P2

AMBIDEXTROUS LOGISTICS

LOGISTICS HUB FOR GOODS AND PEOPLE

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Keywords: Urban Mobillity, Logistics, Terminal, Warehouse, Tranport

ABSTRACT

Ideas can appear in different geographies at different time spectrums. They can migrate through the movement of people and migrated idea manifest itself affecting it's surrounding in many ways such as economically, socially or culturally. The idea also gets affected sometimes completely transformed into a new entity. Such incursions create new interpretations of the already existed ideas. The thesis aims to investigate the different flows of logistics particularly goods and people through urban mobility strategies and utilizing inland waterways to improve the efficiency of logistic lifecycles. The project also speculates about the ever-changing logistic infrastructures such as a terminal, warehouse and distribution centre. The transformation of the typology allows it to be redefined considering the aims of Rotterdam Municipality.

With the immense potential of the inland waterways that Rotterdam have, the connection between North and South will be improved and the introvert identity of port areas will be accessible for the public while changing the urban identity of the area.

STRUCTURE AND METHODOLOGY OF THE RESEARCH

The aim of this research is to utilize inland waterways to improve public transportation and shipping. As a methodology historical relationship between the port and the city is investigated and the specific case of Rotterdam studied. Relevant references are studied to understand how certain logistics flows operated.

Plans of institutional stakeholders for transport over water researched and quantitative data is used to understand the potential of inland waterways. Data is compared with other corresponding data sources to define and scale the problem better.

Literature analysis support how warehouse and terminal typologies evolve and developed and speculated on how the typologies will evolve.

SOCIAL AND SCIENTIFIC RELEVANCE OF THE RESEARCH

The social relevance of this research is to understand the potentiality of waterborne logistics in the city of Rotterdam which will potentialy create alternative modes of transportation and increased accessibility for the city.

The aim of this research is to get to know more about transport over water and what makes it viable since there's not much known about this relative new phenomena for Rotterdam

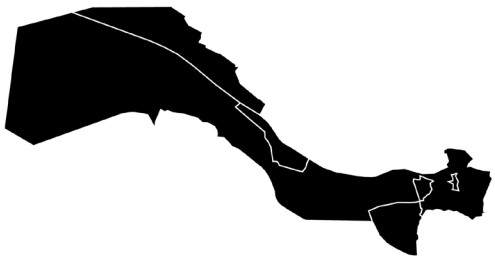
INTRODUCTION

Throughout history, cities have been the culmination of civilizations achievements; they are the result of certain features such as macroeconomic tendencies, societal revolutions and cultural synthesis of a society and its people. Rotterdam's history started as a fishermen's port, although historical sources suggest that already by the end of the thirteenth-century fish has been transshipped from small barges sailing the river Rotte into larger rivercraft.[1]

Until the advent of the ships working with the steam engine, there were sufficient berths for seagoing ships. The town grows ever more prosperous but silting up of the connections with the North Sea situating itself in major arteries of the transportation network. Thus, through 20. Century docks and terminals relocated to reclaimed lands from sea to the west of Rotterdam, kilometres far away from the city centre. During world war II, Port was particularly targeted by heavy air attacks. there had been massive damage to the Port, large parts of quays walls and 40% of the total warehouse area had been lost. [2]

Following years after the war, Rotterdam started recovering itself focusing on the port area. To accommodate emerging sectors such as petrochemical industry and container market new areas developed which contributed rapid extension of Rotterdam Port. Port development was not merely about facilitating large volumes but also about industrial development. These developments pursue with Botlek and Europoort in the 1950s and 1960s respectively which nowadays comprise major chemical complexes. Port development came at the expense of other functions, but that was widely accepted during those redevelopment years. For example, two villages (Nieuwesluis and Blankenburg), as well as some nature reservations (De Beer), fell prey to the Rotterdam expansion wave.

Maashaven, 1933



Haven

Stad

STAGE	SYMBOL ○ City ● Port	PERIOD	CHARACTERISTICS
I Primitive port/city		Ancient/medieval to 19th century	Close spatial and functional association between city and port.
II Expanding port/city		19th - early 20th century	Rapid commercial/industrial growth forces port to develop beyond city confines, with linear quays and break-bulk industries.
III Modern industrial port/city		mid - 20th century	Industrial growth (especially oil refining) and introduction of containers/ro-ro require separation/space.
IV Retreat from the waterfront		1960 s - 1980 s	Changes in maritime technology induce growth of separate maritime industrial development areas.
V Redevelopment of waterfront		1970 s - 1990 s	Large-scale modern port consumes large areas of land/water space; urban renewal of original core.
VI Renewal of port/city links		1980 s - 2000+	Globalization and intermodalism transform port roles; port-city associations renewed; urban redevelopment enhances port-city integration.

Port City Developments by Brian Stewart Hoyle

Port researcher Brian Stewart Hoyle's models illustrate the evolution of Rotterdam Port quite clearly.[3]

With the relocation of port activities, previous port sites developments within the city became obsolete which creates a potential for creating an improved, efficient and sustainable logistics network. Comprehensive inland connections between River Maas and its hinterland led to the development of a network in higher geographical scale, beyond the perimeter of port development, acting as a subsystem in the logistic chain. The architecture of the spaces for will be examined and explore throughout this research. Liam Young explains these spaces as "an architecture whose form and materiality is configured to anticipate the logics of machine perception and comfort rather than our own."[4] Although these typologies exist for a long time and evolved and updated constantly with the recent technological advancements, the architectural questions that it brought have not been investigated enough. Most of the time they appear as ubiquitous and inscrutable rectangular prisms which is -most of the time explained with efficiency.

The aforementioned logistic flows investigated not only with goods but also with people, by facilitating existing (but not well used) water-transport network. According to the report of Economic Development Board of Rotterdam (EDBR), water transport must be maximally linked to other modes of transport and facilities so that people can travel quickly and comfortably. A prerequisite for the successful introduction of a passenger water transport system is the development of a high-quality network covering the entire area from Hoek van Holland to Krimpen is connected.[7]

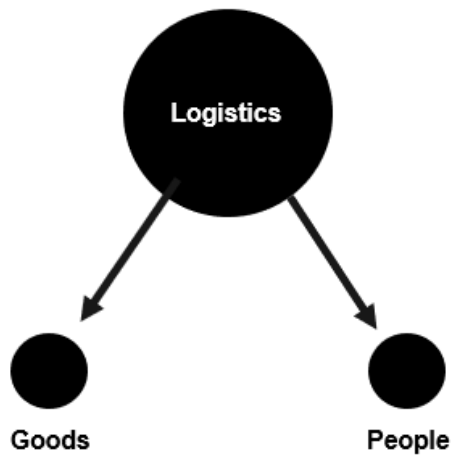
Although the water-transportation in Rotterdam provide service with watertaxi,ferry and aqualiner, it is still not possible to talk about a well-connected system of the transportation network.

Rotterdam's economic character has been historically dominated by its port and known as a port with a city rather than a city with a port, it is still rather difficult to avoid confrontation with that port.

This relation can be examined in two sub-topics, bound to each other :

In many ways, the port turned its back to the community of the city. With the need for larger areas for industries such as liquid bulk (ie. oil) and dry bulk (ie. Steel ore) and better seaside accessibility, port relocated itself to the west and created a geographical separation between the city and port. Not only did this mean that the port disappeared out of sight, but it also left the minds of Rotterdam citizens. In the city, the port left behind large areas of obsolete land, while the increasingly automatized port installations outside of the city produced high unemployment rates among the proud but low-skilled port workforce. [8] The topic yet to be explored is the port city culture which is a shared collective understanding of the relation between the port and the aforementioned people.

The changing dynamics and the transformation of port, waterfront, city and community have different transformation speeds relative to each other. The fast-paced activities of people and machines and port should be incorporated with slow-paced changes of social and political structures of the nation. The multidimensional nature of port development influences the occupation of space and operations of the port. The relation between the people of Rotterdam-Zuid has an ongoing and long-standing culture with the port area, especially with the construction of Maashaven from 1895 to 1905. The ongoing relation of city and port relation is a testimony of the relationship among the port urban elite, worker and citizens have traditionally evolved and embodied in a reciprocal link between people and port. However, this relation's stability is arguable whether it is a mutual relation or port is just act as an economic buffer zone that provides an economic contribution to people of Rotterdam in an indirect way.

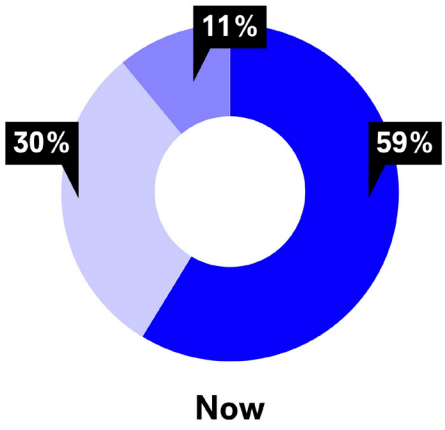


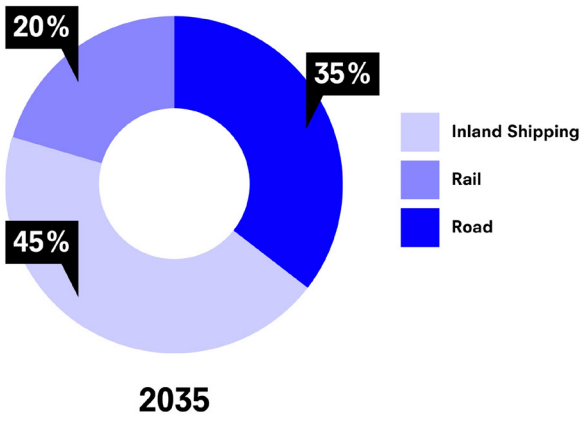
Programmatic Dichotomy

PORT OF ROTTERDAM VISION

Geographically Rotterdam is very well situated making it one of the key nodes of logistic flows. Via Maas and Rhine rivers and their converging branches make many European destinations accessible. From the warehouses, in Rotterdam inland vessels can transport various goods to major economic centres in Netherlands, Germany Belgium, France, Switzerland and Australia.

In the current modal split for transportation of good, majority of logistics rely on roads. For the port's future to be successful, it is essential for the port to innovate itself. Among other things, this demands new technologies and steps towards sustainable transportation. In recent years working with businesses and the government, Port of Rotterdam developed a vision which aims to increase inland shipping and rail transportation rather than the roads. According to the report by Port of Rotterdam, this will take the logistics load inside the city to improve the efficiency of the logistics network. With a single barge capacity corresponding 54 trucks on average, logistics will be optimised and facilitate the growth of the economy of the area.





Rotterdam Public Transport Modal Split

ECONOMIC VISION

According to the "Stadsvisie Rotterdam" report, Rotterdam has three main goals that improve the economic position of the city;

First of all the city wants to attract and strengthen the international competitiveness of Rotterdam's business by offering space to knowledge and innovation economy with an accent on Harbour & Industry, Medical and Creative Sectors.

Secondly, the city wants to increase facilities and leisure time which can attract the number of visitor to the city, potentially create an attractive and diverse city for people to live in.

Lastly, to strengthen the position of Rotterdam, the city wants to offer spaces to companies to grow and accommodate in Rotterdam.

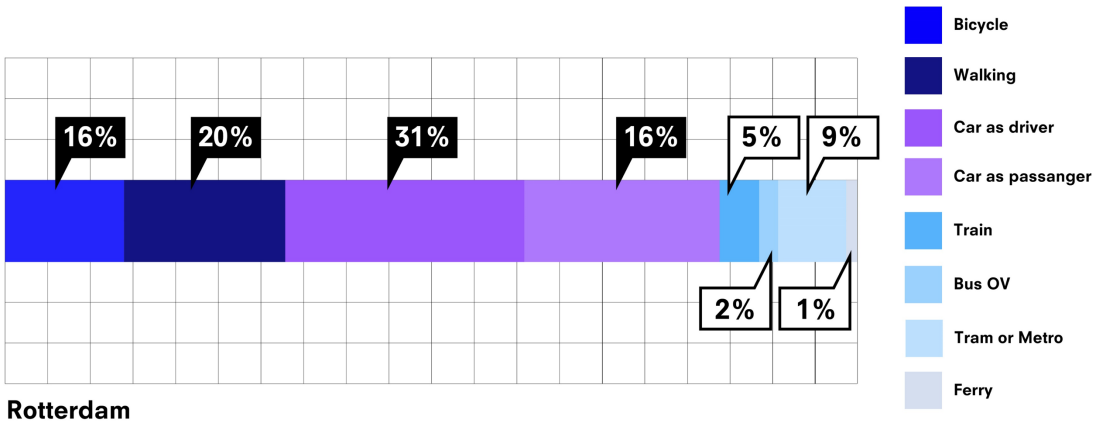
Considering those three goals, a logistic hub can potentially trigger the economic activity in Rotterdam Zuid. A distribution centre can increase the high skilled labour in the area, and act as a catalyst for other business to locate themselves in the region due to the logistic advantages. By facilitating water transportation in the site it can increase the accessibility and the value of the site.

"NEW" FORM OF TRANSPORT

The logistics and mobility systems of cities getting more and more crucial in growing cities. Aa good and efficient accessibility is appreciated for business activities and immensely contribute to the life quality of residents. . Lately with the increased mobility of people, the accessibility of the cities has become under pressure. $ The current infrastructure is getting inadequate and roads are reaching its carrying capacity. Already existing public transport network (bus, tram, metro) has trouble keeping up with the ever-increasing demand for mobility.

Phenomena of public transport over the water is not completely new phenomena in the Netherlands, yet it has not been explored with a comprehensive mobility network. There are existing water taxis, fast ferry and aqualiner transportation however it is hard to say that transportation is well integrated to the other modes of transportation or used with its full potential. Also, the network does not plan to serve the development strategies of the city.

The diagram below illustrates the current modal split in Rotterdam. The current split is mainly dominated by car which creates a burden on existing infrastructure inside the city.



Rotterdam

Rotterdam Public Transport Modal Split

UNUSED POTENTIAL

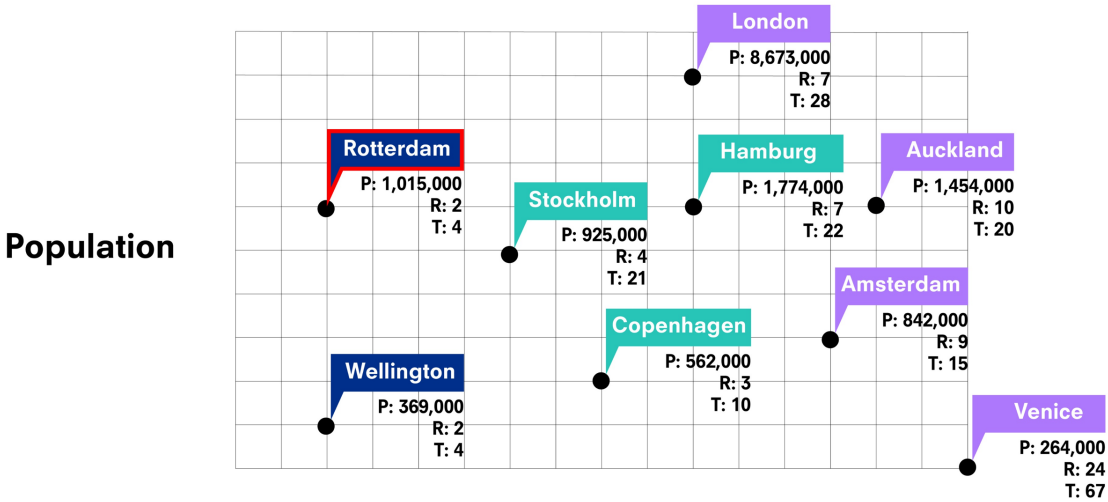
Rotterdam has a long-lasting relationship with water. From dykes to reclaimed port areas, the city culture and economy revolve around the water. However, public transportation on water is not well designed and not considered as the preferred way of transportation. There are already quite a few cities in Europe that implemented water logistics successfully. These cities can be analyzed according to the population and corresponding lines and terminal that they have. The diagram below compares multiple cities, the colours of cities indicates the complexity of the water transport network in relation to population.

The water transportation in Rotterdam can be defined as a small scale mobility system since the ratio of the population to the number of lines is very high.

> 7 Lines
High Number of Stops

> 4-6 Lines
Medium Number of Stops

> 1-3 Lines
High Number of Stops



P: Population **R: Ferry Routes** **T: Terminal**

Water Transport Comparison

SUCCESS FACTORS

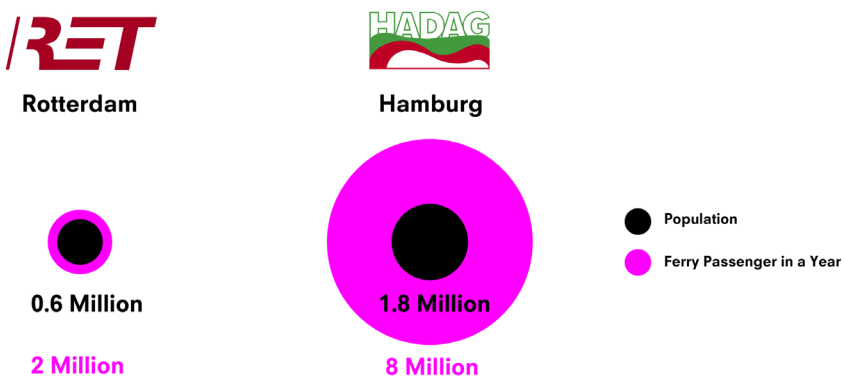
When developing a new modal transportation network several success factors need to be considered. These success factors tend to influence each other towards the same direction and different parties play their role to achieve the mutual target.

First of all, the economic environment is one of the factors that need to be assessed by municipality and government. Transportation on water has a high start-up cost due to the initial investments that need to be made for terminals and ferries. To integrate the new transportation to the existing modes of transportation, the system also needs to compete in terms of price/quality ratio.

Institutional support is another factor that is essential for new transport mode. Government and municipality should collaborate on a common aim of planning, implementing financing the infrastructure which is needed. Both parties need to operate parallel for success.

Another key handicap is that the collective modes of transportations have a temporal distribution of demand and dependence on occupancy rate which is high during peak hours.

Due to these reasons the spatial environment that the transportation network needs to be planned well. Since preliminary urban analysis and researches suggest that Rotterdam Zuid will possess the potential to become an important hub, the network needs to be a part of Rotterdam Zuid as a major mobility node.



Rotterdam - Hamburg Ferry Passanger Comparison

INSTITUTIONAL RELATIONSHIP

Planning waterfront regions in port cities is an act that includes multiple inputs from various parties with varying degrees of political capacities and funding. These parties can have a mutual or particular interest which makes them focus on certain locations or even makes it possible to steer the planning process from remotely. According to Hein, the respective impact of public and private stakeholders is a recurrent theme in both new and old planning histories of port cities and merits systematic analysis.[9] Multinational companies such as container shipping giants, oil companies, port operators, city, civic associations, regional and national governments, public transport entities have influences on planning mechanisms and operating lifecycles. Even though some of these entities do not have formal representation for these processes, their size, financial and international power bring them into the table.

The relationship between the Rotterdam City and Port Authority of Rotterdam (PA) is an interesting example of this complex network of actors. PA is a semi-private corporation which has a shared structure formed by the city and the state. It has operational freedom to facilitate the general efficiency of the port. Due to its joint nature, it is in constant dialogue with the municipality discussing not only economic benefits also the significance of port for people of Rotterdam.

RESEARCH QUESTION

How can this area serve as a hub to improve inland shipping and transportation, incorporating additional programs which change the image of port for people of Rotterdam?

-How can the port be discovered by the city as a part of the urban landscape?

- How can the city be rediscovered by the port as a potential centre for logistic organizations?

- How can port re-integrated to the city to support the future needs of logistics?

The project speculates on redeveloping the waterfront with a complex program which incorporates certain logistics flows such as goods and people to utilize inland waterways. This integration also aims to recreate the missing connection between the people of Rotterdam and port development. It aims to offer a new understanding to develop waterfront considering it's economic benefit and integration of community to port.

CONCLUSIONS

In 20th-century port activities in Maashaven was an element that integrates community to the port. Products travelled through the sea end en up in Maashaven Markt which is a place for both people and goods. In time, with the relocation of port activities, the port development areas within the city became obsolete. The obsolete waterfront strip creating barriers for the city to access to sea both physically and mentally.

Considering the poy-centric characteristics of Rotterdam, Rotterdam Zuid is being one of the main nodes of the city. and its waterfront is going to be productive with new economic activities to provide a shift of low skilled workforce to highly educated. It is essential to provide adequate access to the area. Water transportation for both goods and people can create vital benefits for the area. Advancement of the water public transport network will provide direct access to the revitalized port area, contributing the new image of Rotterdam. It will provide better accessibility to Maashaven's old harbour areas and stimulate the development at the waterfront together with Iconic Bridge and Resilient Mycelia Projects.

Also, transport over the water can extremely improve the logistic accessibility of the Rotterdam Zuid and attract more companies which potentially increase the economic prosperity of the area. Because of the improved accessibility of Rotterdam Zuid, it gets more attraction from the city, benefiting the rest of Zuid indirectly. The warehouse can be used as a storage area for goods produced or sold at the warehouse market locally contributing to waterfront's new economy and distributed from the distribution centre locally and internationally through inland waterways.

By transporting people over the water, it also contributes to the zero-emission vision of the municipality. It is fundamental to sustain a forward-looking logistic understanding for relying less on road infrastructure.

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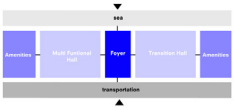
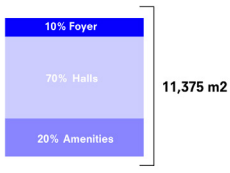
TYPOLOGY RESEARCH

Throughout this research, terminal typologies and warehouse typologies are investigated. Different flow of people and goods are analysized in terms of organizational principles. In 20th century terminals, they are mostly organized in a linear alignment and passanger moved from certain sequence of spaces to access to waterfront which provides access to the transport vehicle. However in contemporary terminals, the buildings usually acoomodate social fundtions in addition to the private spaces. In some examples, the waiting spaces provides more than one program in a day, since accomodation of space varies in time. For warehouse research, particularly different type of storage systems and the types of good that it can store is analyized. Storage systems varies from each other depending on the number of people that it requires to operate or minimum height that it covers to deploy the automatized storage system efficiently.

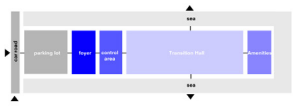
Freemantle Passanger Terminal 1950's - 1960's

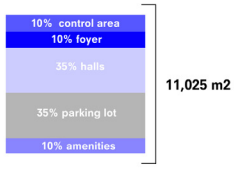




11,375 m2

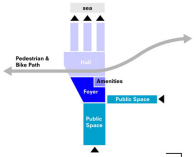
Manhattan Cruise Terminal 1935

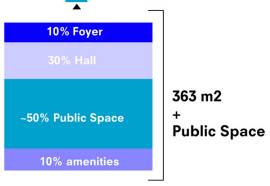




11,025 m2

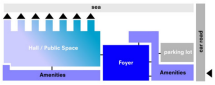
Minsheng Ferry Station 2019

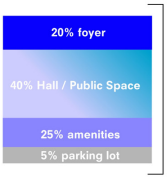




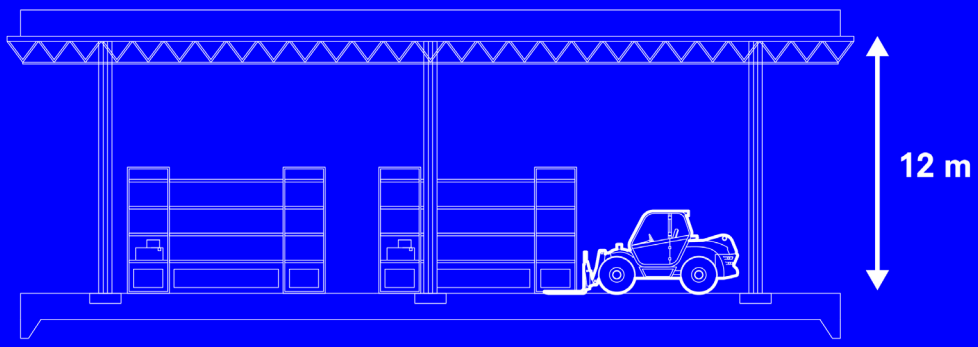
363 m2
+
Public Space

Sevilla Terminal Phase 2 2016





1,096 m2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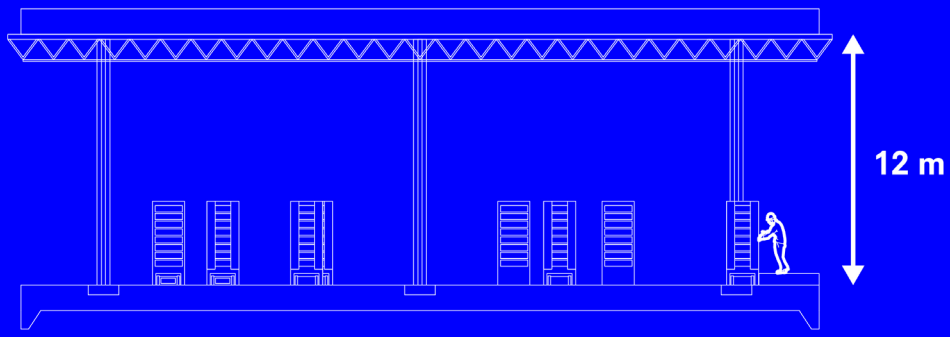
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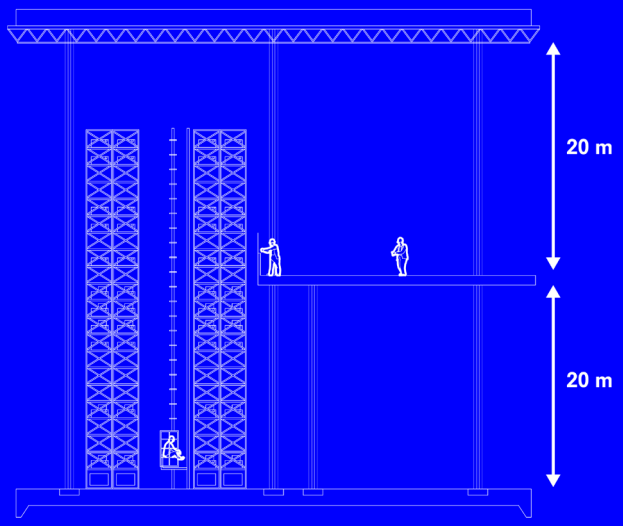
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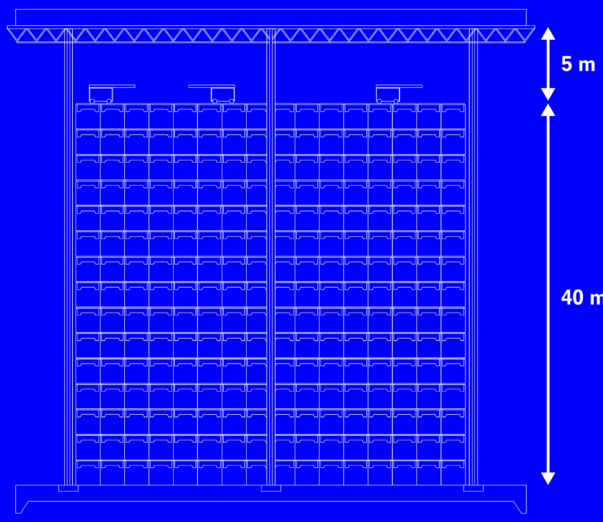
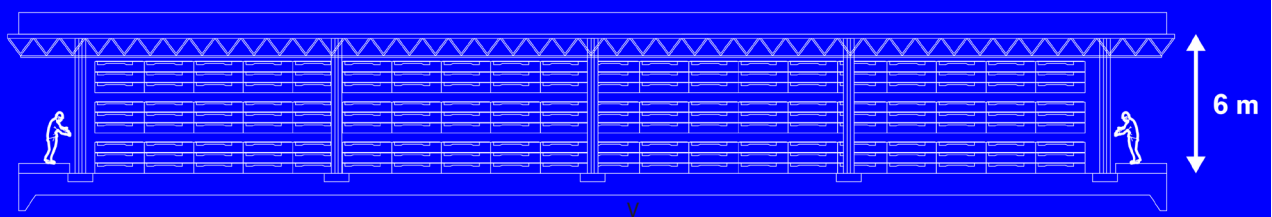

5 m
40 m


6 m

APPENDIX

SITE

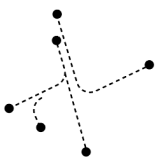
In order to choose the site for Ambidextrous Logistics, few parameters are defined to provide adequate access from both existing and future infrastructural flow. The selected site should have a connection to the transportation network since urban mobility is designed with a broader context. The site should be at the intersection of multiple modes of transportation. Another major restriction is the scale of the program. Horizontal storage systems cover wide footprints and vertical storage systems require high ceiling heights. Besides, storage systems are structures that are suitable to deploy into existing structures due to the flexibility that it offers.

Considering these parameters, the site indicated below is chosen with 195m x 90m dimension. Currently, the site has multiple ownerships. Part of the site is owned by Maneba factory and operated as a factory to make flour and related grain products for various applications in bread and pastry. Other part is owned by various small-scale industrial businesses.

In addition, the site is located at proximity to the Maastunnel and envisioned Pleinweg tunnel which potentially has a connection to the project to have an efficient distribution infrastructure for goods.

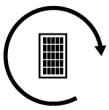
Site is also located just at the entryway to Maashaven for various water transportation modes which will provide easy access for ferries and prevent any excessive water traffic at Maashaven.

Brielselaan Tramstop is also planned to be integrated into the project to provide a seamless transition from one transportation mode to another which will drastically decrease transfer duration.



Connection to existing transportation network

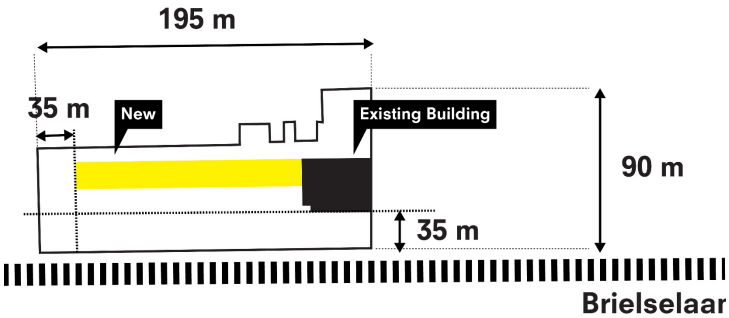
Large Footprint for Storage



Revitalizing Industrial Area

Access to inland waterways and strenghten the mobility between North and South

Site Restrictions



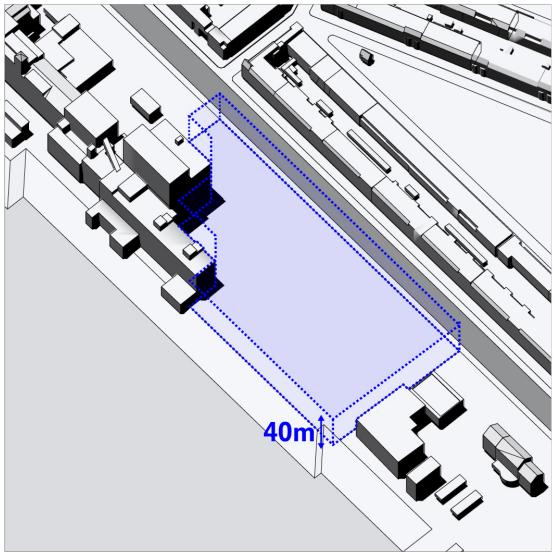
Plot: 17,700 m2
Estimated Program: 17,150 m2
FAR: 0,22
GFA: 2

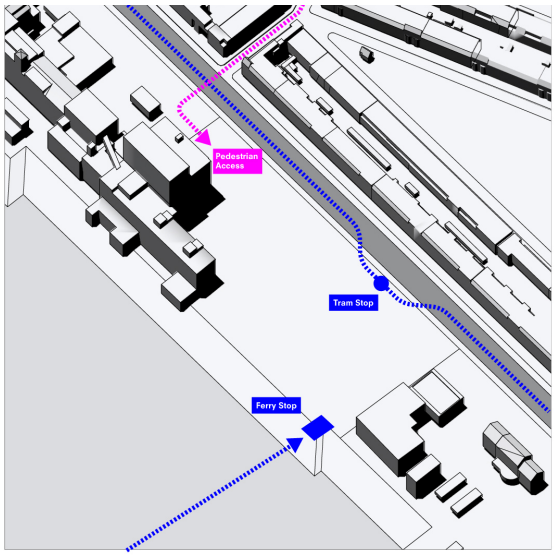
REGULATIONS

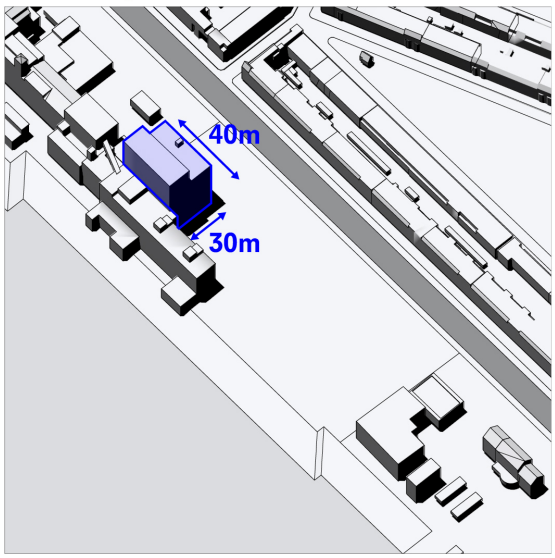
Average building height at waterfront is 60 meters. Selected plot has 28 metres height limit according to the municipality regulations. The proposed height of the plot is 40 meters due to provide view for the certain programs and requirement for high ceilings for warehouse program.

Site has access from 3 different sides and have different modes of public transport. The intersection of multiple modes of transportation provide benefits such as faster transfer durations.

The building of Maneba factory is not demolished, instead adequate programs are placed to benefit cost and operational efficiency. The 60 meters height and large footprint is suitable to transform part of the building for warehouse.

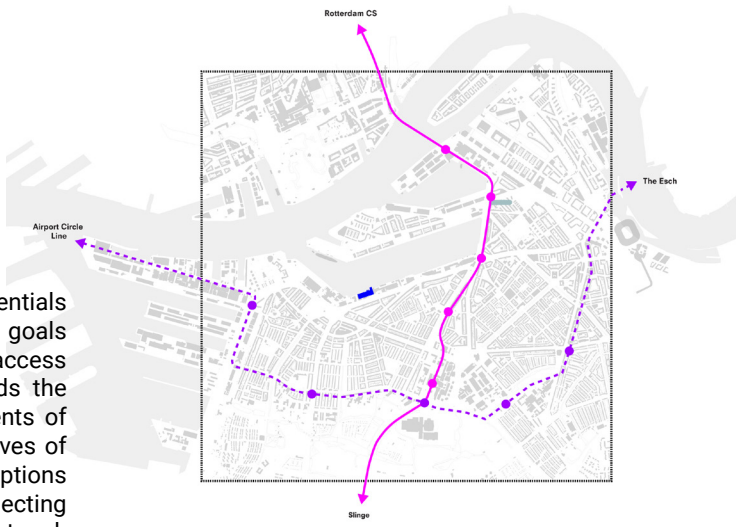




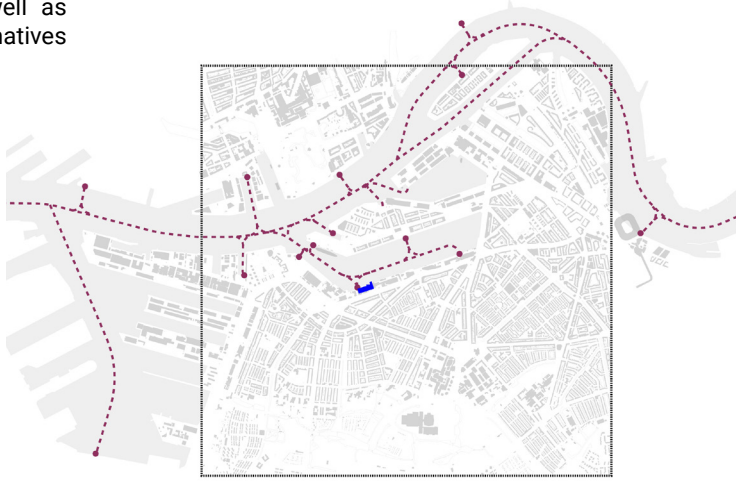


SITE ACCESS

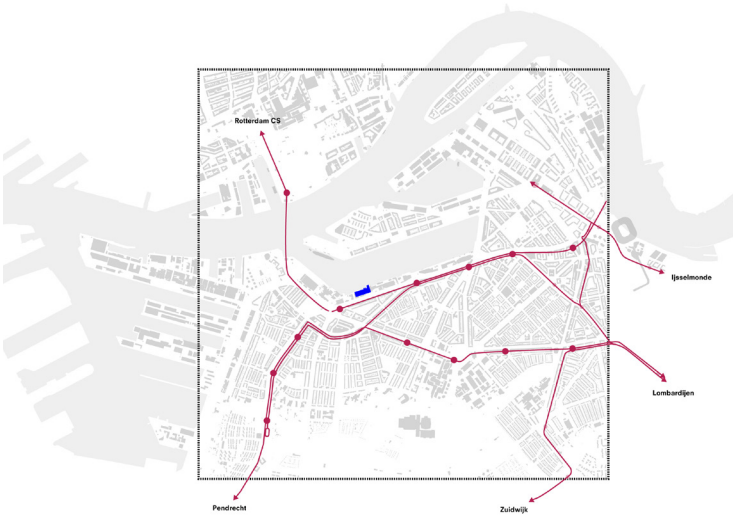
Mobility vision focuses on exploring the potentials of Rotterdam South in the future. Its main goals can be summarized as providing an easy access for visitors from outside of the city towards the Hart van Zuid center and inviting the residents of Rotterdam to use more sustainable alternatives of the transport. Proposed site provide various options of public transport, with water taxi connecting opposite sides of the river and intertwining network of stops between metro and trams, as well as multiple micromobility hubs- for quick alternatives in the dense urban surroundings.



Existing and New Metro Line



Water Transportation Stops

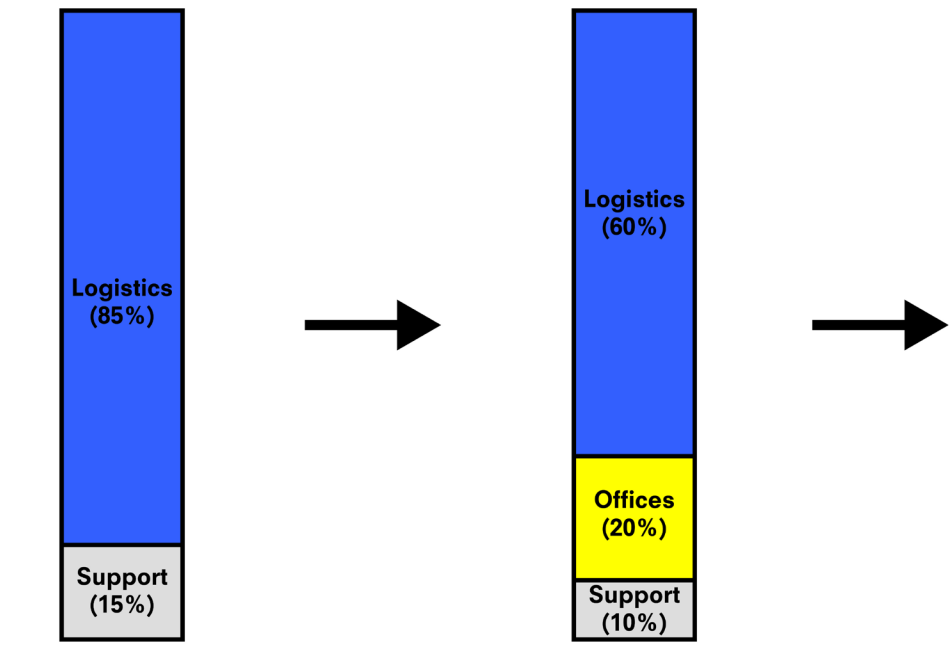


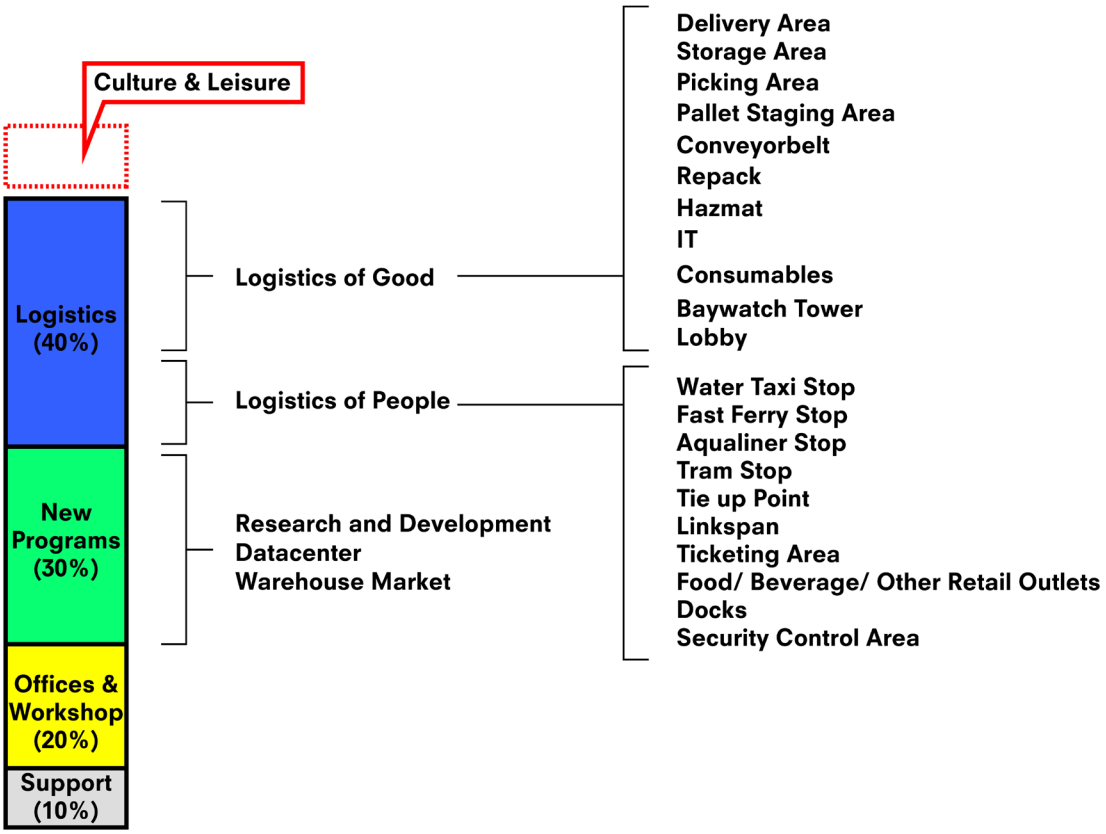
Tram Lines

PROGRAMME

The proposal aims to integrate two different flows, goods and people by redefining the industrial activity and provide access to the waterfront for the public. It to speculate the conventional understanding of a logistic warehouse which mainly consisted of storage spaces and support facilities. The existing typology is already started to define itself after port movement to west of Rotterdam from the area by including/converting some areas into office spaces. However, still, the area does not reflect its full potential. The proposed program integrates different flows of logistics while developing new ways of utilizing warehouse typology.

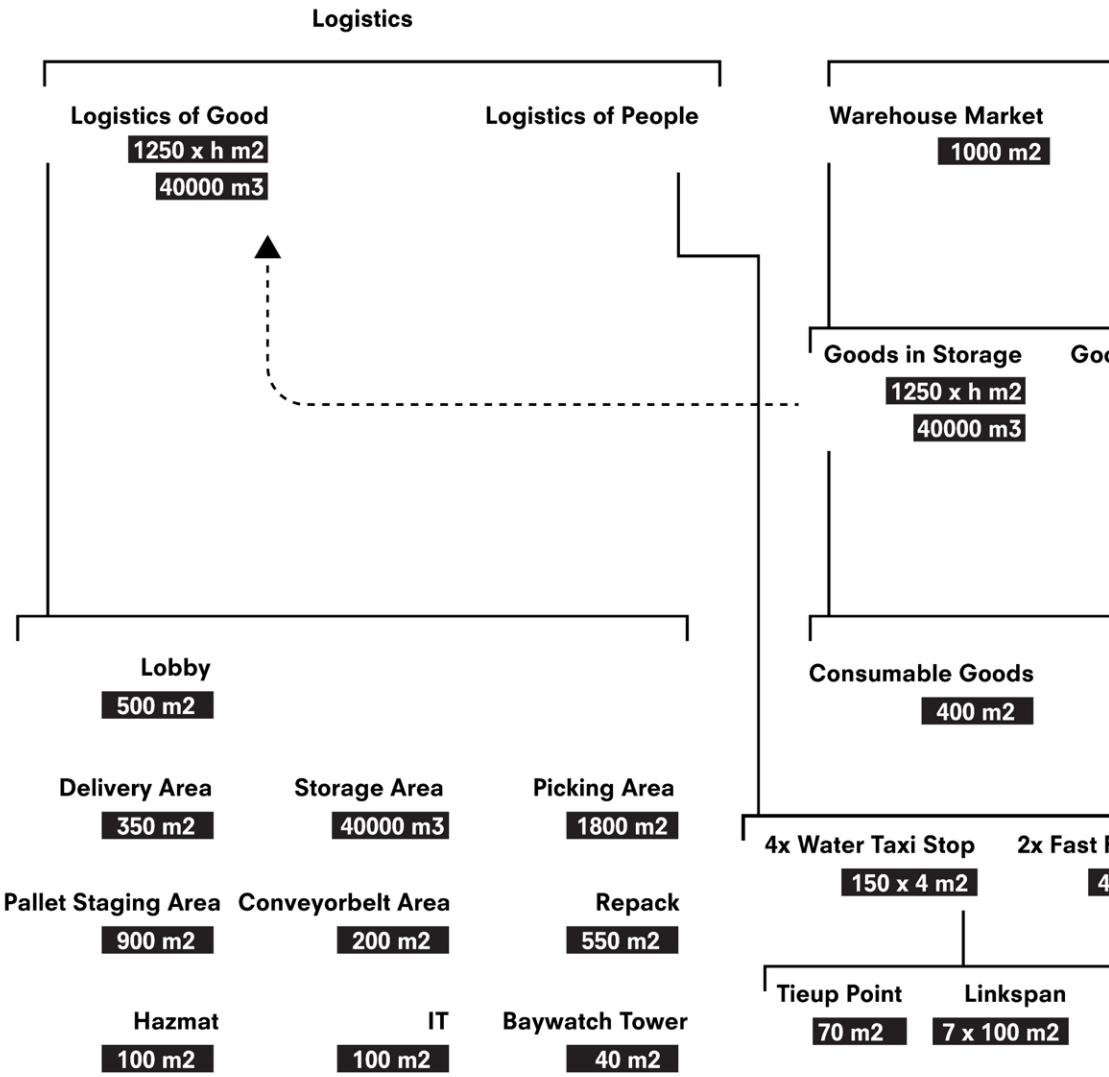
The project also aims to change the identity of the waterfront by adding leisure program to the waterfront and create the missing connection between the people and the waterfront.

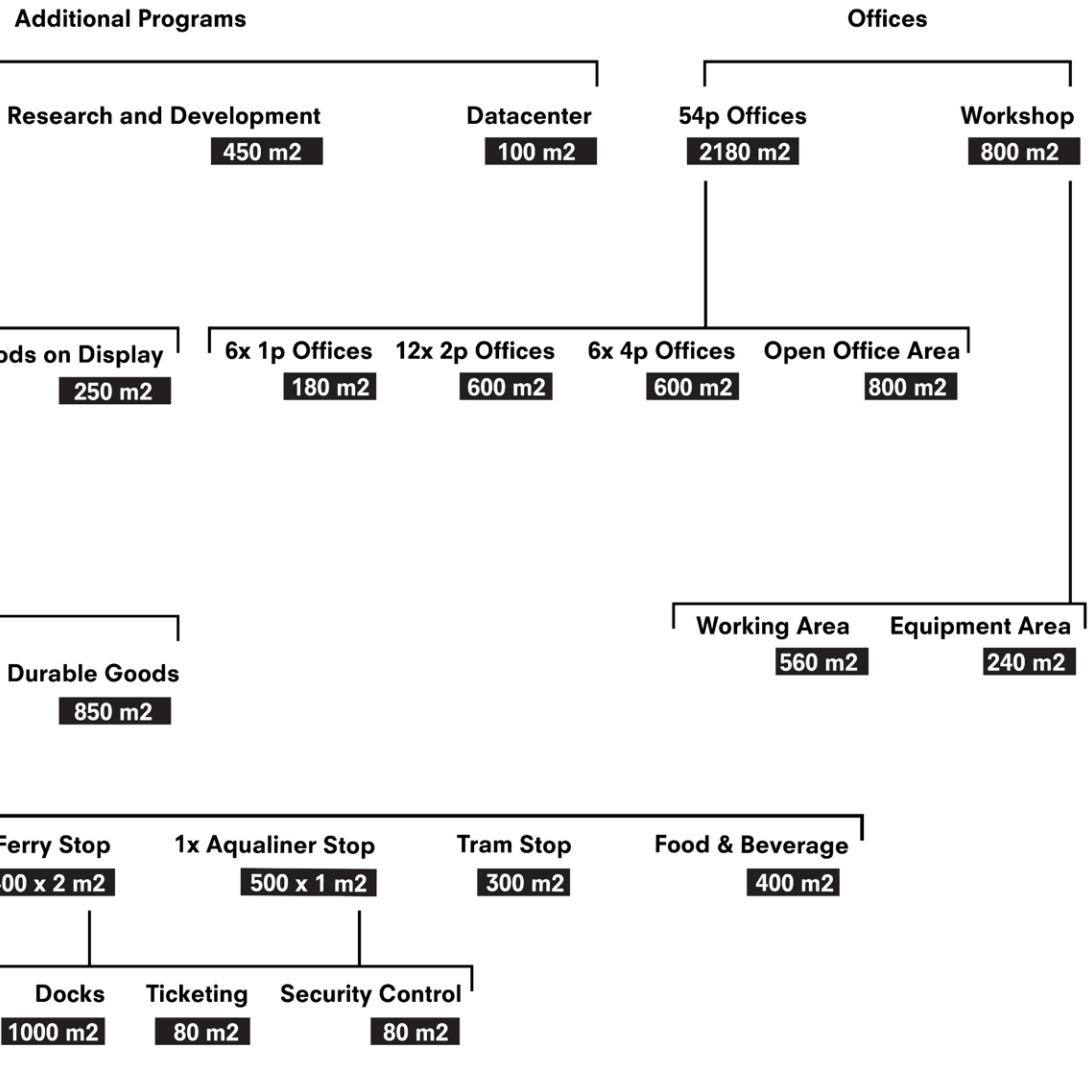




Logistics +
Workspaces +
ew Program

The diagram below illustrates the three main categories of the programme and their proposed sizes. The size of each programme category is defined as through the typological research. Storage area is defined by cubic meters unit instead of square meter due to goods and robots use the space in three dimension distincly different than human spaces. Therefore it represents an accurate understanding of the proposed volume. Warehouse market from additional programs category is introduced to the program as an extension of the storage area.




Additional Programs
Offices
Research and Development
450 m2
Datacenter
100 m2
54p Offices
2180 m2
Workshop
800 m2
ods on Display
250 m2
6x 1p Offices
180 m2
12x 2p Offices
600 m2
6x 4p Offices
600 m2
Open Office Area
800 m2
Working Area
560 m2
Equipment Area
240 m2
Durable Goods
850 m2
Ferry Stop
00 x 2 m2
1x Aqualiner Stop
500 x 1 m2
Tram Stop
300 m2
Food & Beverage
400 m2
Docks
1000 m2
Ticketing
80 m2
Security Control
80 m2

GRADUATION PLAN

-		-
	2.6	Concluding Research and Design Brief
	2.7	Concluding Research and Design Brief
	2.8	Massing Proposals
	2.9	Massing Proposals
P2		
	3.1	Site Masterplan
	3.2	Detailing Volumetric Studies
	3.3	Detailing Circulation
	3.4	Finalizing Relations Between Flows
P2.5		
	3.6	Design Development
	3.7	Design Development
	3.8	Design Development
	3.9	Design Development
P3		
	4.1	Plans/Sections/Elevations
	4.2	Plans/Sections/Elevations
	4.3	Plans/Sections/Elevations
	4.4	Plans/Sections/Elevations
P3.5		
	4.6	Facade/Structure/Climate/Details
	4.7	Facade/Structure/Climate/Details
	4.8	Facade/Structure/Climate/Details
	4.9	Facade/Structure/Climate/Details
P4		
	5.1	Post Production
	5.2	Post Production
	5.3	Post Production
	5.4	Post Production
P5