JETSMARK CENTRE

SPORTS AND CULTURAL CENTRE - KIM LØYSTRUP JENSEN - MSC04-ARCH39 - JUNE 2014

Title Page

THEME
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ABSTRACT

Projektet Jetsmark Center omhandler en typisk problemstilling i de danske provinsbyer – at skabe et livligt område, hvor borgerne kan søge hen for at søge kulturelle oplevelser og socialisere. Centrets omdrejningspunkt er sport og aktiviteter, der vil blive sat fokus på i og med at hverdags funktioner som café og supermarked, som er en del af rumprogrammet, skal tiltrække en bred gruppe af befolkningen, som derved også vil få vækket deres nysgerrighed omkring sport.

READER'S GUIDE

The report is divided into five main sections; Intro, Programme, Process, Detailing, Presentation, Outro and followed by an Appendix. The main focus points in this project are the exterior facade design, the common square design and the multifunctional Sports hall.
All illustrations that do not refer to an illustration number is own material. The litterature and illustration lists can be found at the of this report.

Table of content

Motivation

Sports and culture are by definition vital elements of human life. Whether we go to the movies, watch the children's soccer game or play badminton with friends, it is common that you get a break from the everyday stress and you become part of a common group of people with exactly the same intention - to be drawn into a more simple mode where the household duties like cooking, cleaning, doing laundry and the tasks at work disappear for a while.

Sport and culture is important for each individual, but also for the communities. The smaller communities in particular may be at risk for a lack of influence of sports and culture. The scale of the communities in a way reflects the base and potential for the cities market; so the larger the community the greater is the market to offer more and more diverse facilities.

Sports Halls in the outskirts of Denmark are mainly older halls, which to some extent do not follow the current conditions and trends. Therefore the full effect of sports and sports associations cannot be achieved, which in the long run makes the community lose value and quality - these communities or lack thereof are areas that have a negligible interaction between the population.

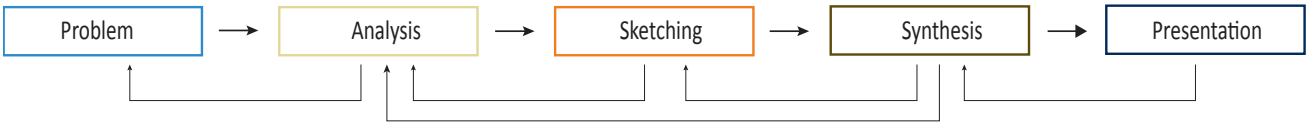
By merging functions and events into one common space it can generate a concentrated life, which can evoke the communities and with great potential provide the citizens with healthy values.

In short the idea for this project came from my own interest in sports, culture, competitions and activities etc. I spent my childhood in Pandrup and Kaas, and therefore have a personal knowledge and experience about the previously mentioned problematic in the smaller communities. In my opinion the potential is highly present in Pandrup and Kaas, but fails to be released because of poor circumstances.

Methodology

This project will be developed in an integrated design process as Mary Ann Knudstrup formulated it. The integrated design process means that the development of this project is to occur with relation to all parameters at the same time, architectural and technical etc. The project will progress in an iterative process that consists of five phases: problem, analysis, sketching, synthesis and presentation. The first two phases are more theoretical, number three and four are practical and the last phase presents the final result of the project. [Knudstrup, 2005]

In relation to the architectural scale the design parameters revolve around the functional demands, community, spatial beauty, proportion, material and atmosphere etc. In relation to the technical scale it is structure, construction, energy calculation, passive and active methods for minimizing the energy consumption etc.
In order to reach all these issues in this project several methods will come into play. The tools and programs considered relevant during the five phases are listed in the diagram at the bottom of this page.



TOOLS:	Problem	Analysis	Sketching	Synthesis	Presentation	PROGRAMS:
Modeling						Archicad
Drawing						Robot
Tracing paper						Be10
Hand calculations						Velux
Site trip						Ecotect
Litterature						3D studio max
Case studies						Sketch Up
						Illustrator
						Photoshop
						Indesign

Sustainability

In this project the sustainable focus will be according to the social and ecological part within the conceptual scale.

Ecological sustainability
This part will primarily revolve around passive house strategies formed in the designing phase in order to achieve low energy consumption and a good indoor environment with the addition of active methods if required.

Social sustainability
One of the main objectives for the development of this project is to promote social sustainability in various preconditions.
In the small scale social sustainability will be taken into consideration according to how the functions, that are included in the programme for a new Sports and Cultural centre, relate to each other and how to implement spatial qualities to the functions in order to make a high attraction level to the sport and cultural spaces, so as many people as possible will use it with joy.
Social sustainability in the larger scale will be about looking into what kind of attractions the new centre shall provide and what hierarchy they should have. The goal is to make a wide range of functions in order to accommodate diversity, which in the end is to ensure that the complex meets a wide target group.

02| A mix of people of all ages that enjoy a sense of community

Tectonics

The angle of this project is to create a tectonic solution that relates to cities of Pandrup and Kaas. The two cities have a very industrial background that is quite similar to Aalborg, capital of the Northern Jutland. It is not many years since the municipality of Aalborg assigned Cubo Architects to complete a design for a new cultural centre Nordkraft with a capacity and diversity suitable for the scale of Aalborg city. Nordkraft is a considered a very well placed tectonic reference for this project as it has successfully exploited and transformed an existing industrial building formerly a power plant into the city's cultural centre without diminishing the industrial history with the preservation of high ceilinged spaces and large columns.
Even though this project does not concern a transformation of an existing building, the site is intensely surrounded by the industrial history of Pandrup and Kaas. The intention of the new Centre is to create a trademark for Pandrup and Kaas that is linked to their common cultural character and industrial history involving the entire cities to the building design.

Tectonic solutions will be implemented as an integrated part of the project and the overall construction shall be a significant part of the identity of the centre and at the same time emphasize the dynamic atmosphere that will occur in the centre. Corresponding to the industrial history of the area the construction is desired visible in search for honesty with a strong character of dynamics, elegance and a vibrant spirit.
Investigations during the design phase will indicate which kind of structures and choice of materials will match the building depending on different factors such as the building typology and the desired expression.
The intention is to use the static program Robot as integrated tools in the design phase in order to ensure that the dimension of the structure is correct both structurally and in relation to the exterior and interior expression that is desired for the project. In addition Robot will be used as a result based tool that can document the statics of the project.

[ill. 03] The image reveals the diversity of Nordkrafts exterior architectural expression, which is also reflected in the internal organization

[ill. 04] Evening image of the front facade of Nordkraft with the main entrance to the facilities

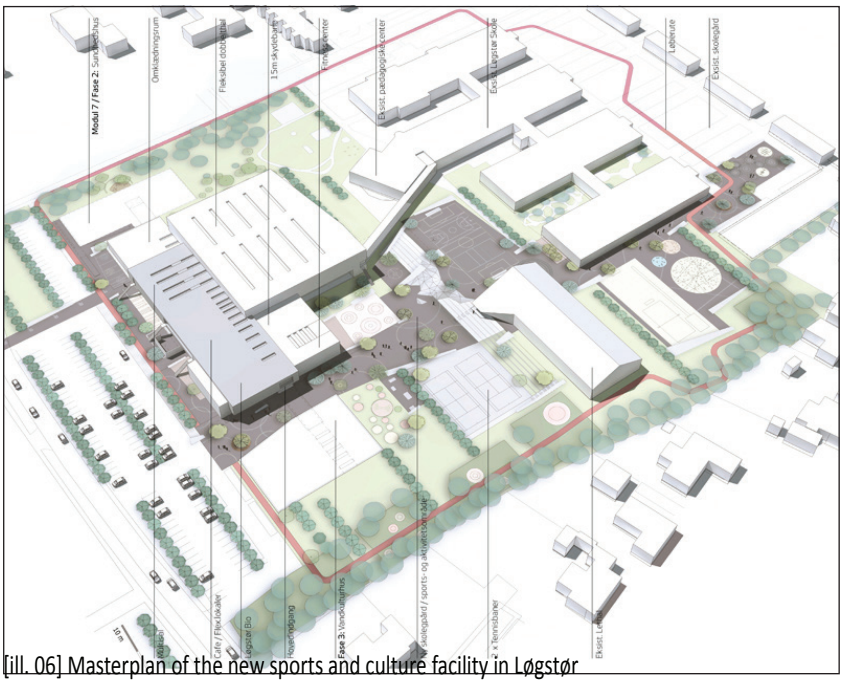
PROGRAMME

At this point the site is considered as a Tabula Rase, where the conditions of the current Jetsmark Centre will show where improvements are needed and the case study of the Lantern will be a source of inspiration.

The programme will create a firm foundation for the design phase of the new Jetsmark Centre.

The Lantern

The Lantern is a project that is being realised in a city called Løgstør in the municipality of Vesthimmerland less than 100 km from Municipality of Jammerbugt. The city of Løgstør has a similar scale to the cities of Pandrup and Kaas with a population of approximately 4.300 people compaired to Pandrup and Kaas that have respectively 2.800 and 2.600 people.
The old sports halls in Løgstør are outdated and the school needs renovation treatment and finally there is a need for a health care center. The idea of the Lantern is to create a new center that combines all these facilities of sports, health care and culture together with a close attachment to the school as well.
The realization of this project will have many positive impacts to the life in Løgstør city both socially and economically. There is an even more widespread vision for the project which is to include cities around Løgstør to use the facilities and also improve the tourist environment in the area by contributing to the increasement of sports and cultural holiday activities.
Projects like the Lantern can cause a positive growth in the city and strenghten the community feeling between the citizens.
The design solution of the Lantern is based on concept that are very clear and strong. All the facilities are connected through 'foyer street' which is the common area for all the visitors and it is here that people can meet despite different initial interests's and purpose in the Lantern. Another main focus point in the Lantern is the outdoor facilities. The layout of the outdoor area is very detailed and every corner has a purpose to increase the quality of outdoor living.
The Lantern will be a great source of inspiration throughout the process of this project for example to create guidelines for scales in room program and when deciding which facilities to include in the new Jetsmark Centre.



[ill. 06] Masterplan of the new sports and culture facility in Løgstør

[ill. 07] View over ´the foyer street´

[ill. 08] Interior render showing the diversity of people using the facili-

Location in a regional scale

The project site is placed in the municipality of Jammerbugt in Nord Jutland. More specifically, it is in the Jetsmark parish, which is an area between the small cities of Kaas and Pandrup.
There is about 25 km from Jetsmark parish to Aalborg capital city of North Jutland which are connected with good logistics in the form of a direct bypass road.
In relation to creating a new modernised sports and cultural centre in the Jetsmark area some aspects that make this area attractive will be explained in the following.
In the area there is a lot of evolving industry and therefor also a lot of jobs. Among them is Schulstad A/S, M-tec and Kaas Stålbyg. The old Flextronics factory once had 2.400 employees, but is today used as a trade fair facility. The industries in Pandrup are a moving size and have a great potential - therefor the cultural qualities of the area needs to be of a certain standard.
The cities of Pandrup and Kaas are closely related to the industry and a lot of the jobs have strong qualities in the form of large areas of single-family neighborhoods which are attractive for especially families.

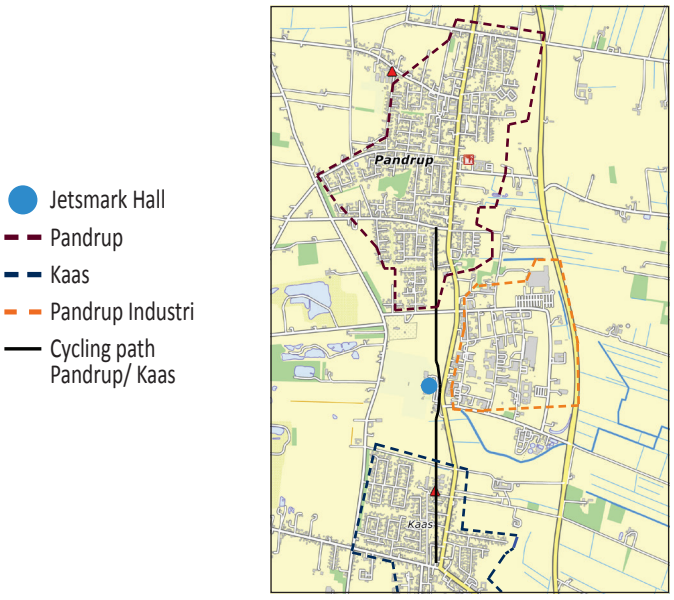
However, an issue with Pandrup and Kaas is that they are lacking cultural hubs and vibrant urban areas that can unite people criss-cross and give the citizens cultural experiences. When this part is unsatisfactory the risk is that people who find a job in the area refrain from living there and instead commute from larger cities like Aabybro or Aalborg to their jobs in Pandrup or Kaas. Ultimately the people that commute will prefer jobs that are closer to their homes which naturally reduces the attraction of the jobs in this area.
Another quality of Jammerbugt municipality is their tourist attractions of Fårup Sommerland and the summer town Blokhus and its popular beach. These attractions create life and inflation in the area during vacation periods, which potentially can be used as a parameter of a new Sports and cultural centre in Jetsmark.
A hotel in the new Centre could be a great quality for the Centre. Tourists and other visitors can utilize the hotel during the Easter and summer vacation where the sports clubs are normally vacation closed, which ensures that Centre remains active as different attractions and café can be utilized by the tourists and other visitors in these periods.


Project Site
Lantern

Location in a local scale

As mentioned previously the project site is located between the two cities Pandrup and Kaas. A cycling and walking path connects the two towns with the project area situated near the middle of these paths. The path is an old train rail, so it cuts sharply through the two towns which means that it is very direct and easy to take this path.
Aside from the cycling path, a road parallel to this is connecting the two towns and again runs right past the project area. Because of the accessibility and the openness of the site it is very exposed and has great potential of being a natural center point.
Pandrup and Kaas each have a population around 2500-2700 people. The small population of each town hinders the possibilities for the cities to contain diverse cultural areas because the market for it is too small. But if the towns shared one common area, the population is doubled and therefor a larger and more diverse cultural area can be created.
One advantage of building a new large sports and cultural center in the Jetsmark area is that there is an opportunity to build several facilities closely together which means that the facilities can affect each other.

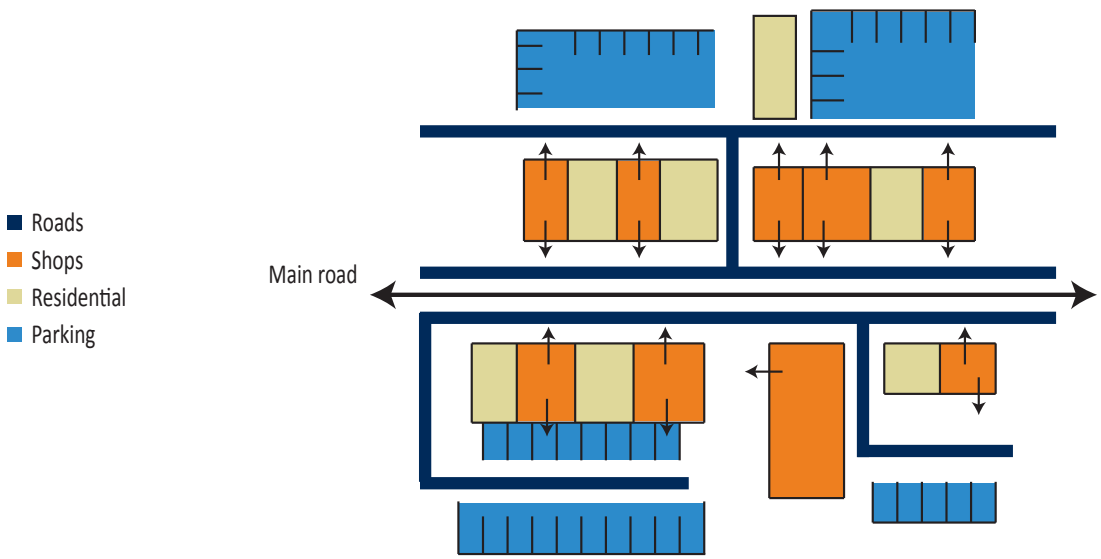
Pandrup and Kaas are not only struggling with the cultural qualities because of the population, but also because of the problem of concentrating life and facilities (further explained in *City typologies*).
The two cities already share facilities such as a middle school, the church and the new Health Center next to the project site. Perhaps most importantly the current Jetsmark Centre is also already a shared facility, which means for example that there is no Pandrup football team or Kaas football team; it is the Jetsmark parish football team.
The people of Pandrup are not keen to travel to Kaas an use 'their' facilities and vice versa, but when the facilities equally belong to both cities there is a great sense of community that extends the city boundaries.



City Typologies

Pandrup and Kaas

In Pandrup and Kaas there is one main road that runs all the way through the city. Several shops are attached to the main road in the centre of Pandrup. However the parking possibilities connected to the main road are poor, so you can only drive by the shops' front facade. Obviously there are walking paths as well, but because almost all parking are placed on the back side of the shops, these paths are not used very much. This makes the centre of Pandrup very dead and it is highly because of the layout of the city. The layout sets the stage for parking the car - going in at the backside of a specific shop - when done you go back to the car and drive away which means that the shops fail to have an effect on each other which could generate a more vibrant life in the streets.



Targets

The desire is for new Jetsmark Centre to be for everybody; for people of all ages and with many different interests just like the Lantern in Løgstør.
First and foremost the Centre is for the people of Pandrup and Kaas and with success it can become a vital part of the two cities identity and unite them in a strong community.
Other targets have also come into consideration based on the first part of the programme. As mentioned in *Location in a regional scale* there are good job opportunities in the area, but the interest to live in the area is wage which could change if the cities could provide better cultural and sports activities. A reference to an interview is used in order to analyze the different demands and preferences when the people choose a dwelling. The interview randomly picked 2.500 people in Aarhus and asked them what the important factors are. The results from the interviews are divided by five important factors; Physical conditions, Social conditions in neighborhood, Conditions for children, Service and facilities and Transport facilities illustrated in the diagram on the adjacent page. The factors are classified by the preference of the interviewed in appendix xx. [dst, 2013]
Several of the factors can be fulfilled in the new Centre in particular the conditions of communal facilities and the proximity to the city's pulse.
The centre shall also be availiable for tourists where the will be good conditions for accomodation and enjoyable activities. A hotel also creates an environment for summer and hoilday camps for children that can use the facilities in the centre, and can also go on a daytrip to Fårup Sommerland.
The facilities in the Centre can be utilized by business oriented people as well. The hotel can be used for a work related weekend course with opportunities to go to the café in the breaks or enjoy some other activity.
To conclude a combination of many facilities can create an environment that is great for many different people with very different purposes in the Centre who will generate a concentrated life of diversity and activity.

People of all ages

People of Pandrup and Kaas

Everybody

Business oriented people

Summer camps

Tourists

Five important factors for living [dst, 2013]

Avoid noise
Access to green areas, sea or lake

1. Physical conditions

Limited social problems
No crime
Residents is less different
Less immigrants

2. Social conditions in neighborhood

Close to school and daycare institutions
Good conditions for childen

3. Conditions for children

Communal facilities
Close to the city's pulse cafés etc.

4. Service and facilities

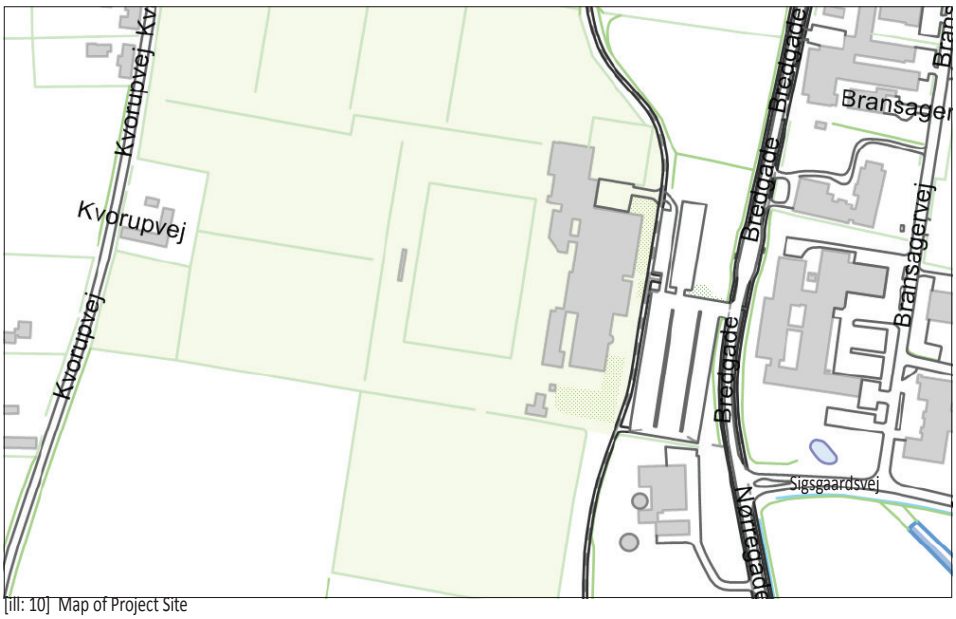
Close to good public transport
Close to workspace
Close to friends and family

5. Location and transport facilities

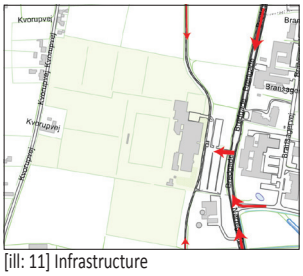
[ill. 09] Exterior rendering of the Lantern in Løgstør

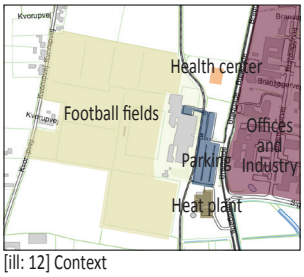
Site context

There are a few possible paths to take that lead to the site. There is the north-south main road which connects Pandrup and Kaas to the area Jetsmark. The main road also defines the area that is placed on the western side of the road. The road Sigsgaardsvej (see image) runs straight from the main road to a bypass road which leads directly to Aalborg in a southern direction and Hjørring in a northern direction making the site very accessible.
Another way of entering the site is from the cycling and walking path which runs right next to the entrance of the current centre.
Because the roads and paths are very dominant in the two cities the access to the site is very immediate and quick from most areas of the cities.
Buildings with different facilities are located north, south and east of the site. The building north of the site is a brand new health center; to the south is a heating plant and to the east there is an office building (image on next page). In front of the current Jetsmark Centre there is 7.200 m2 parking.
Because the office building is on the east side of the road, it is not blocking the view towards the site when using the main road. The Heating plant and the health centre are partially blocking the view but because the current Jetsmark Centre is retracted from the road due to the parking the building becomes very exposed in the flat and open landscape from a long distance of the road.
The landscape in the area is predominantly flat. From the eastern side of the parking and to the entrance of the current Jetsmark Centre there is a slope of 0,5 meter. Between the current centre and the football stadium there is a slope of about 1,5 meters which creates a good place to stand for football audience.
Because of the neutral contour lines the landscape will not be of a high consideration as a design parameter.

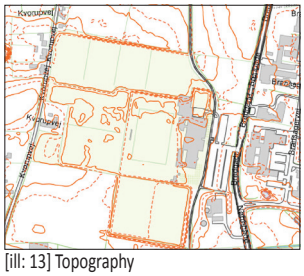


[ill: 10] Map of Project Site


[ill: 11] Infrastructure



[ill: 12] Context


[ill: 13] Topography

Current Jetsmark Centre

The current Jetsmark centre contains two indoor sports halls, swimming hall, fitness center, hotel and two cafeterias.
The complex has been built in four steps over a long period of time:

1: Entrance, main sports hall, swimming hall, cafeteria.
2: secondary sports hall
3: soccer section with cafe oriented to the stadium.
4: Hotel

The oldest building part is the most problematic part. The entrance is very narrow and unwelcomming. When you step into the foyer of the centre it fails to invite as a staying area because it is primarily a long narrow transit area that leads to the stadium. The foyer has no visual connection to the main hall and only a little glass window in a door to the swimming hall.
The very closed foyer the building becomes very private and you wonder if it is okay to enter for instance the main hall or the cafeteria.
The rummaged building parts are the result of a initial building design that did not encourage or support evolving new building parts properly, and therefore the functions and their life is spread. This means that many of the attractions do not affect each other but instead are being held seperate.
Another consequense of the very spread functions and building languages is the logistics and organisations. The centre has a lot of corridors with a closed atmosphere that make it quite confusing to move around in the buildings.

[ill: 14] air foto of the Current Jetsmark Centre


Entrance svimming Hall


Main entrance


Cantine


Entrance to the foyer


Hall 1


Hall 2

A photographic study

The characteristics of the site is shown through series of pictures. The photos illustrate how the area is characterized by its openness and very informal buildings.

Current Jetsmark Centre

Office Building

Health center

Heat plant

Shared cycling and walking path towards the Jetsmark Centre

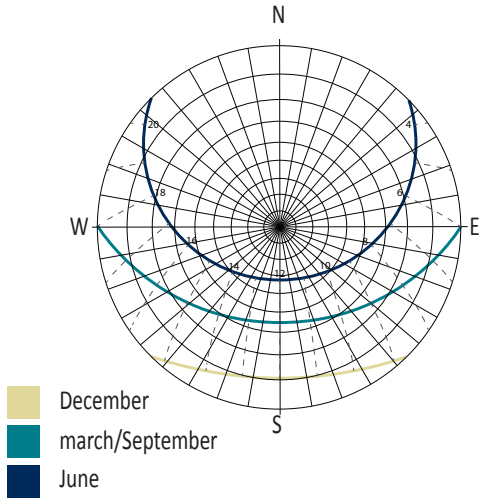
Climate

Climate charts can be useful parameters as a designing tool when creating the new Jetsmark Centre.
The Sun chart explains about placing the functions in order to gain sunny or shadow areas. This can be in relation to passive heating, thermal comfort and atmospherically comfort but it can also be in relation to creating an architecturally attractive space.
The wind chart can be used to consider passive house strategies like natural ventilation in relation to the specific local wind conditions. It can also be used to design sheltered outdoor areas.

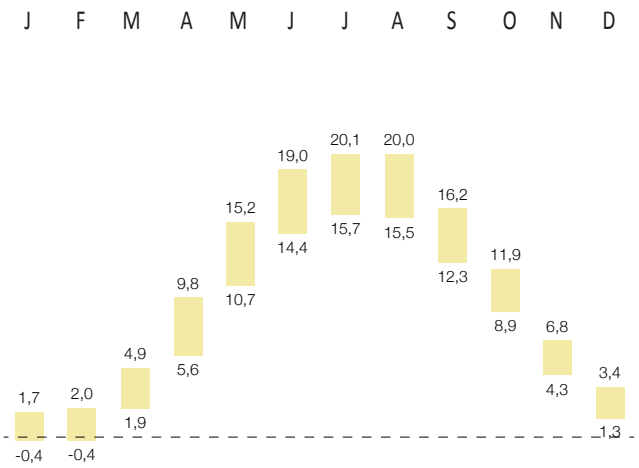
In the design of the Lantern the connection to the outside and the functionality of the outdoor area has a significant priority (p. 10-11). This design solution provides very attractive possibilities to stay outdoors in good weather which is primarily in summer semester. However it is difficult to sell the outdoor area to people during the winter semester when the weather is cold, rainy and all the green and fresh color is gone. Therefore is it very reasonable to consider the options during winter.

The days are shorter, but people are still active when the evening turns the day into night. This observation has generated a desire to create better conditions for staying areas which can function in good weather as well as bad weather. Based on the climate conditions at the project site a design development that relates to rain and wind is encouraged.

Sun Chart Nørresundby

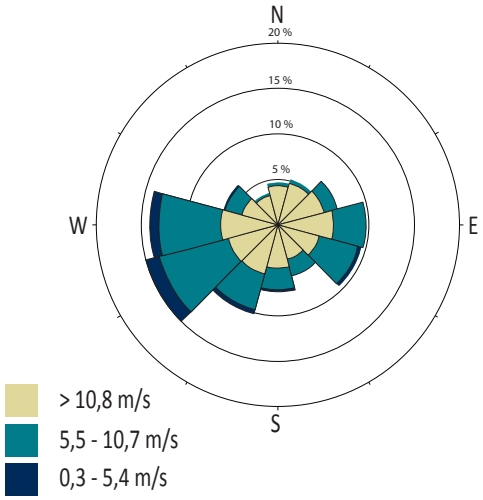


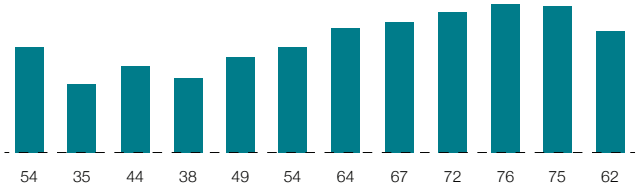
Climate Chart North Jutland



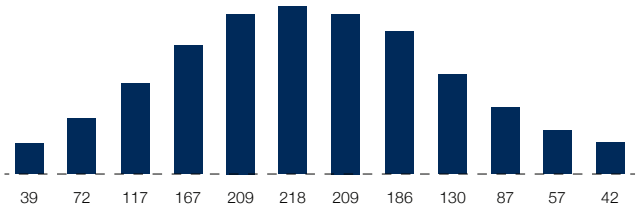
Average day and night temperature, °C

Wind Chart Nørresundby





Precipitation total, mm



Hours of sun, h

Vision

This project is about creating a cultural space and a new city district. This city district shall be a rallying point for the citizens in the cities of Pandrup and Kaas. The cultural space must accommodate diversity and must therefore contain a variety of functions - especially based on sports and activity. The place needs to focus on a wide target group in all ages.

The mixing of functions within the active and cultural area will generate an awareness of the dynamic and exciting environment of sports and the activities surrounding them and in this manner create the social fellowship that occurs when doing sports and sharing common cultural interests.

[ill: 15] friendship circle

Room program

Based on the analysis of current Jetsmark Centre it was concluded that it does not follow todays standards which means that the great potential of the sports centre with its exposed location is not fully exploited.

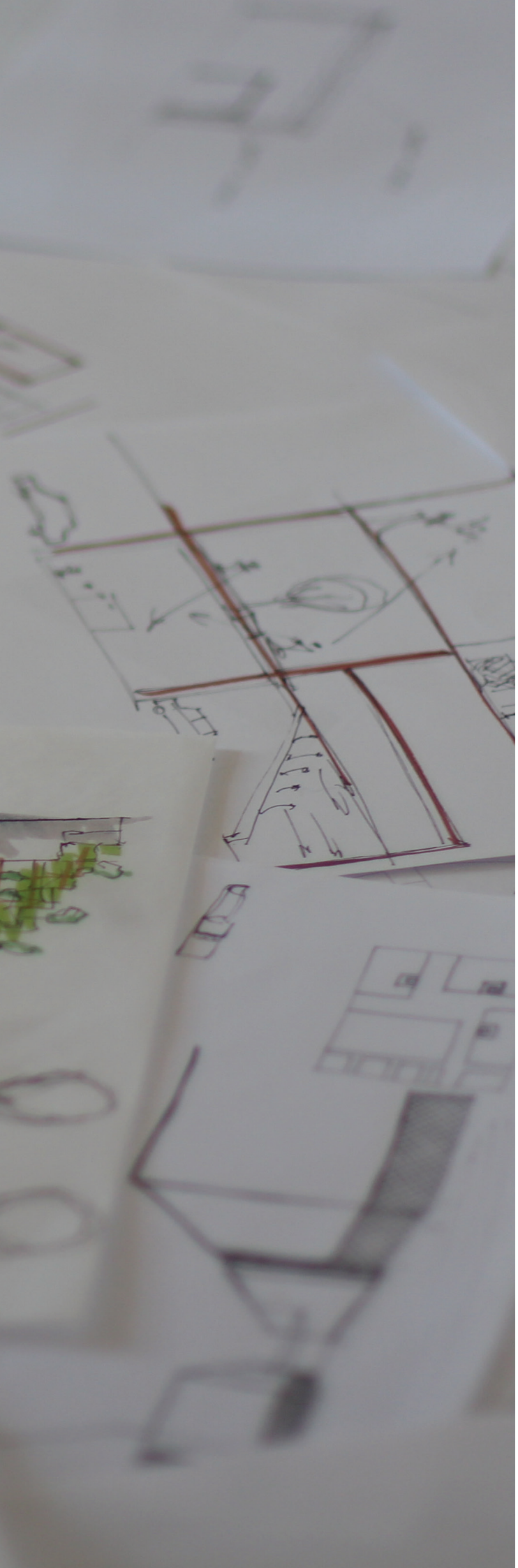
The analysis and considerations on the local and regional scale of making a new sports centre has led to the conclusion that by creating a centre with great diversity the population of Pandrup and Kaas get a new connectig point with a morning to evening life which these cities need.
The functions to include in the new Jetsmark Centre are chosen based on the idea of making a diverse area that invites a wide target group and enhances the potential of creating a dynamic space.
Some of the function areas are based on the current areas and other are based on the case study of the Lantern, which has a similar scale and diversity of functions that is wanted in the new Centre.

	Minimum values		Area	Room
			[m2]	Height [m]
Primary sport related				
	2* Indoor Halls		25*45 (1125)	8
	6*	1. hall changing rooms	300 m2	
	Swimming		35*25 (900)	6
	Fitness		500	4
	wellness		400	3
	Changing rooms: Swimming, fitness, welness		XXX	3
	Activity/ multi room		500	3
	Table tennis, pool, chess, bango etc			
Not sport related				
	Supermarket		800	4
	Café		1200	5
	Sport and health shop		150	3
	Workshop (wood/ steal/ mech etc)		300	4
	Cinema		400	
		Foyer	100	5
		Sal++	300	8
	Hotel		900	
		Foyer	300	5
	30*	Hotel rooms	600	3
Clubs				
	football club		500	3
	Boxing club		700	4
	Handball, basketball, Gymnastic, badminton		100-150	3
		Trophy room		
	Tennis/ volley club		100-150	3
	Danceroom (club)		300	3
	Music rehearsal (club)		200	3
	Youth club		150	3
Div sportrelated facilities				
	Climbing wall			10
	Outdoor fitness			
	Skater field out			
	2* outd. Tennis fields		15*30 (450)??	3
	Stadium football		1000 seats	
	Athletic area			
Div				
	Staff rooms		200	3
		Reception incl		
	2 Technical rooms		200	4

Function diagram

The initial function diagram explains how the functions interrelate which is a helpful tool to clarify and understand hierarchies and different relations prior to the design process.
The core is illustrated as a central distribution area that connects the functions. The organisation can be based on different factors; an organisation where the cultural and sports related functions are all mixed together, or where they are divided into areas with functional similarities (Appendix p. 124).


Shooting field
Boxing club
Tennis fields
Golf sim
Own entrance external
Tennis club Voley
Own entrance external
Voley fields
Music Rehearsal
Own entrance external
Own entrance external
Handball club Basketball Gymnastic badminton
Secondary hall
Own entrance logistic
Cinema
Dancing club
Table tennis
Flex room
Main hall
Own entrance logistic
Own entrance logistic
Supermarket
Core
Football club
Own entrance external
Climbing wall
Changing room
Changing room
Hotel
Cantine/ sportscafé
Own entrance external
Football training fields
Changin room
Pool
Skating area
Café
Athletic
Stadium seats
Swimming
Welness
Changing room
Fitness
Football stadium
Public/ daily facilities
Ones in a while facilities
Clubs/ club related
Serving space

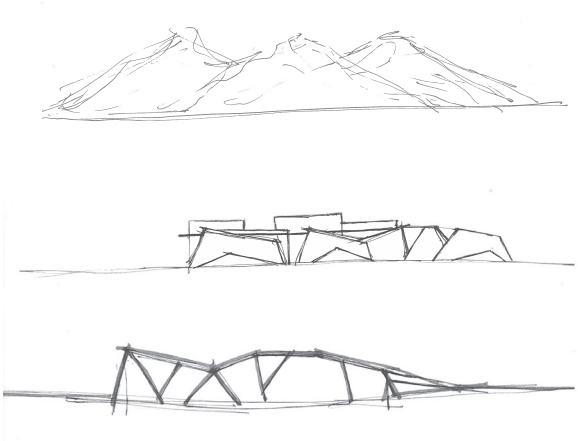


PROCESS

Several methods has been used during the sketching phase in order to generate or refine ideas.
A commonly used process has been to draw initial thoughts and ideas by hand in plan and section. When the idea has been developed in two dimensional scale 3D programs - primarily Google sketch up and Archicad - have been used, to form the idea to a spatial size.
Foam workshops have also been used as a tool, that make it easy to develope form studys and take your forming study to another level because it often is immediate and incidental.
Archicad has been used in order to make functional refinements. The 2D tool in the form of plan and section developement are great to understand functionality because it simplify the process .

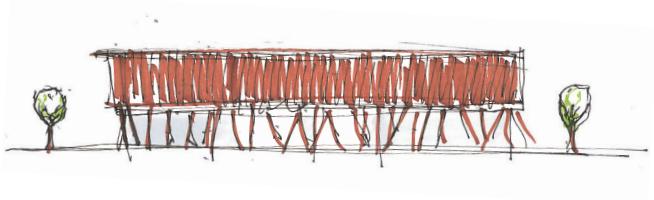
Sketching - Building shape

The programme has made a foundation for the following development. The startup in the design process was to generate many different ideas for a building form. In this phase it was important not to be limited of for instance technical or functional factors, but instead create a large foundation and startup references for the project.



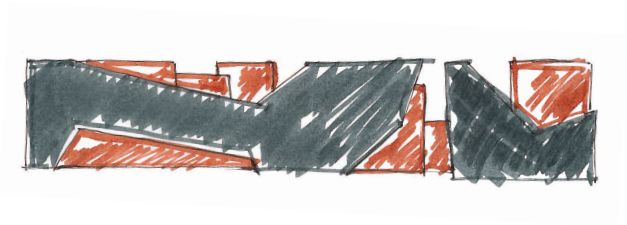
First image is a drawing of mountains were the next images is a abstraction of a mountain. The middle image is a mix between mountain lines and building blocks in between.

A mountain landscape, with window openings blended in to some of the hard rock lines, providing a diverse building both outside but also inside the building with different opening views.



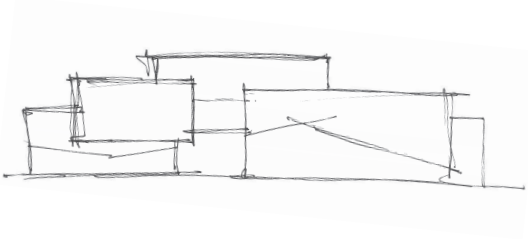
The diverse columns gives a sense of a forest that lifts a building creating an open and public floor at the bottum floor.

A large horisontal flow that can be blended in to the landscape picture.

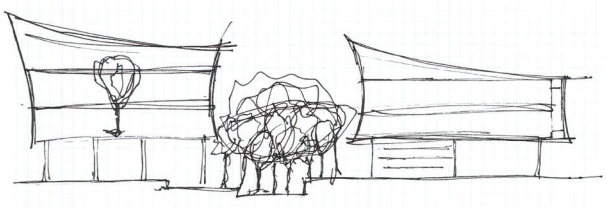


The hard outer shell has strict lines and gives an impression of a box that are protecting an inner structure. The typology create depths and curiosity to the inner shape.

Section that gives an idea of a strong contrast where a hard and urban form makes the one side of the shape where as the other side is dominated by soft nature.



Drawing of a box concept with different angled openings.



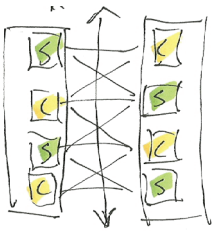
An open floor plan that makes the accesability to the core focus. The core is provided with a embraced shape and are giving the place a concentrated atmosphere.

ICONIC BUILDING SHAPE

After having made the first study and having the vision in mind it is clear that the building needs to have an iconic character and needs to be a trade-mark in the local area.
The further development of the iconic building shape will be conducted with the following key-concerns: How to create a concentrated life, how to induce diversity and include all ages via the expression of the building and interaction on the exterior and also how to make a building exterior that makes its function easy to understand and use.
One of the main tasks of the iconic building shape will be to attract and evoke curiosity that ultimately will generate an awareness of sports and culture in a social environment.

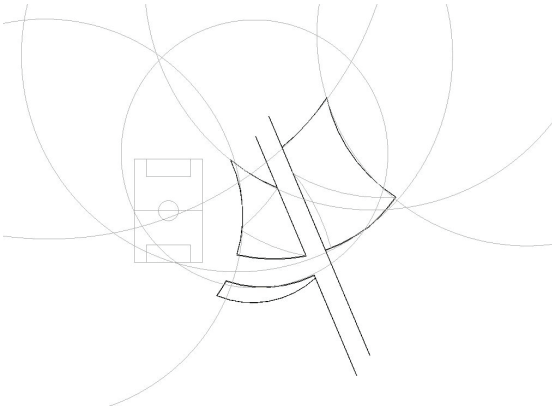
Street or square

The following design phase is about developing the disposition of the different function types.
With the vision in the mind the question of how the functions relate to each other appears. Must the sport and cultural functions be separated in order to create more separate atmospheres or should the very different functions be mixed with each other? The conclusion was quickly to mix sports and cultural functions together. By doing this the different “worlds” affect each other more, which in the end potentially could give a synergy effect to the centre.
The next issue in order to determine the overall disposition is the flow in the building. There are endless ways of organising the functions, but the process in this project has lead to two methods of organising, which have been evaluated and tested; should the functions be shown in the form of a street, where a clear start and end destination appears, or should the disposition be a square with a clear centre point?

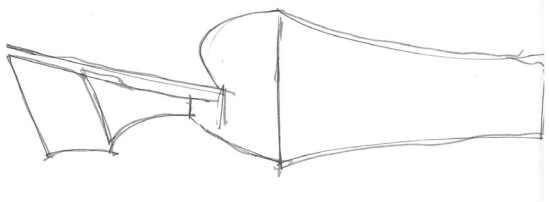


The illustration demonstrates the concept of organising the functions in a street layout. The street has a clear start and end point where the different facilities appear to the sides. In this way the experience of the building has ongoing character.

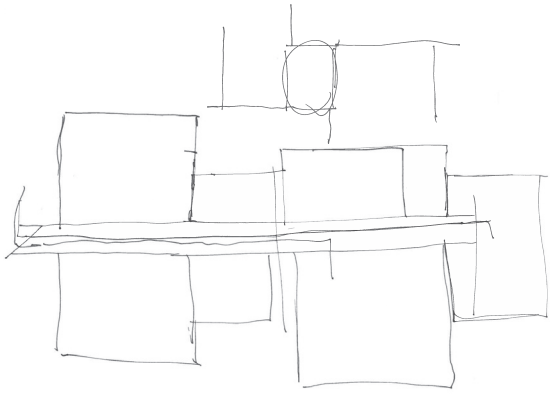
The illustration demonstrates the concept of organising the functions in a square layout. The square has several entrances, which eliminates the clear walking path. The different facilities embrace the square where the buildings main character and attractions are revealed all at once.



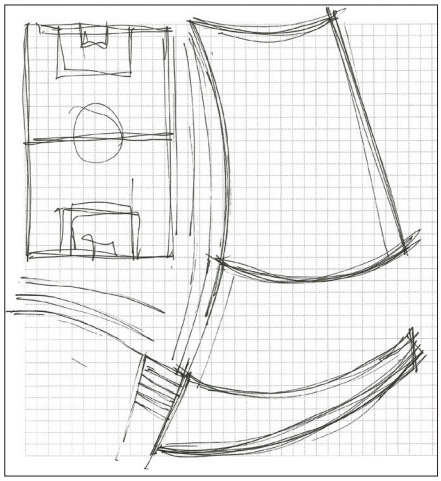
Based on the arc a form koncept was made. By using different arcs very dynamic building shape that either embrace or distances the near kontext.



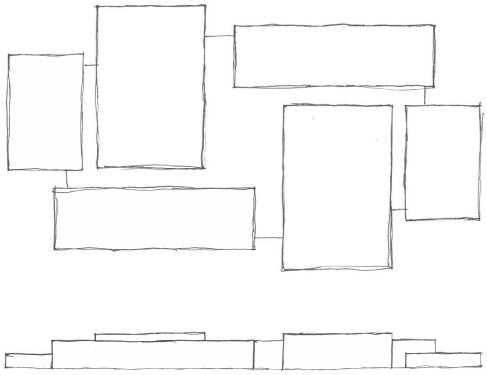
Again the arc as a drawing koncept. Here it is shown in perspective and you really get a sense of a shape with a strong character . Because of the curves the path becomes alluring and gives a curiosity of what the path leads to.



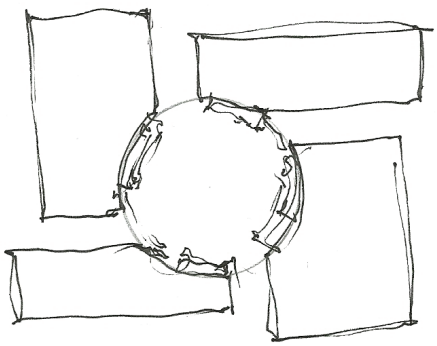
This drawing shows a very strict street with functions at both sides of it.



By using the arc a clear connection path from the soccerstadium to the parking could be made. Depending on the shape the street can become very alluring which can make the path very dominating.



A combination of street and square has been made. The square in the midlle has several entrances which doesnt create a clear path of direction. Connected to the square is the largest functions where the smaller functions can be entered through paths.



A square that was formed like a cirkel was tested. A cirkel has is a very strong embracing shape that can give an intensive atmosphere.

THE SQUARE

The square and street organisation concepts have been tested with drawings and models together with a consideration for the first sketching phase revolving the building shape; how does the square affect the experience of entering the building? How is the contrast between inside and outside with a street organisation?

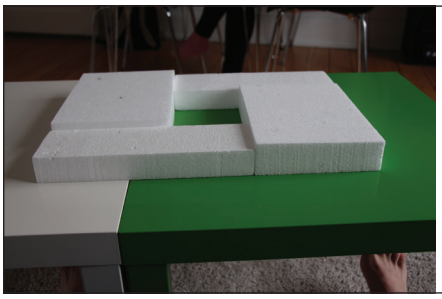
If making a street it would require a hierarchy between the functions, so the end destination would be the “goal” of the visit. This would not go along with the vision of a diverse space that is being used by different people with different purposes.

The conclusion on this study of organisation concepts it is determined that the square will be the primary logistic concept. The idea of making a diverse space where the different functions will affect each other can be fulfilled most effectively with a square, where the functions have visual contact to each other.

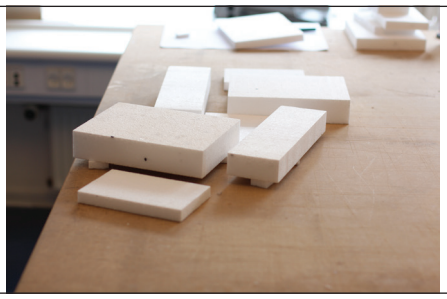
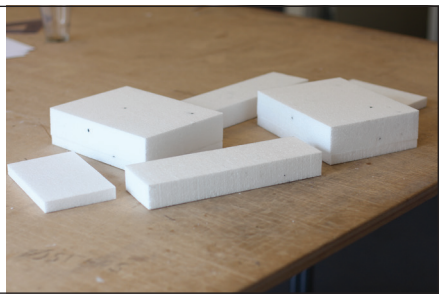
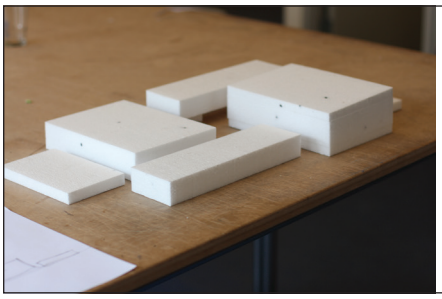
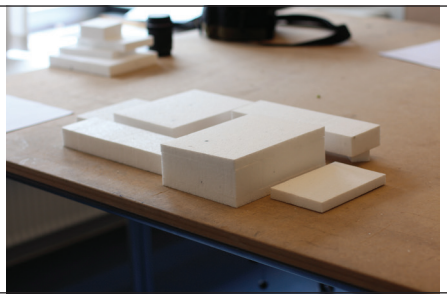
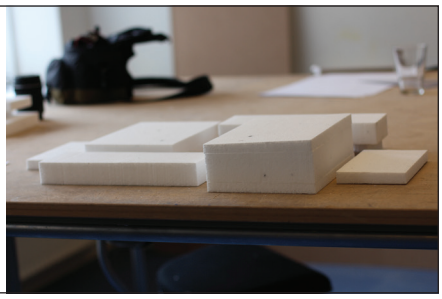
Foam Workshop

With the logistic purpose in mind and making a square that becomes the distributionspace to the public functions a foam workshop was made.
Further at this stage it became clear that a functional space was desired because of the character the space should provide as well as making an obvious typology where the functions would fit. The startingpoint for the shape became therefore boxes. Boxes seemed logical for a centrer that contains functions like sportshalls and a swimming hall, where the functional aspect plays a big part of the shape.
The foam boxes proportions was appromixated sizes of the functions. The big foam box was the multi hall and the long blocks contained functions as cafe, hotel and supermarket.

The study represents a wide range of ideas. The pupose of it was to try to envestigate how the forms could relate to the square, the openness of the square and how the typologi would be seen from the exterior part.





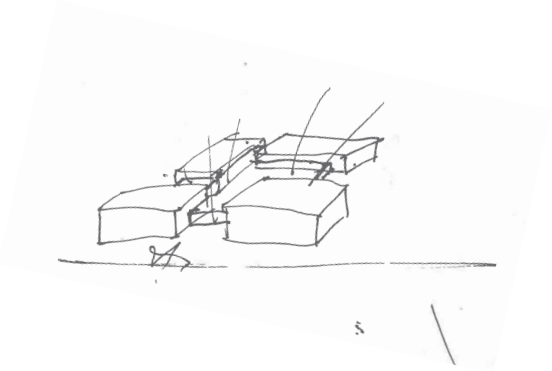






Box or boxes

After it became clear that boxes should be the primary form element, the next question was what character these boxes should provide both as interior expression and as the exterior trademark that was wanted.
In particular two types of design concepts have been sketched and investigated - a concept of several boxes and a concept of a single box.

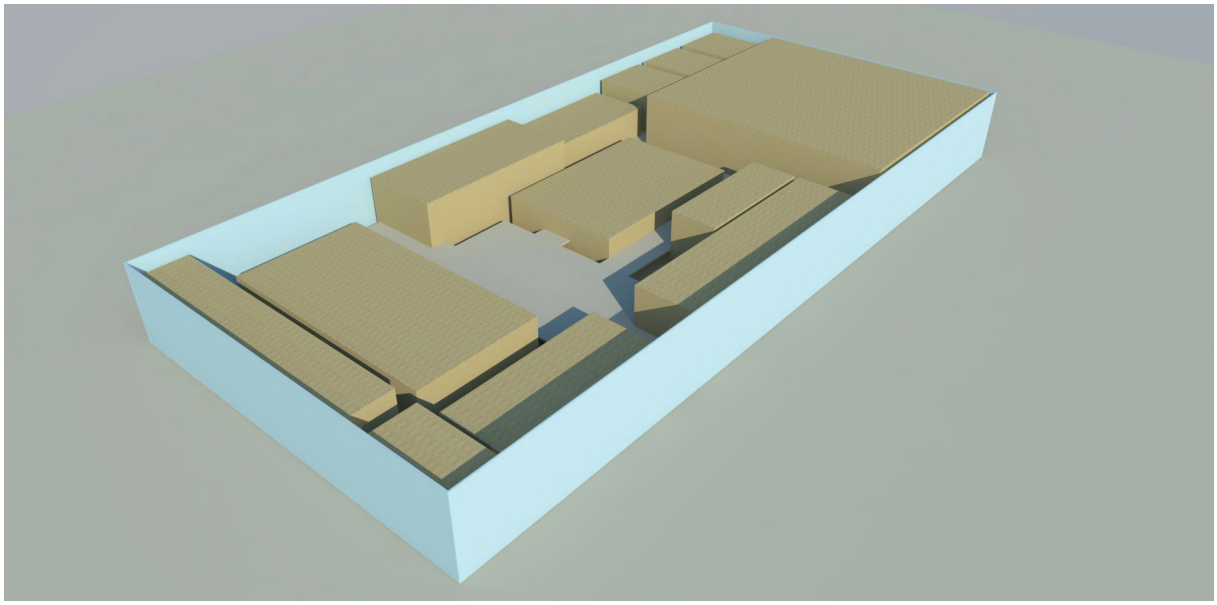
Several boxes potentially have a quality of showing a hierarchy between the functions and thereby show diversity.

A single box potentially has the quality of showing the functions as a unit, and with its simple shape it can become the trademark that the Centre needs to be.

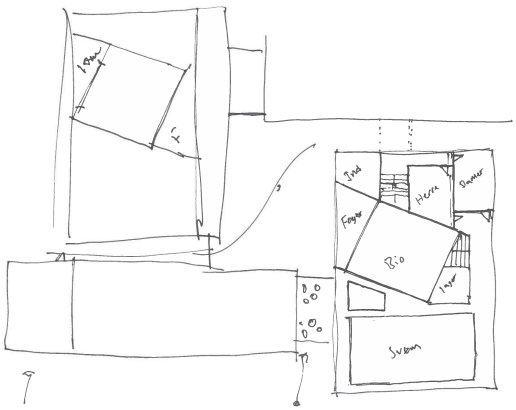


The illustration shows boxes connected with a glass hall that illuminate in the late evening.

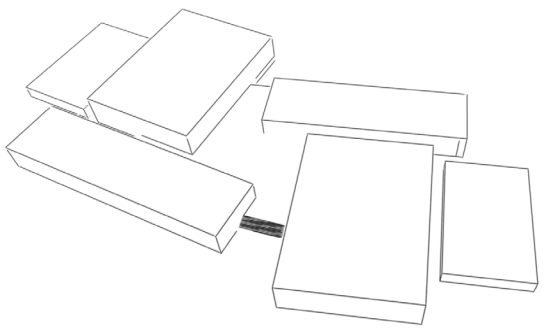
Boxes with different angels creating a diverse and dynamic exterior expression and generates corners in the square that can be utilized by functions such as café, library or the supermarket etc.



A 3D model of boxes covered by a big glass facade.



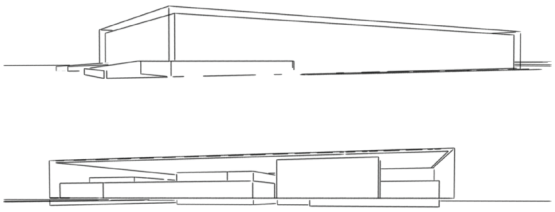
A sketch of how a plan of one of the boxes could be.



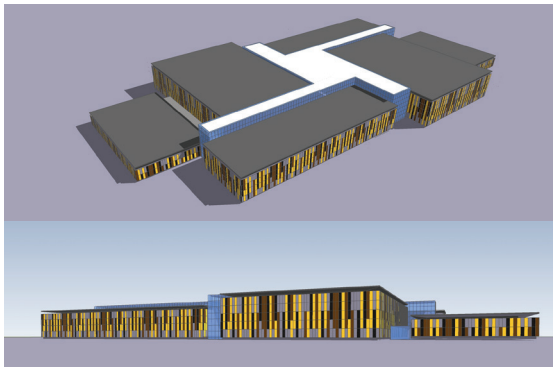
Boxes with a kinked line in the middle part of it creating a diverse square and a welcomming emtrance where the stairs are placed.

Initial Shaping

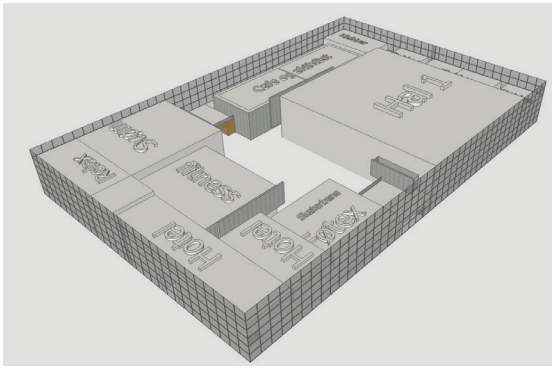
Drawing of boxes surrounded by a glass facade. At the bottom parking is being placed making it easy to park close to the different functions.



Boxes in a box. Here trying to test out the expression if the exterior box is completely transparent. Further the shell is lifted, so the surroundings of the interior boxes at the 1. floor becomes a partially exterior space.

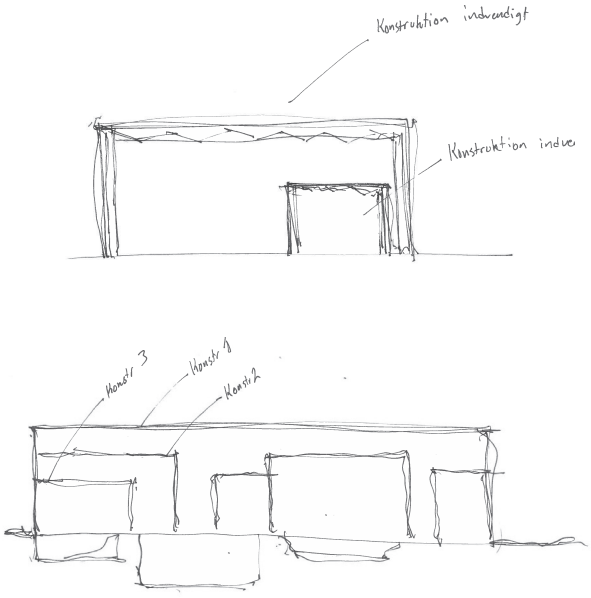


Boxes with a atrium room connecting them. The facade of the boxes contains a shell making the facades look homogeneous despite of the windows behind the facade.

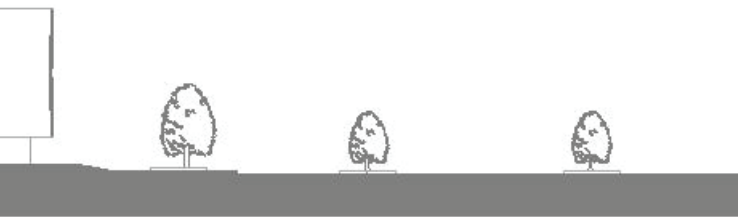


Boxes in a box where the functions was being placed around a square. By placing functions studys of the exterior shells proportions can be investigated.

XXXXX

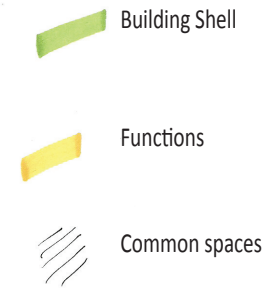


Drawing of a construction image where the construction differs from the overall shape to the functions within it.



THE BOX

It has been decided that the simple shape of a box will be the typology for the new Centre.
A box with the right facade processing could potentially become a simple sculptural object, and the trademark that is desired for the Centre.
The idea for the facade of the Box is a type of frozen glass material that meets the wish of objectifying the building through its consistent clean look. The slight translucency of the façade is potentially a effective method to awake curiosity for the buildings interior from the outside as the functions (boxes) will be slightly visible through the façade but not altogether revealed. The potential of choosing a unique singular material throughout the building facades can also be to evoke a sense of community between the functions where 'all are under one common roof' which can further raise a community feeling between users of completely different functions as they share the building and the common square.
The building will have one expression on the outside, and when entering reveal a whole new expression of the interior boxes.

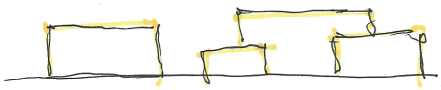


Concept

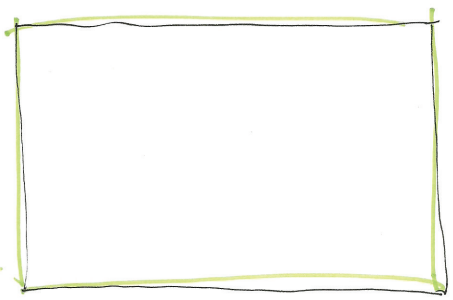
The concept is based on the idea of creating a diverse space that first and foremost gathers and connects the people of Pandrup and Kaas. The diversity is the factor that will create a Sports and Cultural centre that is attractive to people of all ages and interests.

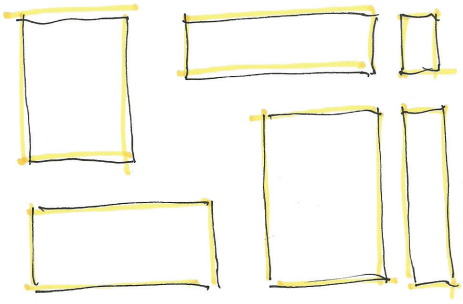
The Functions, included in the program of the Sports and Cultural centre, are combined and linked in relation to logistics, the context, energy factors, atmosphereic and thermal considerations etc. and they are alltogether placed under one common outher shell.
Hence generating additional common spaces inbetween the functions that is protected from the weather.

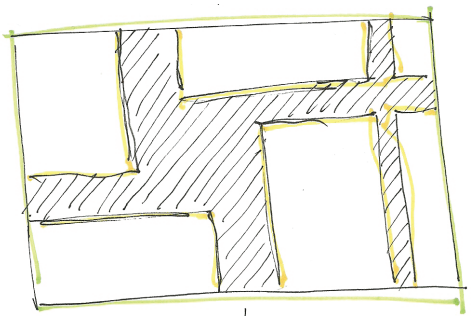
Section Concept:



Plan Concept:







´The large, embracing gesture of the Laban building volume gives the effect of creating a spatial limitation as well as a melting together of Laban Garden and Laban Centre. The topographically shaped structure of the garden - simultaneously serving as an entrance yard for the Laban Centre and a place for walking, playing or leisure - finds corresponding qualities in the interior gestalt of the building.´

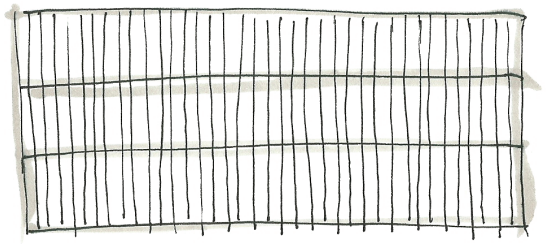
Herzog & de Meuron, 2003

[ill. 16] Laban Dance Centre

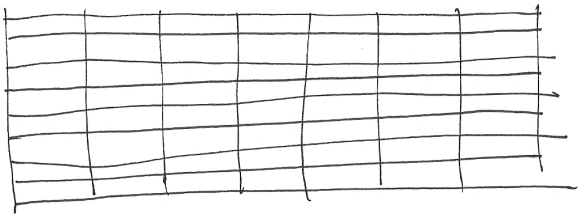
Building Shell

Climate screen, structure and construction

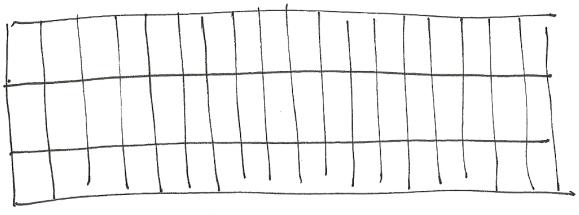
The following shows the considerations made of the possibilities in a frozen glass material for the building shell.
The previous spread shows a reference to the Laban Dance Center in London and their use of frozen glass material as a highly expressive facade material. The choice of facade gives the dance centre an introvert looking building, yet the functions and the vibrant life inside the building transferres to the exterior as you can hint the construction and activity on the other side of the frozen glass facade. There are different types of materials that can be used for the translucent building shell. Two types are investigated, u-profiles or panels, and they are shortly described in the illustrations on the adjacent page. The construction method and the corresponding expressions are tested with handdrawings.



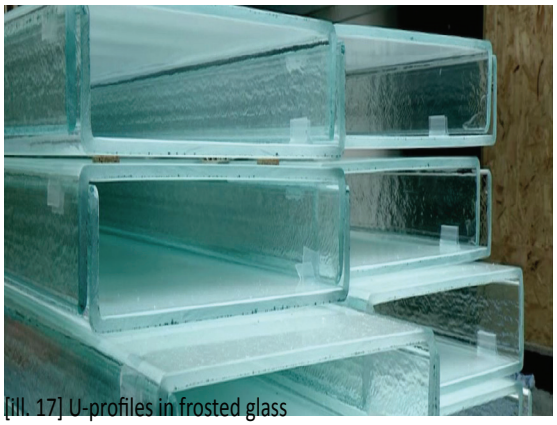
Facade expression with u-profils in frosted glass. The glasses needs to be supported by steel u-profiles in the middle of the facade because the maximum span for this profiles are about 7 meters.



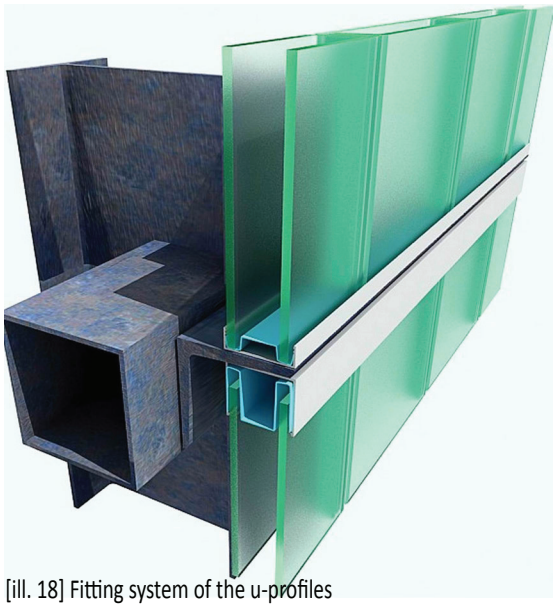
Facade expression with polycarbonate plates. The steel net holding the plates will be slightly visible. Here a horisontal net expression are being testet.



Facade expression with polycarbonate plates. The steel net holding the plates will be slightly visible. Here a vertical net expression are being testet.



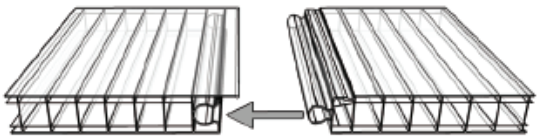
[ill. 17] U-profiles in frosted glass



[ill. 18] Fitting system of the u-profiles

[ill. 19] Building using u-profile glasses

[ill. 20] Image of steel net holding the polycarbonate in laban dancecenter in London



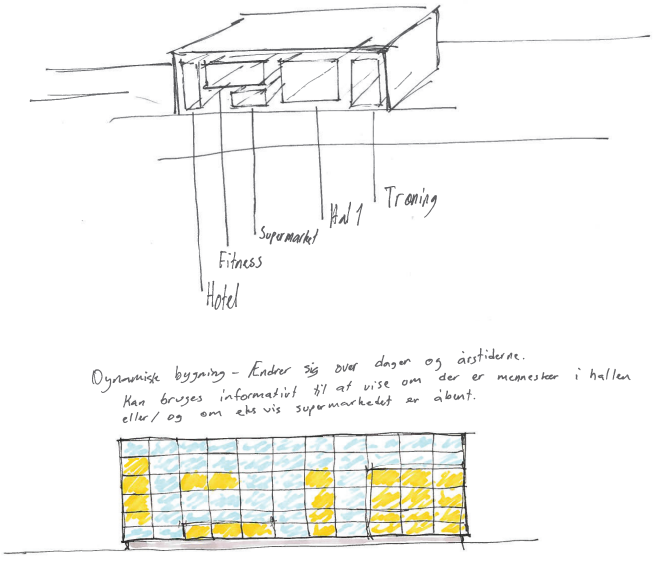
[ill. 21] Image of the polycarbonate clip system.

[ill. 22] Image of polycarbonate facade

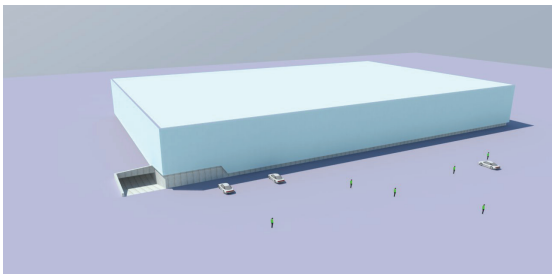
Facade

Daylight, windows and openings

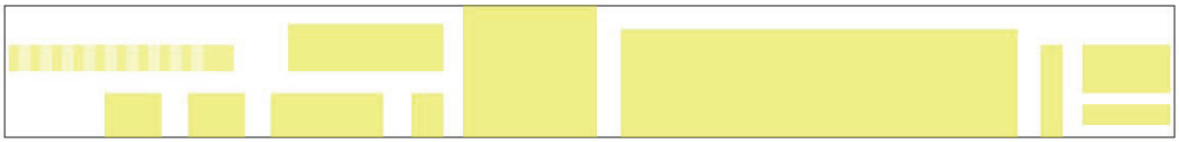
The openings in the facade are being investigated. The idea is that the different functions as much as possible have openings to the facade, so the diversity of the centre is shown in the facade. When the different functions are open their light will be on and therefore the facade expression will change depending on the activity level inside the building as the lights are turned on. This type of facade can create a lively atmosphere when sunlight fades because the indication of the activity inside is even stronger without the daylight. In this way the hours of activity can be prolonged because people are drawn to and feel the invitation from the building and its functions. The change in the building rom day to evening/night is in a positive way captivating the interest of the people as the atmosphere in the buliding will vary with the daylight and the nightlight.
It is considered important to make the openings harmonious and in spirit with the box.



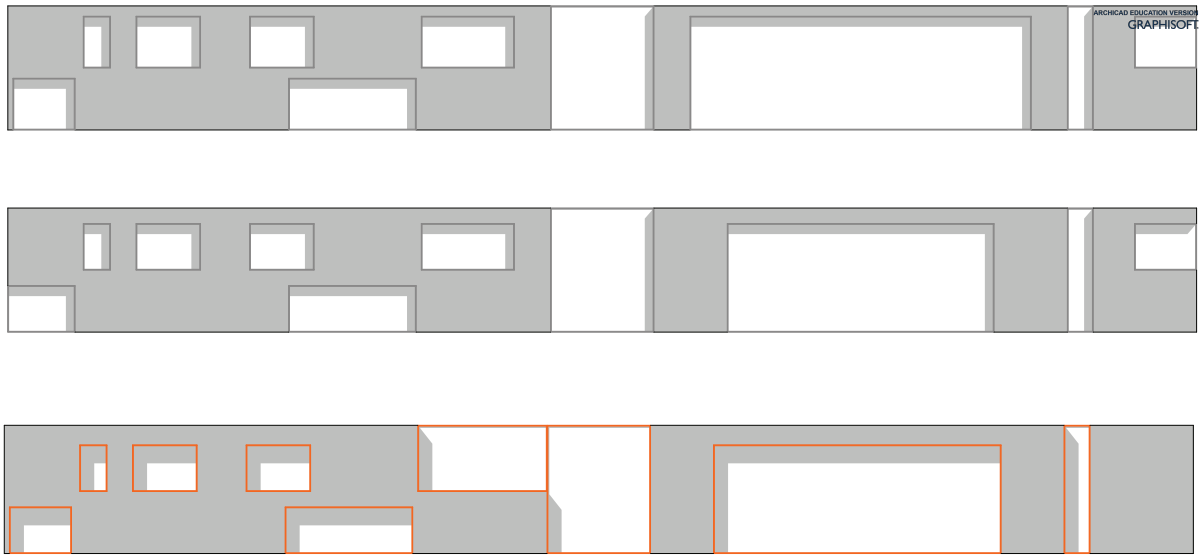
Testing openings in a grid system. The different openings represent different functions.



When no lights are on the building will stand out as a clean and simple object.



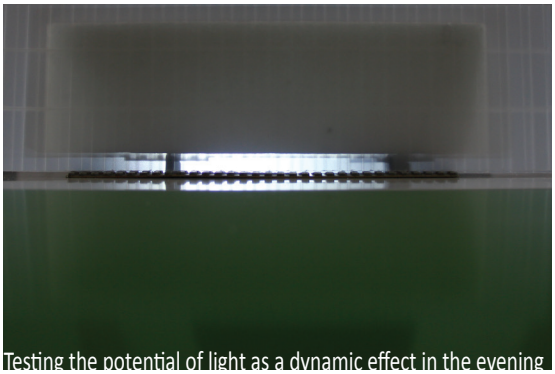
Openings in the box. Here the openings are really large and dominant.

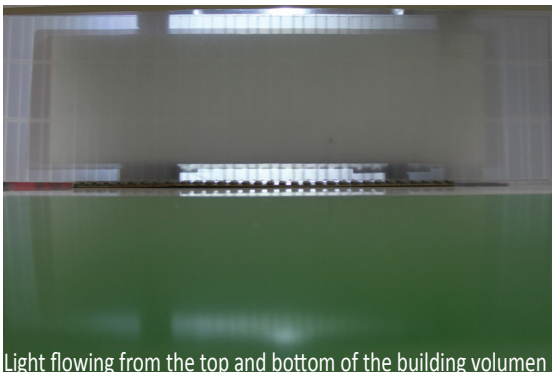


Through the work with the facades the openings was refined at more steps to make them harmonious. This process is of the east facade where the main entrance is located and the facade is paralelle to the road and therefore the most outwardly exposed facade.

Artificial light

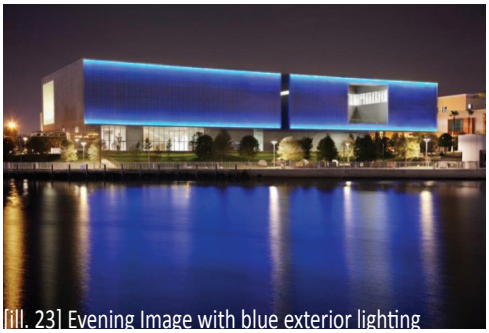
In relation to the desire to create good conditions for the building to have a successful environment during the winter semester the artificial light is a tool with great potential and is taken into consideration in the following.
Appropriate use of artificial light can in itself prolong the hours of activity because people respond to light as a welcoming and safe element in the dark winter evenings and they can be influenced to dare to stay out further into the night instead of going to the warm, safe and comfy home. There are endless ways to utilize light and the case study of Tampa Museum of Art shows how they use artificial light as a tool to create a strong identity for the building in the evening cityscape.
The chosen facade material enables the use of artificial light behind the polycarbonate panels, so that when it becomes dark the light will be on to define the box and create a strong identity that shows that the centre is a light and dynamic space even when it is cold and dark.
This concept of the facade is further developed by adding the possibility for the color of the light to change which will be reflected on the facade defining the box. For example in the spring and when the twilight comes the light can be a warm red or a fresh green color that enhance atmosphere of the time of the year. In the winter the light could be blue which would give the box a character of a giant ice cube.


Testing the potential of light as a dynamic effect in the evening


Light flowing from the top and bottom of the building volumen

TAMPA MUSEUM OF ART
by Stanley Saitowitz and Natoma Architects

This award winning museum is located in Tampa, Florida. The design solution of the exterior is similar to an empty canvas, that needs to be filled with art. The facade is so dominated by a singular material that it awakes a curiosity to know what could be inside this building. In the evening the building changes completely into a very visible and expressive building in contrast to the simple and downplayed building at daytime.
The lake and the surrounding park provide space around the building and allow the sight of the building from a distance, which works well for the very squared and compact building.


[ill. 23] Evening Image with blue exterior lighting


[ill. 24] Evening Image with white exterior lighting

[ill. 25] Daytime image of Tampa Museum of Art

Landscape architecture

Plateau and green areas and infrastructure

The primary intention with the landscape was, especially from the main road, to expose the centre. In order to meet this wish different plateau shapes have been tested, where some was in strong contrast to the box and some was in the same spirit of the box.

Due to the desired exposure of the building the area in front of it will be very flat. The possibility to create a flexible area suitable for temporary arrangements, concerts, competitions etc. has been studied. On the other hand the flat area could have a primary characteristics that it should be looked at and enjoyed visually and only a secondary characteristics that it should be used as a staying area since the exposure to traffic noise amongst others does not suggest the area to be for staying.

By designing a very green area (grass fields) in front of the building the connection to the remaining outdoor areas connected to the Centre is intact.

Along with the context design the infrastructure was also in consideration. Since the centre is changing in character from an old sports hall to a larger scale connecting point the wish is to expose the entrance to the centre when driving by car and cycling as well.

The wish for the outdoor staying areas have been that they need to be in close relation to the café and outdoor sports facilities. A simple plateau surrounding the entire building has a quality that is similar to the simplicity of the building and a simple extension of the plateau towards the football fields creates an attractive staying area.

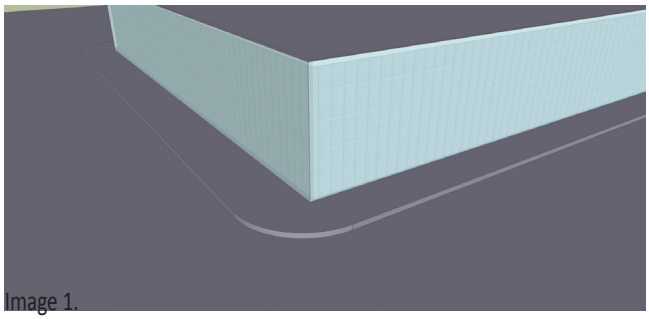


Image 1.

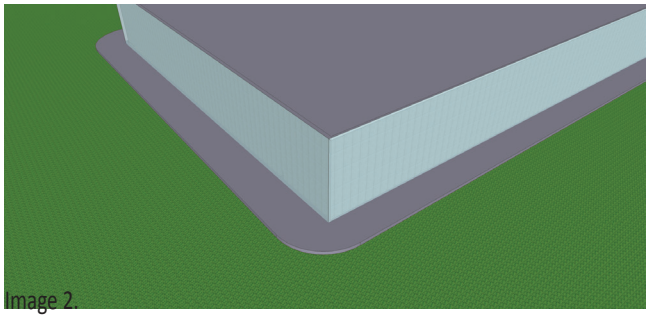


Image 2.

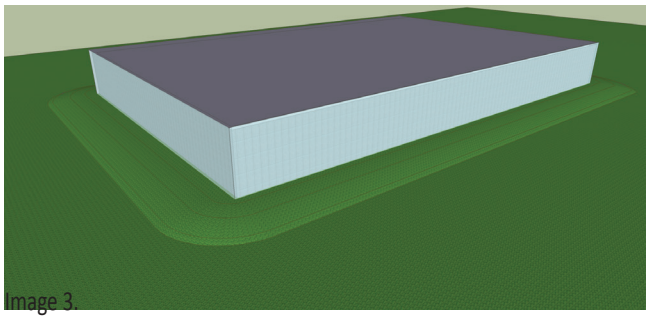


Image 3.

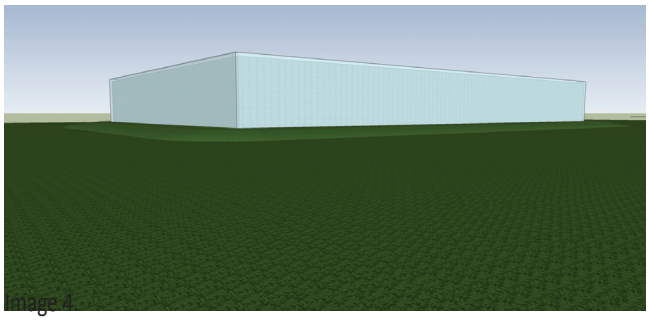


Image 4.

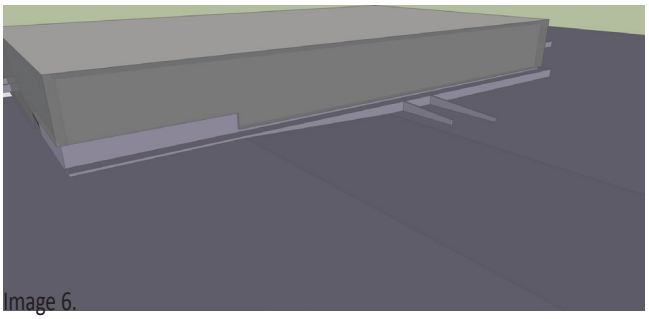


Image 6.

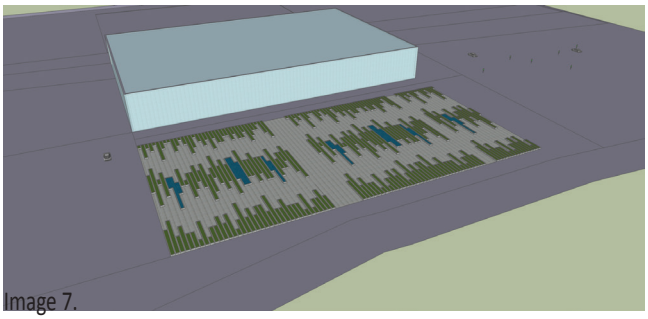


Image 7.

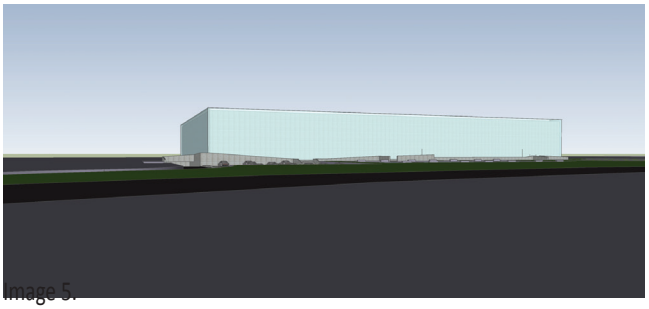


Image 5.

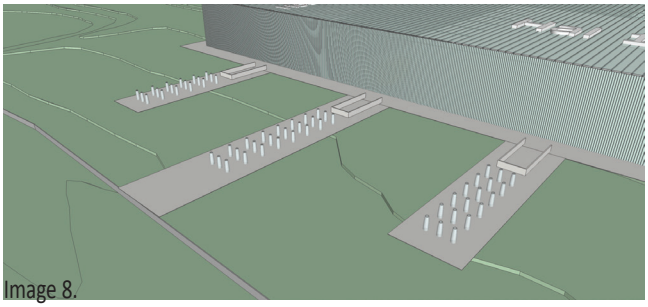


Image 8.

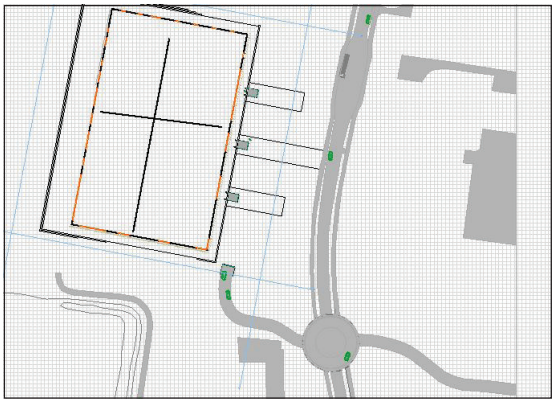
Image 1-6: Different plateau studyes. Image 1-4 create a soft contrast to the strict box. Image 3 and 4 is the box that is put on a artificual hill. In image five concrete in front of the box with a tilt creates a diverse bottom and the box seems like et is floating.

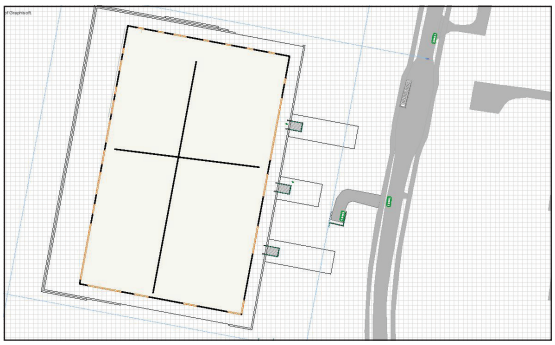
Image 7-8: Tests of the park design towards the road. Image 7 shows a large concrete plate where grass and water are moving in to the concrete plate. In image 8 the concrete are stretching towards the road and welcomming visitors.

Image 9: Image of a plateau that very consequent cuts into the landscape.

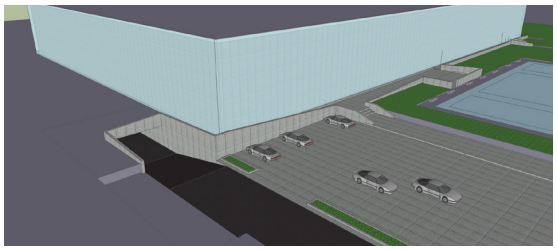
Exterior Development

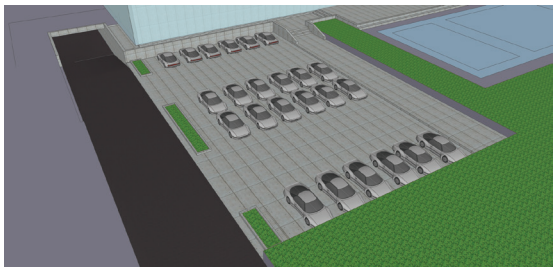
The cycling and working path is an essential part of the infrastructure. Here the path is going in a bow around the front facade of the building and exposes the facade.



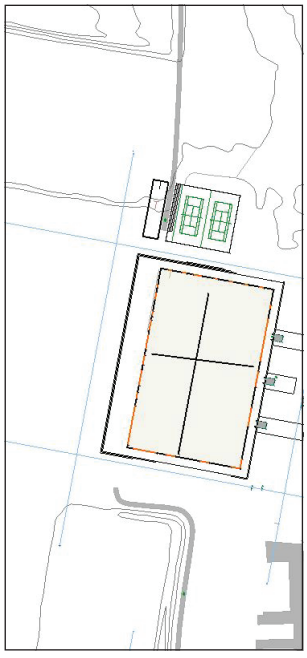


Different entrances from the road where testet. The first image is by a roundabout and the second is an entrance in the midlle part of the site.

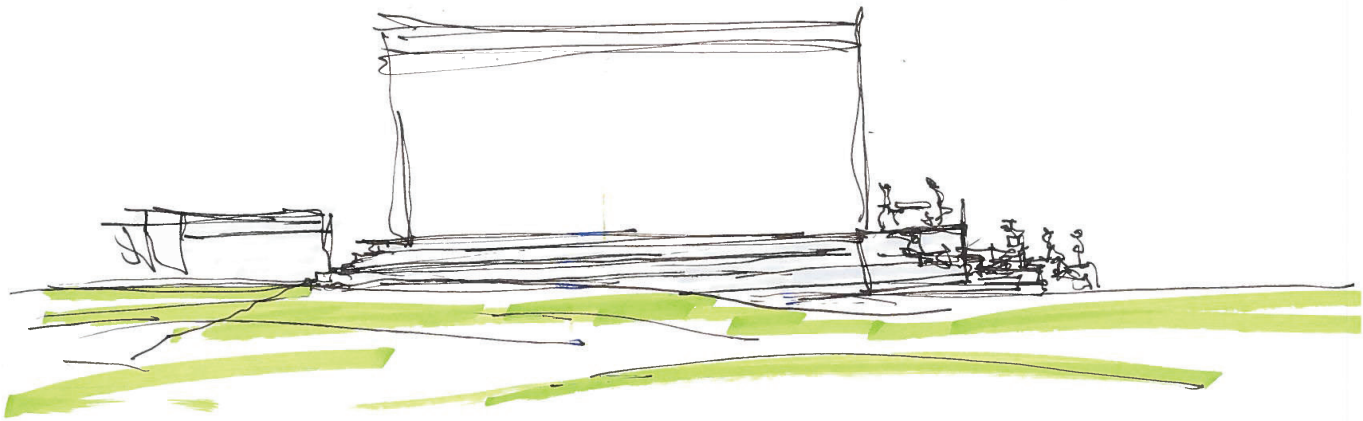




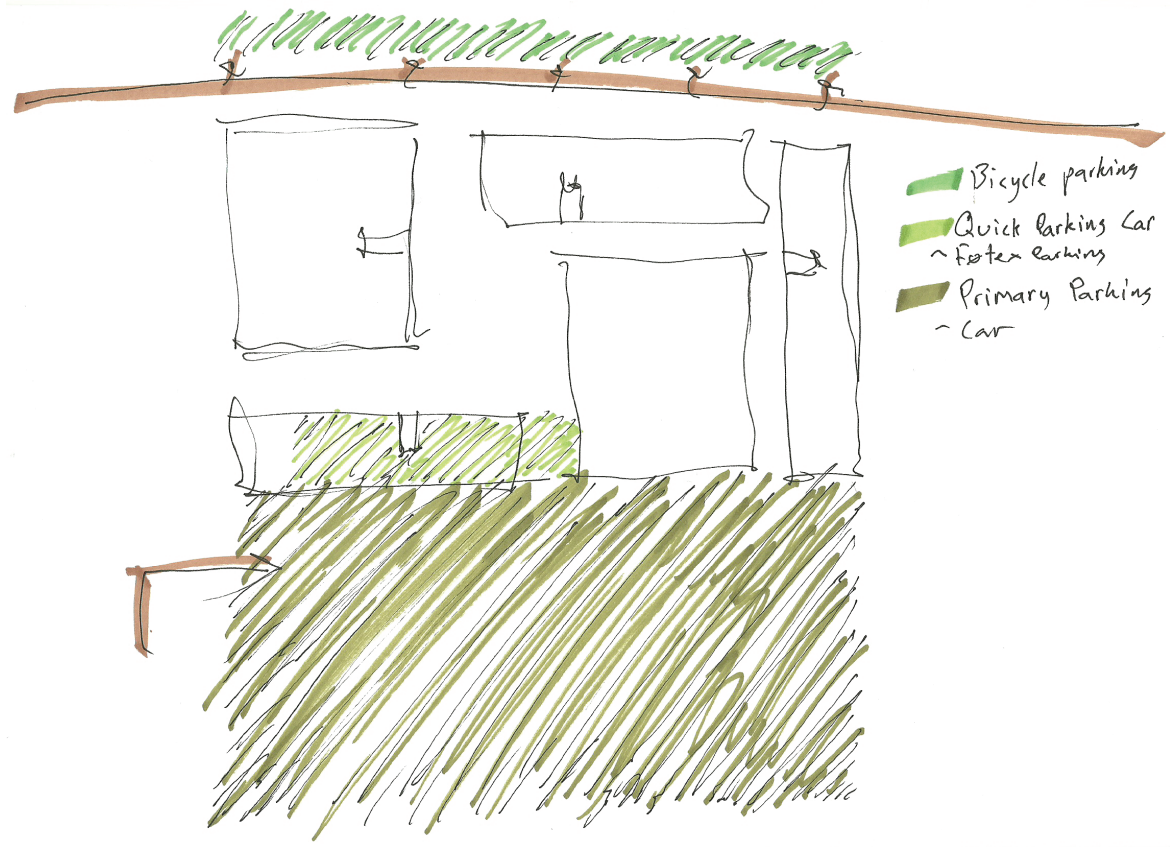
Partial parking on the ground where testet. By having the parking in another level than the building but still very visible and immediate could be a benefit in order to attract people who fast and easy wanted to go to the supermarket.



An image of the cycling path where it is going underground under the plateau at the western side of the building.



Drawing of plateau. The western part of the plateau becomes seating elements and thereby creating staying areas at the sunny space.



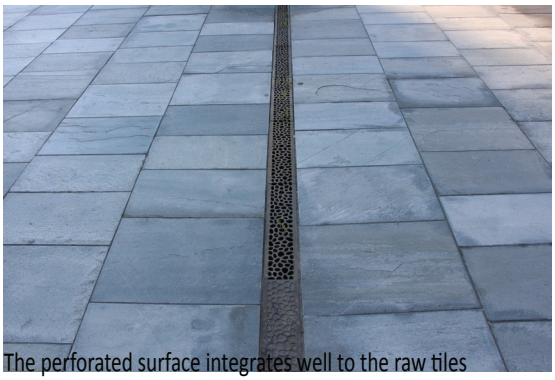
Drawing of parking possibilities. The primary parking being in front of the building and the quick parking being underneath the supermarket making the acces easy. The bicycle parking is here in relation to the cycling path.

Landscape architecture

Water installation, lighting and materials

As mentioned previously due to the desired exposure of the building the area in front of it will be very flat. The flat area is further developed by to add an atmosphere to the field by implementing architectural details that have high quality, but do not interfere with the building expression and instead tries to compliment it with for example low alternate street light design, interesting pavement and water installations that is in great contrast to the otherwise two dimensional architectural language of the field.
The large area in front of the building provides the space that is needed to give great exposure to the building from the road, but at the same time it creates a distance for the pedestrians and cyclers that use the main road to reach the facilities of the new Centre.
The use of paving that crosses the field is a simple and very general tool to create clear connections in the landscape. The path will lead straight to the distinctive main entrance in a formal yet wide-open and spacious approach to the building. The constant and great view of the building as you approach along the path will contribute to the feeling of entering a large common space, the Box.
As mentioned in the section concerning the local climate the weather conditions during the winter semester can hamper the peoples desire to go out in both daytime and when in the evening/night when the sunlight fades. The belief is that one of the main reasons why people choose to stay indoors at home is the matter of safety. Implentation both paving, street lights and water installation can make the area feel and be more safe. The path together with street lights create a clear connection to the building that is also lit up by the inside activty. The water installation can provide a comforting feeling of safety just by its dynamics and movements and when its not active the area turns into the flat and simple area again that only strives to compliment the building.

Water installation hidden under a perforated surface



The perforated surface integrates well to the raw tiles

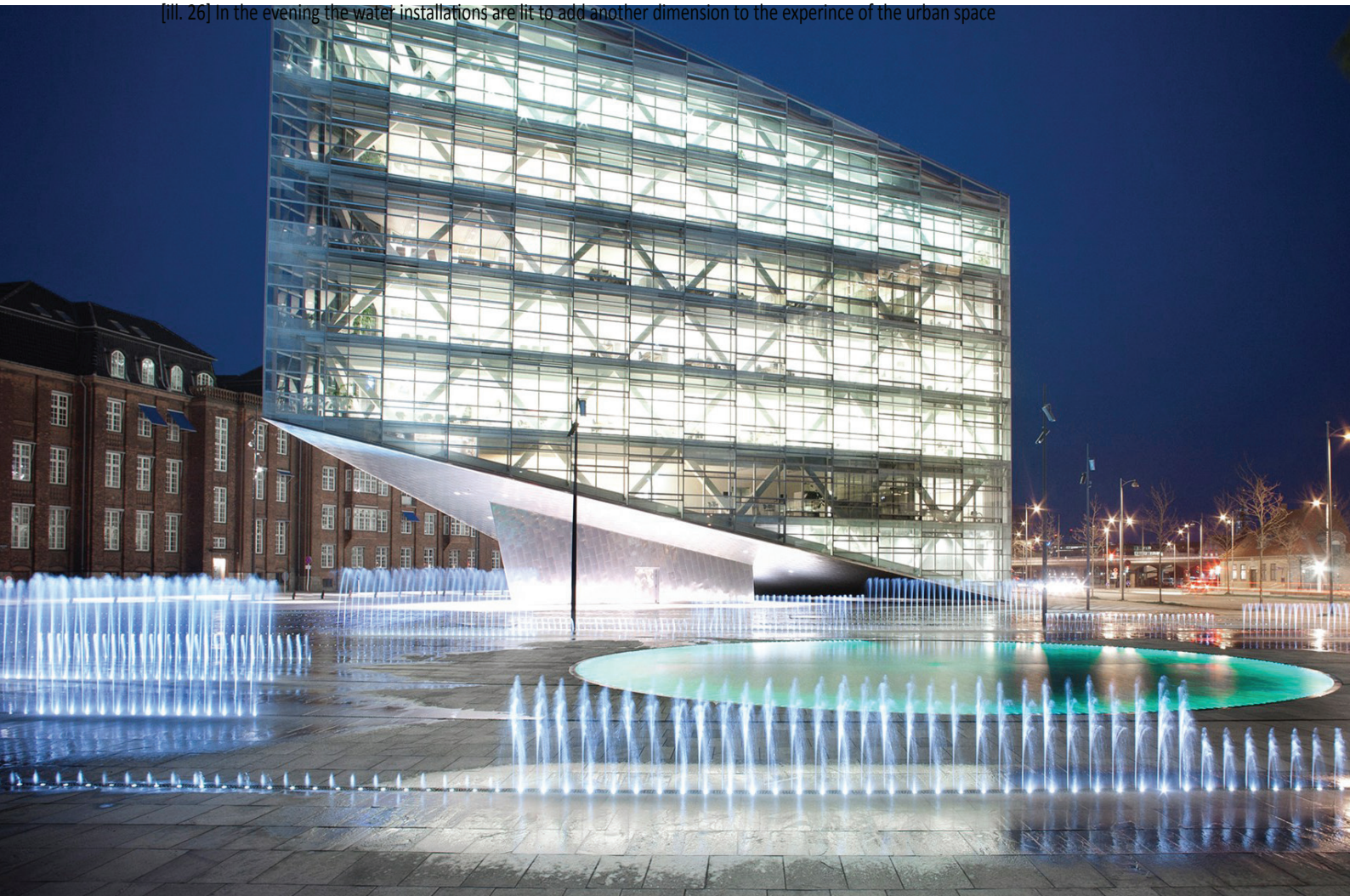
UNDER KRYSTALLEN
by SLA Landscape Architects

The square is called Under Krystallen because it is located at the base of Nykredit's main building in Copenhagen called Krystallen (the Crystal). The building is located in the very center of Copenhagen and the square is a clever way of creating empty space that enables the citizens to enjoy the sight of the building in the otherwise dense urban area. The water installation changes its pattern and the circular water pond changes its colors giving the space various expressions. The flat square has been given an interesting dimension with the water installment and the simple material choices make the square apear very elegant.


Water springs from under a perforated surface


The sound of splashing water is soothing for the city residents

[ill. 26] In the evening the water installations are lit to add another dimension to the experince of the urban space



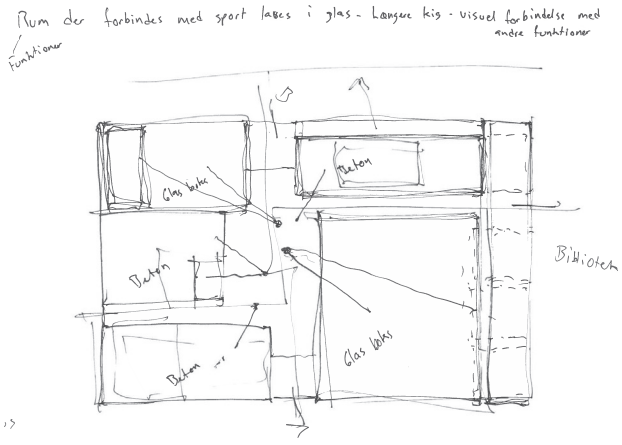
[ill. 27] The large space functions as the buildings' square; the emptiness creating flexibilty in order to benefit a variety of temporary arrangements

´Nordkrafts idea is the thought that diversity should generate the building's life and content. The vision adds both to and on Nordkraft among other to indemnify the beautiful inner high-ceilinged rooms and reuse the large concrete structures of the industrial architecture.´

Cubo

Function Organisation

A central part of the interior developement is the organisation of the functions. The starting point for the organisation is to make it according to the vision of creating a diverse centre point where different functions will affect each other. Therefore it has been an important parametre to have in the back of the mind that for instance sports and cultural functions should be mixed.
Another aspect is the logistical logic in the building. It has been important to for instance secure an easy and immediate acces to the supermarket from the street because the supermarket other wise would lose some of its value. It has also been important to place the café area in an area where it is connected to the stadium, multi hall and swimming hall.
According to day and sunlight there have also been considerations. Many functions are being placed relatively compact which can result in poor daylight factors. Therefore the functions that are in more need of daylight must be connected to either the buolding shell ore the square.
Because clubs needs to have the oppertunity to have privacy it also been important to place them in a private part of the building but at the same time create a curriosity for the union life. One of the important problems this project needs to focus on is to make people be more active. And to focus on the sports and union life is a very important aspect of it.
Finally it has been important to create a square with concentrated life. A parameter have therefor been to try to create lively functions in as many directions as possible.



An idea to the function organisation. The swimming hall and the sports hall are more transparent than the other blocks in order to create a sight line to for instance the union life that takes place in the other end of the sports hall.

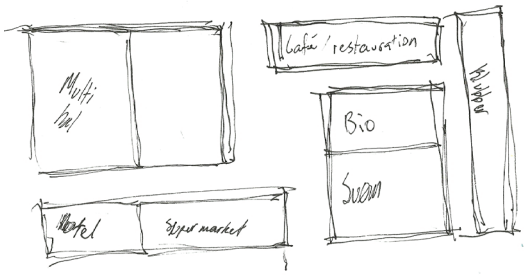


Image that shows an idea to a functional organisation. Here the two halls are placed right next to each other and thereby making the total building length longer.

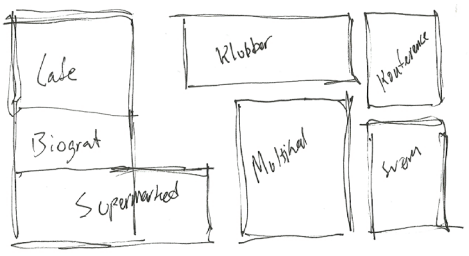
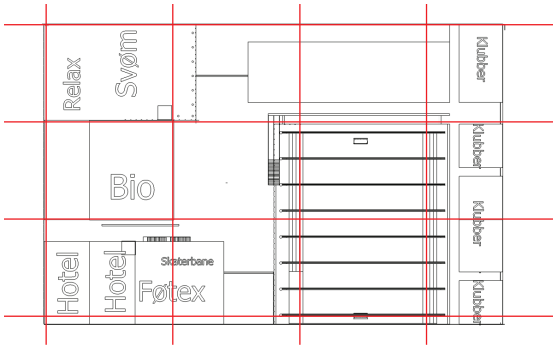


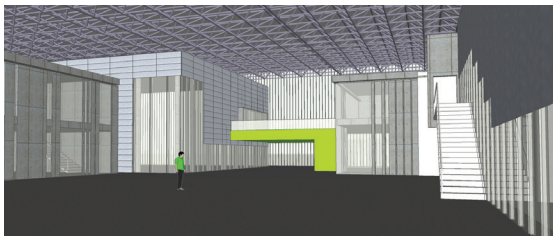
Image that shows an idea to a functional organisation. The clubs are here in close relation to the stadium.

Structure Principal

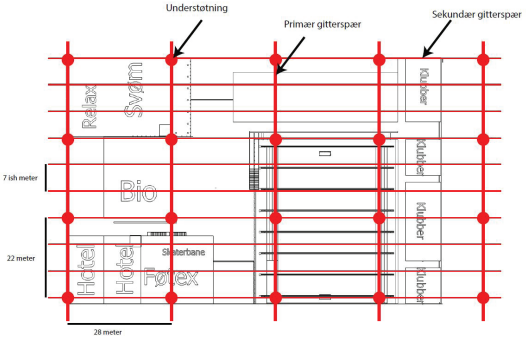
The structural principle plays a big part of the exterior as well as the interior design. The wish from the structure is that it contributes with a raw and industrial ambience. The industrial stamp shall ensure a character of an outside space in the square and the multi hall which at the end is made to make an informal space where every body feel welcome. The different structures that have been testet is primarily steel structurs which based on tabels and cases can provide for an industrial atmosphere as well as being sleek and elegant even in large spans.



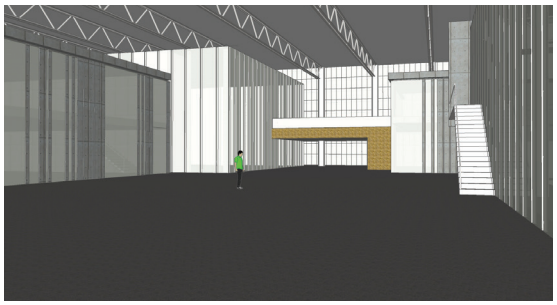
Different grid systems where testet. The support is here placed in the intersecting points of the red lines. If the supports must be in some kind of grid the building volumes will have to fit into that system.



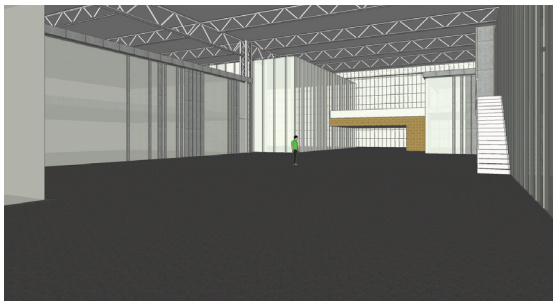
A giant space frame structure as the roof for the overall building shell.



A more dens structure grid with a primary and secondary steel trusses. Across the secondary trusses trapez sheets should be placed.



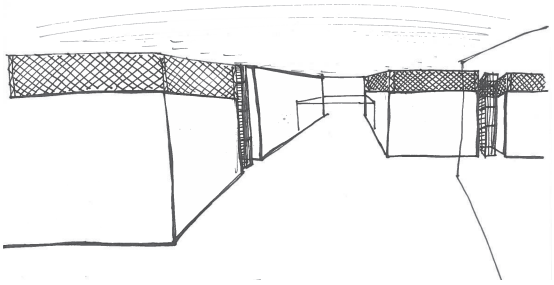
Web beams going across the room with a span of 70 meters with no supports. The beams are clearly under dimensioned.



Primary and secondary webbeams in a similar grid that is shown in the second image.

Boxes in the Box

The starting point of the design of boxes in the box is to create a proper functioning square that can meet the expectations of a lively place and promote the diversity of the visiting people.
The boxes are being formed by putting the functions in boxes and make a difference of the hight of the boxes and in general make boxes with different proportions. There have been made different kinds of nets and panels to roof levels where some activitys are going on. The degree of the transparancy as well as the character of them have been testet.



The square where the net at the activity areas completes the boxes.

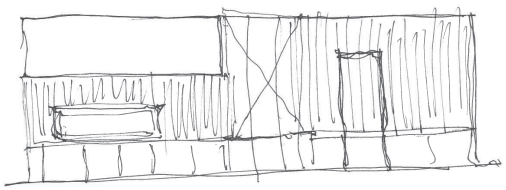


Image of the facade formed into different boxes.

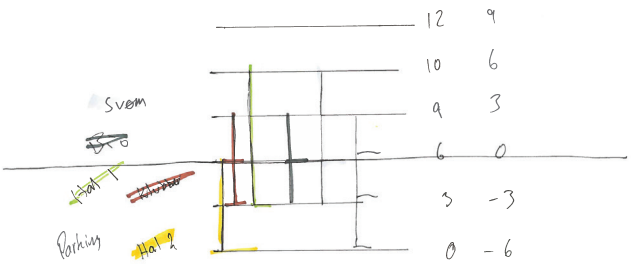
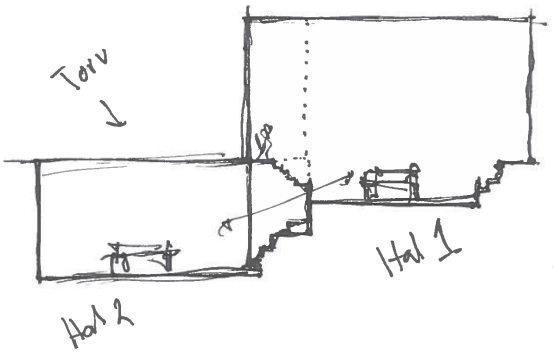


Diagram of the different levels the functions are being placed in.

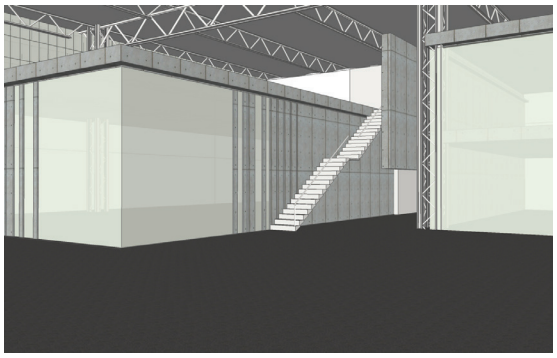


The connection between multi hall and the training hall. The intention is to create a visual connection that will be advantageous for instance when badminton or football turnament are being held.

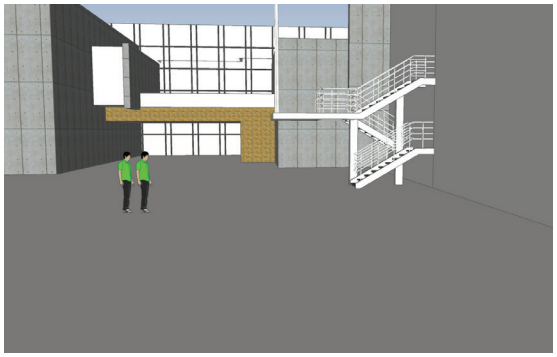
Stair Boxes

The stairs is an essentiel part of the centre because it attaches every functions that isnt placed on the ground level. It has therefor been a important parameter to make the stairs become a big part of the interior design, where the visability of them where essentiel.

The demands for the stairs could be provided with both staircases or more exterior stairs that would have the oppurtunity to be very visible. At the end the result became stair towers that could provide the space with interesting value.

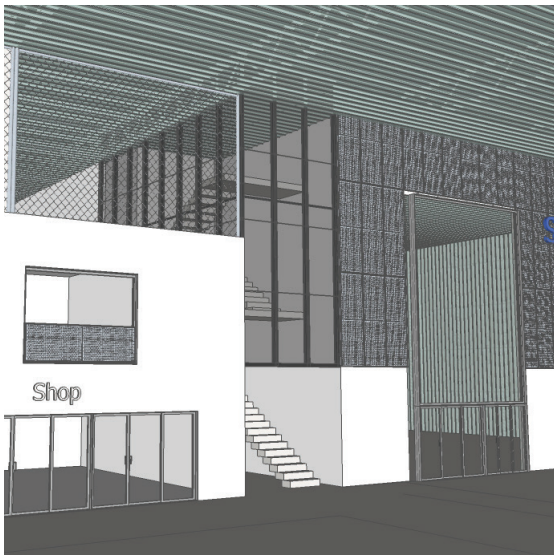


Exterior stair leading up to the hotel. The stair are being held raw and with the same genre as the rest of the space.

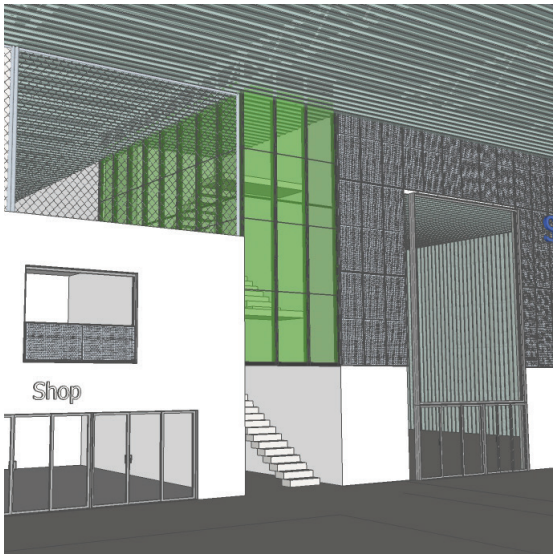


A very industrial stair that stretches out to the square and becomes very dominant.

A reference image from the supermarket føtex in Nørresundby



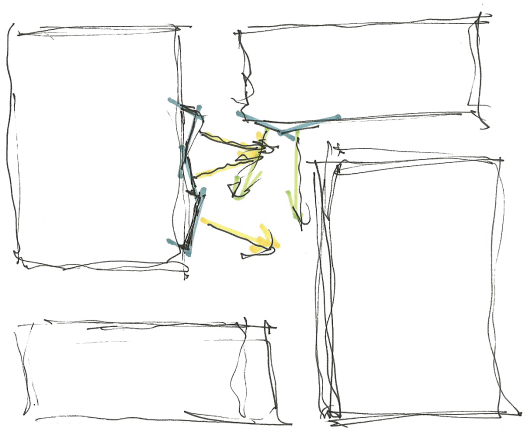
A stair case that are being included in the overall facade graphics. At the back side of the tower there is an elevator.



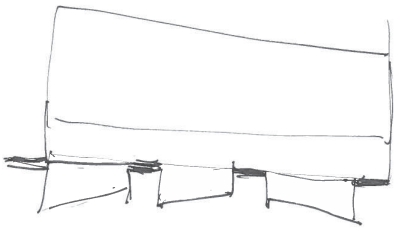
Same type of staircase but with a strong color making it very visible from the greyed facade graphics. By making the three different towers in different strong colors the stair cases will have seperate identities.

Cantilevered Boxes

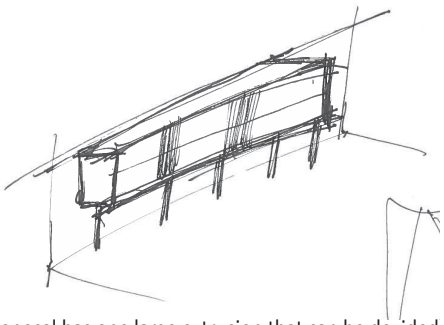
To some of the boxes there have been made cantilevered boxed. These boxes are made to make some of the functions that arent placed at the ground floor more visible.
The way they are doing that is to reach out to the square an to be orientated to focal points of the square so the functions inside of them will become more visable. The live of the functions will thereby be spread out to the square.



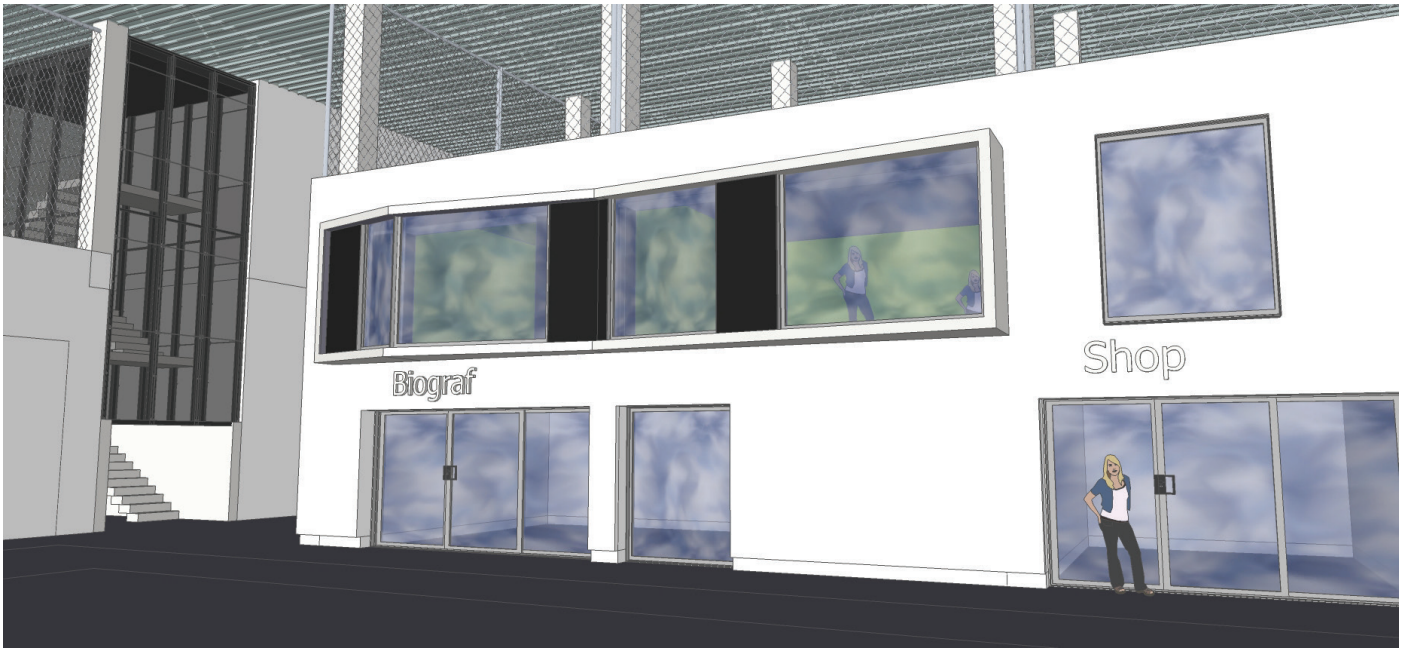
Extruding boxes provide different views through the square.



Multiple extrusions that break the facade.

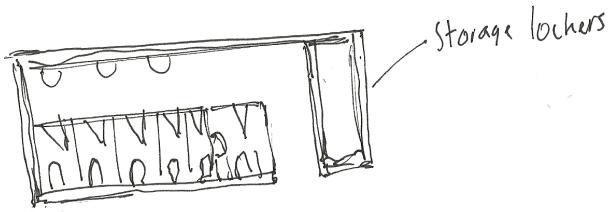


This proposal has one large extrusion that can be devided hat panels inbetween the windows



Cantilever box that breaks several times and where the windows have different orientation.

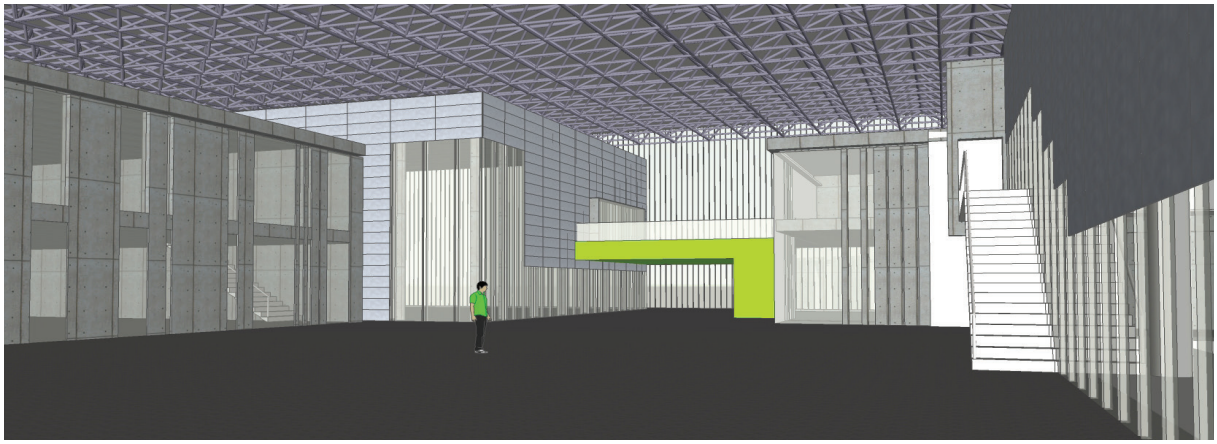
Entrance Box



It has been a wish to make a low entrance part so the entrance to the square becomes more powerfull and contrast full because of the partially tunnel effect a such entrance would provide.
In addition to that the entrance area from the parking and from the stadium are focal points where functions as toilets and safety boxes logically could be placed.
The 3rd aspects of these boxes is that they connect funtions. The entrance box towards the stadium for instance connects the cafe with the swimming hall where they have a visual connection.

A plan of the entrance box. The design reduces the queuing where people enter the building.

A picture of the entrance to the toilets as well as the safety boxes.



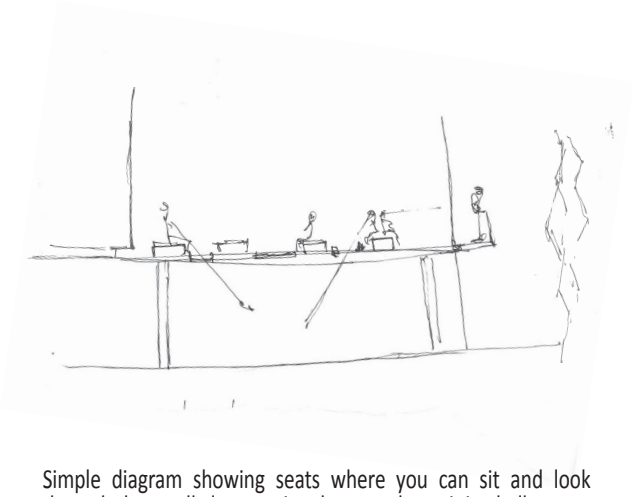
Different kinds of entrance boxes. The 1st one with a really powerfull color and the 2rd with a danish yellow brick.

Square pavement

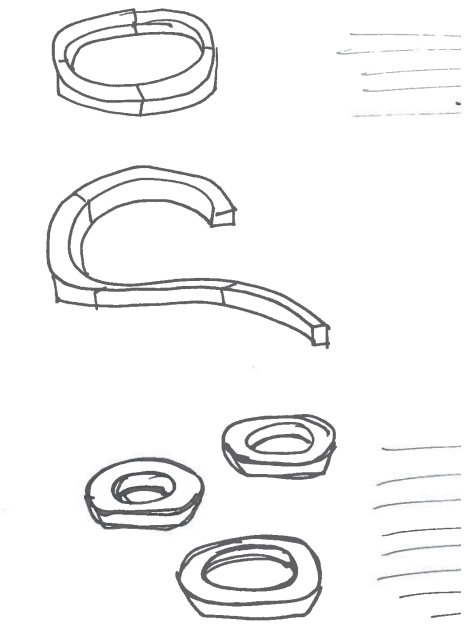
The pavement of the square has been important. A parameter of this was that it needed to emphasize that the square is an exterior and raw place.

Another parameter was to have the possibility to have a flat and empty space if desired.
By having that possibility the square can become a very lively place that can be used for for instance trade fairs and exhibitions and maybe even as an ice skating area during winter.

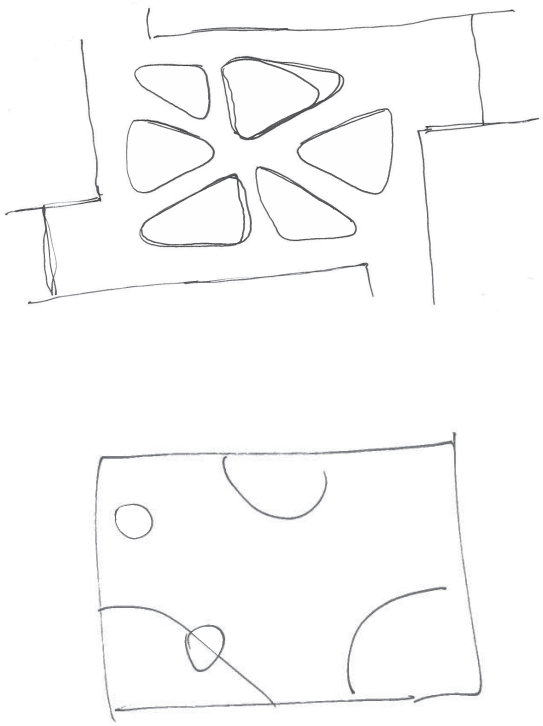
When the space arent being used to for instance exhibitions it would be advantageous to use parts of it as staying areas.



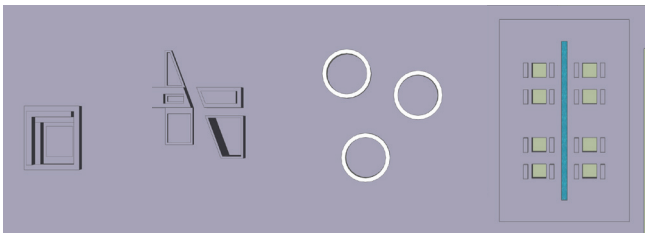
Simple diagram showing seats where you can sit and look through the small glas opening down to the training hall.



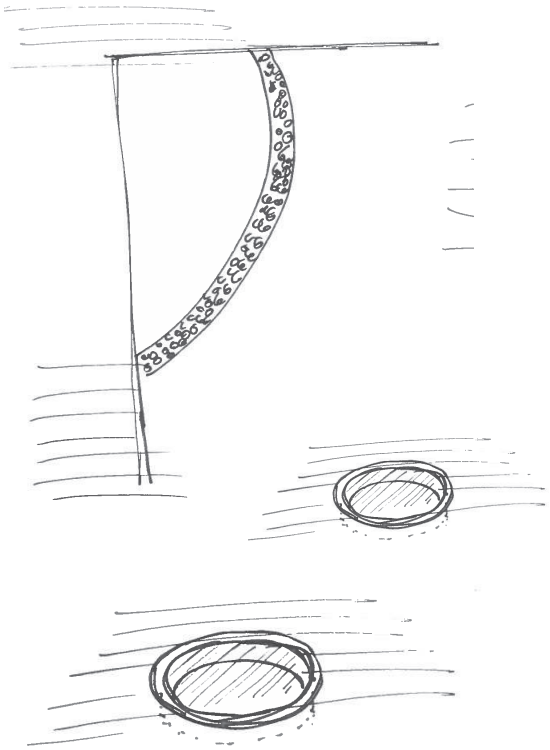
Round or curving benches gives the opportunity to sit introvert or extrovert.



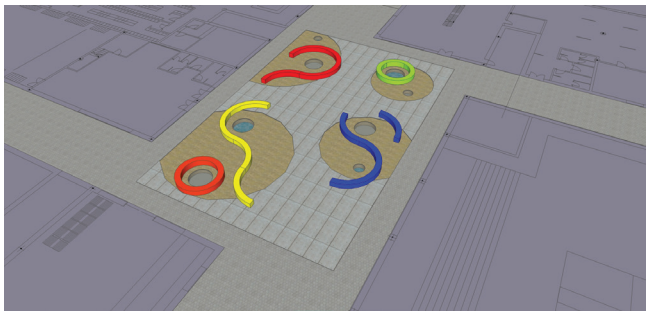
Soft triangles that formes the staying area and the transit paths very clearly.

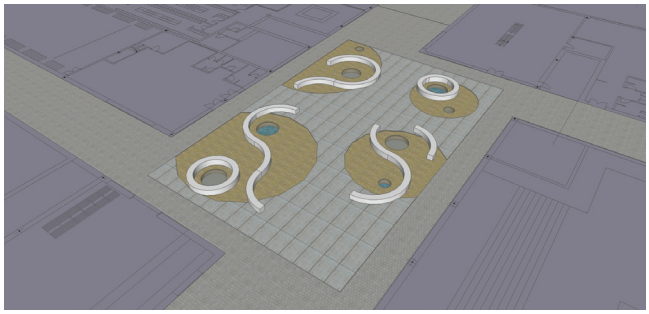


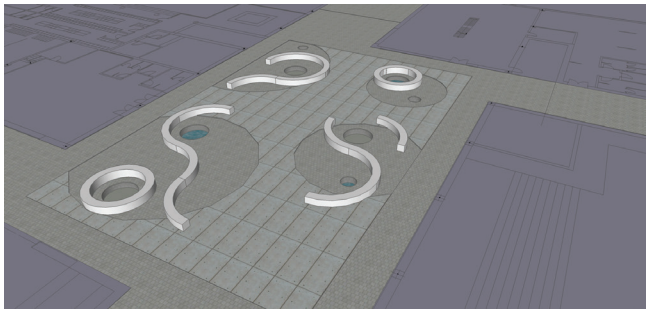
Different idioms in relation to the pavement koncept.

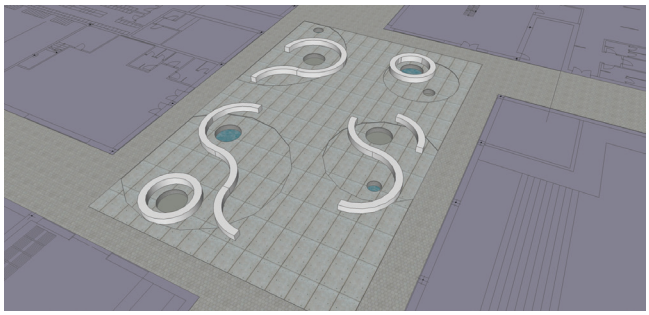


Circles that are the visual connection to the training hall.









A material test. By having a wooden floor in the circles it enhances that it is a staying area.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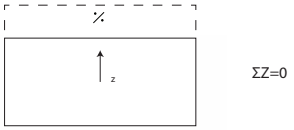
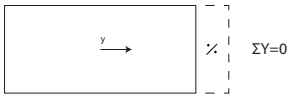
DETAILING

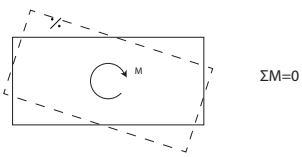
A chapter of some of the technical aspects of the multi hall has been made. In this chapter the independent energy consumption, the daylight, the thermal and atmospherically comfort has been documented in order to secure that the architecture as well as the technical parts can come together and form a whole and integrated project.

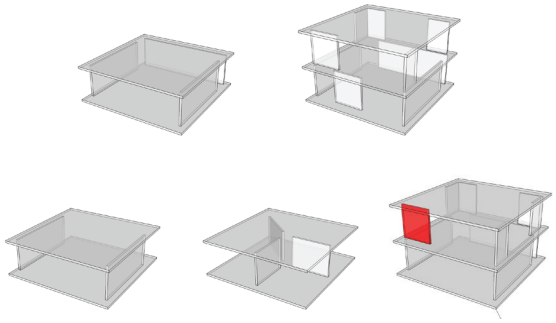
Construction Principle

A general model of the building's structural system has been made to start out the development of the structure. The constructive principle of the interior boxes is a disc-plate system where concrete sandwich panels are primarily used. The reason for choosing the disc-plate system is that the openings in the boxes are relatively small and the discs effect as a stabilizing element which seems optimal, since there is always at least three walls in a box where all are not parallel. If there was a need for a more flexible and open facade adaptation, then it would be possible to redesign for example the staircases as stable structural cores, then the facade discs would not be necessary.
The boxes are each spatially stable. The prerequisite for this is that all discs satisfiy the three conditions of equilibrium. The geometric condition for being able to satisfy these conditions is that each disk must be locked so that it in its own plane can not move in the z-direction or y direction or rotate:

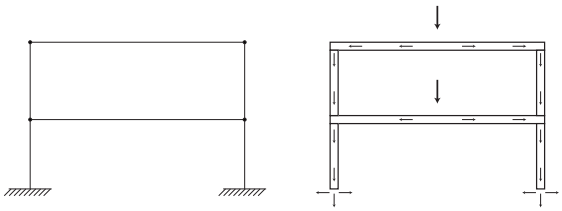




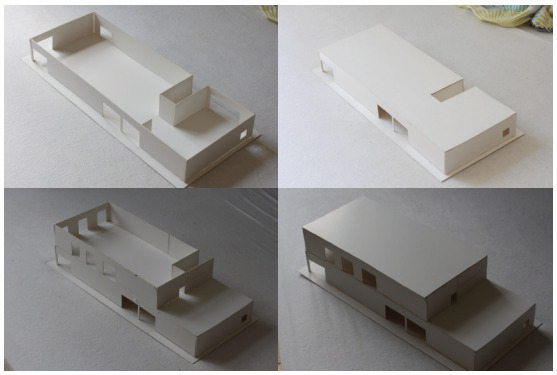




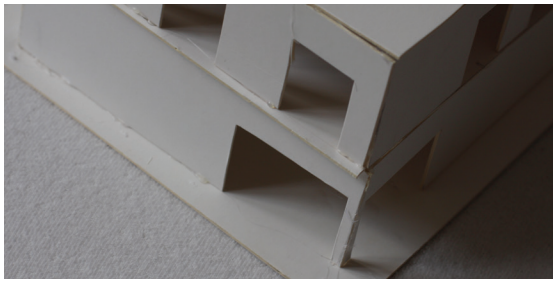
Furthermore, the discs and plates are to be used in a stable composition. The illustrations below show respectively stable and unstable compositions.
A general rule is that there should be minimum three discs that are not all parallel and not directed towards the same point. If this complies then the plate will be stable in its own plane.
When constructing multi story buildings a rule applies that the discs must be supported by either foundation (bottom floor) or a pendulum column or a disc. If this is not fulfilled the disc can be in danger of rotating vertically, so the composition will be moveable.



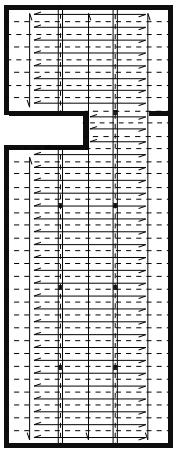
The discs and plates are loaded on top of each other in the boxes in which the disks must always be supported by a foundation or a second disc or pendulum column so that the load will always be vertical and taken directly into the ground. The elements of the foundation and floor joints are fixed (fast indspændt). The floors will be sealed discs on the plates, which, combined with their weight will make the friction so great that they can be considered fixed (indspændt).



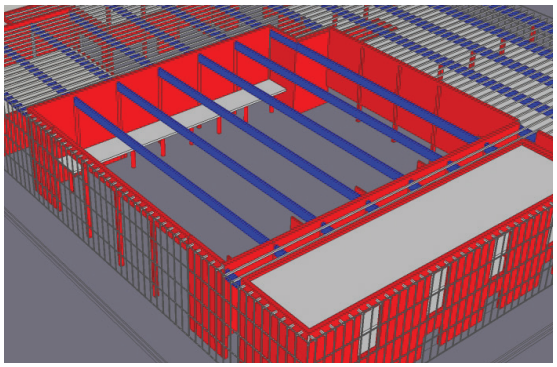
The following models show the process of the supermarket, føtex, and the hotel where the construction can be seen in four steps.
Purpose of the model has been to try to understand stability of the building. It was clear to see that the first discs that were put on was very unstable. As the ground floors' walls were put on it seemed relatively stable all around, but still fragile against twisting. The addition of the plate gave a clear understanding of the horizontal disc effects and wherever there was pressure it seemed very stable. Based on the model and the theory it is believed that this box-structure meets the stable composition.

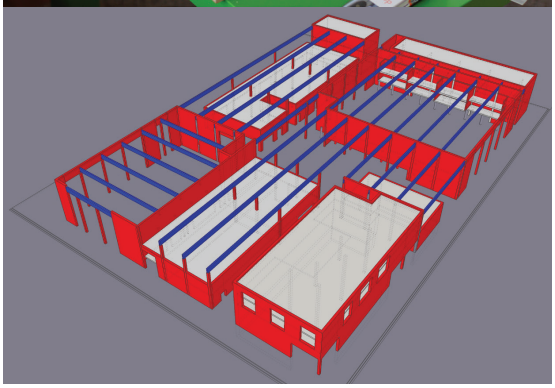


Since the discs are elements fixed to each other, it is anticipated that the sides of the discs will have notes, which together form a vertical gap. This time shall be reinforced and sealed with strong sealant; thereby the disc effect can be achieved all the way around the building. This means that there is not going to be danger of an element that is not supported, for example, under a window, because the loads are will be distributed away from the opening.



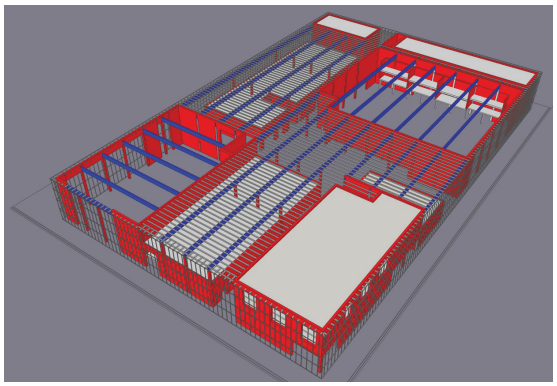
It is fairly unproblematic to use concrete decks for the supermarket and hotel box. This box does not need to have large spans, since the supporting possibilities seem flexible, and therefore can be used where it is needed.
The building's width is 20 meters, so a suitable slender concrete deck is unsuitable because will there will be vibration. Therefore concrete columns at 6, 67 meters are placed in width direction, carrying the steel beam that goes across the longitudinal direction of the building. Spancom spanmax PX18 which has a width of 1.2 meters and a thickness of 0.18 m will be fixed across the building. These will thus have a span of 6.67 meters. Since there will be wind load from the east and south the concrete floors are fixed to each other so that there is achieved horizontal disc effect in both directions.

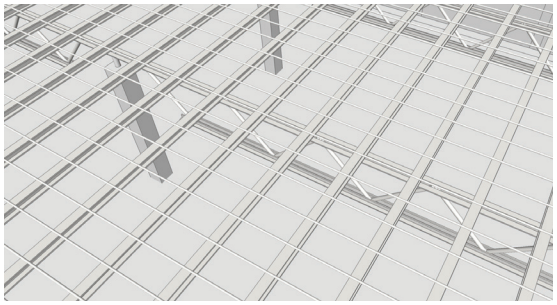




The boxes have the prerequisites necessary to be stable disc-plate systems. However, the Sports hall and swimming hall differ slightly in their disposition. Because of the span of up to 40 meters and a requirement for an elegant truss construction, steel trusses were used in these boxes. As the trusses will only take the loads in their own plan, the disc effect must be achieved in another way so that stability can be achieved also in these boxes. This will be done partly by implementing steel corrugated sheets that will be restrain the trusses and thus ensure the disc effect. In addition a crosswind can be applied.

The atrium structure is formed as a column-beam system in which the trusses are steel trusses. The large trusses are placed at a distance of 6.5 meters in width direction of the center, and spans a maximum of 23 meters without support. With this span the height of the truss system is approximated to be 1.2 meters from the table (FIND TABLE ENTRY). This span is across the square. The height of all trusses in the atrium is sized to 1.2 meters in order to provide a quiet and consistent expression in general. This means that some trusses will be slightly oversized.
The loads of the trusses are distributed to the concrete columns that using table lookup is approximated to (XXX). These pillars continue through to the foundation, so the forces are led down to the ground.

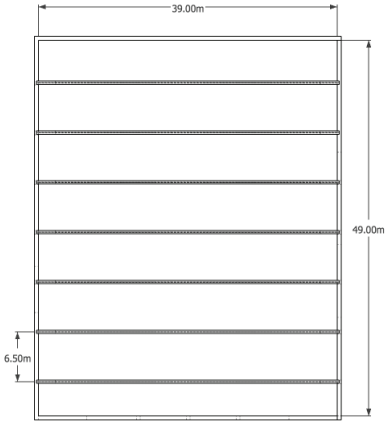


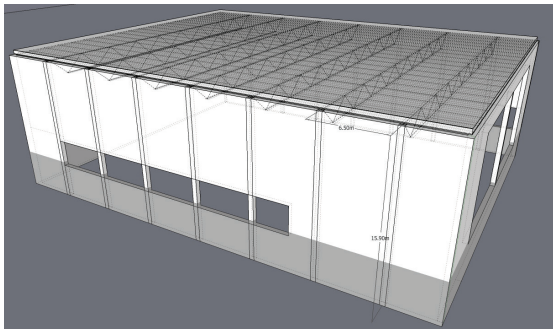


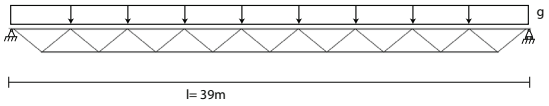
The roof of the atrium is has polycarbonate ribbed sheets. These plates can only cope with a span of around 60 cm, which leads to the addition of a steel net that will domninate the atrium roof. Across the truss system h-profiles c/c 1.2 meters and then steel bars across the h-profiles c/c 0.6 meters. Because of the fixture between the truss system and the many of the H-sections and to the concrete boxes the atrium roof will be stable, although the freestanding it would be unstable column-beam system.

Construction calculation

In the following the steel trusses and the concrete columns in the sports hall will be dimensioned by the use of the program Robot - Structural Analysis. Firstly the basis of the calculations vil be pointed out in relation to the steel trusses and the concrete columns. Next the snow load, wind load and own load wil be found and finally the cross-sectional profiles and the material data vil be considered. These considerations and calculations will be put into Robot, where the limit state and the ultimate limit state (AGT and BGT) will be found. If the constructional elements are not satistying the process will be restarted with either changed cross-section profile or material data.







Basis of calculation of steel truss:

a) Loads and reactions are considered to work ind the nodes.
b) The nodes are being carried out as frictionless joints, which means that the truss bars only can be affected to tension and compression.
c) The truss constructin must be build up ind triangels where two and two have a side in common and do not overlap each other.

Calculation of the own load is based on the characteristics of the roof that rests on the concrete columns, and the acceleration of gravity [Teknisk staabi, 2009: 143]:

Formula: g_{roof} = density x thickness x acceleration of gravity

$g_{sondolit}$ = 28 kg/m^3 x 0,35 m x 9,82 m/s^2 x 10^{-3} = 0,0096 kN/m^2
$g_{rockwool}$ = 100 kg/m^3 x 0,05 m x 9,82 m/s^2 x 10^{-3} = 0,00491 kN/m^2
$g_{trapetz\ panels}$ = 6,04 kg/m^3 x 0,18 m x 9,82 m/s^2 x 10^{-3} = 0,0106 kN/m^2
g_{total} = 0,0693 kN/m^2

In order to ensure robustness and support possible future changes the calculated total own load gtotal is increased by around 20 % :

the final own load is 0,085 kN/m2.

Calculation of the snow load [ds410, 4th edition, 1998]:

Formula: $s = \mu_i C_e C_t s_k$

μ_i: form factor (roof slope)= 0,8
C_e: Exposure factor (landscape etc)= 1
C_t: Thermal factor = 1
s_k: Characteristic terrain value= 0,9 kN/ m^2

$s = \mu_i C_e C_t s_k$

s = 0,8 x 1 x 1 x 0,9 kN/m^2 = 0,72 kN/ m^2

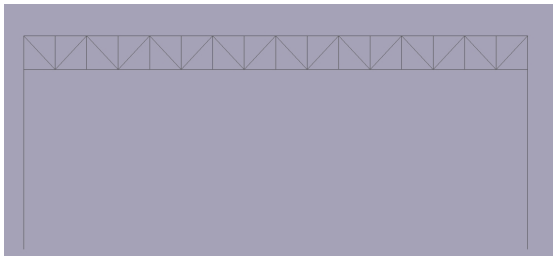
The windload is determined by approximation to be 0.81 kN/m^2 [Teknisk staabi, 2009: 166].

w = *0,81 kN/m^2*

Test of Trusses

Parallel chords:

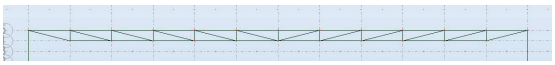
It was discovered that when the truss is being supported in the bottom chord (beam 2) the top chord (beam 1) doesnt perform very good.



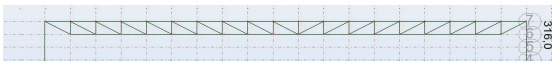
Member	Section	Material	Lay	Laz	Ratio	Case
1	HEB 300	Steel	304.79	522.51	0.20	1 g
2	HEB 300	Steel	304.79	522.51	6.85	1 g
3 Column 3	HEB 300	Steel	107.75	184.73	0.26	1 g
4 Column 4	HEB 300	Steel	107.75	184.73	0.26	1 g
100	HEB 160	Steel	52.87	88.51	0.34	1 g
101	HEB 160	Steel	52.87	88.51	0.24	1 g
102	HEB 160	Steel	52.87	88.51	0.13	1 g
103	HEB 160	Steel	52.87	88.51	0.03	1 g
104	HEB 160	Steel	52.87	88.51	0.04	1 g
105	HEB 160	Steel	52.87	88.51	0.09	1 g
106	HEB 160	Steel	52.87	88.51	0.15	1 g
107	HEB 160	Steel	52.87	88.51	0.34	1 g
108	HEB 160	Steel	52.87	88.51	0.24	1 g
109	HEB 160	Steel	52.87	88.51	0.13	1 g
110	HEB 160	Steel	52.87	88.51	0.03	1 g
111	HEB 160	Steel	52.87	88.51	0.04	1 g
112	HEB 160	Steel	52.87	88.51	0.09	1 g

Travelling crane (similar hight):

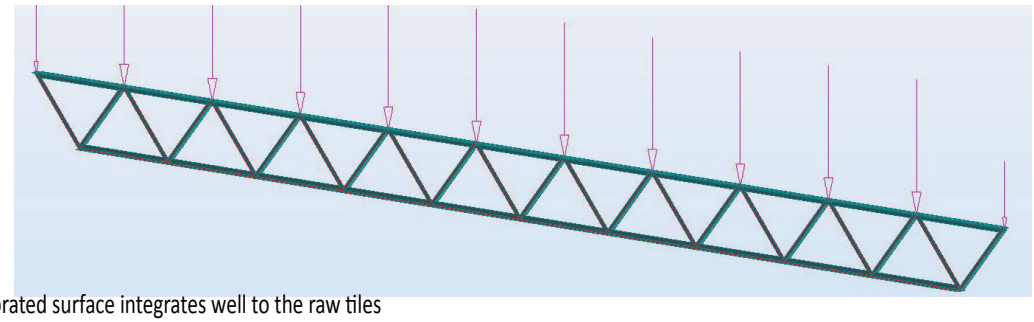
Here it is shown that the angles of the webs are influencing the ratio between the top and bottom chord performance. Where the webs are more horisontal the top chord are performin more and where the angles are diagonal the ratio is more even.



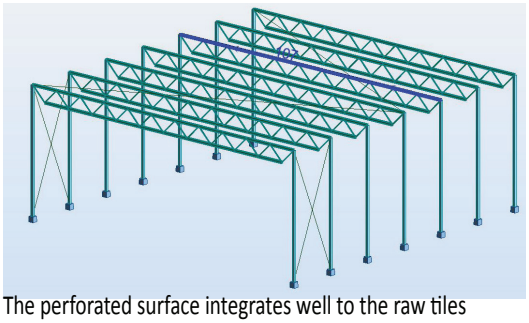
Member	Section	Material	Lay	Laz	Ratio	Case
1 Beam 1	HEA 160	Steel	182.68	301.16	2.59	1 DL1
2 Beam 2	HEA 160	Steel	152.23	250.97	0.61	1 DL1
3 Simple bar 3	IPE 100	Steel	25.33	83.01	0.96	1 DL1
4 Simple bar 4	IPE 100	Steel	6.14	20.13	1.45	1 DL1
5 Simple bar 5	IPE 100	Steel	25.33	83.01	0.27	1 DL1
6 Simple bar 6	IPE 100	Steel	6.14	20.13	1.40	1 DL1
7 Simple bar 7	IPE 100	Steel	25.33	83.01	0.23	1 DL1
8 Simple bar 8	IPE 100	Steel	6.14	20.13	1.02	1 DL1



Member	Section	Material	Lay	Laz	Ratio	Case
1 Beam 1	HEA 300	Steel	149.14	253.74	1.55	1 DL1
2 Beam 2	HEA 300	Steel	133.44	227.03	0.83	1 DL1
3 Beam 3	IPE 100	Steel	27.47	90.03	1.03	1 DL1
4 Beam 4	IPE 100	Steel	12.28	40.26	1.78	1 DL1
5 Beam 5	IPE 100	Steel	27.47	90.03	9.13	1 DL1
6 Beam 6	IPE 100	Steel	12.28	40.26	2.37	1 DL1
7 Beam 7	IPE 100	Steel	27.47	90.03	1.71	1 DL1
8 Beam 8	IPE 100	Steel	12.28	40.26	1.85	1 DL1
9 Beam 9	IPE 100	Steel	27.47	90.03	0.82	1 DL1



The perforated surface integrates well to the raw tiles



The perforated surface integrates well to the raw tiles

Member	Section	Material	Lay	Laz	Ratio	Case	R
3 Beam 3	HEA 260	Steel	360.86	609.28	0.98	1 DL1	
5 Beam 5	HEA 260	Steel	328.06	553.89	0.54	1 DL1	
6 Beam 6	CAE 100x12	Steel	84.39	84.39	0.49	1 DL1	
7 Beam 7	CAE 100x12	Steel	84.39	84.39	0.53	1 DL1	
8 Beam 8	CAE 100x12	Steel	84.39	84.39	0.39	1 DL1	
9 Beam 9	CAE 100x12	Steel	84.39	84.39	0.45	1 DL1	
10 Beam 10	CAE 100x12	Steel	84.39	84.39	0.29	1 DL1	
11 Beam 11	CAE 100x12	Steel	84.39	84.39	0.34	1 DL1	
12 Beam 12	CAE 100x12	Steel	84.39	84.39	0.20	1 DL1	
13 Beam 13	CAE 100x12	Steel	84.39	84.39	0.23	1 DL1	
14 Beam 14	CAE 100x12	Steel	84.39	84.39	0.10	1 DL1	
15 Beam 15	CAE 100x12	Steel	84.39	84.39	0.13	1 DL1	
16 Beam 16	CAE 100x12	Steel	84.39	84.39	0.03	1 DL1	
17 Beam 17	CAE 100x12	Steel	84.39	84.39	0.03	1 DL1	
18 Beam 18	CAE 100x12	Steel	84.39	84.39	0.13	1 DL1	
19 Beam 19	CAE 100x12	Steel	84.39	84.39	0.10	1 DL1	
20 Beam 20	CAE 100x12	Steel	84.39	84.39	0.23	1 DL1	
21 Beam 21	CAE 100x12	Steel	84.39	84.39	0.20	1 DL1	
22 Beam 22	CAE 100x12	Steel	84.39	84.39	0.34	1 DL1	
23 Beam 23	CAE 100x12	Steel	84.39	84.39	0.29	1 DL1	
24 Beam 24	CAE 100x12	Steel	84.39	84.39	0.45	1 DL1	
25 Beam 25	CAE 100x12	Steel	84.39	84.39	0.39	1 DL1	
26 Beam 26	CAE 100x12	Steel	84.39	84.39	0.53	1 DL1	
27 Beam 27	CAE 100x12	Steel	84.39	84.39	0.49	1 DL1	

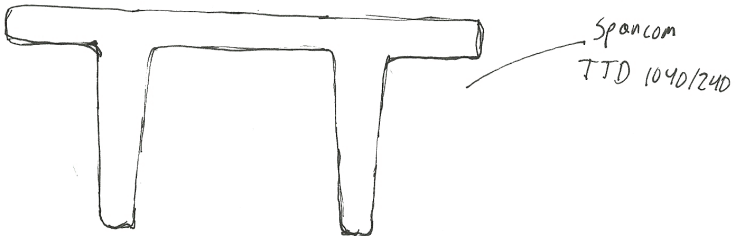
The perforated surface integrates well to the raw tiles

Final truss:

Own load (point load in nodes) 12,4 kN
Snow load (point load in nodes) 15,6 kN
The final truss is a web beam, where the angle web is in an angle at 45 degrees, and the total hight of the truss is 1,8 meters. The top and bottom chord is a Hea 260 and the angle webs is a CAE 100X12.
The top and bottom chord are both being utilized, but with the top chord (Beam3) performing most. The Angle webs can be at lower dimensions. The outer beams are performing the most where the webs in the middle part are performing much less.

Deck Hall 2 (below the square):

As floor seperation between the square and the training hall a ttd deck is going to be used. The span of the deck is around 20 meter which is why a TTD 1020/ 240 from spæncom is chosen. The deck elements is formed as a double t profile. By using a double t cross section the molded concretes properties are being utilized because of the low unladen weight and height along with great stiffness and span.



Technical Development

Square Roof detail 1:20

1 Polycarbonate panels - 60 mm
2 Steel bar
3 HEB 150
4 HEB 200
5 CAE 80 x 8 mmW

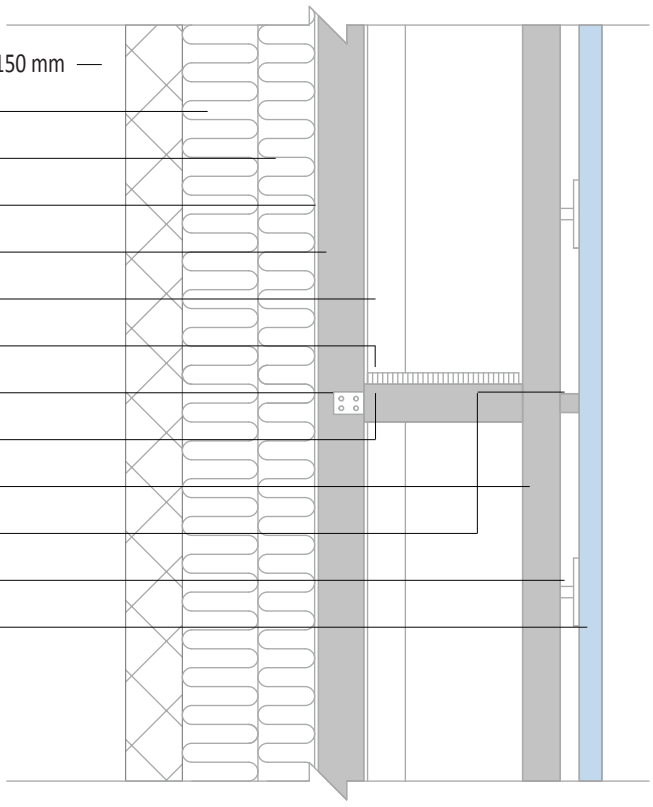
6 Steel bar
7 Polycarbonate panels - 60 mm

Construction Details and U-values

External wall detail 1:20

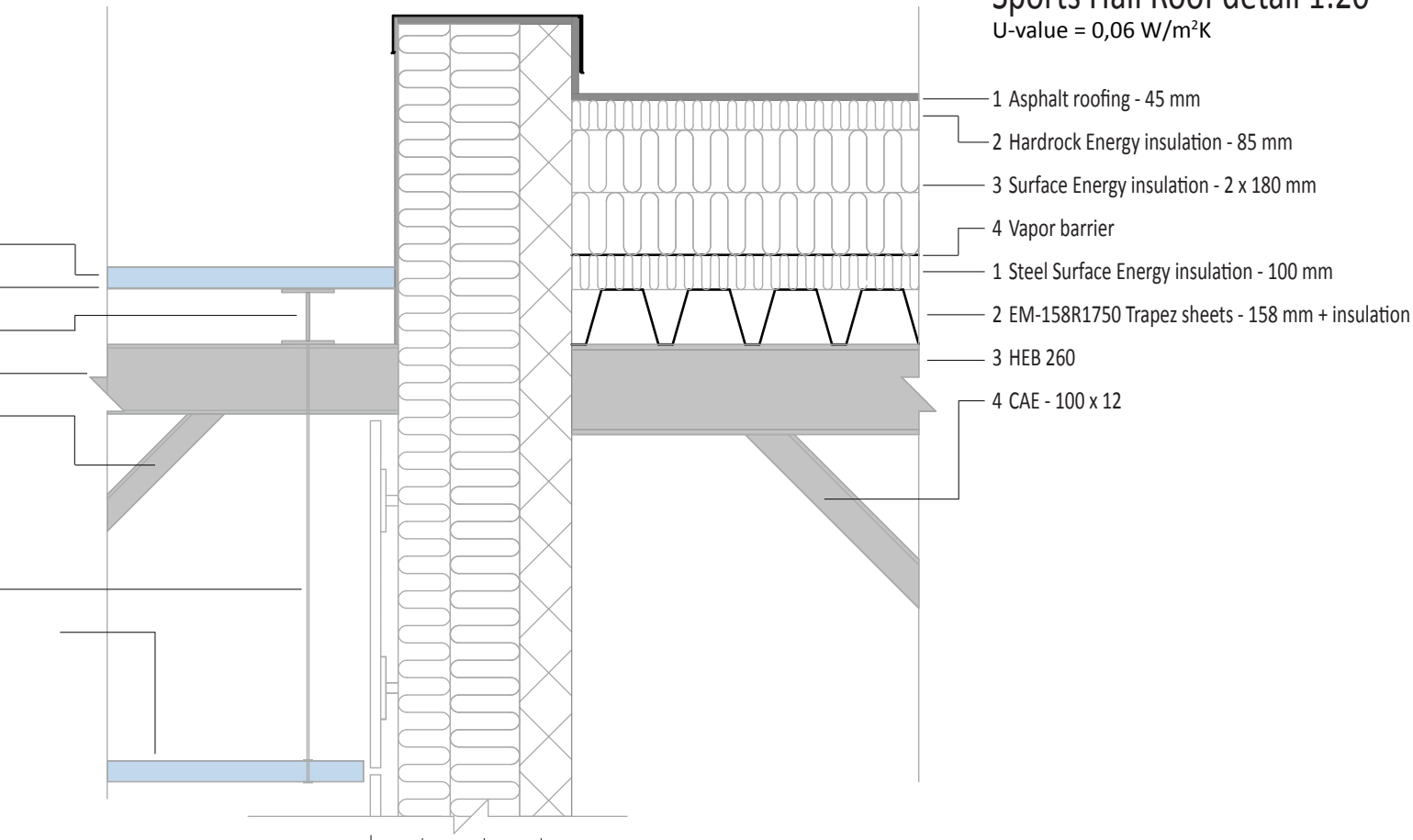
U-value = 0,09 W/m²K

1 Reinforced concrete - 2% steel, 2400 kg/m³ - 150 mm
2 FlexSystem Batts - Rockwool A/S - 200 mm
3 FlexSystem Batts - Rockwool A/S - 150 mm
4 Plasterboard - 12 mm
5 Steel column
6 Drain pipe
7 Steel grating
8 Fixture element
9 Steel beam
10 Horizontal steel frame
11 Vertical steel frame
8 Fixture element
9 Polycarbonate panels - 60 mm



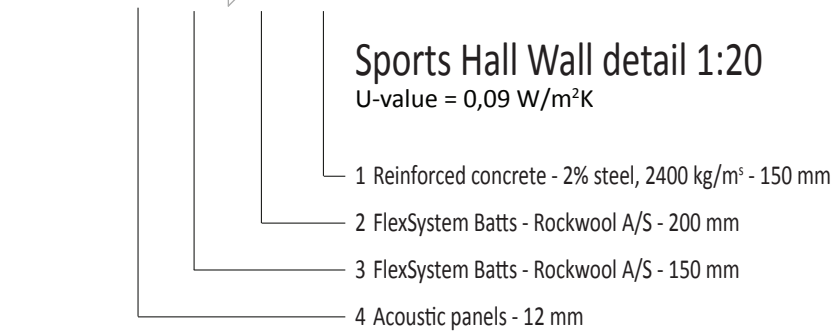
Sports Hall Roof detail 1:20

U-value = 0,06 W/m²K



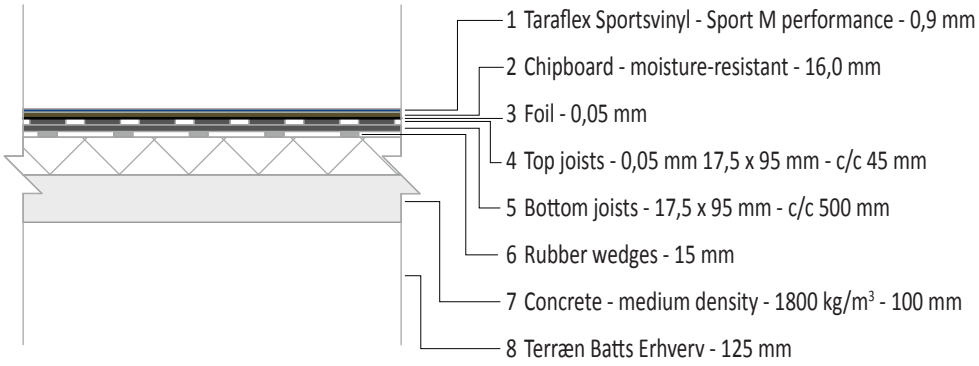
Sports Hall Wall detail 1:20

U-value = 0,09 W/m²K



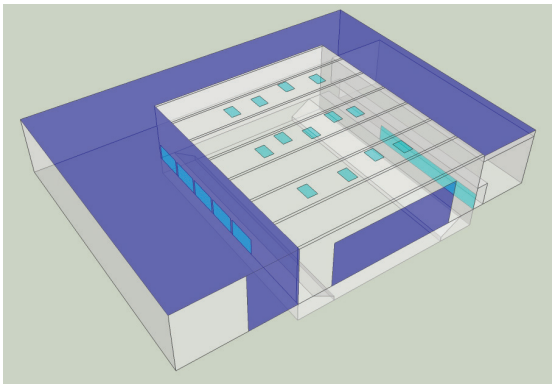
Sports Hall Floor detail 1:20

U-value = 0,12 W/m²K



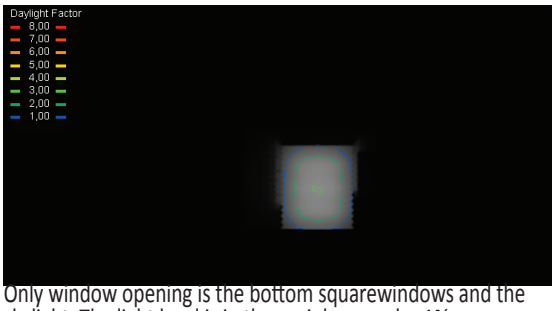
Daylight

In this chapter the daylight in the multihall will be described. In a large space like a sportshall which requires a high light level it is considered to be an important passive house strategy to make the right amount of window openings. If the daylight level isnt satisfying artificial light will have to be used when ever the hall are being used and in a big volumn like a sportshall that will be expensive in relation to the el consumption.
The goal is to get a minimum lux level of 5 percent.

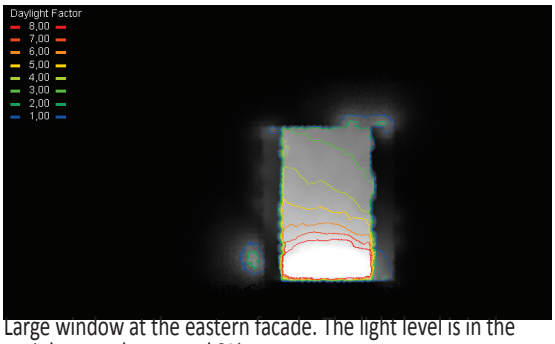


This illustration shows the window openings in the hall. The dark blue wall and roof surfaces are polycarbonate with a light transmittance level at 50%. The light blue surfaces is normal glas with a light transmittance level at 78%.

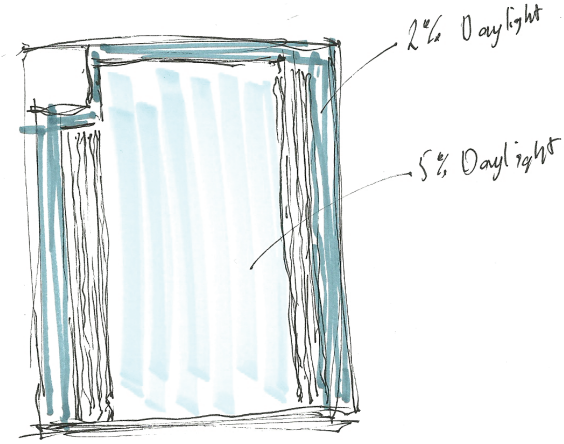
Velux Testing:



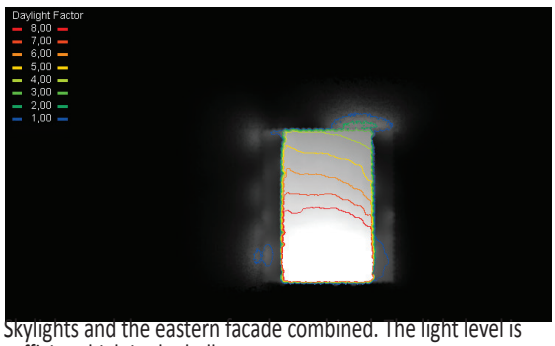
Only window opening is the bottom squarewindows and the skylight. The light level is in the periphery under 1%



Large window at the eastern facade. The light level is in the periphery under around 2%



This illustration shows the hall divided into zones of different types of lighting. The hall way is only for walking and requires 2 % daylight factor. The scene of the sports naturally needs more illumination which can come from a mixture of daylight and artificial light.

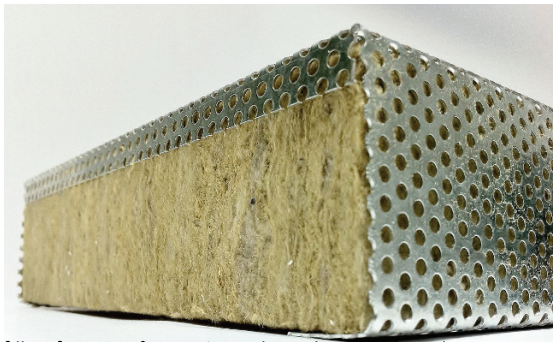


Skylights and the eastern facade combined. The light level is sufficient high in the hall.

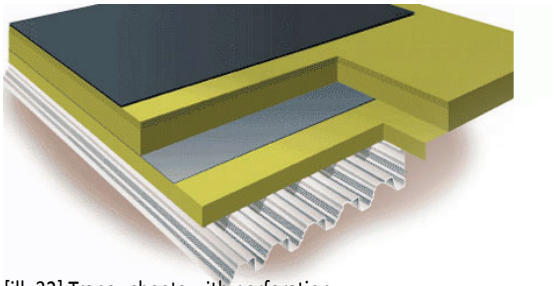
Acoustics

According to the acoustics of the sportshall some consideration have been made. In a sports hall in general there isnt high demands for a low reverberation. Within reasonable limits a relatively high reverberation in a hall can be a quality because it contributes to make the hall more alive and in a way spatial. The limits for a sports hall is when the reverberation time is a nuisance.
The multi hall in the Jetsmark centre is not only thought to be a sports hall but also a hall were cultural activities can take place such as concerts and theater plays. Especially during a theater play the acoustics needs to be controlable, with a reverberation time around 1,1-1,4 seconds.
The whish is that the hall must have an identety as a multi hall and needs to be a competetive place for koncerts, so acoustic solutions must be found.

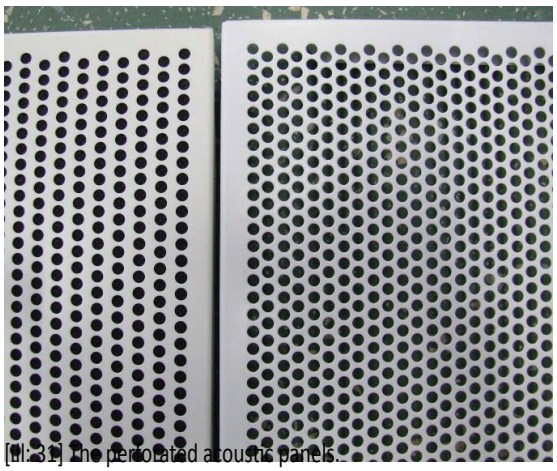
Much of the surface area in the hall are of hard materials with a poor absorption area. The wish is to combine make acoustic solutions that is within the same spirit as the rest. Therefor the acoustic surfaces will primarily be in the perforated trapez ceiling as well as steel panels that are being implemented around the building.



[ill: 30] Image of acoustic steel panel with rockwool in it.



[ill: 32] Trapez sheets with perforation



[ill: 31] The perforated acoustic panels.

Atmospheric Comfort

The Sports Hall has a high level of activity from the people performing various sports, which has an impact on the indoor environment and evokes a need for a regular air change in order to achieve a hygenic air quality. The air change can be achieved by either natural ventilation or mechanical ventilation or a combination of the two in a hybrid ventilation.

The Sports Hall is designed to have the capacity to host a wide range of events and activities such as sporting events, concerts, a trade fair, temporary exhibitions etc.
At a sporting event for example there is a seating capacity for 626 people with additional room for standing audience of approx. 100 people togehter with the performing sportspeople. The event demands a high air change rate in order to achieve a satisfactory indoor air quality. Another situation is during the training sessions which is assumed to have an average occupancy of 20 persons at a time. In this case there is a different and smaller demand of air change, but the high level of activity is still considerable. The mechanical system must have the capacity to generate good indoor air quality at the occasional large gatherings with maximum people load, but the following calculation will be based on the training sessions which is considered to be the primery type of usage of the Sports Hall.

During the summer months the natural ventilation can be a good supplement to the mechanical for cooling when the Sports Hall has excessive tempertures. The Skylights providing daylight to the hall are ideal as the used hot air will rise and exit the hall through the openings of the skylight, therby leaving room for fresh air to enter, which ultimately decreases the energy consumption for ventilation during summer months.
To conclude the optimal ventilation system for the Sports Hall is the hybrid ventilation strategy.
An approximate average air change is calculated in the following as part of determining the energy frame in Be10 (see Be10 on the next page). There are two methods of calculation; CO_2 based calculation and Olf based calculation. The comparison of both result will reveal the most dominant source of air pollution which then can be used as an input in Be10.

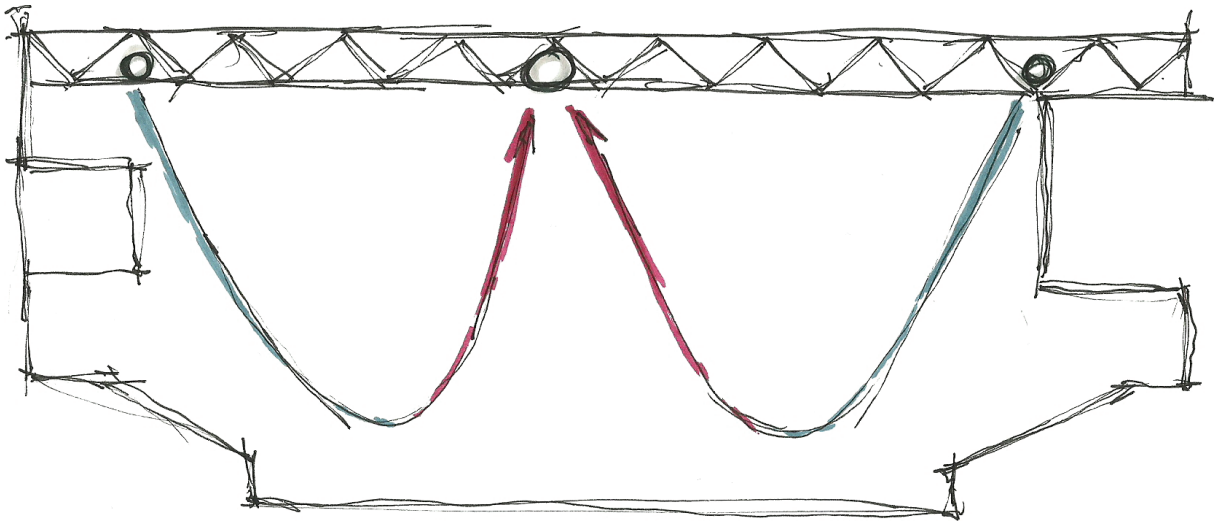


Illustration shows a cross section of the mechanical ventilation strategy. The ventilation type is mixing where the supply air are being blown down to the center of the hall. From here the air gets warmer and are being extracted in the top middle of the hall.

Air change according to CO_2:

Area =	1714	m^2
V_R =	23826	m^3
Person =	20	people
M =	7	met
c =	1000 x 10^{-6}	ppm
c_i =	350	ppm

$n = q/(c\text{-}c_i) \times V_R$

$q = (17 \times M) \times Person = (17 \times 7)\ 20 = 2380$
$\approx 2{,}38\ m^3/h\ CO_2$

$n = q/(c\text{-}c_i) \times V_R$

$n = 2{,}38\ m^3/h\ /\ (1000 \times 10^{-6}\ m^3/m^3 - 350 \times 10^{-6}\ m^3/m^3)\ 23826\ m^3$

$n = 0{,}154\ h^{-1}$

Air change according to olf:

Area =	1714	m^2
V_R =	23826	m^3
Person =	20	people
q_{person} =	13,5	olf
$q_{building}$ =	0,1	olf
c_i =	0,1	decipol
c =	1,4	decipol

$c = c_i + 10 \times q_{total}/V_L \quad \approx \quad V_L = 10 \times q_{total}/(c\text{-}c_i)$

$q_{total} = Person \times q_{person} + (q_{building} \times Area) \approx$

$q_{total} = 20 \times 13{,}5\ olf + 0{,}1\ olf/m^2 \times 1714\ m^2 = 441{,}1\ olf$

$V_L = 10 \times 441{,}1\ olf/(1{,}4\ decipol\text{-}0{,}1\ decipol) = 3395{,}38\ l/s$

$n = 0{,}513\ h^{-1}$

Air change according to olf is higher than CO_2. Olf is the most dominant source of air pollution and will be used in the Be10 calculations.

Be10

The function of the programme is to provide information about buildings' energy frame.
The purpose of calculating energy frames is to minimize the energy consumption according to various energy standards.

Br10 = xxxx kWh/m² yearly

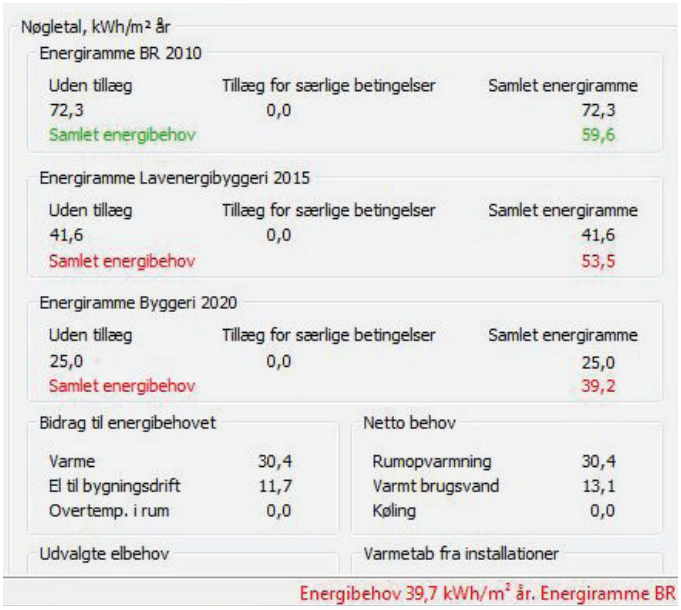
Br15 = xxxx kWh/m² yearly

Br20 = xxxx kWh/m² yearly

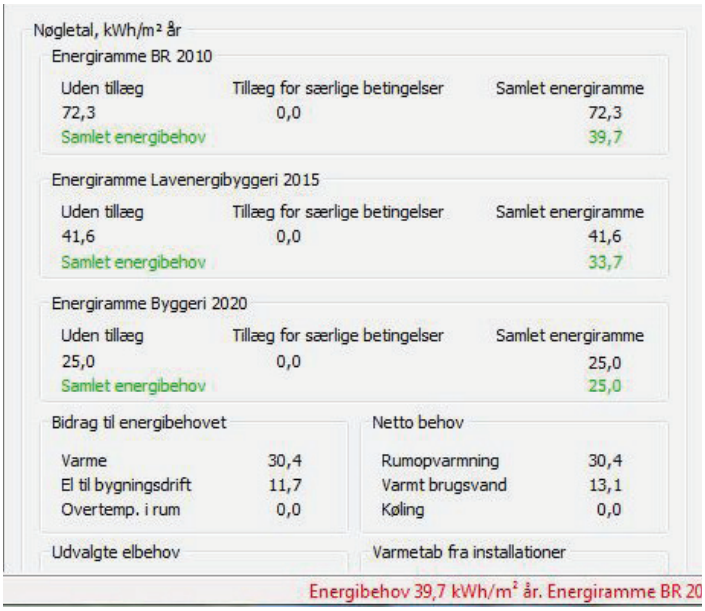
Today all new built projects must comply with the standards of Br10. The goal in this project is to reach near Br20 and finally achieve the standard with the additions of active methods.

The calculation method is based on inputs stored in the building data which means that subjects of building envelope, daylight, atmospheric and thermal comfort etc. are all connected to the result of the energy frame.
The u-values of the building parts determine the buildings' ability to minimize heat loss.
The daylight conditions can also be perceived as the conditions for heat gain from the sun as well as conditions to decrease the use of artificial lighting both with impact on the energy consumption.
The strategy and calculations of the atmospheric comfort also have a direct impact on the energy frame and are included as inputs in the programme.
The 24-hour average depends on the u-value of the building parts and the ventilation rate and can explain the thermal comfort of the Sports Hall to ensure that excessive temperatures do not exceed the demands of Br10 which ultimately can give a good indication if the inputs to Be10 are satisfactory and will show a good result. To sum up the buildings energy frame is minimized by the use of an integrated design process, where both aesthetical and technical qualities are considered in corelation with passive and active methods.

The result of Be10 without active methods.



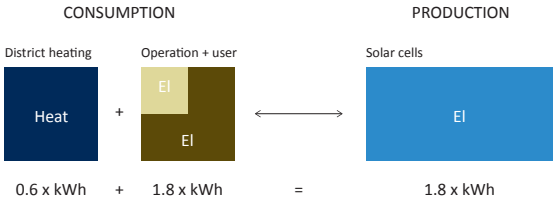
The result of Be10 with active methods.



Active Methods

Renewable energy technologies are based on natural resources of the earth, which can be exploited in many ways; sun, wind, rain, waves an geothermal heat etc. The main advantages of renewable energy technologies are the reduction of carbon emissions and the reduced dependency on fossil fuels.

The solar panel technology is chosen for this project, which can produce electricity for the building operation, appliances and lighting etc. However the results in Be10 also show that heat is substantially contributing to the total energy consumption, which could encourage the use of thermal heat panels or heatpumps. If the project was actually being built then the possibilities and advantages of the different options in the field of renewable energy technology should be studied more in dept, which would lead to a more solid and satisfying building solution in relation to its' energy consumption (see case study of Green Lighthouse p. 126-127).
Normally in order to determine the area demand of solar panels required to cover the energy consumption and reach the standard of zero energy building, the keynumbers shown in Be10 (energy consumption for heating and electricity) are put into the calculation formula below:



[The Chic Ecologist, 2013]

However in this project the goal is to reach Br20 with the effect of solar panels. Therefore the calculation method is reverse. First Be10 is used to determine the area demand for solar panel required and next the value is used to calculate the yearly electricity production from the solar panels and the result can illustrate the percentage of the solar panels' coverage of the total energy consumption.

A =	Panel area		62	m^2
B =	efficiency		15	%
C =	Installed effect	A x B/100	9,44	
D =	System factor		0,75	
E =	Yearly insolation		1097	$kW/h/m^2$

Total energy consumption:

0,6 x 30,4 kWh + (1,8 x 11,7 kWh) x 1714 m^2 = 67.360,2 kWh

Yearly production = C x D x E ≈

Yearly production = 9,44 x 0,75 x 1097 = 7762,65 kWh

The solar panel production coverage of energy consumption:

7762,65 kWh x 1,8 = 13.972,77 kWh ≈ 21 %

PRESENTATION

In this chapter the project will be presented through plans, elevations, sections, visualizations. The presentation will primarily be focusing on the eastern exterior facade, the square and the multi hall.

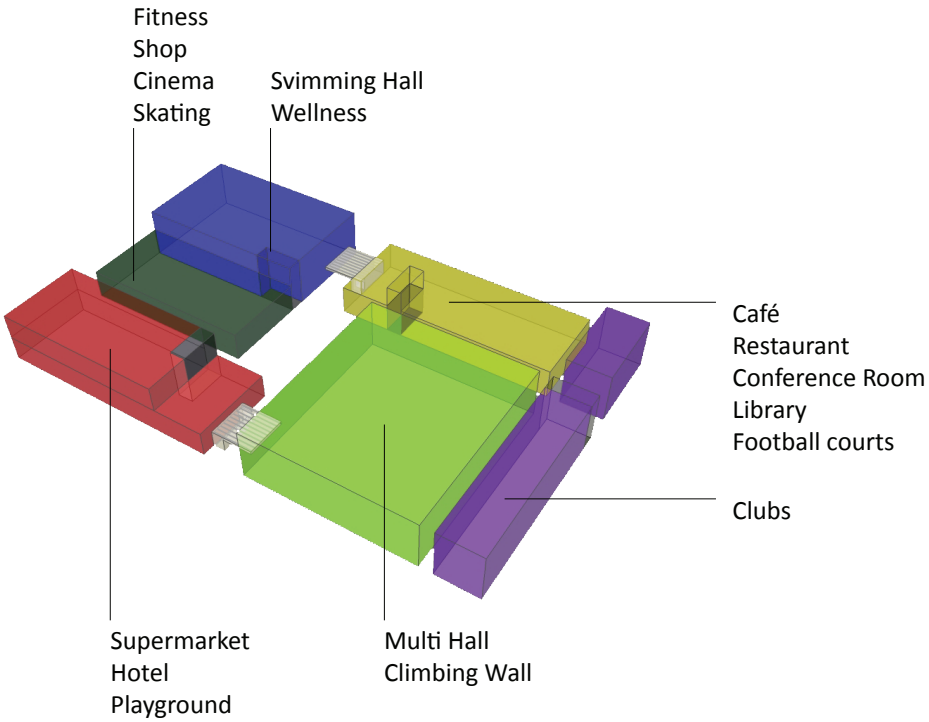
Masterplan

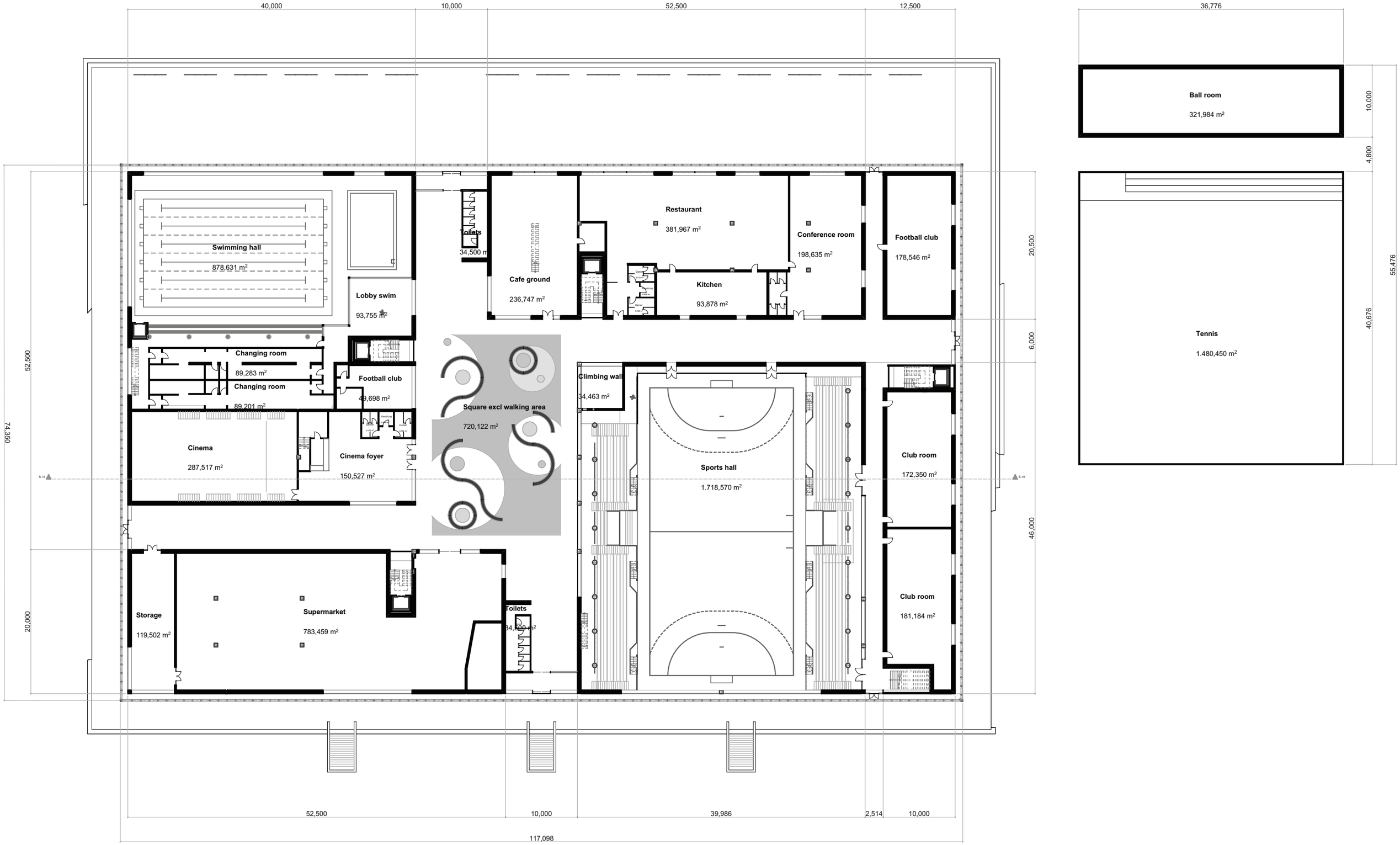
The large Jetsmark center shown in its context. The scale of the building is a very dominant element in the topography. The plateau lifting the building is cut very clearly into the landscape which contributes to the iconic character of the Jetsmark center project.
The entrance from the road have been changed from being in the middle of the old center to be in the southern end. To make the building become more in focus in relation to the infra structure a road round about has been made. The road in the round about going east west leads directly to the a big bypass that runs all the way to Aalborg.
The cycling path going from Pandrup to Kaas have also been changed so it now is going under the plateau on the west side. The cycling path is then closely attached to the building.

Masterplan
1:1000

The Functions

The functions have been placed according to the relations between the functions and with the vision to mix cultural and sports functions and create a more diverse concentrated life in the building.
The process of developing the building has further improved the qualities of the functions; for example by relating the functions to the context.
The café and restaurant are closely related to the football field, so the guests can enjoy a meal while a football game is being played adding a lively atmosphere to the experience. The library is for mental practice or enjoyment, but the function is visually connected to both the outdoor football field and to the indoor multi hall, so the visitors of the library also feel the dynamic and fresh atmosphere from the sports activities.
The supermarket is oriented in the opposite direction towards the entrance to the building, because this type of function desires exposure where the products can be marketed successfully as well as providing the customers with less distance to carry their purchase back to the car or to the bus.
The Clubs are placed along the entire north facade and are given a seperate entrance that can be used by the regular sportsmen and women for a more direct path to their training. The entrance runs across the entire building adding to the division from the rest of the Centre and the clubs get a more private character.
The cinema has no need of the sunlight and is therefor placed centerally in the groundfloor and extends to the level below. Fitness is placed above of the cinema, where there is a good view over the square and the functions can have a semi-shared atmosphere as the running or bicycle machines will be visible from the cantilevered boxes. Even more so are the three open outdoor functions that are placed on the top floors; playground, Skating field, football courts. These functions are open all day every day for everybody and they will add to the quality of the square, which is to create a feeling of community.
The scale of svimming hall and the multi hall makes them stand out compaired to the other functions, which is transferred to the facade design of the boxes. The attachment of a wellness and climbing wall raises the level of the experience in the Centre and visitors possibly receive more than they planned.



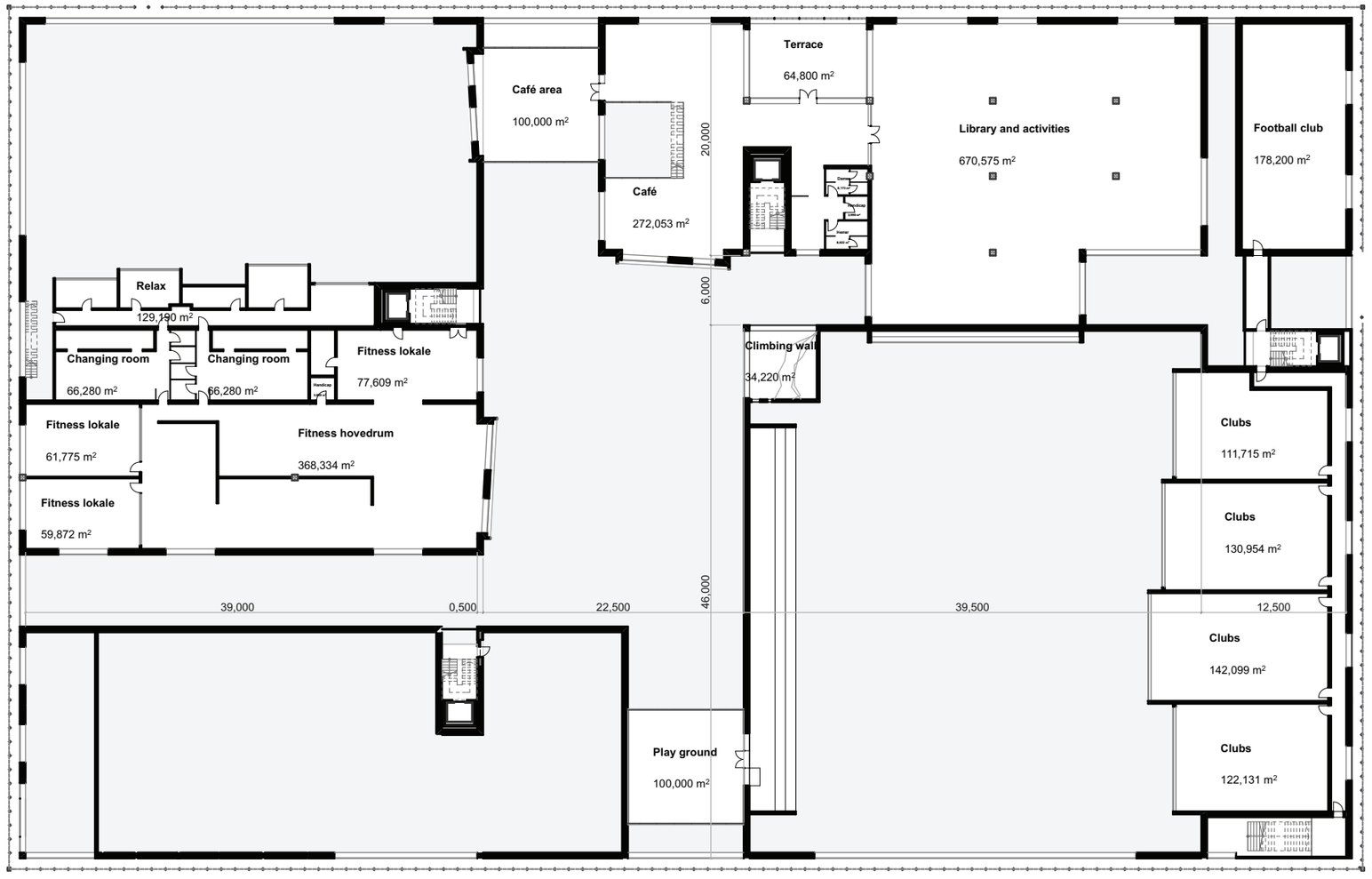


Ground Floor

Floor Plan

1:500

Ground Floor
1:500



First Floor

Floor Plan

1:500

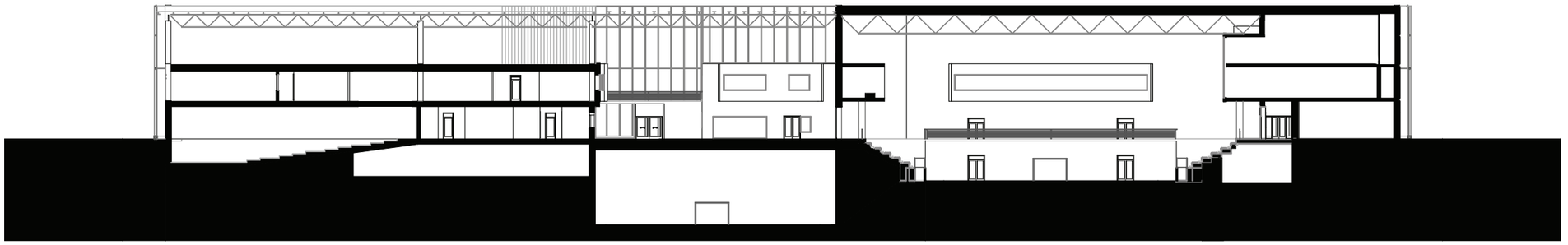
First Floor
1:500

Second Floor

Floor Plan

1:500

Second Floor
1:500

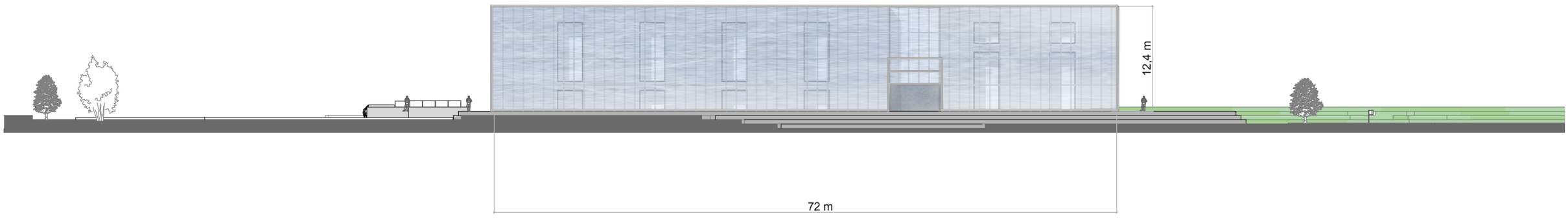


North - South

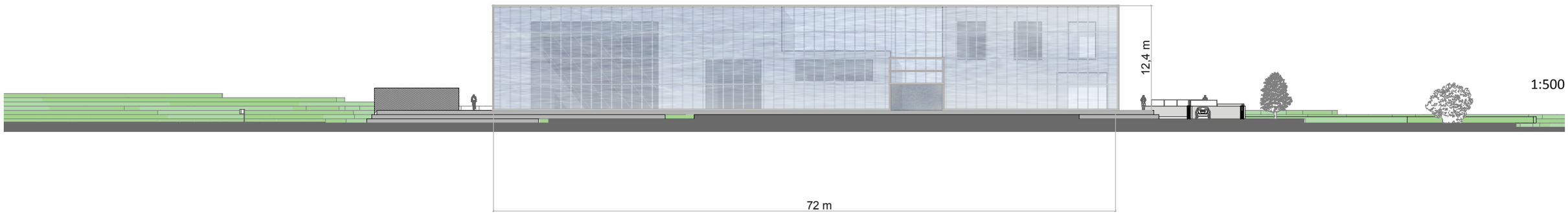
Section

1:500

North - South Section
1:500

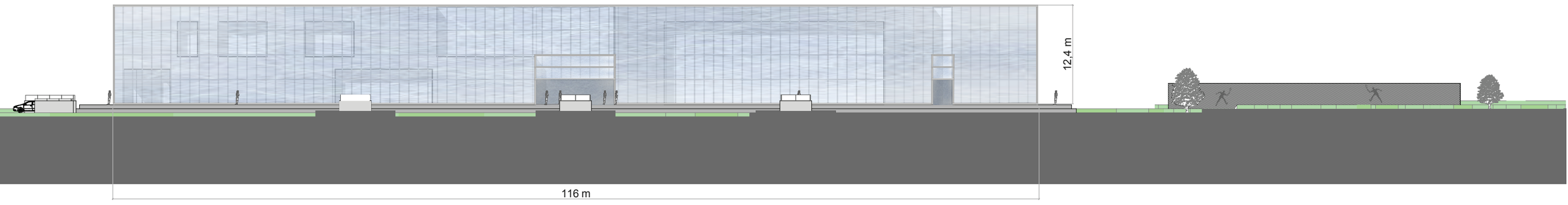


North Elevation



South Elevation 1:500

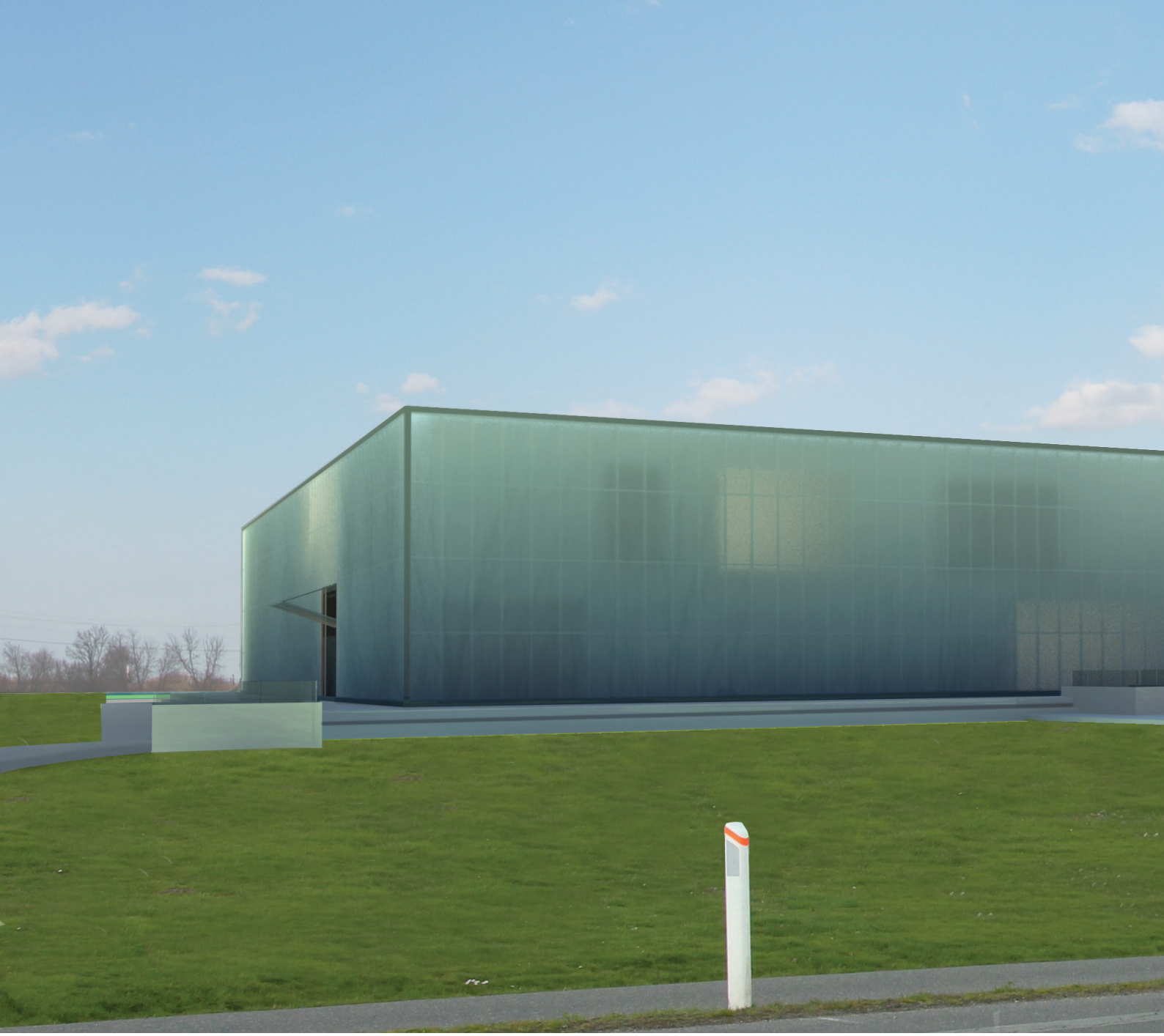
North and South Elevations
1:500



East Elevation 1:500

West Elevation 1:500

East and West Elevations
1:500



Exterior Visualization

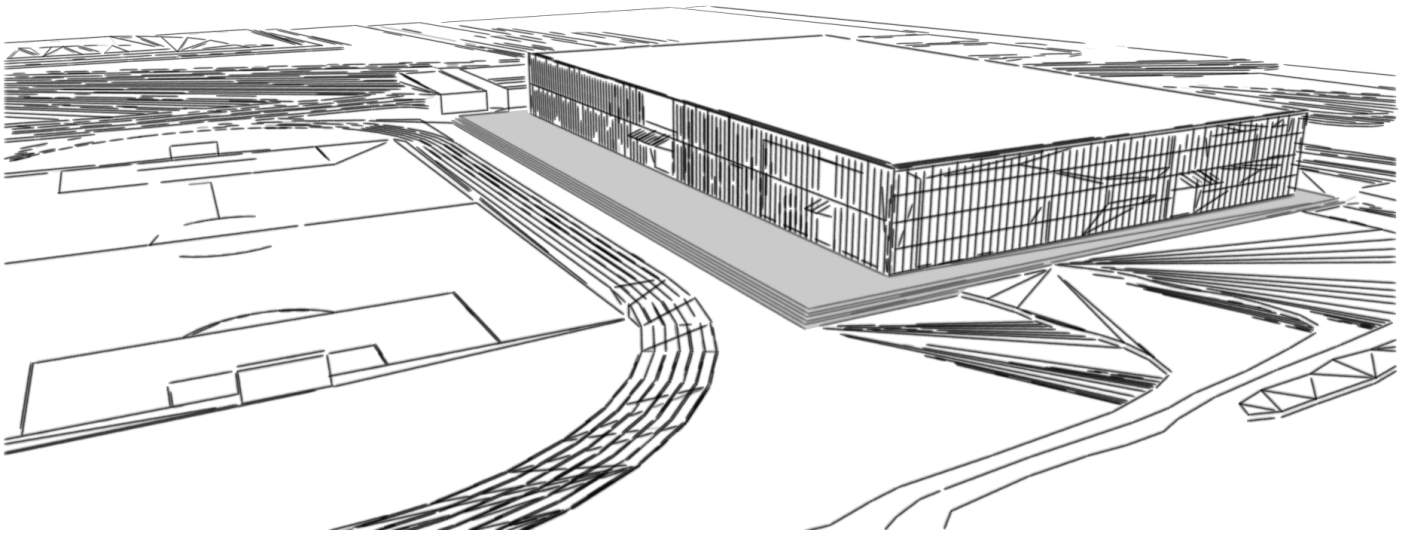
The Jetsmark Center is very distinctive from the road. During the daytime and especially in the light days the facade is very monotonic making the building become an iconic object that becomes the identity of the area. The plateau and the simple surrounding landscape makes the building stand out and it enhances its character. Because of the polycarbonate building shell that objectifies the building it stands out as one unit that collects different functions and by that also collects the diverse people using the Jetsmark Center.

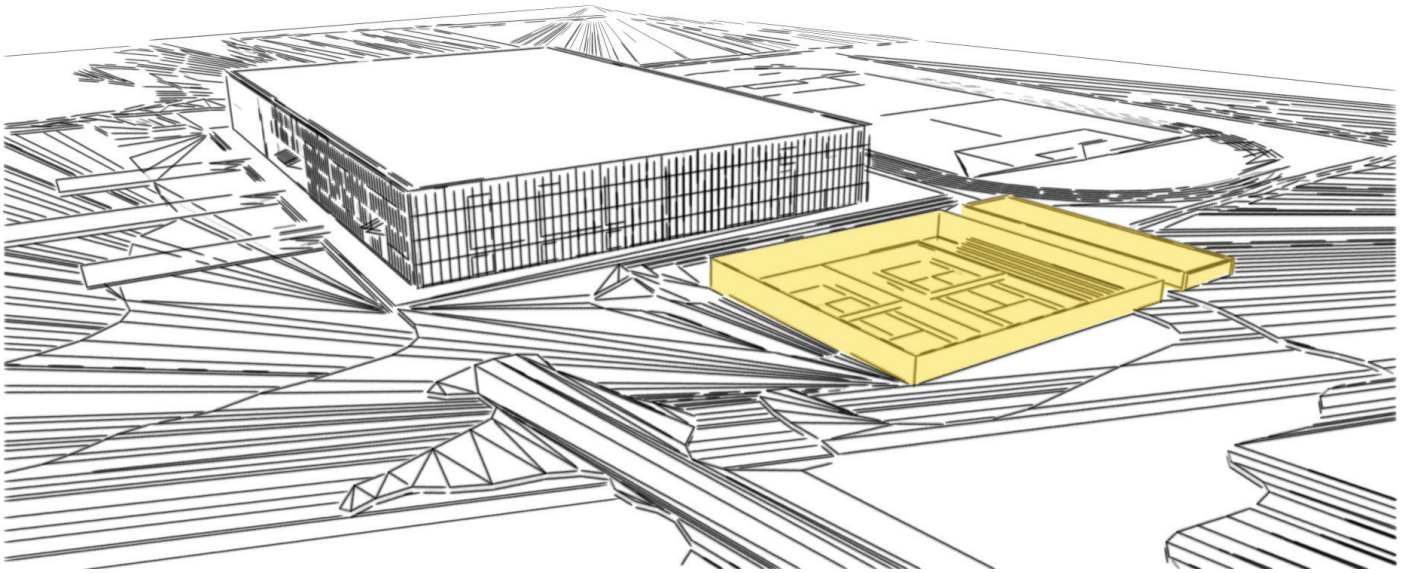
When it becomes dark the light that shines out of the active functions will become more dominant and change the character of the building drastically. Light cables placed in the bottom of the box and the top will define the boxes edges with changing colors which will make the facades even more dynamic over time. In the winter time the edges can be lit up with a blue color making the box stand out as a distinctive icecube. In the autumn the color of the edges can be red and blend in with the strong colors of the defoliation.

The Exterior

The Jetsmark center shown from the south west side. Because of the height difference in the landscape the plateau contains more steps at the west side.These steps follow the length of the stadium which makes the steps useful as stadium seats.
The plateau is extended towards the stadium which defines a staying area in the evening sun and in relation to the café and restaurant. The café and the restaurant can be opened up to the plateau in gives the plateau an even stronger function of being a staying area because tables and chairs then can be moved directly out.

On the north side of the site the tennis fields are placed and right next to them a small building block are placed. Together they form a rectangular form that partially dug into the landscape. The building block is are logistically placed in connection to the football training fields, the running path and the tennis area and are a ball and tool shed for these outdoor activities.





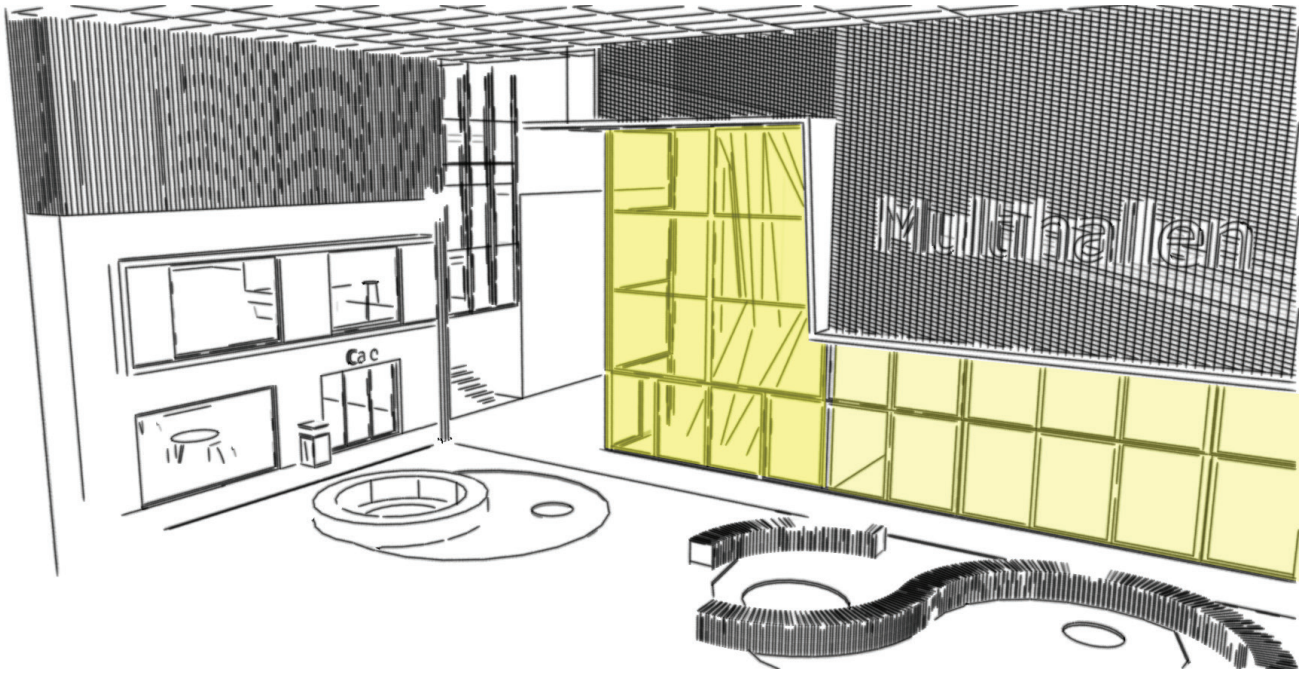
Square Visualization

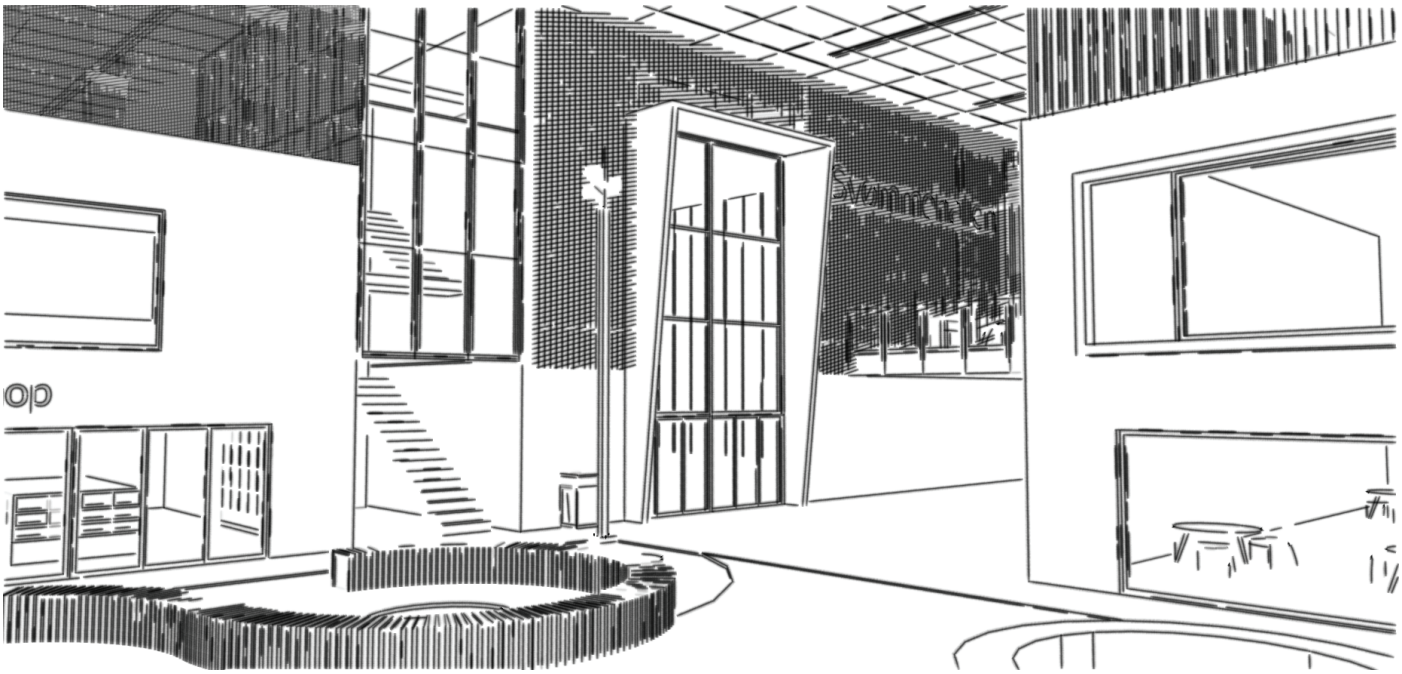
The square will have a crucially important role in the new Jetsmark Centre. For the whole building to work successfully according to the intention of mixing function types and concentrating life in one place, the square must be successful.
Nordkraft has been the main source of inspiration for the square and the desire is to achieve the same kind of flexibility (see appendix xx). The square has been developed on this ground, which has lead to the idea of easily removable furniture and to the refrain from designing any fixed element that could stand in the way for the desired simplicity.

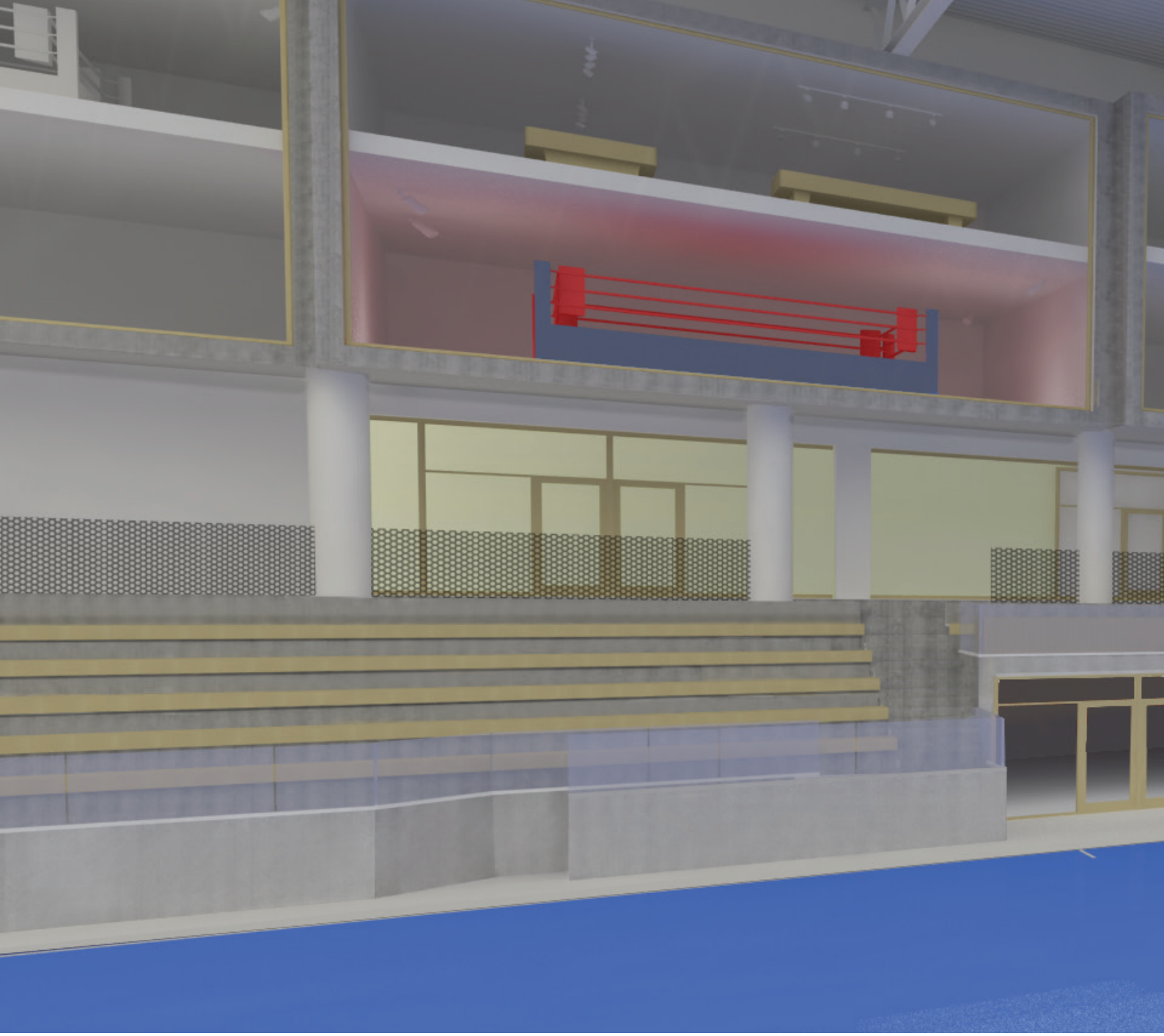
The idea for the atmosphere of the square is to create a covered out door space that is sheltered from the rain and wind. The atmosphere of the ‘outdoors’ is gained by the use of hard materials; white concrete walls, galvanized steel, perforated panels, polycarbonate panel roofing, stone tiles, polished concrete floors etc. Wood and colored benches have been implemented to add warmth to the otherwise hard and clean space. The street light have the same appearence as outdoor street light, which adds to the feeling of being outdoors inside the square.

The Square

The overall architectural idea has been to use simple measures to increase the quality of the square. The pavement outlines a clear distinction between the surrounding transition area and the staying area in the middle of the square. This distinction is enhanced by the street lights and garbage cans that trigger a connection to our perception of the streets outside, where everyone naturally walk on the walkways laid out for us.
The stairboxes centralize the square even further as they are all connected to the three corners of the square. The flow in and between the boxes will be easy to read as the stair will have clear indication of the functions on the upper floors through clever and visible signing in the stairbox.
As previously mentioned the clubs have a more private character with their own entrance, but the intention has been to expose the clubs in order to make them appear open and availiable for everyone without a doubt. This is achieved by the connection between the multi hall and the clubs, because the multihall has a window band along the entire first floor that creates a god view into the hall and past them the clubs boxes.
The window band continues to the corner of the multihall where the height of the windows increase greatly to reveal a climbing wall that extends down to the training hall below the square. The entrance to the swimming hall is detailed in a similar way with a concrete band marking the entrance in a simple way.
The open outdoor functions on the top floors have a very good influence to the atmosphere of the square, since the activity performed there will always be visible and maybe a little audiable when in use.
All in all a mixture of visibility between all the functions and the square has been the key.


Multihallen

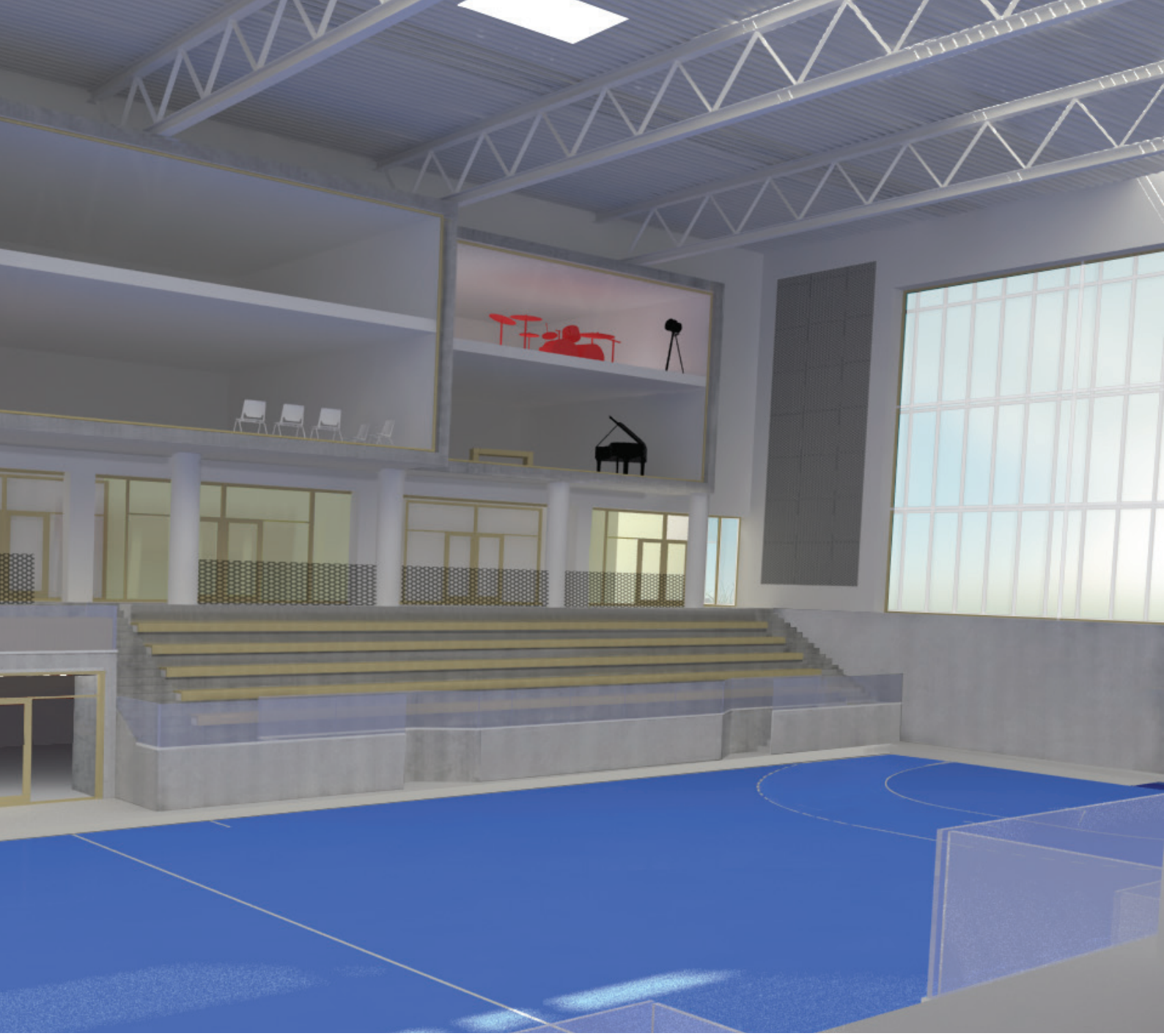




Hall Visualization

In the Jetsmark center the multi hall is the largest room and is a place that can contain different kinds of events in a relatively large scale. The hall contains 630 seatings and a standing area for approximately 100 people.

The rough materials in the form of steel sheets and concrete as well as the visible web beams makes the experience of the hall very raw and industrial in its character.

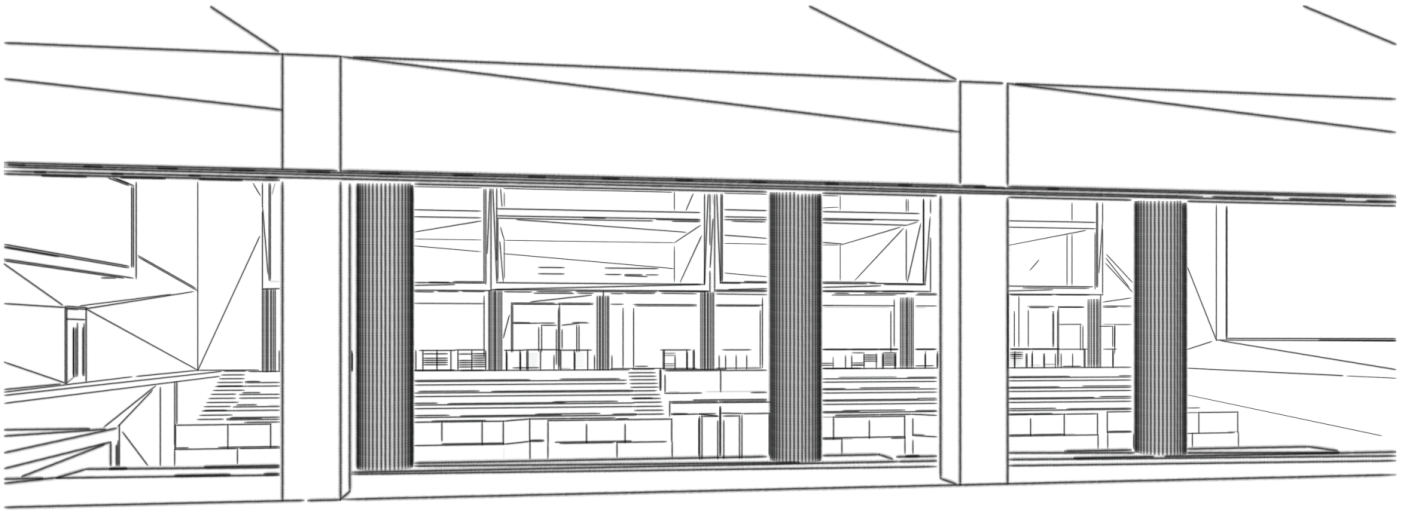


The tribune is distanced from the field which makes the events, whether its a football tournament for kids or a concert, as a spectator experience rather than the feeling of watching a training session.

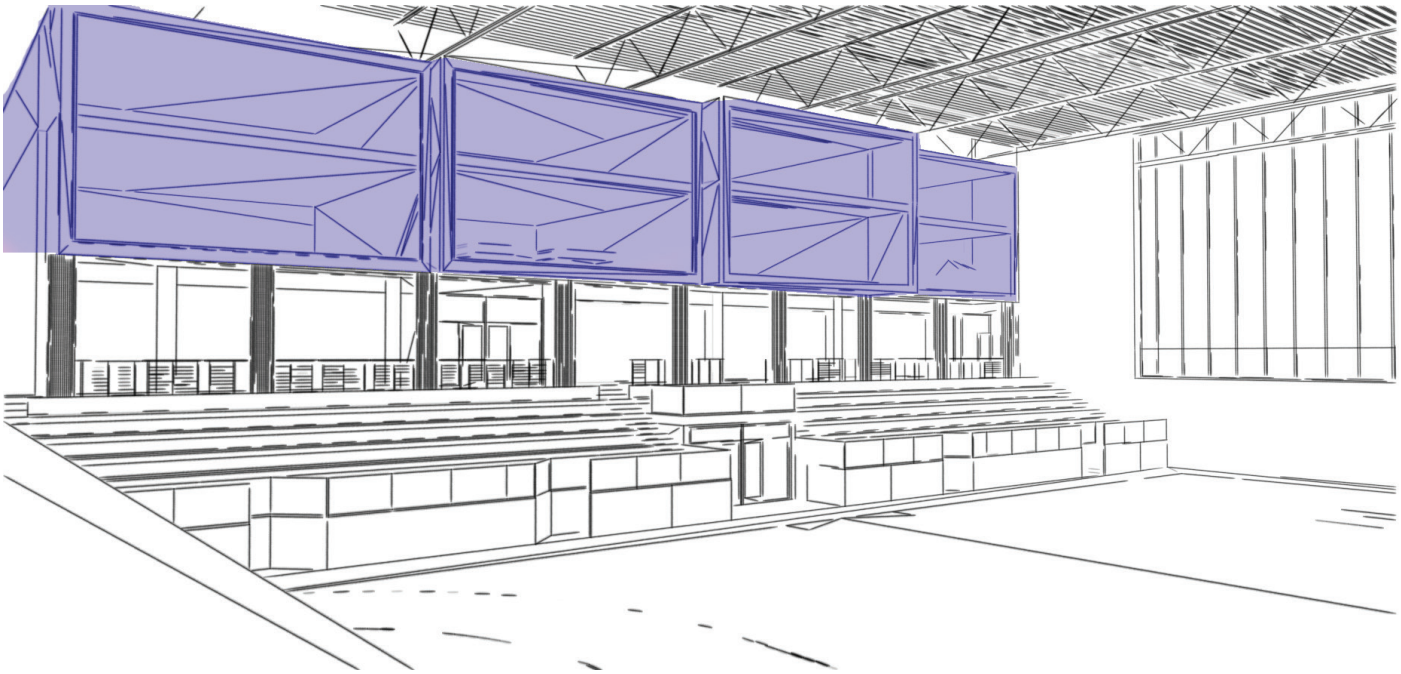
The Hall

From the square the multi hall is unrevealed to some extend. The main focal point becomes the walking area at the other side of the field and the clubs as well.
Because of its unrevealing character from the square visitors become curious of what they can not see and are therefor being dragged into the hall.

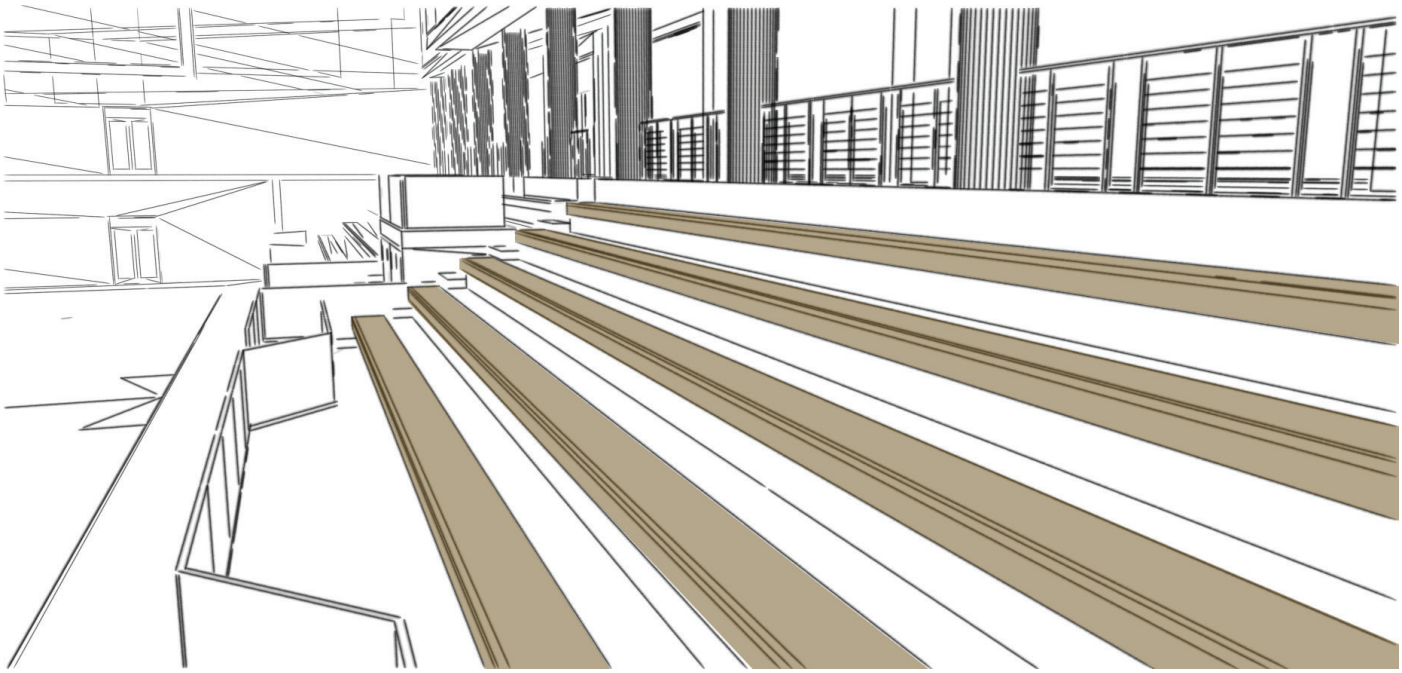
When stepping into the hall you get a wow experience because of the large dimensions of the hall along with the rough and industrial structure.
At the end facade a giant semi transparent window is supplying the room with daylight and the partially revealed steel net holding the polycarbonate are triggering the curiousity.
In the diverse boxes the club life is taking place. It is a demand that the clubs have privacy to some extend, but at the same time it is important to invite people into the club life. Often club life is a closed country to the public but if a visual connection is present people maybe want to be a member of some of clubs.
The privacy that the clubs need is primarily in relation to the sound, but the visual publicity often is not a problem.
The eight boxes contain boxing, pool hall, dance and music.



This illustration shows the window openings in the hall. The dark blue wall and roof surfaces are polycarbonate with a light transmittance level at 50%. The light blue surfaces is normal glas with a light transmittance level at 78%.

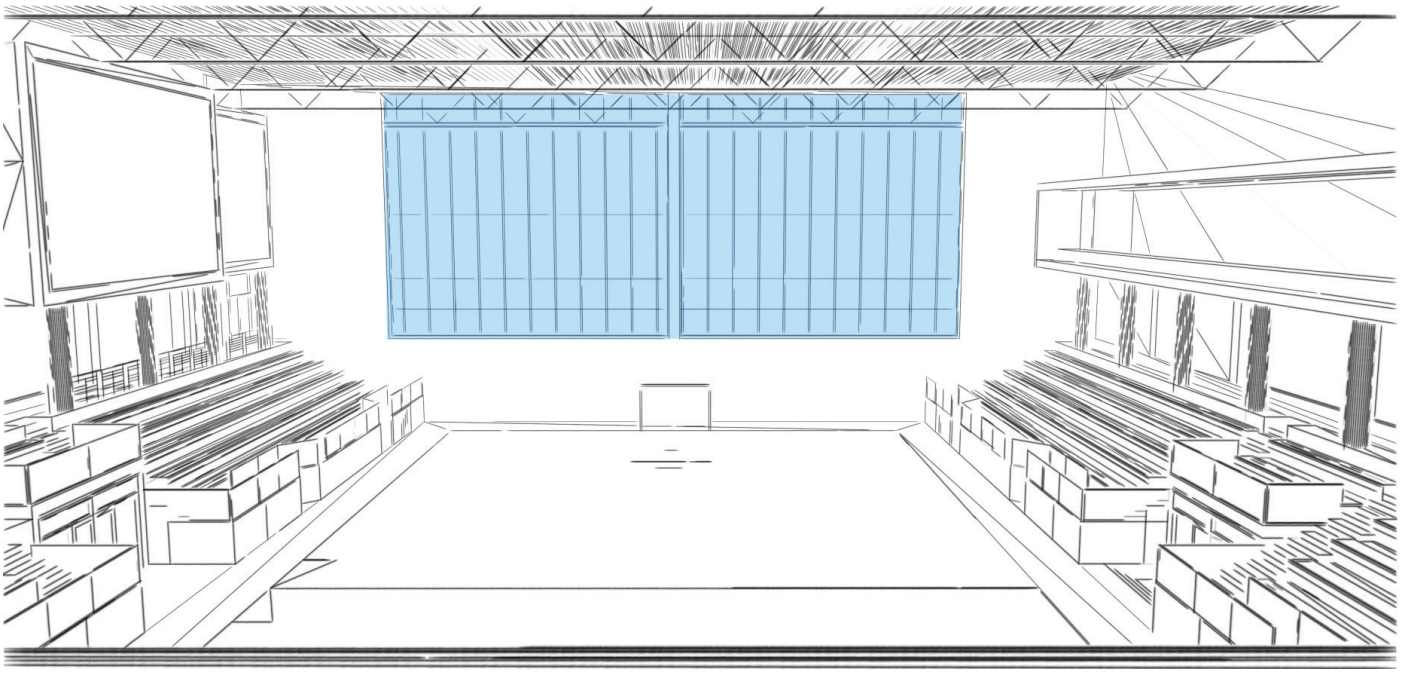


This illustration shows the window openings in the hall. The dark blue wall and roof surfaces are polycarbonate with a light transmittance level at 50%. The light blue surfaces is normal glas with a light transmittance level at 78%.

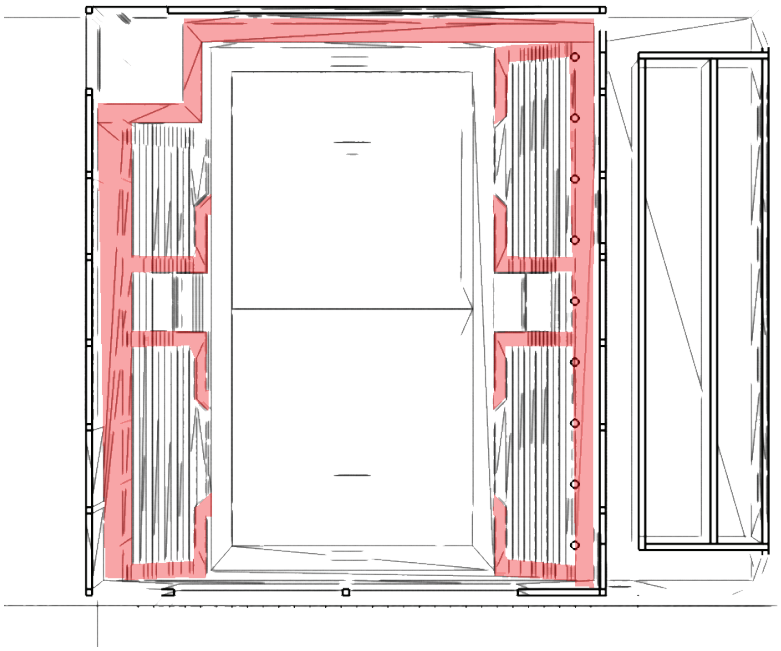


Seating elements that are in a large contrast to the concrete tribune.

Under the tribune changing rooms for the multihal and the training hall are being placed.



View from the library where the giant glass facade is in focus.



The transit area of the hall here marked with red. It is possible to go all away around the hall without entering the field.

Reflection

Now that the design has finished reflections have been made of the project.
This project has much of the time been an enjoyment, because the project in a way becomes very real to me because of my close relation to the current Jetsmark center and the towns next to it. However, looking back at the design process it is very clear that the project was to large for me. The plan solutions, the logistics etc. took up too much time which made it hard to get in depth with the project. That could have been resolved in one of two ways. Either I could have been more clear and very strict about which kind of areas I would focus on and be a bit more superficial in the remaining parts. The second possibility was to make a project with a smaller room program and a more low-scale vision.
Programs as be10, ecothect, daylight visualizer etc are often being used as result based programs. In order to use these programs as powerfull tools for me they should have been used as integated designing tools. By using the programs in that perspective you can gain more understanding of technical aspects and the specific solutions in the building will become more whole.
An experience I gained when analyzing the current Jetsmark Center is that it is very important to make a building that easily can evolve. The current center has been made in steps but the oldest part was formed in a way where it is not easy to implement new functions or to change old ones.
In general I am very pleased with the concept of the project. However, in order for it to work properly a quite big aspect is how the signposting relating to the functions as for instance the supermarket is designed. If having more time this would be an aspect that needed to be focused on.

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[ill. 01, 32, 130]: Front page and Backpage, http://www.coralind.com/choices/
[ill. 02]: http://medicine.uams.edu/faculty/current-faculty/faculty-wellness-program/social-wellness/
[ill. 03]: http://pallisgaard.dk/referencer/nordkraft/
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[ill.41-43]: http://www.dac.dk/da/dac-life/copenhagen-x-galleri/cases/green-lighthouse/
[ill.44]: http://www.kingscross.co.uk/press-release-2012-06-06 (2014)
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[ill.46]: https://www.flickr.com/photos/konstantinbinder/7839993672/
[ill.47]: http://www.tripadvisor.dk/LocationPhotoDirectLink-g189529-d4243470-i72840480-Azzurra_Nordkraft-Aalborg_Aalborg_Municipality_North_Jutland_Jutland.html
[ill.48]: http://www.londondateguide.com/tag/granary-square/
[ill.49]: http://www.kulturformidleren.dk/ordkraft-1804/

APPENDIX - Function Organisation

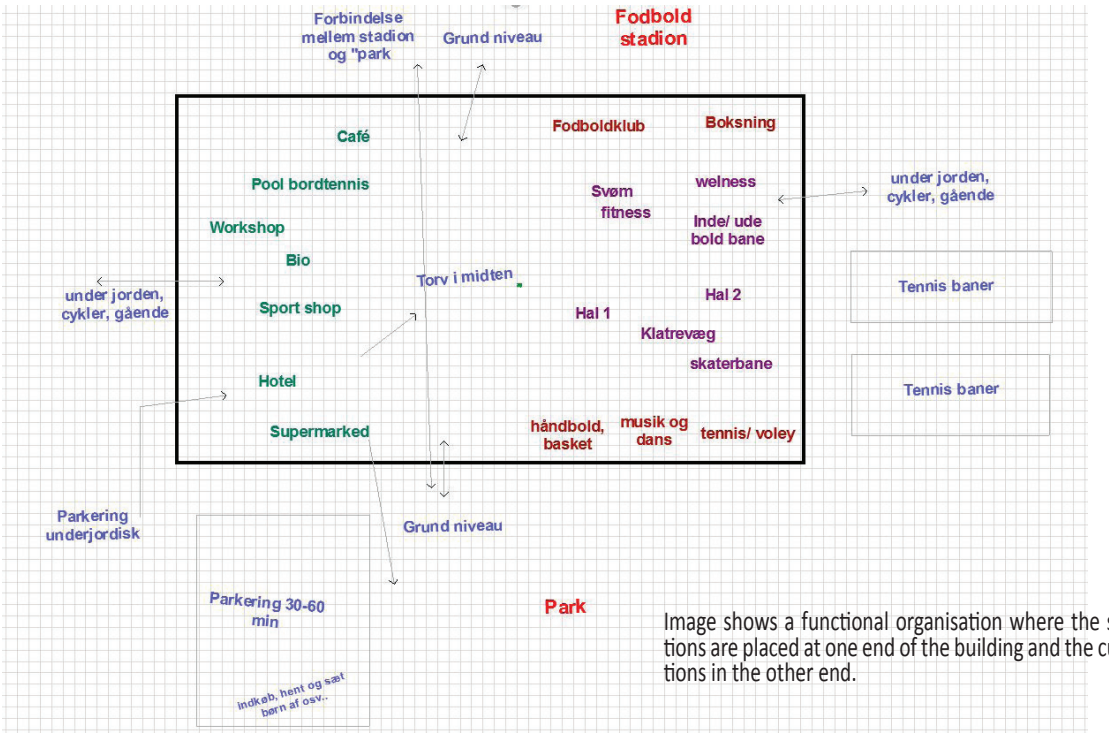


Image shows a functional organisation where the sports functions are placed at one end of the building and the cultural functions in the other end.

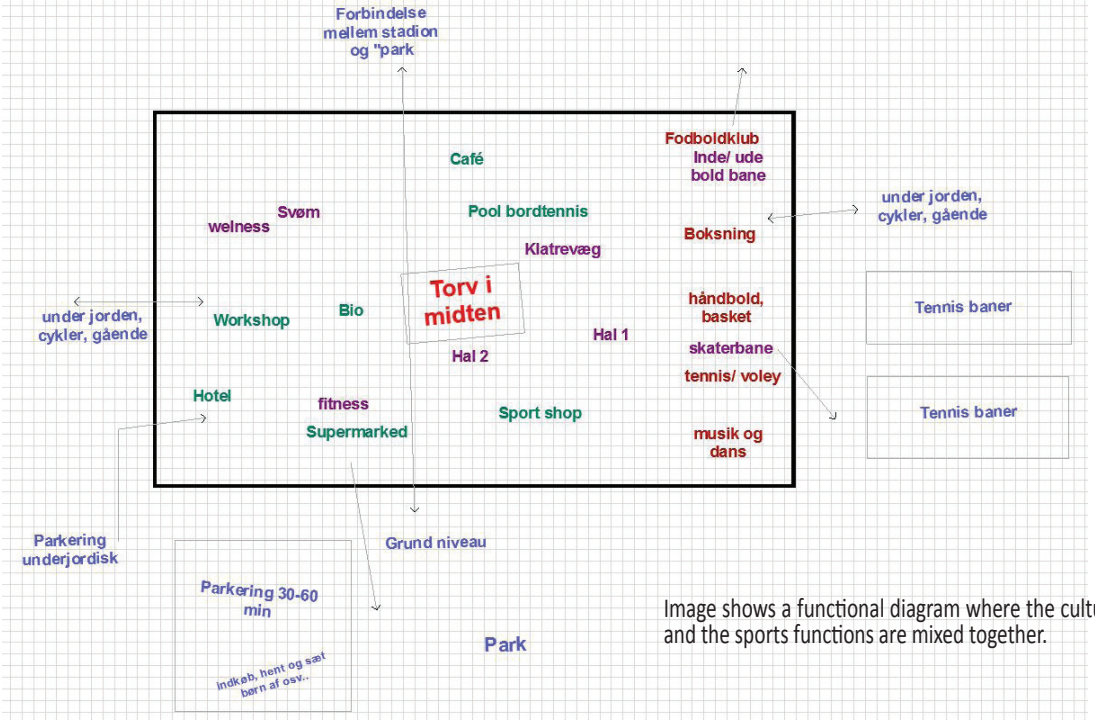
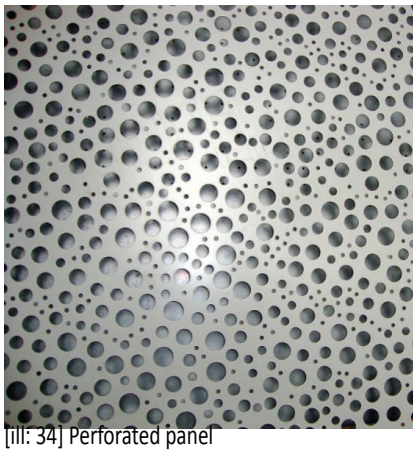


Image shows a functional diagram where the cultural functions and the sports functions are mixed together.

APPENDIX - Material Concept

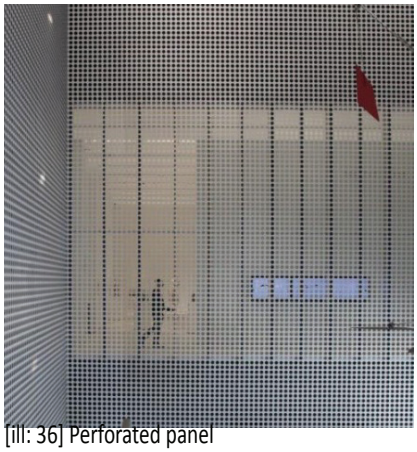
[ill: 32] Polycarbonate panel

[ill: 33] White painted concrete



[ill: 34] Perforated panel

[ill: 35] Rough concrete



[ill: 36] Perforated panel

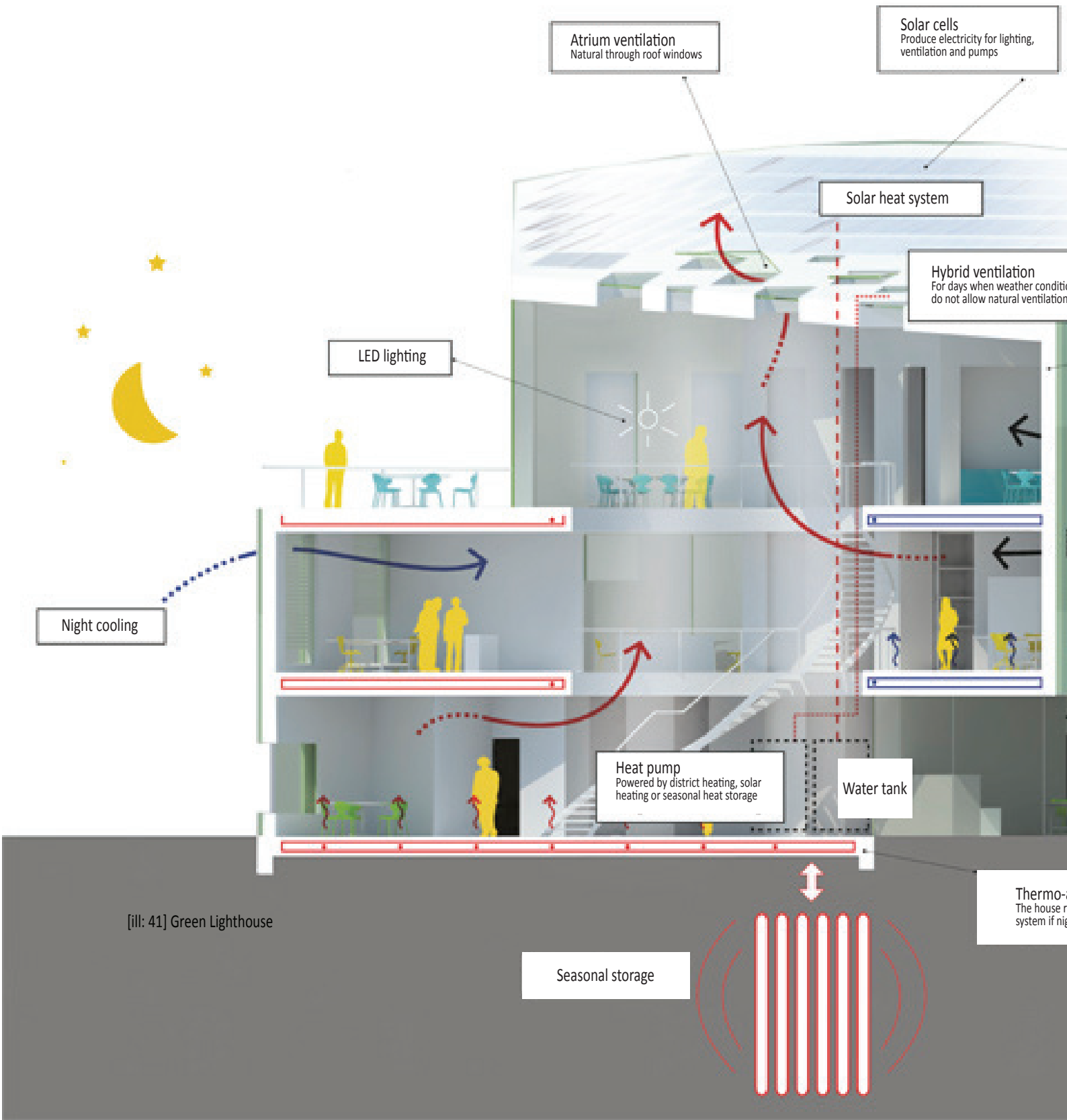
[ill: 37] Dynamic inprints on perforated panels

[ill: 38] Stone tiles

[ill: 39] Wood panel

[ill: 40] Galvanized steel

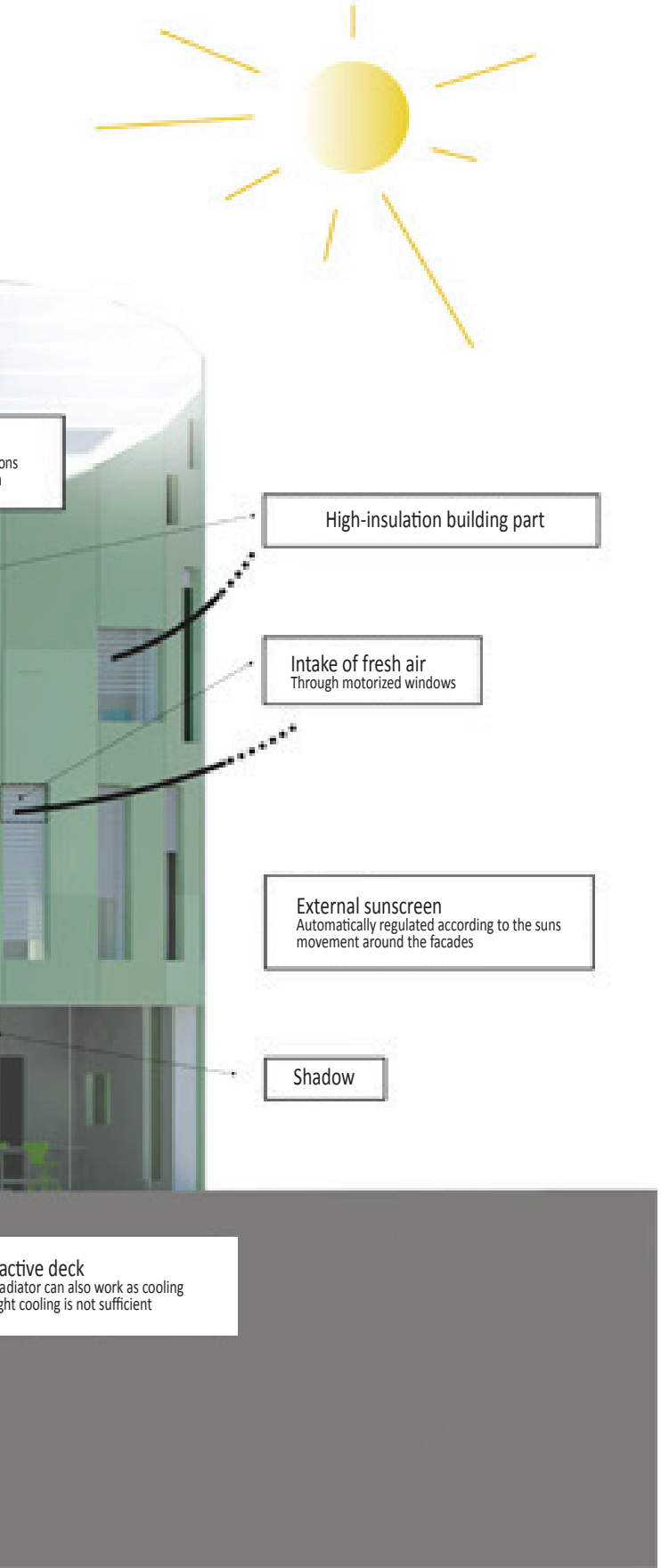
APPENDIX - Integrated Design

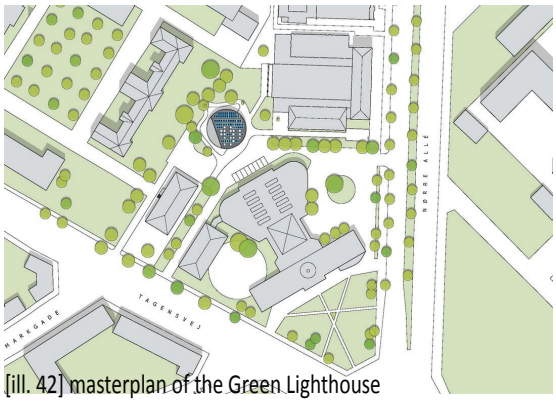


[ill: 41] Green Lighthouse

GREEN LIGHTHOUSE
by Christensen & Co. Architects

Green Lighthouse is Denmark's first public CO2 neutral building.



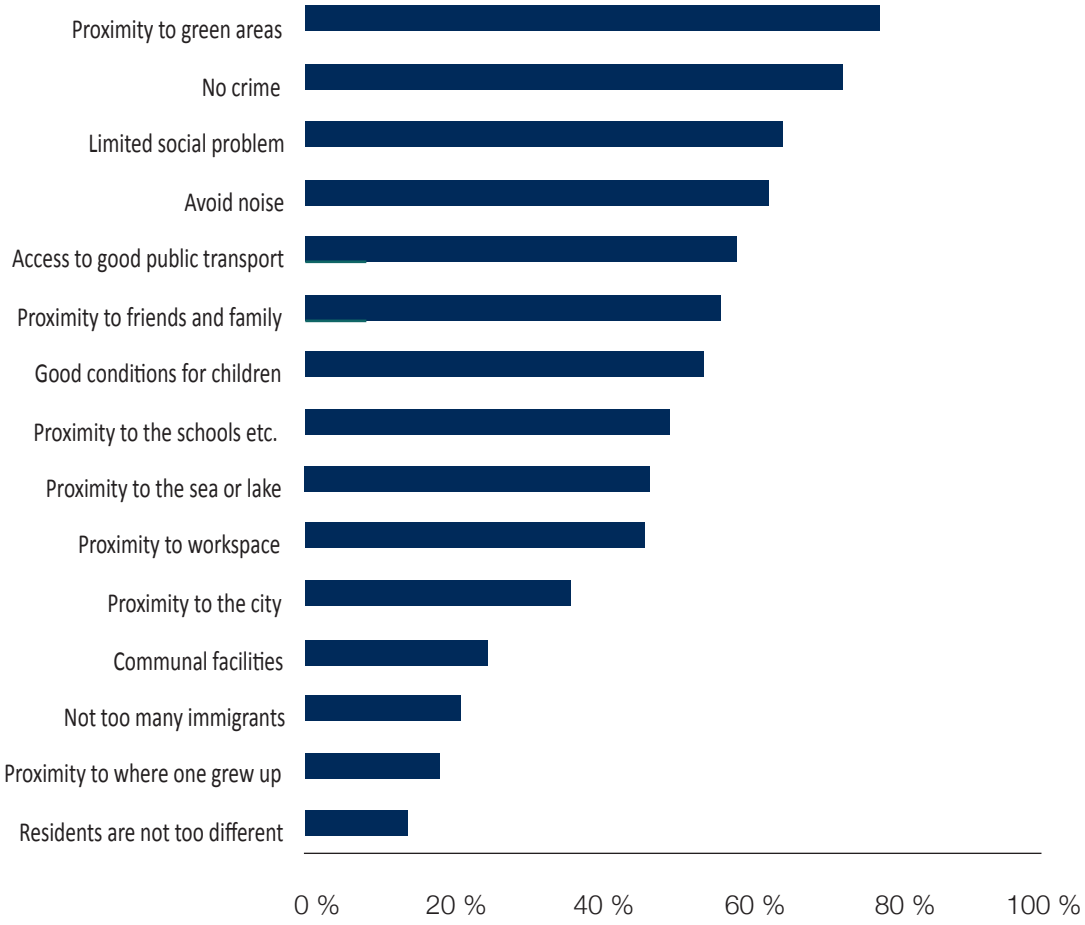


[ill. 42] masterplan of the Green Lighthouse

[ill. 43] Image of the interior with flowing daylight from above

APPENDIX - Living Preferences

Danish preferences [Andersen, 2011]



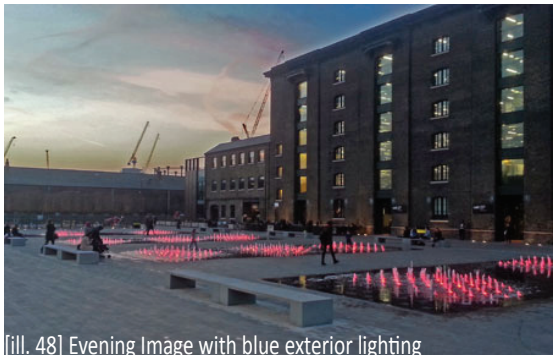
APPENDIX - Case Studies

GRANARY SQUARE
by Townsend Landscape Architects

The surroundings of the Granary square has a lot of industrial history similar to Nordkraft. During a studytrip to London a stop was made at this location and the experience with the play of water was very enlifting and memorable. The integrated installment of the water can be turned of gives the space the flexibility to be used for different events.

[ill. 44] Evening Image with blue exterior lighting

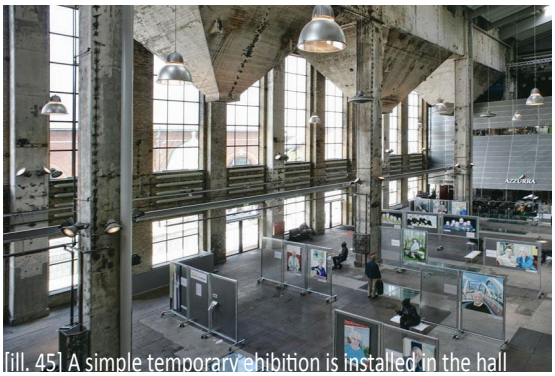
[ill. 46] Evening Image with blue exterior lighting



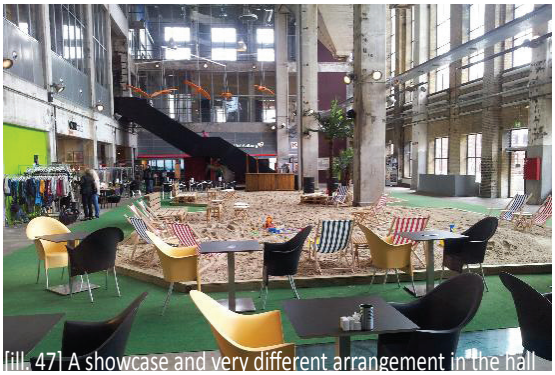
[ill. 48] Evening Image with blue exterior lighting

NORD KRAFT
by Cubo Architects

The three illustrations show the flexibility in the high ceilinged entry hall. By keeping the large space flat and empty creates very good conditions to be creative and give the space a diverse program. The emptiness of the room seems to also have a positive effect on the industrial architectural detail giving an appearence of simplicity and elegance.



[ill. 45] A simple temporary ehibition is installed in the hall



[ill. 47] A showcase and very different arrangement in the hall

[ill. 49] Public Lecture being held in the entry hall