

# MAASHAVEN BRIDGE

Rokas Stasiulis 5164664

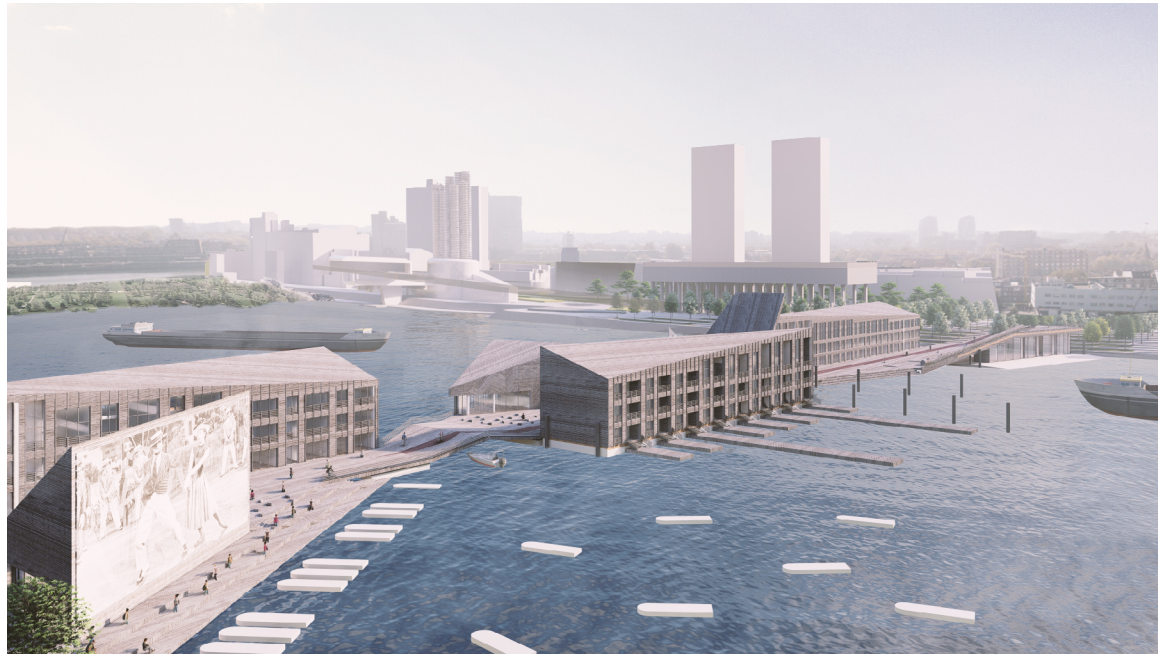


Figure 1. Maashaven Bridge as seen from the neighbouring buildings

## Introduction

The Maashaven bridge is located in Maashaven - an inland vessel harbour and a central location of the city, next to vast urban developments in the neighbouring Kop van Zuid. The building addresses the needs of the residents from surrounding areas, the needs of the city, the port and future inhabitants. Taking advantage of the potential that the central location offers, the project is set to become the defining icon of Maashaven, marking the beginning of a redefined harbour district.

The project is a part of the "Collage city" strategy (Figure 2) which consists of several overlapping districts with defined leading topics of the developments in them. The strategy for the southern bank of Maashaven, the "productive waterfront", includes three

initial interventions as kickstarters of the redevelopment of the harbour, bringing the area from its industrial past to a mixed use future. The bridge provides the necessary infrastructure and connections for further development of the waterfront.

The bridge together with the wider strategy for the site is meant to convert the dormant southern waterfront of Maashaven into a vibrant area for production and recreation by utilizing the potential of the central location and an environment related to water. Moreover the goal of the intervention is the creation of a medium for the extension of the center of Rotterdam onto the waterfront.

The harbour is adjacent to one of the largest modern developments in Rotterdam - Kop van

Zuid. In Rijnhaven major ambitions to densify and convert the former port to a business and residential district are already under way. Around the harbour - a pedestrian-friendly environment is envisioned, including a path all around Rijnhaven.

The new Maashaven bridge functions as an extension of the pedestrian and cycling network in the area, introducing additional infrastructure to the area while contributing to the activation and densification of the harbour by adding new recreational and residential program to the harbour.

Being developed as the protagonist of the harbour redevelopment - an icon for Rotterdam South - the project aims to encourage further development in the harbour. Considering the typology of a bridge as a significant factor in creating an icon, the research preceding the project focused on analyzing the effects of iconic projects and led to the exploration

of programmatic aspects of flagship projects and the appreciation of the public program that comes with, and later is incentivized by iconic projects. The research question thus was how can an iconic project improve and change the perception of its surroundings.

Responding to the ambitions of the city and the group strategy, the projects consist of a few main functions - housing, open public space for the neighbourhoods and public program, connection between the separated parts of the city by a bridge, all this while remaining in an active inland port with berths and the perimeter of the harbour accessible for inland vessels.

All in all, together with neighbouring interventions the Maashaven Bridge provides the harbour with a diverse program, including water treatment, logistics, public transport and residential programs, making the harbour a vibrant central area of Rotterdam.

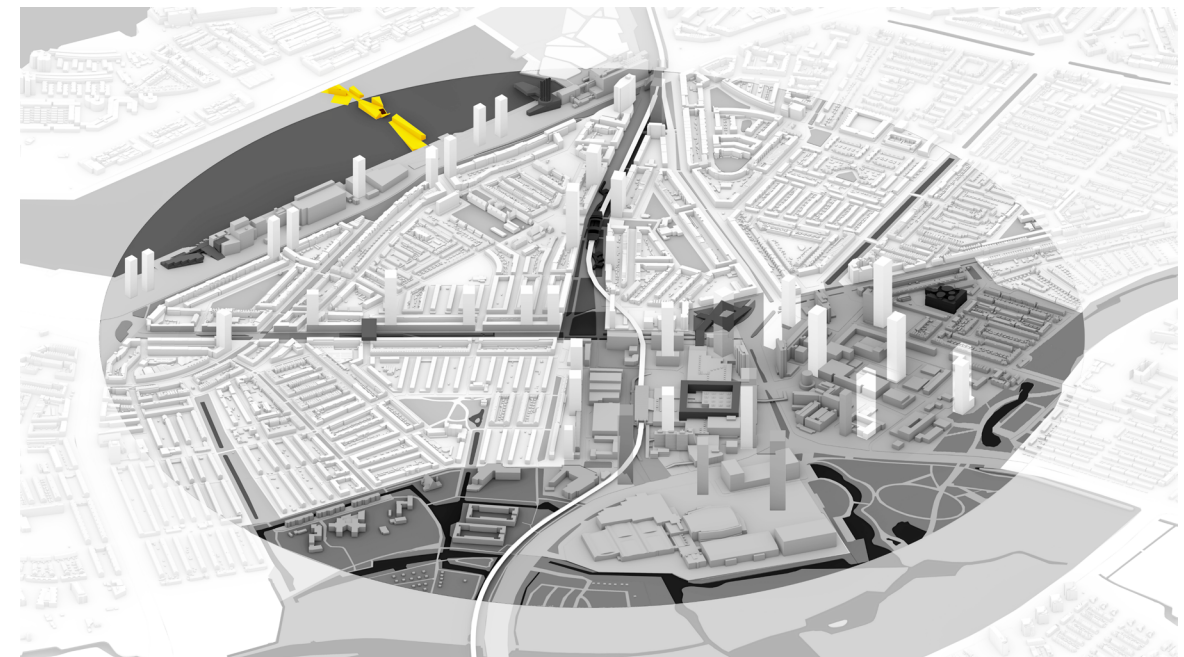


Figure 2. Location within the group strategy

## Urban ambition

The Maashaven bridge is meant to function first of all as a protagonist that unlocks the potential of the harbour, all the while creating a link between the historical southern districts of Rotterdam such as Tarwewijk, Carnisse, Bloemhoff and the new developments of Katendrecht, Willhelminapier. By enhancing the slow traffic links from the center of Rotterdam to the Hart van Zuid hub, the project aims to fade the discrepancies between Rotterdam South and Rotterdam North.

The intervention is meant to create a more coherent city as the strong separation of districts by water and roads are one of the main problems causing uneven development in Rotterdam South. Therefore the bridge is meant to soften the barrier that is created by the vast waters of Maashaven and at the moment separate the older areas of Rotterdam from the rest of the city as was once done on a larger scale with the Erasmus bridge, which brought new attention to the southern bank of the New Meuse.

On the scale of the city, the bridge tries to define a clear connection between the northern and southern sides of Rotterdam. Rotterdam North, the historic location of the city center, and the new developments above the New Meuse are what defines the perception of Rotterdam, however the Southern side of Rotterdam has plenty to offer for the city, and this has been true for several decades. Nonetheless, poor slow traffic connections made Rotterdam south a satellite destination rather than a continuation of the city center. Therefore The Maashaven

Bridge tries to establish connections from the northern side of Rotterdam to points of attraction in the South - the development of Hart van Zuid together with the Zuidplein shopping center, Ahoy arena, Zuiderpark and new developments proposed in the group strategy that act as gateways to Hart van Zuid.

In the Maashaven itself the needs of the city as well as the port are addressed. Maintaining the access for all water traffic is key, therefore the bridge has an elevating part to allow the access of inland vessels to strategic buildings and berths, together with easy circulation for other kinds of water transport. Having enabled access for all types of ships to the entire harbour, the eastern side of the harbour however is more focused on the development of the recreational aspect, extending the local scale slow traffic network and recreational areas from Rijnhaven to Maashaven as well as connecting to the tidal park of Maashaven, which is going to be completed in the near future.

The urban strategy of the city, and the group vision of "Collage city" together with several main interventions envision the waterfronts of Maashaven becoming a resourceful urban area and a recreational site with access to water and waterfront parks, adding new public areas to the city as well as incorporating public spaces and parks into a network of public spaces around the harbour which serve not only the new residents but also amplify the available public space for the residents of the neighbouring districts.

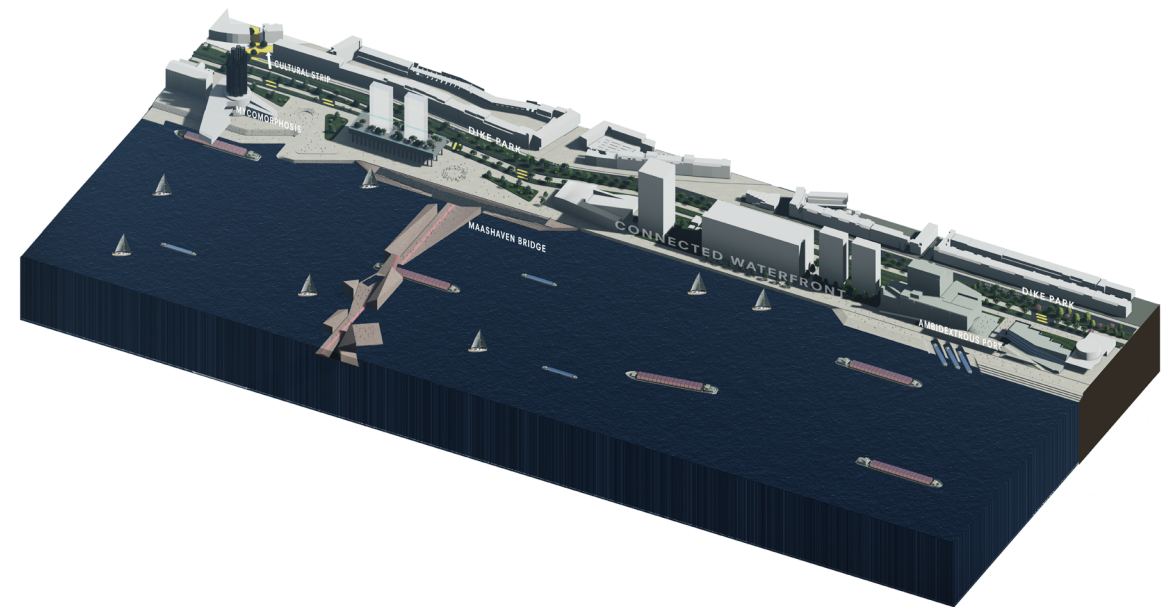


Figure 3. Masterplan for the Maashaven including the new bridge



Figure 4. Productive waterfront, part of the strategy of "Collage city"

General

The Maashaven bridge is set to be a multifunctional project. The main functions support the ambitions to create a strategic connection in the city, inhabit and densify the area and create a point of attraction with the public program which functions as a catalyst for the future development in the proximity of the bridge.

Residential program

The design of the Maashaven Bridge responds to the visions and needs of Rotterdam. In the vision of Rotterdam 2050, the city indicates Maashaven as the site for the exploration of new ways of living on water. Therefore the main programatic element of the project is the residential part with strong emphasis on the experience of living on water as a part of the bridge.

The residential buildings attached to the bridge are positioned on the harbour having the advantage of direct access to water. Therefore the residents are provided with private access to the waterfront and are able to access water transport directly from their front door.

Updated residential program

The final program of the project differs in proportions compared to the one proposed before the design phase. After the decision to make the entire structure floating as means to deal with the effects of climate change, the housing program was reduced to less than a third of the initial ambition and in the end includes 80 residential units of various sizes. The entire project however still reaches the limits of the minimal area set by the studio.

Public program & users

Apart from the residential buildings the bridge offers additional program and contributes to the programming of the harbour as a multifunctional hub, related to recreational and port activities. Therefore next to the residential program the bridge includes several public functions, such as a boat cinema accompanied by a boat rental office and a cinema cafe; a public swimming pool with a cafe that includes a jumping platform for the pool together with changing rooms; as well as a boat service hangar for the boat owners. Above the hangar the terrain of the bridge creates a "play island" with playgrounds catering for the children and active people living in the residential quarters

of the bridge and adjacent areas. On top of everything there are auxiliary spaces such as bike parking and storage spaces with service rooms for climate control equipment that are positioned in the basements of the residential units.

Traffic

A slow traffic connection bridge caters for pedestrians and cyclers crossing the harbour. The bridge must ensure easy access for bikes and pedestrians taking into account the water level changes during the day, as well as during the floods and the overall water level change caused by the raising sea levels.

Experience for the visitors

The objective of the design in regards to visitors is dual. First of all to make the journey through the bridge a visual experience. Crossing the irregular disposition of the elements create both open and more intimate spaces, providing different perspectives towards the harbour. Furthermore, the activities offered on the bridge render it not only a traffic street, but a destination on its own, with cafes, cinema and terraces directed towards water.

Iconic architecture

As bridges, especially ones of large scale, are often icons in their surroundings, the project, because of its position on water, the typology as a bridge and the large scale is already determined to become an icon of Rotterdam South.

The design is meant to resemble a typical floating timber platform that defines the character of the site and sets the tone for the recreational program to develop in the harbour. The volumetric idea is one of a simple floating platform warped by the program of the bridge. The entire complex is of the same materiality, meant to create an unmistakable uniform image for the project.

Sustainability

The position of the project allows to adapt to the changes of water level changes, by placing the buildings and traffic platforms on floating structures that raise and descend together with the water levels twice a day (water level difference is up to 2 meters on a regular basis).



PEDESTRIAN TRAFFIC

BRIDGE AS A JOURNEY

public functions complementing the journey through the bridge - restaurant, cafe, pool, terraces, etc...

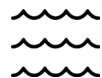


BICYCLE TRAFFIC

SHORTCUT TO THE 2ND CENTER

comfortable bike connection with the city center (Wilhelminapier, Katendrecht, ...)

maximum slope short distances) optimal 10% (for <6%



BUILDING ON WATER

FLOATING STRUCTURE

climate change-proof building able to adapt to rising water levels

expected water level rise: 35-85cm



HOUSING

HARBOUR APARTMENTS

waterside-focused residences with direct views and/or access to water.

Figure 5. Main design ambitions

PEDESTRIAN PATH // WITH ACCESS TO DOCKS & HOUSING & PUBLIC WATERFRONT

BICYCLE PATH // 2 WAY // 2-3 M WIDE

INLAND VESSEL BERTHS (50+) & PUBLICLY ACCESSIBLE DECKS

RESIDENTIAL // 300 HOMES  
SOCIAL HOUSING  
PRIVATELY OWNED HOUSING

85 %

CIRCULATION

15 %

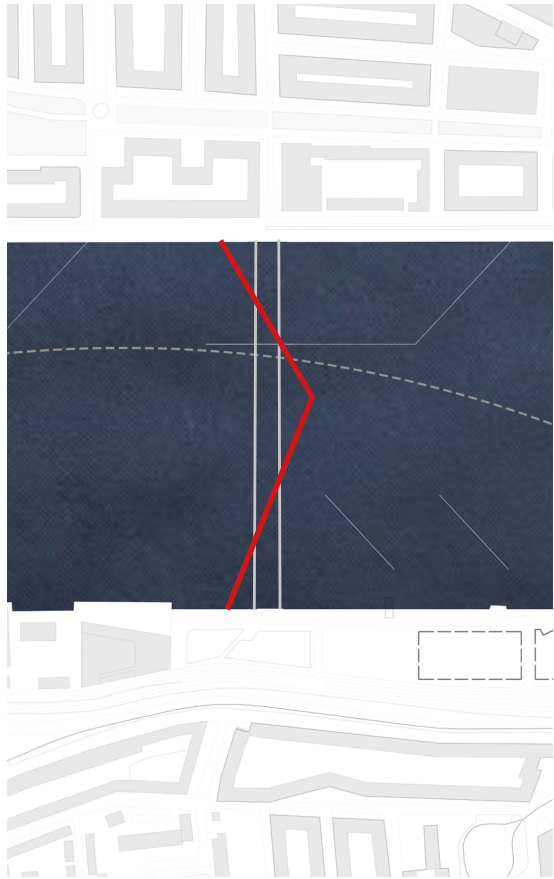
UNDERGROUND PARKING  
200 CARS +  
400 BICYCLES

SUPPORT  
BOAT SERVICE/  
ENERGY PRODUCTION  
FROM WATER

PUBLIC FUNCTIONS  
FLOATING CINEMA/BBQ/  
RESTAURANT/ CAFE...  
400+ M²

Figure 6. The original program of the Maashaven Bridge

## URBAN CONCEPT



### Urban concept

The direct connection of the bridge through Maashaven is enhanced by a curve that creates additional spaces and platforms for the public program. The public functions are located in irregular volumes while the residential part is extended along a typical profile and includes repetitive elements all along the bridge.

### Spacial concept

The spacial organisation of the bridge is achieved by folding and modifying a platform - fitting the program relating to the surrounding situation - the harbour and the public decks of the bridge.

Figure 7. The urban concept scheme

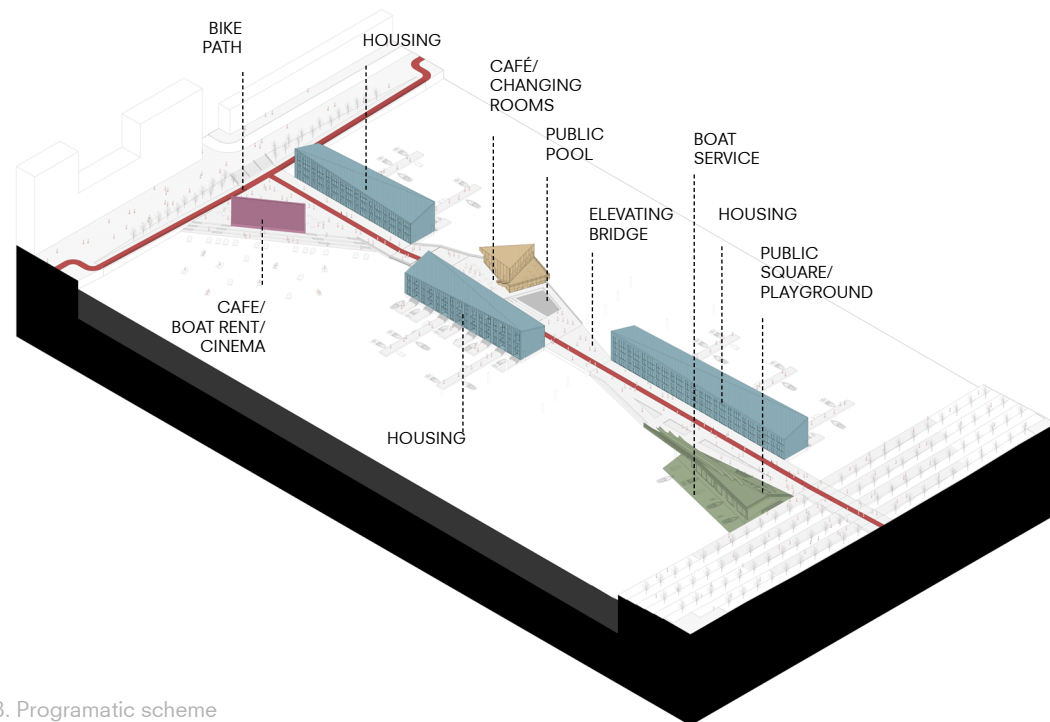
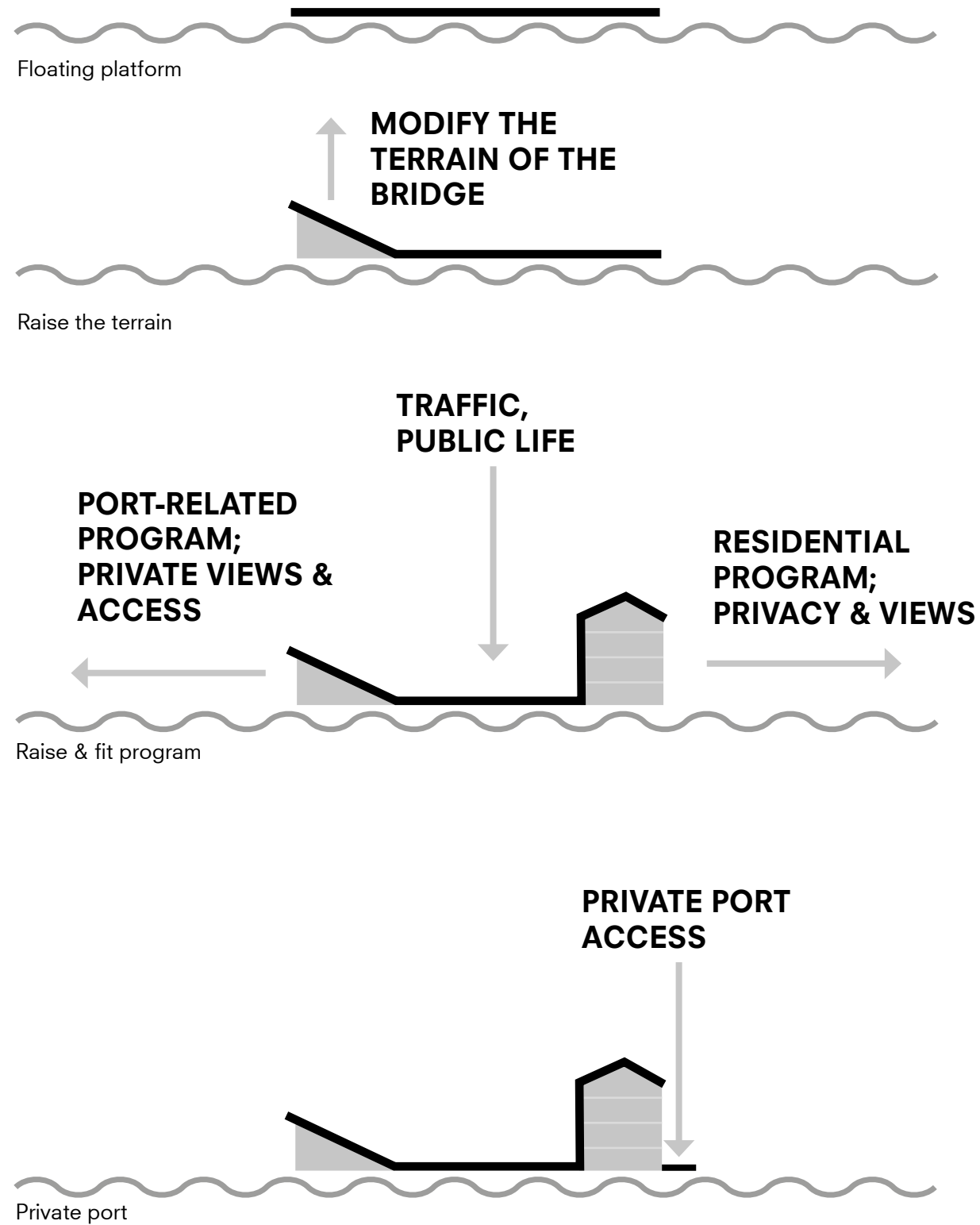


Figure 8. Programmatic scheme

## SPACIAL CONCEPT

## MAASHAVEN BRIDGE



## ACCESS TO THE BRIDGE

The access to the bridge is a particular structure, which adapts to the changes of the water level. Twice a day the water level of Maashaven changes by a difference of up to 2 meters. Therefore the entire floating structure goes up and down together with tides.

The southern edge of the bridge is connected to a new tidal park, which acts as an extension of the new tidal park (which is currently under construction). The tidal park, the newly proposed dyke park and the new tidal park next to the bridge create a continuous network of green urban spaces along the harbour.

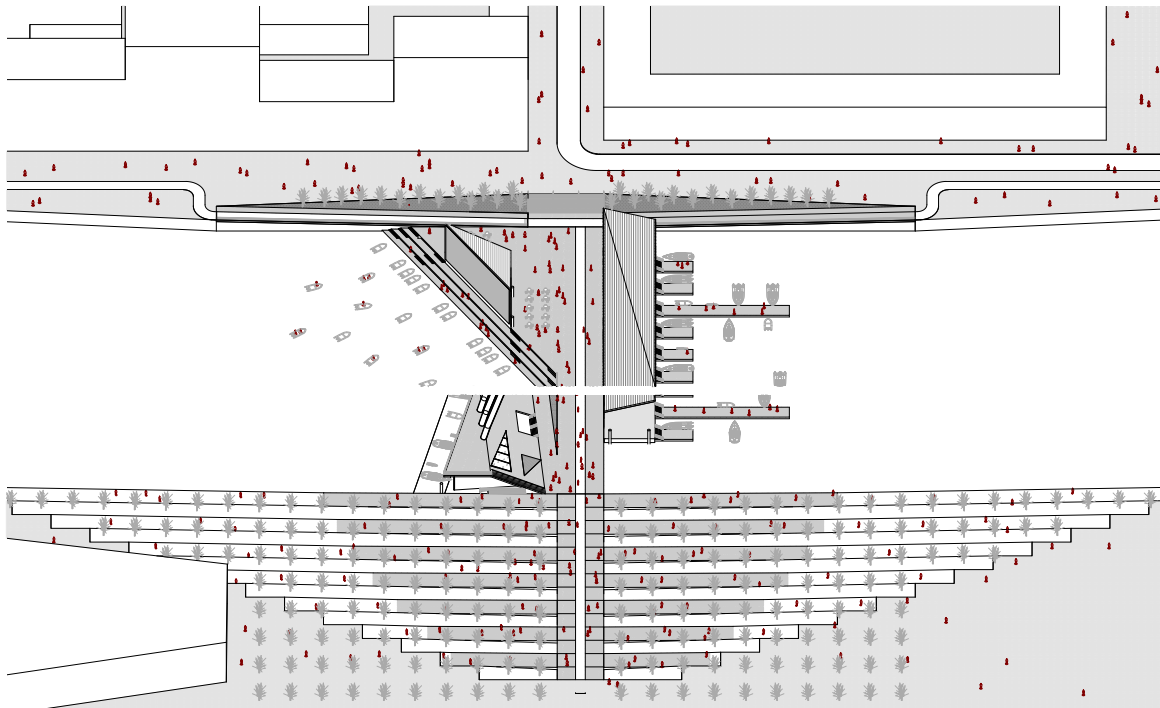


Figure 8. Access to the bridge - northern and southern banks of Maashaven

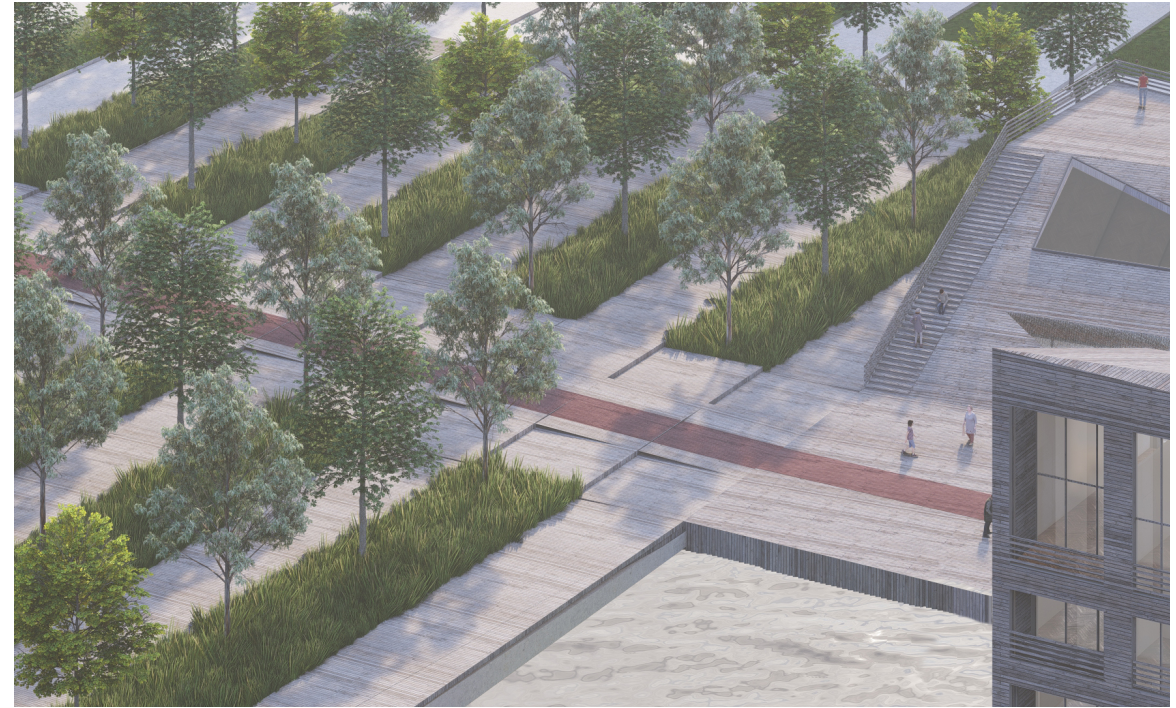


Figure 9. Low tide

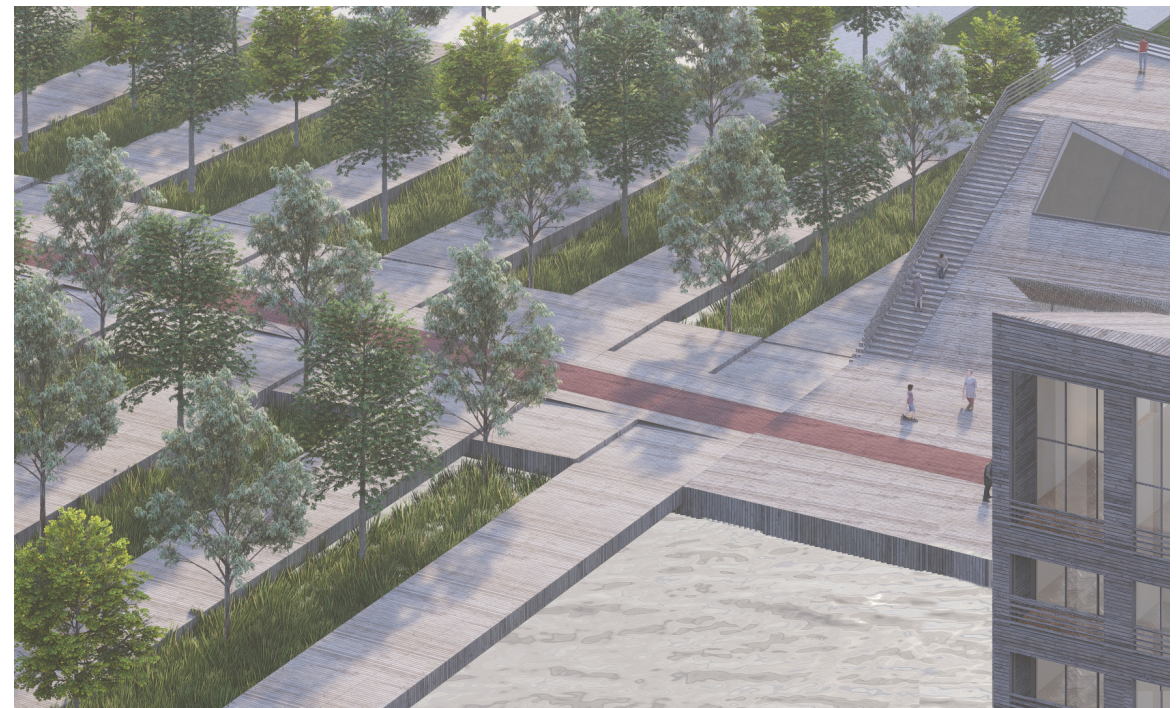


Figure 10. High tide - the tidal park is partly flooded

## FUNCTIONAL ORGANIZATION

The bridge consists of three main “islands” each of which has a different identity and hosts different public program.

1. The first one, closest to Tarwewijk - playground island. It includes a playground with trampolines, nets, slides, a climbing wall. Under this island is located the boat maintenance workshop.

2. The second one in the middle - waterfront island, which features an outdoor pool and a cafe with changing rooms, and a panoramic balcony, which doubles as a jumping platform for the pool.

3. The third island, closest to Katendrecht, is dedicated to cinema, it includes a cafe with boat rental services and a port with rental boats next to it. The largest surface of the second floor showcases movies all year long.

building directed towards the harbour has a cinema screen. Inside the building, a small cinema cafe with a dimmed environment on the second floor showcases movies all year long.

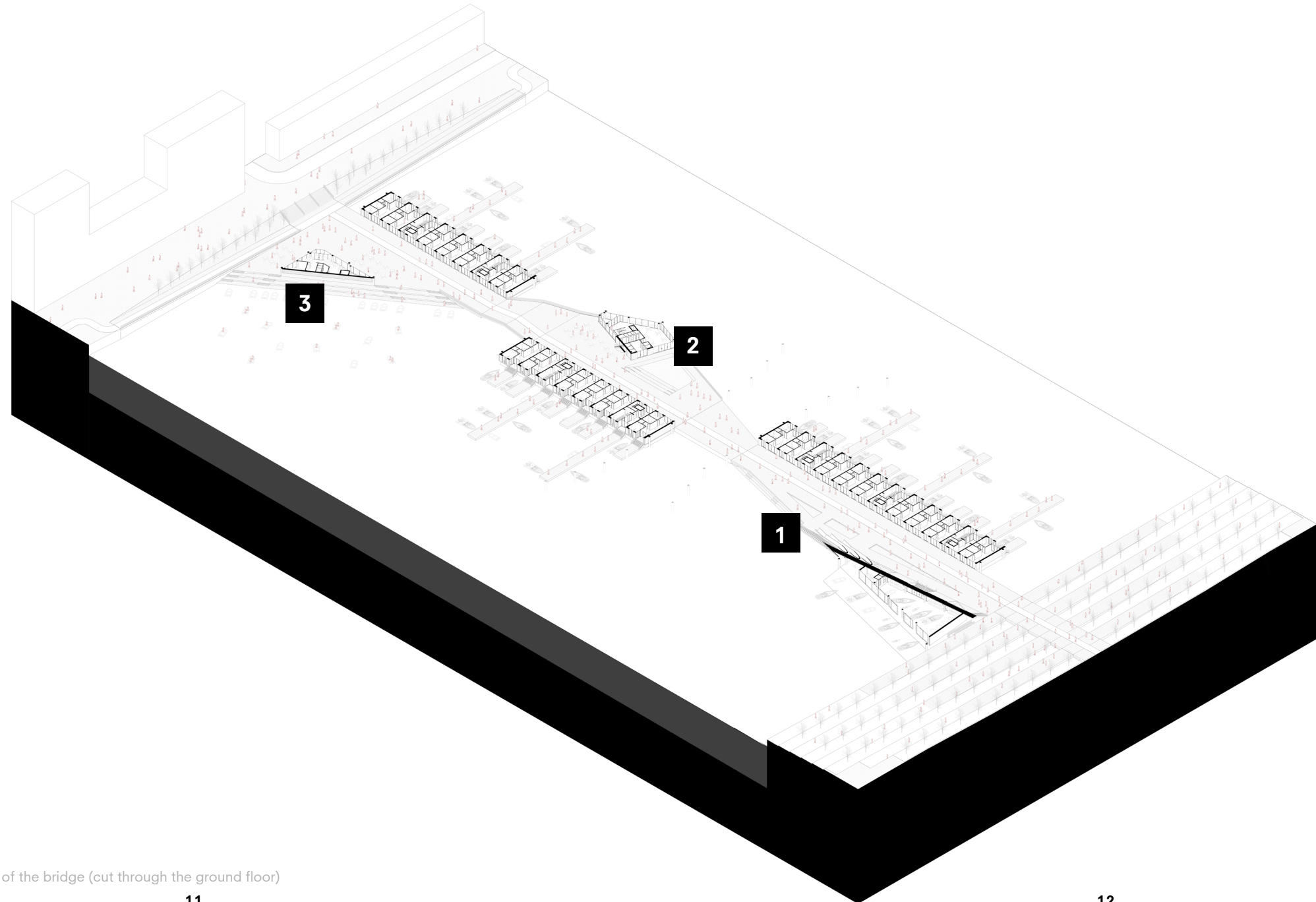


Figure 11. Axonometric view of the bridge (cut through the ground floor)

## HOUSING BLOCKS

The residential blocks are organized in a repetitive manner. A block the width of 4 apartments is joined end to end with the next one. Each of them include a vertical circulation block with an elevator, stairs and technical shafts. In the basement storage spaces for the residents and rooms for the technical equipment are located. The ground floor apartments have direct access from outside and private port platforms while the upper floor apartments are accessed through a small corridor on each floor and feature loggias facing the harbour. The upper floors offer irregular spaces due to the slope of the roof, allowing the apartments on the highest levels to include double height spaces and mezzanines.

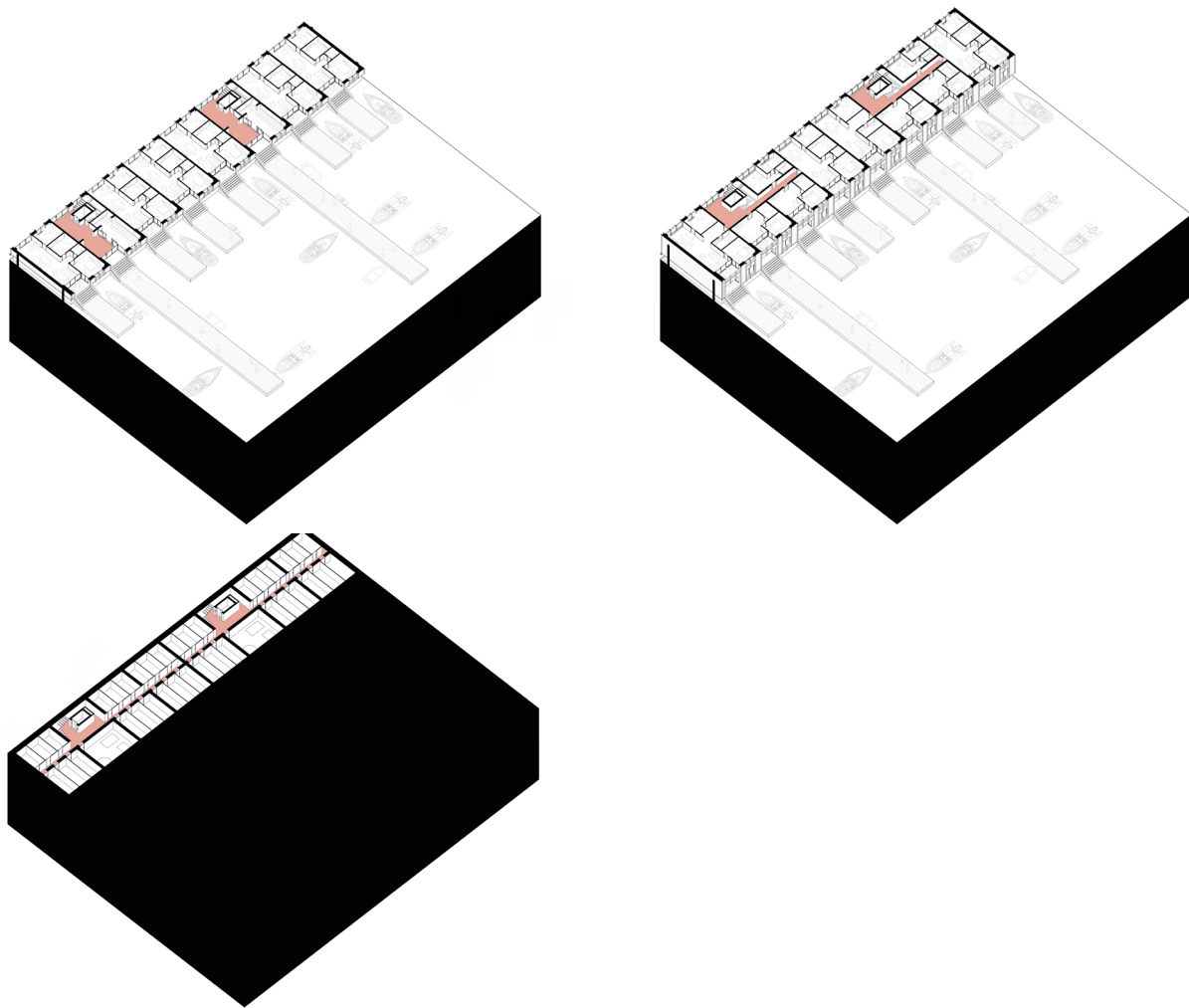
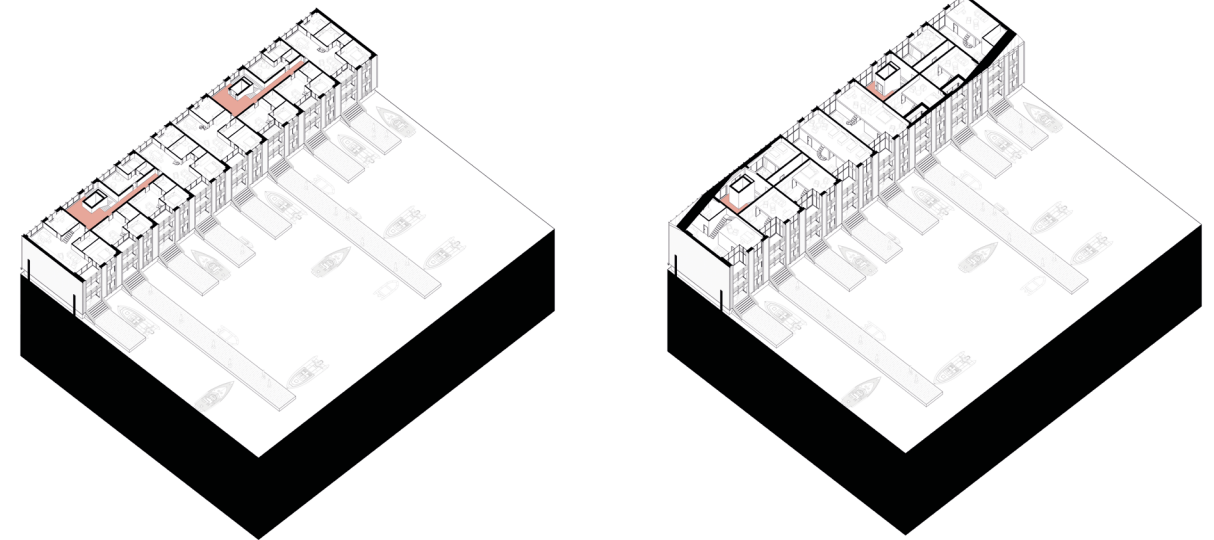
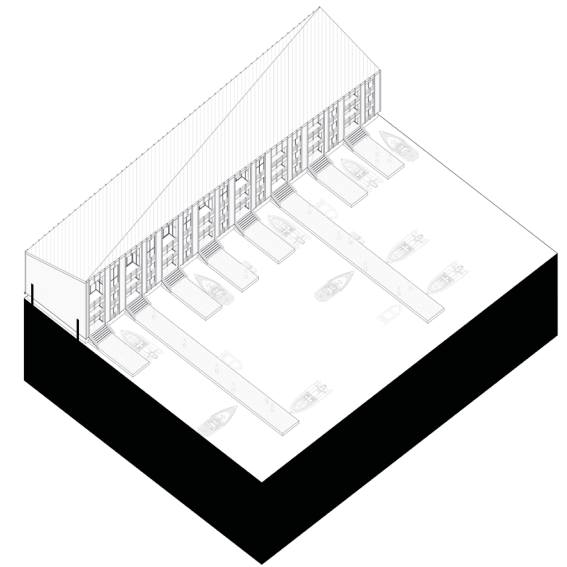


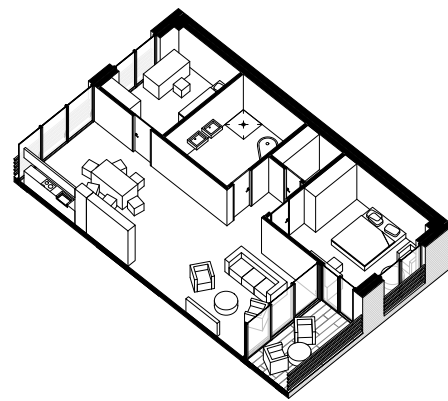
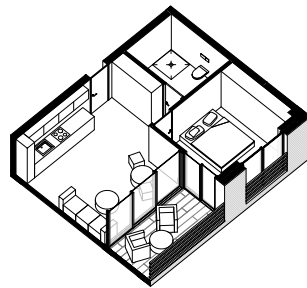
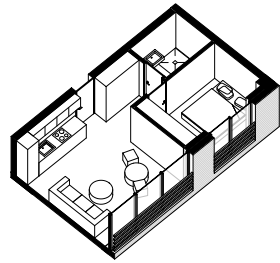
Figure 12. Axonometric view of a housing block, below - basement, middle - 1, 2, 3, 4(3.5) floors, top - overview

## MAASHAVEN BRIDGE



## APARTMENT TYPES

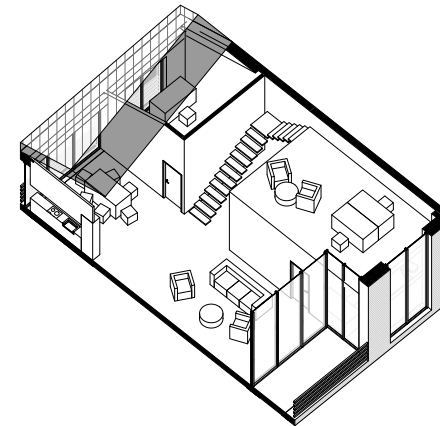
Along the bridge the residential units are organized in a repetitive manner. There are 5 main types of apartments, aiming to offer a variety of living environments for the diverse population of Rotterdam. The apartments range from 30 m<sup>2</sup> to 120+ m<sup>2</sup> in area.



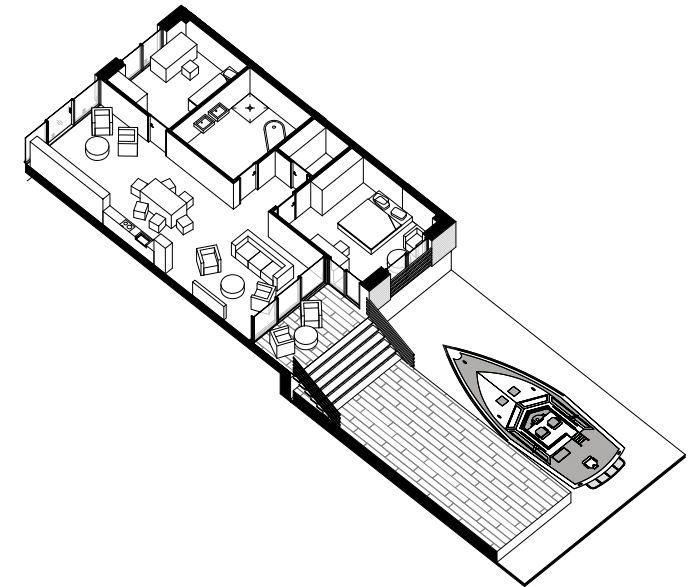
33 m<sup>2</sup>  
1 bedroom  
1 living room / kitchen  
1 bathroom / wc

45 m<sup>2</sup>  
bedroom  
living room / kitchen  
bathroom / wc  
outside terrace

95 m<sup>2</sup>  
2 bedrooms (possible 3)  
living room / kitchen / dining room  
bathroom / wc  
outside terrace



95 m<sup>2</sup>  
2 bedrooms (possible 3)  
living room / kitchen / dining room  
bathroom / wc  
outside terrace & boat platform



120 m<sup>2</sup>  
2 bedrooms (possible 4)  
living room (double height) /  
kitchen / dining room  
bathroom / wc  
outside terrace  
mezzanine

Figure 13. Axonometric view of the apartment types in the housing blocks.



The facades of all the structures are covered with the same material as the platforms of the bridge itself - larch. The subtle differences between the facades reflect the multifunctional nature of the project.

The residential buildings feature horizontal wooden planks, subdivided by a substructure that supports the railings.

The facades of the public buildings include more glazed surfaces and provide panoramic views of the harbour from inside, the closed off parts of the facades are similar to those of the residential buildings, differing only in the patterns.



Figure 14. Facades and materiality

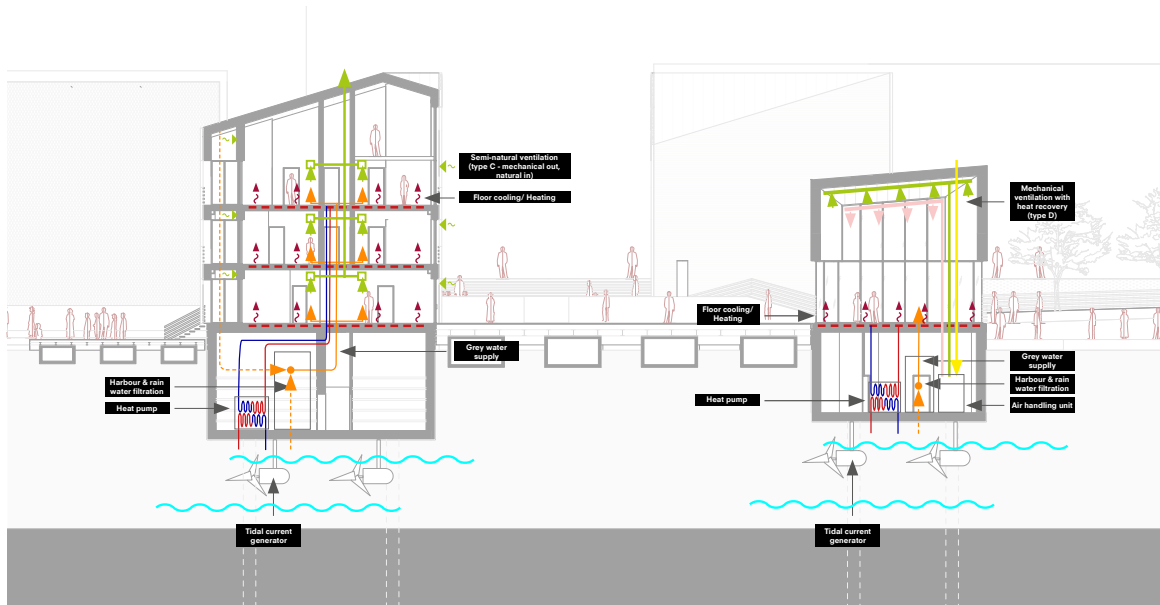


Figure 15. Climate scheme

**Climate**

The climate system of the building uses primarily energy extracted from the harbour.

The heating and cooling is achieved through a built-in floor system that receives heat from the exchanger, which is located in the basement of floating structure.

The airflow differs in the residential and the public buildings. Due to lower airflow requirement the residential buildings are equipped with partly natural ventilation - the air enters the homes through grills in the facade and windows, and is extracted in spaces such as kitchens and bathrooms. In public buildings due to a higher amount of people inside, the ventilation is fully mechanical, air is supplied and extracted through airducts.

The buildings have dual water supply, clean drinking water from the adjacent water treatment center and grey water supply, which is treated in filters located in the basement and supplied in toilets and secondary taps.

Tidal energy is utilized for the supply of electricity. Tidal current generators are mounted to the pontoons which support the housing.

**Structure**

The project consists of several floating structures. The access to the bridge is organized through flexible junctions that adjust to the elevation of the bridge in relation with water.

The volumes housing the residential and public programmes as well as the platforms are all floating. All the elements are anchored to the harbour with pillars and fixed to them in a manner that allows vertical movement.

The floating basements are made from segmented concrete modules, while the structure of the buildings themselves is timber - consisting of a timber frame and stability cores.

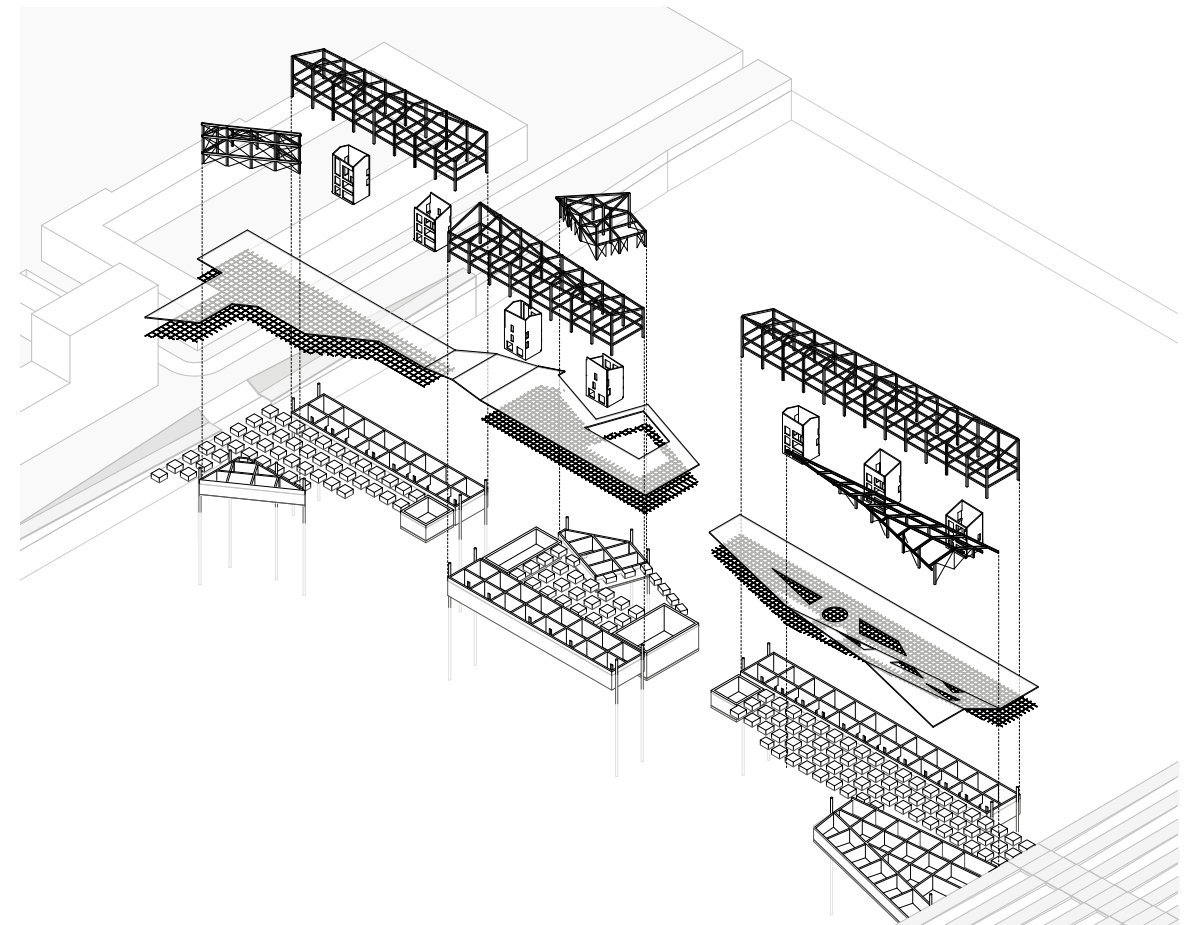


Figure 16. Structural scheme

### Aspect 1: the relationship between research and design

The research done before and during the design phase contributes to the project in multiple ways. The research on iconicity focused on the wider phenomenon of iconic architecture and the effects of such projects. The analysis of projects of similar conditions in terms of their importance in the city helped to understand the scope of influence that unique large scale developments have. Working with projects that have a significant role in the urban environment carries a responsibility which requires not only to understand how to design and build a structure, but also how to achieve the goals set out for the project.

The extensive research phase was essential to understand the complex situation of the project. Analyzing and understanding every aspect of what happened in the past and is currently happening in Maashaven helped to create a clear picture of what surrounds the project and what does it have to relate or react to, in other words - creating a strategy that reacts to and enhances the reality of the site, enhances the current state of site as well as contributes to transformations that will take place in the near future.

Besides the research of the graduation topic research of a narrower scope, related to the location of the bridge on water, residential program on water and similar matters was carried out, mostly during the design phase, which helped to better control the design process and define the qualities of the residential and public program on the harbour. The direct result of which were the urban and design ambitions which shaped the key ingredients of the design.

### Aspect 2: the relationship between the graduation topic and the studio topic

The topic of the graduation studio of Complex Projects 2020 Fall HNY is Migration of Ideas.

Meanwhile the topic of the graduation project is iconicity. The topic of the research was related to and explored the phenomenon of iconic architecture and its effects on urban developments. Iconicity is utilized as a tool of making an impact in cities around the world. Urban redevelopment strategies introduce new flagship projects to underdeveloped areas with ambitions to improve the quality of living environment and initiate new clusters of growth in underdeveloped areas. The technological advancements render the currently used sites of port unsuitable due to the increased scale of the port industry. And in the globalised world the technology travels quicker than the urban environment changes. Therefore this topic is especially relevant to the ever changing redeveloping port areas. Iconic projects such as the Erasmus bridge in Rotterdam, Elbphilharmonie in Hamburg contribute to the evolution of redeveloping harbour cities.

Iconicity itself is a phenomenon that is migrating in the contemporary architecture. It can be described in a few ways - iconic architecture, flagship developments, even Guggenheim effect is a familiar notion, however they all relate to a similar ambition of grand architecture making a desired impact on the surrounding environment. The occurrence of the wider impact of iconicity in various contexts, as a result of an urban strategy, makes iconicity a migrating strategic phenomenon.

### Aspect 3: research method and approach

The methodology of this research was based on studying relevant research pieces and reference projects subject to the phenomenon of iconicity.

The effect of the projects is studied through readings of scientific articles, which examine iconic projects. The aim was to utilize relevant existing research and identify the conclusions fit for the shaping of a project that would be an answer to the needs of the redeveloping

Maashaven harbour and its surroundings.

Iconic projects were analysed trying to understand the significance of the projects on an urban scale. Relevant projects are used as examples of the phenomenon - in this case projects in harbour environments, underdeveloped or redeveloping areas, as well as iconic bridges.

All through out the graduation year the research and design were updated periodically and adjusted to new findings, discussions, personal fascinations and discoveries.

The presence of group work as well resulted in constant changes of the approach, at first towards the definition of the graduation topic, later more related to the development of the surroundings, which in turn impacted the design itself.

### Aspect 4: relationship between the graduation project and the wider social, professional and scientific relevance

Effects of iconic projects are challenging to understand. On one hand, iconicity is perceived as a catalyst of series of transformations in underdeveloped areas. However not all attempts to redefine underused areas are successful. The intended consequences of major interventions not always measure up to the expectations and thus result in disfunctional urban environments and failed investments. Therefore it is important to understand what an iconic project can offer and how does this affect the surroundings. The Maashaven bridge attempts to demonstrate what an iconic project can offer, which is, to program the environment in a way that benefits the surrounding urban space.

A relevant subtopic concerning iconic projects is gentrification. In order to argue the benefits of iconic interventions the possibility of gentrification must be

disproved, to prevent causing harm to the adjacent neighbourhoods by gentrifying the area and driving up the living costs. However this is not always the case as the example of Kop van Zuid shows that iconic interventions might have a localized effect (Doucet, B., Van Kempen, R., & Van Weesep, J., 2010).

### Aspect 5: ethical issues and dilemmas you may have encountered during graduation

Throughout the graduation year one of the main dilemmas related to the topic of iconicity and the project itself was the decision whether it is a good practice to aim to design an iconic project. The question causing this issue was "Is it really for the good of the people that these landmark projects are design or is it the ambition of the client and the designer that are fulfilled instead of the needs of the actual users of the adjacent area?"

Another potential issue related to the graduation project is gentrification. Having introduced a significant intervention to the city the following development might not be sustainable for all its residents, therefore a conflict between the development of the city and the sustainable city dynamics comes to question. As found in research, the gentrification effect of flagship projects is sometimes limited and impacts only the closest environment, but a project that changes the traffic system might cause an effect of a larger scale and impact the city in a more permanent and visible way.

