

Prosess



Strategy 1: narrow and long volume permits daylight from two sides in the hall and provide symmetric light conditions

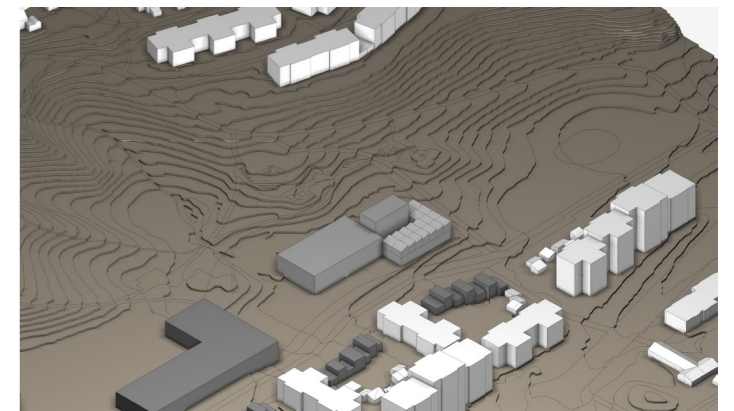
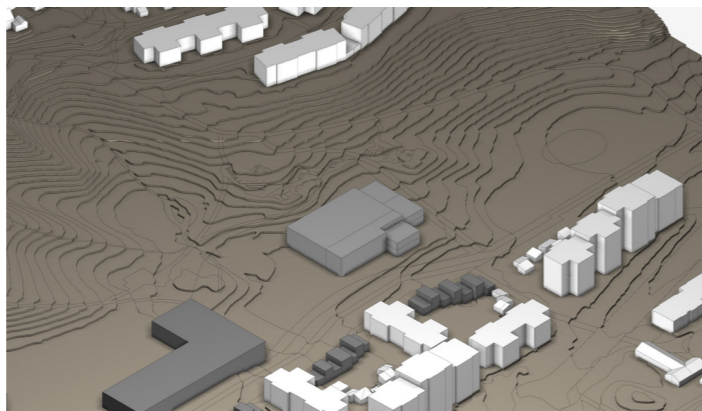
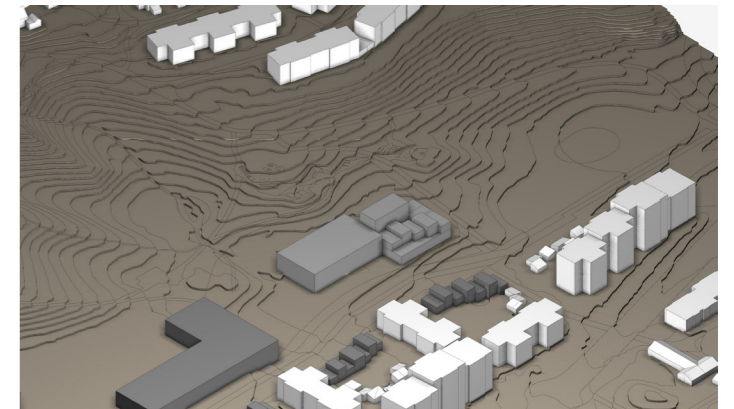
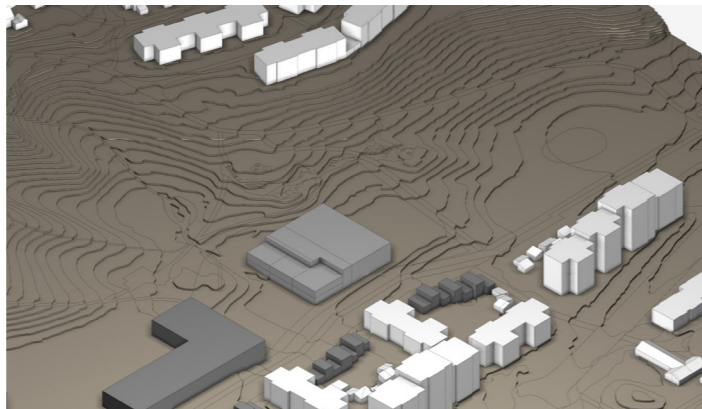
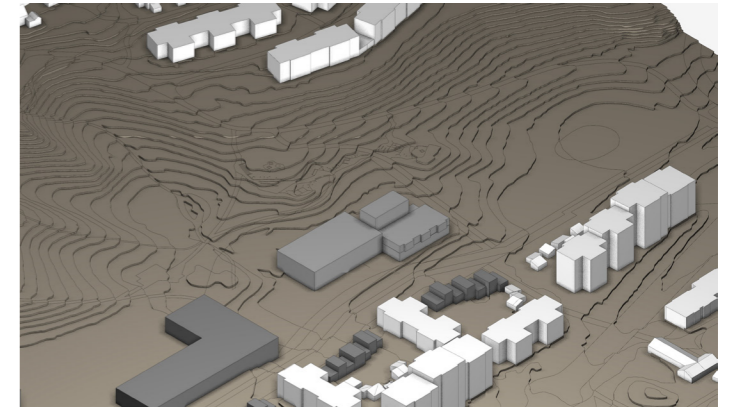
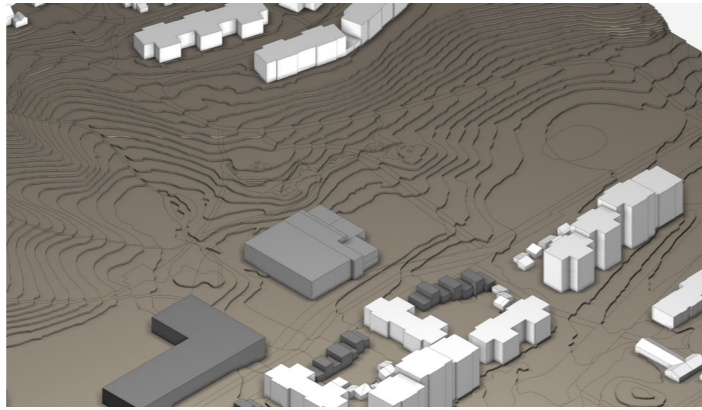
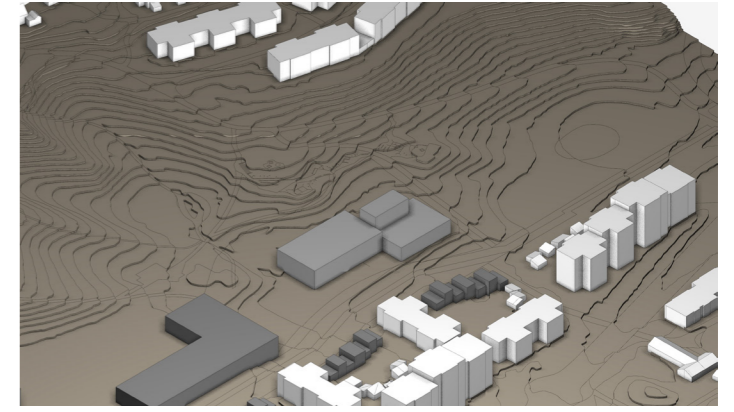
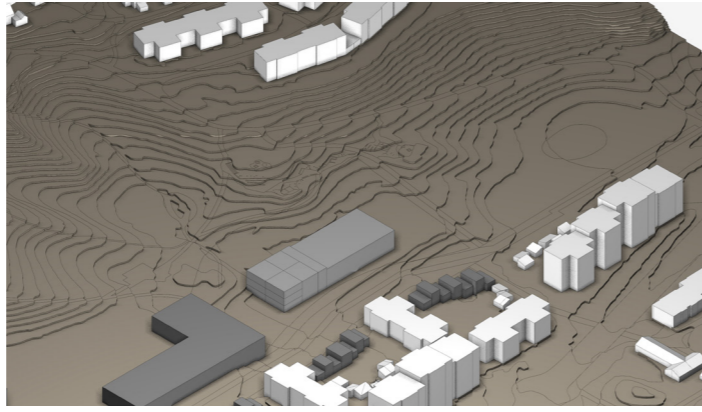


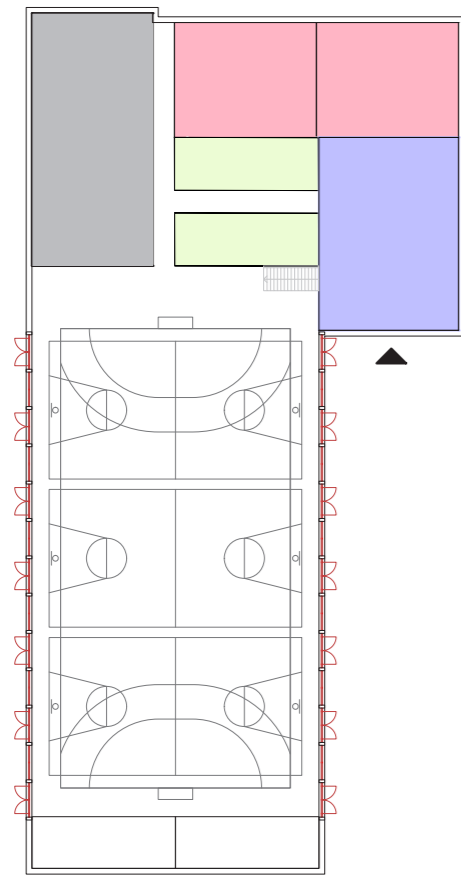
Strategy 2: A compressed and wide volume limit the use of perimeter walls as light source.

Ved å legge tilhørende program for hallomet for kortenden av hallen kan hallen få en trossigthed som gjør at den henvender seg både til parken og Furustien.

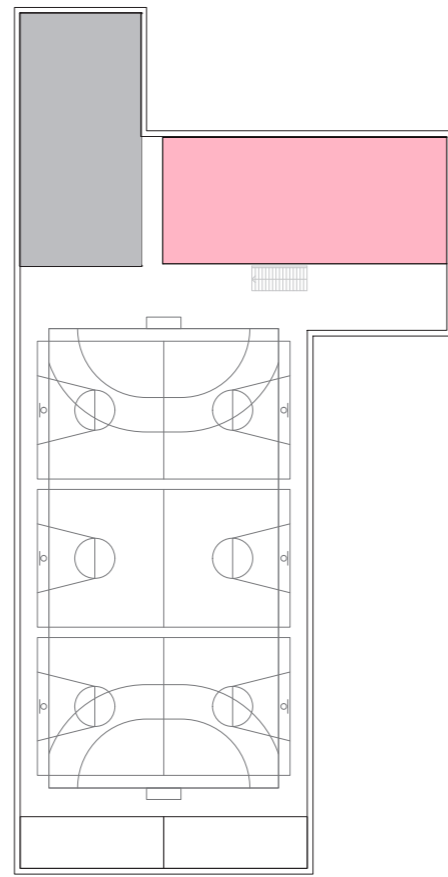
Sørvendt orientering av tilhørende program med mindre saler og inngang:
Positivt - inngang nærme nye verdensparken skole.
Negativt - varmebelastning i sørvendt lys og direkte sollys som må stenges ute i kjernetiden.

Nordvendt orientering:
Positivt: Hallene kan ta inn dagslys fra to-3 fasader, med hovedvekt mot nord. Inngangen havner nærmere tverrgående akse mot nye gran skole.
Negativt: Inngangen er lenger fra verdensparken skole.





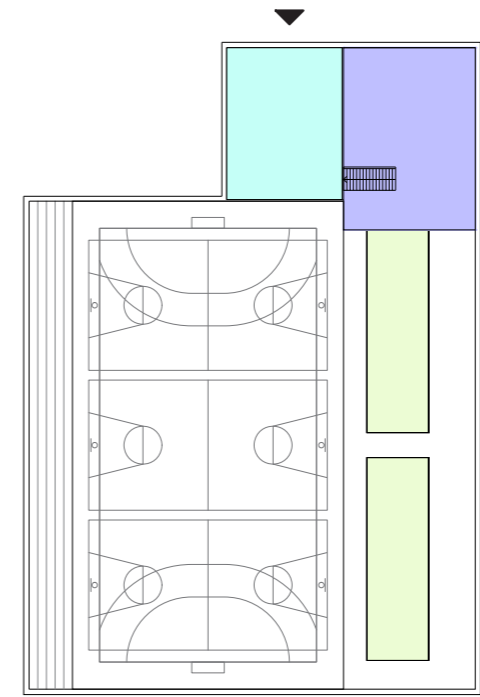
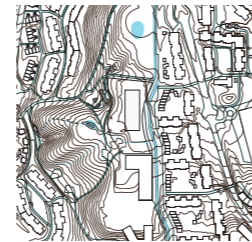
1 etg.



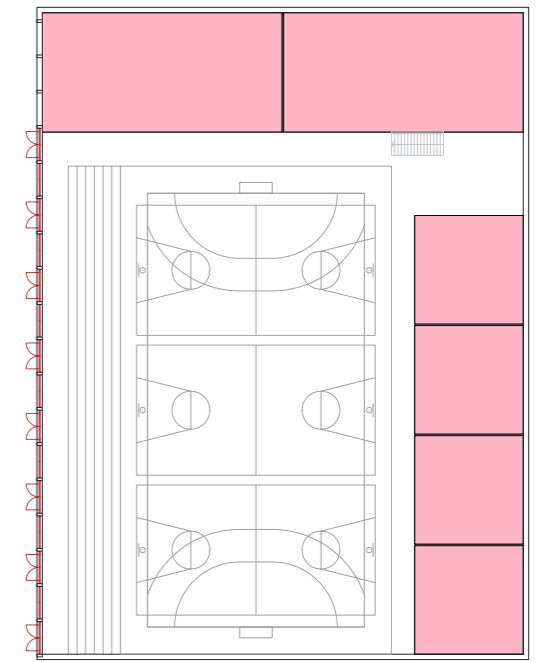
2 etg.

Smal plan

- Garderobe
- Lager
- Inngang
- Dans og kampsport
- Klatrevegg 14m



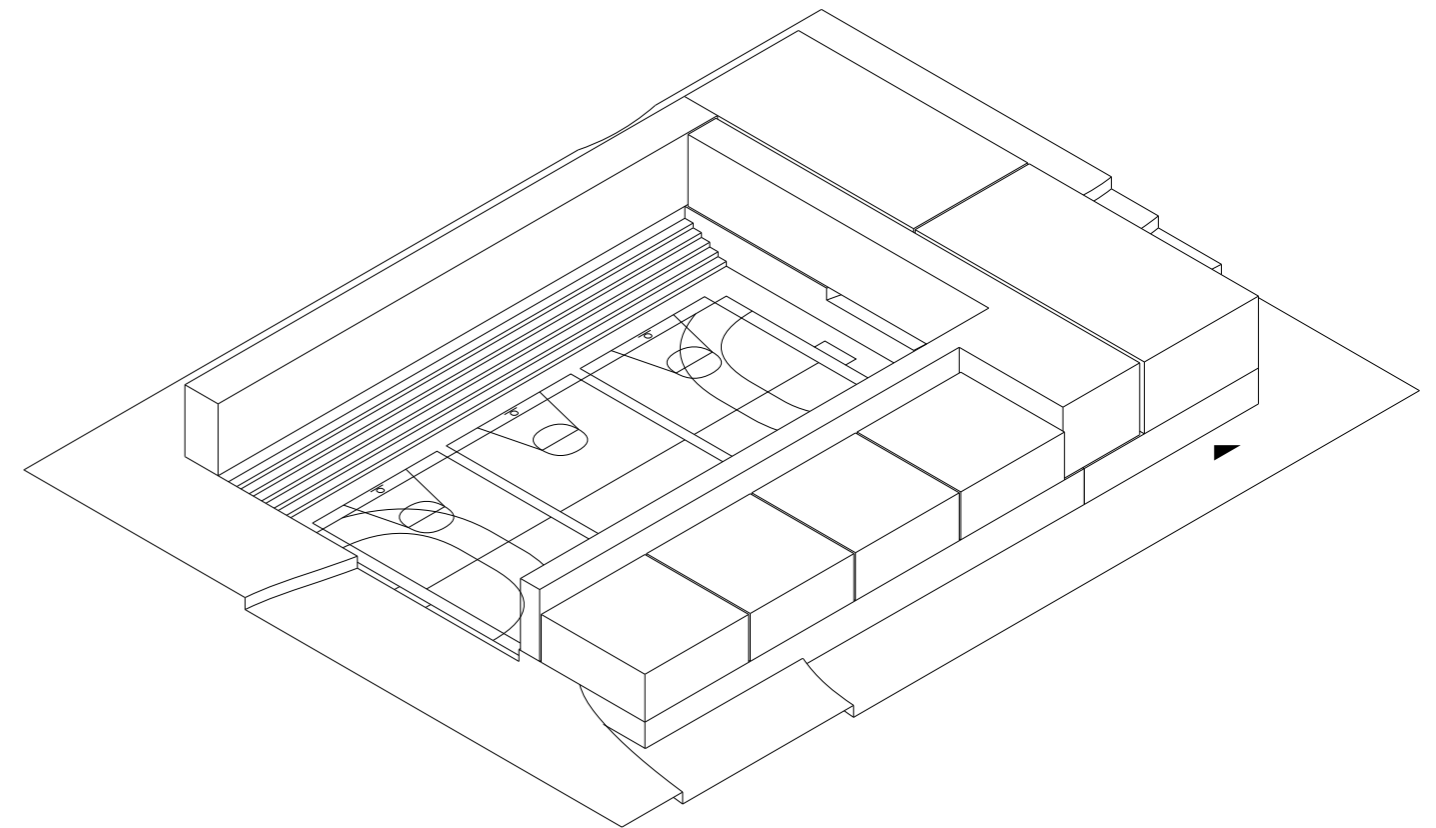
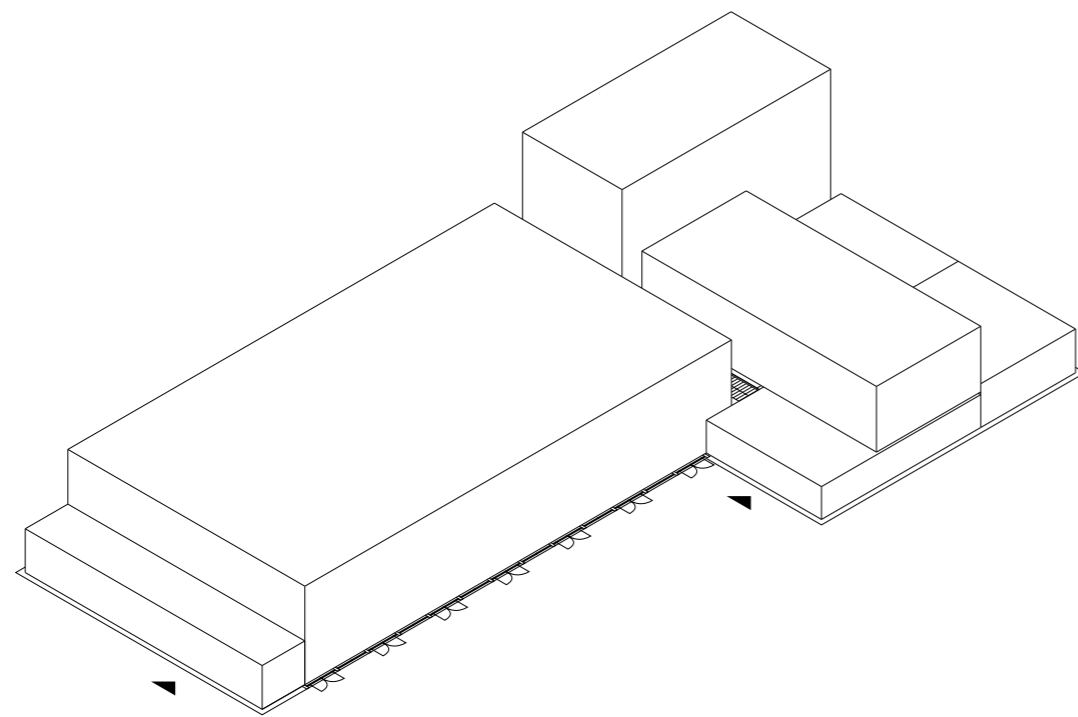
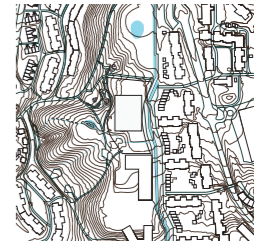
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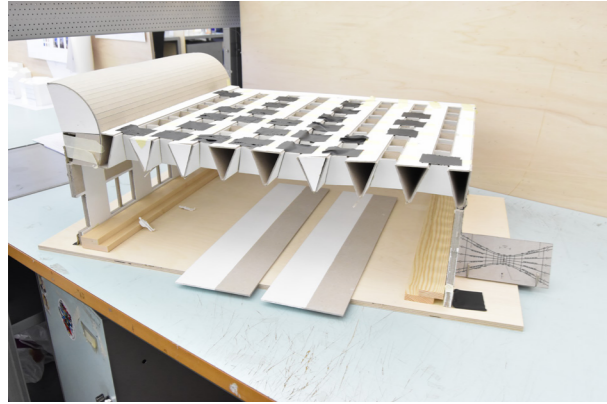
2 etg.

Bred plan

- Garderobe
- Lager
- Inngang
- Dans og kampsport



Model light study #1



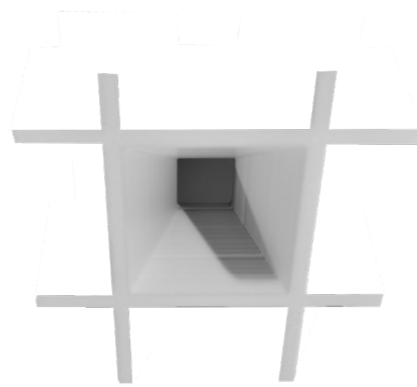
Cassette ceiling with sun scoop on one wall.
Model scale 1:50

Camera settings:

Shutter speed: 1/80
Aperature: F11
ISO: 320
HDR: Normal
White balance: Direct sunlight
Camera lens: Nikkor 12-24

Light conditions:

Outdoor photosession - clear blue sky.
Sunlight hitting the west oriented facade.



Asymmetrically shaped coffers restricts direct sunlight



a) Skylights



b) Sun scoop



c) Vertical window openings, sun scoop and skylights

North- south orientation
Time of day: 12:00
Date: 28th March

Show the importance of vertical windows that allow users contact with the outside.

Barn doors can open or close the vertical apertures depending on the sun conditions outside.

By placing a sun scoop so that it reflects the direct sunlight on to each of the walls facing the different cardinal directions, the space can be read as a sundial. Only that the sunlight from the sun scoops never enters the space in the form of direct sunlight. The intensity and variation can be read and expressed during the day and the seasons.

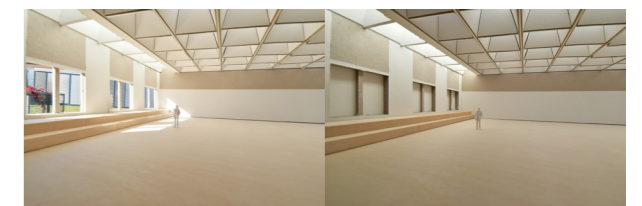
The sun scoop can also be reversed, but then emitting direct sunlight on to the interior walls. Walls could be shaped as reflectors to reflect the light more vertically. A test must be made.



a) No vertical windows



b) With vertical windows

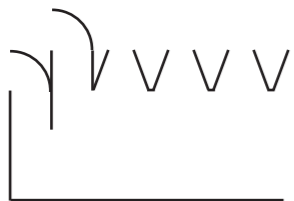


c) Barn doors can easily block out direct sunlight.

North- south orientation
Time of day: 12:00
Date: 28th March

Some quick reflections, based on the model photos, to see what it would take to differentiate between the play area and the surrounding periferi with the sunscoop effect.

Vertical load bearing would have been solved by letting the beams penetrate the sun scoops.



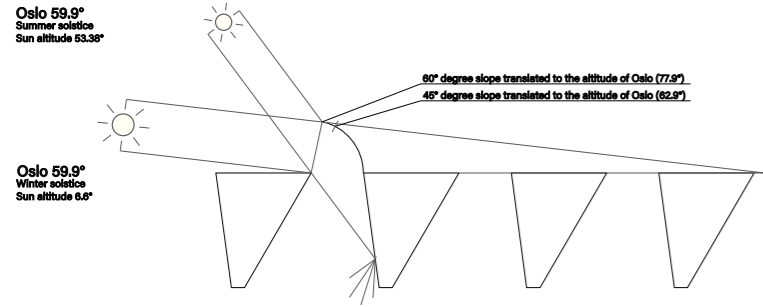
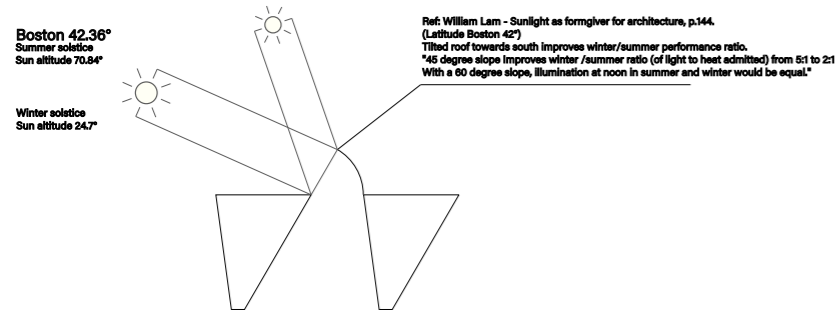
a) Semi recessed



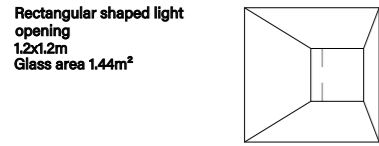
b) Recessed



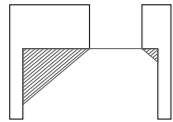
c) Recessed with vaulted ceiling



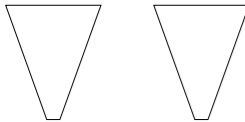
A disadvantage may be that the first monitor quickly will shadow the next



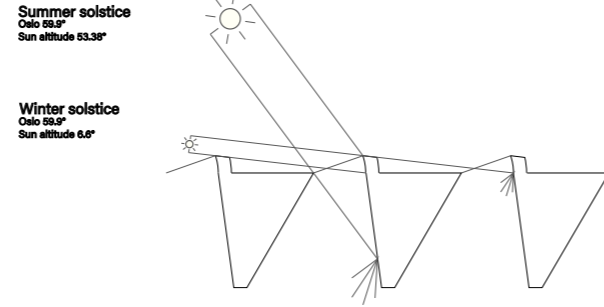
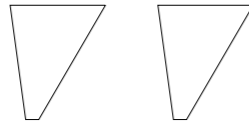
Coffer angles:
Skylights with little surface to see the light entering may be a source of glare



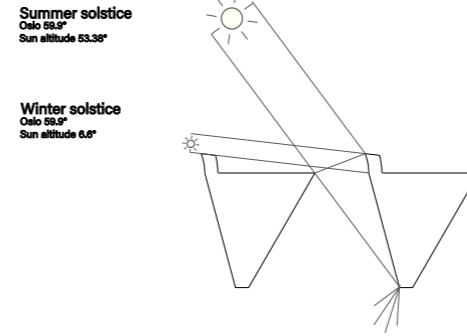
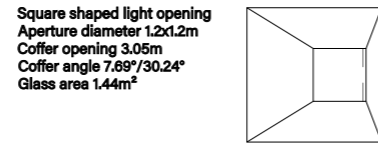
Coffered ceiling with angles - longitudinal direction:
Angled coffers reduce the prevents dark shadows in ceiling and reduce the risk of glare



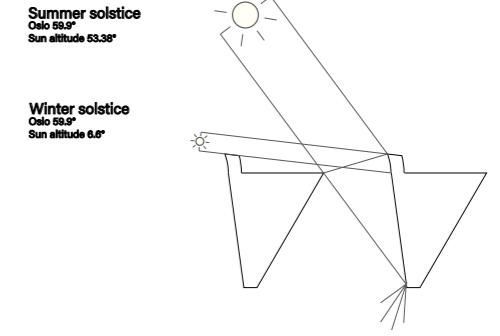
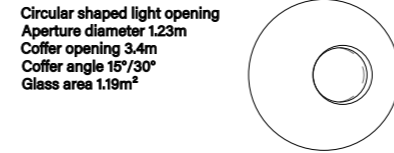
Coffered ceiling with angles - transverse direction:
Angles modified to function as cut off angles for direct sunlight



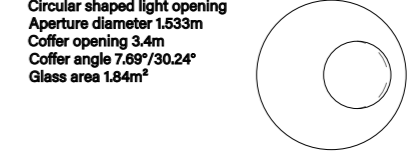
A square aperture does not use the full potential of the ceiling depth to cut off direct sunlight due to the square diagonal corners between coffer opening and aperture opening



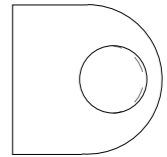
A rounded opening is easier to center and the coffer opening can be increased



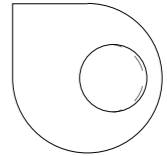
By rounding the north edge of the coffer opening and keeping with the previous angles, both the aperture and coffer opening can be increased



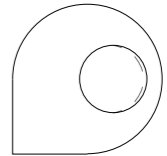
Sculptural coffer variation #2

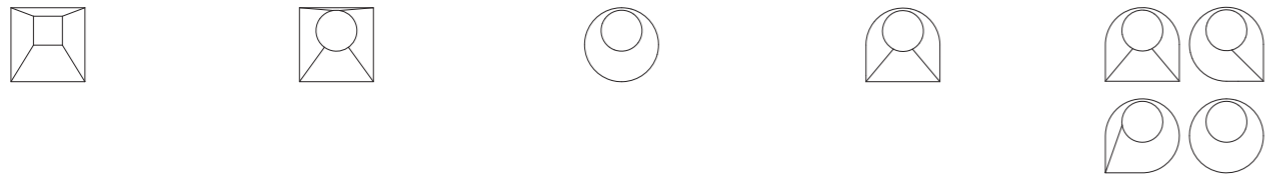
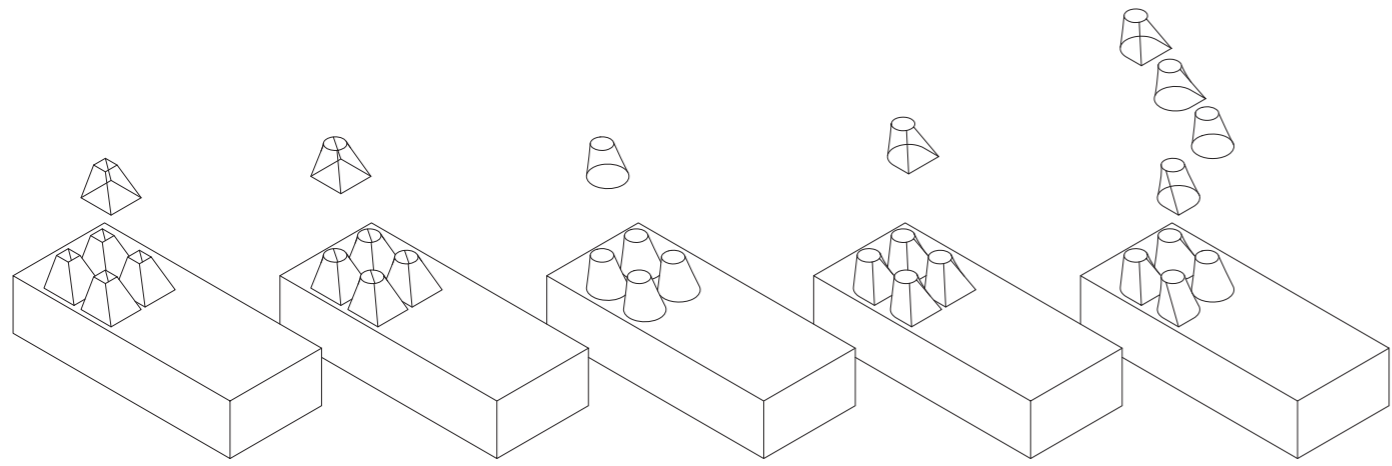




Sculptural coffer variation #3



Sculptural coffer variation #3





-  2.26m² glass area
-  1.44m² glass area

By bending the northern part of the light opening the glass area can be increased from 1.44m² to 2.26m² (36%) without direct sunlight penetrating the space.



Principal solutions

En fellesnevner for idretter i idrettshaller er at de ikke ønsker direkte innslipp av sollys etter som det kan være distraherende for utøvelsen av aktivitetene. Nordvendte lysåpninger er derfor generelt et ønske dersom det skal tas inn dagslys.

Skodder og skyvbare paneler an være en måte å veksle mellom indirekte lys og også ta inn direkte sollys.

Lyset fra nord er et veldig kaldt lys som mangler det varme spektrumet fra det direkte sollyset. Jeg ønsker å finne ut hvordan jeg også kan ta inn lys fra vest, sør og øst. Dersom utformingen av lysåpningene gjøres riktig.

Belysning av vertikale flater øker romlighet og definerer rommets avgrensing.

Alle rom må kunne blende dagslyset av helt av.

Lys- karakter

Dansesal -

Lys- karakter: Semi-diffust og direkte sollys kan forekomme.

Utsyn og kontakt med omgivelsene utenfor er viktig

Martial arts -

Lys-karakter: Unngå direkte solinnfall på utøvere og publikum.

Utsyn og kontakt med omgivelsene utenfor er viktig

Klatring

Lys- karakter: Sidebelyst, I kombinasjon med indirekte overlys kan det tåle litt direkte solinnstråling.

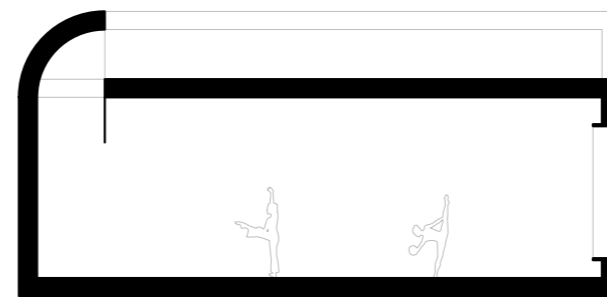
Idrettshall -

Lys- karakter: Ikke direkte sollys i hallen. Viktig med god jevnhet.

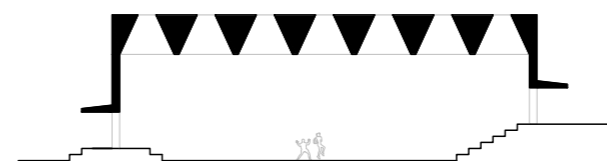
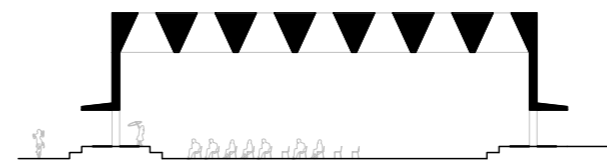
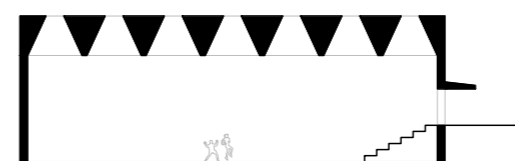
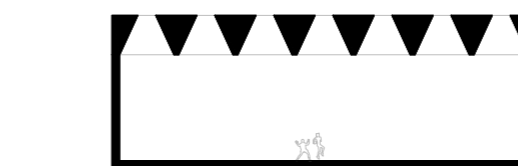
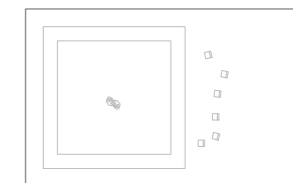
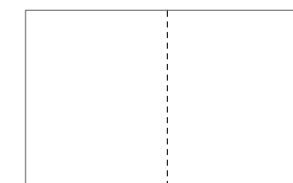
Innsyn til hallens aktiviteter. Muligheten for å åpne opp hallen ut i forbindelse med ulike arrangement er ønskelig.



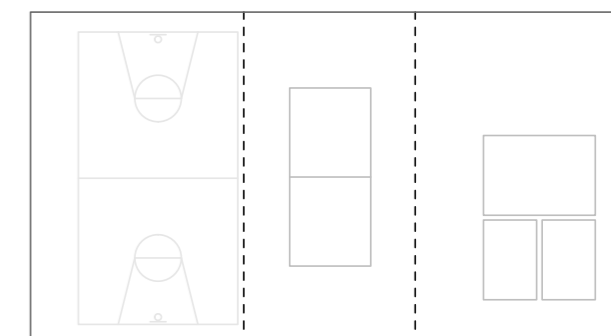
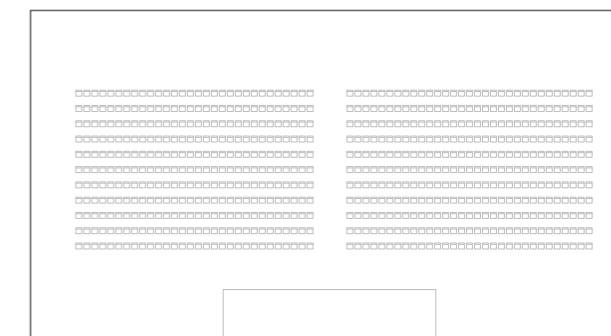
Viktigheten av lys på vertikale flater

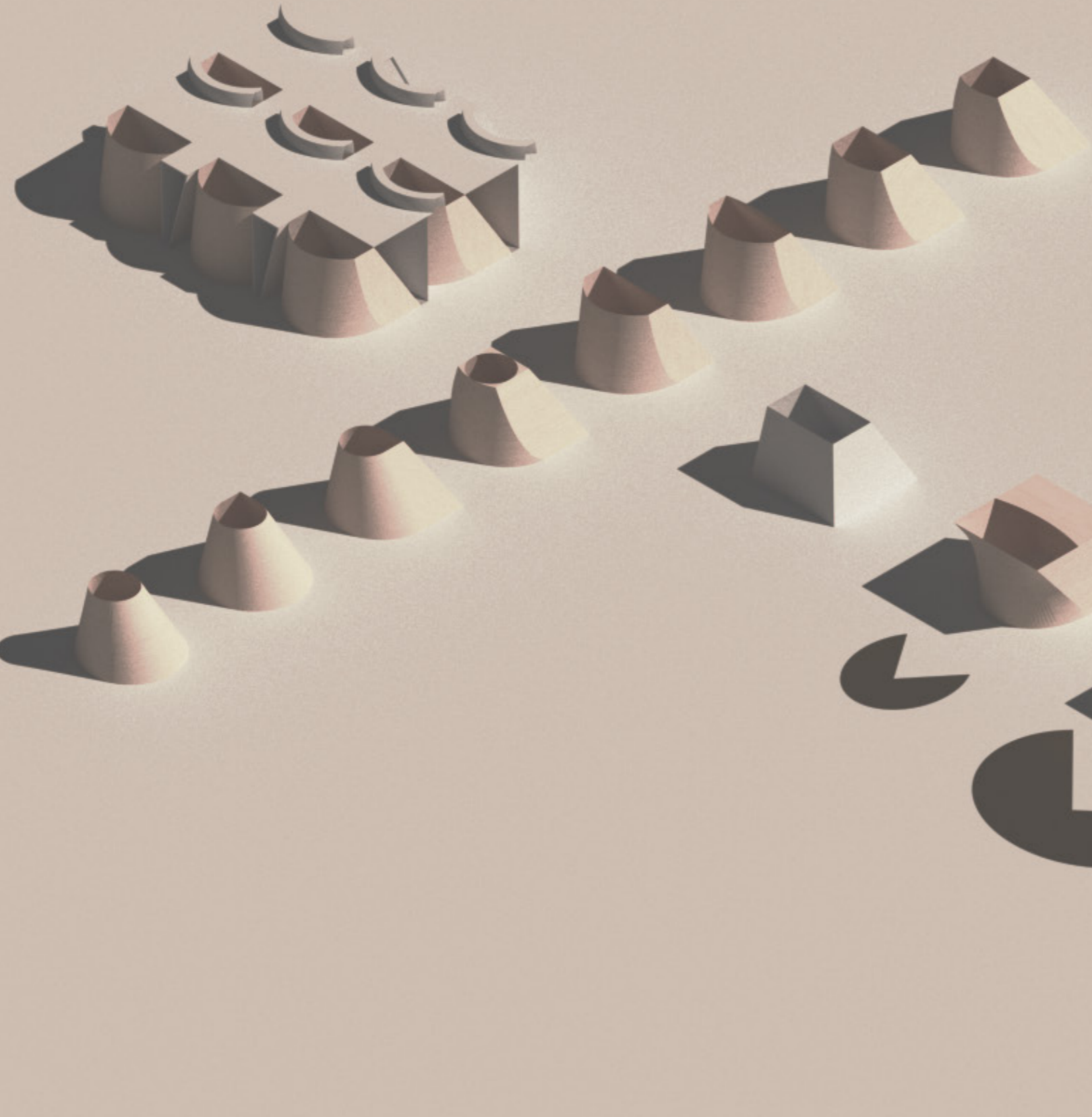


Dansesal

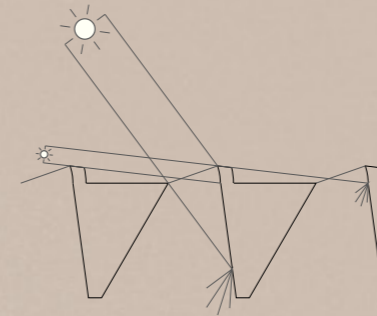


Idrettshall





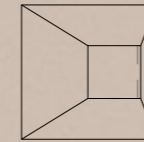
Summer solstice
Oslo 59.9°
Sun altitude 53.38°



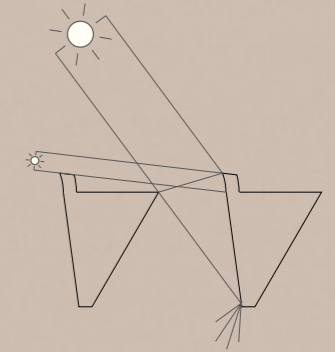
Winter solstice
Oslo 59.9°
Sun altitude 6.6°

A square aperture does not use the full potential of the ceiling depth to cut off direct sunlight due to the square diagonal corners between coffer opening and aperture opening

Square shaped light opening
Aperture diameter 1.2x1.2m
Coffer opening 3.05m
Coffer angle 7.69°/30.24°
Glass area 1.44m²



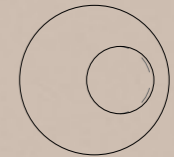
Summer solstice
Oslo 59.9°
Sun altitude 53.38°



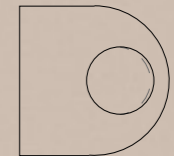
Winter solstice
Oslo 59.9°
Sun altitude 6.6°

By rounding the north edge of the coffer opening and keeping with the previous angles, both the aperture and coffer opening can be increased

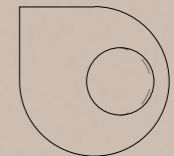
Circular shaped light opening
Aperture diameter 1.533m
Coffer opening 3.4m
Coffer angle 7.69°/30.24°
Glass area 1.84m²



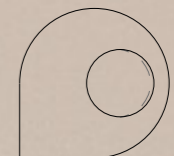
Sculptural coffer variation #2

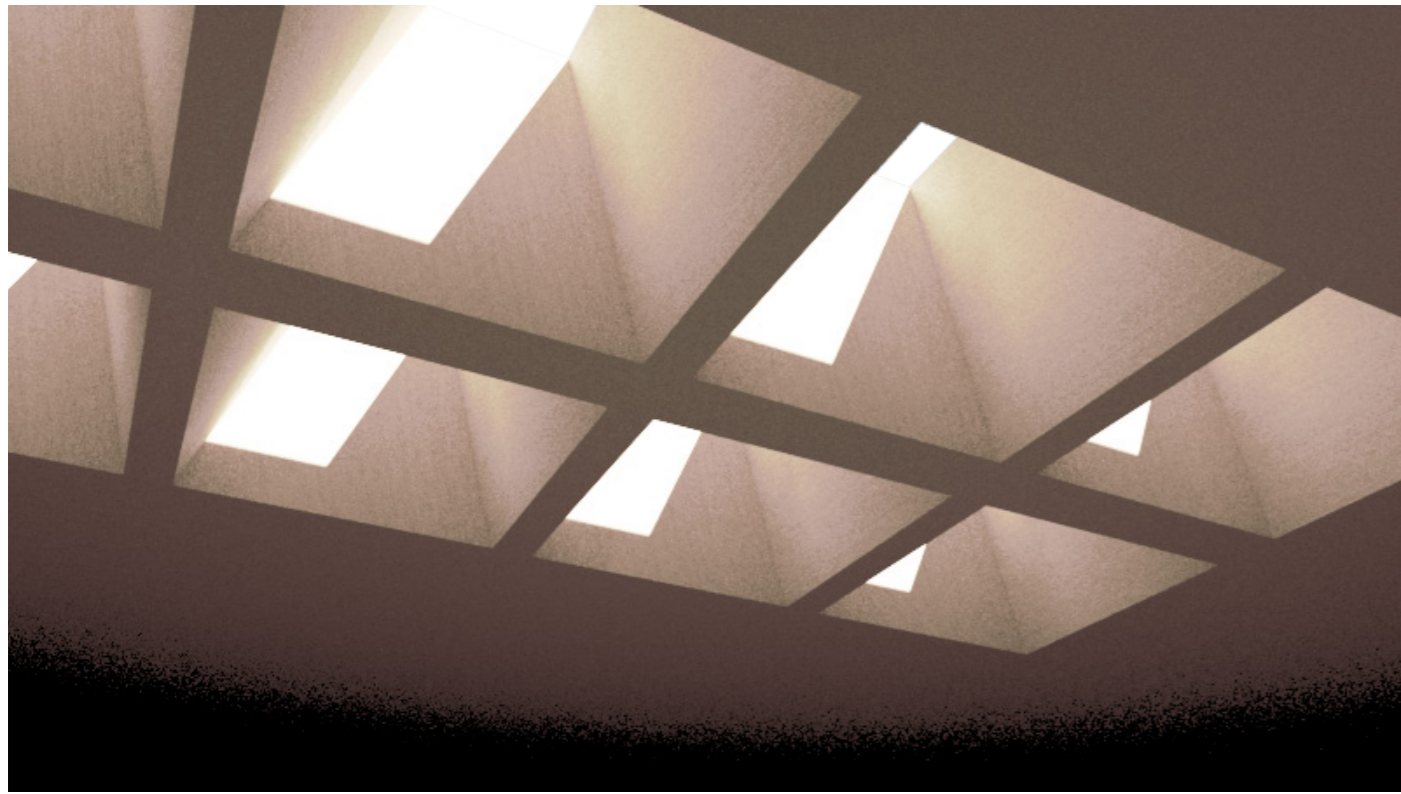


Sculptural coffer variation #3

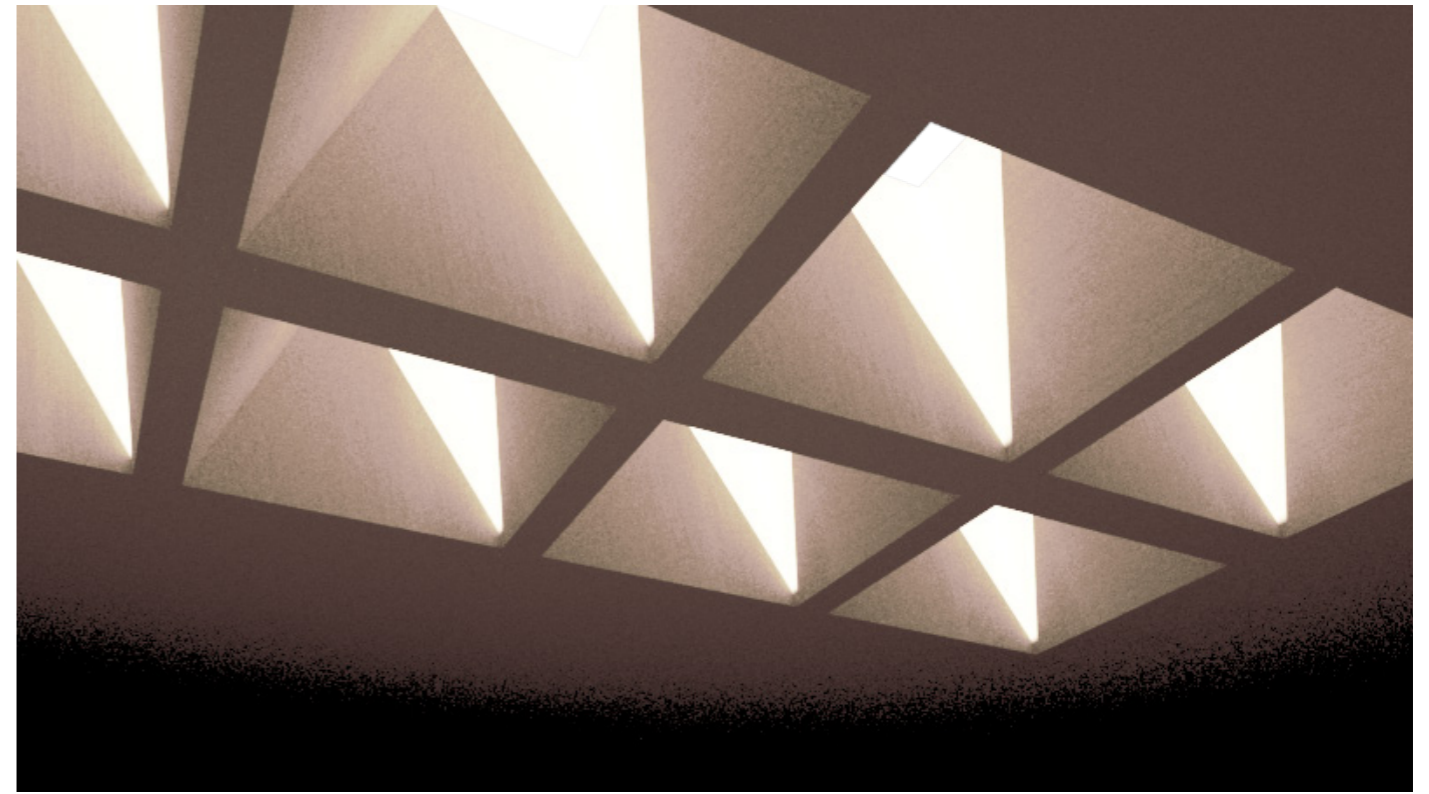


Sculptural coffer variation #3

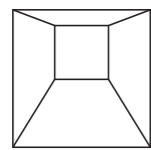




Time 12:00 - 21st of June



Time 16:00 - 21st of June



Square shaped light opening:

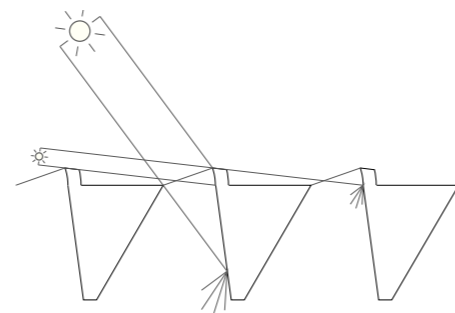
A square shaped aperture does not use the full potential of the ceiling depth to cut off direct sunlight due to the square diagonal corners between coffer opening and aperture opening.

Aperture size 1.2x1.2m
 Coffered opening 3.05x3.05m
 Angle 7.69°/30.24°
 Glass area 1.44m²

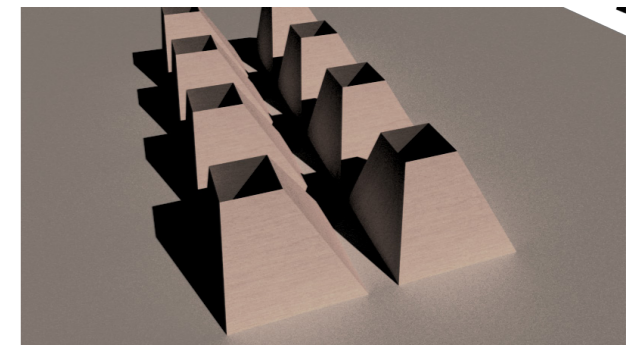
Time 16:00 - 21st of June

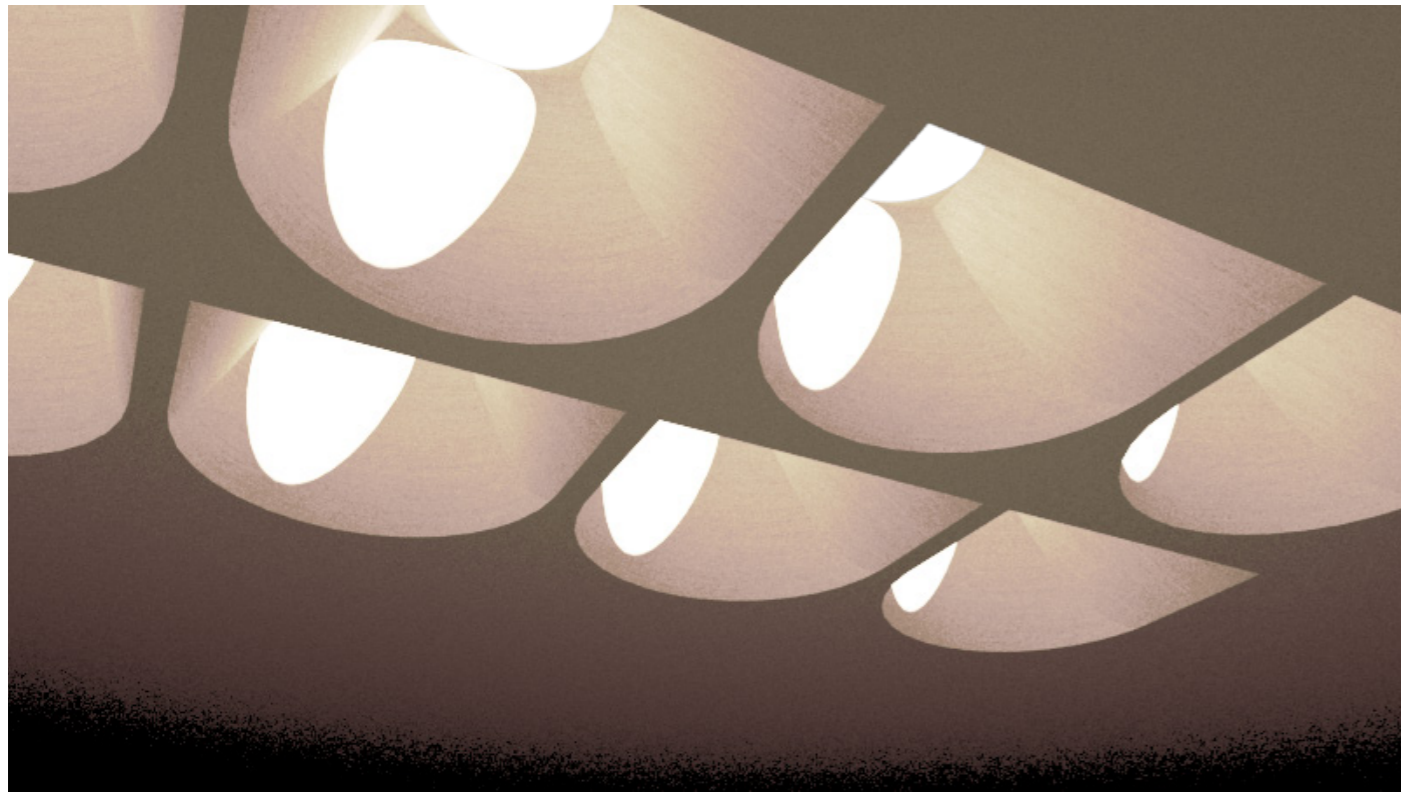
Summer solstice
 Calc 50.1°
 Sun altitude 63.38°

Winter solstice
 Calc 50.1°
 Sun altitude 6.6°



Section diagram 1

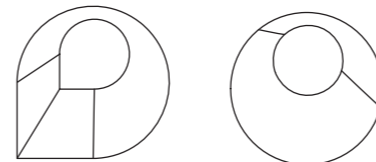
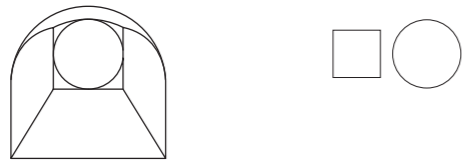




Time 12:00 - 21st of June



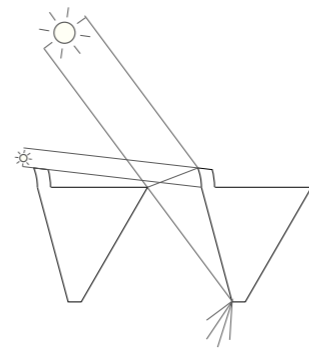
Time 16:00 - 21st of June



Oval shaped coffer:

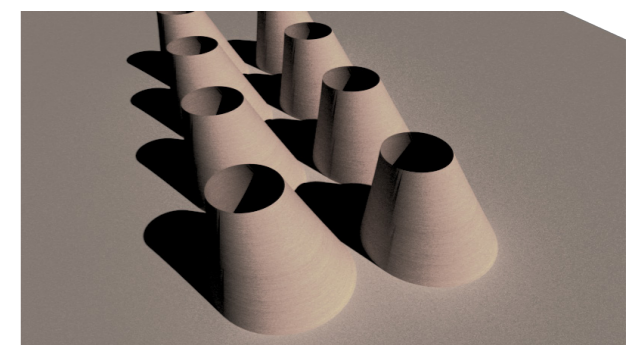
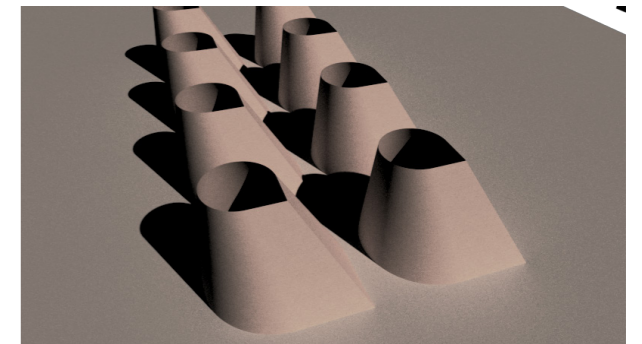
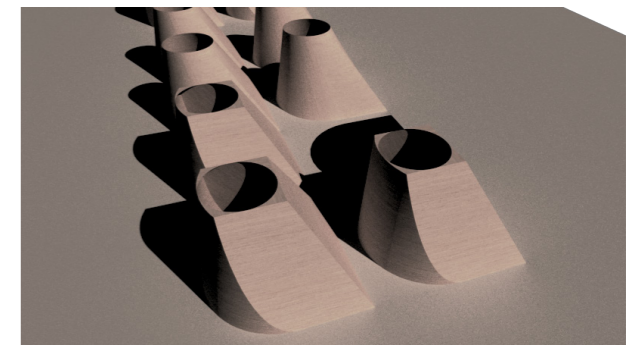
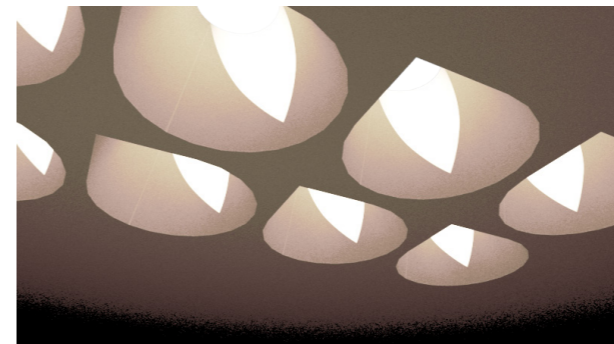
By rounding the north edge of the coffer opening can be increased as the cut off angle is improved and corresponds better to the movement of the sun throughout the day.

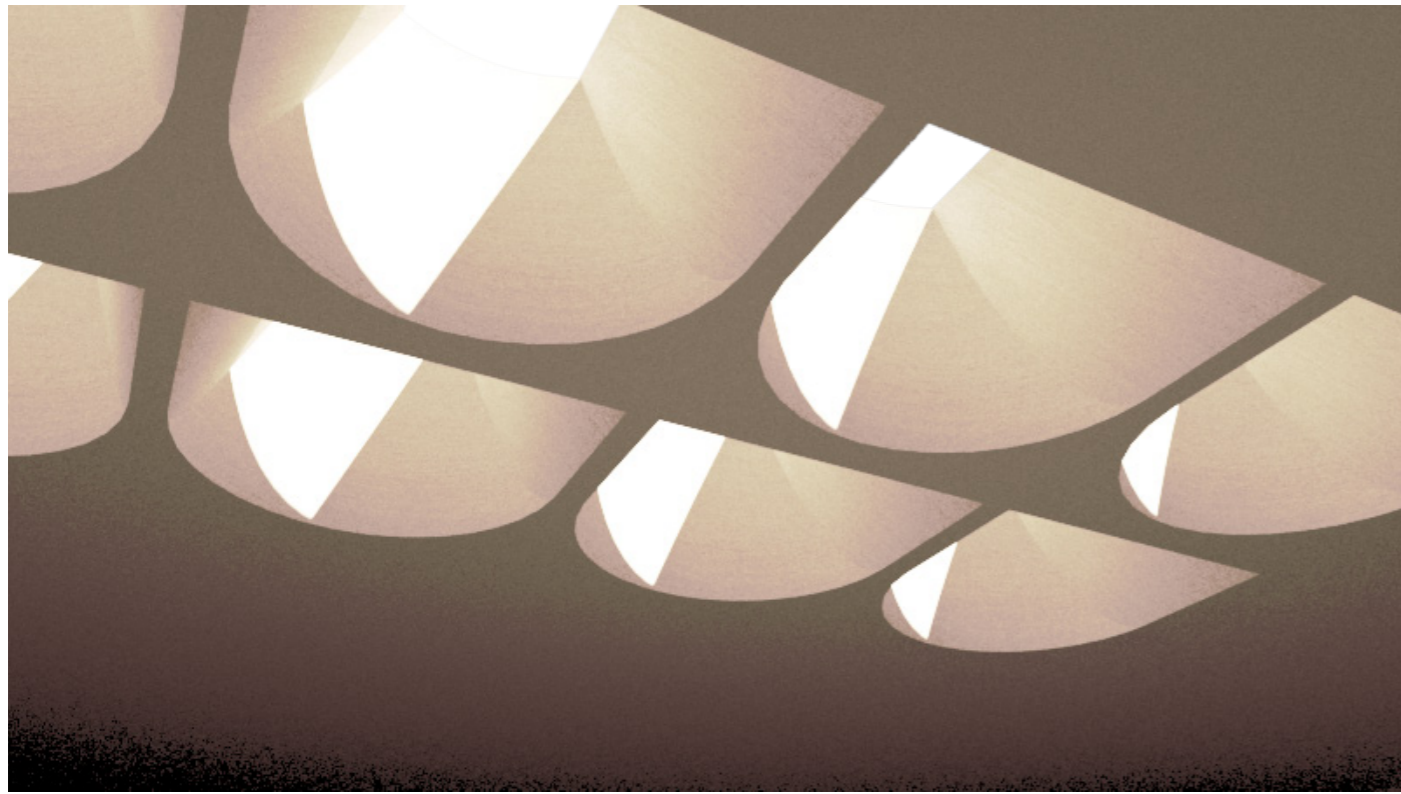
The light opening can be centered more in the coffer, even with a larger coffer opening, as illustrated in section diagram 2.



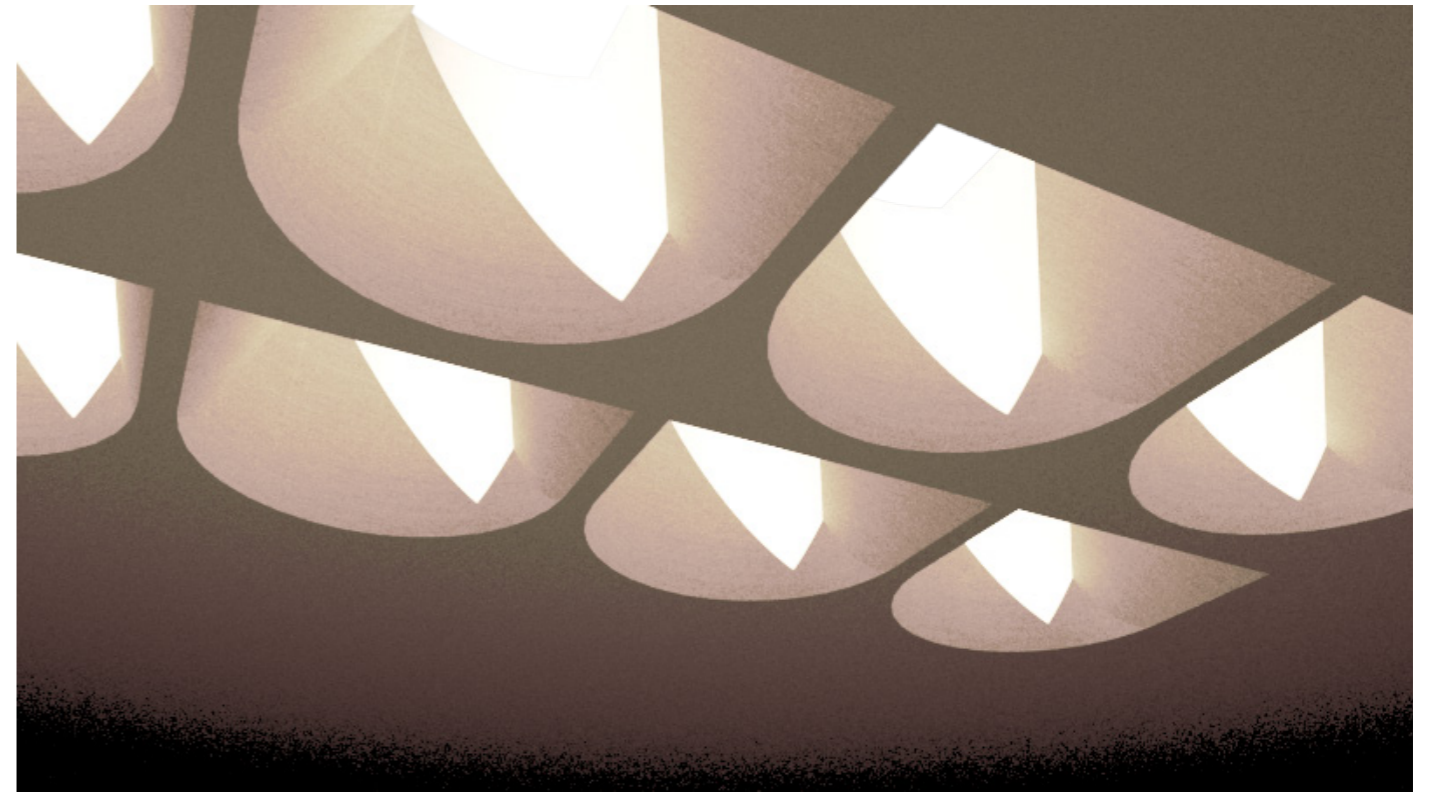
Section diagram 2

- Aperture diameter 1.53m
- Coffer opening 3.4x3.4m
- Coffer angle 7.69°/30.24°
- Glass area 1.84m²

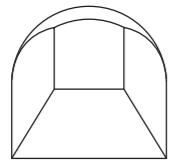




Time 12:00 - 21st of June



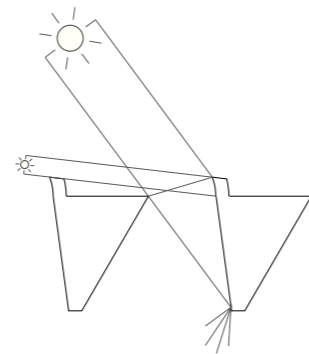
Time 16:00 - 21st of June



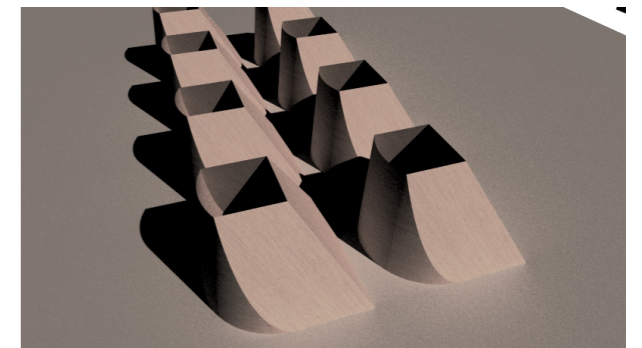
Oval shaped coffer:

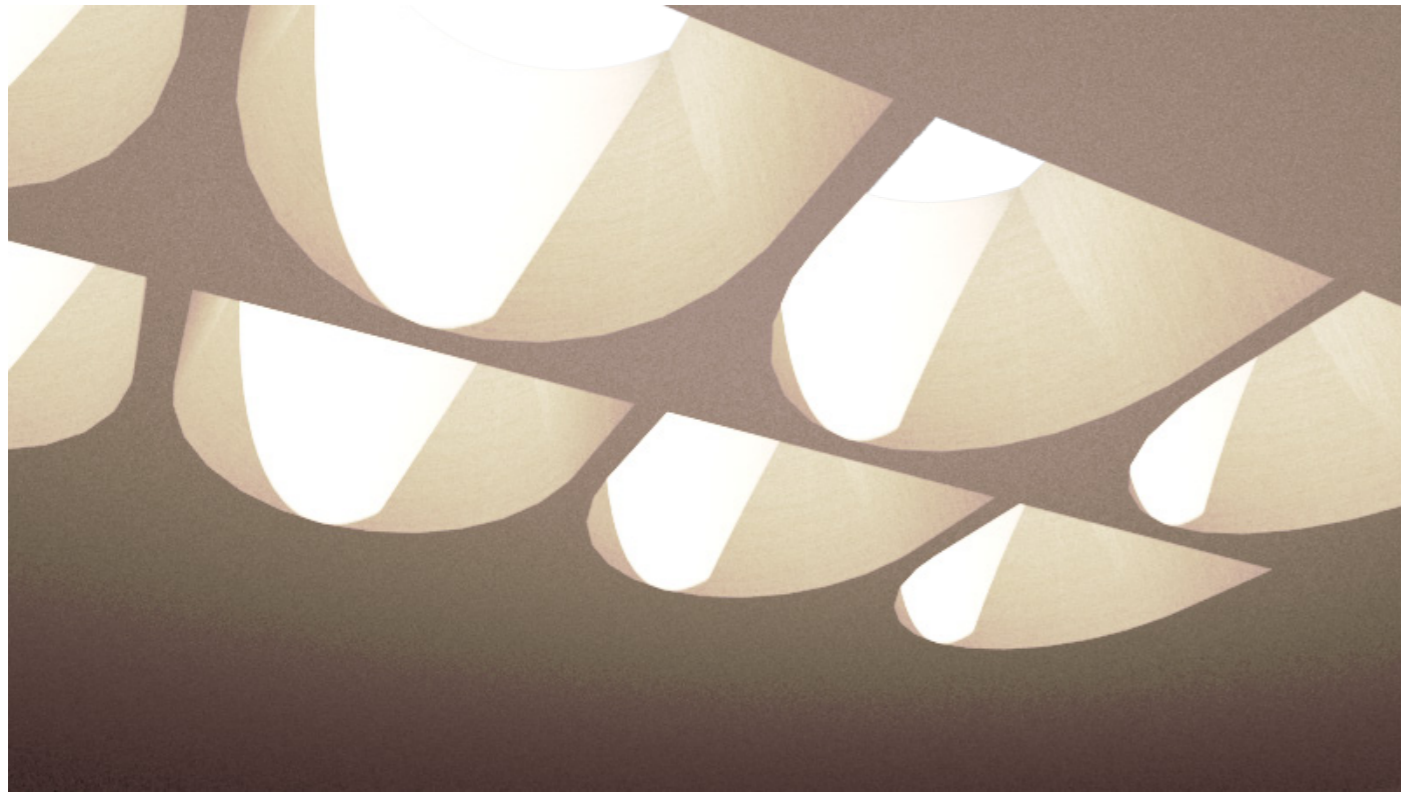
Compared to the coffer angles used for the square light opening both the aperture and coffer opening can be increased.

Aperture diameter 1.53m
 Coffers opening 3.4x3.4m
 Coffers angle 7.69°/30.24°
 Glass area 2.25m²

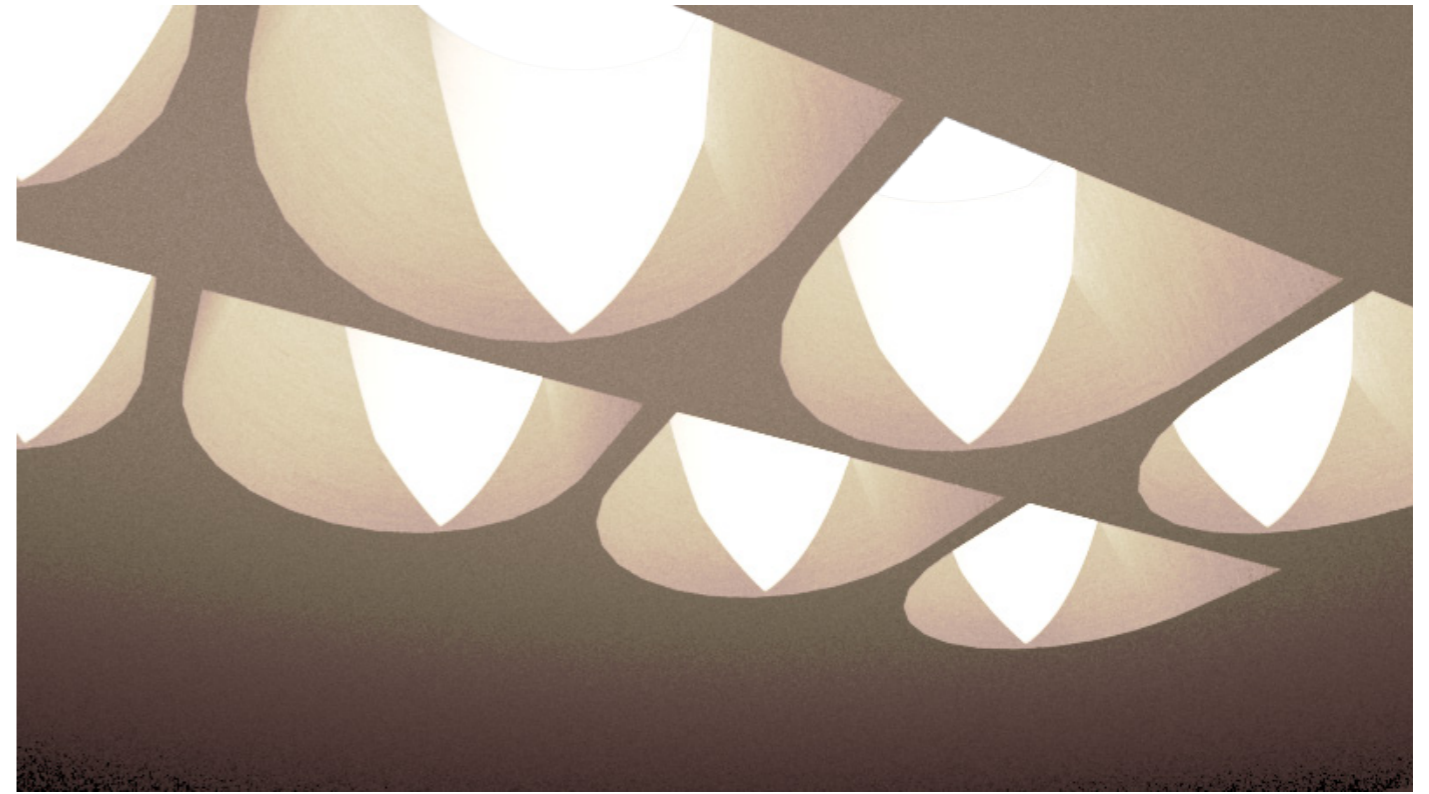


Section diagram 3

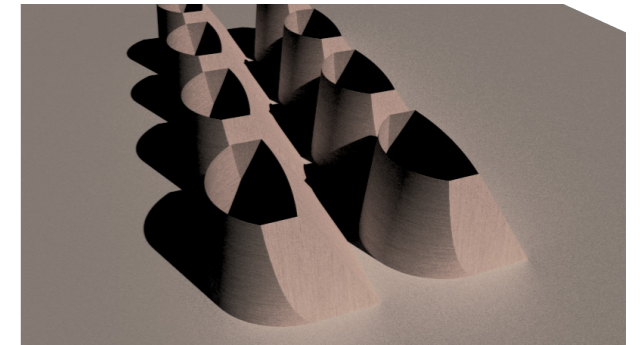
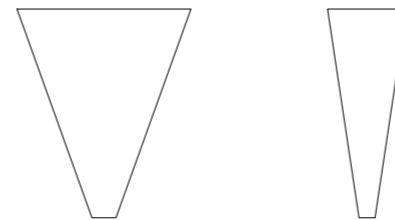
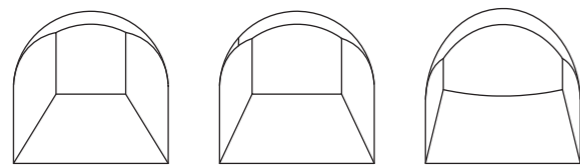




Time 12:00 - 21st of June



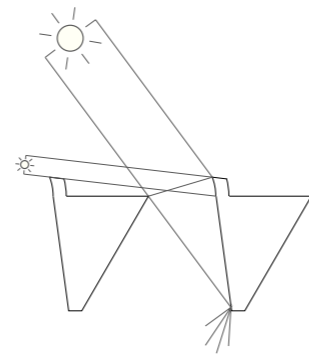
Time 16:00 - 21st of June



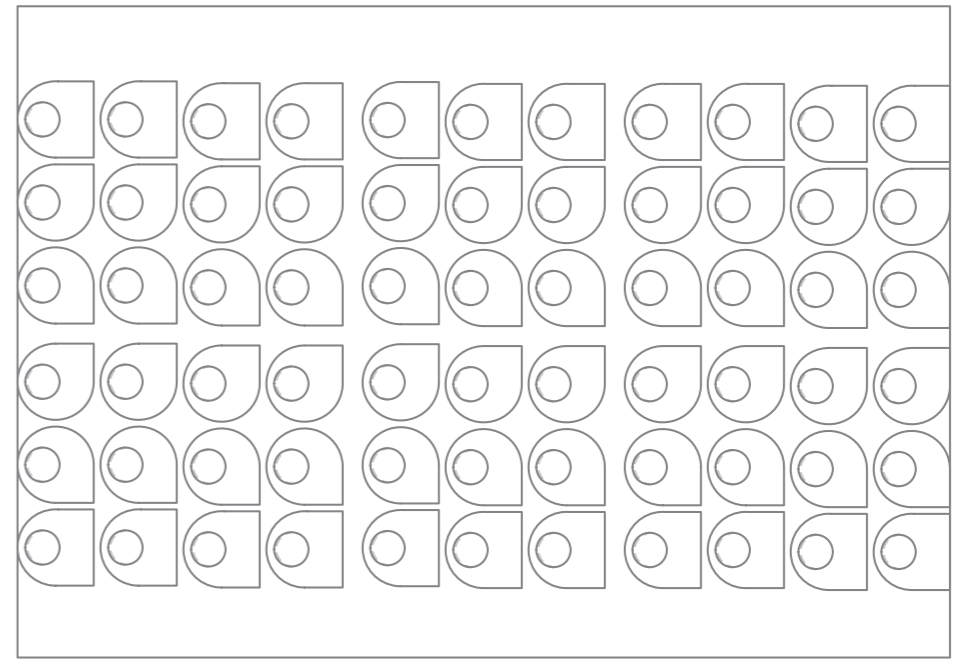
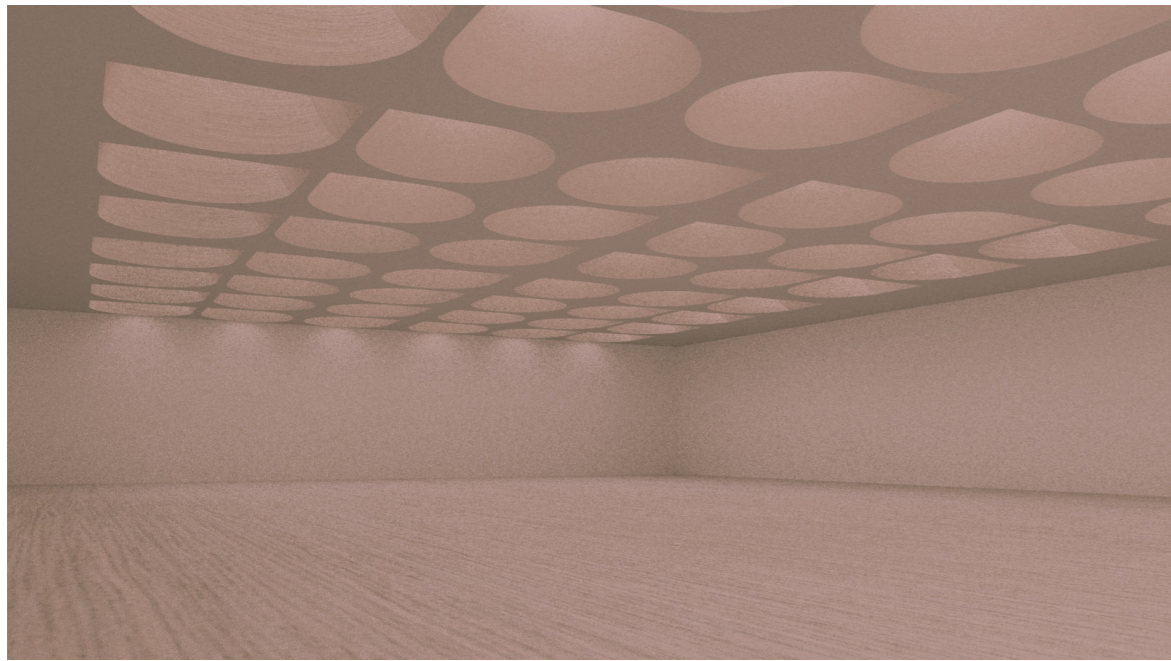
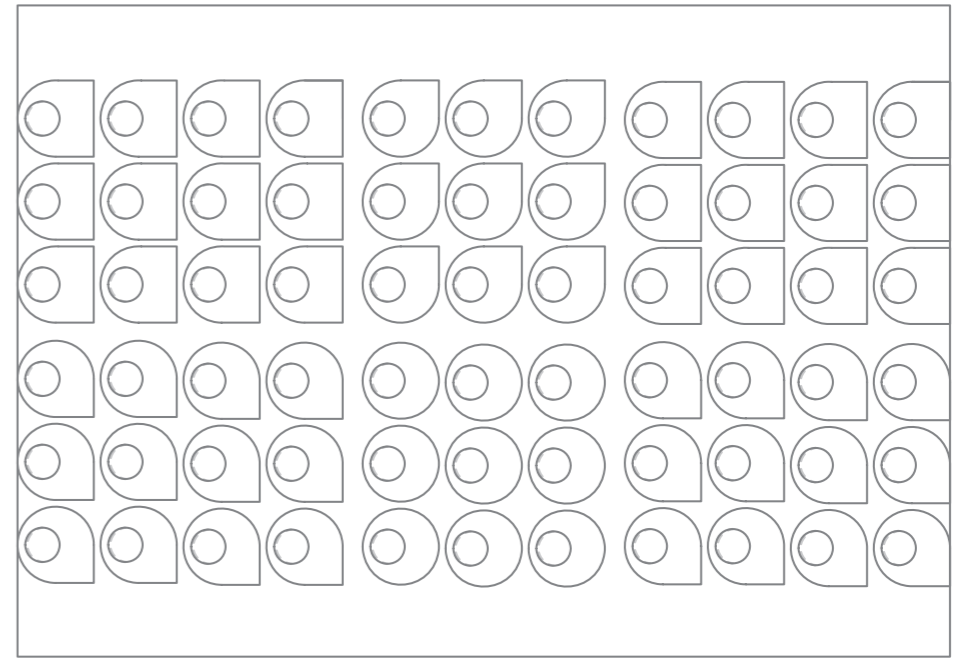
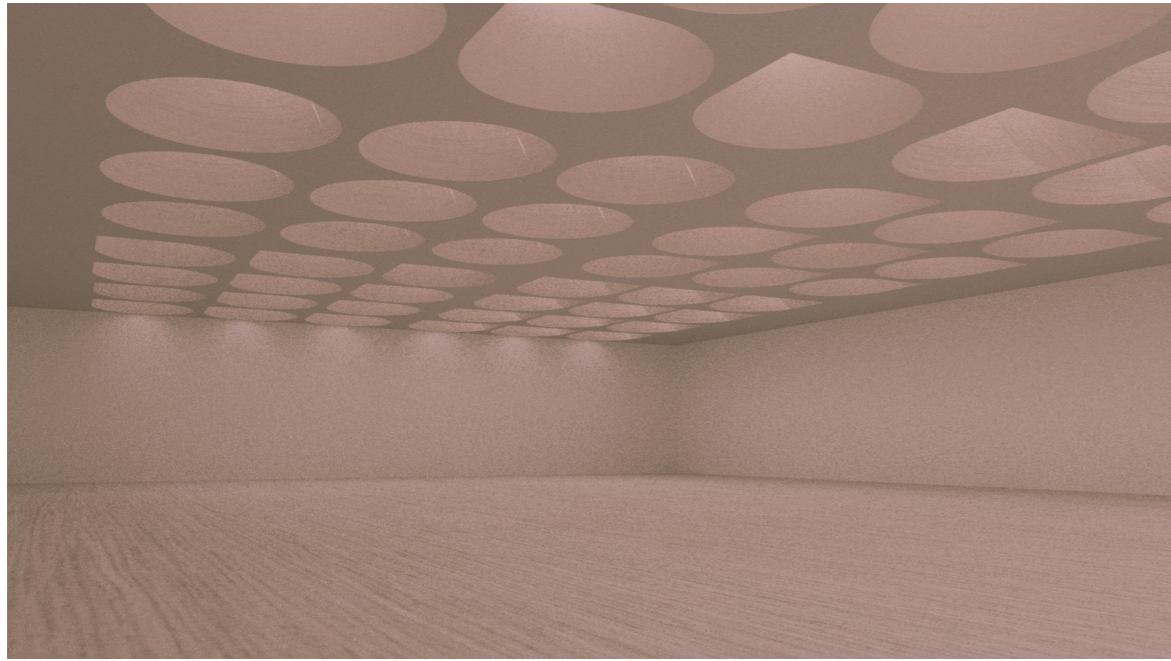
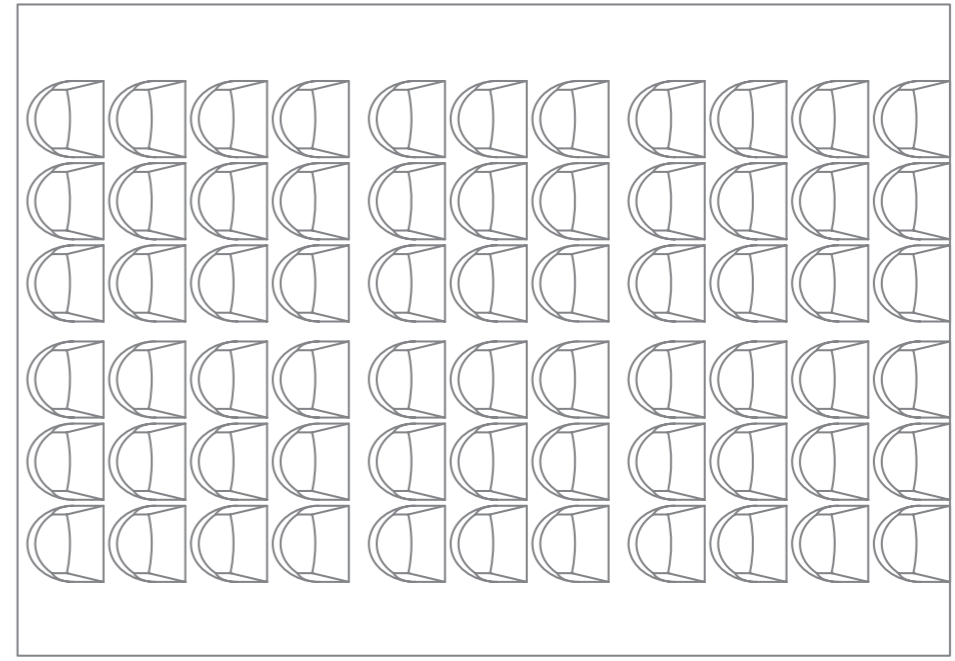
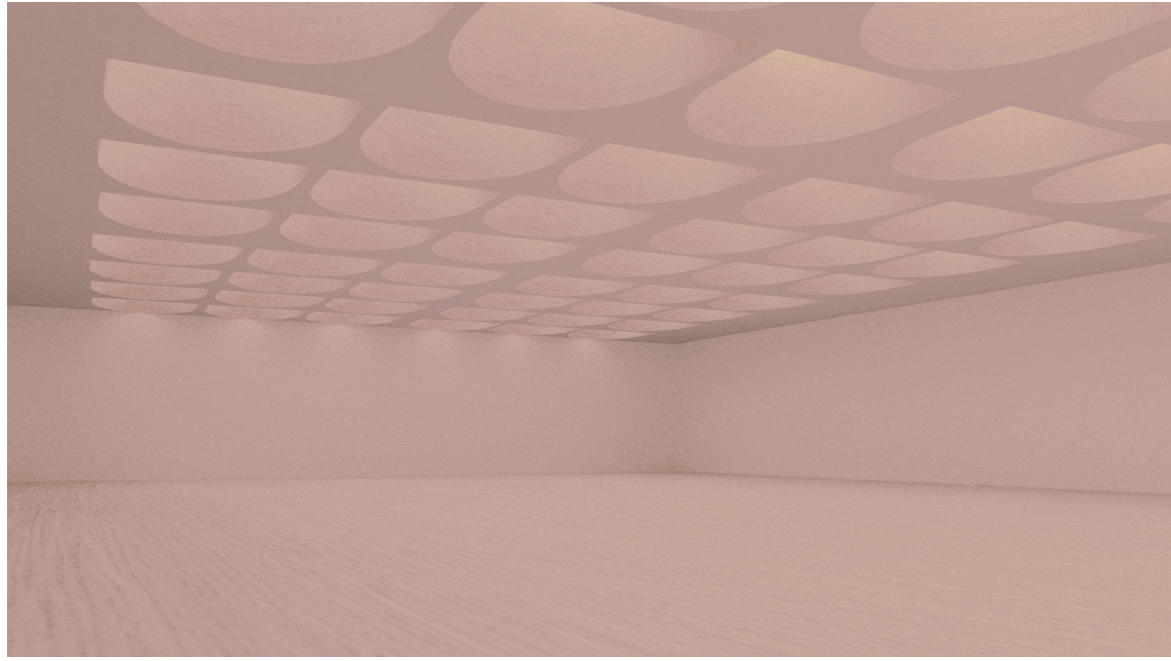
Oval shaped coffer:

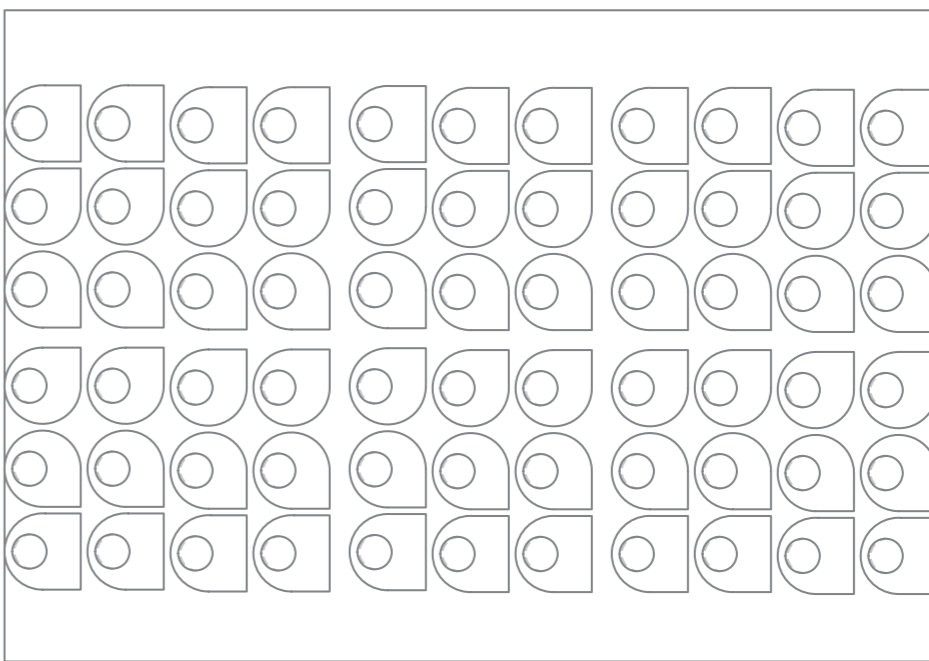
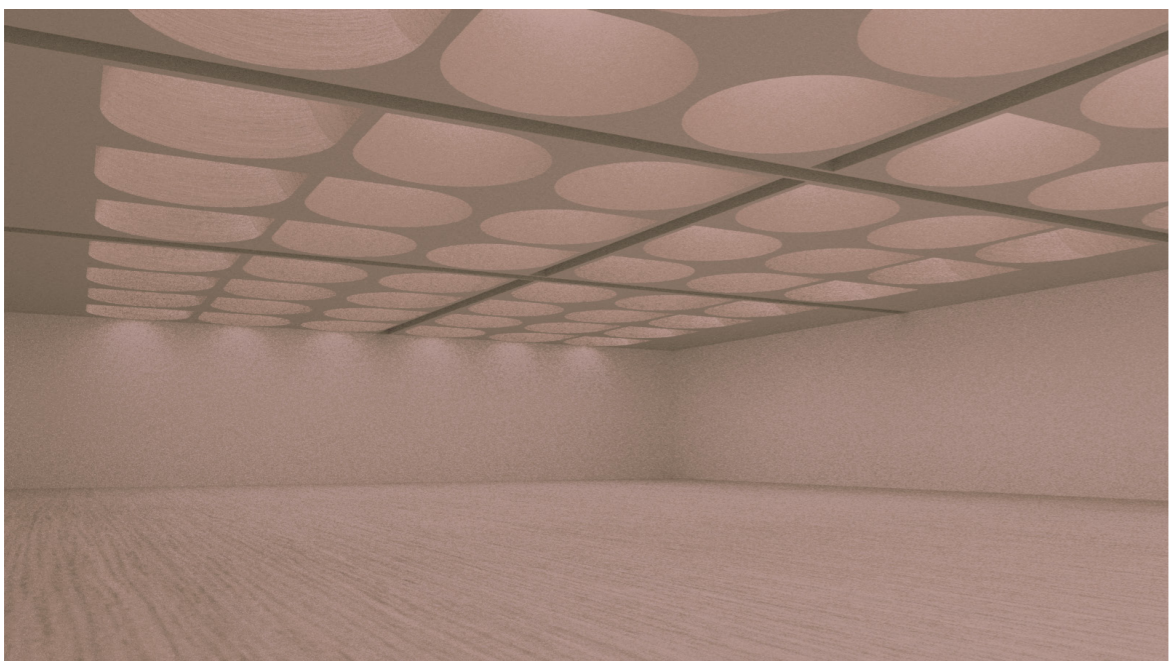
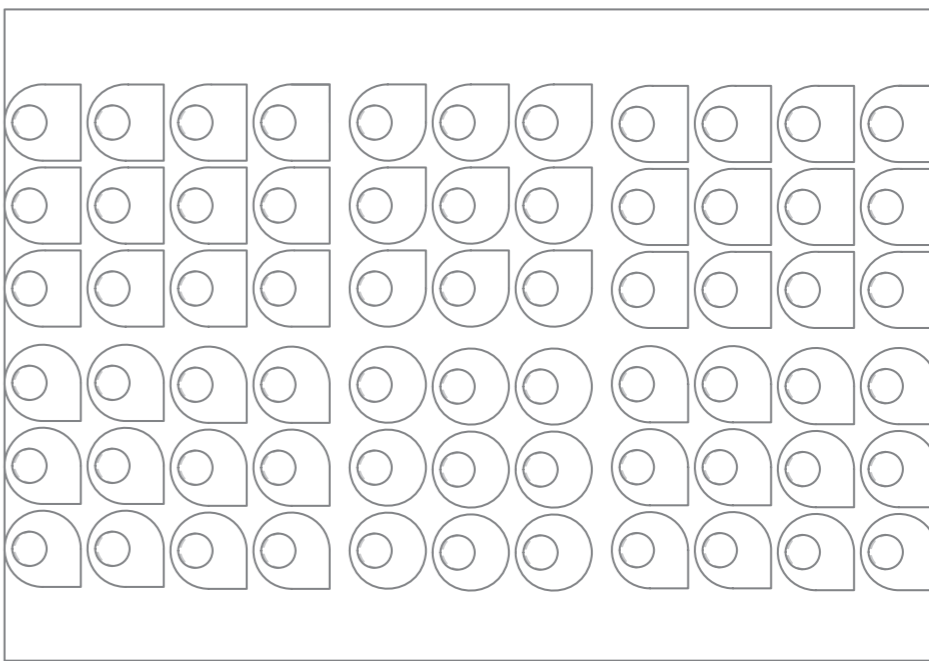
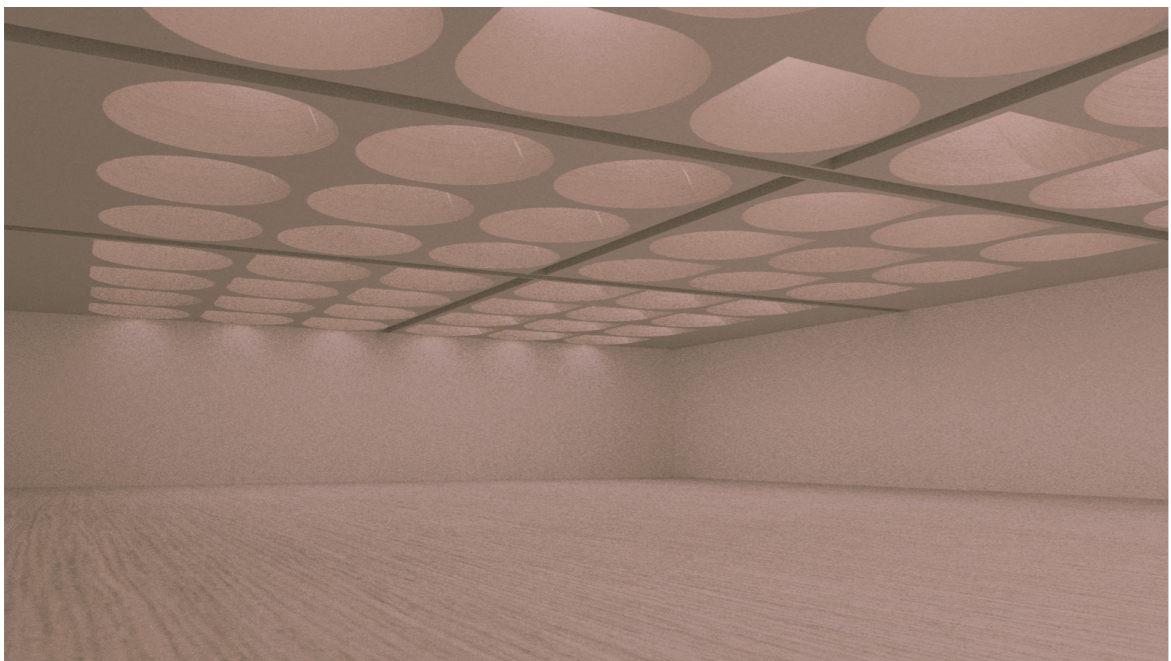
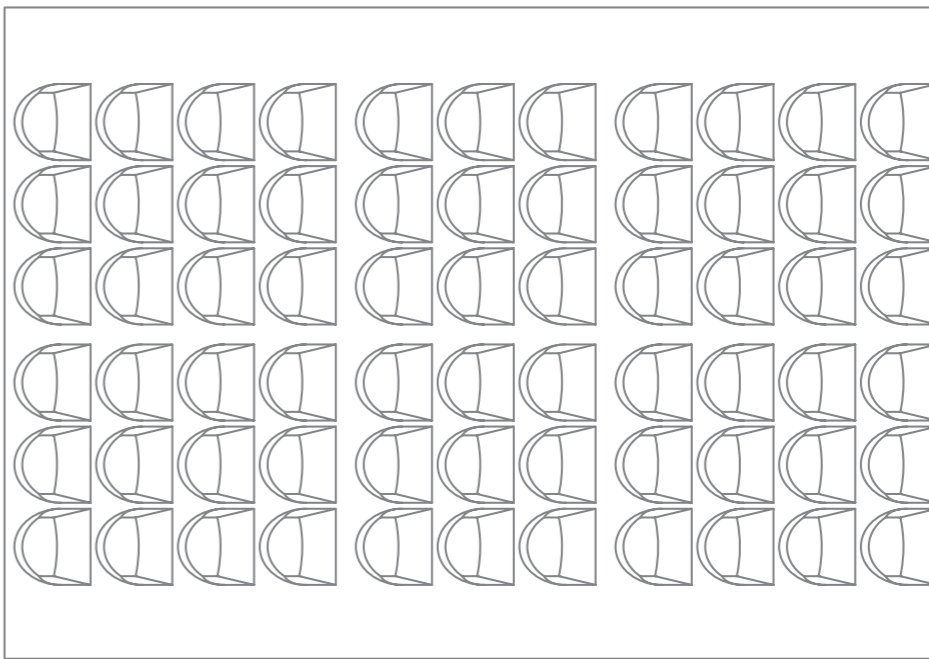
By further changing the longitudinal coffer angle from 19.75° to 8.57° the glass area can be increased to 3.4m².

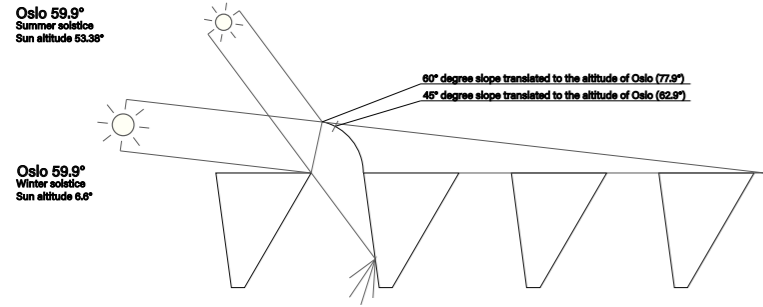
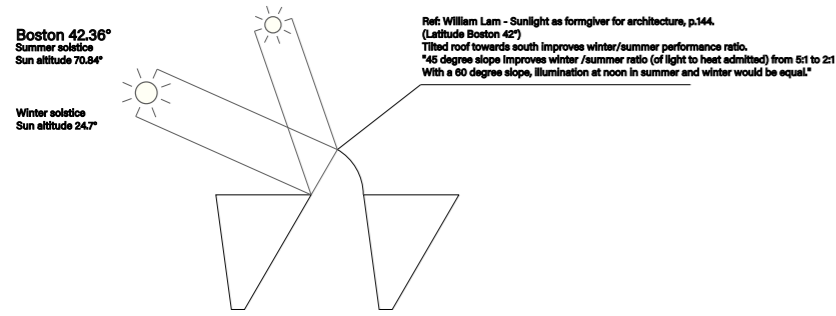
Aperture diameter 1.533m
 Coffe opening 3.4x3.4m
 Coffe angle 7.69°/30.24°
 Glass area 3.4m²



Section diagram 3

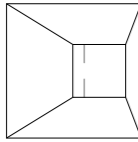




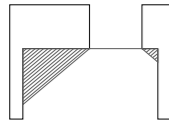


A disadvantage may be that the first monitor quickly will shadow the next

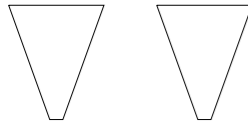
Rectangular shaped light opening
1.2x1.2m
Glass area 1.44m²



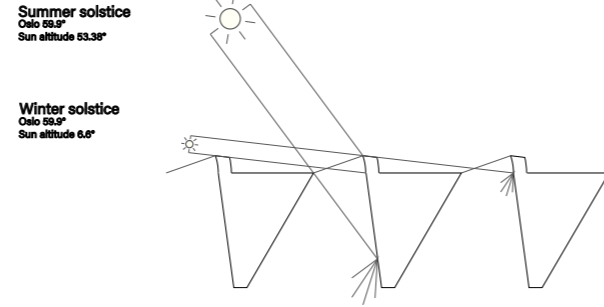
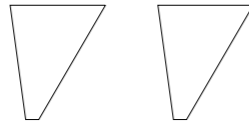
Coffer angles:
Skylights with little surface to see the light entering may be a source of glare



Coffered ceiling with angles - longitudinal direction:
Angled coffers reduce the prevents dark shadows in ceiling and reduce the risk of glare

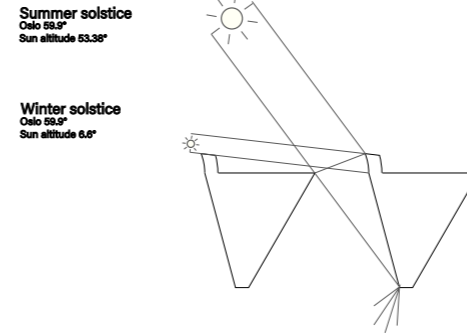
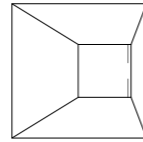


Coffered ceiling with angles - transverse direction:
Angles modified to function as cut off angles for direct sunlight



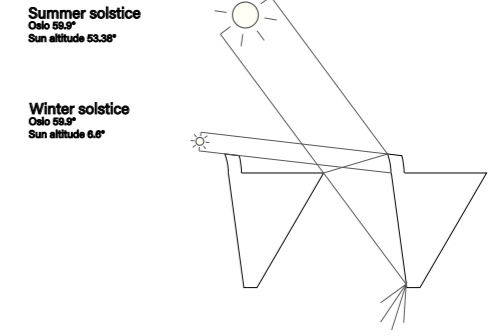
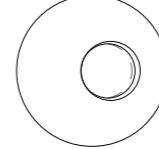
A square aperture does not use the full potential of the ceiling depth to cut off direct sunlight due to the square diagonal corners between coffer opening and aperture opening

Square shaped light opening
Aperture diameter 1.2x1.2m
Coffer opening 3.05m
Coffer angle 7.69°/30.24°
Glass area 1.44m²



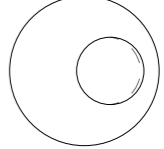
A rounded opening is easier to center and the coffer opening can be increased

Circular shaped light opening
Aperture diameter 1.23m
Coffer opening 3.4m
Coffer angle 15°/30°
Glass area 1.19m²

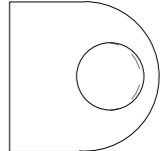


By rounding the north edge of the coffer opening and keeping with the previous angles, both the aperture and coffer opening can be increased

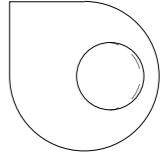
Circular shaped light opening
Aperture diameter 1.533m
Coffer opening 3.4m
Coffer angle 7.69°/30.24°
Glass area 1.84m²



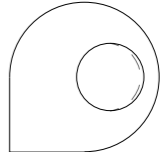
Sculptural coffer variation #2

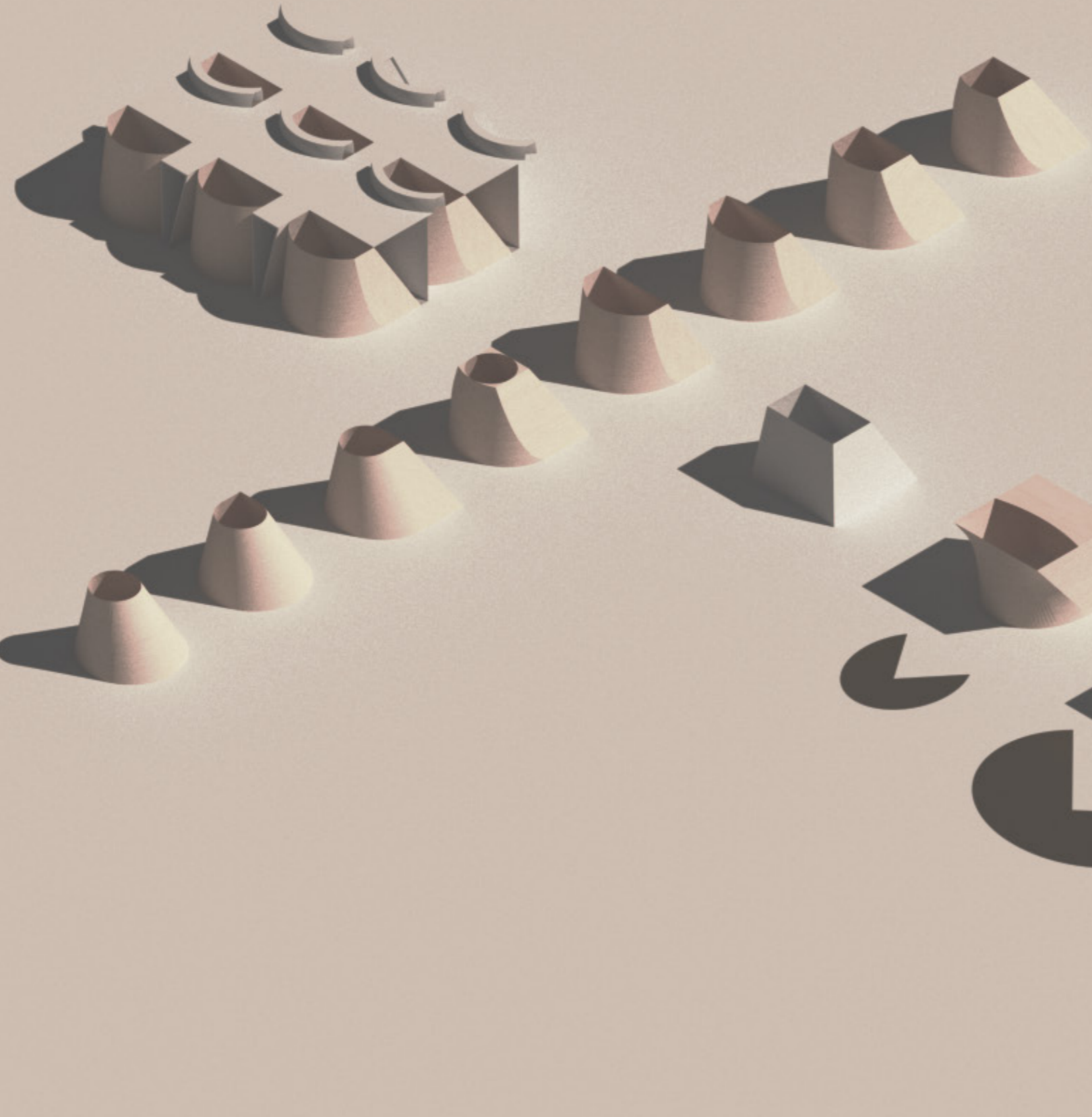


Sculptural coffer variation #3

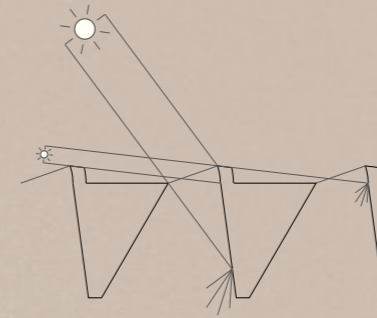


Sculptural coffer variation #3



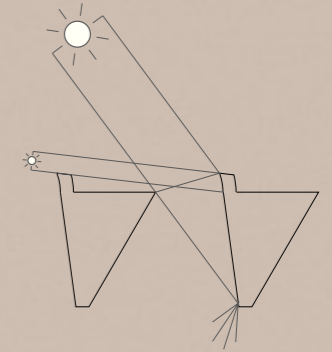


Summer solstice
Oslo 59.9°
Sun altitude 53.38°



Winter solstice
Oslo 59.9°
Sun altitude 6.6°

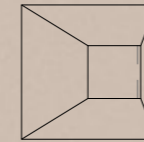
Summer solstice
Oslo 59.9°
Sun altitude 53.38°



Winter solstice
Oslo 59.9°
Sun altitude 6.6°

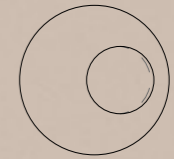
A square aperture does not use the full potential of the ceiling depth to cut off direct sunlight due to the square diagonal corners between coffer opening and aperture opening

Square shaped light opening
Aperture diameter 1.2x1.2m
Coffer opening 3.05m
Coffer angle 7.69°/30.24°
Glass area 1.44m²

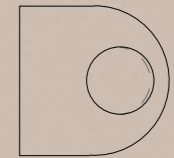


By rounding the north edge of the coffer opening and keeping with the previous angles, both the aperture and coffer opening can be increased

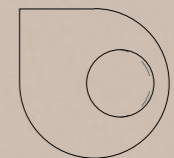
Circular shaped light opening
Aperture diameter 1.533m
Coffer opening 3.4m
Coffer angle 7.69°/30.24°
Glass area 1.84m²



Sculptural coffer variation #2

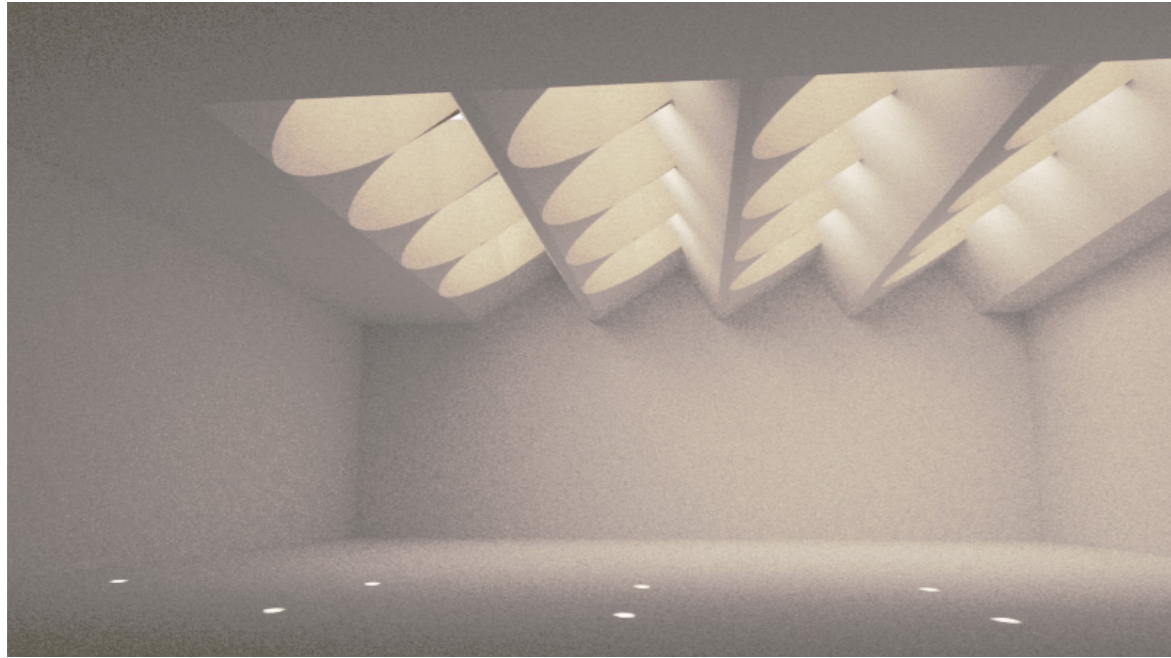


Sculptural coffer variation #3

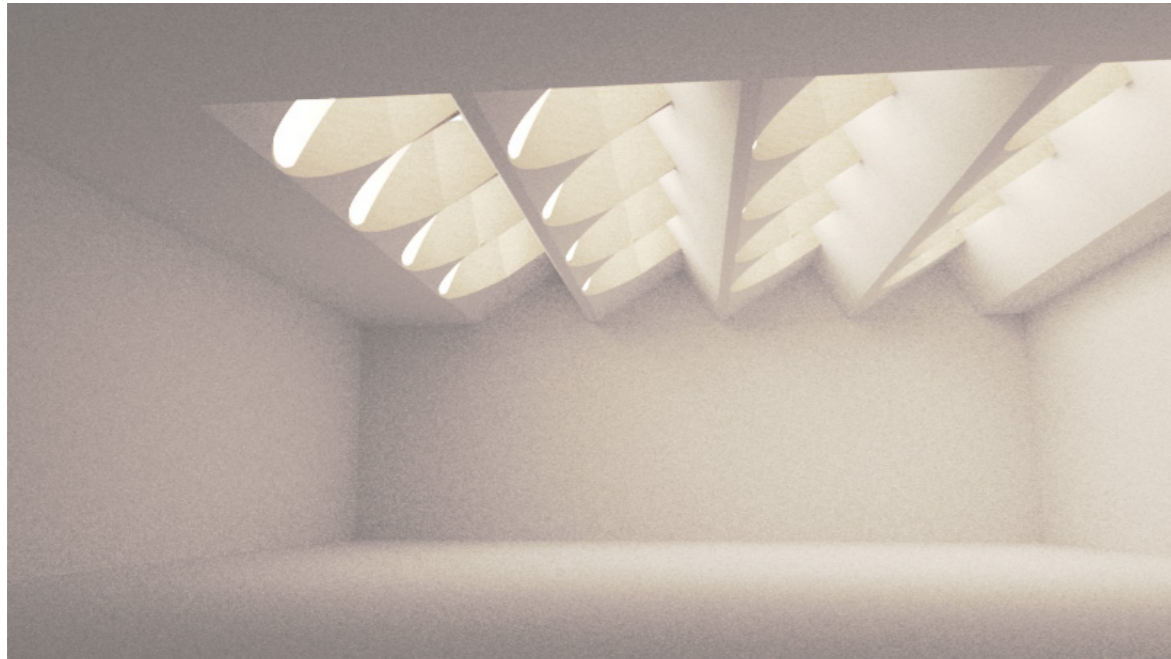


Sculptural coffer variation #3

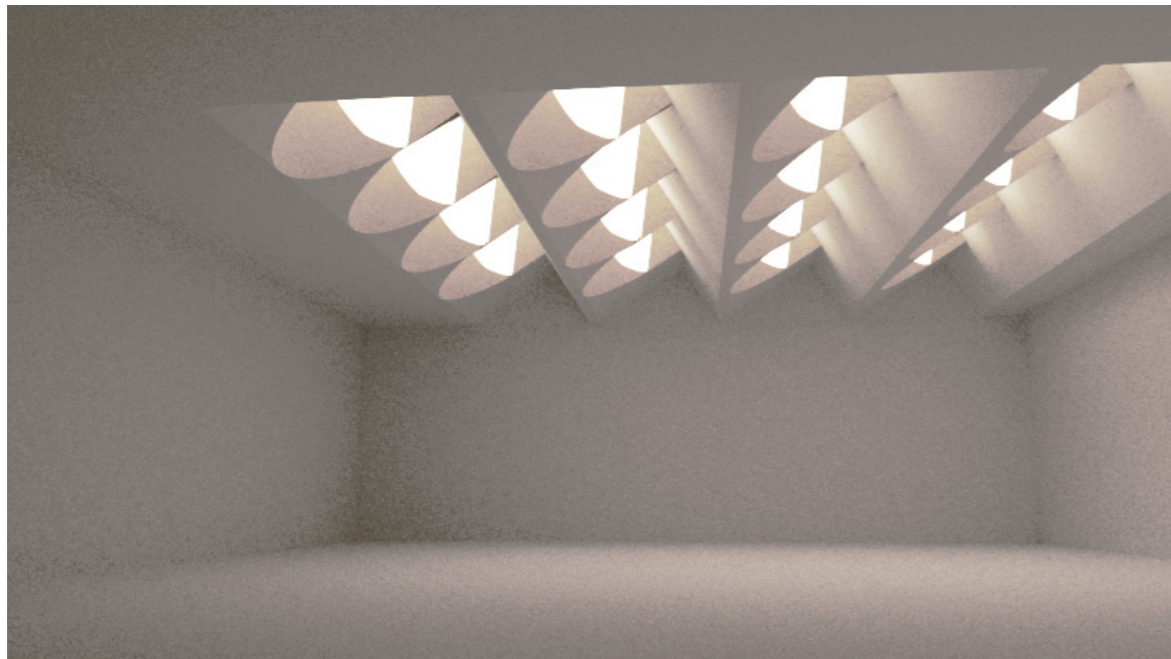




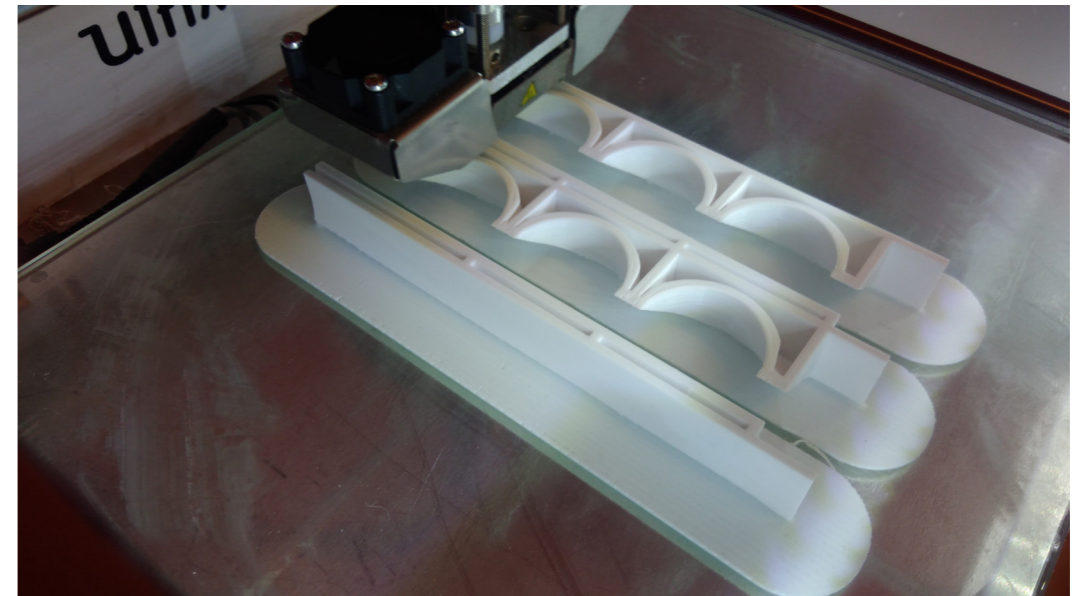
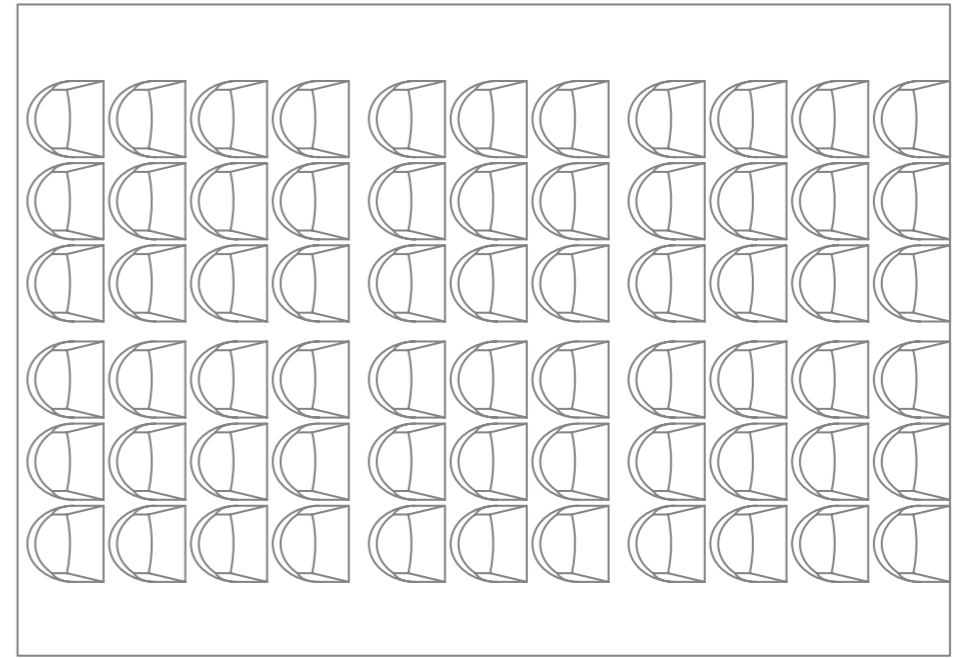
Time 09:00 - 21st of June

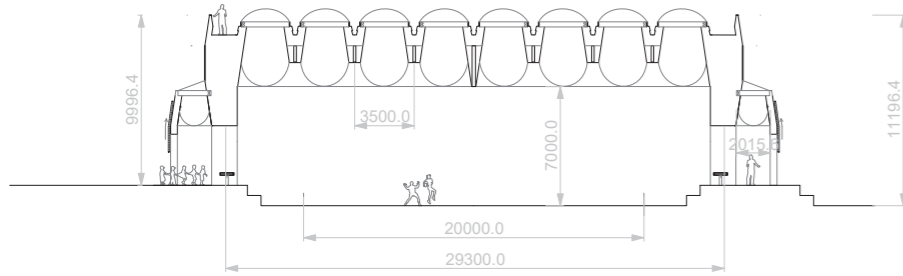
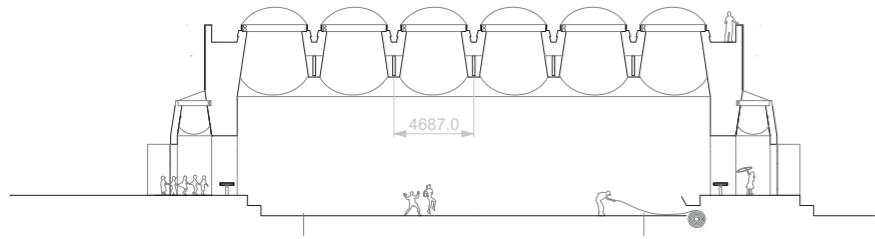


Time 12:00 - 21st of June

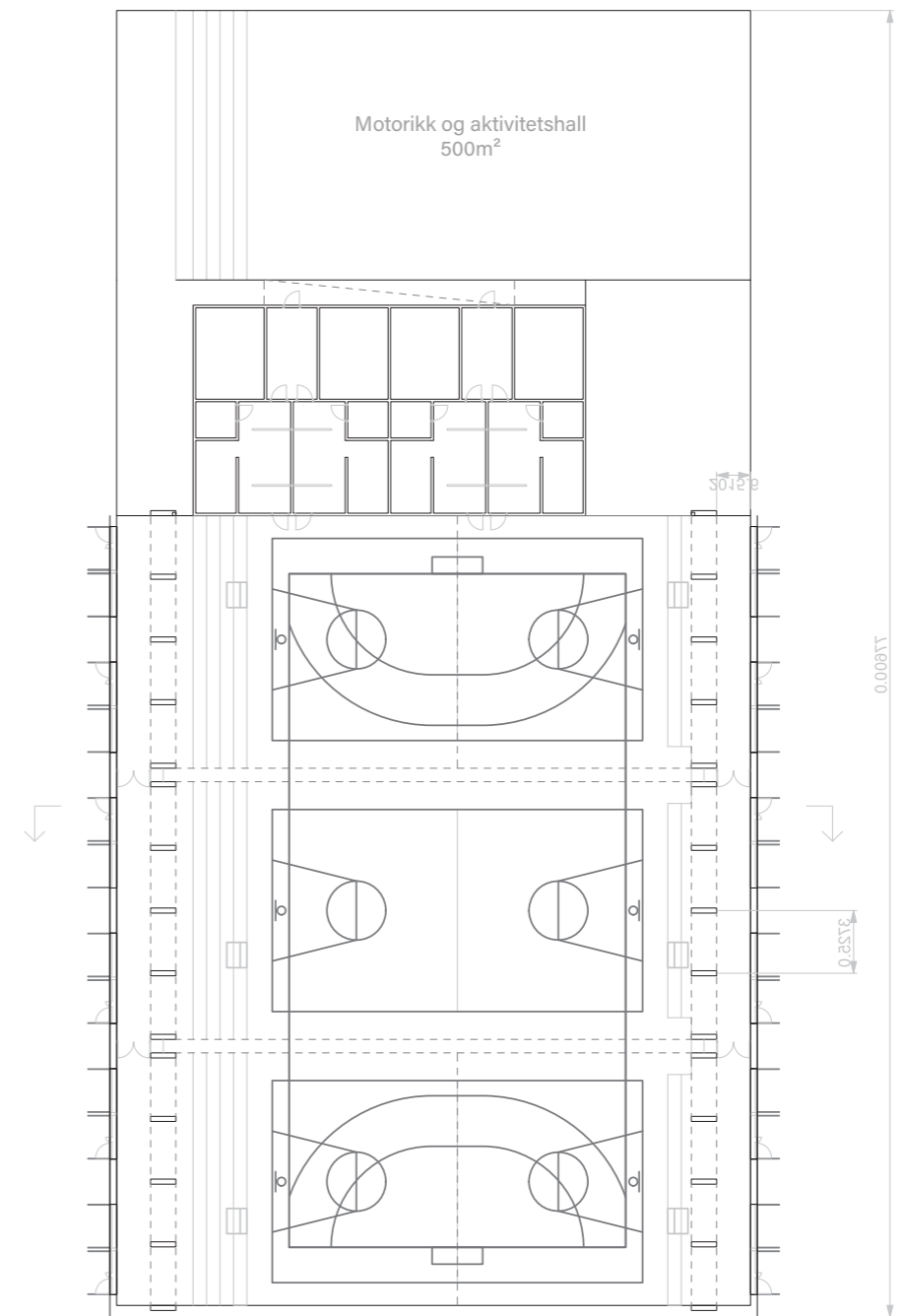
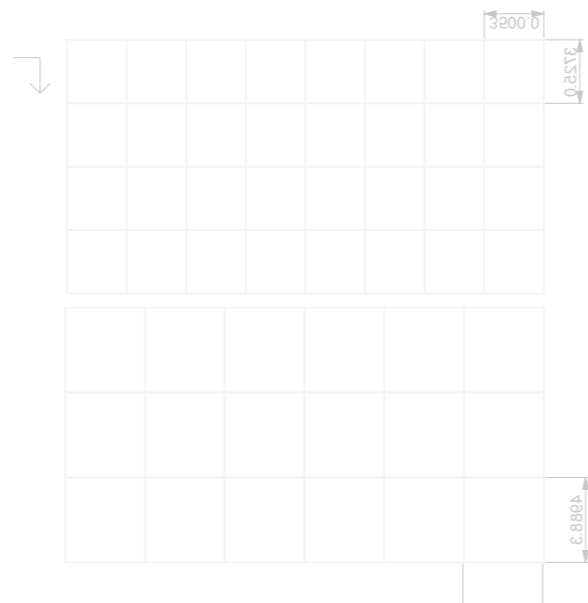
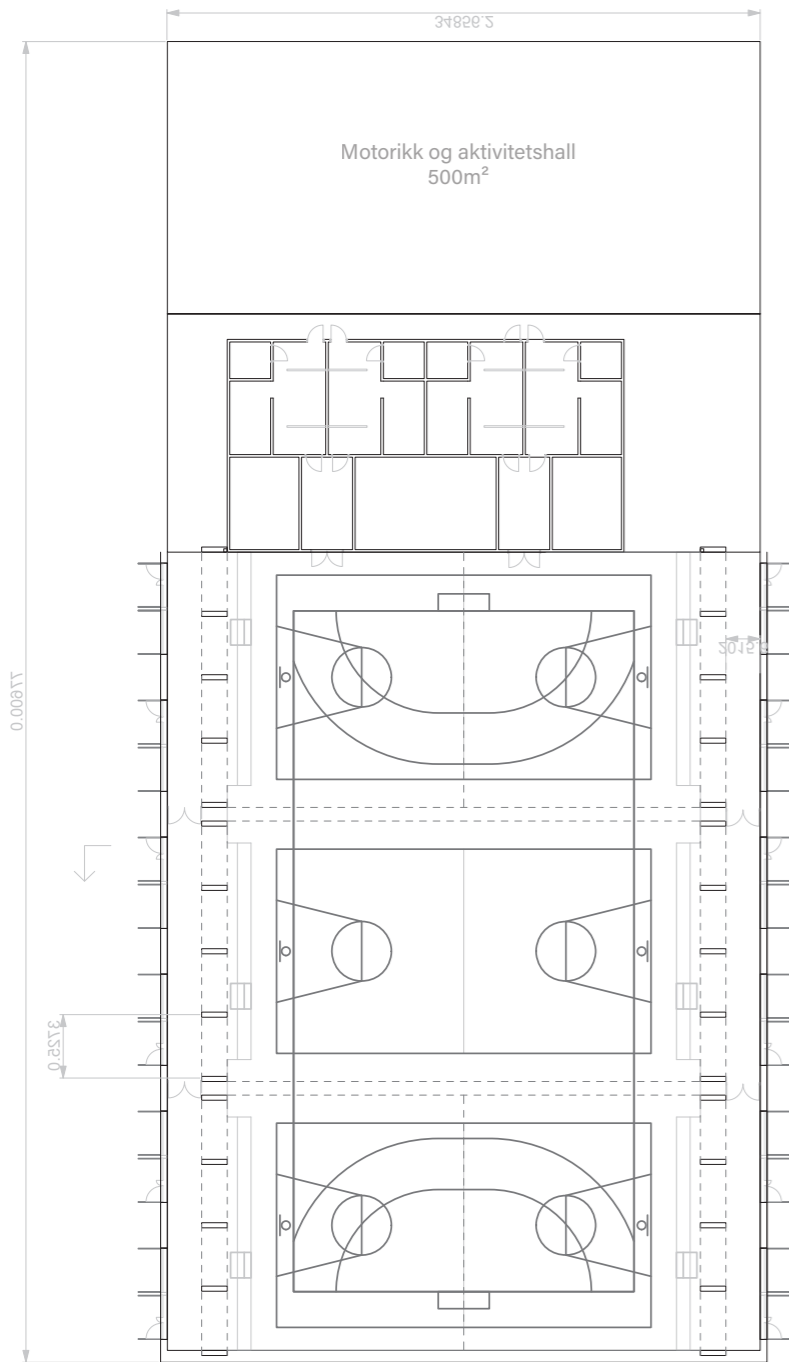
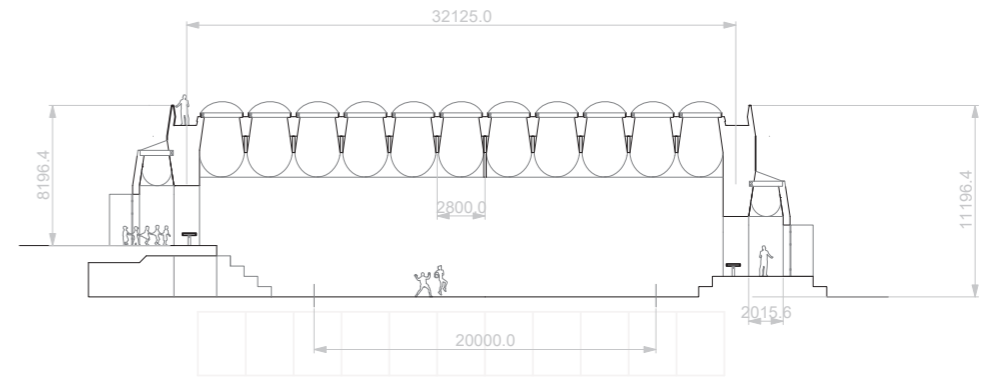


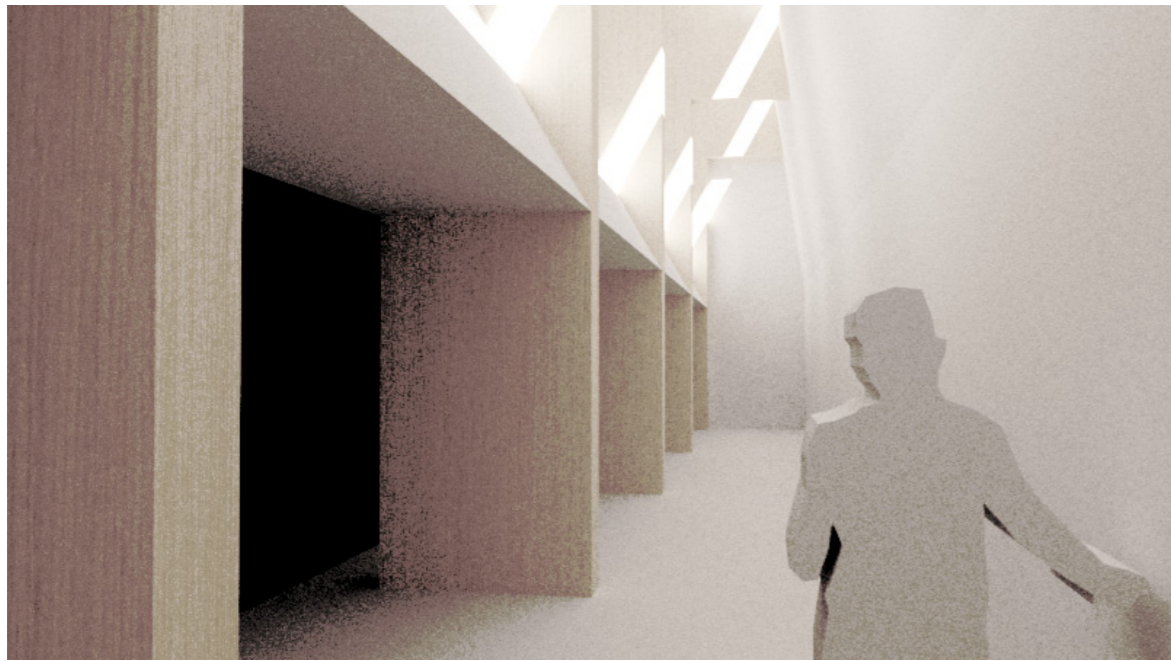
Time 18:00 - 21st of June



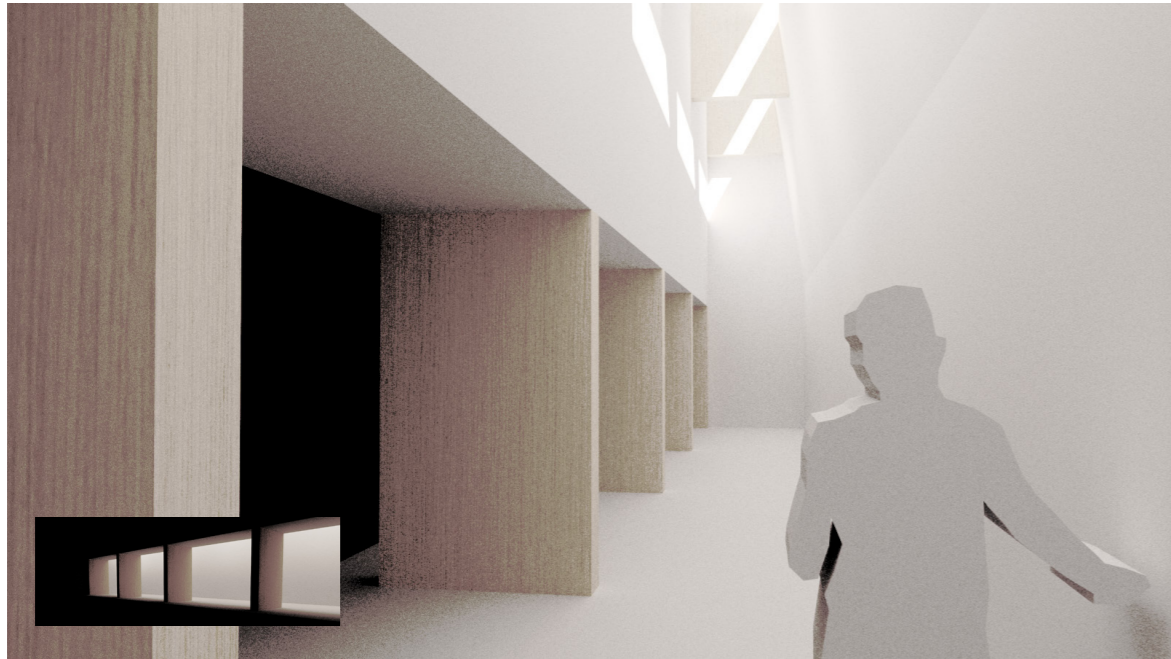


4687.0

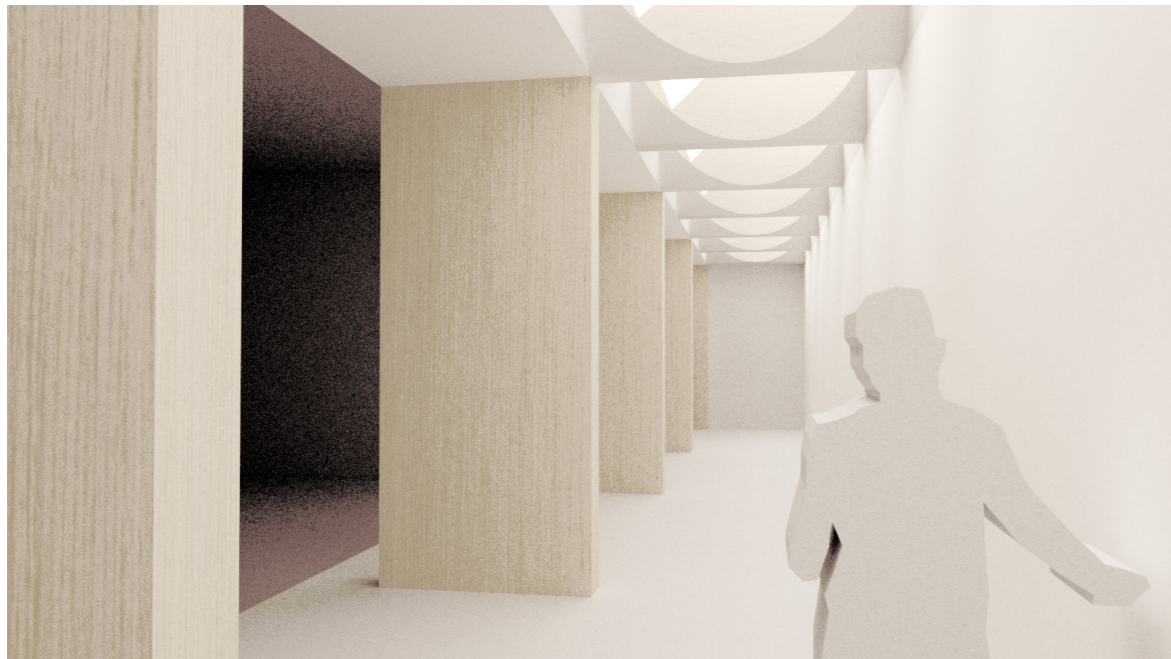




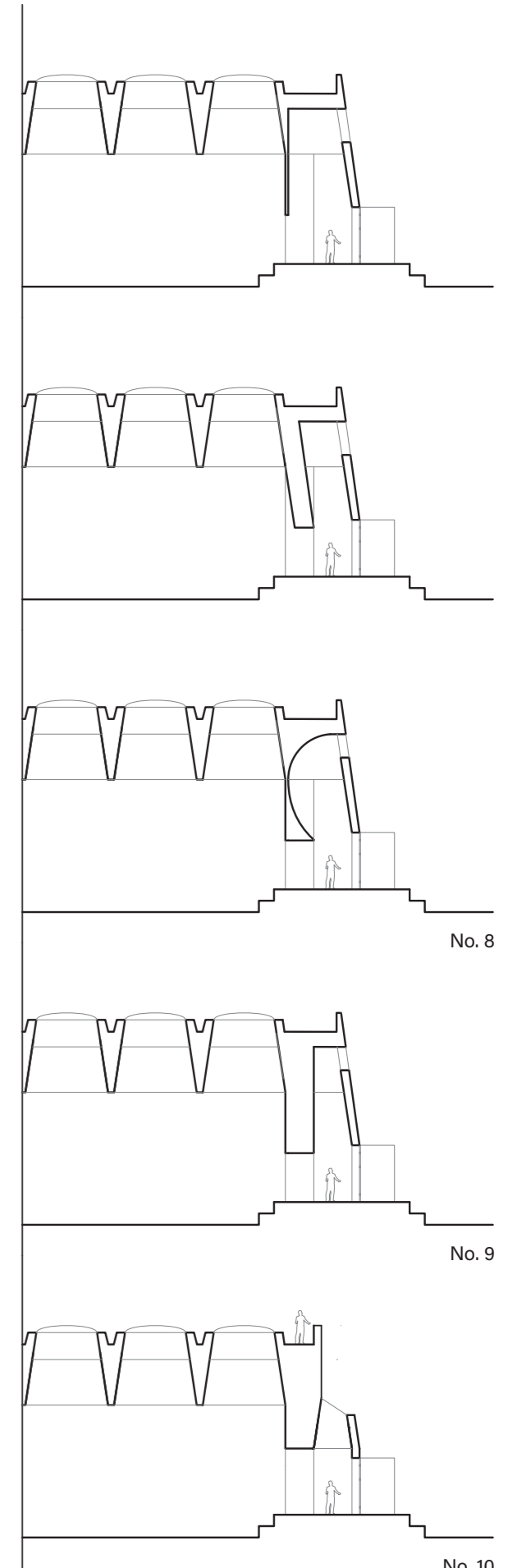
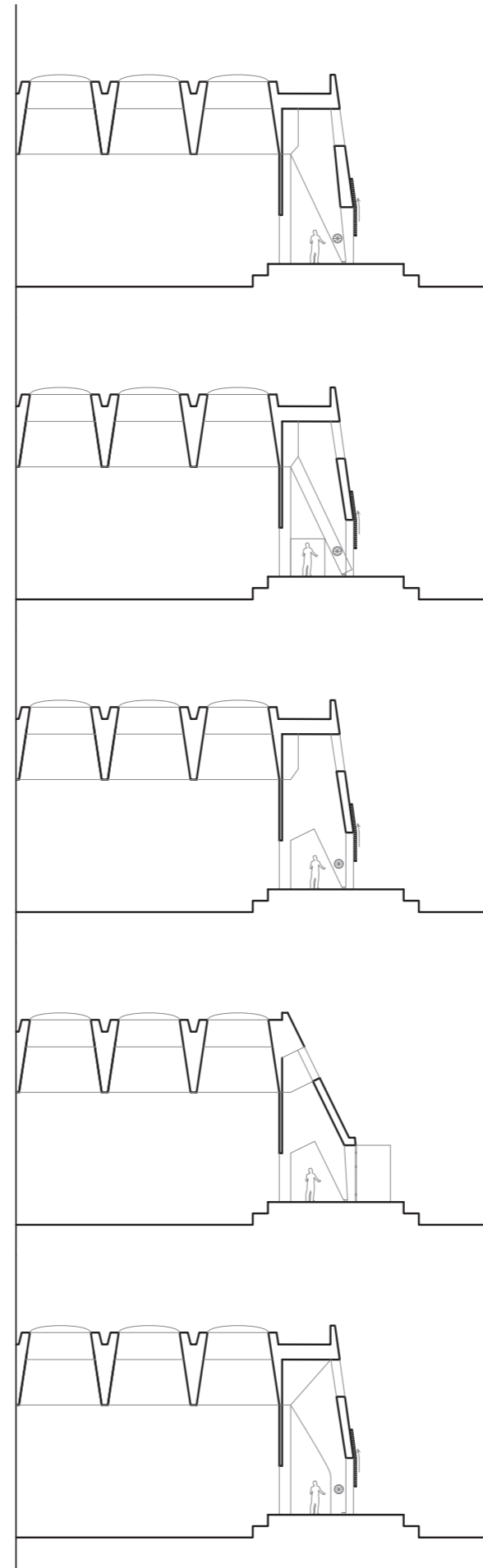
Number 8_Sun scoop - Time 10:30 - 21st of June



Number 9_Vertical wall - Time 10:30 - 21st of June



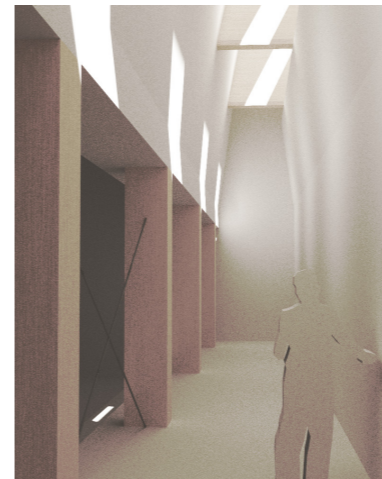
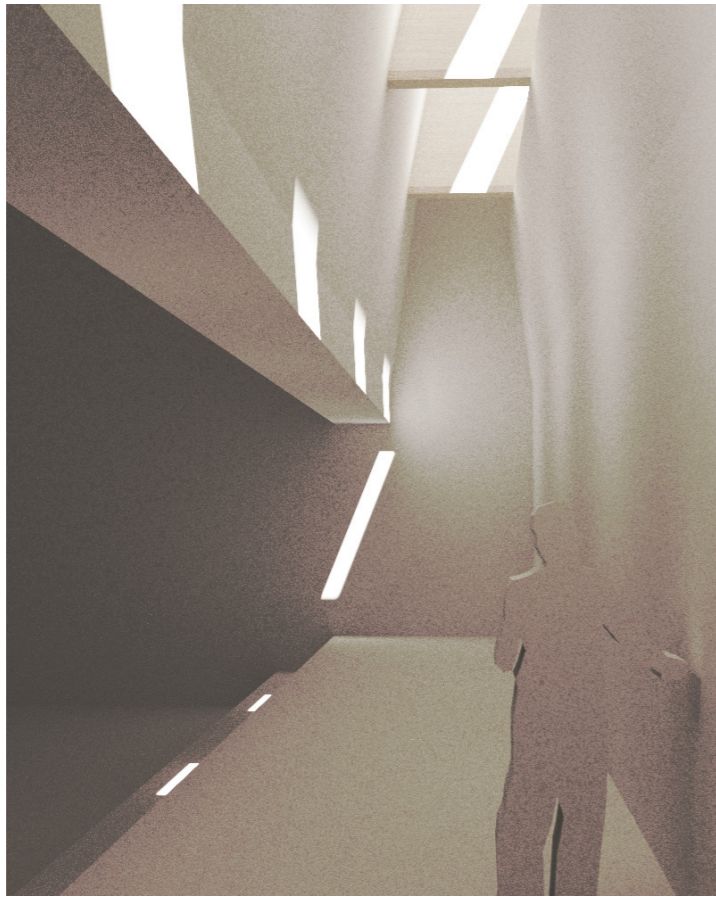
Number 10_skylight - Time 10:30 - 21st of June



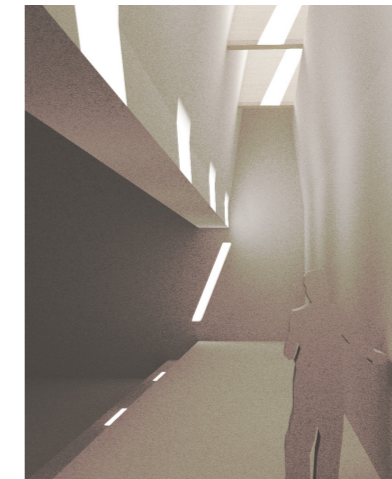
No. 8

No. 9

No. 10



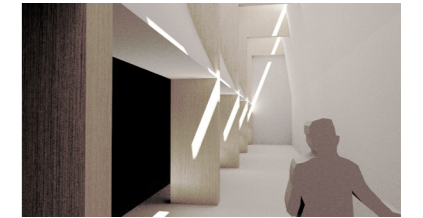
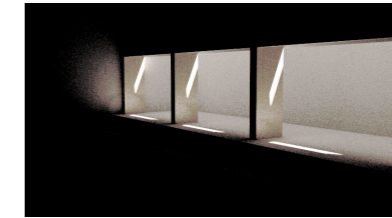
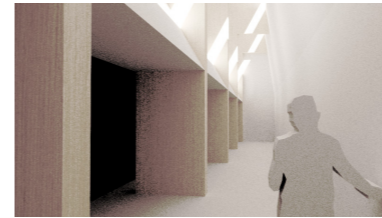
1_Clerestory window_10 July_12.00



1_Clerestory window_21 June_12.00



1_Clerestory window_21 June_12.00_With load carrying columns on the inside



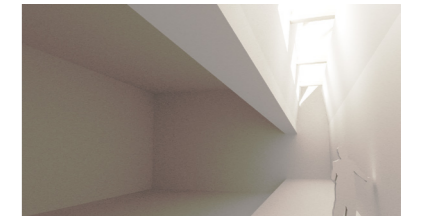
Facade:

Ceiling come down to block the direct sunlight from entering onto the hall surface.

Clerestory window_21st of June k110.30_1.5m columns_Sun scoop

Clerestory window_21st of June k111.00_Sun scoop

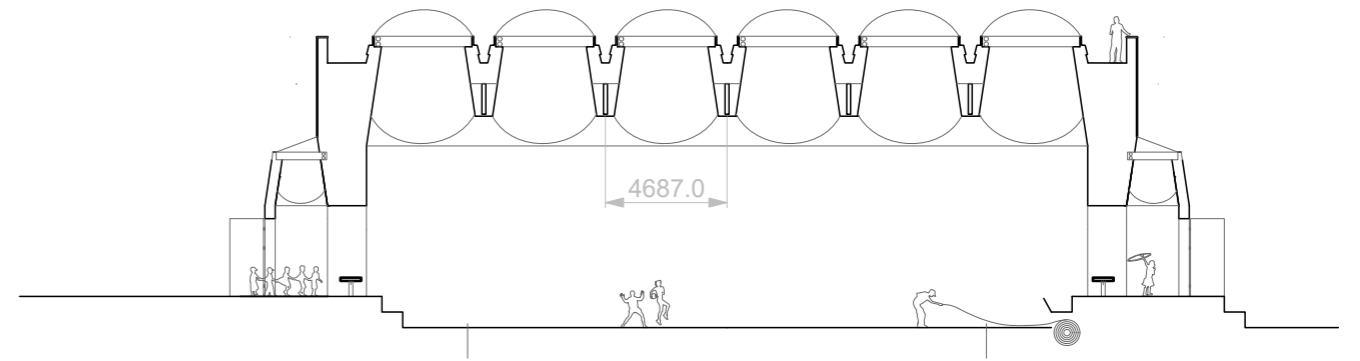
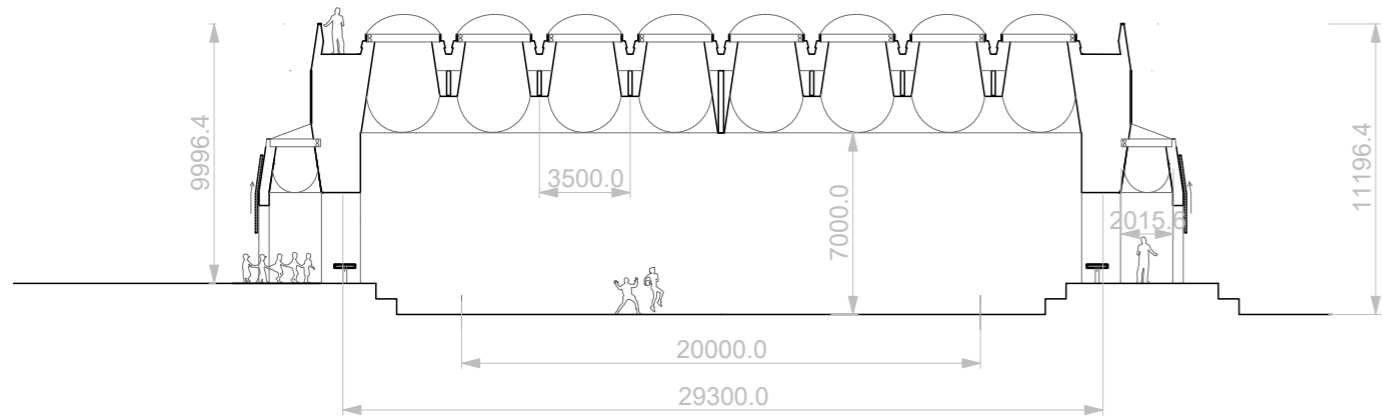
Clerestory window_21st of June k111.00_Sun scoop

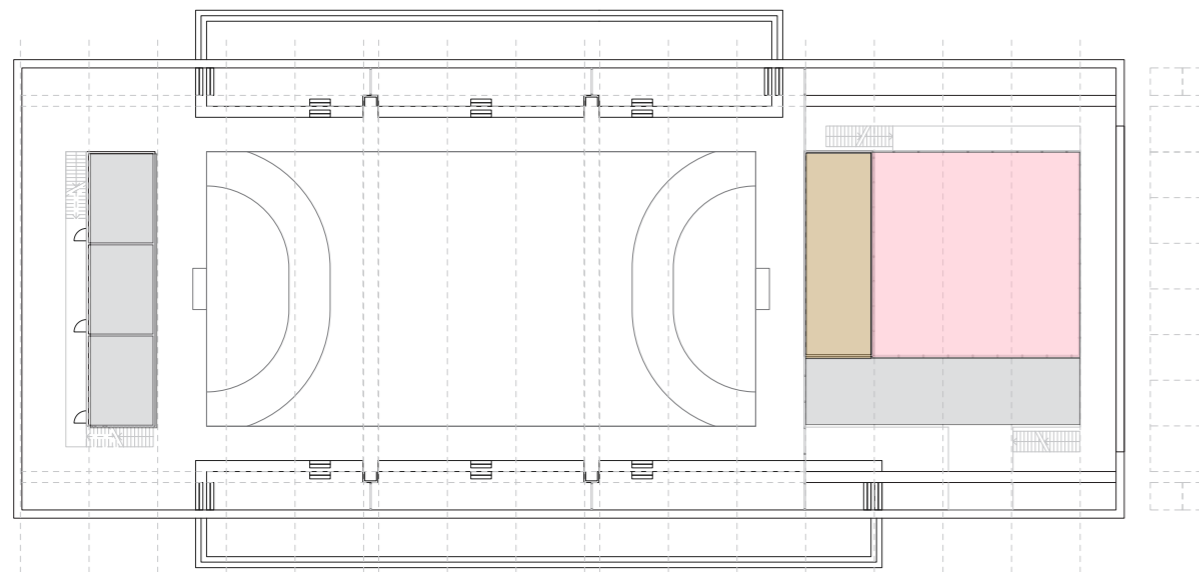


Clerestory window_21st of June k110.30_1.5m columns_Straight wall

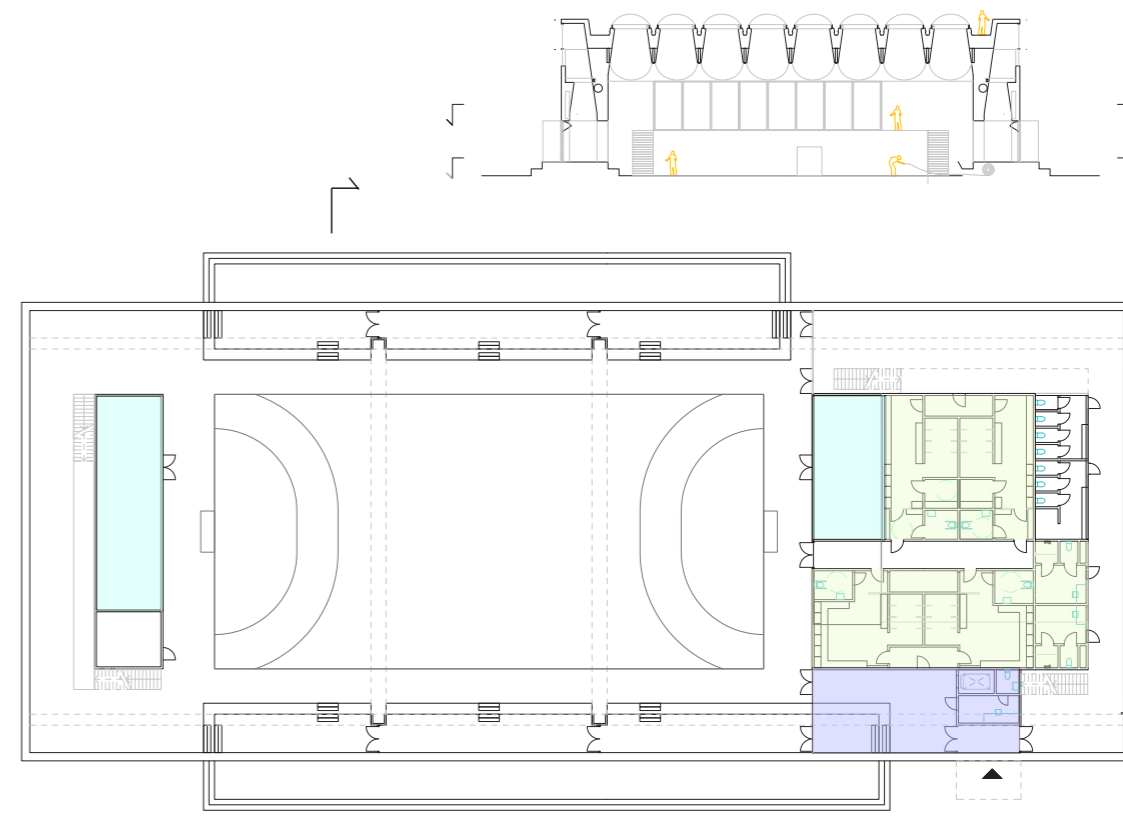
Clerestory window_21st of June k110.30_1.5m columns_Sun scoop

Clerestory window_Load carrying on outer wall





2nd floor.



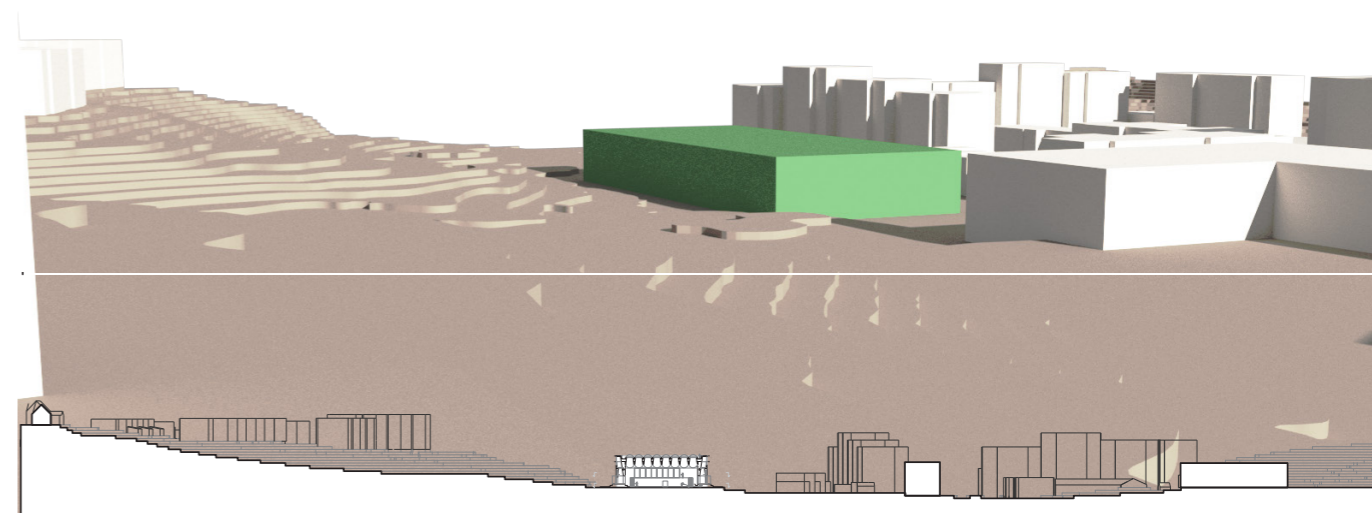
1st floor.

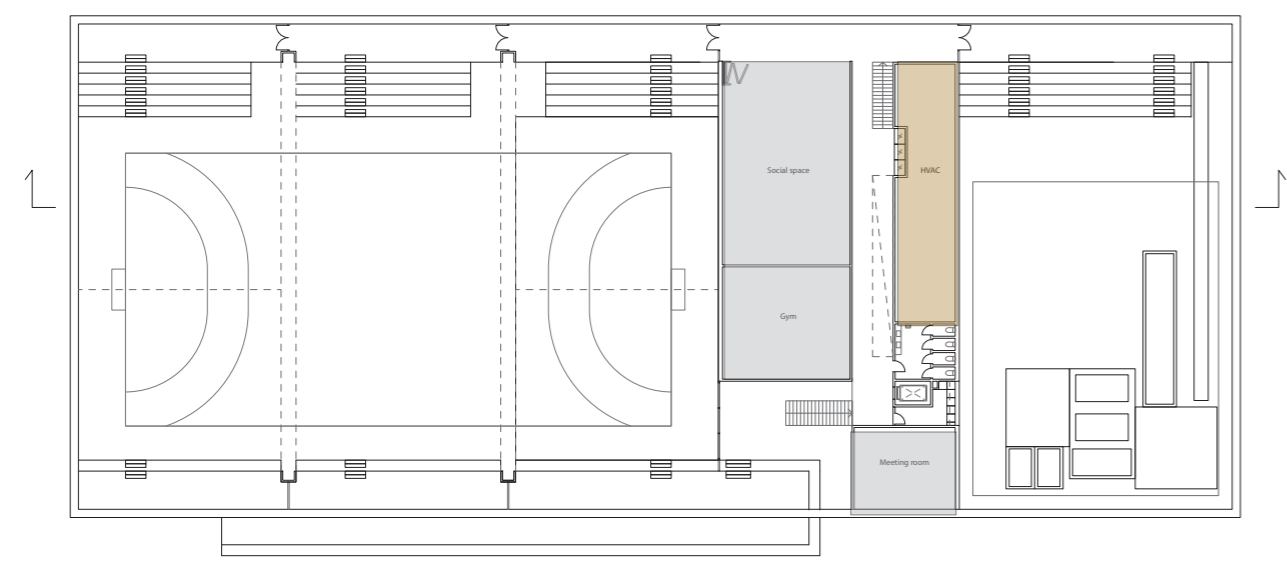
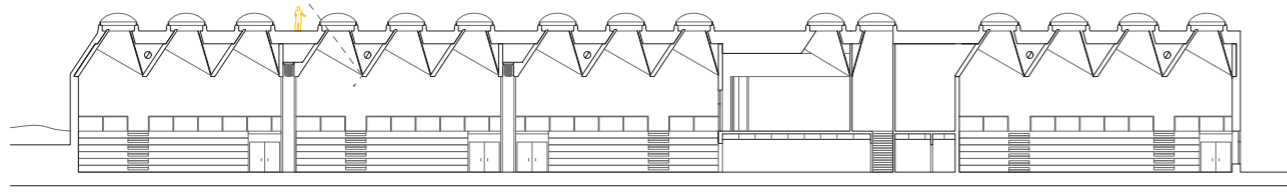


1 - Pavilion

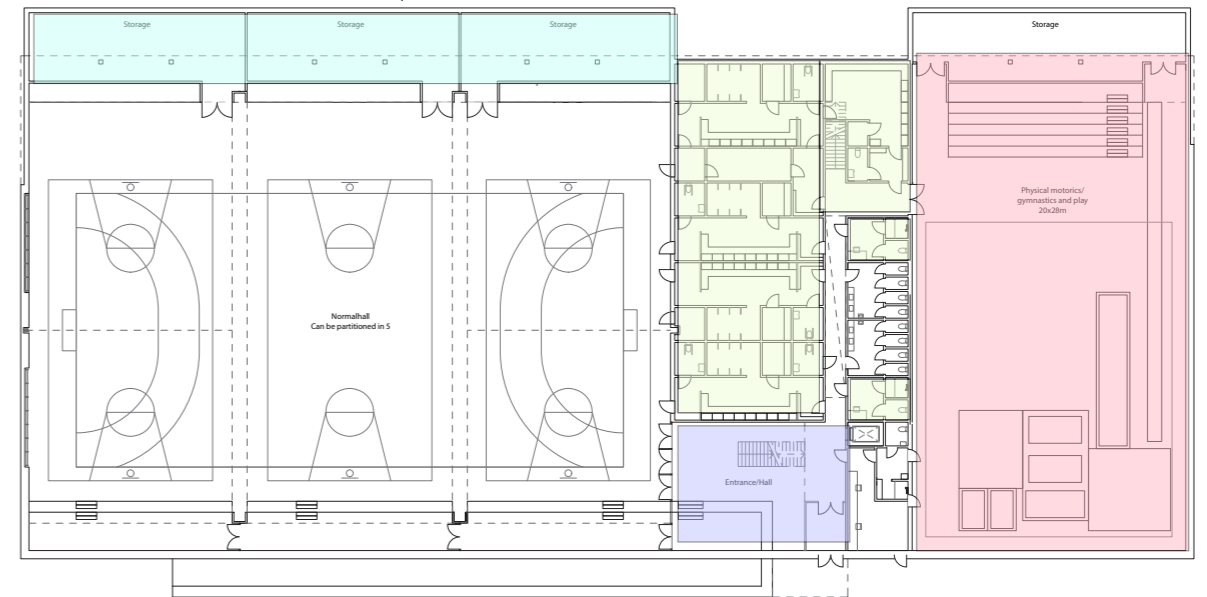
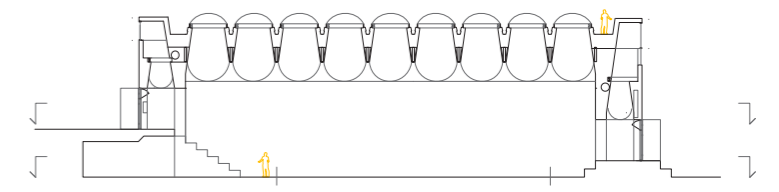
- The building stand on a flat surface
- Sightline is kept at eye level throughout to the park side
- Asymmetric light from east and west clerestory windows.
- Program follow the skylight grid
- End wall opens with a large vertical window to the north

- Wardrobe
- Storage
- Entrance
- Dance space (15x15m)
- Social space
- Technical room





2nd floor.



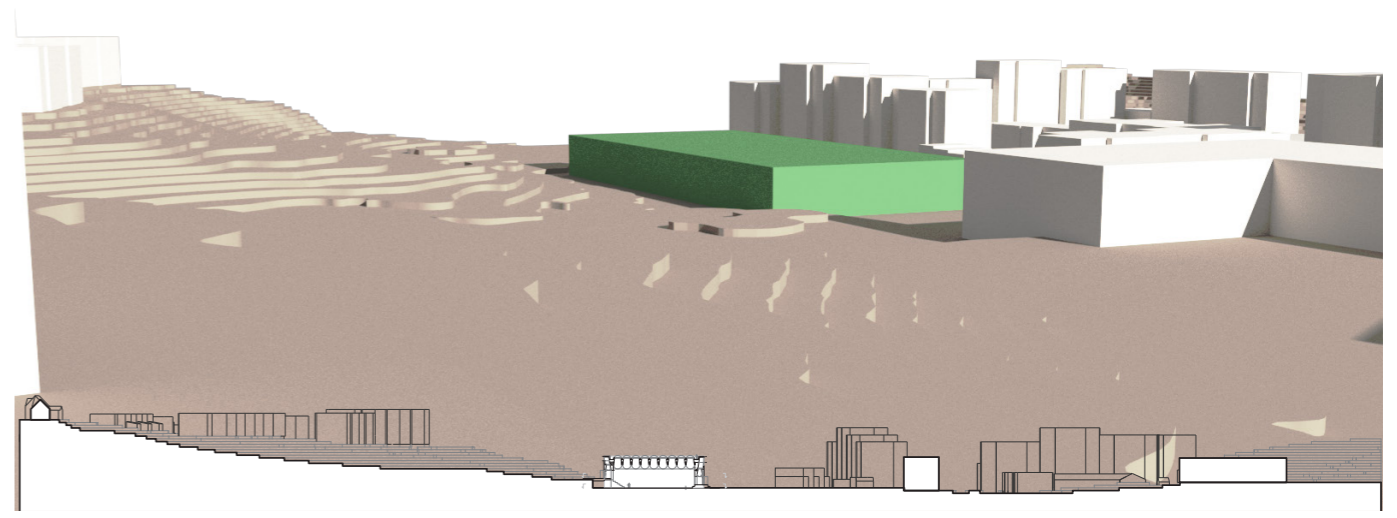
1st floor.

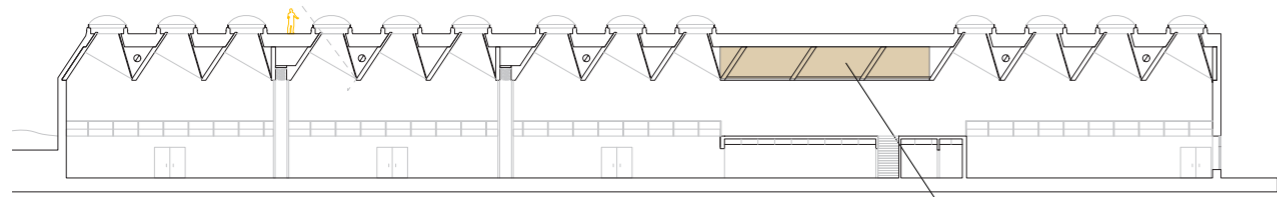


2.1 - Negotiating park terrain

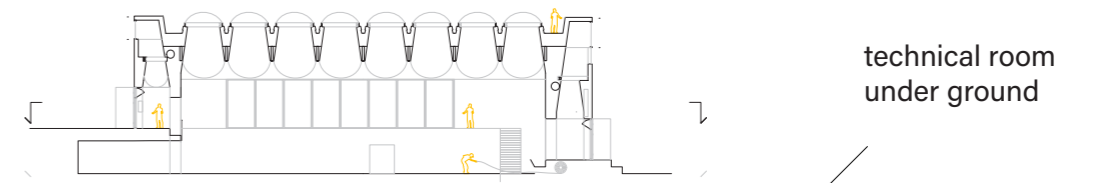
- A site specific character
- Split level create a gallery version
- Storage are handled under ground
- Fits a fourth multi purpose hall
- Asymmetric light from east and west clerestory windows.

- Wardrobe
- Storage
- Entrance
- Gymnastics and play
- Social space
- Technical room

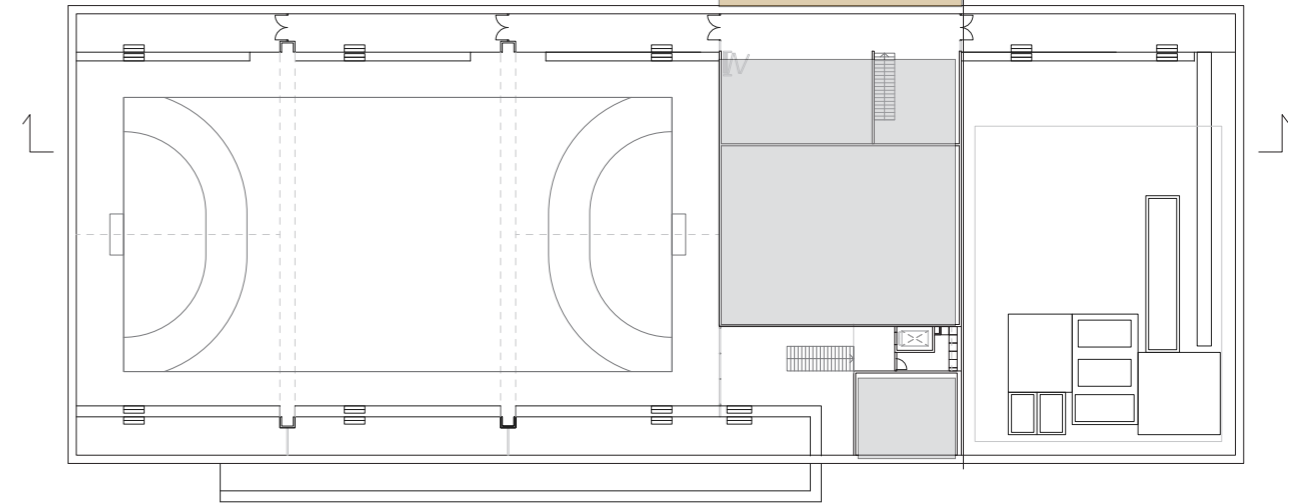




technical room
in ceiling (2.4m height)



technical room
under ground





2nd floor.

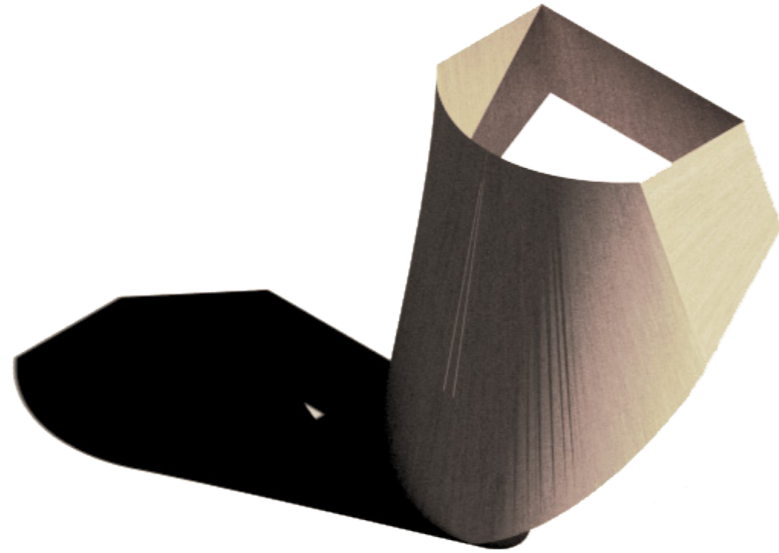


2.2 - Negotiating park terrain

The width can be reduced by removing the telescope tribunes. That would give the same width as the pavilion- version.

- The ceiling can be continuous
- Here shown with technical rooms stored in the ceiling. The storage room could be dug down with storage (to-rage shown on previous page) under ground in order to continue the skylights as a uniform ceiling.

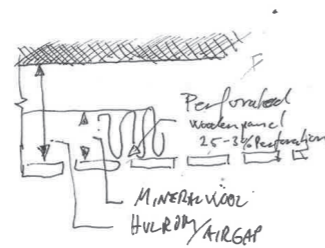
-  Social space
-  Technical room



Bent wood_MIT_KERF pavilion - seating constellation

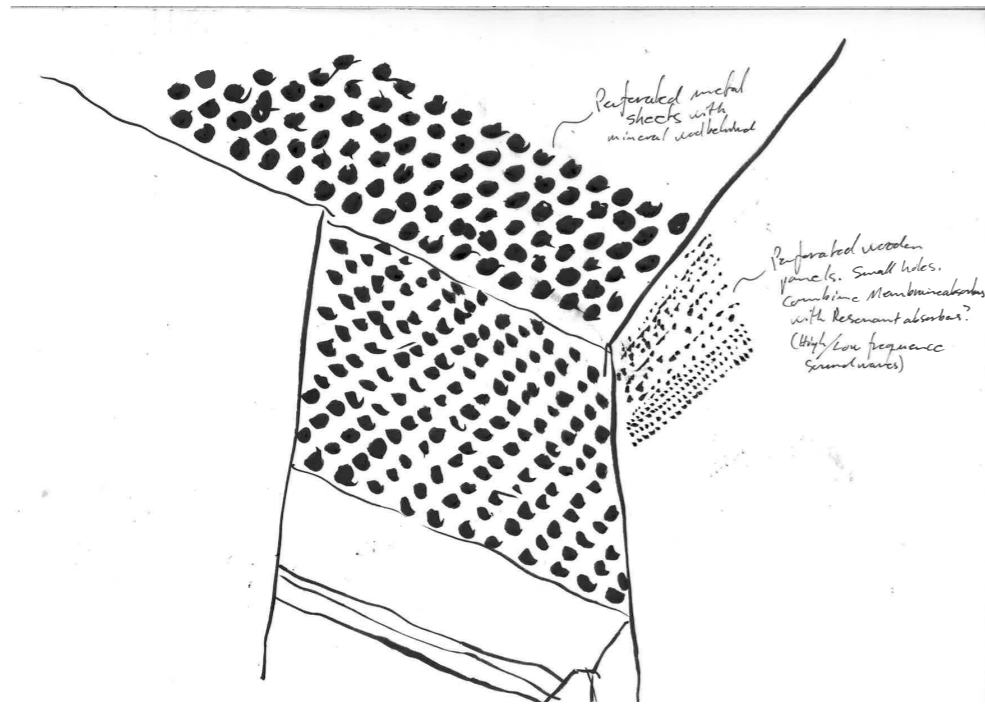
Acoustics:

Ceiling module can be folded by cnc cutting (kerfing) wood plates. Held together with clamps or mounted onto a wooden ratchet in each void. The kerfing of the plates would also work as acoustic perforations with mineral wool in the back.



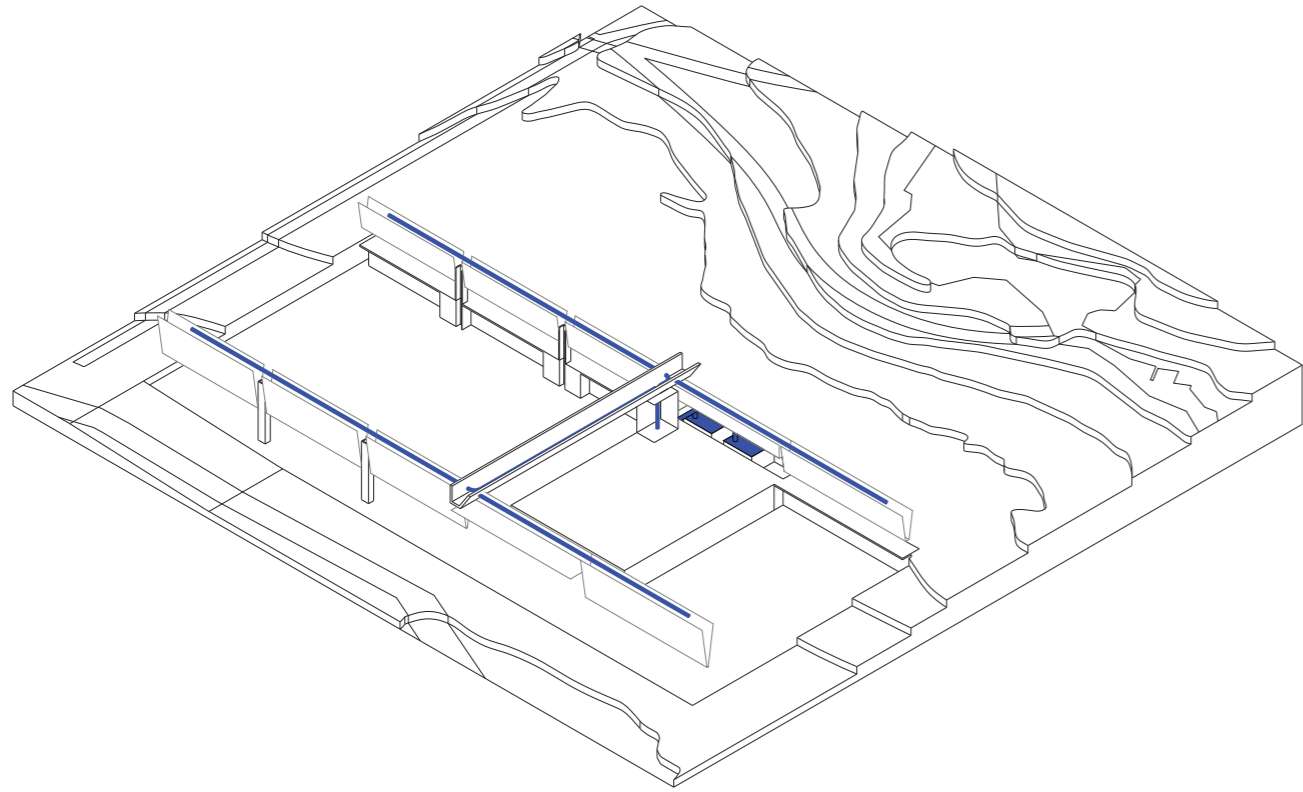
Walls and ceiling can be covered with acoustic absorbants. Perforated metal sheets and perforated wooden panels.

Acoustics: Perforated membrane absorbant

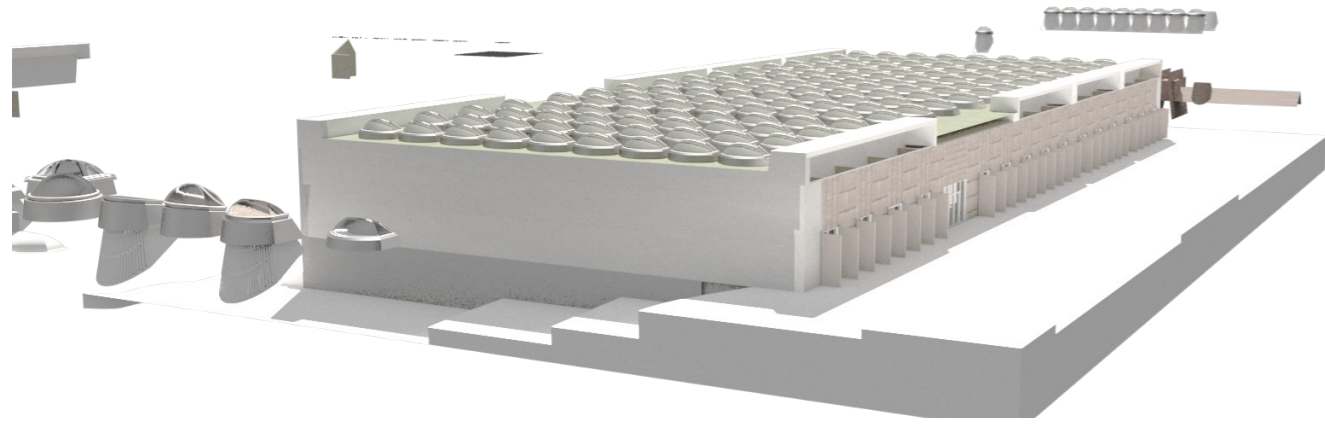


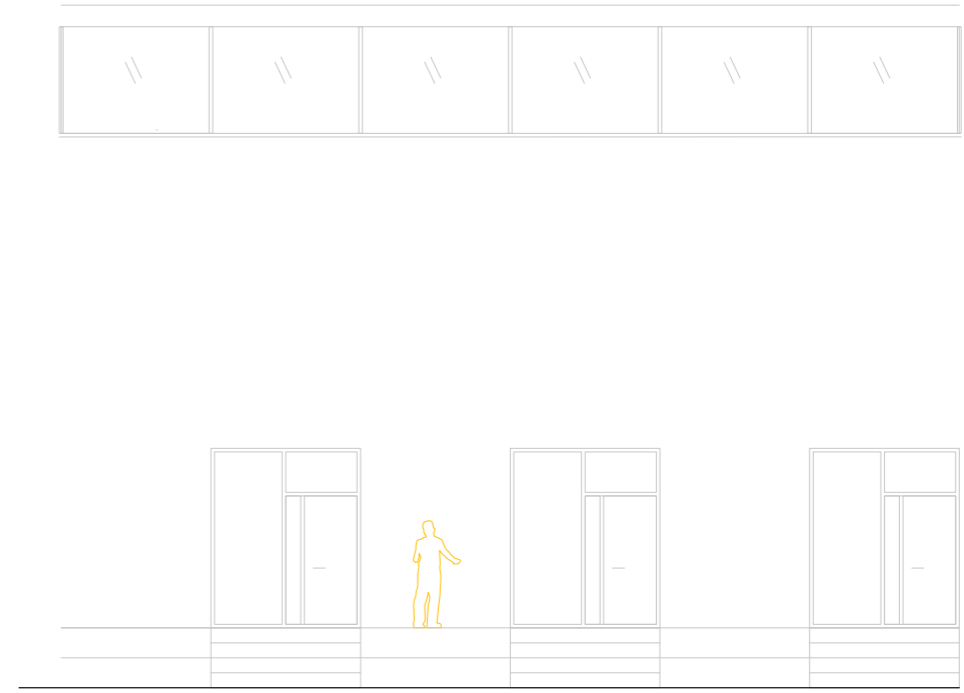
Facade:

Ceiling come down to block the direct sunlight from entering onto the hall surface.



Mechanical ventilation system

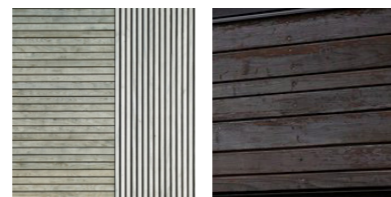




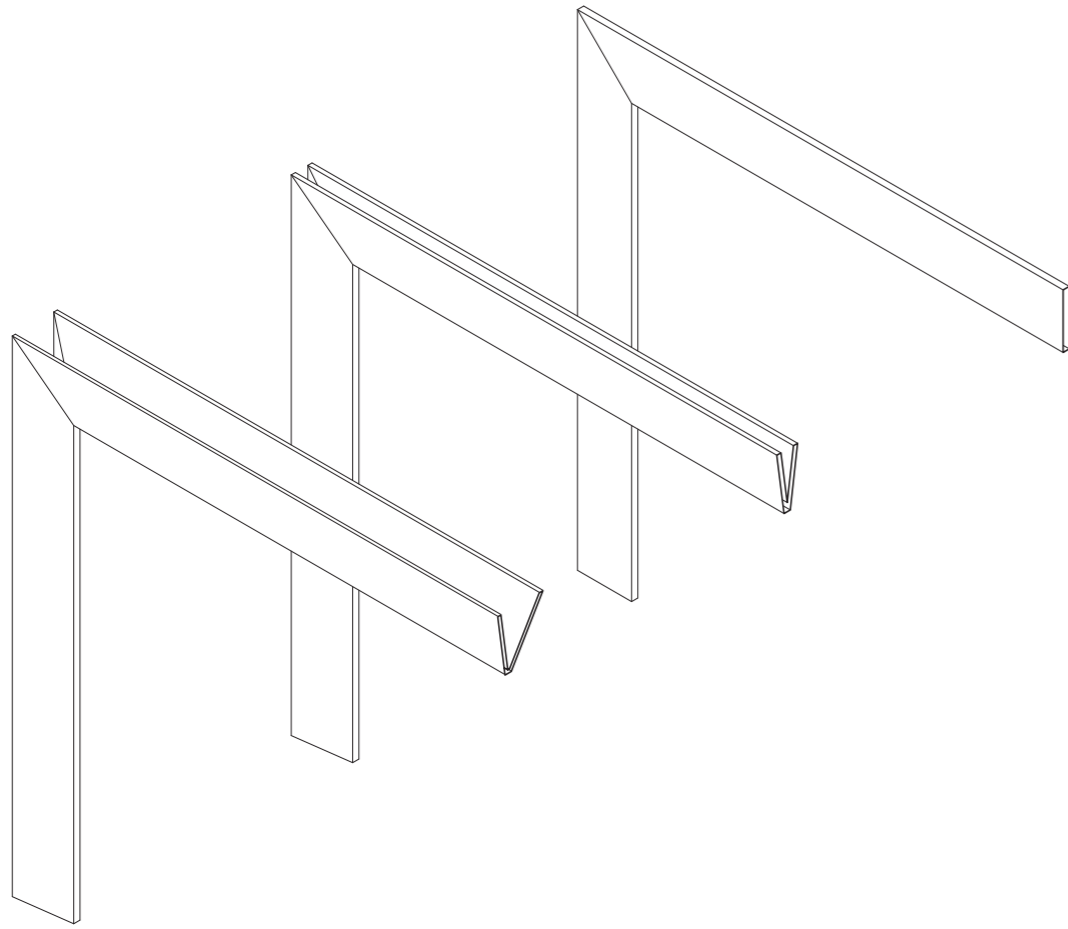
Facade:

Wooden panels to bring a human scale into the facade. Changing direction of the panels or change in width may also help divide up the facade.

Carbonized pine wood could be an option.

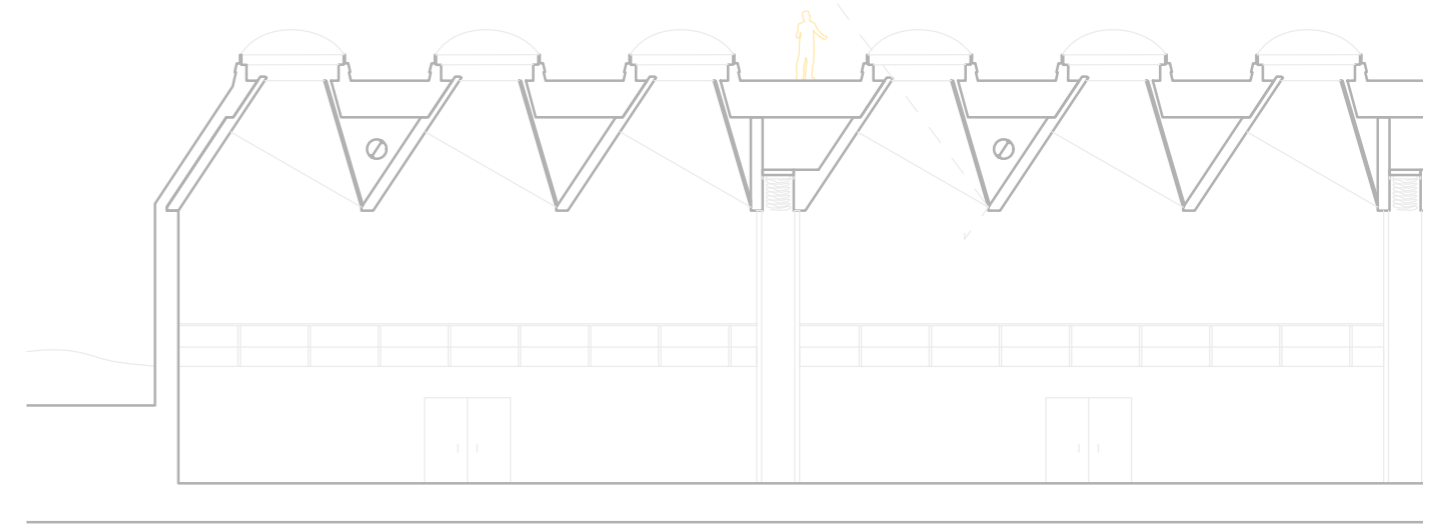


Acoustics: Perforated membrane absorbant



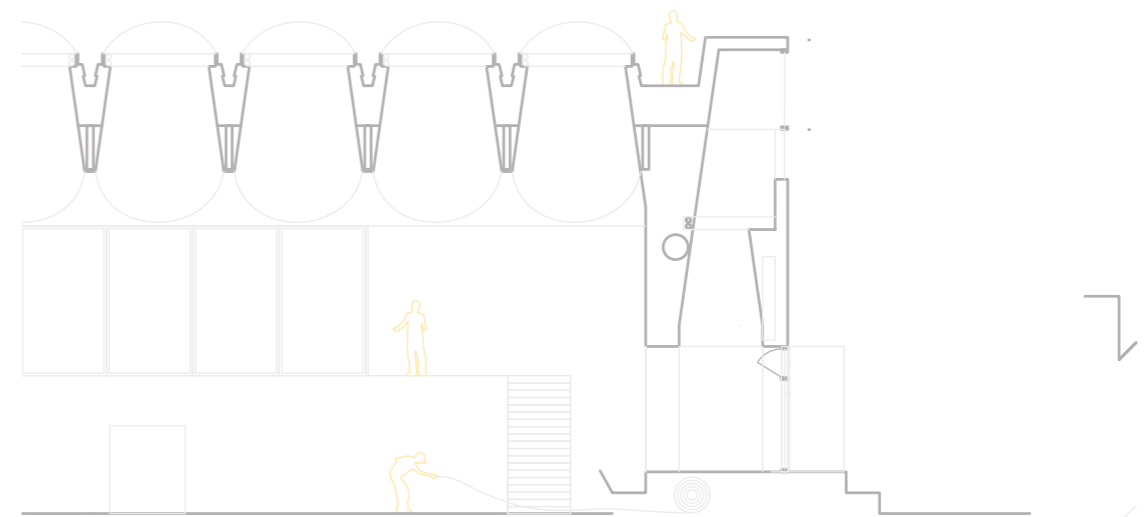
Structural idea: could the beam also become the load carrying columns?
The angle of the columns would be beneficial in that the angle opens up towards north.

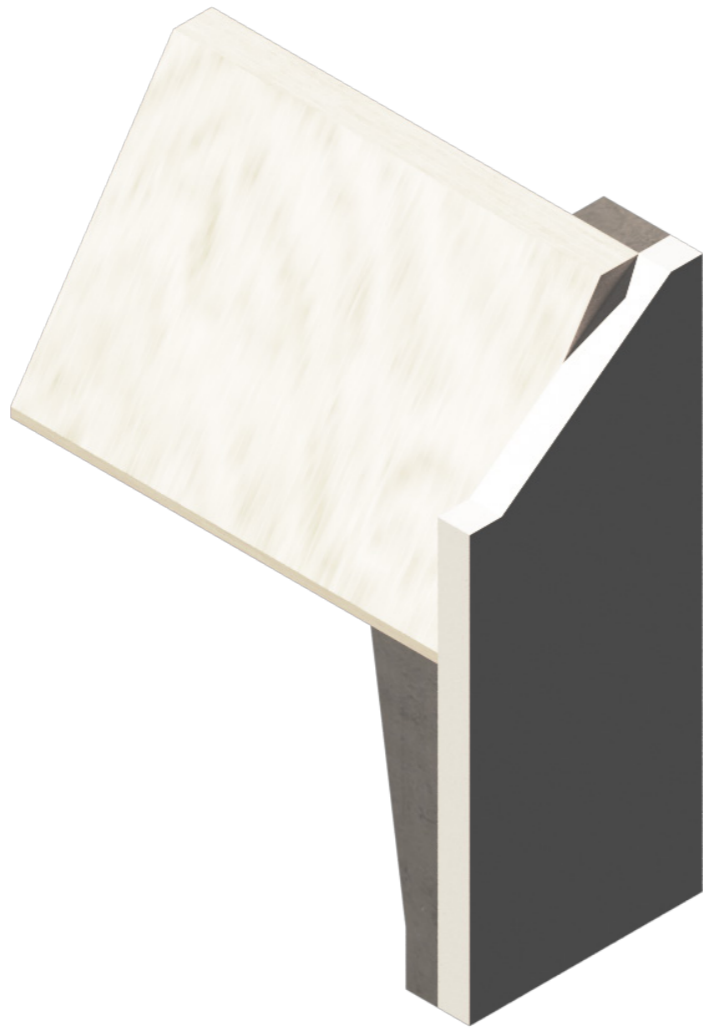
Minus: Technical installations would not be accessible



Facade:

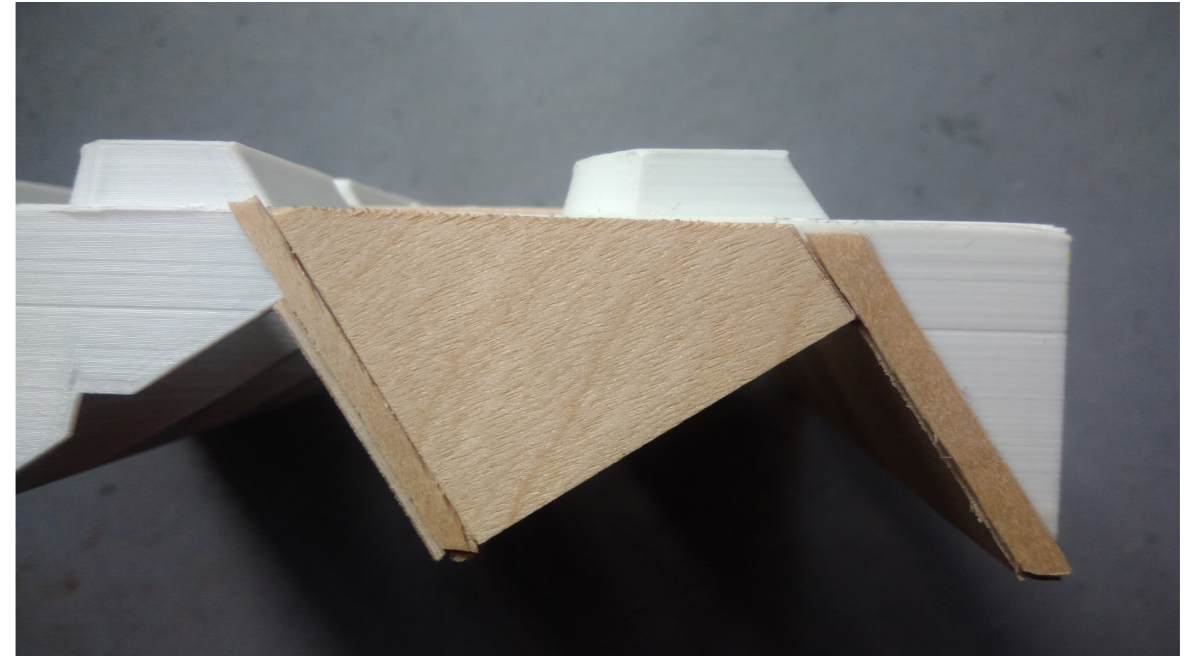
Front view of the east facade. Experiments in wood panels for the facade. Changing directions may express the nature of the construction and may also help break down the scale of the building.



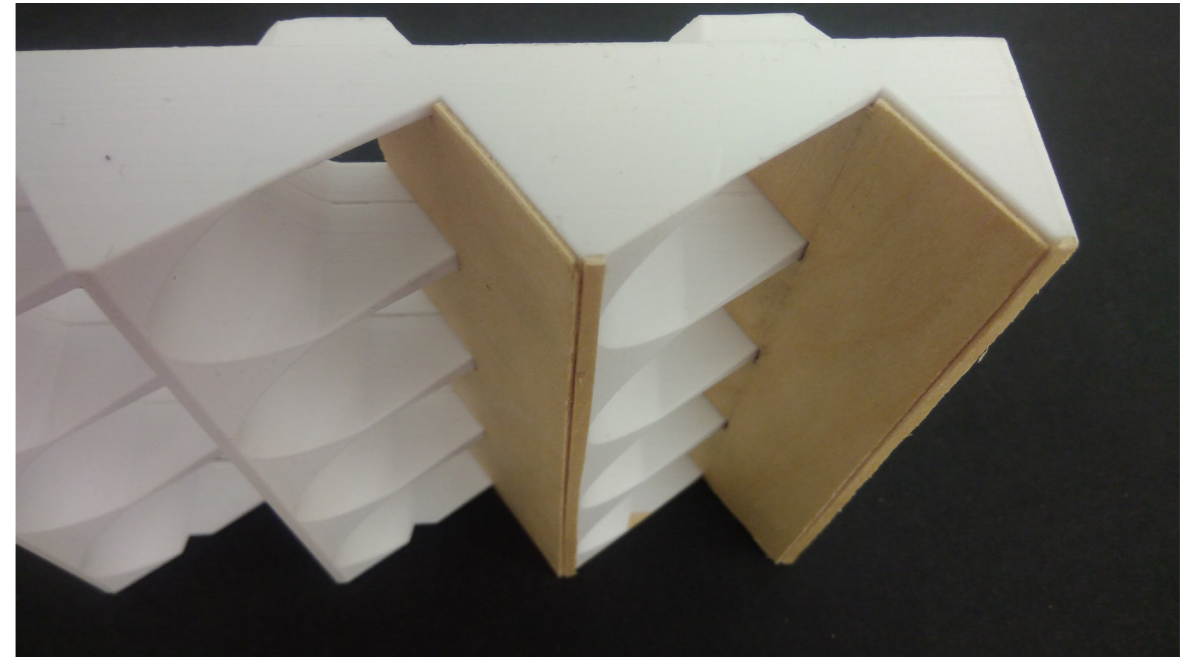


Beam resting on concrete wall elements

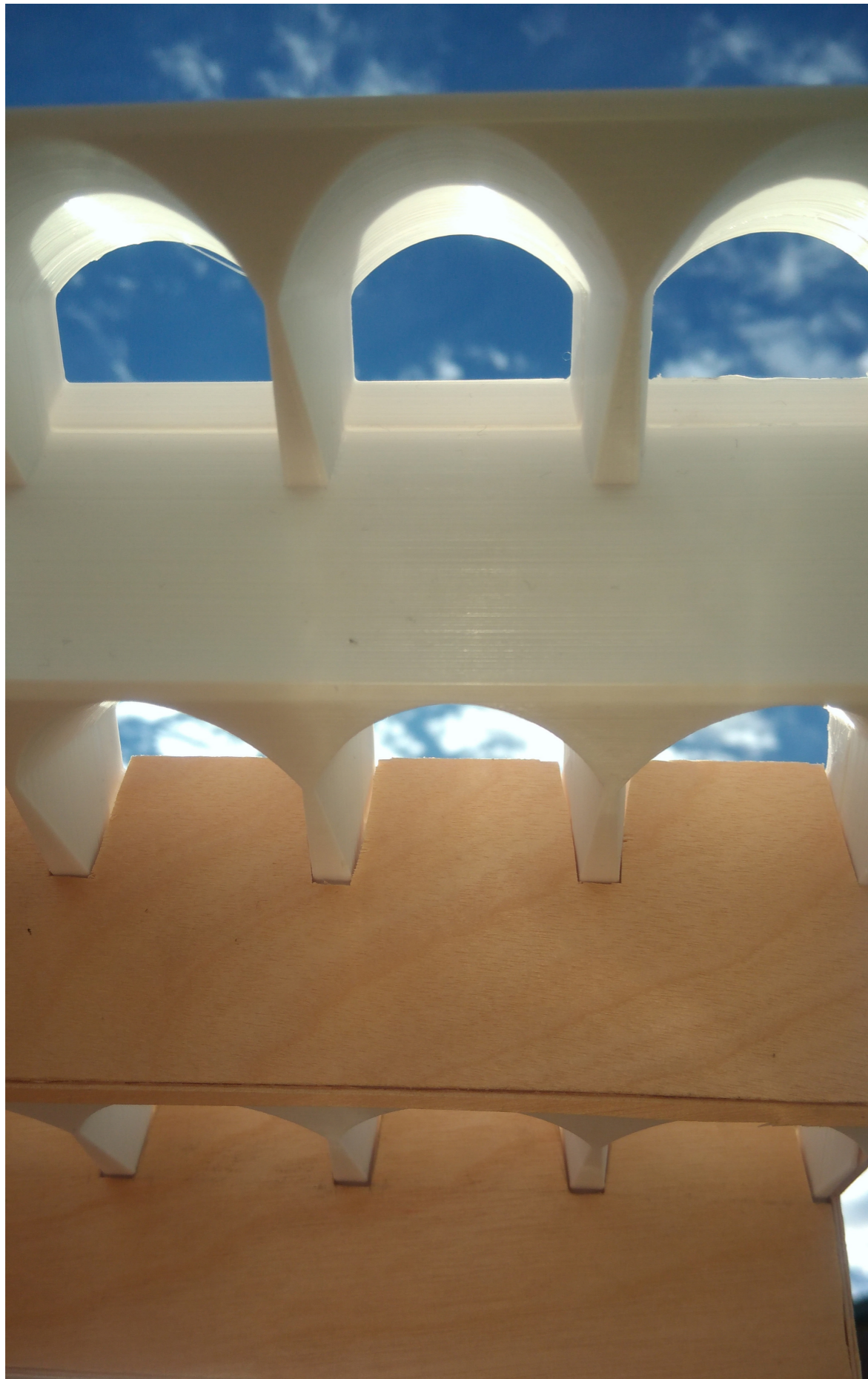
Allows me to bring light inside from clerestory windows.

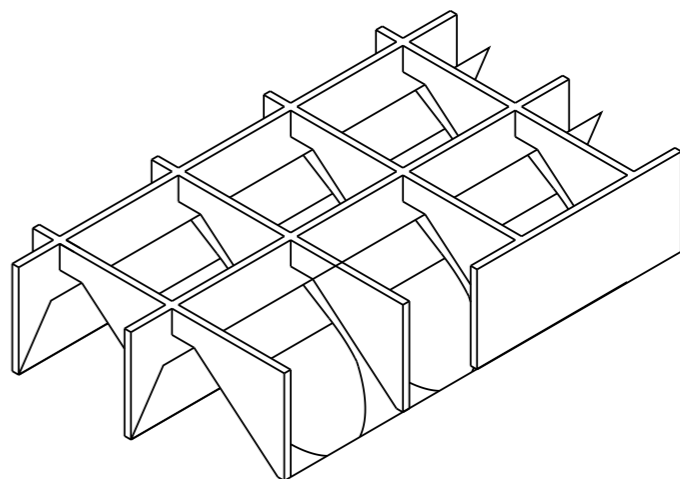
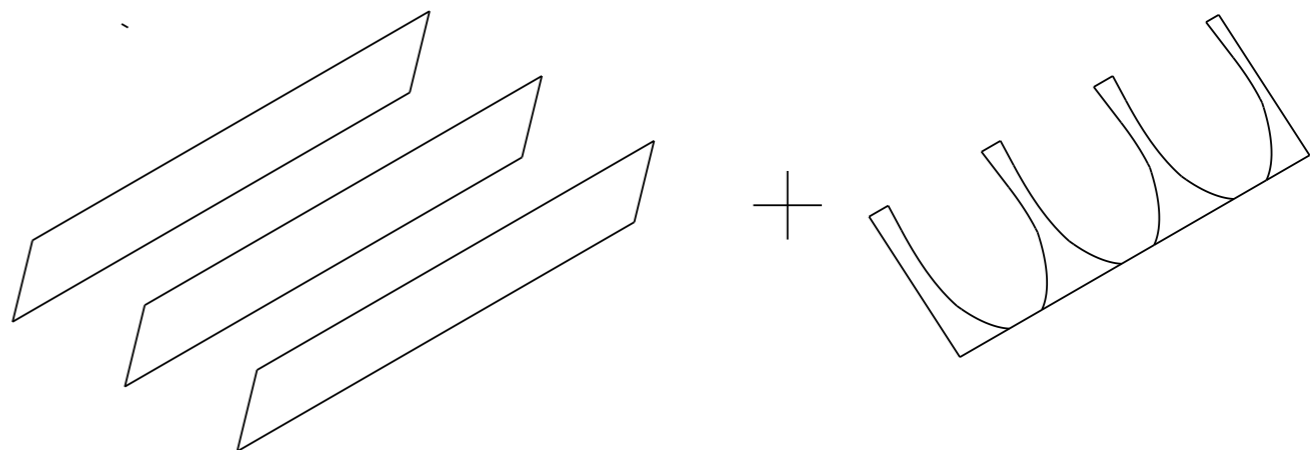
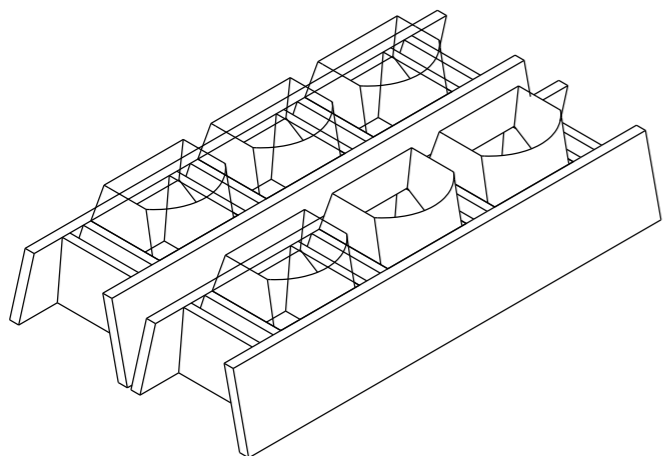
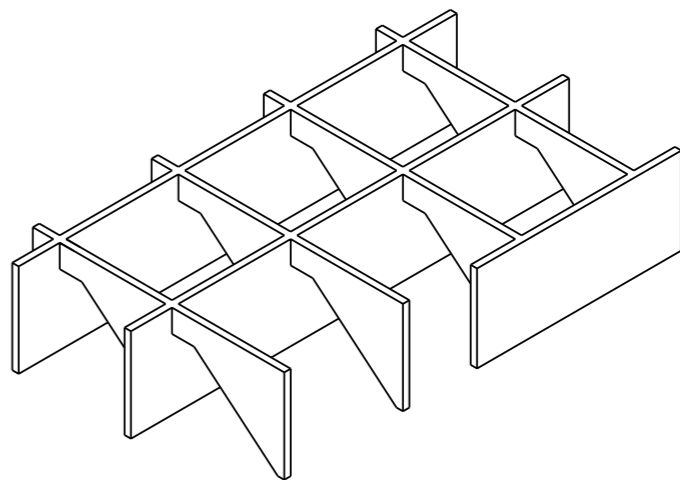
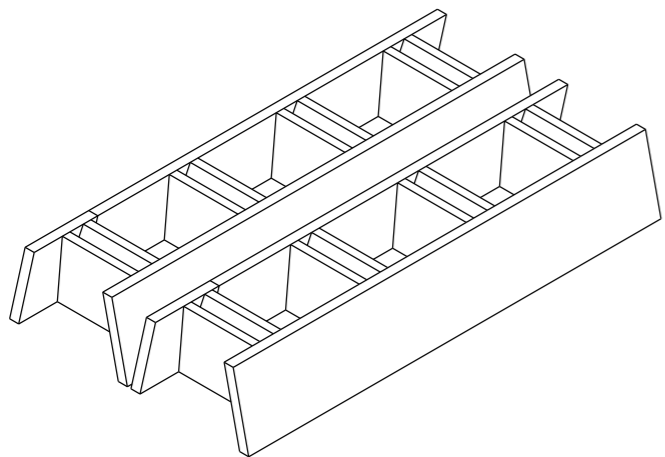
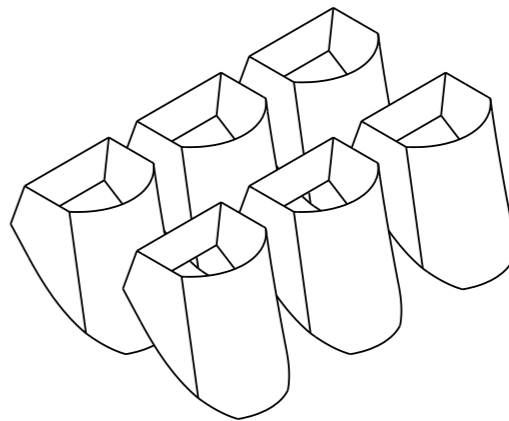
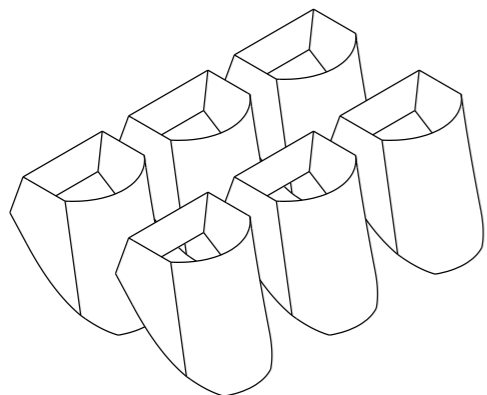


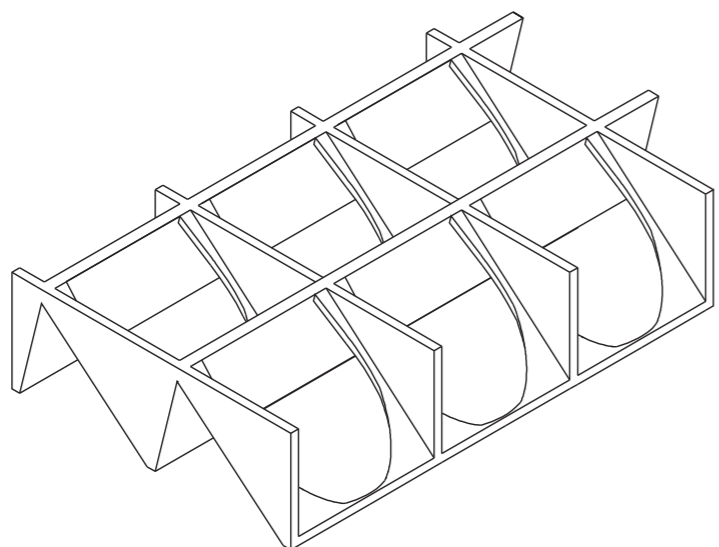
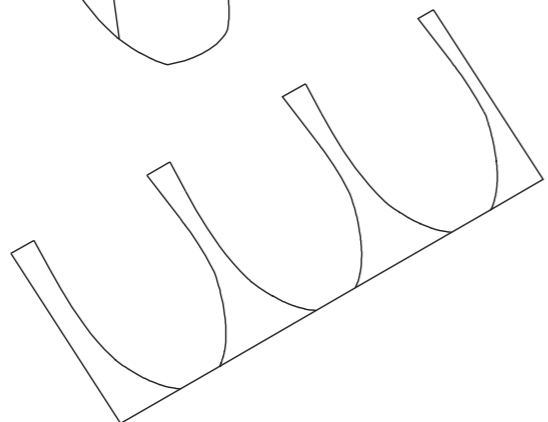
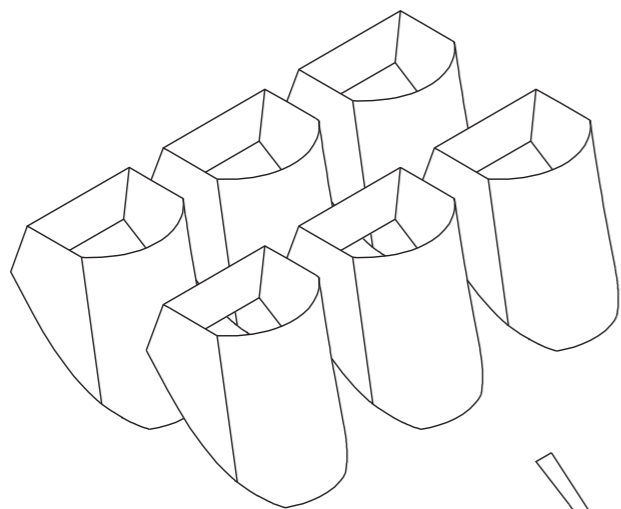
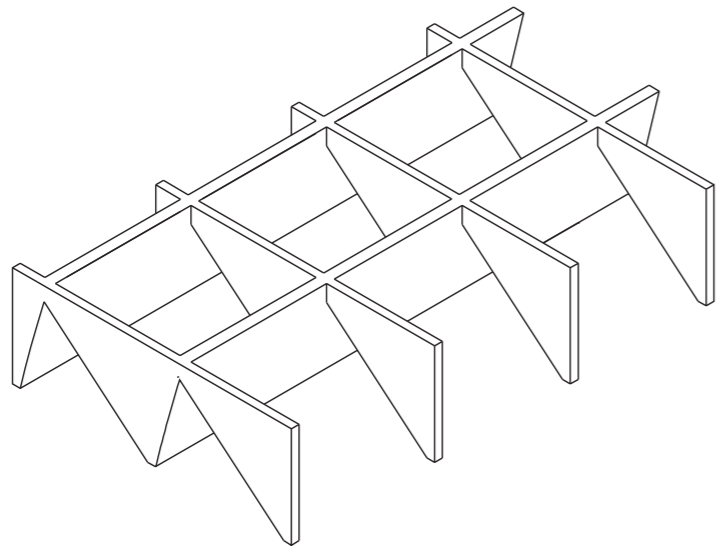
Beam and wooden triangle

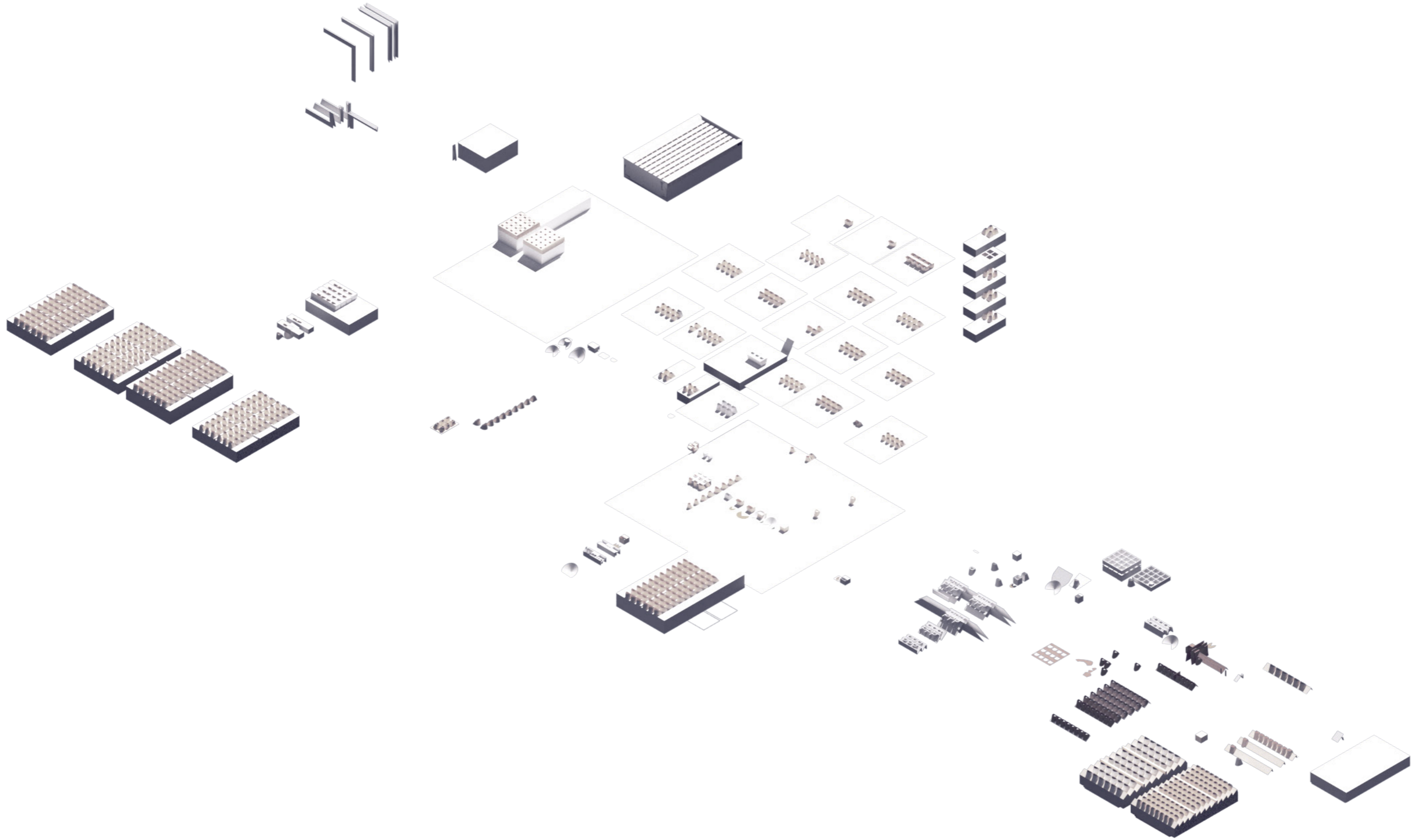


Load bearing beams



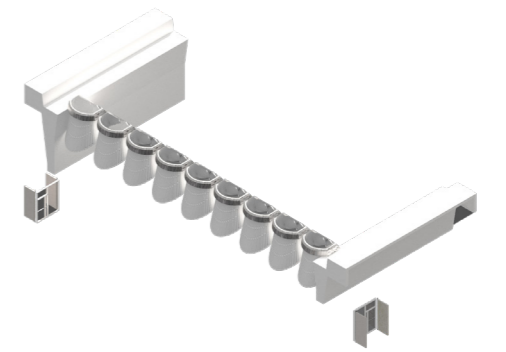


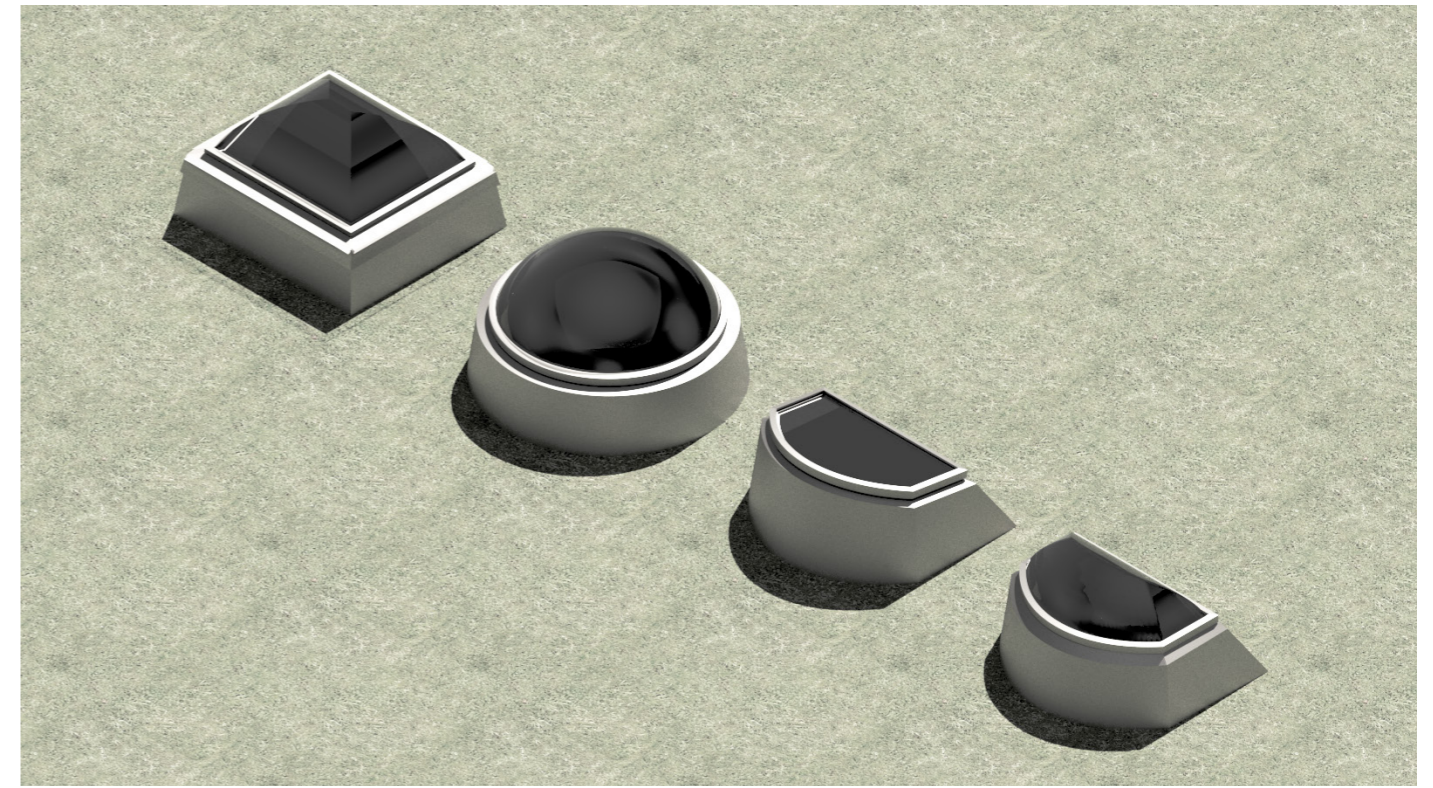
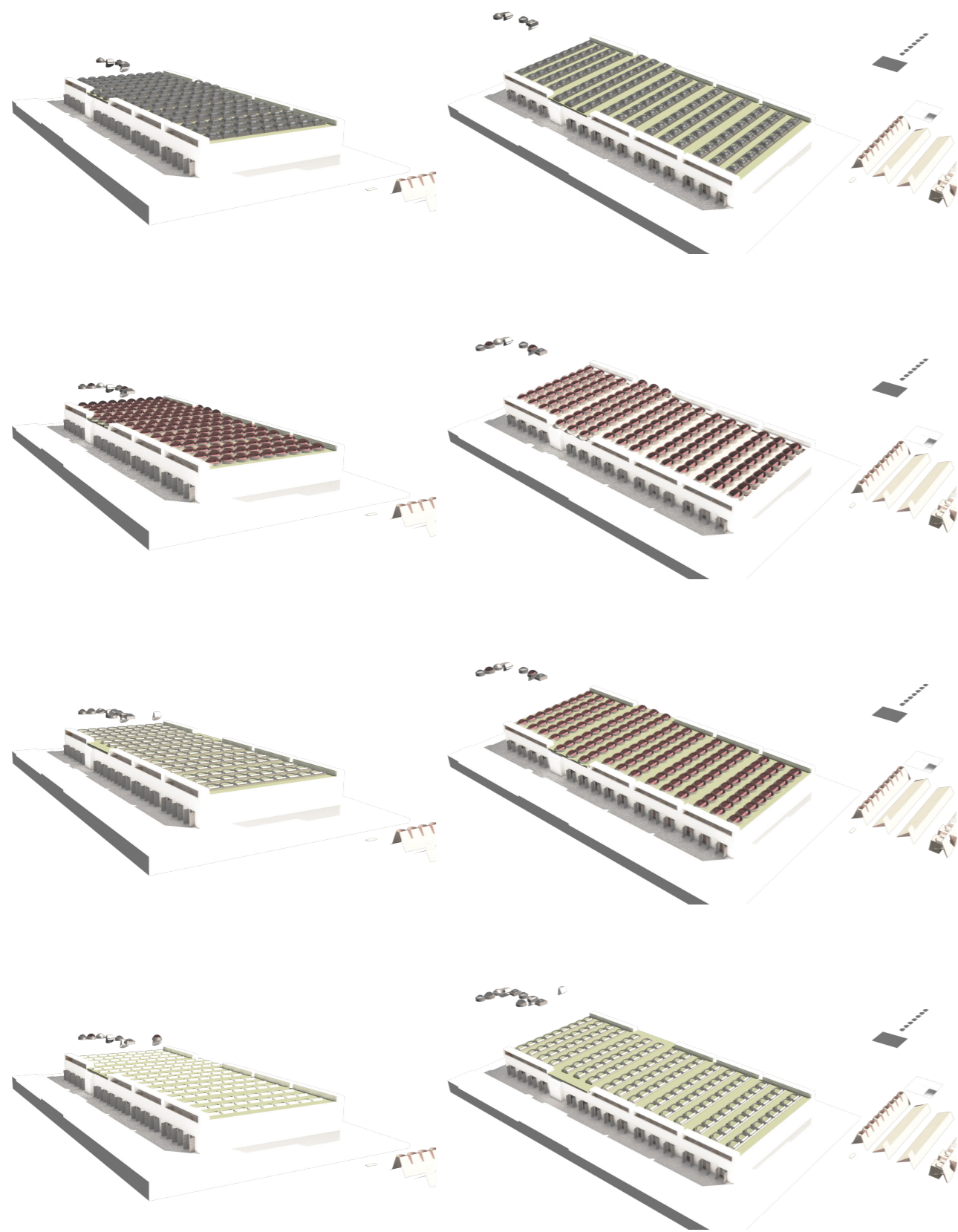




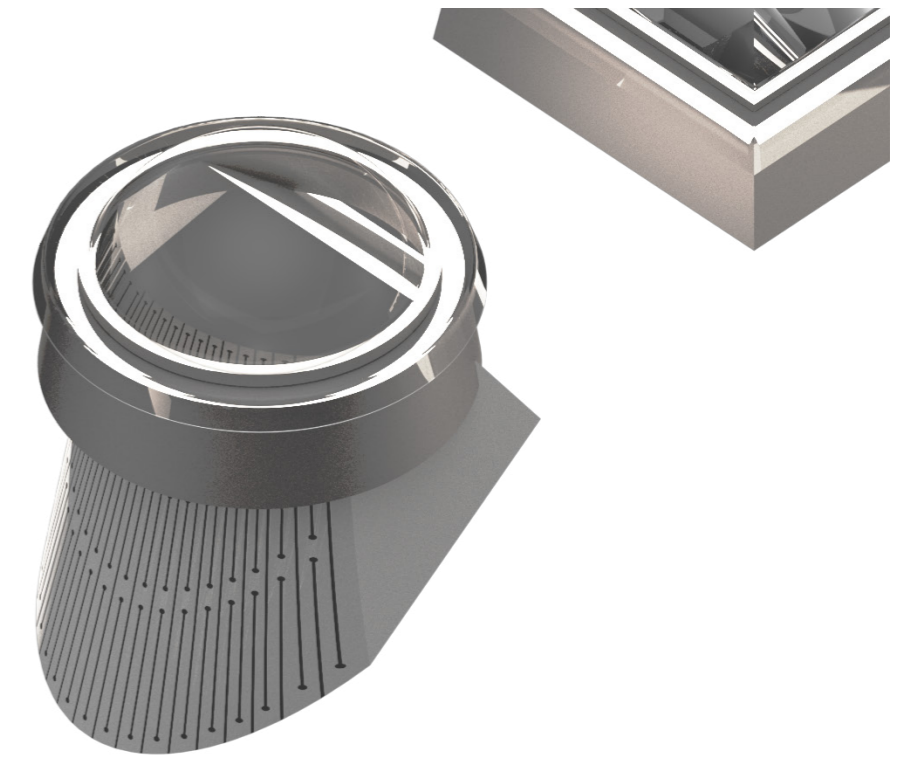


Without skylights inserted - just the opening in roof





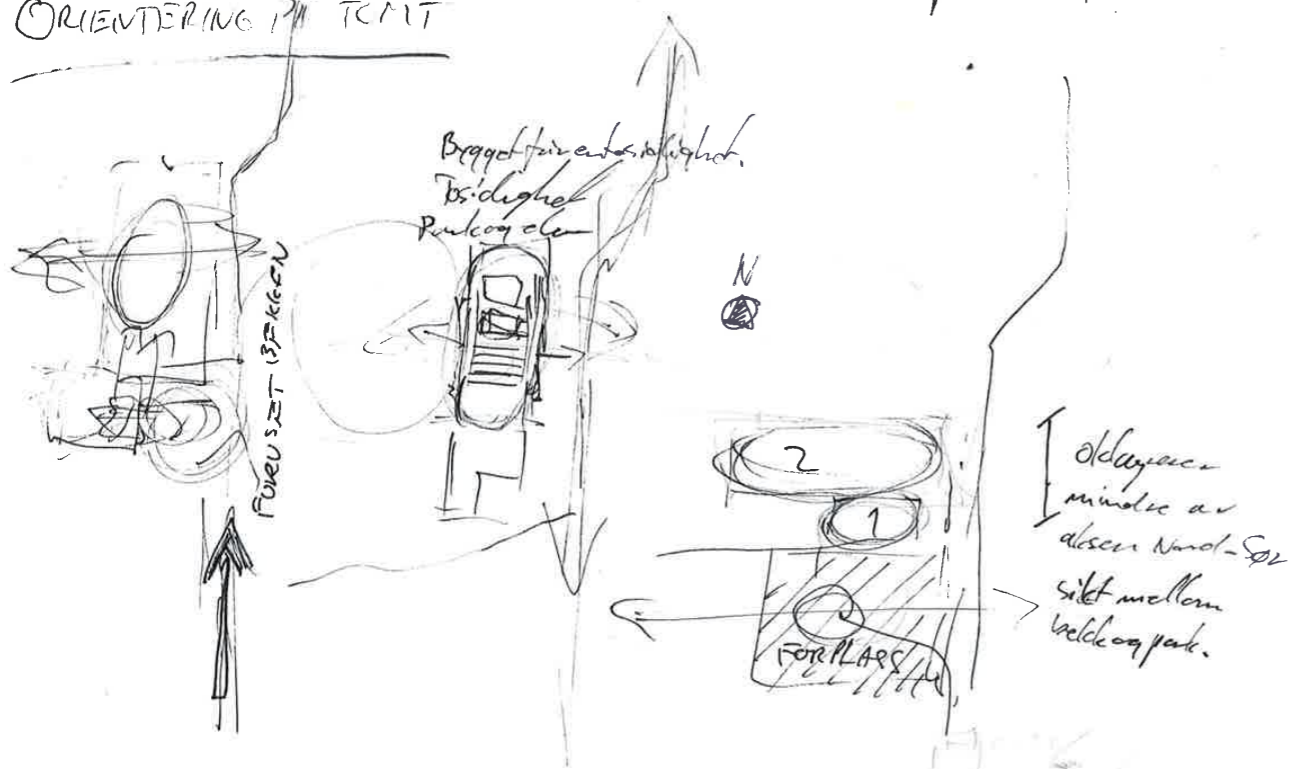
Iteration of skylights from left to right with the aim to minimize glass area ratio. By making the outer shape of the skylight follow the coffer shape, the glass area are kept to a minimum.



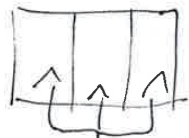
Example: a circular monitor would cover a much larger area than needed.

ORIENTERING PÅ TILT

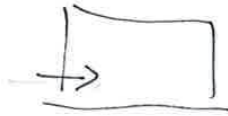
Husk, antagning tilveit.



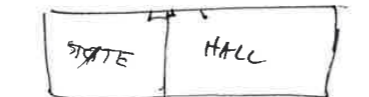
ADKOMST / BETSENEREN PEROM



Samtidig adgang
i hallen og parkering

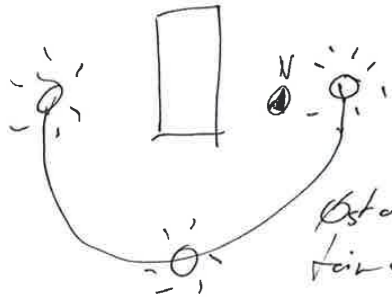


Adkomst fra
parkering.
Rommet blir ikke
foruble seg under
bil en beddeling.



Langt videre på å legge
litt opp. Teknisk fasade
vokst.

Orientering

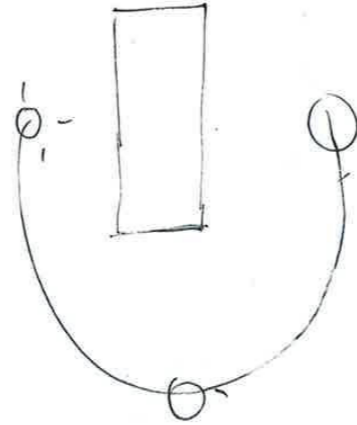
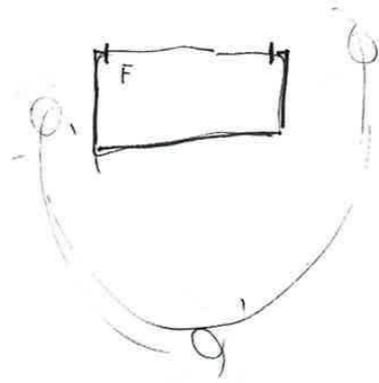


Øst og vest fasade
for samme lyskarakteristikk

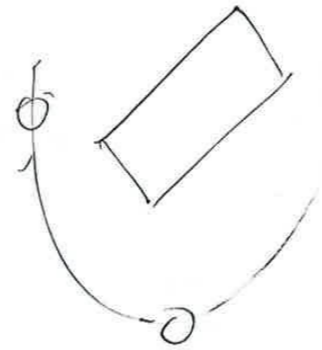


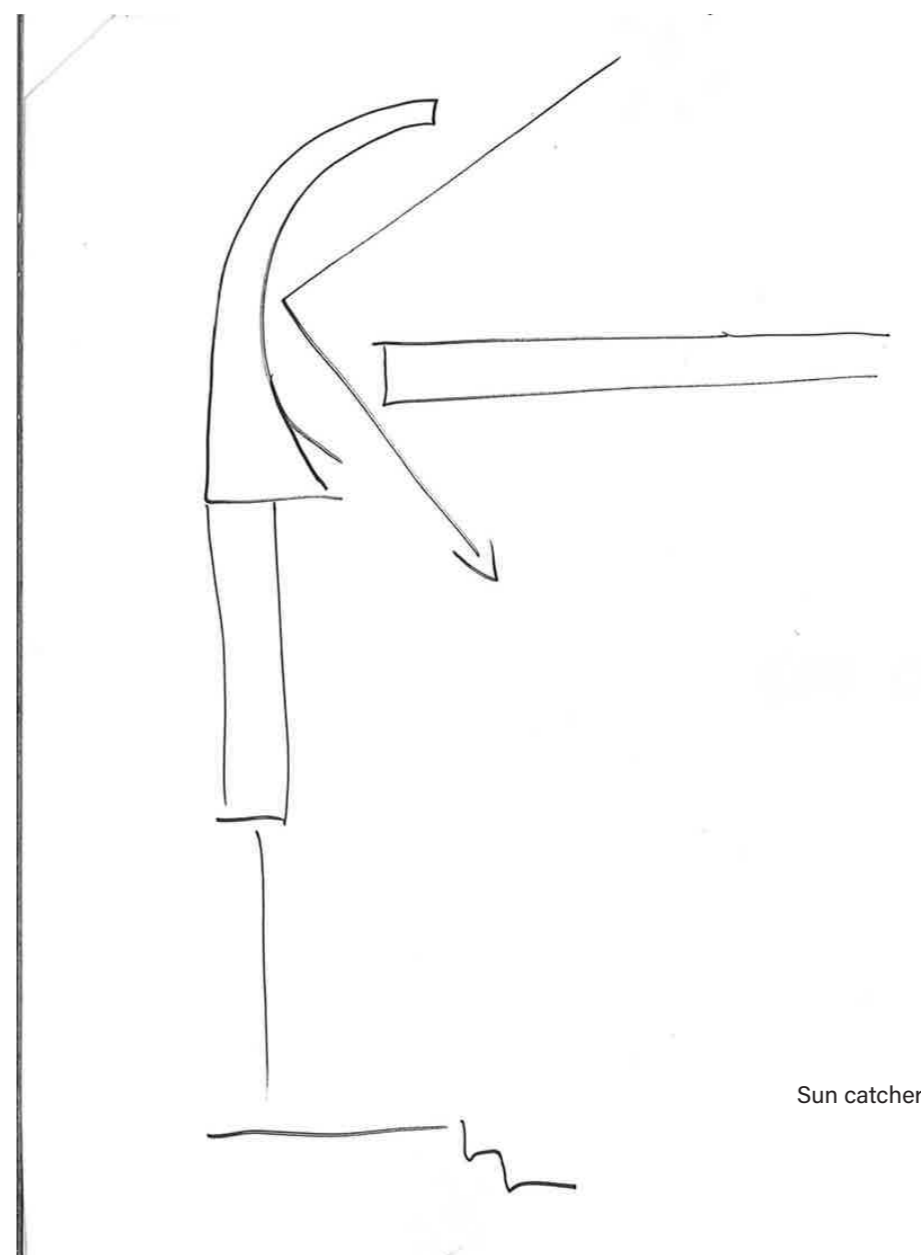
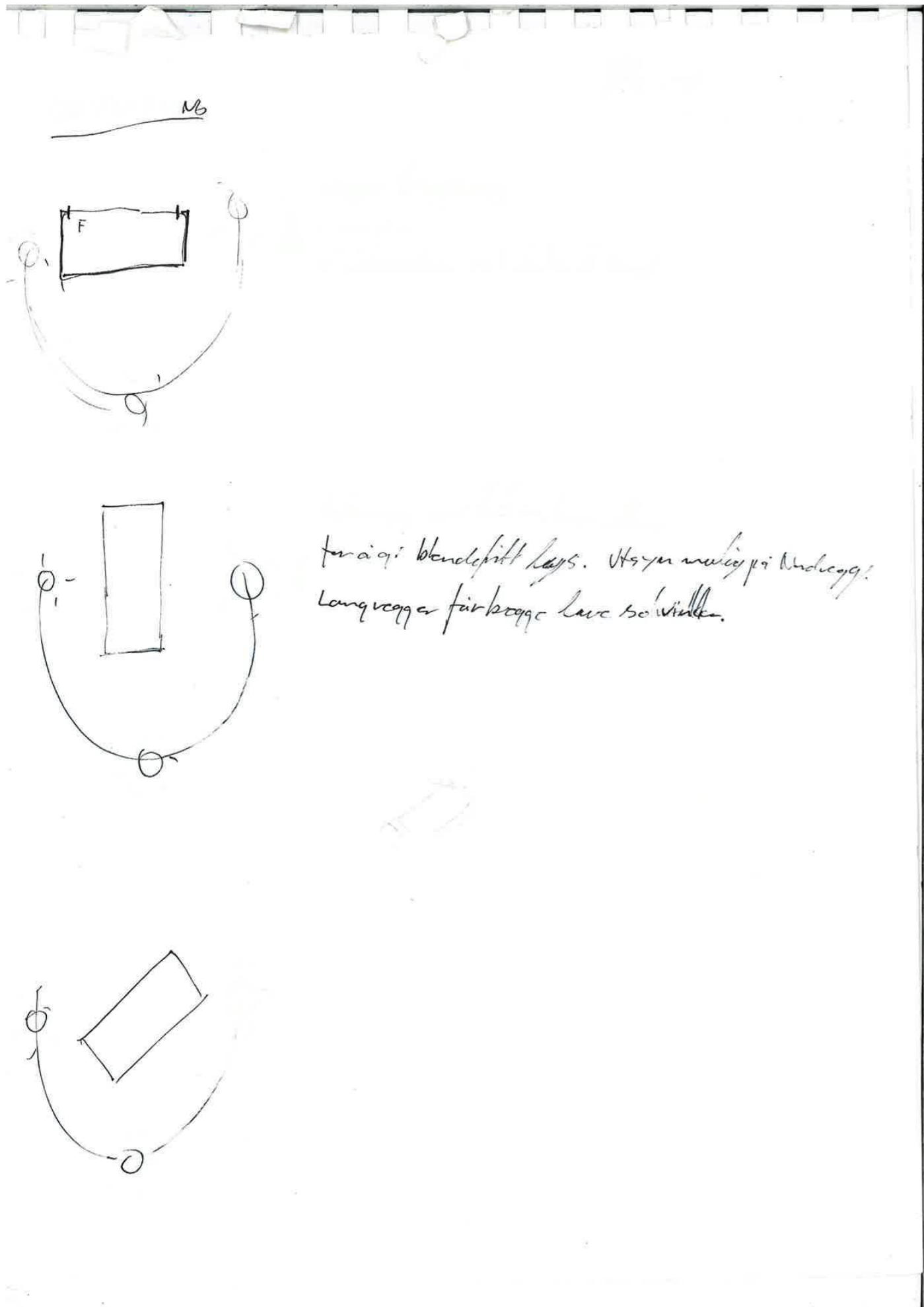
Nord og sør fasade
for ulike lyskarakteristikk

Nb



for å gi blandet lys. Utstyr naturlig på Nordveg.
Langvegger for begge lave so. vindler.





Sun catcher

