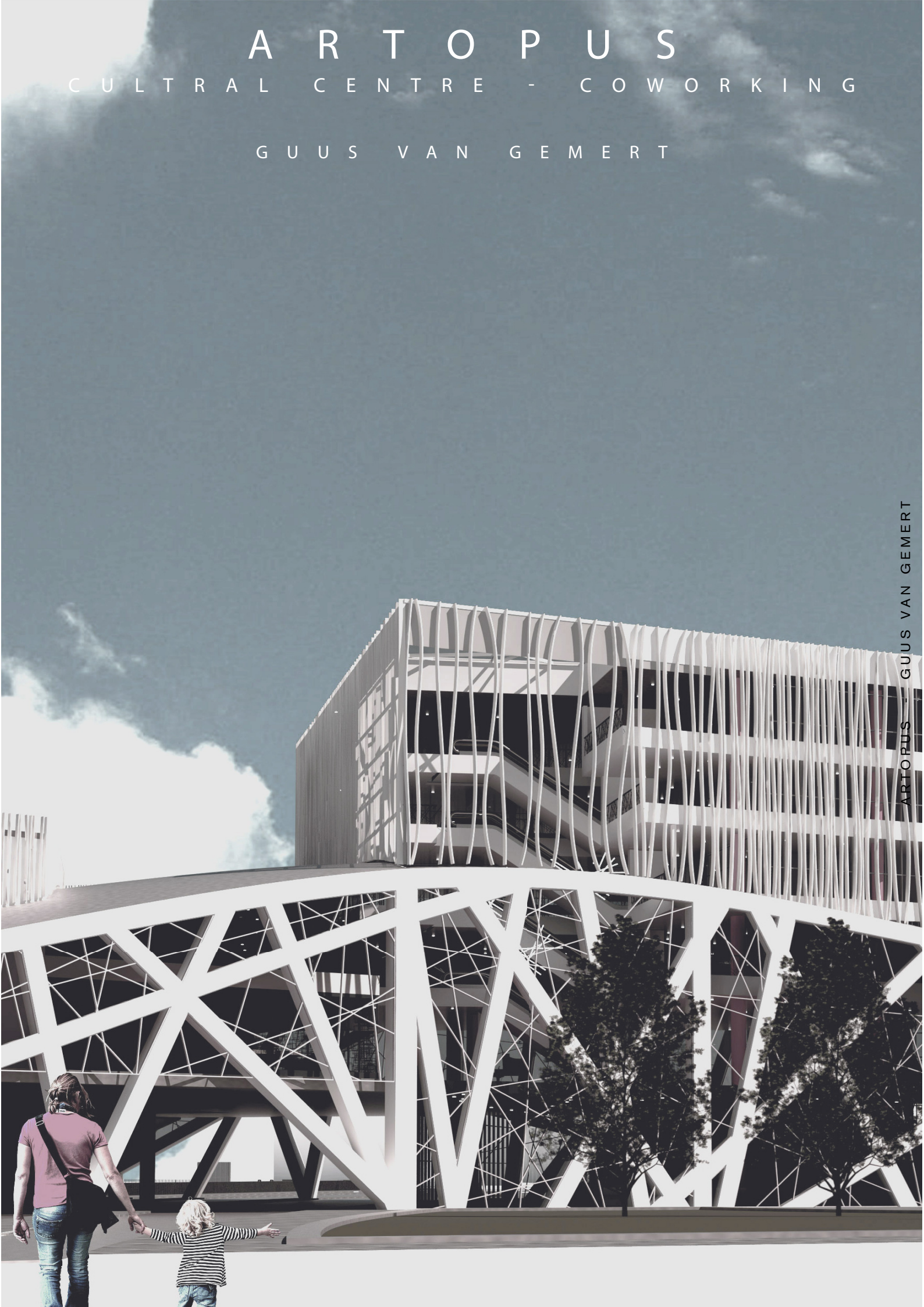
A R T O P U S

C U L T R A L C E N T R E - C O W O R K I N G

G U U S V A N G E M E R T



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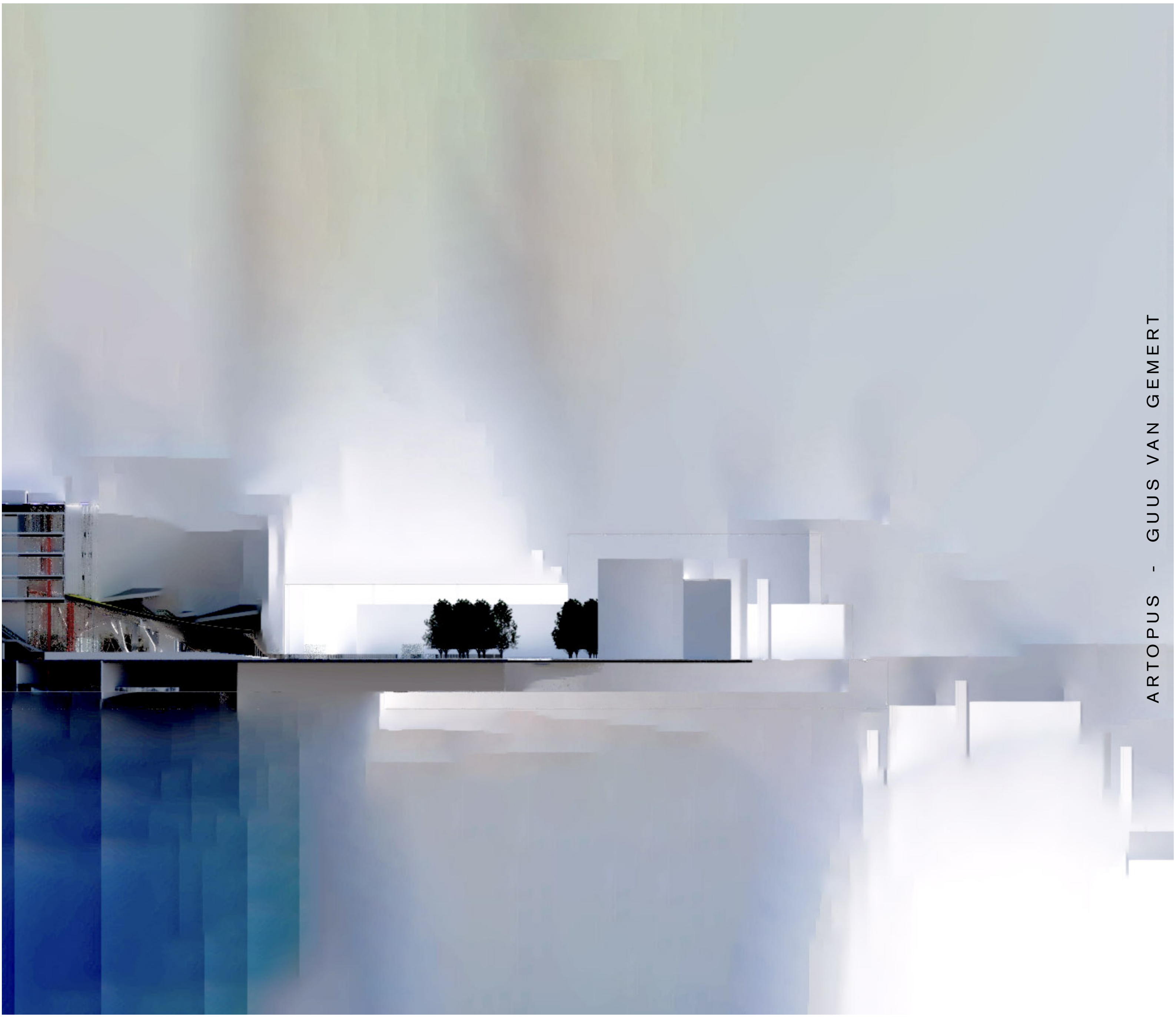

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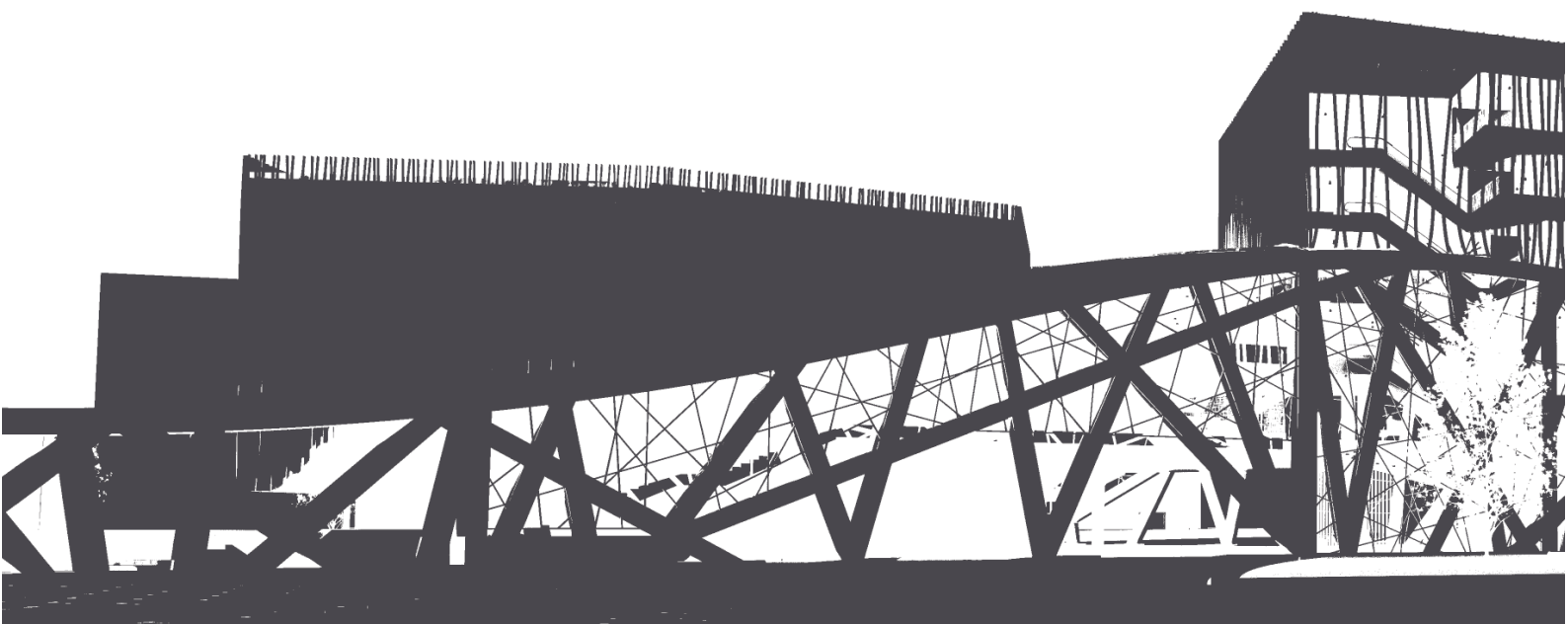
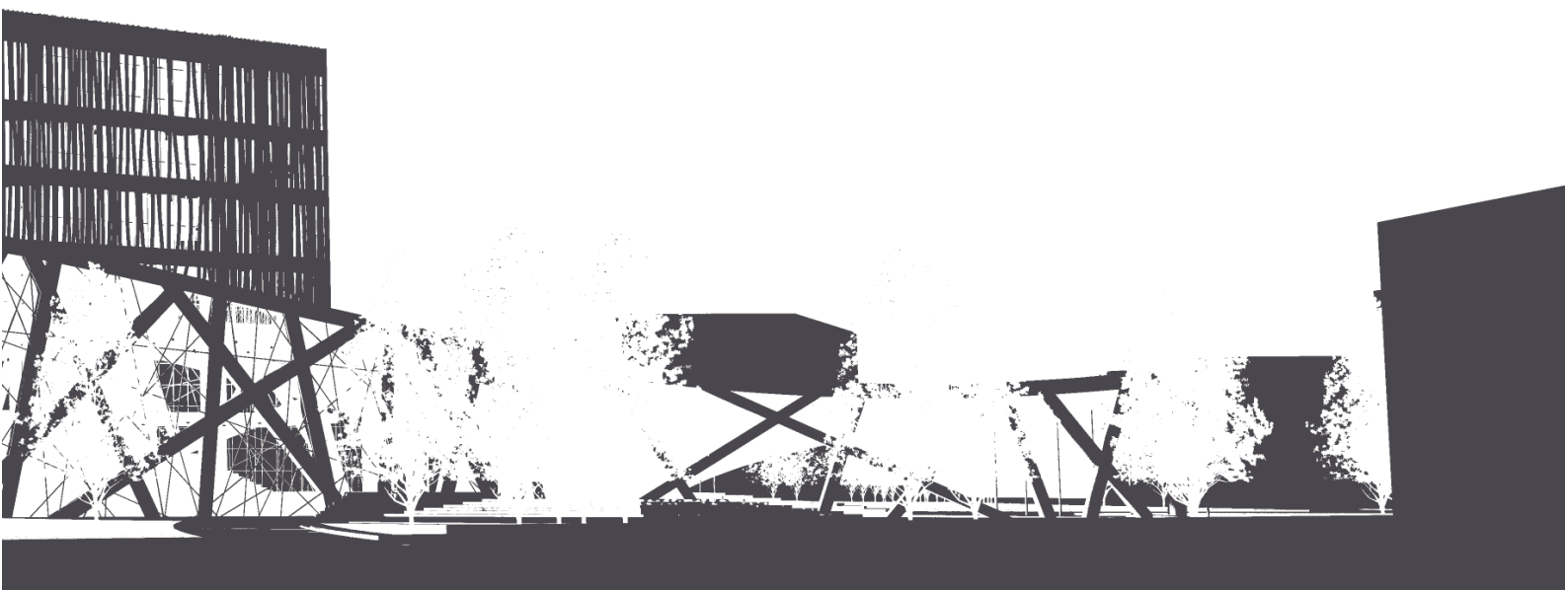


Introduction

Artopus, a design where mobility, working and recreating comes together. Strongly related to it surroundings, on urban level, but also on functional level. At the project site, Rietland park in Amsterdam, different residential area's come together. At present, a wide spread barier, a dike with traintracks, are sepparating these neighbourhoods. But, in 2050 things will be different. Nowadays, NS sends more trains to Amsterdam South, compared to Central station. So what if no trains will go to central station? This means that a lot of valuable space will become free in the city centre. One of the great area's is de marshalling train yard next to Rietlandpark, hence this gives many oppertunities of densification, connecting and increasing the livability in the neighbourhood. These are the three mean themes for this project. In the urban proposal, a green parc will be designed, together with a new densified residential neighbourhood. The building itself is a transportation and infrastructural hub, cultural centra with exhibition space and two theate halls, and co-working space.

Why co-working space? Within this project a fourth theme is quite important to the function of the building. It's about the Smart City. In short, the idea of smart city is a sustainable en efficient society which runs through a collaboration between all city fascilities. Think about Healthcare, mobility, education, government, and so on. This has been made possible by the technical development and the posibility to work in a digital world. Because of this principle, information is accesible everywhere for everyone who needs to get access. You might think that because of this, people can and will work from home, but the opposite is taking place. As some sociologist suggest, people seek in a more active way to social interaction because of this technological developmens. Hence, co-working space are becoming more and more important to our society.

To ccreate a multifunctional building which connectes people, has more to offer than just a working environment and creates an efficient mobility hub, fits perfectly in the concept of smart city. Therfore, this buillding conferms to the idea of smart city, but also reacts to de oppertunities of making new connections is this specific site.



RESEARCH

Infrastructure of Amsterdam
Vision for 2050
Mobility As A Service
Smart City

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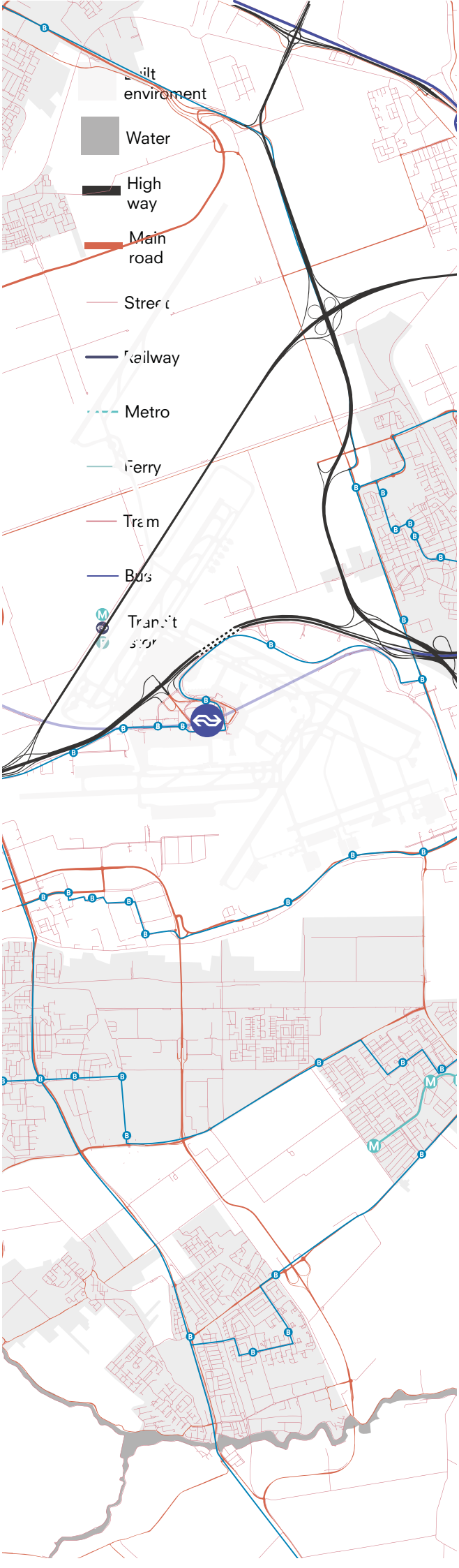
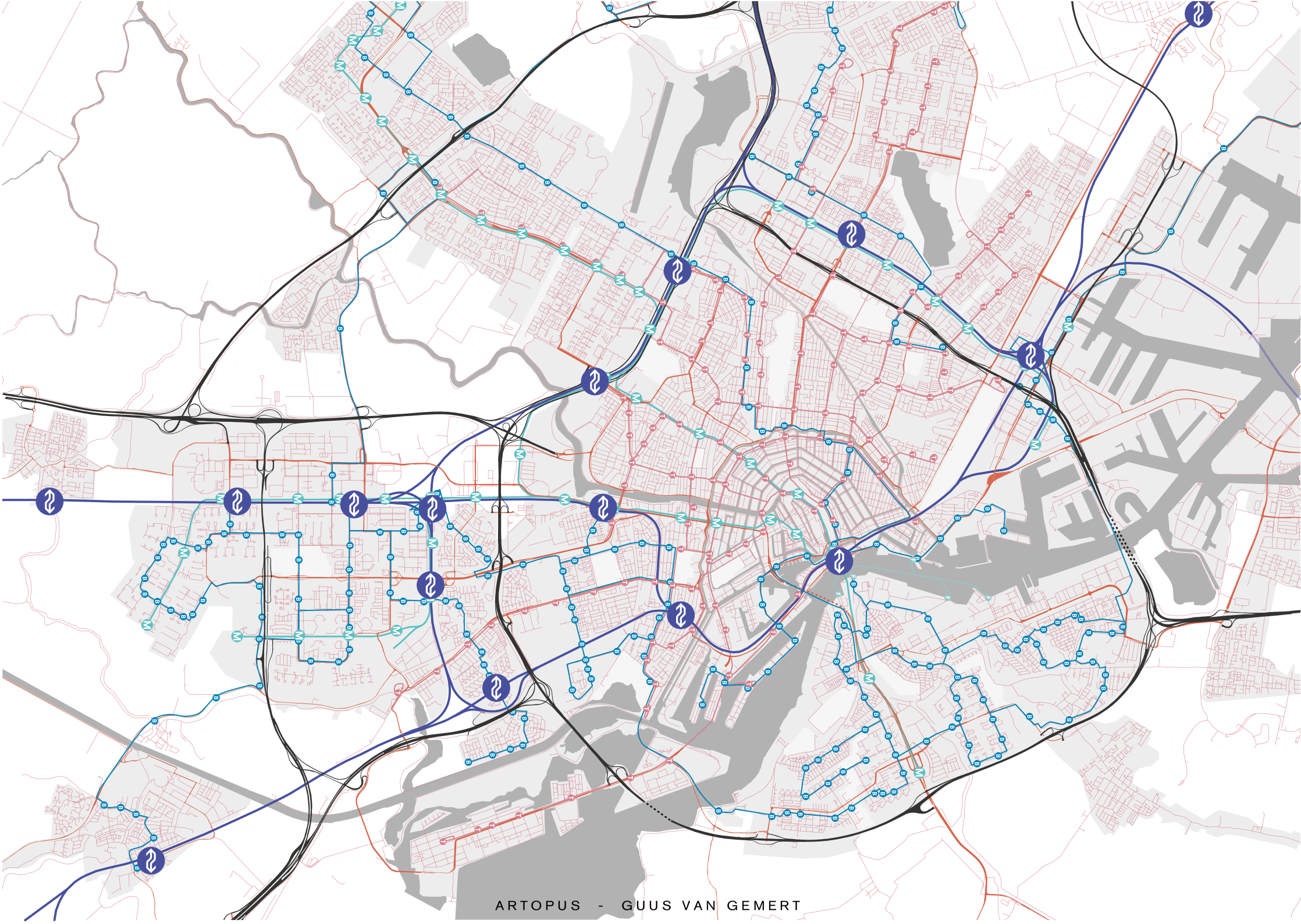
MOBILITY OVERVIEW

The overall structure of mobility related infrastructure shows a multi-layered organisation that employs different modes of mobility throughout the city. The A10 forms a ring around the city that is often perceived as a imaginary boundary for the city[1.2.31]. The ring connects on a larger scale with the Randstad and Almere, but seems to be forming a larger second ring (A9) that also encloses Amstelveen and Amsterdam Zuid Oost.

Train connections reach Amsterdam from three main directions; from the north-west trains that connect Alkmaar and Zaandam to Amsterdam. From the south-west trains from the direction of Rotterdam, Den Haag and Leiden reach the city with stops in Schiphol, Amsterdam Zuid and Centraal station. Stations along the south eastern corridor include Bijlmer-Arena, Amstel and Muiderpoort and connect the city with cities like Utrecht, Den Bosch and Nijmegen.

In the centre a network of multi-modal public transport is in place to connect the finer grain of the city with the larger stations and areas of interest. A combination of trams, metros, busses and ferries makes up the network in the municipality of Amsterdam, which is the working area of the GVB (het Gemeentelijk Vervoers Bedrijf)[1.2.32]. In Diemen en Amstelveen busses are the domaninant form of public transport.

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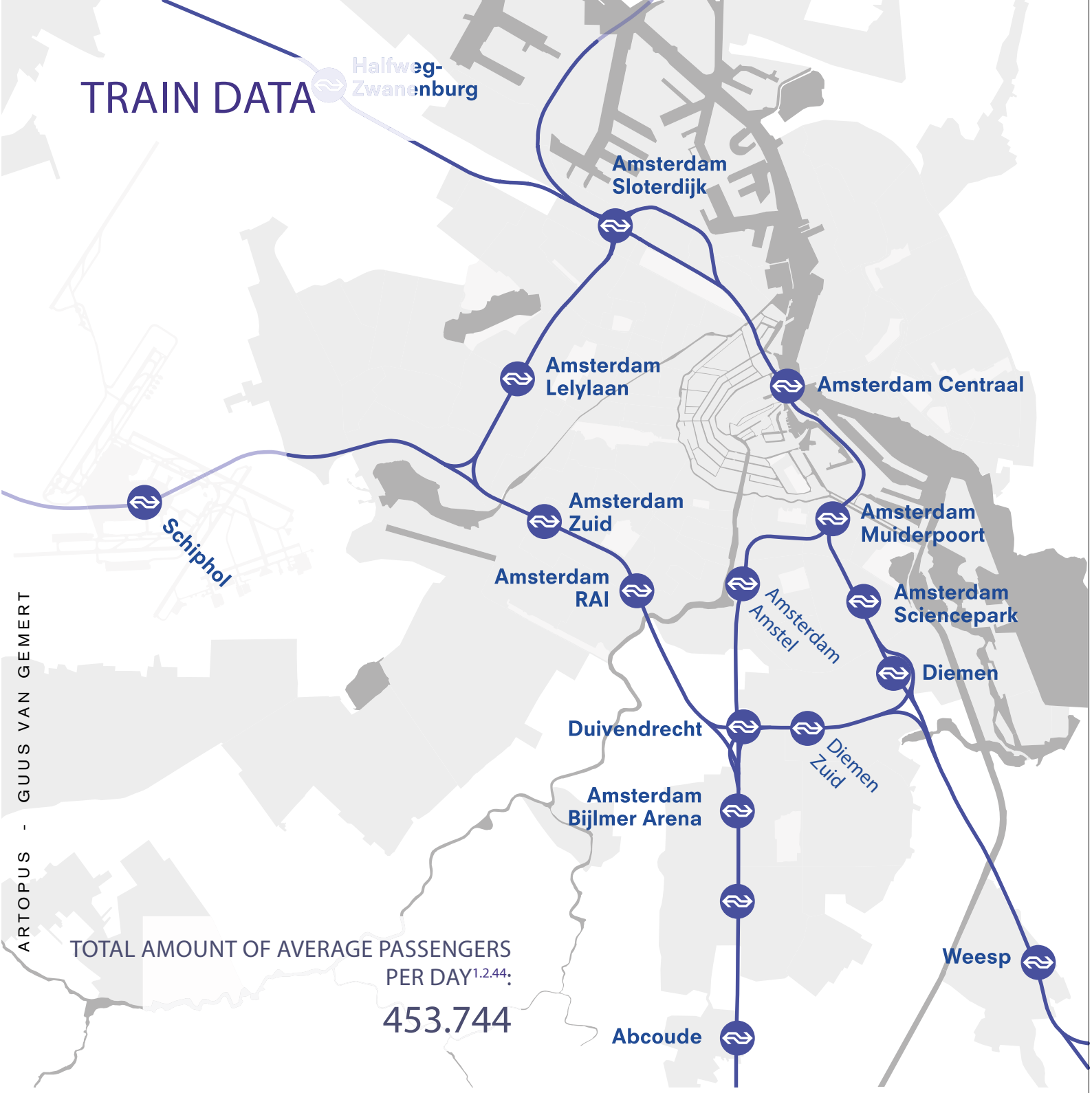
TRAIN DATA



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TOTAL AMOUNT OF AVERAGE PASSENGERS PER DAY[1.2.44]:

453.744

Train network

In total there are 16 train stations in the metropolitan area of Amsterdam. Nine of which are within the municipal boundary of Amsterdam, while the other seven are part of neighbouring areas (even though stations like Amsterdam Bijlmer Arena still have the prefix Amsterdam). The overall train capacity is one of the highest of the country, only rivaled by Utrecht and Rotterdam-Den Haag.

There are five connections to other cities that immediately stand out. Through Weesp trains connect to Almere and Lelystad. The south eastern corridor of Amsterdam Amstel and Amsterdam Bijlmer Arena connects with Utrecht and beyond.

Sloterdijk connects to trains coming from both Zaandam and Haarlem. Trains arriving from The Hague and Rotterdam have to ways of approaching the city; either via Schiphol or via Haarlem (and thus via Halfweg Zwanenburg). The only way to get from Amsterdam Centraal to Schipho, the two busiest stations,l is through a connection with other stations like Sloterdijk or via a detour along Duivendrecht.

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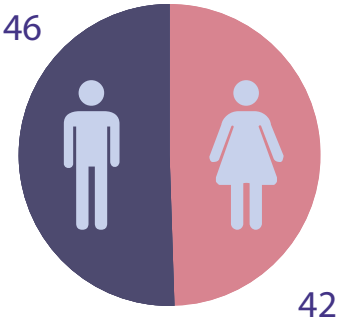
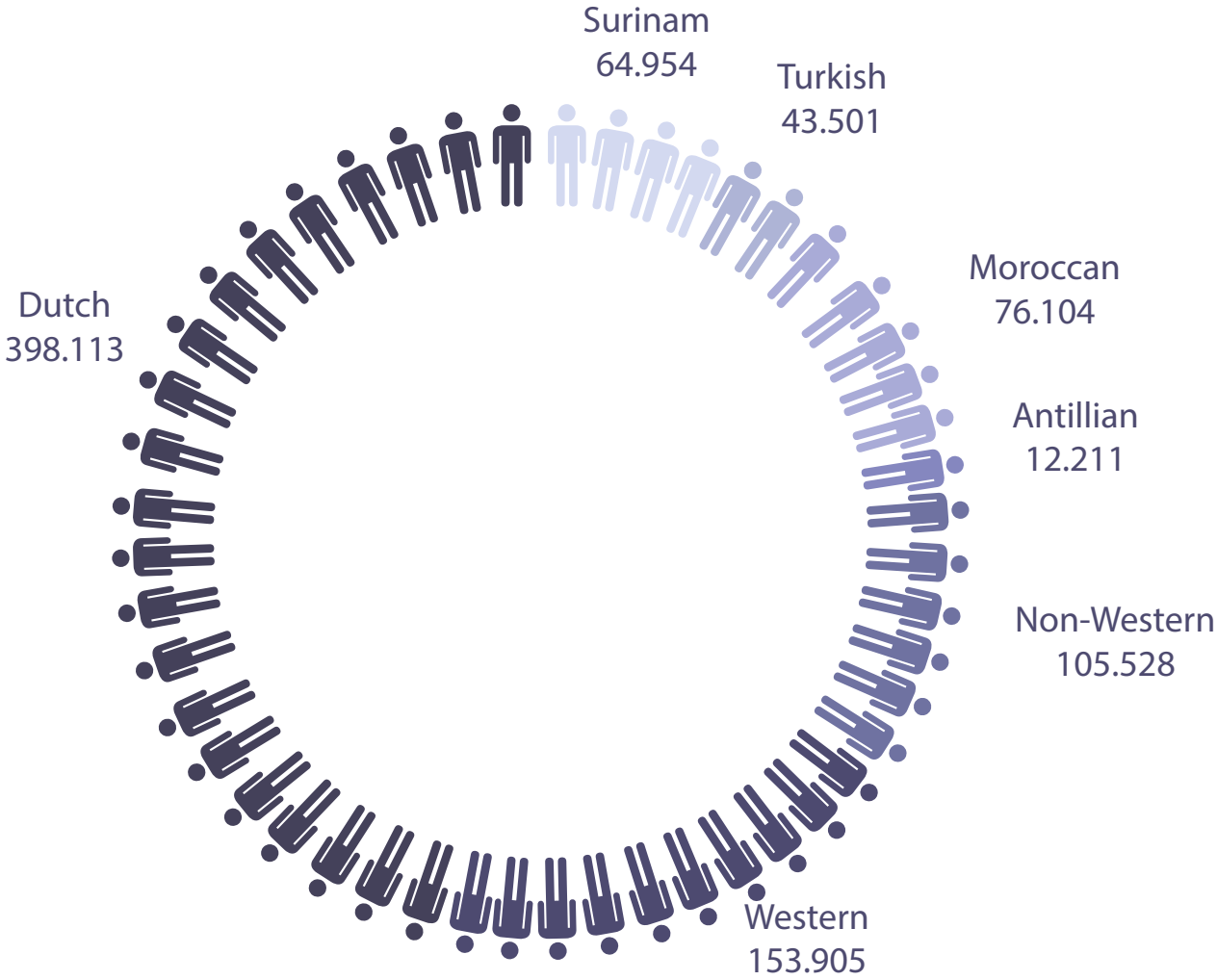
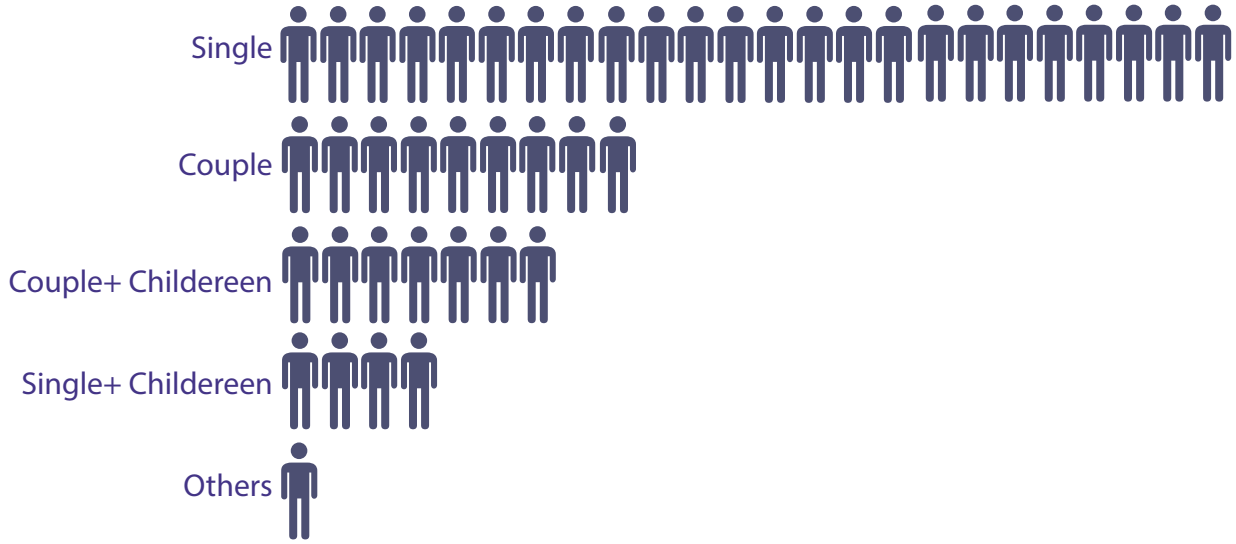
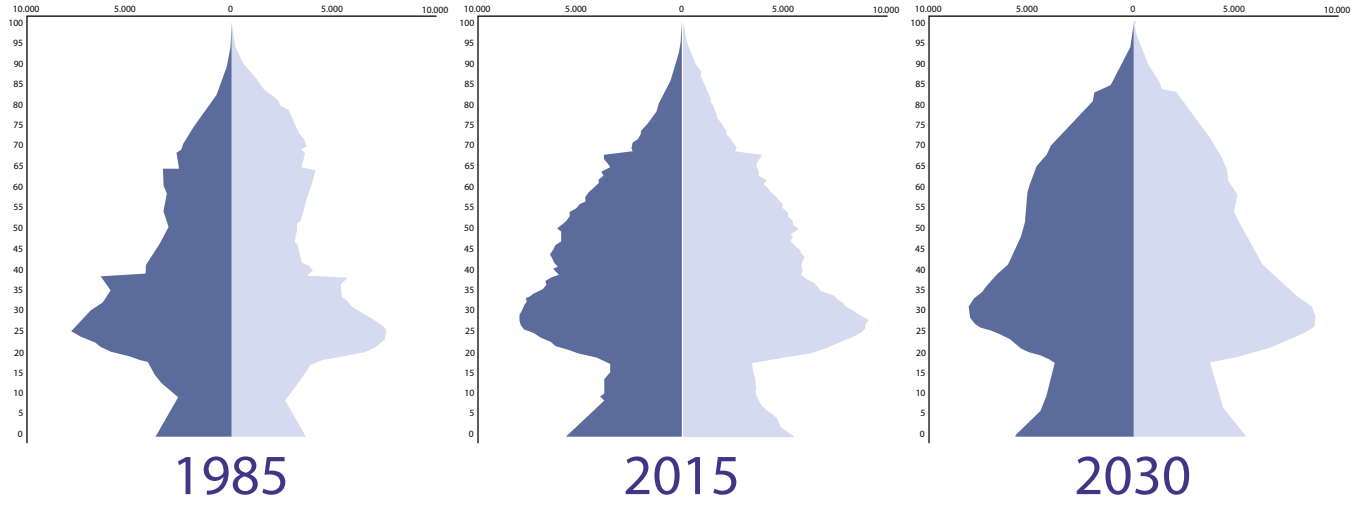
DEMOGRAPHICS





Households





Population through the years

In 1985 Amsterdam has more inhabitants with the ages between 20-40 and less elderly of 65+. In 2030 towards 2050 this will change. People will live longer and will get older. The amount of elderly people will double.

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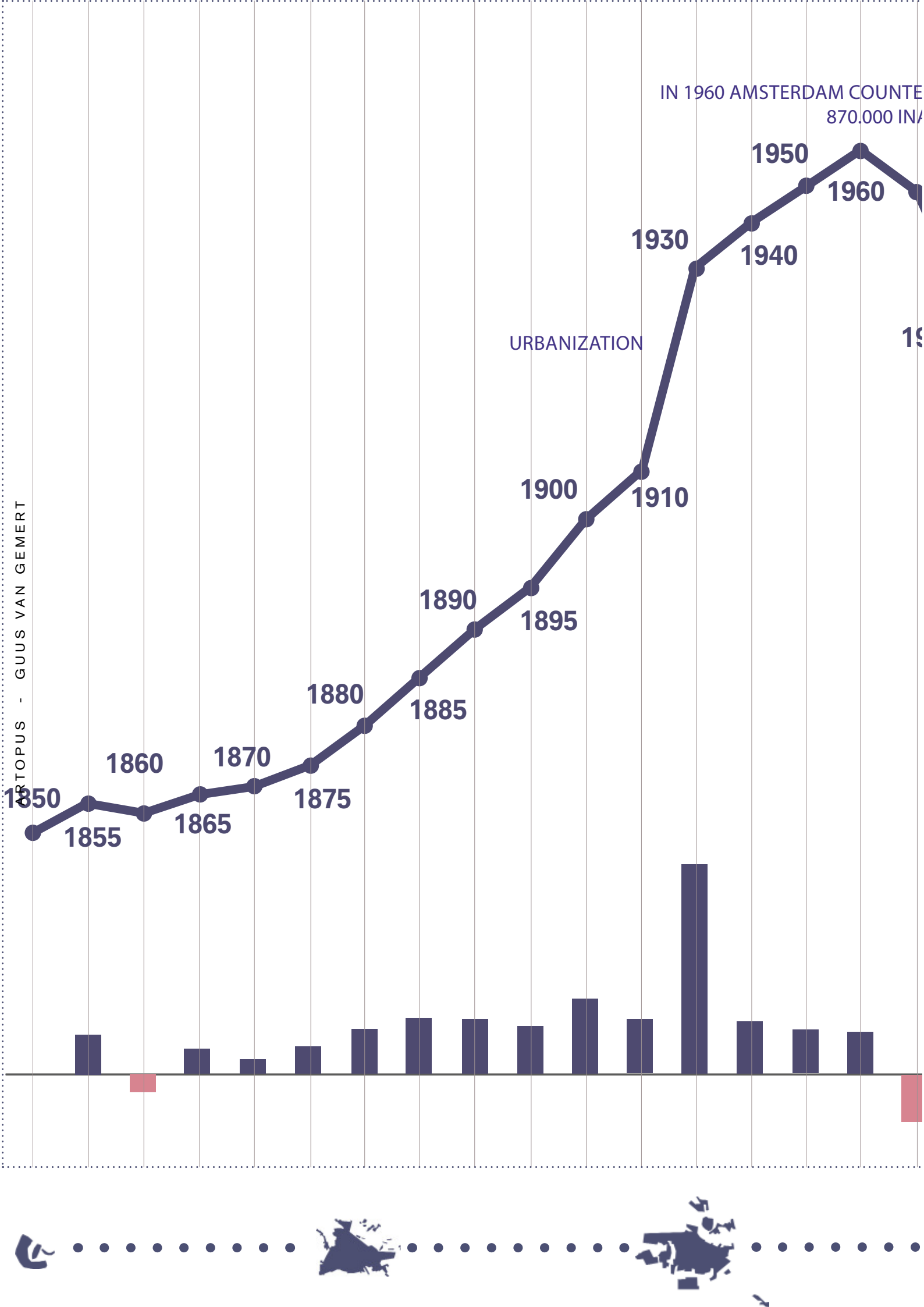
IN 1960 AMSTERDAM COUNTE
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URBANIZATION
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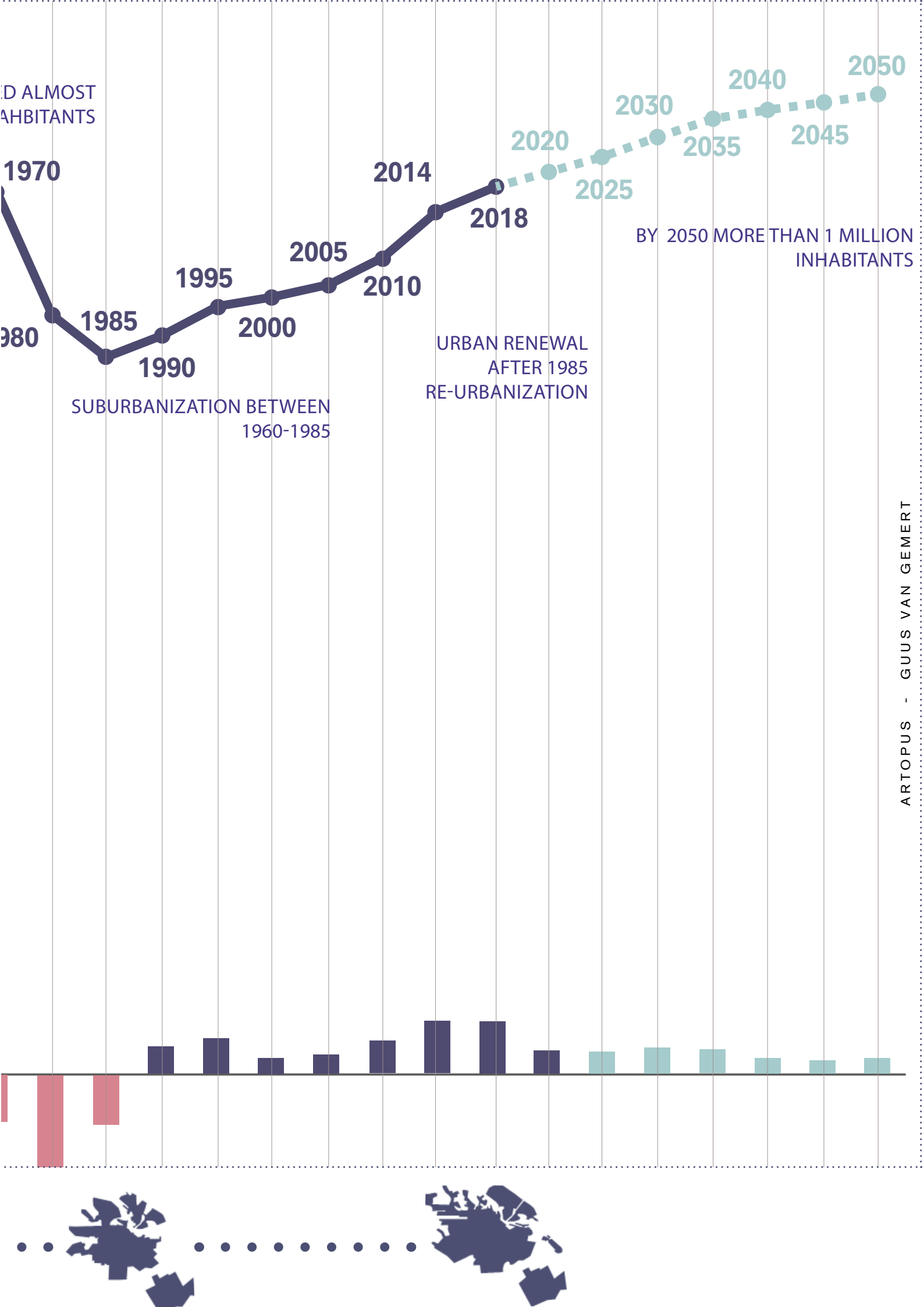
D ALMOST
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2050
SUBURBANIZATION BETWEEN
1960-1985
URBAN RENEWAL
AFTER 1985
RE-URBANIZATION
BY 2050 MORE THAN 1 MILLION
INHABITANTS
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“AMSTERDAM WILL HAVE MORE THAN 1 MILLION INHABITANTS IN 2050”

- OIS Amsterdam (2017) [1.5.1]

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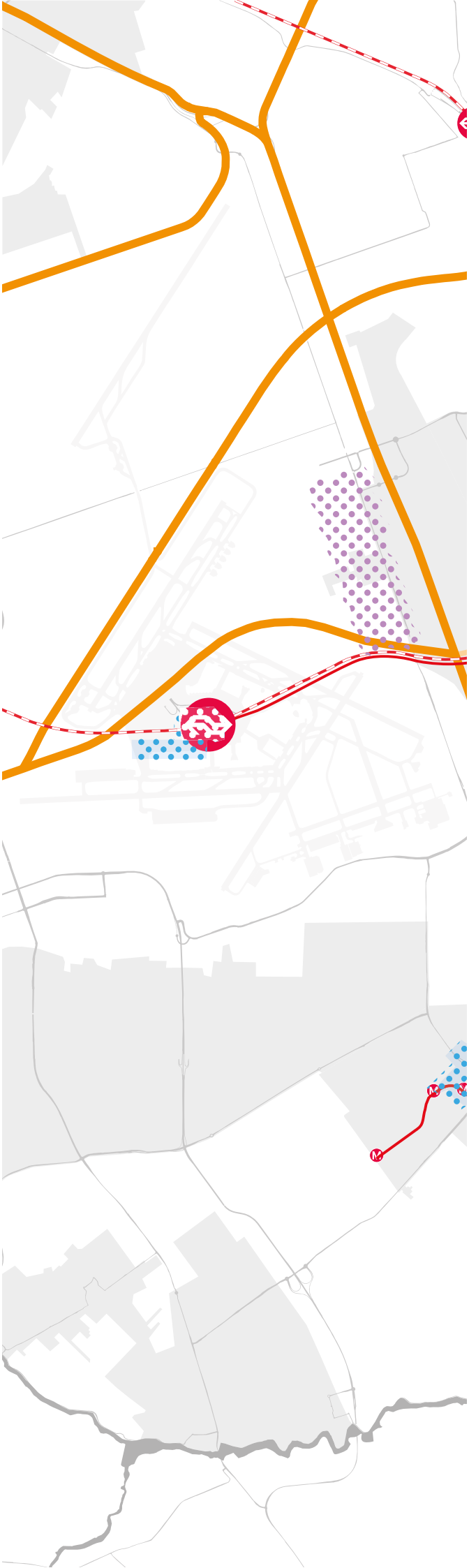
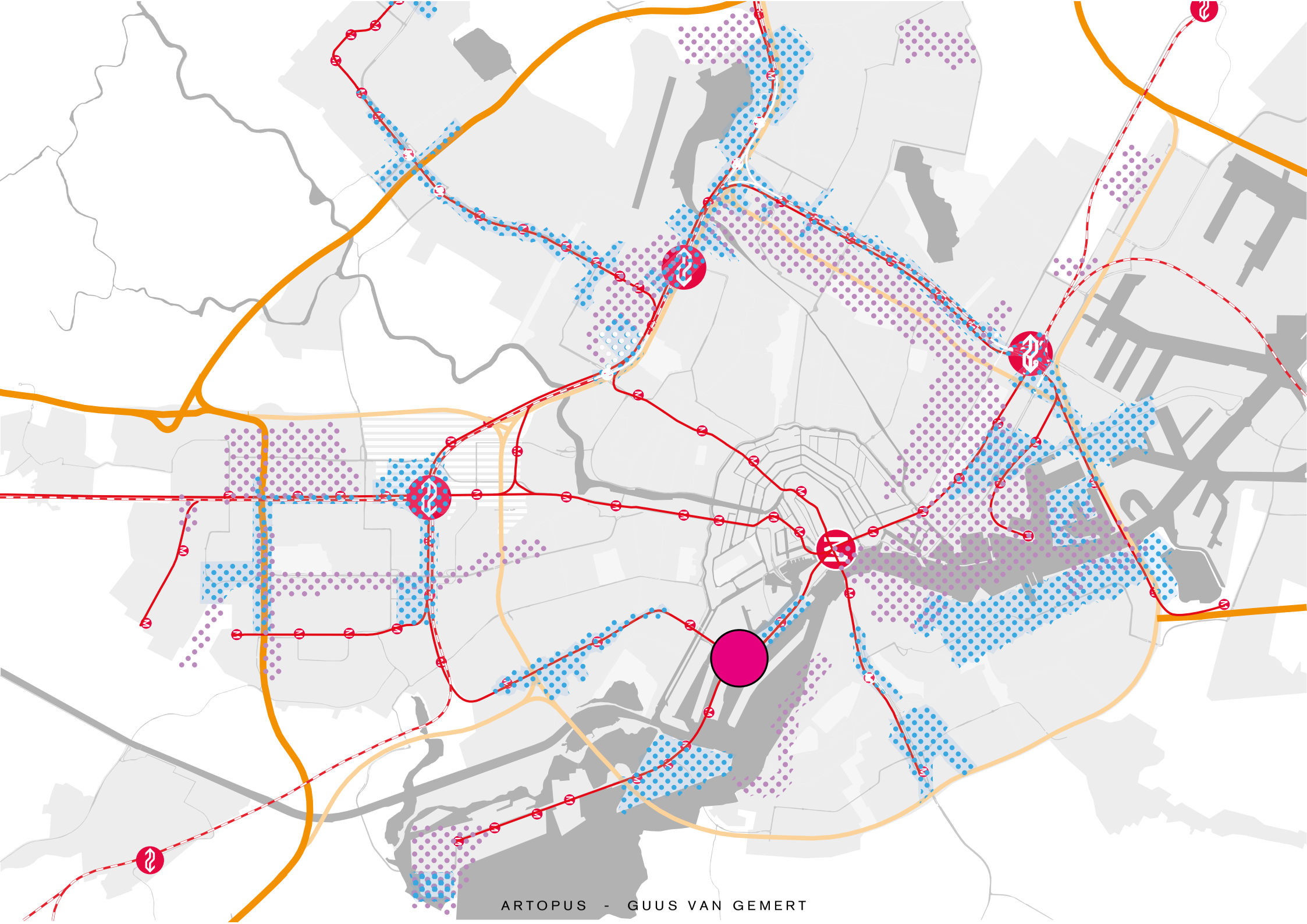
DENSIDIED AREA

Based on the proposed new mobility networks, the potential regions for densification are rather obvious. Most of these regions become available due to the modification on mobility infrastructure and the addtion of new metro stations.

The regions around A10 ring highway could be redesigned and densified due to its downgrade, which makes the highway more approachalbe and living-friendly. Thus, it is forseeable to allow new living quarter and amenities to take place on such region.

New metro lines and metro stations are proposed to improved the liveability of Amsterdam. There are two types of new metro stations at this stage; one is to transform the old train station or the insignificant train station into metro station in order to boost the regional mobility service and to reduce residence commuting time during peak hours; the one is to propose new station on new land that is being proposed by the municipality which shows a great deal of potential due to the increase of population and business oppotunity.

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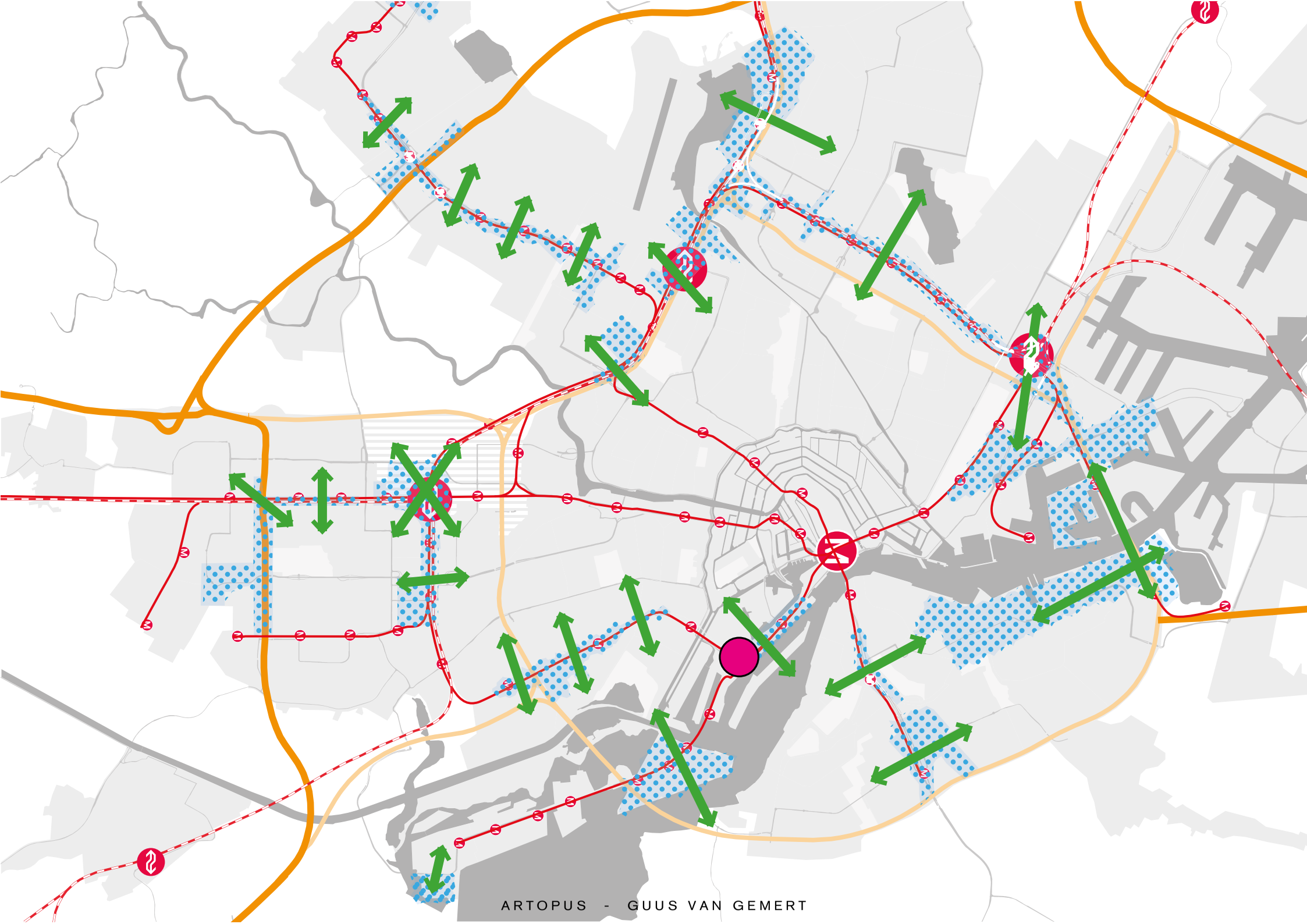
RE-CONNECT

The proposed densified areas, in one hand, bring new opportunity for the local communities, on the other hand, it increase the bonds between communities and enhance the identity of the city as a whole.

Regions, such as Science Park, Duivendrecht station, are too well defined by the infrastructure which becomes barriers for the region. In order to reconnect the disected and fragmented space, the new proposed metro lines are a new way to solve this urban problem. By doing so, there is a new possibility of using the infrastructure space to accomondate new living quarter. For instance, the elevated train track at Science Park could be removed and introduce underground metro line, so that the ground space could be urbanised properly. Such example could be seen based on this group strategy and new vision of city becomes more appealing to the citizens and investors.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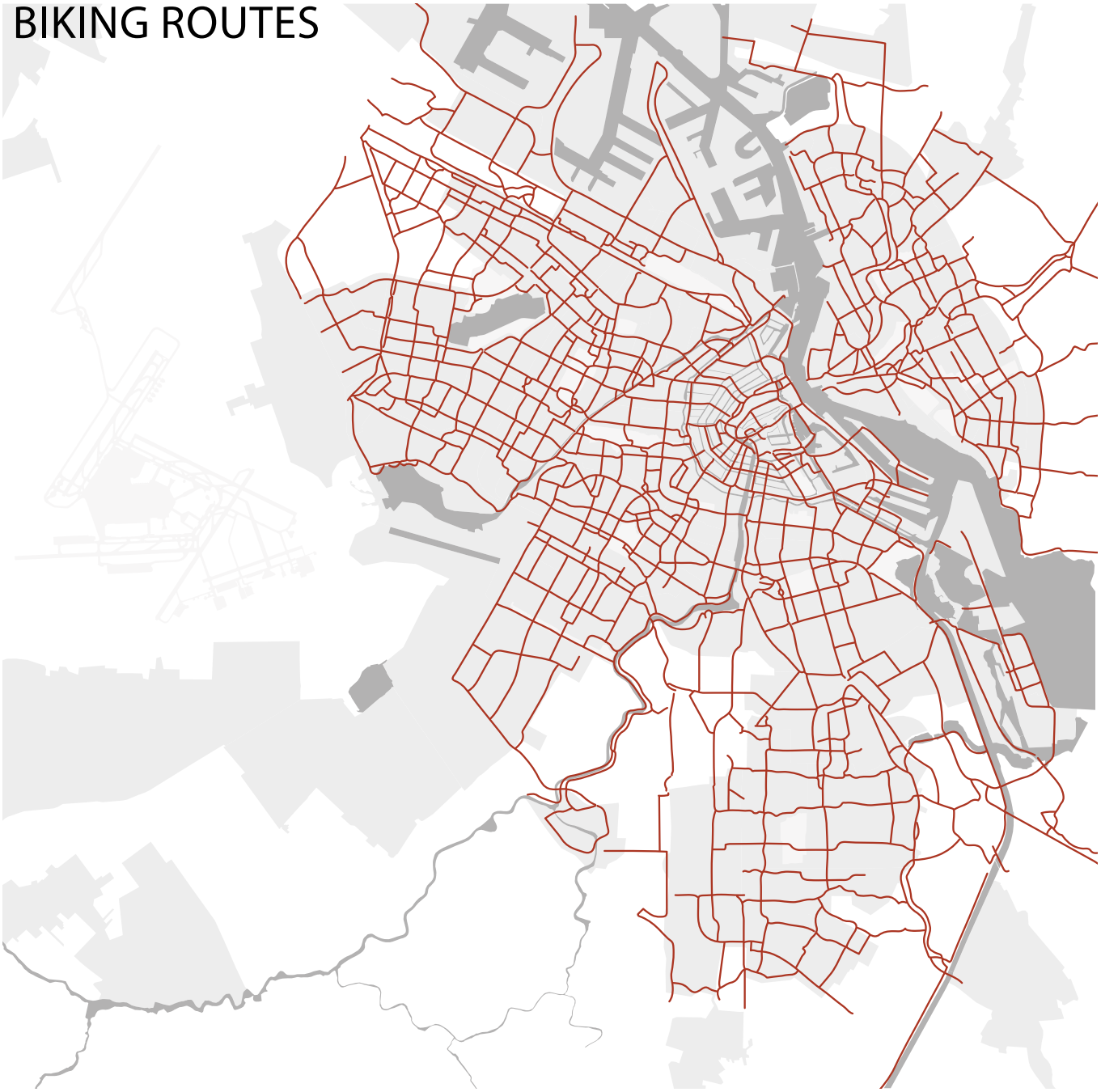
BIKING ROUTES



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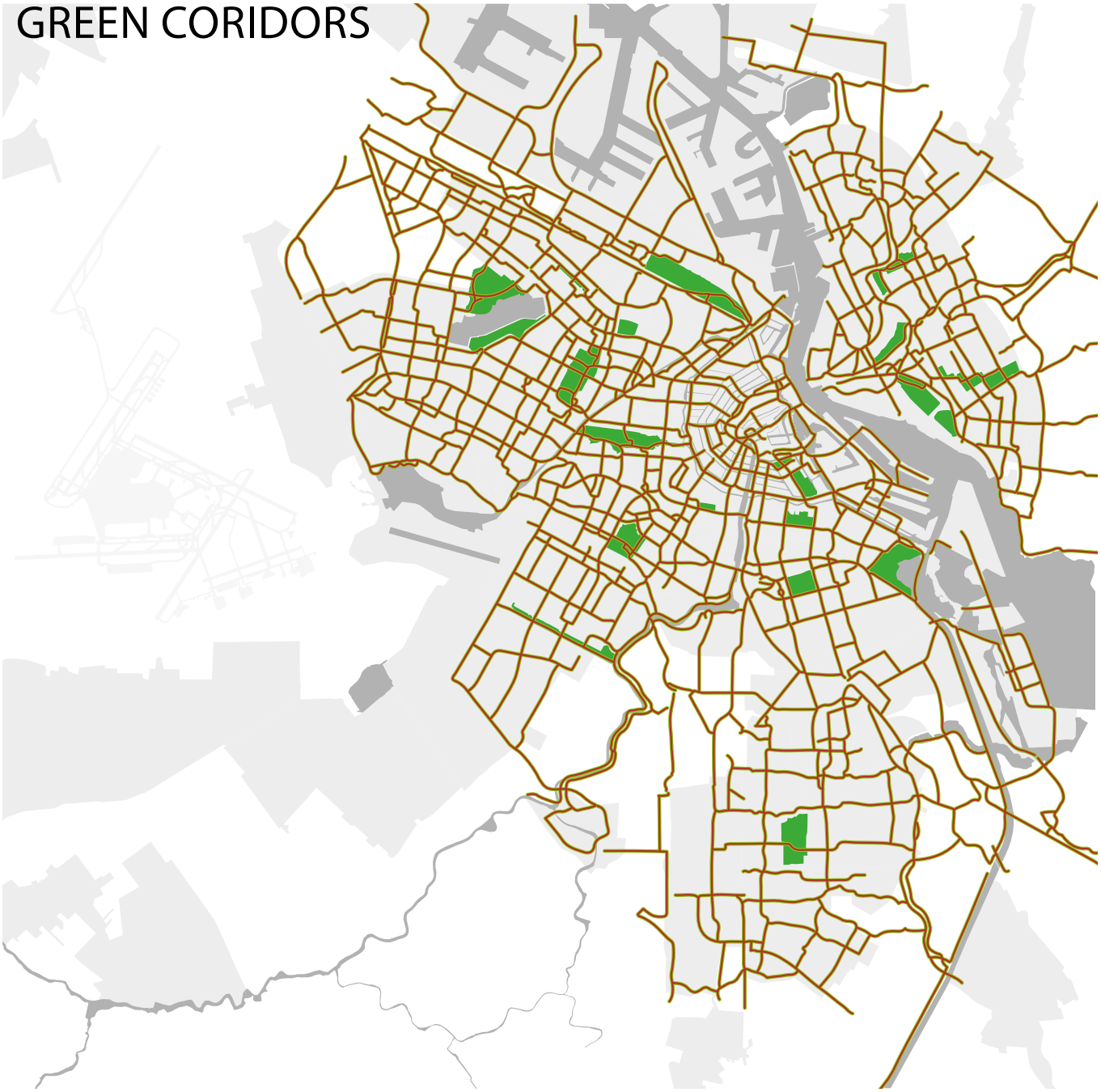
In Amsterdam, biking is transport number one. Therefor, the municipality puts a lot effort and money in cycling infrastructure. In the picture above, all the main cycling routes are shown. These routes connect all the neighbourhoods with eachother, and are mainly the next step afster high and medium speed traffic.
Not only the routes are inportant for the city, also parking places for bikes play an important roll in the infrastructure. Near trainstations, big parking places for bycicles are located. These places functions as hubs for cyclist to other means of transport.

GREEN CORIDORS



Bycicle routes gets interresting of combined with the graan parcs. It is clear that the routes functions as coridors through the city. Because of this, the municipality aims on the oppertunities of realizing green coridors. The cit will get more green and the livability increases. Also, with this it is stimulated to travel by bike instead of the car.

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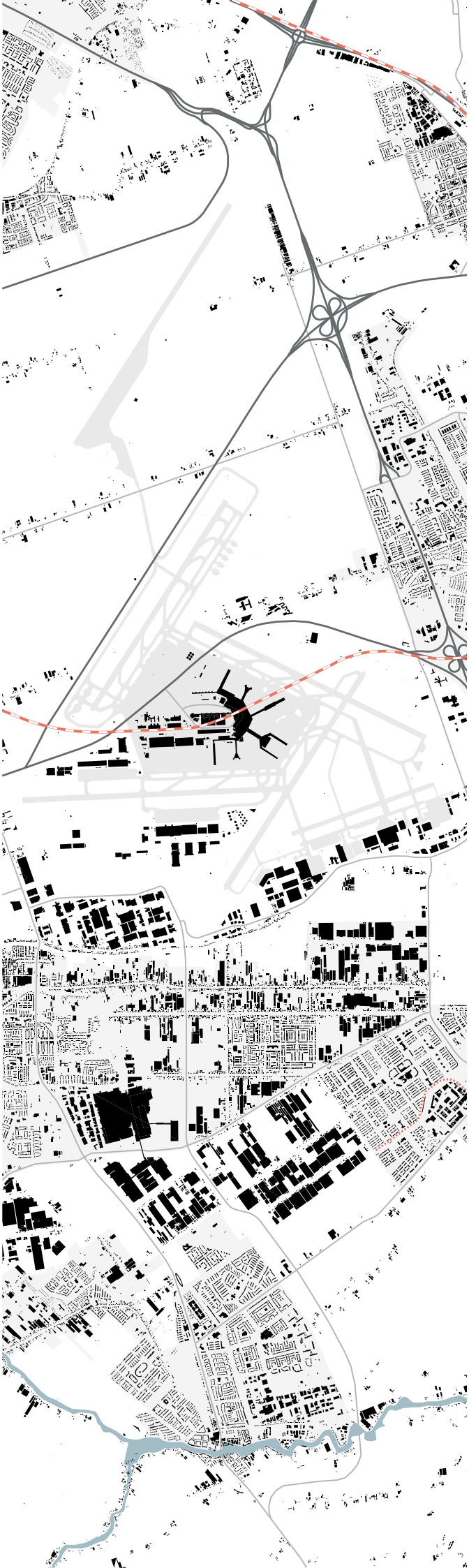
METRO NETWORK

We strongly emphasise the importance of the metro as the main urban modality of everyday traffic within the metropole. The relatively low noise intensity combined with the high-speed urban movements make it a perfect modality for fast metropolitan transit. In order to strengthen its position in the city, we propose new lines that connect important Urban Hubs.

This way the strong (existing) position of the Urban hubs trickles down into the areas the metro serve; allowing for affordable densification projects to find space and become desirable for future tenants. Densification is projected along the strengthened network, in order to capitalize on the increased connectivity of all of the fingers in relation to the Urban Hubs and to each other. Some of these new lines reuse train connections that will become less frequent in order to generate more friendly conditions for new densification or development.

The metro network will also link into the logistic network, by using the same infrastructure for inner city delivery of goods. During off-peak hours the logistic network can use the existing network, thus generating a 24 hour efficient use of a truly urban infrastructure.

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PROPOSED NETWORK

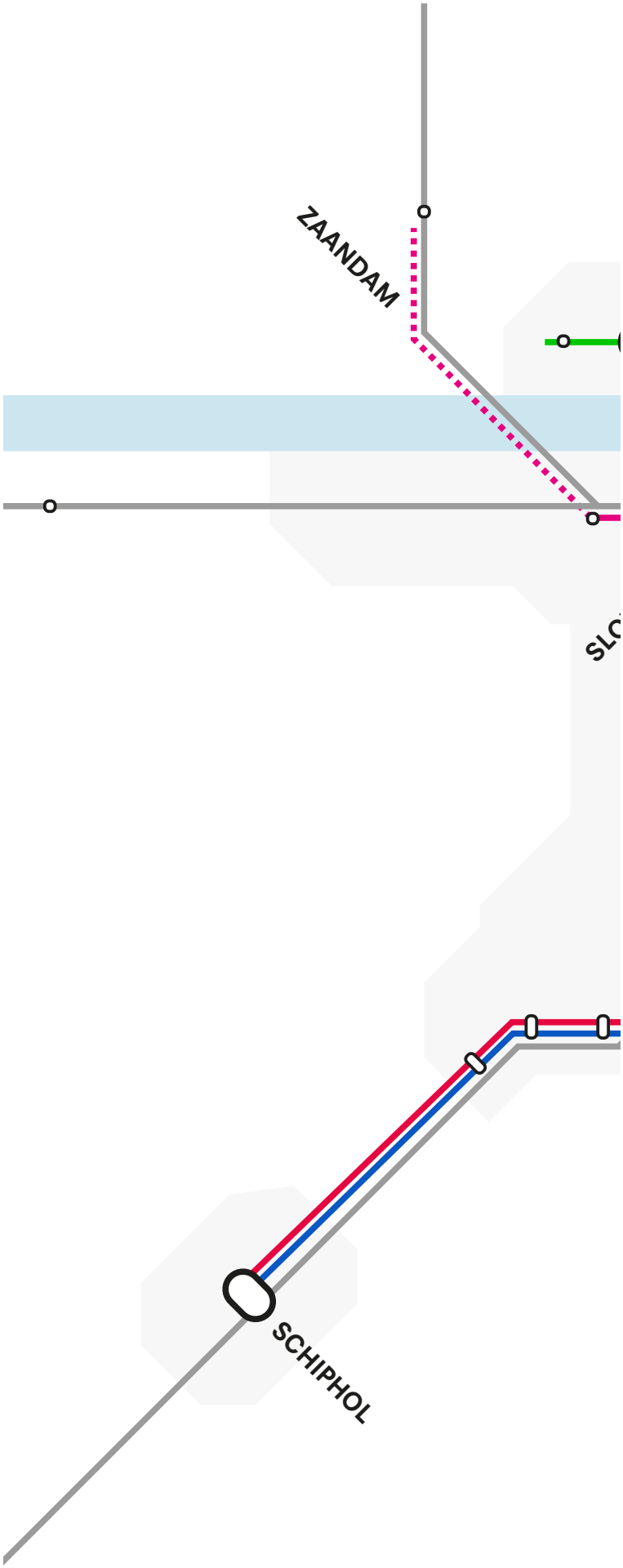
In total two new lines are added to the current system. A new line (pink) will connect Sloterdijk (and in the future possibly Zaandam) with IJburg via Centraal Station and the new developments in City Islands.

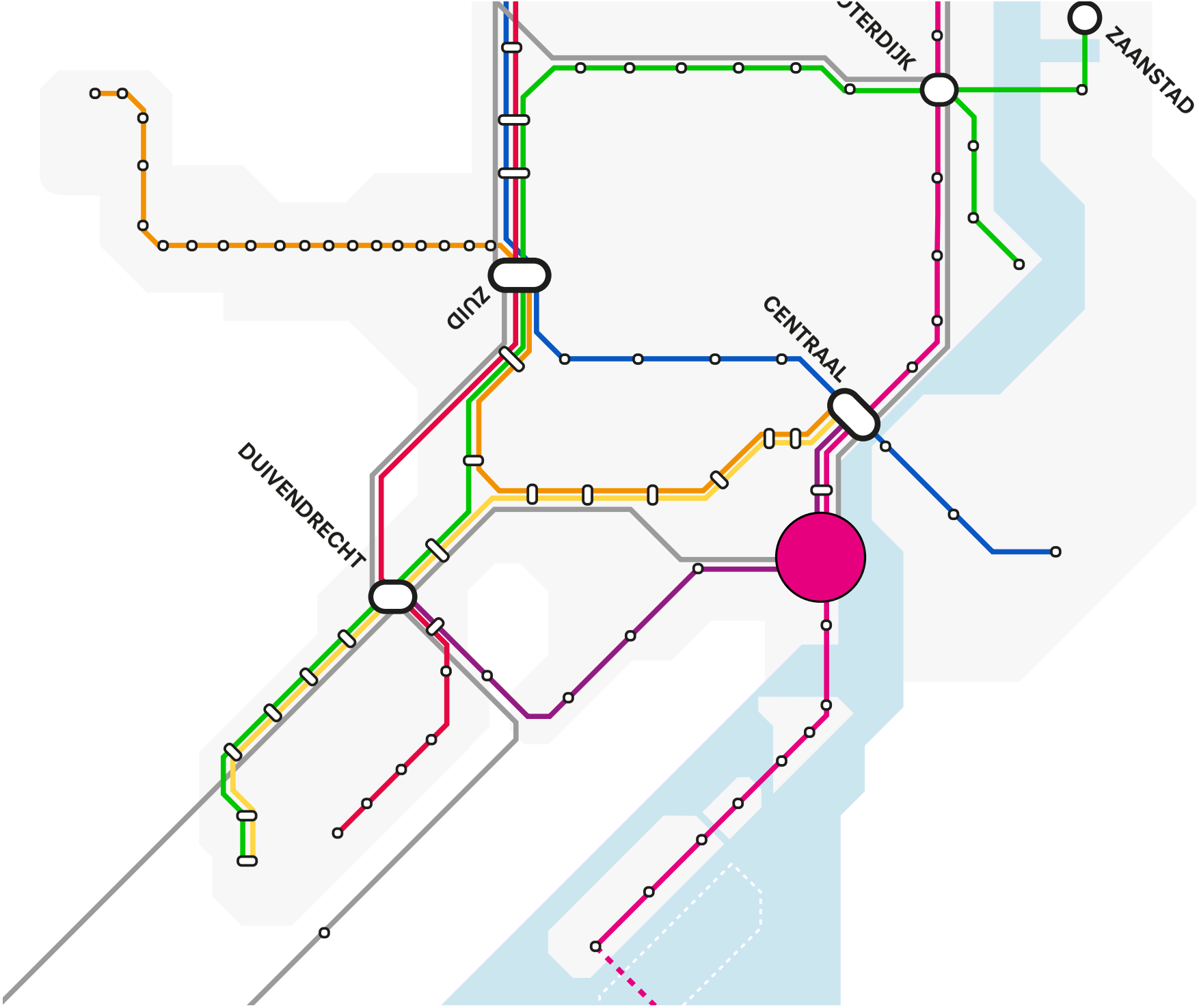
The purple line will form a second loop in the city by connecting Centraal Station with Duivendrecht via Science Park in order to replace the train connection, while simultaneously strengthening the metro network into a more reslient grid that often allows for multiple routes through the city.

By rerouting or extending several of the existing lines, more locations will be served by the metro network, both making the entire network more resilient, as making many of the densification locations a lot more attractive.

Schiphol is probably the most important addition to the network, providing air passengers a direct link to the metropolitan grid. The newly finished Noord Zuid lijn will be rerouted there, creating a very speedy connection (approximitely 16 minutes), once more strenghtening the position of the airport in relation to the city. The airport will also be served by the rerouted Red line, connecting the Bijlmer with the airport, offering both a direct connection, but also many transit opportunities from the Bijlmer on its way.

From sloterdijk the metro will also connect to the new Cruise terminal in Zaanstad, allowing tourists visiting the city a fast entry entry to the places they want to visit. A second branch north of Sloterdijk will kickstart the developments in Havenstad as well.





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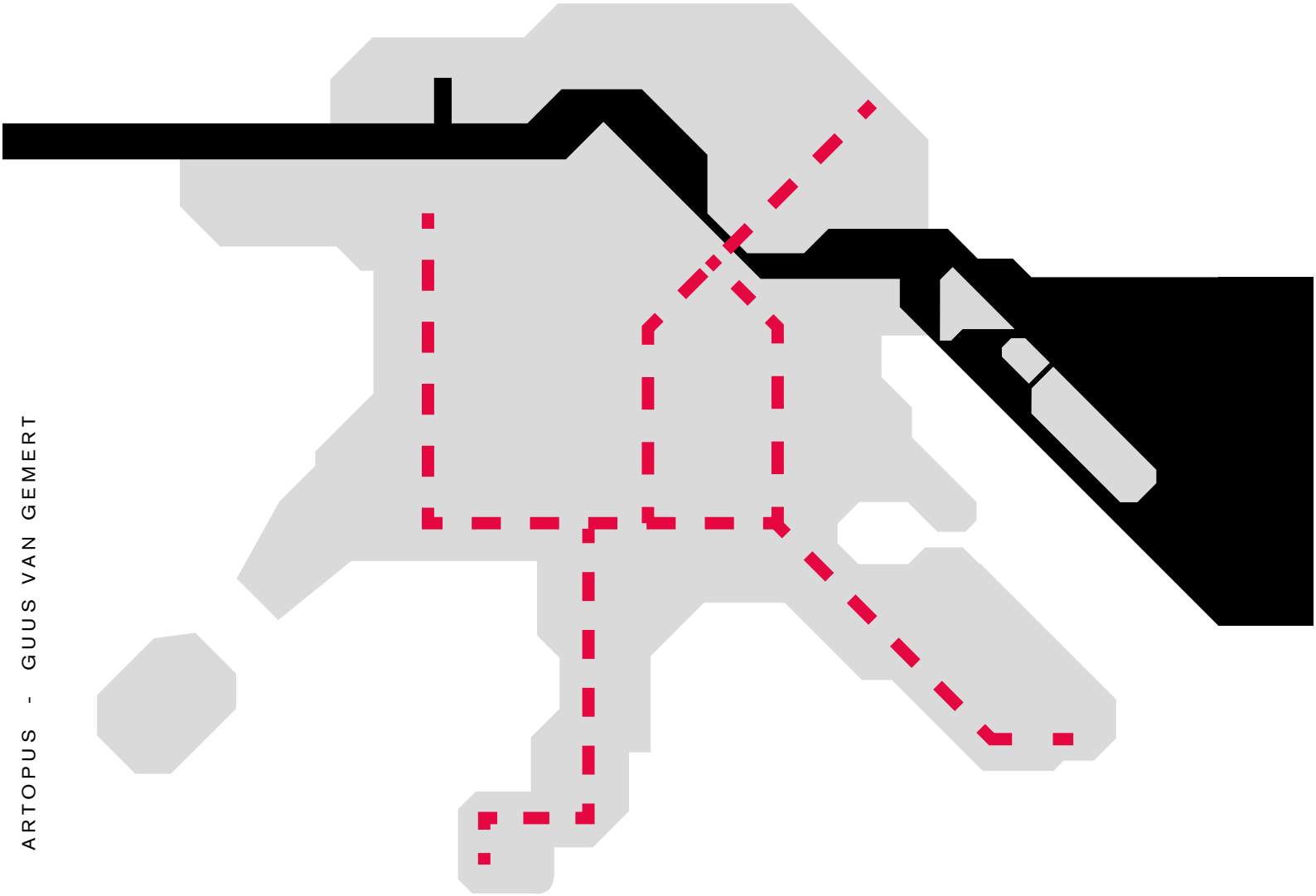
CURRENT SITUATION



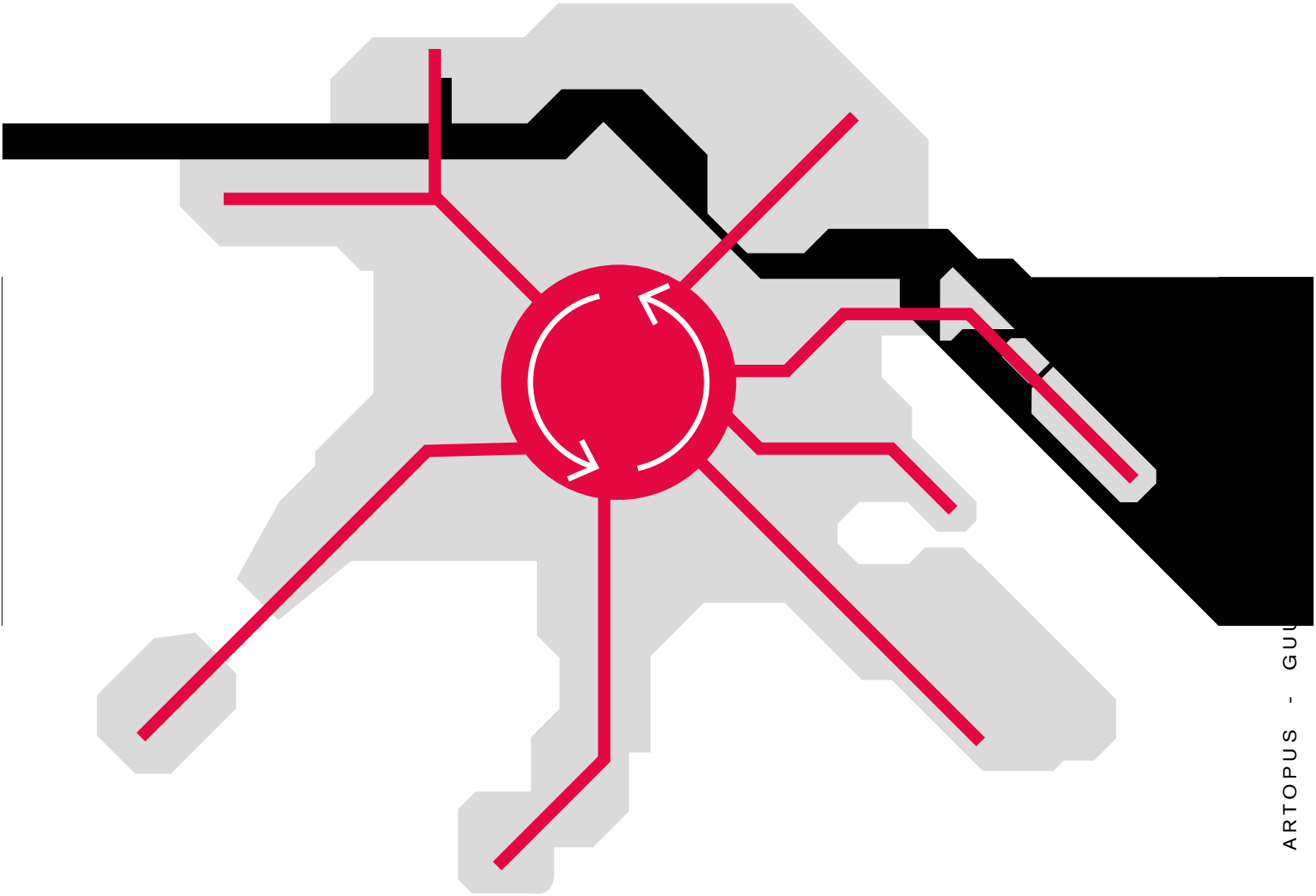
The current network is insufficient in serving the metropole as a whole. It is made up of disjoint lines that are not well connected enough to be dominant as the only urban transportation mode. The new Noord Zuid Lijn is a nod in the right direction by extending into one of the cities fingers (Noord).

The Fingers are the main point of focus in this strategy, because that is where the biggest gains are to be made for the metropolitan area.

Therefore we propose to enlarge the network by extending or introducing new lines that target the ´fingers´. In some cases this is done by rebranding an existing connection, for examble towards IJburg where the sneltram will be refered to as a metroline. By doing this it is it is our goal to lower the threshold from getting onto the metro network.

New lines will extend towards Zaanstad (and possibly Zaandam), the Sciencepark area and the

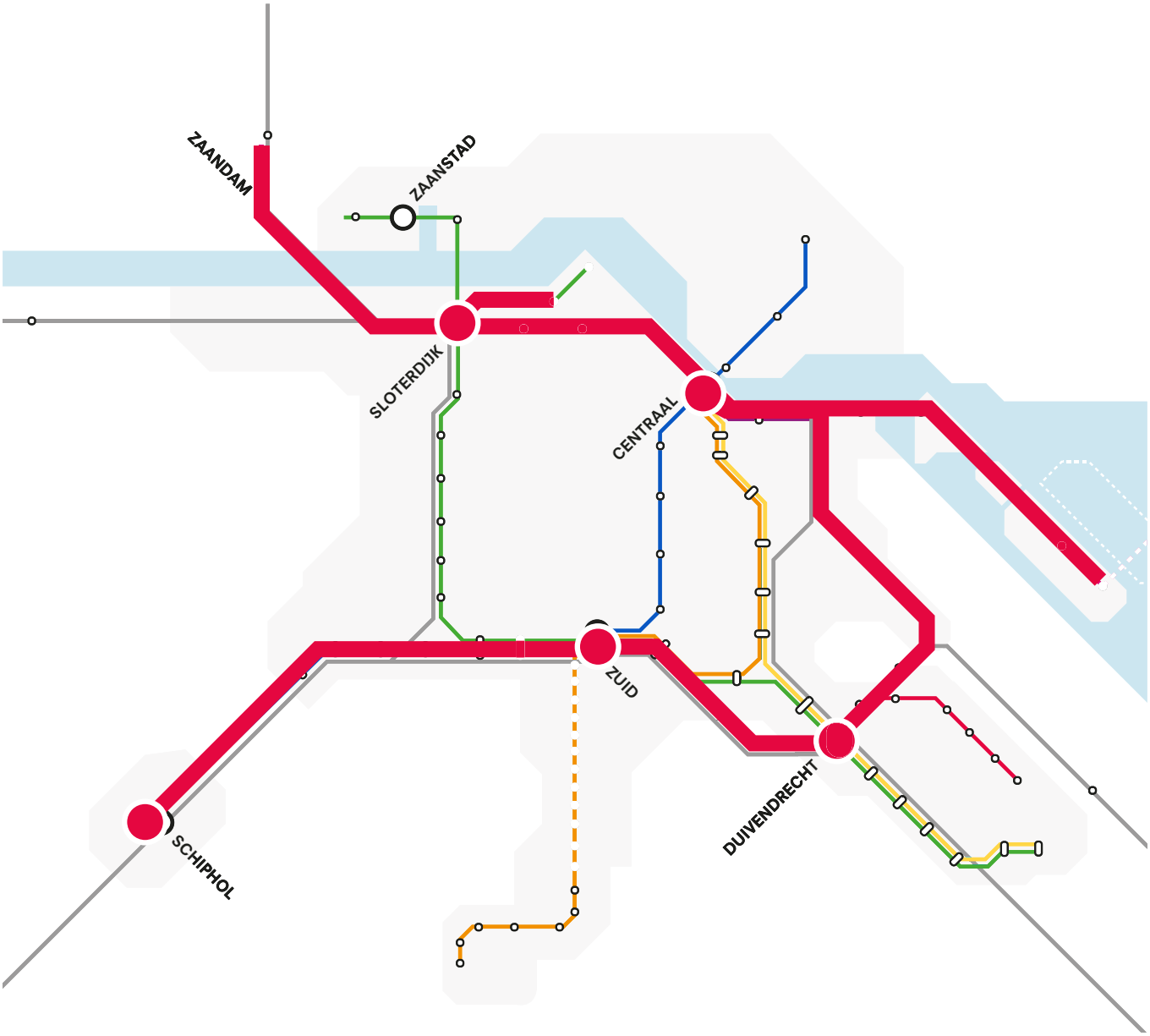
PROPOSED GOAL



Nieuwe Meer district (and Schiphol by extension). This way these areas become a lot more attractive for future developments, not only because they have a strenghtened connection with the city, but also because these lines join the new train system at the key nodes, Sloterdijk, Zuid and Duivendrecht and Centraal.

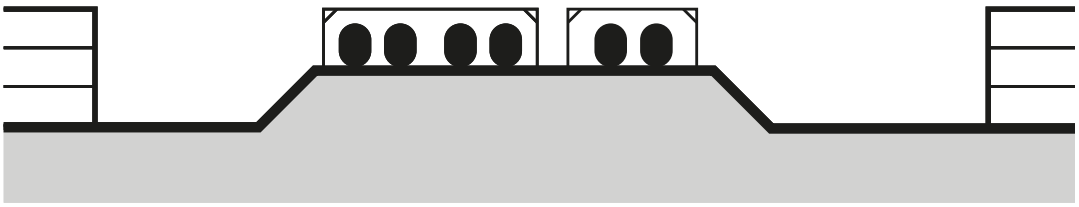
The overall new network also has a strong emphasis on connecting the individual fingers with eachother nonetheless. Two new loops have formed in the city, very similar to the Circle Line in for example London.

USING EXISTING TRAIN TRACKS

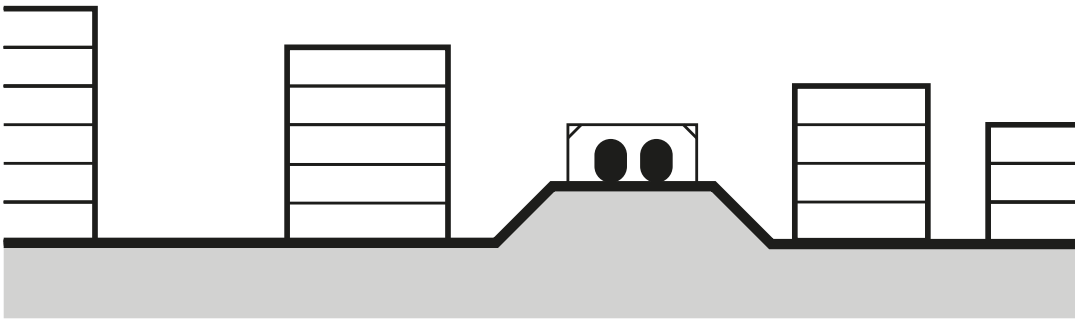


To be able to be realistic about the proposed extensions to the network, we studied the possibilities of using existing infrastructures across the metropole. We have concluded that most of the proposed changes can reuse either redundant train lines or grab onto the space current infrastructure already occupies. By diverting the Almere train connection to Duivendrecht in stead of Centraal, the entire train track along Sciencepark can be transformed into a new metro line. The same goes for the essential Sloterdijk-Centraal connection which is needed to close the city loop. A future connection to Zaandam could be imaginable in the same tunnels already in use for train connections. The Schiphol trainstation could partly be reimagined as a metro station in order to relieve pressure on the train capacities. The train connection will partly be overtaken by the metro with new stops along de Nieuwe Meer. The proposed changes also help to declutter the area around Duivendrecht station by making the big turns redundant.

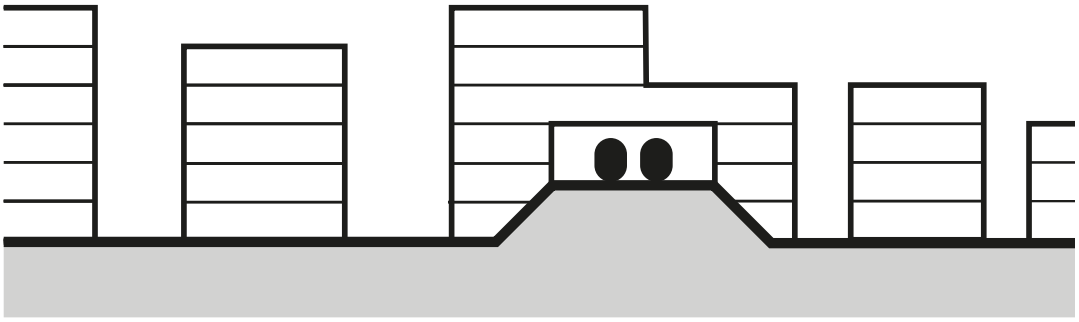
SPATIAL IMPACT



1: Current



2: Shrinking infrastructure down



3: New ways of living around infrastructure

The re-use of the existing rail lines will have the advantage that the there is enough space available (1). Secondly, it means that the metro lines can be implemented before the full train system has changed with minimal costs. Because the metro system produces less noise than the trains, it also becomes possible to live closer to the lines (2). Higher densities could become more attractive due to increased mobility in the area. It could also be considered to build over the metro, encapsulating them, reducing the noise problem to practically zero (3).

Group strategy AMSTERDAM 2050
The colours of the titles refer to colours in diagrams/ model as well?

Densification
The main objective of creating a vision for AMSTERDAM 2050 is to position and define relationships between densification projects and how they are able to connect to the entire metropolitan area of Amsterdam. As a group, we want to define and generate conditions that will allow for city-wide successful developments. The different topics we have chosen to elaborate on, Heavy Infrastructure, Urban Hubs, Urban Infrastructure and through our Individual Projects all seek to contribute to creating an environment for future densification of the city.

Heavy infrastructure
Currently the main effect of the ring road (A10) is severing off connections within the metropole. The high driving speed and the intensity of three lane and raised traffic create a physical boundary between city parts. It metaphorically trims off the fingers from the hand. We believe it is essential for the metropolitan area of Amsterdam to stop thinking of the city as a mono-centric entity in order for the large densification challenge to be successful. The largest densification challenge isn´t in the traditional inner-ring ´centre´, but in het Algemeen Uitbriedingsplan's fingers. It is therefore not our goal to make the ´city-centre´ traffic free, but to focus on a city-wide relieving the pressure this traffic creates by re-thinking sequences and where possible diverting to other transport possibilities that are more in sync with metropolitan conditions.
Therefore we introduce Logistic Hubs that are strongly anchored along the second ring (A9), are served by rail infrastructure and in the case of Schiphol, have large-scale air traffic to their disposal. The goal is that these zones generate special circumstances where all kinds of large-scale infrastructure (large trucks, cargo, delivery hubs, but also services like central waste collection and energy production) are centralised, making it possible to relieve the city from the pressure of the heavy traffic these programmes require. The A10 thus becomes a less intensive traffic carrier, and could evolve into a new type of boulevard that connects the fingers with each other, rather than cutting them off.

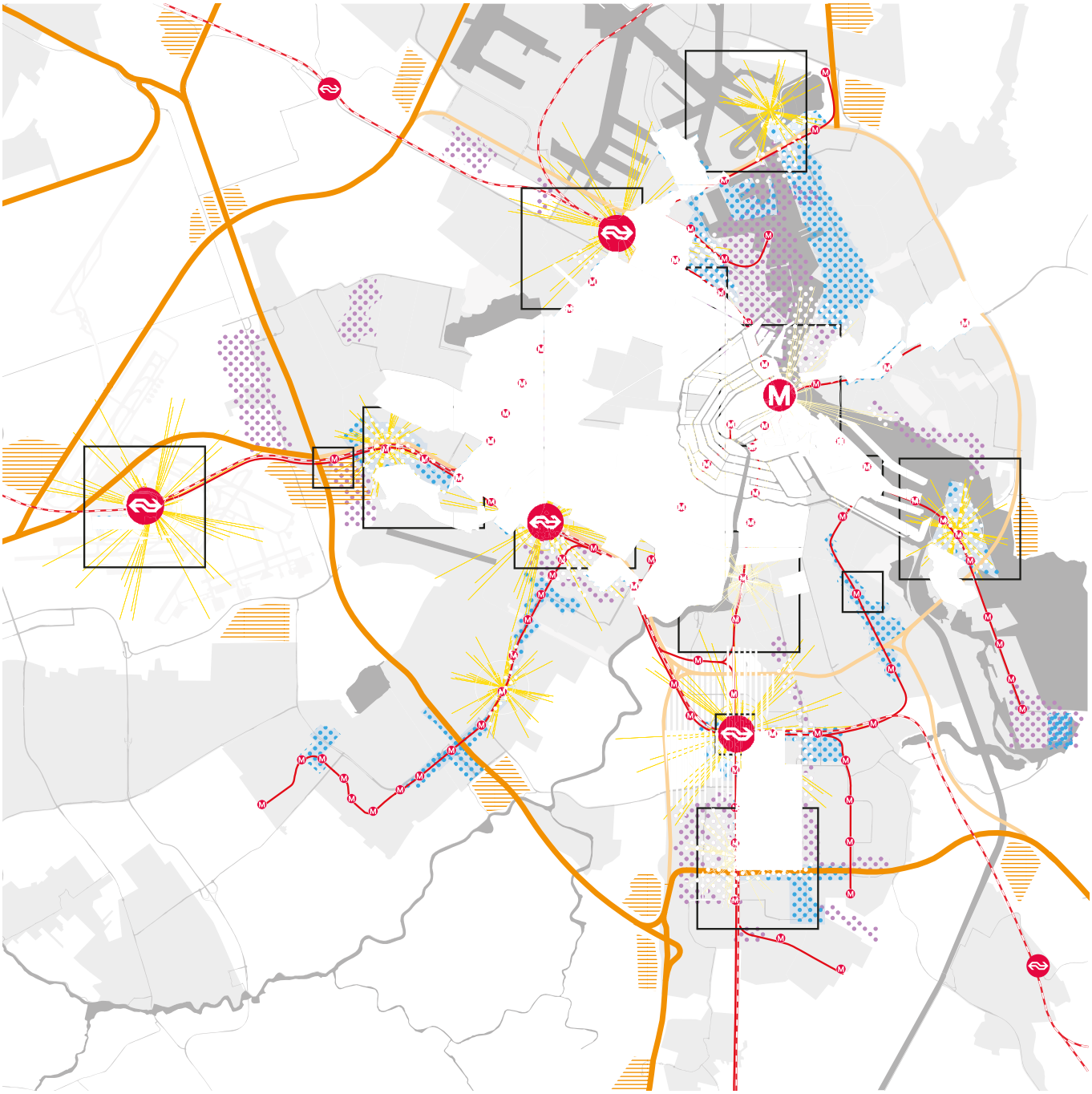
Urban hubs
Within this framework of a multi-nodal city, it is thus important to formally name these nodes that have both special strategic requirements, but also unique urban desires. These nodes in the city are centred around a multimodal transport hub; often combining train traffic with metro connections, but in the case of Zaanstad it combines the new Cruise Terminal with metro connectivity or in the case of Schiphol where trains, metro and air connections meet. We foresee Centraal station to slowly evolve in a station in a major metro hub, rather than the highly intensive train network it currently serves. By by-passing the train-related intensity more evenly to stations along the ring boulevard, which all have a direct metro connection, station areas like Zuid, Sloterdijk and Duivendrecht will become more viable and turn into new urban anchor points. The Urban hubs are characterised thus by a high level of amenities and great regional and metropolitan connections.
-Zuidas
-Sloterdijk
-Centraal
-Zaanstad Cruise terminal
-Schiphol Airport
-Duivendrecht

Supplementary smaller Hubs:
Amstel III
Lelylaan
Schiphol Corridor
City Islands
Noord
Amstelveen Centre
Bijlmer Station

Urban infrastructure
We strongly emphasise the importance of the metro as the main urban modality of everyday traffic within the metropole. The relatively low noise intensity combined with the high-speed urban movements make it a perfect modality for fast metropolitan transit. In order to strengthen its position in the city, we propose new lines that connect important Urban Hubs. This way the strong (existing) position of the Urban hubs trickles down into the areas the metro serve; allowing for affordable densification projects to find space and become desirable for future tenants. Densification is projected along the strengthened network, in order to capitalize on the increased connectivity of all of the fingers in relation to the Urban Hubs and to each other. Some of these new lines reuse train connections that will become less frequent in order to generate more friendly conditions for new densification or development.
The metro network will also link into the logistic network, by using the same infrastructure for inner city delivery of goods. During off-peak hours the logistic network can use the existing network, thus generating a 24 hour efficient use of a truly urban infrastructure.

Individual Projects
Ines - Making a new centre with a green pedestrian street that is connecting 2 parks. That is surrounded by different new types of community buildings.

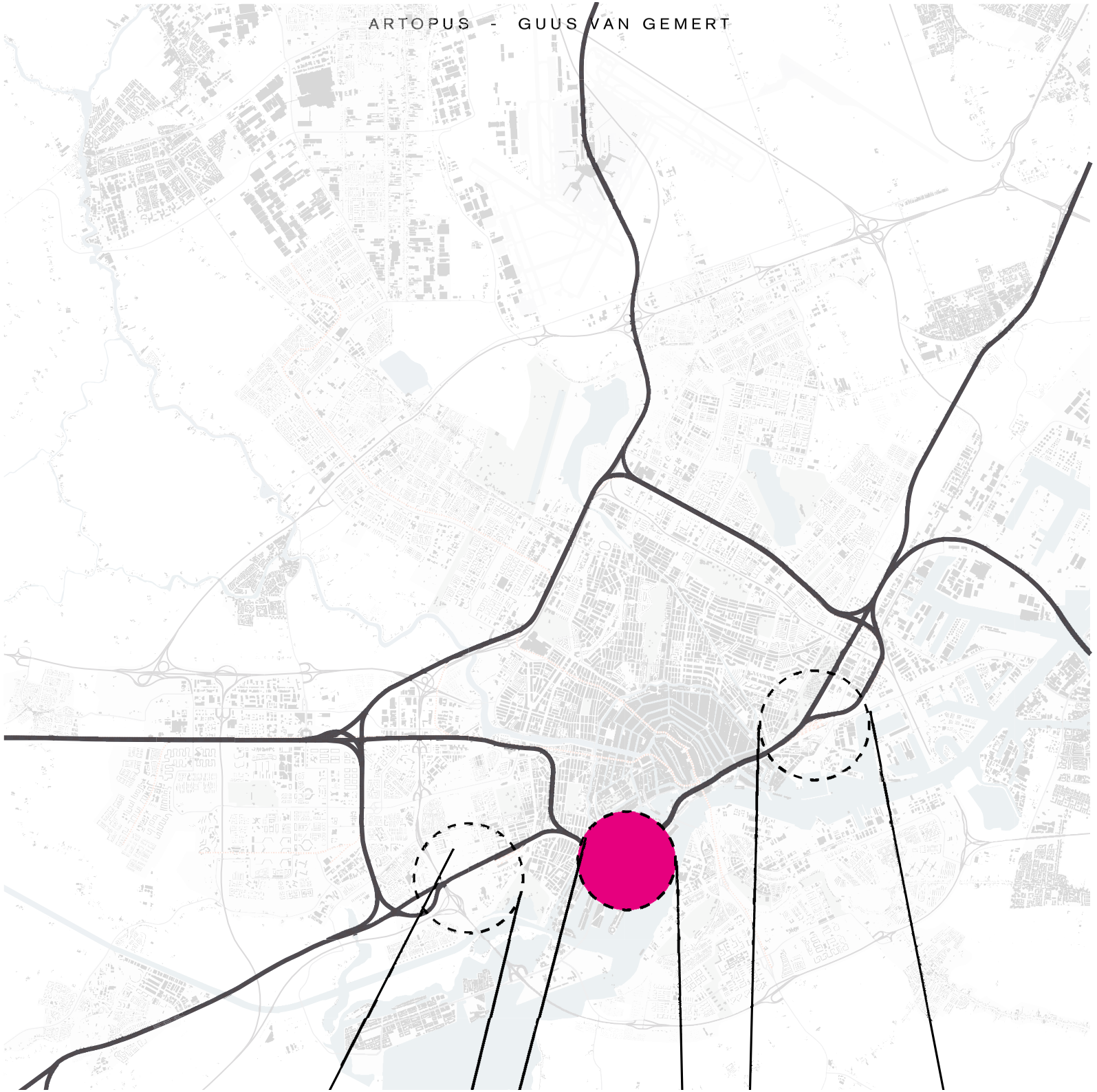
Yuan - The project is to make a new working centre in order to serve the areas of Sloterdijk and Zaandam

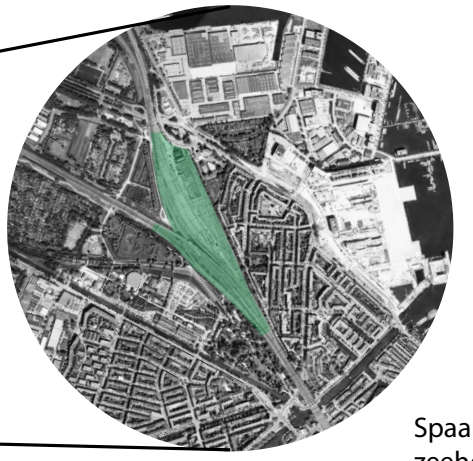


(high density dwellings in 2050). This is because of the rich mobility resources, the working centre could be used efficiently by its surround communities.

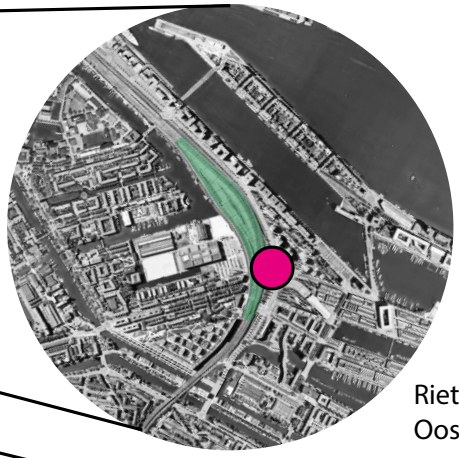
Bill - The proposed project is to provide and facilitate the field of AI and Neuroscience by creating a common ground in the field of future technology. By repurposing the Science Park and its adjacent infrastructure, the project will be set as an example for the future development in the area, in order to collaborate with other disciplines and participate in the adjacent communities.

Guus - In a Smart City, big data and the Internet of Things are digitally connected and supports a more efficient way of energy and facilities usage and improves the livability in high densely populated urban neighbourhoods. In this project, the focus in on the social aspect of data exchange and regulation of Smart Contracts, to be considered as communication. Therefor a new type of public space is required: a Information and Communication Center.

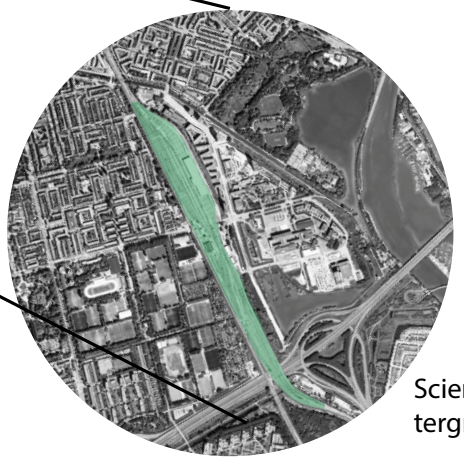




Spaarndammer en
zeeheldenbuurt



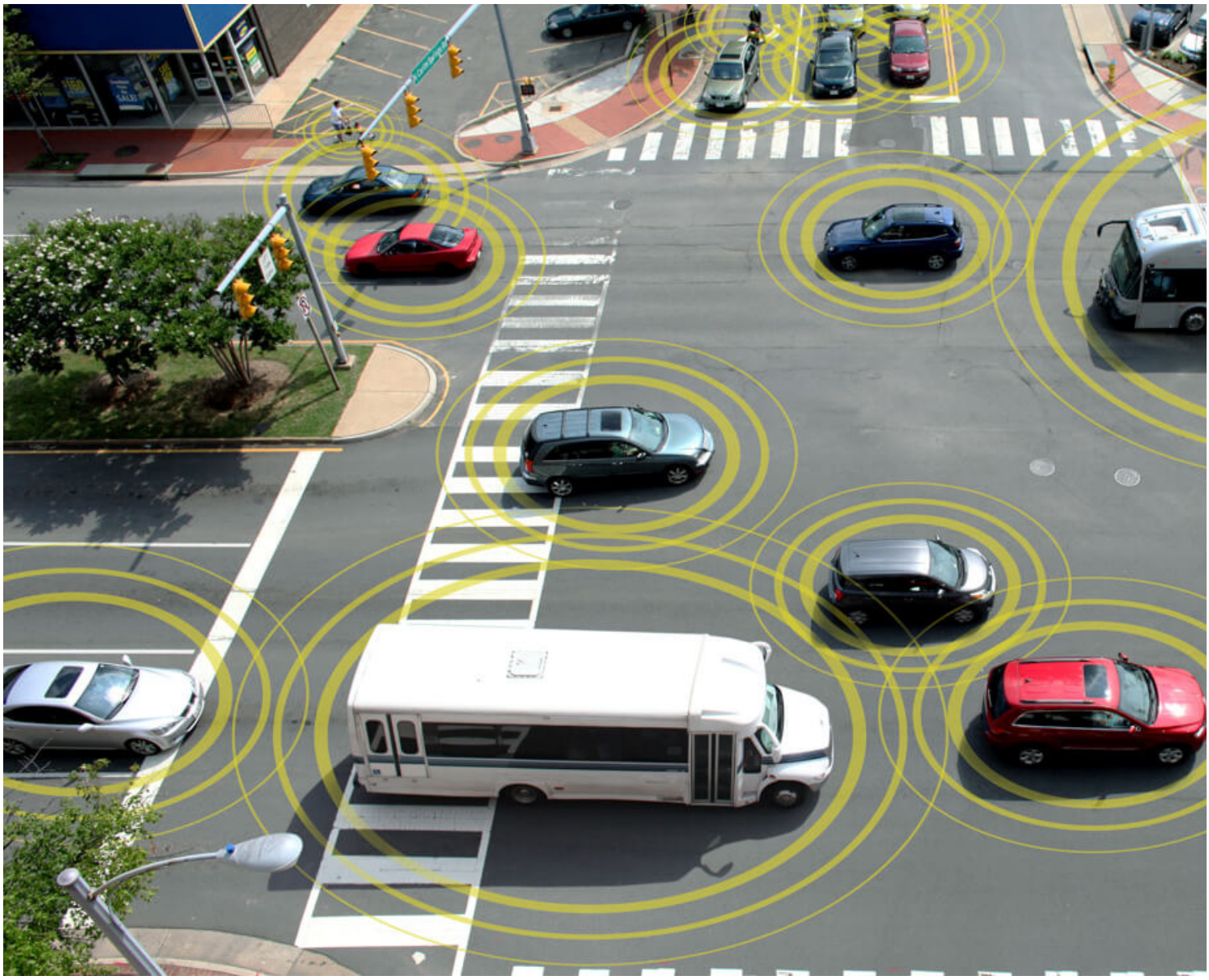
Rietlandpark en
Oostenburg



Sciencepark en Wa-
tergraafsmeer

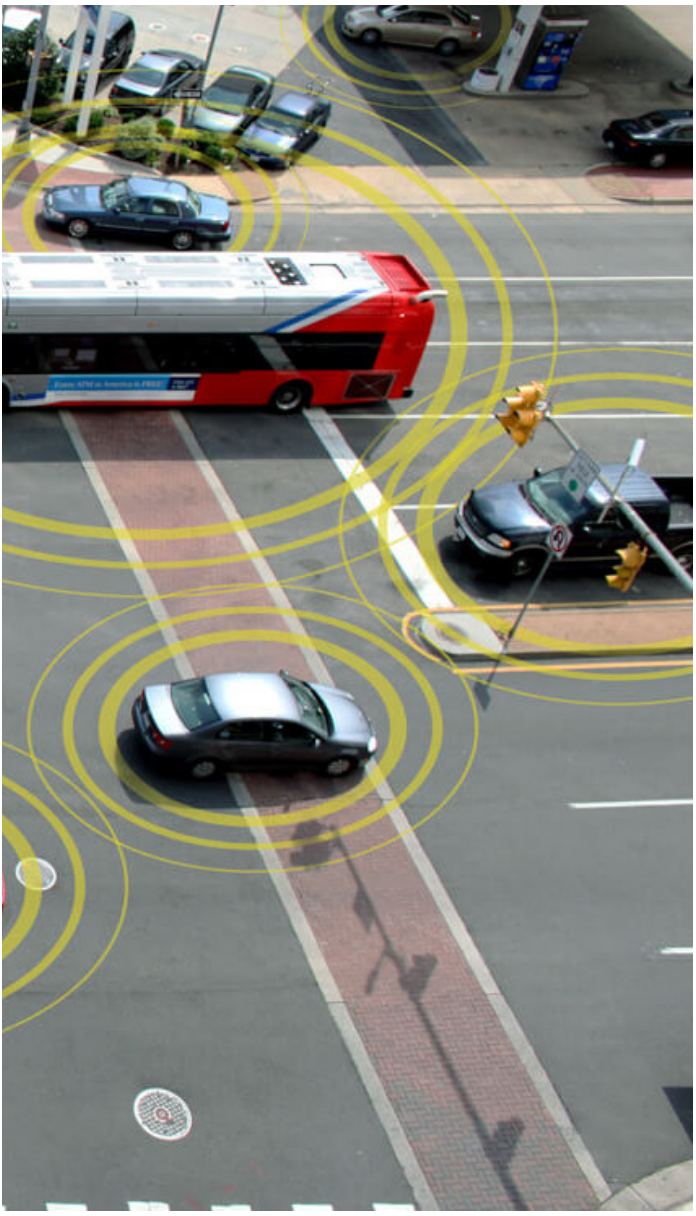
BLOCKCHAIN AS A CATALYST ON MOBILITY AS A SERVICE

ARTOPUS - GUUS VAN GEMERT



Abstract
As cities around the globe have started to develop and grow to become metropolises for their citizens, numerous challenging problems have followed related to mobility and accountability. A new approach to vehicle ownership and usage is required. To deal with a more efficient use of cars, car-sharing and on demand autonomous vehicles can offer a fitted solution. As self-driving on demand vehicles becoming part of the whole infrastructure, a platform to deliver a door-to-door service provides an answer to the demand for efficiency of the infrastructure. The term Mobility as a Service (MaaS) came about as as new mobility solutions such as on-demand, connected, and autonomous vehicles started to emerge. But how to deal with security, centralization of data and privacy? Blockchain technology is and ICT based technology which guarantees safety, transparency and a fast way of financial transaction. Blockchain can be seen as the catalyst of MaaS.

Introduction
Since the economy is growing, the demand of mobility increases. On different levels of transport is the number of travelers increasing. More people travel by airplane, public transport or go by car. It is not only growth in traffic, but people also want to travel faster. This might sound like a bottleneck. More traffic leads to busier networks, which causes longer travel time. According to the United Nations, 2.5 billion people are expected to move in urban areas by 2015. This number of people leads to a reconstruction of the cities infrastructure. How to deal with parked cars, carbon dioxide, nursery oil exits, and waste transfer. There is an urgent need to reduce car trafic to reach the Swedish climate target. This is a must, according



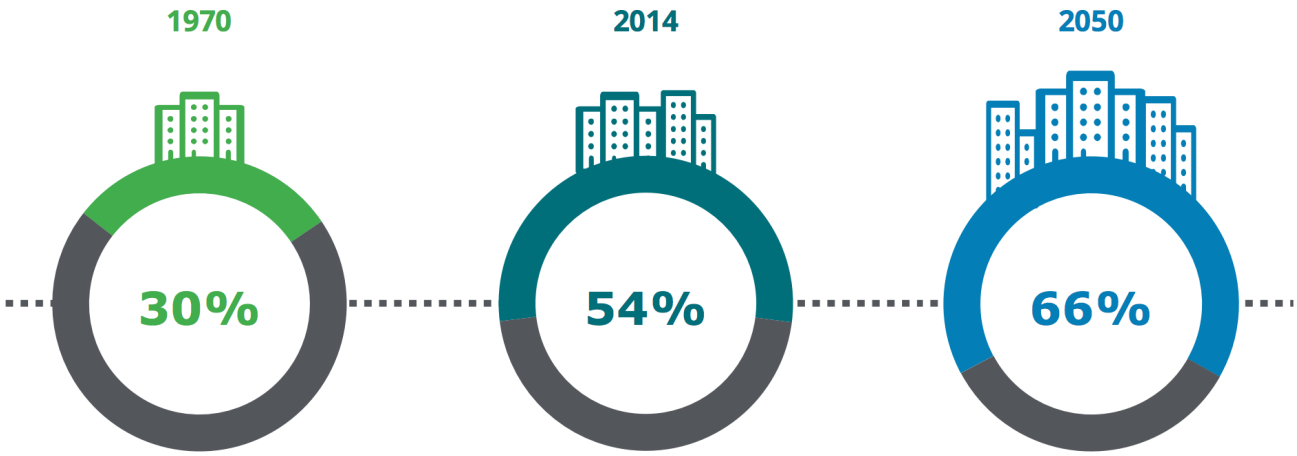
picture 1: mobility in a smart city. (source: argion)

to the Swedish Transport Administration[1].

The Randstad-area, and the Amsterdam region in particular, is facing serious accessibility challenges the coming ten to fifteen years. On one hand because of the rapid growth of the city, on the other hand because of major infrastructural works such as construction of the (enlarged) tunnels for the A10-south. One of the ways to keep Amsterdam and the northern part of the Randstad-area an attractive place to live, visit and work is the reduction of car traffic. Tjon (2017) believes that the possession of a car becomes less attractive when users can contract mobility services that provide seamless access to public transport, taxi services, shared cars and bikes, shuttle services, parking solutions and easy ways of payment; also known as Mobility as a Service.[7]

Not only Amsterdam is aiming high on Mobility as a service, also Finland's capital Helsinki is settings goals to make in unnecessary for any city residents to own a privat car. Within the concept of MaaS. This is not only leading to environmental improvements, less air pollution and saving a lot of money, it also increases the livability and urban space within the city. In Helsinki, clean air is one of the main purpose of the introduction of MaaS. The reason for this is because MaaS will lead to a more efficient way of using means of transportation. Since 2016, Helsinki residents have been able to use an app called Whim to plan and pay for all modes of public and private transportation within the city—be it by train, taxi, bus, carshare, or bikeshare. Anyone with the app can enter a destination, select his or her preferred mode of getting there, or, in cases where no single mode covers the door-to-door journey, a combination thereof and go. Users can either pre-pay for the service as part of a monthly mobility subscription, or pay as they go using a payment account linked to the service. The goal is to make it so convenient for users to get around that they opt to give up their personal vehicles for city commuting, not because they're forced to, but because the alternative is more appealing. According to Sampo Hietanen, the visionary behind Whim, "We want to prove that we can beat the service level of a car. Or at least be comparable to it. We want to show that people want it, not just that we can do it."[8]

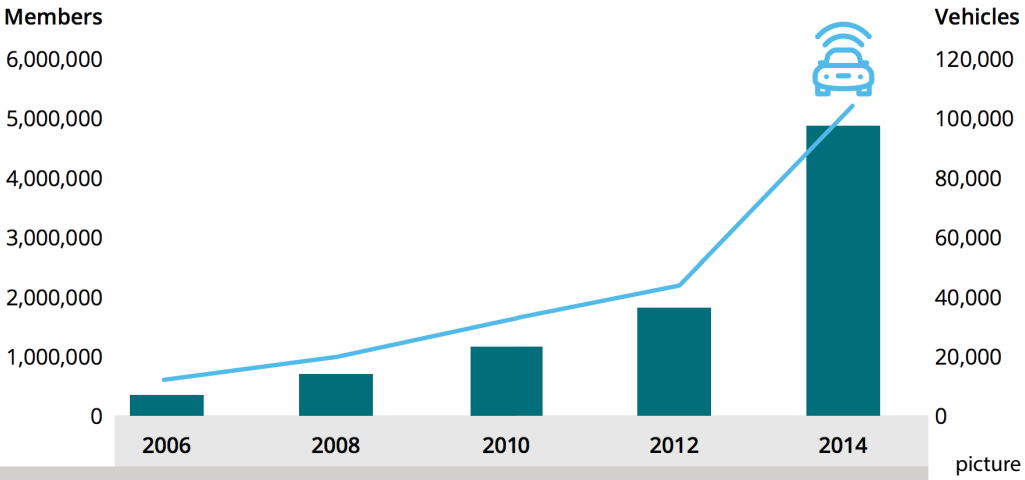
On urban erea's, infrastructure takes in a large amount of space. With densification high on the agenda, the use of street is asking for a new approach of mobility. Multiple cars are parked and are not used, while they could be used in a more efficient way. One of the main developments that could offer a solution here is car sharing. With car sharing, cars can be used way more efficient and could be a major solution in the parking problem in inner cities. Especially with the rise of self-driving cars, on demand car sharing is seen as the most important development in the field of mobility. Large car hubs with charging points on the ring of the city, for example in Amsterdam (picture 4),



picture 2: Global urbanization trends: Percent of population living in urban areas (Source: Source: United Nations, Department of Economic and Social Affairs, Population Division,
World urbanization prospects: The 2014 revision, highlights (ST/ESA/SER.A/352), 2014

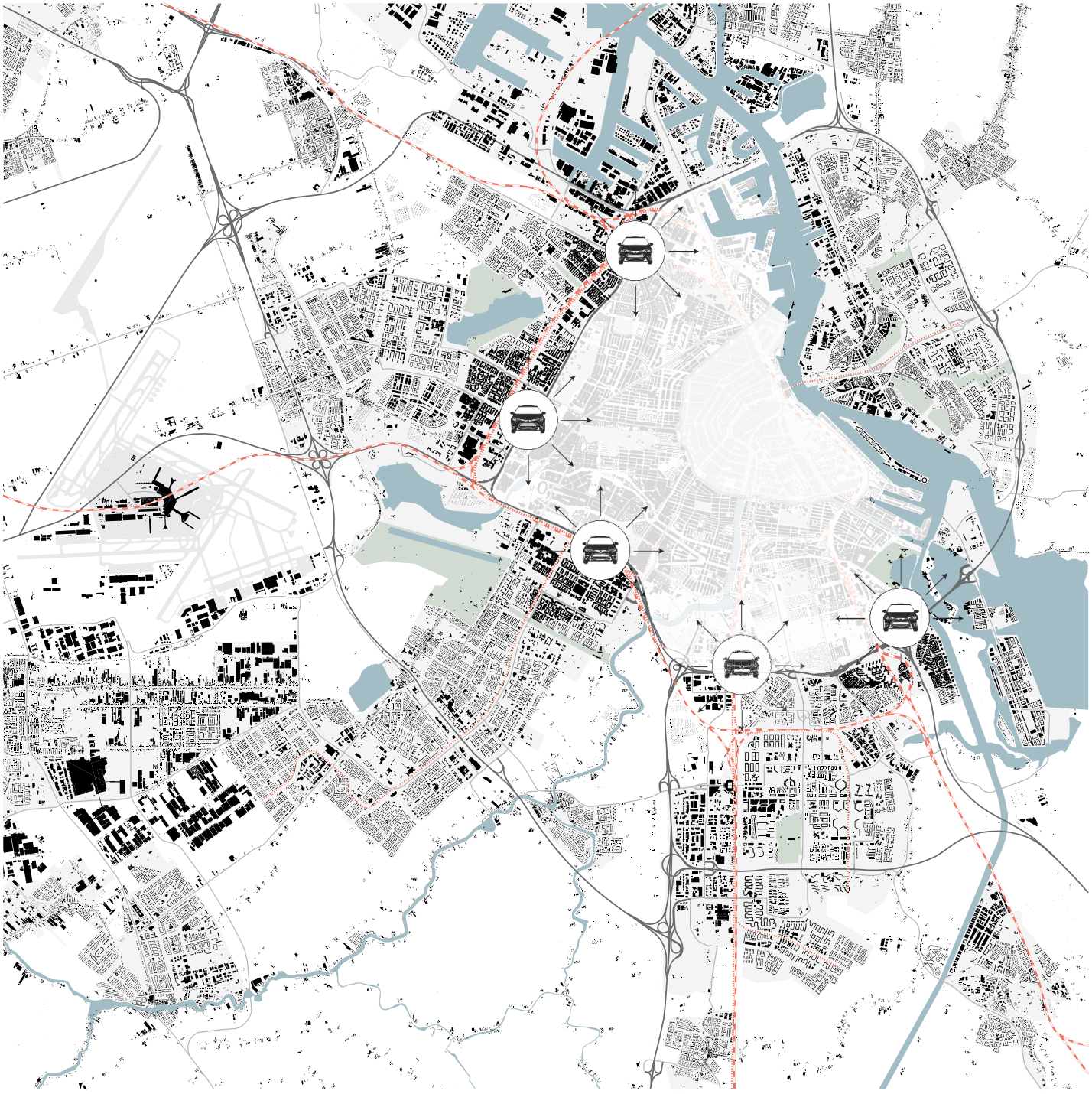
could be an example of eliminating parked cars from the city center. Since car sharing is a bit equal in the level of public transport, different stakeholders can work together to deliver a platform which creates an easy door-to-door solution for users. This approach of mobility is called Mobility as a Service (MaaS). For public transport, mostly an app already exists. No personal data is directly linked to these apps, but with on demand self-driving cars, a lot of personal information can be collected, and this big data can be used to regulate traffic flows. Conventional security and privacy methods used in smart vehicles tend to be ineffective due to the following challenges[2]:

- Centralization: Current smart vehicle architectures rely on centralized brokered communication models where all vehicles are identified, authenticated, authorized, and connected through central cloud servers. This model is unlikely to scale as large numbers of vehicles are connected. Additionally, the cloud servers will remain a bottleneck and a single point of failure that can disrupt the entire network.
- Lack of privacy: Most of the current secure communication architectures either do not consider user privacy — for example, they resort to exchanging all data of the vehicle without the owner's permission or reveal noisy or summarized data to the requester. However, in several smart vehicle applications, the requester needs precise vehicle data to provide personalized services.
- Safety Threats: Smart vehicles have an increasing number of autonomous driving functions. A malfunction due to a security breach (e.g., by installing malicious software) could lead to serious accidents, thereby endangering the safety of the passengers and also of other road



	2006	2008	2010	2012	2014
Members	346,610	670,822	1,163,645	1,788,027	4,842,616
Membership growth rate		39%	32%	24%	65%
Vehicles	11,501	19,403	31,967	43,554	104,125
Fleet growth rate		30%	28%	17%	55%
Member-vehicle ratio	30.1	34.6	36.4	41.1	46.5

picture 3: Global carsharing growth, 2006–2014 (Source: Susan Shaheen and Adam Cohen, Innovative mobility carsharing outlook: Carsharing market overview, analysis, and trends, Transportation Sustainability Research Center—University of California,
Berkeley, winter 2016, http://tsrc.berkeley.edu/node/968)



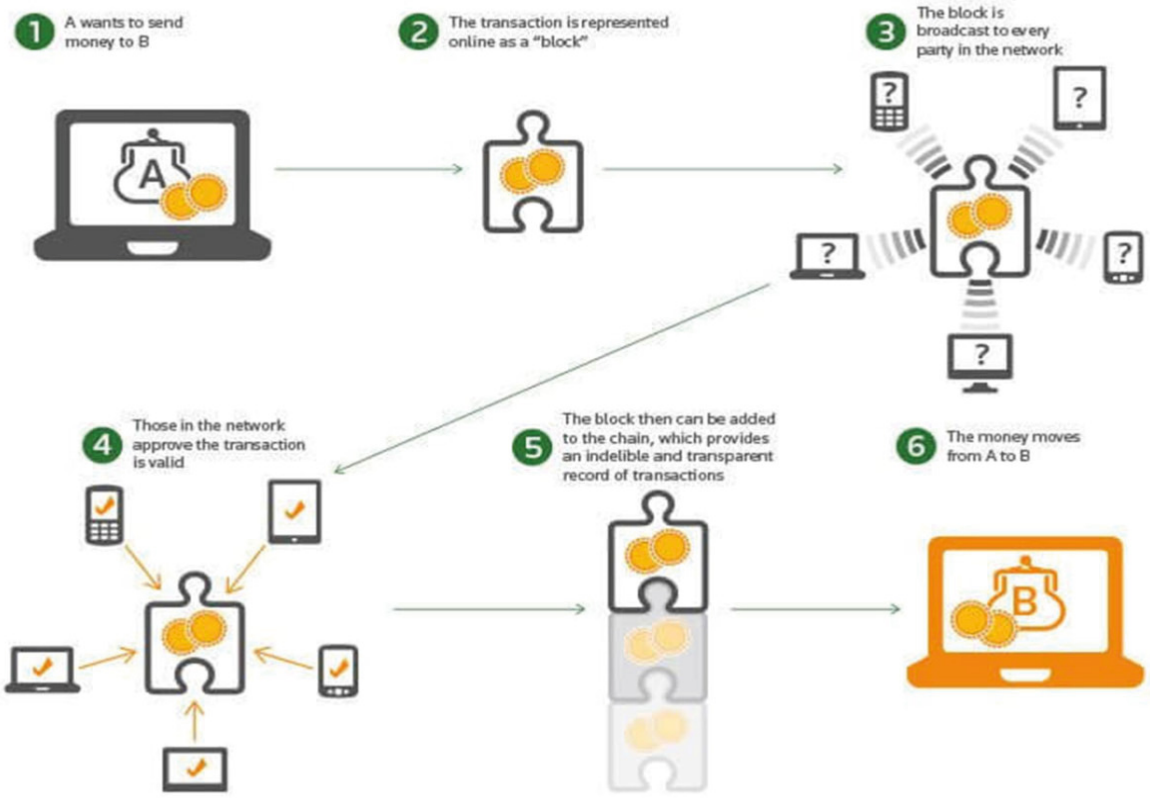
picture 4: On demand autonomous car hubs in Amsterdam (source: own drawing)

users in close proximity.

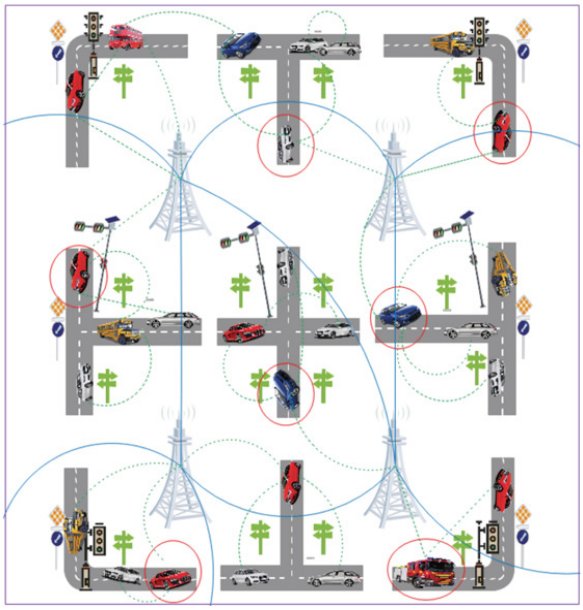
Different technologies are on the rise to come with new developments. One of these, is a technology called Blockchain. Mostly known for its use in the trading of cryptocurrencies like Bitcoin, but it could also be used in modern city mobility. For example, through blockchain insurance companies can financially support people who go in their (e)bike; distance and time can be registered via blockchain. This technology is safe and transparent for its users. This can also be a useful technology for government to motivate people to use the bike instead of the car. Also, with peer 2 peer sharing of bikes and other public transports, the mobility structure of a city will drastically change.

Blockchain technology is based on the idea of decentralizing data registration. It is a package of data, chain after one another, saved and approved on multiple devises. For example (see picture 5), an interaction between person A and B is taking places. This interaction (package of data) is sent to multiple devises. If it's approved, the interaction is registered and saved at the end of the chain on these devises. Because of the regulation of the data on several devises, it has a very low risk of fraud. If the system is hacked or one single package of data is changed, the other devises intervene[6].

How can blockchain technology be a part of big data processing? Big data is a useful bundle of information for self-driving cars. Cars are equipped with GPS, radio handset, small-scale impact radars, cameras, on board computers and various kinds of detection devices to warn the driver of a wide range of good condition.



picture 5: principle of blockchain technology, explaned through fanincial transactions. (source: The CPA Journal)



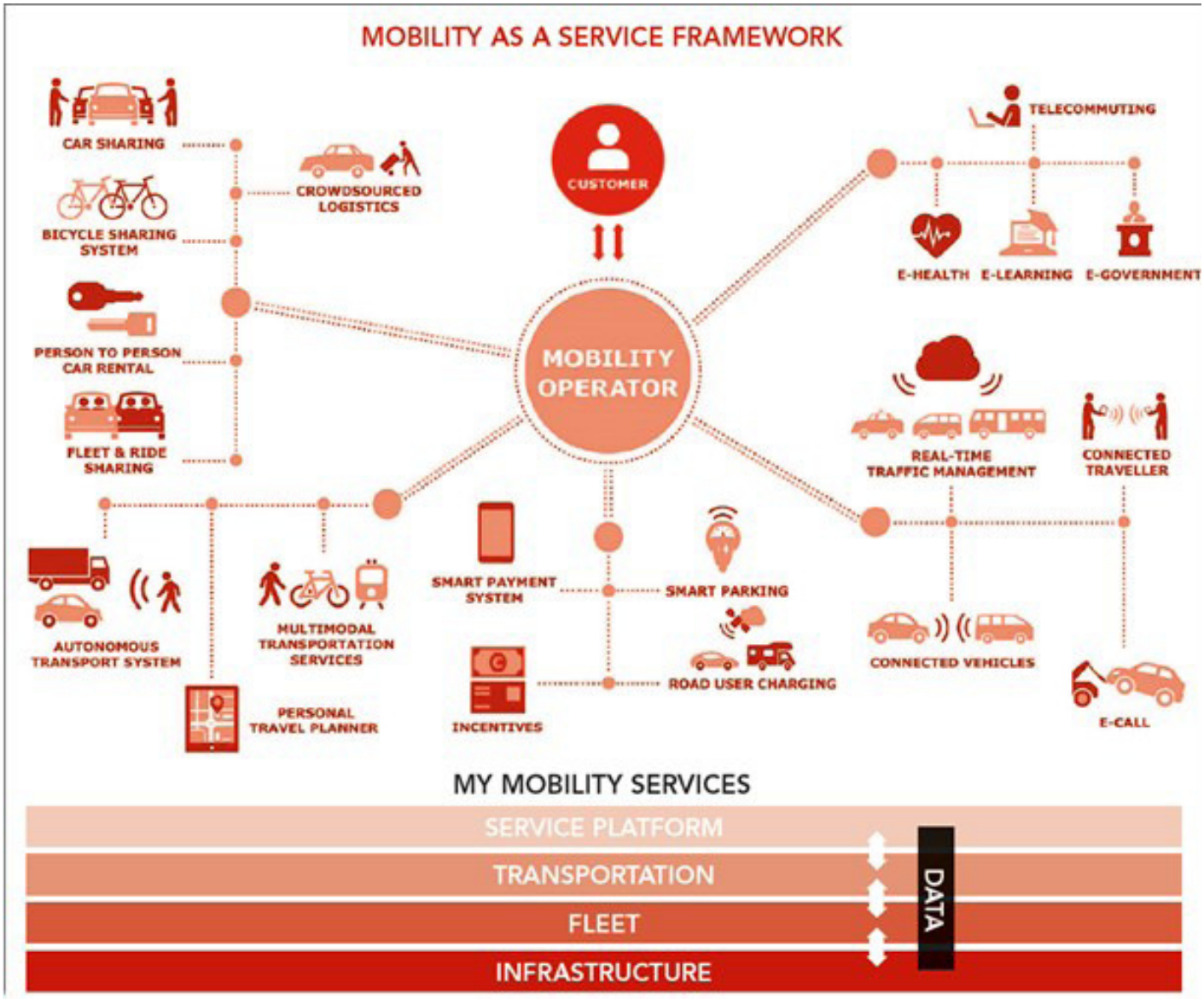
picture 6: Block VN network (source: Journal of Information Processing System)

This data is useful to help self-driving cars be more efficient in travel time, by avoiding bottlenecks, traffic jams, efficient charging, maximize use of the vehicle, or closest possibility of parking. How can blockchiain technology be a solution on centralization, security and privacy in a car sharing society? Can blockchain be a catalyst on Mobility as a Service?

Mobility as a Service

Another important part of mobility are connected to the freedom and well-being of people. Part of this is the ability to move us around and enable us to travel freely. Not be worried about junctions and transvers on mobility providers. Here, Mobility as a Service (MaaS) (Picture 7) could be the next step on mobility development. MaaS is a novel approach to mobility. There have been several efforts to incorporate the approach by trying to bring multiple mobility providers (MPs) together in one platform. In most of these efforts, the organization acted as a broker for all of the MPs and the customers and due to vested interest, it could easily be biased towards well established MPs. Blockchain provides a viable method of coordination of parties that do not trust each other without the need of a central authority. Hereby, a combined mobility service platform can by established that benefits all of the involved stakeholders can by designed[1].

MaaS can deliver a door-to-door services which provides as less junctions as possible, due to real-time traffic data access. This is not only useful for the users, but also for multiple mobility providers[3].



picture 7: Mobility as a Service model (source: ITS International)

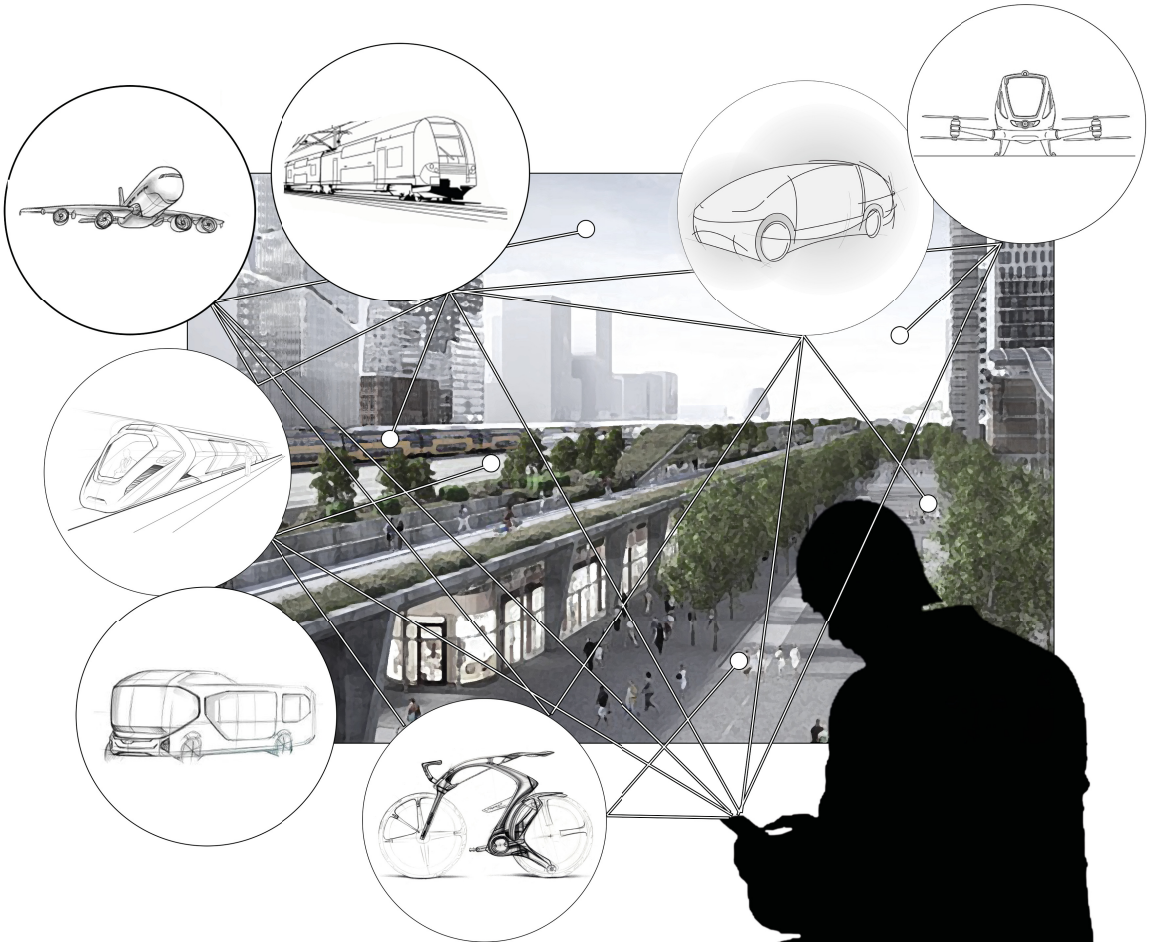
Due to blockchain this platform applies information and ticket-buying services that can accommodate all modes of public and private transport. Even in the smartphone era, you may need a separate app for each region or mode of transport[3]. “An efficient public transport system is a very sustainable means of transporting people in densely populated ereas”, says Steffen Schaefer, the project leader on Siemens’ SiMobility Connect platform. A blockchain based platform which focusses on multiple public transport providers. Nowadays, on demand self-driving cars doesn’t play an important role, yet. With this technology a door-to-door service can be provided.

Block-VN Model

Here, a Block-VN model is proposed (picture 5). A Block-VN model is an architecture based on blockchain in the smart city for the vehicle network, which allows the development of the distributed network of large-scale vehicles in a more efficient and effective way. Fig. 1 illustrates the Block-VN architecture of the blockchain vehicle network to meet future challenges and requirements. In the Block-VN model, the controller nodes are connected in a distributed manner to provide the necessary services on a large scale. The vehicle node with the red circle represents the miner node, which handles request/response requests. Rest all vehicle nodes are just ordinary nodes. An ordinary node may send a service request message either to minor nodes (vehicle) or controller nodes. By using the minor and controller nodes in a distributed way, we can easily achieve the scalability and high availability of the vehicle network. Block-VN also improves vehicle network architecture by enabling consumer-to-machine and machine-to-machine trusted intermediary free services and by providing distributed, secure, and shared records of all services, assets, and inventories[5].

Privacy and Security

Privacy: The privacy of the proposed method is inherited from the blockchain where each node uses a unique PK to communicate with other overlay nodes. This prevents malicious nodes from tracking an overlay

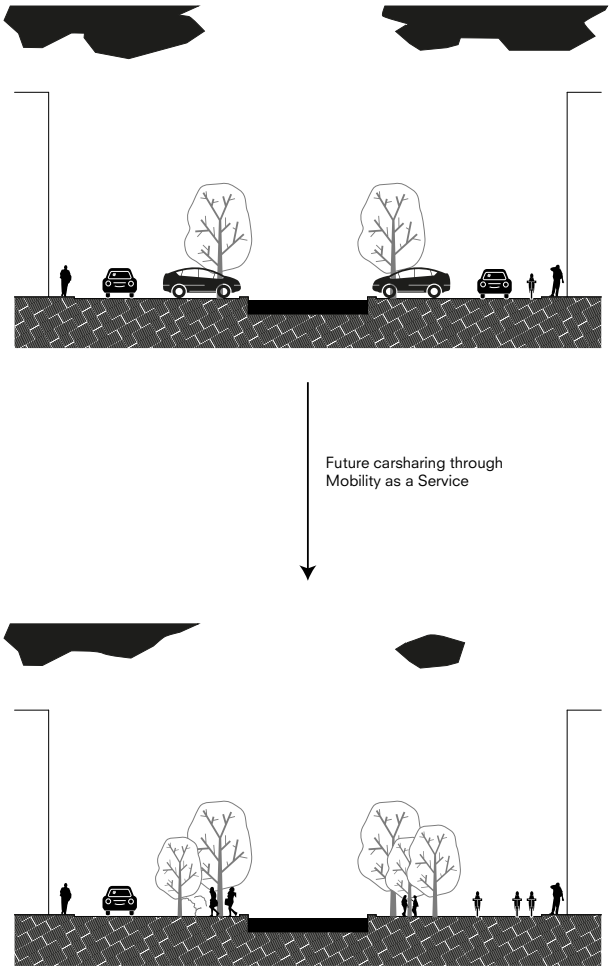


picture 8: combining mobilityproviders (source: own picture)

node. Each vehicle is equipped with in-vehicle storage to store privacy-sensitive data. The vehicle owner can reveal data in the in-vehicle storage to service providers in situations where this data is required (e.g., an accident claim).
An attacker might attempt to deanonymize a user by linking different pieces of data associated with the same anonymous user (i.e., linking the PKs of the user). This attack, known as a linking attack, endangers the privacy of the user. To protect against this attack, each user uses a fresh key for each of its interactions in the overlay.
Security: The security provided by our architecture can be largely attributed to the use of BC. Each transaction in BC contains the hash of the data, which ensures integrity. All transactions are encrypted using asymmetric encryption methods, which provide confidentiality. Recall that the OBMs maintain a key list that provides access control for cluster members in such a way that only transactions for which the embedded PKs match with the key list in the OBM can be forwarded to a cluster member.

In mobility, not only cars will benefit from this technology. Also, cyclists or other not motorized vehicles can be helped. For example, an insurance company may want to reward its customers with lower premiums for partaking in healthy commuting behavior. But also, a city government may wish to encourage cycling activity to mitigate urban congestion and pollution. A local business may sponsor bicycling activity in its vicinity to increase sales. A system called Financial Incentives System allows these organizations to internalize the positive externalities of cycling that have not historically been recognized or rewarded.
This incentive system uses GPS data from sensors affixed to bicycles frames and powered by the cyclists themselves. The use of blockchain technology makes transactions in the marketplace secure, seamless, trustworthy, and transparent. Users are able to reveal “just enough” information about themselves to participate in the decentralized marketplace, instead of exposing their entire profile to a central entity[4].

Urban consequences
As mentioned before, MaaS is not only there for the users op means of transport, but it also increases the livability of the urban space. For example, cars will be used in a more efficient way, withthe idea of carsharing. Since less cars will be parked, the street scene wil become very different with new opportunities for pedestrians, bikes of recreation (picture 9). Urban streets are mostly car orientated. With parking places in front of building en wide road for a better carflow. But, in the future, urban spaces will shift to a more pedestrian en bike friendly approach. Especially within



picture 9: change of streetscene with carsharing (source: own drawing)

picture 10: Impression of new streetscene (source: own picture)

cities, cars become less usefull with the rise of a better door-to-door public transport services. With MaaS, this door-to-door service will become even more accesible, and as we see in Helsinki, the goal is set to make it that easy so people wouldn't need to own a private car anymore.

Conclusion:
Big data and The Internet of Thing are in smart cities useful sources to gather information from. This information can be used in mobility to work more efficient and a better use of urban space. Mobility as a Service provides a platform to make it easy for users to travel door-to-door with as less junctions as possible and the quickest travel time, due to real-time traffic data access. This information can be used by municipalities to control traffic, but also companies, health insurances and education could use this information to improve their own efficiency, but also to improve the livability of the public domain. With conventional methods, data faces some safety challenges such as centralization, lack of privacy and safety threats. To guarantee safety and privacy, blockchain technology offers a solution. Due to its transparency and fraud durability it functions as a catalyst for MaaS

SMART CITY

ARTOPUS - GUUS VAN GEMERT

UNWRAPPING OF SMART CITY AS A CONCEPT

A critical view on the definition about the smart city concept. A lack of definition may leads to a unsuccessful strategy.

Abstract
Nowadays, 50% of all people live in urban areas, and for 2050 this number is estimated on 70%. Cities are rapidly growing and facing multiple challenges, such as mobility, pollution, safety, and health. More and more cities are labelling themselves as a “smart city”, a future city, based on technological, mostly ICT, developments to improve finite resources. But what is exactly the definition of a smart city? And without a universal definition, is it possible to set up universal vision? Entrepreneurs and new projects can only work from a holistic approach and therefore universal vision. This paper citizens this lack of definition, but also states about the importance of the debate and research to smart city to keep up a universal vision. Therefore, smart city has the potency the be used as a tool to optimize finite resources.

Introduction

Cities are growing rapidly over the last few decades. The ear 2008 marked the year where 50 % of world population lives in urban areas, 3.3 billion, with a prediction that this will grow to 5 billion in 2030, stated by the United Nations Population Funds . This increase of inhabitants in cities comes with many obstacles, risks and concerns, such as logistics, health, air pollution, and also economical risks, for example unemployment. Therefore, cities are facing new challenges. How to deal with infrastructure, liveability of the inhabitants, and sustainability of energy usage? For most of these problems, technological developments can give solutions and can lead to an increase of efficiency of institutes, mobility, energy usage, and other city facilities. Because of this, cities are highly investing in the information and communication technologies (ICTs) .

Many western cities have their developments influenced by de debate on ‘Smart Cities’. Thousands of cities all over de world have already labelled their city as a smart city or presented to strive for this so called ‘City of the Future concept’. Yet despite the hype around this urban labelling, we know surprisingly less about the definition about smart cities. Due to this lack of definition, it’s rather difficult to set out future goals without losing focus on what these developments offer for the people in urban areas.

The idea of smart city has its roots in the framework of New Urbanism , which originated in the United States in the eighties and later moved to Europe (Falconer Al Hindi et al, 2001). In short, new Urbanism focusses on the improvement of the urban environment and quality of live in the urban space. One of the topics that is described is the idea of Smart Growth, a planning strategy aimed at making cities more compact, less greedy and soil-consuming Within the course of New Urban Question, a critical view on globalization and urbanization of modern cities, viewed from a contemporary social point of view, is given. Nowadays, the debate about smart city and self-designation of smart city is an important topic, due to urban migration.

In this paper, the aim is to critically review on what this global effect of digitalization of cities exactly means, rather than focusing on the negative aspects of a smart city. It is important for entrepreneurs, as well as developers and investors, the cooperate and have a clear vision about the concept of smart city. Only by this, increase of efficiency and liveability can be obtained. To get this critical view clear, first some definition about smart city will be formulated and what type of aspects are important to come to a being of smart city, after that a critical view about self-designated smart cities is given and how lack of vision and losing the goal may lead to an unsuccessful future city.

Unfolding ‘the smart city label’

Smart cities are trending, and more and more cities are using the label “smart city” . But, due to a lack of definition, it’s it is rather unclear what this label ideologically reveals and hides. A trend that is currently going on, is new technologic developments which causes a high-tech version of a creative and progressive city. As Idsingh describes in her article on AGConnect , a lot of ‘smart city’ projects are established through a technical approach. According to Idsingh, this is a result of a lack of definition on where smart city is based. She mentioned that the pillar of smart city is determined in the residents itself. Therefore, she stated “a smart city should be treading from a human perspective, rather than technological innovations. […] People attended congresses and heard about big data and artificial intelligence and wanted to apply that technology in the city. The result was that projects were innovative, but never quite got off the ground. There were small, individual examples on many stages of congresses.” This is a result of a lack of definition precision, and consequently a total vision of the purpose of technological innovations. But is nowadays formulated as the definition of smart city? A comprehensive definition is given by Garcia et al. (2018) :

“A smart city is an urban area that uses different types of electronic data collection sensors to supply information which is used to manage assets and resources efficiently. [...] The smart city concept integrates information and communication technology (ICT), and various physical devices connected to the network (the Internet of things or IoT) to optimize the efficiency of city operations and services and connect to citizens.”

This is a general definition of what smart city should be about. It is clear the read that the concept of smart city is technological driven, according to Garcia et al. and this technology should service the citizens, something

that is often neglected. Mostly the case can be explained by what Idsingh (2018) mentioned about the small, individual examples without any vision for upscaling or collaboration within the whole. Within the definition of Garcia el al. is also described the importance of integration of information and communication, and various physical devices to the network of Internet of Things. Therefore, individual projects which are technological based, but not cooperating with the bigger picture, are often losing their main goal, namely increasing efficiency and liveability for citizens.

Garcia et al. gave a self-sufficient comprehensive definition about smart city, yet again questions may arise about curtain aspects. For example, efficiency in what? Or a little less self-evident, but nevertheless just as important, how to even measure liveability? Chourabi et al. emphasizes this importance of liveability by mentioning that it is a governmental task to ensure liveable condition with such a rapid growth of urban population . Directly followed by clarifying that it is crucial to get a deeper understanding of the smart city concept. Although a trend is going on and the use of the phrase "smart city" is increasingly heard, there is still not a clear and consistent understanding of the smart city concept among practitioners and academia, says Chourabi (2012)

System of systems

Dirks (2009) gives a more clearer explanation about her vision of what the smart city is about. She describes that cities will become more and more important throughout the 21st century and lots of changes are going on the areas of politics, economics and technology. Within these three main areas, systems are operating and communicating to increase value for citizens. However, develments of these systems are not keeping up with the increase of population in ubran areas. Therefore, she's also mentioning this crucial urge to smart city. But again, a lack of holistic approach is observed. The 'subsystems' where Dirks is talking about should become part of a total system. This total system is where the idea of smart city should be seeked in.

Dirks clarifies thee subsystems of a city. First system is the system of people; a very broad system. It includes public safety, health education and the whole concept of quality of life. This system is strongly related to demography is cities. Due to the variety of city demographics, challenges vary within this system of particular cities.

The second system is the cities' business system. This includes regulation and policy environment, planning regulations, openness to foreign trade and investment, and labour and product market legislation. Basically, every aspect of a city, related to businesses of the city. Obviously, prosperity of a city is directly related to the economy of the city and country. Key point within this system is the ability to attract new businesses.

The third and fourth system is about the movements of goods, services and information in de city. This also includes the transport of people. Therefore, this system is about the road network of a city, public transport, sea and airports. Two main challenges arise from this system: pollution and congestion.

Fourthly, it's more about data movement. Telephone and internet are key points and are develop rapidly with lots of investments in ICT. This is the main topics of the concept of smart city.

Last system is the energy system. This system focusses on resources, energy supply, and also pollution. Cities are facing an increase of CO2 emission, due to urbanization. Renewable sources are and of the main challenges within this system.

According to Dirks, these main systems of a city have their own challenges, but the challenges are also very interrelated and should be treated interrelated. Challenges which sound over welding, due to finite resources, such as energy, materials, space and skills. On the other hand, we live in a world full of pervasive technologies such as networks and sensors. Therefore, these technologies can help us to optimize the use of finite resource. Technologies must be used to transform the abovementioned to maximize efficiency of finite resources. This is, according to Dirks, what smart city concept is about. A development in, mainly ICT, technology and data usage to optimize the use of finite resources. But again, no generic, widespread definition of the concept has yet been elaborated. Something that is already readable in the explanations of the systems, where cities are facing different challenges and therefore subjectively treaded.

Subjectivity of cities

In the article "Smart cities, Ranking of European medium-sized cities", by Giffinger et al, another to description smart cities is given, comparable to Dirks explanation. They stated, "Although the term smart city is understood as a certain ability of a city and not focusing on single aspects, a further definition requires identifying certain characteristics for the evaluation". here a distinction is made between different themes related to smart city. Six conceptually distinct characteristics are :

- Smart economy
- Smart mobility
- Smart government
- Smart Environment
- Smart living
- Smart people

With hardly any imagination, these six characteristics can be mostly related to the systems Dirks described. And again, Giffinger et al. are mentioning the development of these six themes are a result of different factors of individual cities.

In the paper "Smartmentality: the smart city as dis-

ciplinary strategy", by Vanolo (20140) , the concept of smart city is formulated as an objective strategy, ideology and political choices and may be presented as 'natural' and 'universal' approach. But, it will trigger a reconstruction of the infrastructure, physical and digital, of a city which in turn will produce subjective outcomes. Thus, no existence of a universal outcome can be defined. This is actually quite logical, due to a high variety of city context, history and culture.
Vanolo also criticizes the urban visioning is often reduced to a single technology-based vision of the city of the future. It not only puts the cultural factor and context of a city aside, it also restricts the horizon for alternative solutions to problems for over densified cities, today and in the future. In his paper, he emphisizes the importence of stimulating researches and critical debates about the smart city.

"There is obviously a need […] for studies and considerations regarding: the politics engendered by smart city projects; the geometries of power triggered by strategies; the relationships between the city and technology; the role played by different fields of knowledge in shaping the city of the future; and, finally, the need to bring the smart city into the political arena in order to spark a serious debate about the kind of smart city we want to live in."

Vanolo (2014) summarizes it by not only expressing negative about smart city but encouraging the debate and research on smart city.

Conclusion

Due to many obstacles and challenges cities are facing because of urbanization, a trend is emerging. More and more the phrase "smart city" is used. Yet, no precise and universal description about what is smart city concept is, is formulated. Mainly because of the lack of scientific research and political debate has occurred. Many descriptions can be found, for example by Garcia et al. but are very inconvenient and mostly ICT orientated. Also, outcomes are difficult to measure, let alone to describe.

With further research to the definition of smart city, it became clear to one single definition is hardly impossible to formulate. Therefore, Dirks and Giffinger break it apart in either systems or characteristics. They mention different themes that are related to these systems and characteristics, and from there focus on wat technological developments can improve, and thus describing smart city more as an objective tool with subjective outcomes, instead of a universal concept. The search for a universal description about smart city concept is highly contradicted to the idea that cities have their own characteristics, such as context, history and culture.

However, it is mostly mentioned that developments, systems, and innovations should be reduced from a holistic vision of a city, or even the world. Only via cooperating of new projects with the bigger whole, project will gain success and sustainability.

Summarizing, smart city could be a concept to solve future challenges of cities, is built on technological developments but not based on technological developments. It is based on optimizing systems for citizens within urban areas. It is difficult to formulate a universal definition about smart city, but on the other hand it's important for entrepreneurs to have a holistic vision. Therefore, the idea smart city is not put aside, rather the importance of debate and research is required to keep in touch with a universal vision and strategy.

Conclusion from research

This project combines the priciples of smart city in terms of functionmixing, mobility, livability and creating a work environment that futs te future of smart working. To do this, mobility, recreation and working will be combined in one design, a open and transparant building that invites all sorts of users, and a high tech building to function sustainbale and efficient.

Main theme in this design is mobility. Cyclist, cars, pedestrians and even metro's go through the building, so a complex design assignment is set on how this means of transport will flow together in a natural way. Especially for people who will transfer from one to antoher mean of transport. How to make this transfer as efficient as psoible?

To make this place a multifunctional building within the Smart City, the focus is on combining the digital working environment with social interaction, the physical enviroment. There is chosen to combine the working environment with a cultural centre. A cultural centre specified as en theater, with a backstage and rehearsal rooms, and a public exhibition space. Therefore, this building is not the a transprot bridge or hub, but a building which will be lived, where people work and recreate.

Endnotes

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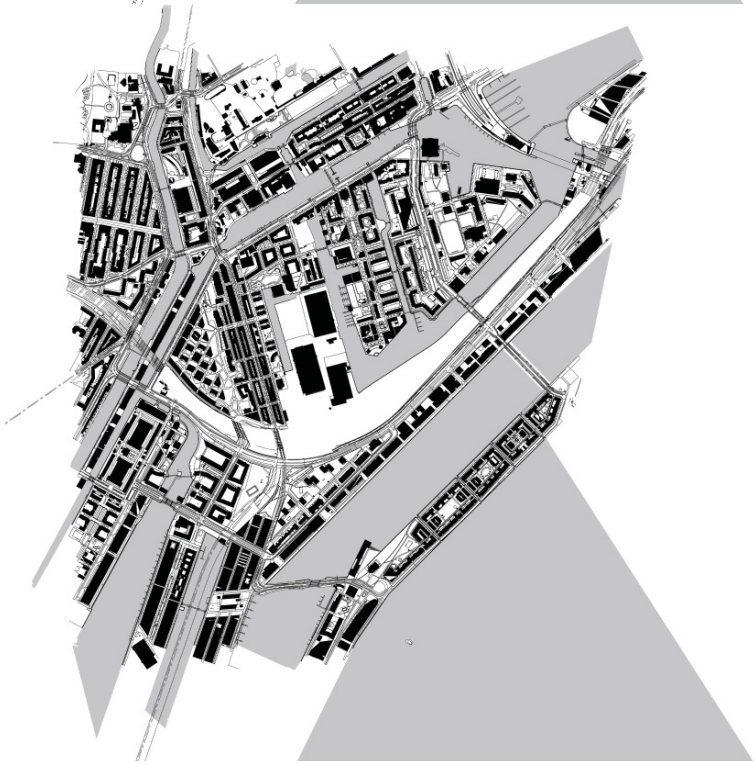
SITEVISION

ARTOPUS - GUUS VAN GEMERT

RIETLANDPARK

- central locatad
- mojar erea comming free
- opportunities for connecting different neighbourhoods
- A new metrostop



ARTOPUS - GUUS VAN GEMERT

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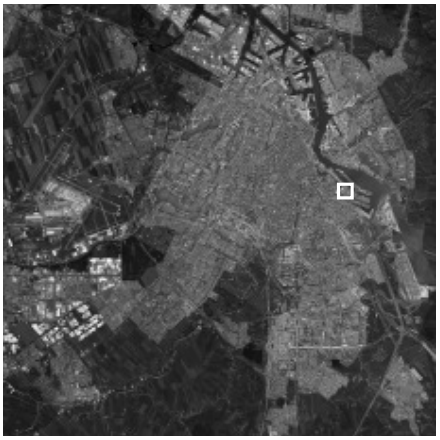
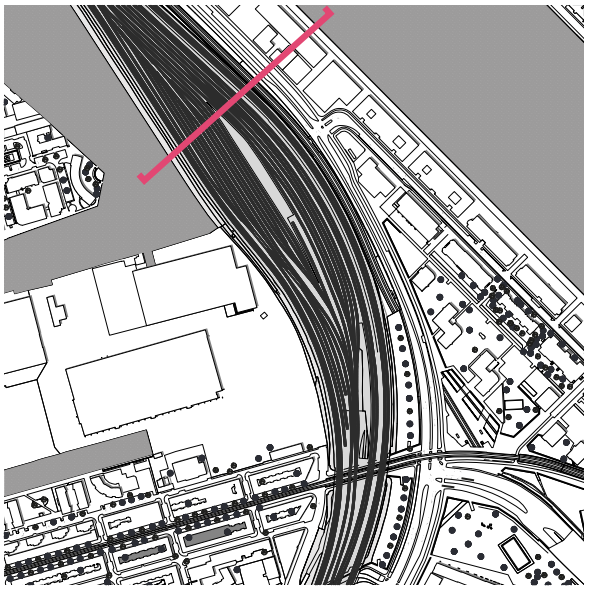
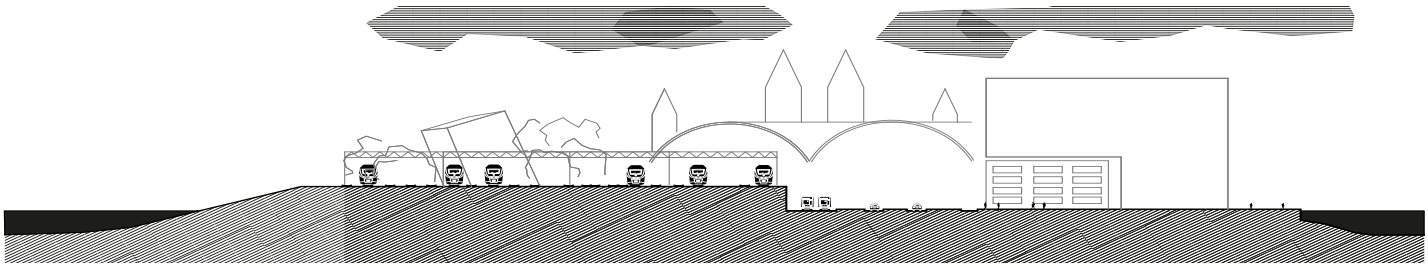
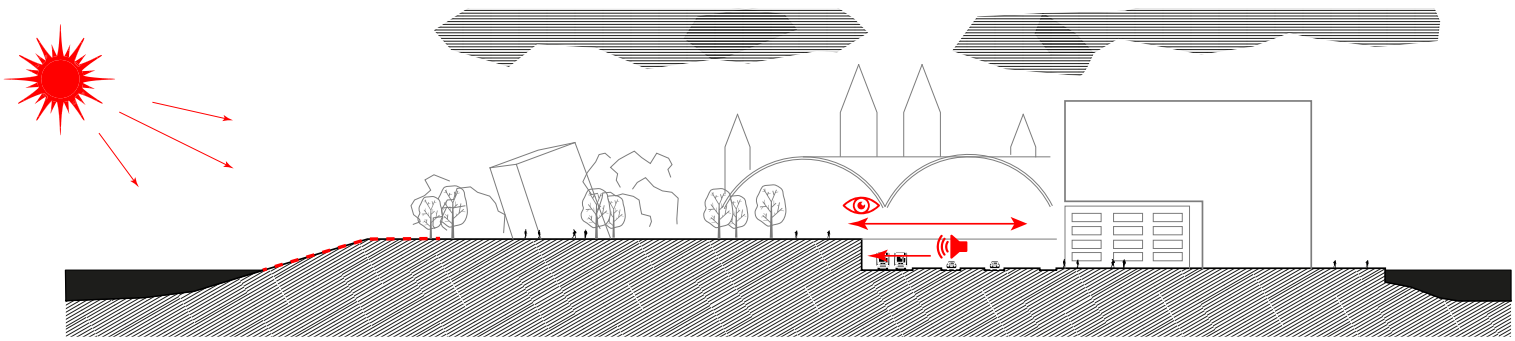
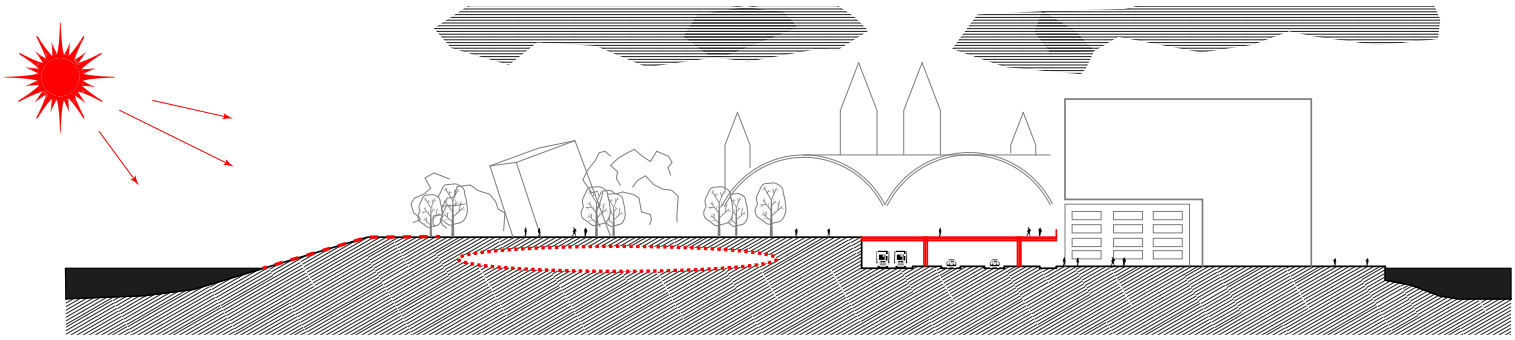


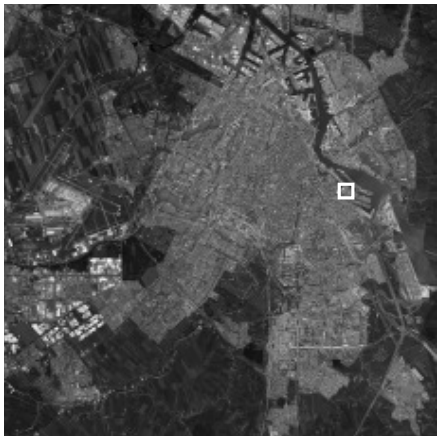


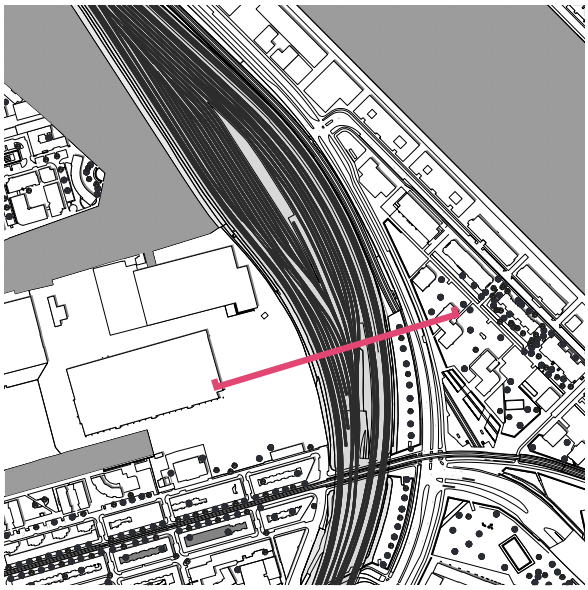


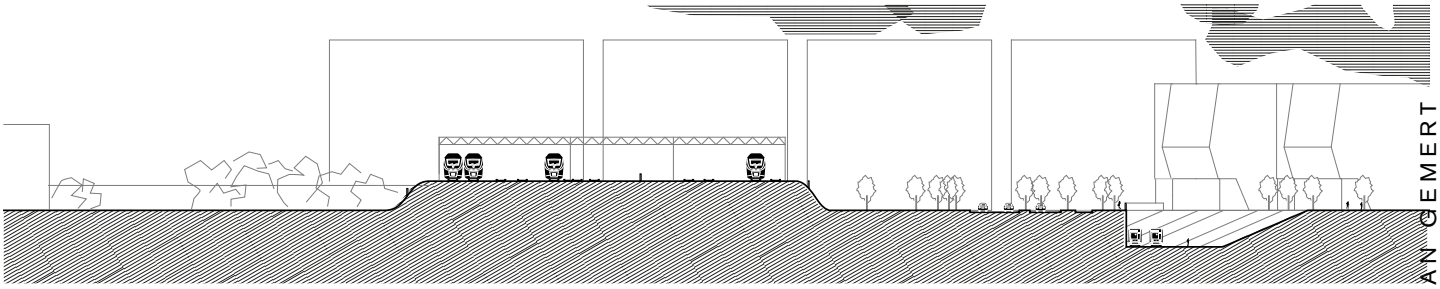
Dike with the green parc



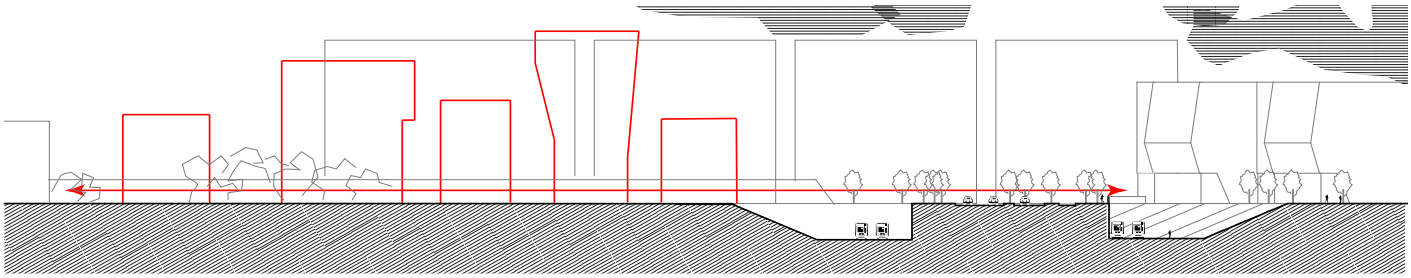








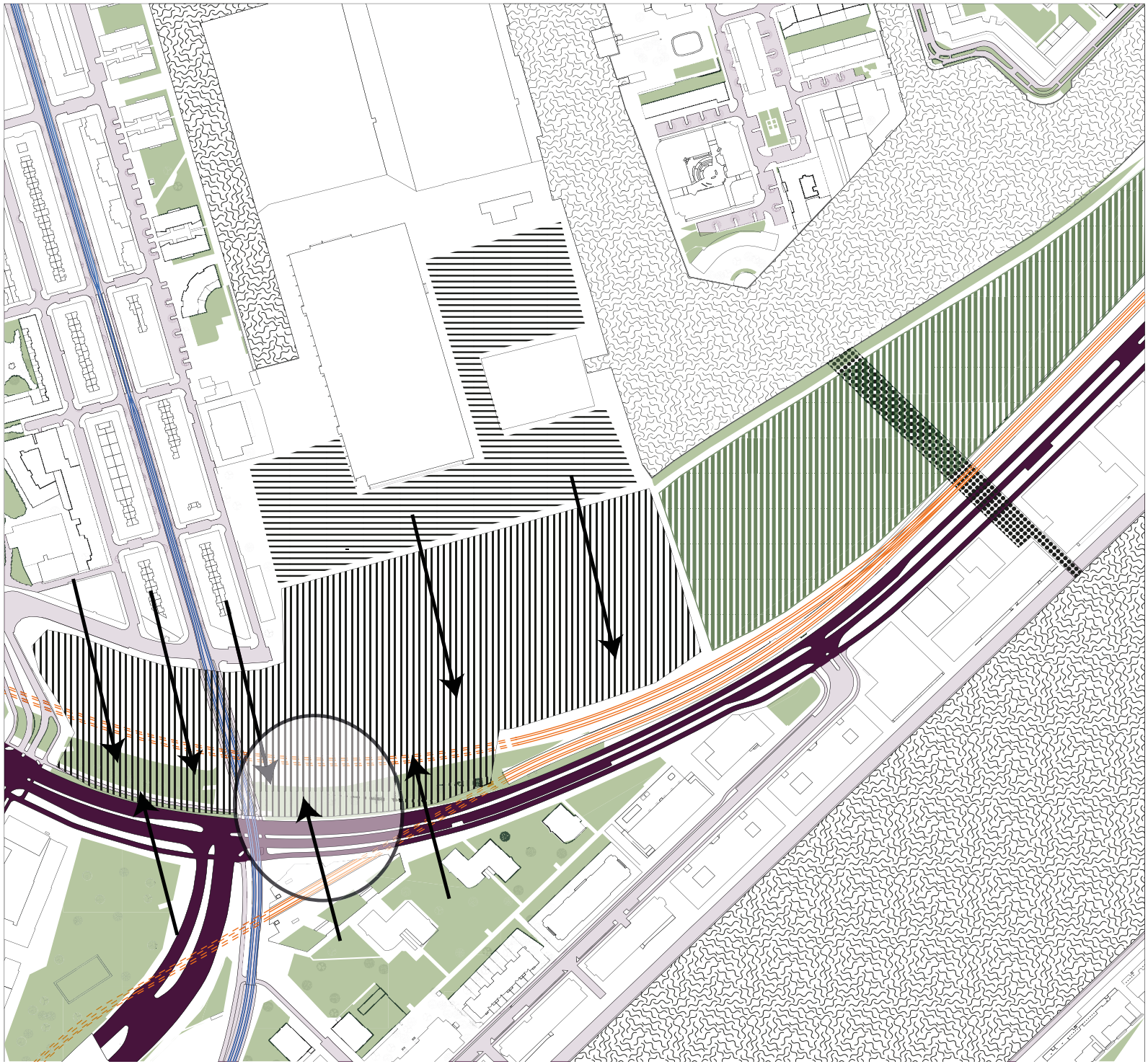
Dike with the densified area



ARTOPUS - GUUS VAN GEMERT

Sitevision for 2050

In this masterplan for Rietlandpark in 2050, it is clear where building extend to desified area's. This is posible due to the downgrading of the traintrack and partialy putting the track underground. This also leads to opportunities for making green connections. Not only with the excisting green, but also with a new park which arises with the disappearence of the traintracks.
The water connections are kept in the way they are, eccept for an extra connection between Dijksgracht and Ijhaven.
Inner urban roads are downgraded, but city ring is kept in tact since the city ring will be even more important with selfdriving, on demand cars.
No train are passing through Rietlandpark, since trains will not go further than the cityring. The traintrack has made place for lightrailtrack which fits into a new lightrail network in metropolitan Amsterdam. Also the tramline to City Islands is transformed and intergrated into the lightrail network om metropolitan Amsterdam. To first part of the track, seen from central station is a combined track where both lines, central - city islands and central - amstel/almere are driving on.



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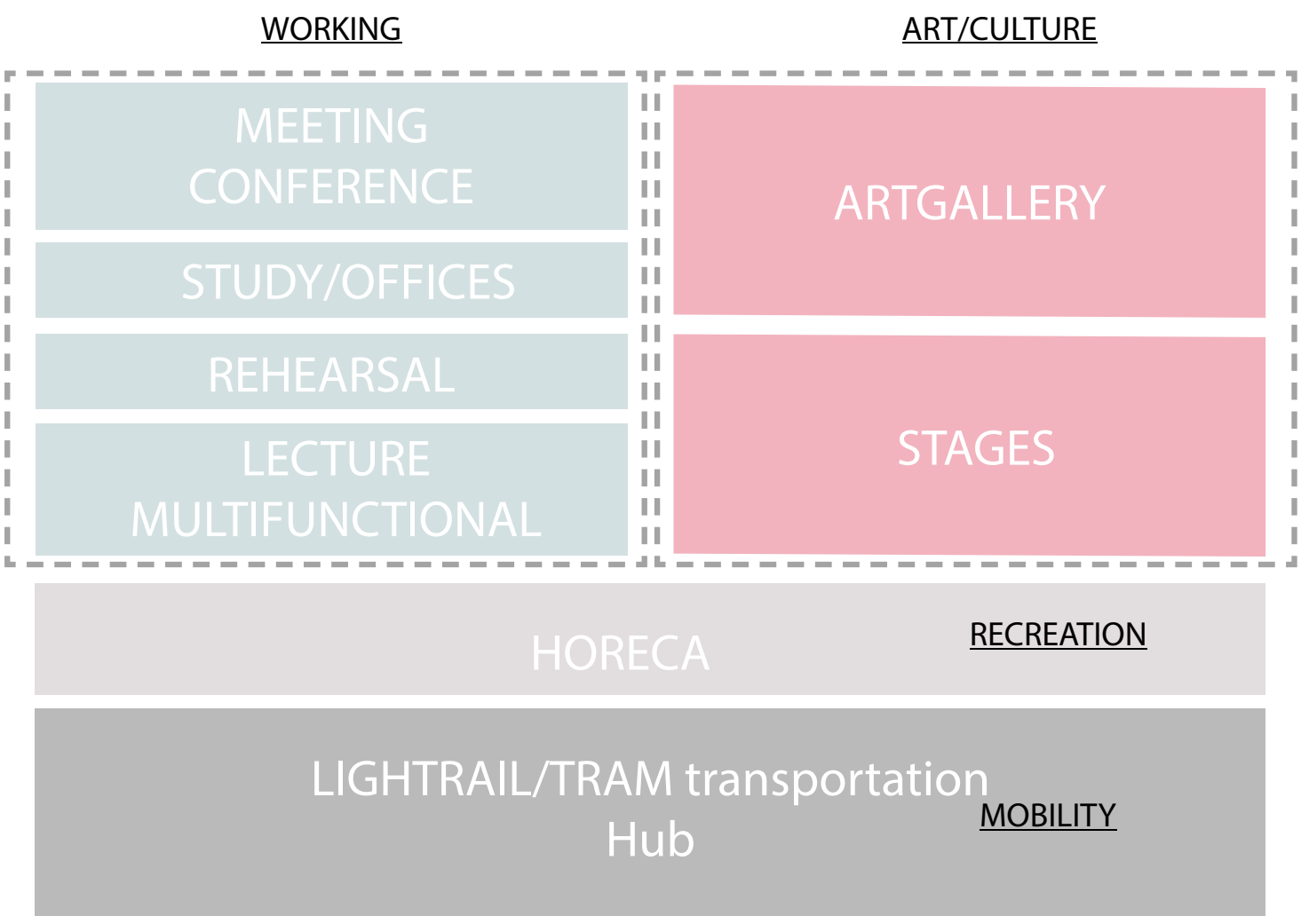
BUILDING PROGRAM

ARTOPUS - GUUS VAN GEMERT

CO-WORKING SPACE

ART/CULTURE

LIGHTRAIL/TRAM transportation Hub



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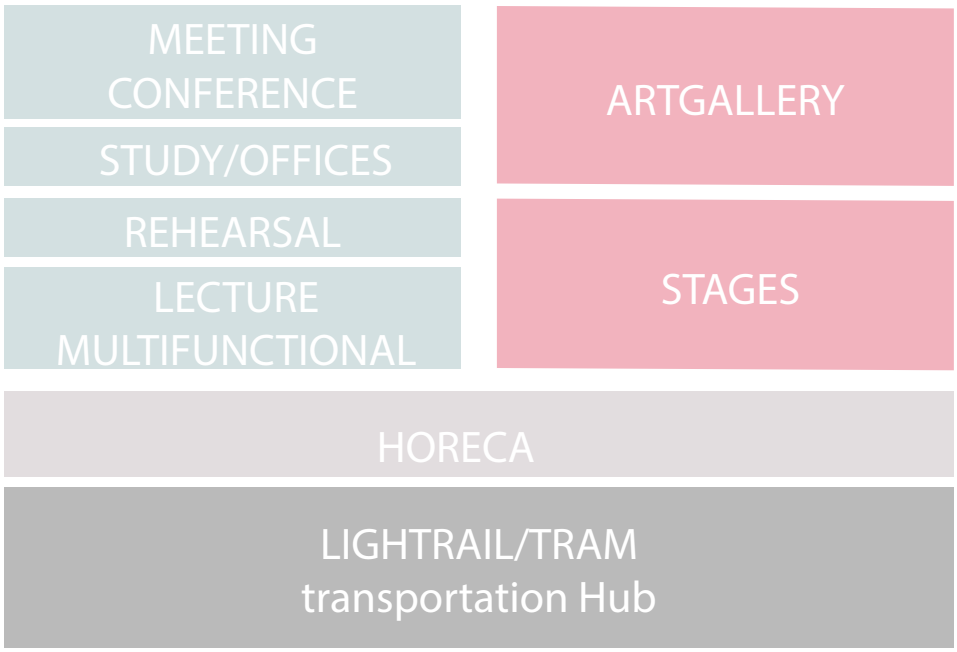
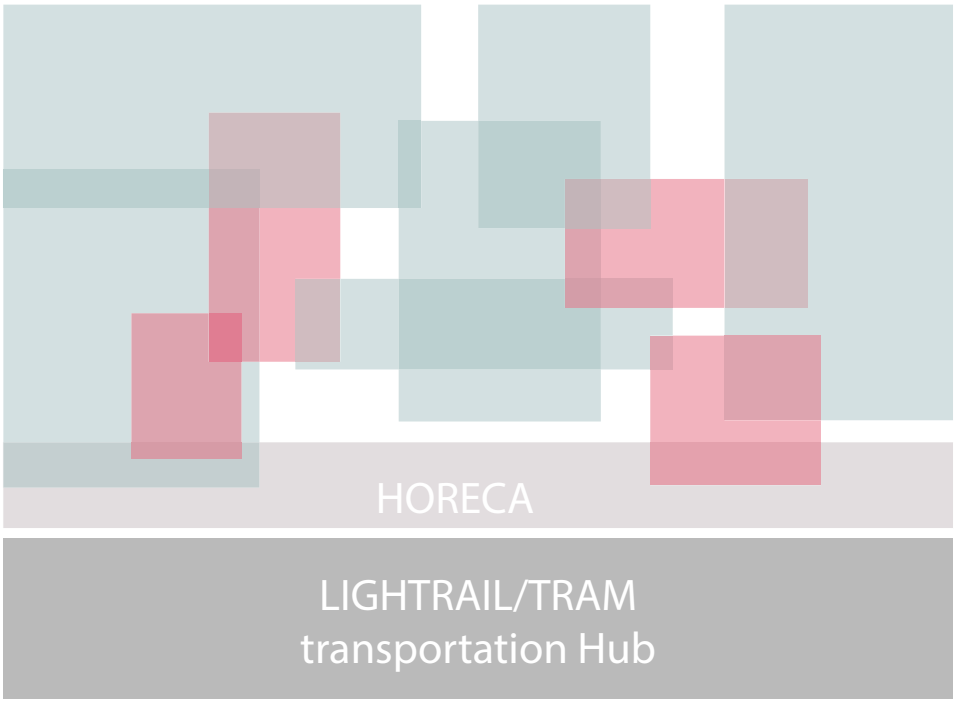
FUNCTION MIXING

FUNCTION MIXING





totaal: 11.000

					lengte	breedte	aantal	opp.		note
café/restaurant	8%	880	sit erea				68%	600	m2	200 persons
			bar				11%	100	m2	
			keuken				8%	70	m2	
			others				13%	110	m2	
			terras							
Study/offices	43%	4730	study				50%	2360	m2	400 working places
			rehearsal 1				16%	760	m2	
			rehearsal 2				12%	570	m2	
			reception				5%	240	m2	
			storrage				10%	470	m2	
			others				7%	330	m2	
Art gallery	11%	1210	gallery				66%	800	m2	
			storage				16%	190	m2	
			shop				8%	100	m2	
			others				10%	120	m2	
stage	17%	1870	stage				50%	940	m2	450 seats
			backstage				10%	190	m2	2 rooms
			storage				10%	190	m2	
			office				7%	130	m2	
			foyer				15%	280	m2	
			others				8%	150	m2	
Lecture/multi	3%	330	Hall 1				80%	260	m2	
			Foyer				20%	70	m2	
meeting/conference	10%	1100	Meetingrooms				50%	550	m2	8 rooms
			conference room				20%	220	m2	
			foyer				20%	220	m2	
			others				10%	110	m2	
Staff	4%	440						440	m2	
others	4%	440						440		

totaal buidling (exc mobility) 11010 m2

Lightrail	track city islands	130	5,5	2	1430	m2	5930 inout/day
	track muiderpoort/almere	130	5,5	2	1430	m2	3060 inout/day
tram	track 10+7	60	3,5	2	420	m2	5280 inout/day
connection					2500	m2	

totale opp. 16790 m2

100%

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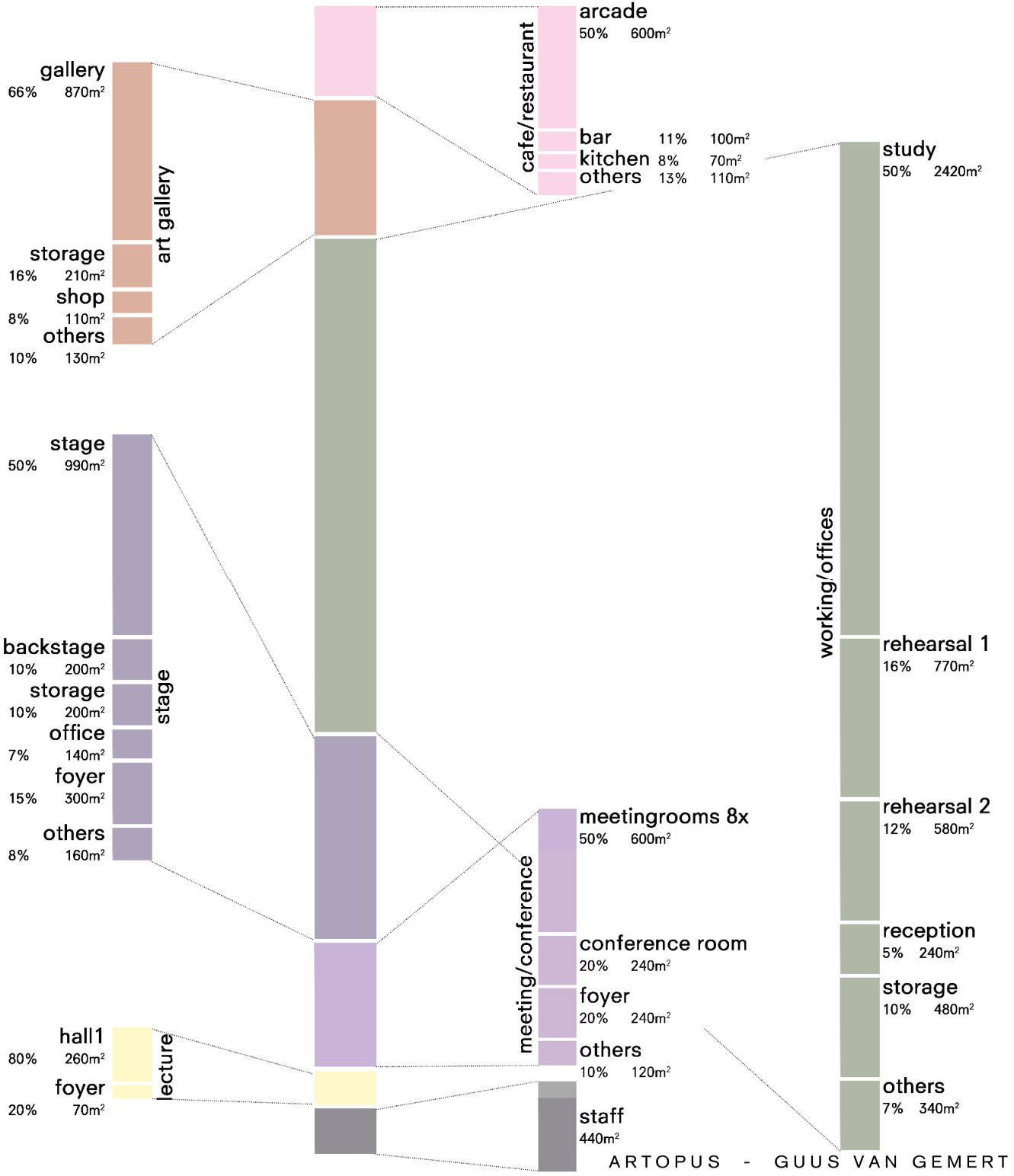

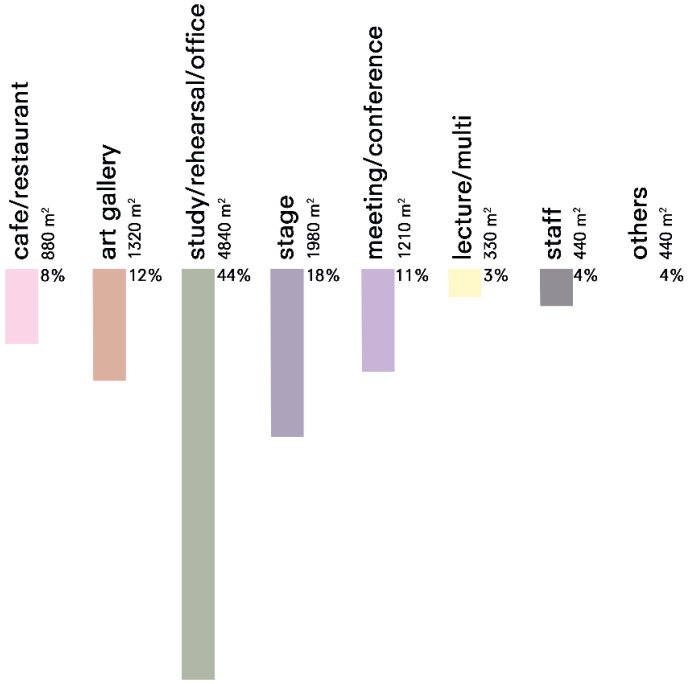

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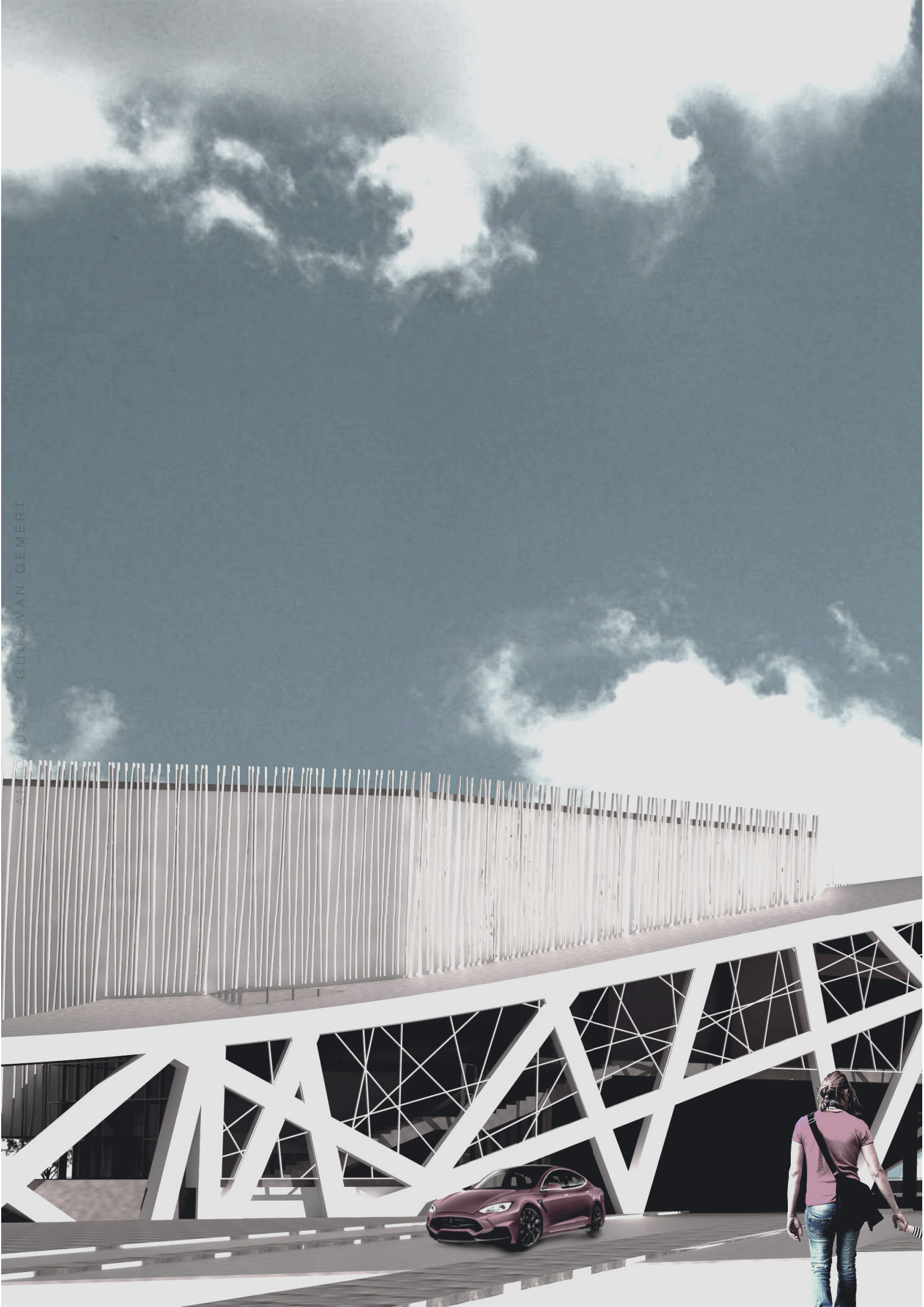
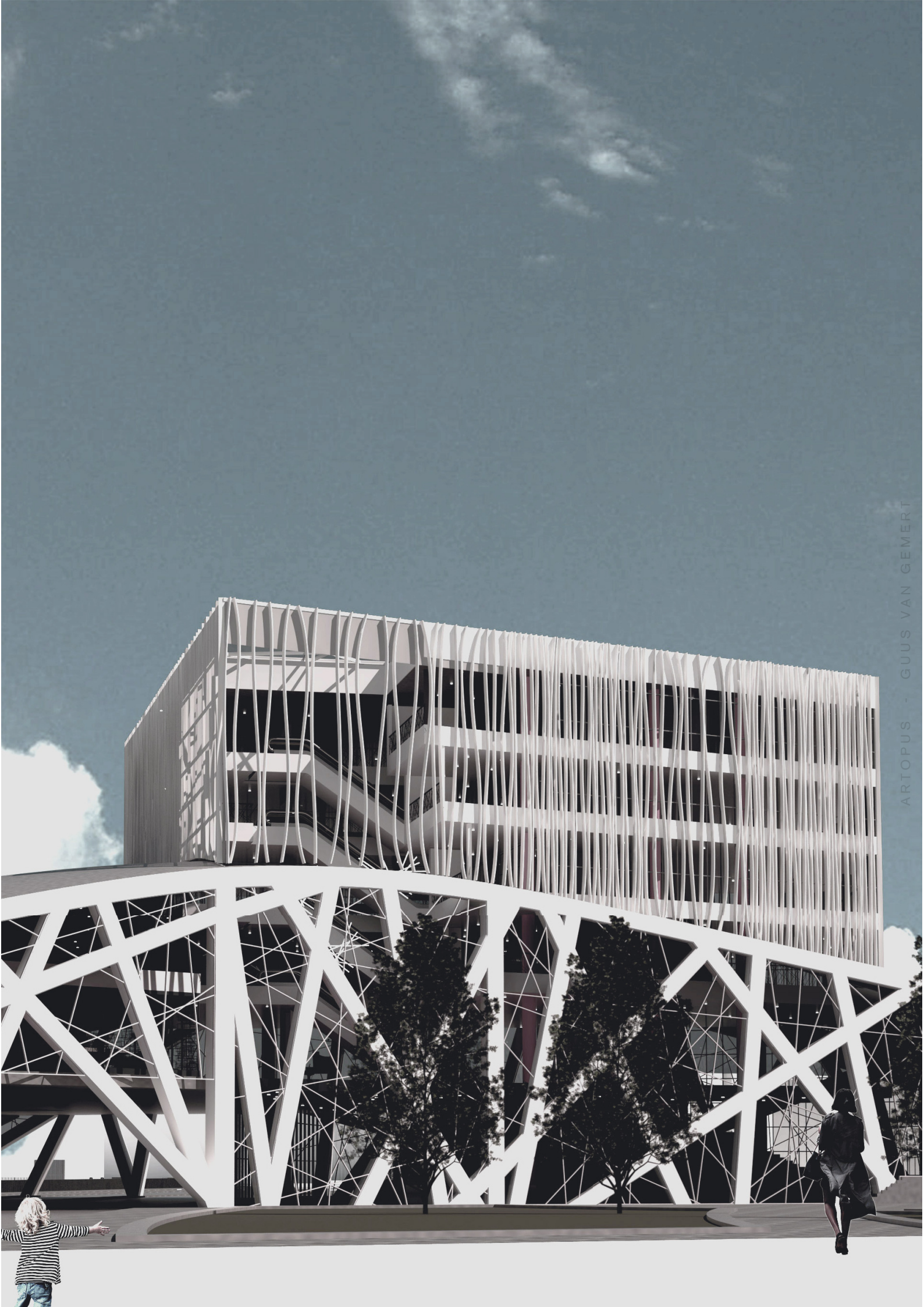
DESIGN


ATELIER PUS - GUUS VAN GEMERT



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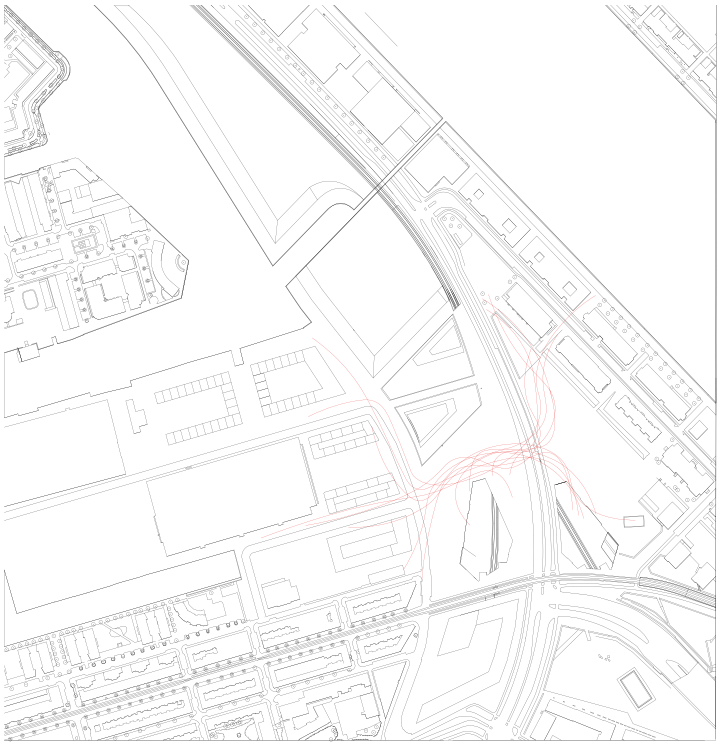

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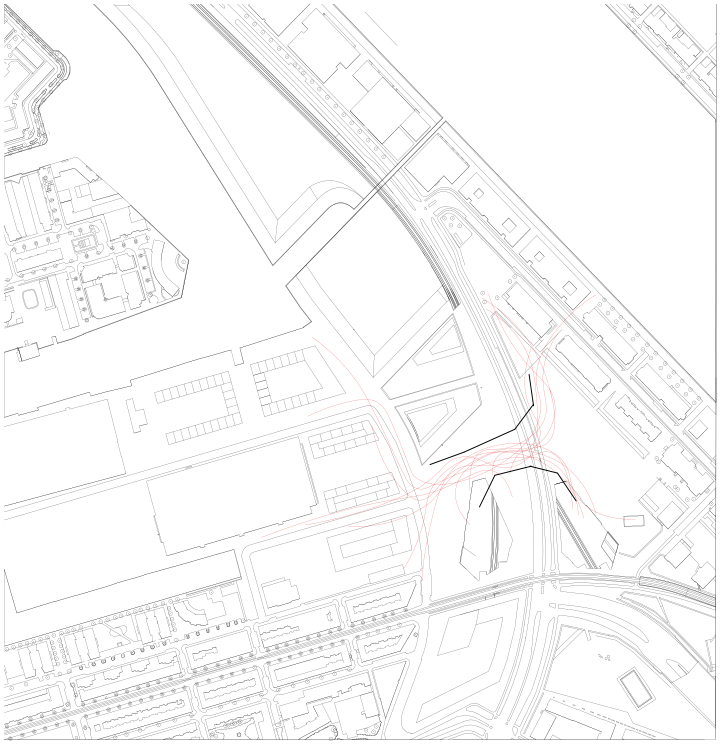

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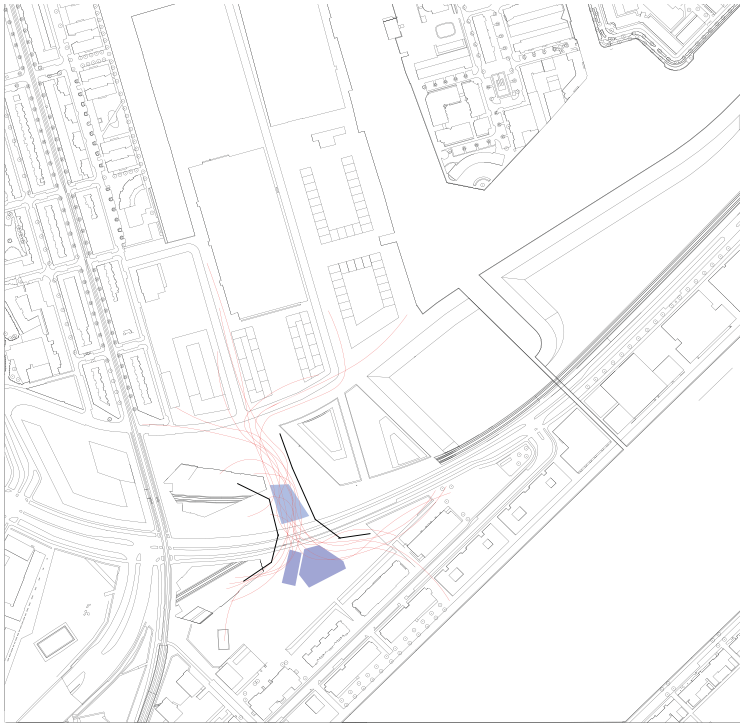

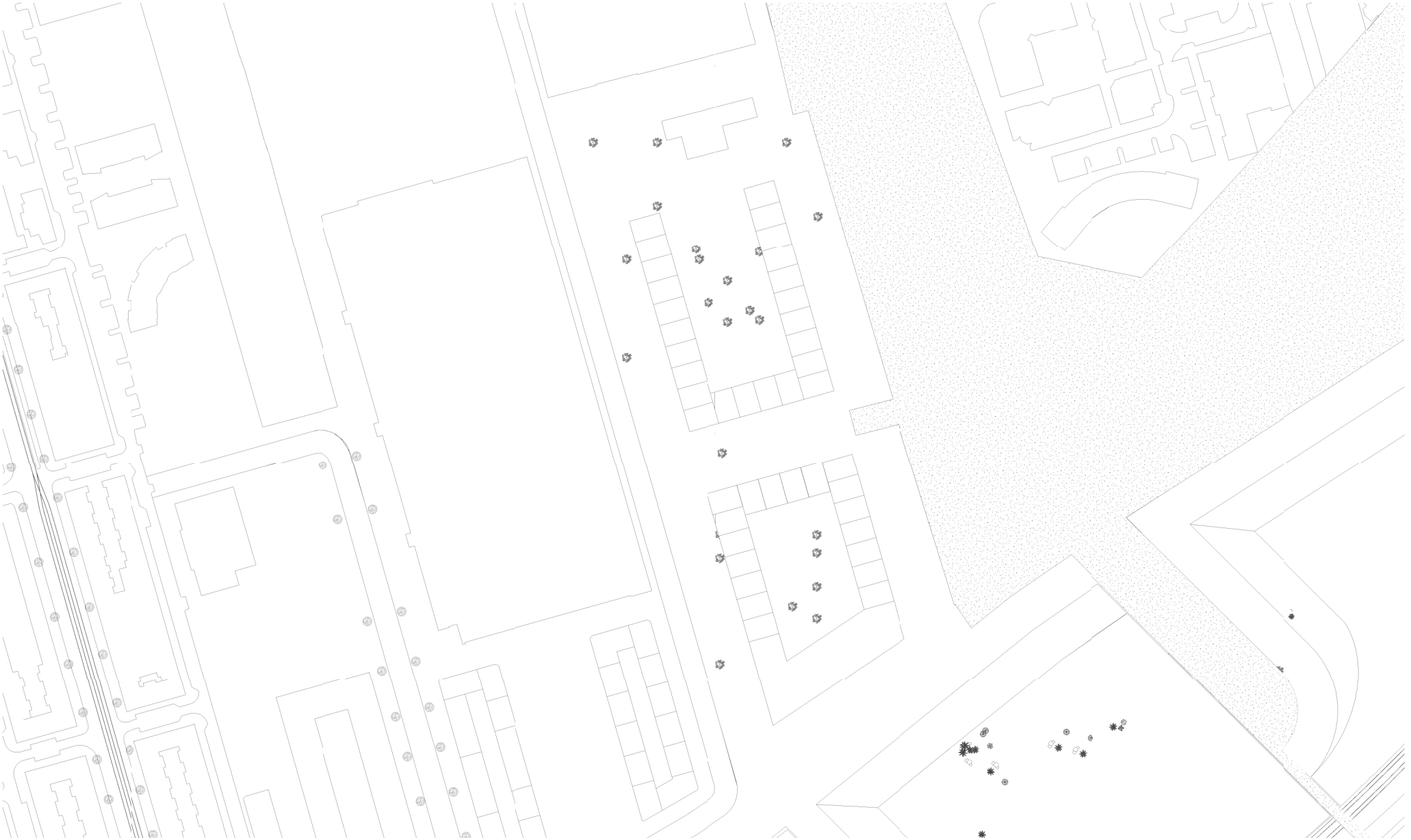

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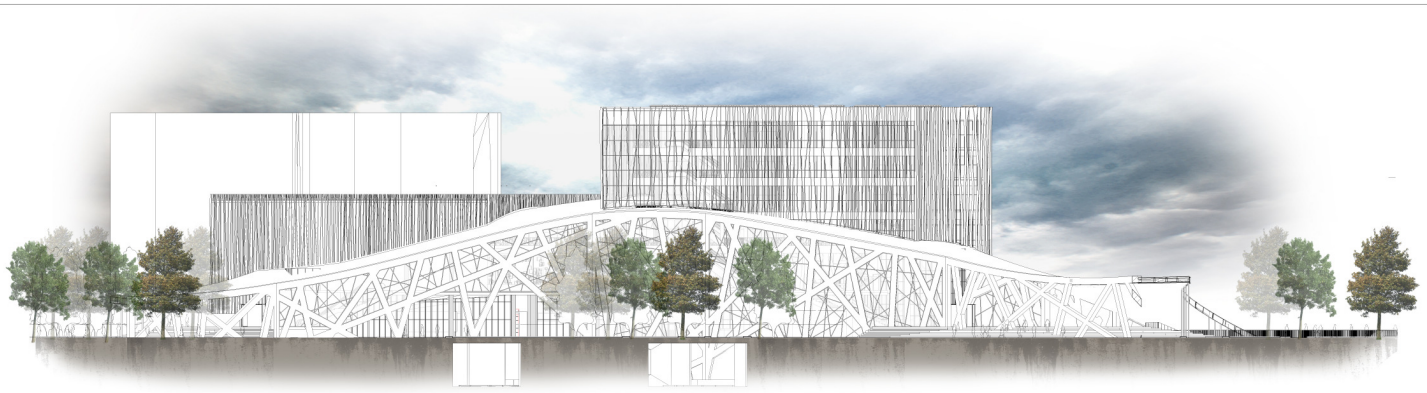
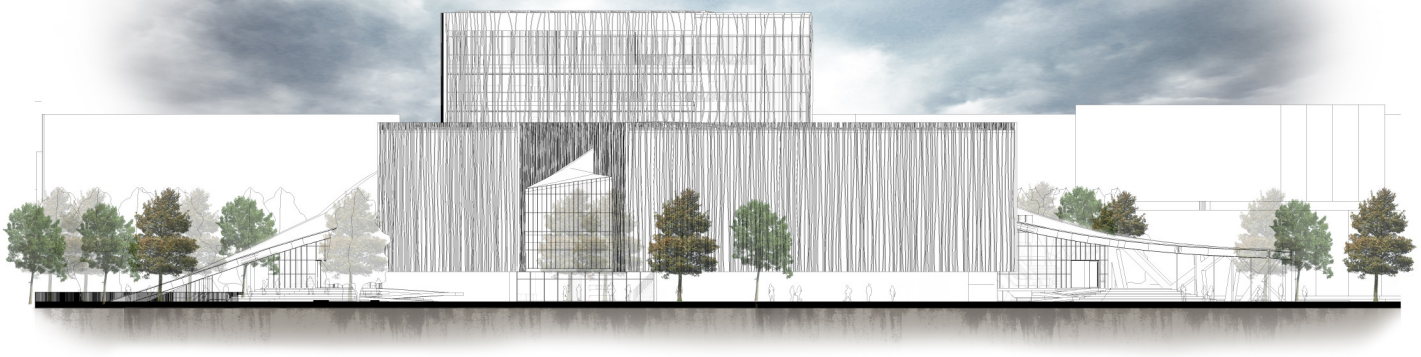
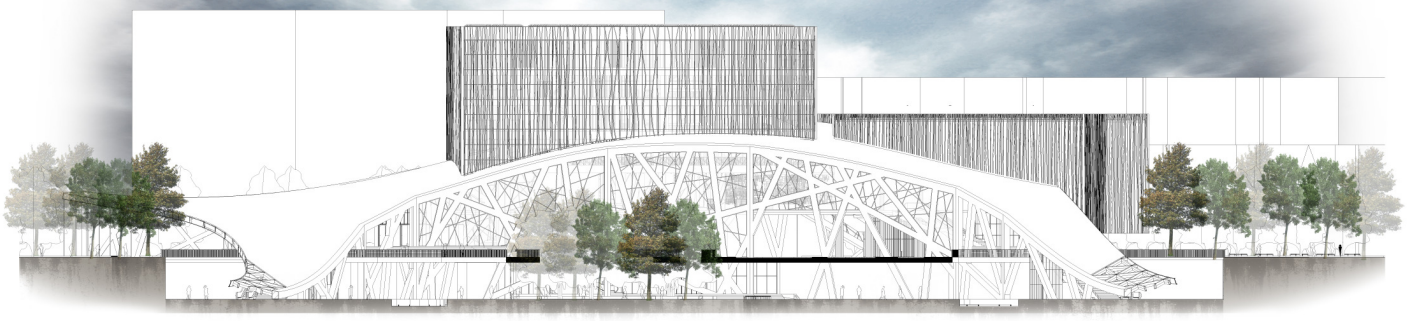


WEST FACADE scale 1:250



NORTH FACADE scale 1:250



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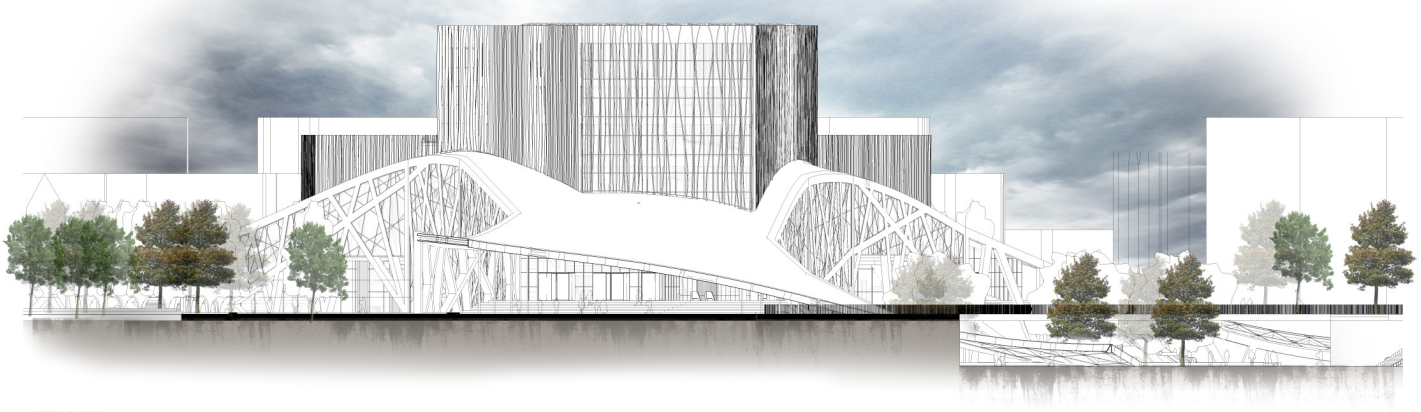
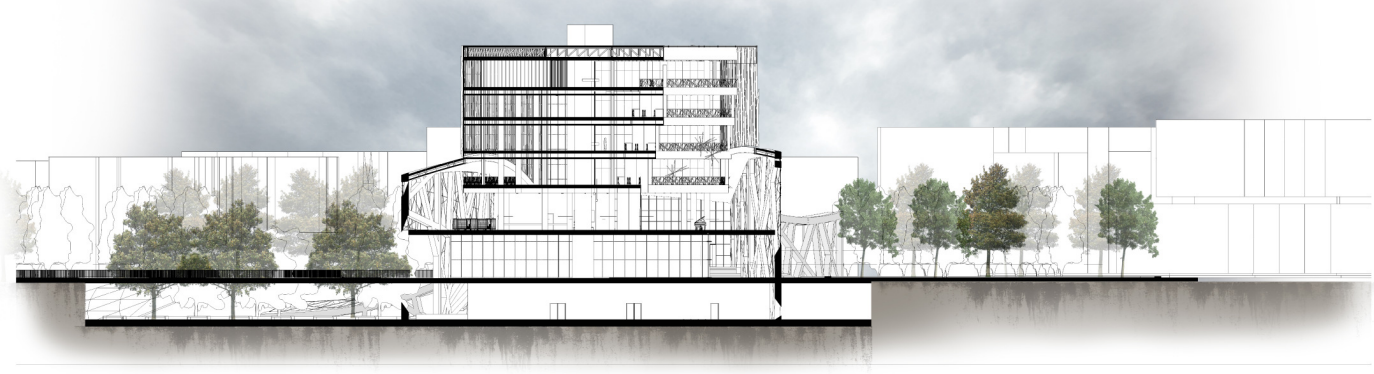
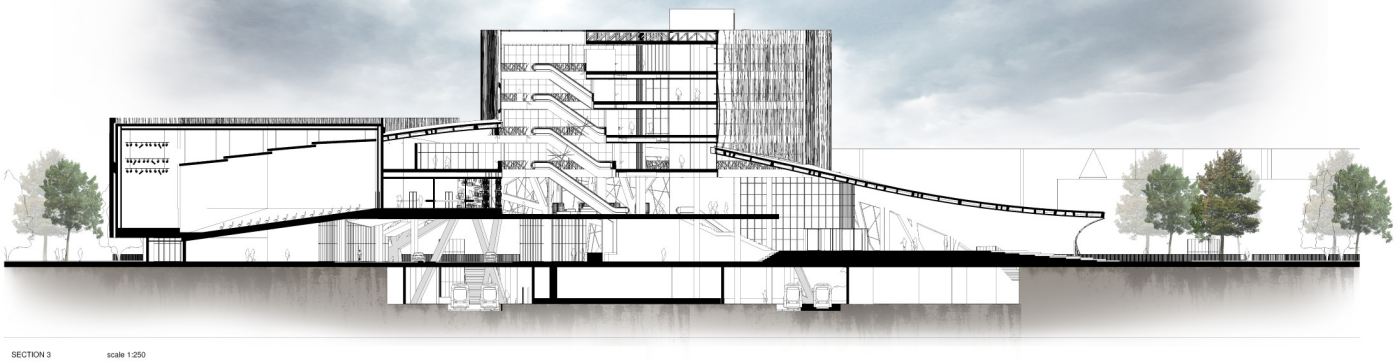


SOUTH FACADE scale 1:250

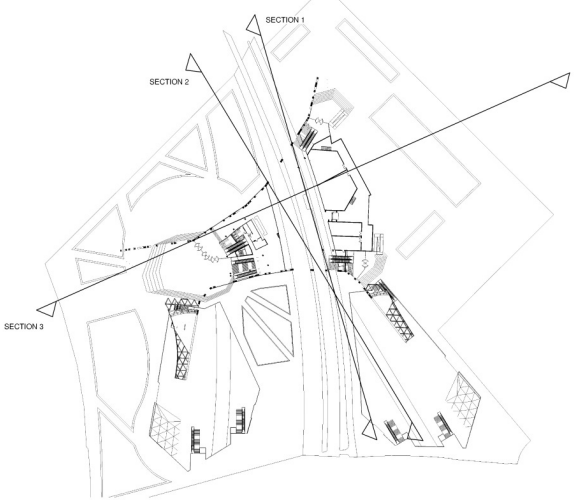
SECTION 1 scale 1:250



SECTION 2 scale 1:250



SECTION 3 scale 1:250



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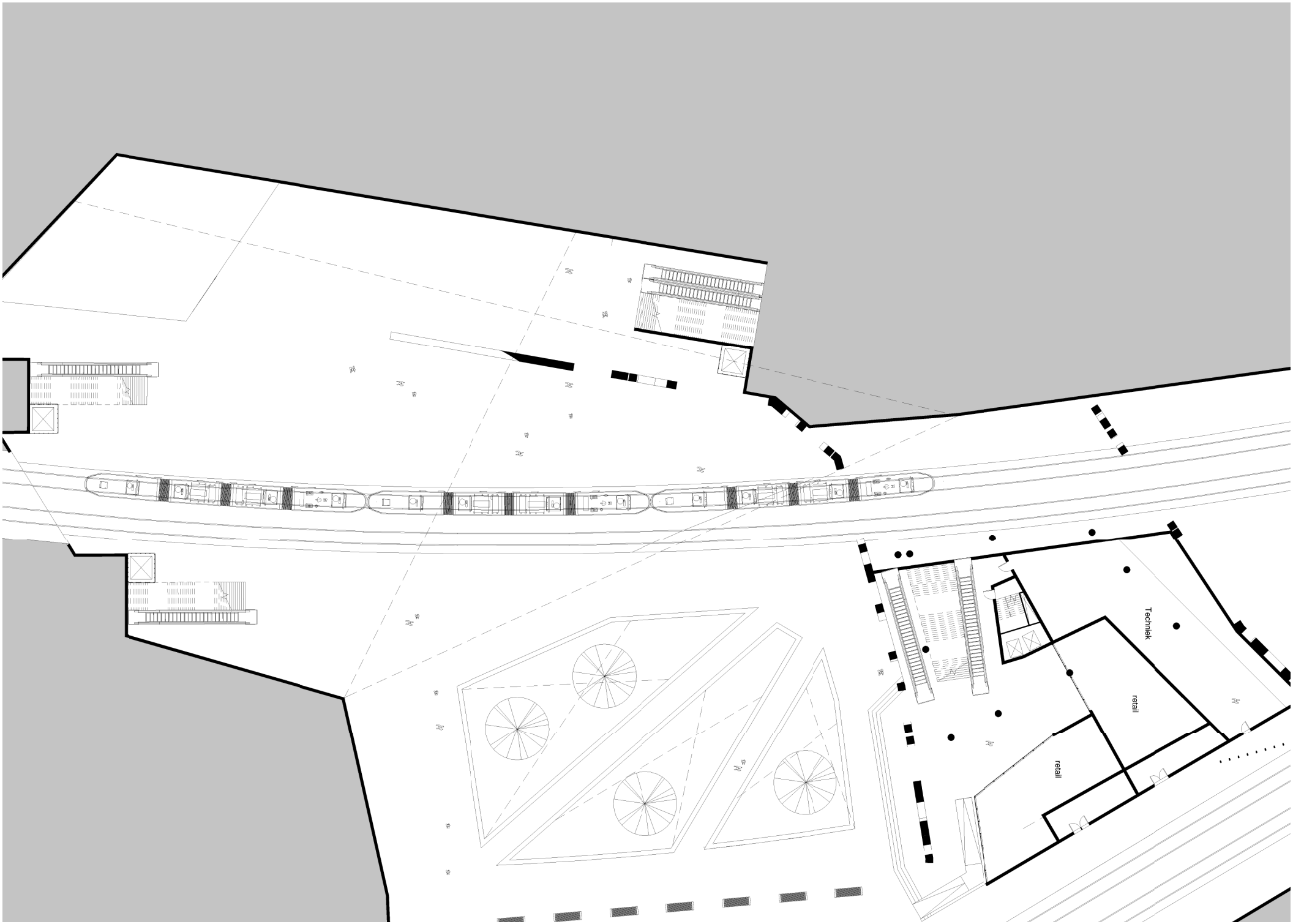
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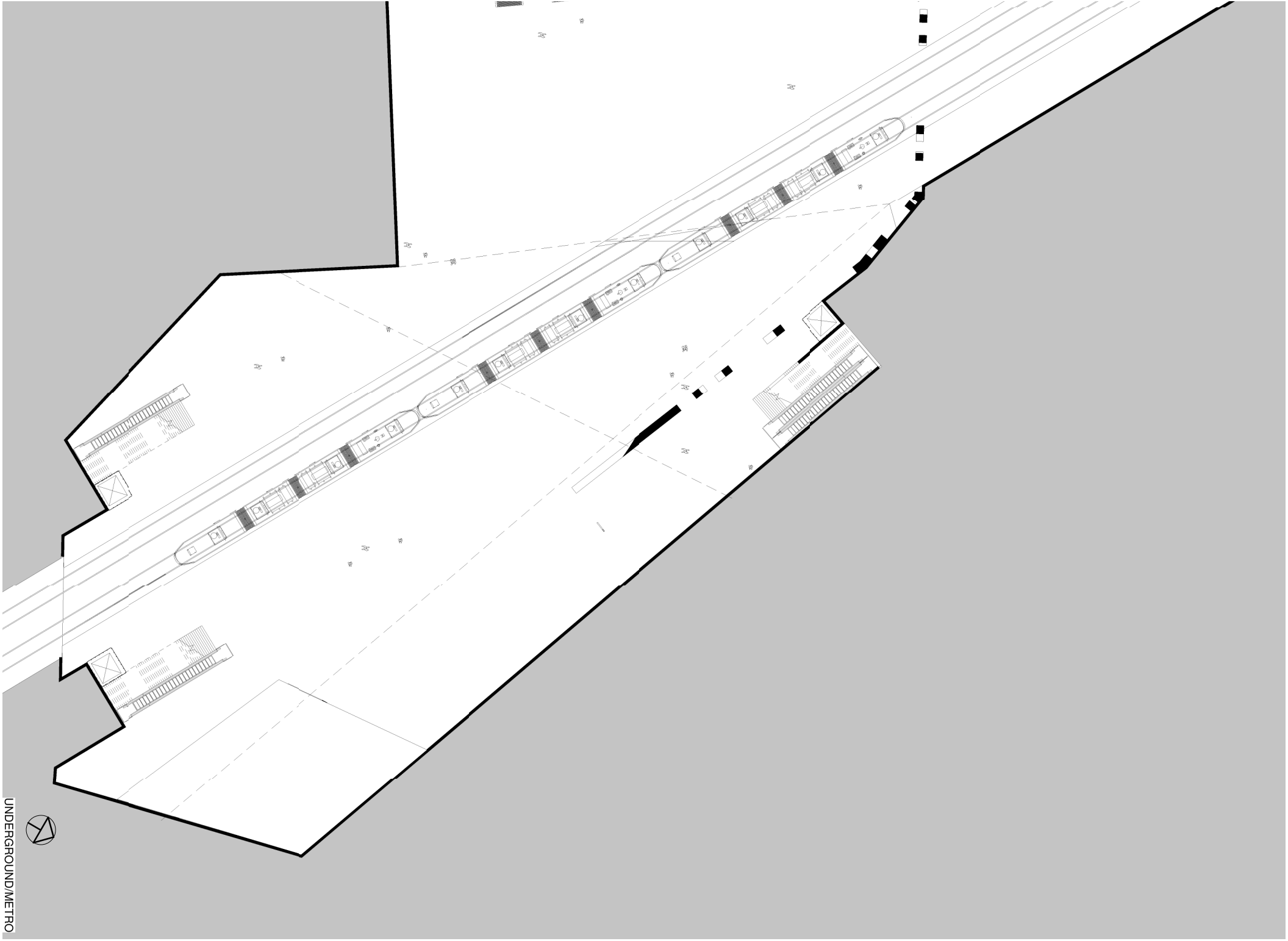
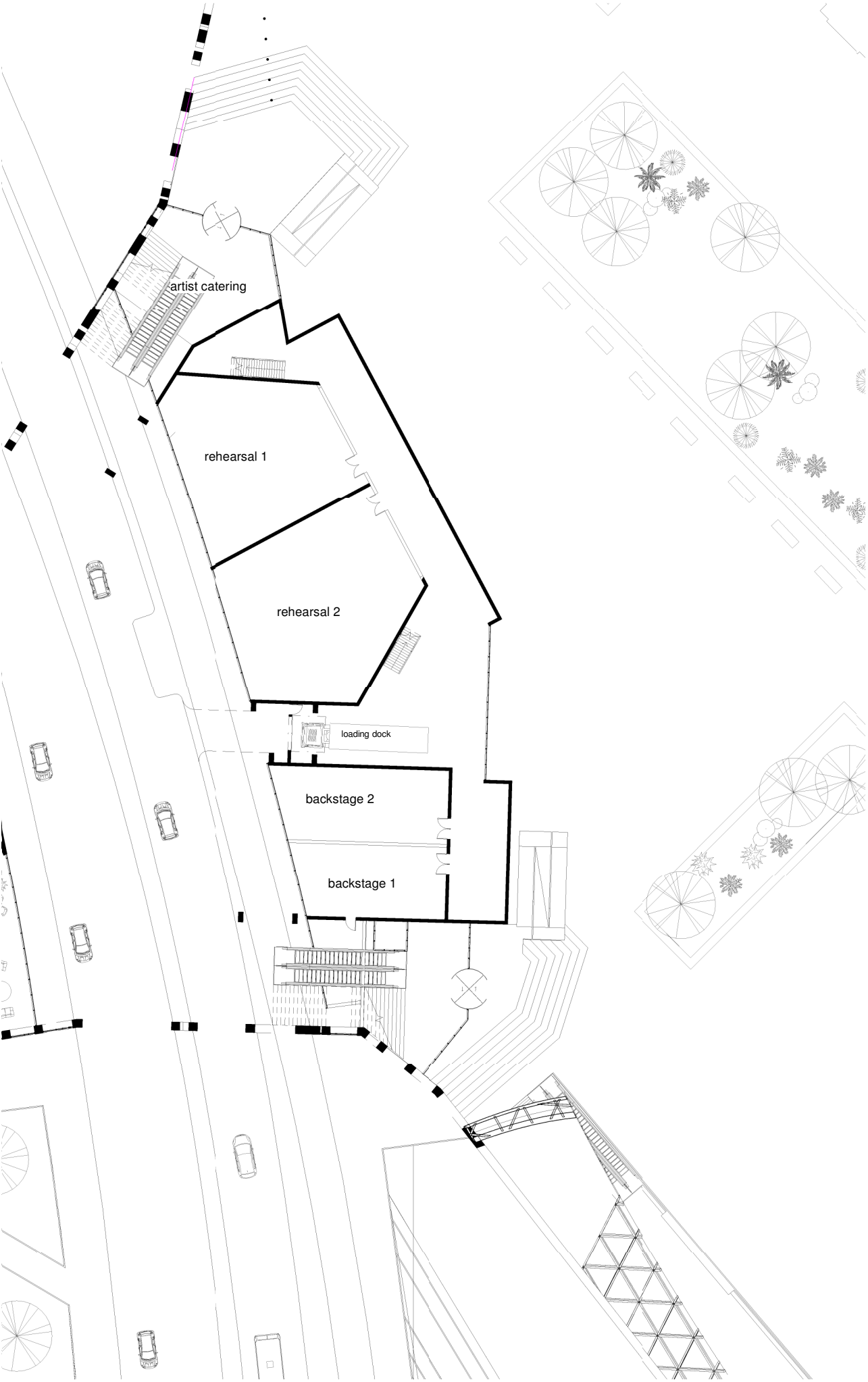


UNDERGROUND/METRO

ARTOPUS - GUUS VAN GEMERT


office
kitchen
storage
bar
cafe



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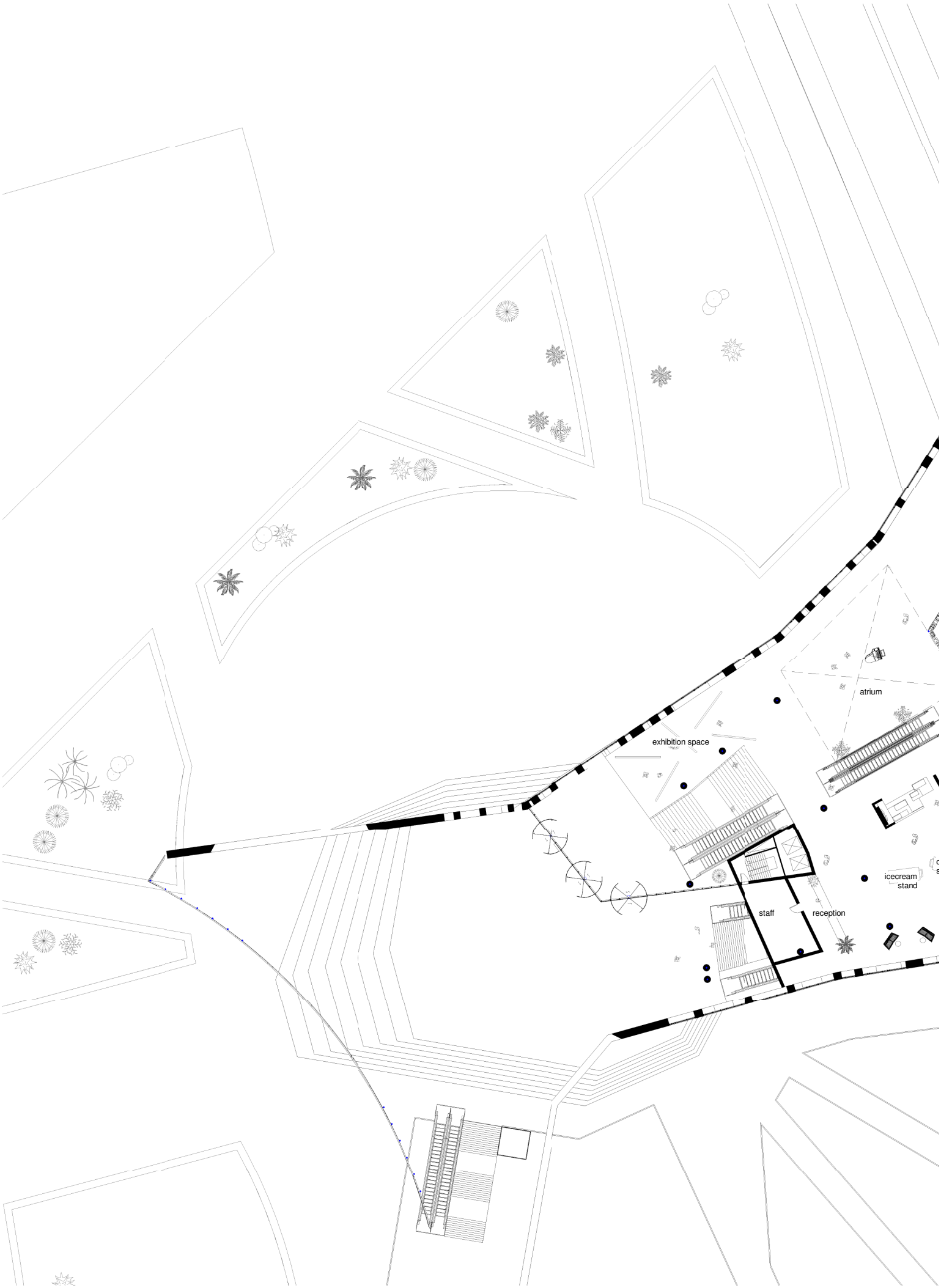
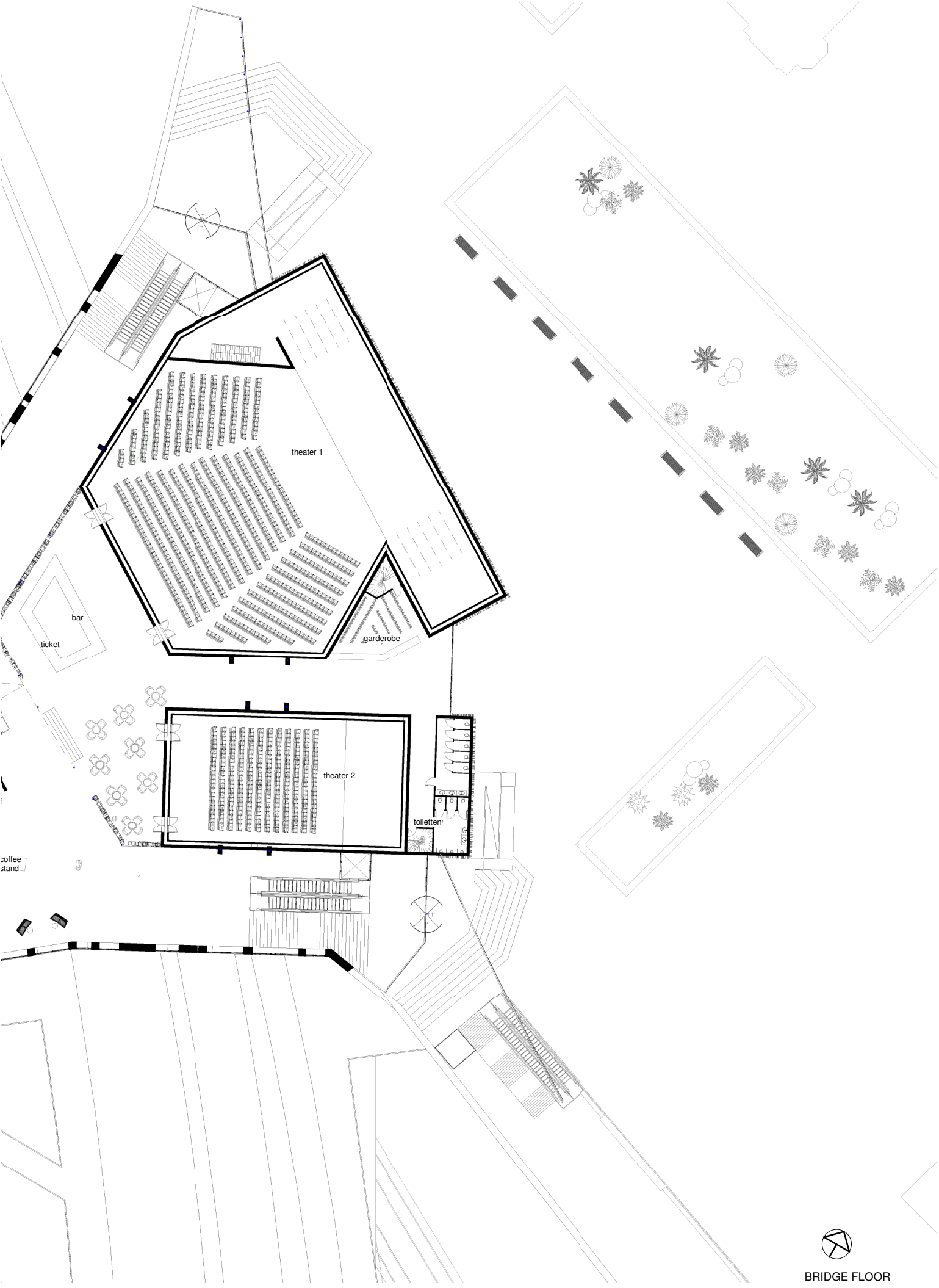
GROUND FLOOR +1500

ARTOPUS - GUUS VAN GEMERT

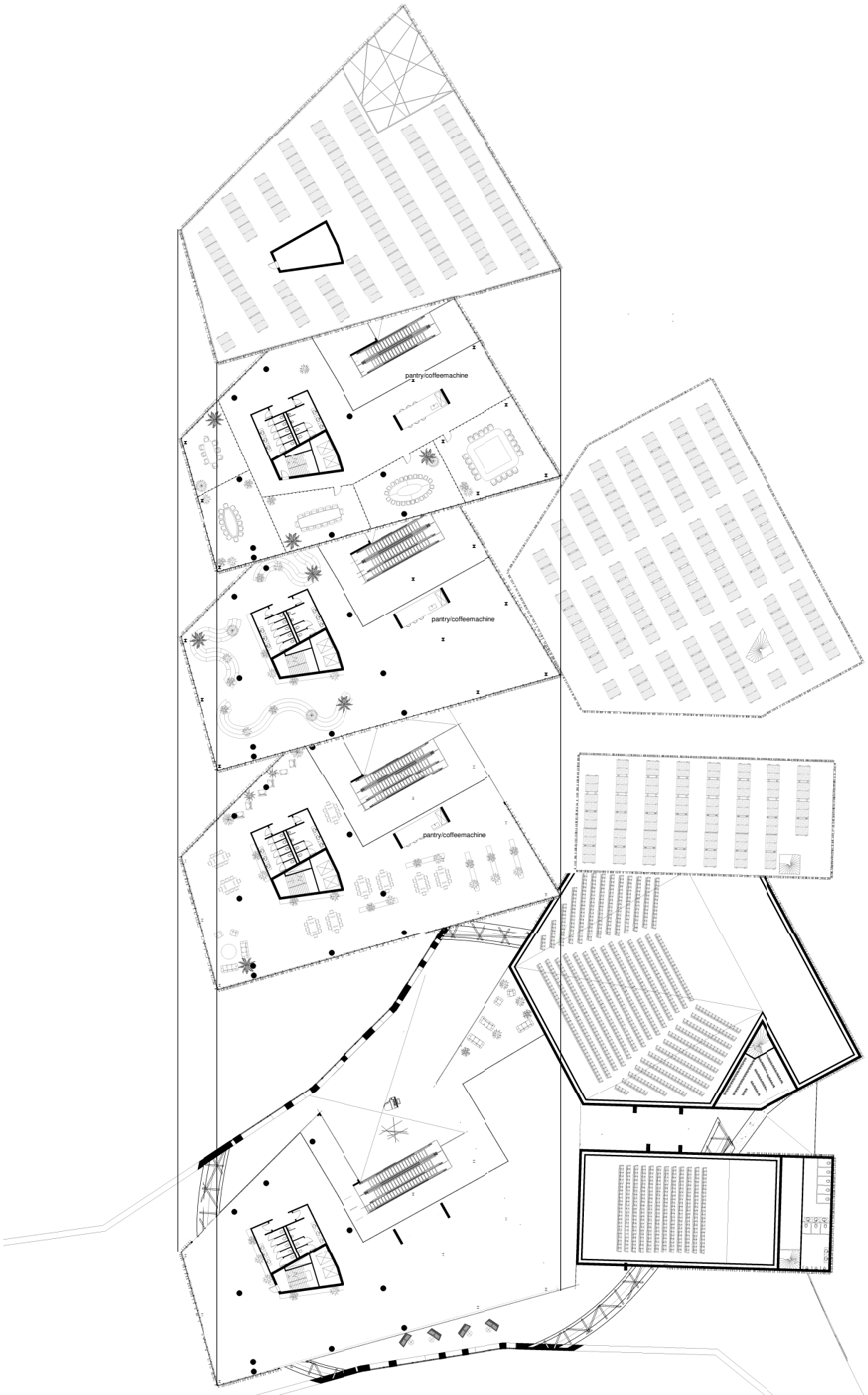




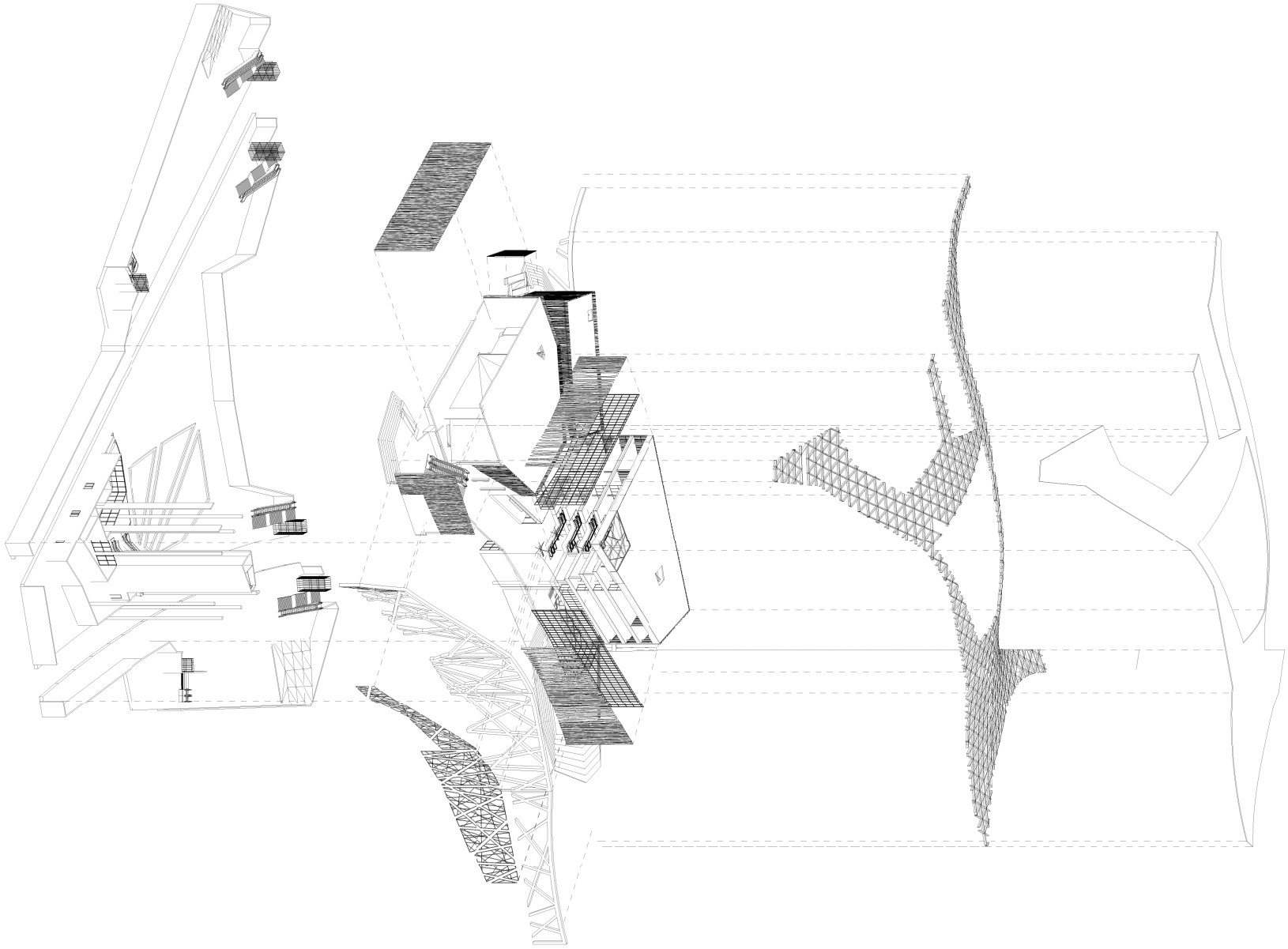
ARTOPUS - GUUS VAN GEMERT

BRIDGE FLOOR

ARTOPOLIS - GIJS VAN GEMERT



UPPER FLOORS/CO-WORKING



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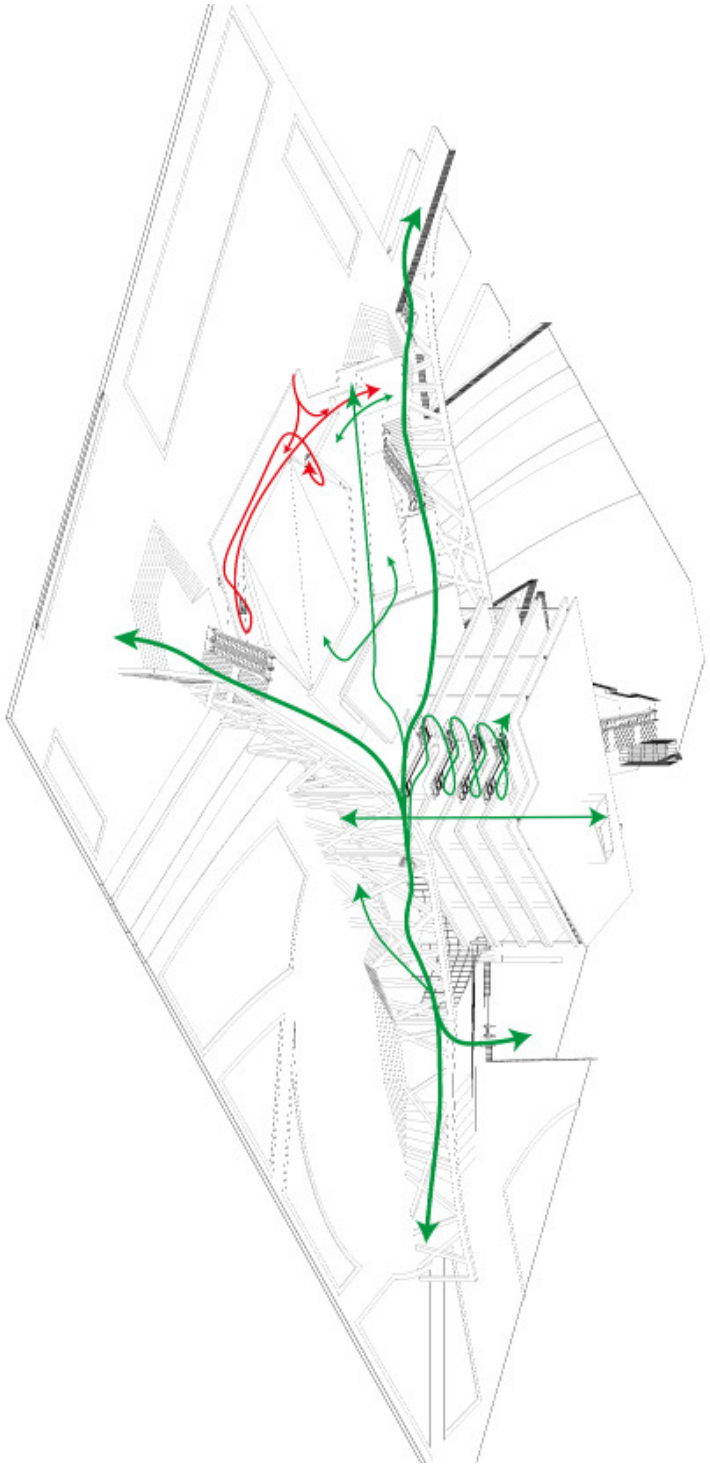
PUBLIC-PRIVATE


theater 1
bar
ticket
atrium
exhibition space
exhibition space
theater 2
coffee
icecream
stand
staff reception
PUBLIC
SEMI PUBLIC
ARTIST
STAFF

ARTOPUS - GUUS VAN GEMERT

PUBLIC-PRIVATE ROUTING



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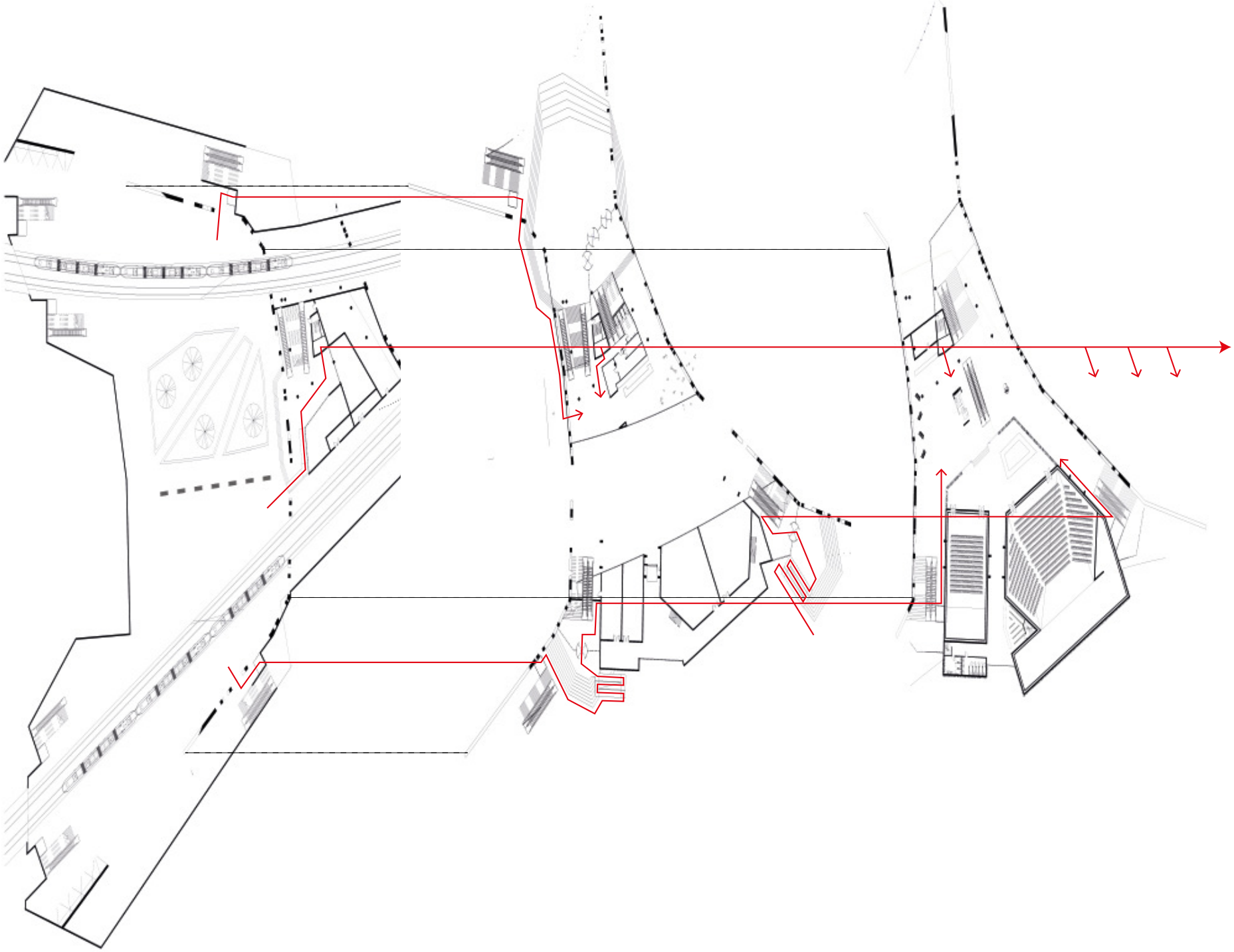
WEELCHAIR ACCESSIBILITY



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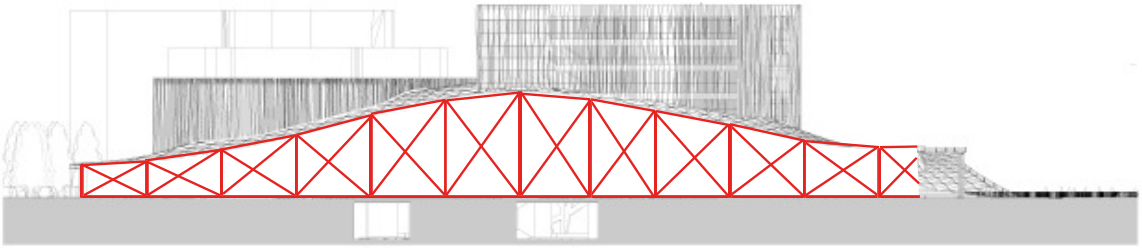
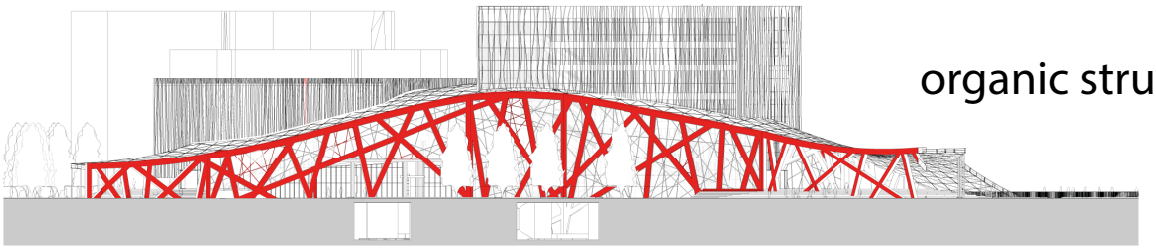
`CONSTRUCTIVE FACADE



constructive wall (truss)



organic structural web

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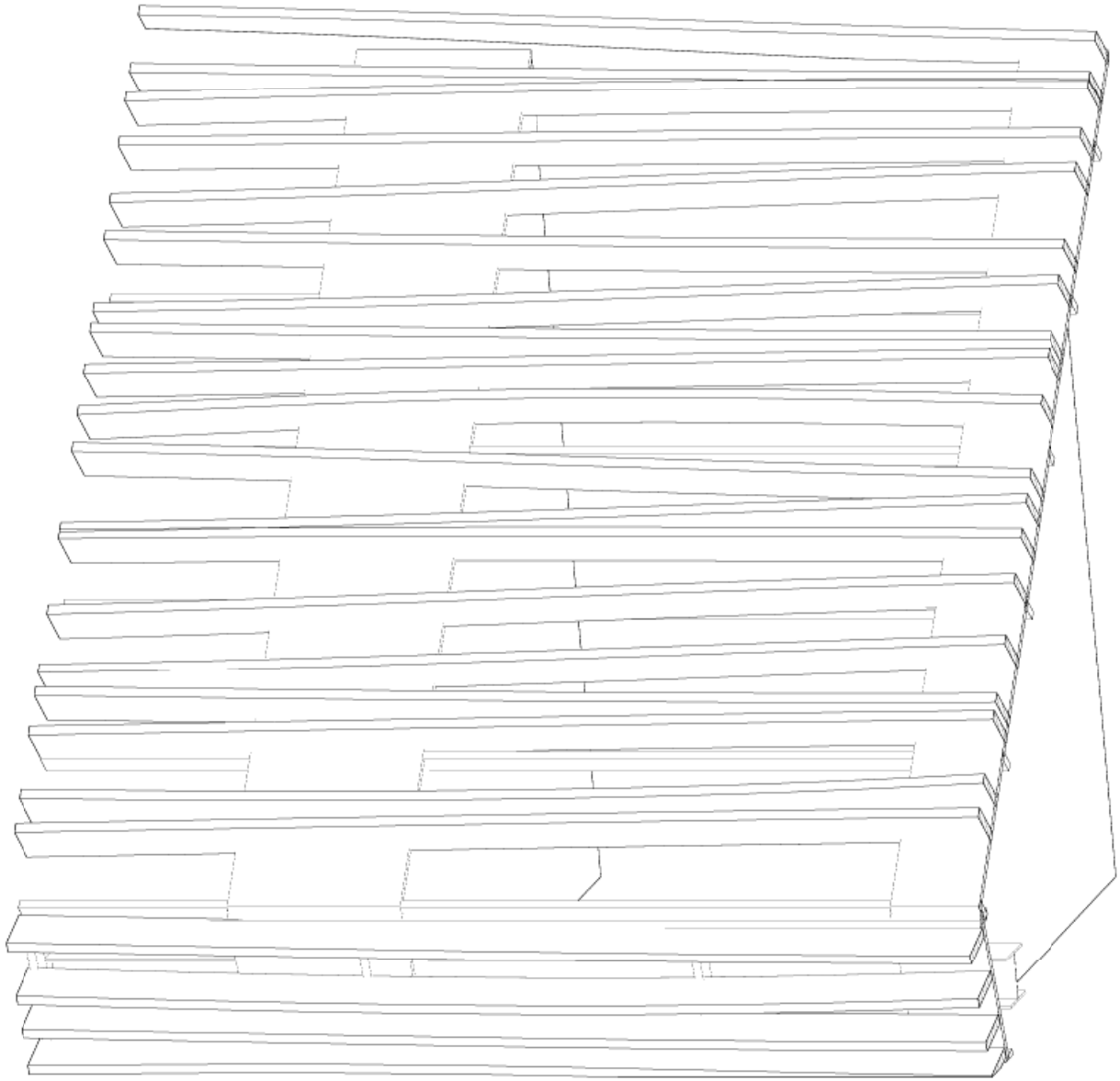
LAMELLA FACADE



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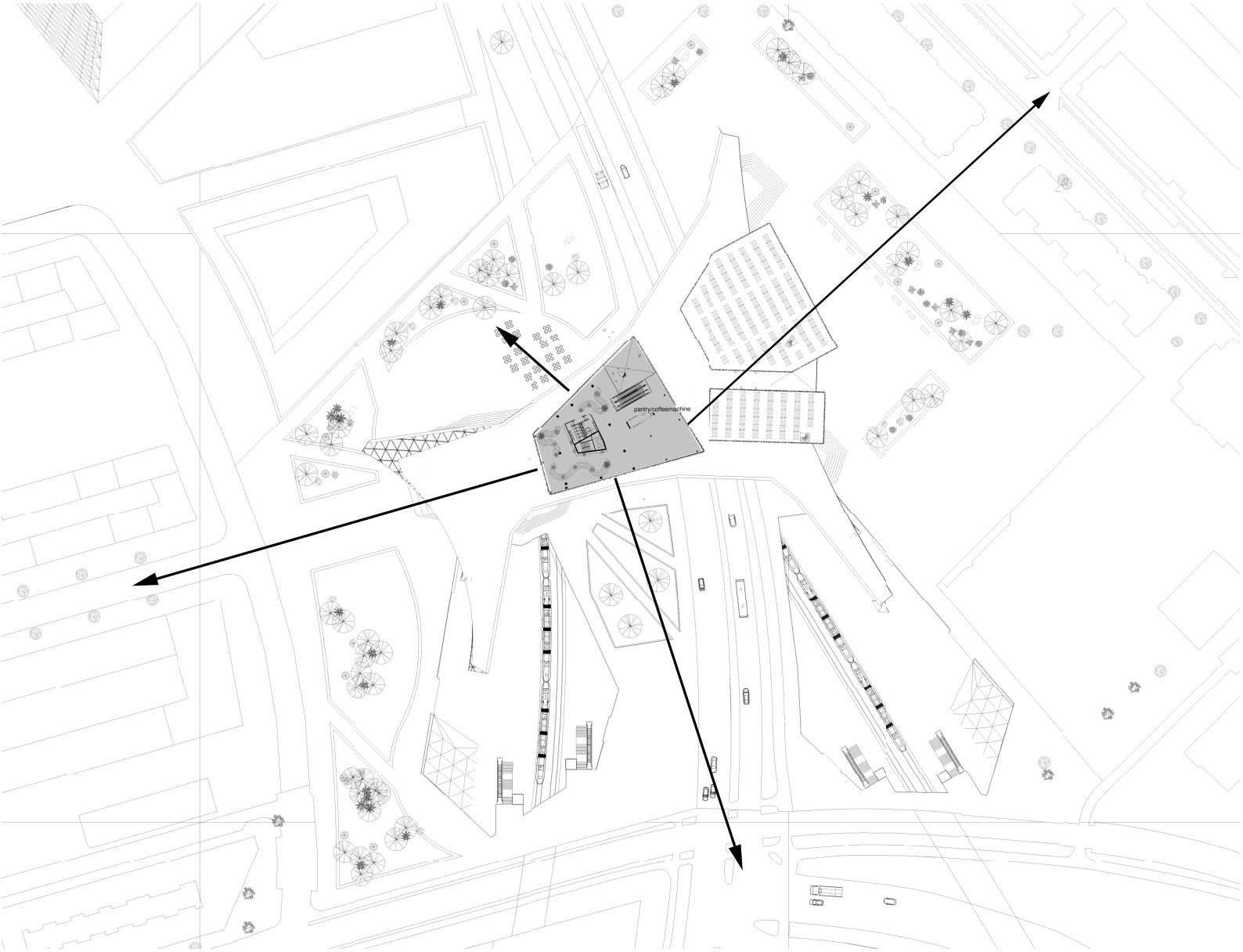
VIEWLINES FROM WORKINGSPACE


pantry/coffeemachine

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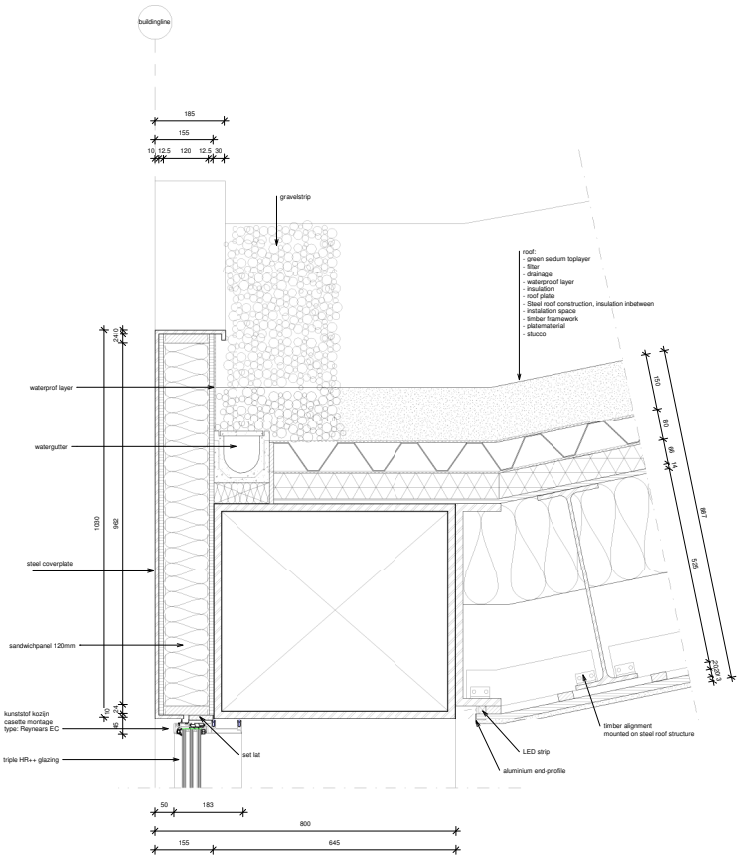
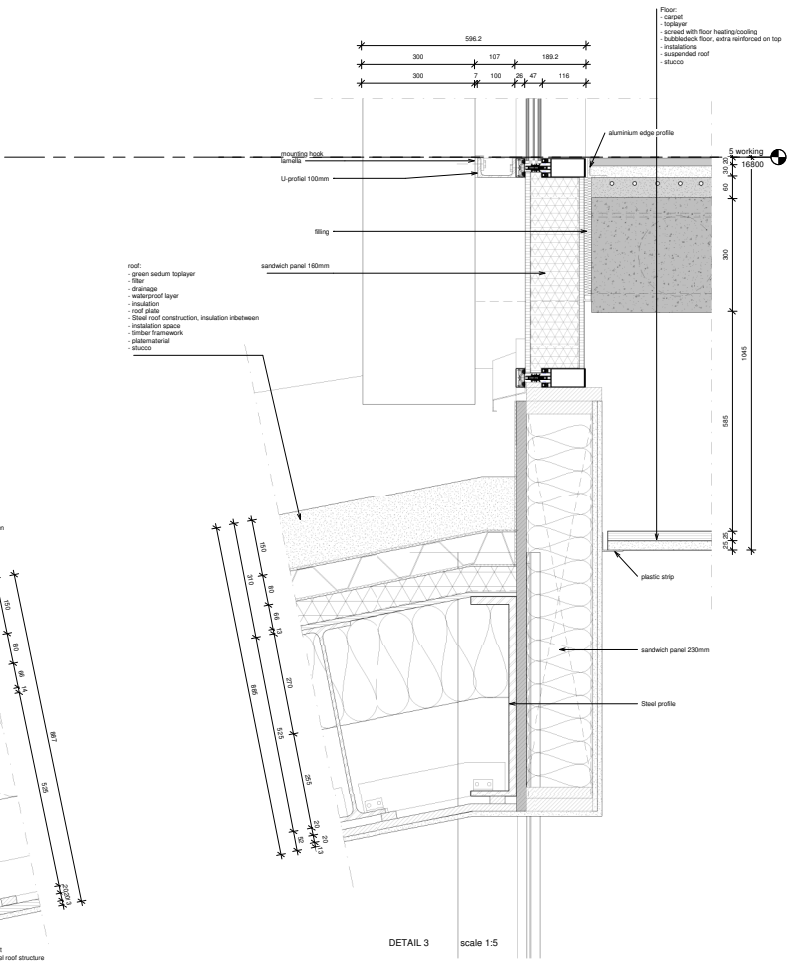
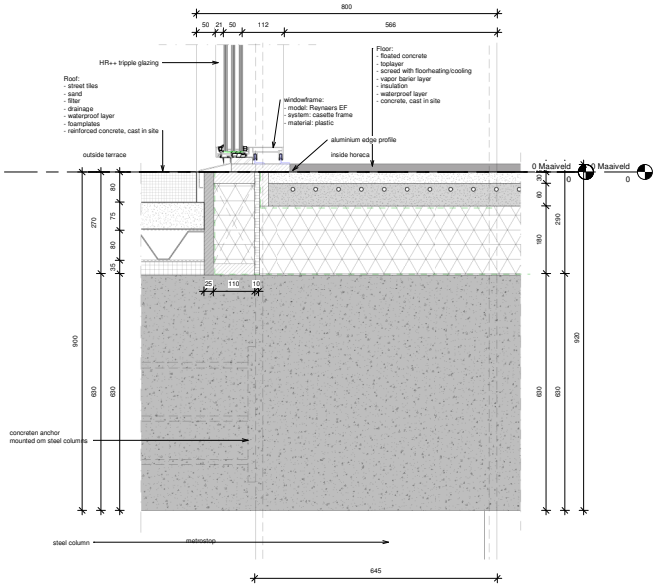


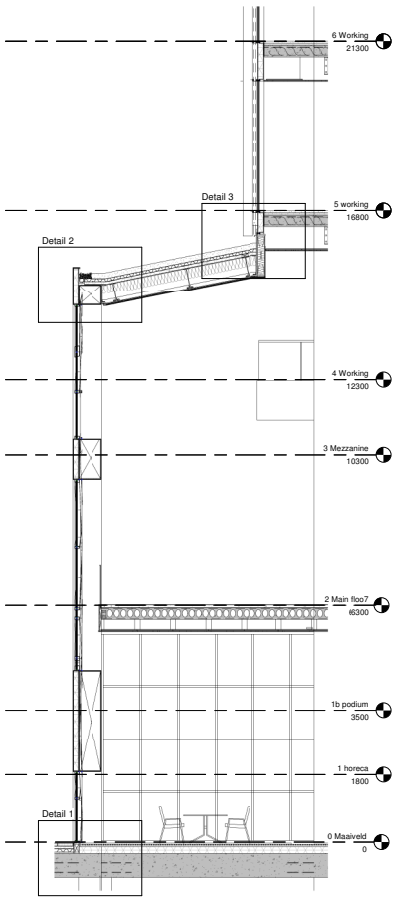
DETAIL 2 scale 1:5

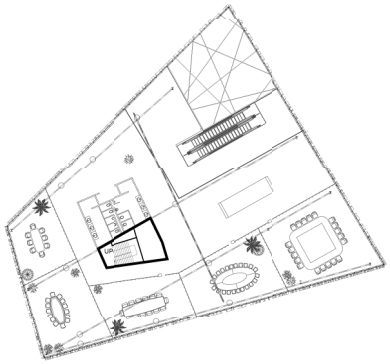


DETAIL 3 scale 1:5

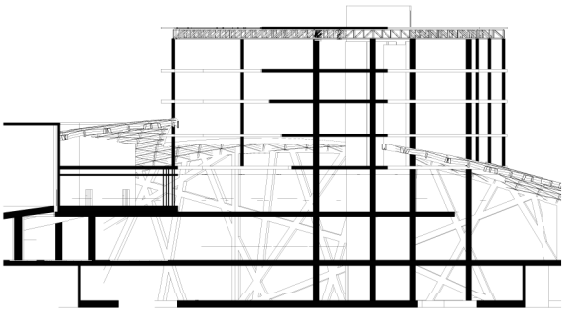


DETAIL 1 scale 1:5

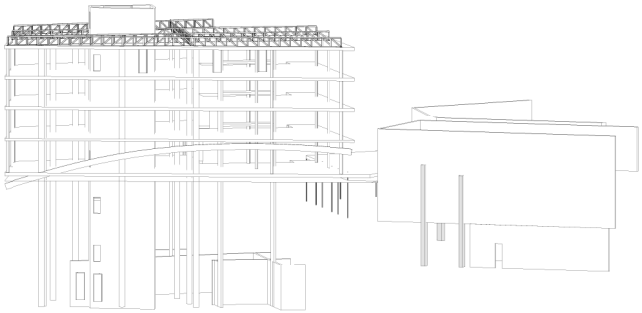




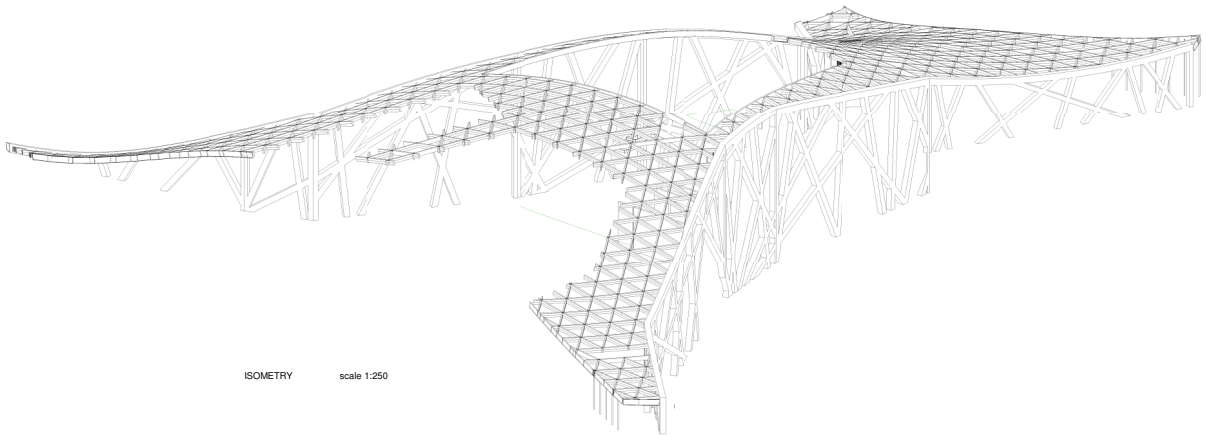
ROOF TRUSSES scale 1:250



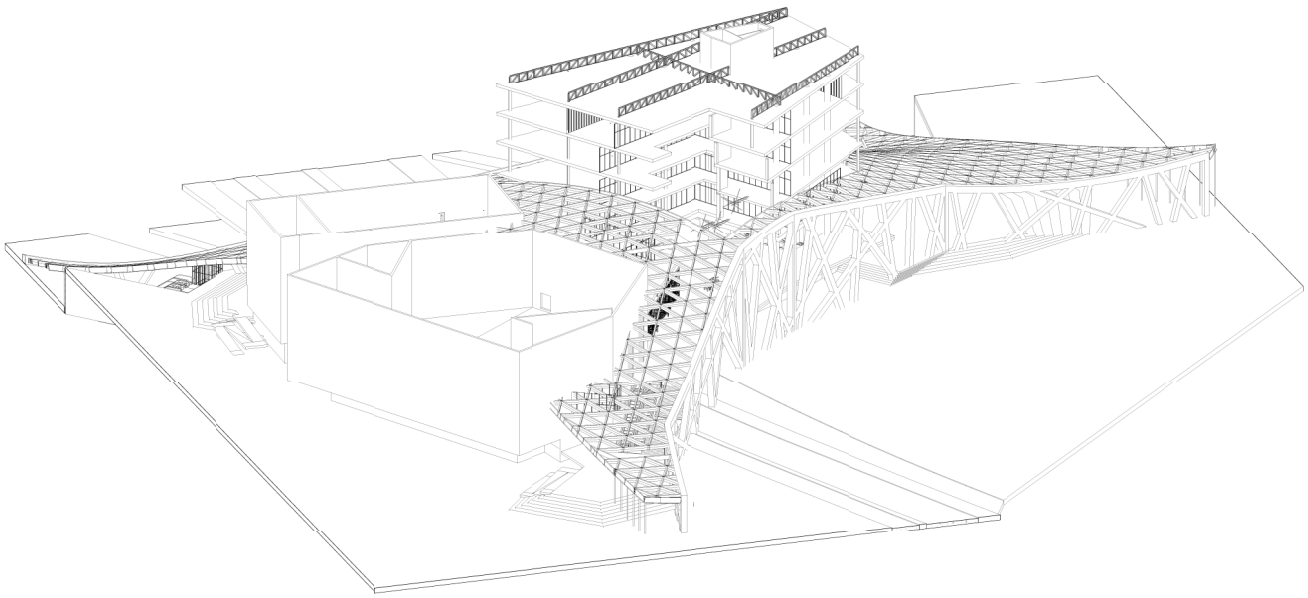
SECTION scale 1:250



ISOMETRY scale 1:250

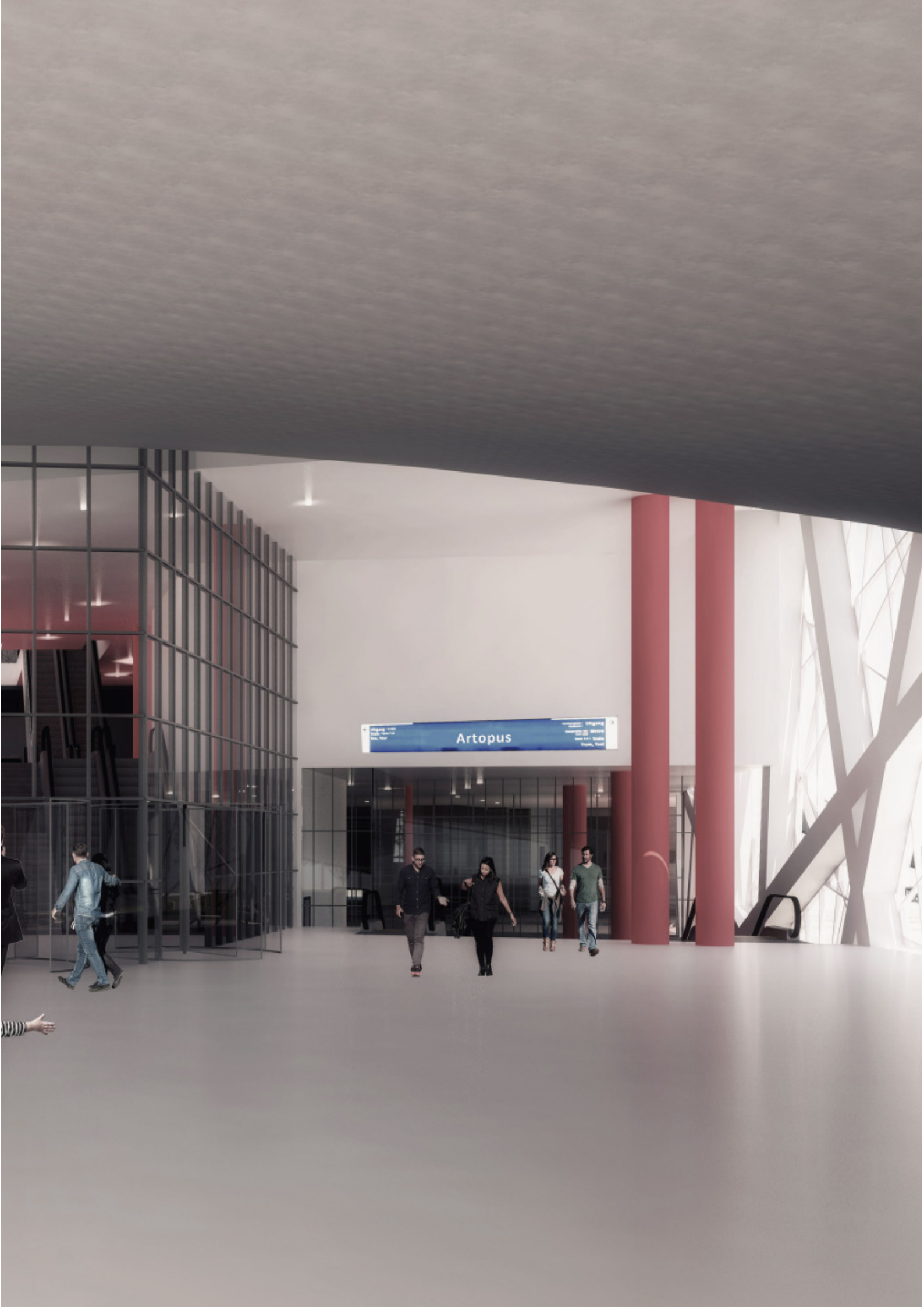


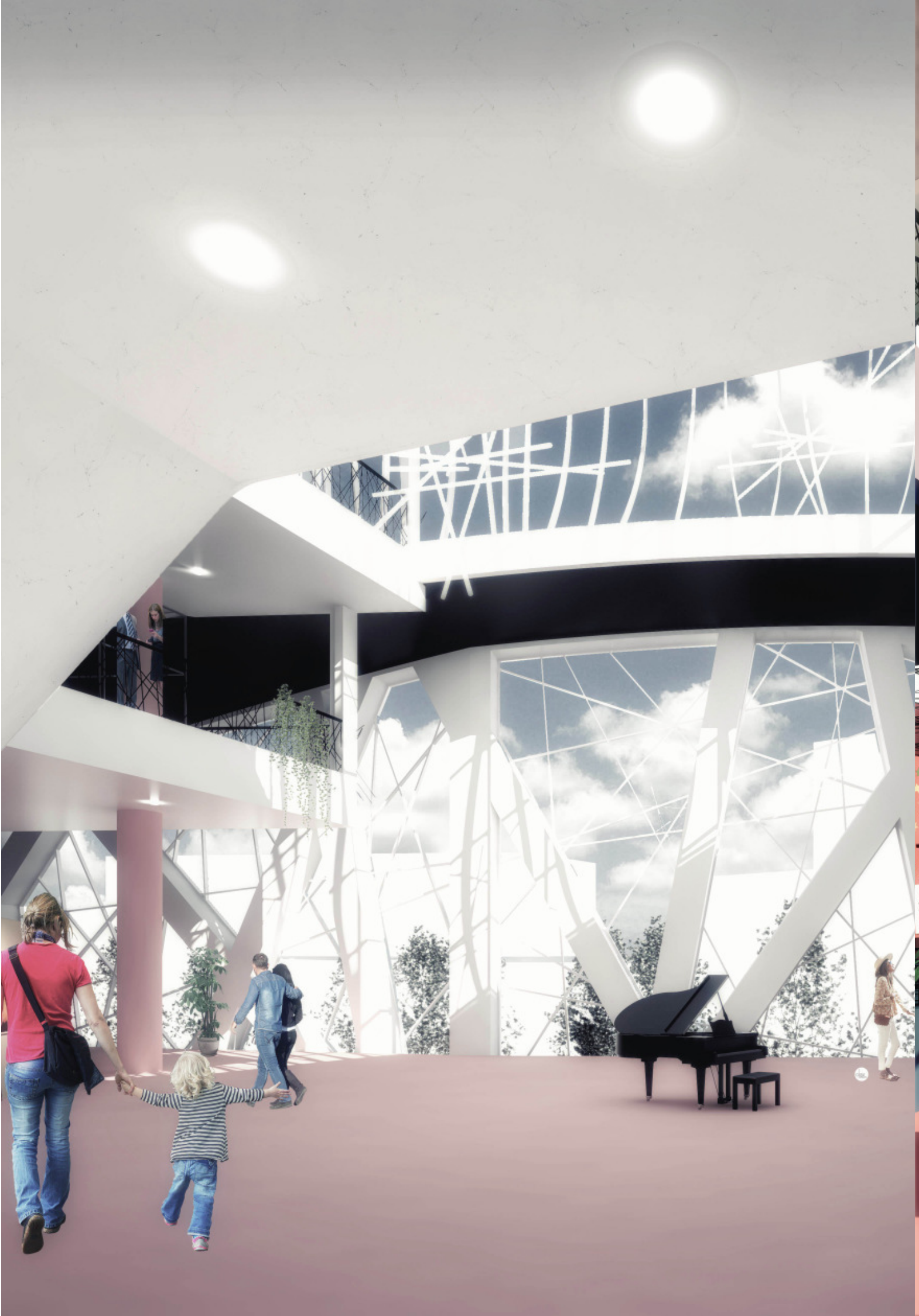
ISOMETRY scale 1:250



ISOMETRY scale 1:250

ARIOPUS - GUUS VAN GEMERT


Artopus




EDA


CAPPUCCINO
DRAW YOUR DREAMS


Artopus
Uitgang
Trein
Bus, Veer