

# Report

## Delta Interventions Graduation Studio 2016-2017

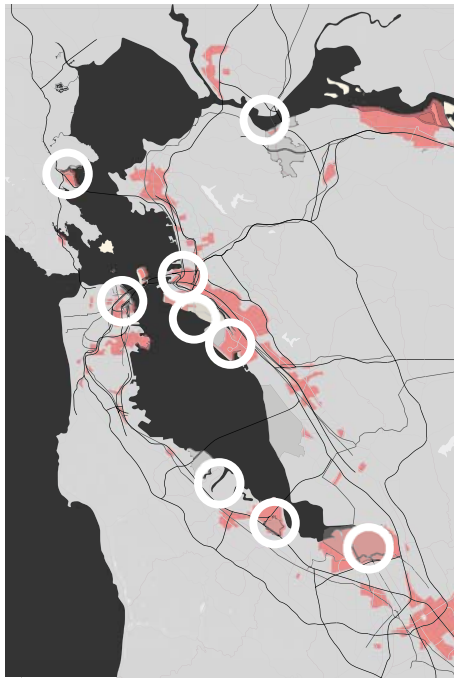
TU Delft Faculty of Architecture,  
Urbanism & building sciences

-  
4429109

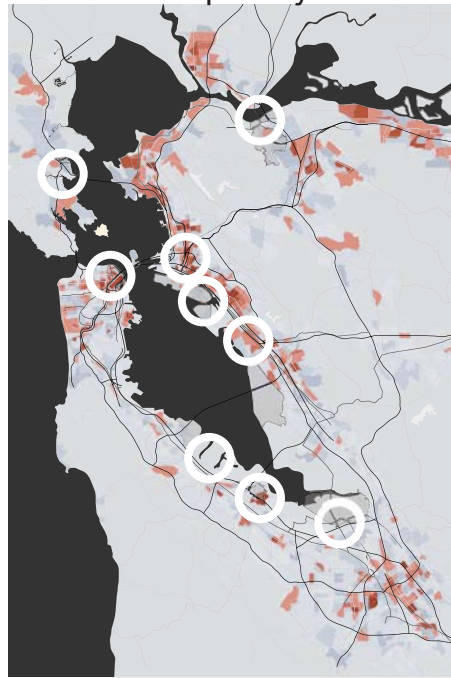
-

# PROJECT SITES

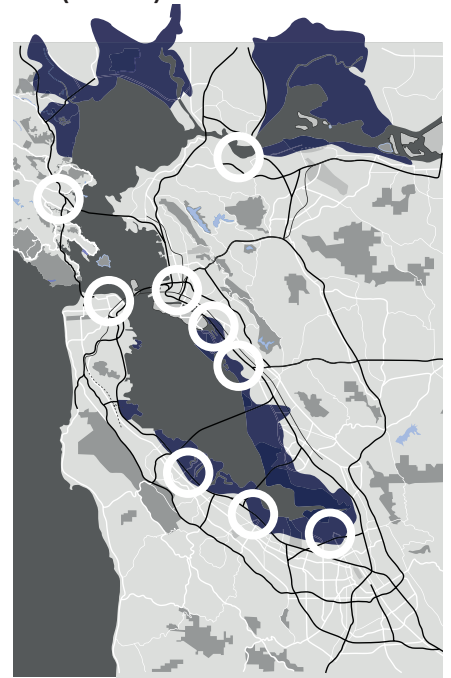
Communities of concern



Income below poverty level



6 ft (~1.8m) sea level rise



- Delta Interventions concerns designing for uncertainty and the social challenges that come with it.
- Project location is the San Francisco Bay Area (SFBA)
- The SFBA faces these challenges around the bay.
- A few sites in which these problems are most present are selected for graduation projects.

# Bay Area: Resilient by Design Challenge

## San Francisco Bay Area

*Uniting the best local and global minds to work towards a more resilient and sustainable future.*

*Rather than wait for disaster, as a community we can work proactively to ensure a better future, creating a blueprint for preparation that harnesses Bay Area innovation and serves as a model for communities around the world.*

*- Resilientbayarea.org*

- Municipalities around the bay have realised the threat of climate change
- An alliance of these municipalities has been formed to address these issues, the Resilient Bay Area Challenge.
- Looking further than SFBA, the alliance can address a global problem as well.

# HUNTERS POINT

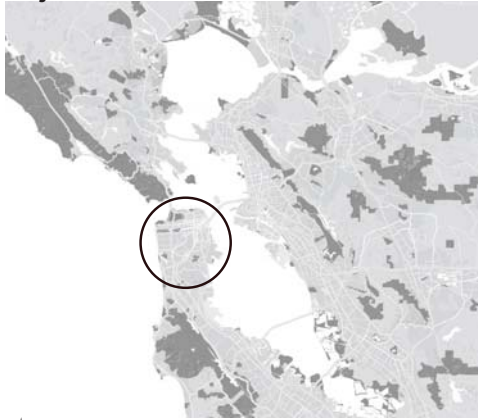


- One of the visited sites: Hunter Point.
- Not an official site, but intrigued by the contrast and view.
- High ground's safety contrasts with the lower lying areas that are prone to sea level rise.
- View shows large volume of water moving land inward, bringing the possibilities of experience closer.
- Large vacant area with a rich history.



# HUNTERS POINT LOCATION

Bay Area



San Francisco



Hunters Point



- Location of Hunter's Point within the SFBA
- Just within San Francisco municipality
- Close to the city
- Peninsula, large waterfront

# HISTORY

Ranches, tanning, fertilizer  
Shipbuilding  
Naval Base  
Job opportunities  
Pollution  
De-industrialisation  
Increased unemployment  
Local Poverty  
Substandard housing



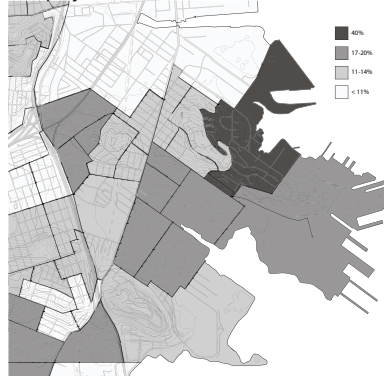
- Rich history
- Great industry, but later on controversial because of nuclear testing
- Disappearing industry, higher unemployment

# DEMOGRAPHICS

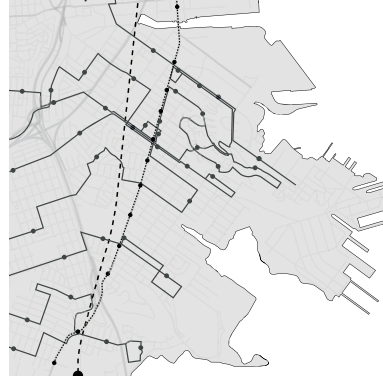
Education



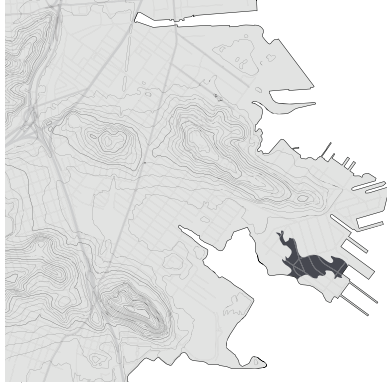
Unemployment



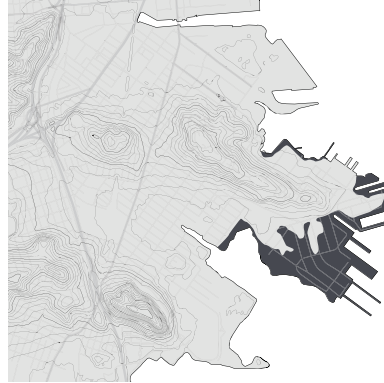
Public transport



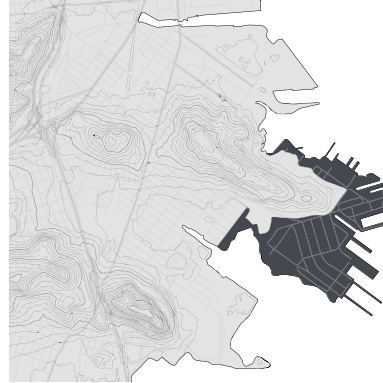
Sea level rise +1000mm



Sea level rise +1300mm



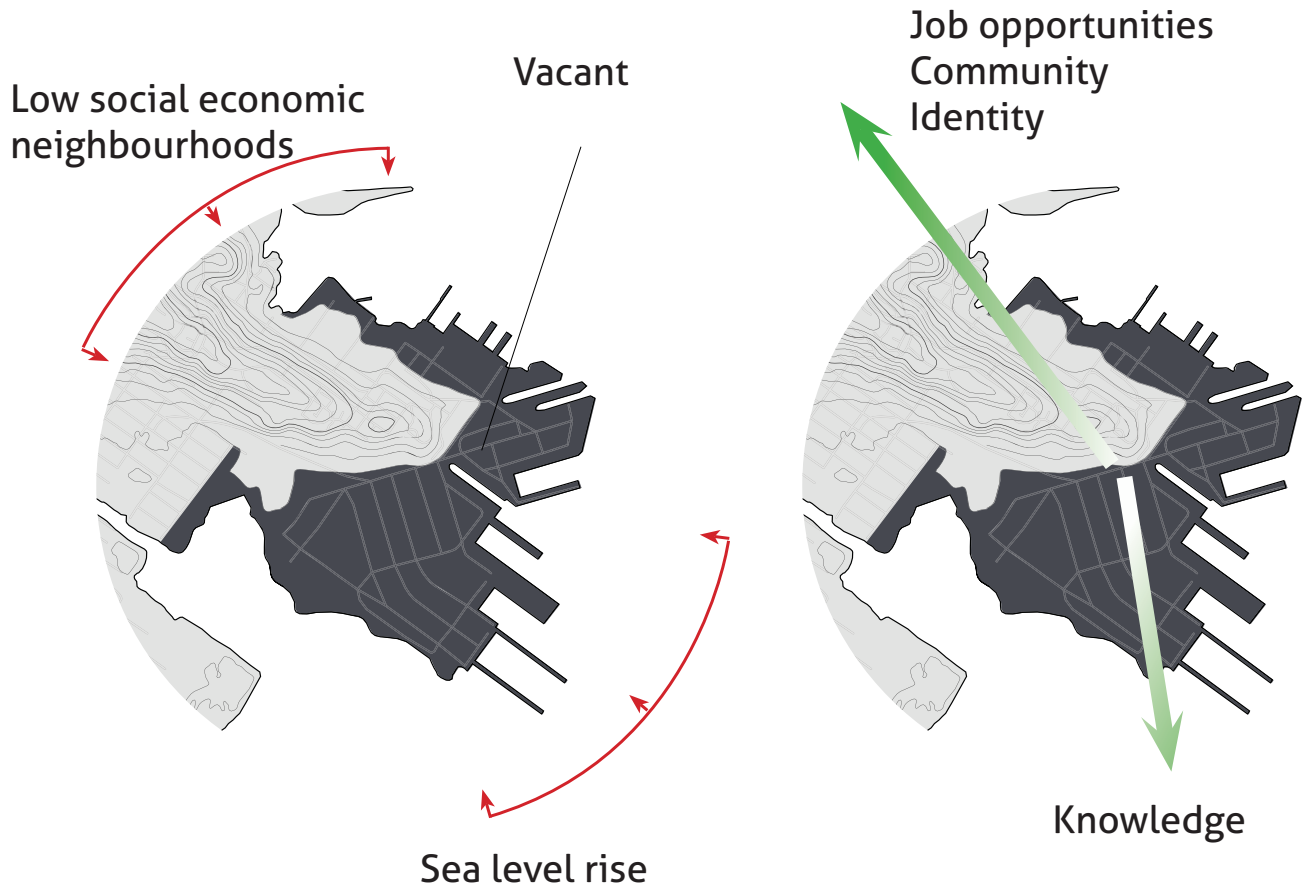
Sea level rise +1600mm



- Encapsulated by high unemployment
- Low education levels
- Public transport and infrastructure new well connected
- Sea level rise from threatens Hunter Point not as much at lower levels but is inundated completely at higher levels.

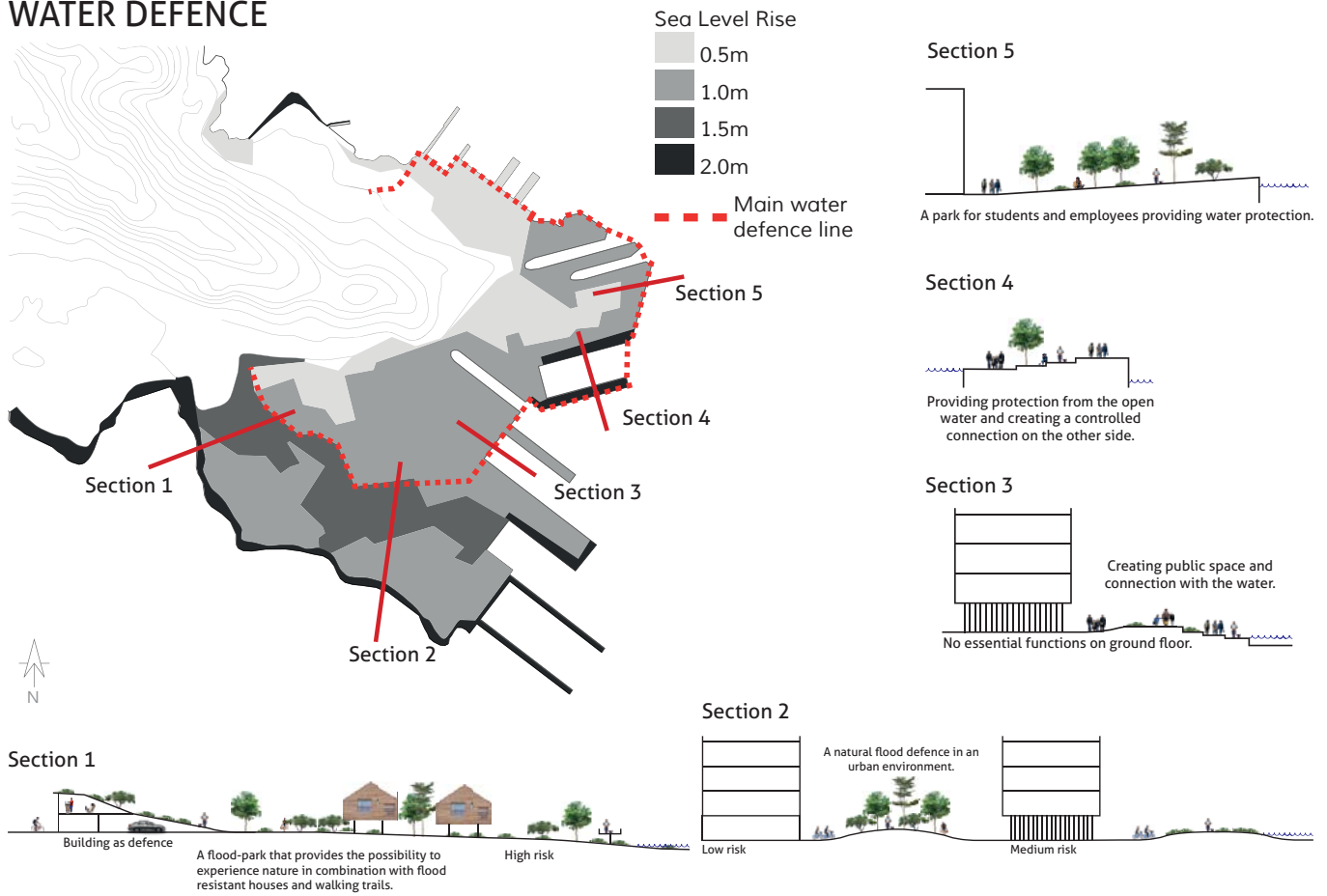
# OPPORTUNITIES FOR HUNTERS POINT

The vacant site offers opportunity to create a new community that address environmental challenges while providing job opportunities and identity. Through a water related hub for education, research and practice, awareness is raised and gives the people something to relate to.



- Demographics from the norths, sea level rise from the bay and a vacant site
- Opportunity to address the challenge of sea level rise/ flood through a knowledge hub, resilience by design challenge.
- Brings job opportunities, a community and education to the surrounding neighbourhoods.

# WATER DEFENCE



- Master plan for Hunters Point, dividing it up in different areas requiring different responses.
- Higher ground is most densely populated, high density with lower flood risk
- Lower ground is less populated and exposed to higher flood risk, in these areas flood should be more accounted for.

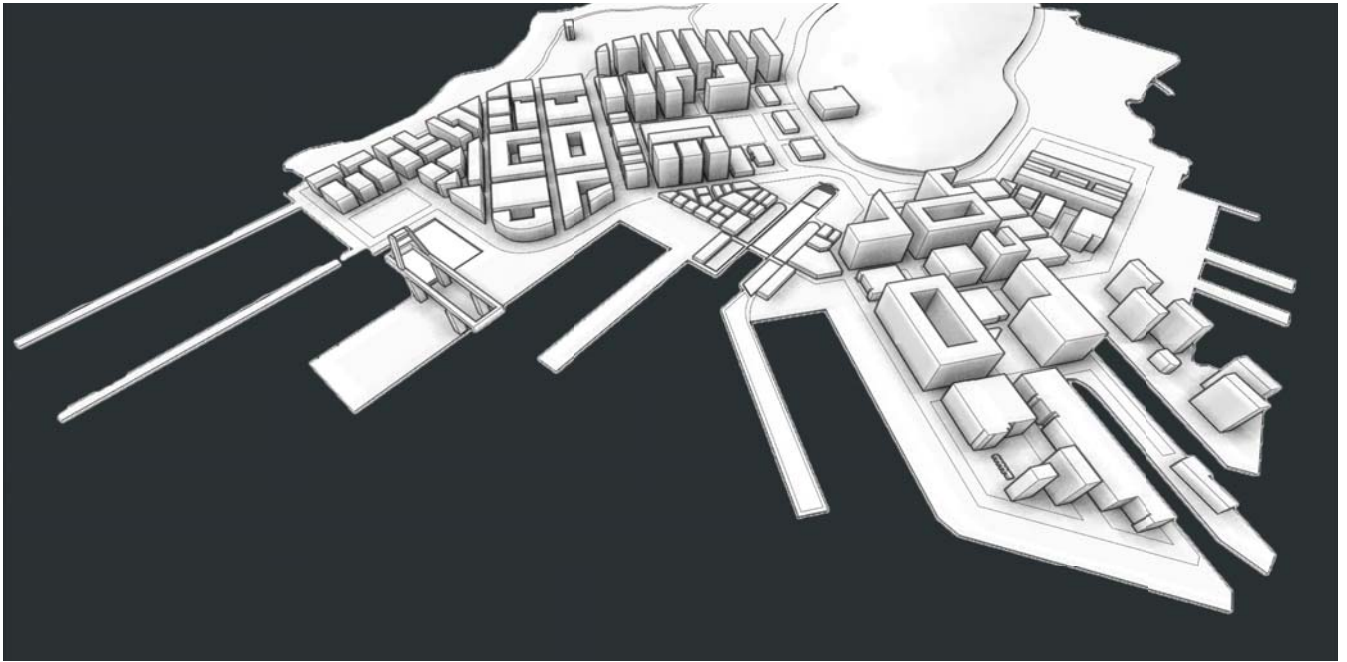
# MASTER PLAN



- The northern part of the master plan is mainly taken up by educational and research purposes, making use of the present docks and possible reuse of the existing buildings
- The southern part features residential buildings in combination with retail and business functions.
- The safer areas are populated while the areas that are prone to floods are reserved for parks and recreations
- Part of the docks on the northern and south side are used for floating residencies.
- Use of cars is discouraged for environmental as well as community point of view.
- Less cars, more interaction, more communication outside of one's own 'car capsule'
- From the main road around the hill, public transport is accessible and extends to provide a connection to entire Hunters Point



# MASTER PLAN



- Density in the parts closer to the hill is higher
- Towards the bay, where the flood risk is higher, the density is lower.

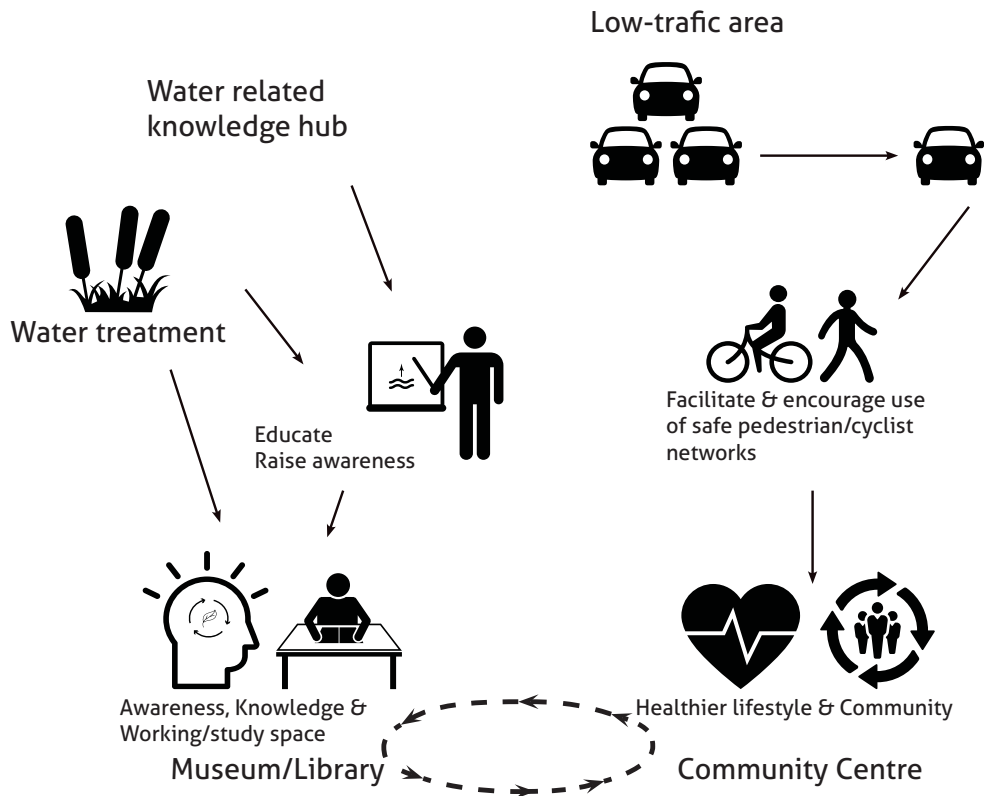


# IMPRESSIONS



- Collage Impressions of the intended experience in different parts of hunters point

# CONCEPT DESIGN



- From the water related hub that provides knowledge and the community within this that provides education and work opportunities a combination between a museum, library and community centre comes together.
- The program brings knowledge to the community and connects the community with the identity of hunters point, water.

# SITE

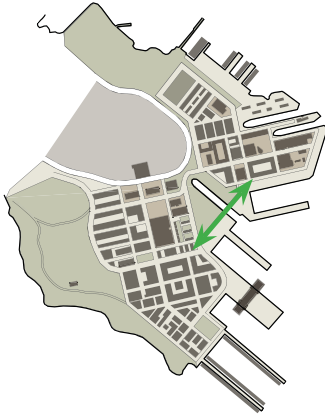
Central location  
Good accessibility  
Connecting north and south  
Inherent connection to water (dry dock)



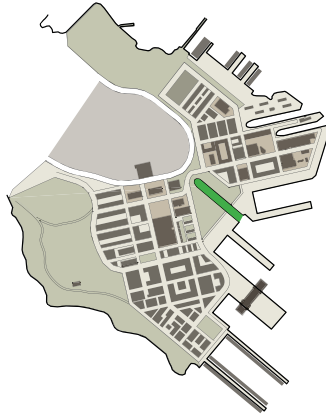
- The centre of the hunter point is the perfect location for the building
- Accessible
- Connecting the divided north and south
- Great connection with water, dry dock
- Existing buildings are not central and have no direct connection to the water

# GOALS

Connecting north and south Hunters Point



Facilitate access and a relationship to water through dry dock



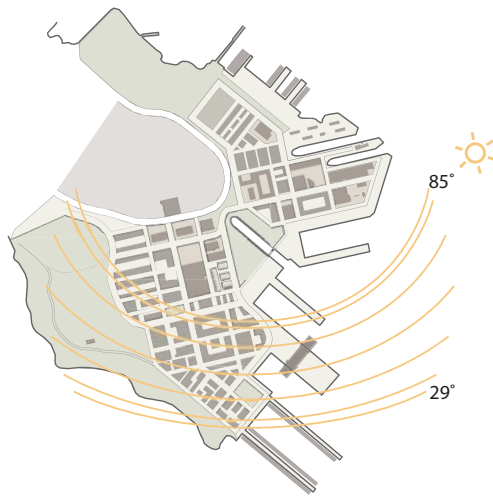
Facilitate a connection and awareness of the bay



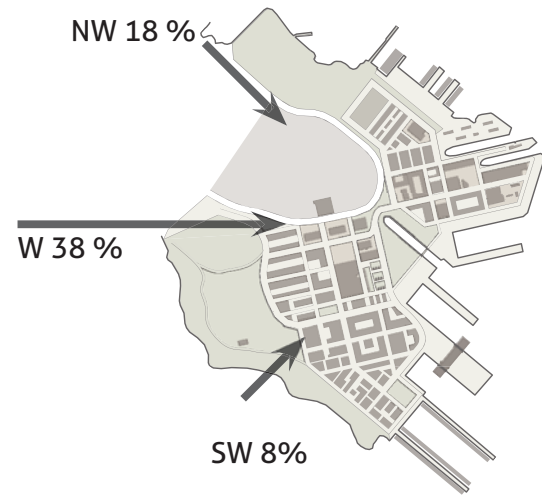
- Main intention for the building is to bring people together while exposing them to the qualities and challenges of Hunters Point and climate change in general.
- Connecting north and south.
- Facilitate a public connection to the water
- Establish a visual connection to and an awareness of the bay

# ENVIRONMENT

Sun

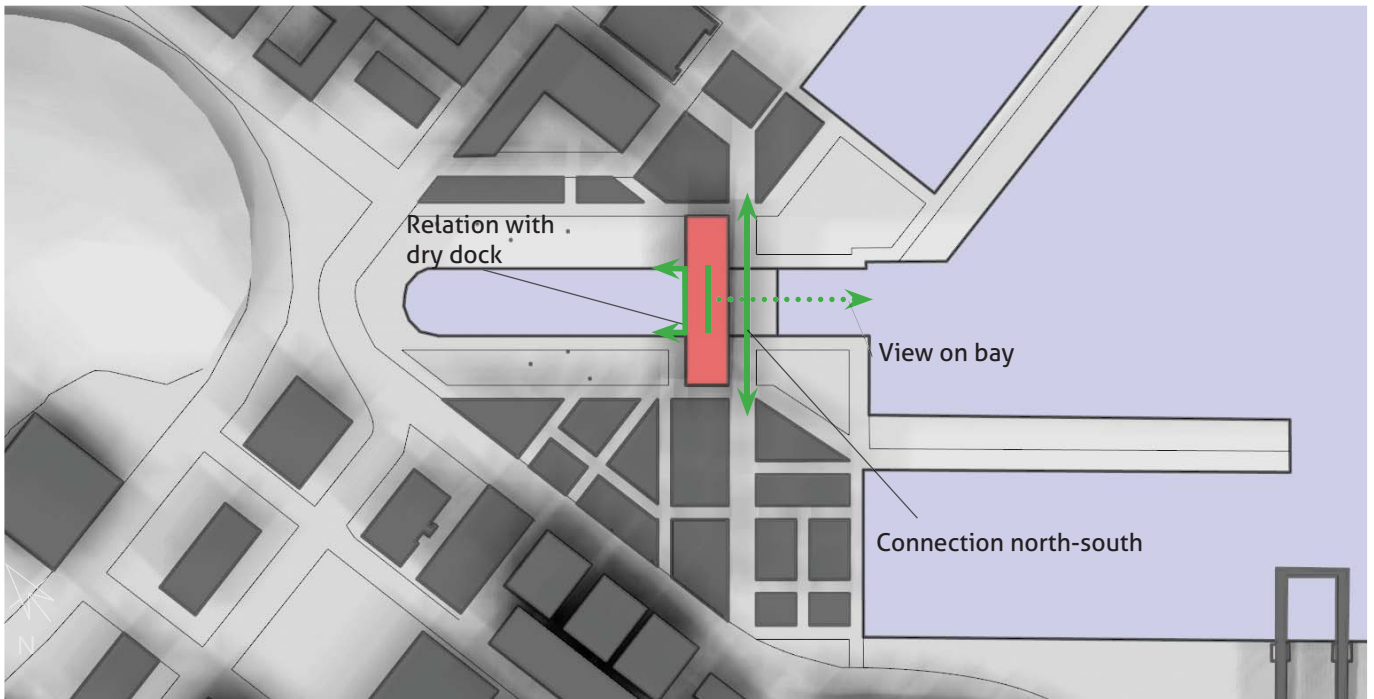


Wind



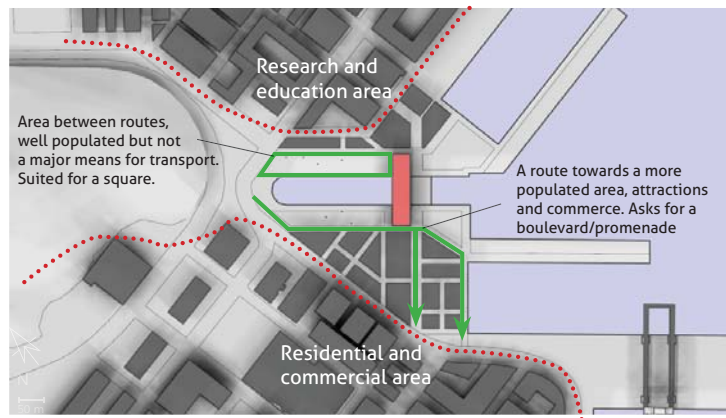
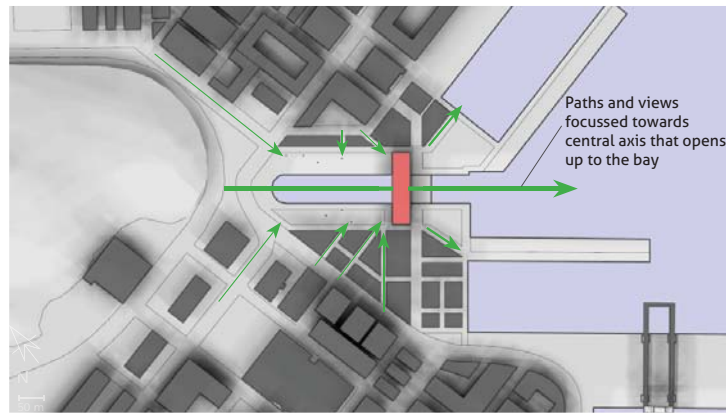
- Dry dock runs from south-east to north-west, being exposed all day because of the open space in the master plan.
- Most prevailing winds are from the west and north west
- Wind power is not that high, and blocked by the hill
- Limited possibilities for wind power

## BUILDING LOCATION



- The location for the building has been decided to be along the bridge that connects north and south parts of Hunters Point.
- The location where Hunters Point is divided by water in two parts, is an opportunity to connect north and south and bring the community in relationship with the water.
- A public area in connection to the water around the building in relation to the water, with a view to the bay.

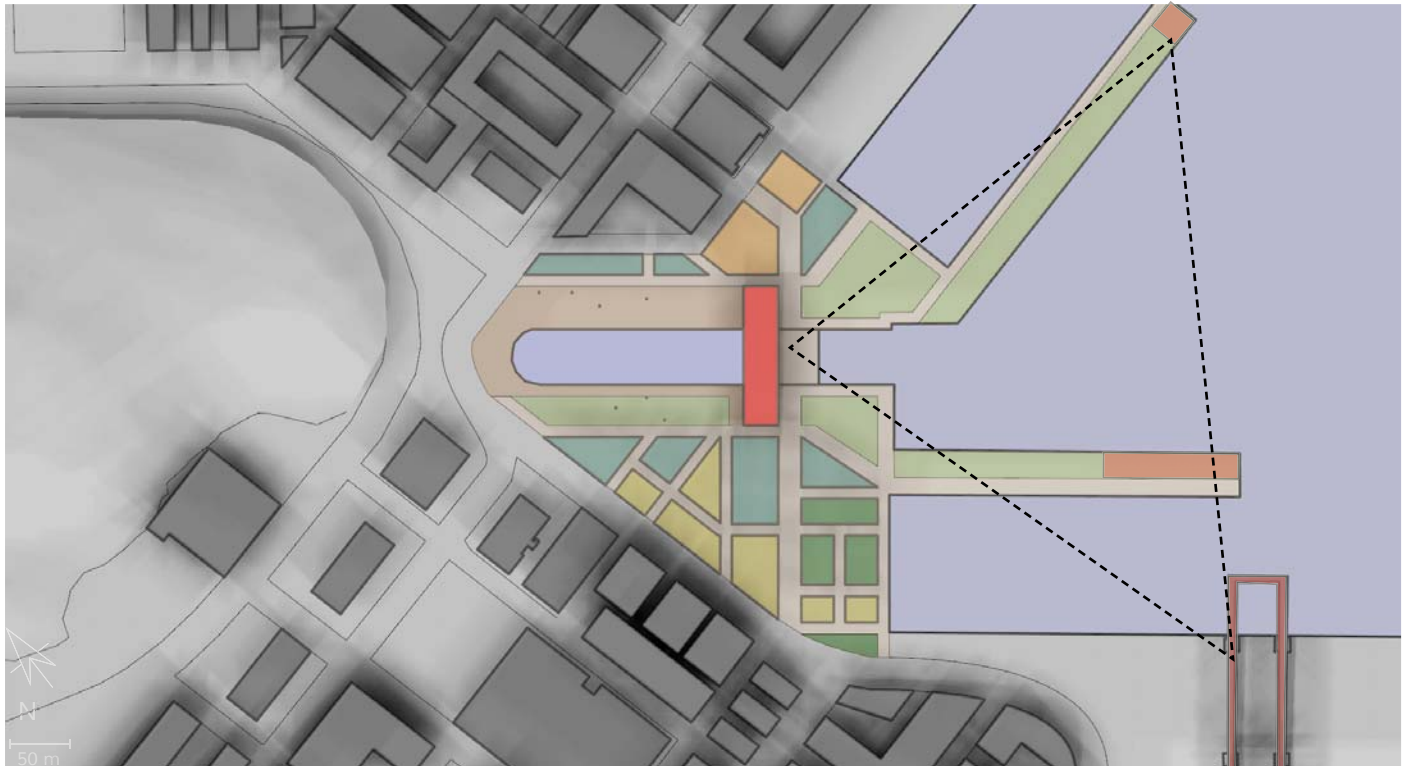
# SITE PLAN



- The site plan focuses on the axis of the dry dock extending into the bay.
- The streets come towards the central axis and funnel to the building, after which the view opens up and the bay is present
- The northern part of Hunters Point is more research and education oriented, having a less busy traffic flow. This side of the dock is more suited for a public square
- The southern part of Hunters Point is more oriented towards commerce and recreation, resulting in a more busy route. This side of the dock is more suited for a promenade/boulevard.



# SITE PLAN



- |                           |            |                |               |
|---------------------------|------------|----------------|---------------|
| Community centre          | Shops      | Theatre/cinema | Public square |
| Bars, caf es, restaurants | Recreation | Parks          | Bay water     |

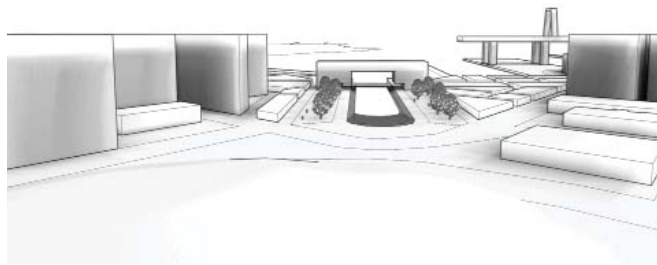
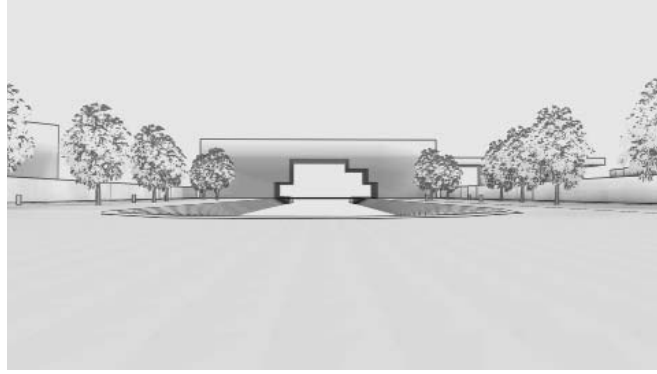
- In the site plan, the community centre is the central piece, it acts as a funnel towards the water and focuses the public space between points of interest.
- Observatory on the north pier, the ferry building on the middle pier and the crane as a landmark in the bottom of the image.
- Buildings in the central part of the master plan are solely accessible by foot and bike. In combination with the lower building height in this part, this makes for a more intimate space and town feel.

# BUILDING MASS



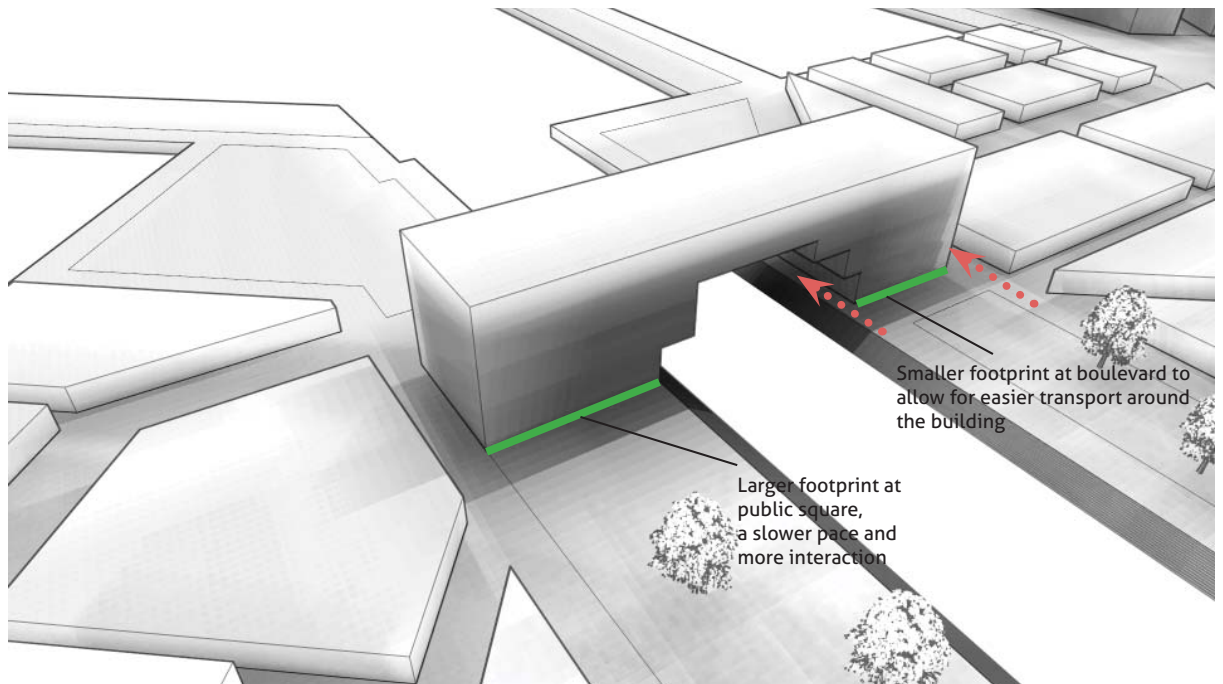
- The building mass spans over the dry dock, extending the focus over the water to the bay and framing the view.
- The solid appearance of the volume is as a wall with a hole in it that reveals part of the experience and public space to come.

# FRAMING



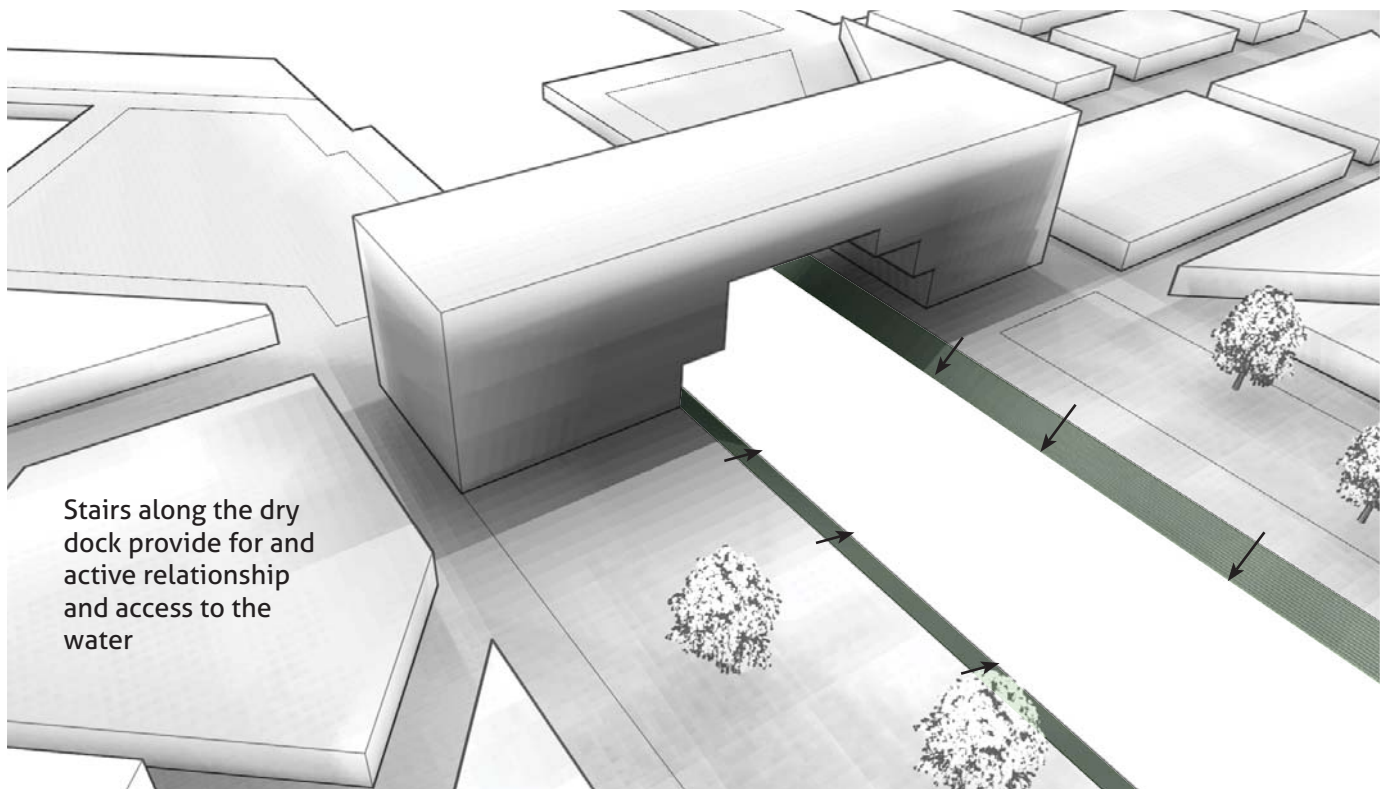
- The building acts as a metaphorical gate, spanning over the water revealing the way to the open water.
- Not only through the centre of the volume but also through the sides of the volume that creates passages in combination with the surrounding buildings.

# CONCEPT



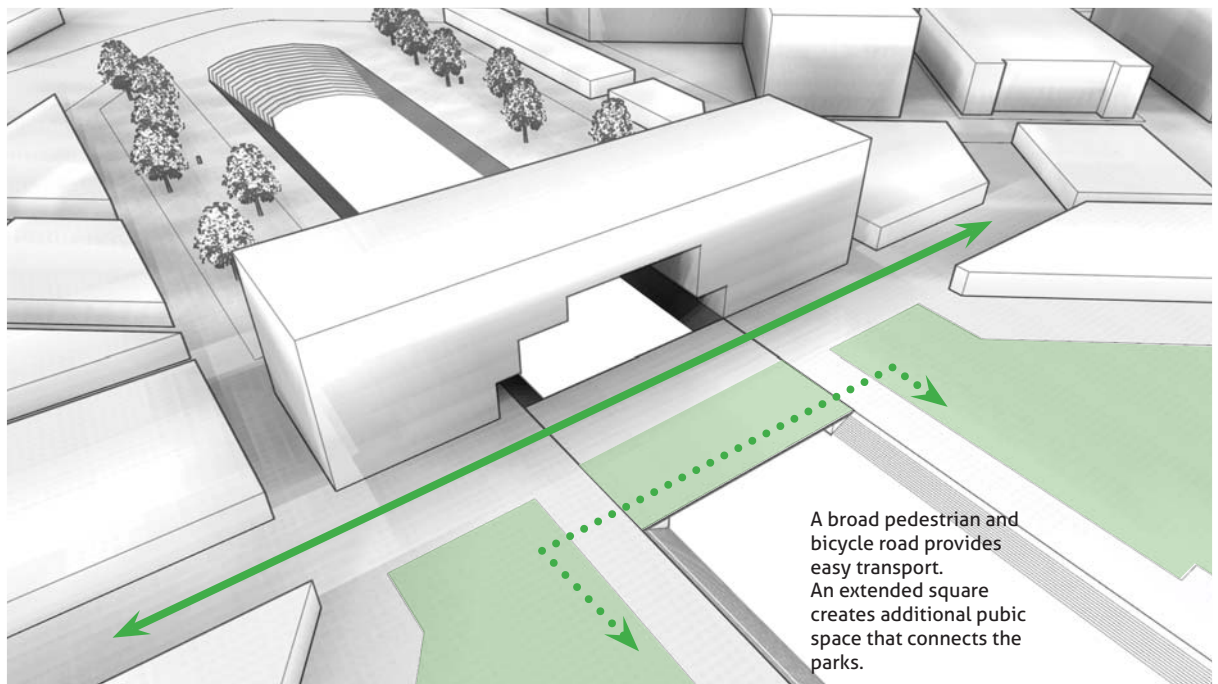
- Because of the difference between the kinds of spaces on both sides of the dry dock, a square and a boulevard, the footprint of the building reflects this.
- A bigger footprint at the square, more of a slow pace area
- A smaller footprint at the boulevard, which features more of a fast pace towards the attractions.

# CONCEPT



- Stairs along the dry dock make the connection to the water physical.
- As the tides change, steps appear and disappear, creating an awareness of the environment.

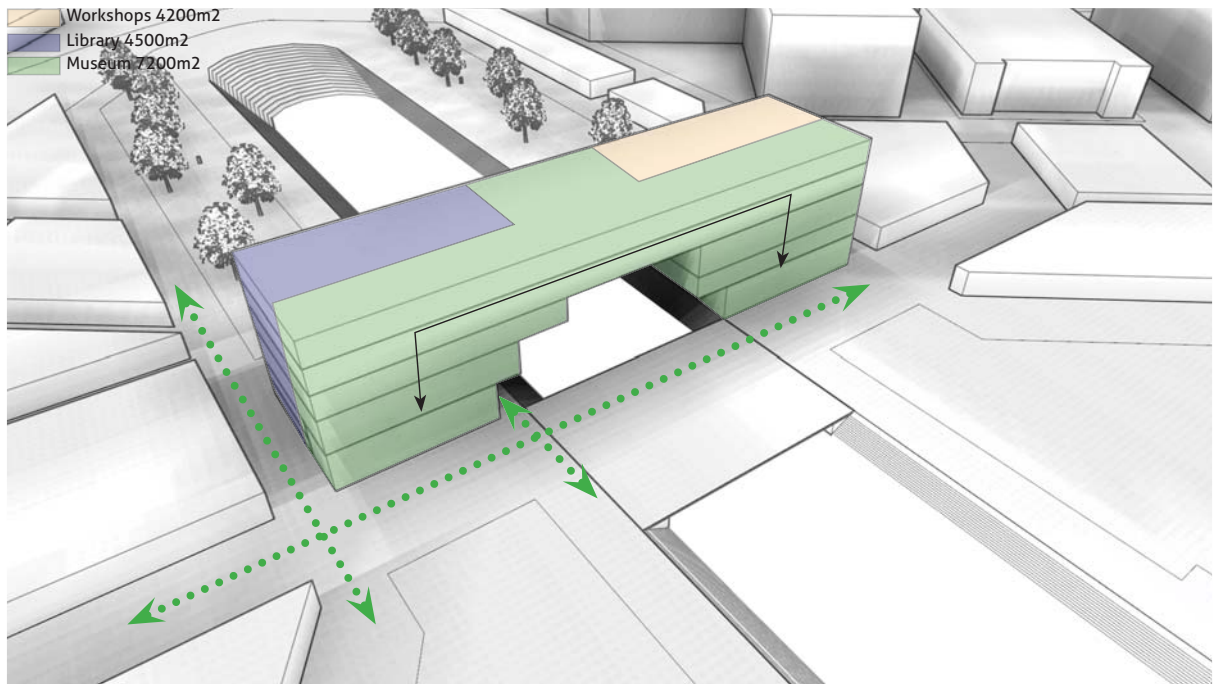
# CONCEPT



- The bay side of the building a more busy side, connecting north and south Hunters Point
- The bridge is split into two parts, one mainly for traffic, while the other part has a slower pace and connects the public open spaces on both sides of the dock.



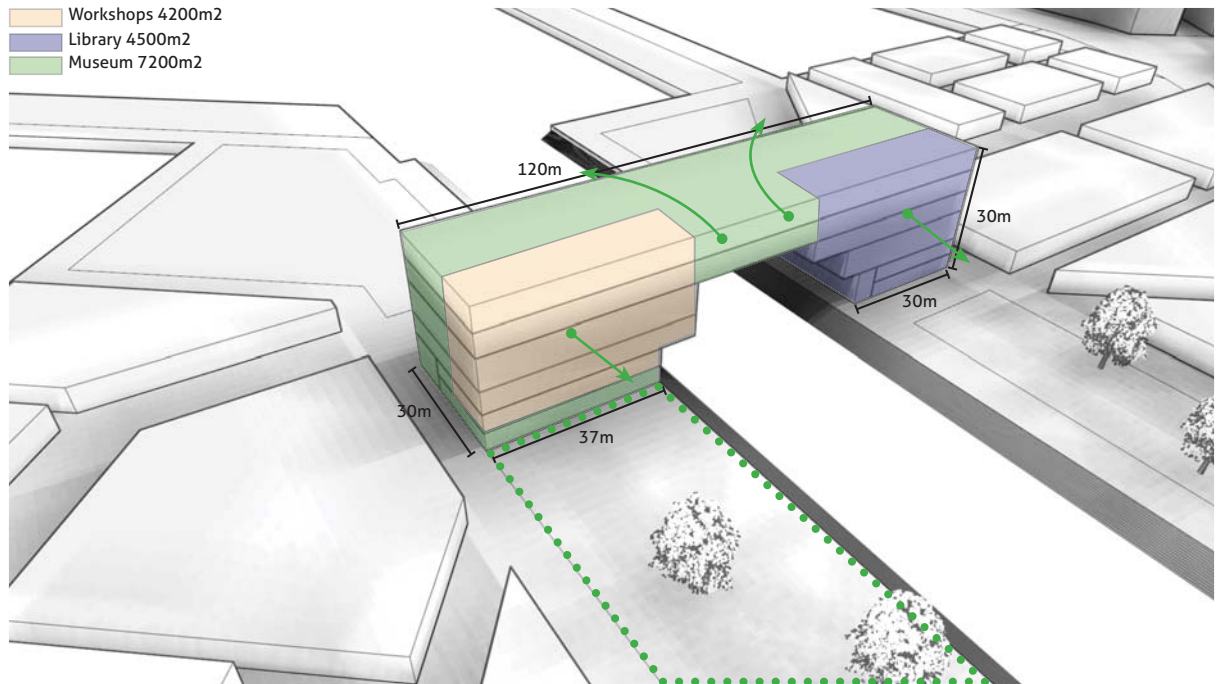
# PROGRAM



- The bay oriented side of the building is a public route, and establishes a visual connection to the bay while educating visitors about the relationship to water.
- The museum has an experience and educative driven program, this fits within the community centre and caters to the area's challenges.



# PROGRAM



- The museum has a connection at the footprint with the square.
- Both having a the same pace of strolling, it opens up the possibility of an exposition on the square.
- The workshops are oriented towards the hill, towards the community which it endeavours to serve.
- As for the workshops, the library is about learning and knowledge, also oriented towards the community
- The museum spans between the two programs, expanding towards the bay,

# BUILDING PLAN

## Ground floor

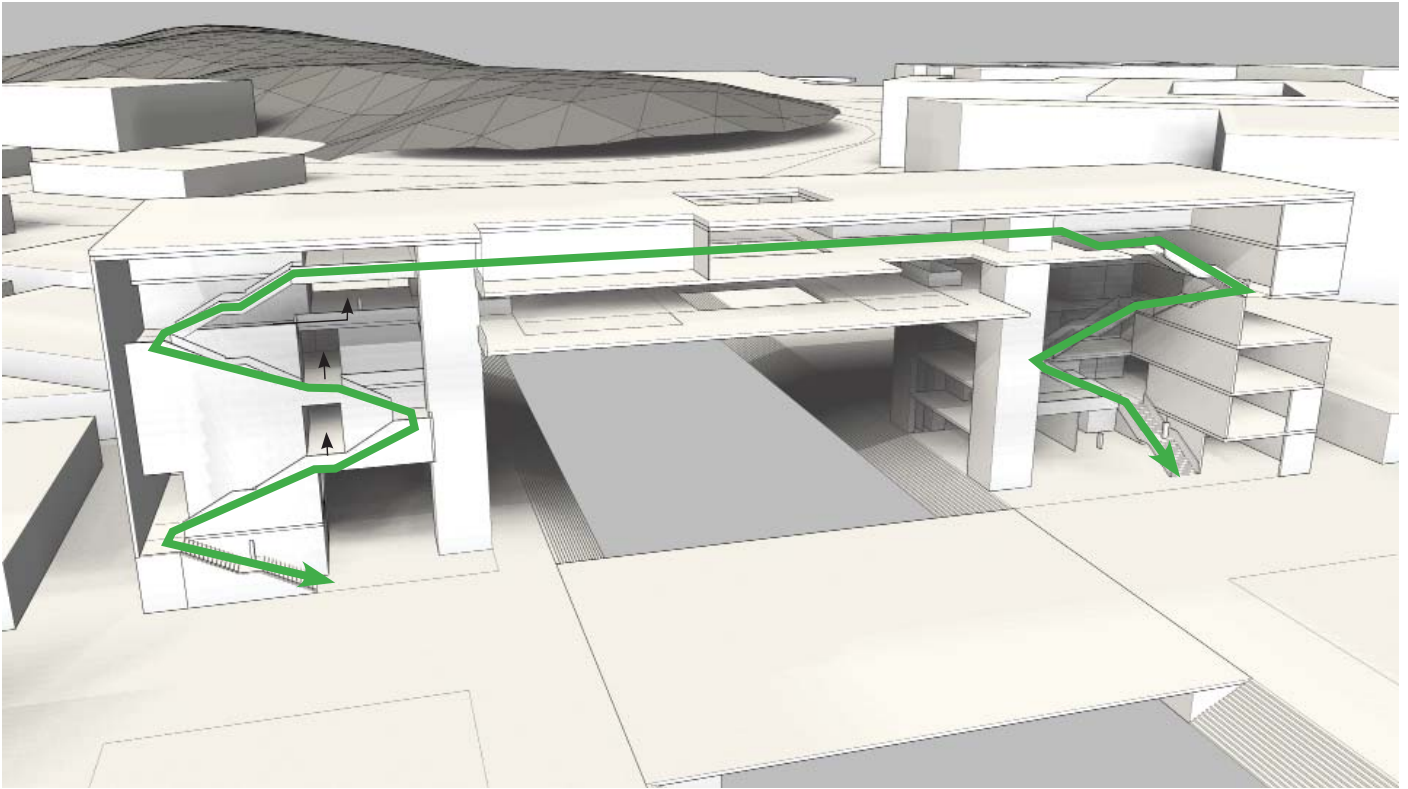


## Fourth floor



- Oriented towards the bay is the entrance of the open public space
- Though the entire building is public, the actual open public space expands over the height of the floor plans
- Main access is through the bay side of the building, as this is where the connection between the bay, the route and the dock comes together.
- The museum is accessible through the hill side as well, as a connection to the public square is desirable for an exposition and possible because of the slower pace.

# ROUTE



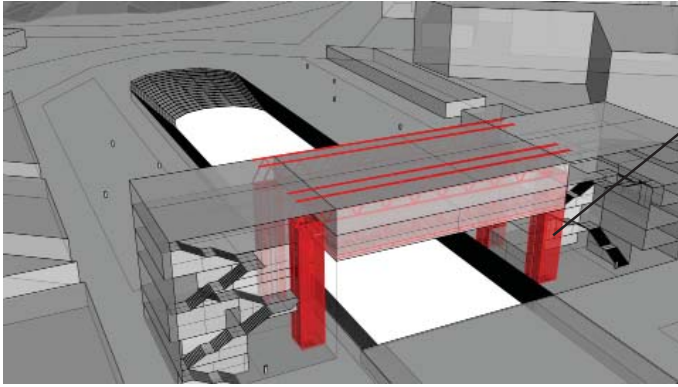
- The route is an experience through the building, the cascading stairs create a space that gets bigger as the levels rise.
- The museum route has an open character, while the library behind it requires a more closed experience, reading and study rooms.
- The workshops have a more

# FACADE



- The facade is made up of lamellae around the entire building as a second skin.
- The inner facades that stand across from each other are completely transparent and make a connection between the two bases.
- The lamellae prevent the majority of the sun heat from entering into the core building while allowing it to pass into the second skin where this benefits the natural ventilation.

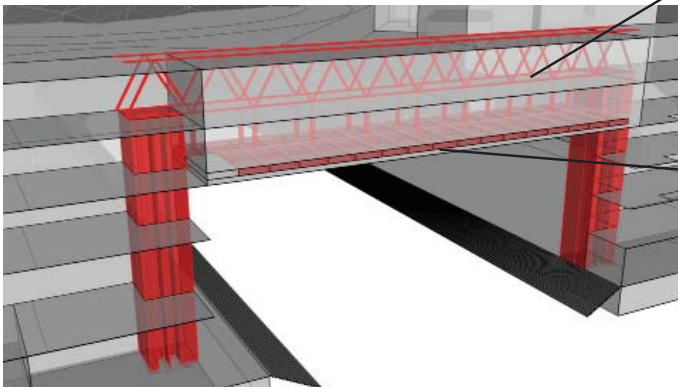
# CONSTRUCTION



CLT Core



Steel truss in interior



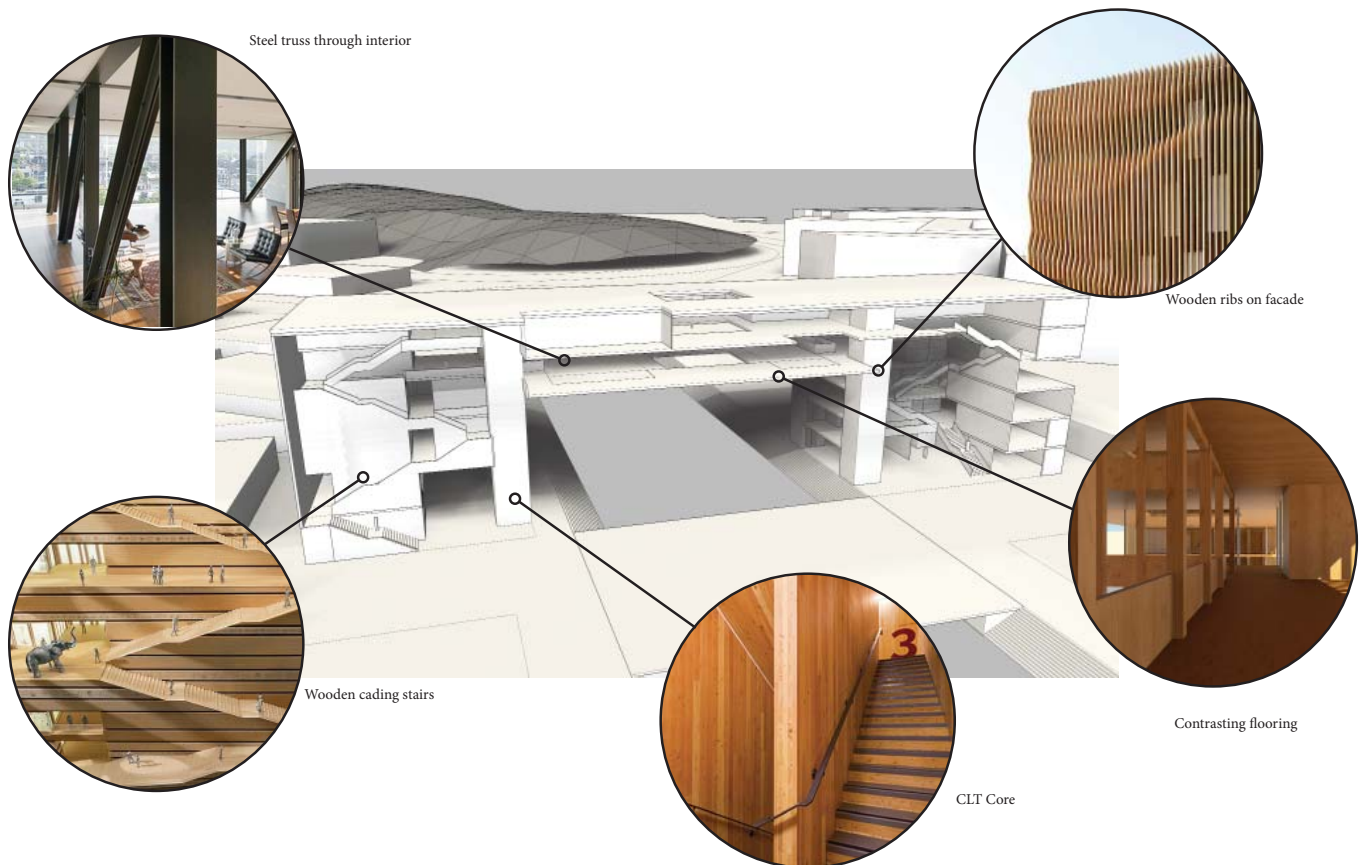
Wood hollow core slab



- As the community centre represents a community that is surrounded by water and has a connection to the water.
- Climate change and with that sustainability is a big aspect, and the community centre should represent this.
- Wood is a sustainable material as it stores carbon rather than producing it to manufacture.
- The core is therefore made of Cross-laminated Timber (CLT) as are the floors, columns and walls.
- The span over the dock is a steel truss as are the beams for the second facade.
- Economical, functional as well as architectural consideration make steel a more viable option for these parts.
- The stability is ensured through the cores, inner walls and the two smaller facades.

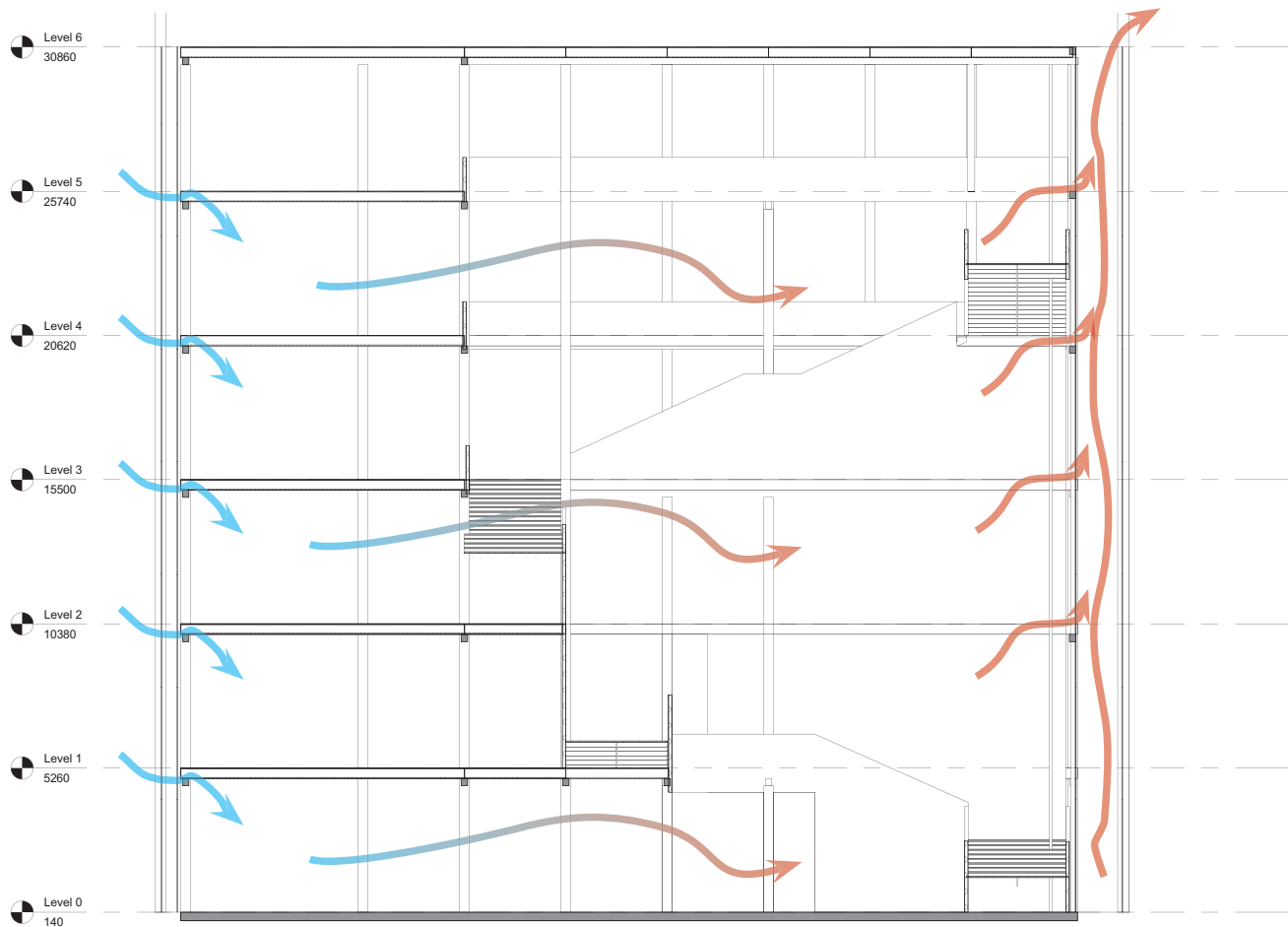


# MATERIALISATION



- Materialisation throughout the building is wood.
- The structural elements like walls, columns and beams are birch wood CLT. It has a high pressure resistance and a light even appearance
- Objects or orientation/ interaction like the floor, handrails and handles are made of white oak with a darker finish.
- White oak is a hard wood and is more resistant to wear.
- The darker colour is contrasting to the lighter birch, creating a layer in materialisation and the use of it.
- The ceilings are covered by aluminium radiation panels the realise cooling for the building

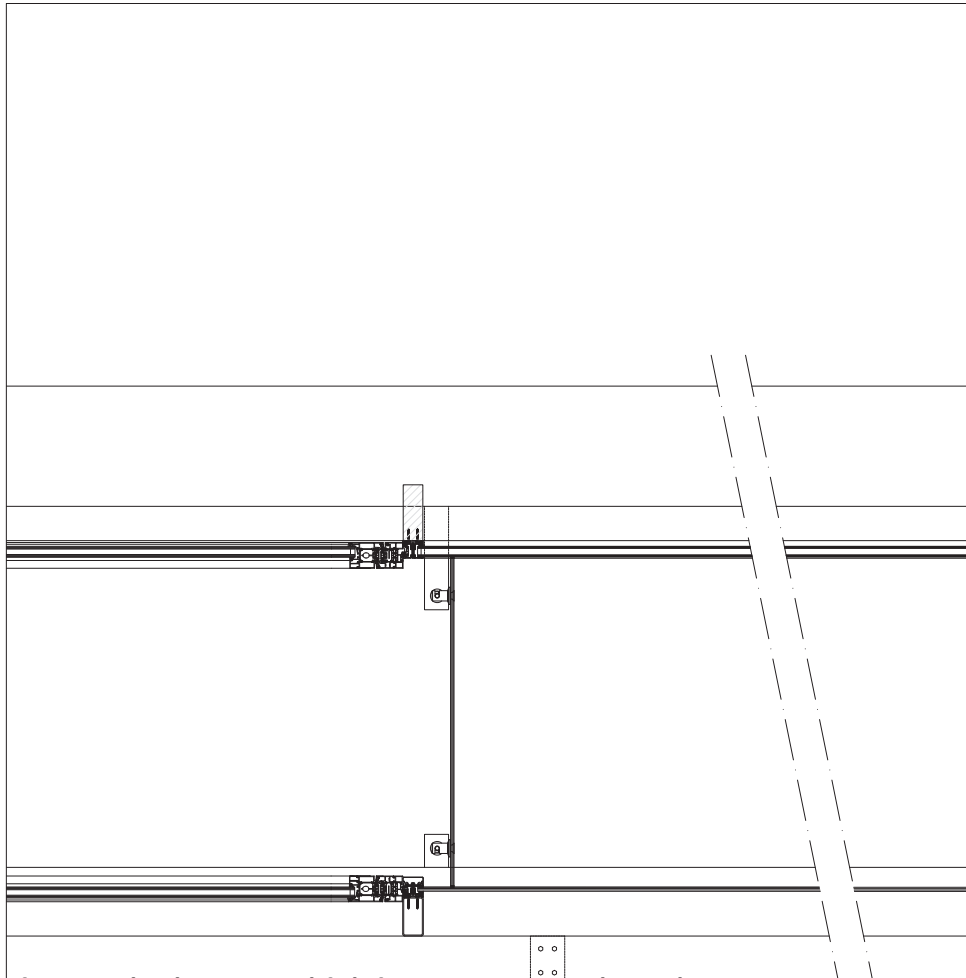
# CLIMATE



- The thermal pull in the second skin facade on the south-east side draws out the stale air through the thermal pull that is created by the heat and pulls in the fresh colder air from the north west facade.
- In the winter the south-east facade becomes the supplier for fresh air, this air is warmer and wont hinder the indoor climate
- In case of lack of thermal pull, fans at the top of the second facade aid in creating an upward draft.
- The glycol substance in the floor heating and ceiling radiation use the water from the bay as a cooling aid. Glycol uses the relatively higher temperature of the water in the winter to warm the glycol, in the summer the colder water cools down the glycol.
- In turn this heated or cooled substance travels through the ceilings and floor to provide colling and heating.



# DETAILS



- The floors are resting on the beams, which in turn rest on the columns.
- As the beams are smaller than the columns, steel braces aid in transferring the forces from one column to the next while connecting the consecutive beams to each other.
- On the hollow core wooden slabs, through which the ventilation runs, dry system floor heating is present.
- As a ceiling, radiation panels are hung from the floors by adjustable hooks.
- Between the mullions, insulation is put in front of the floor to prevent as much thermal transfer as possible.
- The insulation is penetrated by ventilation channels that run in between of the ribs of the floor.
- The platform between the facades is only attached to the inner facade for stability purposes.
- The outer facade has its own load bearing structure.
- The inner facade is double layered with a , as thermal transport from heated air between the facades is not wanted.

# Reflection

## Delta Interventions Graduation Studio 2016-2017

TU Delft Faculty of Architecture,  
Urbanism & building sciences

Bjorn Marsman

4429109

[B.R.Marsman@student.tudelft.nl](mailto:B.R.Marsman@student.tudelft.nl)

Delta Interventions, as implicated, concerns an intervention in a delta zone. With this, many challenges arise for making the designated zone habitable by accounting for uncertainty in relation to water.

Delta related problems are ever present and relevant. Many metropolises as well as smaller cities are situated in the delta for multiple reasons. Some of which are trade, fishing and peoples natural longing for a connection with water. The delta is an essential part of modern life and knowledge of dealing with this environment is important. Especially the central theme of climate change shows that rising sea levels become a threat. In addition to the general sea level rise, hurricanes like Katrina and Sandy have shown their destructiveness in the US. While the San Francisco Bay Area is not directly exposed to the sea, the effects of such hurricanes will undoubtedly affect the inner bay. On a bay/ local scale this is an opportunity to address a community in a specific location, while simultaneously accounting for a global challenge. It is an opportunity to address a problem that is bigger than architecture itself. With the correct interventions in specific locations, a contribution can be made to the larger picture while the local design questions are answered.

In addition to the threat of climate change and changing sea levels, water is an element that can contribute to the experience of a building and be something positive. Take for example the Leça Swimming Pools by Alvaro Siza, that embrace the sea and let the tides fill its pools. Or a project called "Augmented Tides" by Rafael Berges and Jared Clifton that incorporates a system that uses sea water to filter wastewater to be reused or be further filtered to be released back into the sea. Delta Interventions is the studio that focuses on precisely these themes; designing with uncertainty in particular in relation to water but also to make this an experience. The first step towards a direction for my project was choosing the studio, the broad scope of Delta Interventions along with today's relevance of dealing with water made Delta Interventions a studio in which have chosen to develop my graduation project.

Delta Interventions in particular is a studio that requires an effort to formulate ones own project; city, site, master plan and program as long as it addresses dealing with the uncertainty of water related issues. The scope of the graduation project converges from a global generic scale to a specific building scale. In the initial stages, research is focussed on aspects as demographics, geology, water levels etc. From these results, challenges can be formulated. In my particular case the realisation struck that the surrounding neighbourhoods for Hunters Point(my project site) were all experiencing high unemployment, low education and a lack of community. Hunter's Point is vacant and big enough to support the surrounding neighbourhoods while being threatened by sea level rise. With this, I focussed my project towards the community and the relationship with water. My main research questions being; *'How can a building promote an accessible and lively community through architectural design.'* and *'How can the environment(water) become an asset to the architectural experience of the building.'* A well suited project to address in Delta Interventions.

The threat of sea level rise is present over the entire area of Hunters Point. Working with three other students on the same site, it made sense to address this challenge on a scale that affects all the buildings in the area; a master plan. In this, different typologies have been identified; where buildings with a lower urban density have to account for a greater uncertainty(i.e. building on stilts) and higher densities are better protected by the urban design. The master plan as a whole focuses on providing work, education and a network for the surrounding neighbourhoods. It is a water knowledge hub that brings together different disciplines to share knowledge regarding the changes in the water environment.

While requiring additional effort at first, this proved to be unburdening for the individual design of the building as a great deal of uncertainty had been dealt with and the the solcial relevance has a solid base.

The specific site within the master plan for my building is situated in the centre, over a dry dock. Inherently having a connection to the water and being the connection between the north and south part of Hunters Point, this is the ideal location for a community building. The present axis of the dry dock leads towards the bay, the building frames this view and guides the way to the bay and the more vibrant part of Hunters Point.

However, this does not address how water can be an asset to the architectural experience of the building.

Initially, inspired by the mentioned precedents, I explored to establish a physical connection with water through the building. As far as program goes, pools as in the Leça pools were less practical as a combination between a museum, community centre and library. Which has a more all-year round program and has more potential to cater to the population. The idea of filtering water and bringing this process to the visitor through the building as is something that could enhance the experience of the museum. However, working with this idea has proven challenging. As the design progressed the idea of filtration was just that, an idea.

The technicalities of filtering water proved to be complex and required time to be understood, while the design progressed. Not directly stated in my research questions, as it is inherent to architecture, sustainability came to be an important motivator for the choice of main material in my project. Which is, wood. Priorities shifted from exposing the process of filtering water, to a building that represents a community. A community that deals with the effects of climate change, and thus should be reflected in its sustainable endeavours. Eventually, research for the filtration of water pointed out that at most one third of the building's waste water could be filtered over the roof with a weight of one tonne per square meter. In combination with the wood structure, this proved to be more of a gimmick than an honest sustainable feature.

With this, the buildings' focus was directed on a visual, emotional connection to the water, rather than being a platform for interacting with water. From the start, I can see filtering water was a forceful effort to incorporate an experience into the building that does not necessarily add to the core principles of facilitating a connection to the water for the community. As a metaphorical gate (Fig. 2), the building provides the way to the water and acts as a catalyst for interacting with the environment. From an urban scale in which the building frames the view and guides the paths, to a building scale in which the connection to the bay is established every time a visitor moves to a different room.

In relation to the community part of the question, this was established initially on an urban scale. The location of the project was key to good accessibility for the inhabitants. On a building scale I lost sight of catering to the community. The program had been defined but by focussing effort on trying to incorporate the connection to the water, the floor plan did not develop in providing an architectural experience for accessibility.

At this point I felt like the project was not moving forward, things did not fit. By looking at references I got inspired and realised my building was not only about the connection to the water, but about connecting the community. I had been working from too much of a pragmatic point of view, being efficient with the floor area. The architectural experience of the building was constricted to the relationship with water. A clear and transparent route through the building with grand open spaces, however, changed this. Finding inspiration in the new design for the Naturalis museum by Neutelings & Riedijk, uses stairs to create a cascade of public space. By taking this idea and extending it from one footprint to the other, a transparent route was realised where a relationship with the environment is ever present.

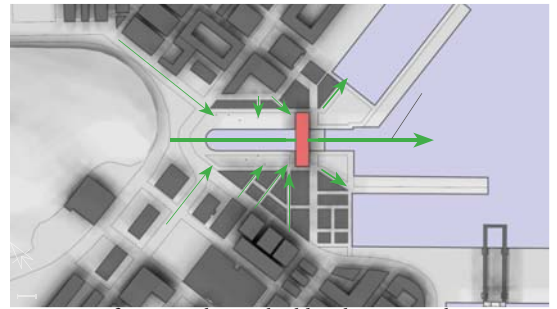


Fig. 1: specific site on the top, building location on bottom

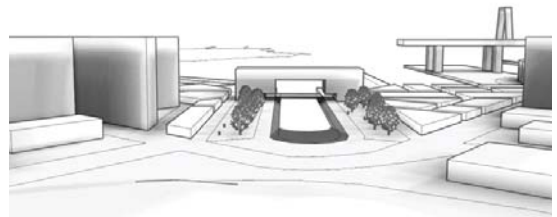


Fig. 2: Building as a metaphorical gate

a visitor moves to a different room.

What this illustrates is a way of working with research. Research by design. The goal has been set by the research questions, a direction to work towards. Answers for this are partly found in literature, as is the case for the filtration of water. Otherwise, possibilities are found by comparing different options, looking at precedents, deducing and setting technical constraints. Eventually, a coherent balance of possibilities come together to the designers best knowledge, having weighed off experience, construction, façades, urban setting, colour, light, material and every other thing that is beyond the scope of this reflection.

Though initially motivated to, for example, establish a connection with water within the building, research by design has revealed that in this case the connection from within the building to the water makes more sense. By personal judgement, based on the research, the design is formulated. Relating back to the overall scope of the studio and the research questions, I realise it is important to design through scales. Meaning that the answer for accounting for uncertainty lies for the most part in the urban scale but might as well have been addressed on building scale by elevating it for example. It is important to manage what is addressed on what scale, ensuring a clear design. Addressing everything on every scale would of course be desirable, but it is not realistic, while addressing everything on one scale would not be an integral design. There is no one answer and thus choices have to be made on the hierarchy of the aspects.