# Light and built form

*Daylight therapy spa for a Nordic setting*

*Elias Sandberg*

*2019*

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CHALMERS

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*Master Thesis*
*Chalmers School of Architecture*
*Department of Architecture and Civil Engineering*
*Architecture and Urban Design, MPARC*
*Spring 2019*

# Abstract

In Sweden lighting conditions vary between an excess of daylight during the summer months to an almost complete lack of daylight during the winter months. The circadian rhythm is not adapted to handle this amount of variation in our daylight intake and prefers a steady day and night cycle. This causes many people in Sweden and the Nordic countries to develop Seasonal Affective Disorder (SAD) during the winter months.

SAD is a mood disorder subset in which people who otherwise have normal mental health throughout most of the year exhibit depressive symptoms at the same time each year, most commonly during the winter.

New technology allows us to emulate the light emitted from the sun. What are the applications of this new technology and how can it be implemented into architecture and how can this improve the quality of life for people living in the Nordic region? This question is most relevant in delicate situations such as healthcare environments. However since SAD affects most people living in the north, a solution should aim to prevent rather than to cure.

As it is more effective to treat illness at the base of its problem rather than trying to fix it after the damage already is done.

Architecture that aims to prevent the effects of SAD should not be exclusive to people who are already in hospitals. A way of doing this is to introduce passive light therapy in a public space to combat the effects of SAD. A suitable environment to do this is a spa, since the notion of visiting a spa already has a connection to health for both body and mind. It is easy to further that notion and to also to make light therapy more appealing.

To investigate what kinds of spatial and tectonic features a light therapy spa requires, the intention is to work with computer aided design in combination with sketching. Alongside with investigations of Scientific and architectural references to understand both the technical and physical requirements of such architecture.

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ARK137 - Future visions for healthcare, housing and work 2: Housing inventions, spring 2018
ARK263 - Future visions for healthcare, housing and work 3: Healthcare architecture, autumn 2017

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Narrative space 2013

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## **01 :** INTRODUCTION & BACKGROUND



## **02 :** SITE & CONTEXT



## **03 :** SITE STRATEGY & PROGRAMME



## **04 :** FINAL PROPOSAL



## **05:** CONCLUSION & REFERENCES

# INTRODUCTION & BACKGROUND

# 01

*Research question, problem statement & goal*
*Delimitations*
*Background*
*Seasonal affective disorder*
*Treatment methods*
*Light therapy*
*Light therapy today*
*Light therapy & the spa experience*
*Working method*

## Research question

How can architectural design help relieve the symptoms of seasonal depressive disorder and improve the quality of life during the winter in the Nordic region?

How can a spa facility integrate light therapy into its treatment?

## Problem statement

Light therapy is a treatment method commonly used to combat SAD (seasonal depressive disorder) but the light therapy rooms in existence today is very clinical or outright boring and has no inherent appeal outside of treatment. This might cause people who are suffering from milder cases of SAD to refrain from attending light therapy. By applying light therapy functions to an activity strongly connected to wellness, such as a spa, the goal is to attract a broader variety of people to participate in light therapy, and also to add another aspect of wellness to the spa experience.

## Goal

The goal with this master thesis is to design a spa and hotel which has the purpose to treat seasonal depressive disorder through light therapy.
The building will also aim to provide a luxurious atmosphere in order to attract visitors during all seasons as well as to avoid institutional association.

## Delimitations

The primary purpose of this thesis is to investigate the spatial and atmospheric properties of a spa. In the final proposal, for the sake of the overall concept, a part of the building will be a hotel.

The hotel part of the design is of secondary importance to the thesis and will not be investigated beyond that of the basic measurements and functions of a hotel room.

Picture above: *Investigation in light and atmosphere, how particles in the air create atmospheric spaces.*

# Introduction

**Background**
The daylight conditions in the Nordic region are quite extreme as it fluctuates heavily between the different seasons. Excess of daylight during the summer and a deficit of daylight during the winter. This sometimes harsh environment has a very prominent effect on how we live and act during different times of the year.

**Daylight & everyday life**
For example the willingness to spend time outdoors are severely diminished during the winter, partly because of the cold weather but also because of the darkness. For some people the willingness might be there but the opportunity is not. In Sweden the 8 hour work day is the norm, usually from 08:00 to 17:00, this means that the majority of the daylight hours are spent indoors. During the winter it can even mean that all of the daylight hours are spent indoors, especially in the northern parts of Sweden. In Västerbotten during the winter solstice (22 Dec 2019) the sun rises at 09:40 and sets at 13:30 (Suncalc.org). The time-frame to be outdoors in the daylight is limited to short breaks during lunch or coffee.

**Vitamin D**
According to recent research we need to spend up to 2 hours a day with 10% of our body exposed to acquire sufficient vitamin D for daylight during the winter *(Plataforma SINC. 2017).* This is difficult to achieve for the average person living in Sweden, and for the population living in the far northern part of Sweden simply impossible, due to the daylight hours being very short. Luckily vitamin D can be supplemented through vitamin D enriched foods or vitamin pills.

**Circadian cycle**
Another aspect of daylight that is imperative to human well being is the daylight entering the eye, as it has a direct impact on the circadian cycle (Mead M. N. 2008). When light enters the eye it travels on a direct pathway from the retina to the hypothalamus, an area in the brain responsible for hormone and neurotransmitter production as well as hormone and neurotransmitter inhibition. (Joarder, Price, a. & Mourshed, m., 2009.) Light exposure causes the hypothalamus to produce hormones associated with happiness and alertness such as dopamine and serotonin. Lack of light exposure on the other hand produces hormones such as norepinephrin ,acetylcholine and melatonin, hormones associated with tiredness. For this master thesis Serotonin and Melatonin are the hormones that are most relevant, since they are responsible for regulating the circadian cycle.



**Serotonin**
The neurotransmitter serotonin is responsible for regulating emotions such as sleep, metabolism, body temperature, appetite and desire. When bright sunlight enters the eye the amount of serotonin in the body increases.
While if there is a lack of daylight, for example during a cloudy day, the serotonin levels are lowered (Zullo, 2007). Low serotonin levels are among other things connected to disturbed sleeping patterns, the reverse is true if the serotonin levels in the body are high.

**Melatonin**
Melatonin is responsible for the control of the hormone and immune systems within the body as well as sleep patterns, sex drive, body temperature. Melatonin is created from serotonin, when melatonin levels are increased, serotonin levels are decreased. When there is a lack of sufficient daylight entering the eye this transformation begins (Somer et al.,1999). During the winter or when there are inadequate light conditions inside a building, the natural levels of serotonin are not enough to suppress the melatonin, this is usually followed by feelings of sadness. (Edwards et al.,
2002)

**Conclusion**
In short, when the levels of serotonin and melatonin are unbalanced the circadian rhythm is disturbed and affected people express depression-like symptoms.
This diagnosis was up until 2013 refered to as Seasonal affective disorder (SAD) when the Diagnostic and statistical manual of mental disorder fifth edition formally changed the name from SAD to depressive disorder with seasonal pattern (DDSP).
For the sake of convince I will refer to Depressive disorder with seasonal pattern as SAD as it is the established more commonly used in everyday life.

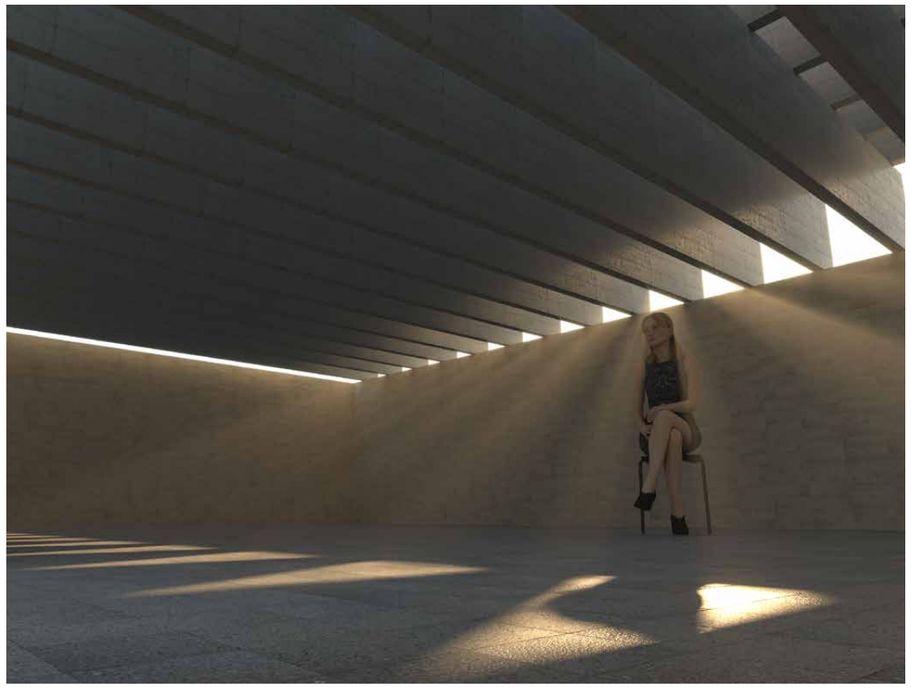
# Seasonal Affective Disorder (SAD)

Seasonal affective disorder is a mood subset disorder with symptoms similar to depression with the exception that the occurrence is bound to the seasons.

**Symptoms**
The Symptoms of seasonal affective disorder range from disturbed sleeping pattern, general fatigue, persistent low mood, reduction in sex drive to lethargy and increased appetite.

**Prevalence**
As a general rule seasonal depressive disorder is more prevalent the closer geographically you get to the poles. One exception to this is Iceland, as the populace of Iceland historically has been very isolated and experienced very few external influences. In combination with extreme daylight conditions this has allowed people over time to adapt and now exhibit lower rates of SAD than southern latitudes (Magnusson A, Stefansson 1993).
In Sweden the average prevalence of SAD is estimated at 20% of the population (girls 25% and boys 13%) with approximately 8% reporting grave symptoms. (Cecilia Rastad,. Jan Ulfberg,. Per-Olow, Sjödén. 2005)
However it is difficult to determine an exact number since SAD often falls under the same diagnosis as depression.

**Subclinical Seasonal affective disorder**
Baba Pendse chief physician at Lund university hospital claims in an interview with metro that 90-95% of Swedes are feeling down during the winter due to the daylight conditions (Metro, 2013). This group can be classified to suffer from Subclinical seasonal affective disorder (S-SAD) as the symptoms are not severe enough. For people with S-SAD a walk outside in daylight everyday may be enough to rectify the symptoms. However in the northern parts of Sweden even this can be difficult as the sun rises and sets during working hours.



Picture above: *Investigation in light and atmosphere, how particles in the air create atmospheric spaces.*

# Treatment methods

Sunlight plays an essential role in the circadian cycle and lack of sunlight is the main reason for seasonal depression (Melrose S. 2015).

While anti-depressive medication might offer some relief, there are natural ways to approach treatment that may offer better effects for example light therapy, meditation, yoga or tai chi, massage therapy and physical activity.

**Light Therapy**
While the effectiveness of light therapy is debated, it is still used as a first line treatment and appears to be effective on most people suffering from SAD (Mayoclinic 2017)

**Meditation**
Research on the effects of meditation and mindfulness shows them to be beneficial for both physical and psychological health (Edenfield, T. M., & Saeed, S. A. 2012)

**Physical activity**
It is proven that physical activity and the levels of dopamine and serotonin are closely linked (Young S. N. 2007) there should be no surprise that physical activity might help relieve the symptoms of SAD.

**Yoga & Tai Chi**
Yoga and Tai Chi are both physical activities with inclusion of mindfulness and meditation, the main distinction between the two are that in yoga you focus on holding postures while in Tai Chi there is more of similar to martial arts with dancelike movements. The intensity of both yoga and Tai chi can be adapted to the fitness level of the participants.
In 2017 a study confirmed that yoga can reduce depression on a clinically significant level (Prathikanti et al., 2017)

**Massage therapy**
A study conducted in 2005 seratonin levels in the body are proven to increase after a massage session (International Journal of Neuroscience 2005)

Picture: *Investigation in light and atmosphere, how water interact with light and objects*

# Light therapy

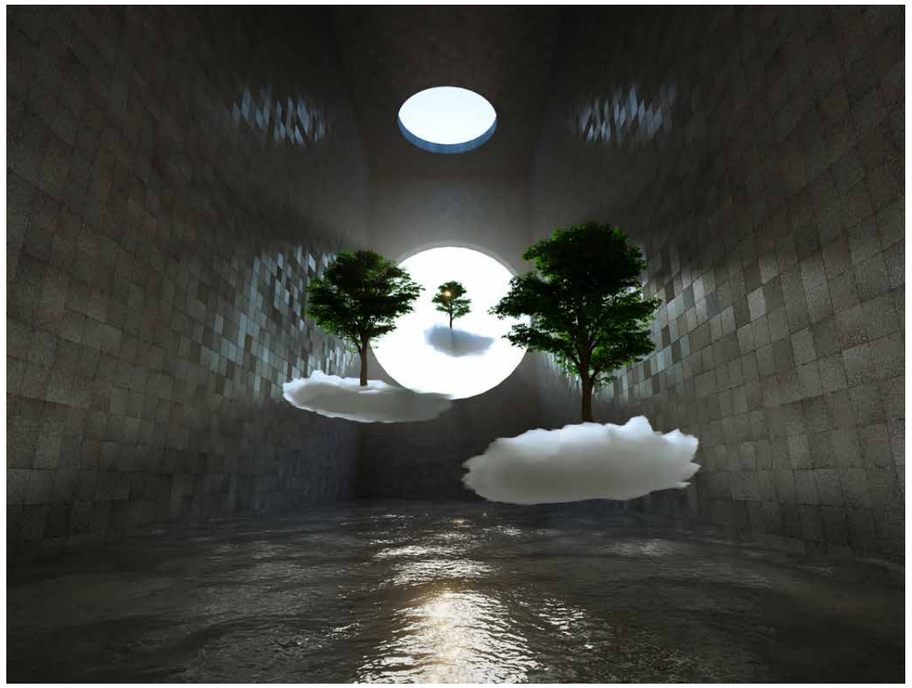
**Background and effectiveness**
Light treatments efficiency is debated, in a study from 2007 done by SBU light therapy effectiveness shows to be nothing more than placebo while another study done in 2008 from Uppsala university shows that people suffering from SAD react very positively to light therapy (Cecilia Rastad,. Jan Ulfberg,. Per Lindberg. 2008) A clinical study conducted in 2017 shows that patients suffering from SAD rates light therapy as the most important and effective tool to combat the symptoms (Rastad, Cecilia & Wetterberg, Lennart & Martin, Cathrin. 2017)

**Treatment**
When undergoing light treatment the patient starts by doing daily treatments for a week. After the first week has passed you usually continue with one treatment every day. The treatment usually starts during fall when the natural daylight starts to fade and goes on until there is enough daylight to satisfy the daily needs naturally. In order to efficiently treat SAD there are three Key elements:

**Intensity**
The intensity of the light entering the eye, the typical recommendation for treatment is 10,000 lux, For reference the illumination from the sun is upwards of 100,000 lux depending on weather and geographic location.

**Duration**
The recommended time spent in light therapy depends on the intensity of the light, for a 10,000 lux light the recommended duration is 20 to 30 minutes. If the intensity of the light is lower, the duration is increased.

**Timing**
For most people light therapy is most effective if done early in the morning. (Mayo clinic 2017)



Picture above: *Investigation in light and atmosphere, how water interact with light and objects*

# Light therapy today

Light therapy today mostly consists of a room painted in white with chairs or other seating arrangement and a some magazines. To the right are some examples of existing light therapy rooms in Sweden today.

As long as the light used for light therapy is of the appropriate intensity (10,000 lux) and placed correctly (eye level or higher) there is no necessity to paint the room itself white. There is however a case to be made for white painted light therapy rooms, in that the white paint reflects more light and thus increases the total illumination of the space, requiring less light intensity from the light sources. There is also the association between the colour white and cleanliness, peacefulness and also to some extent to healthcare, which might lend light therapy a bit of legitimacy in the eyes of someone not well versed in exactly how light therapy works.

I believe that a totally white room might actually reduce the effectiveness of light therapy, since the eyes need to remain open for the duration of the treatment naturally one should be provided with something interesting to look at and an environment which is painted in a monotone colour in this case white offers little to that affect. This can be approached in different ways when considering the architectural design of a space, for example a window could be provided so that the person undergoing treatment can enjoy a nice view, or materials with a interesting texture could be used.

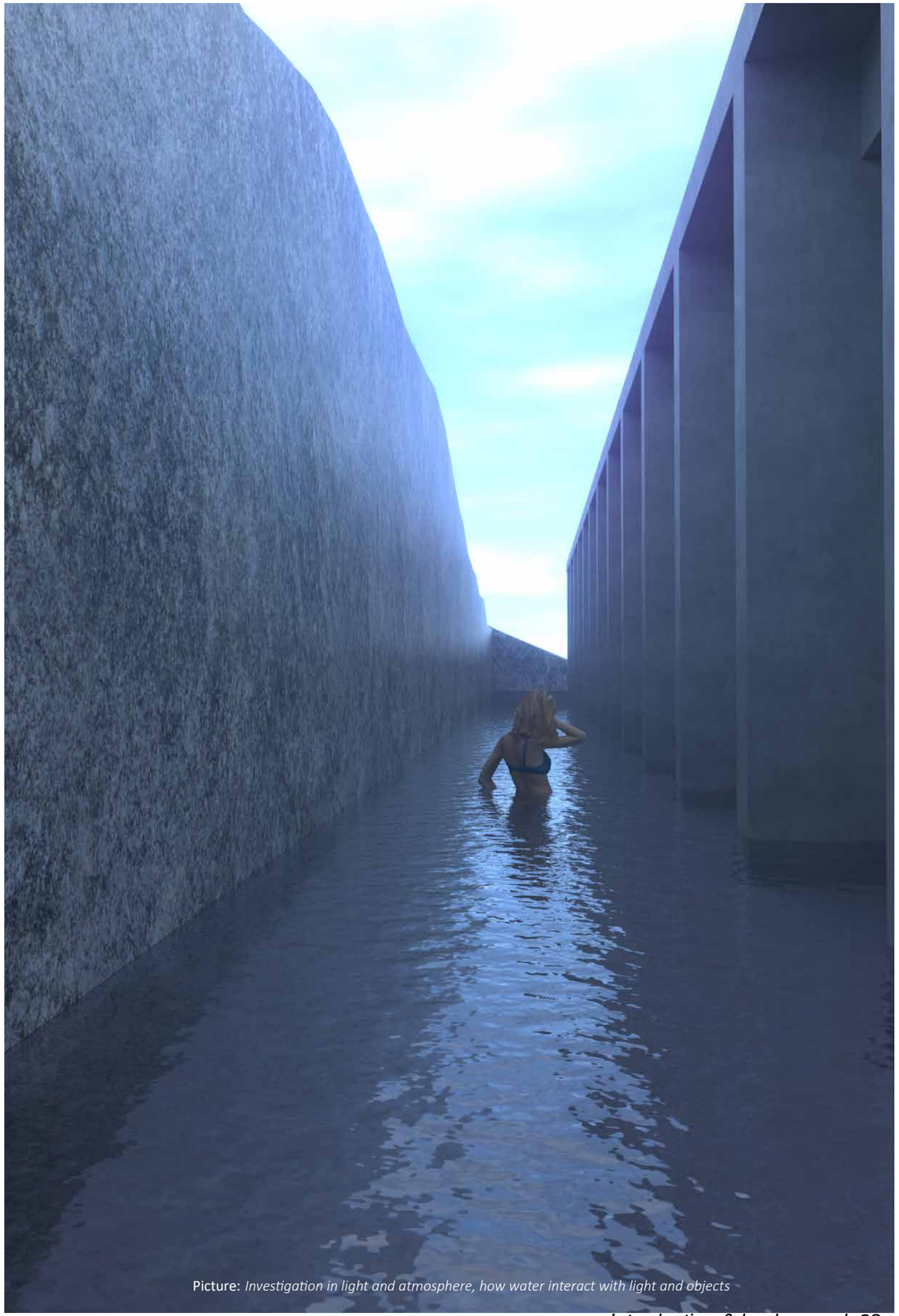
*Source: freys hotell lilla radmannen stockholm*

*Source: Umeå university light therapy room Aurora*

*Source: Varberg stadshotell*

# Light therapy and the spa experience

Light therapy is in many ways an excellent extension to the general spa experience, as it focuses on the well being of the individual and at the same time promotes calmness and relaxation. This is often the same goals one has when visiting a spa.



Picture: *Investigation in light and atmosphere, how water interact with light and objects*

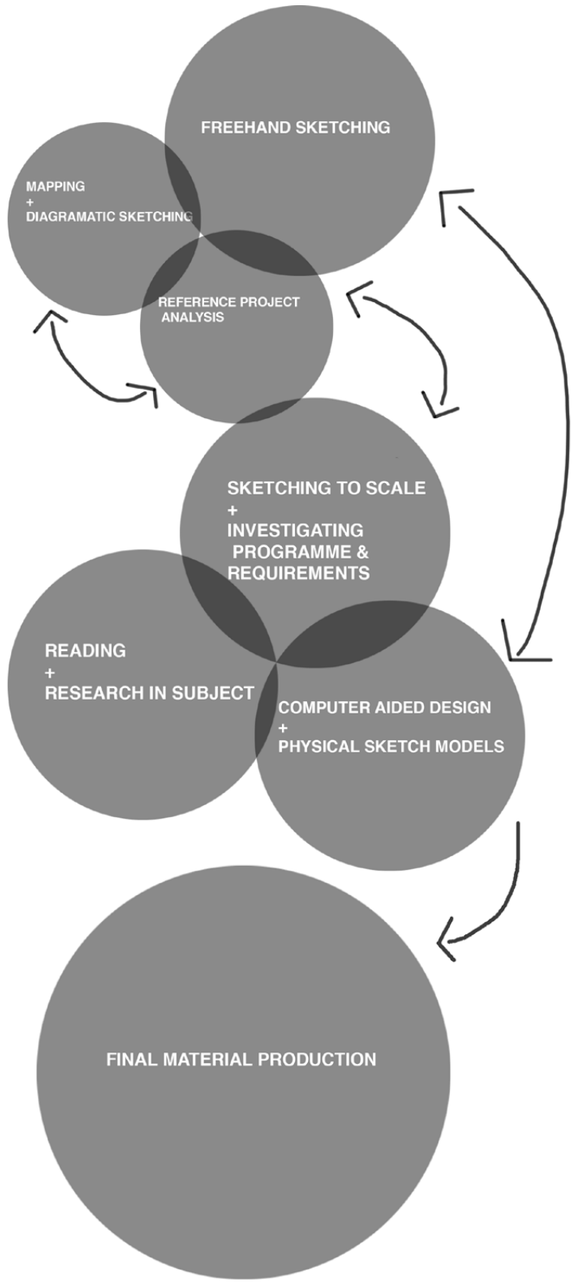
# Method

The design process is not linear and I believe that one shouldn’t be afraid of skipping back and forth between different phases of the design process in order to achieve the best possible result.

I have worked with freehand sketching and computer aided design as my primary design tools, renders as secondary design tool.

Computer rendered images gives much more depth and understanding in how different materials come together and can display texture in a way that no other design medium can and is an essential component in the design process for me.

I have worked with research by design as my main method of investigating the spatial and tectonic aspects of my thesis.



# SITE & CONTEXT

# 02

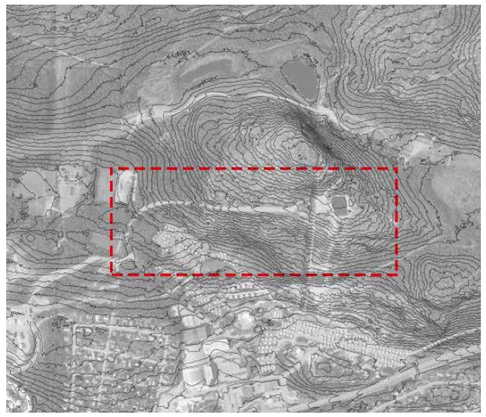
*Site & Urban overview*
*Site Photos*
*Site analysis*
*User*

# Site overview

The site chosen is located in the city Skellefteå located in the north of Sweden.
The reason is that even if all of Sweden suffers from extreme daylight conditions, the north has it even worse and the need for a building like the one proposed is even higher.


Skellefteå is a small city of about 40,000 inhabitants and is located in Västerbotten county.
The geographical location of Skellefteå places it in between Umeå and Luleå and allows people from both cities to easily travel in between to access the building.

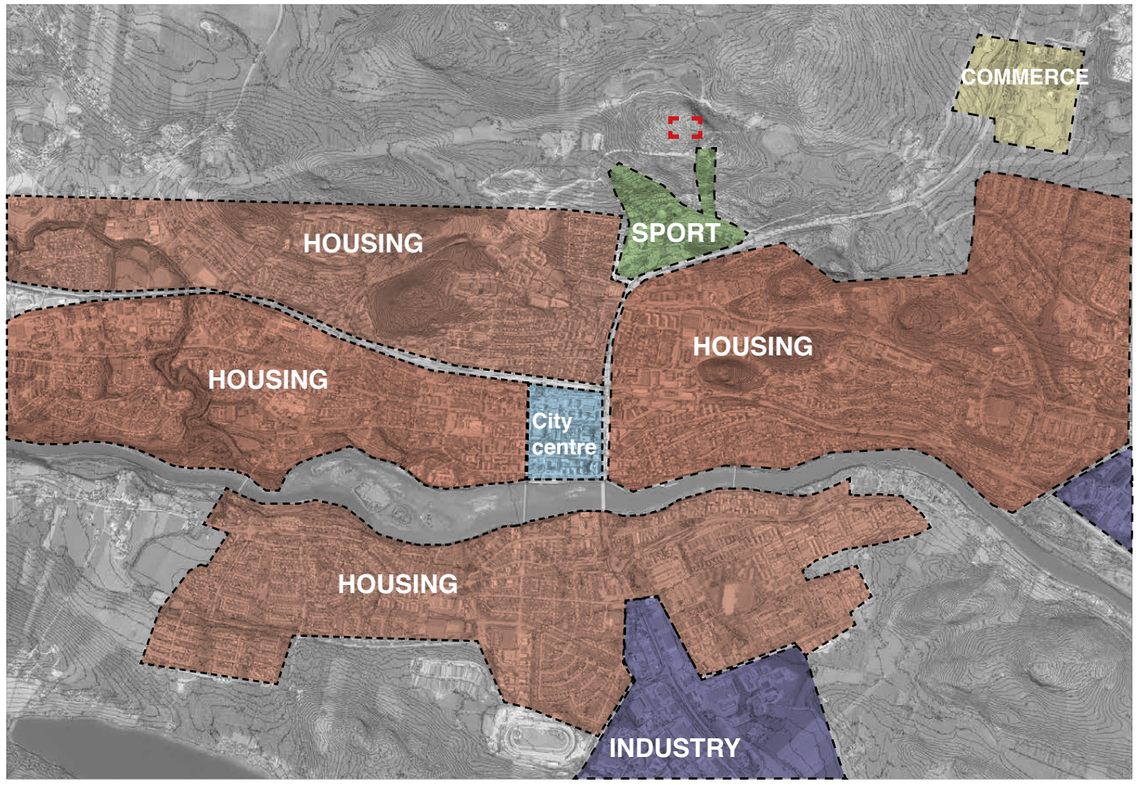
To the north of the city is a small mountain called *Vitberget* the site is proposed to be located on the peak of said mountain



# Urban overview

For this master thesis is located in Skellefteå, Västerbotten.
The reason behind this decision is that since the further north in Sweden you go, the more prevalent SAD is, and while a project like this might affect more people in a larger city such as Stockholm or Gothenburg the need is not the same. Furthermore Skellefteå has a very strategic location in relation to other larger northern cities along the coast of the coast of the Bothnian bay such as Luleå and Umeå.

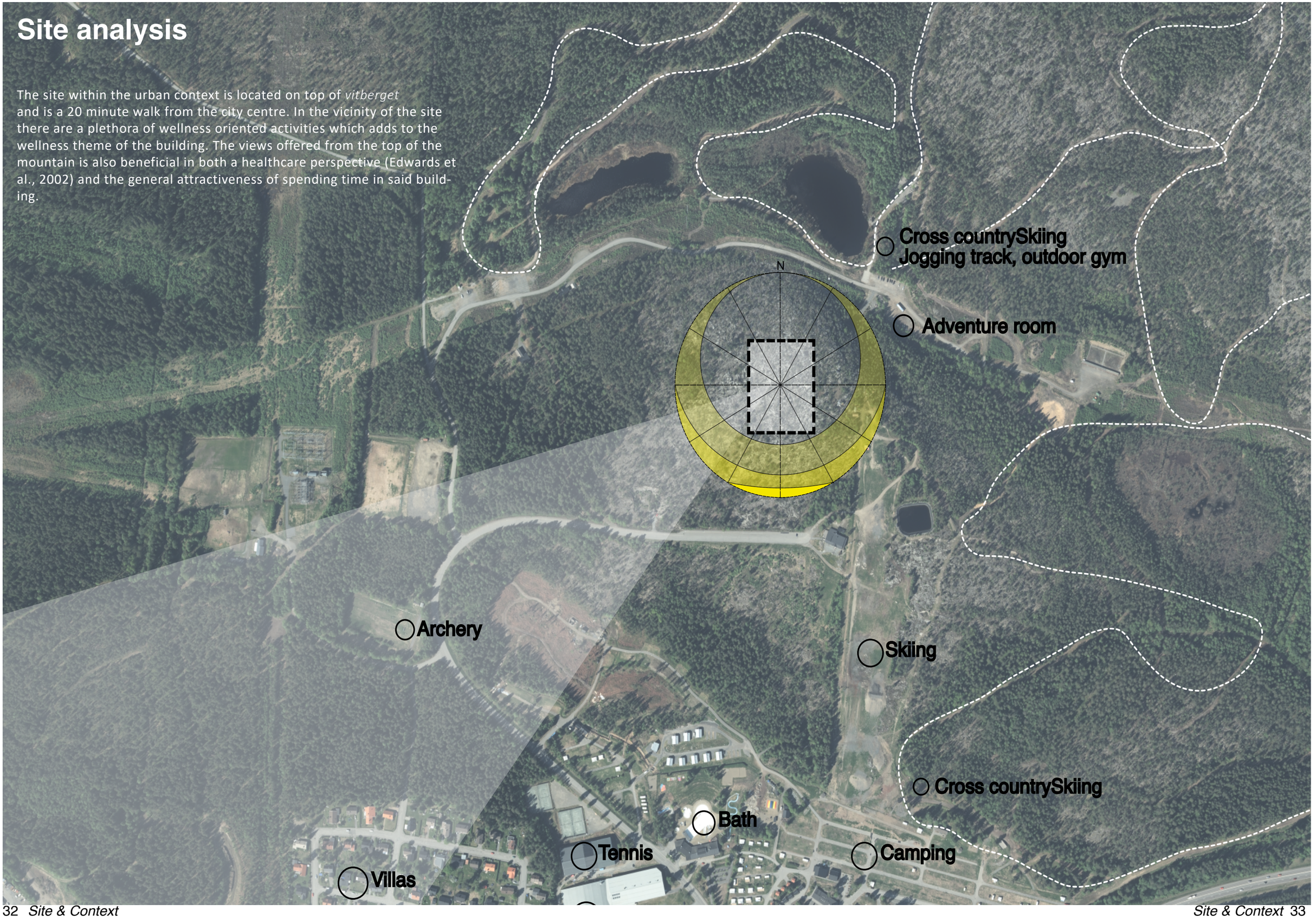
Below is a map describing the general layout and functions in the city.



# Site photos

# Site analysis

The site within the urban context is located on top of *vitberget* and is a 20 minute walk from the city centre. In the vicinity of the site there are a plethora of wellness oriented activities which adds to the wellness theme of the building. The views offered from the top of the mountain is also beneficial in both a healthcare perspective (Edwards et al., 2002) and the general attractiveness of spending time in said building.



# User

The primary everyday user is the inhabitant in a 30 minute radius of the site. The primary weekly user is people from the near surrounding such as Umeå & Luleå and other smaller villages located in the surrounding hinterland within 2 hours by car. With the completion of the *North Bothnia Line* this travel time will be cut down to less than half that.

The secondary user is tourists, mainly during the summer where the building will act as a regular spa facility with fantastic views and the opportunity to witness unique landscapes and daylight conditions.

# PROGRAMME & SITE STRATEGY

# 03

*Concept*
*Lighting Systems*
*Programme*
*Site strategies*
*Sun analysis*

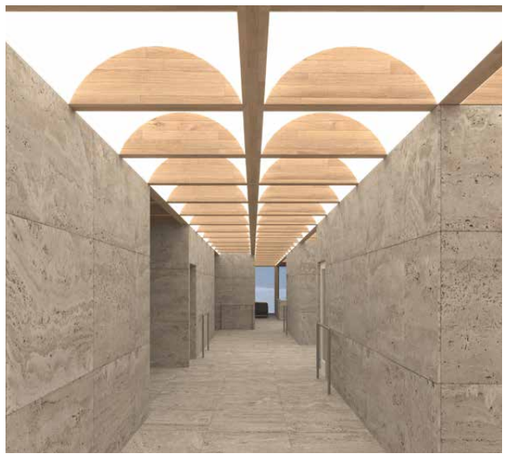
# Concept

The concept developed aims to provide light therapy integrated in the spa areas of the building. While in the more public areas and the hotel area the aim is to through artificial means create an internal daylight cycle that is more beneficial for humans than the natural daylight cycle present in northern Sweden.

The building proposed should take into consideration and trick you into not thinking about the light therapy as the main purpose of the visit. The essence of the spa is well-being which goes hand in hand with light therapy and an improved circadian cycle.

Morning

Midday



Dusk

# Lighting Systems

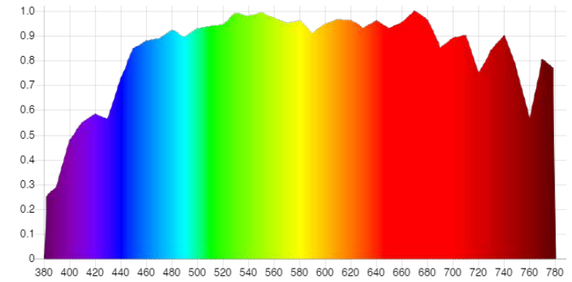
When considering the built environment I believe that it is very important to let as much as possible of the natural environment into the building, to help combat the fact that in modern society there is little time to be spent outdoors. Lighting is no exception and while a good amount of windows goes a long way windows does not help when there is no daylight available, such as in a Nordic context during the winter. As of now there are several alternatives for artificial light mimicking the light coming from the sky.

These new technologies can be used to create a substitute for natural daylight, artificial light-sources are as of yet not a perfect substitute for the sun, but it can go a long way when no other alternative is possible. To the right there are four diagrams comparing the wavelength of natural daylight to that of different artificial light sources.

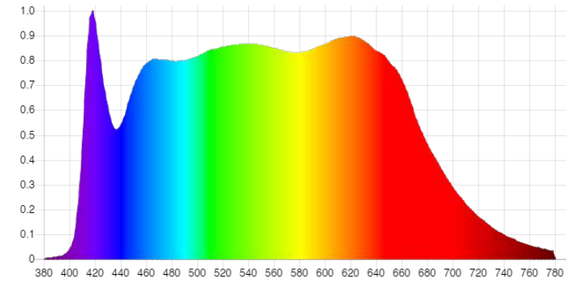
When conducting light therapy the blue wavelengths are the most important as ‘blue’ light corresponds best with the notion of a natural sky and has an energizing effect when entering the eye. This effect is however not desirable to experience throughout the day as come night-time one might find it hard to fall asleep as the reptile brain believes it to be daytime since there are blue wavelengths entering the eye.

Most newer electronic devices such as smart-phones and computers often has a feature called ‘*night-mode’* or ‘*Flux*’ which mimics the light colour of the sky by using your geographic location to pinpoint the location of the sun in relation to the horizon and thereby determining how much blue light to emit.

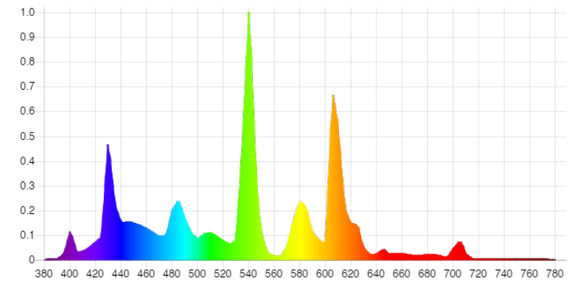
In this master thesis I will propose a solution which takes this into consideration and aims to create a artificial circadian cycle.



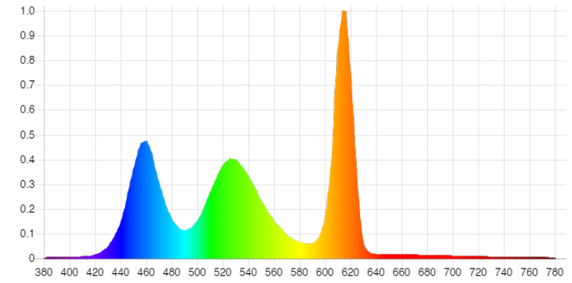

Natural light




High end natural LED 99 CRI ’Full wavelength’



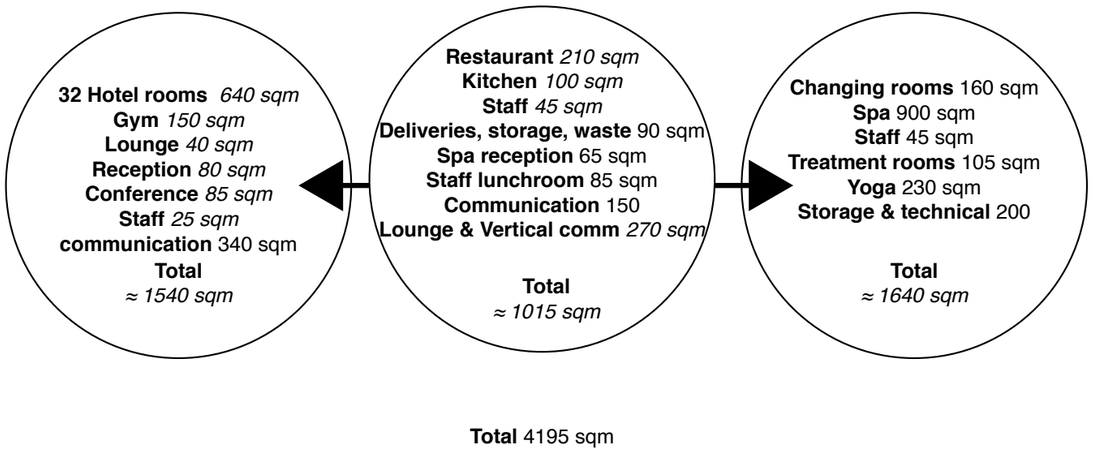

Flourescent



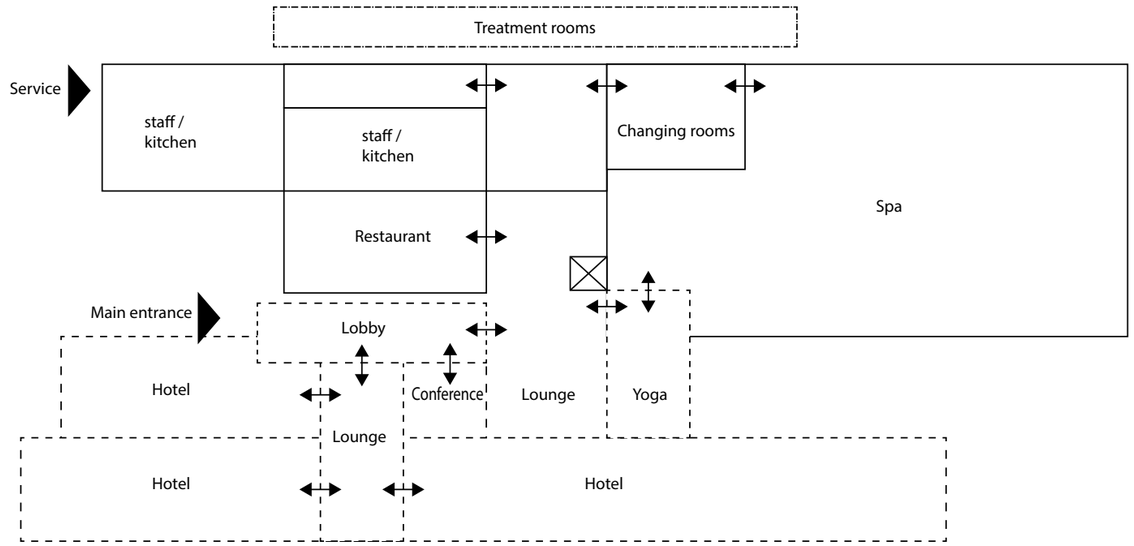

Regular LED

# Programme

The purpose of the building is to cater to both to long term guests and weekday visitors, there is a clear division in the organisation between the hotel area and the spa area. You enter through the same entrance but you never walk past any hotel rooms on your way from the entrance to the spa.

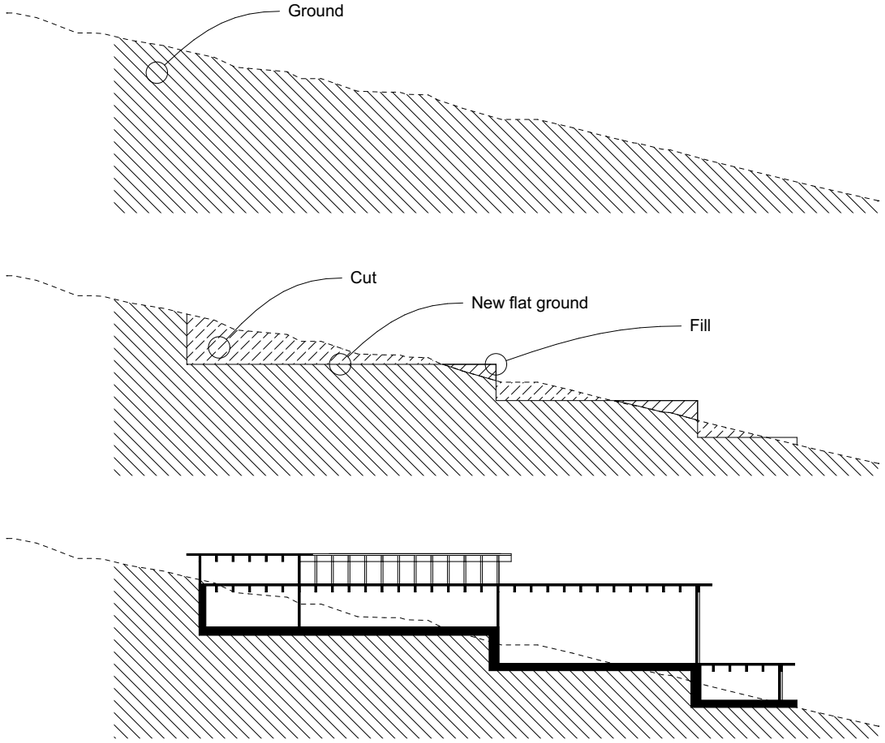



**Total** 4195 sqm



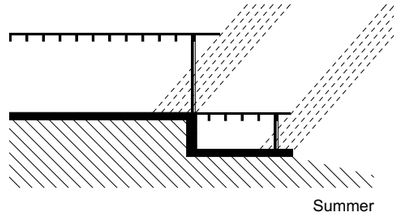

Schematic layout of the programme

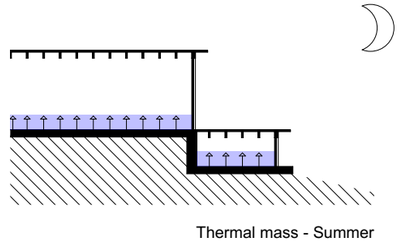
# Site strategies

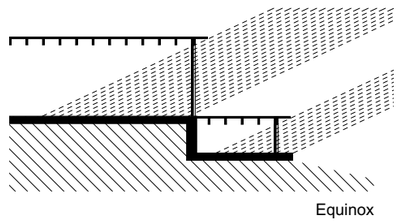


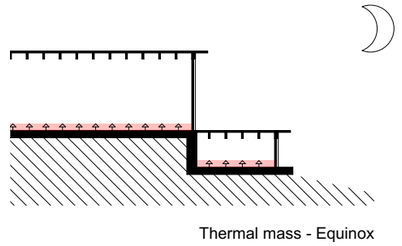

The building is built on a slope. The first step is to excavate the area on which the base of the building will stand. The material excavated can be used to build up areas and make a flat surface for the building to stand on.

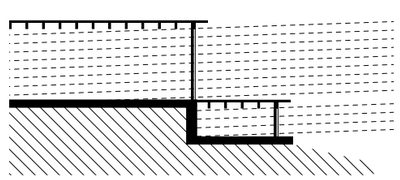
The soil that is left over may be used to construct the road leading to the building.

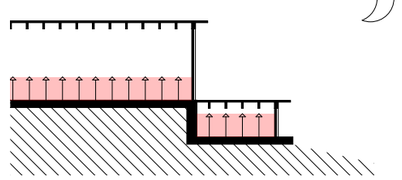


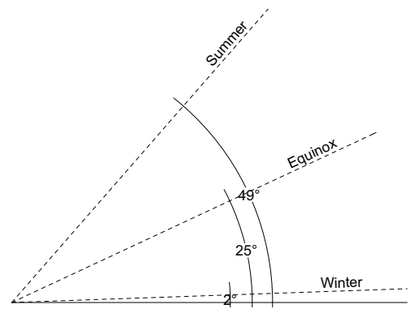



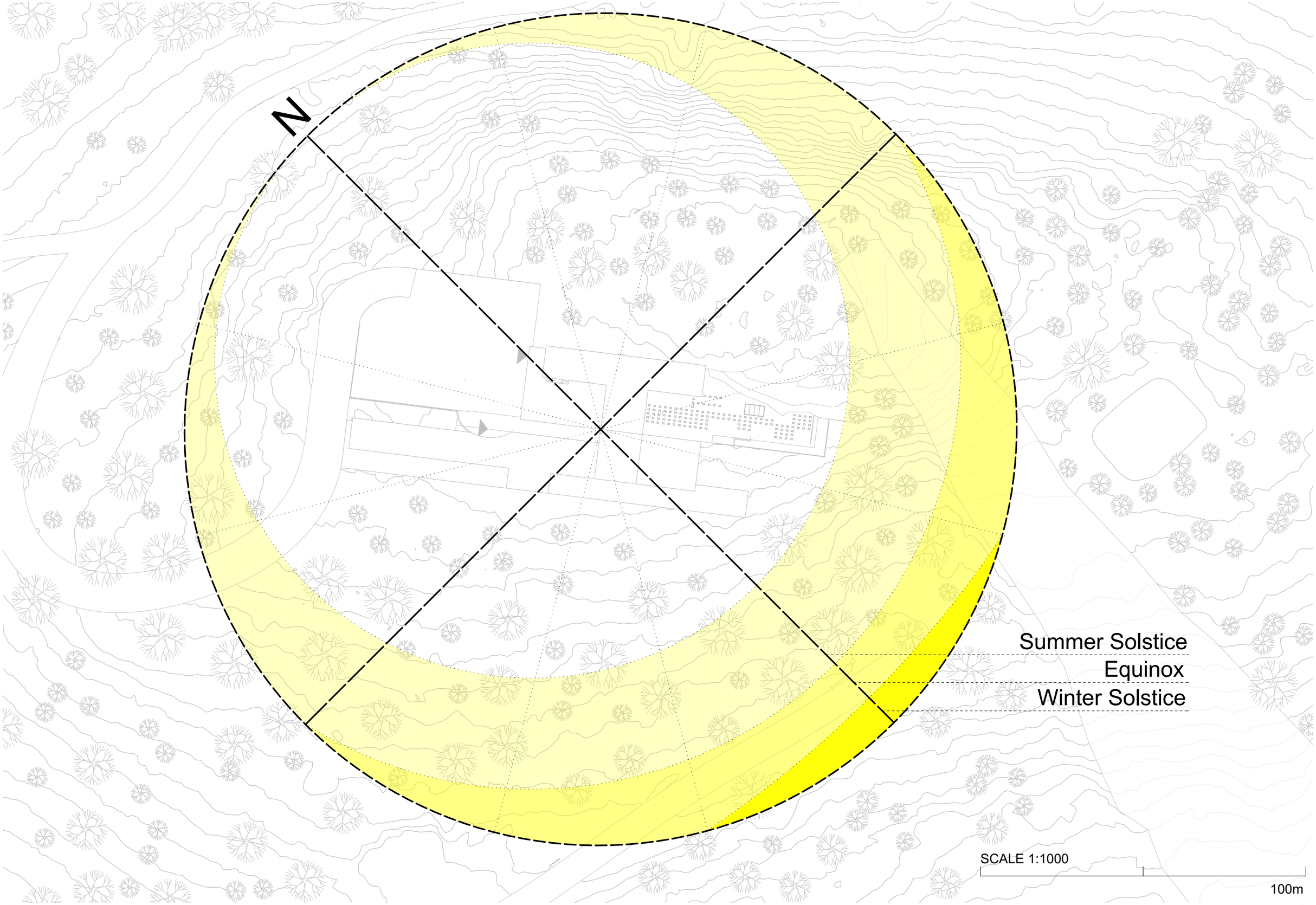




During the winter the light emitted by the sun is scarce. The glazing on the building allows for maximum daylight during the winter, both in order to help heat up the building but also to allow for the inhabitants inside the building to access more natural light.

During the day when the sun is low, the light entering the building helps to heat up the thermal mass of the flooring inside the building. During the night this thermal energy is released to help keep the building warm.




N
Summer Solstice
Equinox
Winter Solstice
SCALE 1:1000
100m

# FINAL PROPOSAL

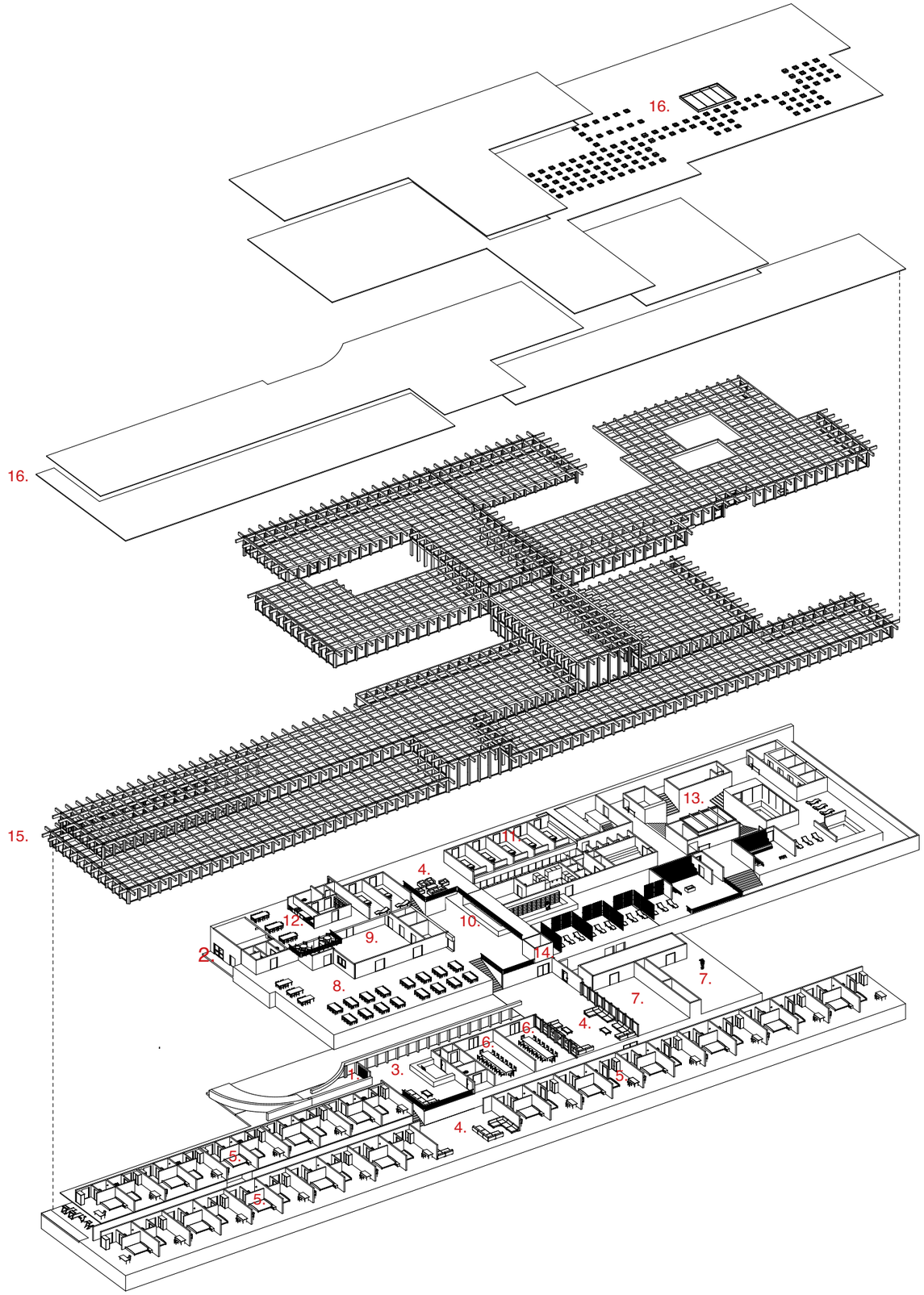
*Exploded axonometric & Materiality*
*Site-plan*
*Exterior perspective*
*1st floor*
*2nd floor*
*3rd floor*
*4th floor*
*Perspective A*
*Perspective B*
*Perspective C*
*Perspective D*
*Roof-plan*
*Short side section*
*Long side section*
*South west elevation*
*Ceiling light detail & light cycle*
*Spa plan*
*Wash-room*
*Wash-room perspective*
*Light therapy pool*
*Light therapy perspective summer*
*Light therapy perspective winter*
*Outdoor pool*
*Outdoor pool Perspective*
*Therapy-room & perspective*
*Dry Sauna & perspective*
*Mirror pool & perspective*
*Sky-pool & perspective*
*Design process*

# 04

# Exploded axonometric

The final proposal consists of a terraced building in 4 stories, adapting to the natural slope of the site the terracing aims to reduce the material which needs to be removed from the site prior to construction. The building consists of a plinth meeting the ground and a raster of gluelam beams providing structure for the roof and glazing.

The contrast of the light glue-lam and heavy concrete plinth is meant to reflect the relationship between the trees and the stone present on the site.



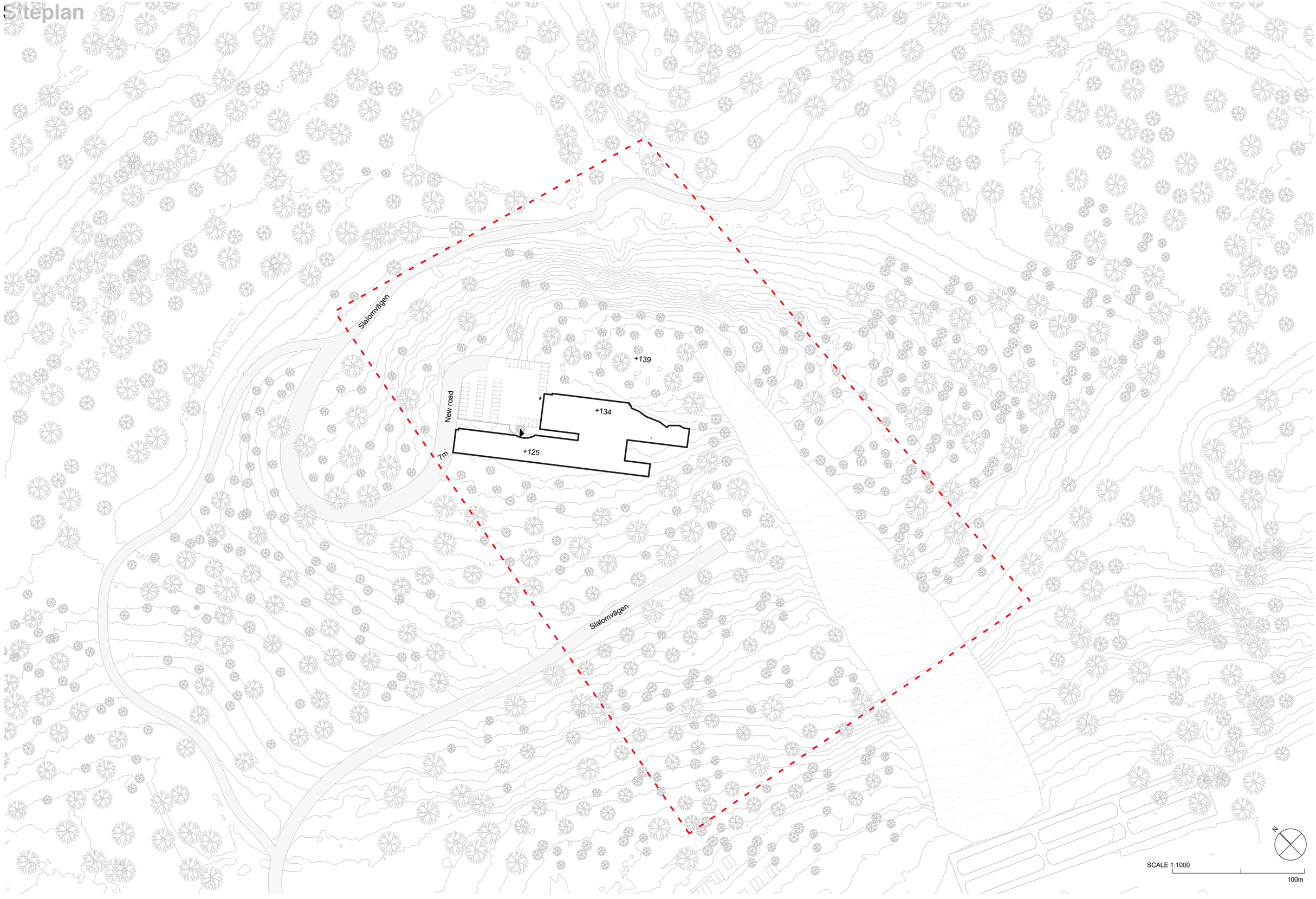

# Materials

**Travertine tiles / concrete** *for the plinth to contrast the light feeling of the wood*

**Gluelam** *beams and pillars for the facade and overall structure*

**Sedum** *roof to help the building fit into the environment*

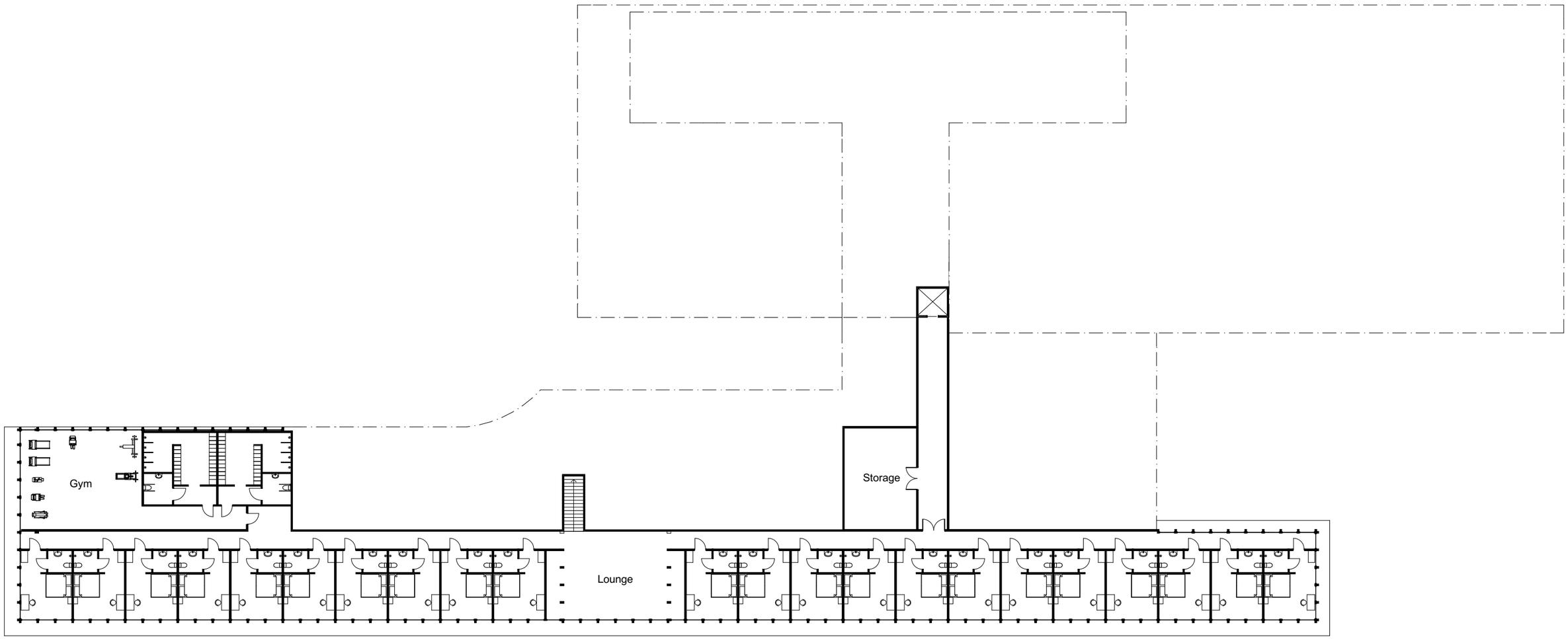
# Siteplan


Slalomvägen
New road
+139
+134
+125
7m
Slalomvägen
N
SCALE 1:1000
100m

## Exterior Perspective

# 1st floor

*The first floor of the building consists of hotel-rooms a gym, a lounge area and for the hotel guests.*



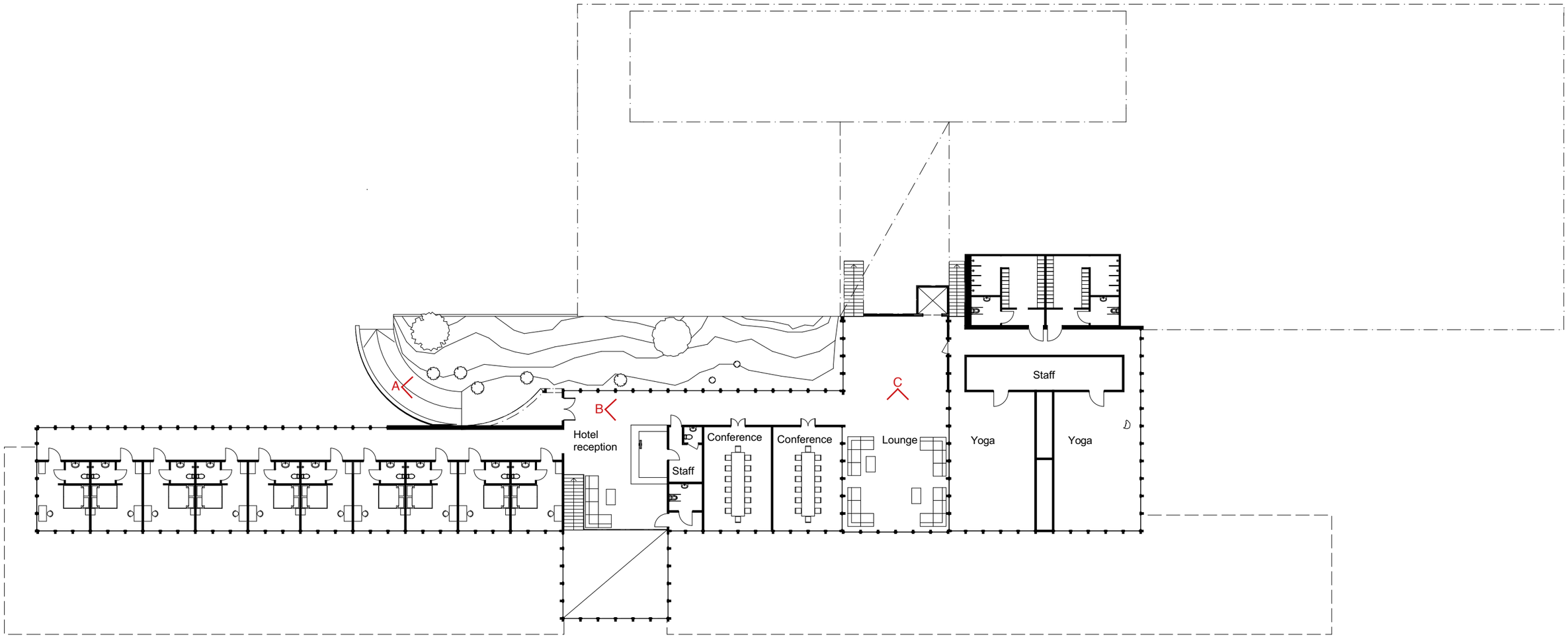

N

Plan 1

10m

# 2nd floor

*The second floor contains the main entrance from which you directly arrive at the hotel reception.*
*You can either check in to the hotel or pay for entry to the spa or yoga area here.*
*There are also conference/event rooms located on this floor.*



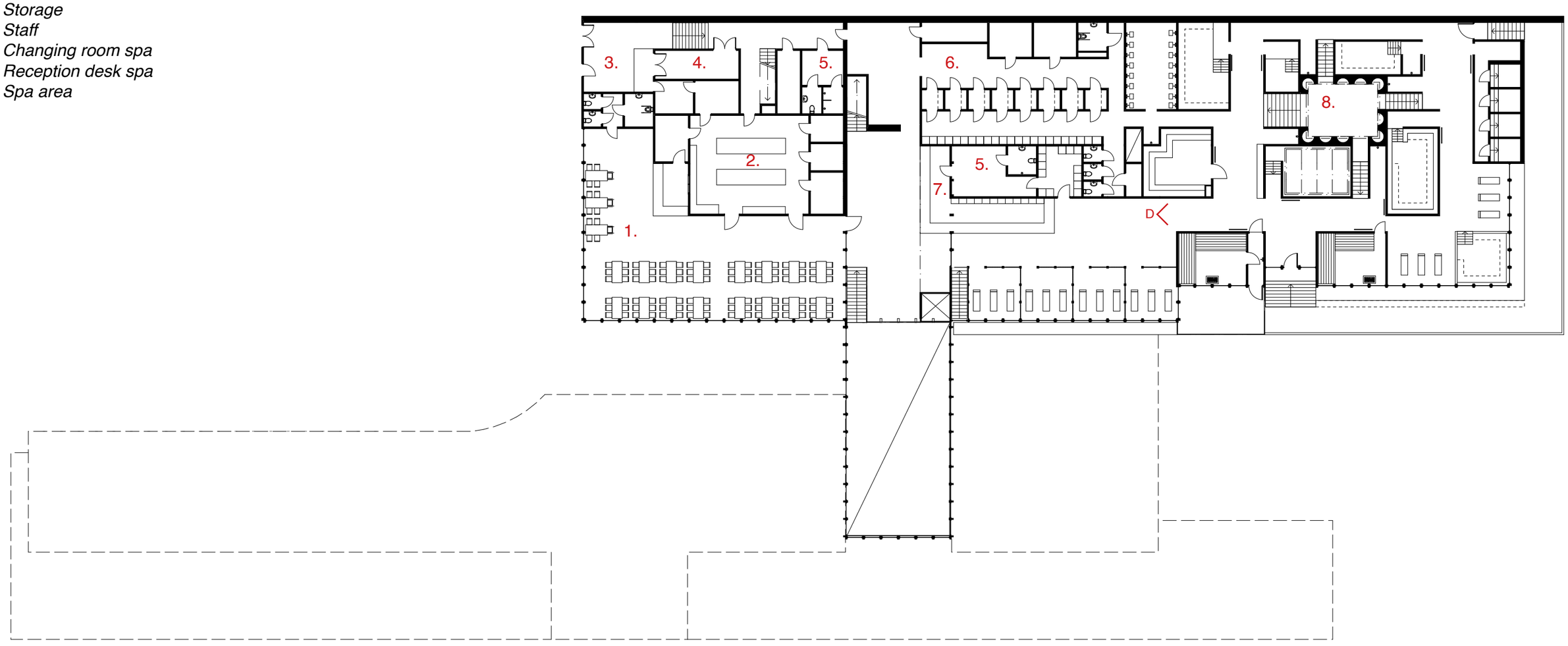

Plan 2

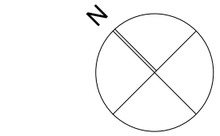
10m

# 3rd floor

*The third floor of the building contains the vertical communication, spa areas, kitchen, staff and service entrance.*

1. *Restaurant*
2. *Kitchen*
3. *Service/Staff entrance*
4. *Storage*
5. *Staff*
6. *Changing room spa*
7. *Reception desk spa*
8. *Spa area*



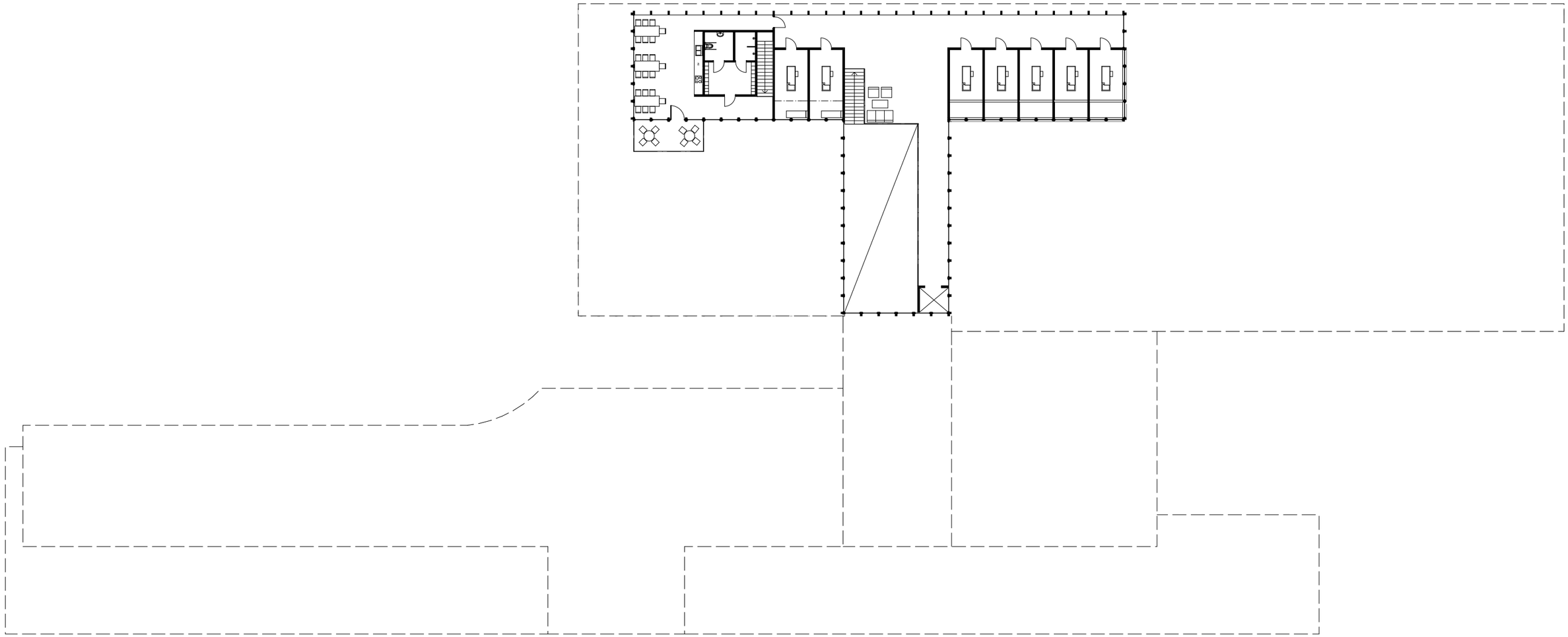




Plan 3

10m

# 4th floor

The fourth floor of the building contains treatment rooms, a small lounge area and staff kitchen.



N

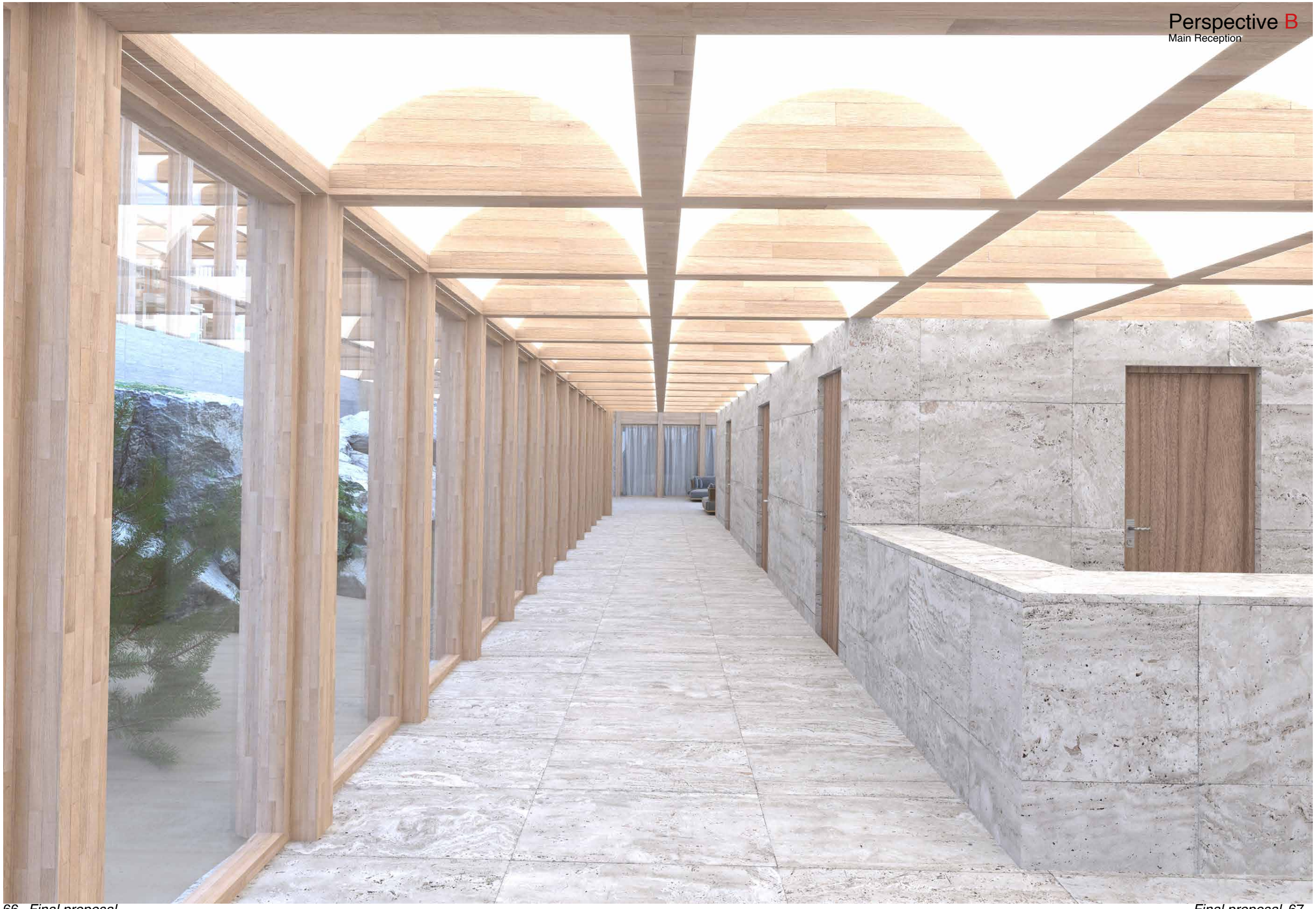
Plan 4

337 m2

10m

# Perspective A

Main entrance



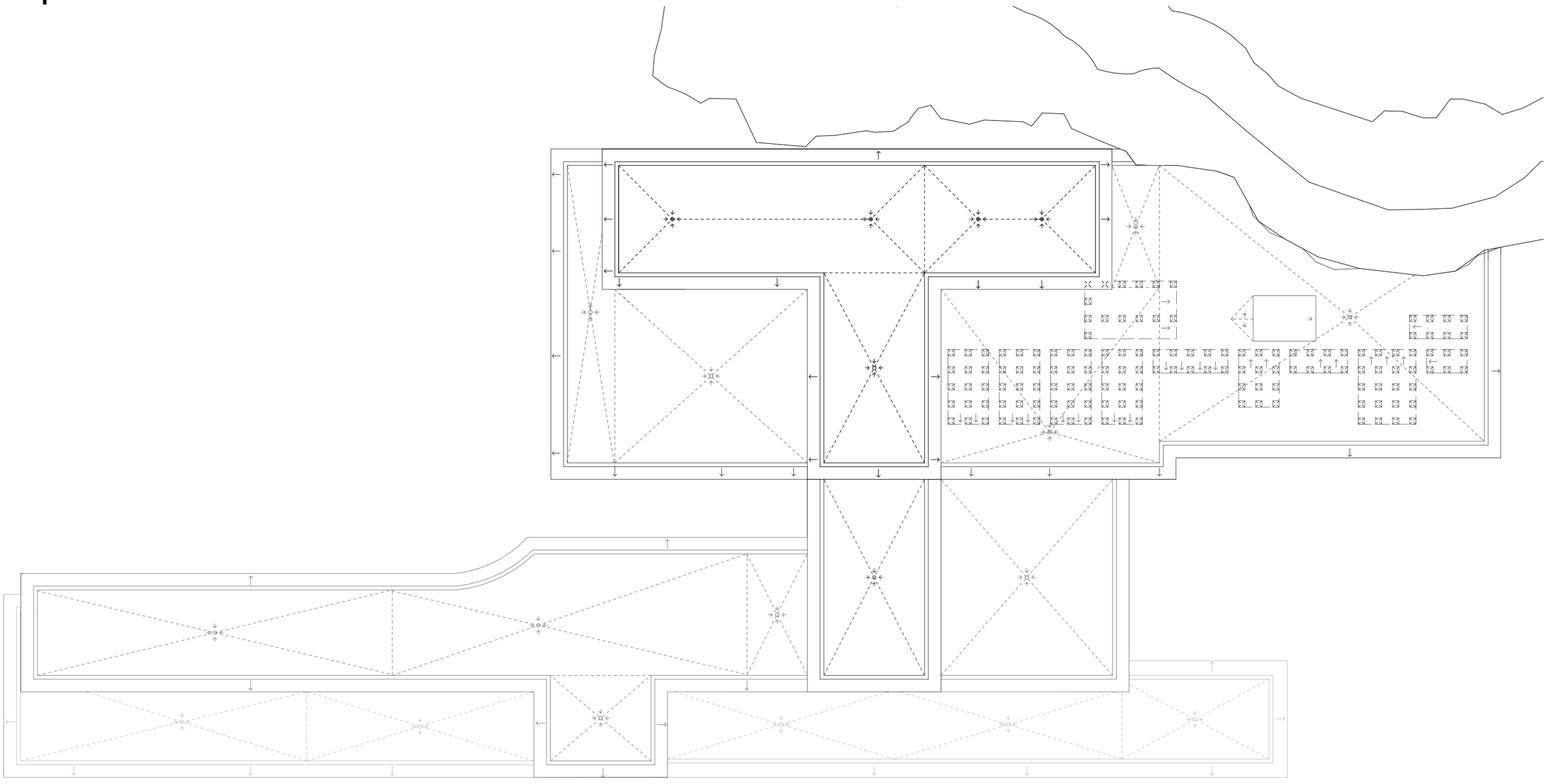
## Perspective B
Main Reception


Perspective C
main lounge

# Perspective D

Spa

# Roofplan

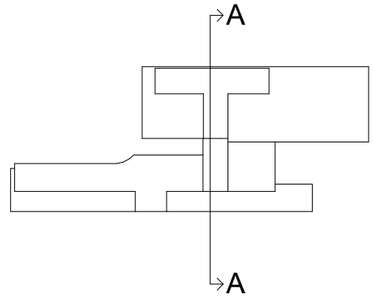


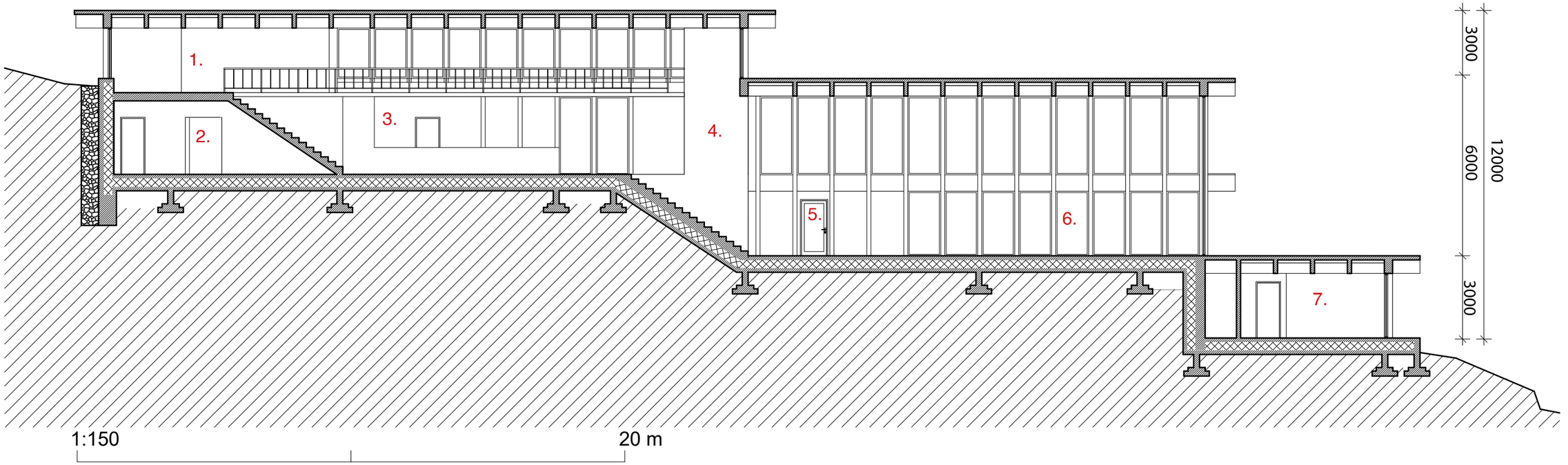
N

Roofplan

10m

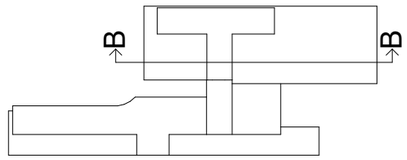
# Shortside section

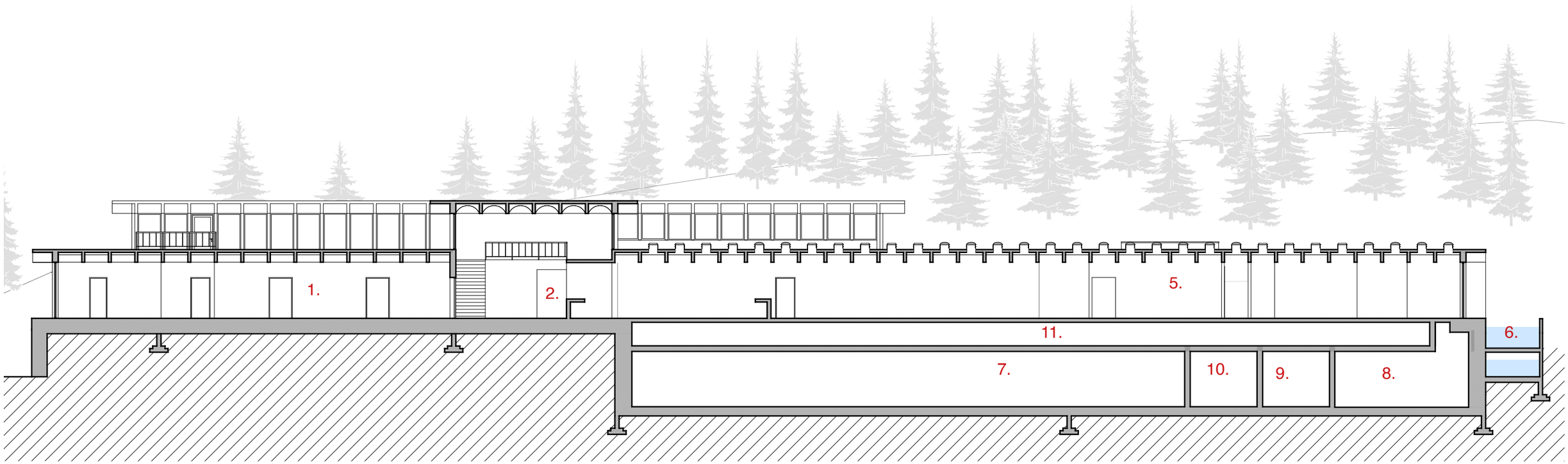



1. *Waiting area Treatment rooms*
2. *Entrance changing room spa*
3. *Reception spa*
4. *Elevator*
5. *Entrance Yoga*
6. *Lounge area*
7. *Hotel room*

# Long side section

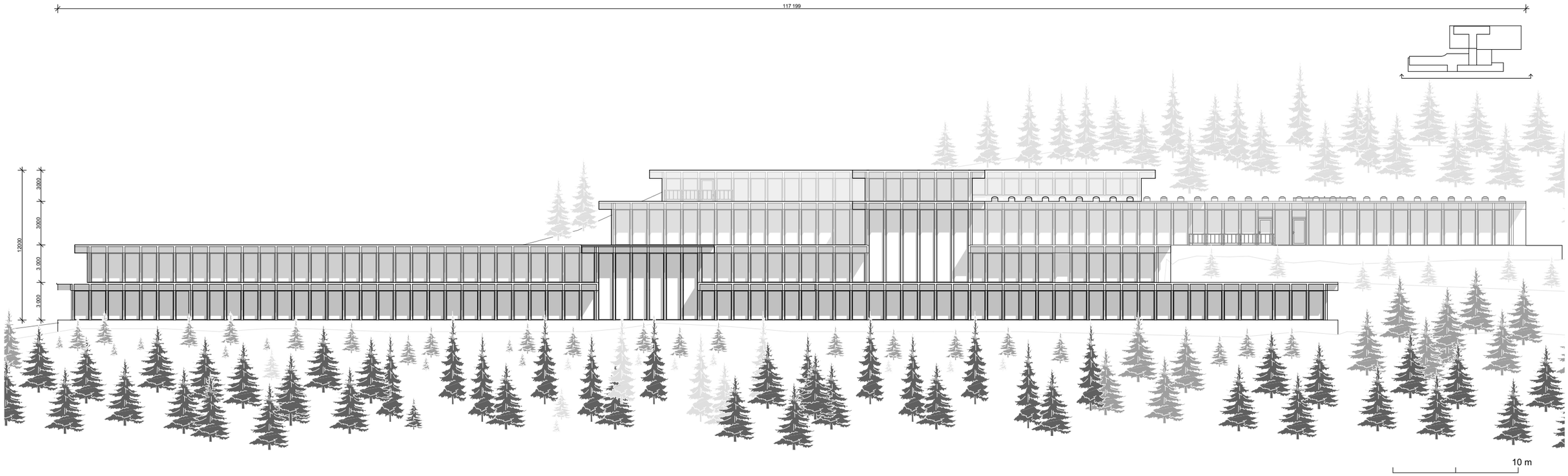



1:200 20 m

*1. Restaurant*
*2. Spa changing room entrance*
*3. Treatment room waiting area*
*4. Reception desk/ juice bar Spa*
*5. Main spa pool area*
*6. outdoor pool*
*7. Ventilation*
*8. Water filtering*
*9. Sludge water tank*
*10. Overflow tank*
*11. Ventilation culvert*

# South west elevation



# Ceiling light & light cycle

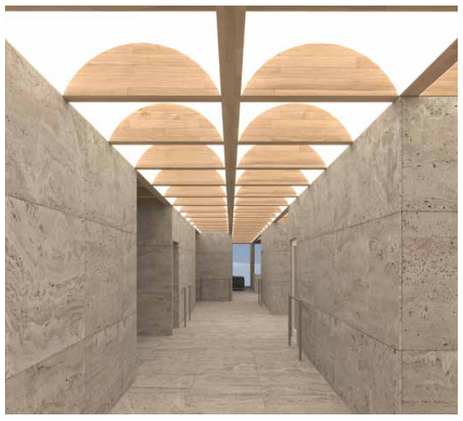
The ceiling and lighting system is the same throughout the whole building, with exceptions for certain rooms in the spa and cellar.

The idea behind the lighting system is firstly to allow natural light to enter the building, hence the roof-lantern. However during the winter there will not be much natural light available, thus the ceiling is outfitted with led lights which has the ability to change temperature (kelvin) throughout the day.

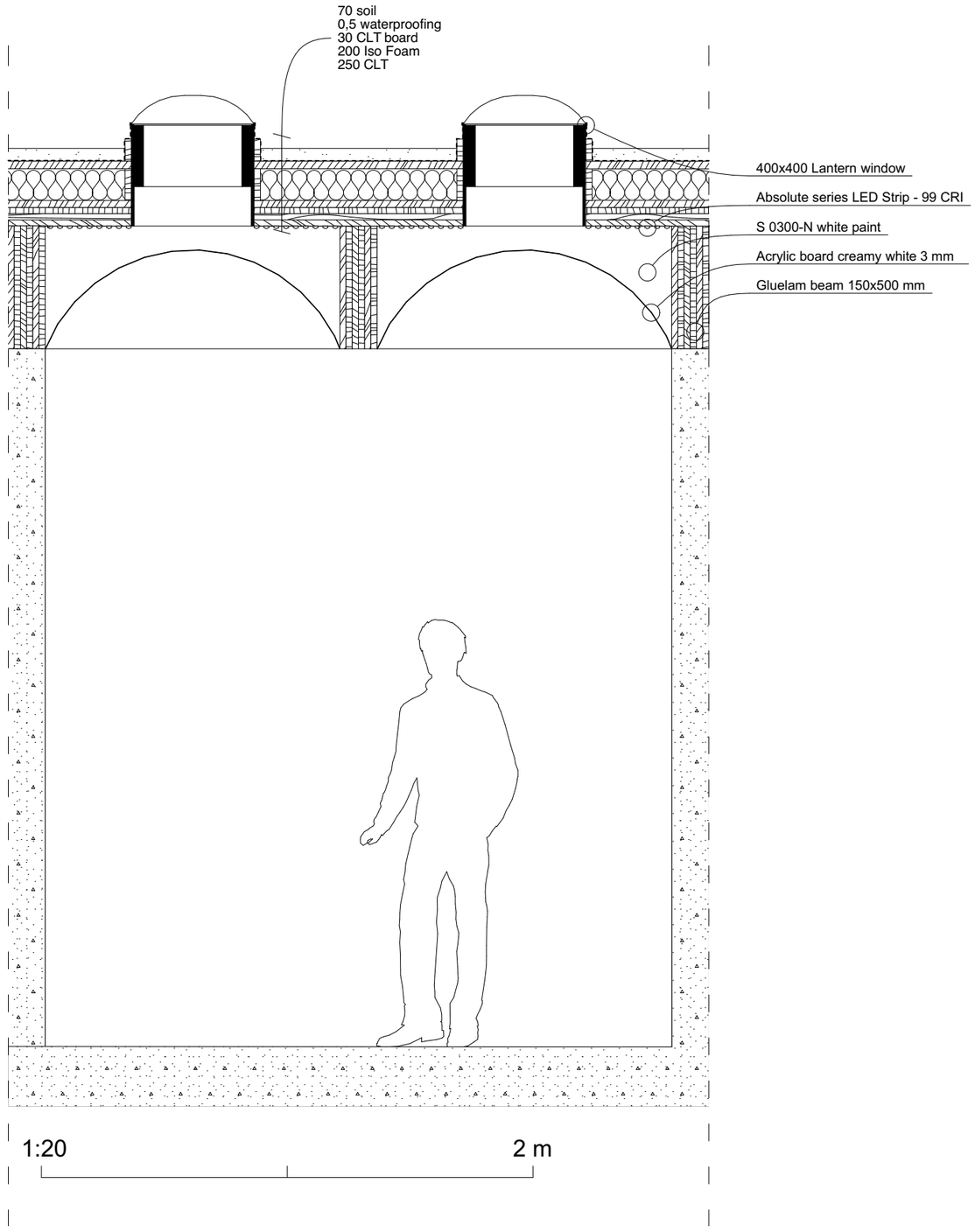
The idea is meant to work similarly to the night-mode function available on most smart phones and laptops. The colour temperature fluctuates throughout the day to match the colour of the sun. In northern Sweden however, the sun sets as early as 13:30 so the Day/night cycle has to be set to match a climate closer to the equator in order to induce a more healthy circadian cycle.

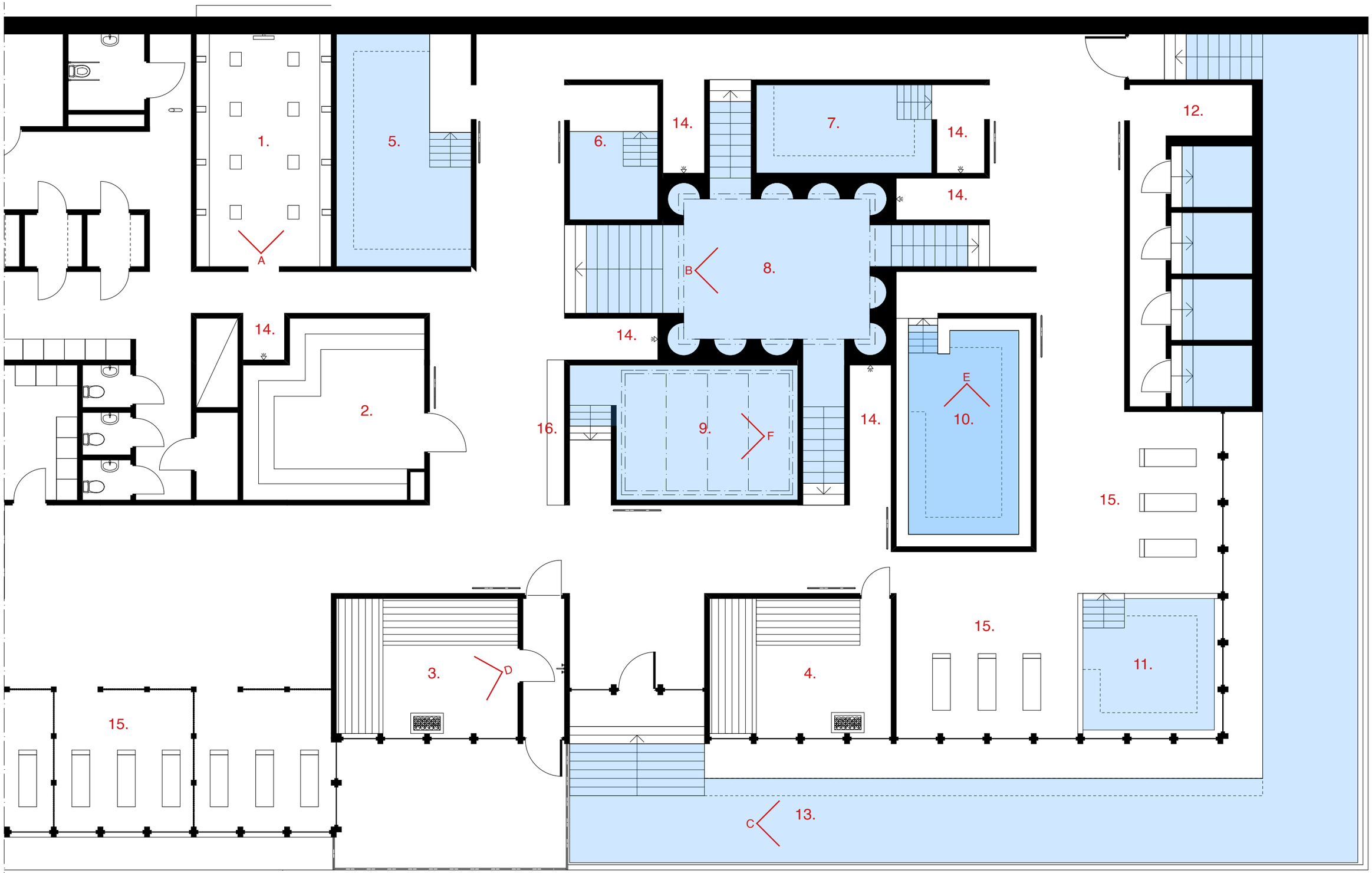
Morning

Midday 5000K



Dusk 2700K






*1. Washing*
*2. Steam Sauna*
*3. Sauna*
*4.Salt Sauna*
*5. Hot pool 42°C*
*6. Cold pool 14°C*
*7. Sound bath 33°C*
*8. Light pool 35°C*
*9. Skypool 33°C*
*10. Mirrorpool 33°C*
*11. Jacuzzi 40°C*
*12. Floating tanks 37°C*
*13. Outside pool, Summer 30°C, Winter 36°C*
*14. Showers*
*15. Relax area*
*16. Drinking water*

N

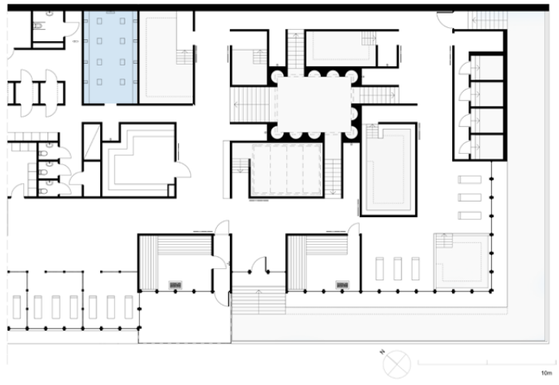
10m

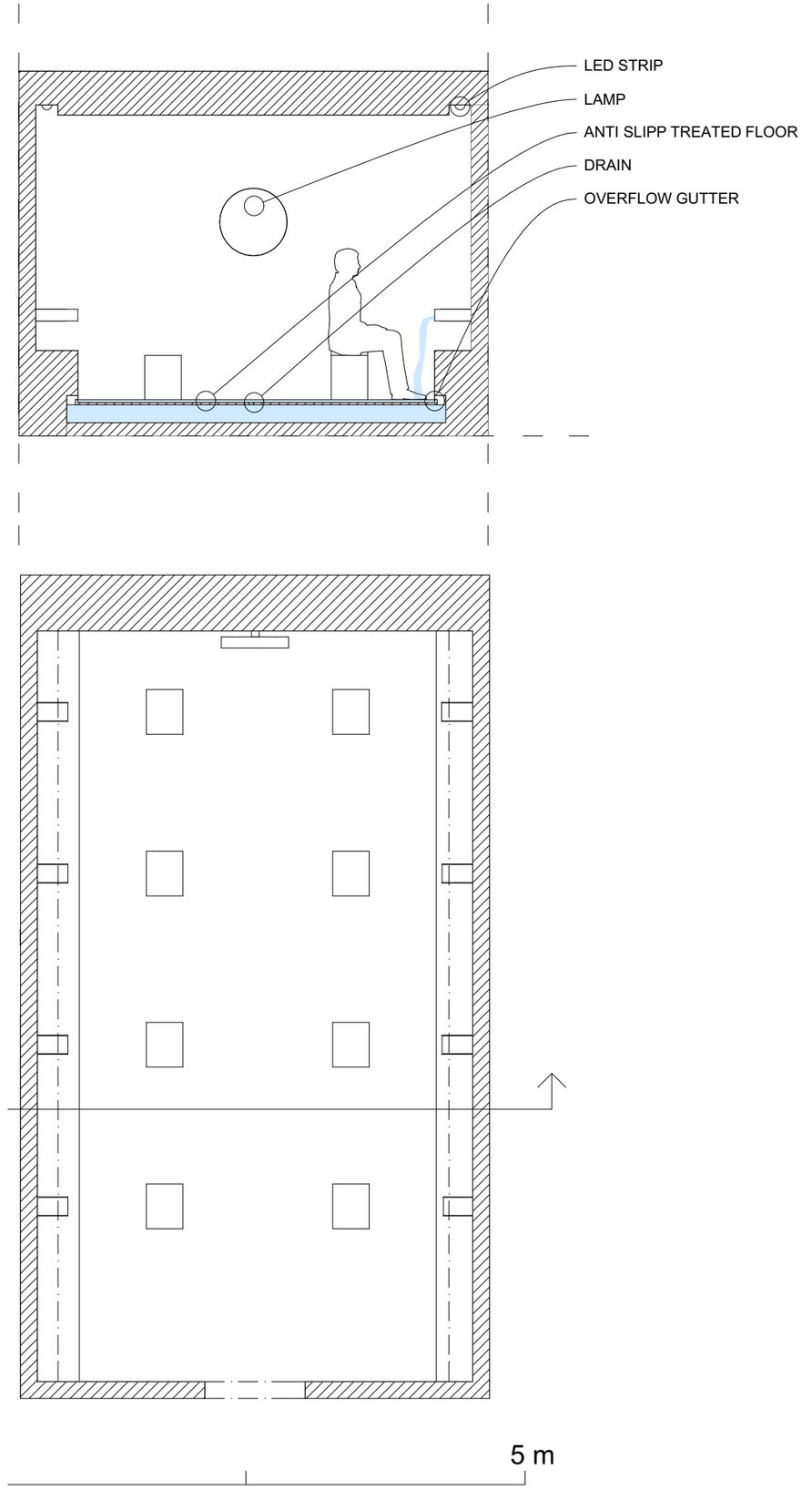
# Washing room

The first room you enter after passing through the changing-room is the wash-room.

Inspired by the Japanese spa process where you, prior to stepping into the bath sit down on a stool or bench with a bucket and a facet in front of you. The bucket is then filled with water and you pour it over yourself after applying soap and shampoo.  The concept in this room is to create a relaxing atmosphere with a polished metal ceiling and a water-mirror on the floor to reflect the soft light emitted by the round lamp placed in the middle of the room.

This is also a abstract interpretation of the midnight sun over the northern lakes.





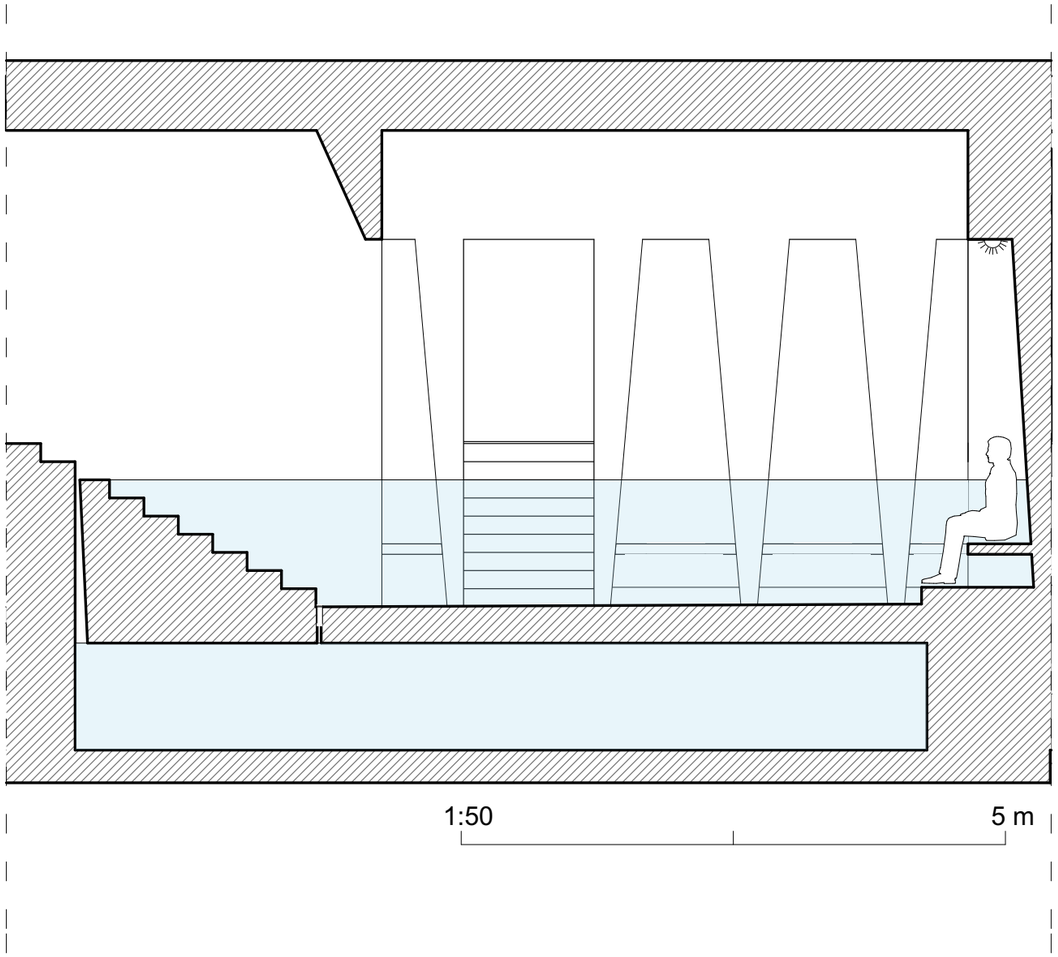

Perspective A
Washroom

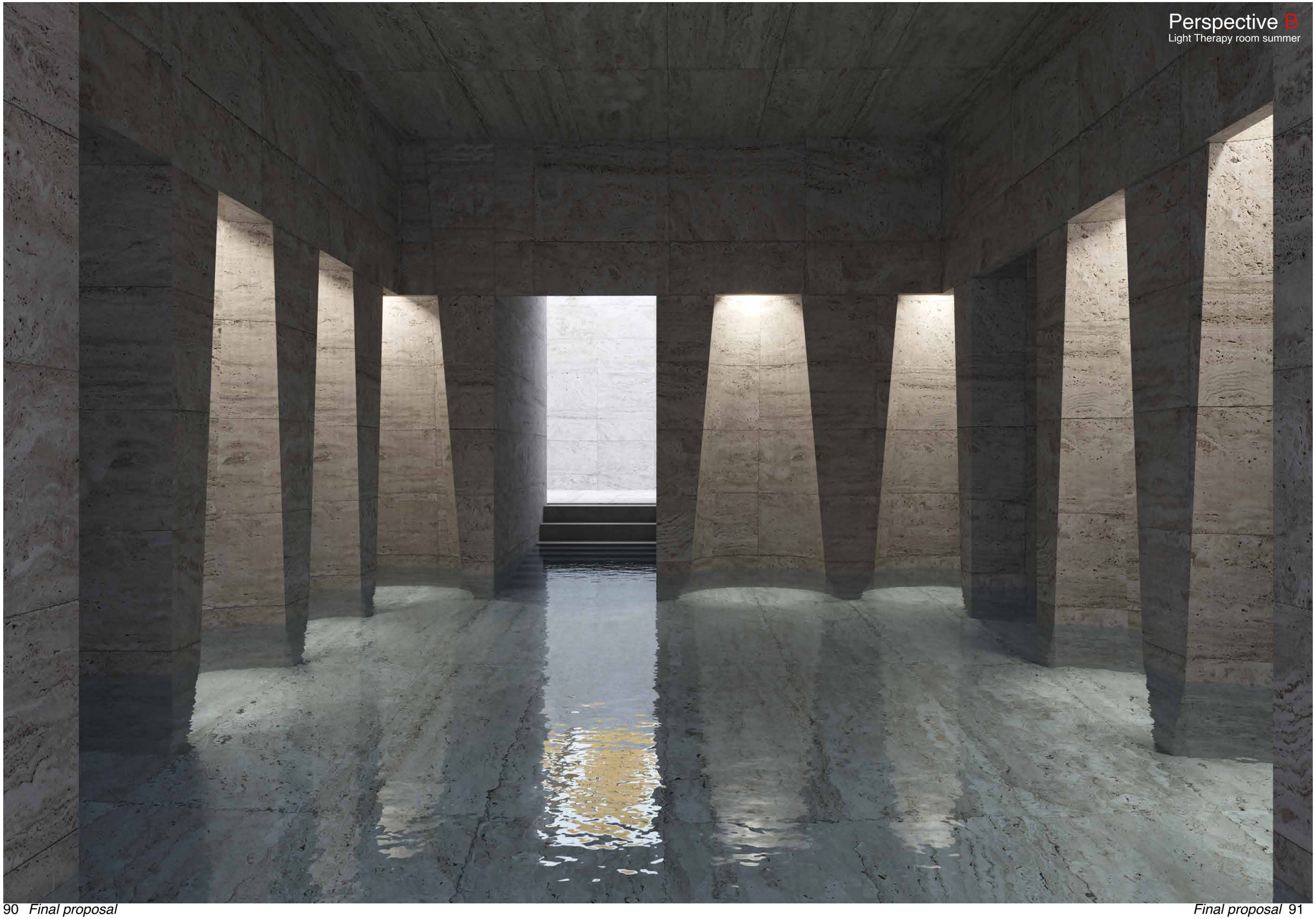
# Light therapy pool

The light therapy pool aims to provide light therapy as well as a relaxing experience, the nine alcoves oriented along the walls allows for individual space while in the pool.

The pool is centrally located and invites you in as it is the first thing that is visible after exiting the washroom.

As light therapy is seldom necessary during the summer and as such the lights can be toned down to create a cave-like atmosphere during the summer months.





## Perspective B
Light Therapy room summer

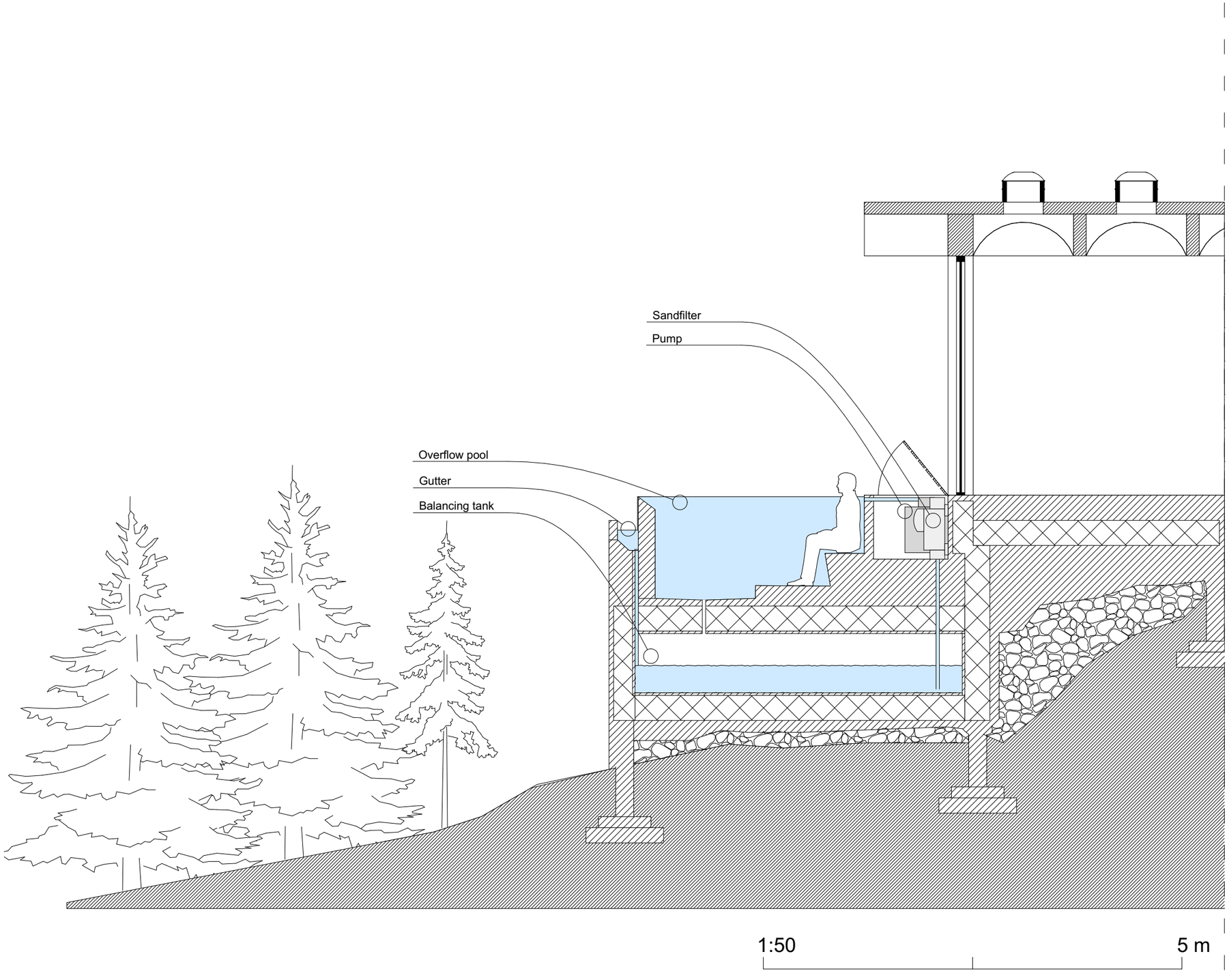

Perspective B
Light Therapy room Winter

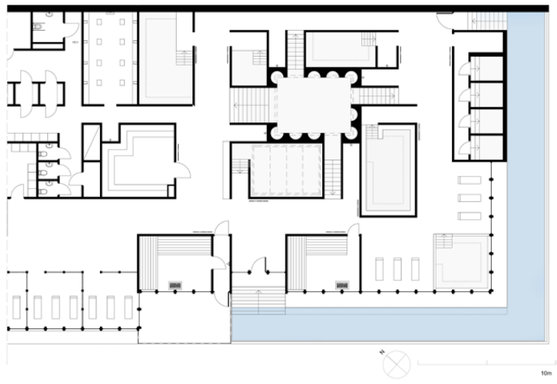
# Outdoor pool

The outdoor pool makes use of the view and allows you to have an uninterrupted view of the surrounding landscape while submerged in the warm water.

The outdoor pool like most pools in the building works on the overflow principle, when a person enters or exits the pool the water level is automatically adjusted to always be the same. This also allows for the creation of a seamless border between the water and the outside. This function is commonly referred to as an ‘infinity’ pool.

In addition when considering the cold climate the pool is equipped with a larger than usual overflow tank to allow all of the water inside the pool to be easily stored in a more insulated tank to help mitigate heat-loss and make cleaning of the pool easier.



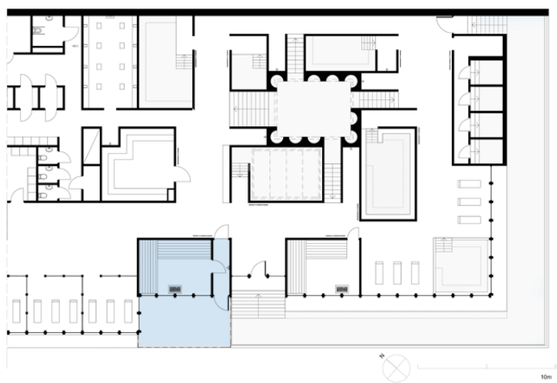



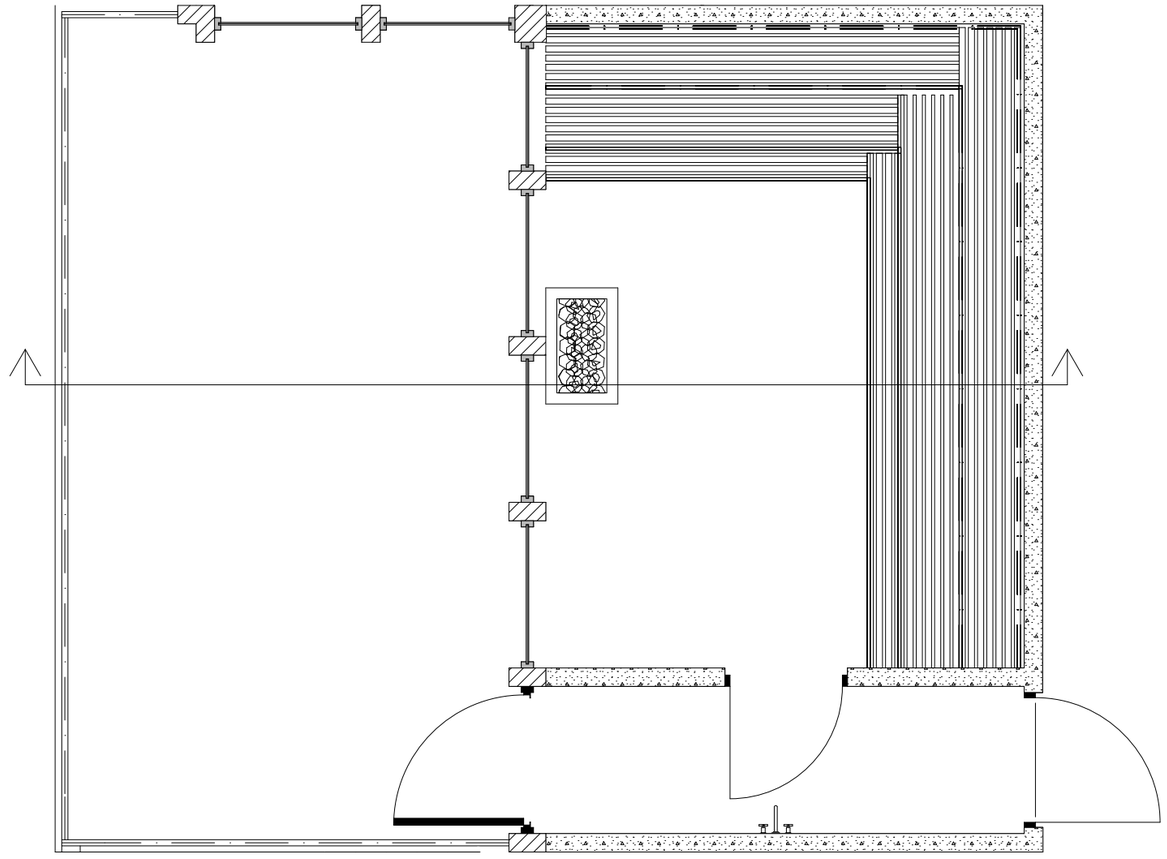
## Perspective C
Outdoor pool

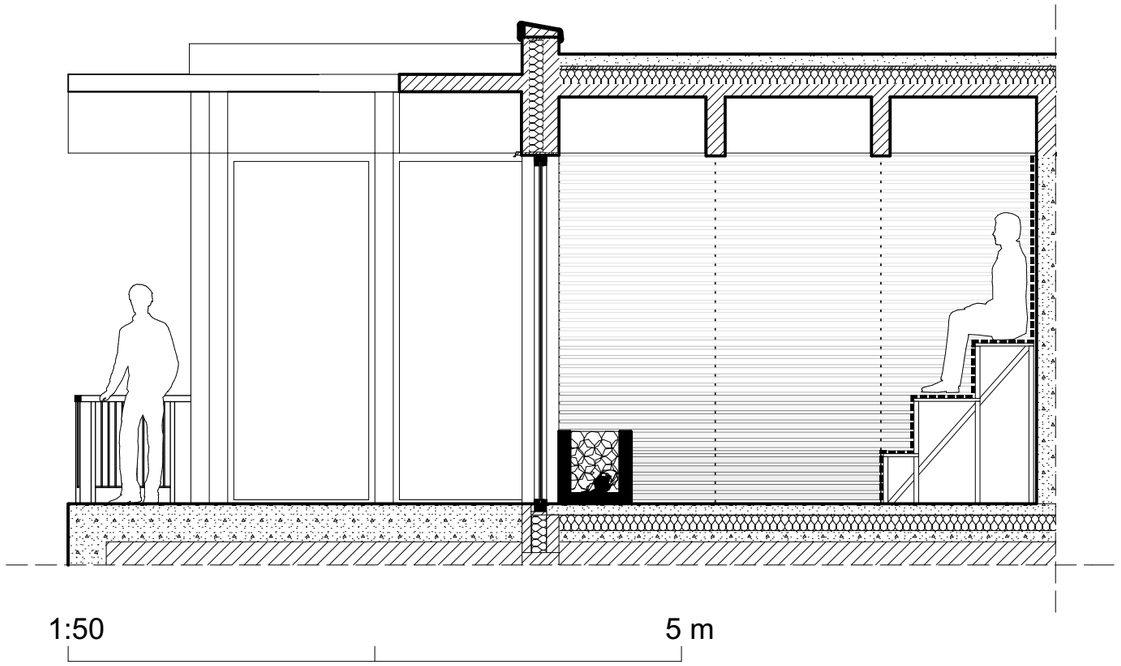

# Dry Sauna

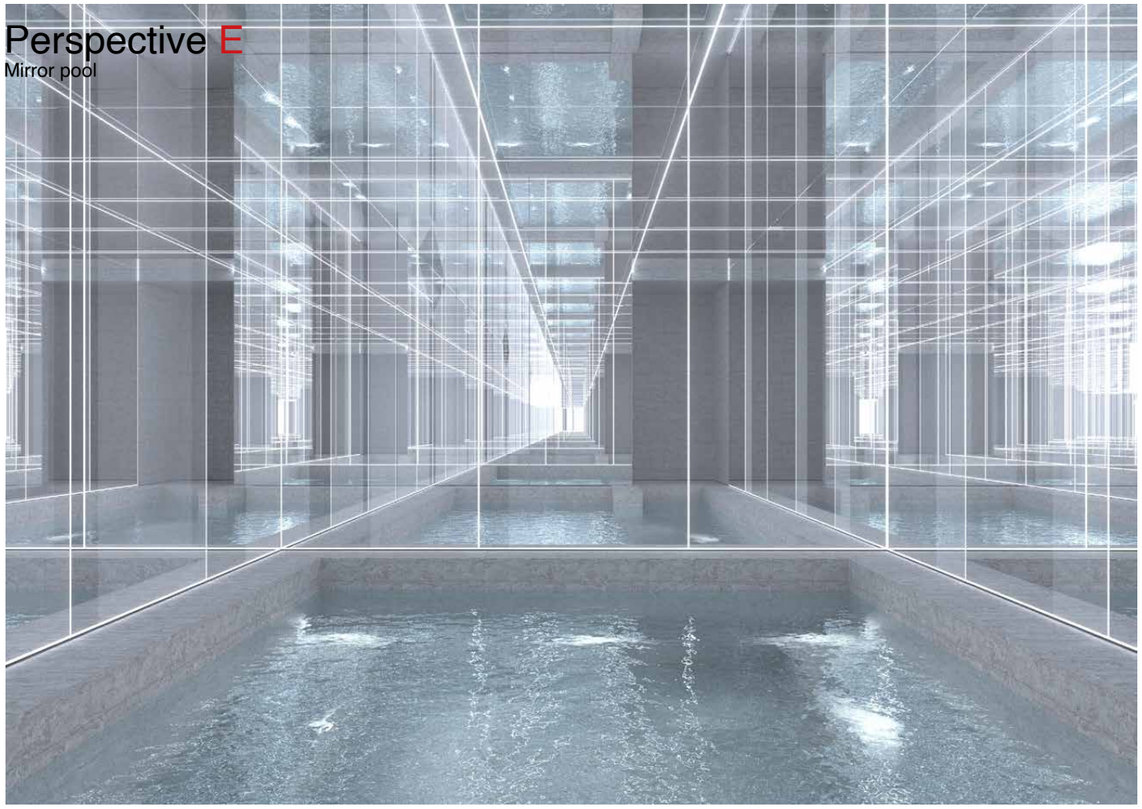
The dry sauna is making use of the location and has large windows in order to make sure the visitor has a amazing view while enjoying the sauna.

In addition to the main sauna, the adjacent corridor connects to a terrace in order for the guests to access the outside. The contrast between the warm sauna and the cold outside is an essential part of the sauna experience.



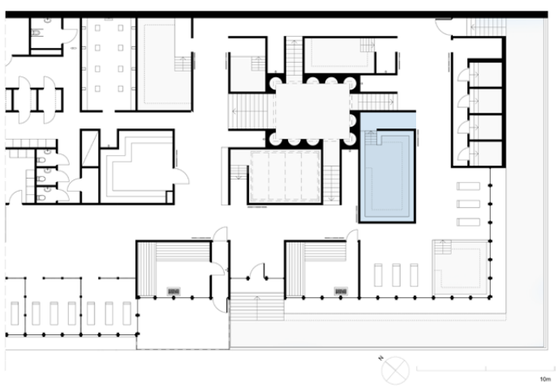


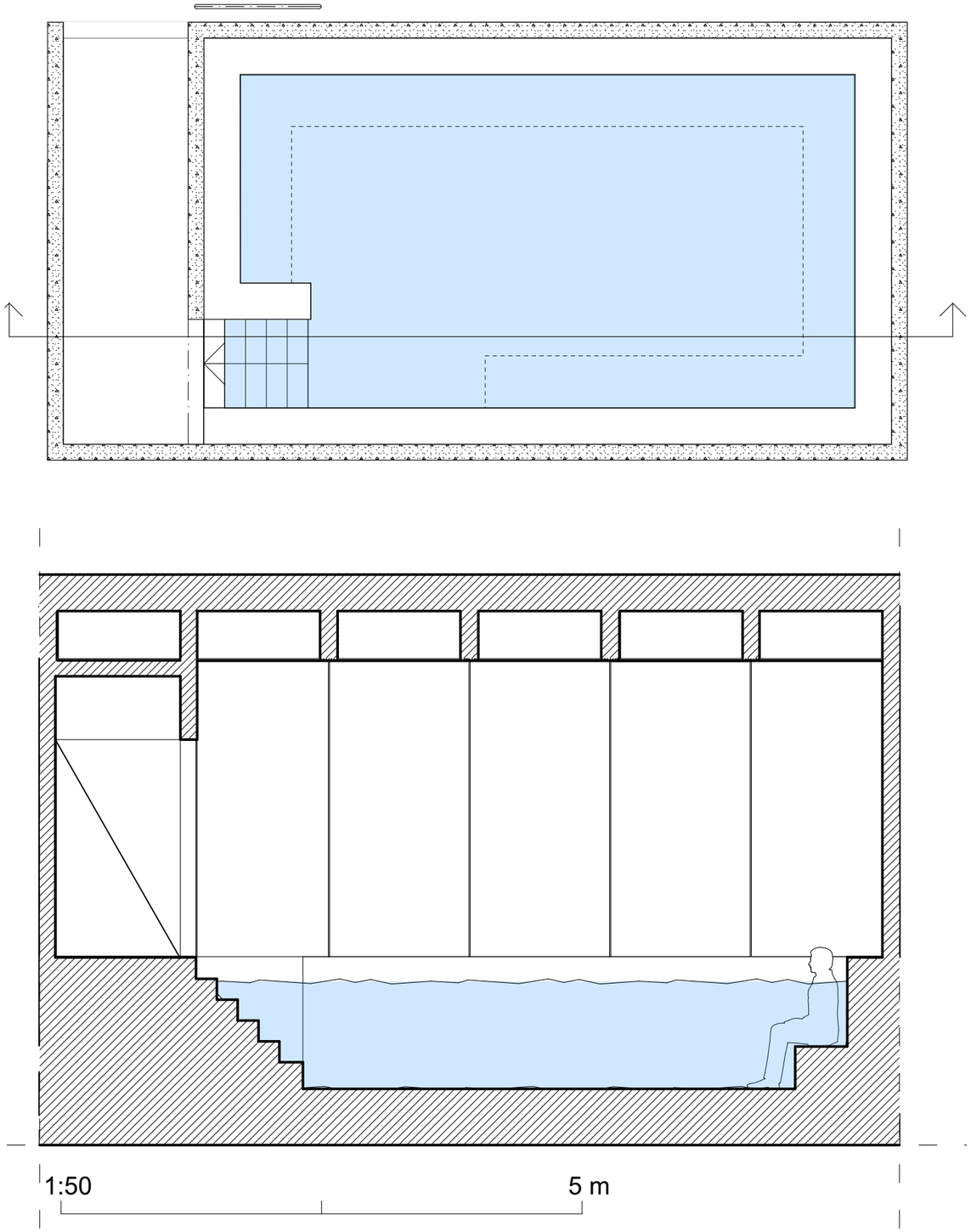





# Mirror pool

The mirror pool makes use of mirrors to create an unique experience.



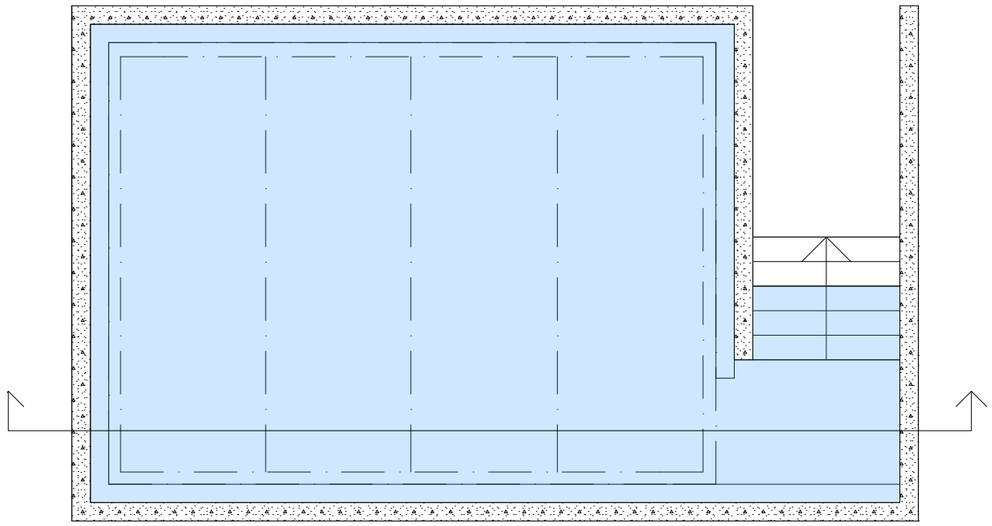


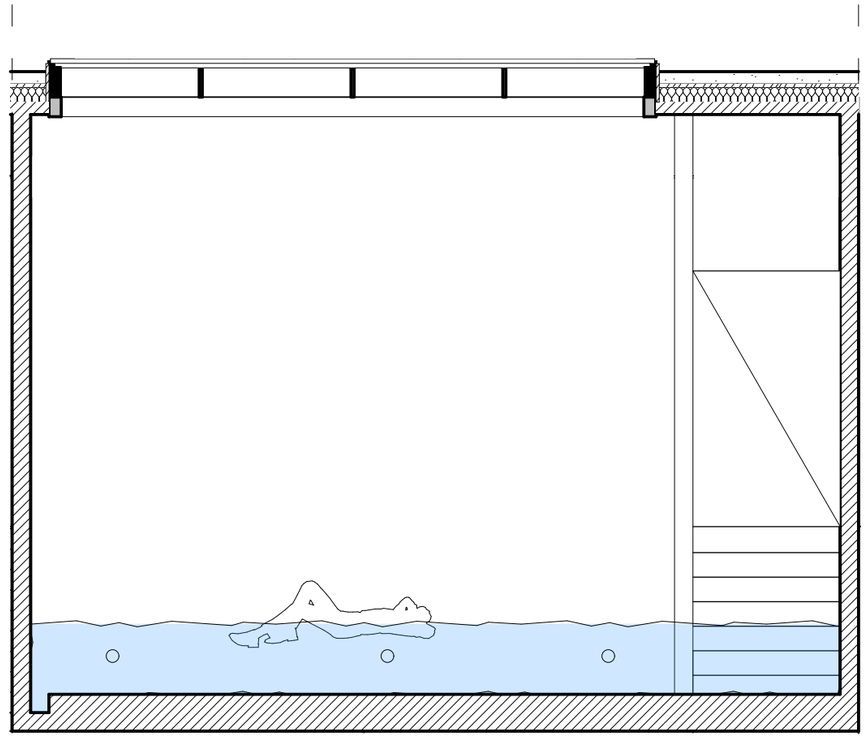
Perspective F
Skypool

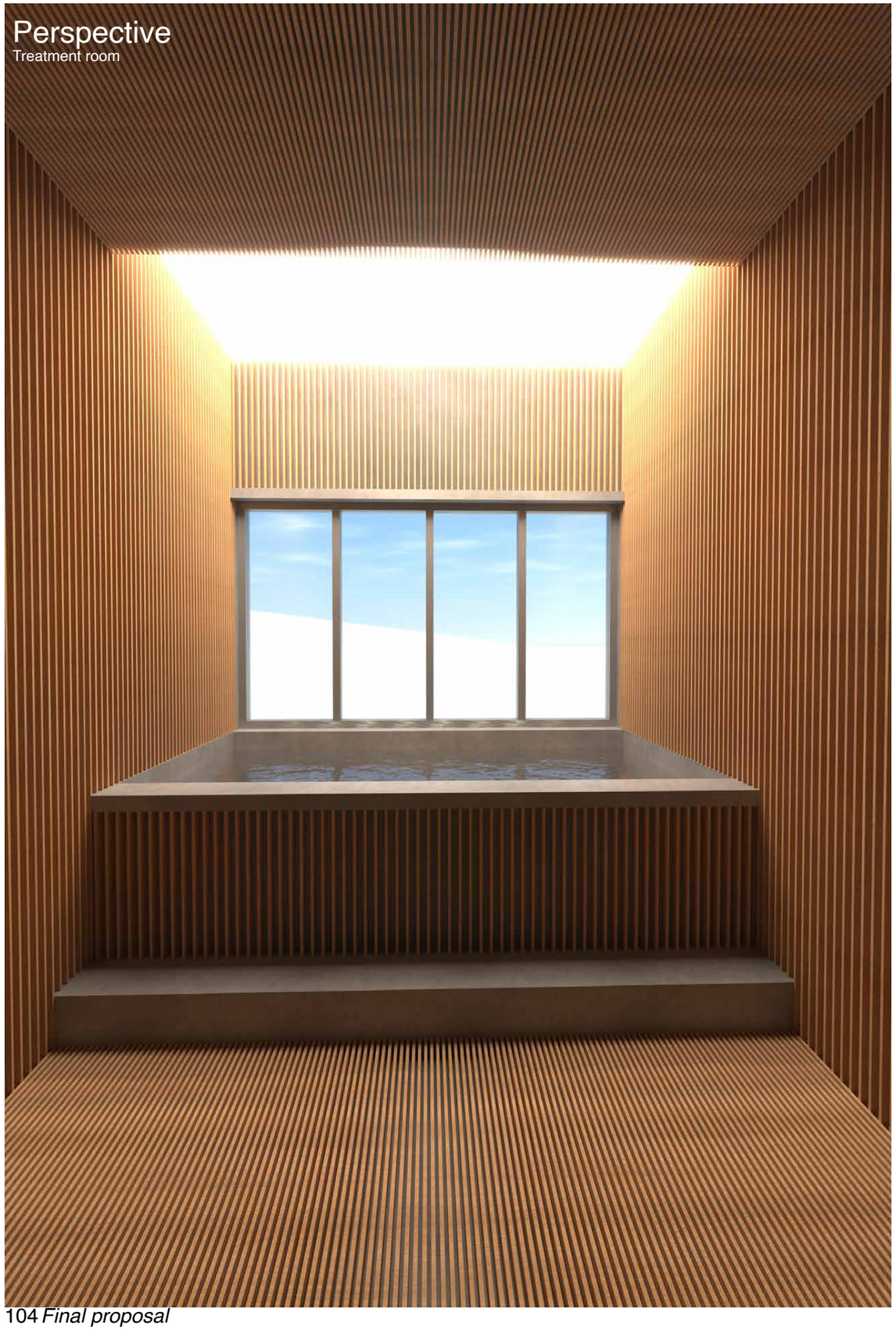
# Sky pool

Saturated salt water gives the spa visitor the ability to effortlessly float, the ears are submerged below the water so that most of the exterior noise is cancelled.

The room also has a large ceiling window to allow the stars to be seen during the winter, and the sky during the summer.





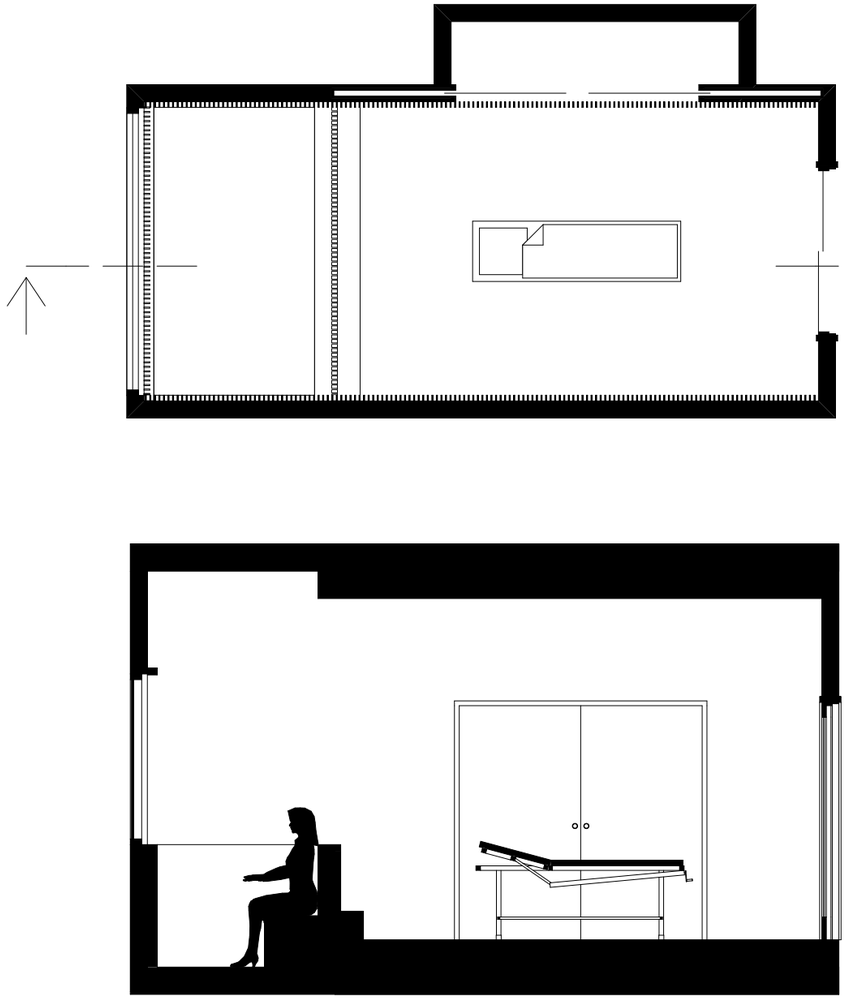



# Therapy room

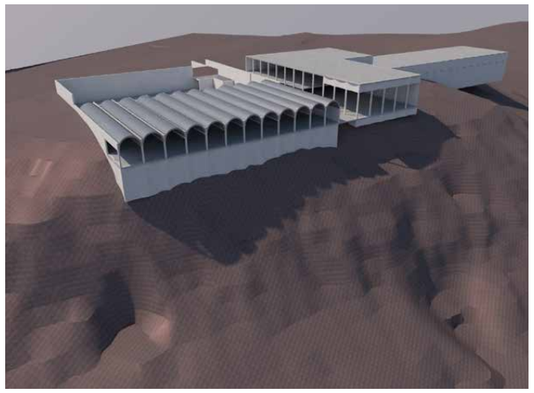
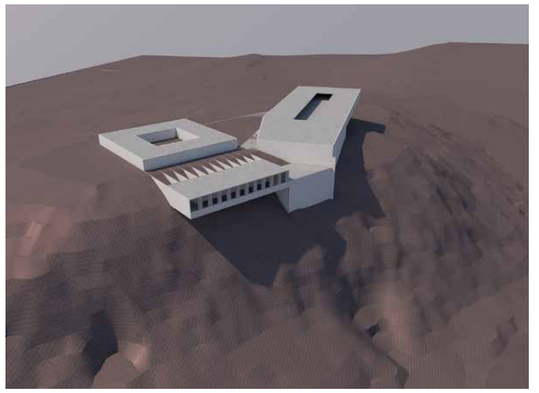
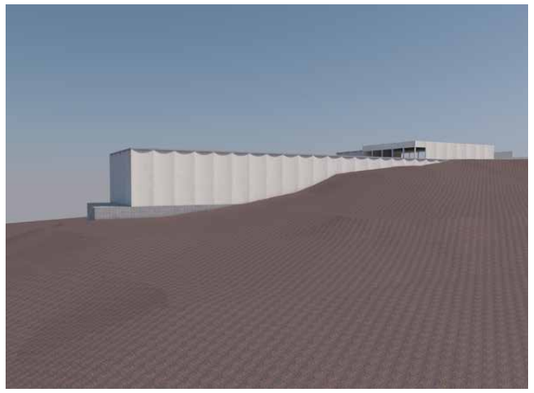
The therapy room is located separate from the main spa area on the 4th floor, this is to create a more relaxing experience when inside the therapy room.

The purpose of the therapy room is to cater both to light therapy but also to other kinds of therapy one might undergo whilst in a spa. The room is dimensioned to be able to fit a massage bench as well as a bathtub or recliner.

While undergoing light therapy it is important to have something to look at as the eyes need to remain open, to that affect there is large windows so that the patient can look at the view while being treated.

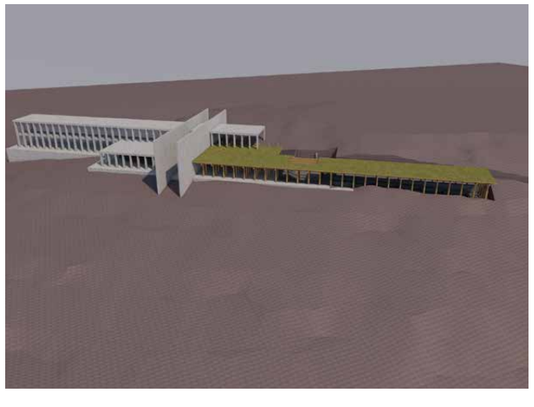
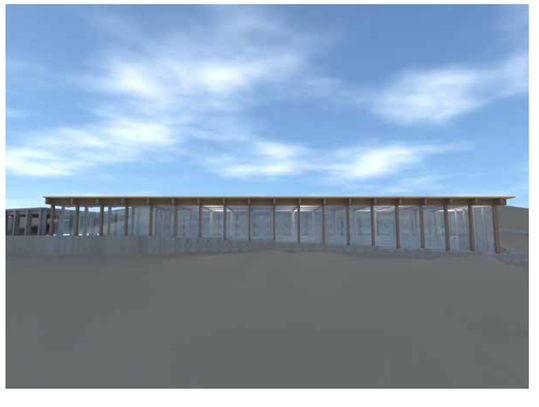


# Design Process






# CONCLUSIONS & REFERENCES

# 05

*Conclusions*
*References*
*Bibliography*

# Conclusions

In order to design a spa it is important to consider the experience as a whole. The health benefits as well as the atmosphere, in certain aspects the atmosphere can be considered part of the health benefits as the relaxing and calm nature of the spa is part of the therapy.

I have also discovered that light therapy should be integrated in a way that does not dominate the experience, I believe that it should be a natural extension of the spa rather than the central part.

To promote mental health is an important part of the overall well being of everyone in society, and since we spend more time indoors now than ever before the built environment plays a central role in how we live and how healthy we are.

I believe that architects should take this into consideration, especially considering the extreme lighting conditions we have in Sweden.

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Image source: Tate.org

*The weather project*, 2003 by *Olafur Eliassson* is a great reference for this master thesis as it shows how working with mono-frequency lights can create interesting atmospheres.
The 'sun' in the installation also heavily resembles the midnight sun in the north of Sweden.
Many other art installations By Eliasson is also of relevance such as *The fog assembly,* 2016 and *Yellow forest* 2017.

Image source: 7132therme.com/en

The *Therme Vals spa* by *Peter Zumthor* is an excellent example of architectural qualities that are relevant to this master thesis.

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