Victor with a project that will restructure the station connecting the city center with the river IJ. An efficient station at the junction of train, metro, bus, tram, car, pods, bicycles and pedestrians.

### Densification

Amsterdam's North will be in large extend

developed by 2050 and the demand for housing near the center will only increase. Nick and Erik (thats me) will focus on the densification of the inner-city. Can we densify the existing city in other ways? Nick will use the vacant space that is created by the ban of parking spaces. His housing project adds a layer of public and shared living to maintain the creative and social appearance of the Jordaan. My project will focus on the deification of the most desired location of Amsterdam, the Amsterdam canals, by building in the courtyards of the existing building blocks. The focus is on affordable housing for single person households. Efficient micro units and shared spaces makes it possible to live in the heart of Amsterdam within a social, healthy and luxurious environment.







Aspect 1: The relationship between research and design.

In the first part of the graduation studio (MSc3) I focussed on the development of a graduation project proposal. By research on the wider context of Amsterdam, the seminar topic of Energy and the smart city concept a basis of knowledge was generated for the Amsterdam 2050 studio assignment.

This research phase resulted into several research papers and eventually the P2 proposal which came forth out of findings during mappings on Amsterdam on the topic of energy. Through this wider context research the proposal for a datacenter came forth. Thus the research phase and proposal were the foundation for the design and its process. Also it gave the basic architectural ideas and options during the design phase. The project will close with a complete presentation of research and design phase.

Hard data shows that more datacenters are emerging around cities and the importance of internet increases in various layers of our environment. Today these are anonymous buildings on the periphery of our city. In the coming decades these will fill a greater role as typology within our built environment. The AMS Mid-City studio focuses on a 2050 scenario of Amsterdam. Within the studio resources (energy), mobility and health are likely to change dramatically in the coming 40 years. The general aim is to develop potential new typologies that are yet unknown in the contemporary built environment. The developments surrounding the internet and the rising importance of data are all around us and evident. Devices that are connected to the ubiquitous network are carried with us and amenities are further digitalizing by the year.

Aspect 2: The relationship between your graduation topic, the studio topic, your master track and your master program.

With the idea in mind that an architect would need a decade or two to get from idea to finalization of a project the studio aims on developing a scenario for an Amsterdam 2050 environment in which the students projects should play a role in. This means partly that the project should correspond or relate to one of the developments or changes that the group envisions for 2050, and that the typology of the project would be different than typologies today. Ideally that the project would develop or explore a new kind of typology.

My project explores the physical impact of the internet on the city and its environment. It proposes a typology where a building with dataservers act as a new form of civic typology for civilians that replaces the library, bank and governmental building as object in the city.

Making an architectural position for a new type of technology is not new. Just as the translation once was introduced to the city, its architecture changed over the years and became more specific to its usage. This project develops a position in architecture towards so called 'datacenter'. This happens on the future riverbank of the group 2050 scenario. Both in positioning of the project and overall topic it relates to future developments of the city.

Im taking part in the Architecture master track, for this the project adds a new field by developing a new typology in a future scenario. It investigates the combination of the datacenter as future spatial need for the internet and its additional role as bank, gemeentegebouw and library. Whether it be a public accessible building or not, the exploration of the physical space needed for the internet will eventually become an urban and thus architectural question.

The public enclave combined with the datacenter

causes the project to touch upon various topics in the field of sustainability, architecture and building technology. Through details, flows and expression the building is currently developed to its final stage. In sustainability the building tries to function as a district heater and utilizes the cold water of the River IJ to cool down and heat district water for the housings to come in the area. In an architectural sense the combination of different typologies asks for a new type of architectural language and thus certain details which relate to the field of architecture and building technology together.

Aspect 3: Elaboration on research method and approach chosen by the student in relation to the graduation studio methodical line of inquiry, reflecting thereby upon the scientific relevance of the work.

The Complex Projects Mid City studio is divided into 2 main parts of the graduation projects process. During the first part (MSC3) the aim is to develop an architectural proposal through research in various fields relating to Amsterdam and the topics energy, mobility and health to 2050. During this process we mapped in the first weeks the city and location. This can be seen as a wider contextual research. Afterwards the focus was on the topic of Energy. Also a reference trip was done to Vienna to get an impression of how a smart city would function. Through this the proposal for a Datacenter came forth. After the general research, seminar paper and site related paper the final proposal was developed. These steps were in general followed by students and thus also me. It was clearly a big scale to small scale process and in the first part the role of the student was to give himself a design brief. As if he would be the municipality. Information gathered is organized into hard data, soft data, typology research and mappings.

In the second part (MSc4) the proposal was translated into a concrete design. Starting in 4 main topics, form, program, site and concept. Through prototyping of these topics the potentials were explored and chosen. Rather from big to small this part mainly consists of abstract to concrete. From abstract forms to detail

level development. During P3 a draft design was presented and next week at P4 a design according to TU Delft graduation standards will be presented.

Aspect 4: Elaboration on the relationship between the graduation project and the wider social, professional and scientific framework, touching upon the transferability of the project results.

During the research phase of this project the wide context that architecture is acting in was clarified. Architecture isn't only about making space or buildings but larger fields effect the field of expertise and also give the field of expertise potentials for its further development. This realization is important to bring into the actual field of practice since it would widen the range of thought as an architect. That it isn't only about buildings and usable man made objects but its also about facilitating an environment in relation to the needs and potentials of our zeitgeist.

The idea that we develop a new typology during this project requests an openminded attitude and a less constrained project. This challenges the student but is in my point of view relevant to the role one would have in his future career. An openminded and therefore more flexible attitude would give more options and potential to growth. Also this graduation project brought a very intensive program with,

therefor asking the student to plan wisely and to time manage his process. This I think is crucial for an architect in the field of practice.

While this project won't be the one answer to how a datacenter would look like in 2050, it definitely is another position in the discussion how the internet as physical space would be formed in the years to come and how the relation between people and their data as 'immaterial' would form. This project is one position and there are many to make. I think its important that the discussion and developments of ideas around the world of immaterial and the digital will continue to develop and explore potentials so the field of architecture is 'armed' with ideas and positions in the current discourse of data which will be a

crucial part in the coming decades.

Aspect 5: Discuss the ethical issues and dilemmas you may have encountered in doing the research, elaborating the design and potential applications of the results in practice.

During the research I realized or came to the realization that the information related to the research topic is wide and not fully researchable in the timeframe of the project. It is important to be selective in information and strategic. This is crucial for having a clear story but also an effective and more navigated process. I realized that practicality and concept in some cases collide. While in the field of practice the wishes of the client would play a bigger role since money talks, I think that in the field of science the concept and the exploration of new fields within architecture are of bigger importance, leaving the economic and sometimes practical reasons beside. This mentality might be worrying to building technology folks, but it definitely adds gasoline to the discussion and therefor evoke a further research in the topic addressed. Despite this project being one position in how data and user could be confronted, I believe this field needs more ideas and architectural positions in order to develop more as a current discussion. Its actually wonderful how building technology, sustainability and architecture could combine in the field of data and user.











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