

## MASTER

### Fortress of light a modern metaphor of a military stronghold

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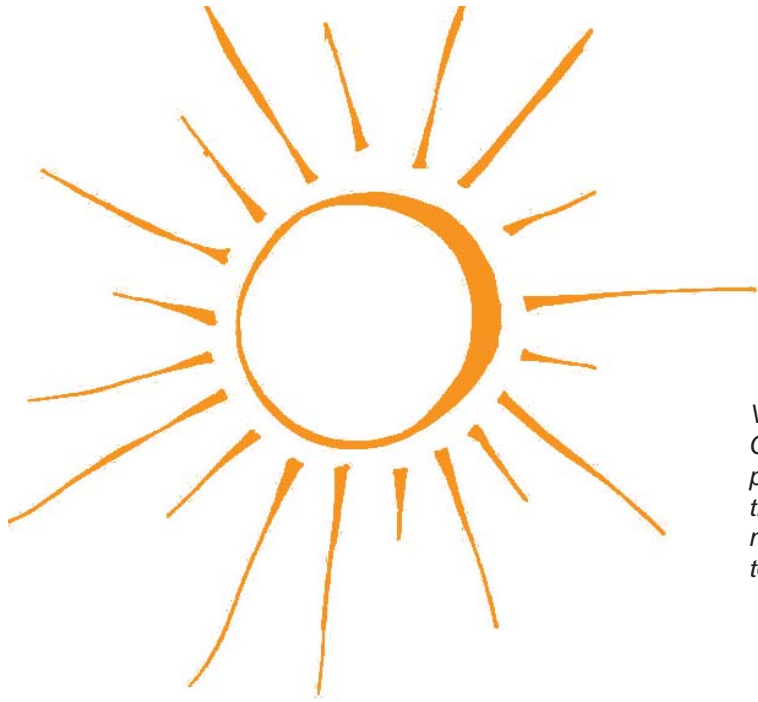
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***Fortress of Light***  
***A modern metaphor of a military stronghold***

***Corina Popa***



*I would like to thank my coordinators J.G. Wallis de Vries and A.J.M. Walraven for their guidance, to Irene Curulli for her support and knowledge of reuse, to the people from Philips, Solg and Davita Nederland for sharing their knowledge, to all my friends that have been there for me and most importantly to my husband for knowing when to make me laugh.*



# **FORTRESS OF LIGHT**

A Modern Metaphor of a  
Military Stronghold

Graduation Project January 2013

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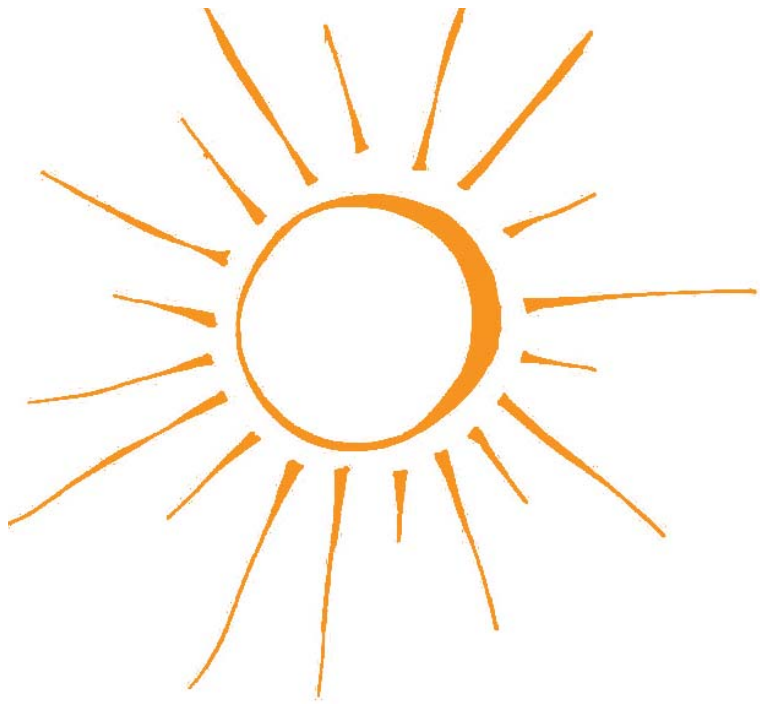
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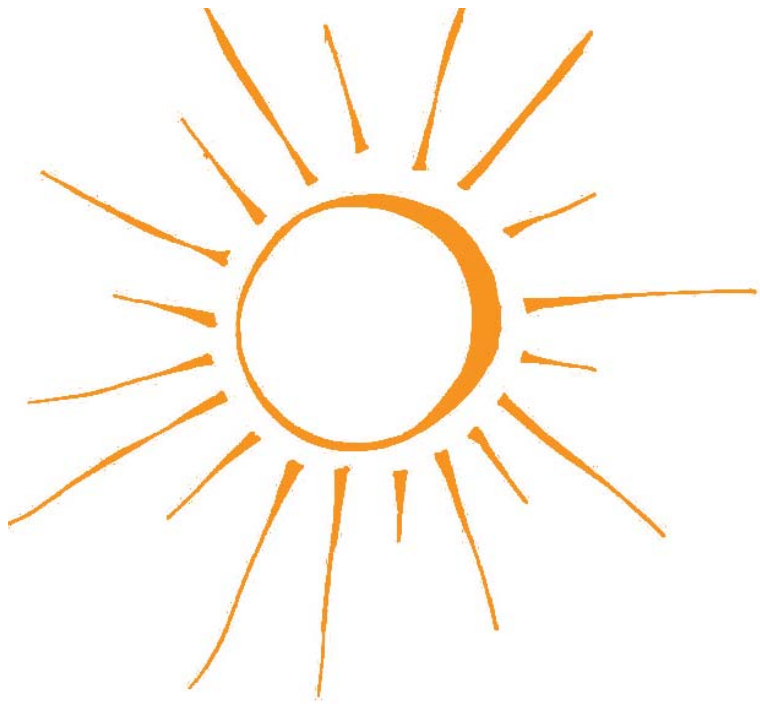






# Contents

<b>1. Introduction.....</b>	<b>pag. 08</b>
1.1. Definition of reuse.....	pag. 11
1.2. Military reuse.....	pag. 11
1.3. Bibliography.....	pag. 13
<b>2. Point of origin.....</b>	<b>pag. 14</b>
2.1. Presentation of the Tapijn Barracks, Maastricht.....	pag. 17
2.1.1. The city, the history and its relevance.....	pag. 17
2.1.2. The barracks.....	pag. 19
2.1.3. Description of the existing.....	pag. 21
2.2. Analysis - Terrain, location, economic potential, social interaction.....	pag. 22
2.3. Bibliography.....	pag. 27
<b>3. Theoretical research .....</b>	<b>pag. 28</b>
3.1. Initial assignments .....	pag. 31
3.2. History of the military architecture .....	pag. 31
3.3. Military characteristics in the Netherlands.....	pag. 32
3.4. Psychology of the wall .....	pag. 37
3.5. Analysis of previous examples of reuse and their relevance .....	pag. 38
3.5.1. Hafen City, Hamburg, Germany.....	pag. 39
3.5.2. Chasse Park, Breda, the Netherlands.....	pag. 39
3.5.3. La Caserne de Bonne, Grenoble, France.....	pag. 40
3.5.4. La Caserne de Bonne, Grenoble, France.....	pag. 40
3.5.5. Montpellie, France.....	pag. 41
3.5.6. Amiens, France.....	pag. 41
3.6. Conclusion – research result.....	pag. 42
3.7. Bibliography.....	pag. 42
<b>4. Design .....</b>	<b>pag. 44</b>
4.1. Concept .....	pag. 47
4.1.1. Story line .....	pag. 47
4.1.2. Urban design.....	pag. 49
4.1.2.1. Military strategists and the second landscape (framing landscape).....	pag. 49
4.1.2.2. The architectural concept and its relation to the second landscape.....	pag. 52
4.2. Function.....	pag. 54
4.1.4. Light therapy.....	pag. 71
4.1.4.1. History.....	pag. 71
4.1.4.2. Present day medical use and technology.....	pag. 73
4.3. Bibliography.....	pag. 76
<b>5. Conclusion.....</b>	<b>pag. 78</b>
<b>6. Annex.. .....</b>	<b>pag. 82</b>





## Abstract

The “Fortress of Light” project represents the final product of a Master in Architecture at the Eindhoven University of Technology in the Netherlands.

The topic of the project is one of the oldest military bases from the Netherlands, the Tapijn barracks. For almost 100 years the barracks have been an active part in the life of the city of Maastricht, until they recently became obsolete.

The task of the diploma project, symbolically called “Champ de Mars” and lead by J.G. Wallis de Vries and A.J.M. Walraven was to create a reuse project for the barracks and their grounds.

In order to properly be able to design the project various facets of reuse were analysed. A description of this research can be found in Chapter 1.

Chapter 2 provides the historical background of the site and the importance it has had in time. This analysis lead to identifying the three stockholders that are interested in the future development of the site.

Chapter 3 places the Tapijn barracks in the context of the military history of the Netherlands and investigates the psychological effects of isolating such a site from its surroundings.

Armed with these facts Chapter 4 follows the process of how the proposition was designed. The choice fell on creating a Light Therapy Park. The “Fortress of Light” is a metaphor of a medieval fortress in a modern world. The project aims to preserve the military character of the barracks but also the one of Maastricht. The chapter contains information on the decision process as well as an overview of various light therapy technologies that could be used on the site.

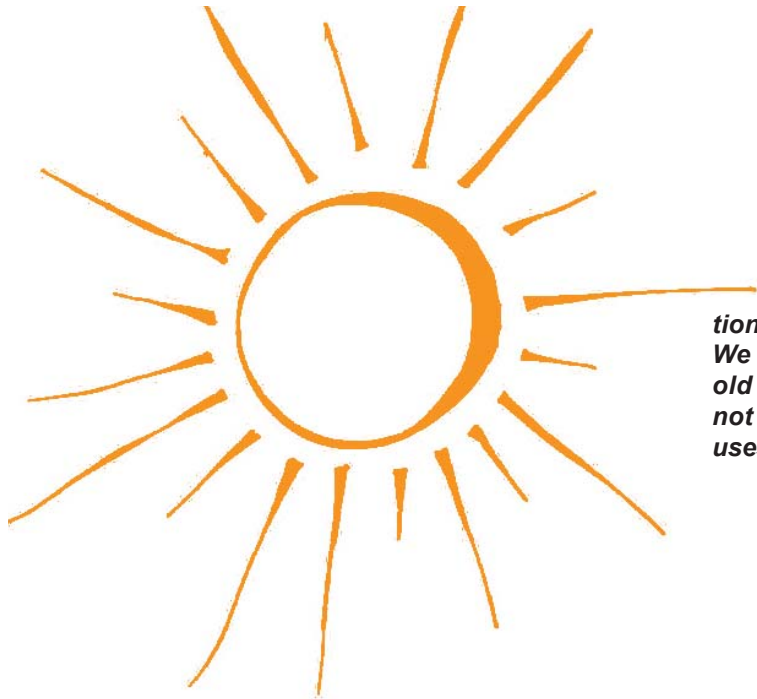
As a conclusion Chapter 5 looks at how the design stands in respect to the desires of the stakeholders identified in Chapter 2. It explains the reasons why I believe this design is the proper solution for the reuse question at hand.











***“What we need is continuity . . . historic preservation is not sentimentality but a psychological necessity. We must learn to cherish history and to preserve worthy old buildings . . . we must learn how to preserve them, not as pathetic museum pieces, but by giving them new uses.”***

***Ada Louise Huxtable  
(Lessons In Healing the City's Scars )<sup>1</sup>***

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<sup>1</sup> *The Adaptive Reuse of Historic Industrial Buildings: Regulation Barriers, Best Practices and Case Studies - Sophie Francesca Cantell - [http://historicbellingham.org/documents\\_reports\\_maps/adaptive\\_reuse.pdf](http://historicbellingham.org/documents_reports_maps/adaptive_reuse.pdf)*



# 1. Introduction of Reuse

As this is a project of reuse, the main role of this chapter is to introduce the central theme: architectural reuse. Until now the most important category of reuse has been the industrial reuse, but in more recent years military compounds and office buildings have opened the door for two new typologies of reuse.

The military nature of the Tapijn barrack assigns it to a special category of architectural reuse: military reuse.

## 1.1. Definition of reuse

Architectural reuse refers to either the rehabilitation of a building or an area or to the complete restoration of the architectural element in order to make it function again in its contemporary society and surroundings. This process happens once the architectural element loses its purpose and viability. There is, of course, also the more radical approach, the one of completely replacing the architectural element, in case it has become obsolete. The particular cases of buildings or urban structures preserved as historical elements, despite their function becoming truly obsolete, serve the purpose of historical reminders.

The economic and technological development of the society meant, that at some point in time, powerful and important industries became simply obsolete. Their technology became old and tired with the discovery of a newer one. The time it takes to replace a technology with a newer one has been getting smaller at an ever increasing pace, due to the fast development of the general level of technology.

One could see, as the first architectural elements to become obsolete, reused and replaced, the medieval fortifications of fortresses and fortified cities. These had to come down and make place for the booming industrial towns and their expanding industrial areas. The industrial development created a period of economic prosperity, urban redevelopment and social reforms. It brought many opportunities but it also created many new social issues to be resolved, like the protection of the workers and their rights. As the technological development grew and faster systems of production were developed, many industries were soon left behind.

The industrial reuse did not start until quite a number of years later, when the importance of preserving that specific cultural period was acknowledged. By now, the era of the industrial architectural and urban reuse is coming to an end. Few elements remain. The majority has either been reused or lost. However the process is not over yet. As the

human society is a cyclical one, history repeats itself and new architectural and urban elements become obsolete and have to be reused. This can be seen in the present reuse process of the office buildings and military compounds. This is why the well preserved wild terrain of the Tapijn Barracks from Maastricht, the Netherlands, presented a strong interest by the time military forces no longer needed it.

The process of reuse involves many elements, historical and cultural values, activity management and analysis, the aesthetics and detail analysis of the surviving buildings and relationship with systems of infrastructure. These are just a few of the elements involved in the necessary analysis of a reuse project.

However, they are not fixed. They depend on the specific of the previous function and its implication as well as their value in the future development of the area.

## 1.2. Military reuse

Military reuse is a particular case of architectural and urban reuse. Its distinctiveness comes from the character given by the restrictive function. In any of the other cases, the building/complex to be reused would be used on a daily basis by many residents of the area. The terrain would be completely or at least partially integrated in the urban system of the city.

Military compounds, due to their nature, are closed systems, where only a limited number of people can access their grounds. The side effect of such a function is the fact that in time, the terrain will detach itself from the rest of the urban and sociological network and will be practically lost in time. That is why its reuse requires a different approach, which implies a stronger sociological research and approach than any of the other types of reuse.

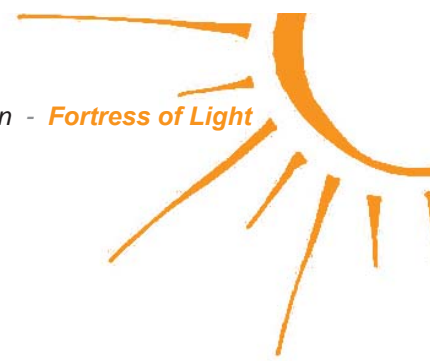
Military reuse requires a thorough understanding of the historical relationship of the terrain both with its past and present surroundings. It requires a clear understanding of the psychological and sociological connections from both the past and the present in order to properly express its values and be able to reconnect it to the social fabric of the city.

Important to mention is, that military reuse creates a special set of characteristics which need to be related back to the urban surroundings, through the reuse project.

In the process of reuse of the industrial areas, large and imposing facades made themselves obvious, and strong connection to the infrastructure made for interesting elements to reinterpret. But in the military architecture and urban planning, the priorities were completely different. The facades had to blend in, as to camouflage the structures, while the connection with the infrastructure, though of extreme importance to the military, did not express itself in such a prominent manner.







Due to the economic character of the industrial building many of them have been preserved mainly for their architecture, despite their importance in the social evolution of the city in question. Through the direct involvement of the military elements in the course of the history one would expect that their preservation would be based firstly on their cultural value and secondly on their architectural, but that is not always the case. The historical and social research done throughout the project has produced different results than expected.

The purpose of the next two chapters (Chapter 2 “Point of origin” and Chapter 3 “Theoretical research”) is to present the relevant characteristics discovered through out the research and to understand their importance for the project of reuse. The determined characteristics were used to create a new function and layout. The design is described in detail in Chapter 4 “Design”.

### 1.3. Bibliography

- *Sophie Francesca Cantell, The Adaptive Reuse of Historic Industrial Buildings: Regulation Barriers, Best Practices and Case Studies*  
[http://historicbellingham.org/documents\\_reports\\_maps/adaptive\\_reuse.pdf](http://historicbellingham.org/documents_reports_maps/adaptive_reuse.pdf)
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### Image Source

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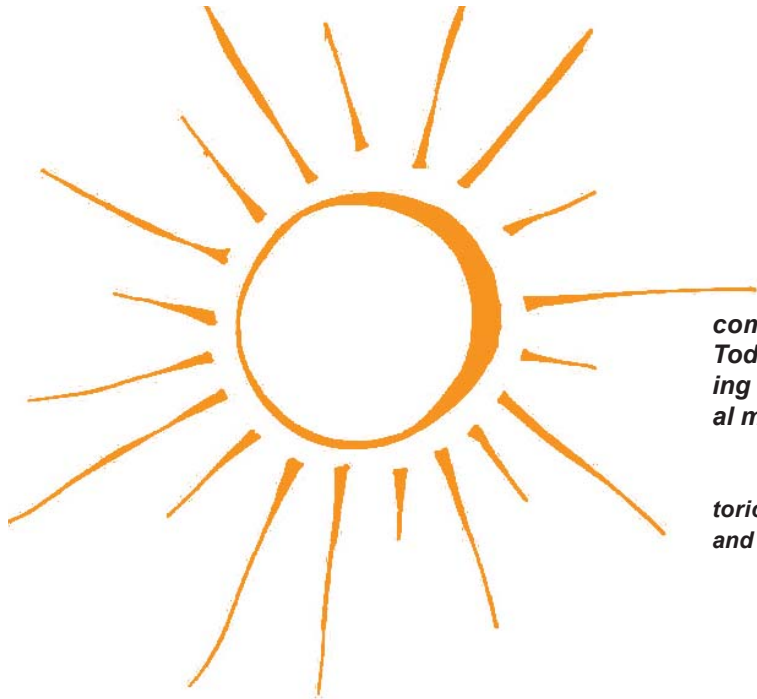












***“Historic buildings help define the character of our communities by providing a tangible link with the past. Today, historic districts around the country are experiencing unprecedented revitalization as cities use their cultural monuments as anchors for redevelopment.”***

***Sophie Francesca Cantell, *The Adaptive Reuse of Historic Industrial Buildings: Regulation Barriers, Best Practices and Case Studies*<sup>1</sup>***

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<sup>1</sup> Sophie Francesca Cantell, *The Adaptive Reuse of Historic Industrial Buildings: Regulation Barriers, Best Practices and Case Studies*  
[http://historicbellingham.org/documents\\_reports\\_maps/adaptive\\_reuse.pdf](http://historicbellingham.org/documents_reports_maps/adaptive_reuse.pdf)

## 2. Point of origin

### 2.1. Presentation of the Tapijn Barracks, Maastricht

The content of this chapter deals with history, present situation on a local, national and international level of the terrain and its importance. It also analyses the strengths and weaknesses as well as the needs and the desires of the parties involved. The main role is to give a proper understanding of the context that lead to the need to transform and reuse the enclave of the former military barracks.

#### 2.1.1. The city, the history and its relevance

Maastricht is the most important city of the Limburg province of the Netherlands. It is located in the south of the country, almost bordering Belgium and Germany. The now large cultural centre started as a Roman settlement. The name "Maastricht" is derived from the Latin "Trajectum ad Mosam", in translation "Ford in the Maas<sup>2</sup>". The place where now stands the Bridge "Saint Servaas" is where, long time ago, the Romans built the first bridge over the Maas. The bridge was at that point in time part of the "Via Belgica", one of the most important military and commercial roads of the time. This strategic location allowed the small settlement to develop at a fast pace and to become a strategic stronghold of the region.

In the year 1229 Maastricht was granted, by Duke Henry I, its city rights. As a result, in the year 1250 the city was surrounded with its first defensive walls. With the new importance and economic boom of the developing city, by the 14th century, the area surrounded by the walls became too small. In response to the problem, a secondary line of walls was built allowing the city to triple its size.

Despite its military importance it took until 1567 for a garrison to be located in the city. The decision to station the garrison was taken by the regent Margaret of Parma in response to the unrest between Protestants and Catholics.

In March 1579 the Spanish army, lead by Parma laid siege to Maastricht. The defence of the city was entrusted to Sebastian Tapijn, because the official defender of the city, Francois de la Noue, was unable to reach the city in time. On June 29th 1579, Maastricht was finally conquered by the Spanish forces. Sebastian Tapijn lost its life during the siege.

53 years later, in 1632 Maastricht was recovered from Spanish hands. The recovery was done under the charge

<sup>2</sup> Maas is the river that crosses through the heart of Maastricht. It starts in France and goes through Belgium and the Netherlands before it drains into the North Sea. From start point to end point, it totals 925 km.



Fig. 1. (above) Location of Maastricht in the south region of Limburg, the Netherlands

Fig. 2. (bellow) Location of the Tapijn barracks in Maastricht 1924

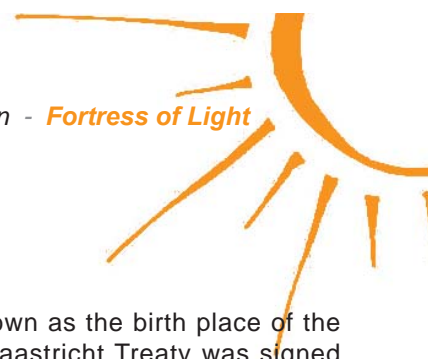
Fig. 3. (bottom) Location of the Tapijn barracks in Maastricht 2012











of Frederik Hendrik. Five years later, the Spanish forces tried to reconquer the fortress. But the attempt was unsuccessful.

The French army conquered Maastricht in the year 1673. The importance of the attack lies in the speed with which the city was taken. The new strategies of the French military engineer Vauban made all the difference. His approach was characterised by the systematic use of trenches. Furthermore, he placed two batteries of siege artillery on the north face of hill "Saint Pieter" so he could shoot over the defensive works. Vauban's work was of great importance for the restoration and improvement of the defences during the french occupation. After the city was conquered he lead the construction of Fort "Saint Pieter" in order to prevent other enemy forces from using his own strategy against the city.

In 1567 the first garrisons started being housed in the city. This was primarily done in barracks and monasteries. By the 17th century, walls alone were no longer enough to defend a fortress. The fire power of the guns increased exponentially. This made it necessary to push back the enemy as far as possible from the defensive wall. In order to do that, various defensive works were created. These consisted of ravelins, bastions and inundation basins. They were placed outside the wall and together they moved the first line of defence away from the city.

Because of the changes in strategic insight, the military importance of the fortified city diminished. That lead to a constant reduction of the garrison starting with the year 1840. The constant reduction lead in the end to the cancellation of the fortified status in the year 1867. This was the beginning of the dismantling process of the fortification system created until then. The process was sped up by the arrival of the industrial period. The demand for new construction sites, roads and rail tracks enticed the extension of the city. The local industry benefited greatly from the strategic location of Maastricht in the international network of product distribution. The water canal Zuid-Willemsvaart, which crosses the Netherlands from the city of 's-Hertogenbosch to Maastricht, was one of the most important contributors to the fast development of the industrial cities in the southern half of the Netherlands. The benefits brought by the Zuid-Willemsvaart canal, made several other industrial cities in the area, to invest in the construction of a more complex network of canals.

The new threats brought by the First World War, revived the military interest for the geographic position of the south of Limburg and implicitly for Maastricht. The city suffered greatly during the periods of the two World Wars. In time, the same as the rest of the Europe, Maastricht rose back to its former glory. But this time its main income method was no longer trade, but tourism.

*Fig .4 (left) Map of the siege of Maastricht from 1748 showing the layout of the troops.*

Today, Maastricht is known as the birth place of the European Union, as the Maastricht Treaty was signed here.<sup>3</sup> In Europe, Maastricht is perceived as a touristic place with bohemian streets and many cultural events. It is a city, rich in old architecture and cultural monuments. The cultural status of the city is strongly maintained by its administration and many artists settle here on a regular base. The city is also known as the home of one the strongest Universities in the Netherlands, University of Maastricht, especially in the medical field.

### 2.1.2. The barracks

Not long after the dismantling of the walls and its defences, the "De Kommen" area, which was under military ownership, started serving as an exercise area and swim basin for the local forces. Due to the threat of the First World War the interest for the strategic position of South Limburg was revived. As a result in the year 1904 the Minister of War decided the construction of new barracks. The decision to build in "De Kommen" was met with very strong resistance not only in the city council but also amongst the residents of the city. The general opinion was that the construction of the barracks would compromise the interests of the city. As a fortress city, enclosed by the defensive walls, Maastricht had little to none free space. Every little piece of land had to be used. Thus green areas were hard to come by. This explains the strong protective reaction of the residents towards the natural space of "De Kommen". The secondary reason was losing the possibility to use the terrain for sport activities and festivities through the construction of the barracks. There was of course also the fear that the peace and quiet of the neighbouring areas would be completely gone. But the objections were ignored and the barracks were built.

The resulting military enclave were bordered by the river Jeker to the west, the city wall and the deer park to the north and the neighbourhood Villawijk to the east. The south side was enclosed by the construction of a ring road and subsequently new constructions. The exercise area was moved to the south of the city.

The same as during the industrial area in the following years, Maastricht developed greatly. The terrain of the barracks became slowly incorporated in the new urban network. The area located south of the ring road was developed into a new residential area. A large police station was built on the former location of the bastion called "Brunswijk" (Lunet la Royale). Also, a sports ground was placed in the vicinity. More precisely on the former location of the "Jeker" bastion. All these changes meant that the entire military activity of Maastricht was now condensed in the barracks of the "De Kommen" area.

<sup>3</sup> *The Maastricht Treaty was signed on February 7th 1992*

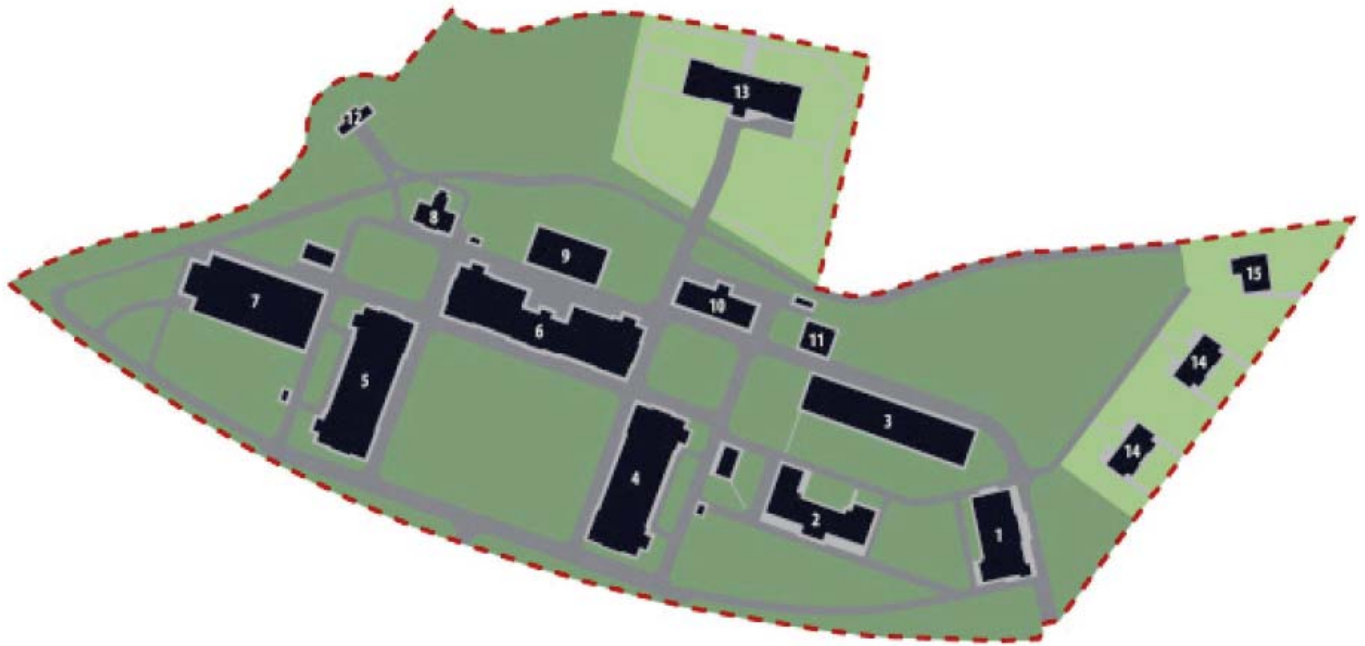


Fig. 5. Plan of the original compound. Functions per buildings: 1 guard building, 2 the officer's mess, 3 garage, 4 pavilion I, 5 pavilion II, 6 main building, 7 training building, 8 bath house, 9 gymnastic building, 10 mess hall, 11 stables, 12 armoury, 13 hospital, 14 houses, 15 the building of the army engineers.

Fig. 6. (bellow) Plan of functions 2012. Functions per buildings: 1 guard building, 2 the officer's mess, 3 garage, 4 pavilion I, 5 pavilion II, 6 main building, 7 training building, 8 offices, 9 sports building, 10 mess hall/kitchen, 11 garage/warehouse, 12 officer's building, 13 hospital, 14 mess hall/canteen, 15 the building of the army engineers.



Until the year 1934, the barracks had no official name. They would usually be referred using either a military identifier, as the name of the regiments, or the geographical location ("kazerne van het Dertiende Regiment" - the barracks of the 13th regiment, "Nieuwe Kazerne" - the new barracks, "Kazerne in De Kommen"- the barracks located in De Kommen, "Infanteriekazerne"- infantry barracks). The barracks were officially named "Tapijnkazerne" on September 24th 1934. The name was given in order to honour a very skilled and brave military engineer, by his full name "Sebastian Tapijn", that helped defend Maastricht in the siege of 1579.

The barracks were originally built to house the 13th Infantry Regiment. The actual construction started in the year 1916. By the year 1919 the compound contained 16 buildings (three pavilions, a gymnastic and fencing building, a bathhouse, a kitchen building, an exercise shed, an armoury, two private buildings, a stable, a vehicles shed, two double houses, and a genie/engineer building). In time, several companies and battalions were added. Most of the additions were done in the periods of preparation or during the two World Wars. During the Second World War the military base was under the occupation of the German army. After Maastricht was liberated by American and British forces, the Tapijn barracks functioned as the headquarters of the American 9th Army.

In 1950 a new regiment was created. The Regiment "Mortieren Menno van Coehoorn" was responsible for training soldiers to use mortars<sup>4</sup>. By then, the compound was proving to be too small for all the regiments stationed there, as well for all the required activities. An extension both in terrain as well as in buildings became necessary. The land between the north line of the compound and the water line located south of the first line of medieval walls, "Deer Camp", was used to build two new buildings.

Three years later the complex was used for the training of the "Menno van Coehoorn" Regiment and the "Chassé Regiment". The training facility was named "Fourth Depot". In 1967, the "Fourth Depot" was replaced by the international signal units of the Headquarters Allied Forces Central Europe (HQ AFCENT) established in Brunssum.

### 2.1.3. Description of the existing

The military character of the compound has been camouflaged, in the last couple of years, by large trees and overgrown plants. After the military departed, the buildings have been used for a relatively small period of time as temporary residences for people with low income. That lowered the level of maintenance of both the buildings as well as the terrain and its grounds. The fence used by the military to preserve the security of the complex can be seen now

<sup>4</sup> A mortar is an indirect fire weapon that fires explosive projectiles known as (mortar) shells at low velocities, short ranges, and high-arching ballistic trajectories. It is typically muzzle-loading and has a barrel length less than 15 times its caliber. - [http://en.wikipedia.org/wiki/Mortar\\_%28weapon%29](http://en.wikipedia.org/wiki/Mortar_%28weapon%29)



Fig. 7. Map showing the previous course of the river Jeker through the terrain of the Tapijn barracks.

bordering an almost lifeless element.

Today, despite being relatively well preserved, the compound and its buildings are showing their age. The exterior line of buildings (on the south and east sides) is the only part of the complex truly known to the inhabitants of the surrounding areas while the central buildings are completely unknown.

There is a strong contrast between the exterior and the interior in what concerns the level of preservation. Most of the interiors have been stripped down of any military identifiable element. The empty rooms and the corridors crowded with random objects belonging to the temporary residents don't do justice to the space.

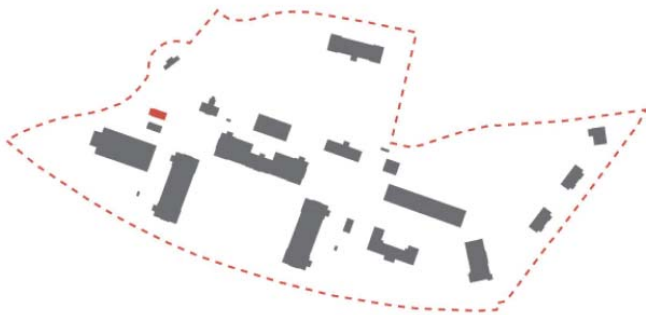
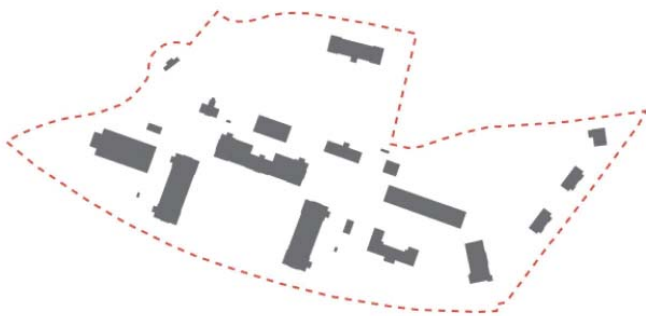
The plan of the barracks was designed based on the pavilion system. The system is characterised by a complete separation of functions into different buildings.

The Tapijn barrack was built between the years 1916 - 1919 and the construction process was lead by C.E. Blaauw. The original complex of the barracks consisted of the following buildings: a guard building (1), the officer's mess (2), a garage (3), two pavilions I (4) and II (5), main building (6), training building (7), bath house (8), gymnastic building (9), the mess hall (10), the stables (11), an armoury (12), a hospital (13), two double houses (14) and the building of the army engineers (15).

By 2012 several buildings changed function and the compound received a series of new additions. The original buildings have the following functions: the guard building (1), the library/shop (2), storage (3), accommodation building I (4), accommodation building II (5), main building (6), garage (7), command post (13), housing (15), service housing for the ground's keeper (16).

The new additions, built in the 1950's, are the offices (8), the sports building (9), the mess hall/ kitchen (10), garage/warehouse (11), officer's building (12) and the mess hall/canteen (14).





The striking thing when looking at the plans, is the orientation of the buildings. They are all orientated in the south-west direction. That is a really interesting fact as at the moment the barracks were constructed, there was literally nothing facing them. This leads to the conclusion that the reason must have been related to concerns of health and the desire to capture as many hours of sun as possible.

The locations of the buildings also show the military strategy of creating bottle necks at the entry gates for better security measures.

## 2.2. Analysis - Terrain, location, economic potential, social interaction

The terrain of the former barracks was initially located on the outskirts of Maastricht. In time, with the economic development of the city, it became surrounded by new residential areas. By now, the process has positioned the terrain in the heart of the city. That makes it a true treasure from a financial point of view. But that creates the risk of having the urban and social needs of the area completely ignored.

The location needs proper attention as it can represent, due to its history and location, a strong catalyst for future investments and for the following development of the area and the city itself.

- The terrain is well placed. It is central and close to major roads of the city. Right now there is not enough parking for any high intensity traffic function but there is potential for that to be solved. The unused former sport terrain located in the south of the terrain can house a generous underground parking.

*This creates potential for high profile functions with an intense flow of people.*

- The neighbourhood is quiet, with many residential areas and just a few other functions. One of the locations of the University of Maastricht is located close, on the other side of the historical wall from the north side of the terrain.

*The low variation of functions creates equally good ground for both high intensity and low intensity functions.*

- The terrain interrupts a green axis crossing the city. The enclosed nature of the military function is what, most likely, caused the gap in the urban development of the green spaces.

*Integrating the terrain in the green belt creates opportunities for more means of discovering the city, as it would become highly accessible for pedestrians and bikers.*

From top to bottom:

Fig. 8. Map of the terrain 1924.

Fig. 9. Map of the terrain 2012

Fig. 10. Buildings 1924

Fig. 11 Buildings before the Second World War

- The large surface of the terrain can be seen as a difficult element to handle. But it can allow for stronger and more dynamic connections to the surrounding urban network.

*Due to the scale of the terrain, the surrounding urban fabric and the connections to it are of utmost importance.*

- The positioning of the buildings close to the main entrances was done in such a way that visitors or unwanted guests could be stopped as soon as possible. The main representative complex of the “Cour d’Honneur” (the two pavilions and the main building) was the only space where nonmilitary personnel was allowed (for events). The positions of the three buildings allows for minimal lines of sight (almost none due to the density of the trees).

Next to that, the entire terrain is laid out in such a way, that the lines of sight are short and the spaces are small and hard to overtake.

*This means that there is no proper entrance to the complex and that the interior infrastructure is not suited for public functions. Thus requiring a strong urban analysis.*

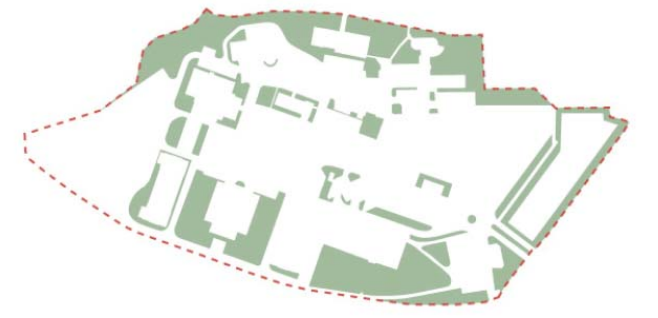
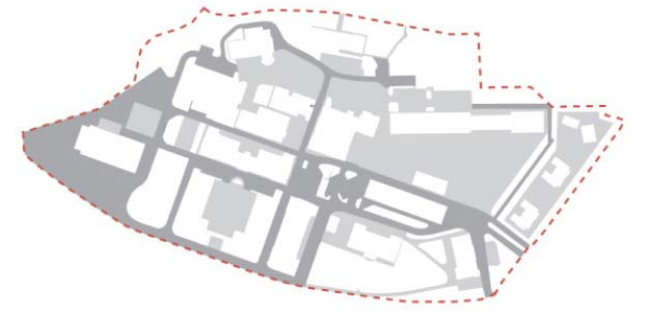
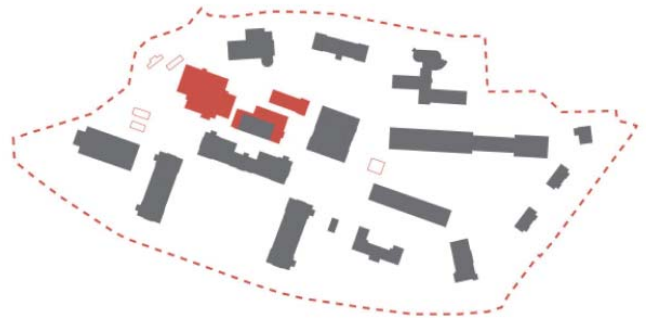
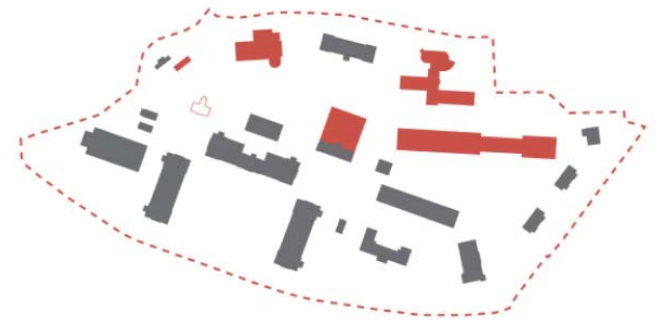
- The existing buildings, despite having been built in several steps can be simply split in two categories: the original / initial architecture and the modern additions. The first category (representing the north, east and south lines) presents elegant volumes with strong personality. These are also the volumes known to the residents of the city and the only ones they can relate to.

The volumes part of the second group were built, due to necessity, during periods of international conflict. The focus was thus less on the architecture and more on simply creating new spaces. Due to that the middle area of the complex can be seen as rather crowded. This creates in certain areas difficulties in properly perceiving the volumes of the buildings.

*The military barracks have been involved in the social history of the city. They have been intensely active in the process of development but as part of the team and not as leaders. Determining the level of connection to the residents can be a strong criteria in determining the fate of a building.*

- The large green area located in the north-east corner is presently used as a petting zoo. The space presents a strong potential with the presence of the medieval entrance gate of the defensive wall.

*Moving the petting zoo to a different location allowing for a complete use of the terrain is an important element to consider.*



From top to bottom:

Fig. 12. Buildings before the Cold War

Fig. 13. Buildings 2012

Fig. 14. Infrastructure map

Fig. 15. Green areas map

Fig. 16. Axes map



## Main Players & Their Needs



### CITY OF MAASTRICHT

People - Companies - Tourists

#### NEEDS

Culture - Economy - Education and Research - Quality of life - Protected Historical Spaces

#### INTERRELATED PROBLEMS

Unemployment - Decreased demographics  
Transportation - Tourist Connections



### RESIDENTS OF MAASTRICHT

Retired people - Employees - Children

#### NEEDS

Pleasant environment - Recreational Spaces - Residential value of the zone - Health

#### INTERRELATED PROBLEMS

Recreational and Cultural Activities - Social Interconnection



### UNIVERSITY OF MAASTRICHT

Teachers - Students - Researchers

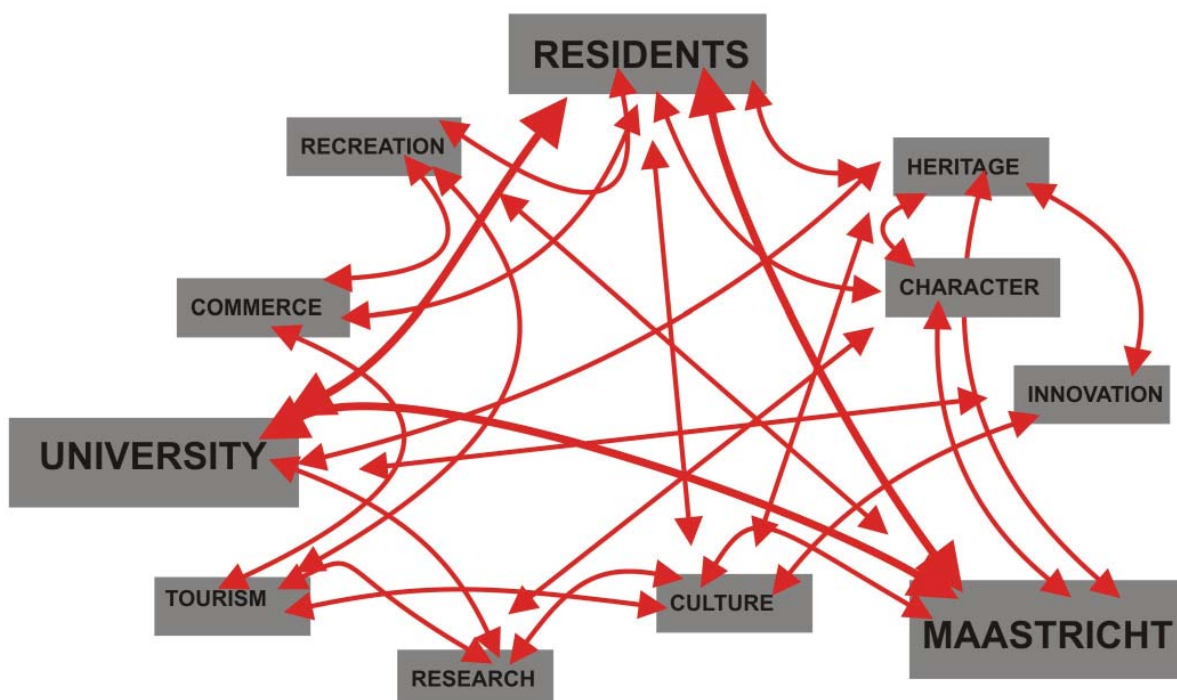
#### NEEDS

Cultural and Educational Status - Research Facilities - Educational Space - Mobility - Economic Opportunity

#### INTERRELATED PROBLEMS

Future development - Profitability of the Investment for the Future of the City

## Symbiosis





- The players interested in the redevelopment of the terrain are the city of Maastricht, the University of Maastricht and the residents of Maastricht.

The city of Maastricht wishes to use the terrain to attract investors to boost the economy and the financial desirability of the city.

The University of Maastricht is known for having all its facilities scattered throughout the city. Due to the dense nature of the central urban fabric, available terrains for extension do not happen often. The direct vicinity of the terrain of the Tapijn barracks with one of the facilities of the university has created a strong interest in the future developments.

Due to the enclosed nature of the military function, the terrain and its northern and western direct vicinities present a wild beauty in the shape of green corridors. These have been used for a long time by the residents of the area as recreational spaces. Thus it comes as no surprise that their main concern is that the terrain will be completely transformed for economic gain and the corridors will be lost.

*As all three parts have expressed strong reasons for their interest, their wishes should be thoroughly analysed and as much as possible taken in consideration in the new function.*

On a larger scale there are important issues to be mentioned. The city of Maastricht is a strong touristic and cultural point and a large part of the city income is created through related functions. As this meant profit, the touristic character was strongly increased in time. Today, the preservation of that character has transformed Maastricht in a conservative city, where few other types of functions dare to venture.

Many of the residents of Maastricht have decided to move either outside the city limits or across the border in Belgium, in order to escape the touristic element of the city. As a consequence, the interest in the residential market has decreased.

The city houses one of the strongest Universities in the Netherlands and thus attracts many young students, but the attraction is temporary. The majority of the students finds the northern area of Randstad<sup>5</sup> much more appealing than the peaceful city of Maastricht.

As a conclusion of the analysis three layers of aims have been determined:

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<sup>5</sup> Randstad is a conurbation of four cities: Amsterdam, Rotterdam, The Hague and Utrecht and their surrounding areas

Fig. 17. (top left) A graphic representation of the main players involved in the futures development of the terrain.

Fig. 18. (bottom left) A graphic representation of the symbiosis process with the elements resulted from the analysis.

### Overall Aim

- **To make Maastricht attractive from both a touristic and an economic point of view.**

Maastricht has been left in the background, by the developing cities in the northern areas of the Netherlands. This has made it to become more and more conservative in an attempt to become even more unique. The side effect is the fact that the highly conservative status of the city is what is dragging it down, discouraging the more modern approaches and investments.

It now requires an out of the box approach to draw the international attention to itself once more.

### General Aim

- **To create a symbiosis between the three main elements of the neighbourhood: the residents, the university and the city.**

A function able to serve all of them is more likely to create long term beneficial effects.

### Specific Aims

- **To strengthen the character of the area by creating a better connection between the existing functions.**

The core of the military society is represented by the goal to work as one. It seems only fitting to preserve and extend the character by creating a new unity.

- **To preserve the character of the military function by creating a collective function.**

- **To bring a new infusion of elements that can naturally generate further developments.**

The goal is to create an effect similar to the one resulting from throwing a stone in the water.

- **To use the characteristic elements of both the city and the country in order to create an element with an international potential.**

A proper example can be seen in the development of Philips. The benefits that the company has brought to the city of Eindhoven are as big as the ones brought to the country.

- **To increase connectivity with the touristic layout of the city.**

The touristic routes of the city cross in the direct vicinity of the terrain, but never touch it. A fast way to make the terrain known is to integrate it in the structure of the routes.

- **To revive the area.**

- **To provide a place for all ages with the purpose of a slow revitalisation of the demographics.**





Fig. 19. (above) View of the main gate on the south side of the complex

Fig. 21. (below) View from the south border of the complex over the main building of the "Cour d'Honneur"



Fig. 23. (below) View of the corridor between the main building of the "Cour d'Honneur" (right side of the picture) and the buildings located in the central area of the terrain.



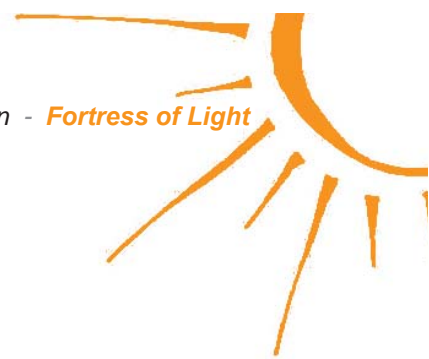
Fig. 20. (above) View from the south-east corner of the terrain, over the Clock Building (the guard building)

Fig. 22. (below) View over the Officer's Building.



Fig. 24. (below) View of the former hospital building.





### 2.3. Biography

- **Maastricht**

<http://en.wikipedia.org/wiki/Maastricht>

- **Historische kaarten van het Grensschap**

<http://www.grensschap.eu/Gebiedinkaart/Historischekaarten.html>

- **Notermans J. (2004), Maastrichts silhouet no. 59: De Tapijnkazerne,**

Maasmechelen: Drukkerij Gijsemberg

- **Ramakers E. (2005), Historische atlas van Maastricht: 2000 jaar aan**

Maas en Jeker, Uitgeverij SUN

- **Sophie Francesca Cantell, The Adaptive Reuse of Historic Industrial**

*Buildings: Regulation Barriers, Best Practices and Case Studies*

[http://historicbellingham.org/documents\\_reports\\_maps/adaptive\\_reuse.pdf](http://historicbellingham.org/documents_reports_maps/adaptive_reuse.pdf)

- **E.F.G Caspers, F.J.T. van Gemert, P.M.G. Vriens, Comparative Studies (M3 research report)**

#### Image Source

- **Chapter Cover - The Tapijn Barracks**

- <http://www.bing.com/maps/>

- **Fig. 2. - Map of Maastricht with the location of the barracks 1924**

- *Comparative Studies (M3 research report) E.F.G Caspers, F.J.T. van Gemert, P.M.G. Vriens.*

- **Fig. 3. - Map of Maastricht with the location of the barracks 2012**

- *Comparative Studies (M3 research report) E.F.G Caspers, F.J.T. van Gemert, P.M.G. Vriens.*

- **Fig. 4. - Map of the siege of Maastricht from 1748 showing the layout of the troops**

<http://www.grensschap.eu/Gebiedinkaart/Historischekaarten.html>

- **Fig. 5. - Plan of the original layout of the Tapijn barracks**

- *Comparative Studies (M3 research report) E.F.G Caspers, F.J.T. van Gemert, P.M.G. Vriens.*

- **Fig. 6. - Plan of the 2012 layout of the Tapijn barracks**

- *Comparative Studies (M3 research report) E.F.G Caspers, F.J.T. van Gemert, P.M.G. Vriens.*

- **Fig. 7. - Map showing the previous course of the river Jeker through the terrain of the Tapijn barracks.**

- *Comparative Studies (M3 research report) E.F.G Caspers, F.J.T. van Gemert, P.M.G. Vriens.*

- **Fig. 8. - Map of the terrain 1924.**

- *Comparative Studies (M3 research report) E.F.G Caspers, F.J.T. van Gemert, P.M.G. Vriens.*

- **Fig. 9 - Map of the terrain 2012.**

- *Comparative Studies (M3 research report) E.F.G Caspers, F.J.T. van Gemert, P.M.G. Vriens.*

- **Fig. 10. - Map of the buildings 1924**

- *Comparative Studies (M3 research report) E.F.G Caspers, F.J.T. van Gemert, P.M.G. Vriens.*

- **Fig. 11. - Map of the buildings before WW II**

- *Comparative Studies (M3 research report) E.F.G Caspers, F.J.T. van Gemert, P.M.G. Vriens.*

- **Fig. 12. - Buildings before the Cold War**

- *Comparative Studies (M3 research report) E.F.G Caspers, F.J.T. van Gemert, P.M.G. Vriens.*

- **Fig. 13. - Buildings 2012**

- *Comparative Studies (M3 research report) E.F.G Caspers, F.J.T. van*

*Gemert, P.M.G. Vriens.*

- **Fig. 14. - Infrastructure map**

- *Comparative Studies (M3 research report) E.F.G Caspers, F.J.T. van Gemert, P.M.G. Vriens.*

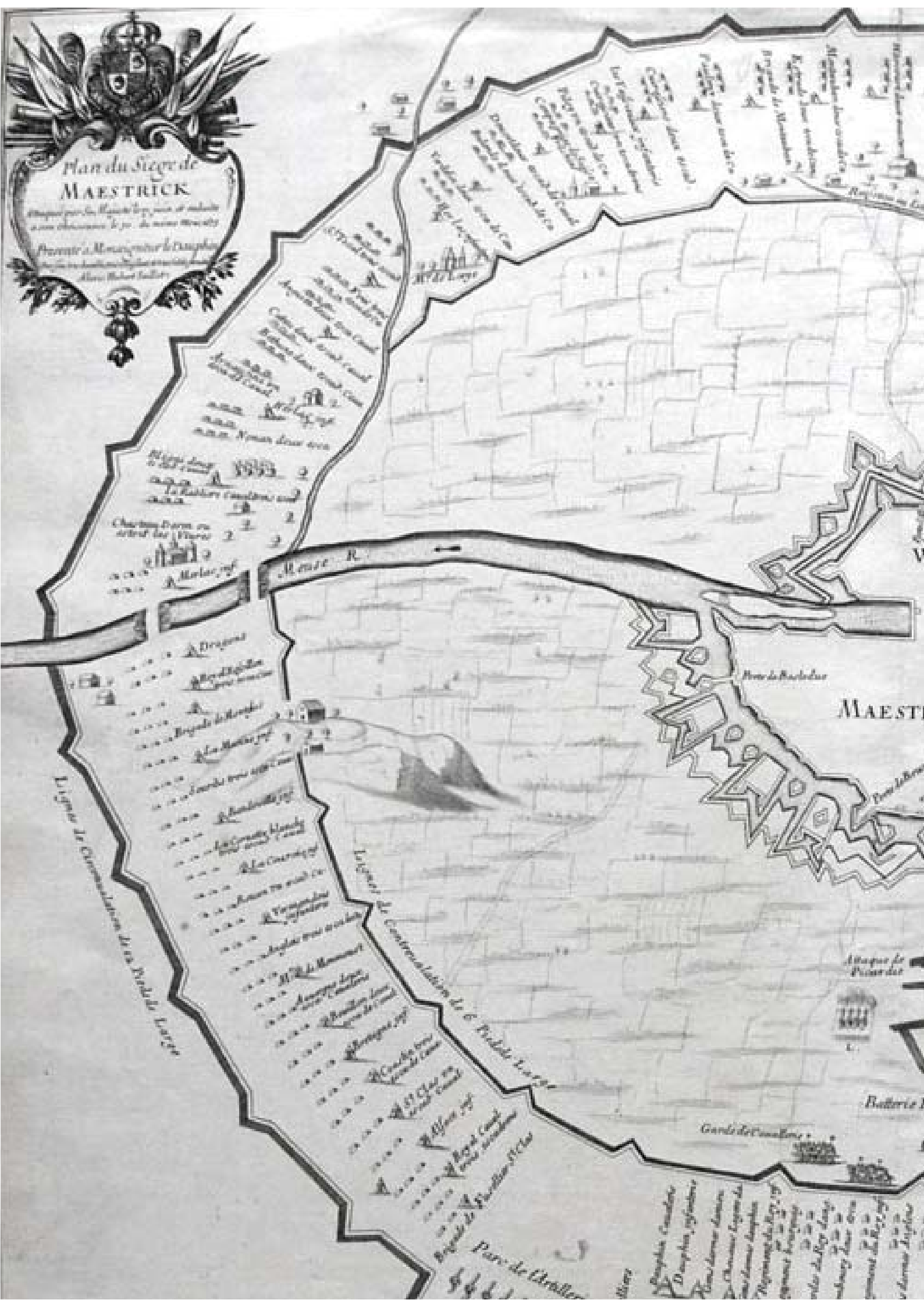
- **Fig. 15. - Green areas map**

- *Comparative Studies (M3 research report) E.F.G Caspers, F.J.T. van Gemert, P.M.G. Vriens.*

- **Fig. 16. - Axes map**

- *Comparative Studies (M3 research report) E.F.G Caspers, F.J.T. van Gemert, P.M.G. Vriens.*







*Le plan de la Batterie d'Alger*

- A. Logement fait dans le donjon sur le Couronnement par le Marquis
- B. Logement fait par Monsieur de Camp dans le donjon à l'entrée de A
- C. Logement fait le commandant
- D. Logement fait sur le bord de F. G. H. par Monsieur de la Fayette
- E. Le Marais attaché au donjon servant de fort à l'entrée de la communication
- F. Logement fait sur la pointe de la défilé
- G. Fortification du Marais qui sera avant l'attaque de la communication
- H. Batterie Royale de ce passage
- I. Batterie qui servira de appui à la Batterie Royale
- K. Batterie qui sera le 22
- L. Batterie qui sera le 23
- M. Batterie de la pointe qui sera le 24

- O. Batterie de la pointe
- P. Batterie de la pointe
- Q. Batterie de la pointe

WYCK

STRICK

Le Grand Bâillon de Mestel

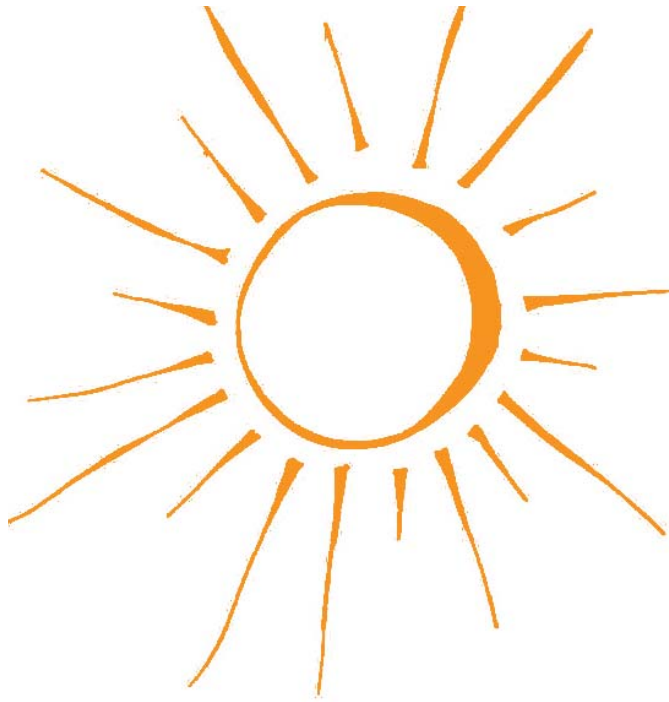
Académie Royale du Prince d'Orange

Attaque des Gardes

Quartier du Roy

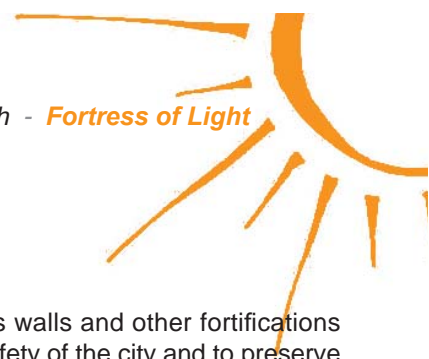
Hôpital





***“The border wall has no architectural program, yet it generates intense activity. Crudely built, it is loaded with complex symbolism, more construct than construction. The wall reveals the power of an abstraction to create human environments.”***

***Architecture of Enric Miralles and Carme Pinos (page 8)***



## 3. Theoretical research

### 3.1. Initial assignments

The goal of the theoretical research in architectural projects is to allow a better understanding of the bigger picture. Urban layouts and facade analysis can only answer part of the necessary details.

The specific theoretical research goals assigned at the beginning of the project were:

- Literature study of history and theory of military architecture in the 20th century and mapping Dutch military heritage. Collecting stories, mapping collective memory and perception (comparative case studies, Maastricht or other).
- Comparative studies of the relation of military architecture with the city and the landscape.
- Studying artists who reflect on and intervene in spaces that lost their functions (Gordon Matta Clark, Erwin Wurm, etc).

Three teams were formed and each team received one of the tasks mentioned above. As I was part of the group dealing with the first task, the theoretical research presented in this report will be focused mostly on the psychological perception of the military world. Despite having three separate groups, the research tasks often intertwined and a number of common elements can be found in all the resulting papers.

The comparative studies that dealt with the conceptual and structural analysis of several examples of military barracks still standing in the Netherlands have been used as a starting base for the detailed description of the chapter "2.2. Analysis - Terrain, location, economic potential, social interaction". The research task dealing with artists and their works of art have allowed us to perceive the reuse of the terrain as one cohesive element.

### 3.2. History of the military architecture

Generally, the location of a settlement has been chosen based on the resources that can be found in close vicinity. Out of the general resources water has always been the most important and relevant to a location.

In time, settlements would develop into cities and cities into fortresses. The advancement was most of the time, due to economic reasons. Economic prosperity attracted more people and implicitly more trading opportunities. The increase of the level of trading translated in higher amounts of resources and/or money stored in the city. The large amounts of resources were attracting not only traders but also enemies and unfriendly visitors. That is why the

defensive structures such as walls and other fortifications became necessary for the safety of the city and to preserve the continuity of the trading activities.

The general layout of a fortified city contained the defended residential areas, the trading zone and sometimes small agricultural terrains, interior military structures, defensive walls and towers used to spot the enemy from a distance and to defend. An additional line of defence was given by the moat surrounding the walls. The moat was crossable only by one main bridge to minimise the weak points in the structural defence system.

The arrival of the cannon in the 15th century made the defensive structure with only walls insufficient in order to properly defend a fortress. The iron canon balls were strong enough to break the walls of the fortresses. This required a new strategy in defensive systems. As a result the walls became shorter but wider in order to accommodate firing canons from on top of them. Also, additional defensive structures like canals were added outside the line of walls.

In the Netherlands at the beginning of the Eighty Years War (1568-1648) the Dutch Republic decided to create a strategic network of fortified cities. In order to do that, the Republic paid for the construction of the defensive structures. The cities were designed with specific layouts determined by mathematical calculations that would take in consideration the firing range of the weapons used at the time.

As water is a strong feature in the Netherlands, people have learned how to use it to defend from the enemy. When in danger, large areas of land were inundated in order to stop the advancement of the enemy troops. The water would be too high for the advancing of the troops but too shallow for the use of boats. The method proved to be very effective, but it came at a cost: any crops grown on the inundated terrain would be completely lost. The system of flooding areas has been successfully used in border defence too.

The method reached a new level when it was used cohesively at a national scale. Three national water lines were created to help defend the country: the Holland Water Line (Naarden-Muiden-Weesp-Vreeswijk-Oude-water-Woerden-Schoonhoven-Nieuwpoort-Gorinchem-Woudrichem), the IJssellinie (Nieuweschans-Bourtange-Coevorden-Zwolle-Deventer-Zutphen-Doesburg-Arnhem-Nijmegen) and the South Line with the following fortified cities Grave-'s-Hertogenbosch-Heusden-Geertruidenberg-Breda-Steenbergen-Bergen op Zoom-Hulst-Sas van Gent-Sluis. The fortified cities found along these three lines were completely modernised. The restructuring process was lead by Menno van Coehoorn.

By the end of the 18th century, the Dutch fortifications at that point under French reign received the new role of defending not just the Dutch border but also the French border from its enemies. As the priorities of the national defence system changed, only the strategically placed cities were obliged to maintain their fortifications. All the other



cities were free to dismantle the defensive structures and build freely outside the former city limits.

Another factor with an important role in the disappearance of the fortified cities was the beginning of the industrial revolution. The need for roads and rail roads as well as land for the new industrial buildings was a strong motivator in the cancellation of the fortress status of many cities. This process was allowed due to the new political structure of Europe of larger entities with clearer borders. This allowed larger areas to prosper without being attacked by every regional neighbour.

With the advancement in weapons development, the increase of the firing range and the arrival of the aircraft, the water lines lost their effectiveness and thus their importance. The era of the fortified city as a defensive structure finally came to an end.

The importance of the fortified city started being counter balanced, since the 16th century by the element of the barracks. The initial system of gathering troops from among the villagers in moments of danger proved itself to be ineffective on the long term. In order to be able to have sizable armies at any moment in time, permanent armies became a necessity. As a result permanent structures were created to house the armies, namely: barracks and forts. In the beginning, these structures had a semi-permanent character. It is only in the 18th century that the first permanent barracks were built in the Netherlands. These constructions were inspired by the French military architecture.

The French engineer Vauban<sup>1</sup> is considered the father of military architecture. His structures were true marvels of mathematical calculations and strategic corners. He is the one that perfected (in Europe) the method of taking advantage of the terrain.

He also developed the linear type barracks. These were long rectangular structures of two to three levels in height. The structures were able to house between 200 to 500 soldiers. The barracks were specifically designed to house soldiers. Officers, noncommissioned officers and enlisted men were placed in separate buildings. With the introduction of conscription a new wave of barracks was constructed between 1810 and 1840 in the Netherlands.

A second type of barracks was developed around 1820. This was the squared barrack or the *cárre* type. The structures belonging to this type had symmetrical floor plans and facades. The type went out of fashion around 1870.

A third type of barracks was the so called "type du Génie". These started being used around the year 1874. The main structure was linear. Additional volumes were

<sup>1</sup> Sébastien Le Prestre, *Seigneur de Vauban and later Marquis de Vauban (15 May 1633 – 30 March 1707)*, commonly referred to as Vauban, was a Marshal of France and the foremost military engineer of his age, famed for his skill in both designing fortifications and breaking through them. - [http://en.wikipedia.org/wiki/S%C3%A9bastien\\_Le\\_Prestre\\_de\\_Vauban](http://en.wikipedia.org/wiki/S%C3%A9bastien_Le_Prestre_de_Vauban)

added in time to the main structure to create fully structured back wings. The structures "type du Génie" allowed for better conditions of hygiene and higher amounts of light. They were more opulent than their predecessors.

By the end of the 19th century the issue of hygiene started to be reflected stronger in the designs used for the new barracks. The movement started in France but arrived shortly in the Netherlands. Around the year 1900 all the barracks that were in existence had almost the same typology: a long main building consisting of two floors and four one level high cross wings. The rooms for enlisted men were located in the cross wings. The space between the two central cross wings was roofed and used as an exercise shed. This type of barrack was built in Utrecht (1880), Assen (1892), Amersfoort (1890-1892), Groningen (1895), Breda (1896), Nijmegen (1902) and Ede (1904).

Another phase in the development of the barracks was the H-form design. This was used in 1907 for the field artillery and cavalry barracks in Ede. The guard rooms and the punishment area were located in the central part while the rooms for enlisted men were placed in the wings. The rooms and offices for noncommissioned officers were occupying an entire wing, while the kitchens and the canteens were placed in separate buildings.

The H-form typology was the prelude to the pavilion system. The most important characteristic of the pavilion type is the complete separation of all the functions in individual buildings. The system was used through out the Netherlands between 1910 and 1940. The "Kromhoutkazerne" in Utrecht was the first example of this type in the Netherlands. The system continued to be used, with a series of modifications, through out the entire period of the Second World War.

### 3.3. Military characteristics in the Netherlands

Military strategy has internationally a pragmatic and highly functional approach. As in most fields, there is a general set of rules valid for everybody and everywhere as well as a very personal and specific approach for each country, even region.

Vauban's approach has shown how important the geographical element is in the strategy of a defensive or offensive line. But the local characteristics are also determined by the history of the area and the culture of the people. Different conditions result in different approaches and characteristics. To mention just a few cases, the Russians have used, countless times with great success, the cold local setting to defeat unprepared enemies. The same characteristic and practicality was responsible for creating the famous AK-47<sup>2</sup>, the weapon that fires in any condition. The Turkish used the advantage of their large impressive armies as a strategy of intimidation, while the Romanians defended

<sup>2</sup> The AK-47 is a selective-fire, gas-operated 7.62×39mm assault rifle, first developed in the former USSR by Mikhail Kalashnikov. It is officially known as *Avtomat Kalashnikova*. - <http://en.wikipedia.org/wiki/AK-47>

their land by destroying any viable resource from the path of the enemy with the distinct purpose of weakening its strength and cohesion and created impressive ambushes using the natural surroundings.

As one of the goals of the theoretical research was to determine the characteristics from which the Dutch approach was created as well as the actual military strategies, three main elements were chosen to be researched. These are: type of soil, railway system and location of military bases. Each element was researched by overlapping maps representing important variables of the context.

#### • Ground types in the Netherlands

The soil types in the Netherlands range from sandy areas, unusable for agriculture, to clay areas, swamp areas, and all the way to good fertile land. This variety has divided the country in a series of unofficial regions. The regions can be also identified based on the types of industries/agriculture used and the density of the cities/population.

Most of the agriculture is condensed in the western areas of the country (North and South Holland, Utrecht and south of Gelderland) while the sandy regions (most of Gelderland, North Brabant, Overijssel and Drenthe) have been mainly used for industry.

*By overlapping the layout of the military bases and the types of soil one can see a higher density of bases in the sandy areas. As the land was unusable for agriculture, the conditions allowed for large military compounds and training facilities without creating disturbances in the daily life of the cities. (See map on page 34)*

#### • Railway system in the Netherlands:

History has shown, on many times, the importance of a good network of roads. The economy is not the only element that benefits from a transport system which functions properly. One of the most complex examples is the approach taken by Hitler between the two World Wars. He used the process of building a strong system of roads to bring back the German economy and to keep the society afloat. He created jobs that kept people happy and gave them a constant source of income. The result of the economic revival was a dense grid of roads which allowed for an extremely fast deployment of troops.

*In order to determine how strong the relation between the military and the transport system was/is in the Netherlands, the railway map from the 1900 (plus the later additions) was overlapped with the map containing the locations of the military bases. As a result it became obvious that the two were strongly related and that the location of the railway was one of the more important factors in the placement of the military bases as all the outposts are located either in a city with a rail connection or in the direct vicinity of one. (See map on page 35)*

#### • Location strategy in the Netherlands:

The ground soil types are the geographical elements

while the rail system represents the economic element. The two of them bond together with the historical data and the historical geographical policies to give the entire image of the military strategy of the Netherlands. For that analysis the borders of the country were used as reference points.

The Eastern border can be split in 4 regions: North, Central, South and Maastricht.

- The Northern area of the Netherlands is a lowland with sandy soil that presents nothing more than cattle pastures. It has a low population density and a minimal industrial development. This made the area easily dispensable in care of a conflict as it did not present a major interest for an enemy force. There are several military outposts as not to make it too easy for the enemy to pass through and to be able to give an early warning in case of danger.

- The Central area is marked by the major rivers crossing it: the Rhine and the Maas. This small valley formed around the two rivers made it an easy surface to flood if needed. This turned it into a natural border that required a different layout of the military bases. These are located behind the floodable line so that they can have a short response time. There is also a small number located in

Fig. 1. (below) Map of the regions, the Netherlands

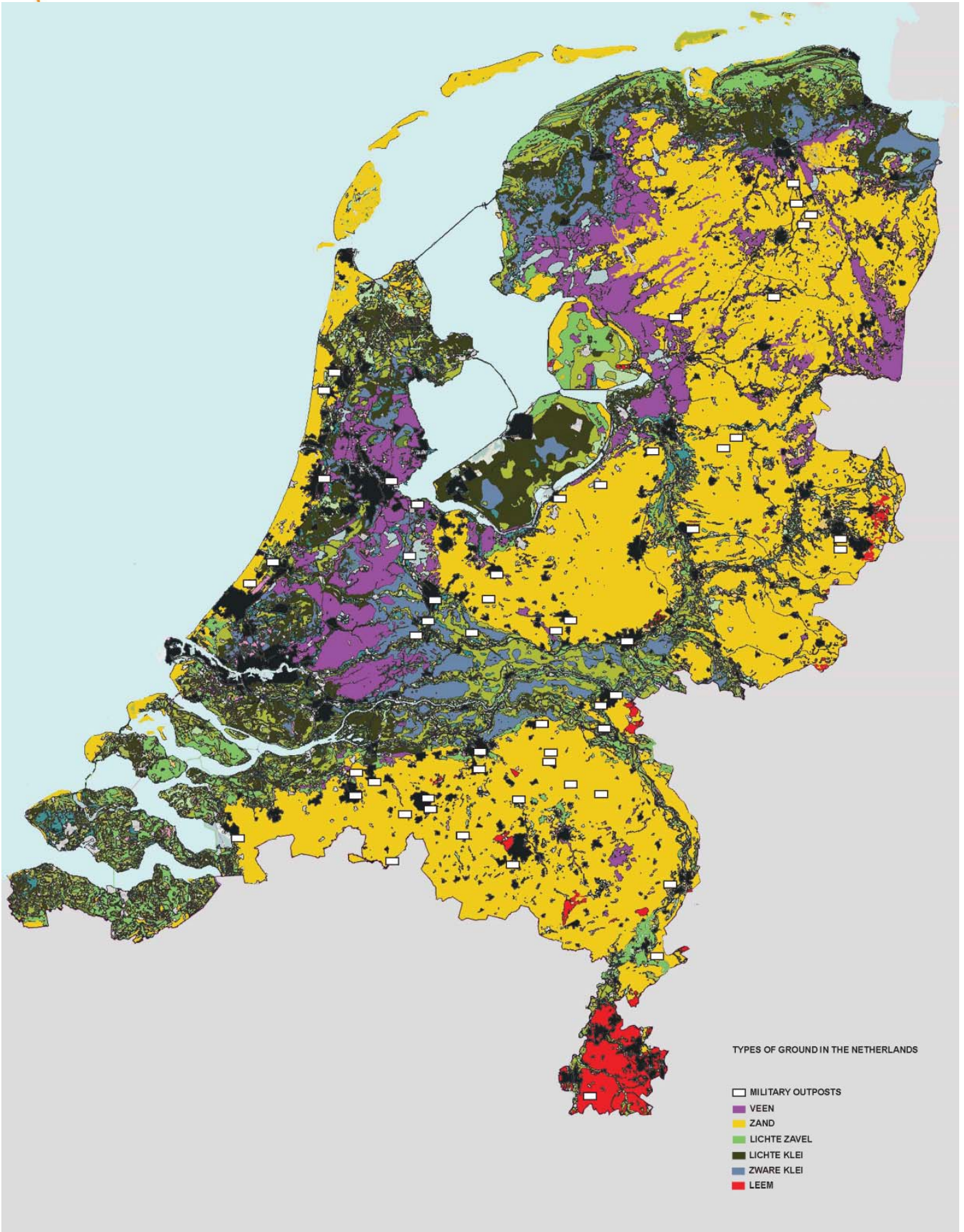
Fig. 2. (page 34) The map presents the overlapping of the map of ground types with the locations of the military bases in the Netherlands

Fig. 3. (page 35) The map presents the overlapping of the railway network with the locations of the military bases in the Netherlands

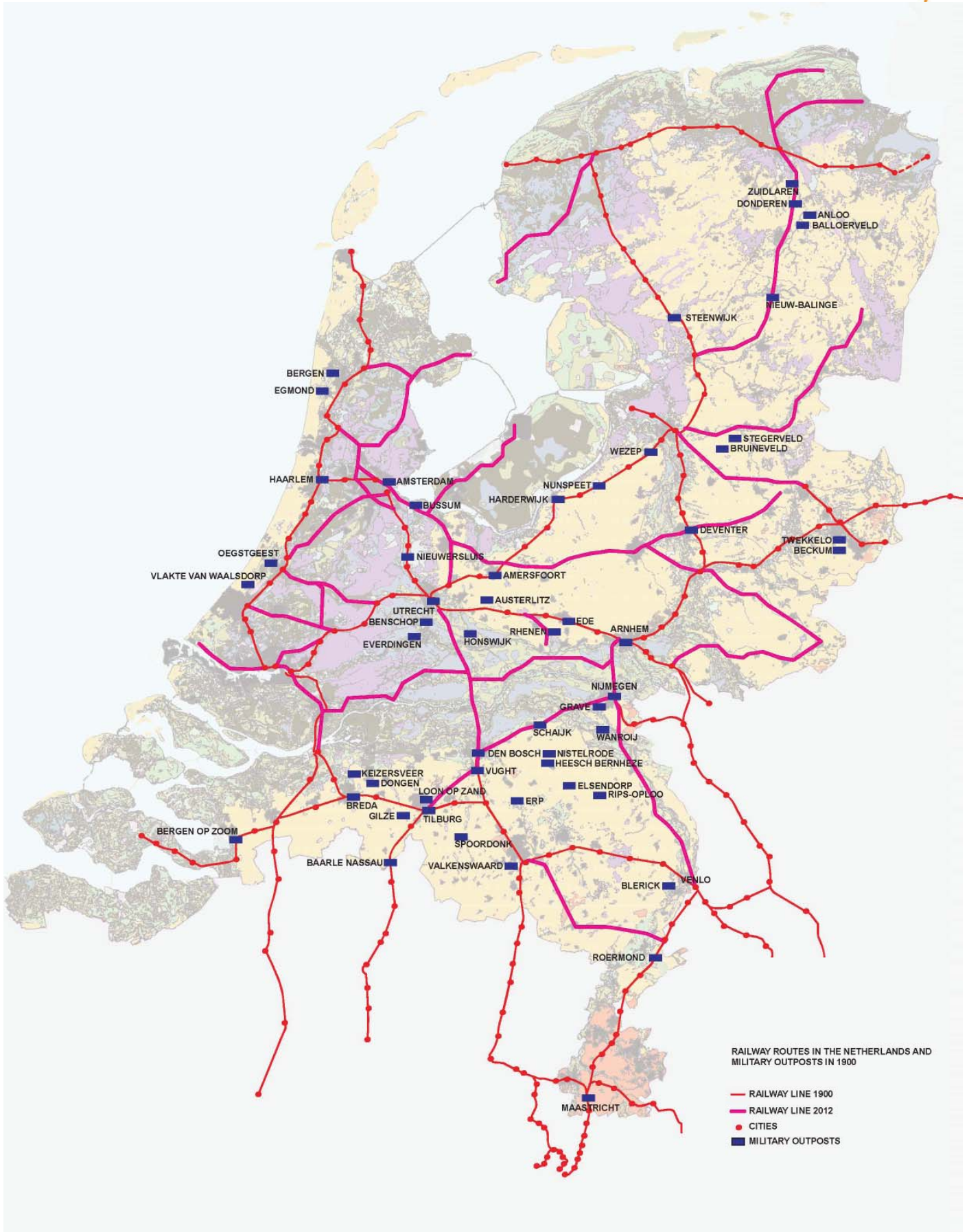
Fig. 4 (page 36) The map presents the overlapping of the ground types, the railway network and the locations of the military bases in the Netherlands



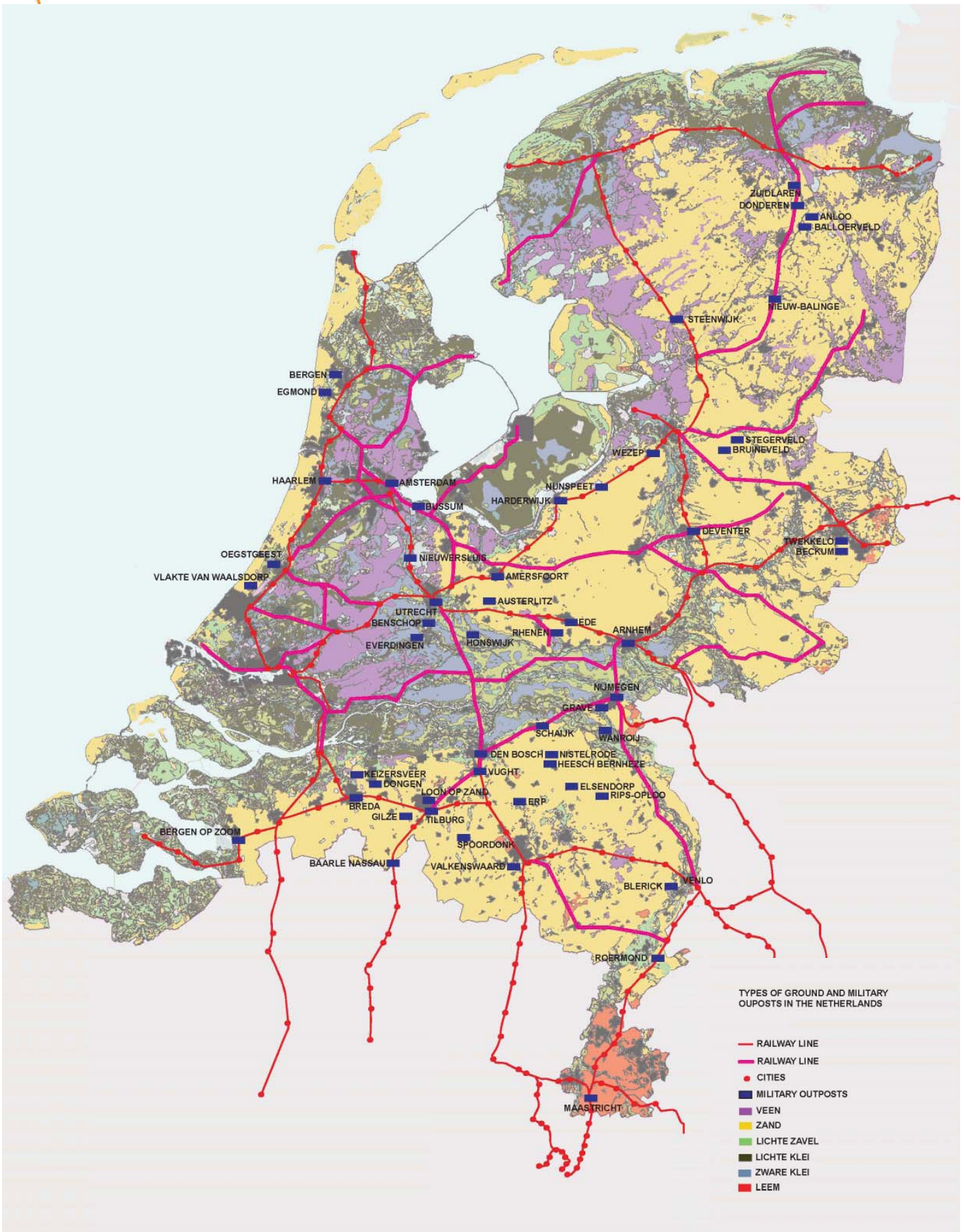




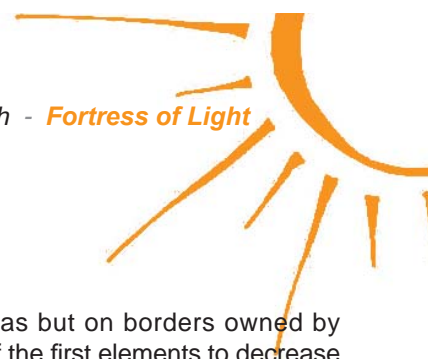












front of the flooded line as alarm outposts.

- The Southern line has no natural line of defence like the Central area. Its role is to protect an area with a strong and rich industrial area. Thus the line of defence is strong and starts really close to the German border. The region is the richest in military outposts in the Netherlands. Due to the border lines Maastricht is an island. It is hard to defend as it can be easily severed from the rest of the country. In military strategy is of highly importance to know one's weaknesses in order to efficiently use resources. The role of this entire line is to defend the rich area of Amsterdam, Rotterdam and Den Haag and the royal grounds.

- The few military bases on the Western line, the water line are the last line of defence and are important in the protection of the royal family. The coast line did not receive too much attention in the defensive strategy of the country as the Dutch fleet has been historically strong. The fleet has also been an important player in the political games played in the canal. (See map on page 36)

*As a general conclusion of the three map analyses it becomes really clear that the Dutch military strategy was based on knowing and using all the available elements, no mater if it was made by Mother Nature or man made.*

### 3.4. Psychology of the wall

Back in the day, military was an intricate part of the residential world. As soon as a settlement/city would become a point of trade, a point of economy, the need to protect resources or income would arise. That required fortifications and military personnel.

The fortifications had a dual psychological character. They were responsible for the fact that the city was safer. And also for attracting the attention of competing forces. The reason behind it was actually the presence of stronger defensive structures. A increase in defensive systems meant there was something of interest behind the walls, thus something to be conquered.

The defensive lines of a city were acting both as military grounds as well as military tools. The two elements have always communicated and worked together. The strength of the bond depended on the historical period as well as on the location of the city/fortress. The art of a perfect fortress/fortified city reached its highest level of development during the Renaissance years through the ideal cities. The same tools used to design the military layouts were used to design the residential areas of the cities. The desire to create the perfect order can be observed from through out the history, from Roman times to the modern layouts of cities like Chicago and Barcelona.

With the technological development and the implicit changes in the society, the design methods for residential and military layouts took different paths. The transition was surprisingly fast. Once larger states were properly formed and Europe gained a certain stability, the wars were no

longer held on regional areas but on borders owned by larger states. This was one of the first elements to decrease the need for fortification walls in every city. Later, the industrial revolution provided the last push in removing the fortified defences. The large surfaces required by the industrial development were impossible to provide by the medieval cities. Thus large expansions were necessary. As a result, large parts of the strong defensive walls came down, to allow the much needed extensions.

Other historical elements to have shaped the present view over the military, on European grounds, were the two World Wars. Wars have always been a source of economy, either by forcefully gaining new resources or, in later years, by creating jobs. The damage done by these two conflicts on European soil destroyed, amongst other things, the portrait of the soldier. It transformed the image of the guardian, of the revered and highly regarded military personnel into a despised source of horrors. Military stopped being the ideal career desired by young boys, it became instead an element of trauma and tragedy.

The change can be seen in the architectural approach of reuse used until now on military compounds. Despite buildings being preserved and their military layouts being restored, all elements related to the military character of the space were cancelled with the introduction of the new functions. The reuse activities were focused on preserving the concrete parts (the physical parts) and not the memory or the character of the previous function. This is the only type of reuse to ignore unofficially such a major element. However, that comes as no surprise, as the reuse was done by people with stronger emotional bonds to the hard times related to the two World Wars. The desire was to forget the horrors and to bring back the positive connection to the compounds.

Today, at least one generation later, we realise the need to preserve more than just the shells of the buildings. In order to do that, one of the main tasks to be researched during this project was to understand the psychological bond of the people with the military and the military bases. One of the main determining elements of this bond is the wall surrounding the military bases. Its immediate purpose is to keep intruders out of the base and preserve the safety of the military strategy.

The wall, as a divider, has always been an intricate part of the human society. It symbolises not just a physical border but also a psychological border. Its effect does not change with the increase or decrease in scale. It can be used on a macro scale to intimidate. That can be done not just through its size but also by its renown. For example, the reputation of the great wall of China was enough to discourage many of the opponents.

Despite having relatively small dimensions, like the Berlin wall, a wall can represent a massive border through the use of psychology and politics. On a micro scale a wall can be as simple as a curtain or a divider wall. It can also be

a social element expressed through fear or social misunderstanding. These are the reasons why the wall and its psychology are of great importance in understanding the evolution of the role played by the military structures in the development of urban networks.

In residential architecture the walls create a visual border between the interior and the exterior. The outside patch of land or fence acts as a physical border. Their role is to keep unwanted attention out of the intimate interior space. Basically the wall acts as a psychological and physical safety border on the “outside - in” direction.

In the military architecture the wall represents a stronger border due to the lack of familiarity. The military border, expresses besides its role of safety provider, the character of secrecy. In “The art of war”<sup>3</sup> Sun Tzu talks about the importance of not letting one’s enemy know too much about its internal layout and organisation. This shows the role of the wall to keep things in, not just out.

The wall can be psychologically cancelled by a strong level of interaction between the two elements located on each of its sides. If the interaction decreases or stops, in time, the elements become not only physically separated but also psychologically separated.

The initial strategy on the research of mapping collective memories was to use visual and audio media to express the connection of the residents from the area surrounding

3 *The Art of War is an ancient Chinese military treaty written by Sun Tzu, a high-ranking military general, strategist and tactician. The treaty contains 13 chapters. Each chapter deals with one aspect of warfare. The text is known as the definitive work on military strategy and tactics of its time. It is the most famous and influential of China’s Seven Military Classics. Next to the local fame, the treaty has influenced also the Eastern and Western military thinking, business tactics, legal strategy and beyond.*  
- [http://en.wikipedia.org/wiki/The\\_Art\\_of\\_War](http://en.wikipedia.org/wiki/The_Art_of_War)

the Tapijn barracks with the terrain of the barracks and the barracks themselves. The interviews were designed to help understand how people residing in Maastricht feel about the barracks, and to discover if there is an emotional bond between the people interviewed and the barracks.

Interviewing people proved to be difficult. Many people were unwilling to share their time. Others felt this would be intruding in their personal space and felt obliged to refuse. Despite all the difficulties, a large enough number of people allowed to be interviewed. The collected data was enough to give a proper image of the present situation.

During the interviewing process it became obvious that the present residents of the area have no bond with the barracks. The lack of a strong bond was partially expected, as the level of military activity decreased in the later years, but the absence of it was unexpected.

People no longer perceive the barracks as an element of distinctiveness for the area. It is now part of the background. After the Second World War the activity of the barracks has decreased dramatically leading to the disappearance of the interaction with the exterior world. Now, at least one generation later, there are no more stories.

There was very little concern whether the military character would be lost and whether the barracks should be preserved or not. The biggest concern of the people interviewed was whether the park would be lost through architectural and urban investments. Some even implied that they would desire the transformation of the entire terrain into a large, beautiful park.

There is, indeed, an awareness in what concerns the historical value of the barracks, but it is not born out of a connection with the place.

Fig. 5. (below) A digital representation of the psychological border of the wall.





### 3.5. Analysis of previous examples of reuse and their relevance

The analysis of other important cases of reuse was required in order to have a reference point, to know how the process had been used so far. The architectural and the urban approaches combined with the previous chapter “The psychology of the wall” explain the architectural psychology of military reuse.

#### 3.5.1. Hafencity, Hamburg, Germany

The Hafencity project of reuse represents one of the biggest inner-city projects of urban development. The surface reused is of 157 ha and it used to be part of the industrial area, more precisely the harbour. Despite not being a project of military reuse, its relevance lies in the social problems that had to be resolved.

In 2001 Kees Christiaanse/ASTOC won the competition for the urban development of this area. The new design aims to create spaces with a large variety of functions: living, culture, leisure, tourism and commercial. The central goal was to provide adequate public visibility and to make the inhabitants of the city aware of the new area. The goal was born out of the discovery that, despite being a central terrain, the inhabitants had no knowledge of the existence of the place. The nature of the function



Fig. 6. (above) View of Hafencity's public spaces, Hamburg, Germany

Fig. 7 (below) View of Hafencity's public spaces, Hamburg, Germany



and the restrictive access have created the same type of psychological borders as the military compounds. In order to reintegrate the terrain in the urban network of the city cultural events were created. An information centre was placed in one of the adjacent districts. The cultural events are by now a regular feature with the purpose to attract people. (Fig 6 and 7)

#### 3.5.2. Chasse Park, Breda, the Netherlands

The Chasse Park was designed by the architectural office of OMA (the Netherlands), the famous office of Rem Koolhaas.

The terrain of the Park was an important historical military ground for the city. The rich history of trade responsible for the creation of the city, attracted many competitors and enemy forces. This resulted in an increasing importance given to the defensive structures of the city and to its military resources.

In time, the priorities of the city changed. The economy shifted and together with numerous cities in the Netherlands, Breda removed its fortifications and relocated its military base. The plot left behind benefitted from a strong location in the centre of the city.

As a result, in the year 1991 an official competition was launched by the city to find a proper solution of reuse. The

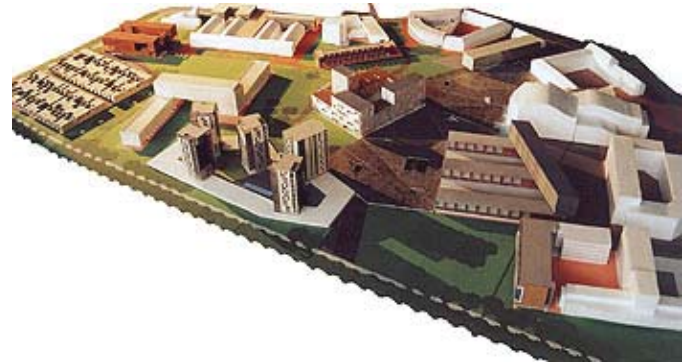


Fig. 8. Render of the plan of the Chasse Park project

Fig. 9. 3D Render of the Chasse Park complex





competition was won by OMA and the project was based on the principles of a campus, a park free of traffic with large surfaces of green areas. The main goal of the new master plan was to completely open the previous enclosed enclave.

The approach backfired and today the lack of functional cohesion of the spaces is immediately noticeable. The people living on the premise do not interact and the large spaces surrounding the buildings are mostly deserted. The complex preserves nothing of the previously military character and does not create a good environment for social interaction. (Fig 8 and 9)

### 3.5.3. La Caserne de Bonne, Grenoble, France

The project is known in France as the “Deville Project”. It represents the reintegration of the barracks “La Caserne de Bonne” into the urban fabric of the city.

The former military terrain was transformed into a complex with housing, office spaces, a park and leisure activities. The complex was connected to the city through the extension of the transport network.

Despite the beautiful preservation of the buildings and the delicate integration of the new functions, this is another project in which we can see no preservation of the functional military character. (Fig. 10 and 11)



Fig. 10. Perspective render of the “La Caserne de Bonne” project

Fig. 11. Render of the plan proposed for “La Caserne de Bonne”



### 3.5.4. Military barracks, Montpellier, France

An architectural and urban competition was launched for the project of reuse of this military base. The goal was to find a solution to replace the former military base with 2500 units of housing. The competitors were asked to come with really divers solutions.

Out of the many, that have tried to handle the large terrain, only 6 teams were chosen to continue their research and provide the competition committee with a final solution. All of them focused on the connection of the terrain with the nature but each individual project chose a different activity or element as a catalyst for the master plan. All the projects suggested large openings, modern buildings and impressive elements.

However none of the projects managed to maintain a connection with the military and its characteristics. The focus was on bringing the future and not preserving the roots. (Fig. 12 and 13)



Fig. 12. One of the six final projects from the official competition

Fig. 13. One of the six final projects from the official competition





### 3.5.5. Amiens, France

The reconversion of the fortress from Amiens was entrusted in the hands of the architect Renzo Piano. The goal of the project was to create a modern university campus in an preserved old setting. Next to the educational facilities, additional residential spaces were added.

The new plan preserved a large part of the military constructions and reused them with the use of modern elements in the new ensemble. The project remained faithful to the military constructions and kept them with the goal of preserving the military enclosure. But the preservation alone of the physical construction is not enough to allow visitors to understand the true character of the place. The new function has simply erased the memory of the previous one. (Fig. 14 and 15)



Fig. 14. Render of the future campus, Amiens, France

Fig. 15. Bird's eye view of the former military terrain, Amiens, France



### 3.5.6. Paris, France

The project represents the reuse of one of the 19 military forts used to defended Paris. The surface of the site is of 12 hectares.

“Preserve the past and prepare the future” (André Santini, the mayor of Paris) was used as the main goal of the project and the reason used to justify the large investment.

The intention of the project was to transform the fort into an integrated residential district of the neighbourhood while preserving the shape of the fortress. There are 3 types of residential buildings, according to their location in the shape of the former fortress. These are: “Bastion” (the five angles of the fort, “Belvédère” (one central block in the shape of a parabola) and “villas” (independent vertical housing units).

Despite the goal to preserve as much as possible, just small elements were kept and integrated in the new complex. The character of the place was erased by the residential function. The only reminder is the shape of the fortress. Unfortunately, that one can be observed only by taking a walk along the exterior promenade following the shape of the fort. (Fig. 16 and 17)



Fig. 16. Render view of the plan for the fort, Paris, France

Fig. 17. Perspective render of the residential area, Paris, France



### 3.6. Conclusion

In conclusion to the two chapters of research Chapter 2 "Point of Origin" and Chapter 3 "Theoretical Research" two main issues became of importance to my approach.

- Firstly the issue of the loss of military character in the majority of the projects of reuse:

- Why does the new function have to erase the past one?

- Is there a way to preserve the character of the old historic function?

- Can we preserve that character through other means (like the function or the infrastructure) than just preserving the buildings themselves?

- Can that character be expressed and implicitly felt by the people visiting the new terrain without explanations being given/written?

The main goal at this point became to find an approach that would allow visitors, unfamiliar with the history of the location, to feel the military character just by experiencing the space.

- The second issue regarding the players involved in the future of the terrain: the residents, the university and the city. All of them represent equal forces in the equilibrium of the area and all of them have extremely strong arguments for their desires.

Therefore it became of great importance to find a solution suitable for all of them.

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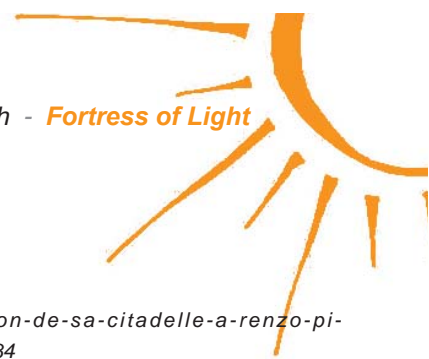
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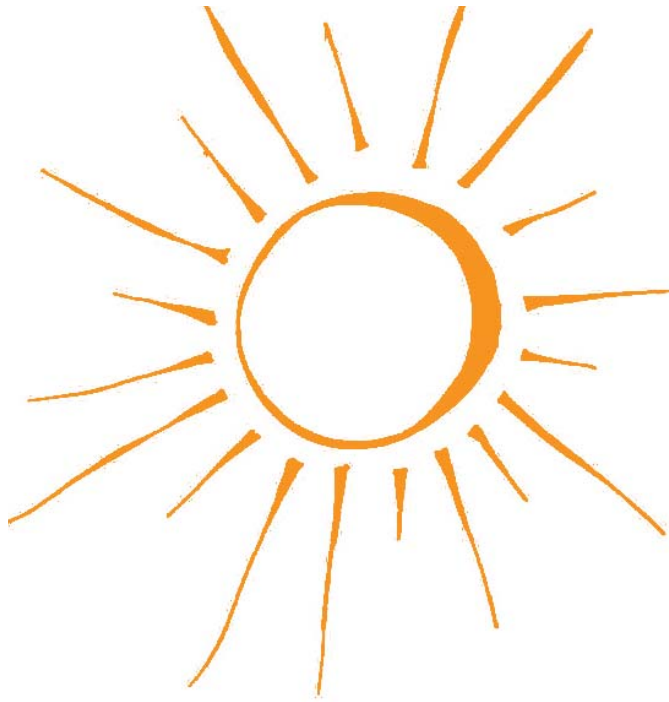




4







***“To bring in the sun, that is the new and the most imperative duty of the architect.”***

***Le Corbusier (The Charter of Athens)***

## 4. Design

### 4.1. Concept

The concept of the project is a complex structure which includes the story line, the urban design and the architectural inspiration taken from the military world.

#### 4.1.1. Story line

In every culture there is the belief of a system of core elements that determines and influences every living element. In the Asian cultures there is the complex symbolism of the “earth, wood, fire, water and metal” elements of the Feng Shui<sup>2</sup> system of beliefs, while Europe uses the more pragmatic set of elements “earth, air, fire and water”.

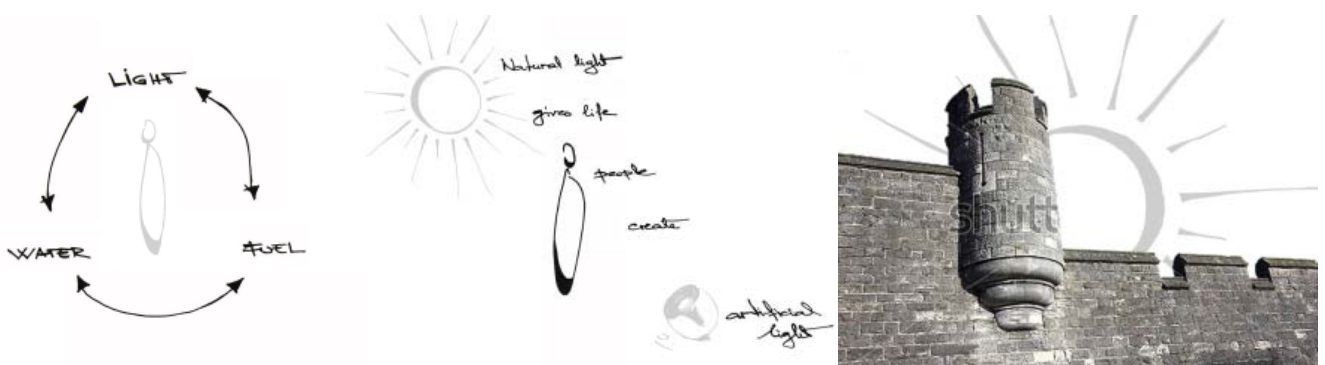
Correspondents can be found in absolutely any field. Water, sun and earth for plants, water, food and shelter for animals and construction materials and work force for buildings.

People are complex beings, evolved enough today to require more than just the basic elements of food, shelter and water. People of the modern society demand, as part of the essential package, entertainment, relaxation, travel and many other. One may wonder if that isn't sometimes counterproductive. Do we really need all the additional elements? Are we so different today from 100 years ago? Has the essence of the human being evolved so far? Or are we simply distracted by the social pressure?

An even more interesting question, born during this process was whether *are there any elements we are simply*

<sup>2</sup> Feng shui is a Chinese system of geomancy believed to use the laws of both Heaven (Chinese astronomy) and Earth to help one improve life by receiving positive qi. - [http://en.wikipedia.org/wiki/Feng\\_shui](http://en.wikipedia.org/wiki/Feng_shui)

Fig. 1. (below) A graphic description representing the concept of the light chapter - basic elements - creation chain - fortress of light



*missing by being misled by an artificial society?*

The answer is yes. We have lost the connection with one of the primary elements of mankind: the sun.

As a technologically advanced society we take for granted the use of artificial light and forget the purpose of the sun in the human biorhythm. The sun and its light play an intricate part in the proper physical and psychological functioning of the human body. The natural clock of the human biorhythm has always been determined by the movement of the sun and the amount of light exerted on the environment. However, with the development of the society we have simply shifted the work load indoors. Presently, there is an impressive number of people spending their lives indoors. It is impossible to simply shift everything and modify everything in a blink of an eye. What we can do though, is to modify and improve the work conditions and work towards allowing the sun to reclaim its place.

That being said I decided to create my own system of core/basic elements to use as a base for the design of the project. The chosen elements are: Light, Water and Fuel.

Light represents the force of life. The light is the reason we perceive our environment. Darkness is just a concept. In reality darkness is just the absence of light.

The sun is a source of life. However, people are also capable of giving life. As a result, they have created, through a long historical process, artificial light to suit their indoor needs. Using that line of thought, one could only conclude that the sun is a praised possession, which needs to be kept safe and given back its rightful place. In today's modern society a praised possession would be placed in a safe, but in medieval times, a fortress would be built around it. Thus, I have decided to reinterpret the military purpose of the Tapijn barracks into a modern metaphor of a fortress, and call it the **Fortress of Light**. (See fig. 1)

Water is a dual element of life and destruction. It is part of us, as the human body contains approximately 60% water, but it can also act against us. The Dutch people are well aware of the force of water as they have been battling



it for centuries.

Water represents a strong military element. As presented in Chapter 3 "Theoretical Research", water in the Netherlands was used to flood large areas in order to break the speed of the enemy forces.

In the vicinity of the former Tapijn barracks, there is already present a strong line of water but its original connection with the barracks has been lost. In order to integrate it in the new design of the fortress and use it to remind of the medieval moats used to defend them, I decided to create a closed circuit of water that would mark two distinct areas: the core and the defensive line.

The core represents the middle area, the vault, the place where the sun resides and it is protected. It is a place where natural light is used and vegetation is low, which allows for open spaces filled with light.

The defensive line, represented by the outer line bordering the main roads, is meant to keep the integrity of the core. As defensive structures have always been man made elements, artificial light is to be used here to emphasise the distinctiveness of the area. Tall trees will border the preserved buildings of the former military barracks.

Crossing from the defensive area to the core area will be done through strategically placed bridges that will control the number of people accessing the protected area. The bridges will also allow control over the access points of the terrain. This process is a strong reminder of the military strategies used to control spaces and to attract enemy forces into ambushes. (See fig. 2)

Last but not least, the fuel, represents the function that is to take place both in the defensive area as well as in the protected space. The fuel is, in this case, a metaphor. It represents the fuel required for the soul to evolve and create. This metaphor was chosen because the function takes place in the house of the sun, and the sun is the responsible for the energy that allows people to create.

The purpose of fuel is to recharge and to give new energy. As a result, the desire for the future function is to be one that can recharge people and give them physical and psychological energy. An element that can reconnect the neighbourhood, its players, its network and its interaction. ( See fig. 3)

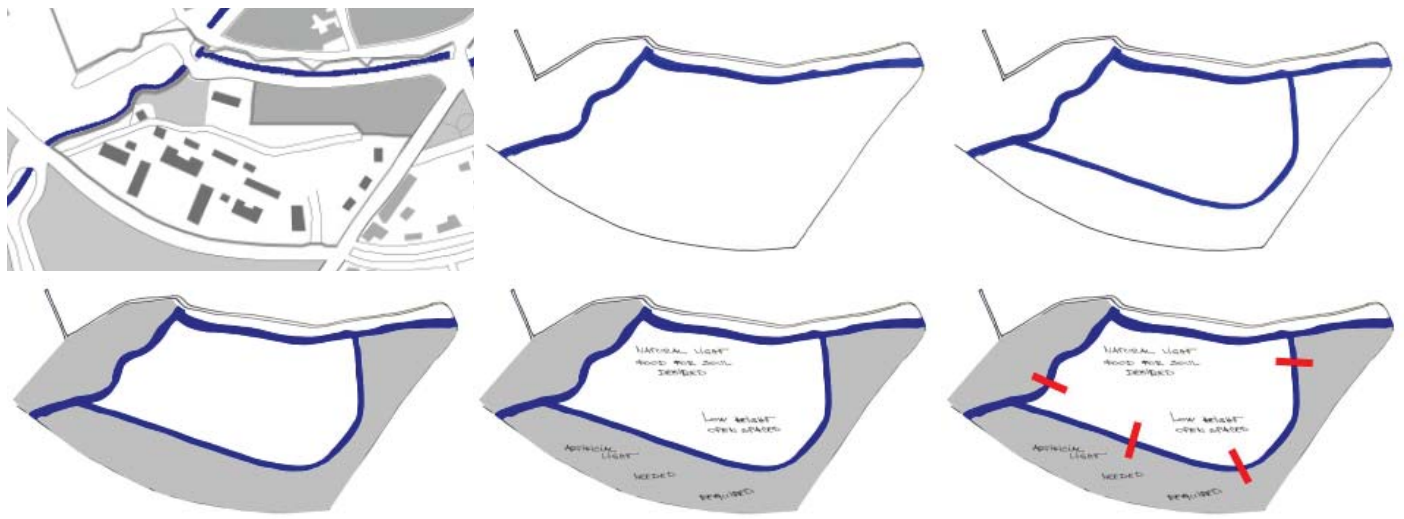
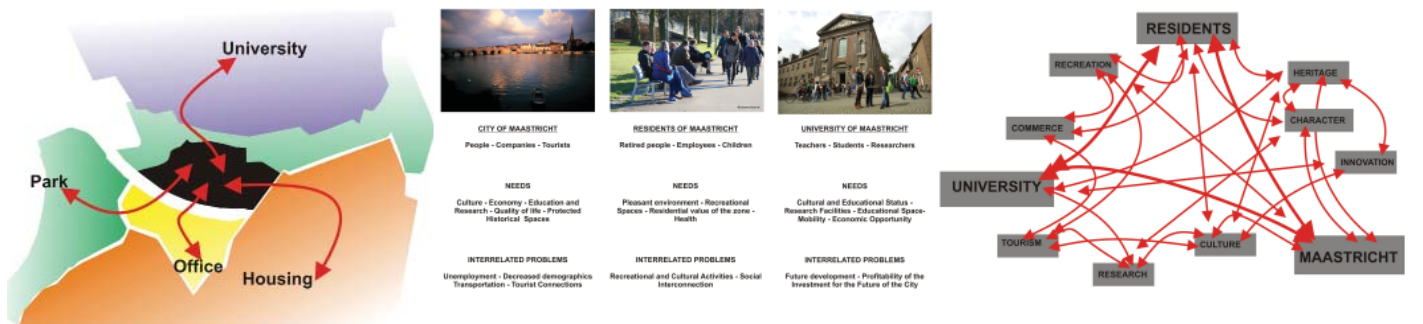


Fig. 2. (above) A graphic description of the process of the water chapter and the areas that are determined by it.

Fig. 3. (below) A graphic description of the process of the fuel chapter. The pictures present the important players in the process and their interactions.



#### 4.1.2. Urban design

##### 4.1.2.1. Military strategists and the second landscape (framing landscape)

There are several strong names in the world of military strategy. Sun Tzu, a Chinese military general, renowned for his military teachings, believed that if one controls the environment one controls the conflict. He was also a strong adept of the element of surprise and camouflage in order to perfect a good defence/offence. Carl von Clausewitz was a Prussian soldier and military theorist who believed in the “fog of war”, a state of confusion generated by the discrepancy between the political objectives (political intelligence: the “truth” that comes from the political centre) and the military objectives (military intelligence: eyes on the field). His teachings explain how to take advantage of that confusion and use it as a camouflage. Vauban, a French engineer, is considered to be the father of military architecture. He began his career by destroying the items he would later so fabulously create. And that, makes perfect sense. Being an expert in breaking the defensive lines of a fortress means knowing what to expect and what is needed to defend against. He perfected the skill of using to the maximum the potential of the surrounding existing landscape. What seems to be less known, or at least less expressed, is the fact that in doing, so he would practically create a second landscape overlapping the existing one. The second landscape would be based on pure military strategy and experience and it would function in tandem with the existing one.

With the integration of the Tapijn barracks in the modern structure of Maastricht, its relation to the strategic natural surroundings was severed. In time, due to its nature, the enclosure became increasingly isolated and, in the end, got completely lost from the landscape element. One would say that is a side effect of the modern development and that the traditional landscape has been now replaced by the urban landscape. True. But, due to the enclosed nature of the military barracks and to the decrease of the military

involvement in the social life, the Tapijn barracks did not get integrated in the new urban landscape.

To base the new space on the strong history and military character, I focused on the urban landscape and, more importantly, on the circulation and connection system (as this is a strong strategic element). I used the logic and the efficiency of the military approach and designed a new layer to overlap and integrate in the existing network. As a final touch I have decided to take Vauban’s example and create my own landscape. I have also tapped into the teachings of Sun Tzu and von Clausewitz and created an urban camouflage in order to preserve the military character of the area. My landscape integrates several other military concepts: an efficient infrastructure, practical; accessibility, controllable spaces and most important camouflage and its element of surprise. Last but not least, in order to preserve the idea of unity of the military base, the terrain will house only one main function.

My approach proves that we live in a cyclic society, where history repeats itself. This is shown by the fact that when the first intention to build a military base on this terrain was express publicly, the residents of Maastricht were outraged. The terrain was a beautiful completely natural zone. The owner of the land, the military, ignored the public opinion and transformed the green area into an enclosed space. Today, more than 100 year later, the residents of Maastricht are claiming their park back. Ironically, the fulfilment of their wish is possible through the use of military techniques: second landscape and camouflage.

The terrain of the Tapijn barracks was designed to restrict access. Every building is placed in a way that it restricts the possible lines of sight into the core area of the compound. The buildings of the south-east entrance are laid at an angle which narrows the path. The resulted effect is the one of a funnel, creating a good place where intruders can be stopped. The impressive “Cour d’Honneur” was designed to allow access only on its grounds. It was the place where public events would be held. Visitors would be

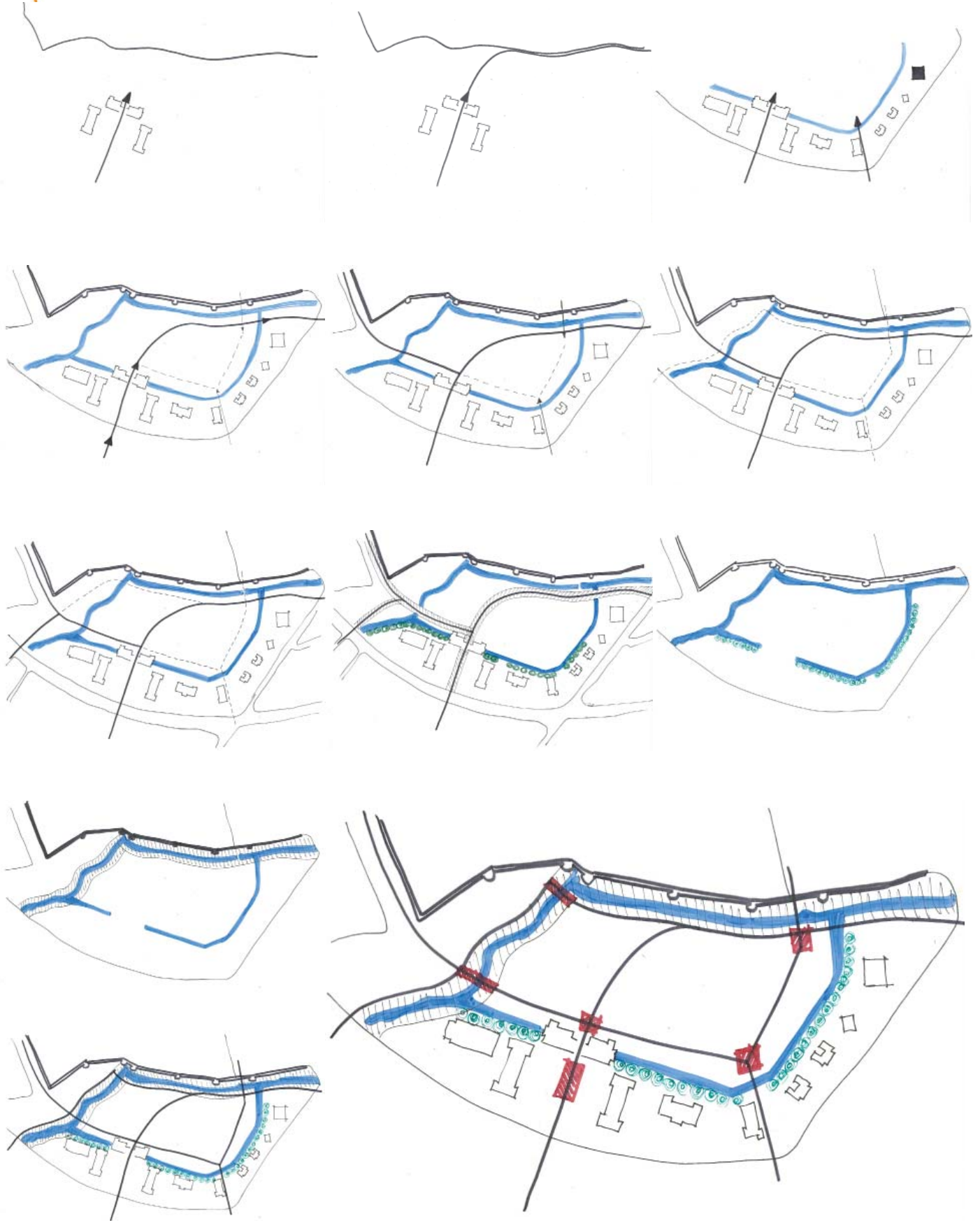
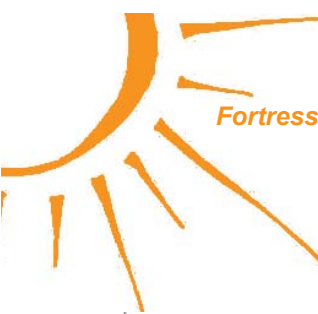
Fig. 4. (bellow) Map of the green surfaces, 1924 Maastricht



Fig. 5. (bellow) Map of the green surfaces, 2012 Maastricht







allowed on the ground of the base without putting in danger the security of the rest of the campus. These are the two main accesses of the compound, but none of them can truly function as a proper access into an urban structure. As a result, in order to be able to create a feasible urban plan, a new entrance had to be designed.

The first step is the removal of the buildings located in the core area. Their connection to the surrounding network of the city was minimal to begin with. Their individual locations fragment the interior space and contradict the idea of unity. The space cleared by their demise is used to create the new landscape of the "vault".

Secondly, in order to integrate the terrain in the daily routine of the city traffic system as well as to reconnect it with the green network, I have decided to give to the "Cour d'Honneur" its rightful place and transform it into a proper entrance. This is done by creating an underground passage allowing the crossing from south to north of the main road and crossing the main building of the "Cour d'Honneur" with a tunnel that allows the passage of people and bikes. The newly created road continues through the heart of the terrain and connects with the region of park located on the east side of the terrain.

Secondary accesses determined the rest of the interior roads by creating a closed network. The interior network creates intersections where public elements and events

can be created. The most important intersection for my plan is the one located in the south-east corner of the interior network, in the immediate vicinity of the Guard Building. This space is placed on one of the more important pedestrian crossing routes (north to south) connecting the University with the south areas of the city. Here is where I have laid the accesses to the buildings with the main public spaces.

The now closed line of water can be crossed using five bridges. The one from the old defensive wall (north-east) is the only one to be preserved. The rest of the bridges represent new additions to the site. They represent the military strategy of controlling the locations of the entrances and the number of people that can access the terrain.

As the terrain is crossed only by pedestrian alleys and bike paths, the car routes remain unchanged. There are two parking areas on the terrain, though. One located in the south-west corner to serve a restricted access research facility. And one short term parking on the south-east corner to serve the informational building hosted by the Guard Building.

There are three concentric layers in the urban plan of there terrain: the exterior defensive line of preserved buildings, the protected core area with the green park and the interior hidden garden which allows the camouflaged buildings to be accessed from the core of the park.

*Fig. 6 (left page) A sequence of images describing the development of the urban structure of the new terrain*

*Fig. 7 (bellow) The new master plan for the terrain of the former Tapijn barracks.*





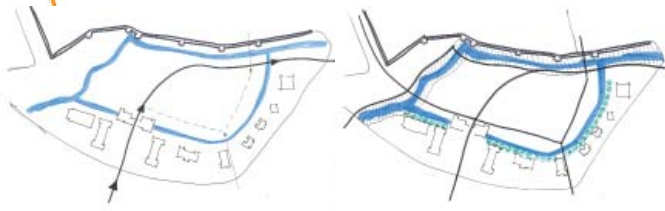
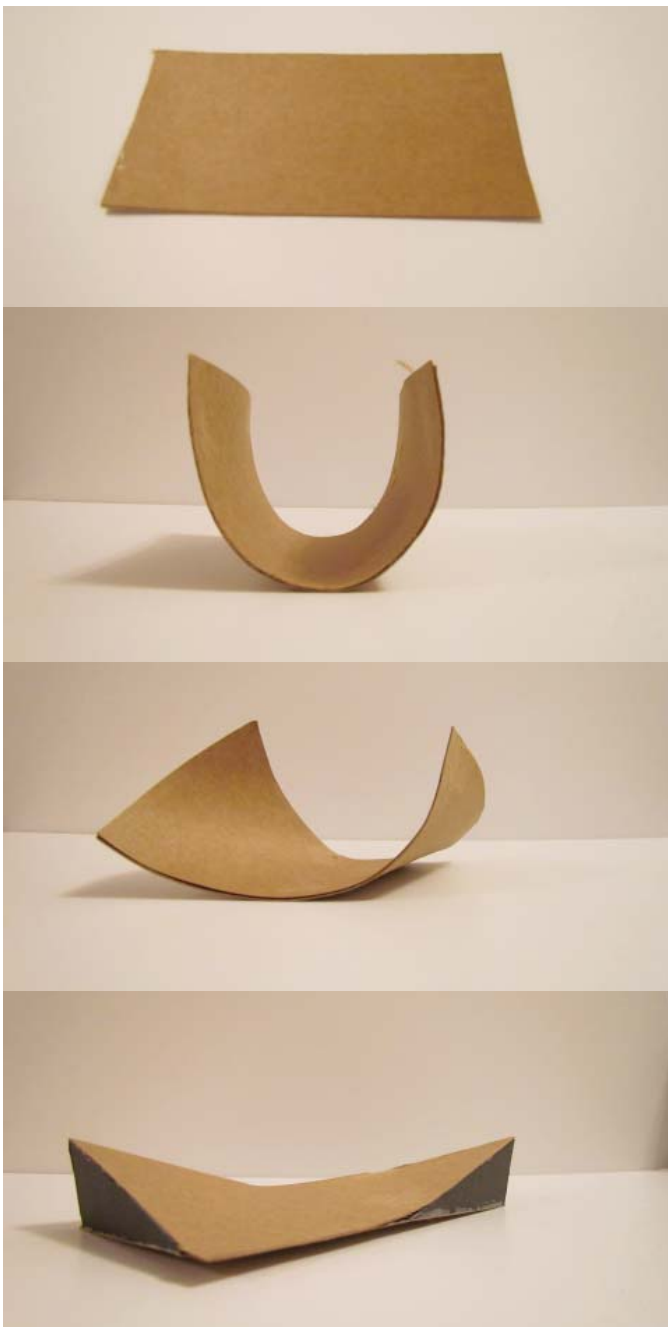


Fig. 8. (above) Sketches from the development process of the urban plan

Fig. 9 (below) Sequence of pictures describing the process used to create the second landscape located in the core area of the fortress/master plan



#### 4.1.2.2. The architectural concept and its relation to the second landscape

The core is the main area of the new master plan. It is also the main usable surface resulted from the intersection of the new infrastructure. Its rectangular shape is simple and clear. Moving the main access through the main building of the Cour d'Honneur raises the problem of how to direct people towards the east of the terrain as, with the removal of the interior buildings, there is nothing but an empty plot. A simple road is not always enough to guide people.

Using military strategy I have decided to use the terrain itself in order to properly direct traffic. The process of using the terrain to direct the traffic can be seen in the sequences of pictures on the left. Due to the lack of objects to direct people, the flat terrain allows for any route in order to cross the space. Once its sides are elevated, one main direction is created. The gesture is simple and efficient and uses only one element, the terrain itself. By raising instead the corners of the rectangle a diagonal path is created. The path, bordered by the two newly created hills is now strong enough to guide people.

This technique creates a new landscape. A secondary landscape as mentioned in the previous chapter of the urban development. The second landscape of the park emphasises the nature of the core of the fortress. It represents a hidden world inside the urban structure of the city. It is the surprise of the entire complex. This is an element born out of the military techniques found in the writings of many cultures. The direct inspiration in this case was the French engineer Vauban. While watching a documentary describing and decomposing the elements of a military fortress designed by Vauban, I came to realise it was not only part of the existing landscape, but the fortress itself created a secondary landscape of walls and hills intended to camouflage and advantage the residents of the fortress.

The idea intrigued me and together with the main question resulted from the theoretical research *"How to preserve the character of the military base in the new plan in a way that is understood from the simple experience of the space?"* (See page 42) I decided to combine the elements and reintegrate the terrain of the Tapijn barracks in the urban landscape of Maastricht by creating the new landscape. Each landscape reflects itself in the other. Their relations are in direct connection despite their contrast.

The side effect of raising the terrain is the formation of two large volumes under the two elevated corners. If these spaces would be filled with earth they would be lost, but if instead in those volumes buildings would be placed, the surface would become used very effectively.

The buildings placed under the green surface are camouflaged. They can be clearly perceived from the direction of the city, but from the core of the terrain they are completely hidden. This allows the green area of the core (the



park) to remain one element and not to be disturbed by the elements of the city.

The camouflage concept of the buildings is strongly connected to the military concept of the bunker. The bunker is a military element designed to camouflage a piece of military defence in natural surroundings. The two elements present in one place, the military element and the natural camouflage are of completely different natures. Despite that they work together in order to achieve a common goal.

The contrast between the two elements starts with the material used. Ground and plant life are used for the exterior while solid stone or concrete are used for the interior. The contrast continues also in the shape of the volume as the exterior is natural and organic while the interior is simple, clear, logic and rectangular. The contrast of the two spaces is born out of the necessity of the interior to mimic the usual architectural surrounding so that the military personnel can properly fulfil its job and the necessity of the exterior to mimic a completely different environment in order to camouflage the interior.

*The main idea of each space is not to be aware of the other space until completely immersed in it.*

This is the most important characteristic of the camouflage system for my project. I have decided to preserve this military character and to use it in order to create a route of sequences of spaces completely independent in their design, experience and perception.

The idea of the route is to start from the city side, cross the preserved monumental part of the defensive area and enter through a new urban space created by the new buildings into the core. The role of the new buildings is to create a transitional space able to maintain the visitor unaware of the different environment on the other side. The sequence of spaces crossing the main new building takes the visitors through a dynamic space that changes with the movement of the sun. The dynamic of the space is born out of the constant movement of the shadows. The route ends on the other side of the building where the visitors discover a completely different world, the park. (See fig. 7 on page 51)

The camouflage concept is applied also in the design of the facades. The large nets used by the military to hide large objects and vehicles (fig 13 and 14) are the inspiration for the facades of the buildings located in the camouflaged area (in the core area). They can also be seen as the attempt of the nature to reclaim its ground. The facades represent the border between the nature and the urban.



Fig. 10, 11, 12 (right) Pictures of different types of bunkers

Fig. 13, 14 (right) Pictures representing different types of military object camouflage





Fig. 15. (above) Digital render. View of the inner garden.

## 4.2. Function

The function of the new space was based on two main ideas:

1. *To revive the spirit and the economy of Maastricht.* This goal resulted from the analysis done in Chapter 2 "Point of Origin".

As an architect I have no power in creating jobs or investing financial capital. What I do have, is the power to design elements of interest that in time, much like the ripple effect of a stone thrown into water, will attract other elements of interest. Therefore the goal was to create a function, new to Maastricht, but to preserve the spirit that created the city.

2. *To create symbiosis*, by designing a place of peace, where the main players of the area can coexist in a productive way. As described in the second chapter "point of Origin", the main players are: the residents of the area, the city of Maastricht and the University of Maastricht and all of them have laid strong requests for the development of the terrain. That is how the idea of creating a productive symbiosis came to life.

In addition to these two core ideas, several other factors proved to be of relevance:

- The fact that the Netherlands is internationally known

for its inventivity and many innovative projects. This is emphasised by the fact that one of the most important companies in the world is Philips, a Dutch piece of history.

- The fact that Maastricht University has a very strong medical department and is known for good medical services.

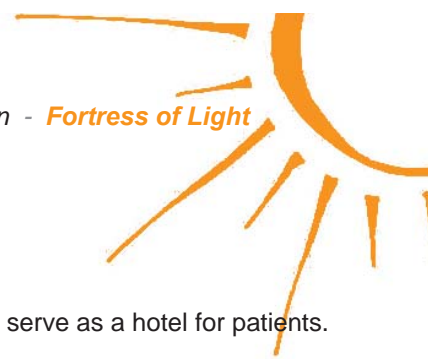
- And last but not least the fact that the Netherlands, as one of the countries located in the north of the Northern hemisphere, has high rates of winter depression due to the short hours of light during cold days of winter.

The sum of all these elements resulted in the idea of a **Light Therapy Park**. The function has the capacity to be the place of symbiosis where all the needs and desires of the players involved can be met.

The new function of the park allows, as desired, the preservation of the green area for the residents, the construction for new spaces that can be used by the University and the city of Maastricht to create a new and strong investment in its economic future.

### 4.1.3.1. Light therapy park

The purpose of the Light Therapy Park is to research and to apply medical therapies which use light. The complex is open and allows people to enter the terrain from any point. Depending on the specific function of a building, the



levels of access can go from completely restrictive to completely public.

The park contains a number of specific spaces: research facilities, offices, conference halls, hotels, informational buildings, therapy and hospital areas and a large amount of green spaces.

**A** - Research facilities The research facilities are destined for the research of new and existing light therapies and their impact on health and productivity.

**B** - The former “Cour d’Honneur” is preserved as the main entrance and main office area of the complex. The office facilities are to be used both by the research and administrative departments.

**C1** - The building is to be used as a hotel for visiting medical specialists, researchers and any other visitors of relevance for the Light Therapy Park.

**D** - The former guard building will be used as an information and administrative building for the entire complex as well as office spaces where information on light therapy and other uses can be given to any medical, commercial or private party.

**E** - The three small existing buildings make for perfect independent medical offices.

**C2** - The new building will serve as a hotel for patients.

**E1** - The building serves as a specialised hospital facility.

**F1** - The main building houses: a library/work space, a conference area, a sports and sport therapy centre and medical offices for general issues.

**F2** - The building will house the sleep therapy centre, a book and a print shop.

**F3** - The building will house the beautification therapies centre and a specialised shop for light therapy devices that can be used at home.

**Outdoor space** - The park itself will allow the students of Maastricht University to continue to use the green space as an open air study area. It will also provide a relaxing environment for the residents of the area and any visiting party. The outdoor space will have dynamic light devices to compensate for the dark days and allow for further light therapy.

Fig. 16 (below) Light therapy park - function master plan







Fig. 17. (above) Picture of building A

Fig. 19 (bellow) Picture of south-west building of the B complex



Fig. 18. (above) Picture of building A

Fig. 20. (bellow) Picture from the back of the main building of the B complex



Fig. 21. (bellow) Picture of the building C



Fig. 22. (bellow) Picture of building D, the Guard Building





Fig. 23 (above) Map with the location of the described buildings.

#### **Building A**

The building is part of the group of existing buildings that is preserved. The initial function of the building was as a training facility, while in the second half of activity of the military base the building was used as a garage.

The volume has the most secluded location in the complex. That allows it to have a more private entrance without completely being separated from the rest of the enclave. On the north and west side the building is bordered by water, on the south side by the main road of the area (this is where the main car and pedestrian access is), which leaves only the east side to be delimited from the park. That was the main reason behind the choice for the new function: research laboratories.

Here existing and new technologies are to be researched. The access is restricted only to specialised personnel.

#### **Building B**

The complex of buildings represented by the existing "Cour d'Honneur" preserves, through the urban plan, its military importance. It is used as a main entrance space on the terrain for pedestrians and bikers. Through the core of the central building, a wide tunnel allows for a clear flow of people to cross from the city area to the interior green park area.

The new function of the complex is to house the offices and the official spaces required for such a complex compound to function. It also houses conference and meeting halls for specialised meetings, as well as research facilities (with less security and privacy demands).

The access in the buildings is restricted to authorised personnel and registered visitors.

#### **Building C1**

One of the goals of the Light Therapy Park is to create a new type of tourism: medical tourism. The complexity of the complex and the collaboration with the University are intended to attract specialists and researchers from all over the world.

Thus, the complex must have the possibility to accommodate visitors. The new function of the building C1 is to serve as a hotel for the specialised personnel: doctors, scientists, press personnel and others.

Its location, further away from the entrances and main paths, allows for a certain level of privacy. Despite that, the building is close enough to be easily reached from either of the south entrances.

Access is open but limited to the public spaces.

#### **Building D**

The former guard building, also known as the "Wachtgebouw" or the Clock Building, will maintain its status and will remain an important piece of the south-east entrance. It will be used as an information and administrative building for the entire complex as well as office spaces where information on light therapy and other uses can be given to any medical, commercial or private party.

The small parking place in the direct vicinity of the building is to be used for short term parking, directly related to the information building.

Access is open but limited to the public spaces.





Fig. 24. (above) Picture of the gate through the medieval wall

Fig. 26 (bellow) Picture of the most southern building E on the east side of the terrain.



Fig. 25. (above) Picture of the river Jeker along the city wall.

Fig. 27. (below) Picture of the central building E on the east side of the terrain



Fig. 28. (bellow) Picture of the street bordering the East line of the terrain



Fig. 29. (bellow) Picture of the most northern E building on the east side of the terrain



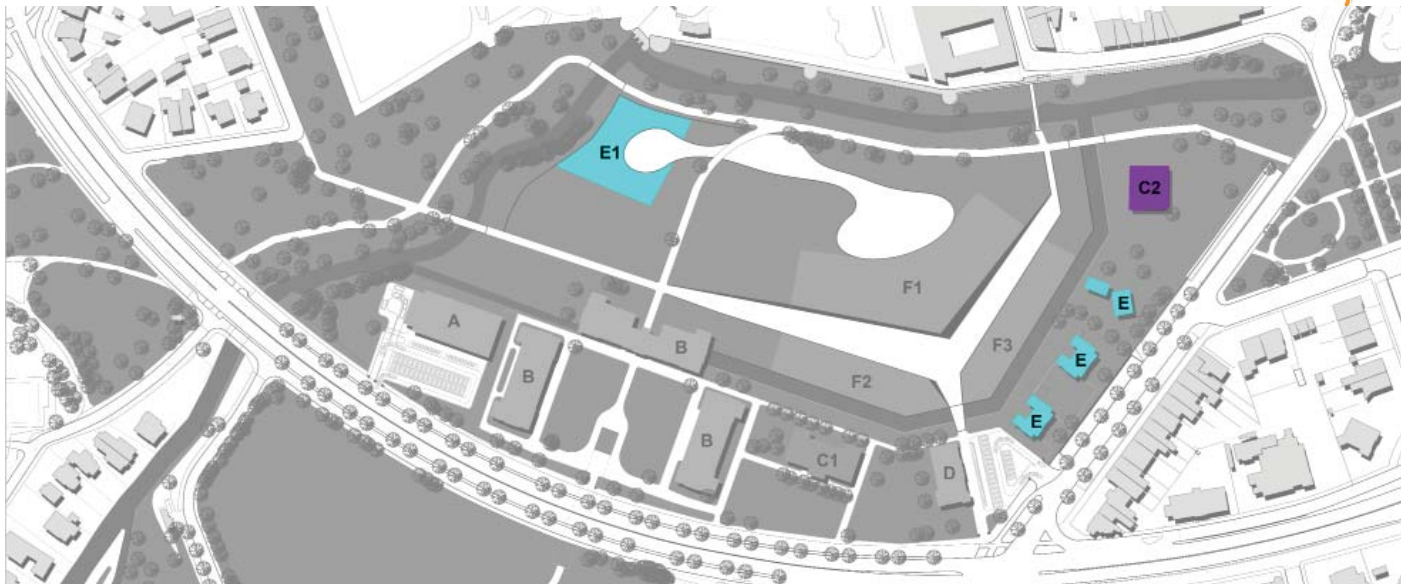


Fig. 30 (above) Map with the location of the described buildings.

### Building E

The three existing buildings have served, during the active days of the military complex, as independent housing facilities. The private nature of the facilities is kept in the new plan as they are to be used as small private practices for doctors using light therapy in their treatments. The spaces can be rented out to independent doctors and allow for separate access. The secondary road allows them independent entrances and privacy.

Access is open but limited to the public spaces.

### Building C2

This is the only new building on the “defensive grounds”. Its purpose is to house a different part of the medical tourism created by the new facilities, the patients. As the terrain deals with many different medical issues and houses complex treatment facilities, patients from longer distances, who can not travel daily, are to be expected.

The building is located close to an entrance but somewhat distanced so it can allow for more privacy. It has a direct line off access to the E1 building, the hospital.

In the urban plan, the new building is used to enclose the core area of the park and clearly mark the defensive area.

Access is restricted to authorised personnel, patients and registered visitors.

### Building E1

The building is one of the new constructions of the core area. It is located under one of the raised corners of the landscape and is camouflaged by the green area of park.

The secluded location made it the perfect choice for a specialised hospital facility where more serious illnesses can be treated with the help of light therapy devices. The facility will be focussed on helping treat cancer and skin diseases, but other related treatments can be easily accommodated.

The facility works in direct connection with the other medical offices on the campus and with specialists from all over the world. The building has special accommodation facilities for patients unable to travel but can also work with patients housed in the hotel, the building C2.

The interior garden is secluded and camouflaged by the green park and it provides large surfaces of light exposure.

Access is restricted to authorised personnel, patients and registered visitors.



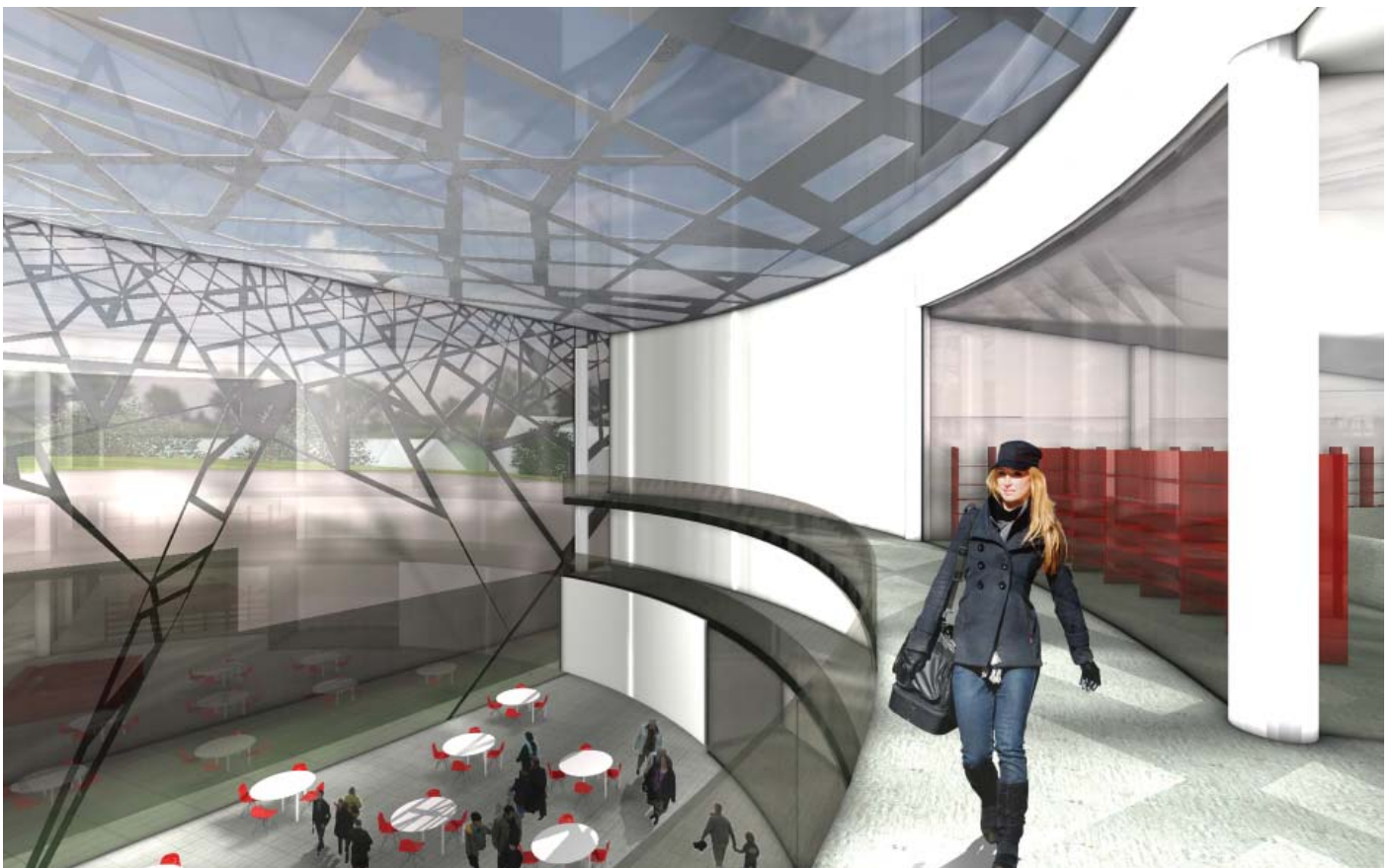
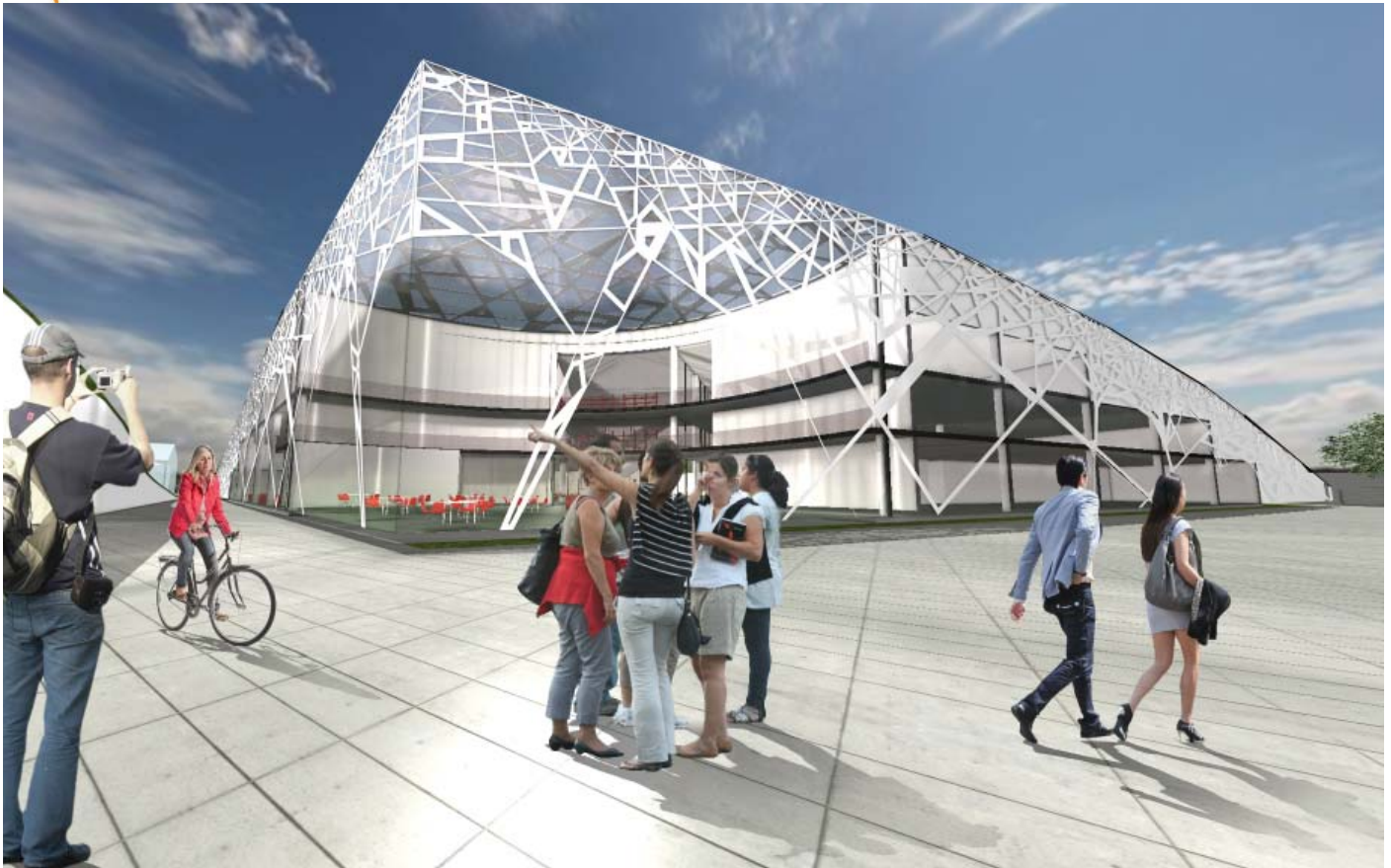




Fig. 31 (above) Map with the location of the described buildings.

### Complex of buildings F

The complex of three buildings creates with their layout two of the main paths of the complex. The north-south path connects the preserved gate of the historic wall with the south-east corner of the barracks. The west-east path connects the region of park located on the west with the residential areas on the east of the military terrain.

Due to the close location to the facilities of the University of Maastricht, open access functions and an orientation towards students and residents is what determined the specific function of the building. Thus the main building F1 contains a work area/library, a conference area, administrative offices, sports therapy and sport facilities and medical areas with consultation offices and treatment facilities. The building will be detailed in the following pages using floor plans, sections and renders.

The F2 buildings contains the sleep therapy facilities and the book/print shop. The location of the book shop close to the square created by the three buildings emphasise the public role of the intersection. The sleep therapy facilities require a more quiet environment than the beautification therapies, thus locating it across a “silent” function as the library seemed the best choice. (See plan on page 63)

The F3 building contains the beautification facilities and the light shop. The beautification facilities contain both the more commercial spa type spaces as well as the more complex medical facilities that require specialised personnel. The light shop sells products that use the light therapy technologies promoted and used in the Light Therapy Park. The shop provides specialised personnel that can explain technical details to any interested customer.

The location of the therapy buildings close to the main

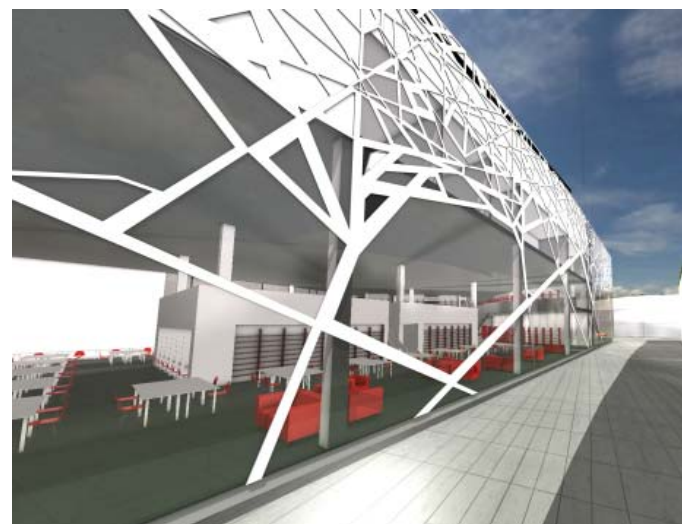
south-east entrance allows for easy access for both local and not local visitors.

All the buildings are located under the green surface of the park and have large glass facades. The facades are covered with a non-structural network inspired from the camouflage techniques (See page 53). The role of the facade network is to create an unitary component. The role of the network extends on the inside of the structures, by being used to create a dynamic game of shadows on all the interior surfaces.

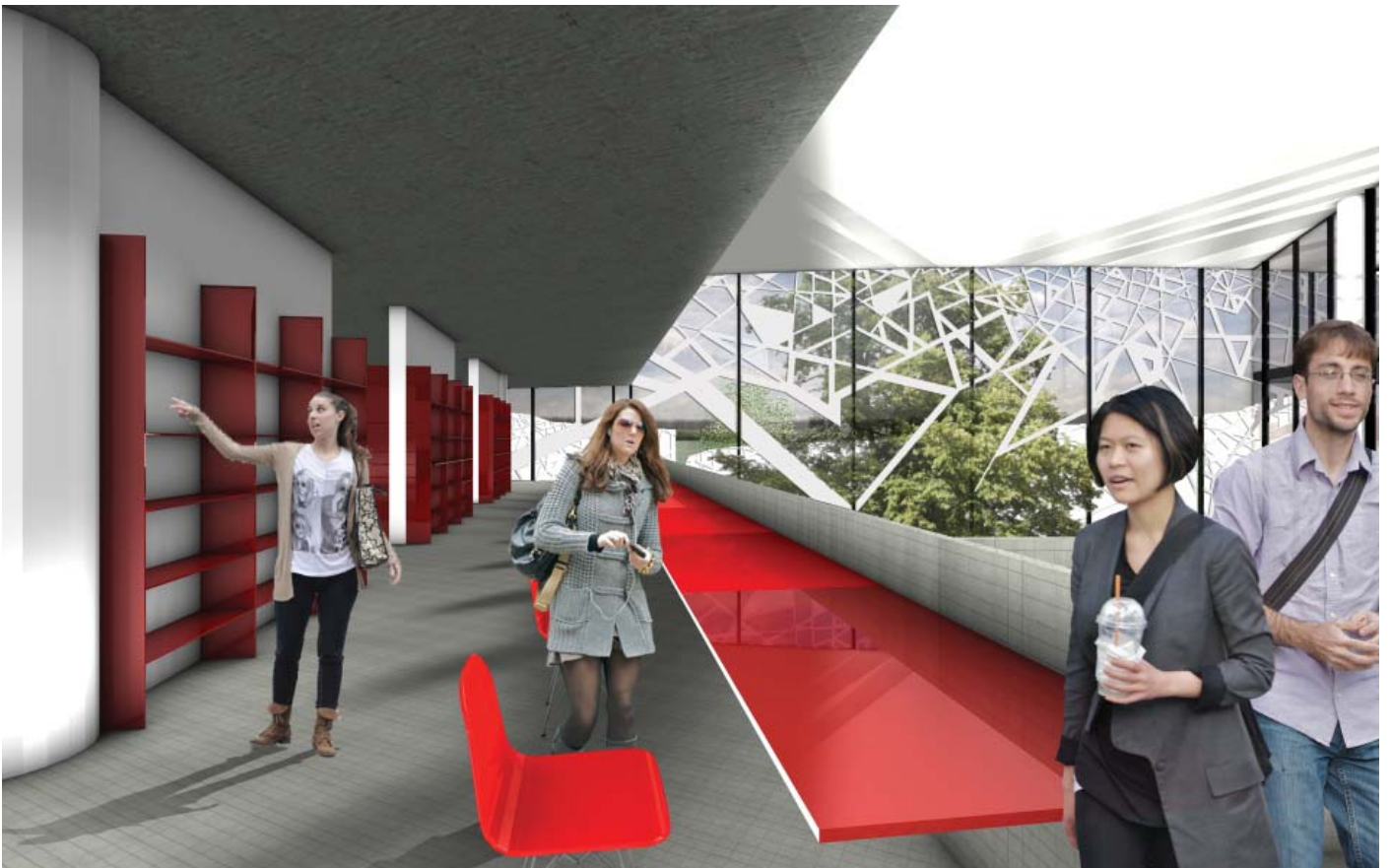
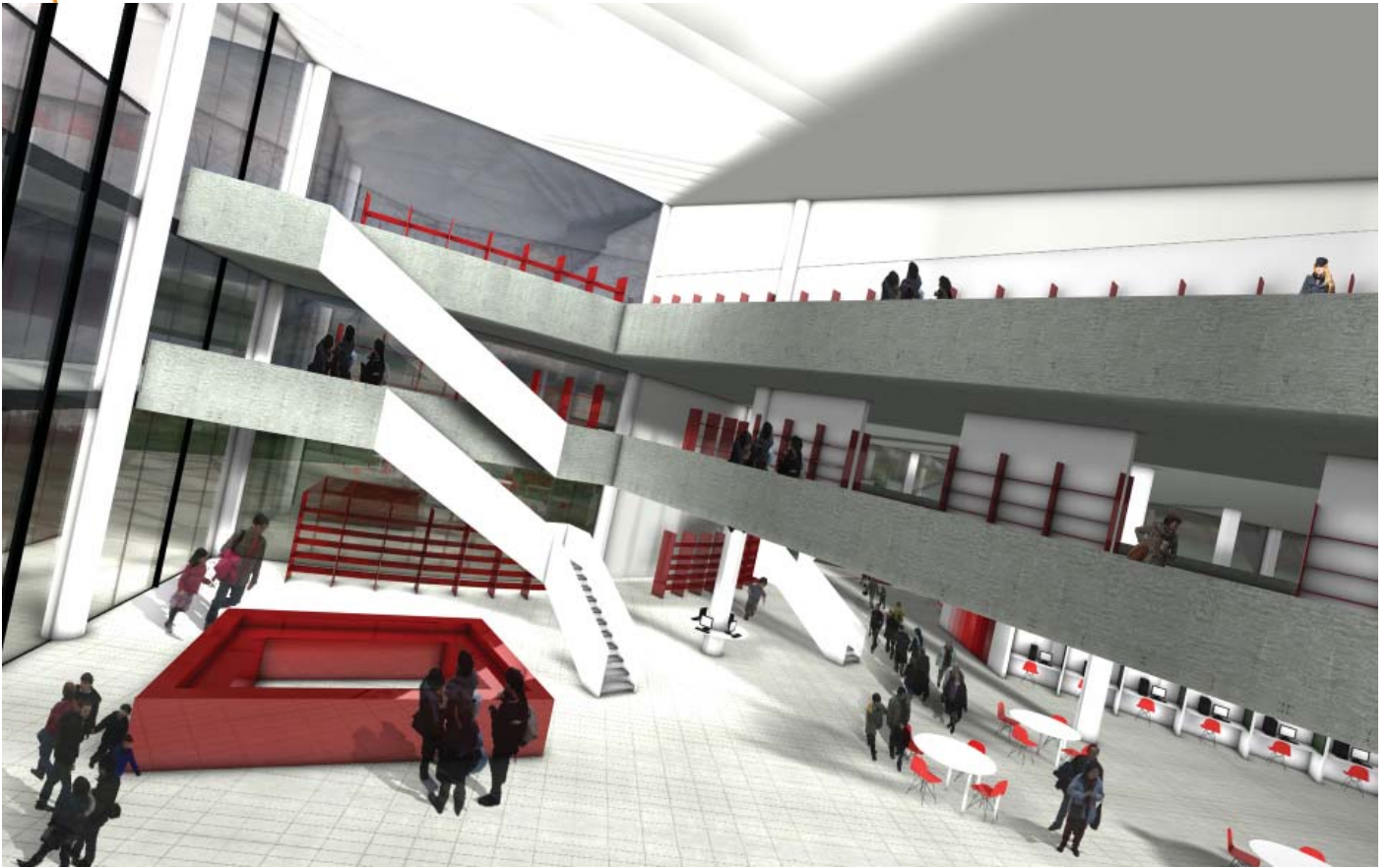
Fig 32. (bottom) Digital render - View from the south of the F1 building.

Fig 33. (top left) Digital render - View over the building F1.

Fig 34. (bottom left) Digital render - View from the main entrance atrium of the F1 building.







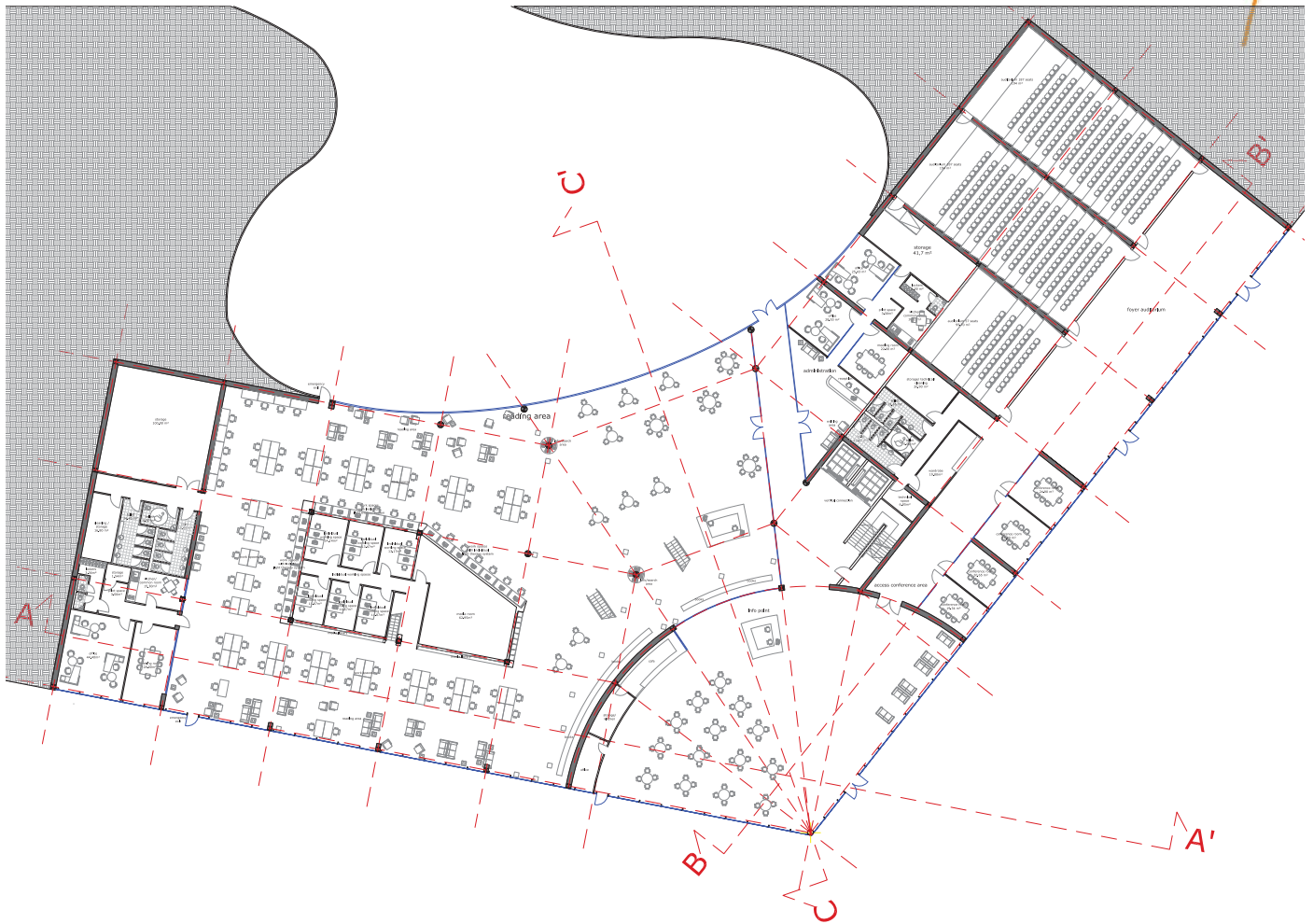


Fig. 35. (top) Ground floor

### Ground Floor

The first layer of the building is also the most public and the one with the highest flux of people. It has the largest scale of all three floors.

Its main function is a combination of two important functions for the area: library and work space area (west wing). Standard libraries are used mostly as places to research the provided material. Here the goal was to design a work space where people could come and spend one or more hours doing whatever work they have to do, while receiving a dose of light therapy. The method is most suited for students and busy people who can't afford to lose work time, but the facility can be used by anybody.

The large number of students who spend the sunny days studying on the green area of the existing park made me realise the benefit of adding the library function to the work space. That is why the resulted design has a larger variety of spaces allowing for different scenarios. The entrance hall is a more crowded space with large tables which allows for larger groups of people to work together. The staircases provide access to two platforms where a large number of books can be accessed. On the platforms, individual sitting areas can be found. The high locations on

the two platforms allow for a special perspective over the space and the interior garden. The big height of the space creates a bright space with a high level of luminosity.

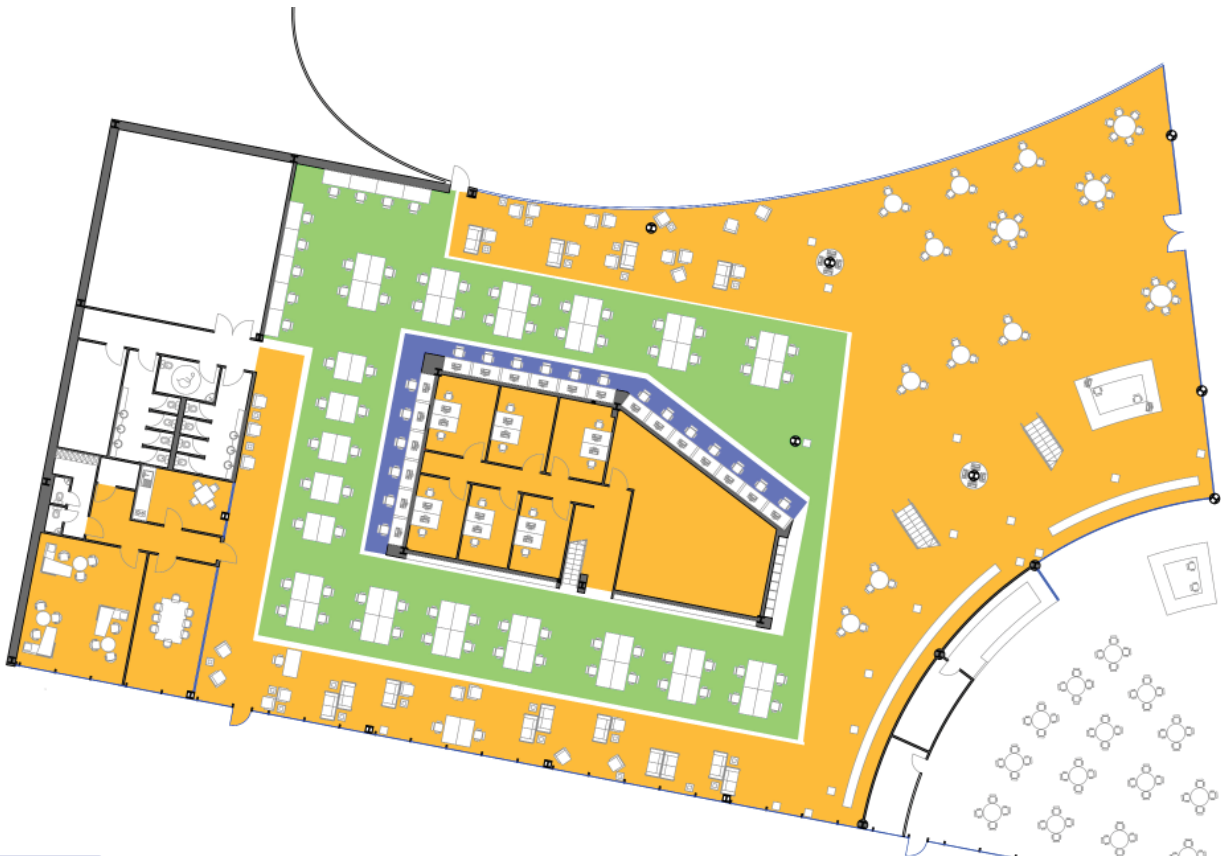
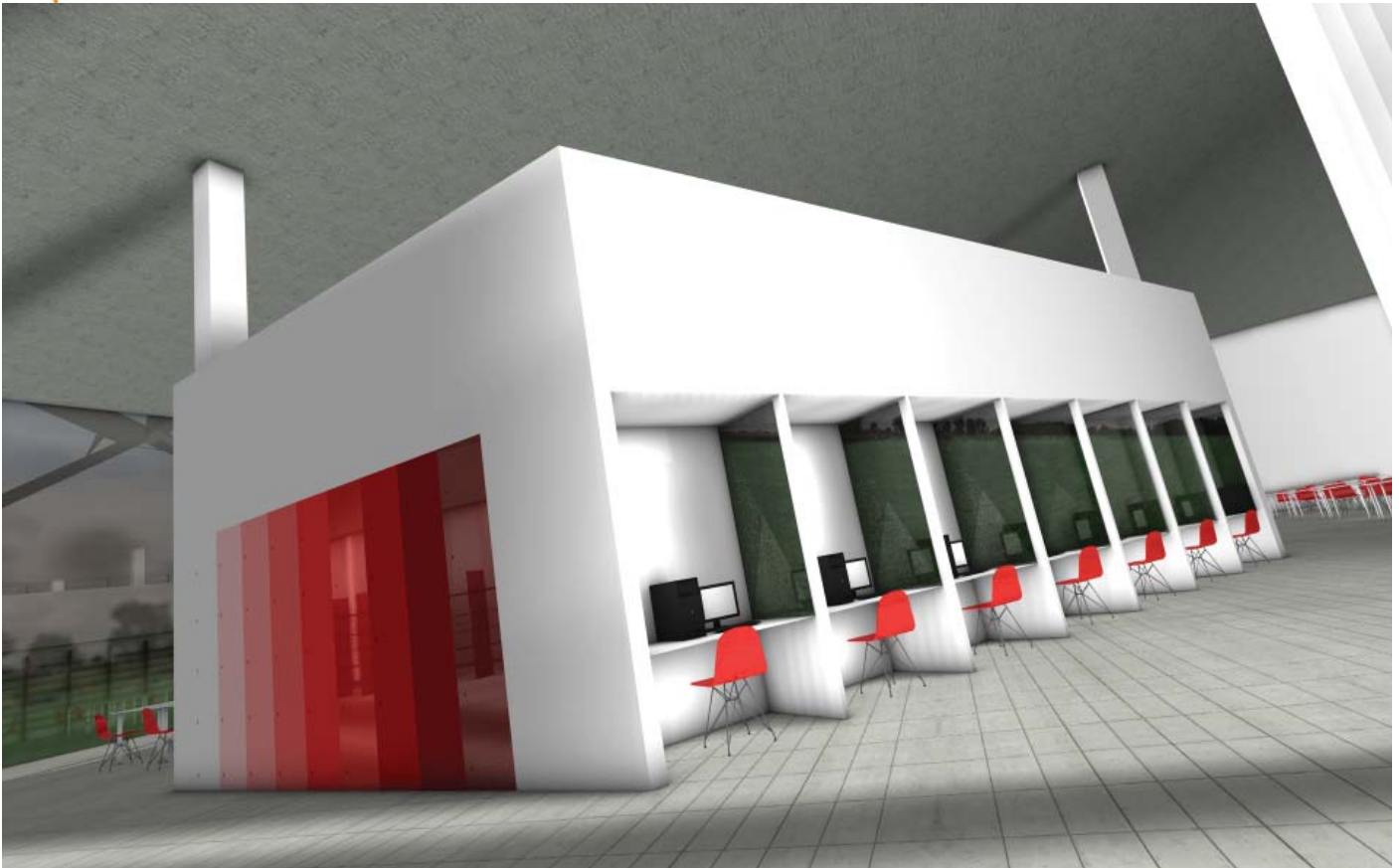
Deeper into the library area, an island can be found. The volume houses individual computer spaces on three of its exterior walls, digital media library on the fourth and lockers on the fifth. The interior of the volume is split into six smaller rooms where a maximum of two people can work and a media projection room.

The rest of the space houses a variety of work settings. The tables provide a stricter environment for work while the couches allow for a more relaxed space where work or simply reading can be enjoyed. The relaxed mode of reading determined the placement of the couches in the vicinity of the glass wall, as the outside public movement can be perceived as a distraction.

On top of the island (see first floor plan, page 66) two spaces allow for completely informal setting. There are no tables and chairs but "Fatboy" type sitting elements and pillows. The space can also be used by larger spaces, for example kindergarden and school groups.

Fig 36,37. (left) Digital renders - View from library/work space







The island, the central volume, seen here in render on the left page, contains 21 computer stations. The orientation was chosen as to allow as little distraction as possible. The special character of the work stations comes from the technology that incorporated. The side panels formed of flat surfaces containing light devices, allow the user the option to choose from 4 different light settings as well as blue light. The 4 light settings were inspired by an existing Philips technology, namely "School Vision Technology" (for more details see page 72). The blue light technology is used with great success in treating winter blues (for more details see page 72).

Spaces with individual light devices, like the couches, also allow the individual to determine the level of light desired. The general light setting for the entire space can be seen in the drawing on the left. The outer area, the orange layer, uses mainly a standard intensity and colour light setting with the possibility to switch to a calmer setting with standard intensity but warmer colour.

The study area, the green area, focuses on the study mode and thus a more focus light mode is desired, with high intensity level and standard colour tone. The blue area allows, as described earlier, standard, warm, focus, calm and blue light use.

All the light systems used indoors use sensors to determine the level of natural light that penetrates through the windows. The measurements are necessary so that the interior lights can be used to compensate for the exterior input and not to override it.

In the east wing the conference area is located. Three auditoriums of different sizes are provided for medical conferences. The same spaces can be used, when needed, by the University of Maastricht. The auditoriums can receive a total of 445 people. The foyer is of a similar size so it can facilitate any large gathering. The conference area can be accessed from the central core or from its own private entrances. This allows for a complete separation of functions if required.

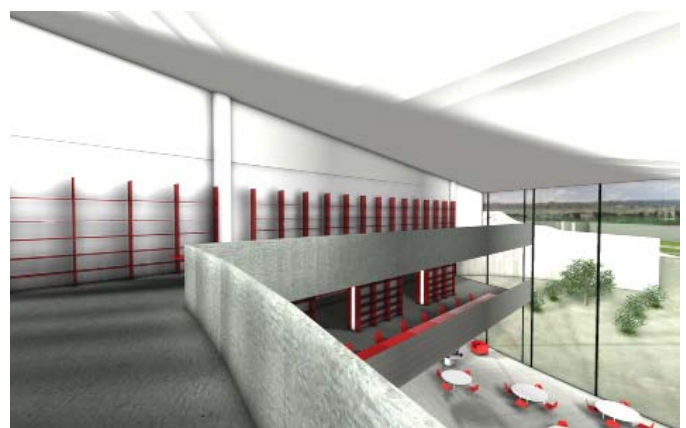
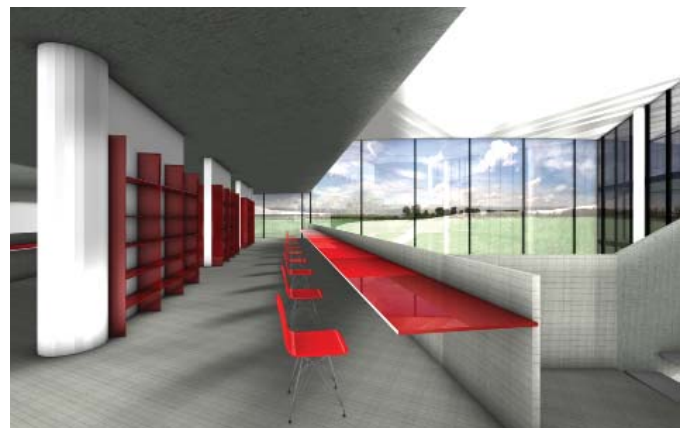
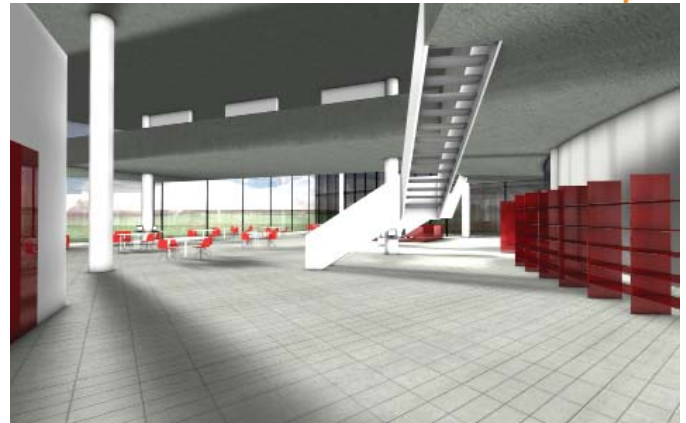
The principle of "School Vision Technology" from Philips can be also applied to the conference area. Here, the light settings can be adjusted according to the type of the activity or presentation to be unfolded.

The administration facilities of the building are also located on the ground floor. They are easily accessible both from the central core or from the back garden. The technology used in the library environment focuses on providing light therapy and allowing as much freedom in choosing one's lighting settings.

Fig. 38 (left top) Digital render - View from the library

Fig. 39. (left bottom) Plan of the different types of light used in the library/work space areas. Orange - standard intensity and colour; Green - high intensity and standard colour; Blue - blue light

Fig. 40,41,42,43. (right) Digital renders - Views of the library/work space





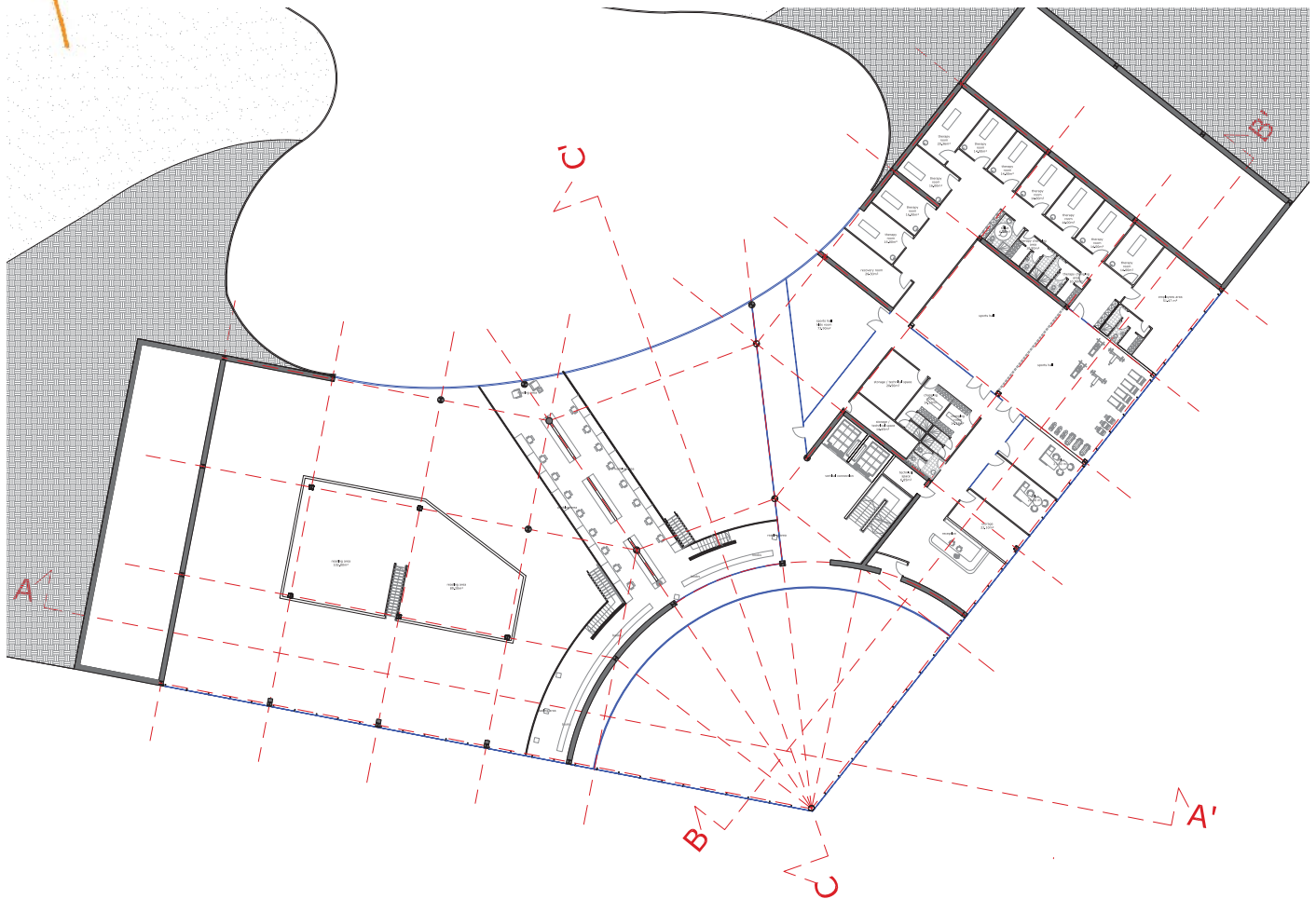


Fig. 44 (top) First Floor (for a larger scale drawing see the annex)

### First Floor

The first floor is divided between the work space/library (west wing) and the sports facilities (east wing).

The sports facilities provide two gym halls. A large one that can be divided in two smaller spaces depending on the activities and a smaller one, shaped as a triangle, destined for large groups of children. The big number of individual therapy rooms allows for physiotherapy as well as light therapy. If the patients require more time to recover after the treatment, a separate room is provided. There are two sets of changing rooms, one destined especially for the gym users and one the people using the therapy facilities.

Light therapy has been used with great success in sports and sport training. Devices using polarized light (see page 74) are used to speed up recovery times of physical injuries.

Light therapy has also been used to increase performance in professional athletes. The human body functions best in certain parameters and in certain time slots of the day. Light therapy can be used "to lie" to the body about

the time of the day when the competition is scheduled at odd times or when jet lag is present due to large distances of travel.

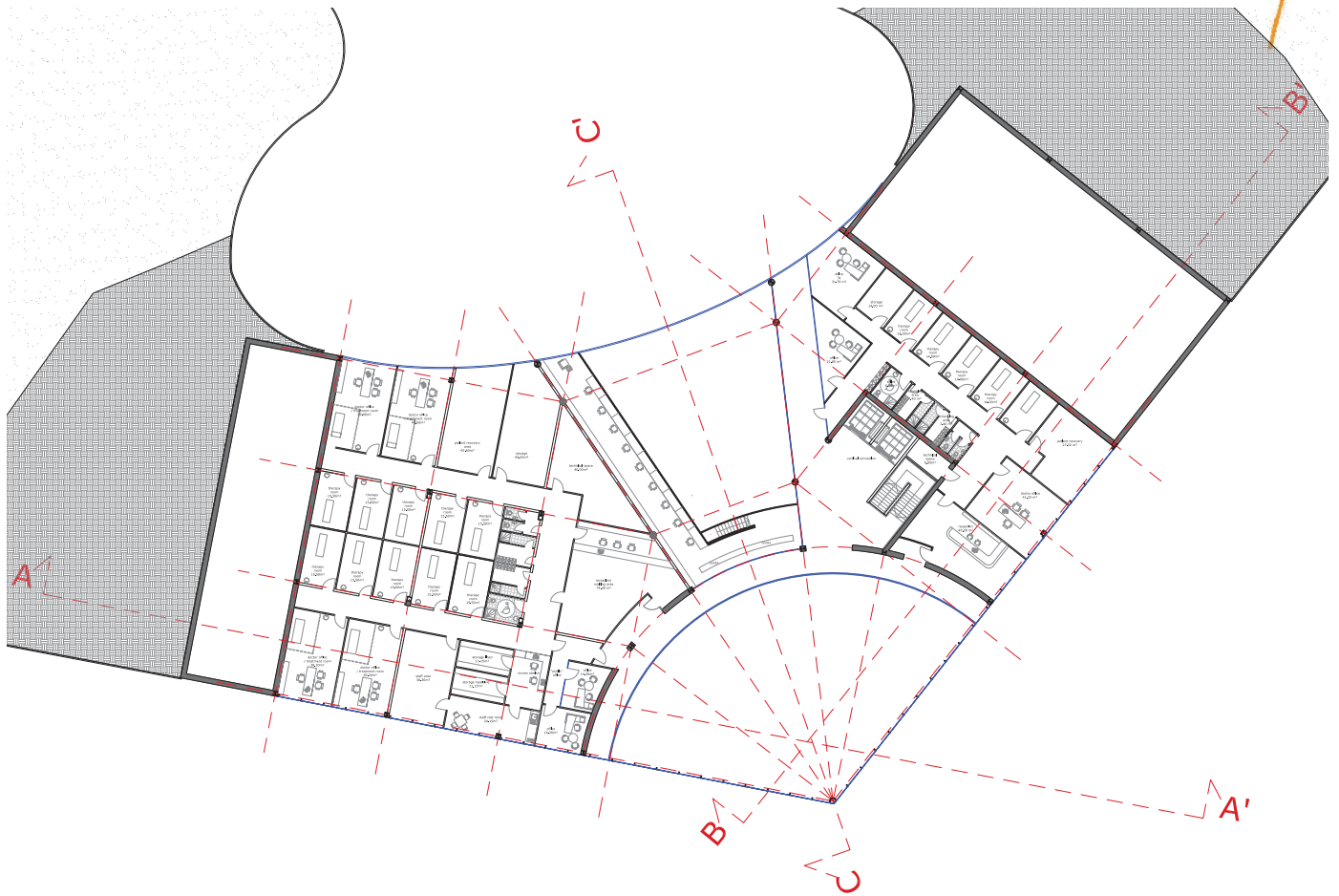


Fig. 45(top) Second Floor (for a larger scale drawing see the annex)

## Second Floor

The second floor contains the second platform of the work space /library and the medical facilities.

The medical facilities have been placed on this floor due to the privacy requirements. This location allows for less traffic and quieter spaces. The central location of the work space/library is responsible for the division of the usable space for the medical facilities in two main surfaces. This allowed for the design of two individual facilities.

The larger medical facility located in the west wing of the building is focused on dealing with general medical issues like low intensity depression, winter depression, small dermatological problems and certain physical injuries. The smaller facility, located in the east wing, houses a "spa" type medical facility providing therapies used to boost immunity, maintain general health and help against jet lag.

The medical devices used in the therapies are vary from small hand held devices, to larger, still mobile devices. The facility can also provide treatments with large fixed

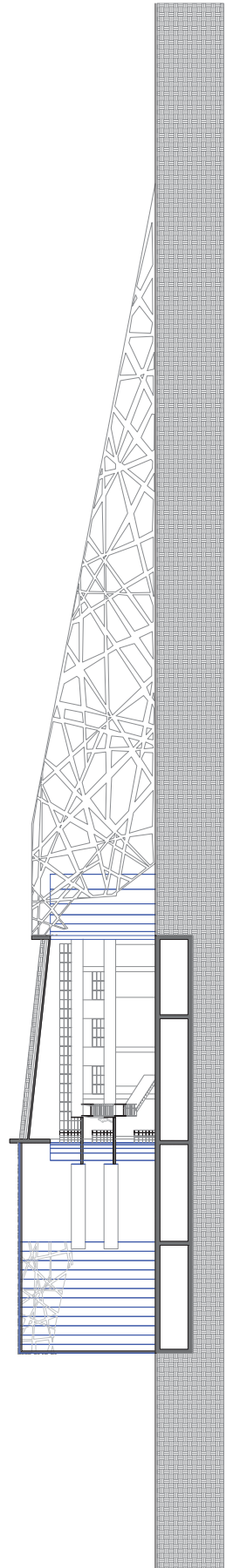
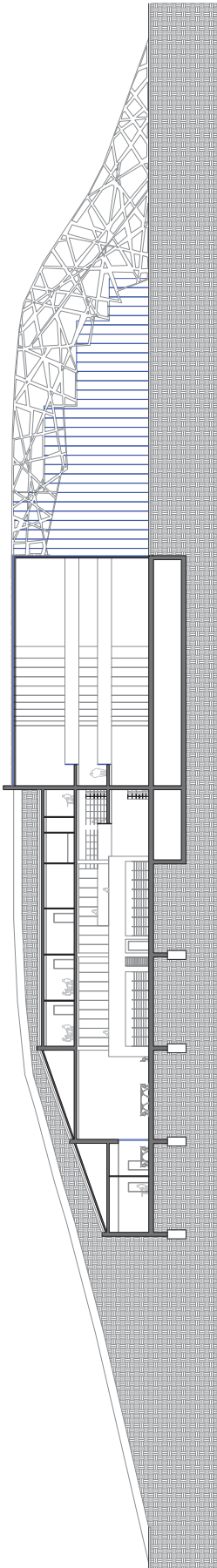
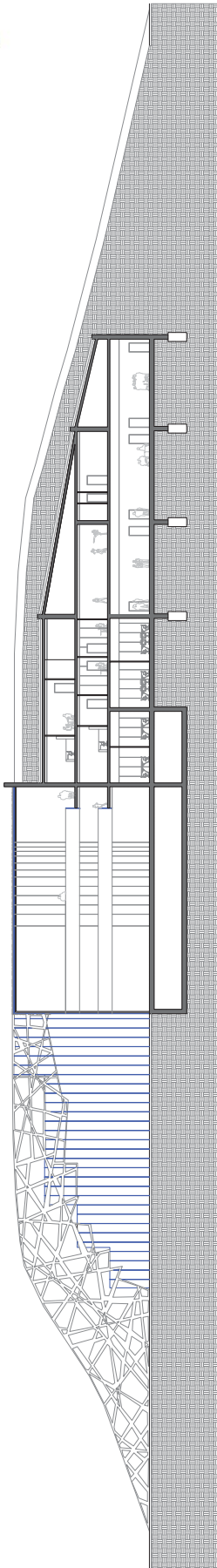
devices resembling "sun tanning" beds. (see page 74)

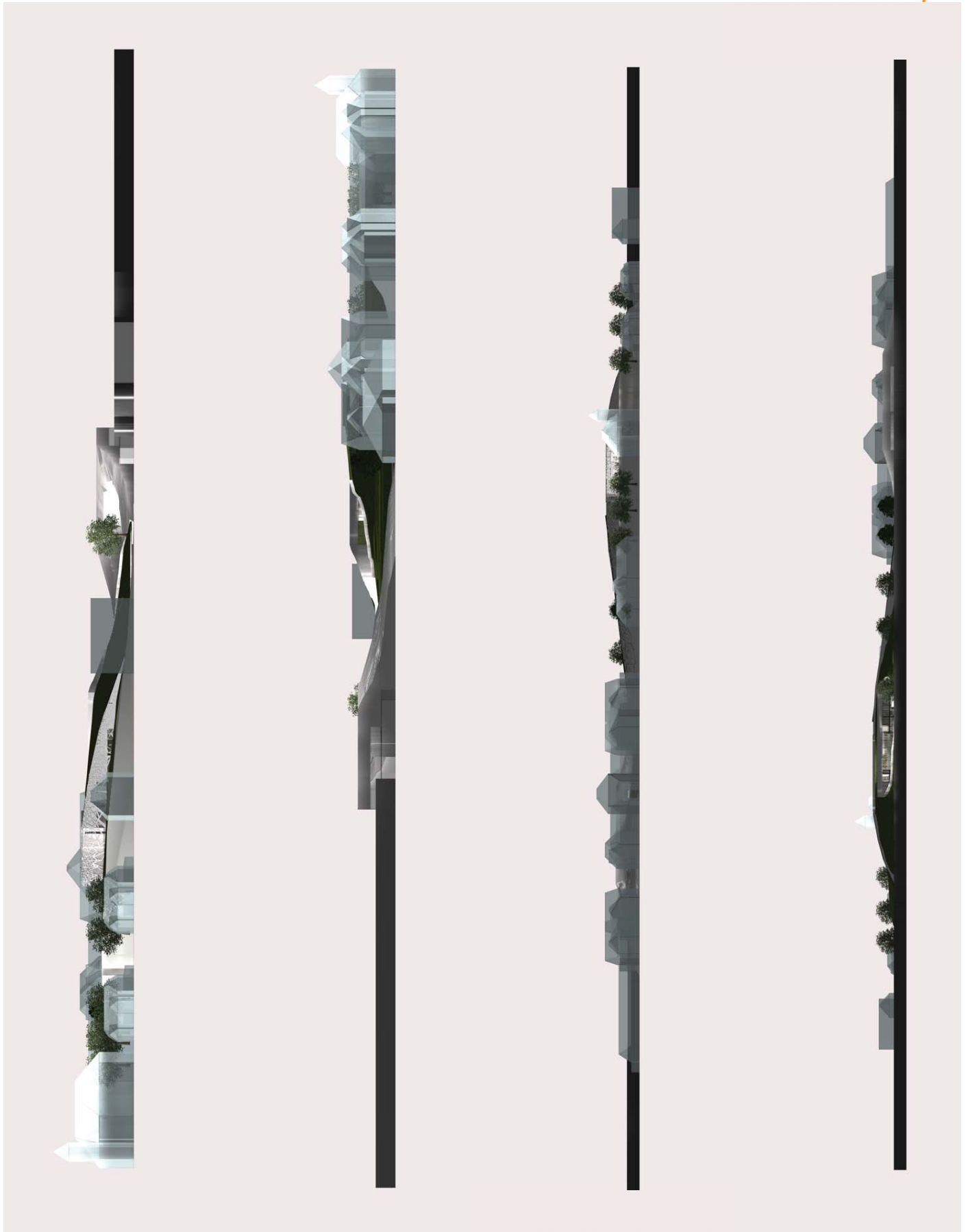
The two elevators have been calculated to house, if necessary, wheel chairs and stretchers.

Fig. 46. (page 68, top to bottom) Sections BB', AA', CC'

Fig. 47. (page 69, top to bottom) Facades











### The outdoor space - the Park

The resulted park represents a connection in the urban green belt of the city of Maastricht that was broken by the seclusion of the Tapijn barrack. The role of the park is to restore that continuity, to allow the preservation of the picturesque environment of the historical wall and the river Jeker and to create an attractive area for recreation.

The park has few urban elements, as the intention was to create a piece of nature and not a designed urban park. The slope of the green areas is low and allows for an easy walk towards the higher levels. Its existence was strongly inspired by the large number of people using the green areas on the shores of the river Jeker to bask in the sun and recharge their batteries.

The main urban design feature of the park is the light system, meant to compensate for the dark days when the sky is covered with clouds and the levels of light are minimal. The scope is to create psychological boosts for the people enjoying fresh air.



Fig 48, 49, 50 (top and right) Digital renders





#### 4.1.4. Light therapy

Light therapy represents the family of medical treatments using the beneficial effects of the rays of sun. Light therapies start from the basic sun bathing, which almost everybody does during the summer time and goes all the way to medical therapies using complex technological devices.

Light therapies are rediscovered in the present and unfortunately in today's society many people underestimate the biological requirements of the human body for sun light. The modern society has moved people back into "caves". The side effect is an increasing number of people suffering from depression and low levels of vitamin D. Despite not being able to help with vitamin D production, light therapy does have many positive uses.

##### 4.1.4.1. History

Since the ancient times, the sun has been a strongly revered force of nature. The divination of sun in the ancient Egyptian culture is a well known element by now. The Romans and the Greeks also realised the benefits of the natural sunlight, element strongly seen in the architecture of the time, when roof terraces were a must in order to maintain a healthy condition. These are just a few of the most common historical facts of they way cultures perceived the benefits of the sunlight throughout history.

Sadly, afterwards, for a very long period of time, the health benefits of the sun light were strongly ignored. Science took a break during the medieval times and valuable information was left idle for a large number of centuries.

Finally, in the more modern times of the 19th century the benefits of the sunlight were taken to a new level by the work of scientists that discovered that ray's of sun have the ability to kill bacteria (even through a glass surface). To top it all of, in 1903, the Danish doctor Niels Finsen<sup>1</sup> received the Nobel Prize for medicine. The work of Finsen proved that Lupus Vulgaris (a tuberculosis form, at that time thought to be incurable) could be cured with the use of ultraviolet radiation.

The discovery was an eye opener as Europe was plagued by tuberculosis and rickets<sup>2</sup>. Rickets is a bone disease, which affected large numbers of people living and working in the developing industrial cities. Scientists also discovered that sun doesn't only cure these crippling illnesses but it also is responsible for a large part of the production of vitamin D in the human body.

<sup>1</sup> Niels Ryberg Finsen (15.12.1860 – 24.09.1904) was a Danish physician and scientist of Icelandic descent. In 1903 he received the Nobel Prize in Medicine and Physiology "in recognition of his contribution to the treatment of diseases, especially lupus vulgaris, with concentrated light radiation, whereby he has opened a new avenue for medical science." - [http://en.wikipedia.org/wiki/Niels\\_Ryberg\\_Finsen](http://en.wikipedia.org/wiki/Niels_Ryberg_Finsen)

<sup>2</sup> Rickets is a softening of bones in children due to deficiency or impaired metabolism of vitamin D, phosphorus or calcium, potentially leading to fractures and deformity. - <http://en.wikipedia.org/wiki/Rickets>



Fig. 51.(above) "Les Frênes" Leysin, Switzerland

Fig. 52. (bellow) View from one of the sun rooms, during a therapy session in the "Les Frênes" clinic



Fig. 53. (above) View of the Zonnestraal Sanatorium, Hilversum, the Netherlands

Fig. 54. (bellow) Aerial view over the Zonnestraal Sanatorium, Hilversum, the Netherlands



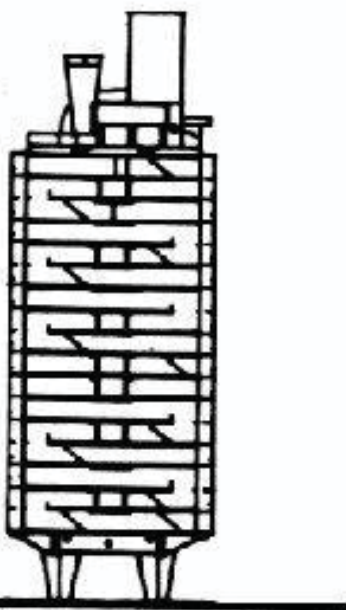
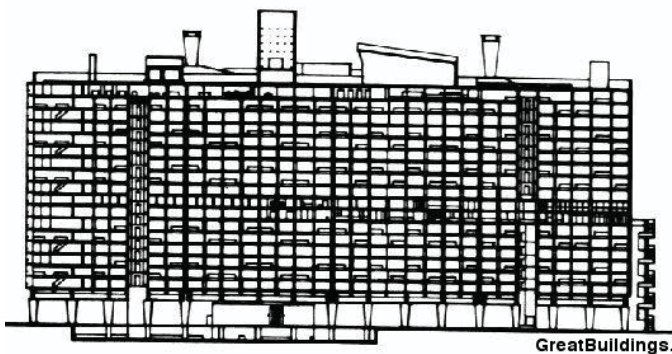




Fig. 55. (above) Picture Unite d'Habitation, Marseilles, France

Fig. 56. (below) Longitudinal section Unite d'Habitation, Marseilles, France

Fig. 57 (bottom) Transversal section Unite d'Habitation, Marseilles, France



Another medical figure, representative for the development of the light therapy was doctor Auguste Rollier<sup>3</sup>. He started using natural light therapy as a treatment for patients with tuberculosis. The work he did at his clinic in the Swiss Alps, starting 1903, implied taking his patients outside for sun bathing sessions. As nothing like this had been done before, the first clinic he opened implied a large number of modifications done to the existing structure: enlarging windows, creating patios and a large solarium on the top floor so patients unable to move could benefit the benefits of sun without the issue of transport or weather conditions. The very first clinic to be built, in modern times in Europe, especially for the use of light therapy was "Les Frênes". The clinic was opened by doctor Rollier in 1911. The building consisted of a central block, south orientated, and two large wings. Every wing had large balconies to allow easy access to outdoor sun bathing. The building also had a roof solarium.

*"The close relationship between sunshine and happiness is so obvious that it hardly requires emphasis. Anyone who has seen the splendour of a typical winter's day in the Alps with its brilliant sunshine and still, cold air will realise what a stimulating effect it has."* (Auguste Rollier)

The many health benefits discovered influenced not only the medical approach but also the architectural approach of the time. The housing architecture of the late 19th century was represented in many places by dense and cramped spaces. The usual courtyards were not enough to bring light in all the apartments. The best location was represented by the front block of the building and in particular by the first floor and its large windows. This location was generally owned by the upper middle class families, leaving the darker apartments for the lower class. Finally in the 1920's a social reform concept was used to increase the life conditions of the workers.

A new style of design was born, one that focused on the amount of sun light that could reach the interior spaces of the houses and the architect Le Corbusier<sup>4</sup> was one of the most important spokespersons of the new architectural trend. His preoccupation with sun light and tuberculosis was transcribed into his architectural designs.

"Unité d'Habitation" is a one of the most influential works of Le Corbusier. The project was built between 1947 and 1952 in Marseilles, France. The purpose was to alleviate a severe shortage of housing in the post war period. The giant block could house 1600 people and contained 23 different apartment layouts, almost all with double height liv-

<sup>3</sup> Auguste Rollier (1874-1954) is a famous heliotherapist. He opened 36 clinics with over 1000 beds in Leysin, Switzerland. His work was used to treat many illnesses of the era, in particular tuberculosis.

<sup>4</sup> Le Corbusier born Charles-Édouard Jeanneret, (6.10.1887 – 27.09.1965), is one of the pioneers of the modern architecture. He was an architect, designer, urbanist, and a writer. His career spanned five decades and his buildings were constructed throughout Europe, India and America.

ing spaces. Next to large windows and balconies, Le Corbusier designed a communal roof top for all the apartments dwellers. (See fig 55, 56, 57)

In the Netherlands the first clinic for sun therapy was built in the year 1926 in Hilversum. Called the “Sanatorium Zonnestraal”, the sanatorium was initially used to treat diamond cutters that suffered from tuberculosis. The name Zonnestraal means “sunbeam” in the Dutch language, which seems rather fitting. The project of the sanatorium was commissioned by an Amsterdam based health care cooperative for diamond workers to the Dutch architects Jan Duiker and Bernard Bijvoet. Due to the lack of funds, the project was postponed for several years. By the time the funds were made available, and the design could begin Bijvoet had already relocated to Paris. This made Duiker the primary architect responsible for the project of the sanatorium.

Initially, the building was intended to serve only low wage male workers, in the attempt to return them as fast as possible to their work. Due to the requirement of new funding, the targeted clientele was enlarged allowing for the facilities to be used by men, women and children.

After a period of intense use and international renown, the sanatorium faced closure due to the increase in use of antibiotics and eradication of tuberculosis. Luckily the building has been restored (starting 2001) and preserved as a national monument.

With the death of Auguste Rollier in 1954 and the increase in activity of the pharmaceutical industry, the use of light therapy lost public interest. The gentleness and the effectiveness of the cure brought by sunlight was soon ignored and simply forgotten. Until now.

#### 4.1.4.2. Present day medical use and technology

The most common use for light therapy is to treat the depressions resulted out of the lack of light during the winter months. For that blue light lamps can be used, both in a medical facility as well as at home with commercial small devices.

The use of light therapies on skin issues ranges from smaller items like eczema and rashes and goes all the way through to psoriasis and even skin cancer.

Sport therapy makes use of light therapy for a decreasing the necessary healing time for injuries, as well as to increase the results of professional athletes.

Sleep therapy is another therapy increasing in demand in the modern society. Stress and the disruption of the natural biorhythm based on sun light are two of the most common causes for sleep disorders.

Beautification uses for light therapy are the most profitable today. Many devices have been researched and designed to be bought and used at home. Unfortunately many of them are of low quality as the desire for profit is



Fig. 58. (above) Golite Philips system.

Fig. 59. (below) Bioptron



Fig. 60. (bellow) Sensolite therapy bed

Fig. 61. (bottom) Sensolite therapy bed







Fig. 62. (above) BlueTouch Pain Relief Patch (Philips)

Fig. 63. (below) Dynamic lighting concept Philips



Fig. 64. (below) Photon Therapy LED Light Beauty Machine .AYJ-M13A



interfering with the proper public awareness. To list just a few, light therapies are used in: hair removal, hair rejuvenation, wrinkles reduction, wrinkle resurfacing, skin pigmentation, skin tightening, scar treatment, tattoos, acne, vascular lesions, pigmented lesions, tattoo removal, adipose tissue and cellulite, and many others.

The laser technology (a more particular use of the light therapy) is strongly used in surgical and beautification applications.

- Blue light / Sun light

The system, used by several companies today, uses exposure to blue light in order to counter the effects of the SAD disorders (Seasonal Affective Disorder). Some examples of products are the GoLite Philips lamps (Fig. 58) and the Lightphoria Sad Light Therapy. The technology is generally simple to manoeuvre and it requires little to none training.

- Dynamic Lighting (Philips)

Dynamic Lighting is used to bring the dynamics of daylight indoors. Its purpose is to enhance people's sense of well being. (Fig. 63)

The system mixes the light output of two different lamps to create a variation of colour temperature and light intensity. One lamp has a colour temperature of 2600 K (warm white) while the other has 5600 K (cool white). Using different light outputs means the colour temperature can have endless variations between the values of the two lamps.

- School Vision Philips Technology

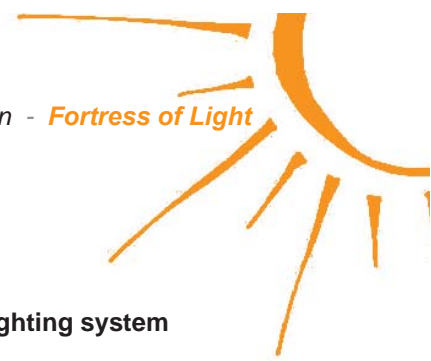
School Vision Philips Technology is a simple solution that allows teachers to control the classroom atmosphere and to create the right ambience – whatever the time of day or lesson. Making the learning environment as comfortable as possible for each activity, allows the young minds alert and eager, optimising results for teachers and pupils.

The system consists of a system of ceiling lights with four lighting settings. Firstly, the “normal” setting with standard intensity level and standard colour tone for the normal setting of regular classes. Secondly the “focus” setting with the highest intensity level and a cool colour tone, meant to support concentration for tests. Thirdly the “energy” setting with a higher intensity level and a very cool colour tone, that is meant to support either a fresh start of a day or the regrouping after the lunch break. And lastly the “calm” setting with standard intensity level and warm colour tone meant to support a class that is too hyperactive.

The system does not require any additional personnel or any special training.

- Polarized light

Polarized light is used either as a local treatment with local hand held devices or as a full body treatment with sun tanning beds like devices. Bombarding the body with polarized light enables it to boost its immune system for an improved delivery of the oxygen to the cells, with the general effect of improved functionality of the human body. The



therapy has been also used with success on sports related therapies, helping speed up recovery of the injured parts.

The equipment is used by trained personnel. The degree of training varies from specific training on the less invasive devices to the full medical trained personnel for the complex devices.

Examples of products: Sensolite (Fig. 60 and 61) , Bioptron (Bioptron compact, Boptron pro 1, Bioptron 2) (Fig. 59).

- The Heal Well Solution (Philips)

The technology helps patients recover better and faster after a medical intervention. The research was born from the observation that patients recovering in the south side facing rooms of a hospital, had a shorter recovery time than the ones resting in the north side facing of the buildings.

The technology aimed to implement special artificial light to compensate for the lack of intense light in the north facing rooms. The implementation of the new technology cancelled the disadvantage of the location.

- Photodynamic therapy

Photodynamic therapy, in short PDT, is a form of phototherapy that uses nontoxic compounds that are light sensitive. During the therapy process they are selectively exposed to light. By doing so they become toxic elements for the targeted diseased cells.

Photodynamic therapy has been successfully used to kill microbial cells including bacteria, fungi and viruses. The most popular use of the photodynamic therapy has proven to be the treatment of acne. Medical uses of the therapy include a wide range of health conditions, including wet age related macular degeneration and malignant cancers.

The majority of modern systems of photodynamic therapy involve a photosensitizer, a light source and tissue oxygen. The combination is used to chemically destroy any tissue that has selectively taken up to the photosensitizer or has been locally exposed to light.

- BlueTouch Pain Relief Patch (Philips)

The device responds to the large percentage of adults, suffering from muscle and joint pain, looking for an efficient natural treatment. The treatment is based on increasing the production of nitric oxide in the skin with the help of a special type of blue light LED's. (Fig 62) This has been proven to trigger a number of protective and preventive processes in the human body. The technology can be used on both fixed and mobile devices.

- Therapeutical use of lasers

Lasers are a special type of light therapy. They are used with great success to treat cancers and other tumours. Prior to the surgery special substances are introduced in the body to bond with the diseased cells. The laser uses them as a guiding system in order to destroy the negative elements. The technology is very specialised and used only in specialised hospitals.

#### 4.1.2.5. Outdoors lighting system

Most of the light therapy technologies focus on the interior systems and discard the outdoor possibilities. It is indeed more difficult to create devices for light therapy in exterior settings due to the variable nature of the natural light. Artificial light therapies have not yet managed to help with the natural production of the body of vitamin D.

Recent research studies have proven that in order to prevent the winter depression even the low levels of light during the winter days are more than enough. The downside is the negative psychological effect of the dark cloudy days. As even if on a biological level the light is helpful, the visual effect is not enticing, and that makes many people ignore the benefits and search for stronger light environments indoors.

A desired course of action would, thus, be to create outdoor systems that can sense the levels of natural light and simply compensate (not override) for the low visual amount helping with the possible psychological side effects.

Presently, in the Netherlands, light therapy is used in

- almost all psychiatric polyclinics of regular and academic hospitals;
- all departments of PsyQ (Psycho Medische Programma's) [www.psyq.nl](http://www.psyq.nl);
- most of the psychiatric hospitals (for example: GGzE in Eindhoven and GGZ Breburg in Tilburg;
- Geestelijke Gezondheidszorg (RIAGG);

and in a large variety of facilities for the elderly:

- Wissenhaeghe (Vitalis) in Eindhoven;
- St. Franciscus in Gilze;
- De Bolder (Vivium Zorg Groep) in Huizen;
- Oosterheem (WoonZorg Haaglanden) in Zoetermeer;
- De Weyert (ZZWD) in Dwingeloo;
- De Wartburg (Axion continu) in Utrecht;
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- Blue Touch Pain Relief - Sports

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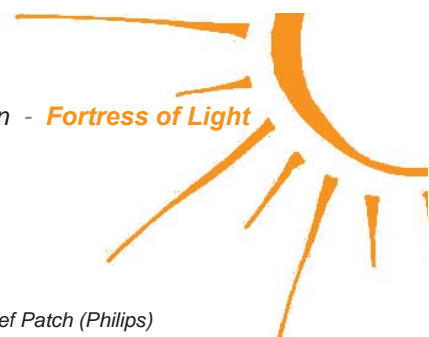
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- Fig. 4. - Map of the green surfaces, 2012 Maastricht  
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- Fig. 13.  
- <http://www.google.nl/imgres?um=1&hl=nl&tbo=d&biw=1600&bih=797&tbn=isch&tbnid=T-MQrB8-wiiDWM:&imgrefurl=http://www.polycount.com/forum/showthread.php%3Ft%3D65671&docid=LhOAHa2BKRArM&imgurl=http://www.richkni.co.uk/dartmoor/pix/hanging/hang11.jpg&w=900&h=597&ei=RvzIUMbLBILM0AWF74HYBw&zoom=1&iact=hc&vpx=1150&vpy=440&dur=288&hovh=183&hovw=276&tx=119&ty=85&sig=111048939670513498092&page=1&tbnh=150&tbnw=222&start=0&ndsp=31&ved=1t:429,r:22,s:0,i:150>
- Fig. 14 - Pictures representing different types of military object camouflage  
- <http://www.militaryphotos.net/forums/showthread.php?24770-camouflaged-tanks>
- Fig. 51.- "Les Frênes" Leysin, Switzerland  
- <http://notresaga.com/jeanetautres10.html>
- Fig. 52. - View from one of the sun rooms, during a therapy session in the "Les Frênes" clinic  
- <http://notresaga.com/jeanetautres10.html>
- Fig. 53. - View of the Zonnestraal Sanatorium, Hilversum, the Netherlands  
<http://www.zegelaar.com/index.php?showimage=21>
- Fig. 54. - Aerial view over the Zonnestraal Sanatorium, Hilversum, the Netherlands  
- <http://www.suzannefischer.nl/pages/Projecten/Zonnestraal.html>
- Fig. 55. - Picture Unite d'Habitation, Marseilles, France  
- [http://www.greatbuildings.com/cgi-bin/gbi.cgi/Unite\\_d\\_Habitation.html/cid\\_1165875418\\_1\\_14.html](http://www.greatbuildings.com/cgi-bin/gbi.cgi/Unite_d_Habitation.html/cid_1165875418_1_14.html)
- Fig. 56. - Longitudinal section Unite d'Habitation, Marseilles, France  
- [http://www.greatbuildings.com/cgi-bin/gbc-drawing.cgi/Unite\\_d\\_Habitation.html/Un\\_d-Habit\\_Section\\_A.jpg](http://www.greatbuildings.com/cgi-bin/gbc-drawing.cgi/Unite_d_Habitation.html/Un_d-Habit_Section_A.jpg)
- Fig. 57 - Transversal section Unite d'Habitation, Marseilles, France  
- [http://www.greatbuildings.com/cgi-bin/gbc-drawing.cgi/Unite\\_d\\_Habitation.html/Un\\_d-Habit\\_Section\\_B.jpg](http://www.greatbuildings.com/cgi-bin/gbc-drawing.cgi/Unite_d_Habitation.html/Un_d-Habit_Section_B.jpg)
- Fig. 58. - BlueTouch Pain Relief Patch (Philips)  
- [http://www.design.philips.com/philips/sites/philipsdesign/about/design/designnews/newvaluebydesign/january2012/blue\\_touch\\_pain\\_relief.page](http://www.design.philips.com/philips/sites/philipsdesign/about/design/designnews/newvaluebydesign/january2012/blue_touch_pain_relief.page)
- Fig. 59. - Bioptron  
- <http://www.bioptron.eu/>
- Fig. 60. - Sensolite therapy bed  
- <http://www.sensolite.nl/?lang=en>
- Fig. 61. - Sensolite therapy bed  
- <http://www.sensolite.nl/?lang=en>
- Fig. 62. - BlueTouch Pain Relief Patch (Philips)  
- [http://www.design.philips.com/philips/sites/philipsdesign/about/design/designnews/newvaluebydesign/january2012/blue\\_touch\\_pain\\_relief.page](http://www.design.philips.com/philips/sites/philipsdesign/about/design/designnews/newvaluebydesign/january2012/blue_touch_pain_relief.page)
- Fig. 63. - Dynamic lighting concept Philips  
- [http://www.lighting.philips.com/main/lightcommunity/trends/dynamic\\_lighting/what\\_is\\_dl.wpd](http://www.lighting.philips.com/main/lightcommunity/trends/dynamic_lighting/what_is_dl.wpd)
- Fig. 64. - Photon Therapy LED Light Beauty Machine .AYJ-M13A  
- [http://sell.pakuya.com/upload/20110820/HOT\\_Photon\\_Therapy\\_LED\\_Light\\_Beauty\\_Machine.jpg](http://sell.pakuya.com/upload/20110820/HOT_Photon_Therapy_LED_Light_Beauty_Machine.jpg)



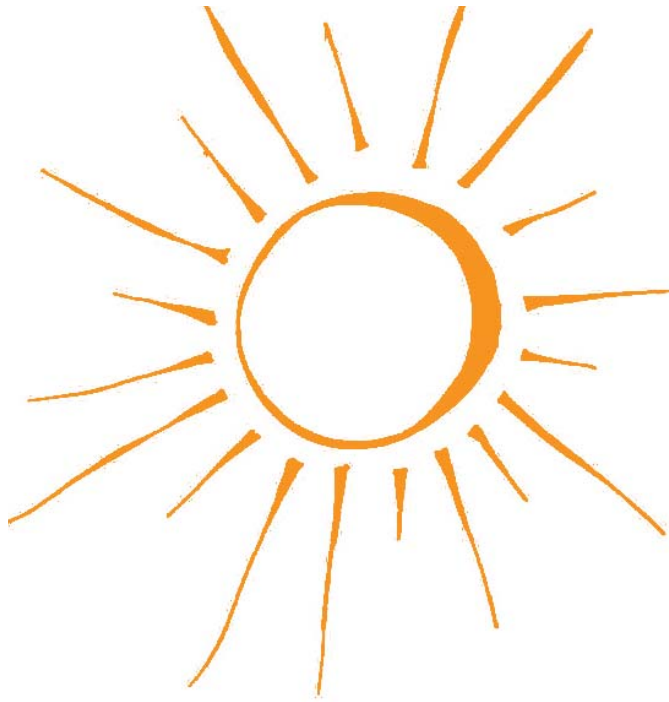




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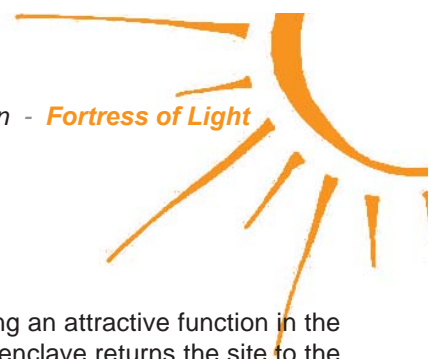






*“Architecture should have little to do with problem solving  
- rather it should create desirable conditions and opportunities  
hitherto thought impossible.”*

*— Cedric Price, The Square Book*



## 5. Conclusion

In the research phase of this project three stakeholders were identified: the city, the University and the residents of the neighbourhood.

The main importance for the city of Maastricht was in increasing income from tourism and redeveloping the city as an attractive location for international innovation.

The main importance for the University was the expansion of student facilities allowing for further growth.

The main importance for the residents of the neighbourhood was to increase access to green spaces for rest and recreation.

As a symbiosis of the three goals is expected to gather the most support from all stakeholders it is likely to prove most economically viable as it has access to the shared resources.

The Light Therapy Park revives the financial interest in the city. Its function is meant to attract investors from the medical field, researchers and patients. The process uses the existing medical image of the city and boosts it to a higher level. The increase in economic interest will attract young people to settle in the city once more and revive the housing market.

The benefits for the University are not just in a larger number of buildings but also in the opportunities it creates for its students. They can access the research facilities and benefit from internships supervised by internationally renowned scientists. The expected long term benefits are: an increase in student numbers, specialised guest scientists and international renown.

The light therapy used in the facilities of the park will not only help the patients. It will also increase the productivity of the students and the welfare of the residents from the area.

The green area of the park will emphasise the collective character of the people from Maastricht and create a good environment for social interaction.

In addition to the before mentioned benefits, the Light Therapy Park also responds to the geographical disadvantage of the northern European countries, providing relief for an increasingly common disorder. As such, it is likely to draw visitors from the surrounding countries next to the local visitors.

The restoration and reuse of the most prominent and publicly known buildings retains the original character of the site while opening up the centre as a large scale park. Turning the core into a fortress allows it to guard the access of

the people to sunlight. Placing an attractive function in the unknown area of the former enclave returns the site to the urban fabric from which it was brutally torn a century ago.

In creating a second landscape and hiding new and important functions in plain sight, military strategens such as camouflage and controlling the movement of people in terrain are honoured. The unity of the site reflects both the military unity as well as providing a focal point for future investments.

The method of reuse used here focuses more on the revival, conservation and reinterpretation of the character and idea of the site instead of on the pure reuse of the brick. The design maximises the usable space while minimising the impact on the green spaces in the core, thus defending the rights of residents and users to access the life giving energy of the sun.

Taking all this into account I believe that the project satisfies the criteria set forth by the stakeholders due to the fact that the common goals are met without a single stakeholder being left out.

It is said that a good compromise leaves all parties disappointed. I believe this project creates an effective symbiosis rather than a forced compromise.

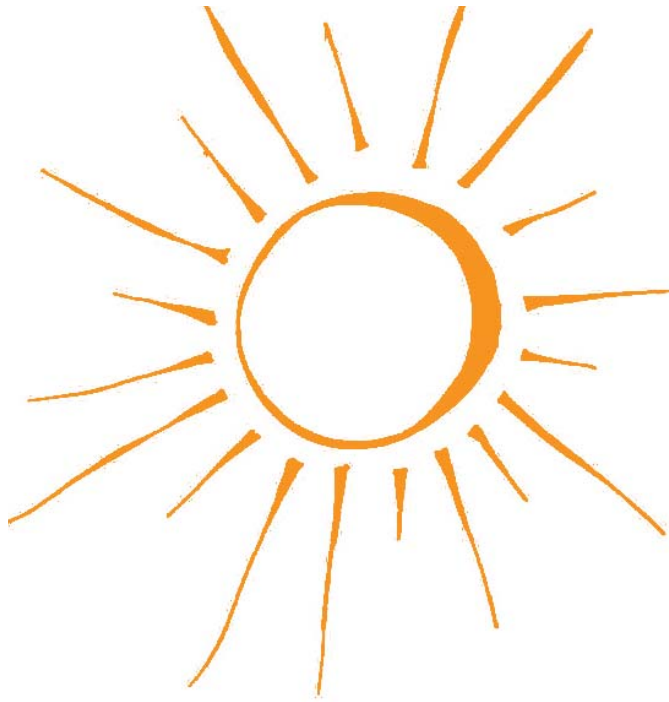






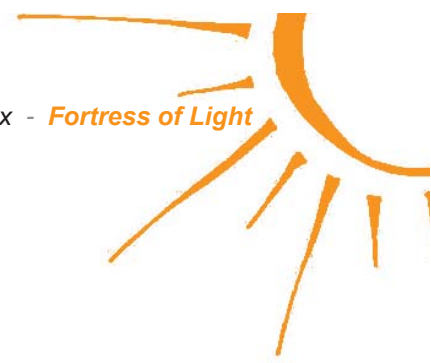






*“The architect, like other workers in our endeavor, is facing the inevitability of a change of profession: he [sic] will no longer be a builder of forms alone, but a builder of complete ambi-ances.”*

*— Tom McDonough, The Situationists and the City: A Reader*



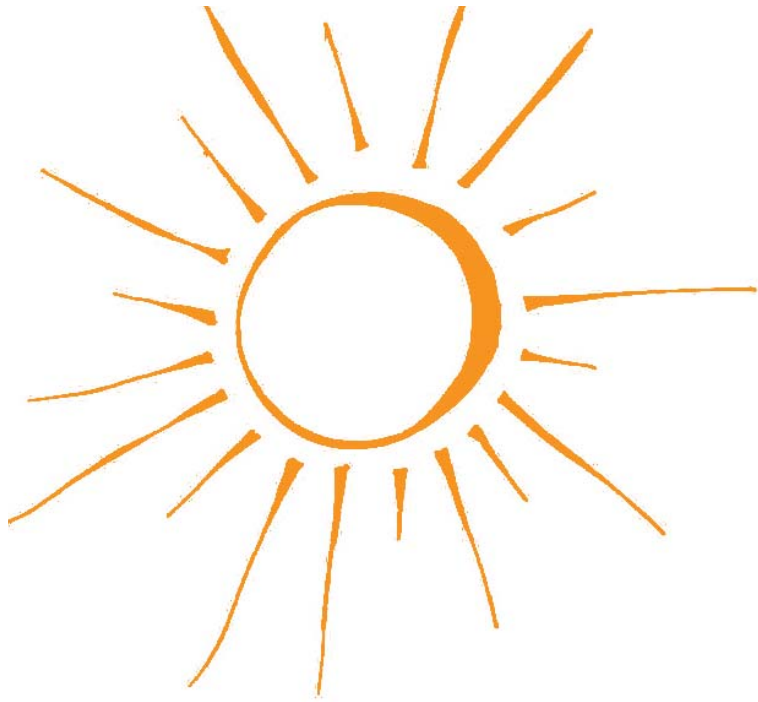
## 6. Annex

- 6.A. Mater Plan
- 6.B. Ground Floor Plan
- 6.C. First Floor Plan
- 6.D. Second Floor Plan
- 6.E. Basement
- 6.F. Sections
- 6.G. Technical Detail Roof
- 6.H. Technical Detail Floor

*Image Source*

- Chapter Cover
- <http://www.willburt.com/products/integrated-trailers/tactical-military-trailers/?lang=pt>



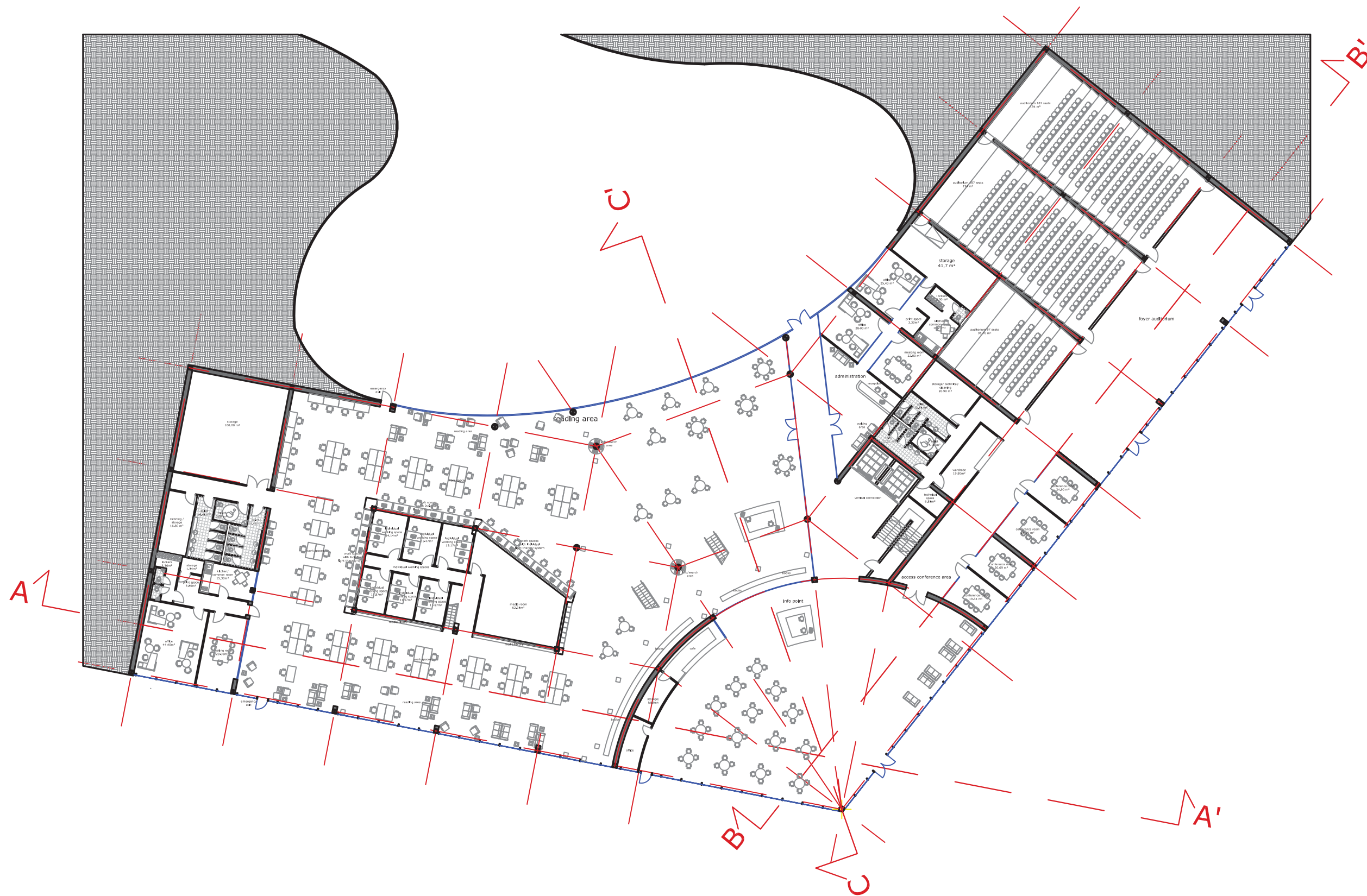


# 6.A.Master Plan





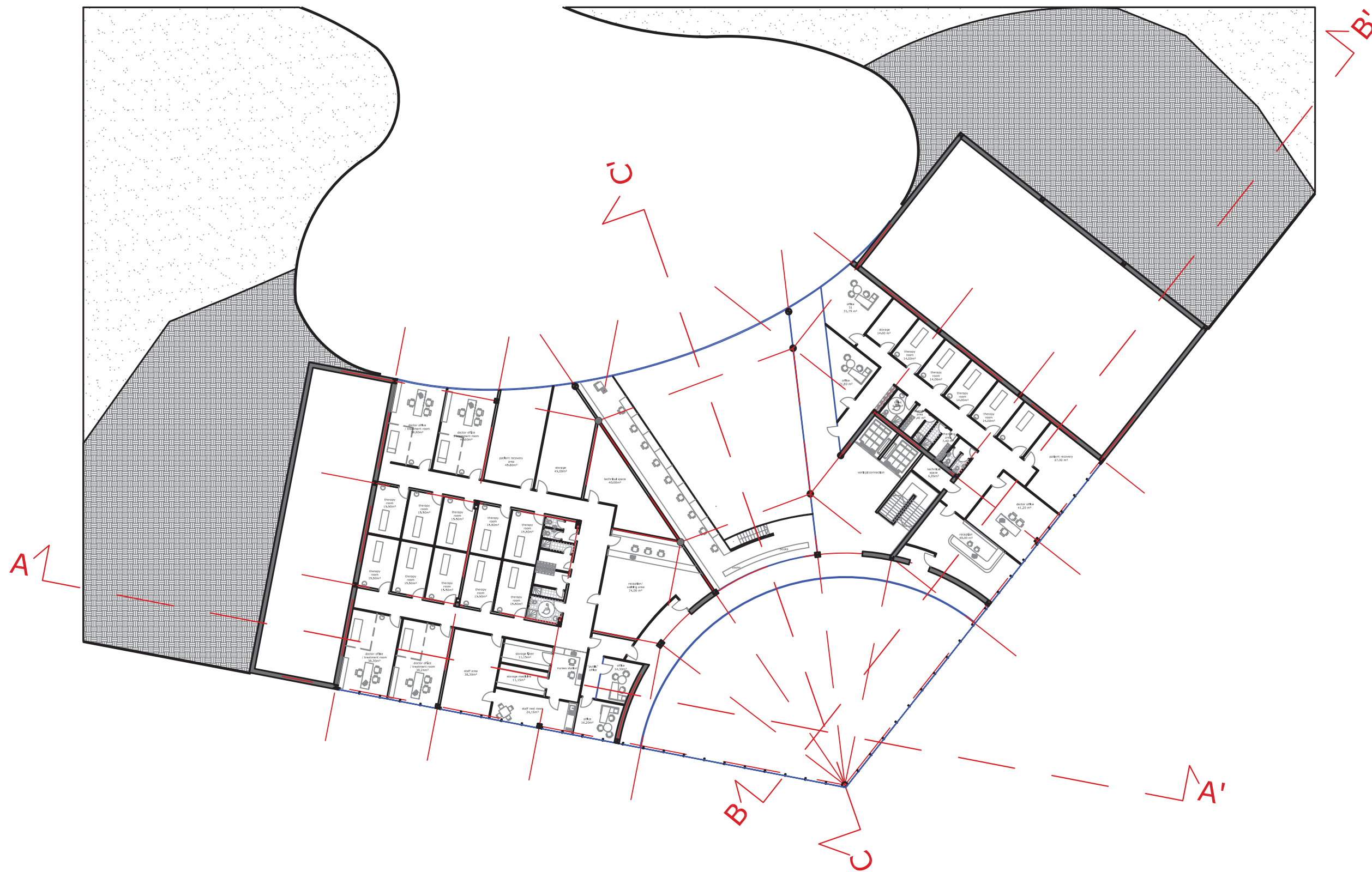
# 6.B.Ground Floor scale 1:400



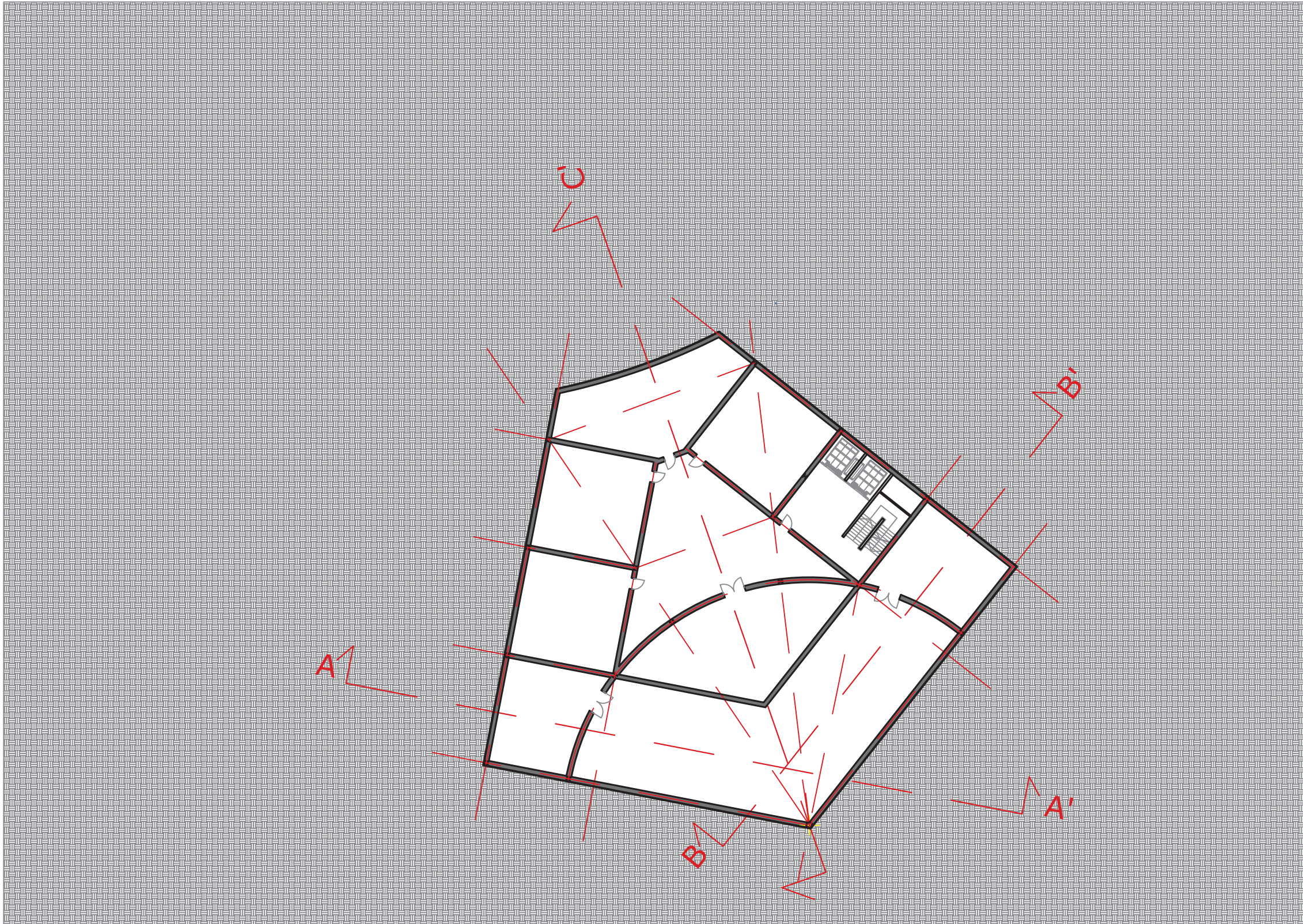




# 6.D.Second Floor scale 1:400

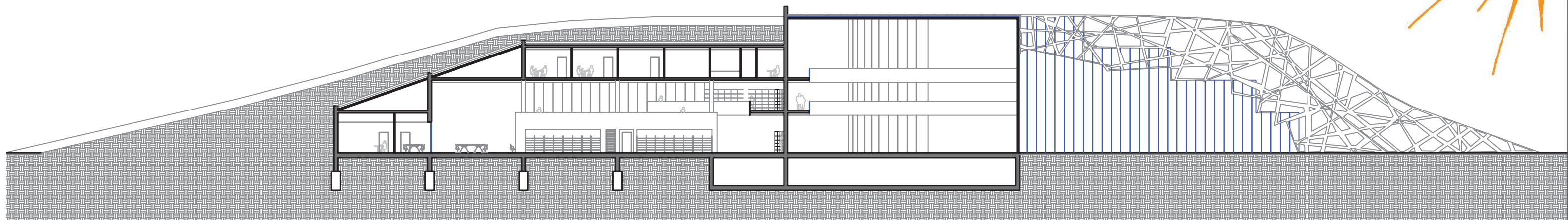


# 6.E.Basement scale 1:400

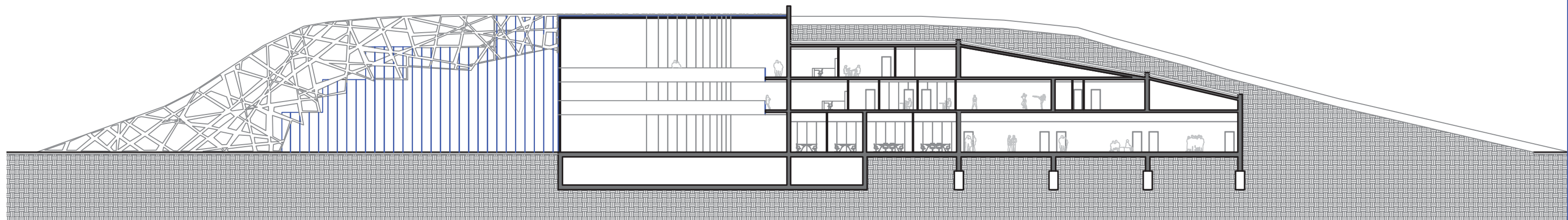




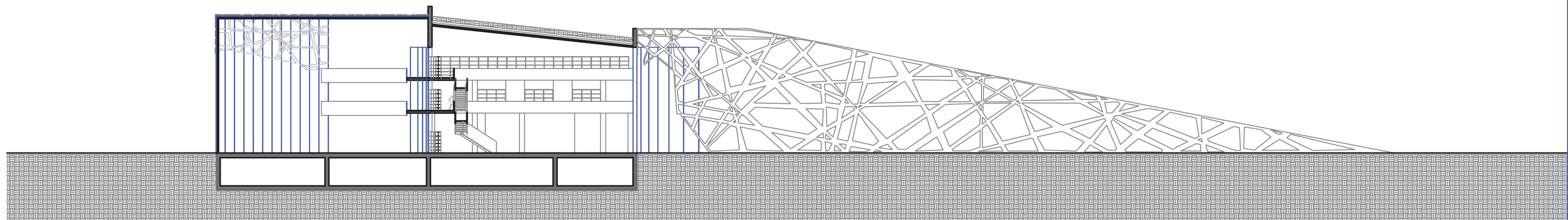
# 6.F.Sections scale 1:400



Section AA'



Section BB'



Section CC'

### 6.G. Technical Detail

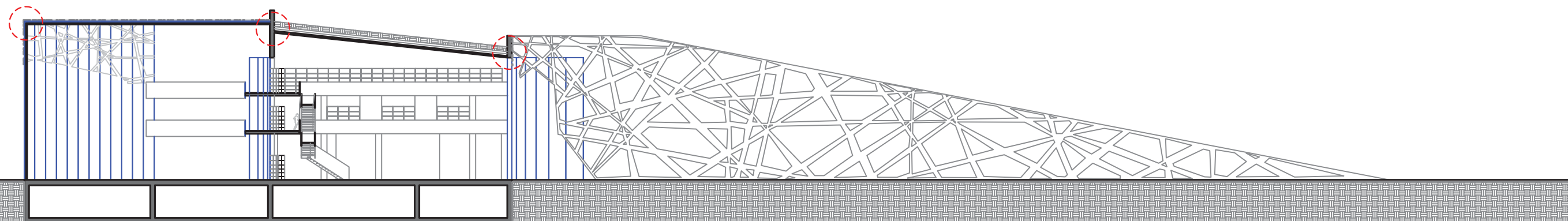
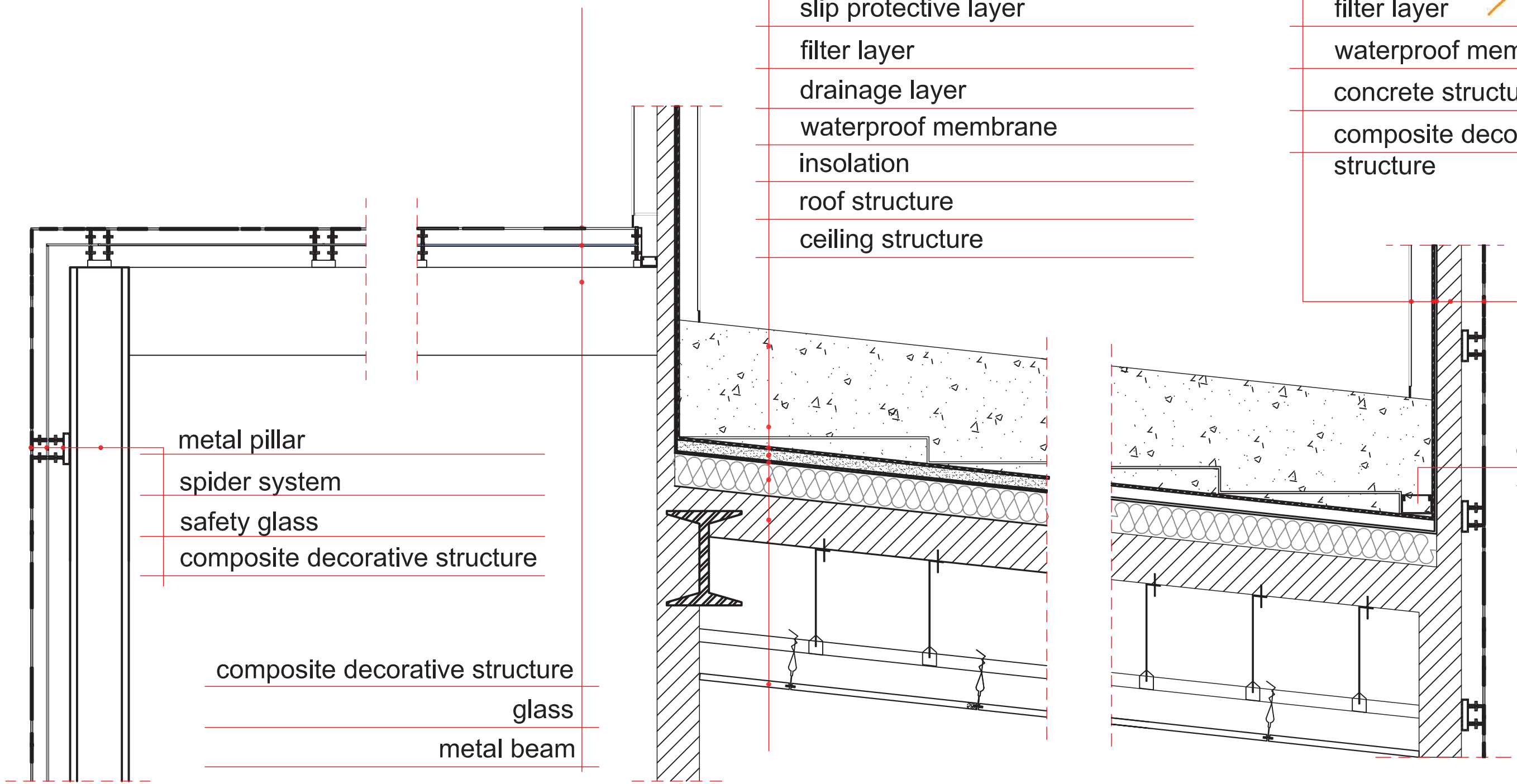
- green roof
- slip protective layer
- filter layer
- drainage layer
- waterproof membrane
- insolation
- roof structure
- ceiling structure

- protective layer
- filter layer
- waterproof membrane
- concrete structure
- composite decorative structure

- metal pillar
- spider system
- safety glass
- composite decorative structure

- composite decorative structure
- glass
- metal beam

- drainage system







### 6.H. Technical Detail

