

Migration of social climate change adaptation

# RED CROSS SOCIAL CENTER

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## Introduction

Climate change(d), a problem that we are already dealing with for several years. Mostly we try to protect ourselves by using hard infrastructure like dikes. This works well but it is not enough (Klinenberg, 2018). We also need next to the hard infrastructure, a social infrastructure to protect our cities against climate change. Especially in the South of Rotterdam climate change is becoming a problem. Due to the high impact of the urban heat island effect, the high amounts of pavement, and the weather which is getting more and more extreme.

### Resilient communities

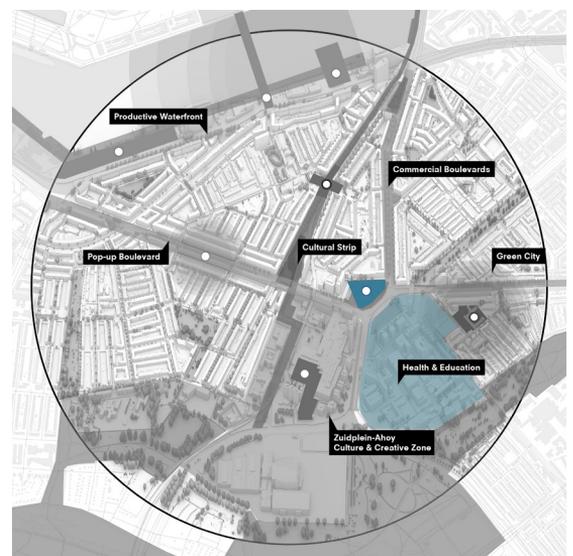
To find out how this social- and hard infrastructure can be combined into a design the following research question was investigated. 'How can both hard- and social infrastructure contribute to the creation of a resilient climate proof community?'. The emphasis of this research is on the social infrastructure, an attempt to change the habits of people from individual to a more communal mindset. The building will not create this social infrastructure but it will aim to create the right circumstances for people to develop this social infrastructure.

The building site, located in the South of Rotterdam is determined by analyzing the effects of climate change in the city. In order to ensure a maximum impact of the building, the intervention location should be on the spot which is impacted the most. Through the analysis the location is found North of shoppingcenter Zuidplein. This particular location is (or will be) heavily impacted by the urban heat island effect, high wind chill temperatures, and extreme weather. These effects can seriously damage buildings and make people sick or even kill them. The location is on the crossing of four neighbourhoods: Zuidplein, Tarwewijk, Bloemhof and Vreewijk. The crossing offers a unique opportunity for the building to connect the people of the now disconnected neighbourhoods.

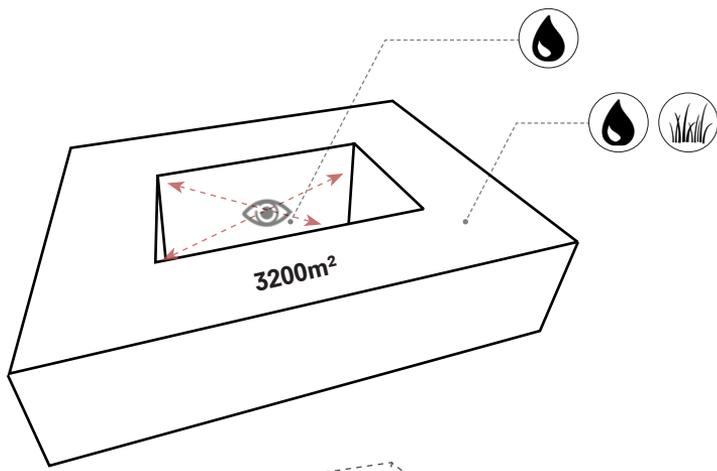
## RED CROSS SOCIAL CENTER

To be able to attract people to the building an accessible and welcoming function should be housed in the building. Also it should be concerned with climate change and helping the victims of it. The Red Cross is such an organization, they aim to help people all over the world dealing with climate change. It is a non-profit organization which is also very active in the Netherlands. The project location has one of the lowest scores on living quality of the whole country (Ministerie van binnenlandse zaken en koninkrijksrelaties, n.d.). This offers an unique opportunity for the Red Cross to create short lines with the people they aim to help.

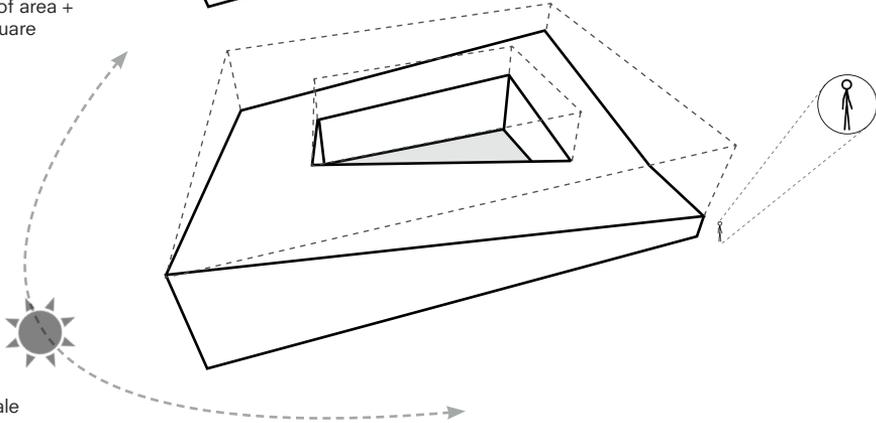
The people most affected by this climate change are the people bound to the place they live in, like the elderly and the children. To attract the elderly and the children there have to be communal spaces for them particularly. Also there should be common spaces for the rest of the neighbourhood. So a headquarters for the Dutch Red Cross combined with a communal center. The Red Cross Social Center.



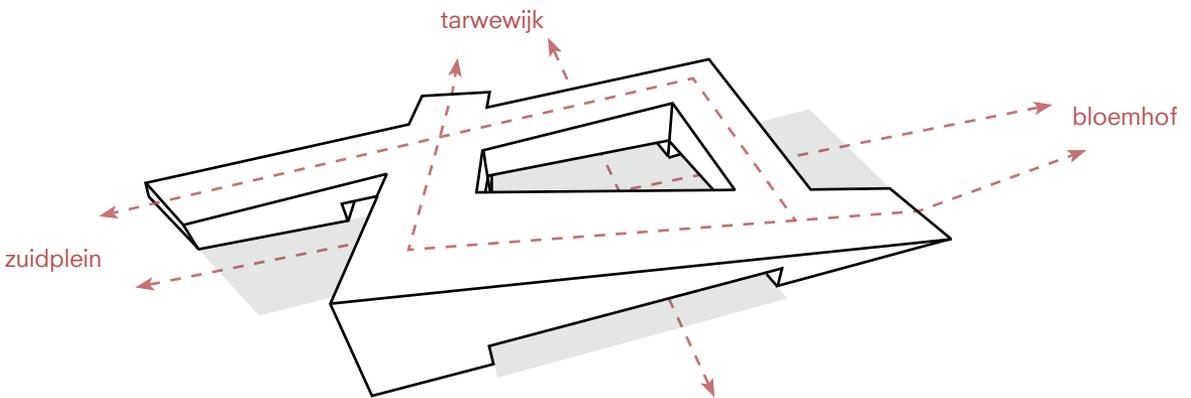
Location within strategy



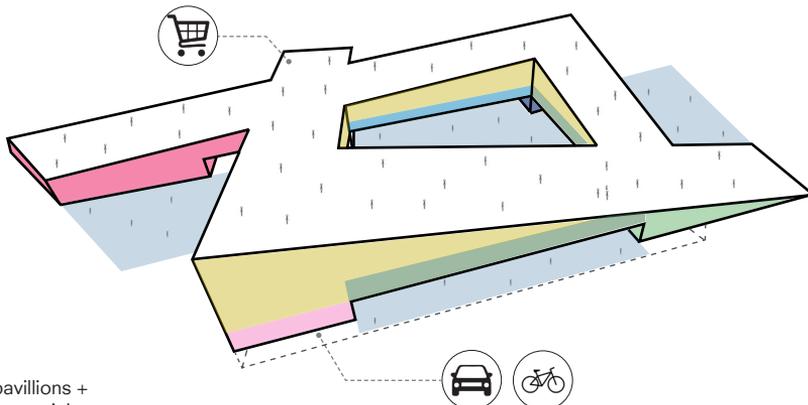
Step 1: Enough roof area + courtyard watersquare



Step 2: Human scale



Step 3: Connect the neighbourhoods



- auditorium
  - first aid classrooms
  - entrance
  - multifunctional elderly
  - stage
  - watersquare / playground
  - restaurant
  - red cross HQ
  - green accessible roof
  - Ⓜ food bank store
  - Ⓜ car parking
  - Ⓜ bike parking
- total 12.000m²**

Step 4: Public pavillions + watersquare as a social connector

## **Design Brief**

The design brief consists of three parts. The design ambition, the urban ambition and the program ambition. The design ambition states that there should be a combination of a headquarters for the Dutch Red Cross and communal spaces for the neighbourhoods. Within particular elderly and children. The project should partly be funded by the Dutch Red Cross and partly by the municipality of Rotterdam. The project has to be a connector between the four now disconnected neighbourhoods Zuidplein, Tarwewijk, Vreewijk and Bloemhof. Furthermore, the building should be very accessible, and create visibility for the Dutch Red Cross. The building itself should be able to deal, and make use of the climatic effects affecting the building site.

In terms of the urban ambitions, the new intervention should replace the restaurant, the soccer field and the bridge connection to Zuidplein shopping center. Also most of the existing trees have to be maintained because they contribute to the mitigation of the climate change effects. And lastly the building should be accessible from all four neighbourhoods and it should take the height of the surrounding buildings in mind.

Lastly the programmatic ambitions. The program consists of five main parts, the biggest is the Red Cross headquarters of approximately 5000m<sup>2</sup>. Second largest is the communal section containing multifunctional spaces for elderly, a playground for children, sports and a stage. In total the communal part will be around 2000m<sup>2</sup>. Next the Red Cross aid, a part of the Red Cross which is more oriented to help the locals. This contains classrooms to teach first aid, a food bank and an auditorium. In total 1500m<sup>2</sup>. Then the entrance and the replaced restaurant, together 750m<sup>2</sup>. And lastly the logistics containing car parking, bike storage, deliveries and mechanics with a total of 2500m<sup>2</sup>. The total estimated area for the Red Cross Social center will be 12.000m<sup>2</sup>. The different functions need to be located in a way that they create interaction with each other.

## **Concept definition**

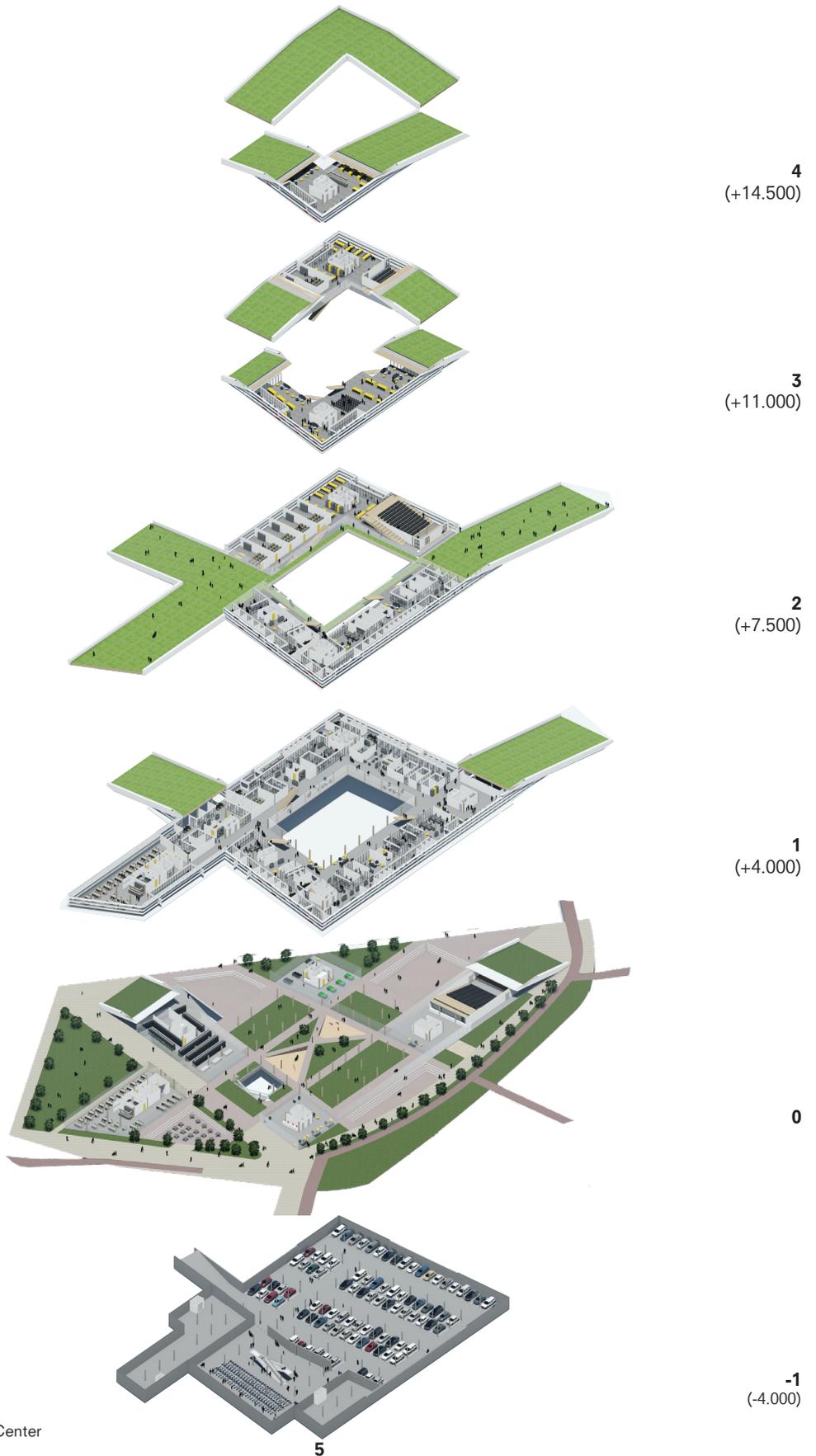
Together with the design brief the mass is being created. Keeping in mind the factors to create a resilient plot. To create this resilient plot there should be a water collection for use in the building with an area of approximately 3200m<sup>2</sup> (calculated). Watersquares and WADI's should be present to buffer water coming from the extreme weather and to support the sewer system. The amount of green should be increased to minimize the effects of the urban heat island effect and to lower the wind chill temperatures.

## **Site concept**

The final concept shown on the left is built up in four steps. Step 1 is the creation of a squared mass with a courtyard in it. The roof has the requested surface of 3200m<sup>2</sup>. The courtyard contains the watersquare and connects the different functions by making a visual connection. The second step pushes down some of the sides of the roof, on the north side to take over the height of the dwellings across the street and on the west and the east to relate to the human scale. The South side remains high to act as a sunscreen for the courtyard. In the third step openings are made in the mass and the roofs are connected to the ground floor to make it accessible. And through this the four neighbourhoods are being connected with the enlarged watersquare. Lastly showing the functions in the building with the five public pavilions on the ground floor, connected by the watersquare. Together these four steps for the final massing of the Red Cross Social Center.

## **Program concept**

Programmatically the design is encouraging different interactions. The five legs of the building all contain a different function, one being the entrance to the offices, a restaurant, a multifunctional space for elderly, a food bank and an auditorium. These five legs are connected by the water square which also contains different activities such as a terrace, a playground, a sports field, and a jeu de boules track.



Axonometric views of  
the Red Cross Social Center

## Design, routing and experience

On the left side the different layers of the building are shown, in the following paragraphs each floor will be discussed in terms of design, routing and experience. Starting with the logistic basement. The logistic basement contains parking spaces for 100 cars, a storage for 800 bikes, mechanical spaces and a storage for the deliveries. Visitors can go up using the escalators, which are also used for bikes and shopping carts. They could also use the elevator leading to the offices of the Red Cross or the elevators leading to the food bank. Around the escalators a vide is created to introduce light in the basement and to show people the way up.

The ground floor consists of five pavilions, connected by the water square. The pavilions contain a restaurant, an entrance to the headquarters, a food bank, a multifunctional space for elderly and an auditorium. The upper levels can be reached by the elevators that can be found in each pavilion. The five pavilions each have their own core in the middle containing installations, vertical logistics, fire stairs and toilets. In this way the facades can be kept transparent to create an accessible character. The green roof is accessible from two sides at this floor. The passages underneath the building, leading to the courtyard, are finished with light materials to make people feel safe.

The first floor is dedicated to the private functions of the Red Cross. The plan is made in three sections. Going from the courtyard to the outside. Around the courtyard the circulation area is based, which is at the same time the place where formal meetings can be held in a more relaxing environment. People from different departments can meet here, conference rooms can be used and curtains are used to create more privacy. Going one step to the outer façade. The temporary functions of the office are based, like the storage, coffee corner, lockers, temporary solo working units and conference rooms. Next to the outside façade the dedicated zone is based where people work at

their desk the whole day. There are also solo working units and flexible outdoor working units. From all sides the connection to the outside is maximized to create visibility.

The second floor is a public floor. When people walk on the roof they end up on this floor, they can either choose to take the outdoor route to the other side or go in where they can on the North side find public study places, classrooms for first aid lessons and an auditorium. On the other side they can find the more public departments of the Red Cross like the local department and assistance. People can go here for a varying set of problem like filling in tax papers. At this level the building is also connected to the Zuidplein shopping center by using the existing bridge.

The third floor has no roof entrance, from this point on to the top the roof is only used for the collection of rain water. On the North side more classrooms and study places can be found, accessible from the second floor. On the South side a meetup area is located for Red Cross volunteers, this is a big open space suitable for different events. This space is reachable from the second floor and by escalators. Both sides have an outdoor area on the courtyard side.

The fourth floor contains a public bar that can be reached by stairs from the second and third floor and by elevator. Also this bar has an outdoor balcony on the courtyard side. Everywhere in the building the wooden structure is visible.

## Design relevance

The project should inspire others to think about different ways to deal with the climate change. Designing the ideal conditions for the establishment of a social infrastructure can be one of them. For the Red Cross this design offers an insight on when their headquarters is combined with a social function close to the people they aim to help.



regular facade South



open structure on the top floor to provide outdoor working spaces



Facade on the first floor to provide extra shade for the ground floor



Red screens to reduce sunlight in the building

Facade system on the South side to collect solar energy and provide shade

## **Materialization**

The building contains different types of materialization. Firstly, the watersquare is paved with a red brick which represents the Red Cross and will mitigate the effects of the urban heat island effect. The building itself is on the ground floor fully transparent with the wooden structure visible inside. The façade on the South side has overhangs covered with white solar panels to on the one hand collect energy. On the other hand mitigate the impact of the urban heat island effect because white is the best colour to do that. The façade system contains openable windows in the middle and because of the overhangs it provides shade in the summer. In winter the sun is lower and the building can be partly heated by the sun. The inner facades share the same structure as the outer facades but without the overhang because there will be no direct sunlight here. The floors of the building are made by cross laminated timber (CLT), which is a sustainable material.

The roof of the building is fully covered with grass to decrease the impact of the urban heat island effect and to mitigate the wind chill temperature through evaporation. Part of the roof will be accessible, from the ground floor to the second floor. And people are able to walk up over concrete tiles.

## **Structural concept**

To make the building as flexible as possible a column grid is applied. The grid size is 6x6 meters. The structure is made of wood to emphasize the sustainable image of the Dutch Red Cross. The columns are connected to each other by wooden beams that on their turn carry the weight of the CLT floor. The wooden columns are linked through each floor by steel connectors.

To create stability in the building the two roofs that are accessible from the ground floor are connected to the foundation of the building. In this way they create stability together with the cores of the building.

## **Climate design**

The climate design of the building consists of four elements. Energy collection, water collection and use, ventilation and heating.

The energy collection is fully done by the building itself. By using the façade system and the upper roofs to place solar panels the building can collect up to 410.000kwh/year. Which is sufficient to run the whole building.

Water will be collected on the upper roofs and led down to the mechanical space in the basement. Here it will be filtered and used in to flush the toilets and wash hands. There still has to be a blue water connection for the drinking water. The basement can store up to 150m<sup>3</sup> of water for times without rain. The building itself uses around 18m<sup>3</sup> of water a day. When the water is used it will be filtered again in the basement and the overflow will be given back to nature through the wadi's. The wadis will buffer the overflow and the rainwater of intense rains (happening twice a year). When there is an extreme rain (happening once every 10 years and increasing) the watersquare will step in. The watersquares can buffer up to 1.000.000 liters of water until the sewer system can handle it again.

The ventilation is taken care of with a mechanical ventilation system. By using this system it is possible to rule the amount of ventilation for each space individually. And windows can still be opened if people want that.

The heating system consists of floor heating connected to a warmth and cold storage in the soil below the building. In winter the building will be heated by the sun and the floor heating. In summer the building will be cooled by the cold water running through the floor heating system.

ANALYSED NEIGHBOURHOODS	CHANCE TO PREVENT DAMAGE BY FLOODING	AMOUNT OF FLOODING	CHANCE OF FLOODING NEIGHBOURHOODS	CHANCE OF GROUND WATER NUISANCE IN 2050	WATER DEPTH HEAVY RAINFALL	PAVEMENT PER NEIGHBOURHOOD	PERCENTAGE OF WATER PER NEIGHBOURHOOD	LOWEST GROUND WATER LEVEL	RISK OF POLE ROT
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TARWEWIJK	NA	2 to 5m	1/3000 to 1/30.000	small chance	20 - 30cm	50 - 60%	>10%	>2m	high risk
BLOEMHOF	NA	NA	1/3000 to 1/30.000	big chance	20 - 30cm	>80%	1 - 2,5%	1,5 - 2m	high risk
VREEWIJK	NA	NA	1/3000 to 1/30.000	significant chance	10 - 15cm	50 - 60%	1 - 2,5%	1,5 - 2m	high risk
ZUIDERPARK	NA	NA	1/3000 to 1/30.000	significant chance	10 - 15cm	<40%	5 - 10%	1,5 - 2m	medium risk
CARNISSE	0-20cm	NA	1/3000 to 1/30.000	significant chance	10 - 15cm	60 - 70%	<1%	0,8 - 1m	high risk
ZUIDPLEIN	NA	NA	1/3000 to 1/30.000	significant chance	>30cm	>80%	<1%	0,8 - 1m	low risk

HEATING OF SURFACE WATER	HEAT STRESS DURING NIGHT	WIND CHILL TEMPERATURE IN SUMMER	URBAN HEAT ISLAND EFFECT	GREEN PER NEIGHBOURHOOD	FLAT ROOFS	OVERALL QUALITY OF THE LIVING ENVIRONMENT	BUILDING AGE	LONELY ELDERLY OF 75 YEARS AND OLDER	PERSONS UP TO 15 YEARS
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10 - 20	3,5 week	40°	>2°	21%	40%	largely insufficient	1930 - 1940	30 - 100/km <sup>2</sup>	18%
10 - 20	3,5 week	43°	>4°	25%	25%	insufficient	1900 - 1930	30 - 100/km <sup>2</sup>	19%
10 - 20	2,5 week	43°	1,8 - 2°	40%	15%	weak	1930	30 - 100/km <sup>2</sup>	16%
30 - 40	1,5 week	38°	1,2 - 1,4°	60%	35%	largely sufficient	1970	<10/km <sup>2</sup>	8%
10 - 20	2,5 week	43°	1,8 - 2°	31%	35%	largely insufficient	1940	>100/km <sup>2</sup>	17%
NA	> 1 month	44°	1,8 - 2°	23%	23%	sufficient	1970	30 - 100/km <sup>2</sup>	NA

Through this chapter I will reflect on my research and design process of the last year in the Complex Projects studio. The studio consisted of two parts, the first half year focusing on the research on a topic of your own choice and the second half year elaborate on the research with design. In my case the research process was quite disorderly in my opinion. I was searching for something but I did not know what exactly. Next to the individual research, there was also a part of the studio dedicated to analyze a part of Rotterdam and envision how it should be developed in 2050. In our case we worked on the area between Rotterdam Ahoy and the Maashaven with a group of eight.

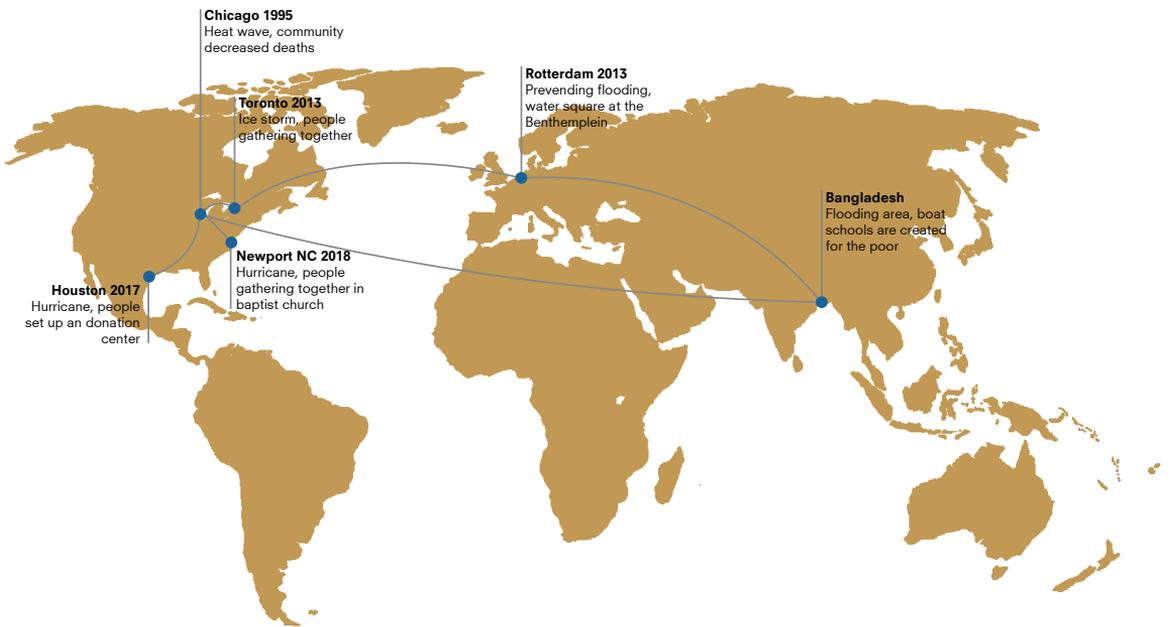
### Research and design

As mentioned before the first half year of the studio was about the individual research of your topic of choice, and the group research about the site. For me it was very hard to find the right topic to work on because it could be anything. After a while of trials and errors I decided to work on the topic of climate change adaptation. This because I think it is a very relevant topic where we all have to deal with in the (near) future. I was a bit doubting about this topic because I thought many students before me would have done it. But then during the research I stumbled upon the concept of social infrastructure. A terminology researched by the American Sociologist Eric Klinenberg. He claimed that only dikes etcetera are not enough to adapt our cities to the climate change. We also need each other. The social infrastructure is a process where the habits of people slowly change from an individual mindset to a more communal mindset where everyone checks on each other etcetera. This was all new to me and it was never translated to a design, which was very interesting for me. During this process the teachers constantly guided me to steer me into the right direction. This worked well for me because I sometimes missed the overview because of the huge amount of information I had collected.

During the research period I firstly started with a quantitative research on the location. I used different sources to analyze the different effects that affect the site in the South of Rotterdam. This worked very well to me because now I could clearly state my problem, and the direct impact on Rotterdam. Next to this I could use this analysis to find the location of the design intervention. I could clearly see where the effects were the most extreme, so that would be the place for the intervention.

After I got this quantitative research complete I decided to dive deeper into the hard- and social infrastructure, where I also found my research question: 'How can both hard- and social infrastructure contribute to the creation of a resilient climate proof community?'. For this literature research I used different books and articles of Eric Klinenberg about the social infrastructure. For the hard infrastructure I dove into the plans that the city of Rotterdam had to deal with the change of climate. This method worked well for me despite the fact that the social infrastructure could not be translated directly to design. This literature research led me to the determination of the target groups for the building, the people bound to the place they live in. The elderly and the children.

When researching the social infrastructure further it turned out that the function should be one that makes people aware to the change of climate and it should be an accessible and welcoming environment. Also through research I found out that a non-profit organization might work best, also stated by Klinenberg in his book. This whole process was very hard for me because I did not really know if I was doing the right thing because I could not translate it to an actual function for the building. The only thing I knew at that moment are the ones mentioned above. The tutors helped me to find the right way to proceed with the process and this resulted in the discovery of the main function for the building.



The main function for the building should be a headquarters for the Dutch Red Cross, because this is a non-profit organization concerned with climate change and helping people. And it turned out afterwards that they also have a climate research center. This function combined with functions for the elderly, the children and the neighbourhood would form the Red Cross Social center.

By doing an investigative research I was able to find references for these functions. I decided to combine the concept of the Red Cross headquarters with a community center, where people could meet each other. Combined this formed the program bar for the project. This approach worked well for me because I now defined what the size of the building would be.

From this point on the relation between research and design became much stronger, I now had found a link from the research towards the design. By using the research I could define the design ambitions, the urban ambitions and the site ambitions. This really helped me to start the process of making mass studies. I first started making ten masses as requested. At that moment I thought that the tenth mass would be the final mass. Luckily the teachers kept pushing to make another five, and another five. Until I reached the final mass which I now worked out. When I look back and compare the final mass with the tenth mass I had at that time the final mass fits way better in the ambitions I had set up.

The further elaboration of the design project was easily relatable to the research because I already analyzed a lot in advance so at this point I only had to apply it to the design. Still the teachers gave me very good feedback every week which I also applied to the design. And it really took the design to a next level.

### Migration of ideas

The topic of the studio called migration of ideas. We defined this as a group as: 'The movement of ideas, thoughts, philosophy, knowledge or other non-physical conditions from one space and/or time to another, where they are activated and manifested. As a result, this may purposefully or accidentally effect other existing conditions in a different setting, thereby giving birth to new ideas or phenomena.'. We all had to connect a migration of ideas topic to our research. In my case it was called the migration of social adaptation to climate change. In my opinion, and I think many others share this opinion, I think the overrated by the teachers. Everyone applied the migration of ideas to their project because they had to but it did not really add something new.

### Methodology and scientific relevance

The different research methods I used to conduct the research were in my opinion the right choice. I think this was what the studio expected we did. Looking back I could have done some parts differently but I am satisfied with the results I am having now. I think the project certainly has scientific relevance in the sense of the application of this social infrastructure into an design. Of course this social infrastructure cannot be designed one to one but the design can offer the ideal environment for people to meet each other and to establish this social infrastructure themselves. So I see this architecture as a tool for people to push them to meet each other live instead of through mobile devices.

Of course I cannot predict right now if it truly would work, that also depends on the users of the building. They have to be open for change and for a more communal society. But when they do, they can get prepared for the changes in climate and can prevent people dying or getting ill.

## **DESIGN REFLECTION**

In the global context a project like this would be very interesting, a Red Cross headquarters that would try to help people. Having short leases to the people they aim to help. Combined with a communal center that attracts people, where people can meet each other, where they can find help, and where they feel safe. I can imagine that in many countries this could be a solution, maybe not the scale of the design right now but a smaller scale.

### **Ethical dilemma's**

Overall the process went very well. Unfortunate was the Corona crisis that really affected this whole year. During the reference research of the program I tried to contact the Red Cross to ask for cooperation so we could both benefit from the results. But unfortunately, and understandable they could not find the time to do this because of the care that they had to provide due to the Corona crisis. Furthermore I really missed the cooperation with fellow students. I am curious how my design would look if there was no Corona, maybe it would be a whole different design.

### **Conclusion and next steps**

I am happy with the overall process of the last year. I learned that doing research can really strengthen the design. In the following weeks from P4 and P5 I am planning to bring the drawings and visualizations to a next level and I am thinking of making a model. Hopefully the P5 can be live with some spectators.

Klinenberg, E. (2018, September 23). Social infrastructure can help save us from the ravages of climate change. Retrieved October 28, 2020, from <https://www.latimes.com/opinion/op-ed/la-oe-klinenberg-social-infrastructure-20180923-story.html>

Ministerie van binnenlandse zaken en koninkrijksrelaties. (n.d.). Leefbarometer. Retrieved October 28, 2020, from <https://www.leefbaarometer.nl/kaart/#kaart>

The full research on the Resilient communities can be found in the Resilient communities report by Gerwin van den Boogaart