24 SLUSSEN

STOCKHOLM, SWEDEN

*This is a design realisation handbook for the project **"24 SLUSSEN"**, which is a waterfront public space with terraces and a series of 24-hour facilities. It responds to an undergoing regeneration masterplan taking place in Slussen, Stockholm, Sweden.*

*We visited Stockholm in November 2016, and at that time, I was intrigued by the overall complexity of Slussen, which is known as a run-down traffic junction at the heart of the city. Noticing the site was under a complete demolishing, I thought about relations between the past and the future for this site- With this 10-year regeneration, changes are happening in almost like a slow-motion speed for people who actually lives in the city. So maybe, we as architects, should not draw out a site boundary claiming it as a public space or give it to commercial contractors who would turn it into department stores.**

What could Slussen, as public space, offer to the local residents?

The aspiration of this project is to speculate the potential of this location and the existing structures on site and make it an inviting public waterfront area where people celebrate their urban life and embrace the water. It is also a project discovering the 24-hour aspect of the Nordic urban environment through testing and manipulating light performance at night, which explores the possible contrast between night appearance of space and its physical existence during the day.

BENVGA08

Anqi Yu Unit 21 Year 4

Project Title| 24 SLUSSEN

Unit Tutors| Abigail Ashton + Andrew Porter + Tom Holberton

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** These are the current approaches to "public space design" in the latest scheme.*

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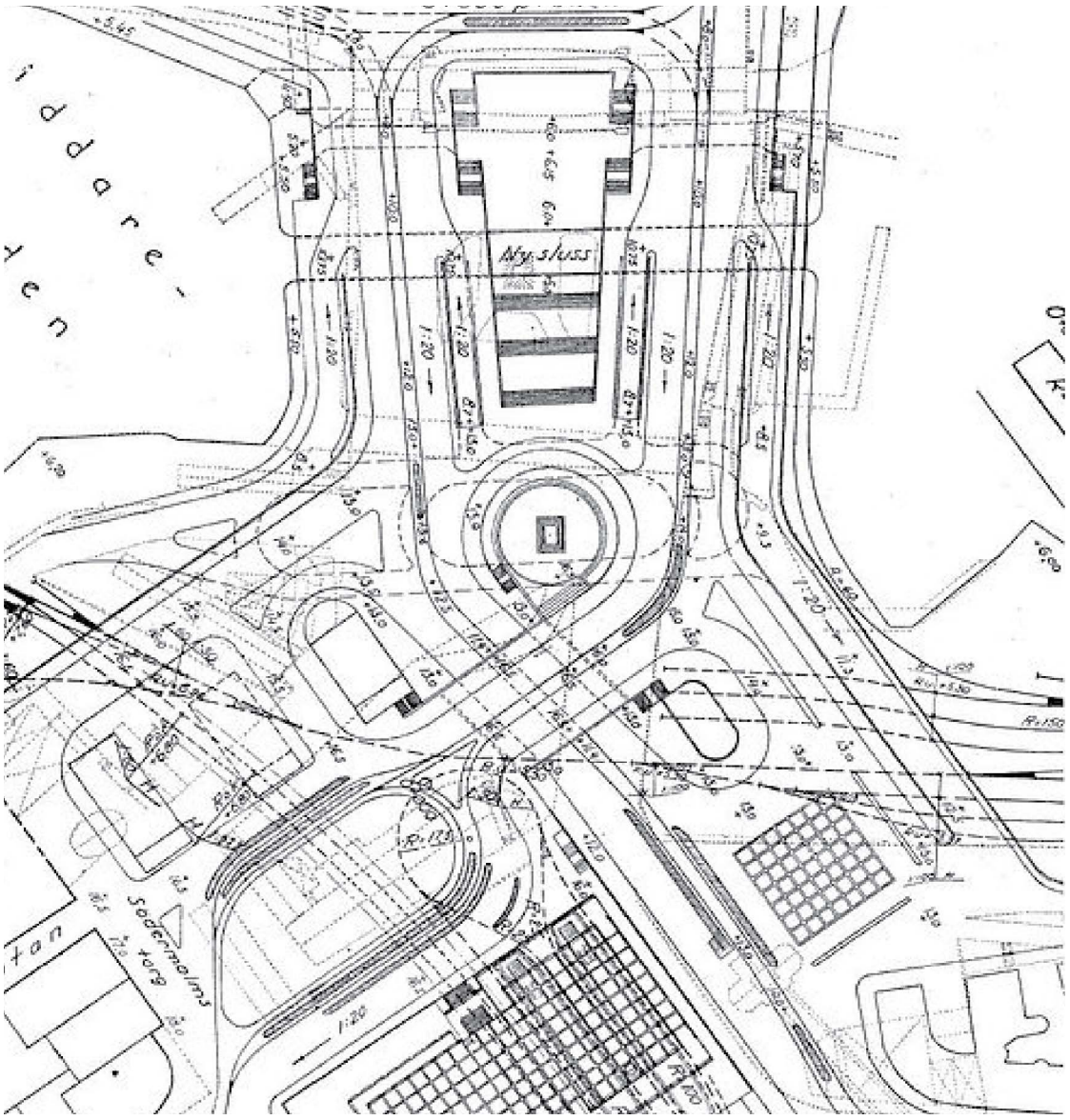
BIRD-EYE VIEW

[SLUSSEN]

The Slussen area is the hub of public transport in Stockholm, Sweden, linking together a metro station, commuter rail line, bus terminal, ferry harbour, and a complex cloverleaf-shaped road interchange and associated pedestrian passages and walkways. The name comes from the word "sluss", which means canal lock as the area Slussen sits exactly where there are locks linking Lake Mälaren and the Baltic Sea. The history of the development of the channel at Slussen date back to the 1600's and have evolved into an ongoing political debate of reconstruction needs since the early 1970s. The controversy is about whether Slussen is a unique historic example of traffic engineering that should be preserved or a public transport area that has seen its time and desperately needs to be modernized and rebuilt.



PAST

It is unclear exactly when the channel at Slussen was created, but in the centuries up to the 17th century the differences in level between the Lake Mälaren with the Baltic Sea made it increasingly difficult to pass through the Söderström channel. The first lock was built here in 1642, Queen Christina's Lock. By the early 1700s the lock proved too small and in 1751 the Christopher Polhem Lock was completed. In 1850 an even larger lock was completed, the Nils Ericson lock. In the 1860s rail traffic started crossing the locks and in the ensuing decades more and more wagon and carriage traffic, as well as pedestrians, crossed the lock between Gamla Stan and the Södermalm suburb. Various plans to improve the traffic situation were drawn up between 1895 and 1919. With the arrival of the automobile, by the 1920s, the traffic situation was being called "Slussen Misery" (slusseneländet) in the press. In 1930 a committee was appointed with the task of solving this and other city traffic problems.

In 1931 a total overhaul of Slussen was funded. Buildings were demolished, a new Karl-Johan Lock was built, and a cloverleaf interchange was built. Pedestrian tunnels and walkways were built on three different levels. The project was praised by Le Corbusier as "the modern era's first large project".

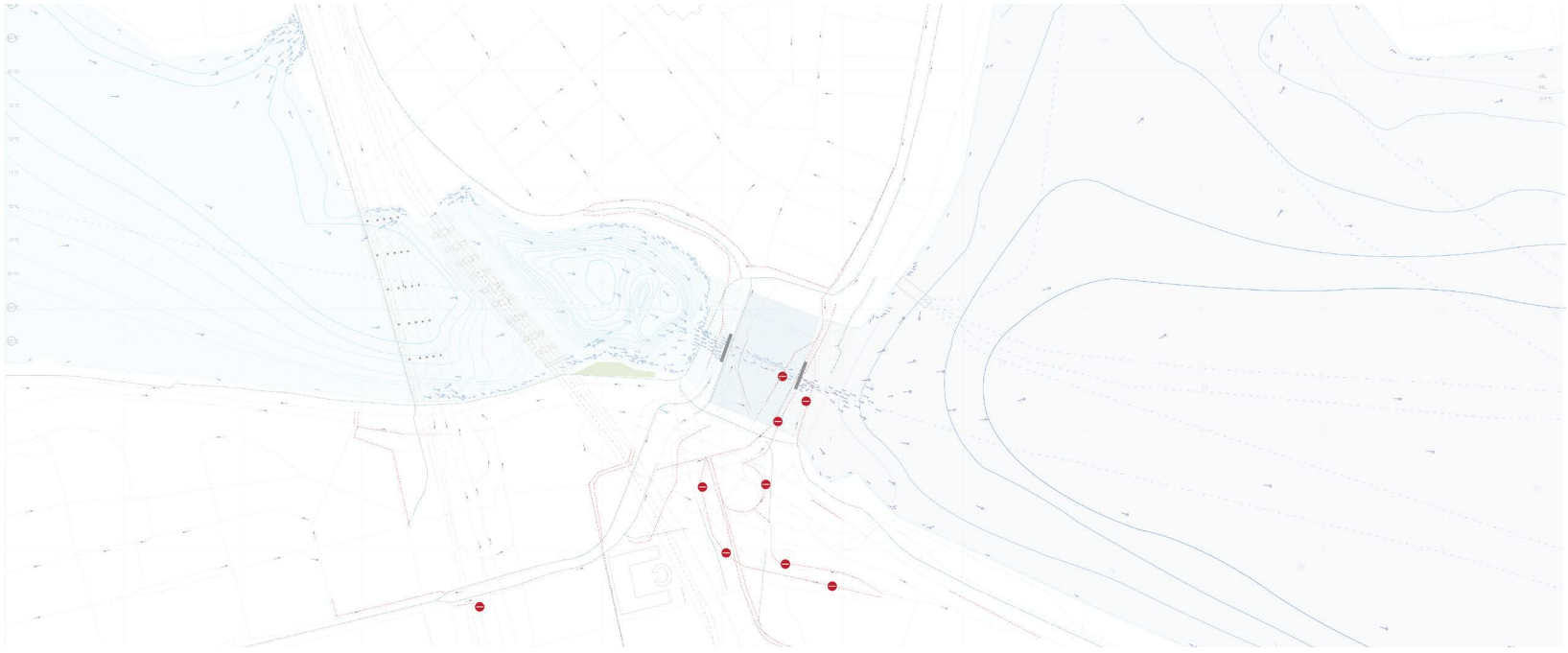
"Change is inevitable, change is part of history and with any radical change to a place you lose a part of its life and identity."

FUTURE

A vigorous discussion in Swedish media followed with some arguing that many of the original design features were either no longer needed due to other traffic relief projects such as tunnels that had been completed over the previous few decades, or were unusable due to physical deterioration of the structure. In May 2009 the city of Stockholm announced a new master plan for the Slussen area. Since then, nothing has happened and the old Slussen still exists while its structure continues to deteriorate. The interchange was closed in 2016 and the demolition of the present structure started. The area will be a construction site for the next eight to ten years.

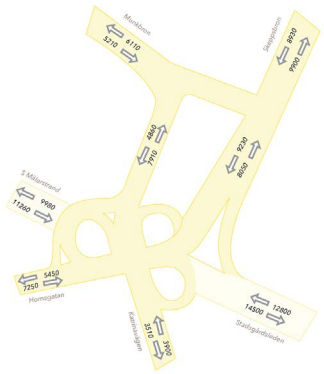
The aim for this regeneration work is to create a modern urban quarter at the heart of the Stockholm archipelago and a dynamic new civic destination. The City of Stockholm is taking the opportunity to transform this important part of the capital into a new destination, creating a balance between road vehicles and pedestrians while enhancing the public realm with easier access to the waterfront.

EXISTING CIRCULATION ANALYSIS

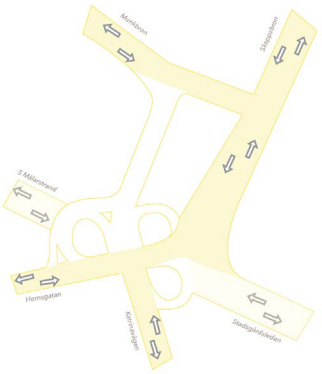


CHANGE OF TRAFFIC SCHEME

ORIGINAL CLOVERLEAF DESIGN

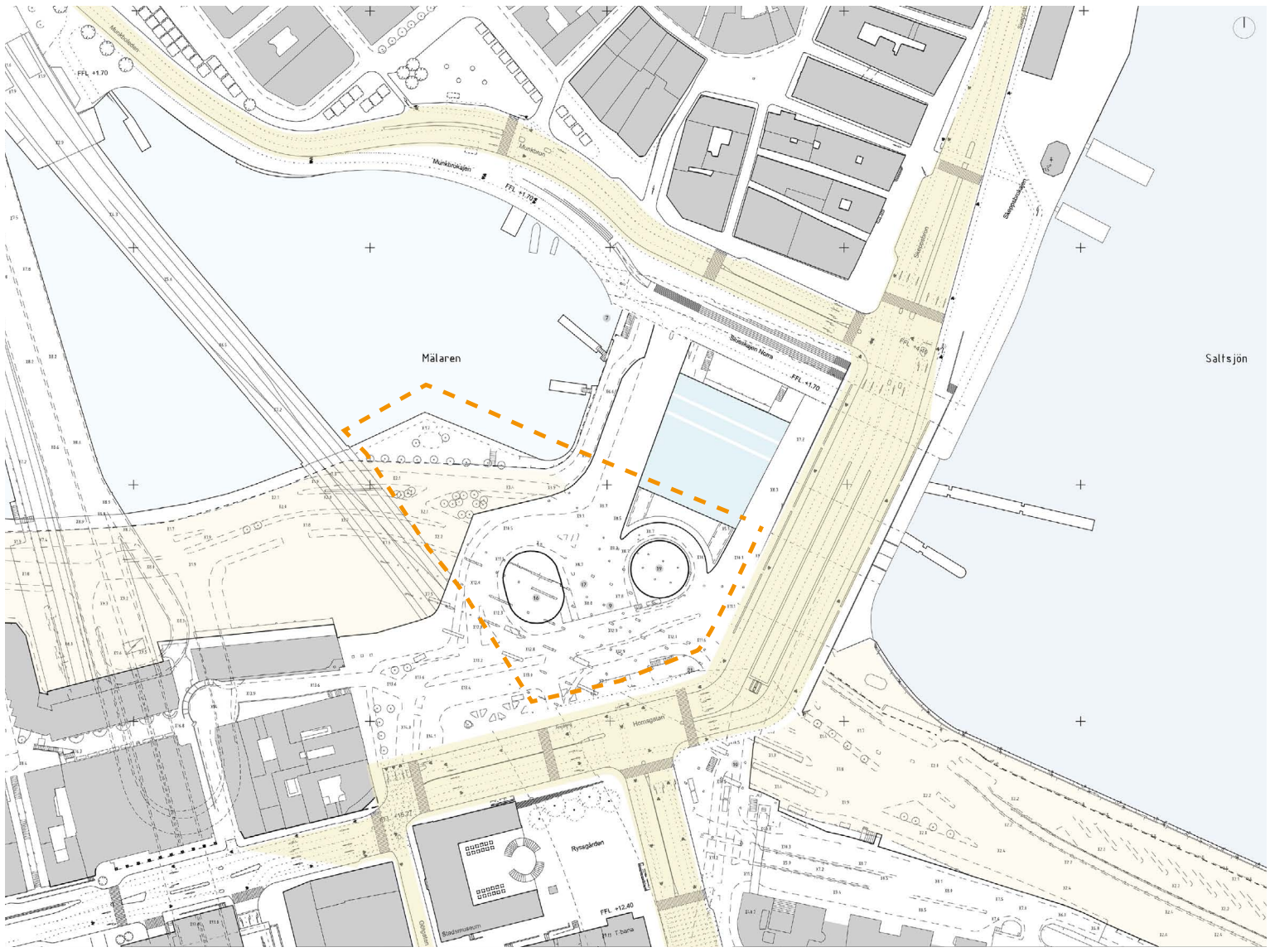


EXISTING



PROPOSED

OVERLAYING NEW TRAFFIC SCHEME TO EXSITING SITE



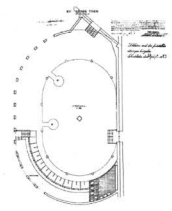
In the future traffic scheme, the vehicle traffic is combined to the east side leaving the west side available for new public space. In my project, I intent to start with taking this orange dotted area as my site and masterplanning this waterfront public space.

"Slussen as it is today is a disgrace for the city. The design itself is already very car age like, pedestrians are forced into wet and dark tunnels, while car traffic strangles the whole place from all sides like a knot. On top of that this whole place is falling apart, most spaces are closed or out of business ... Slussen has been like an open wound for the city, for many decades now. As a pedestrian coming from Gamla Stan, it was like a hellish barrier towards Södermalm. Centralbron is also ugly, but at least its not getting into the way of pedestrians that much..." --A comment of Slussen from a city forum

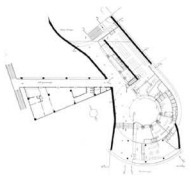
My aim is to alter the impression on Slussen as a pedestrian-unfriendly transitional area, and activate the waterfront,; as well as ultilising the existing height gap between the lower ground and higher ground level.

SITE_ EXISTING CONDITION

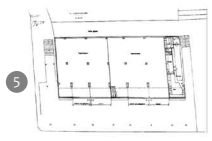
TOP LEVEL

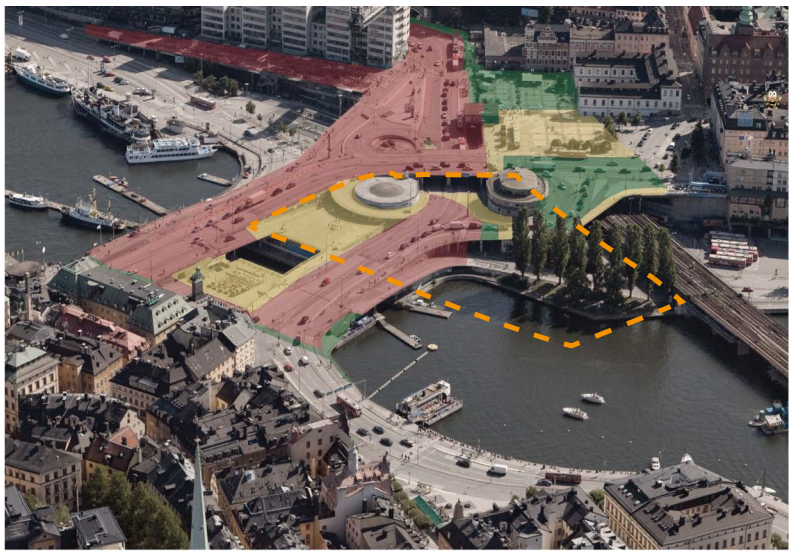


INTERMEDIATE LEVEL +6.7M



GROUND LEVEL +1.7M





1

2

3

4

*Note that the drawing orientation shifted due to illustration purpose.

Coloured surfaces show technical life of the existing constructions. Red areas must be rebuilt as soon as possible, the yellow areas within 30 years and green areas within 80 years. Looking at the orange dotted area in detail, there are three levels with a total heights of approximately 12 metres. The lower ground level (+1.7M) is mainly occupied by buses; the intermediate level was shopping mall, however, in recent years, it has been abandoned; the top level connected the clover-leaf interchange to inner Sodermalm. Pedestrians and vehicles that travel from Sodermalm to Gamla Stan (or vice versa) only use on the top level.

I am interested in taking the existing concrete columns as a key element to retain, and taking a more integrated approach to reorganize the levels within lower ground level (+1.7M) and top level (+12M+). My aim is to:
[1]Put pedestrians as priority and consider their walking experience;
[2]Make use of the existing columns and deliver a subtler link between the lands and the waterfront;
[3]Develop a new vertical relation that changes this isolation between the levels.

TRAFFIC LANES ON LOWER GROUND LEVEL +1.7M

VIEW FROM POINT A

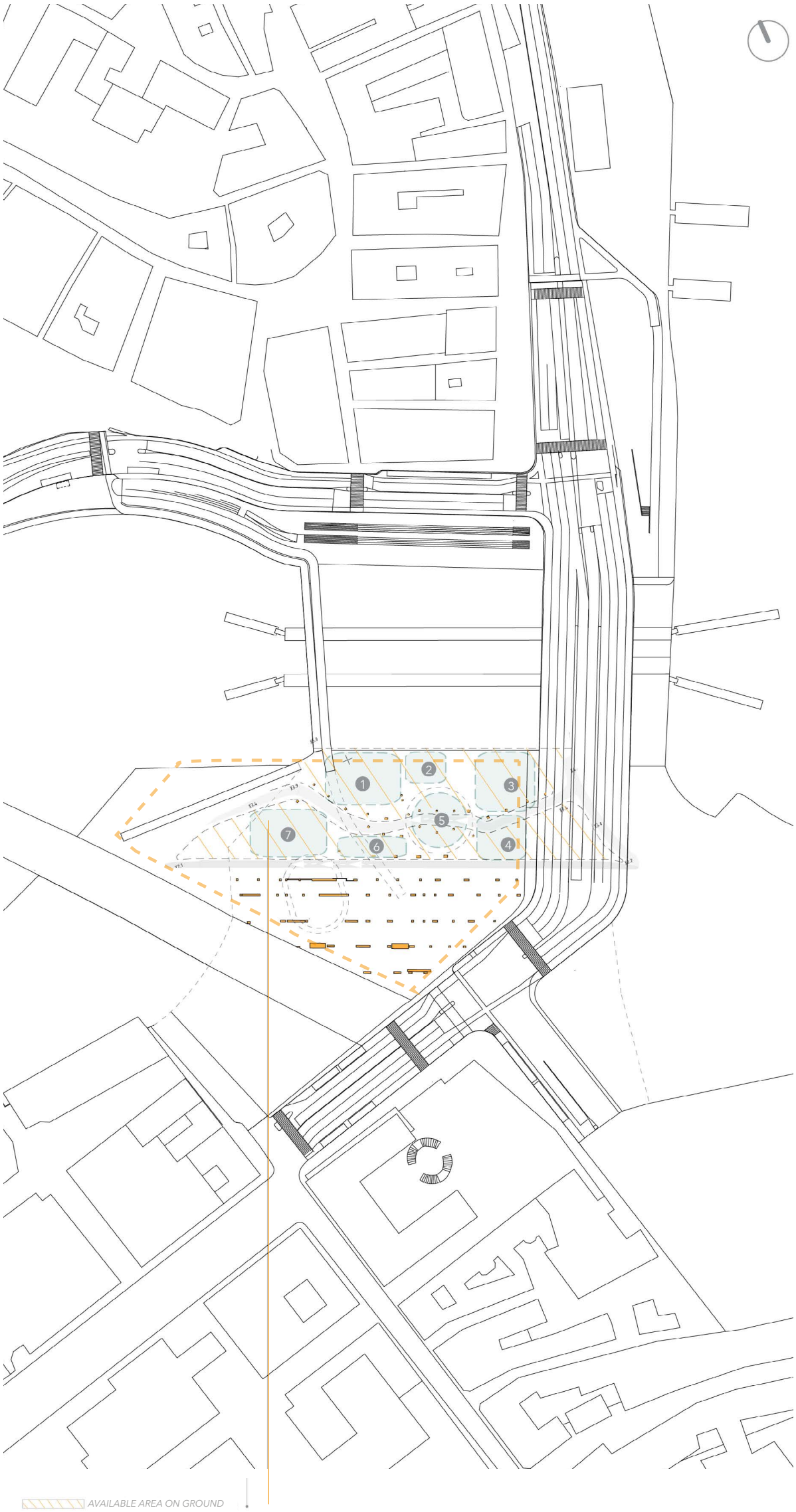
BUS TERMINAL

On the blue dotted lower ground level, there are 6 vehicle lanes. The light-coloured lanes are for cars with a height restriction of 3.4 metres. The dark-coloured lanes are shared between 13 different numbers of buses. The height of the columns gradually increases from 2.6 metres to 10.6 metres, as it goes from Lane 1 to Lane 6.

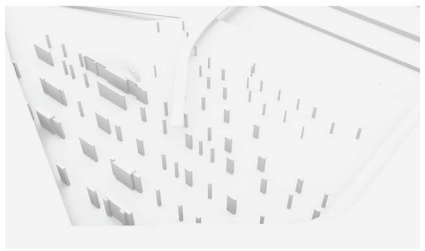
The operation hours of these bus are from 5am to 1am daily from Monday to Friday; 6am to 1am on Weekends. The vehicle lanes are open 24/7.

Due to the operation of these vehicle lanes, the available area on this level is limited to the hatched area, which is also the area adjacent to water. Therefore, I decided to focus on designing the waterfront area first.

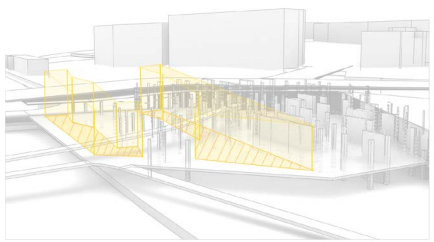
POTENTIAL SITES FOR FACILITIES



SITE TOP VIEW



POTENTIAL 3D VOLUMNS

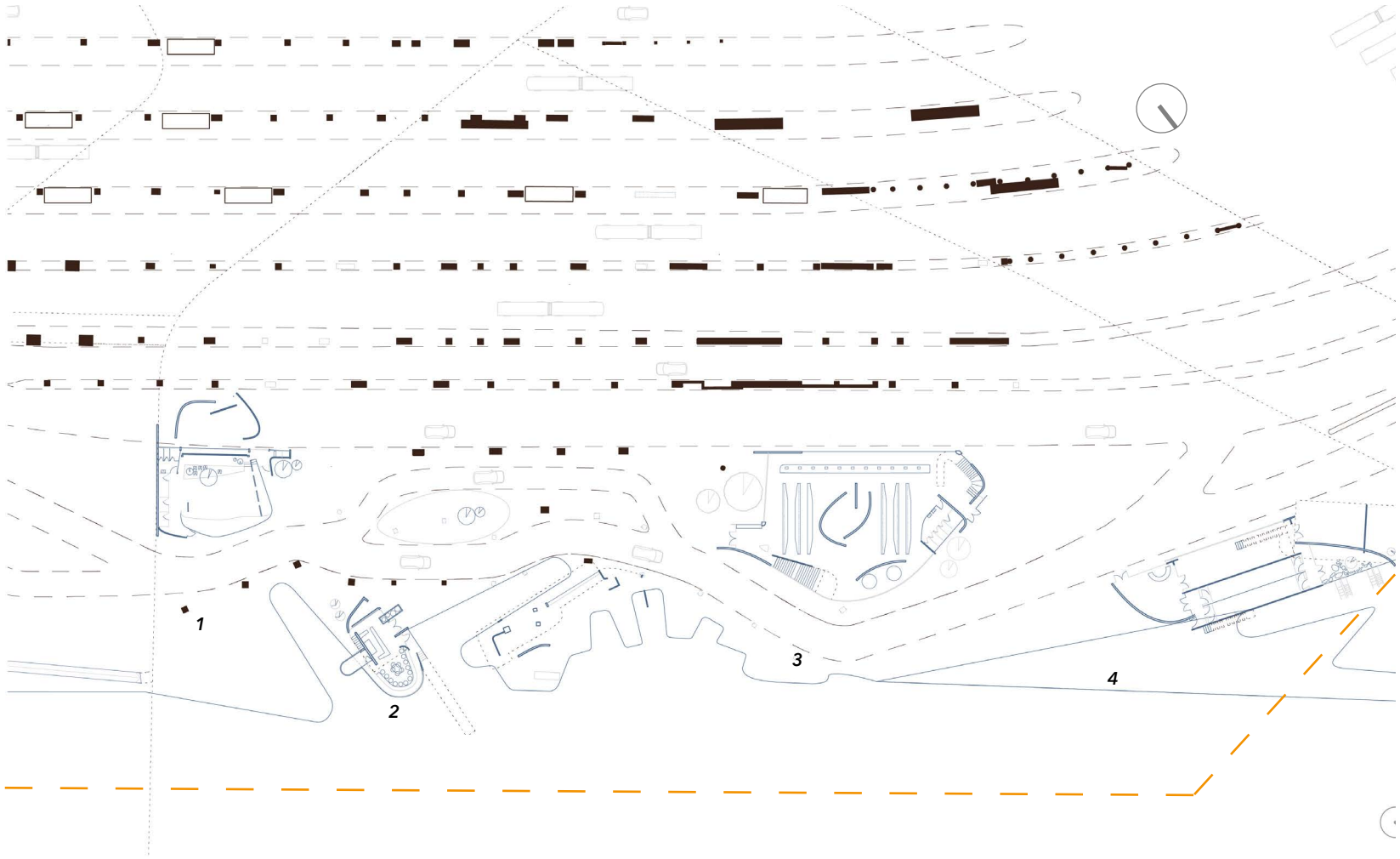


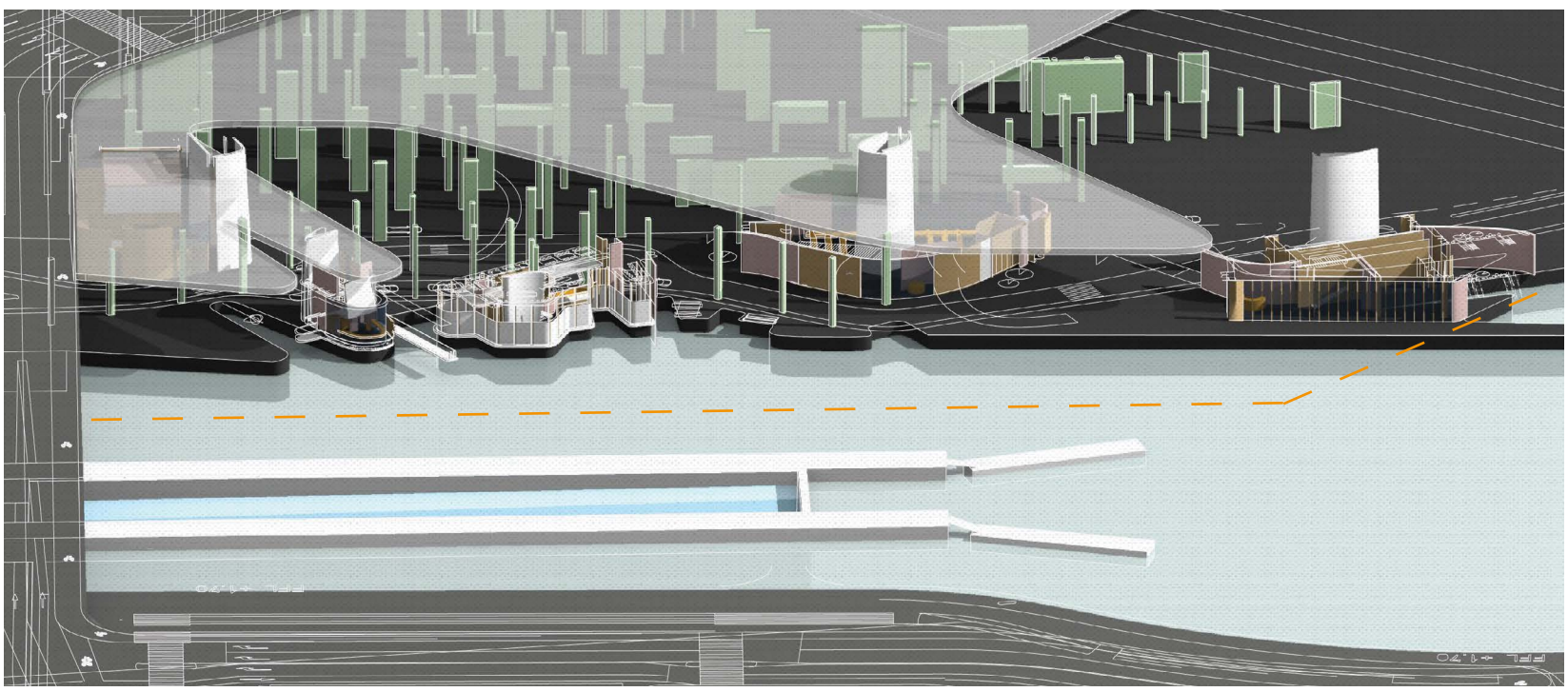
**Note that the drawing orientation shifted slightly due to illustration purpose.*

Since the general public transportation runs from 5 am to 1 am, with some overnight services. The activeness of the city during the night is just as much as it can be during the day. Therefore, in order to activate the waterfront area, I proposed to have a series of 24-hour facilities, including cinema, cafe, gym, library... These facilities can be regarded as 'functional islands' which is accommodating and inviting, so that people could see Slussen as a destination for relaxing and gathering.

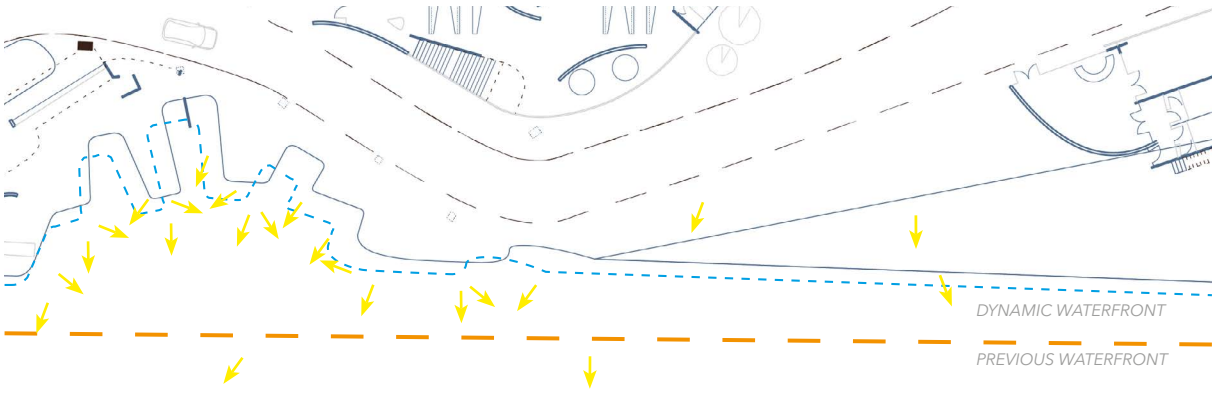
Most of the existing concrete columns are treated as a backdrop as this stage, while a few short columns (2.6 metres) are included in. They can be used as structural supports.

PLAN_LOWER GROUND LEVEL +1.7M





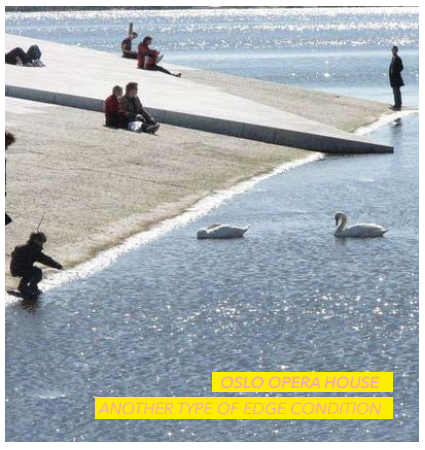
WATERFRONT EDGES COMPARISON



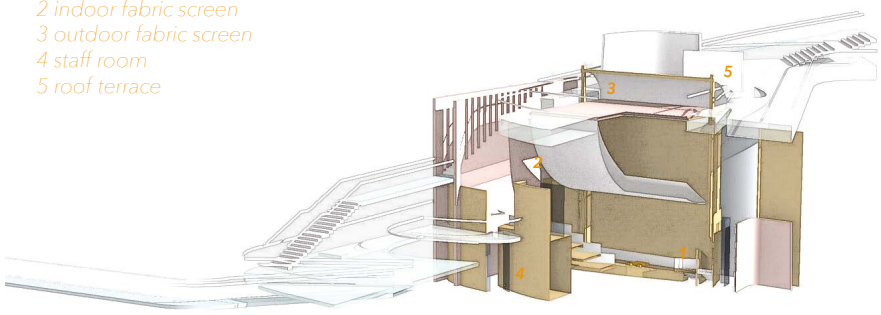
**Note that the drawing orientation shifted due to illustration purpose.*

Zoom in to the waterfront area, the first thing is to rethink about the edge condition. Since the existing lower ground level is 1.7M above the water surface, this edge is not just a boundary line to walk along- it is also a lifted platform where people can take a seat. To consider this edge as an extended bench for people to chat, relax, daydream..., it becomes more interesting. When I think of two people who would like to seat side by side but still be able see each other's face, I think of a bent corner- this sort of spatial rearrangement implies its possible usage. Therefore, a dynamic waterfront would potentially make people reorientate themselves in regard to the waterfront.

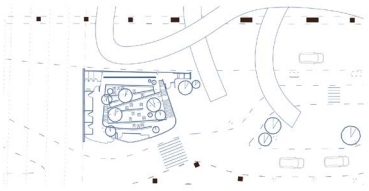
In the reference picture, we can see that people are sitting on the waterside steps during lunchtime. What I learn from this half-circle arrangement is that, first, the idea of 'gathering' is strengthened in this setting; second, everyone has a slightly angled view depending on where they are sitting. Thus, in my design, instead of treating the waterfront as a straight line, I think it would create more possibilities for people to socialize and engage with the site if it is non-linear with 'pockets' that cut in to the land.



1 ground-floor entrance
2 indoor fabric screen
3 outdoor fabric screen
4 staff room
5 roof terrace

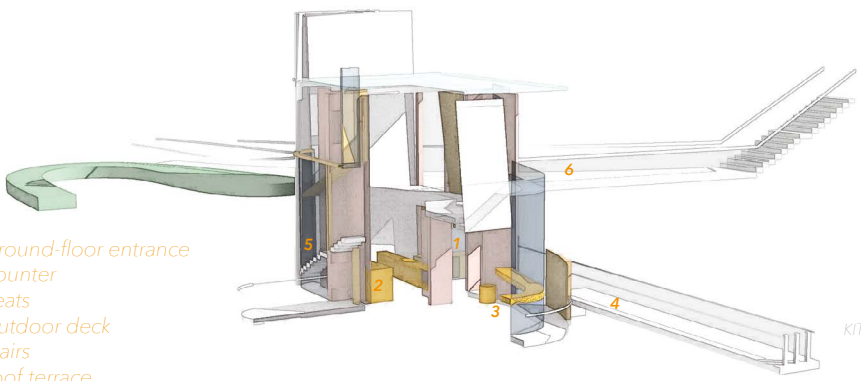


PLANTS
SEATS
STAIRS
TOILETS
STORAGE
MONITOR ROOM
SOUNDPROOF WALL



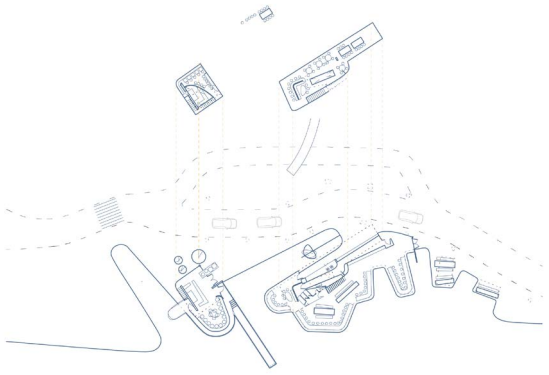
1 CINEMA

1 ground-floor entrance
2 counter
3 seats
4 outdoor deck
5 stairs
6 roof terrace



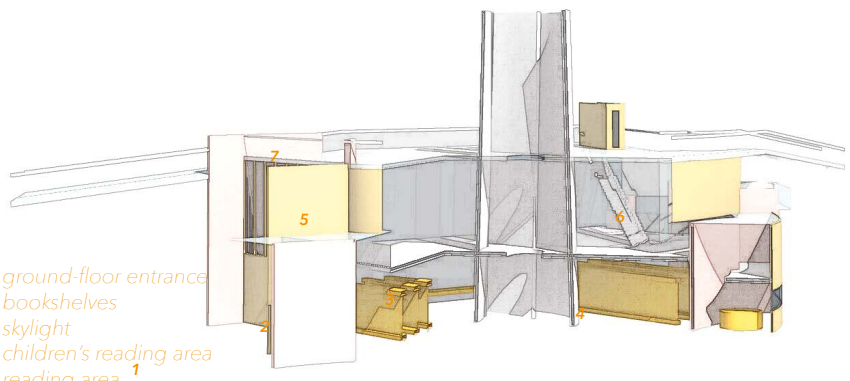
KITCHEN COUNTER
SEATING BAY
STAIRS
TOILETS
SEATING
OUTDOOR DECK

1 counter
2 kitchen
3 seating area
4 stairs
5 roof terrace

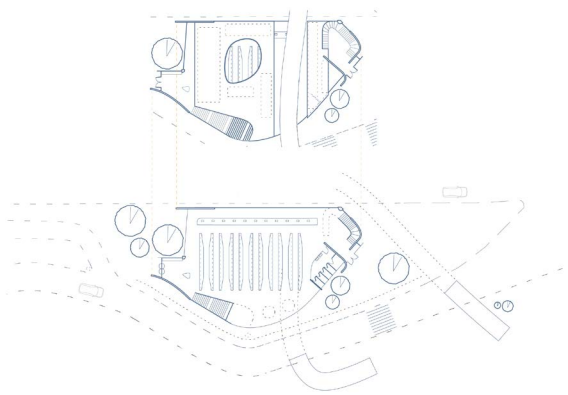


2 CAFE + CANTEEN

1 ground-floor entrance
2 bookshelves
3 skylight
4 children's reading area
5 reading area
6 stairs
7 roof terrace

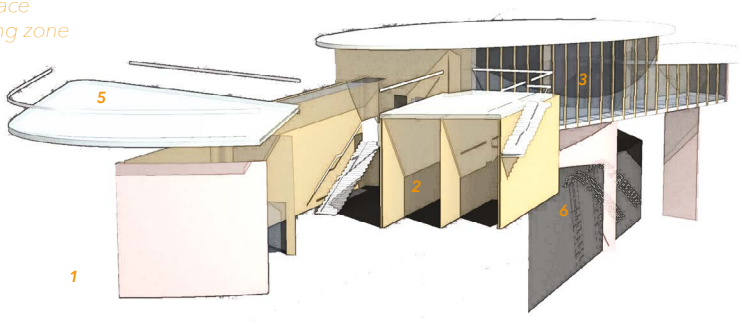


BOOKSHELF
RESEARCH DESK
STAIRS
TOILET
READING
KIDS' ZONE

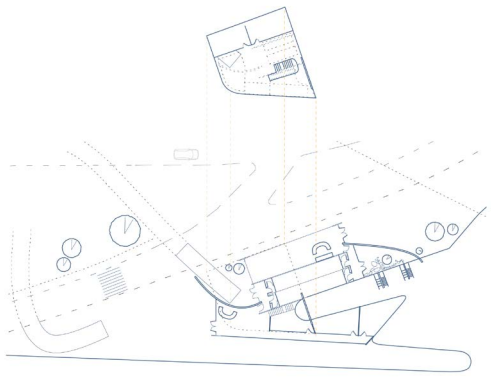


3 LIBRARY

1 ground-floor entrance
2 shower and changing room
3 studios
4 stairs
5 roof terrace
6 swimming zone



RECEPTION DESK
CHANGING ROOM
ENTRANCE TO SWIM
STAIRS
STUDIOS
EXCERCISE SPACE

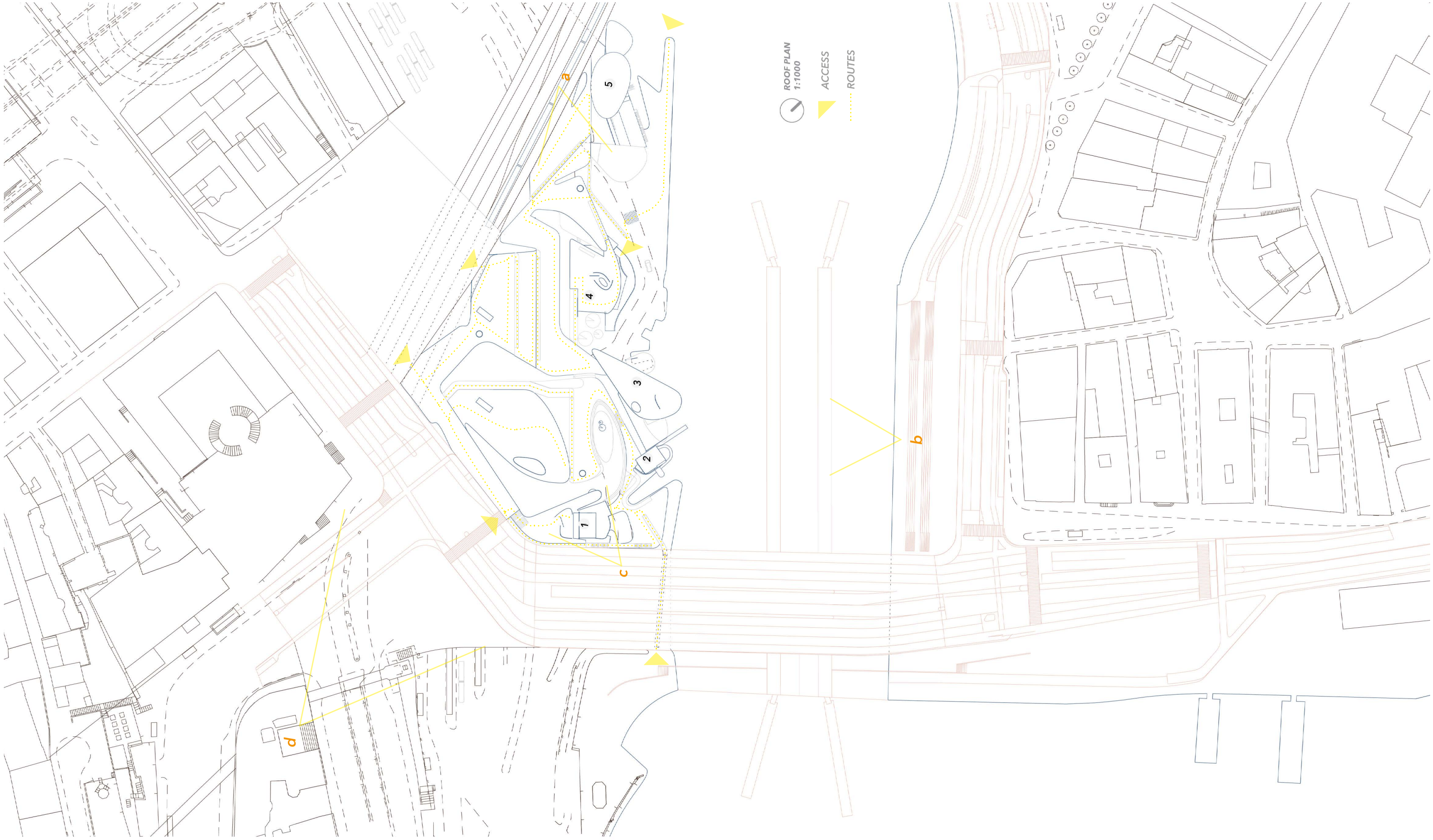


4 GYM

After setting out the edge condition, I began to think of these series of 24-hour facilities in depth by thinking of types of communal facilities, which have programmes that can be extended to nights. This led me to my decision of having a cinema, a cafe, a canteen, a library and a gym. These spaces will be in the form of separate 'functional islands' that situate within the identified available area on the lower ground level.

The cinema functions as a garden with plants during the day and a cinema at night; the cafe and canteen is 24/7 and locates closest to water so that it could serve the night shift and people passing the site on boats; the library provides an indoor reading area by the water, as well as an archive for resources on the history and the development of Slussen; the gym offers exercise studios, shower and changing space, which can be very useful for the swimmers, especially in cold winter days.

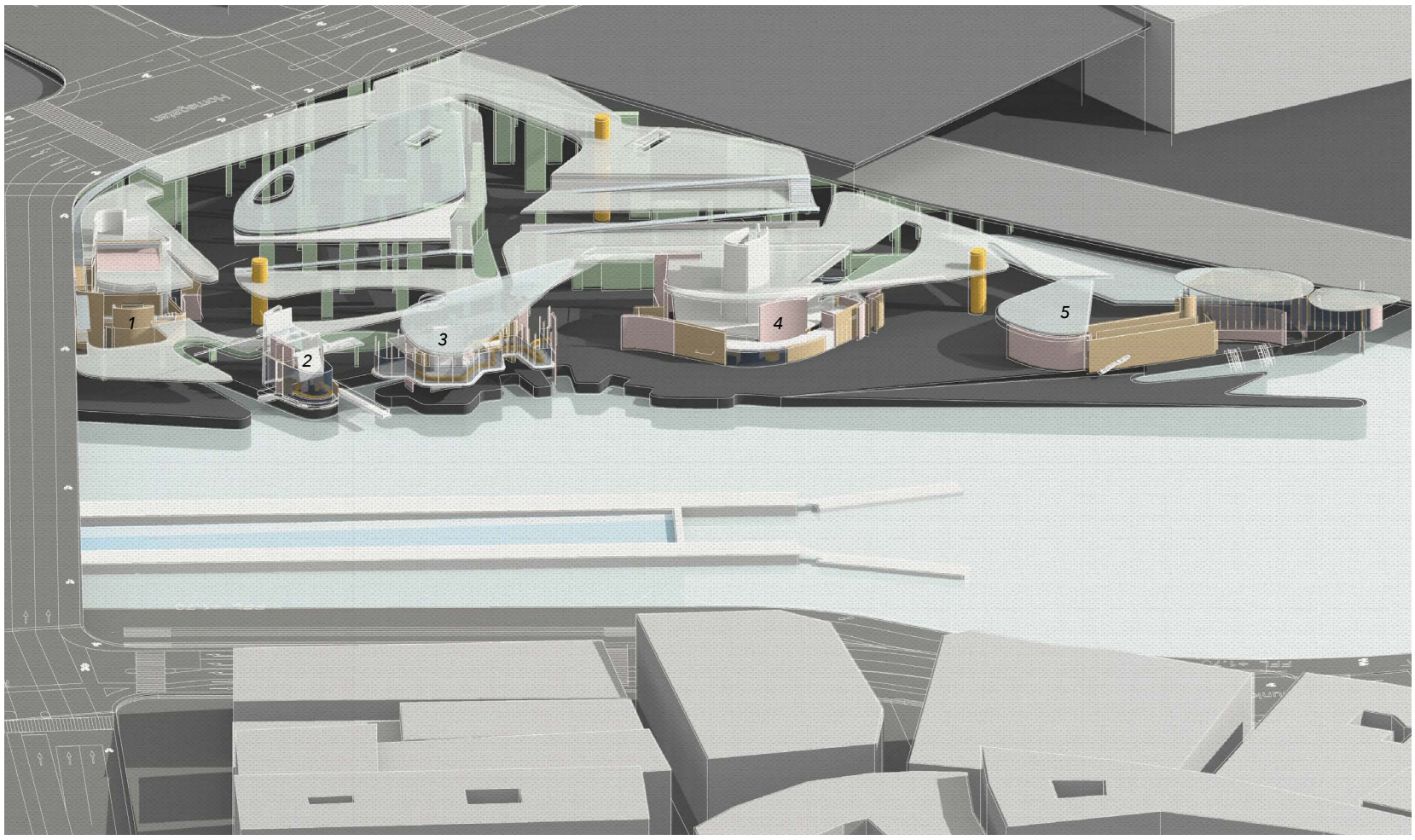
The design language I applied is from the curvature of the original cloverleaf in 1930s, which almost gave the cars a stage to perform a dance. I intended to preserve this feeling. Therefore, I decided to keep this idea of curvature, but in the form of 'a stage of promenading pedestrians'.



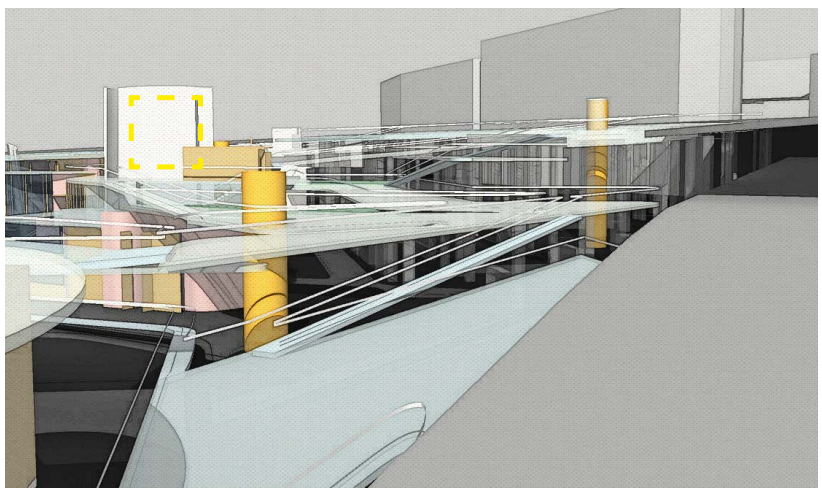
SECTION 1 BUILDING FORMS, SYSTEMS, PLANNING CONTEXT

DESOLVING THE HEIGHT GAP INTO DESCENDING TERRACES

OVERALL BIRDEYE VIEW

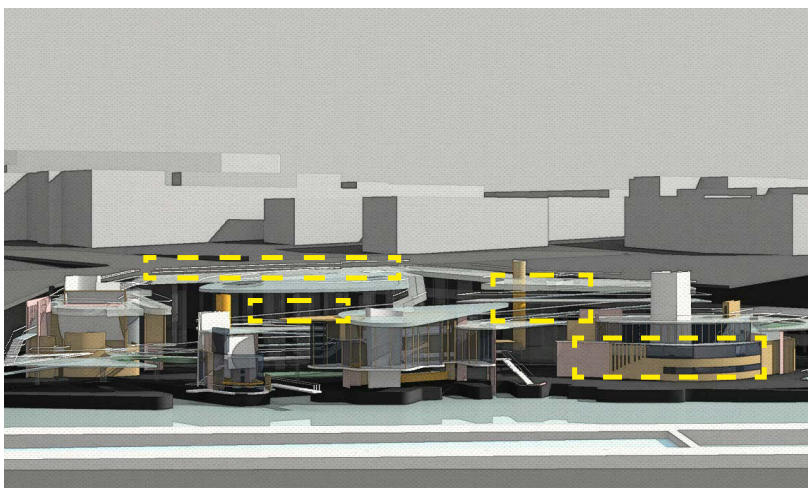


VIEWS FROM CERTAIN VIEWPOINTS



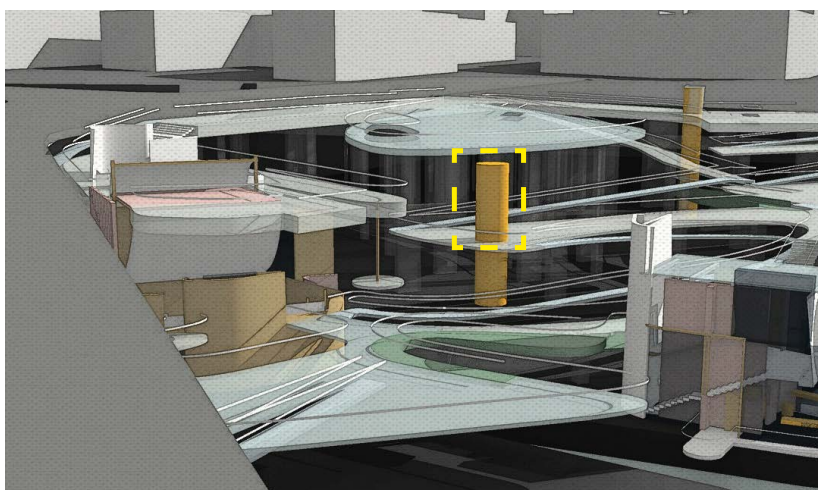
a VIEW FROM TRAIN

- ☐ *CUTOUT ON THE LIGHTWELL*



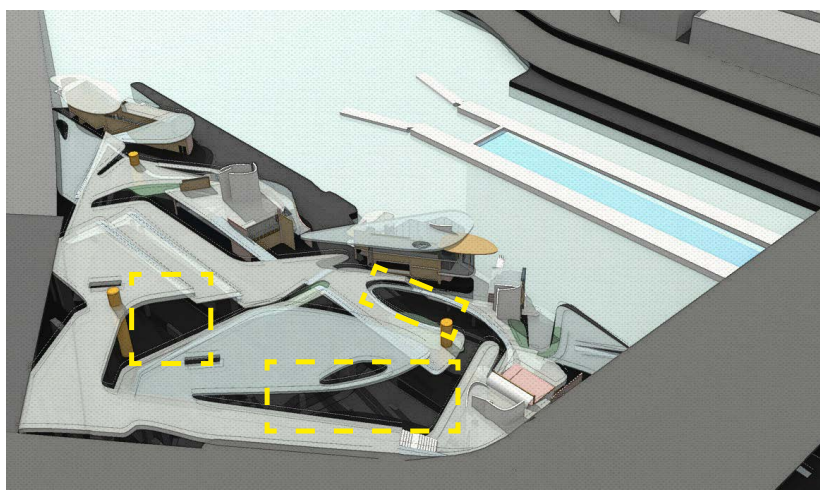
b VIEW FROM THE OPPOSITE BANK

- ☐ *RETHINK OF THE WINDOW*
- ☐ *HANDRAIL EXPRESSION*



c VIEW FROM NEW VEHICLE ROAD

- ☐ *SOUNDPROOF*
- ☐ *LIFT HEIGHTS RECHECK*



d VIEW FROM KATARINA ELEVATOR

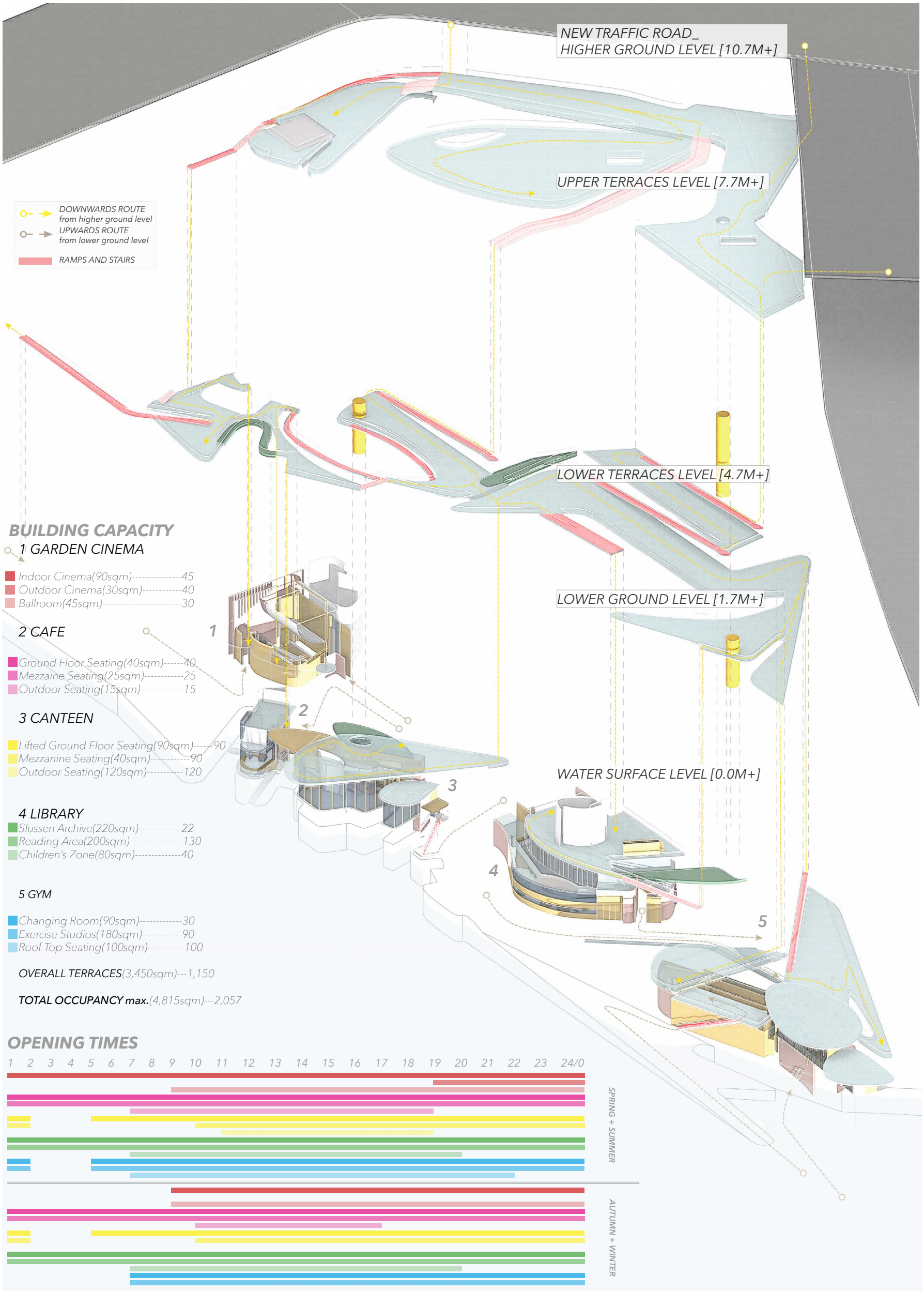
- ☐ *TERRACE GAP TREATMENT*

**Annotations in yellow note boxes are design elements to develop(also applies to the following pages)*

My design decisions are make based on imagining the walking experience as a pedestrian within the space, as well as the viewing experience as a observer who is standing away and staring at the site.

In order to make the routes down more inviting and intuitive, I used curved edges as an overall expression for the terraces; since curved routes are the opposite to shortcut- it will potential enhance the promenade experience of pedestrians. Curvature is applied to soften the edges as well as creating a cascade landscape, which appears to use an utterly different language from the rest of the city centre. As part of the future cityscape, this deliberate gesture can not only draws the city closer to its waterfront, but also catch people's attention and become a new attraction in this busy area.

Set the targeted views from train, cars, the other side and Katarina Elevator from 38 metre above, helps me to identify several key points to work on. Among these points, I am most interested in the view from the other side, and almost see it as a genre painting that stages the locals' and travellers' leisure time.



BUILDING CAPACITY

1 GARDEN CINEMA

- *Indoor Cinema(90sqm)----------45*
- *Outdoor Cinema(30sqm)----------40*
- *Ballroom(45sqm)----------30*

2 CAFE

- *Ground Floor Seating(40sqm)------40*
- *Mezzaine Seating(25sqm)----------25*
- *Outdoor Seating(15sqm)----------15*

3 CANTEEN

- *Lifted Ground Floor Seating(90sqm)------90*
- *Mezzanine Seating(40sqm)----------90*
- *Outdoor Seating(120sqm)----------120*

4 LIBRARY

- *Slussen Archive(220sqm)----------22*
- *Reading Area(200sqm)----------130*
- *Children's Zone(80sqm)----------40*

5 GYM

- *Changing Room(90sqm)----------30*
- *Exercise Studios(180sqm)----------90*
- *Roof Top Seating(100sqm)----------100*

***OVERALL TERRACES**(3,450sqm)---1,150*

***TOTAL OCCUPANCY max.**(4,815sqm)---2,057*

OPENING TIMES

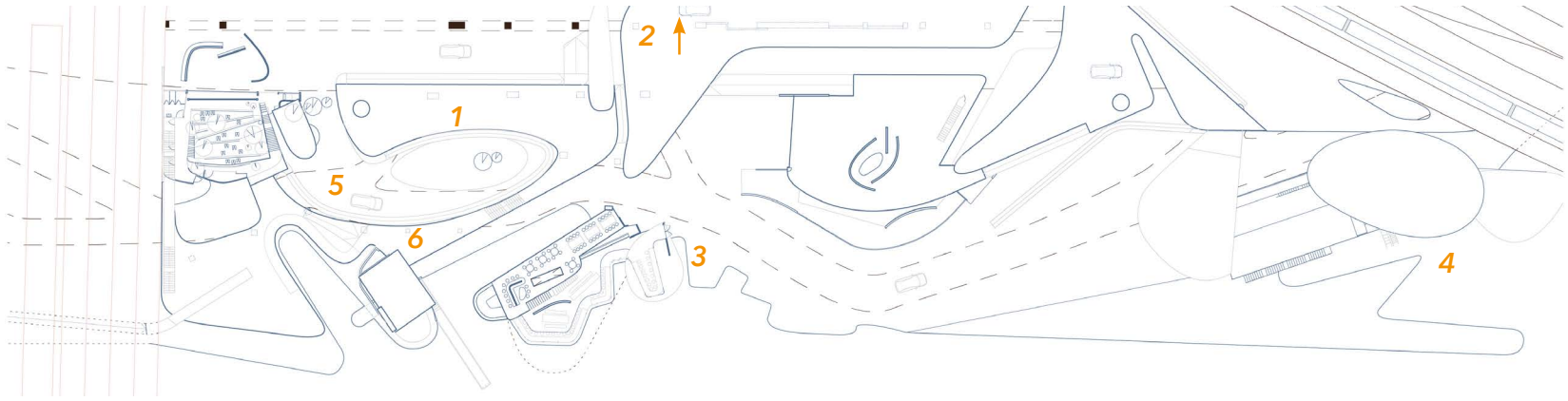
The occupancy figures are based on the assumption of the maximum number of people and attendance in all of the spaces. However, due to the seasonal operation of these facilities, around a year, there would be a significant reduction in occupancy during autumn and winter since the outdoor seating and dining area will be closed.

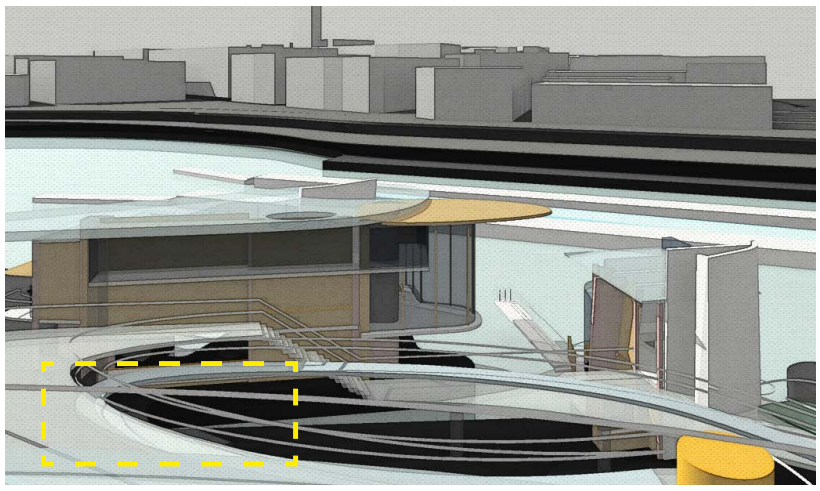
*Besides, the cinema can serve around 500 audience, because of this 8*8 fabric screen, people would be able to see films playing from boats or pontoons on the lake and the bank-side steps on the other side. Presumably, on a warm summer night, the further seats on these two areas can be arranged.*

As for the opening times, seasonal timetable shows that during autumn and winter, the outdoor parts of these facilities will be closed and the opening hours are shorter in general. The functions can be very flexible; for instance, ballroom can be used as dancing studio for classes during the day.


STOCKHOLMER SUMMER SWIM

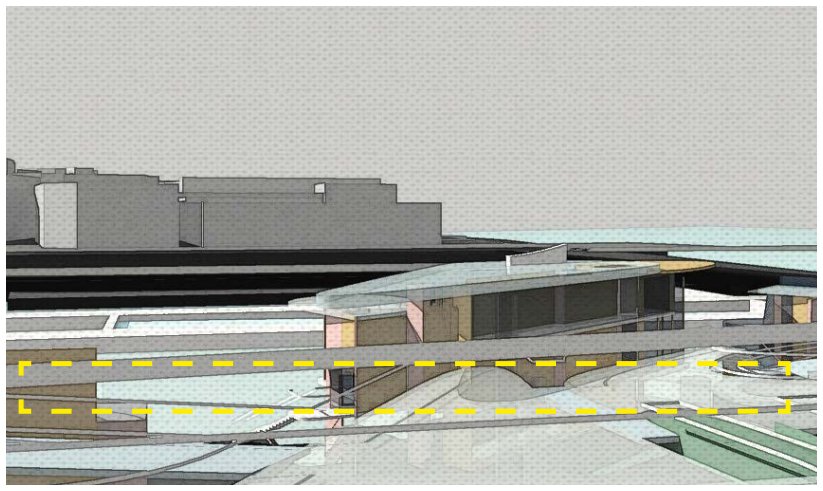
EXPERIENCING MOMENTS FROM CERTAIN SPOTS





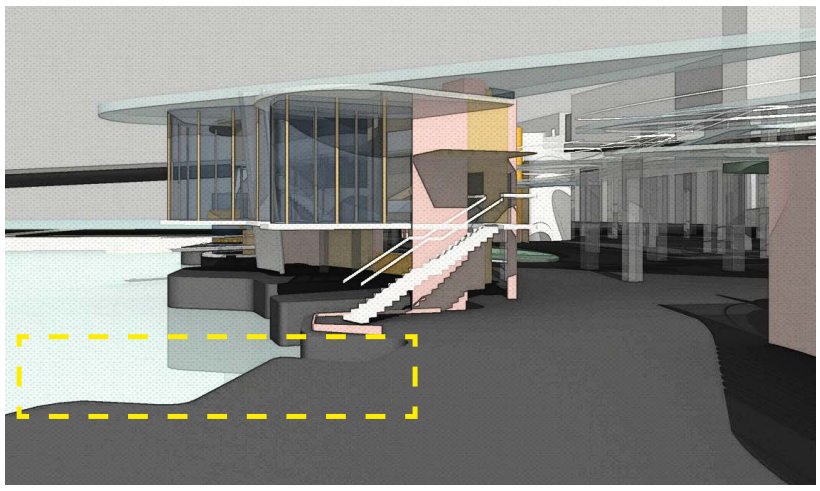
1 SITTING ON UPPER DECK

PAVING DIFFERENTIATE THE SITTING AND WALKING AREA; OR SEATS



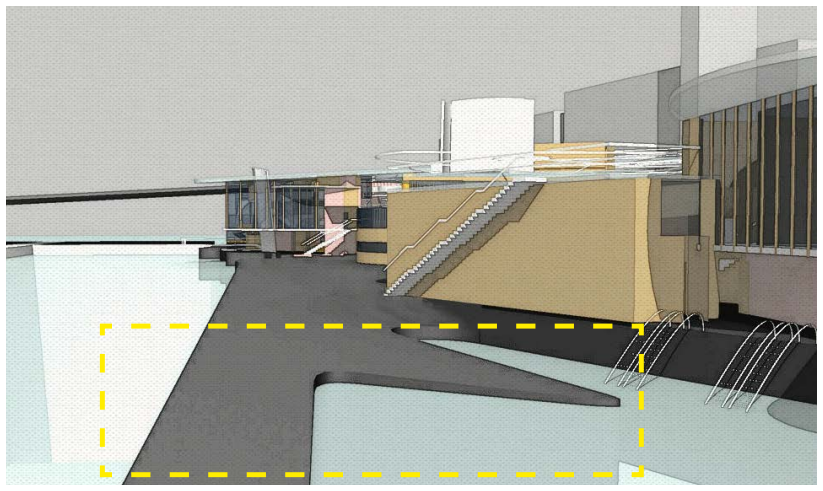
2 WALKING OUT OF A LIFT

WIDER HANDRAIL FOR MAKING PEOPLE LEAN TO THE VIEW



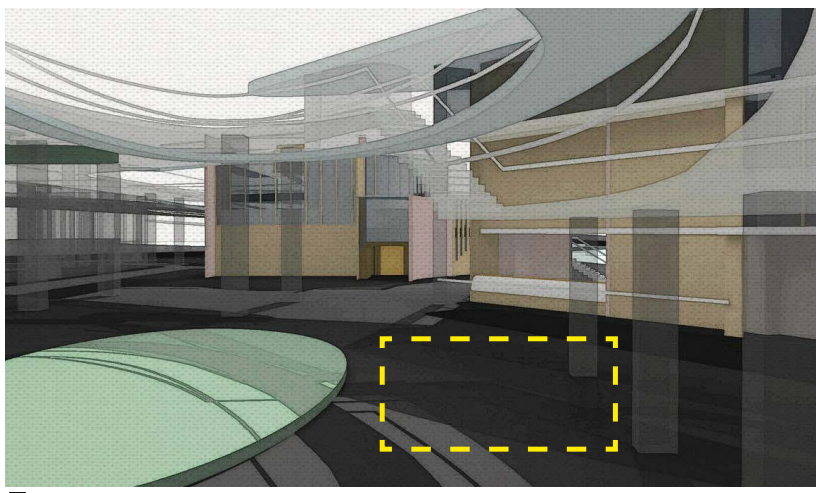
STANDING BY THE EDGE

SAFETY LIGHTING ALONG THE EDGE



4 GOING FOR A SWIM

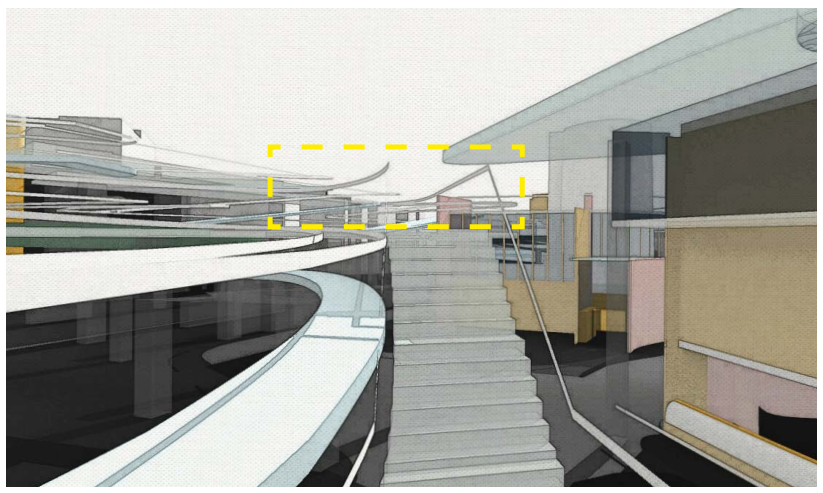
BAREFOOT-FRIENDLY AND NON-SLIPPERY GROUND TREATMENT



5 DRIVING THROUGH SITE

PEDESTRIAN AND CAR LANE PAVING

MARK OUT TRAFFIC FREE ZONE



6 WALKING ON STAIRS

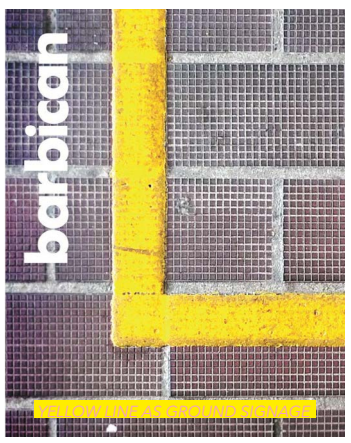
COLOUR CODE HANDRAIL AS ROUTE SIGNAGE

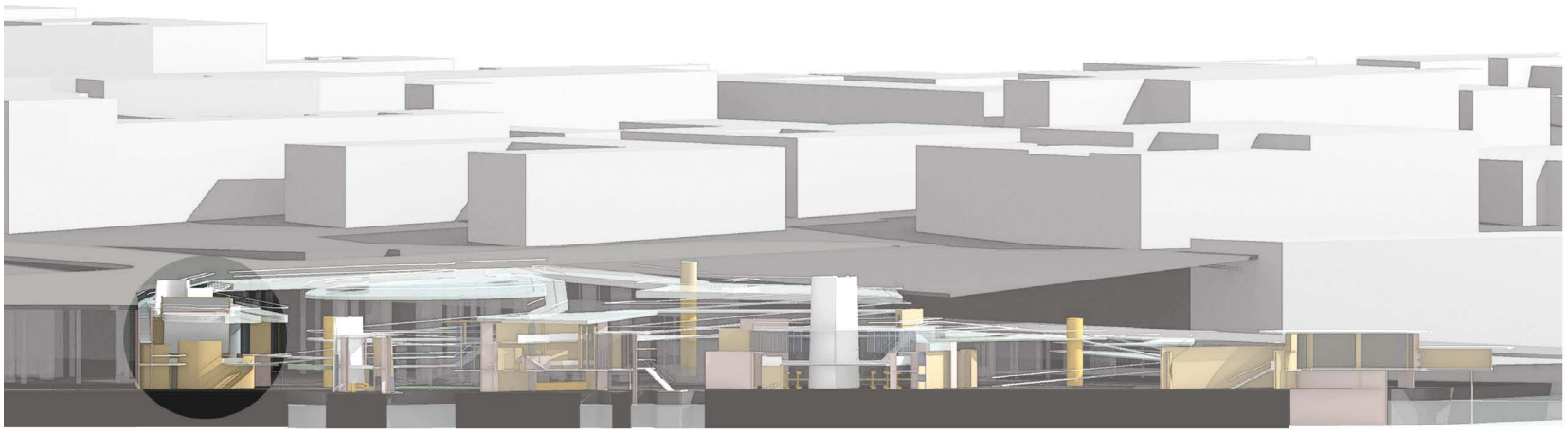
This set of views feature different experience through the site. From this "user experience" perspective, I intended to point out several detailed requirements to consider and develop further. The design notes I made are mainly on different paving treatments,handrails and signage since the key function of this terrace is for people to walk through, accessibility is crucial. Development on terraces will be focused on:

- Paving Treatments for: 1) walking area; 2) sitting area; 3) swimming landing

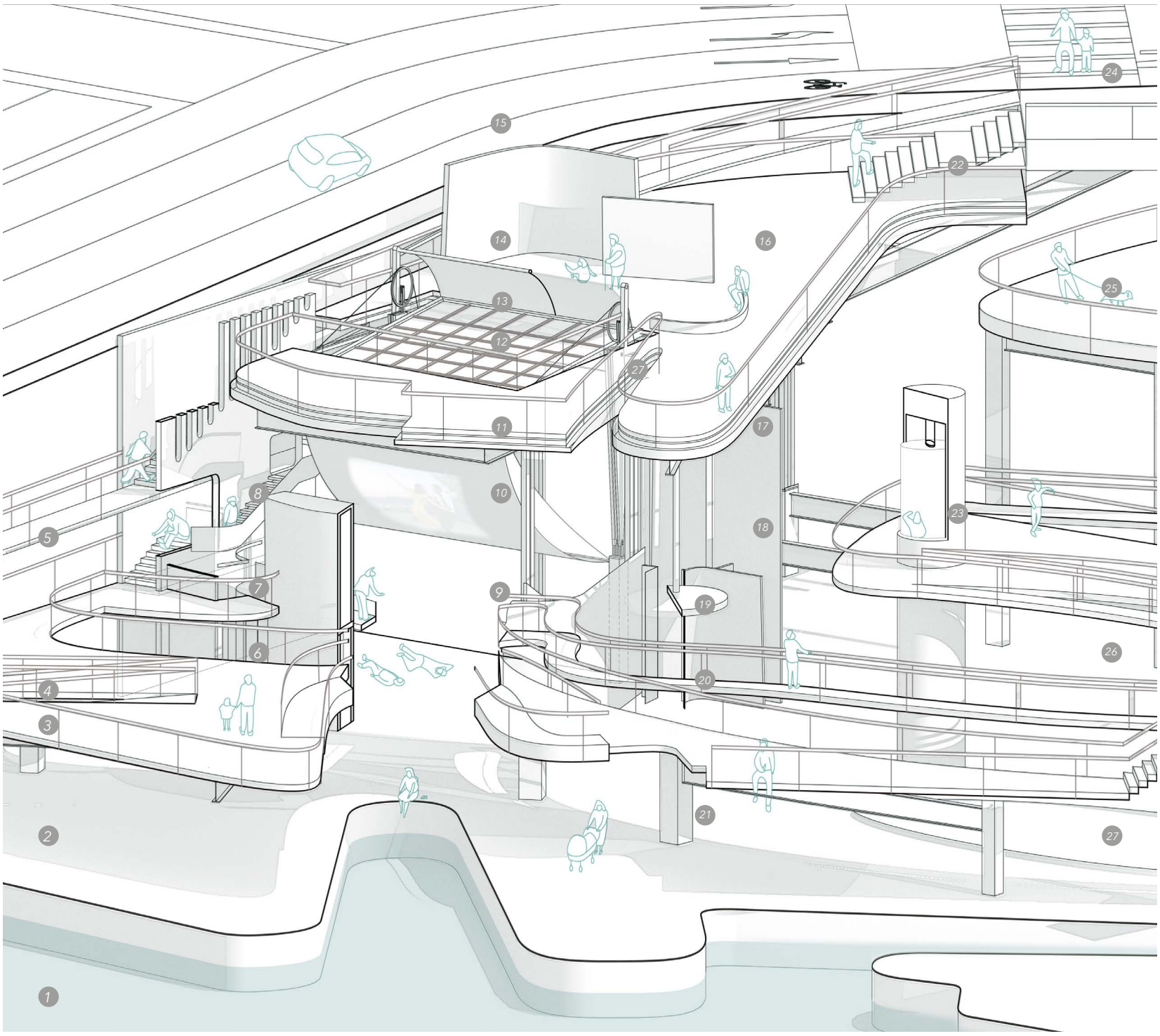
- Colour code handrails and adjust their heights,density and width accordingly.
(For instance, sides facing the waterfront can be wider so that people will tend to lean on it and enjoy the view; As it goes higher, the handrails are dense; Handrails on stairs and ramps can have its volume, considering height difference of adults and children.)

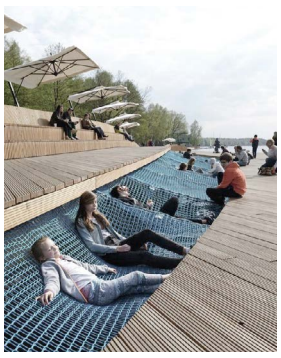
- Signage builds in the paving using colour and symbols to highlight: 1) routes leading to the facilities; 2) non traffic zone; 3) disable access

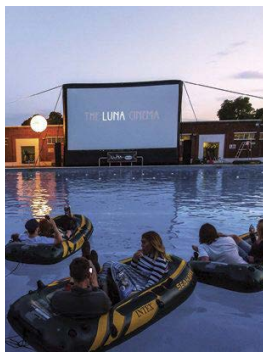




CINEMA ILLUSTRATION





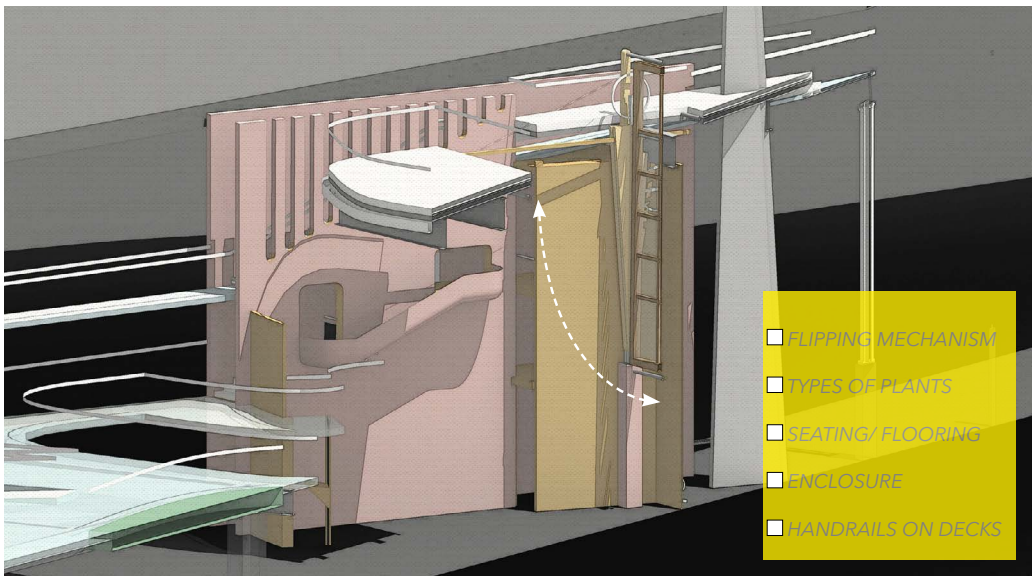


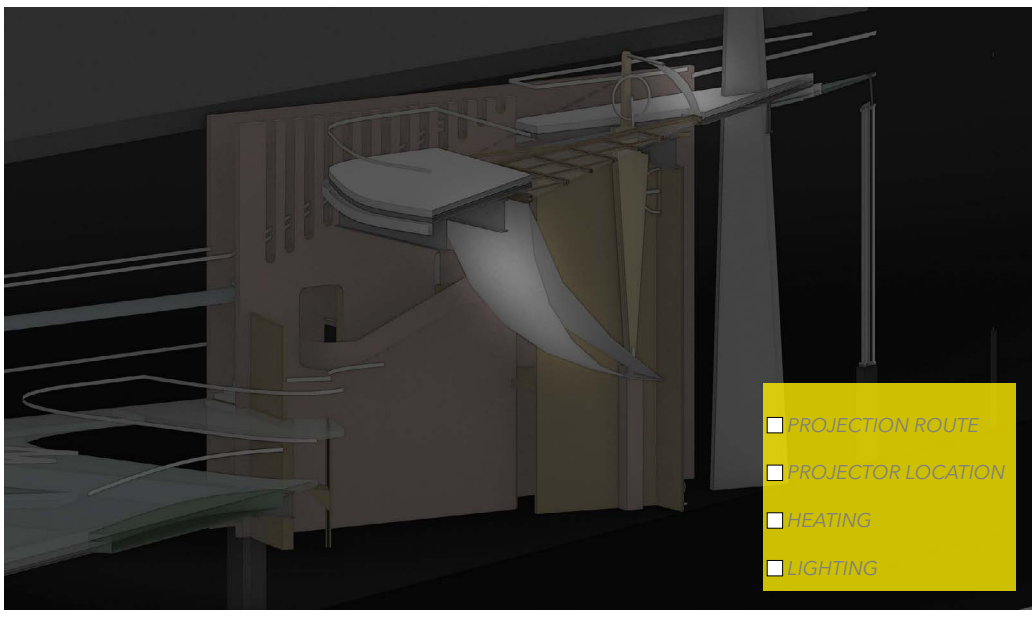
1 Lake Malaren
2 Lower Ground Level 1.7M
3 Lower Terrace
4 Ramps to Lower Ground Level
5 Walkway to Higher Ground Level
6 Lower Ground Entrance
7 Lower Terrace Entrance
8 Side Balcony
9 Indoor Cinema
10 Internal Screen
11 Handrail
12 Flipping Panel
13 External Screen
14 Outdoor Cinema
15 New Traffic Road
16 Upper Terrace 1
17 Gutter
18 Soundproof Wall
19 Poster Platform
20 Ramps to Higher Deck
21 Existing Columns
22 Stairs to Main Road
23 Lift
24 Zebra Crossing
25 Upper Terrace 2
26 Car Lane
27 Green
28 Flipping Mechanism

Garden Cinema is located at the east end of this site, due to the area restriction. (The curved water edges creates small pockets in the centre for cafe and food hall, leaving the two plots on the sides for gym and cinema.) It is accessible from higher ground, lower terrace and lower ground level. A ramp hugs around half of the cinema and connects people through all three levels.

The cinema is featured with fabric screens operated by flipping mechanism. During the daytime, the screen is folded in so it just seems to be a garden with small trees and plants for people to have picnics; and at night, the screen flips out to create two screens, which forms an indoor and an outdoor cinema. People will be lying down and looking up to the screen in the indoor cinema Potentially, this screen will also be seen from the lake and the other side; therefore larger projections can be introduced to accommodate more people watching films together

CINEMA PROGRAMME



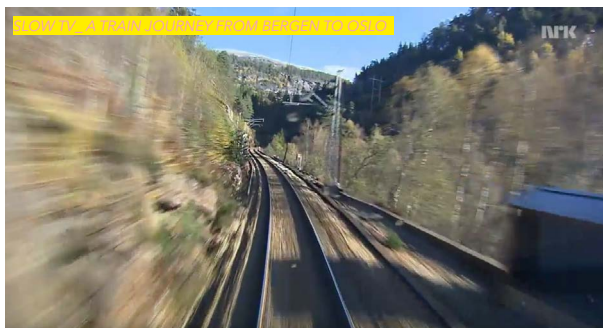


SOURCE OF PLANTS

Rosendals Tradgard is a plant nursery in Djurgarde, Stockholm. Presumably the plants they have there will be suitable for growing on site. For instance, hyacinth, tulip, daisy, quercus robur, lily of the valley, smorboll, mountain avens, corn flower, mullein, etc.

GARDEN DURING THE DAY

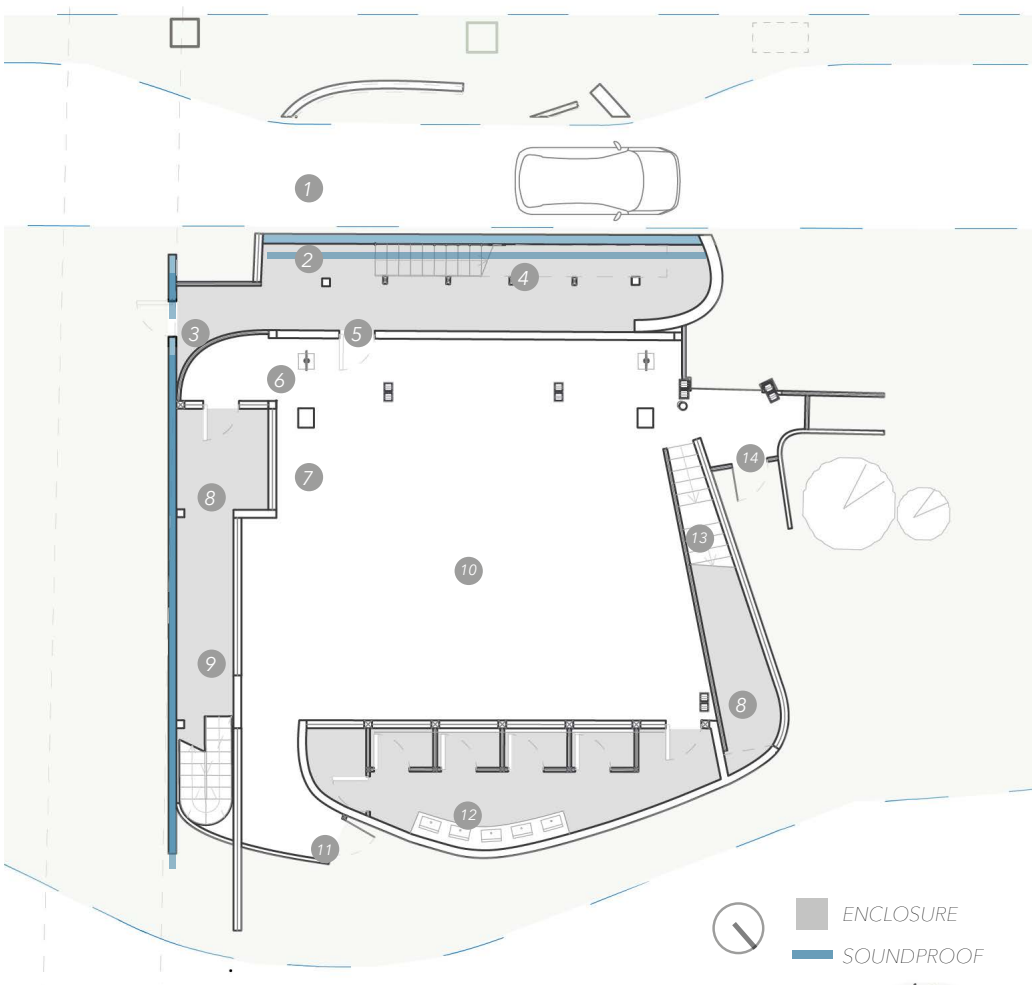
FILM EXAMPLE



As a non-profit cinema, no new-released film would be played here. The films will be selected and provided by the Stockholm Film Festival Committee, and the public can also leave notes on what old films they wanted to watch or donate film tapes. Apart from films, other short videos and Nordic "Slow TV" can also be included.

CINEMA AT NIGHT

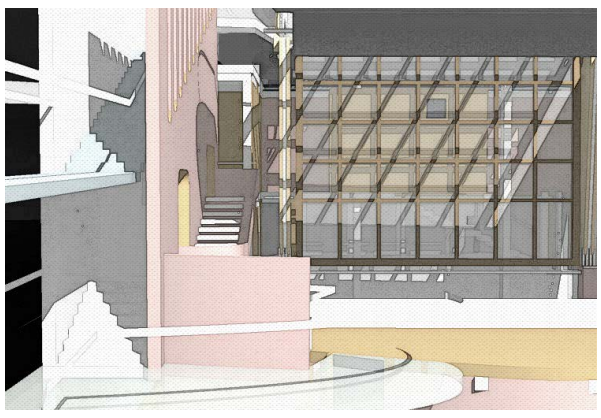
ENCLOSURE IN GARDEN CINEMA



MOMENTS IN GARDEN CINEMA

BALLROOM

LIGHTING THROUGH CINEMA SIDE



ENTER FROM LOWER TERRACE

SIGNAGE FOR DIRECTIONS IS NEEDED

1 Car Lane
2 Soundproof Wall
3 Back Entrance
4 Stairs to Ballroom
5 Door to Indoor Cinema
6 Flipping Mechanism
7 Fabric Stand
8 Storage
9 Bar
10 Indoor Seating
11 Front Entrance 1
12 Toilet
13 Stairs to Lower Terrace Level
14 Front Entrance 2

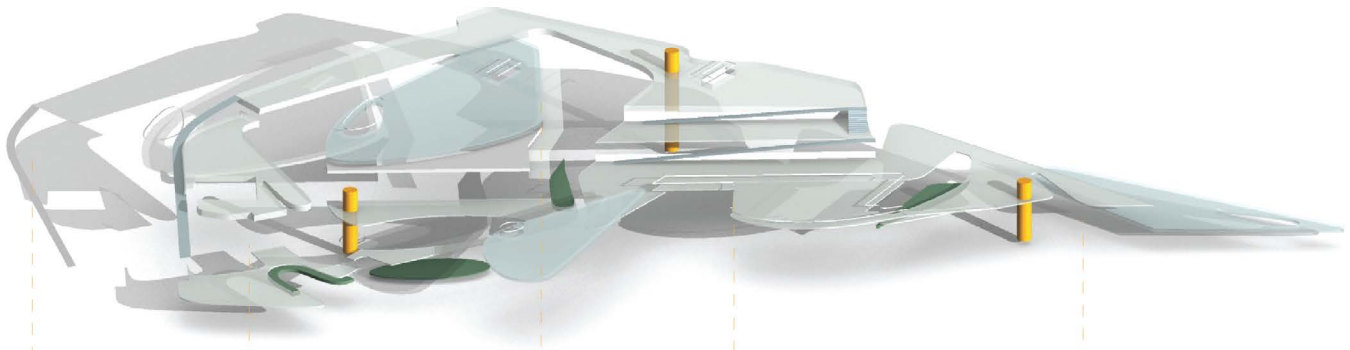
There are three enclosed space in garden cinema, which are ballroom, bar and toilet. The other part of the building is open-air; however, due to the cold weather in Stockholm in winter, curtains will be installed around the upper deck to stop the wind from Lake Malaren and keep the indoor cinema warm.

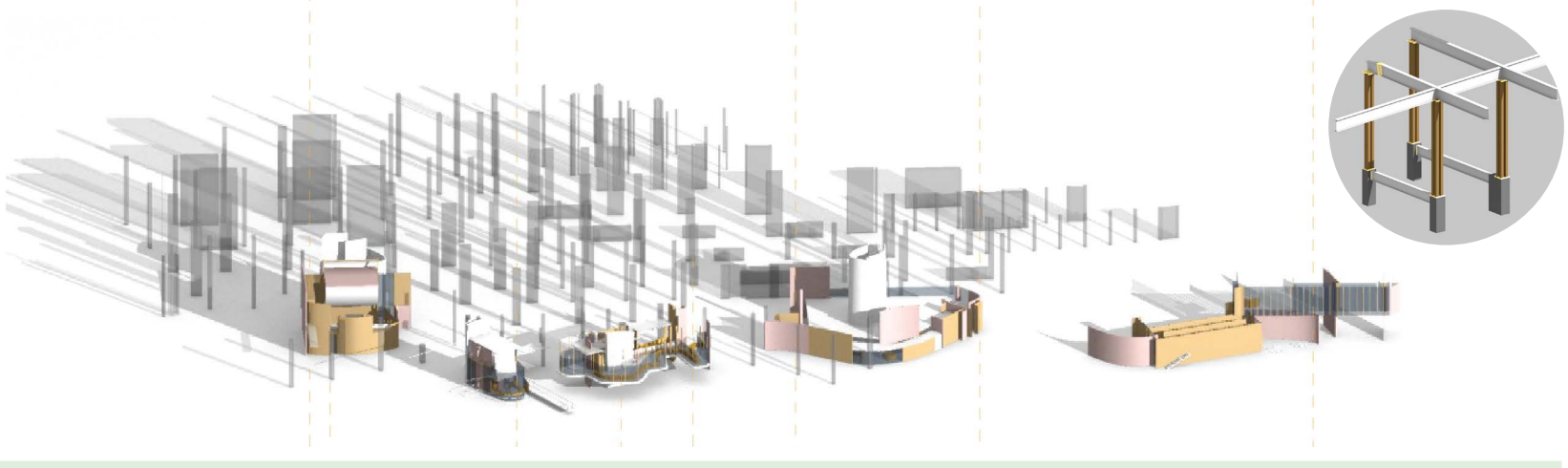
As people are lying down and looking up to the fabric screen in the indoor cinema, mats will be need. The mats will be stored in the cabinet under the staircases(no.13) for audience to take and use.

Bar for drinks and popcorns are on the east side by the screen on ground level. Ballrooms are on the first level, which is on top of the remaining car lane. Therefore, a thick wall on the south side is introduced for soundproof purpose, and the same applies to the concrete wall on the east side.

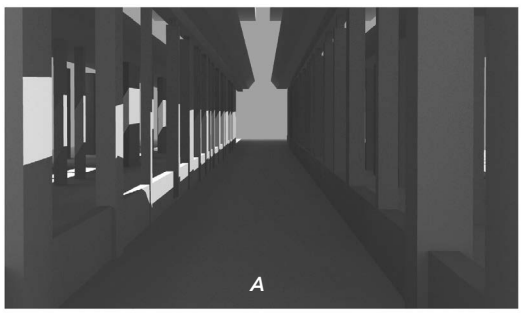
OVERALL STRUCTURE DIAGRAM

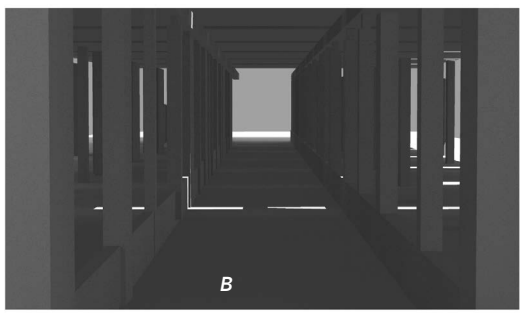
- ☐ REWORK COLUMNS
- ☐ DECK MATERIAL
- ☐ CAPACITY-WEIGHT

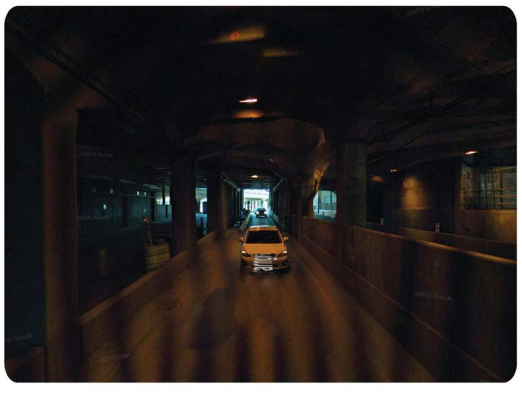


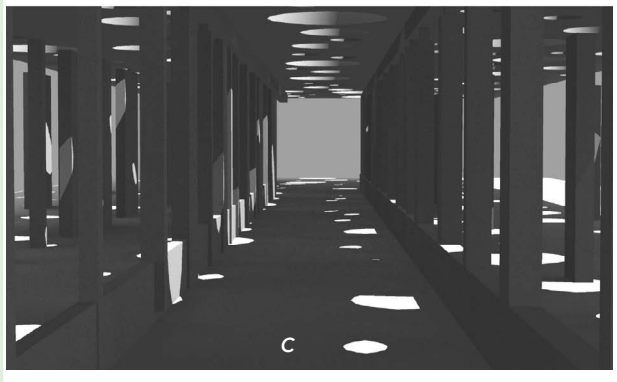


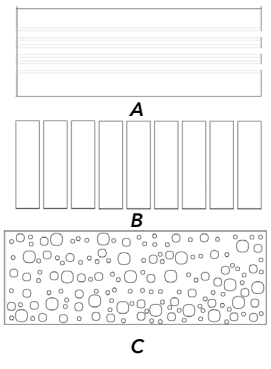
TERRACE CUTOUT EFFECT ON VEHICLE LANES BELOW





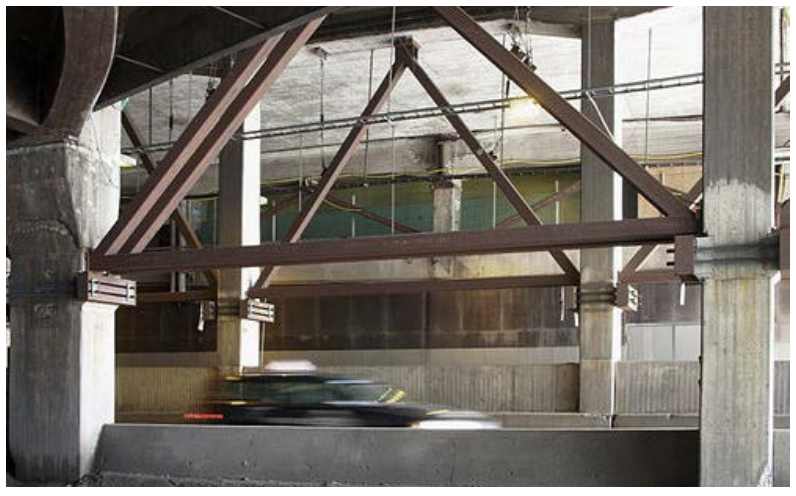






TWO EXISTING COLUMN CONDITIONS

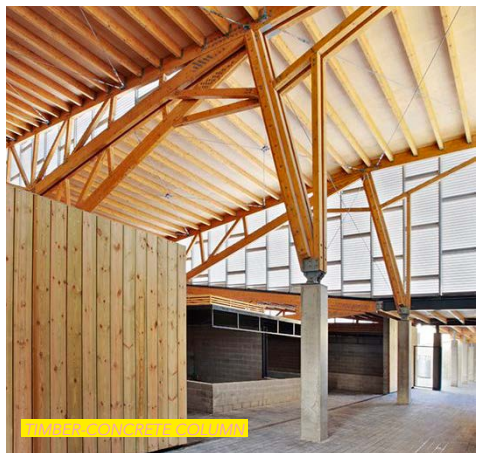
FRONT SHORT COLUMN



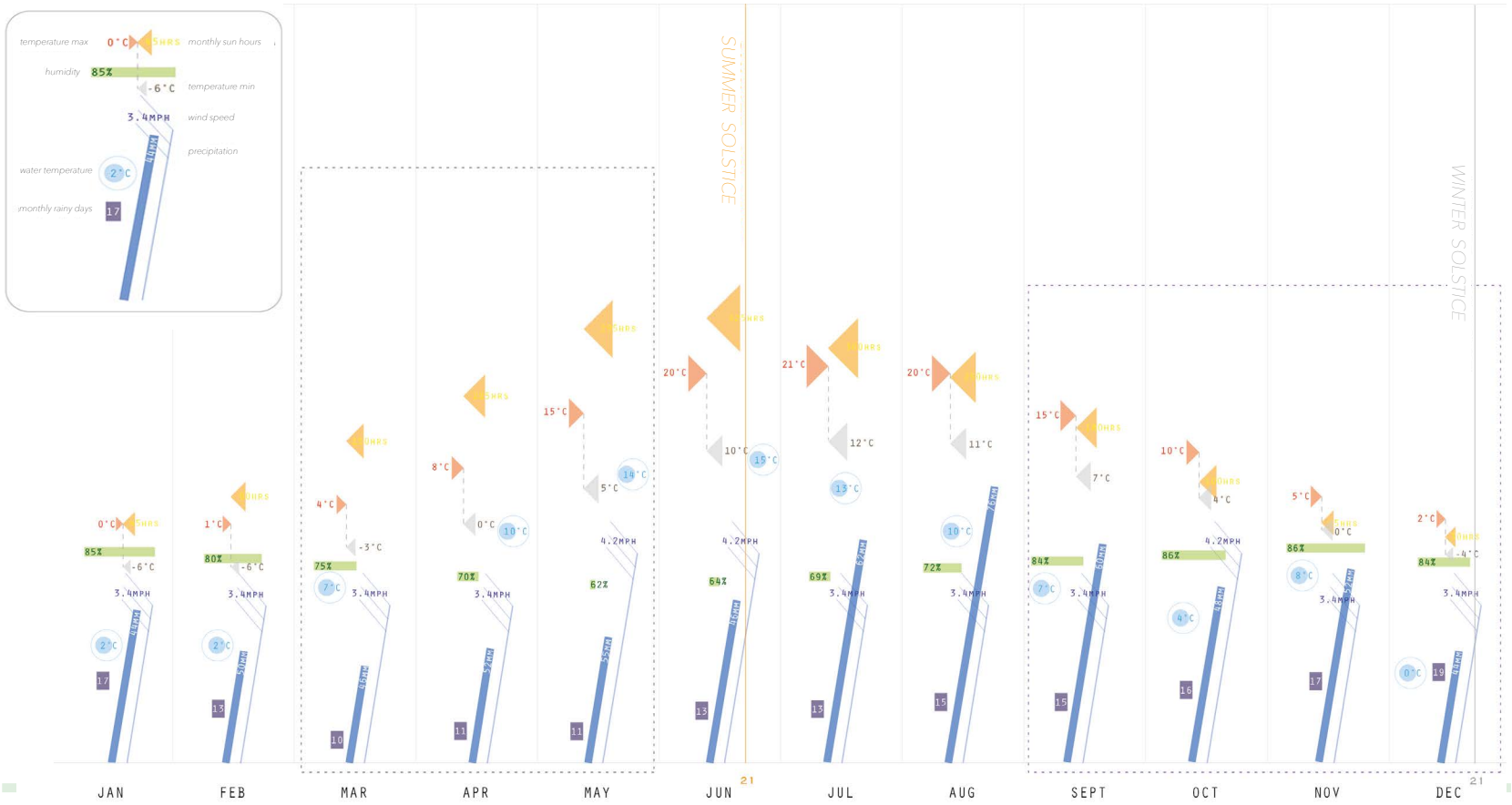
BACK TALL COLUMNS

The basic principle for the overall structure is that these remained columns will be reworked on to reach their needed heights and strength. The terraces, just as roof pieces of a building, will be sat on top of these columns, connected with metal joints. Besides, three lifts from ground to terrace level can be regarded as a support to hold the pieces of terraces as well.

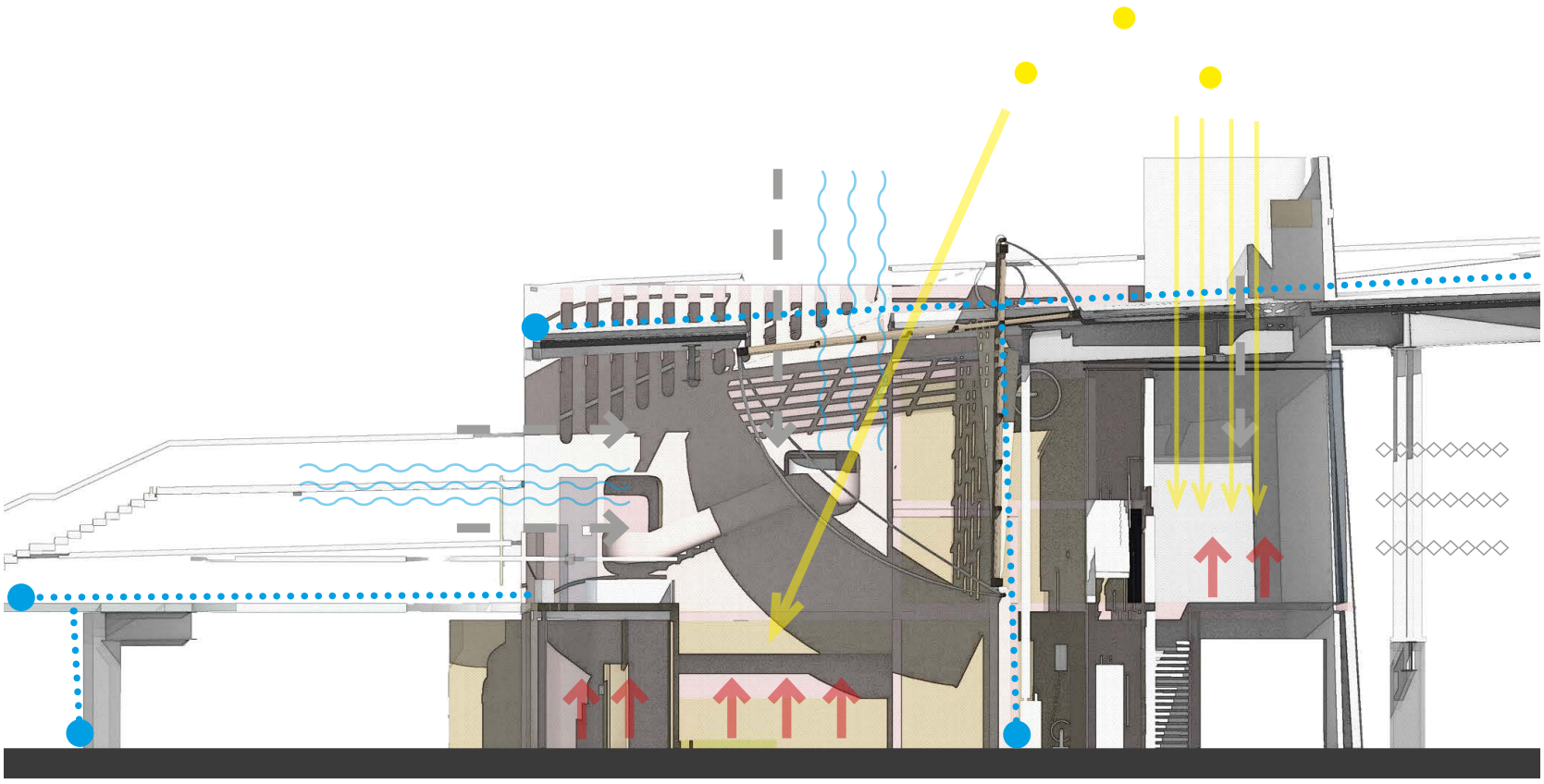
The remained columns on site have different dimensions. The ones closer to the waterfront are shorts, vice versa. In order to standardize these columns, there will be I-beam inserted in between every two columns on a certain height. Then, the columns will be trimmed to the level where these I-beams are. Next, metal joints will be placed on these trimmed columns and connect timber columns on top to make the columns to a ideal height, which depends on the position of the deck piece above it.



STOCKHOLM CLIMATE ANALYSIS



ENVIRONMENTAL DIAGRAM



SERVICE

Rainwater is channelled from the roof gutter to water storage tank on the ground level for cleaning, and then goes into the sewage system after using. Service plant are located at the basement level.

HEATING AND COOLING

Enclosed space in Garden Cinema is insulated and floor-heated during winter. The temperature in the rest of the building is about the same as the outdoor temperature. Therefore, heating is crucial in winter since the average temperature for the three coldest months are -3C. This heat can be provide by heated blankets, curtains or lights.

VENTILATION

Since the building is semi-outdoor. There is natural ventilation throughout. As for the enclosed area, windows can be opened to keep it ventilated.

SUNLIGHT

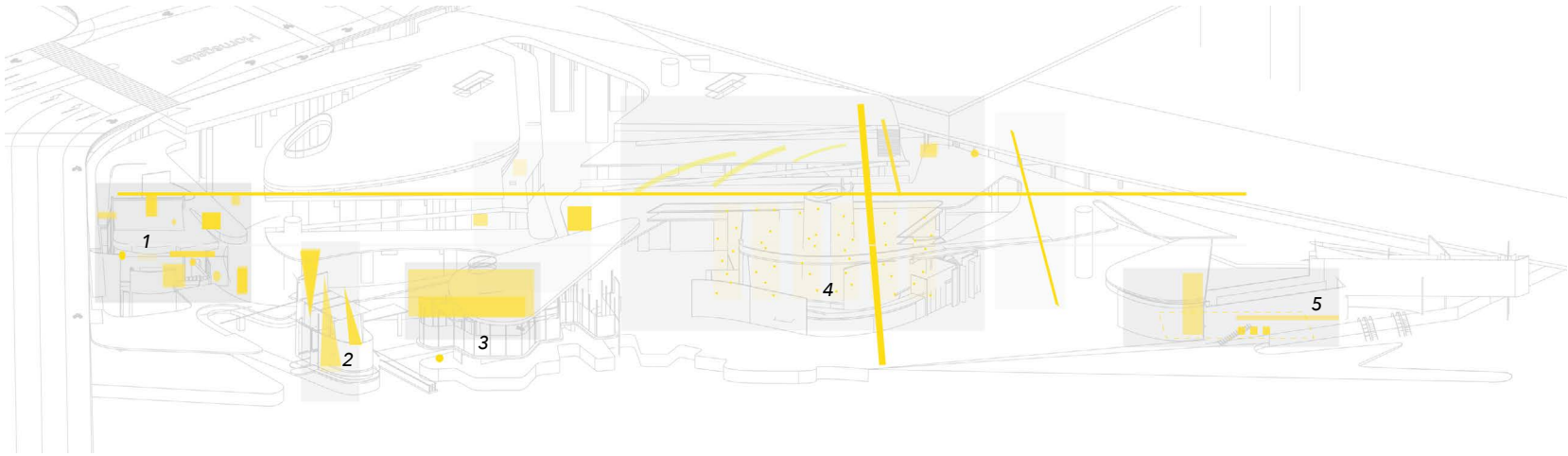
Open-able ceiling allows skylight comes in to the internal space and the ballroom.

ACOUSTIC

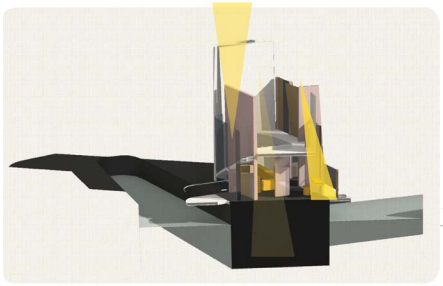
The site is adjacent to traffic. Concrete walls are introduced on the sides next to traffic acting as a soundproof element.

Rainwater
Service Plant
Heating
Cooling
Wind
Sunlight
Noise

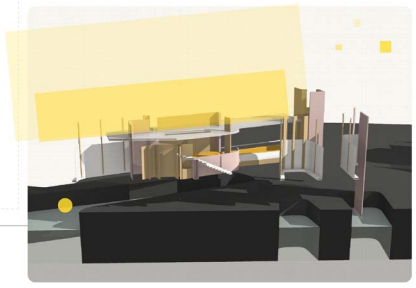
MOCK OVERALL LIGHTING PATTERNS



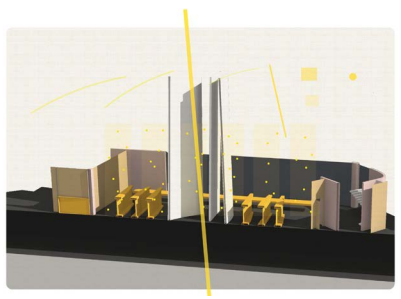
2 CAFE



3 CANTEEN



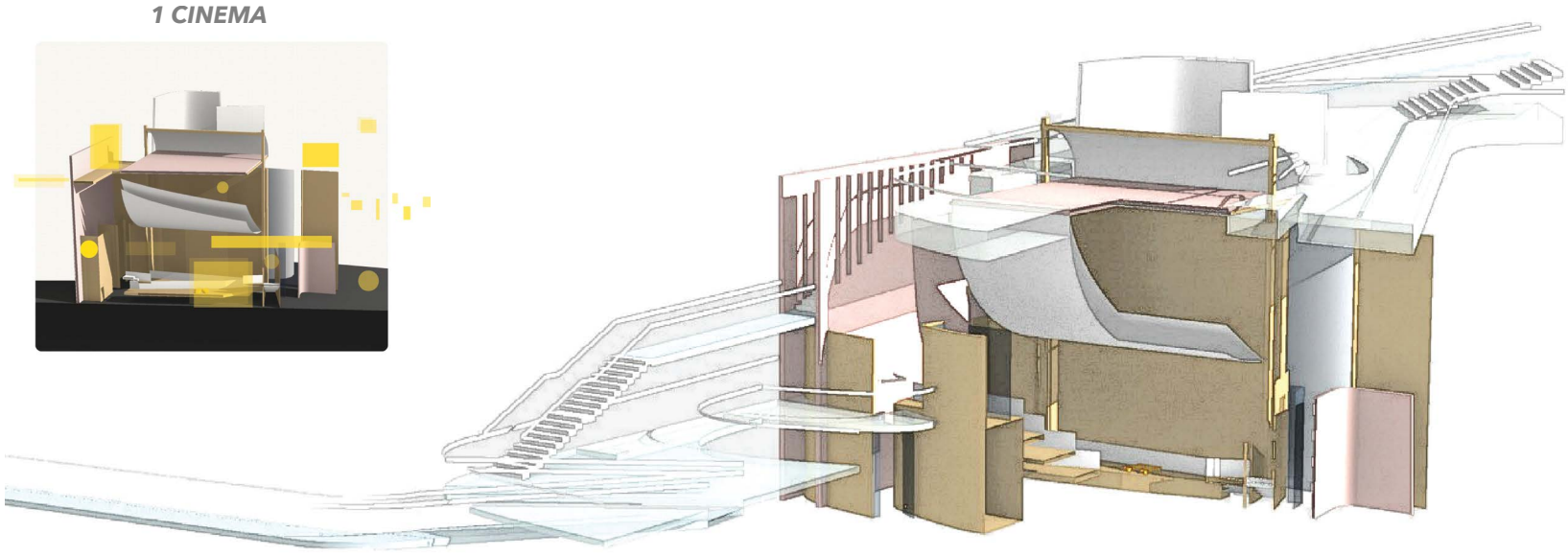
4 LIBRARY



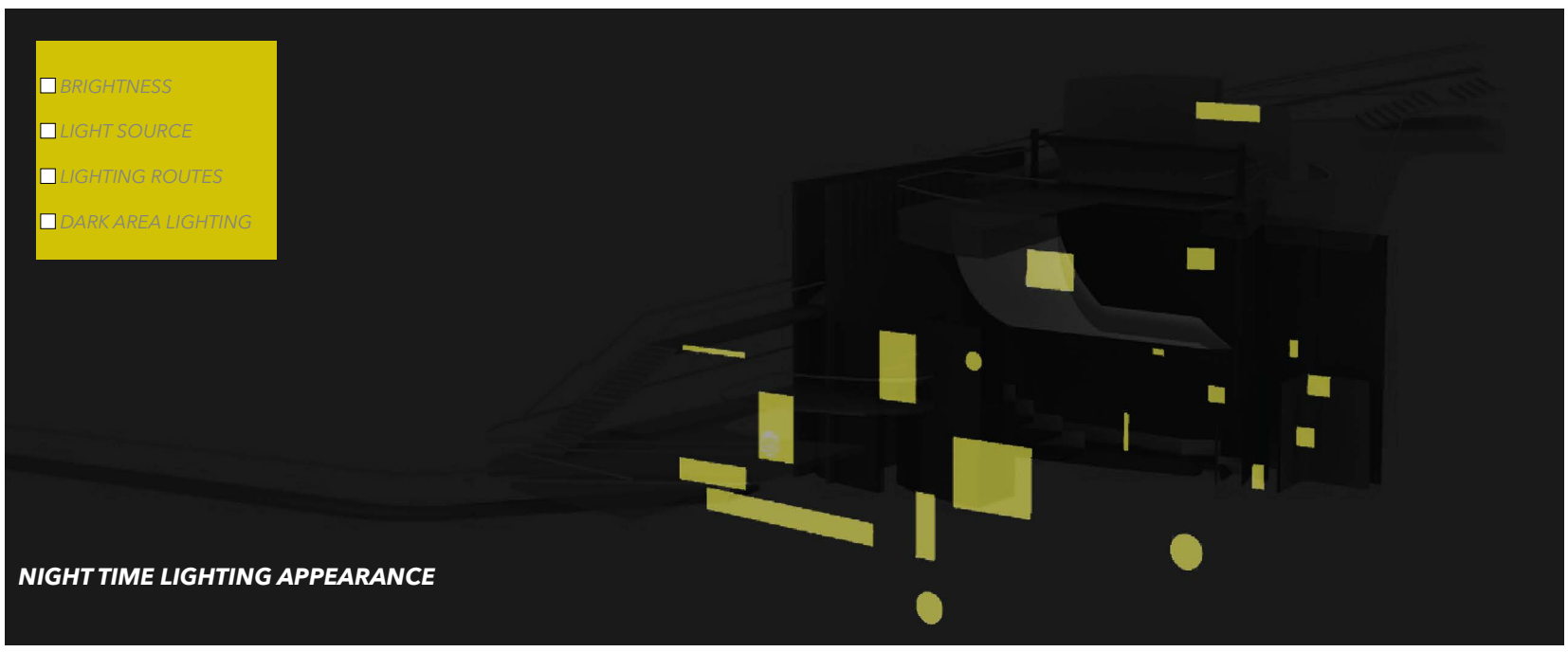
5 GYM

MOCK CINEMA LIGHTING PATTERNS

1 CINEMA



DAYTIME APPEARANCE

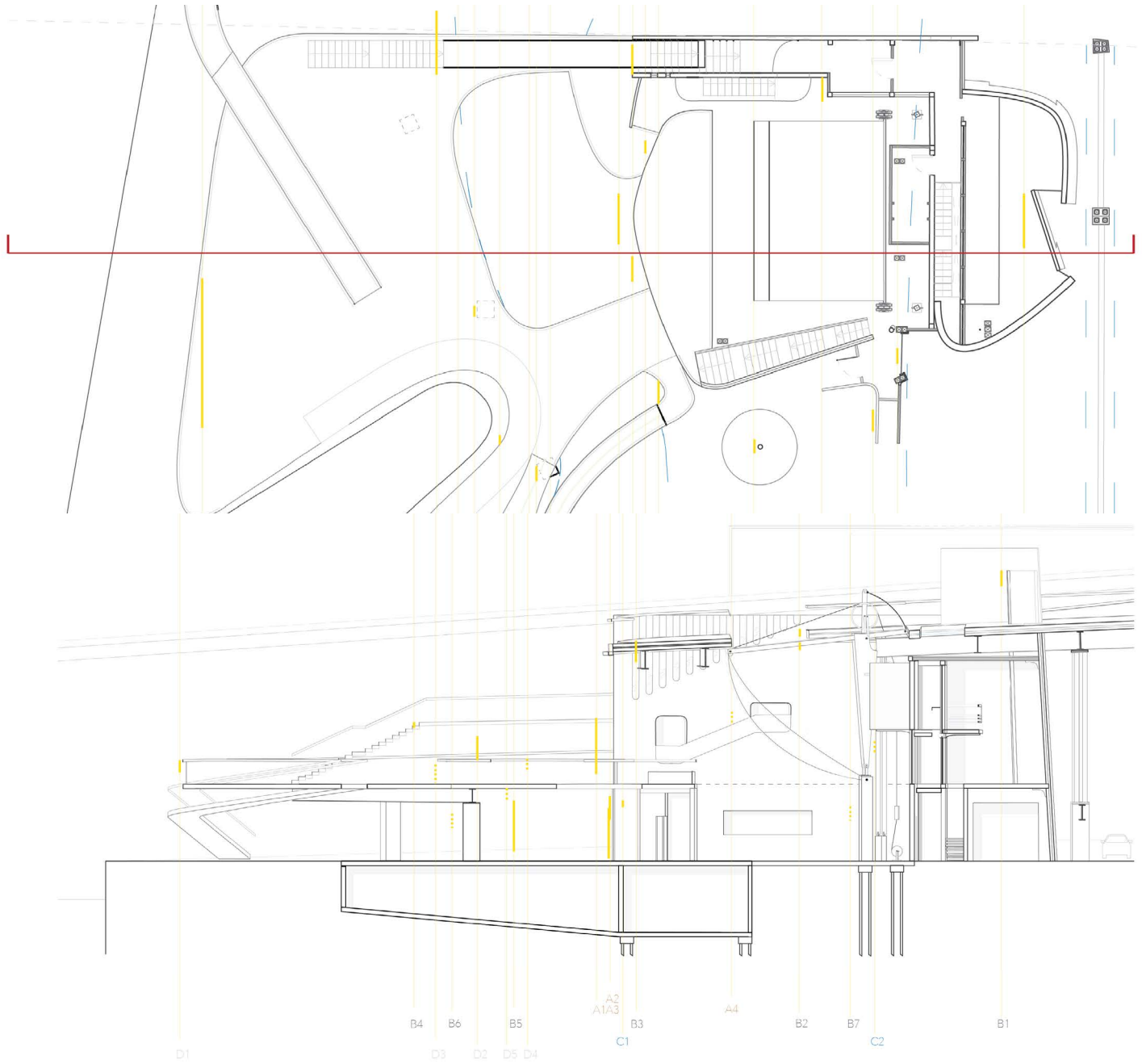


NIGHT TIME LIGHTING APPEARANCE

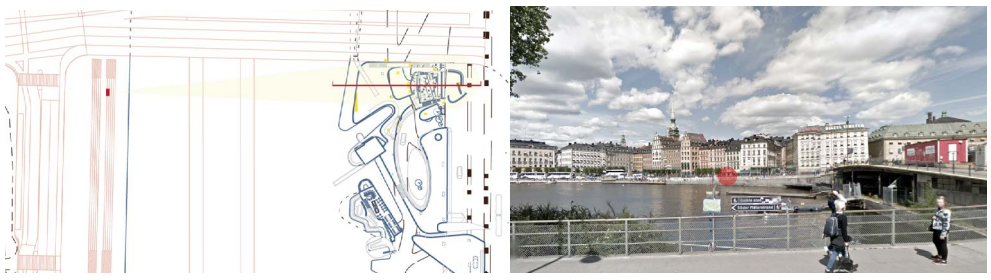
Testing out the views from varied locations made me interested in the relation of my site and 'the other side'. In Section 3, I intend to explore this visual dialogue across Lake Malaren during the night. Since night appearance of architecture do not necessarily need to follow its physical existence. My aim is to see the buildings in Scandinavian darkness as a canvas where luminous patterns are projected on as suprematism paintings. So apply this idea to my building, I give myself this patterns to start with. I'm interested in taking the other side of the lake as audience, and testing this visual expression and its implication on building's tectonic by day.

Another aspect is turning these 2D patterns into 3D volumetric light boxes, which allows the light to travel beyond a linear line on the plan, so that dark areas are lit up as well. This will be further explored in Section 3. I will start with marking out the areas need to be lit up at night, and then channel these routes of light with the location of the lighting patterns. Test the 3D puzzle in this way in which the 3D light boxes look 2D from one particular standing spot. Besides, as one can imagine, this series of lighting patterns are designed from one certain standing point on the other side of the river. However, this view will be twisted as the viewpoint shifts. This is also one of my interest to examine my design at a later stage.

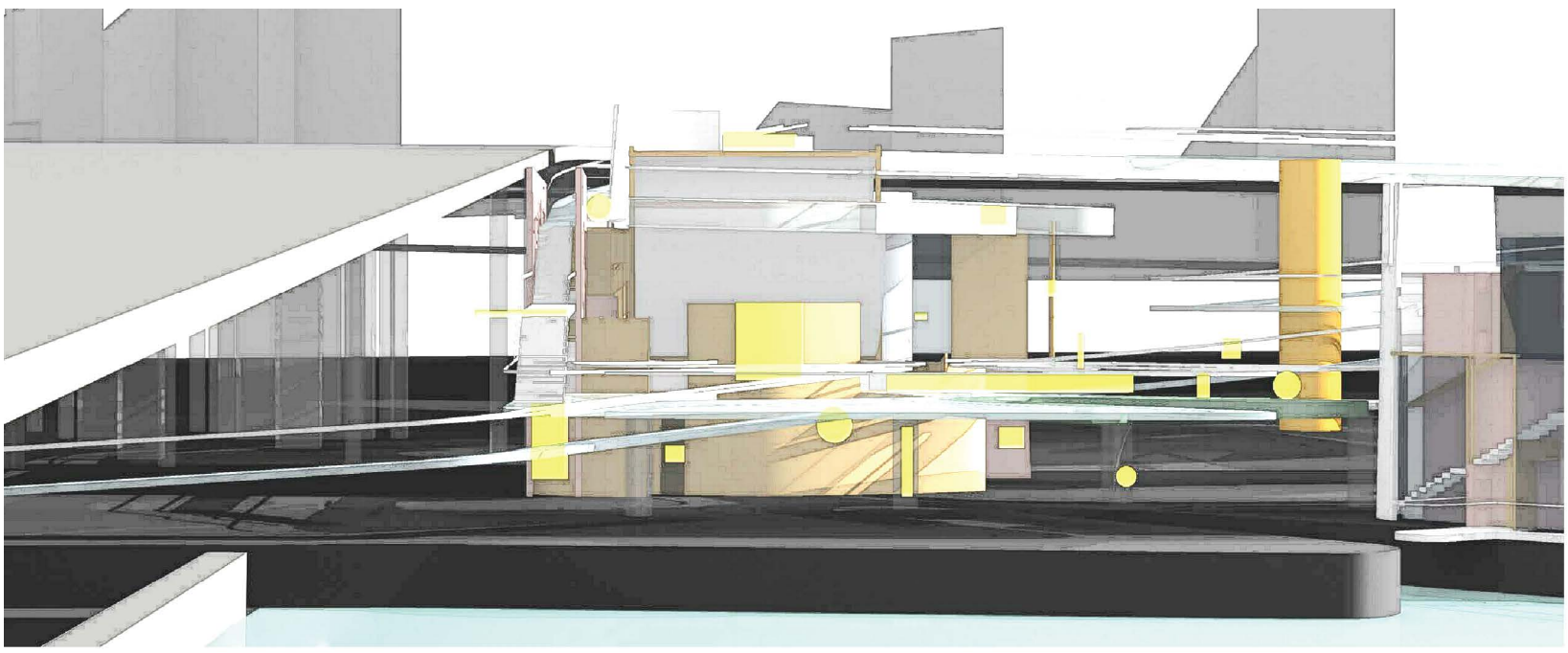
LIGHT PATTERN CODES AND LOCATIONS



VIEWPOINT FROM THE OTHER SIDE (100M AWAY)

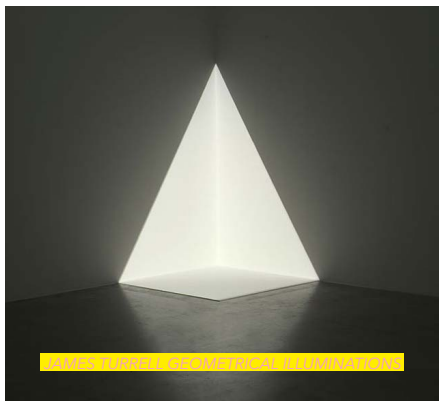


ACTUAL EYE LEVEL VIEW WITH ORIGINAL COMPOSITION OF LIGHT PATTERNS

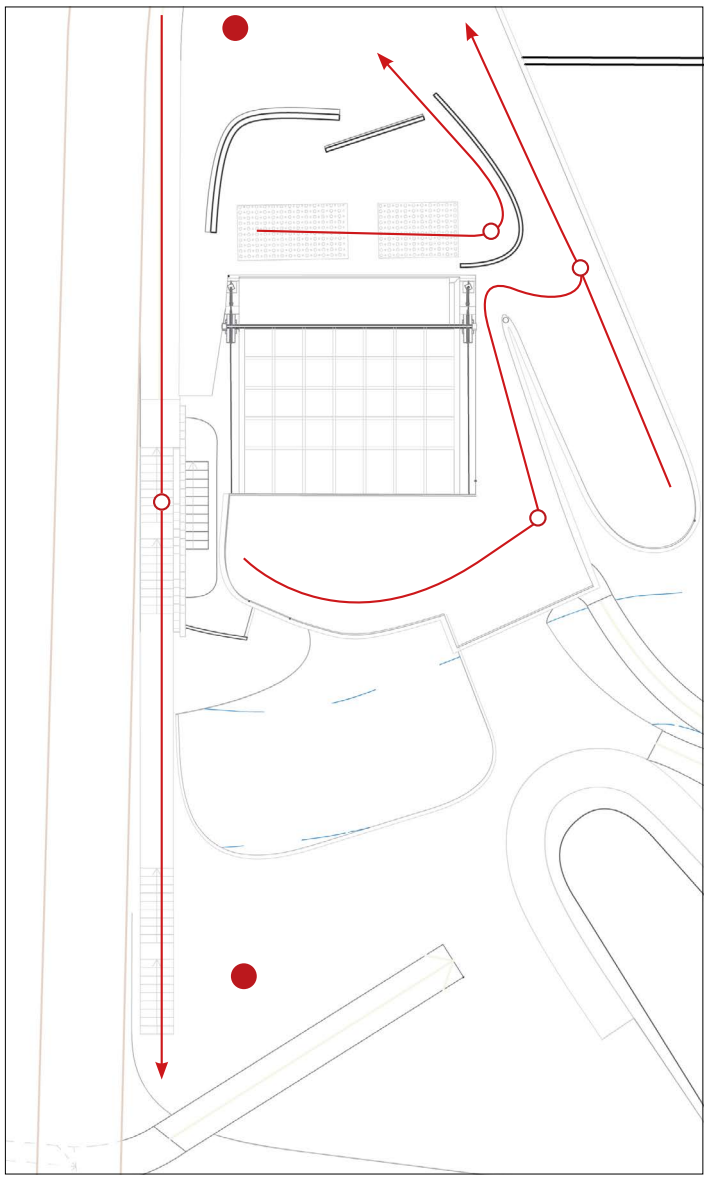


The distance between that particular viewpoint I set and the cinema is around 100M, therefore it is important to make sure these patterns can be seen from afar.

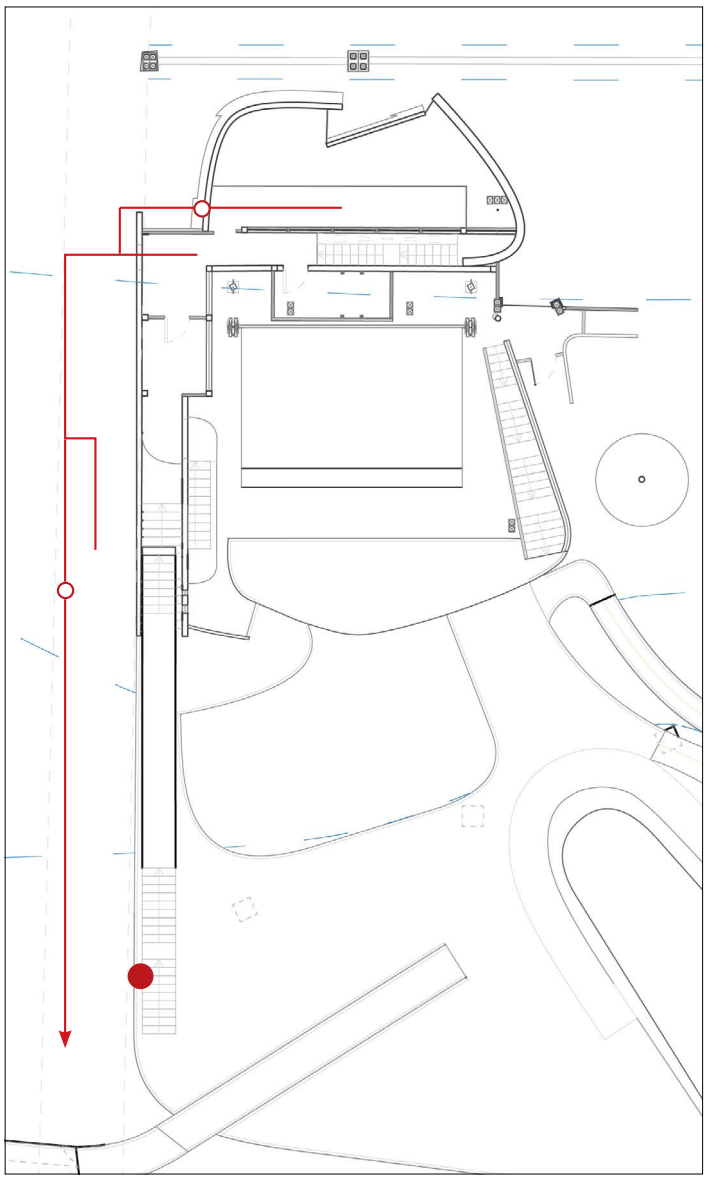
The lights are intangible but it has to come from a physical existence, which can be embedded, framed, projected, mirrored light coming from specific spots in the building. Therefore, the first step is to locate these light patches and label them. Due to the size of each pattern and the distance to that particular standing spot is different, the required brightness of each light source varies. In this case, each one of them will need to have different treatment to achieve the ideal luminous effect. This will be further explored in Section 3.



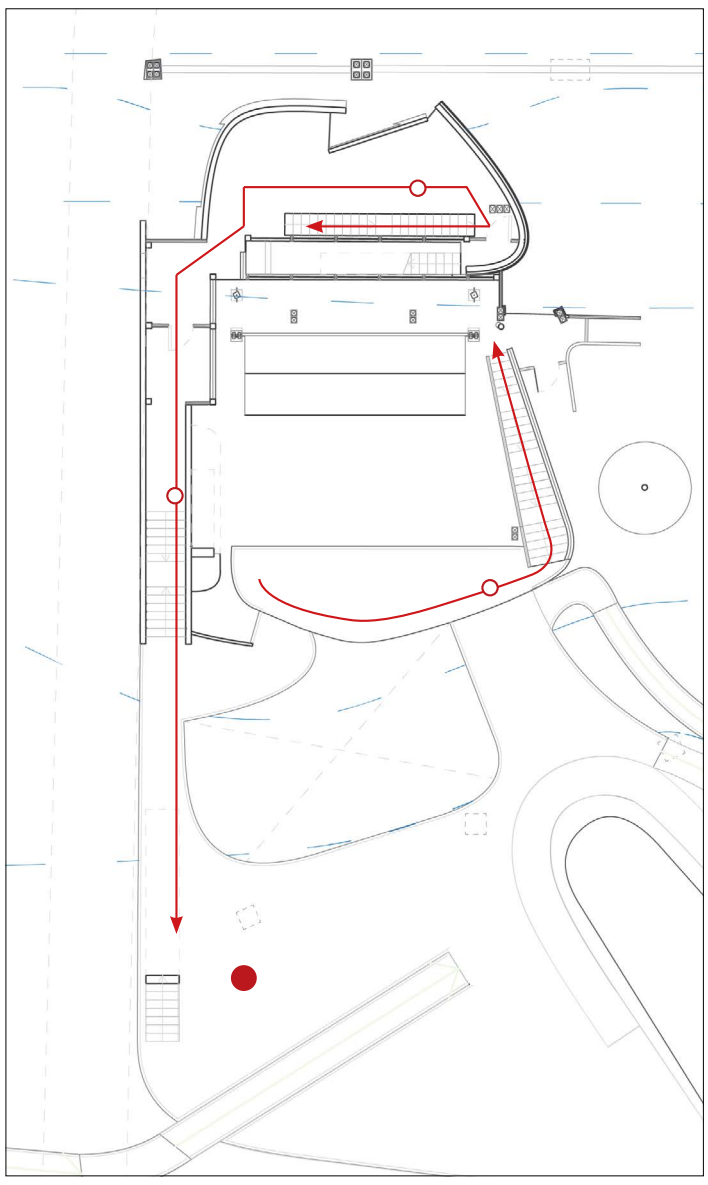
HIGHER GROUND LEVEL +10.7M



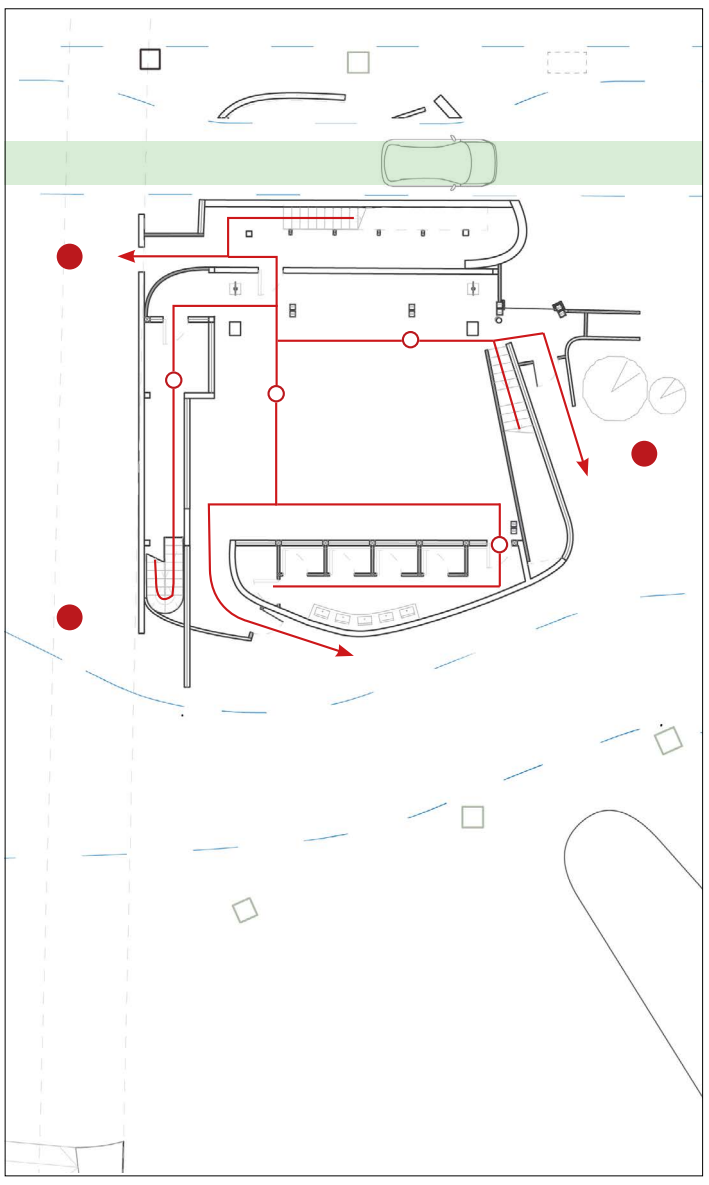
UPPER TERRACE LEVEL +7.7M



LOWER TERRACE LEVEL +4.7M



LOWER GROUND LEVEL +1.7M



ESCAPE ROUTE

MIDDLE POINT OF ESCAPE ROUTE

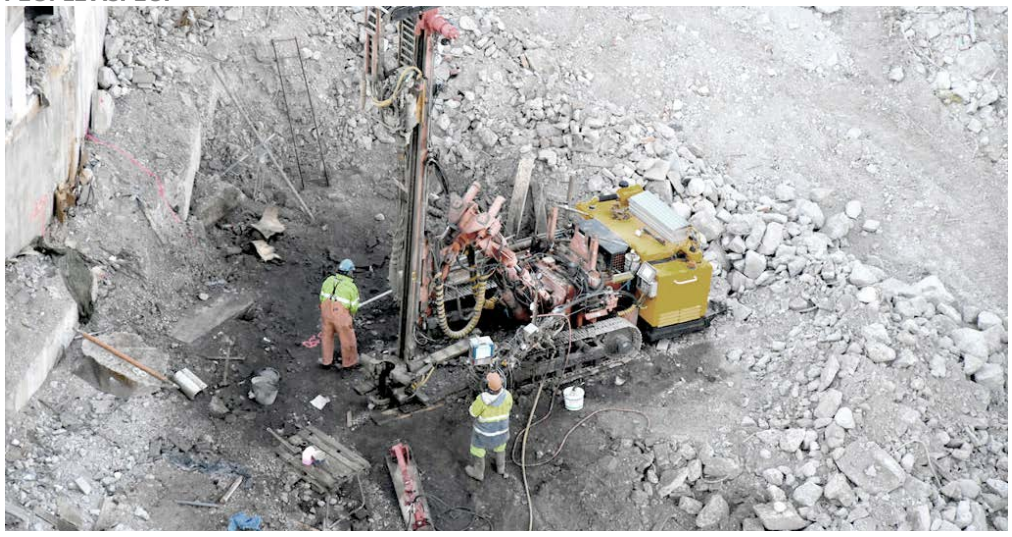
HOSE FOR FIRE SERVICE ACCESS

FIRE TRUCK ACCESS

The fire escape strategy is shown above for each level. As for 'Purpose Group', Garden Cinema is Group 5: Assembly, Display ans Recreation. Since the site is adjacent to water and the building is semi-outdoor, fire is not a substantial concern. There are hoses for fire service access on each level, which should be sufficient in emergency. According to BS 5588-5:2004, 18 metres is the maximum travel distance in an unprotected space for recreation buildings, while 45-metre distance is allowed if there is more than one direction.

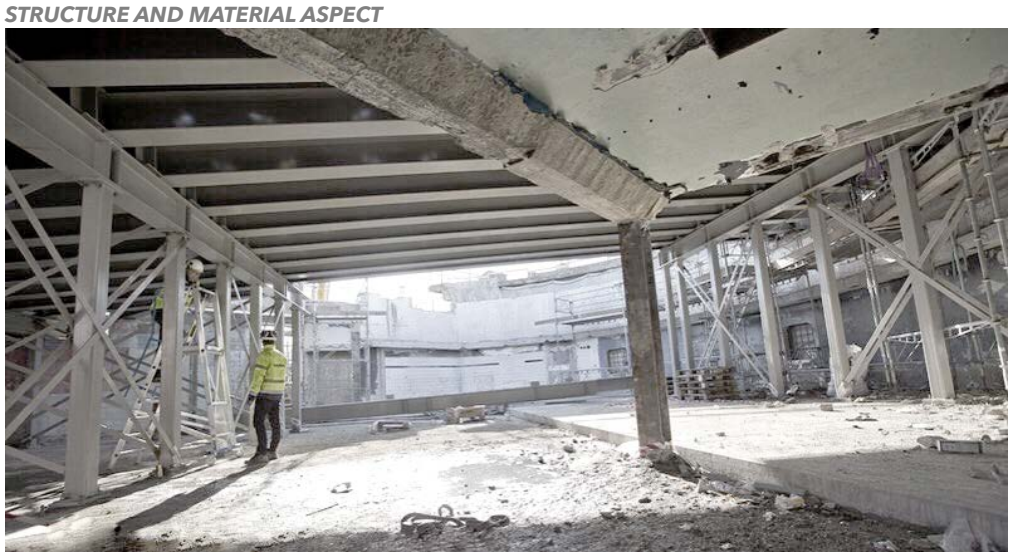
ONGOING DEMOLITION ON SITE

PEOPLE ASPECT



Protections like safe boots, gloves and helmet , should be worn for the ones are on site. During concrete trimming and framing work, face protections, glasses and ear plugs should also equipped.

STRUCTURE AND MATERIAL ASPECT



Structural engineer and material specialists should have regular meetings with the architects to pre-evaluate the buildability and risks of designs in detail. Preparation work beforehand to avoid as much as possible changes on site .

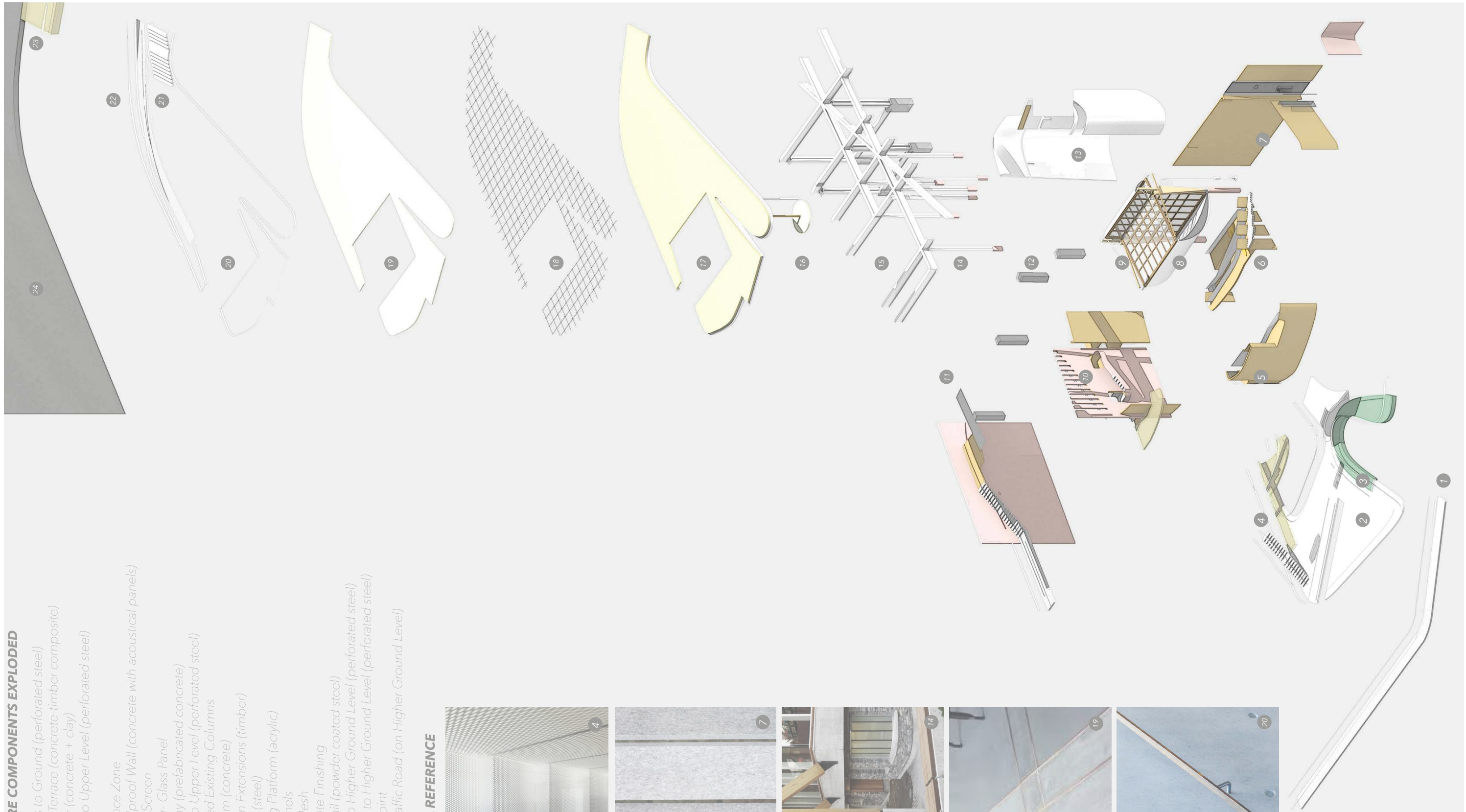
MACHINERY ASPECT

Large machines and cranes are needed for constructing a project of this scale. The operation and maintenance of these machines are crucial.

The machines may produces loud noise, which is also a concern to the surroundings. Notice should be given and soundproof should be prepared beforehand.

DELIVERY ASPECT (OVERALL PROCUREMENT)

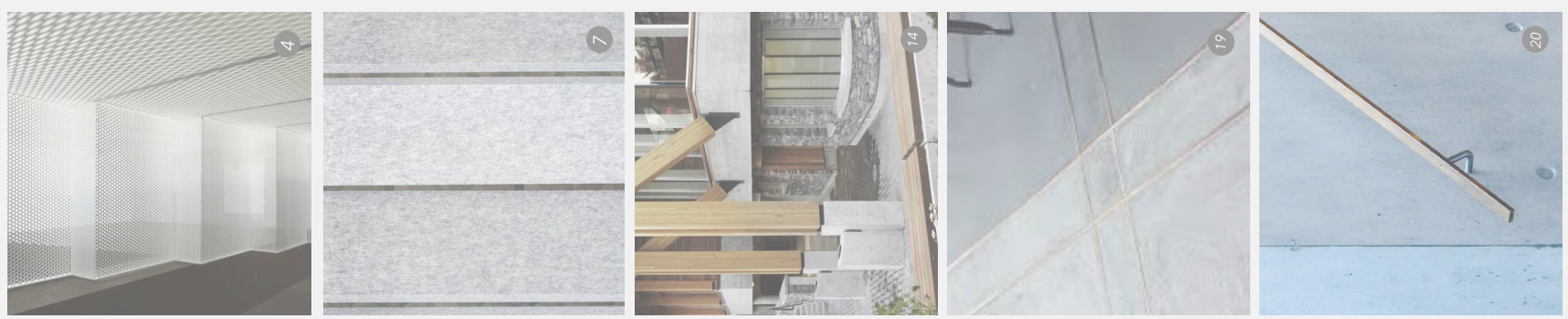
Shipping is the main delivery method in this project due to the closed access for the overall regeneration work. Also, due to the closing of Slussen lock, shipping route should be organised to avoid passing the lock. Besides, sharp items like glass and aluminium sheets should be carefully wrapped to avoid scratches or being scratched.



STRUCTURE COMPONENTS EXPLODED

1 Ramps to Ground (perforated steel)
2 Lower Terrace (concrete-timber composite)
3 Planter (concrete + clay)
4 Stairs to Upper Level (perforated steel)
5 Toilet
6 Audience Zone
7 Soundproof Wall (concrete with acoustical panels)
8 Fabric Screen
9 Timber- Glass Panel
10 Balcony (prefabricated concrete)
11 Stairs to Upper Level (perforated steel)
12 Trimmed Existing Columns
13 Ballroom (concrete)
14 Column Extensions (timber)
15 Beams (steel)
16 Busking Platform (acrylic)
17 CLT Panels
18 Wire Mesh
19 Concrete Finishing
20 Handrail (powder coated steel)
21 Stairs to Higher Ground Level (perforated steel)
22 Ramps to Higher Ground Level (perforated steel)
23 Entry Point
24 New Traffic Road (on Higher Ground Level)

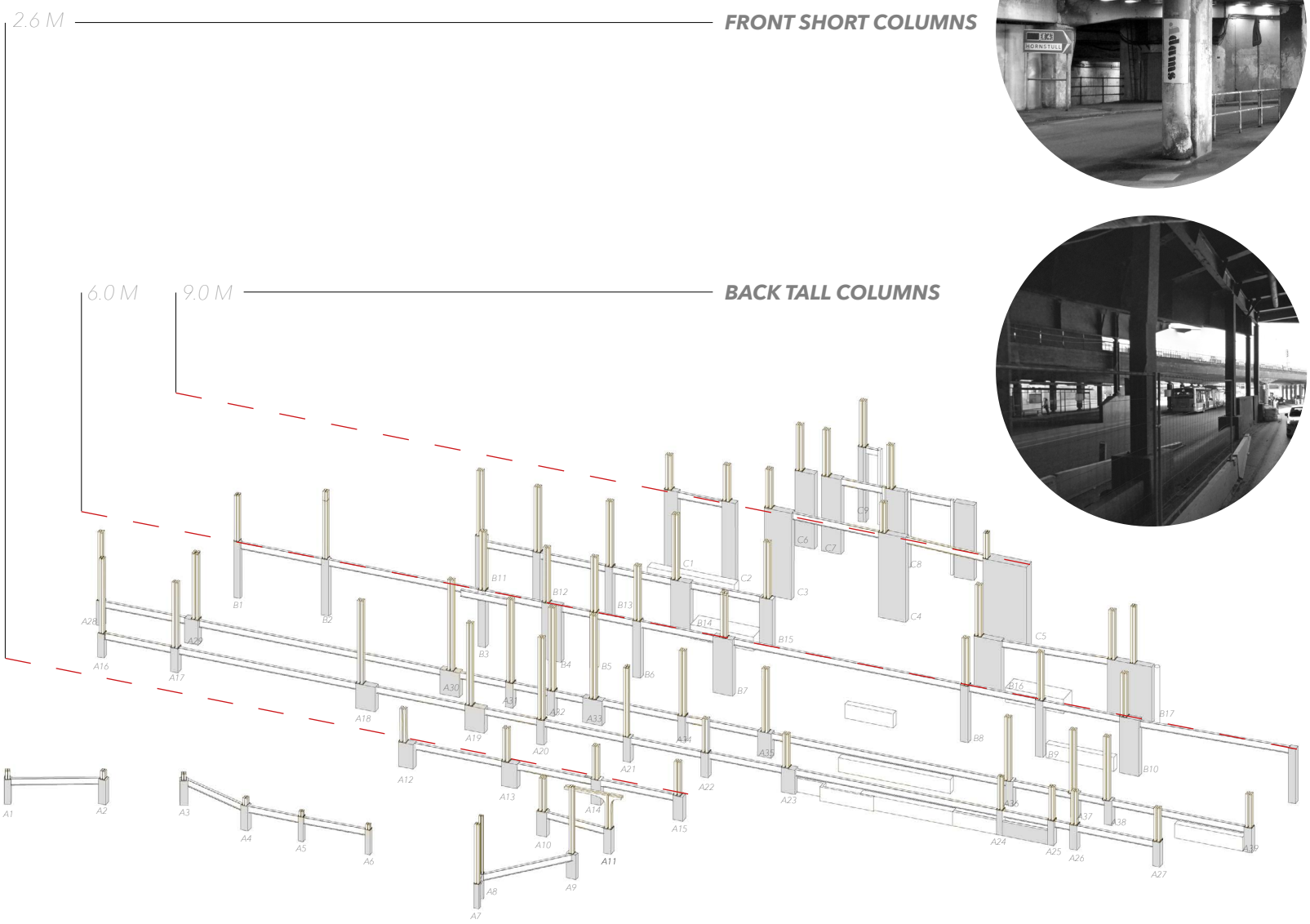
MATERIAL REFERENCE



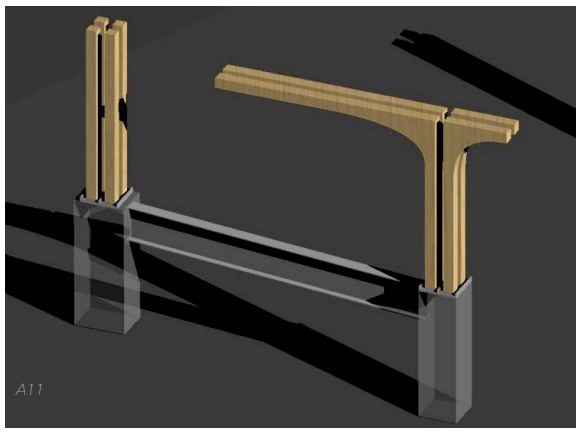
SECTION 2 BUILDING CONSTRUCTION

STRUCTURE OVERALL_GARDEN CINEMA

COLUMN TRIMMING TREATMENT



SPECIAL TREATMENT A11

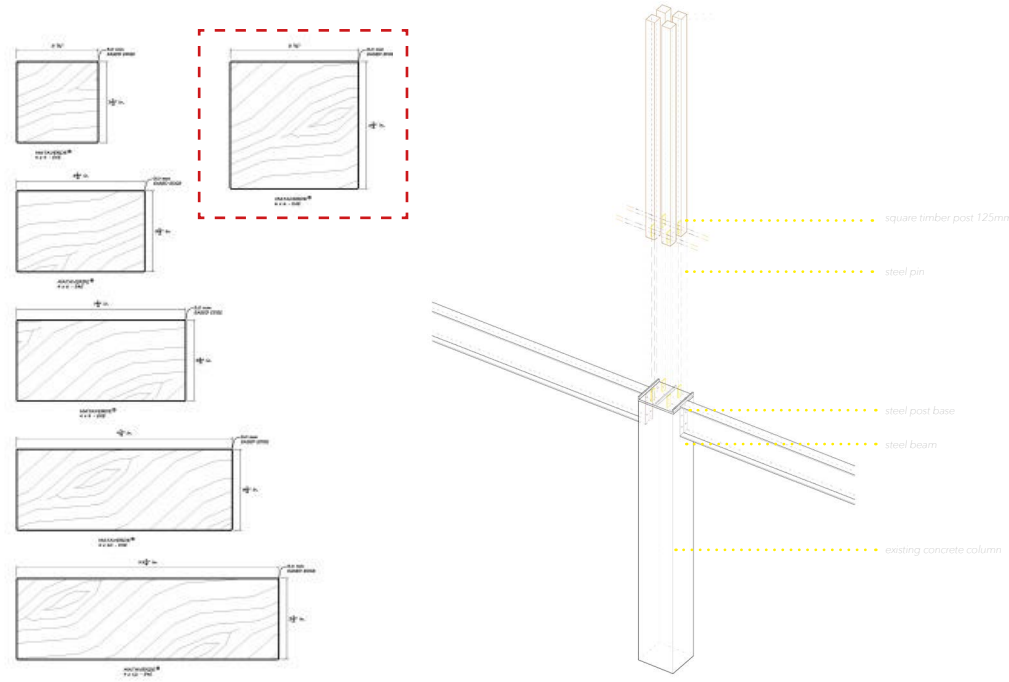


One of the columns does not aligned with the timber-concrete-composite terrace above, thus, there will be a split treament, which allows this column to reach and support a couple of adjacent terraces above. This timber column is made of cross-lanminated timber.

TIMBER EXTENSION HEIGHTS(MM)

A1	810	A14	357	A27	352	B1	485	B14	694
A2	810	A15	357	A28	736	B2	715	B15	598
A3	600	A16	795	A29	710	B3	623	B16	544
A4	730	A17	698	A30	966	B4	593	B17	604
A5	520	A18	895	A31	884	B5	584	C1	364
A6	520	A19	872	A32	885	B6	584	C2	384
A7	632	A20	873	A33	8.89	B7	476	C3	409
A8	616	A21	732	A34	692	B8	502	C4	326
A9	616	A22	354	A35	673	B9	512	C5	269
A10	351	A23	354	A36	675	B10	469	C6	488
A11	351	A24	351	A37	675	B11	694	C7	489
A12	356	A25	351	A38	675	B12	694	C8	461
A13	351	A26	354	A39	353	B13	694	C9	486

CONCRETE + TIMBER EXTENSION DETAIL



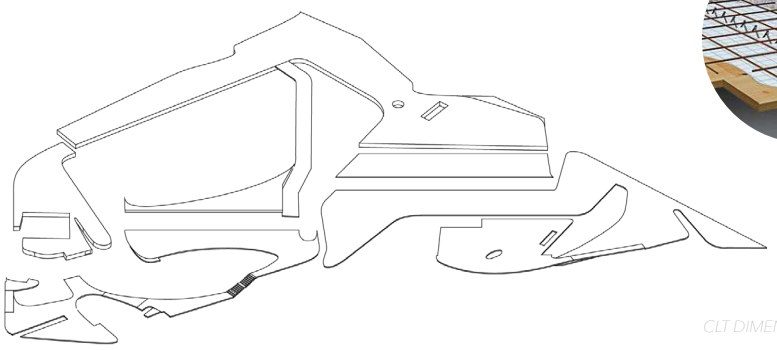
RINGSAW TRIMMING

Concrete trim is normally operated in this way which the concrete slabs are flat and placed on the ground. In the case of concrete columns, which are perpendicular to the ground, ringsaw needs to hold at a certain height and cutting in parallel to the ground. This means extra stability is required from the builder. Since the existing concrete columns are designed to be trimmed to 2.6m, 6.0m and 9.0m accurately, it is better if the ringsaw is combined with a stable platform, which operates on these three adjustable levels.

After trimming, the existing concrete columns with ideal heights need to be repaired and painted. Next, steel plates are placed on top of these columns and fixed in position by drilling and bolting. Then pre-made cross-laminated-timber columns will be connected with the columns, according to their individual codes. In this way, the columns are ready for terrace pieces to sit on top.

TERRACE

TIMBER CONCRETE COMPOSITE DECKS

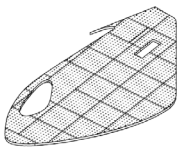


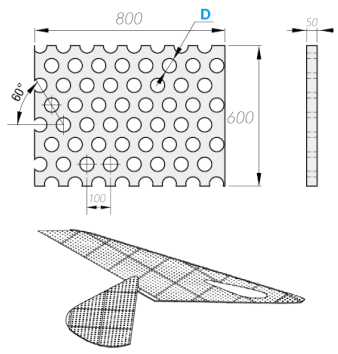
Dimensions (mm)	2.4m	2.7m	3.0m	3.3m	3.6m	3.9m	4.2m	4.5m	4.8m	5.1m	5.4m	6.0m	6.6m	7.2m
25 x 50					✓		✓		✓					
35 x 75	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
35 x 100	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
35 x 150			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
47 x 47	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
47 x 75	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
47 x 100	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
47 x 150			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
47 x 200			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
47 x 225			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
47 x 300												✓		

CLT DIMENSION 47x300x6000

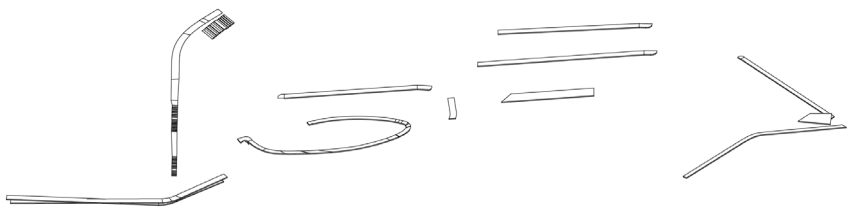
"the terraces are designed to be nearly monochrome so that people read them as a backdrop, which can almost disappear..."

BEIGE PERFORATED STEEL DECKS

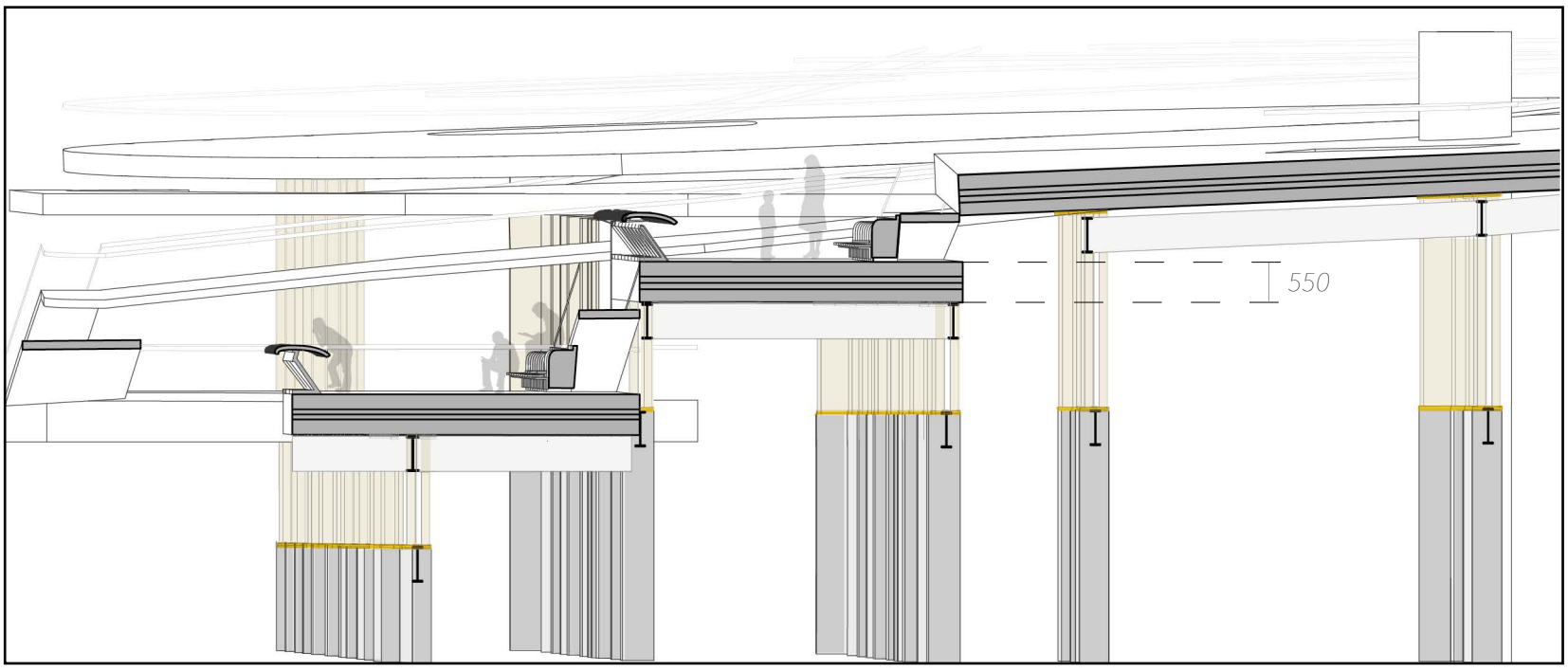




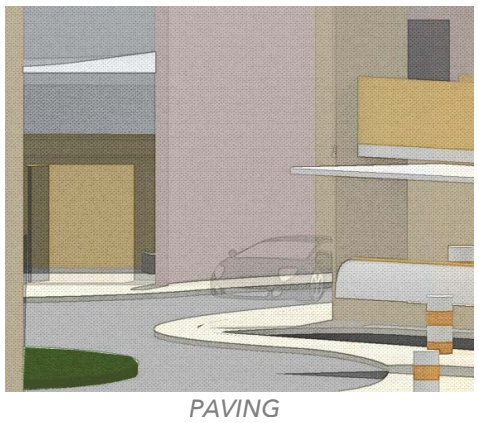
STAINLESS STEEL MESH STAIRS AND RAMPS



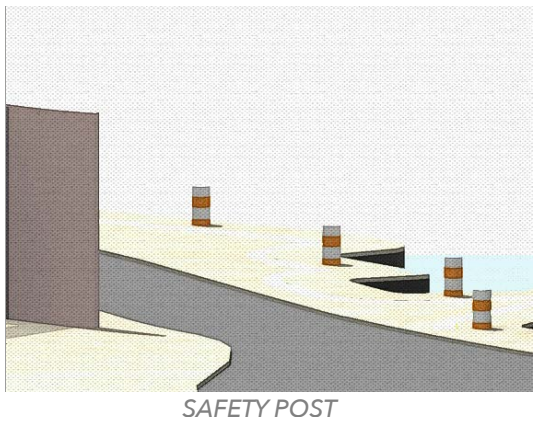
Light-weighted stainless steel meshes are applied to overall circulation to make translucent separation between movements. It also casts slender shadows and amplifies noise of people walking, which adds extra visual and acoustic effect to this lively atmosphere.



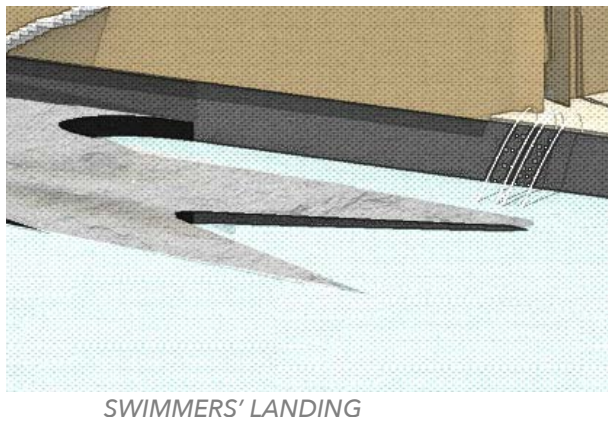
GROUND DETAIL



PAVING

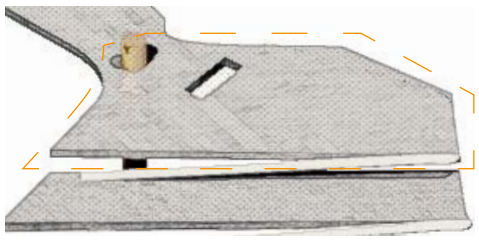


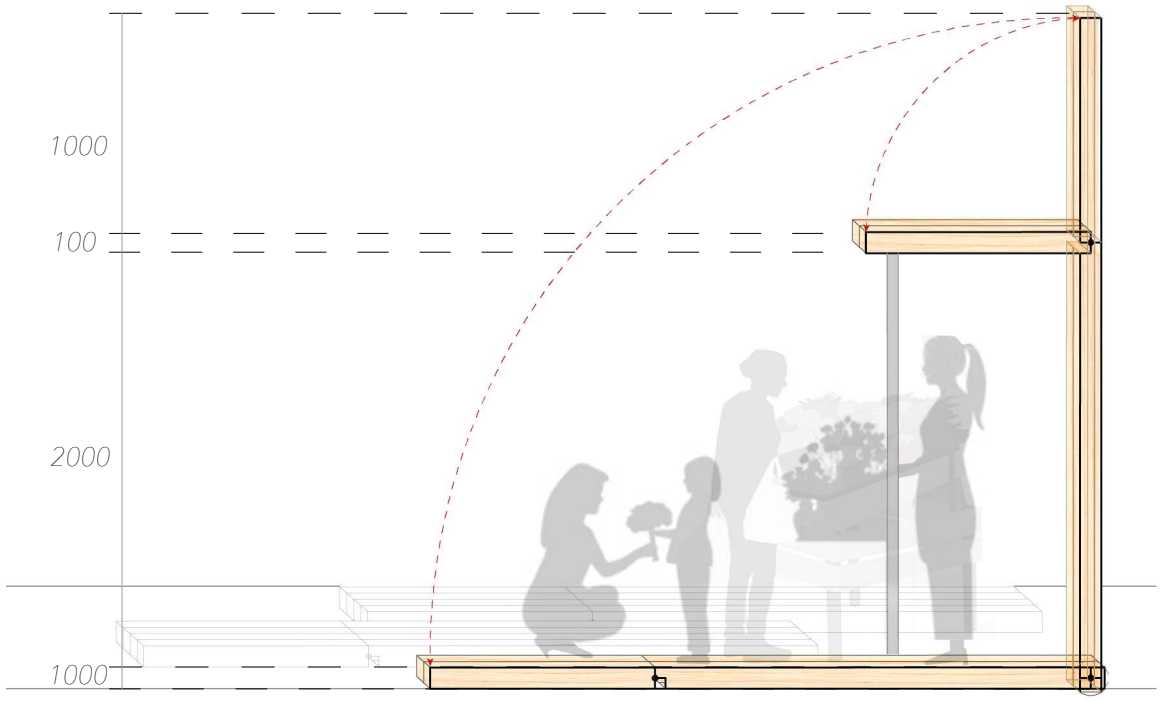
SAFETY POST



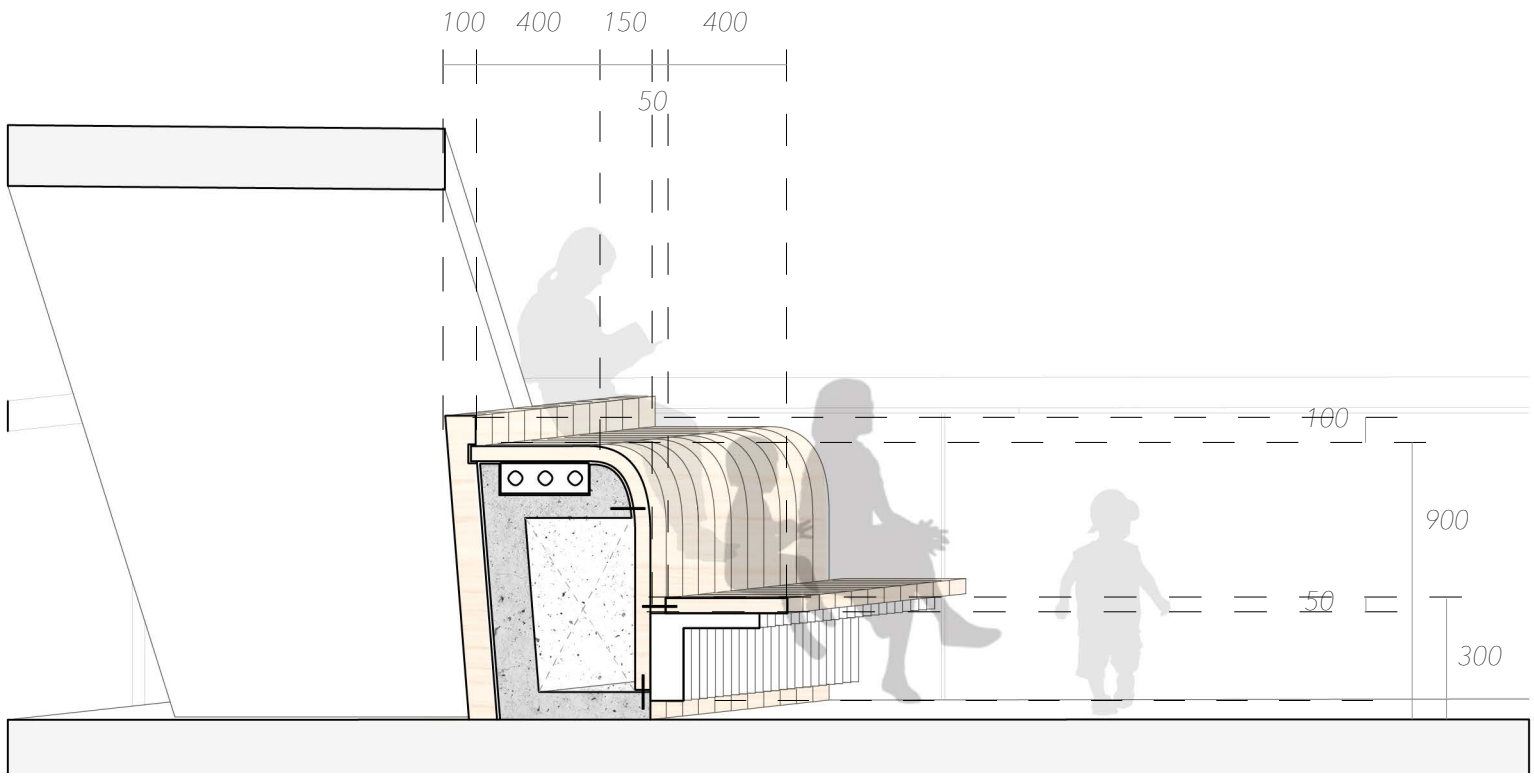
SWIMMERS' LANDING

FOLD-ABLE MARKET STALL

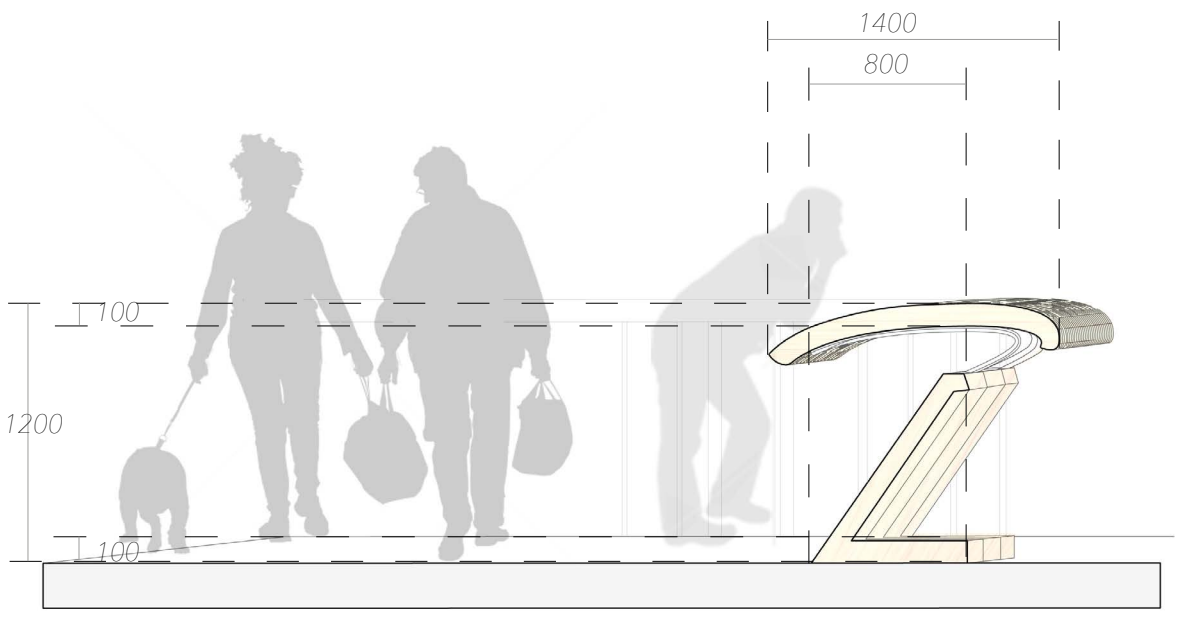




SEATING

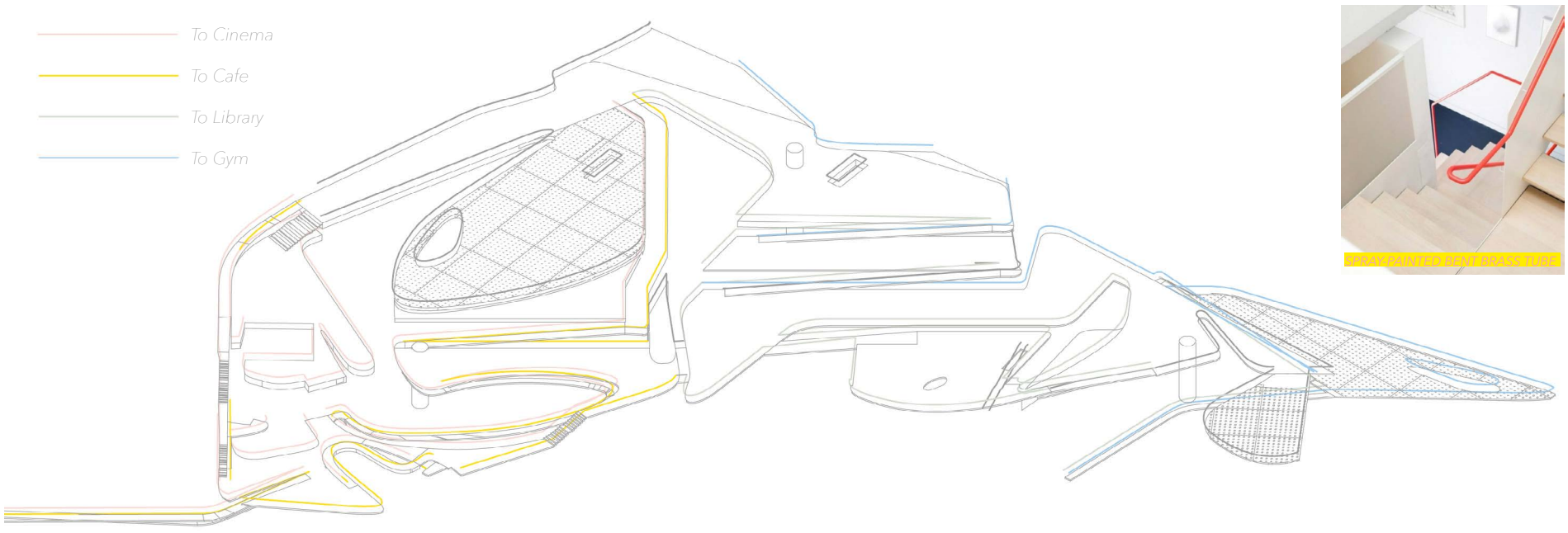


WIDE TIMBER HANDRAIL _LEANING TOWARDS THE VIEW

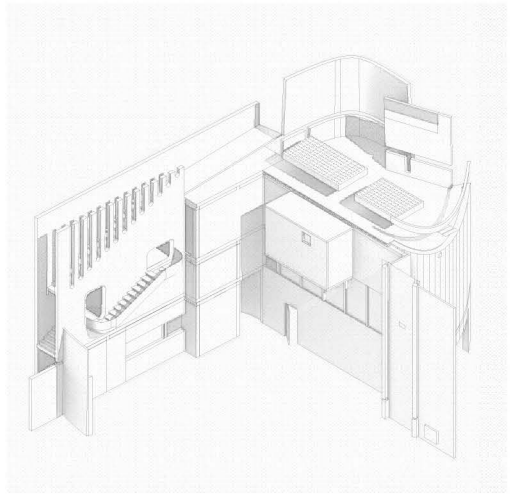


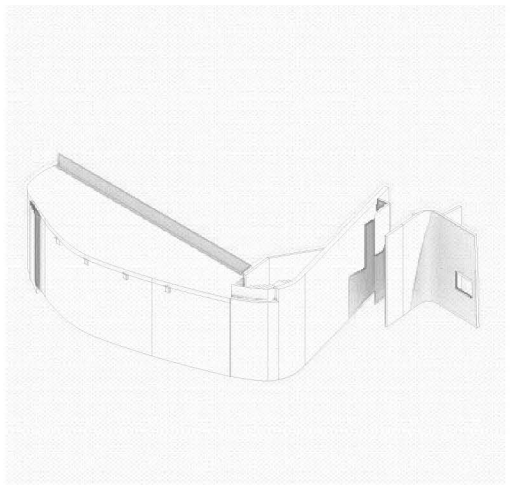
Dimensions (mm)	2.4m	2.7m	3.0m	3.3m	3.6m	3.9m	4.2m	4.5m	4.8m	5.1m	5.4m	6.0m	6.6m	7.2m
25 x 50					✓		✓		✓					
35 x 75	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
35 x 100	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
35 x 150			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
47 x 47	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
47 x 75	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
47 x 100	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
47 x 150			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
47 x 200			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
47 x 225			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
47 x 300												✓		

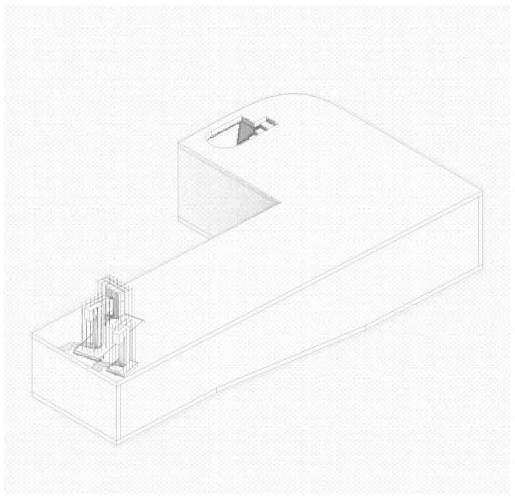
THIN COLOUR-CODED HANDRAIL _WAY FINDING

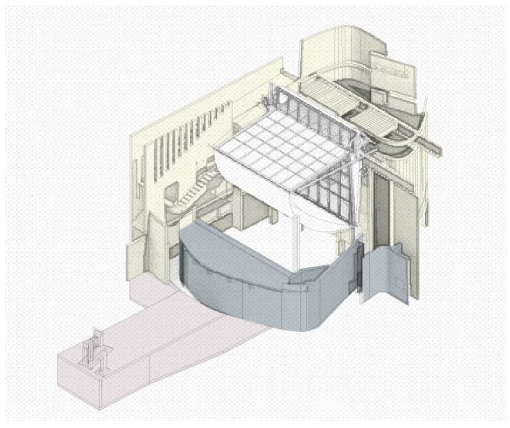


MATERIAL COMPONENTS

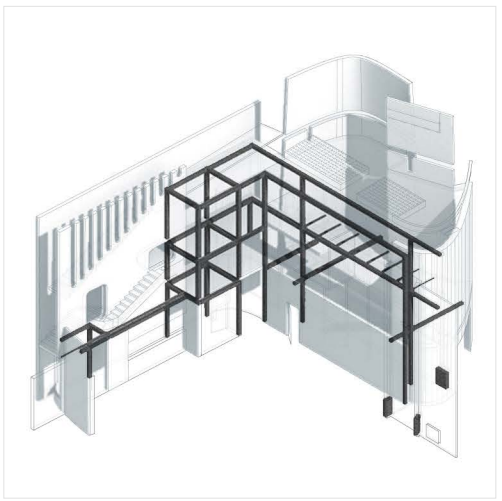


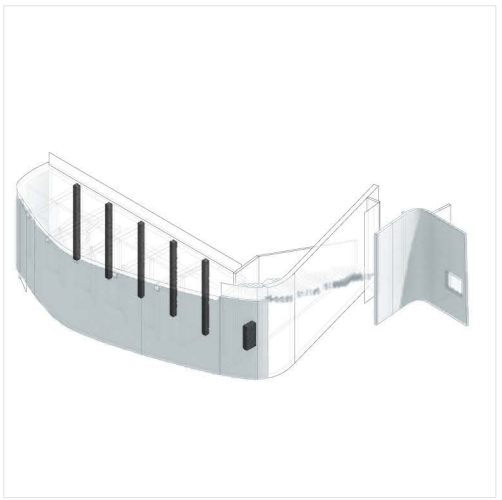


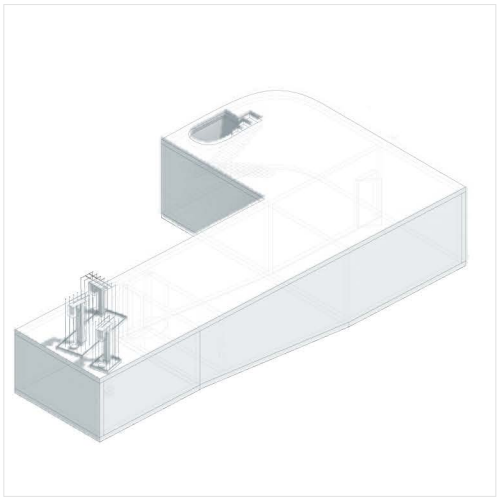




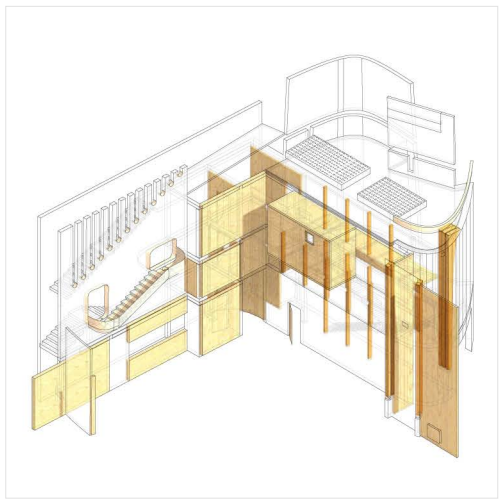
CONCRETE

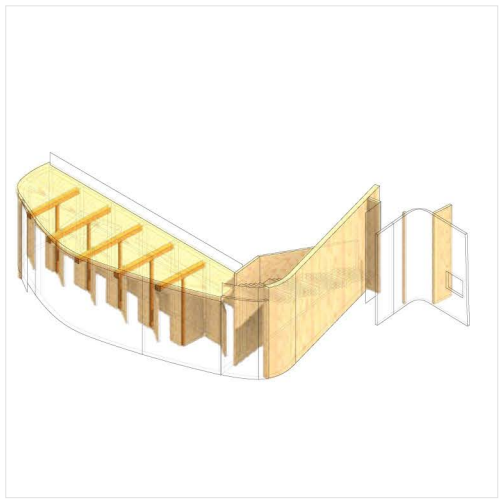


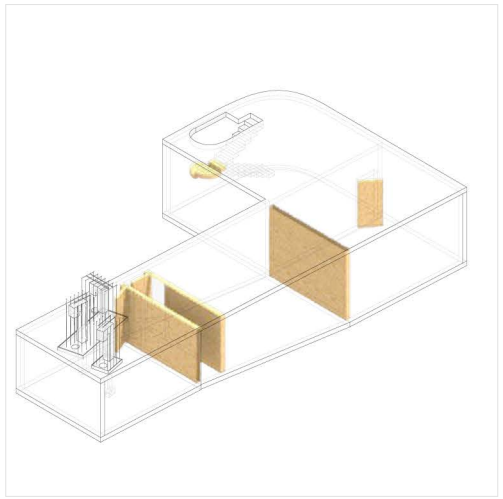




TIMBER (CLT)







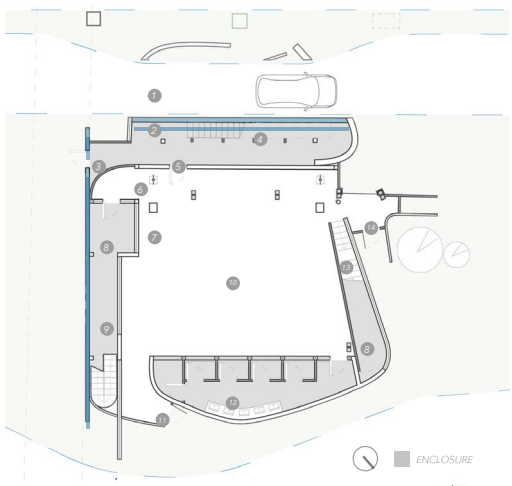
CONCRETE COLUMN DIMENSIONS (M)

1.9 X 0.2 X 0.2 ... (2)
1.6 X 0.2 X 0.2 ... (3)
2.0 X 0.2 X 0.2 ... (5)
2.5 X 0.2 X 0.2 ... (12)
3.0 X 0.2 X 0.2 ... (18)
4.0 X 0.2 X 0.2 ... (5)
5.0 X 0.2 X 0.2 ... (10)

0.77 X 0.25 X 1.00 ... (1)
0.50 X 0.25 X 1.00 ... (3)
0.20 X 0.10 X 1.50 ... (8)

TIMBER COLUMN DIMENSIONS (M)

2.5 X 0.1 X 0.2 ... (14)
3.5 X 0.1 X 0.2 ... (4)
8.0 X 0.8 X 0.2 ... (4)
2.5 X 0.2 X 0.2 ... (9)
2.0 X 0.1 X 0.1 ... (2)
3.0 X 0.1 X 0.1 ... (5)



1 Car Lane
2 Soundproof Wall
3 Back Entrance
4 Stairs to Ballroom
5 Door to Indoor Cinema
6 Flipping Mechanism
7 Fabric Stand
8 Storage
9 Bar
10 Indoor Seating
11 Front Entrance 1
12 Toilet
13 Stairs to Lower Terrace
14 Front Entrance 2

CONCRETE WALL DIMENSIONS (M)

5.0 X 5.5 X 0.2 ... (6)
4.0 X 4.5 X 0.2 ... (6)
5.0 X 2.5 X 0.2 ... (1)
4.0 X 2.5 X 0.2 ... (1)
3.5 X 2.5 X 0.2 ... (10)
3.5X 3.0 X 0.2 ... (3)
1.5 X 3.0 X 0.2 ... (2)
1.5 X 1.5 X 0.2 ... (10)
5.0 X 2.3 X 0.2 ... (5)
5.0 X 2.5 X 0.2 ... (9)
5.0 X 3.0 X 0.2 ... (6)
6.0 X 2.5 X 0.2 ... (4)

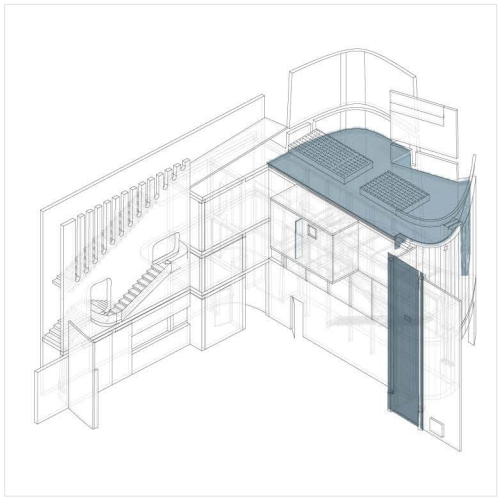
CLT PANEL DIMENSIONS(M)

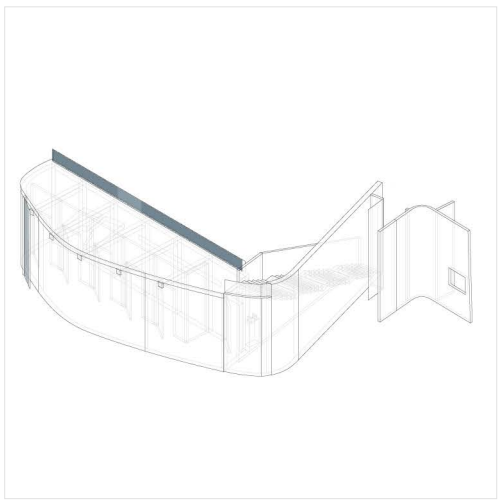
5.0 X 1.0 X 0.2 ... (2)
3.0 X 2.0 X 0.2 ... (5)
2.0 X 2.0 X 0.2 ... (1)
0.8 X 2.0 X 0.2 ... (3)
0.9 X 2.0 X 0.1 ... (20)
1.0 X 2.0 X 0.2 ... (16)
1.5 X 2.0 X 0.2 ... (8)
2.0X 2.0 X 0.2 ... (3)
3.0X 2.0 X 0.2 ... (5)
1.5 X 2.5 X 0.2 ... (6)
3.0 X 2.5 X 0.2 ... (4)
4.0 X 2.5 X 0.2 ... (2)
5.0 X 3.0 X 0.2 ... (1)

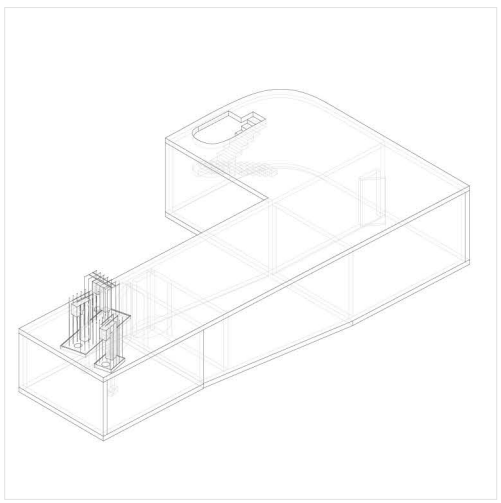
These concrete columns and walls can be pre-cast and deliver to site; while bent concrete wall needs to be cast on site. Timber mould will be built for on-site casting.

CLT panels are pre-made and ship to site. After installation, CLT panels will be coated with paints.

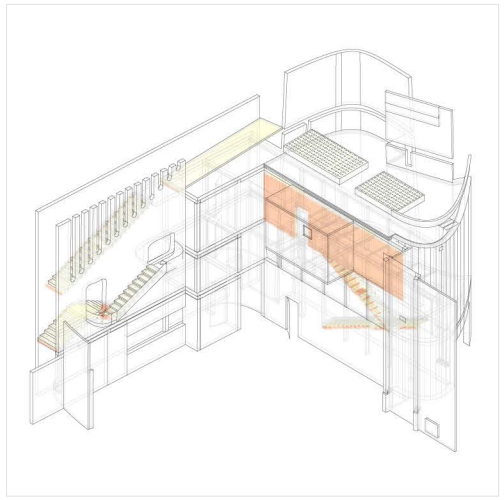
GLASS

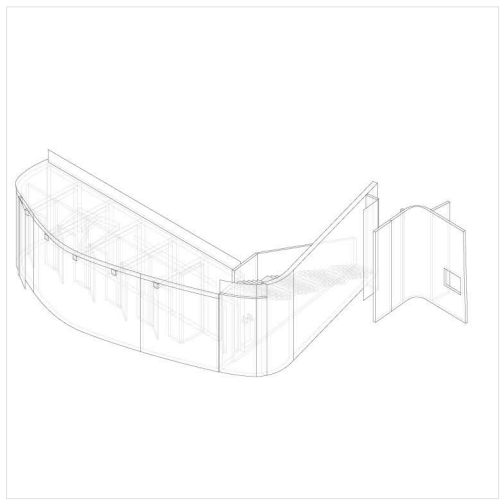


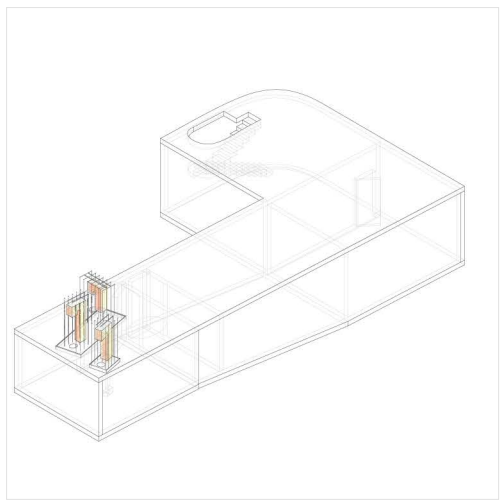




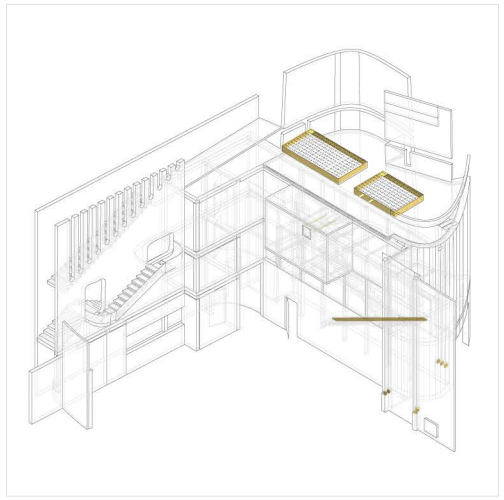
METAL

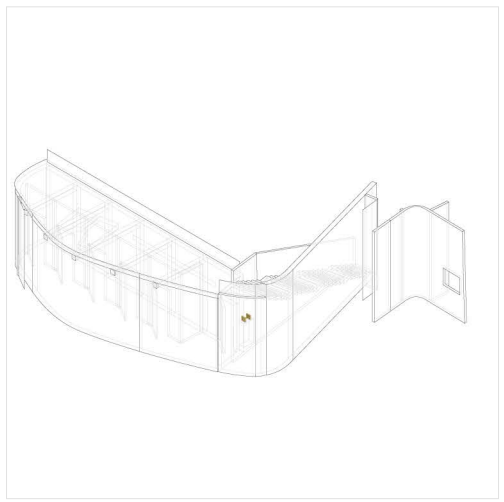


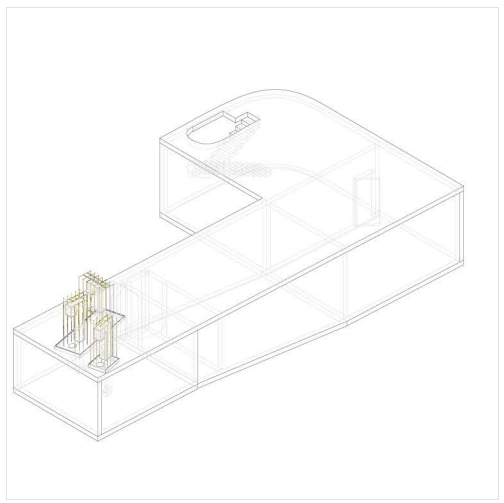




OTHERS







GLASS DIMENSIONS (M)

0.55 X 0.5 X 0.006 ..... (20)
1.5 X 2.6 X 0.012 ..... (6)
1.8 X 0.9 X 0.012 ..... (2)
2.0 X 0.9 X 0.012 ..... (2)
3.0 X 2.5 X 0.012 ..... (8)
2.5 X 2.5 X 0.012 ..... (4)
2.5 X 2.0 X 0.012 ..... (4)
1.75 X 1.35 X 0.020 ..... (4)
1.75 X 0.64 X 0.020 ..... (4)

MULLION DIMENSIONS (M)

0.55 X 0.015 X 0.005 ..... (21)
0.90 X 0.020 X 0.020 ..... (6)
2.60 X 0.020 X 0.020 ..... (7)
6.00 X 0.020 X 0.020 ..... (5)
10.0 X 0.020 X 0.020 ..... (2)
2.55 X 0.020 X 0.020 ..... (15)
1.40 X 0.020 X 0.020 ..... (5)
0.70 X 0.020 X 0.020 ..... (5)

Use polished bronze mullions to connect glass pieces.

PERFORATED STEEL DIMENSIONS(M)

0.8 X 0.3 X 0.02 ..... (46)
1.2 X 0.3 X 0.02 ..... (19)
1.44 X 0.3 X 0.02 ..... (12)
0.8 X 0.6 X 0.02 ..... (2)
1.2 X 0.6 X 0.02 ..... (1)
1.44 X 0.9 X 0.02 ..... (1)
3.0 X 2.0 X 0.02 ..... (1)
1.70 X 0.28 X 0.01 ..... (4)
1.00 X 0.28 X 0.01 ..... (4)
1.50 X 0.28 X 0.01 ..... (4)
0.68 X 0.28 X 0.1 ..... (9)
0.44 X 0.28 X 0.1 ..... (9)

REFLECTIVE ALUMINIUM DIMENSIONS (M)

1.6 X 3.0 X 0.02 ..... (1)
0.9 X 0.7 X 0.02 ..... (1)

Light-weighted perforated steel are spray-painted in beige, mainly applied on stairs and ramps.

BRASS JOINTS DIMENSIONS(M)

0.2 X 0.2 X 0.05 ..... (9)

BRASS FRAME DIMENSIONS(M)

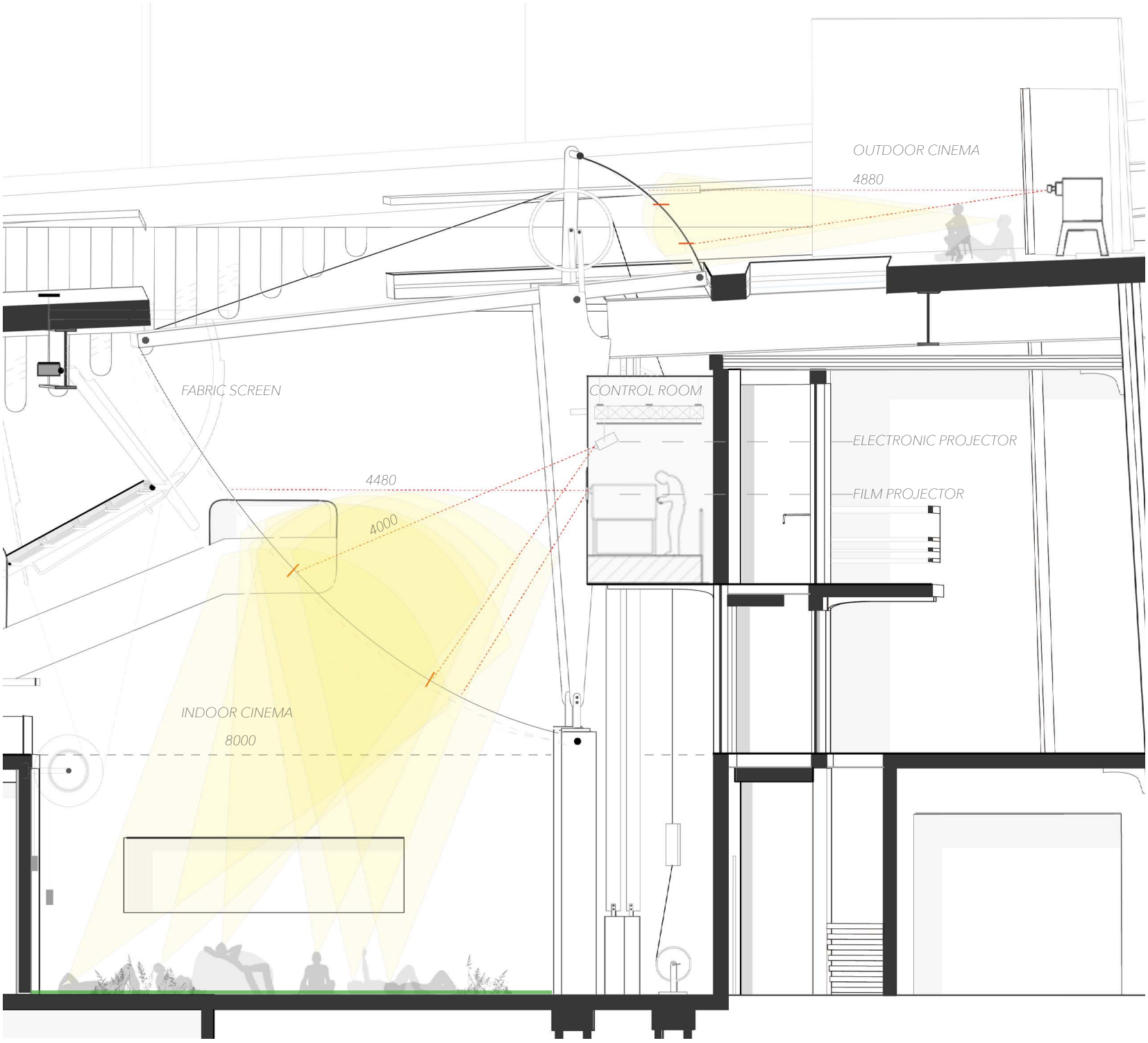
4.0 X 2.0 X 0.35(0.02 thickness) ..... (1)
3.0 X 2.0 X 0.35(0.02 thickness) ..... (1)
7.0 X 0.2 X 0.05 ..... (2)

BRASS TUBE DIMENSIONS (M)

4.6 X 0.02 (diameter)..... (5)
3.8 X 0.02 (diameter)..... (7)
4.4 X 0.02 (diameter)..... (5)
0.8 X 0.02 (diameter)..... (4)
1.2 X 0.02 (diameter)..... (2)

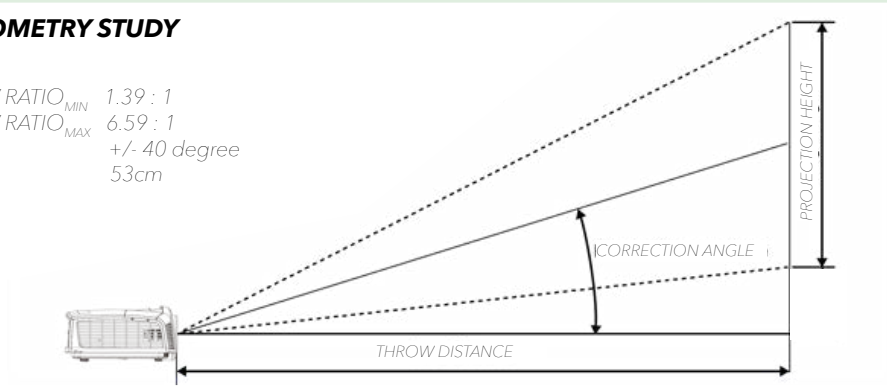
Bend brass tube on site to make brass frames with three different dimensions (2.0 X 0.6), (1.9 X 0.6) and (1.6 X 0.6) for light installation (D1).

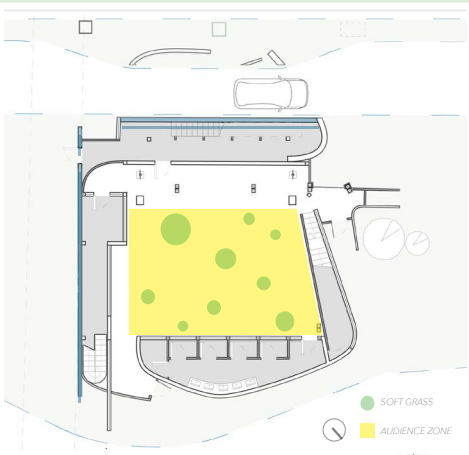
PROJECTION _ SPATIAL RELATIONS



PROJECTION GEOMETRY STUDY

HORIZONTAL THROW RATIO$_{MIN}$	1.39 : 1
HORIZONTAL THROW RATIO$_{MAX}$	6.59 : 1
CORRECTION ANGLE	+/- 40 degree
FOCUS DISTANCE$_{MIN}$	53cm



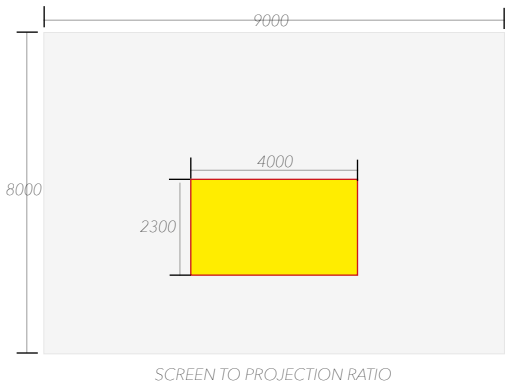


INDOOR ELECTRONIC PROJECTION

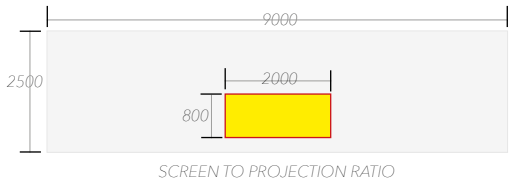
HORIZONTAL THROW RATIO	1.74 : 1
CORRECTION ANGLE	35 degree
FOCUS DISTANCE	400cm

OUTDOOR ELECTRONIC PROJECTION

HORIZONTAL THROW RATIO	6.1 : 1
CORRECTION ANGLE	15 degree
FOCUS DISTANCE	488cm



SCREEN TO PROJECTION RATIO



SCREEN TO PROJECTION RATIO

SOFT FLOORING MATERIAL

FLIPPING SCREEN _ COUNTERWEIGHT CALCULATION

The timber-glass panel rises up at night to pull out the double fabric screens, through adding weights one side. To know how much weights (F_1)it requires to keep balanced(as it shows on the right):

Knowing: $F_1=F_2$, $G_1 = F_2 \times Sin(15^o)$

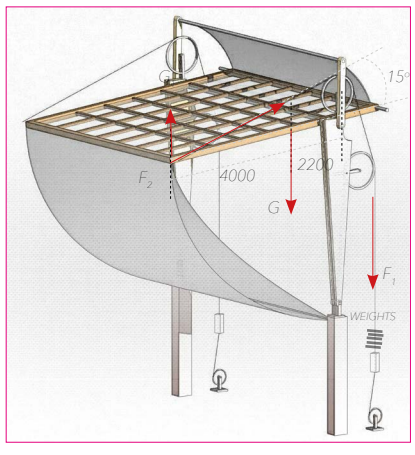
$G= F_2 \times Sin(15^o) + 40/22 \times G_1 = 0.26\ F_1 + 1.82 \times 0.26F_1 = 0.73F_1$

$G= 28 \times G_{\text{small glass}} + 14 \times G_{\text{big glass}} + 5 \times G_{\text{short timber stick}} + 6 \times G_{\text{long timber stick}} + G_{\text{timber frame}}$

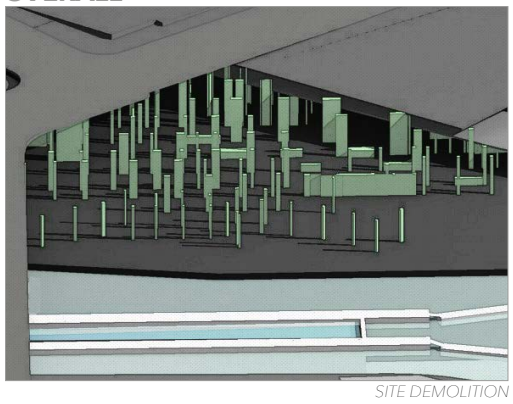
$=28 \times 5 + 14 \times 8 + 5 \times 15 + 6 \times 20 + 60 = 507kg$

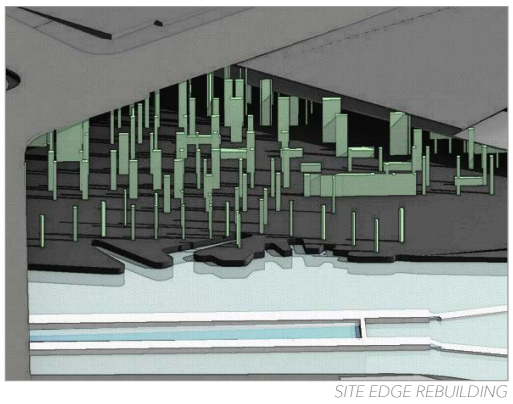
$F_1 = G/0.73 = 507/0.73 = 694.5 = 700kg$

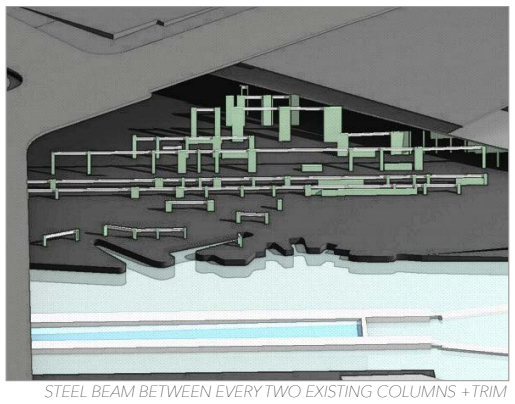
Thus, ***fourteen 50kg weights*** *are required to be put on.*

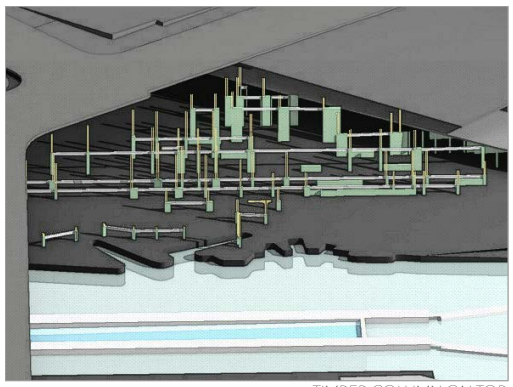


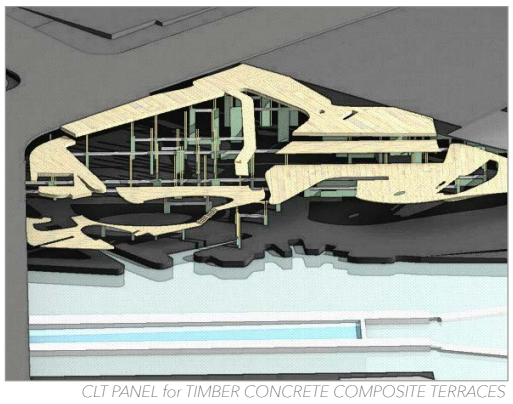
OVERALL

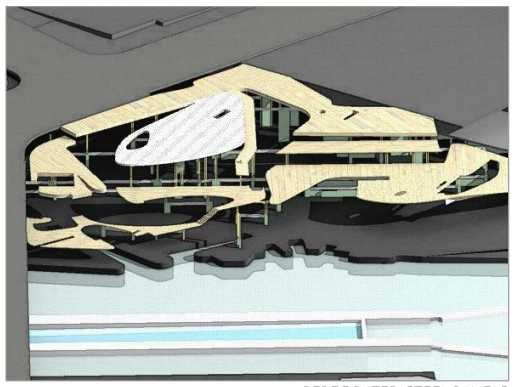

SITE DEMOLITION

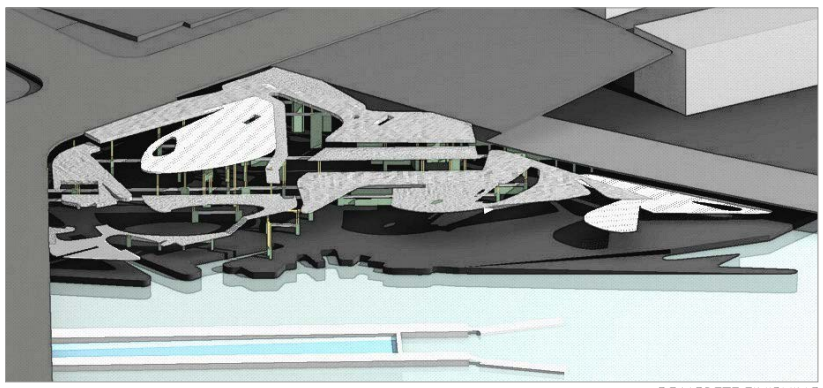

SITE EDGE REBUILDING

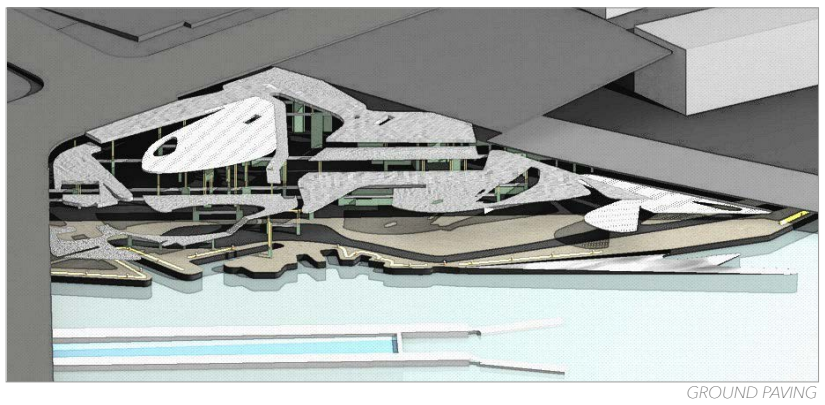

STEEL BEAM BETWEEN EVERY TWO EXISTING COLUMNS +TRIM

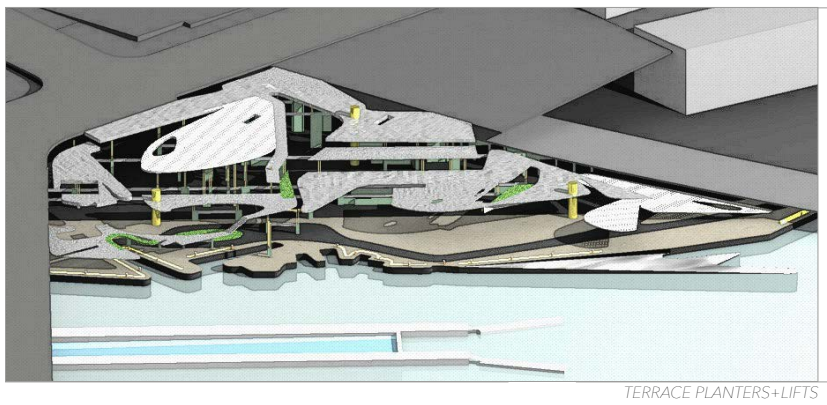

TIMBER COLUMN ON TOP

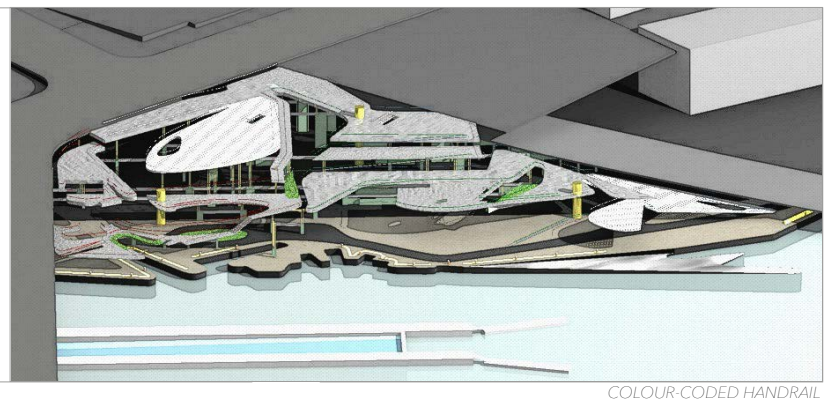

CLT PANEL for TIMBER CONCRETE COMPOSITE TERRACES


PERFORATED STEEL PANELS

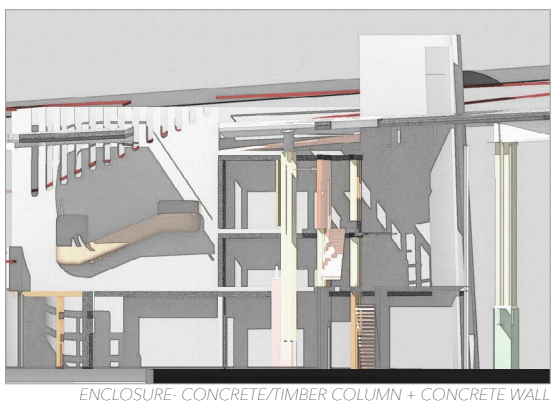

CONCRETE FINISHING

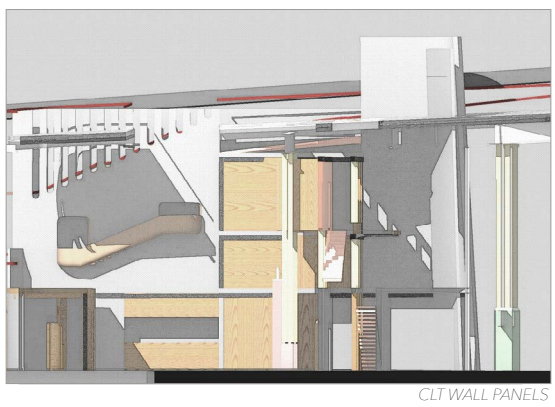

GROUND PAVING

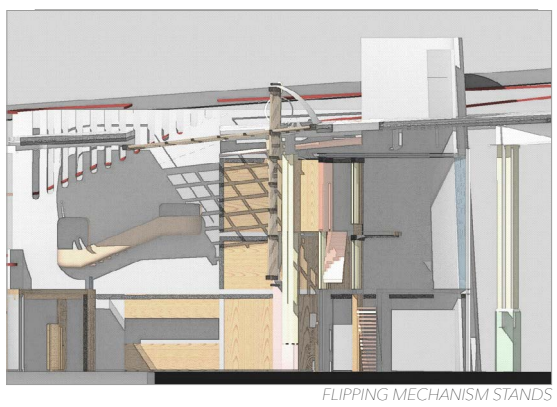

TERRACE PLANTERS+LIFTS

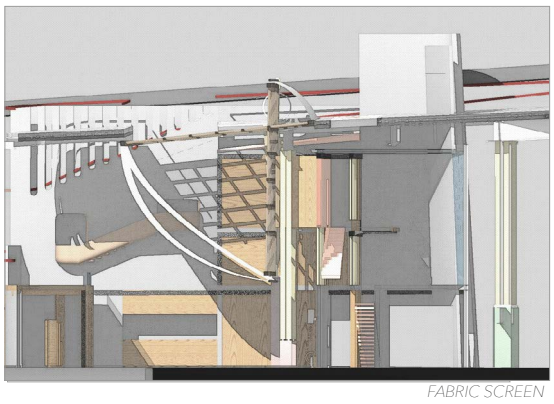

COLOUR-CODED HANDRAIL

GARDEN CINEMA

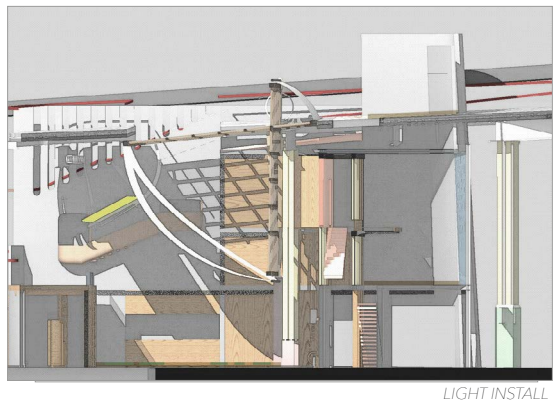

ENCLOSURE- CONCRETE/TIMBER COLUMN + CONCRETE WALL


CLT WALL PANELS


FLIPPING MECHANISM STANDS


FABRIC SCREEN


GRASS + FLOOR HEATING

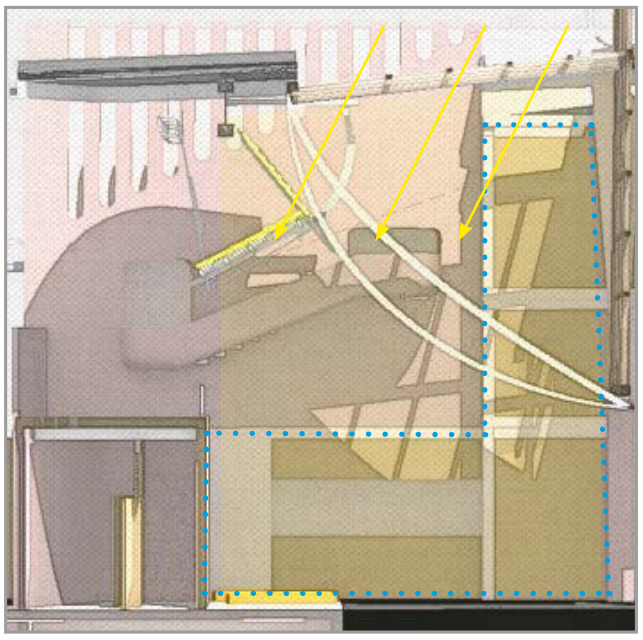

LIGHT INSTALL

Construction takes place in two phases: overall terraces first, and garden cinema next.

In phase one, firstly, rebuild water edge and trim the existing columns to their required heights; secondly, connects timber columns and trimmed concrete columns with steel joints; Thirdly, place steel beams between the timber columns, and put timber beams between the steel beams for CLT; Fourthly, place CLT panels, wire mesh and perforated steel panels on top; fifthly, pour concrete on top of CLT panels. Next, handrails, ground paving, ramps, stairs and planters can be installed when the platforms are finished.

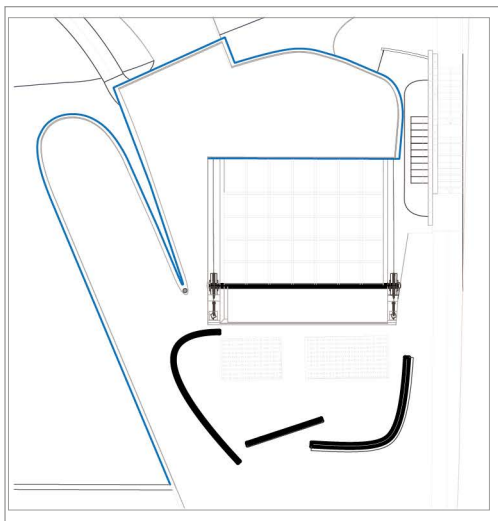
In phase two, firstly, put concrete beams, pre-cast concrete walls and timber beams on place; secondly, put CLT panels on place; thirdly, install the frame of flipping mechanism, as well as the timber-glass panel; fourthly, tie the fabric screen to the frame; fifthly, put grass and floor heating on top of the audience zone; sixthly, install the light devices. The construction of other facility buildings is in the same sequence as the cinema.

INDOOR CINEMA

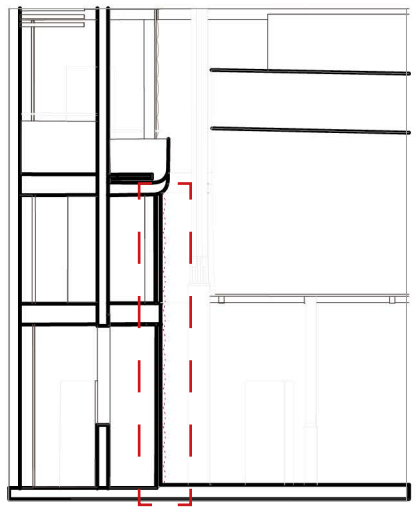


NATURAL LIGHT ACOUSTIC

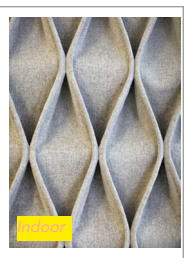
RAIN WATER

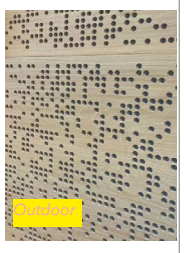


GUTTER



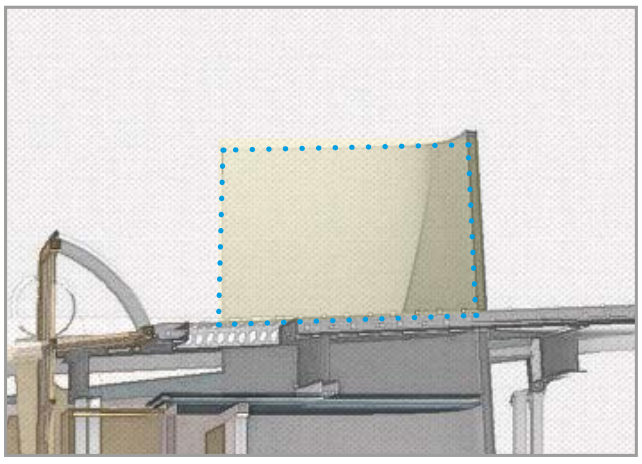
INDOOR SOUNDPROOF MATERIAL ON CLT



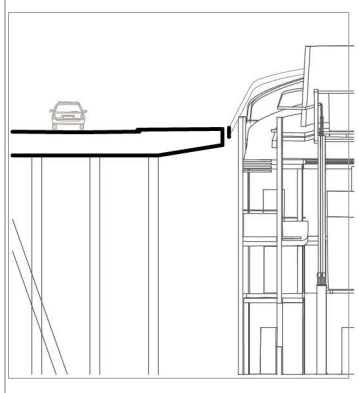


REFERENCE

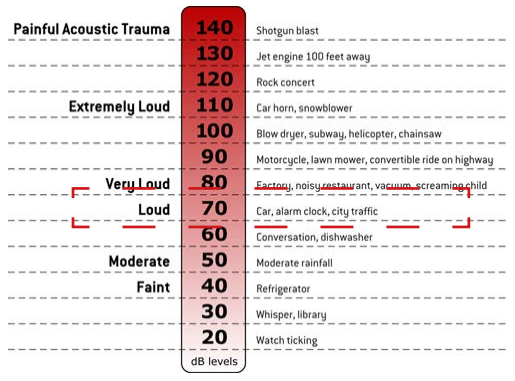
OUTDOOR CINEMA



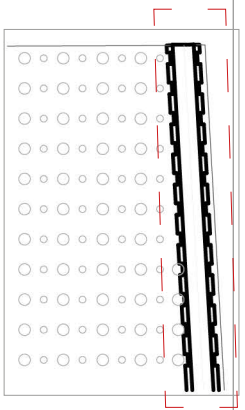
ACOUSTIC



ADJACENT TO NEW TRAFFIC ROAD

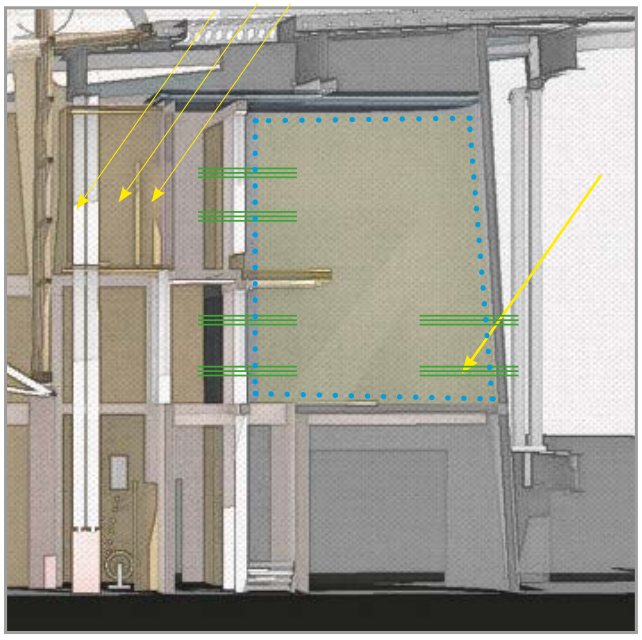


NOISE LEVEL CHART

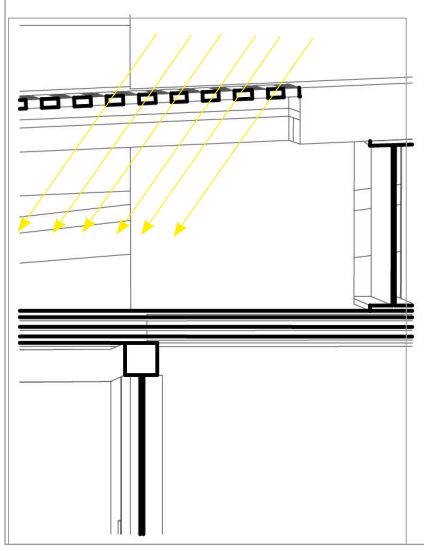


OUTDOOR SOUNDPROOF

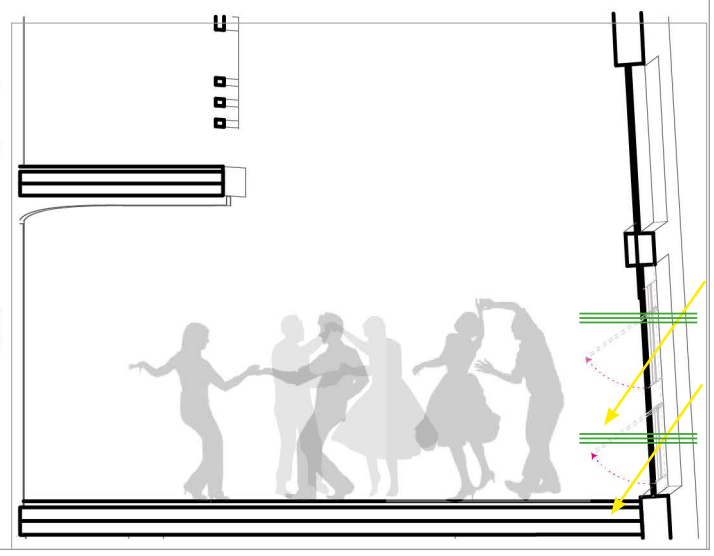
BALLROOM



NATURAL LIGHT VENTILATION ACOUSTIC

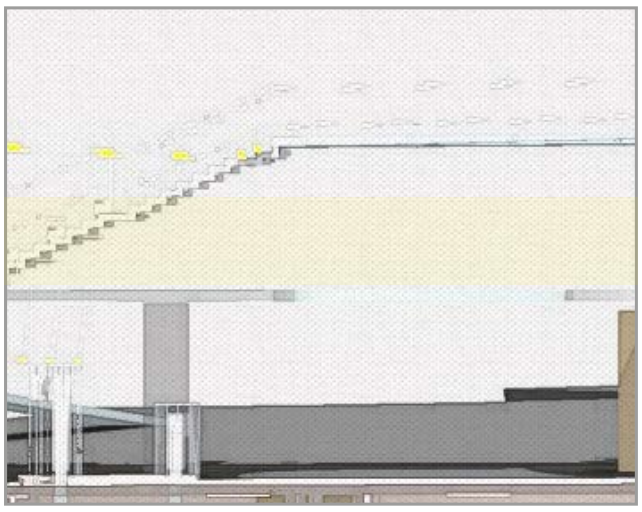


LIGHT THROUGH PERFORATED PANELS AND GLASS



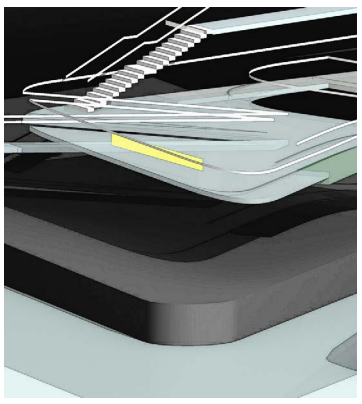
SIDE WINDOW VENTILATION

LOWER TERRACE



LIGHTING TREATMENT

** This aspect will be explored in detail in the following pages in this section.*



OLD FILM STORAGE + DARKROOM

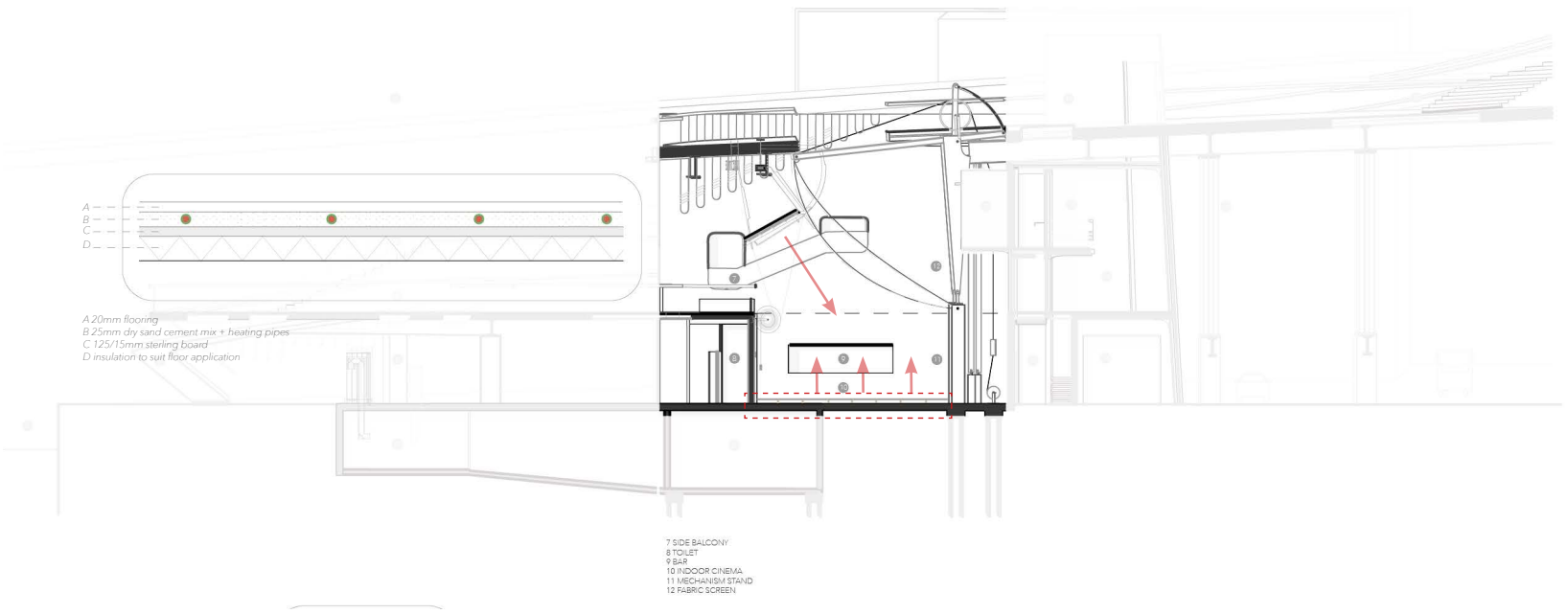
LIGHTING TREATMENT VENTILATION

Old film storage and darkroom are in the basement and requires to be light-tight. Therefore, these two space have no windows and passive ventilation fans will be installed for air exchange.

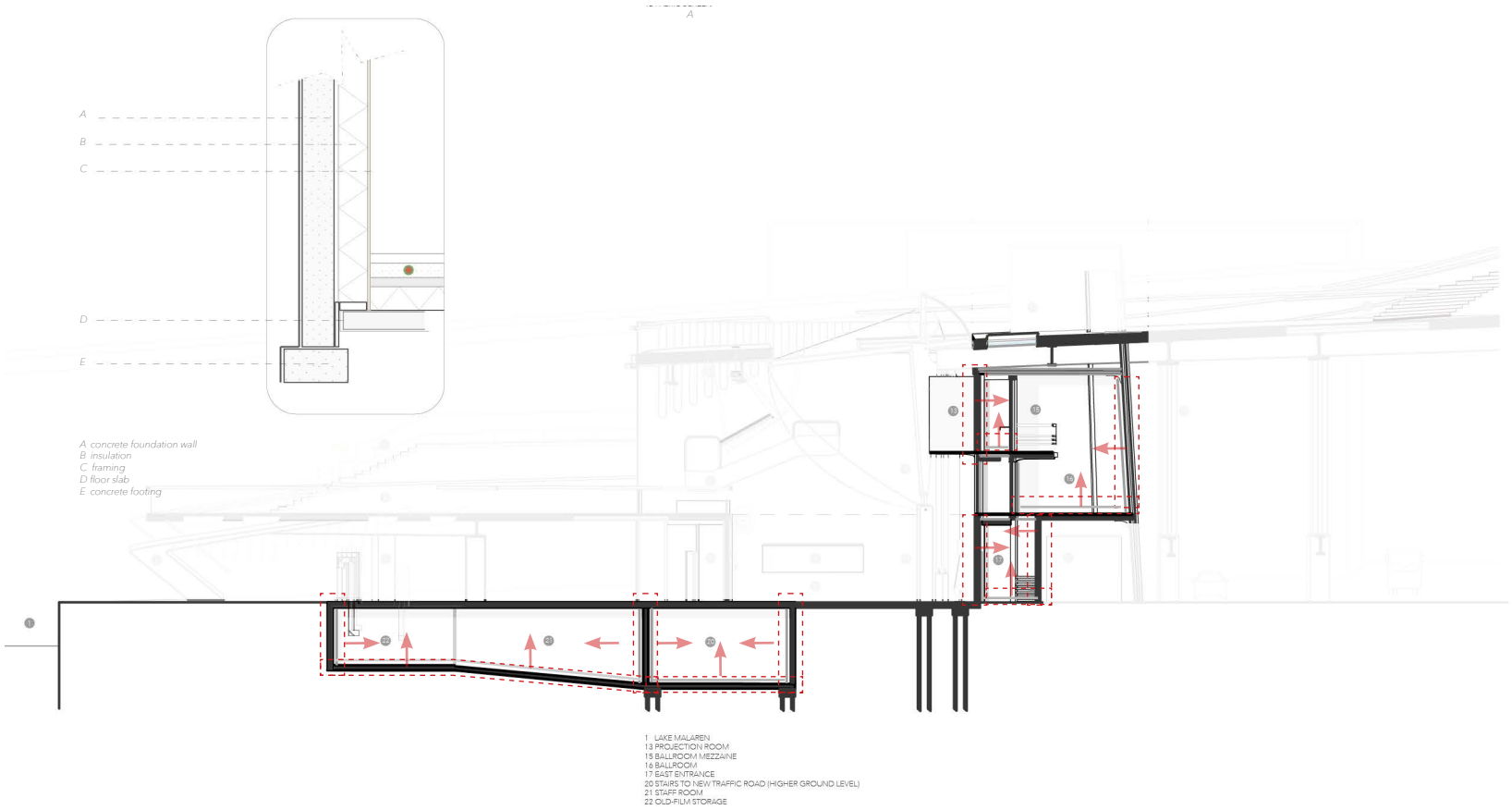
Besides, artificial lights that do not damage the film quality will be used in these two rooms to provide the staffs with just enough brightness to work with. For instance, fluorescent lights with UV filter will be used in the old film storage space, while safelights will be installed in darkroom for film development and

VENTILATION FAN

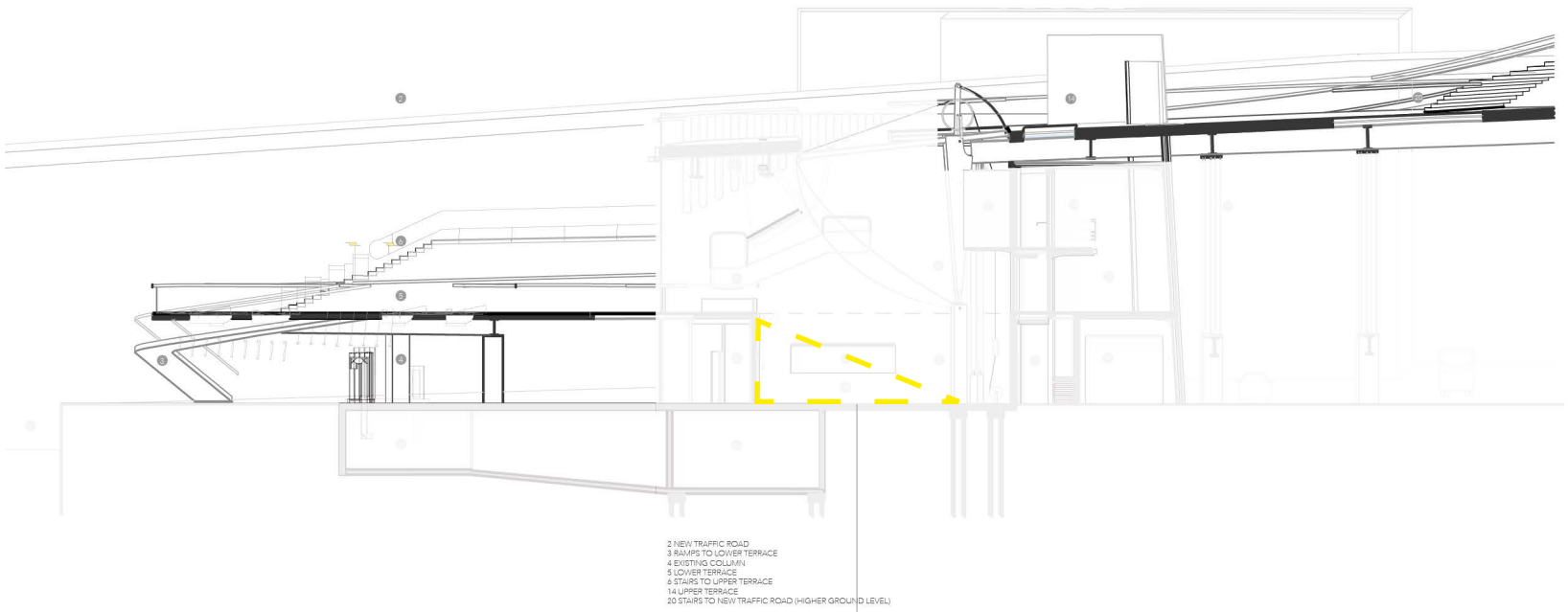
INDOOR CINEMA SPACE _ Light heating panel + Underground heating

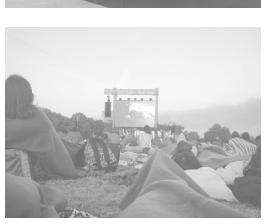


OTHER ENCLOSED SPACE _ Wall heating

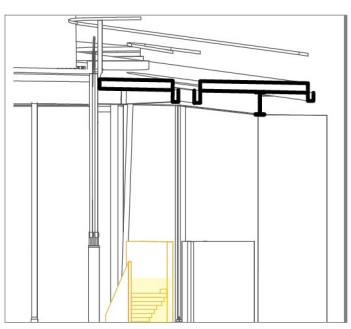


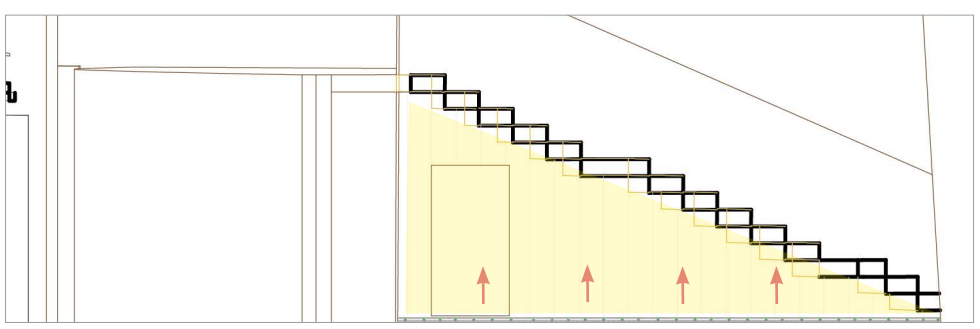
OUTDOOR SPACE _ Blanket + Outdoor heating features

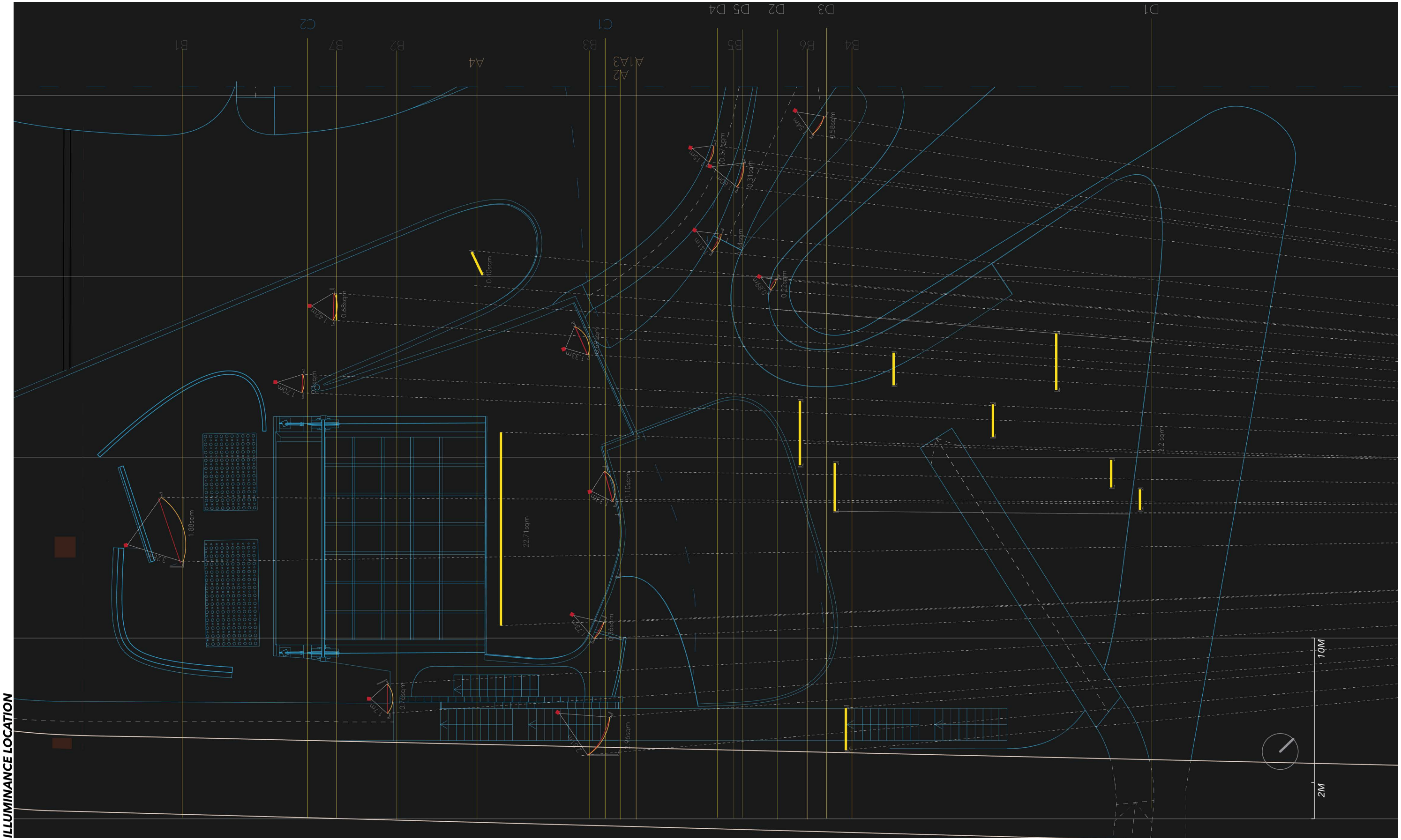




_ Blanket-warming Cabinet under Staircase

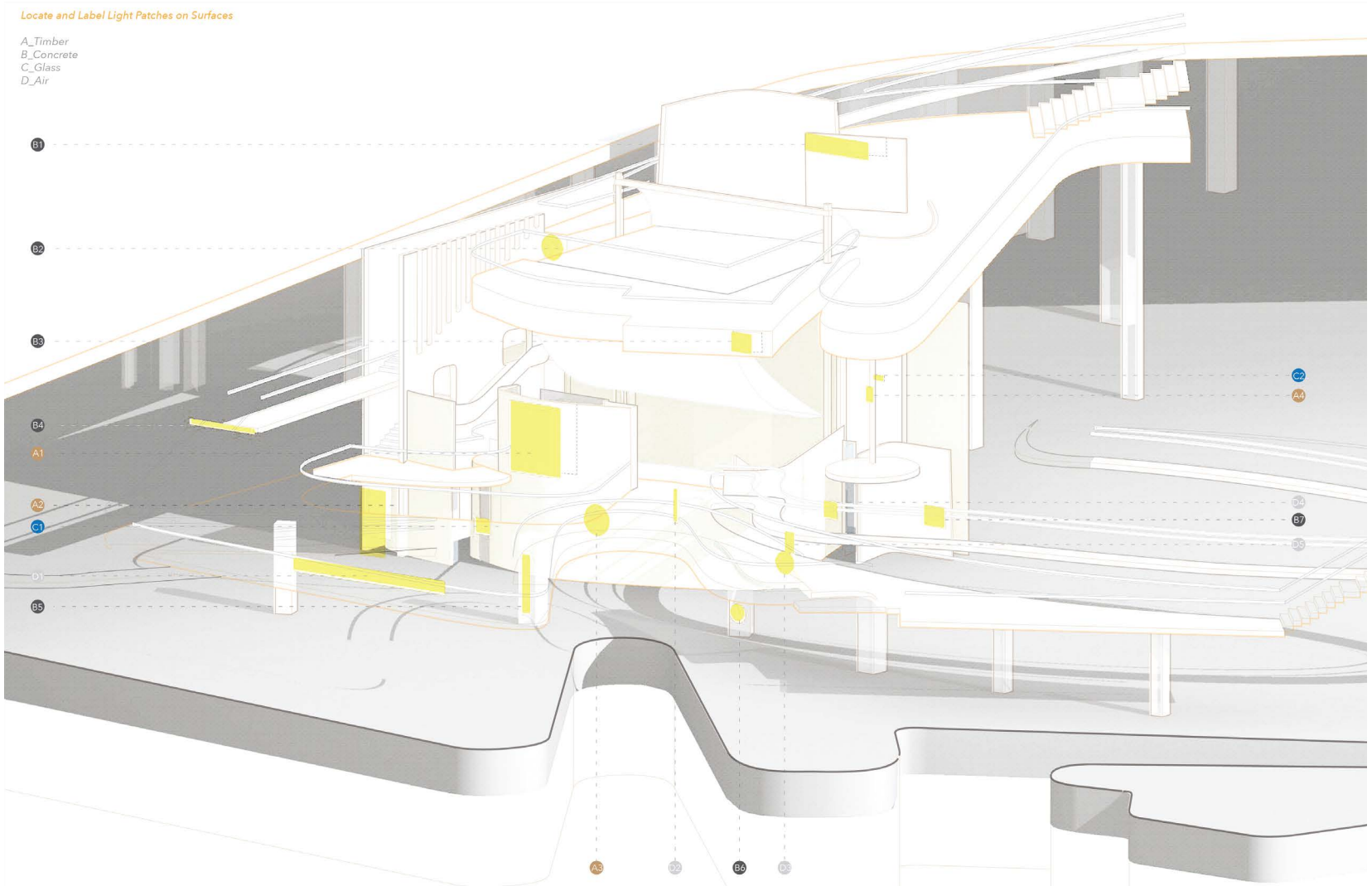




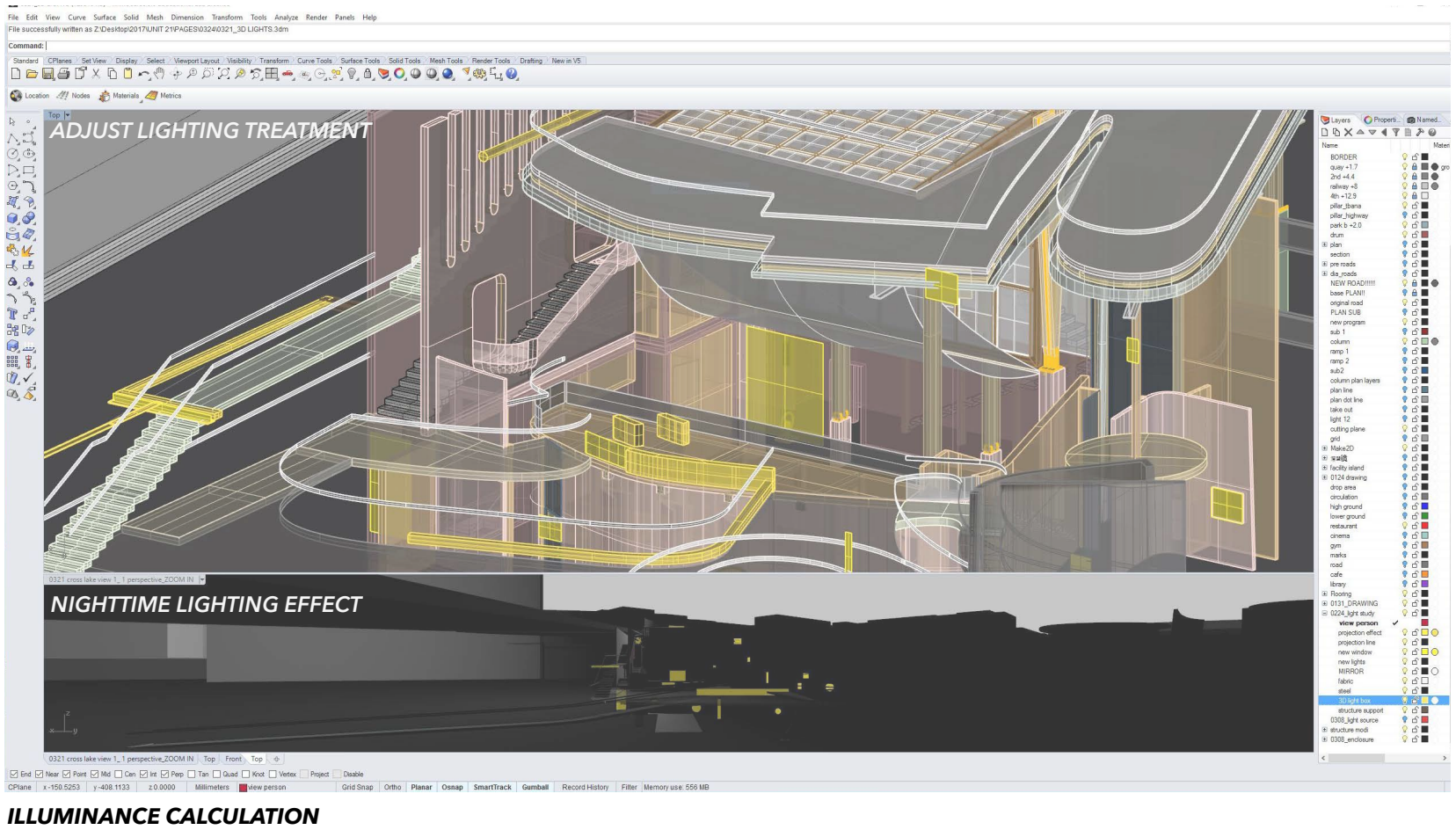


SECTION 3 BUILDING PERFORMANCE

GENERAL LIGHTING STRATEGY



WORKING METHOD



ILLUMINANCE CALCULATION

F= E x A /(UF x MF)

F= Average luminous flux from light (lm)
E= Illuminance level required (lux)
A= Area at working plane (sqm)
UF= Utilisation factors, an allowance for the light distribution of the luminaire and the room surface.
MF= Maintenance factors, an allowance for reduced light output because of deterioration and dirt.

**** In this project, UF= 0.4; MF= 0.7.***

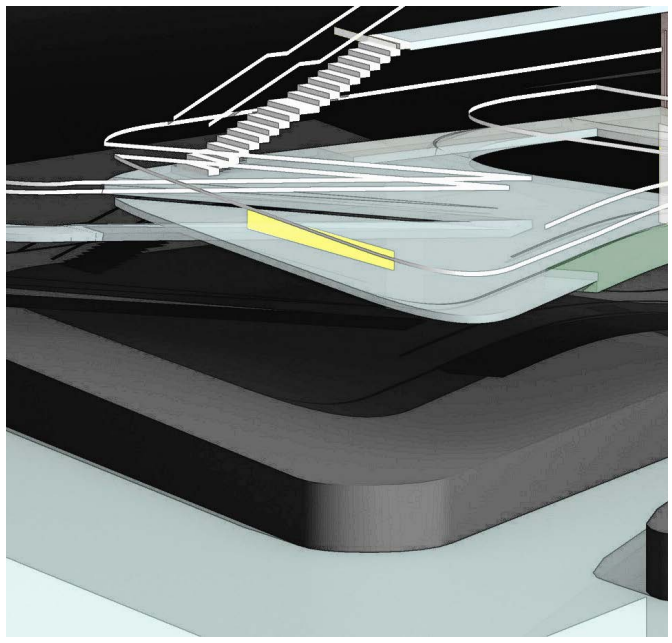
**** In this project, E= 5,000 lux - 10,000 lux***

Examples of E _ Full moon = 1lux; Street light = 10 lux; Normal Indoor = 10-1,000 lux; Surgery = 10,000 lux; Sunlight = 100,000 lux

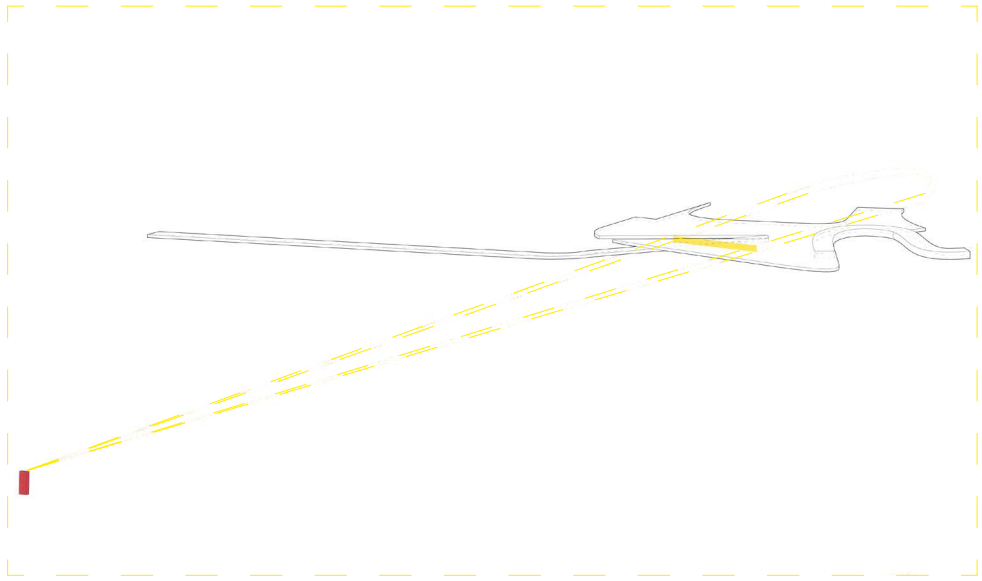
In this section, five light patches will be detailed, which are A1, A3, A4, B4 and D1. (please refer to the top drawing on this page.) The scope of light are contextualized as three-dimensional objects, which are built into the architecture. I took this process of transforming light patterns to physical installations into four stages: firstly, test the geometry of luminous shapes in perspective view from a particular viewpoint through Rhino (as shown above); secondly, translate these geometrical forms as lights and calculate their brightness in relation to their sizes and distances to the viewpoint; thirdly, integrate these lights with the existing design and develop specific moments leading by lights; fourthly, improve details and surface treatments of these lights and their surroundings. The aim of this study is to explore, test and clarify the realisation of this daytime appearance and night-time performance of these light patches.

The five light patches are picked to represent five moments: A1_heating up the indoor cinema from up above; A3_guiding lights for glimpsing at the darkroom; A4_(introvert) buskers stand with music from the darkness; B4_walking down the stairs under moonlight; D1_seating down and feet off the ground with lake view.

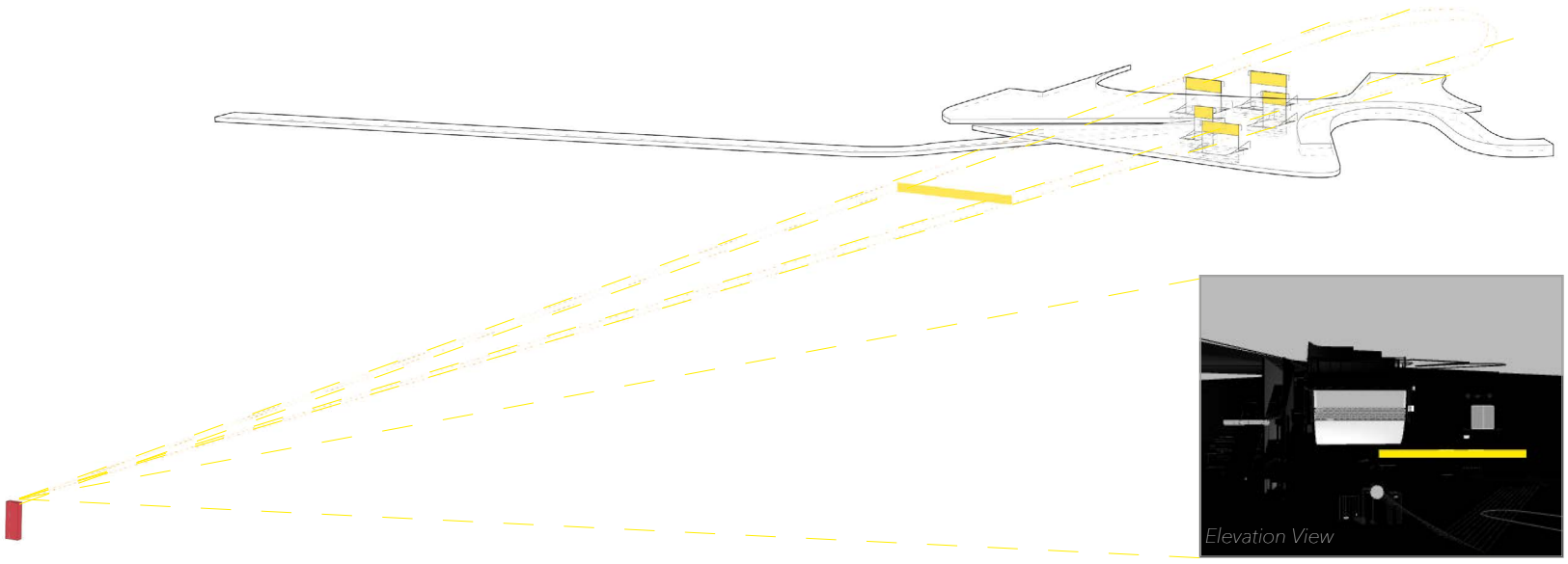
ILLUMINANCE ILLUSTRATION



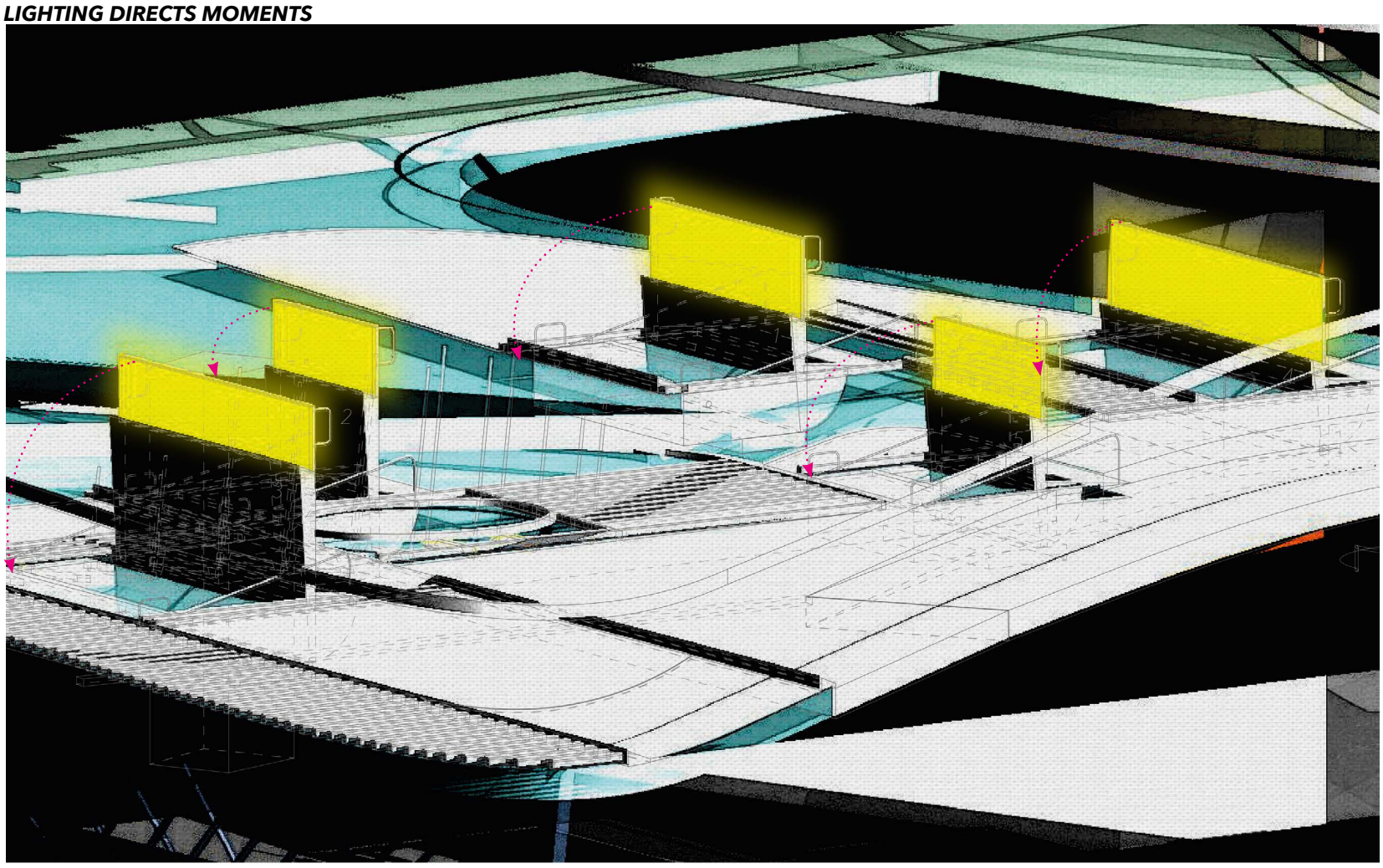
MARKING OUT 3D RANGE



PATTERN AS LIGHTING *_DECONSTRUCT LIGHT PATTERNS WITHIN ITS 3D RANGE*



LIGHTING DIRECTS MOMENTS



ILLUMINANCE CALCULATION *_LED PANEL SPECIFICATIONS*

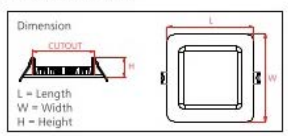
Panasonic LED

LED Panel Light

Recess mounted Slim square type LED panel in white finish with anti-glare diffuser and seprated energy efficient electronic driver.

Technical Specification

Input Voltage : AC 220-240 V, 50/60Hz
Driver Type : Constant Current, Non-Integral
P.F ≧ 0.5 For 7W, ≧ 0.9 For 15W & 20W
Voltage operating Range : 80-330V
High Surge Protection : 2.5 KV
CRI : Ra ≧ 70,
LED Life : 30000 BH
Optics : Polycarbonate Diffuser
Accessories : With Driver



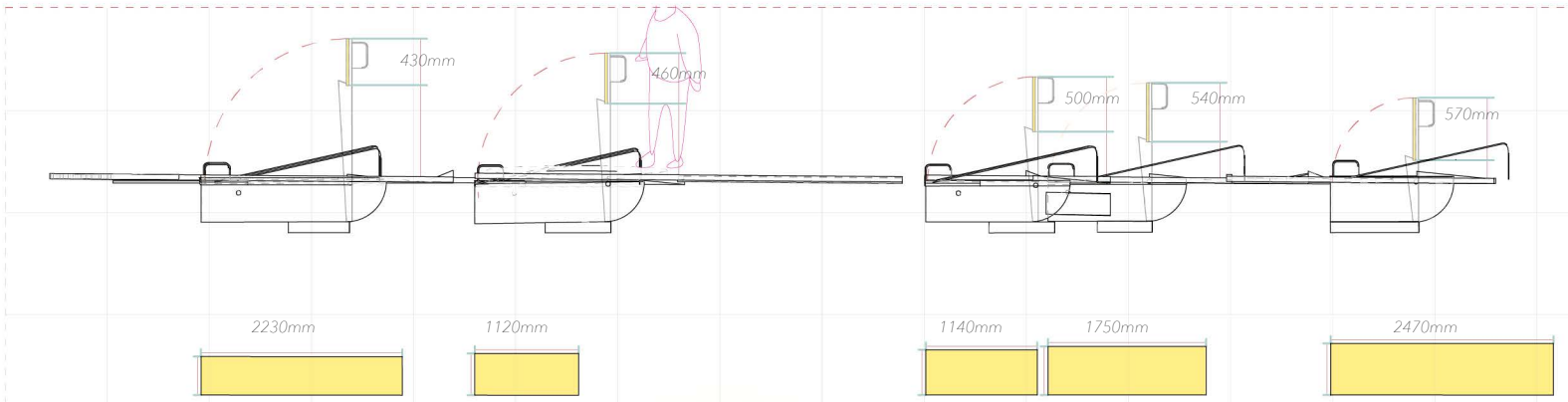
Wattages	Product Description	CCT	Lumen Output	Cut out Dimension (in mm)	Dimension (LxW×H) (in mm)	Product Code
20W	LED Panel Light	3000K	1380lm	205 x 205	220 x 220 x 28	ALF1450120042
	LED Panel Light	4000K	1465lm	205 x 205	220 x 220 x 28	ALF1450120043
	LED Panel Light	6000K	1500lm	205 x 205	220 x 220 x 28	ALF1450120045

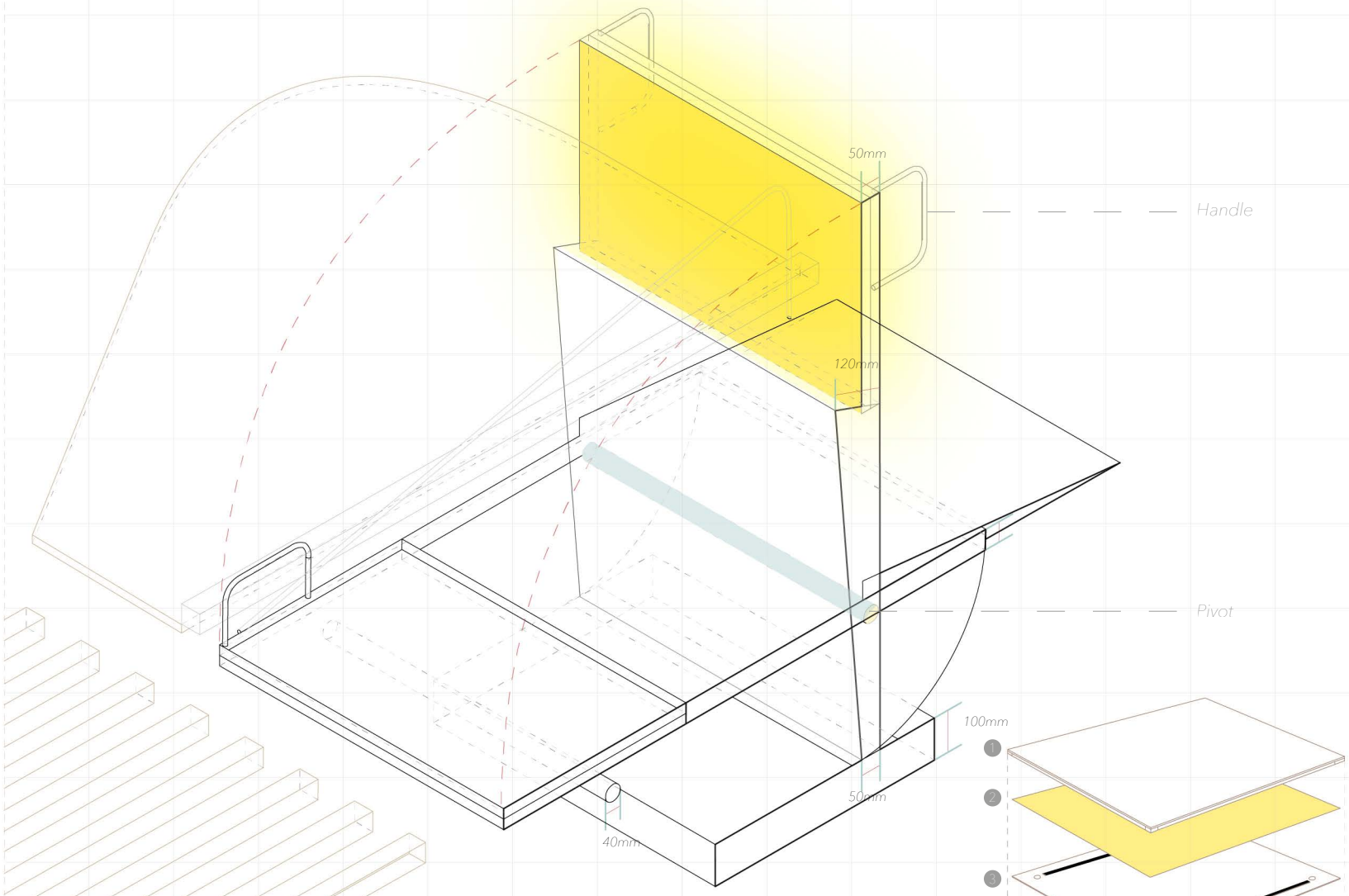
F= E x A /(UF x MF) = EA/ 0.28

(value of E should be between 5,000 to 1,0000 lux to be visible)*

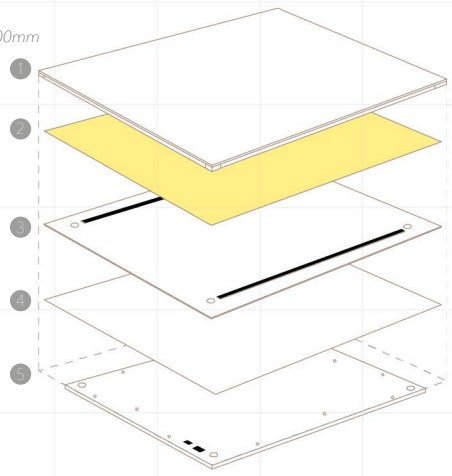
*A_1= (0.22*0.22)X 9 X 2=0.87; F_1=0.87E/ 0.28=1500 X 18=27,000 lm ---- 8,690 lux*
*A_2= (0.22*0.22) X 4 X 2=0.39; F_2=0.39E/ 0.28=1500 X 8=12,000 lm-------8,615 lux*
*A_3= (0.22*0.22)X 10 X 2=0.97; F_3=0.97E/ 0.28=1500 X 20=30,000 lm-----8,660 lux*
*A_4= (0.22*0.22)X 11 X 2=1.06; F_4=1.06E/ 0.28=1500 X 22=33,000 lm-----8,717 lux*
*A_5= (0.22*0.22)X 6 X 2=0.58; F_5=0.58E/ 0.28=1500 X 12=18,000 lm-----8,690 lux*

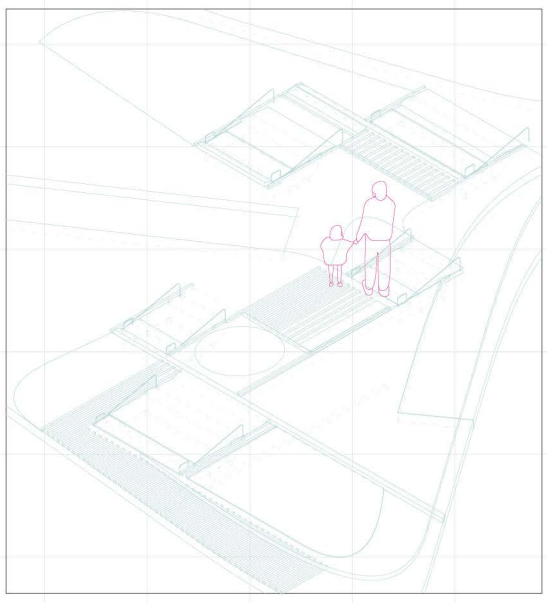
DIAGRAM _DETAIL + PERFORMANCE

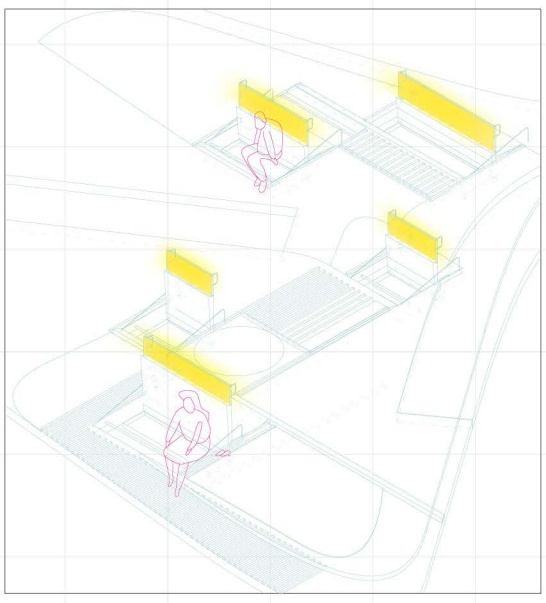


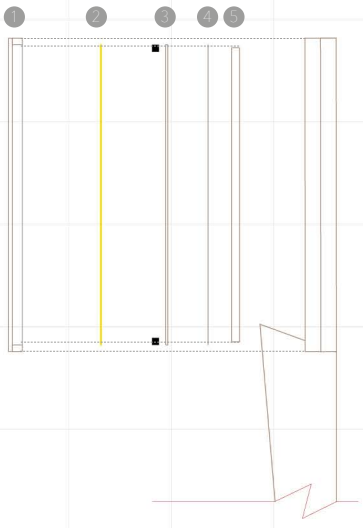


1 Acrylic screen
2 Yellow film
3 LED strip on plate
4 Control Boards
5 Backplane





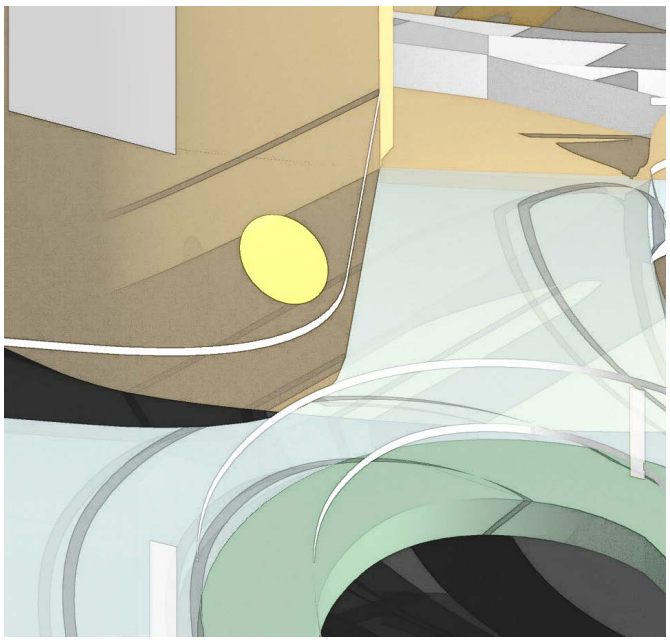




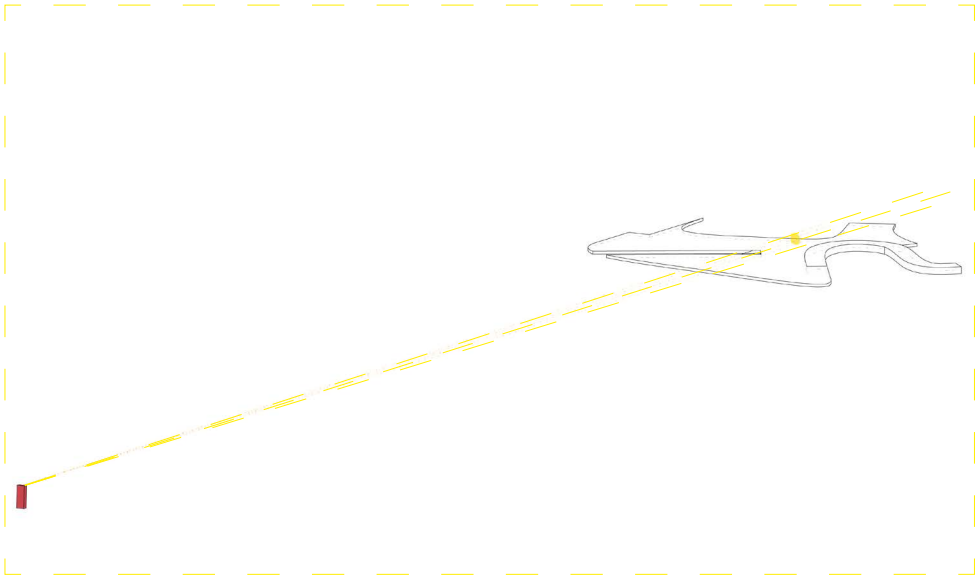
Luminous panels are hidden under timber paving, which can be lifted to form several sunken seats at night. The original luminous pattern (D1) is a long bar of lights floating at the height level of handrails. The five hidden panels together recreated this bar of light, which can be identified from the certain standing point on the other side of the lake. As the seats are occupied, the lights are vertically positioned and turned on. Therefore, the luminous patterns are not fixed but rather interactive to occupancy of people. The length between the lower edge of the luminous patterns and the seat level is 1.15m, so that when people are at a seating position, their heads will not be blocking the luminous patterns (unless they are very tall!).

Sunken seating arrangement serves two purposes: first, it sets out a height level that matches with the luminous patterns; second it creates a feeling of being in the ground with feet hanging in the air- that people experience a lot in childhood when they are too little to have their feet reaching the ground. It gives people a sense of free.

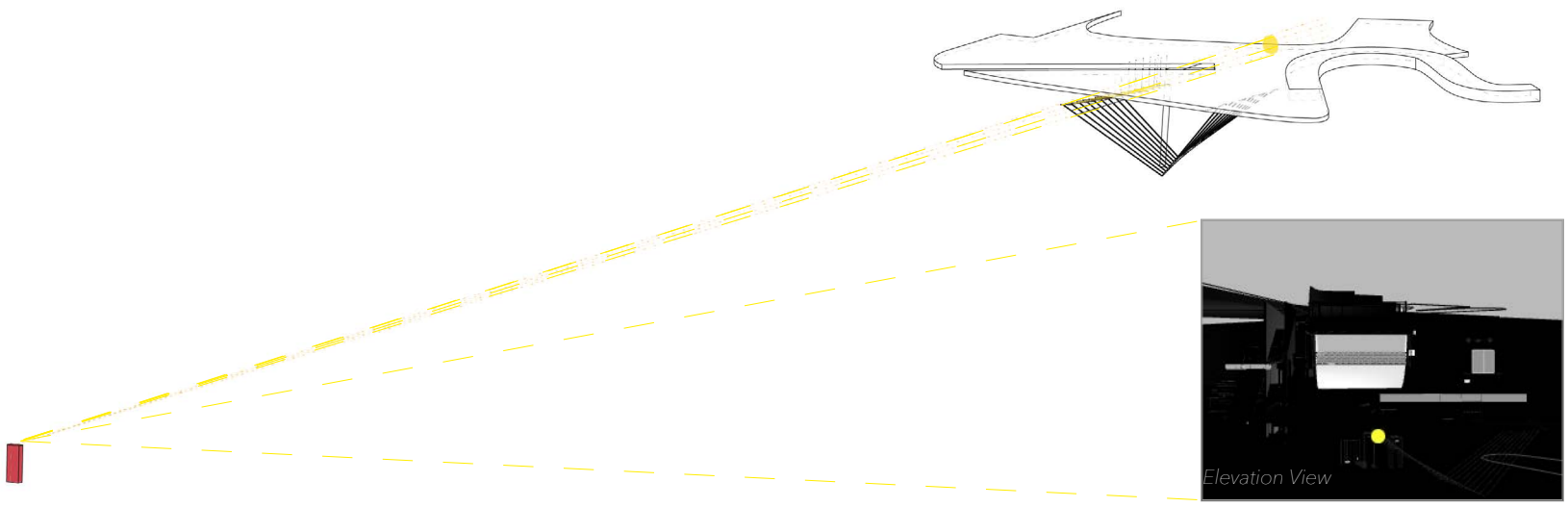
ILLUMINANCE ILLUSTRATION



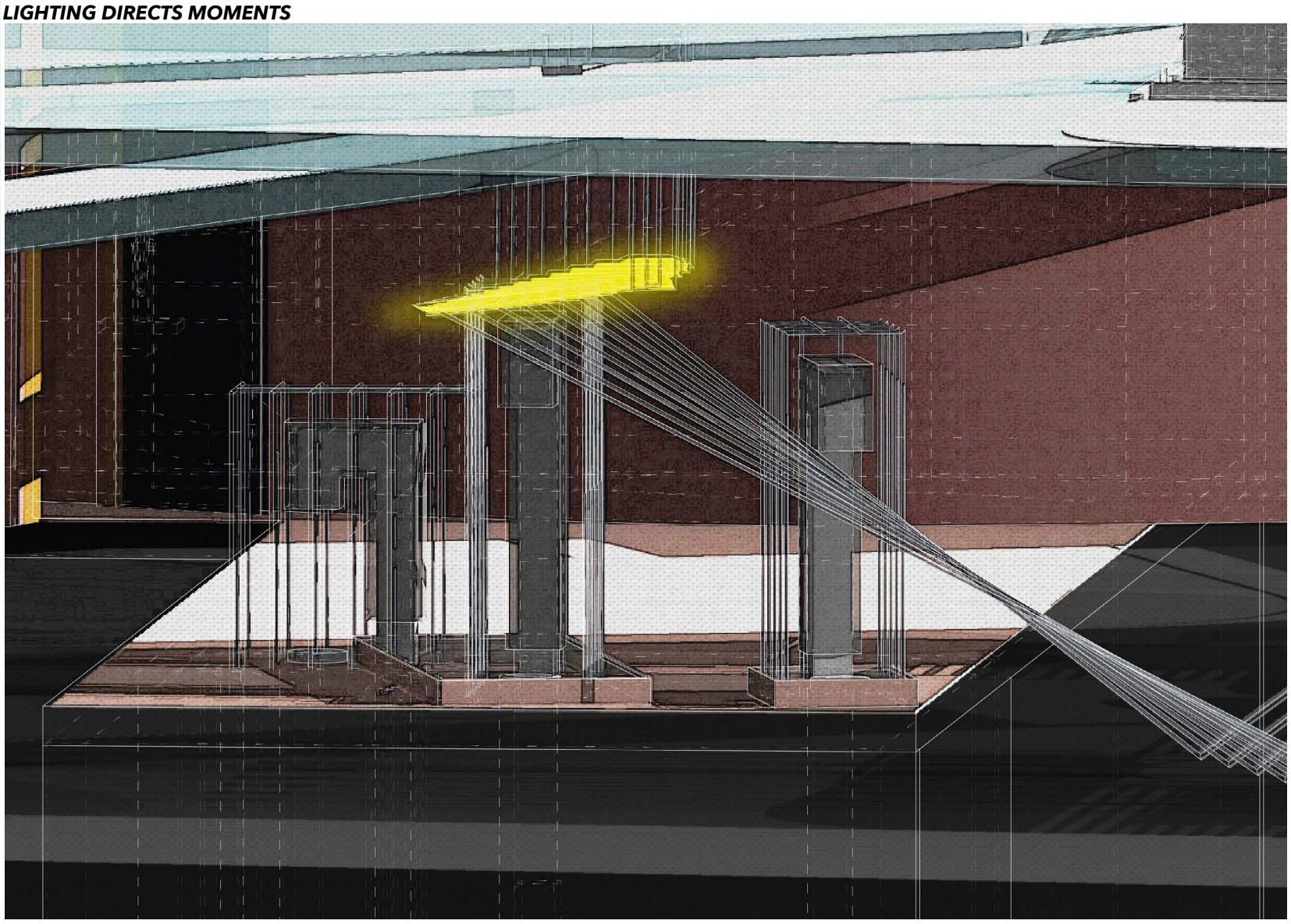
MARKING OUT 3D RANGE



PATTERN AS LIGHTING *_DECONSTRUCT LIGHT PATTERNS WITHIN ITS 3D RANGE*



LIGHTING DIRECTS MOMENTS



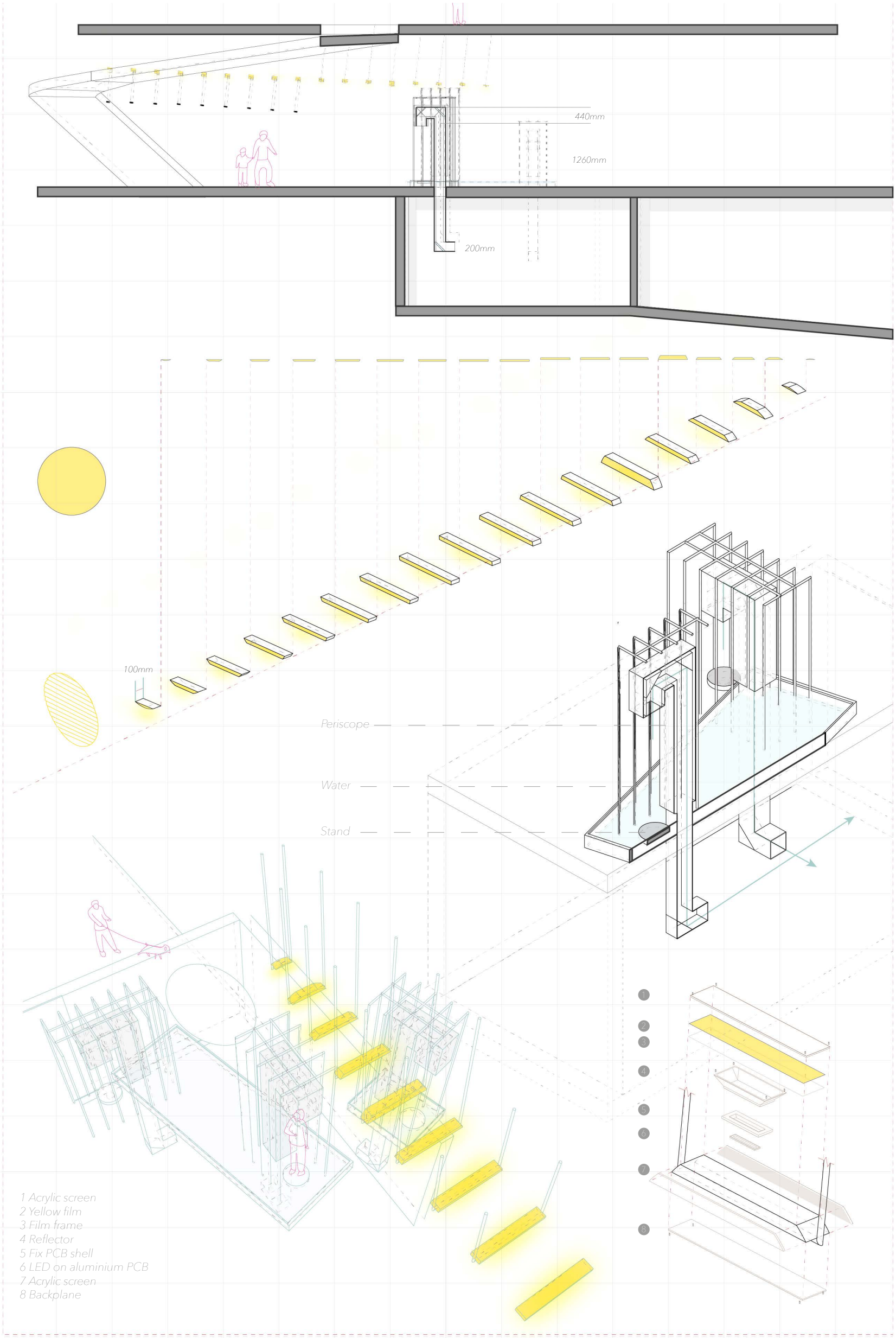
ILLUMINANCE CALCULATION

F= E x A /(UF x MF) = 7500 x A/ (0.4 x 0.7)

A_1= 0.0036; F_1=10,000 x 0.0036/ 0.28=129 lm
A_2= 0.0114; F_2=7500 x 0.0114/ 0.28=305 lm
A_3= 0.0158; F_3=7500 x 0.0158/ 0.28=423 lm
A_4= 0.0192; F_4=7500 x 0.0192/ 0.28=514 lm
A_5= 0.0219; F_5=7500 x 0.0219/ 0.28=587 lm
A_6= 0.0241; F_6=7500 x 0.0241/ 0.28=646 lm
A_7= 0.0260; F_7=7500 x 0.0260/ 0.28=696 lm
A_8= 0.0274; F_8=7500 x0.0274/ 0.28=734 lm
A_9= 0.0285; F_9=7500 x 0.0285/ 0.28=763 lm
A_{10}= 0.0291; F_{10}=7500 x 0.0291/ 0.28=779 lm
A_{11}= 0.0291; F_{11}=7500 x 0.0291/ 0.28=779 lm
A_{12}= 0.0286; F_{12}=7500 x 0.0286/ 0.28=766 lm
A_{13}= 0.0568; F_{13}=7500 x 0.0568/ 0.28=1,521 lm
A_{14}= 0.0250; F_{14}=7500 x 0.0250/ 0.28=670 lm
A_{15}= 0.0213; F_{15}=7500 x 0.0213/ 0.28=571 lm
A_{16}= 0.0148; F_{16}=7500 x0.0148/ 0.28=396 lm
A_{17}= 0.0023; F_{17}=10,000 x 0.0023/ 0.28=82 lm

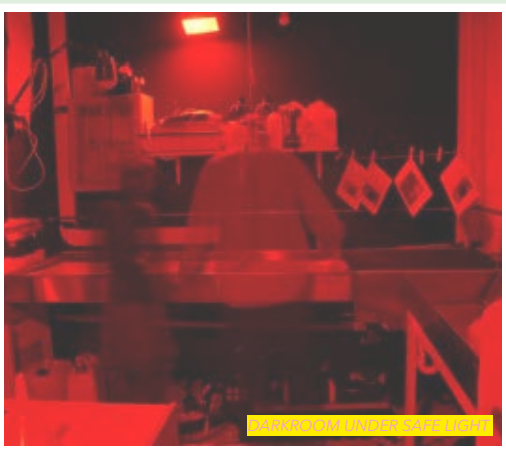
BRIGHTNESS = LUMENS	250+	450+	800+	1100+	1600+
Standard	25W	40W	60W	75W	100W
Halogen	18W	29W	43W	53W	72W
CFL	6W	10W	13W	18W	23W
LED	4W	5W	10W	15W	20W

** Normal LED lights are suitable in this case since all the luminous flux required is below 1,600 lm.*

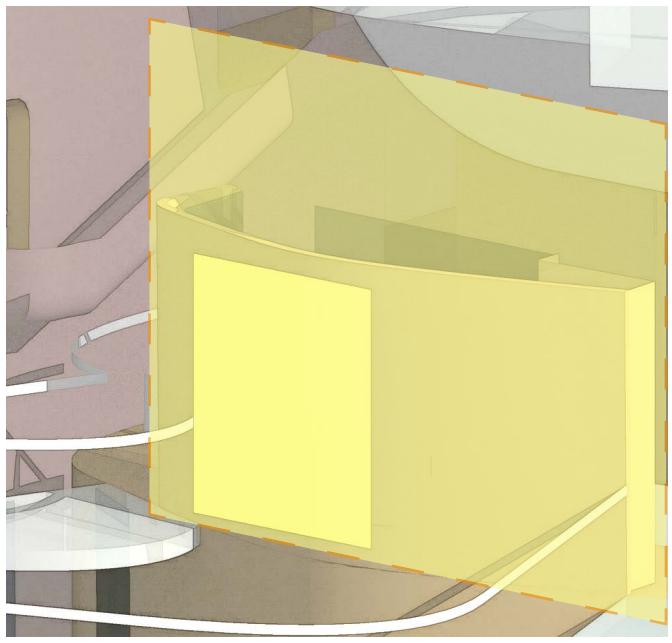


The circular light patch is broken down into 17 strips of LED lights that are positioned in the way in which it forms a thread of light guiding people to walk towards the glimpse points. Downward-facing periscope is used to channel the view up without cutting any opening that brings lights to the darkroom. It also enhances this discovering experience by making people to look up when they are actually receiving a sight of what it is like down below. There is a dark room in the basement next to the old film storage. It can be used for film development or repair. This space with special technical equipments and lighting condition tends to be quite mysterious; therefore, it will be an interesting experience for people to take glimpse into the space.

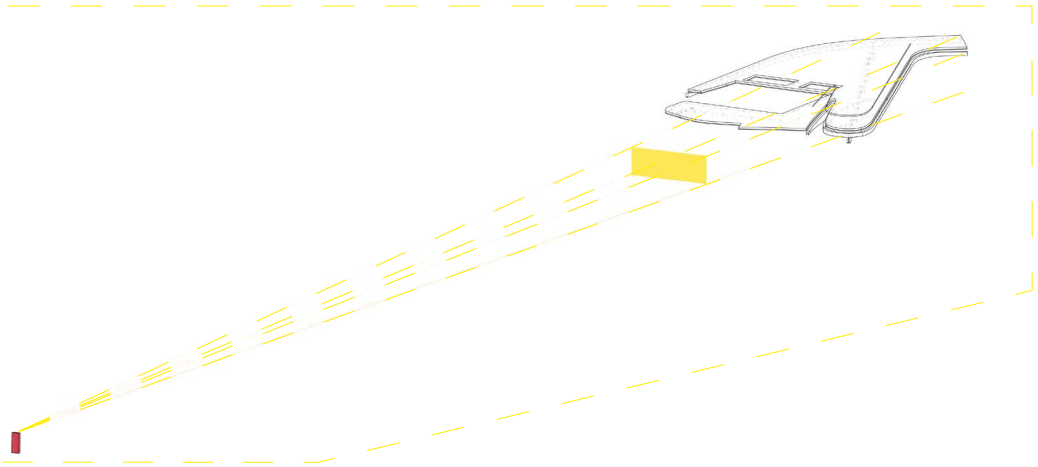
The lighting control of this space is crucial since film will be exposed in all kinds of visible light. Safe lighting (15W bulb and red GBX-2 filter) are used in darkrooms. This kind of lighting of relatively long wavelength and low intensity illumination that does not rapidly affect open film but permits on to see well enough to work in the area. For the viewers from ground level, this special light almost acts as a filter of the scene, which brings out the hidden atmosphere. Periscope mechanism is introduced to keep this area light-tight.



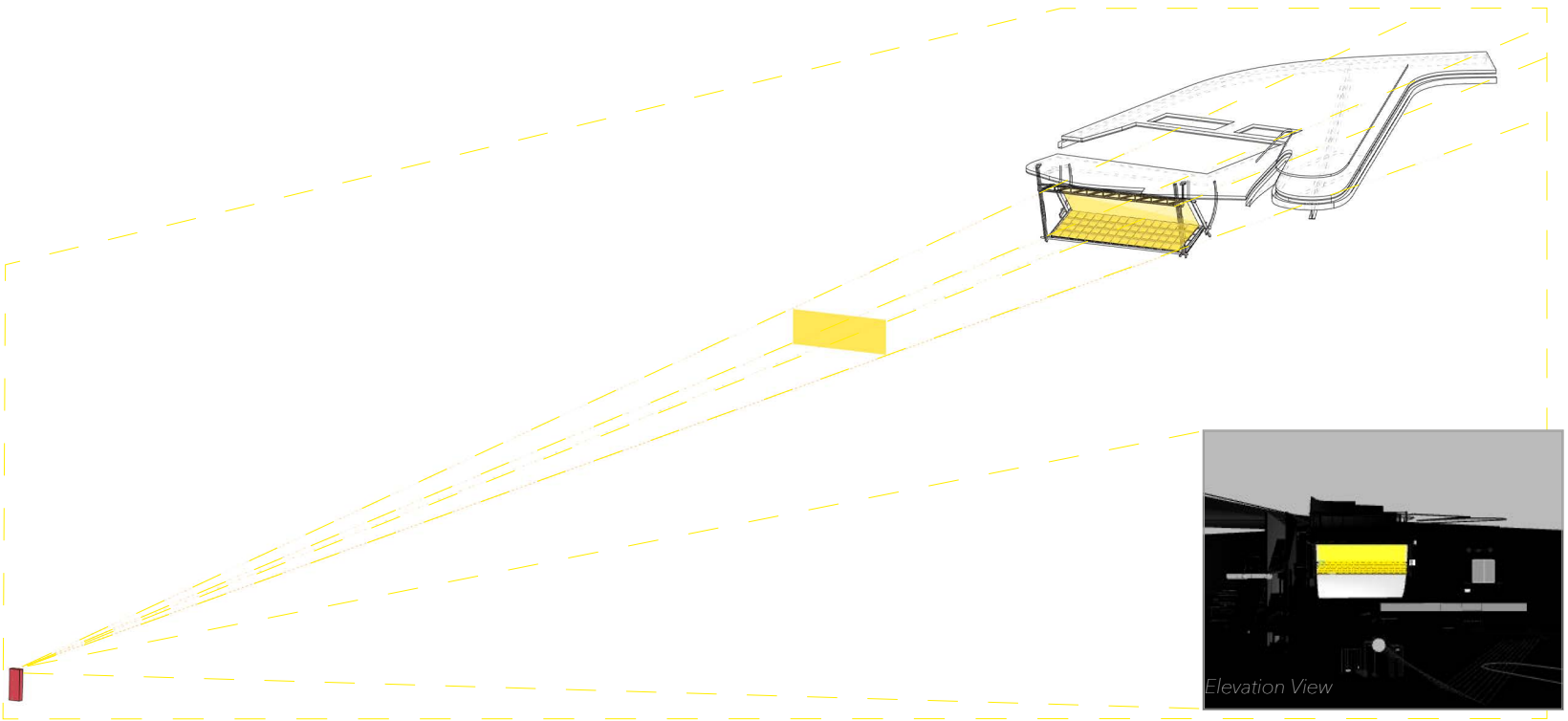
ILLUMINANCE ILLUSTRATION



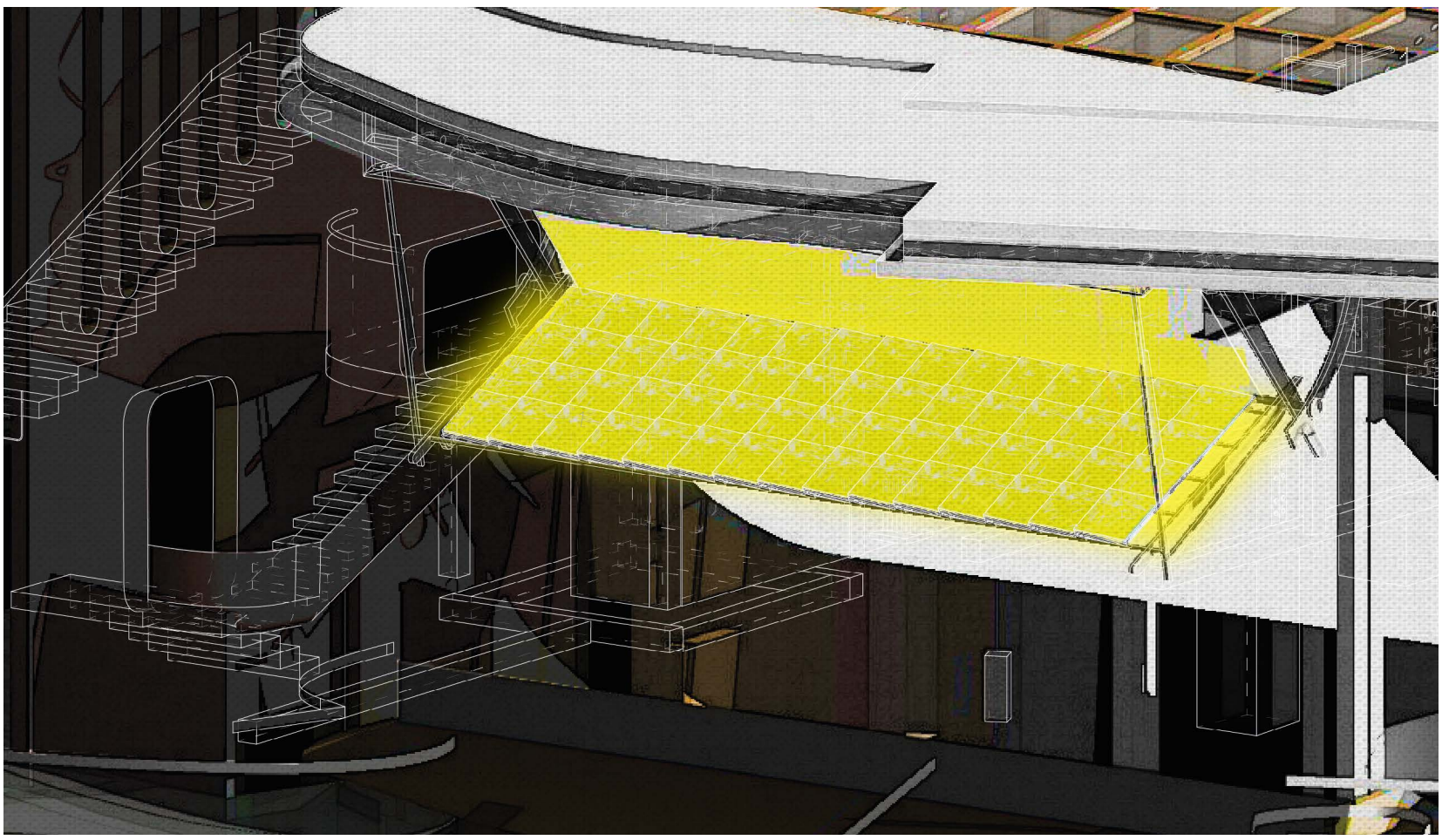
MARKING OUT 3D RANGE



PATTERN AS LIGHTING ***_DECONSTRUCT LIGHT PATTERNS WITHIN ITS 3D RANGE***



LIGHTING DIRECTS MOMENTS



ILLUMINANCE CALCULATION

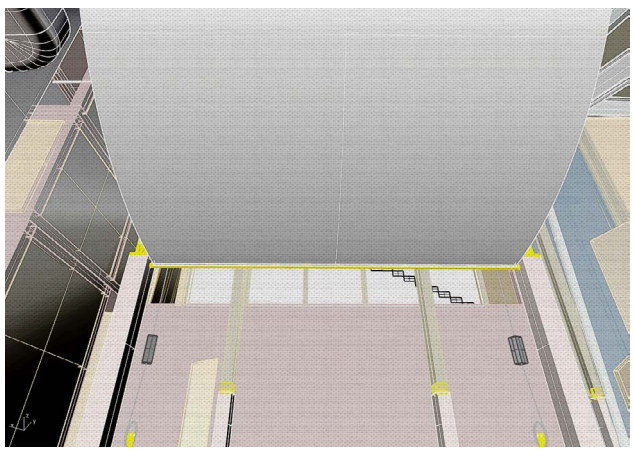
F= E x A /(UF x MF) = 7500 x A/ (0.4 x 0.7)

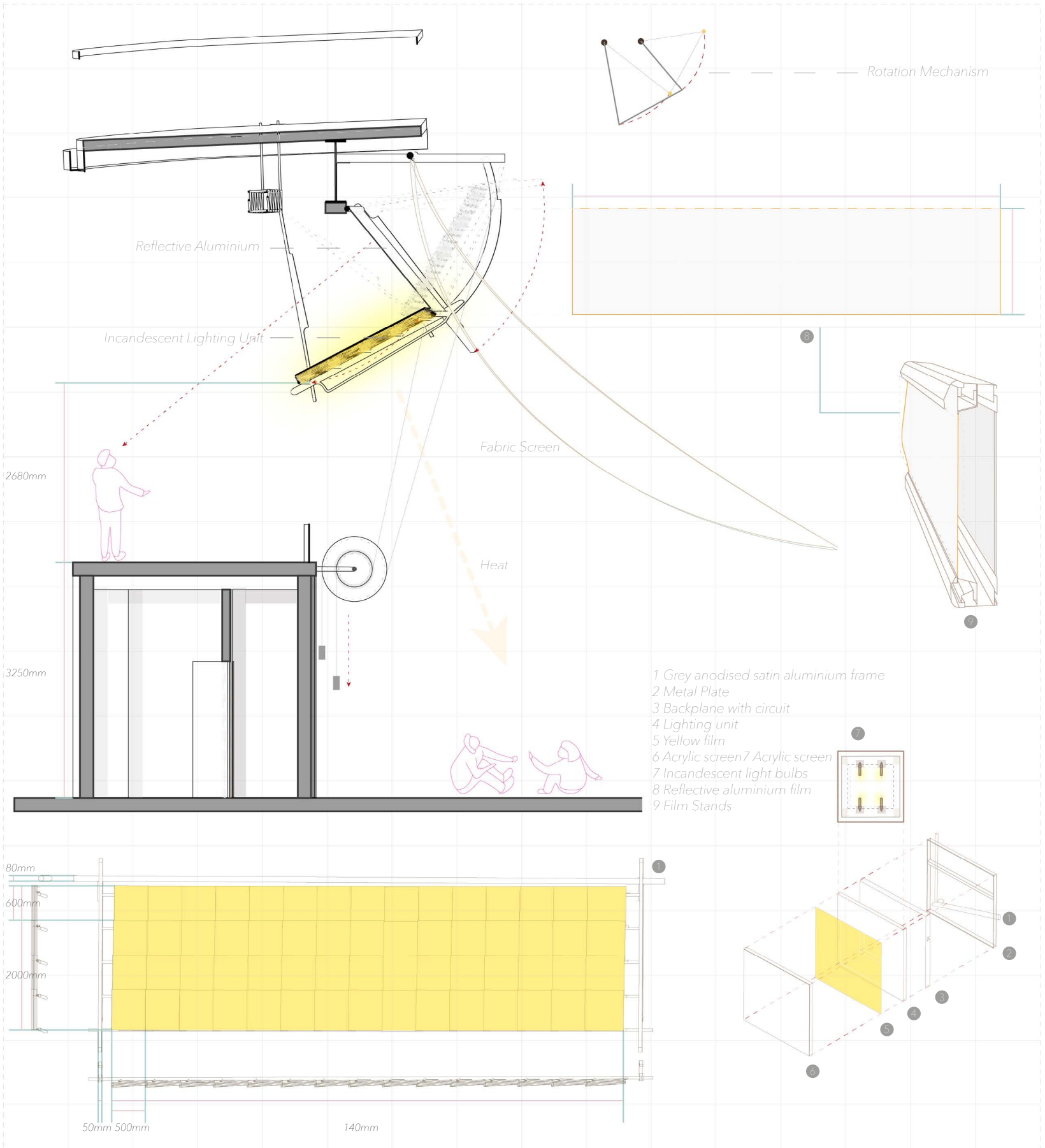
*A_1=0.30 ; F_1=5000 x 0.30/ 0.28=**5,357 lm***

There are 60 identical lighting panels (4X15) with a surface area of 0.3 sqm, which are fixed on light-weighted metal frame with an angle of 8 degree to form this seamless lighting panel.

AUDIENCE VIEW

Since the light is designed to be as wide as the film screen and able to heat up the audience area below the screen, the location of it needs to be checked in relation to the range of vision of the audience. Take this audience view to make sure that the lights are positioned at a certain angle and height, which will not appear on the screen to interfere with the film. Therefore, the audience will be able to enjoy the heat provided by the lights without seeing them.





DETAIL STUDY _HEAT EMISSION FROM LUMINOUS PANEL

To quantify the number of incandescent light bulbs needed for heating:

Heat Provided by Luminous Panel per Hour = Electric Energy per Hour - Luminous Energy per Hour

Incandescent lights are chosen in this case, due to its low luminous efficiency (2%), which means high heat emission (98%).
Knowing_ F= 5,357 lm and Luminous per Watt= 15, Power= 357W,
Therefore _Electric Energy per Hour= 357 X 3600= 1,285,200 J
_Theoretical Heat Emission per light per Hour = 1,259,496 J

Hourly heat gain from one incandescent light bulb is approximately 1.25 10^6 J.*

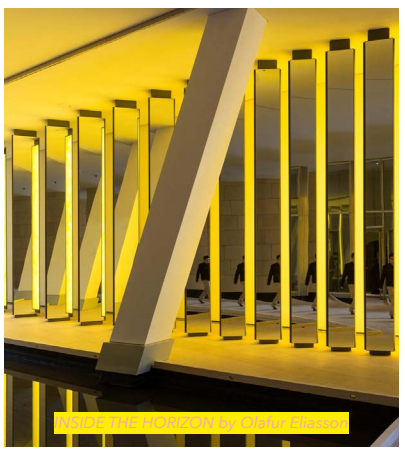
Heat loss per hour per capita in -5°C= 1,470 kal
(R=hRADIATIVE X (TSKIN - TRADIANT) X ARADIATIVE; hRADIATIVE= 20; (TSKIN - TRADIANT)= 37°C+5°C=42°C; ARADIATIVE= 1.75sqm)
Indoor cinema max capacity= 45
Heat loss per hour= 66,150 kcal= 2.77 10^8 J*

Assume total heat loss is covered by heat emission from this luminous panel:
Numbers of incandescent light bulbs needed= Heat loss/Heat gain from an incandescent light= *2.77* 10^8 */1.25* 10^6 *> 221*
Since this luminous panel is made up of 60 identical panels, each panel needs to contain ***4 incandescent light bulbs.***

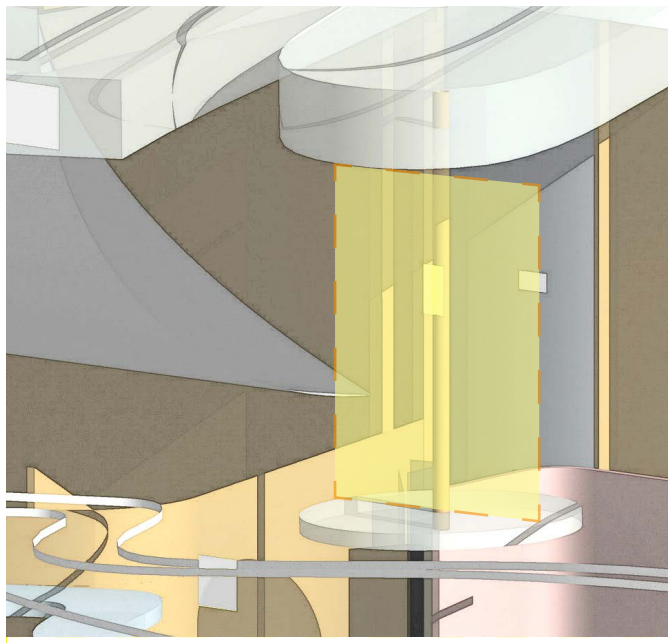
FEATURES	Incandescent
Rated Avg. Life	750-1000
Life Span	Low
Watts	3 – 500
Cost to Operate	High
Price of Product	Low
Lumens per Watt (LPW)	15
Color Temperature (in Kelvin)	2700K

The largest light patch is above the indoor cinema space, which needs to be heated up during winter when the temperature is likely to drop to -5°C at night. Therefore the light patch is detailed in the way in which it provides indoor space with heat that comes from warm lights. Half of this patch is made up of small light panels.

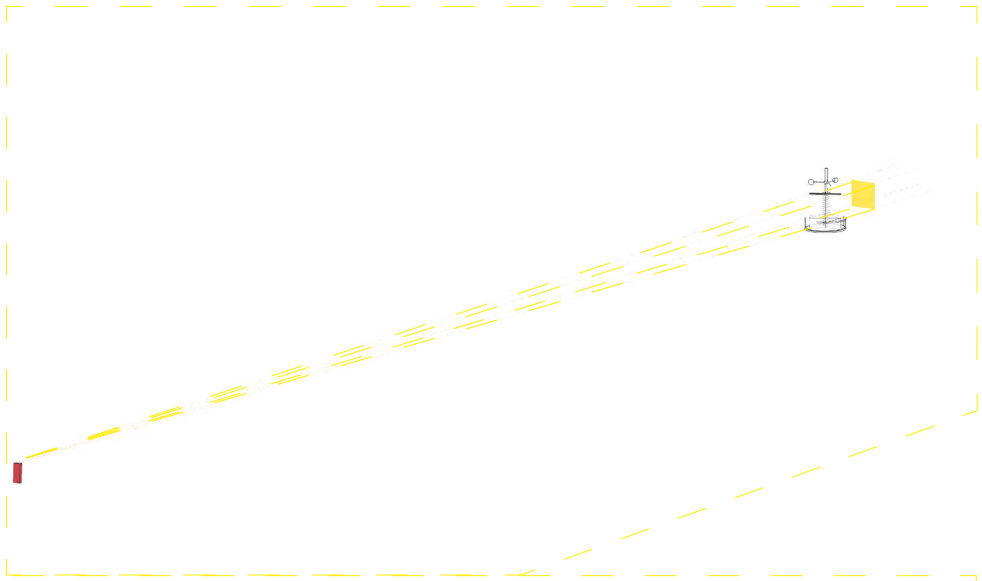
Apart from the functional aspects, I intended to bring in my experience of walking along the mirror installation by Eliasson in Fondation Louis Vuitton, where people find themselves in the space and as they walk through, the image of them updates itself. Therefore, to make this space more interactive, the other half of the light patch is in the form of a reflective aluminium surface, which is placed at an angel of 75 degree in relation to the array of warm lights. This angle not only allows the reflective surface to catch the yellow tint of light from the warm light array, but also allows people who walk passes or stands on the platform to see themselves. Also, this dynamic silhouette of people can be portrayed on the overall image, which becomes a moving scene for the other side of the lake.



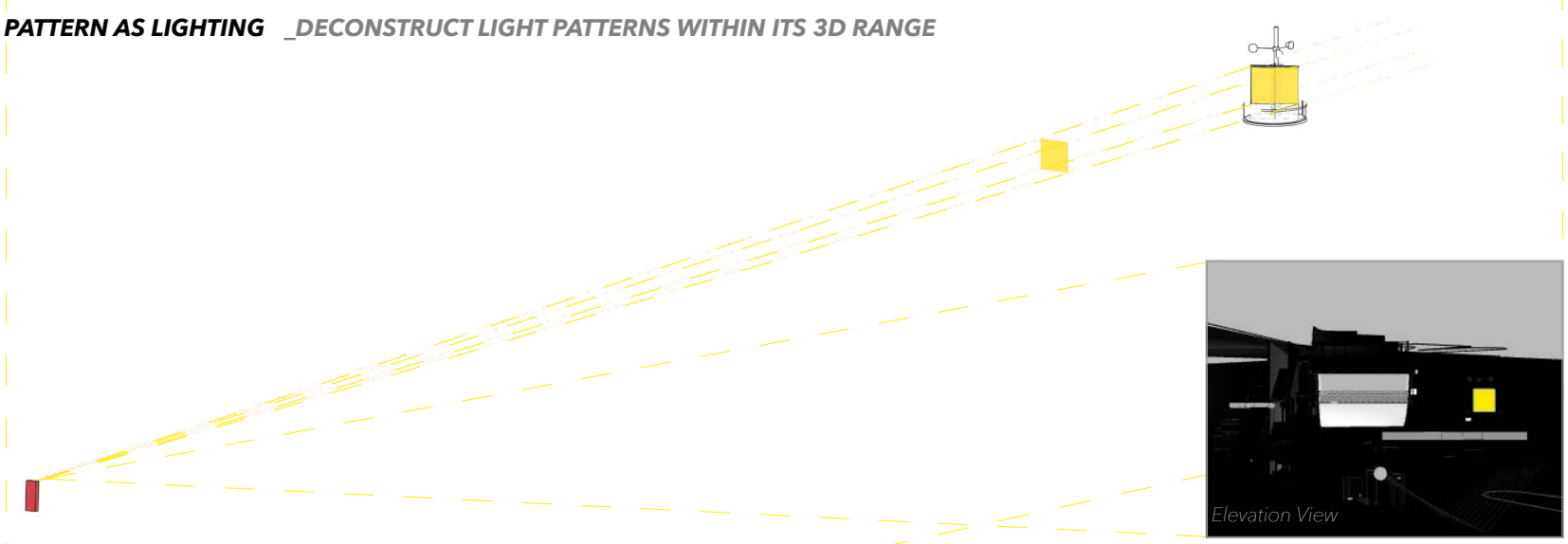
ILLUMINANCE ILLUSTRATION



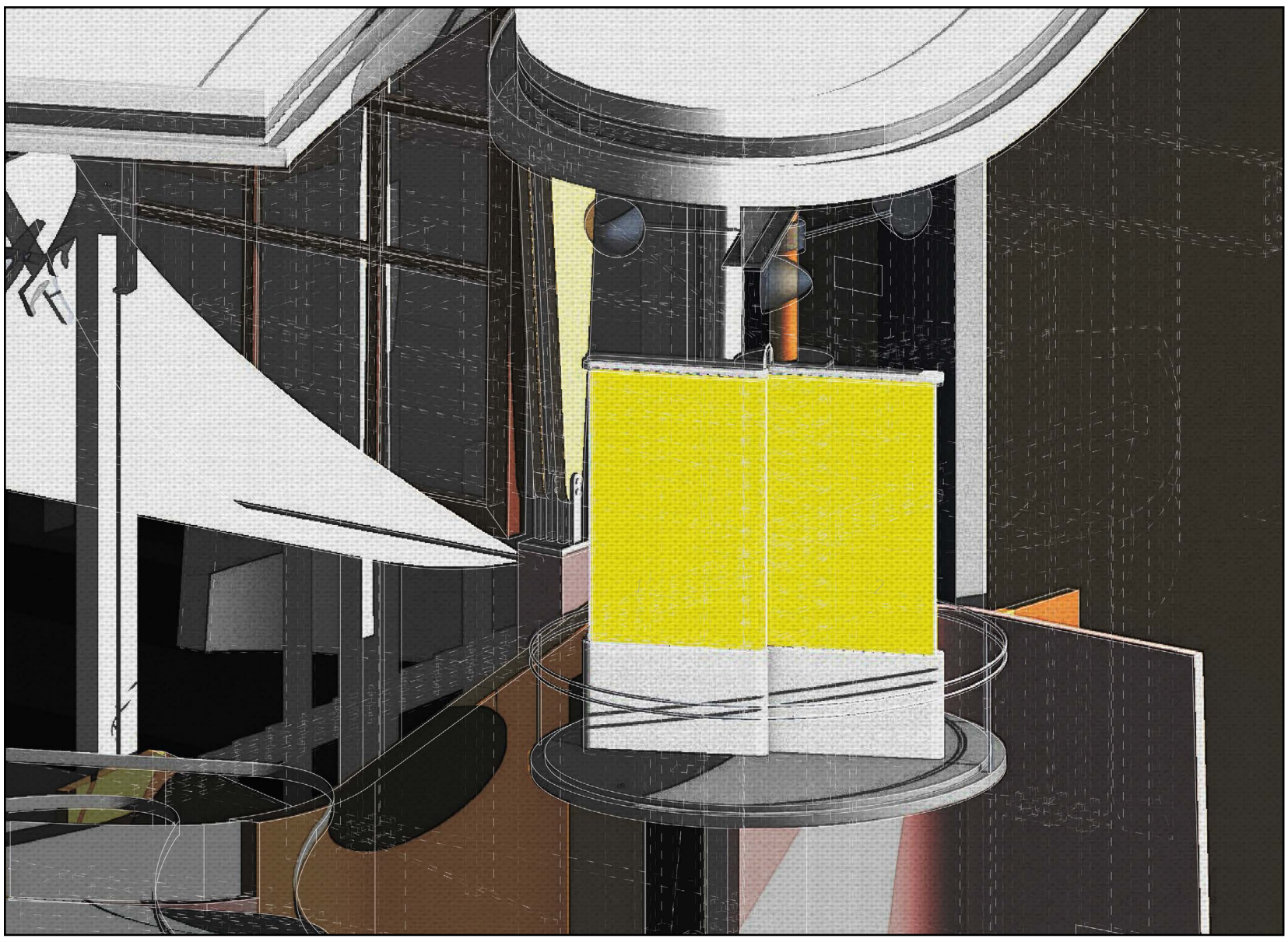
MARKING OUT 3D RANGE



PATTERN AS LIGHTING _DECONSTRUCT LIGHT PATTERNS WITHIN ITS 3D RANGE



LIGHTING DIRECTS MOMENTS



ILLUMINANCE CALCULATION _LED PANEL SPECIFICATIONS

Wattages	Product Description	CCT	Lumen Output	Cut out Dimension (in mm)	Dimension (LxW×H) (in mm)	Product Code
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	LED Panel Light	4000K	1465lm	205 x 205	220 x 220 x 28	ALF1450120043
	LED Panel Light	6000K	1500lm	205 x 205	220 x 220 x 28	ALF1450120045

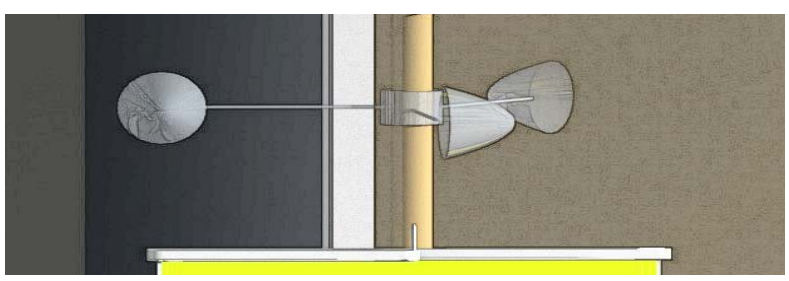
F= E x A /(UF x MF) = EA/ 0.28

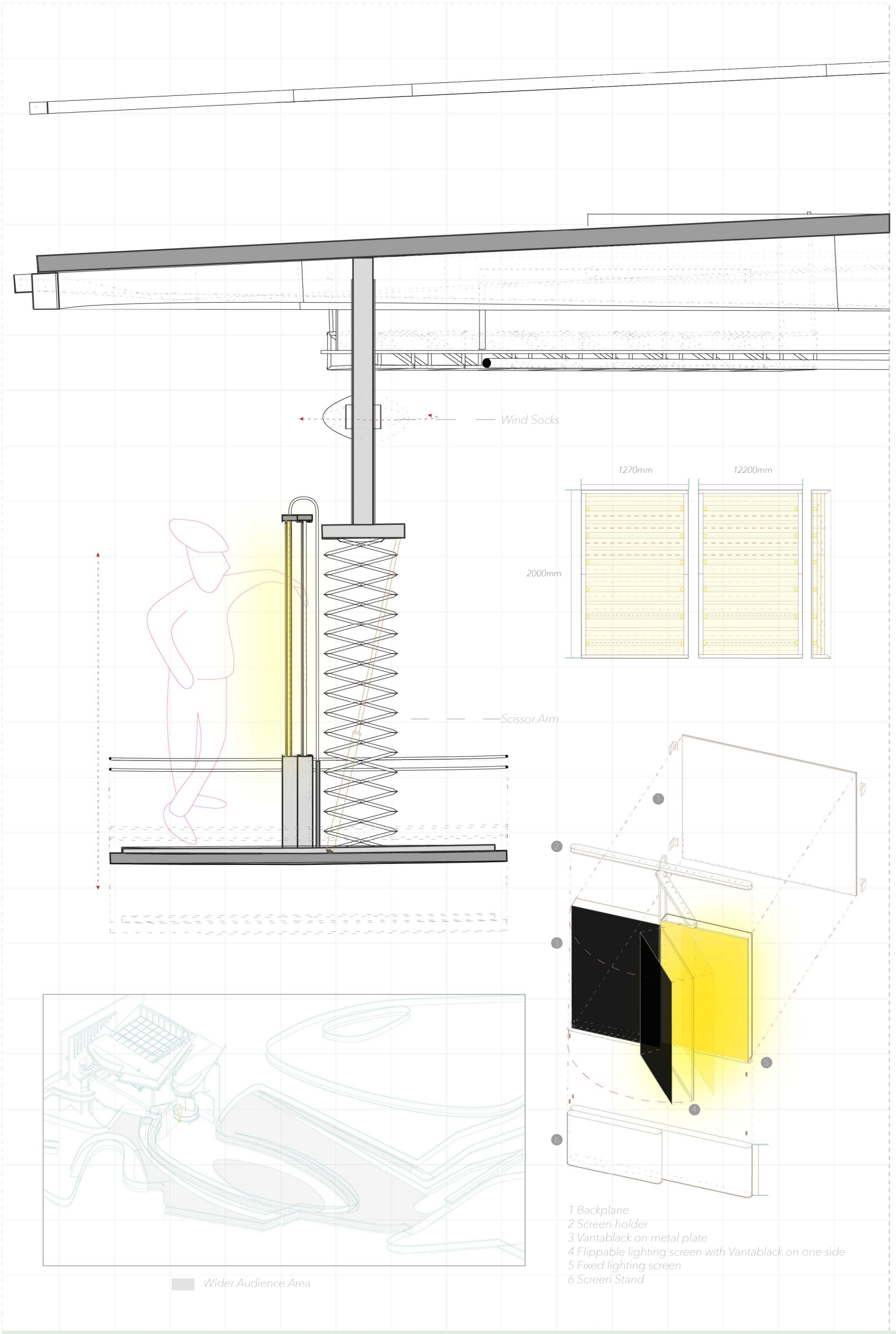
(value of E should be between 5,000 to 1,0000 lux to be visible)*

*A_1= (0.22*0.22) X 6 X 9=2.61; F_1=2.61E/ 0.28=1500 X 54=81,000 lm*
---- 8,690 lux
*A_2= (0.22*0.22) X 5 X 9=2.18; F_2=2.18E/ 0.28=1500 X 45=67,500 lm*
---- 8,670 lux

WIND SOCK DYNAMICS

Wind sock visualizes wind. It is installed on top of the buskers' stand as a broadcasting symbol for people to know if it is too windy to be up there on particular days and times.

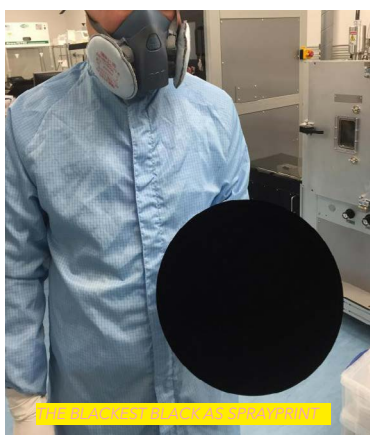




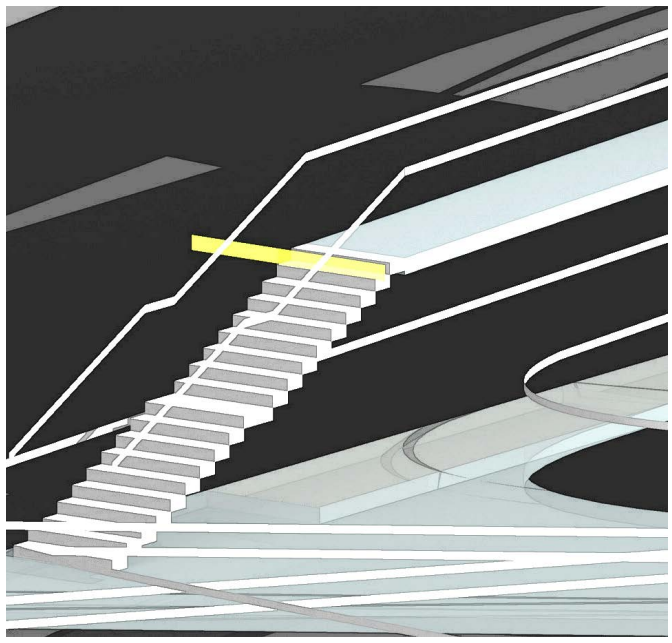
The buskers' stand can be lifted with a scissor arm. It gives the buskers a personal stage where their talent sparks at night. The book-like luminous panels are double-sided with the front side of it made of LED array, and the back side of it spray-painted in Vantablack.

It may look like a circle superimposed on the photo, but this is actually a round object coated in Vantablack. This colour is known as the blackest black, which is exclusively owned by artist, Anish Kapoor; however, the Newhaven company has revealed the revolutionary material is available in a more user-friendly spay-paint form, which applied to virtually any surface. The material traps 99.8 per cent of incident light, which makes objects appear as two-dimensional black holes, as it becomes impossible to make out surface topography.

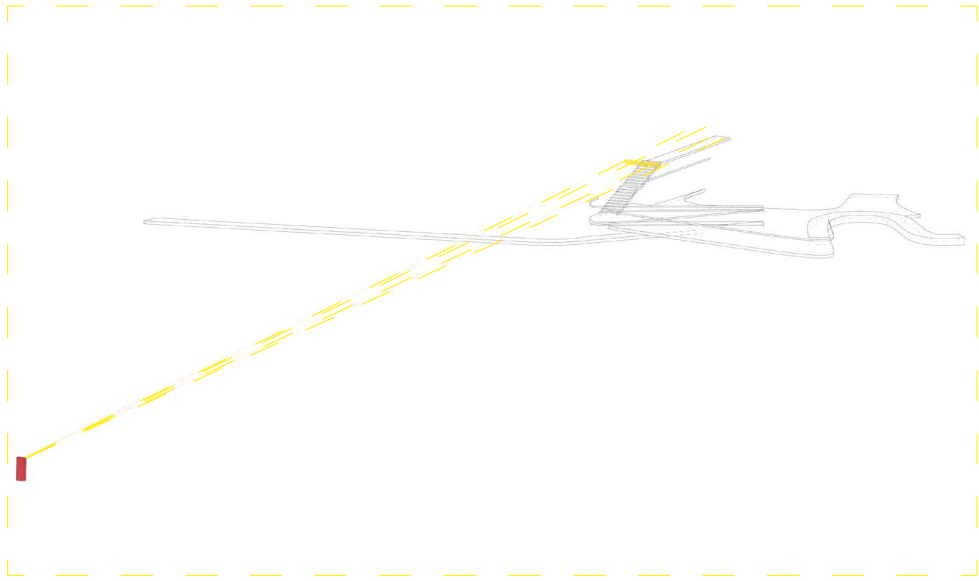
Apply this colour technology to one side of the luminous panels give buskers an option to choose if they would like to perform under spotlight or perform without people seeing them. This might be ideal for an introvert busker or for the ones who want to be more concentrated on their performance.



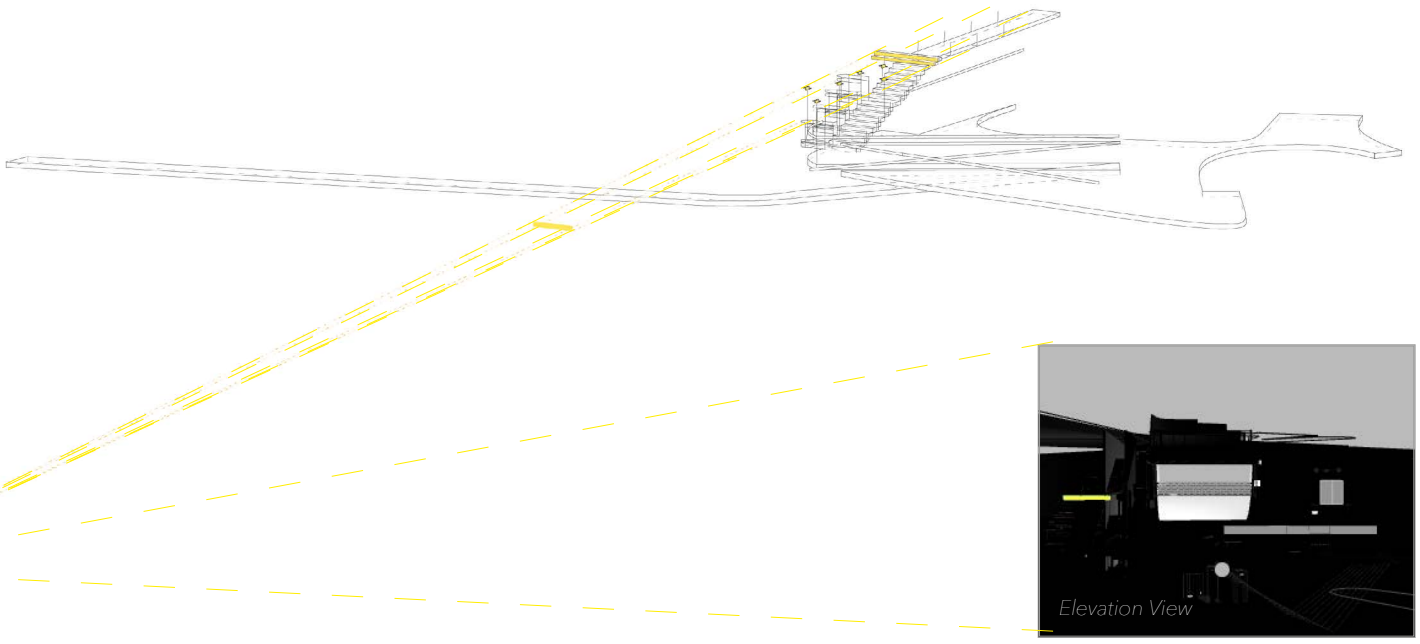
ILLUMINANCE ILLUSTRATION



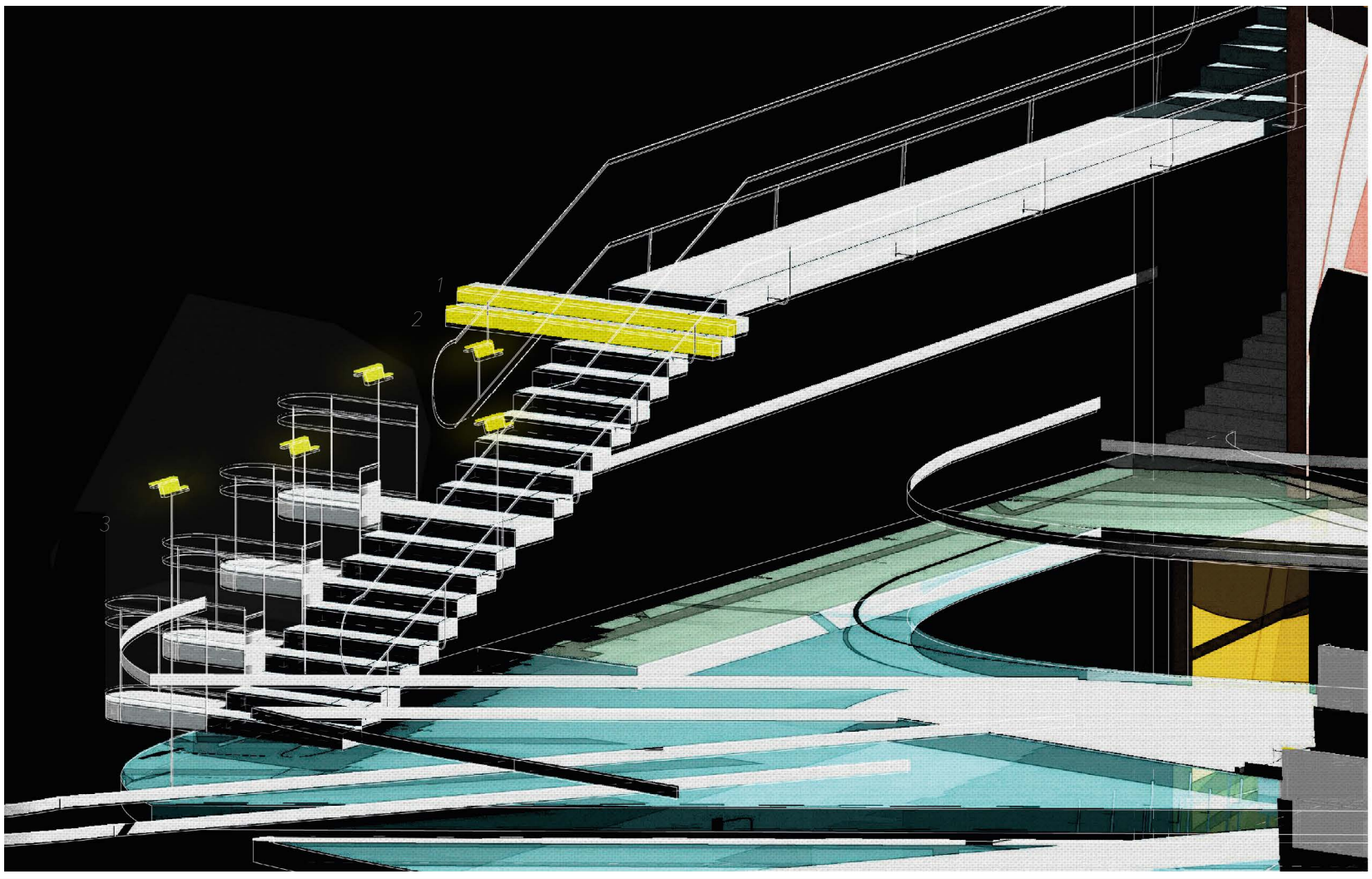
MARKING OUT 3D RANGE



PATTERN AS LIGHTING _DECONSTRUCT LIGHT PATTERNS WITHIN ITS 3D RANGE



LIGHTING DIRECTS MOMENTS



ILLUMINANCE CALCULATION

F= E x A /(UF x MF) = 7500 x A/ (0.4 x 0.7)

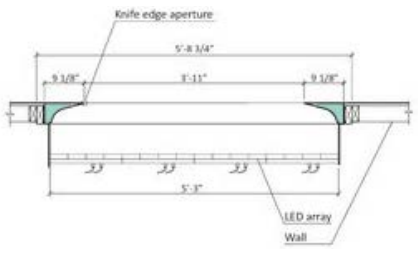
A_1= 0.33; F_1=7500 x 0.33/ 0.28=8,839 lm

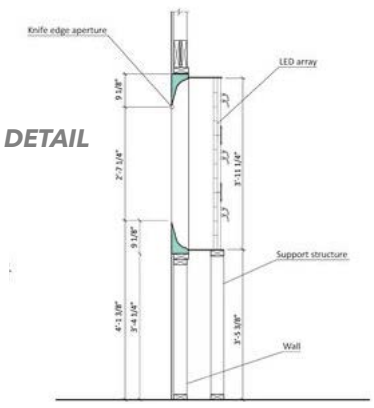
A_2= 0.39; F_2=7500 x 0.39/ 0.28=10,446 lm

A_3= 0.035; F_3=5000 x 0.035/ 0.28=625 lm

** Pointy edges are applied in order to make lights sharply defined against the rest of the background.*

REFERENCE STUDY _ JAMES TURRELL LIGHTING DETAIL





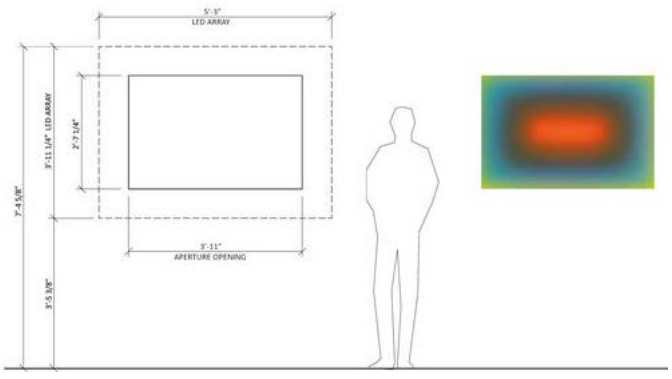
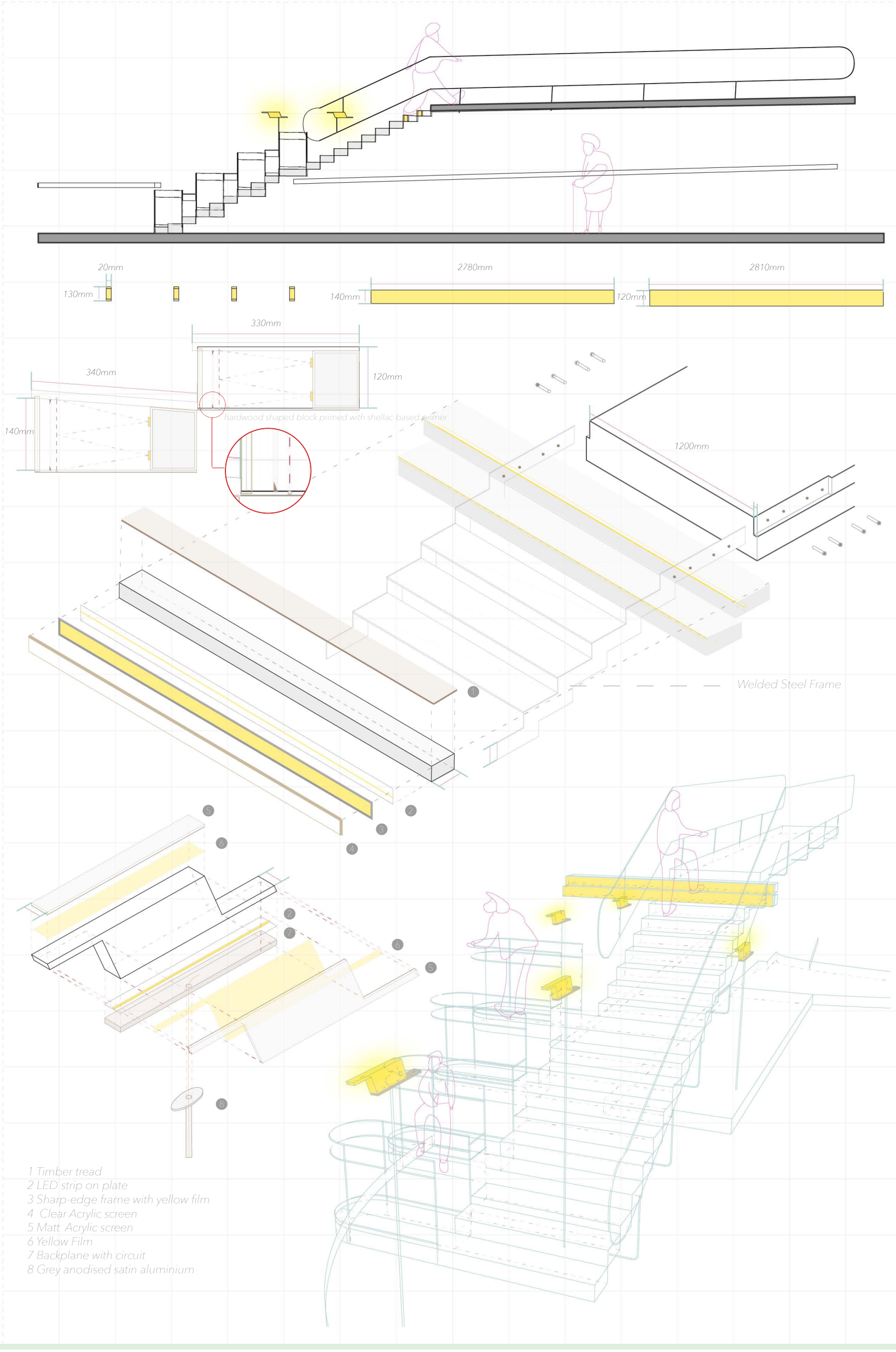


DIAGRAM _DETAIL + PERFORMANCE

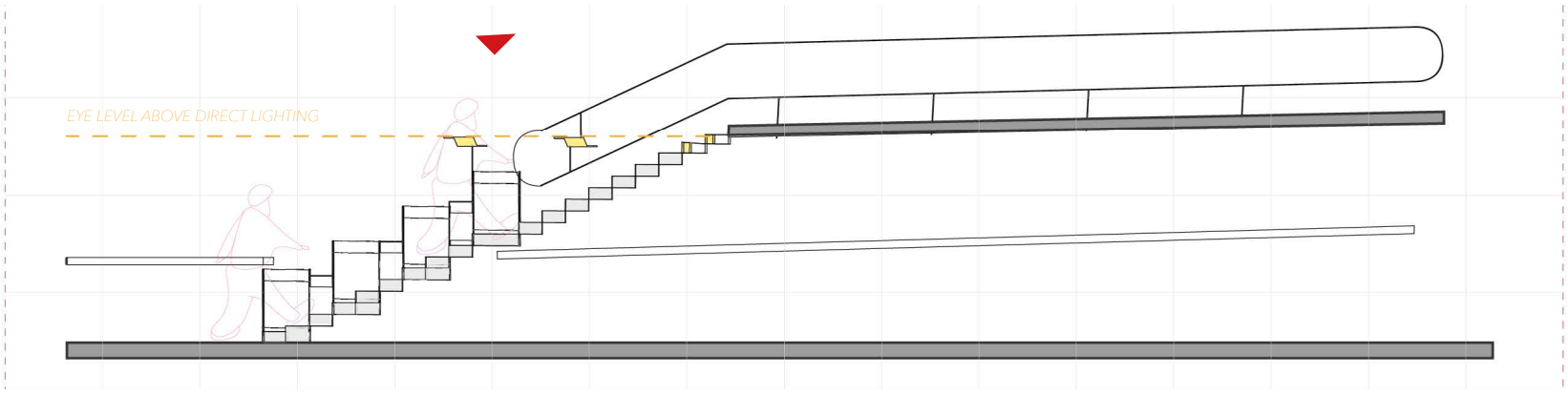


The long light patch falls on the staircases, which are translated as LED arrays embedded in the two steps. In order to achieve this shape lighting effect, pointy edges are applied as frames that give a sharp and clear definition to the rim of light. Take the light installation by James Turrell as an example where he used "hardwood shaped block primed with shellac-based primer prior to mudding or painting, 2 coats." (Turrell, 1999), I intended to apply similar detail here. In this project, the stairs are designed as light-weight elements which are made out of colour-coated perforated steel. Therefore, the two steps needs to have five light-tight surfaces with one side framing and emitting light, made by steel with matt coloured paint, which makes steel non-reflecting.

There are also smaller lights 'floating' in the space supported by extra-thin steel poles. These lights guide people to walk down the space without tripping over. They are carefully positioned in the space so that it could cover the shadow casted by handrails, but do not exceed the visual perimeter of these light steps.

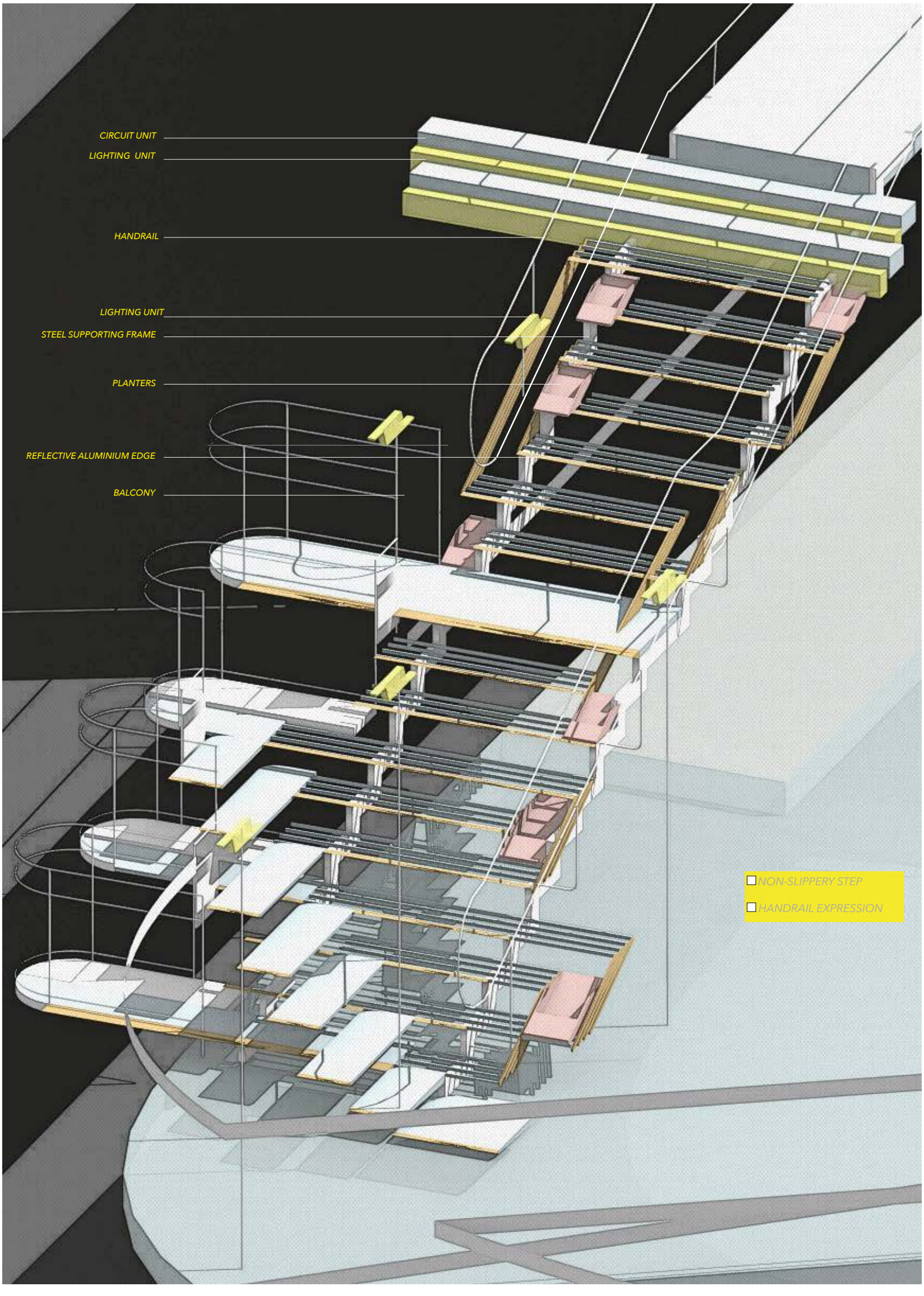
Four steps are extended as a series of petit balconies to make a pause in this sequence of steps. These extensions matches the linear form of the light patches and allows people to either stand or sit on to enjoy river-facing view.

REDESIGN PEDESTRIAN ROUTE _ AVOID DIRECT LIGHTING



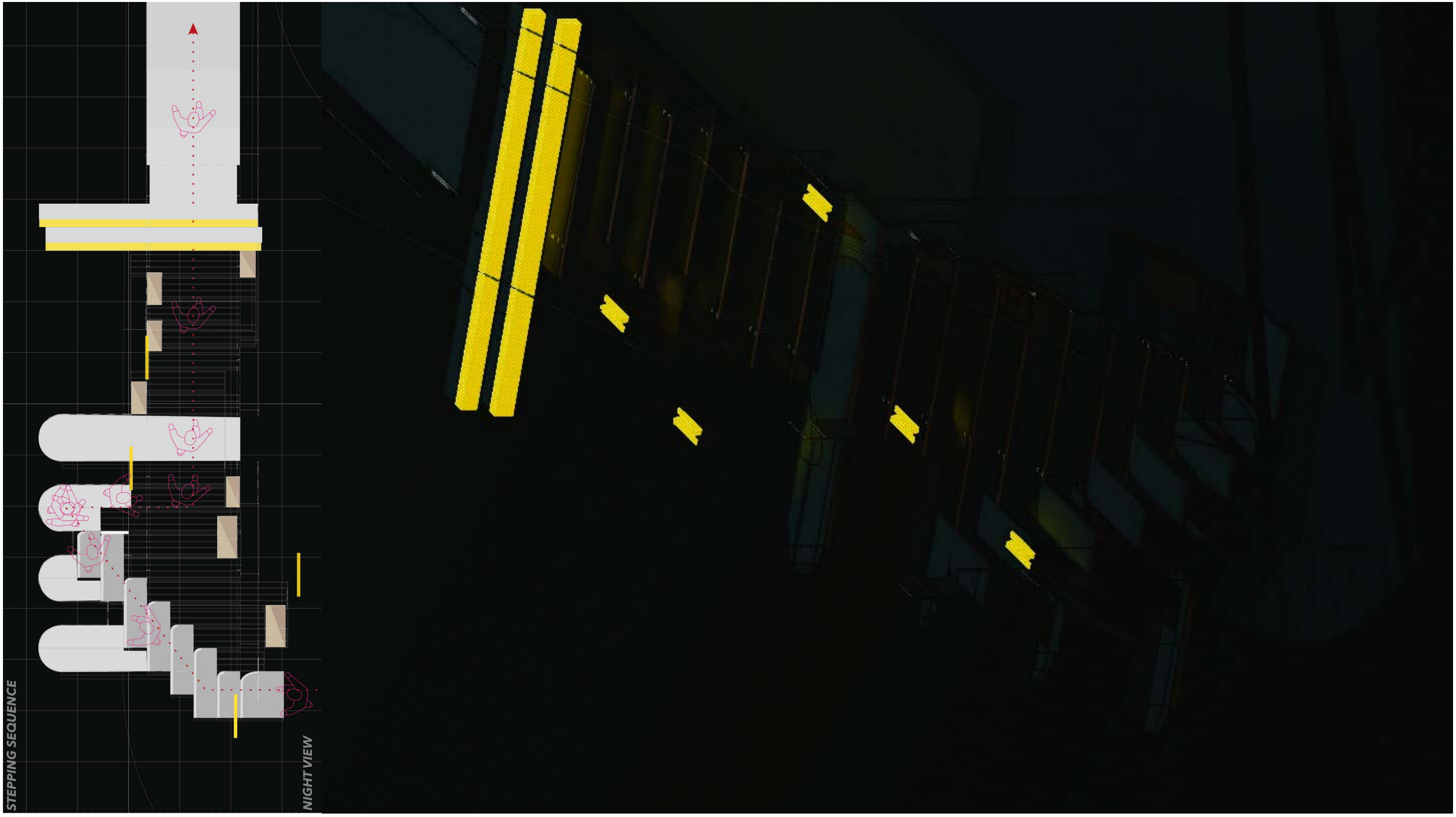
Walking up this staircase makes pedestrians walking straight towards the light sources, which might be too bright to be comfortable to stare at. Therefore, by adjusting the stairs, it forms a natural guidance to invite people walking up through the solid steps, which subtly helps them to avoid looking at the light sources directly. The solid steps are carefully positioned, and stop at a height level where pedestrians' eye sights are above the light sources (as marked in the diagram above), they then take a few linear steps and continue their journey up to the terraces.

DAY VIEW



SECTION 3 BUILDING PERFORMANCE

NIGHT PERFORMANCE _ STAIRS (B4)



CLIENT ORGANISATION

City of Stockholm Council.

Council decides on the city's share of the funding for the redevelopment of Slussen.

Stockholm County Council plans for implementation and financing of public transport.

Environment Court / Supreme Environmental Court decides on the capacity and regulation of Lake Mälaren. Project Slussen have worked out what the state sought while the Environmental Court decides whether to give permission or not.

The Development Committee is responsible for the development of the plan. Decisions on zoning is then taken into the City Planning and City Council.

PROJECT INITIATIVE

"The Slussen of today was built to solve the traffic problems of its time and cars were the focus of the area´s planning in the 1930s. Hundreds of thousands of people pass through Slussen on a daily basis, but few chooses to stop here. Now Slussen is to rebuilt as a place where everyone will be interested in stopping to enjoy the new spaces and facilities." ---- City Council

PROJECT AIMS

To deliver a better river front public space for people, and make Slussen a centre of Stockholm again.

A central feature of "24 SLUSSEN" is the 24-hour aspect, which celebrates nightime of the city with lighting and a series of new facilities including: a cafe, a canteen, a gym, a cinema and a library. Once complete, the extensive public terraces will also provide spectacular panoramas over Stockholm.

DURATION

Construction works started in the summer of 2016, with expected completion in 2026. The contracts will be implemented in extended collaboration with the client. "24 SLUSSEN" is a part of phase two construction, which is expected to start on site in 2020.

THE DESIGN TEAM

Chief Architect
Foster + Partners

"24 SLUSSEN" Project Architect
Anqi Yu

Local Collaborating Architect
Berg Arkitektkontor

Structural Engineer
ELU, Arup, Dewhurst McFarlane + Partners

M+E Engineer
SWECO

Landscape Architect
White Arkitekter

Additional Consultants
(Traffic, Lighting, Urban Planning,)
Spacescape AB, ACAD, Fire Safety Design AB, Tyrens AB, Tikab Struktur Mekanik AB, Projektlots, WSP, Structor Miljobryan Stockholm, AF Lighting.

ROLE OF THE ARCHITECT

- Understanding the potential of the site and how it meets need of the public in Stockholm

- Advising and consulting on its new use

- Study the urban condition, furture traffic implication and waterfront edge condition of the site

- Preparing drawings and specifications of this project

- Coordinating with engineers, consultants contractors, and clients.

- Providing clients with visual materials for public relations

- Providing PPP (Public Private Partnership) contractor with construction drawings and specifications.

PRELIMINARY COOPERATION ADVICE

"24 SLUSSEN" is a part of overall masterplan of Slussen regeneration work, which is carried out by Foster + Partners.

It is crucial to follow preliminary planning advice before proceeding with a formal planning application. Consultation must be hold on a regular basis to establish a efficient communication between the design of this public waterfront and the overall masterplan of Slussen.

It might be useful to have one design team member from Foster + Partner joining the design of "24 SLUSSEN" when phase one construction is coming to an end.

FUNDING

Stockholm city is funding the entire redevelopment except bus terminal in Katarinaberget.

It is jointly financed between the city (25%), County Council (25%) and state (50%). Even Värmdö are involved in contributing should there be budget overruns. In addition, the leading Swedish Association of Local Authorities and Regions (SKL) discuss with the municipalities around Lake Malaren on how the regulation should be paid.

BUDGET

The project's budget of about 12 billion, according to the revised implementation signed on 28 September 2015.

The 12 billion figure includes traffic solution, a new public space, a bus terminal in Katarinaberget, drainage channels and the lock and the renovation of Lokattens staircase.

Following the audit conducted by an independent panel, and additional investigations, clarified many parts of the direction of the project. A functional and beautiful public spaces must be secured with a design programme and city bus accessibility should be prioritized.

PLANNING PROCESS

- Check local architectural, public space and waterfront regulations;

- Check planting requirements regarding to the arrangement of it in the overall plan;

- Check access point with the traffic arrangement provided by Foster+ Partner;

- Hold Public Consultation on site;

- Prepare Planning Application as part of the Slussen Regeneration masterplan.

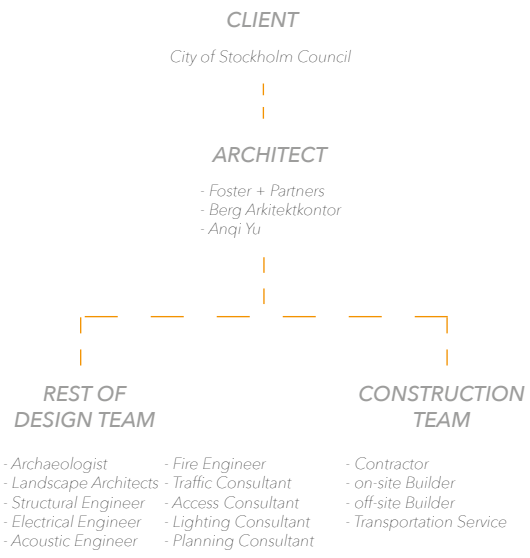
- Submit Planning Application

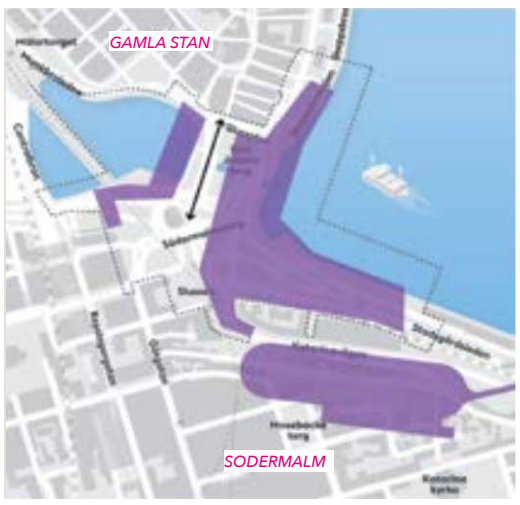
- Revise According Planning Application

OTHERS

500 people will be work on construction of this project. "24 SLUSSEN" as a part of phase two construction, is expected to be constructed by 50 people on site, with major pre-made materials completed in an off-site workshop with 20 people. Another 10 people is needed for delivering materials.

NETWORK





PHASE ONE (APPROX. 4 YEARS)

PHASE TWO (UNTIL FINISHED)

TYPES OF CONTRACT

PARAMETERS	OBJECTIVES	STANDARD CONTRACTS			PUBLIC-PRIVATE PARTNERSHIP
		TRADITIONAL	DESIGN + BUILD	CONSTRUCTION MANAGEMENT	
QUALITY	*Quality is the key. As a part of Slussen Regeneration Project, "24 SLUSSEN" is aim for creating a new public space at the heart of Stockholm where people can celebrate 24-hour urban life style, enjoy nordic lighting and embrace waterfront.*	●	○	●	●
TIMING	*The overall duration is from 2016 to 2026, with the project starting in 2020. This project is expected to be built in 4 years.*	○	●	◔	●
COST	*The funding mainly comes from the council and the state. This project prioritizes on quality and time, therefore, there should be relatively less restrictions on cost. However, certain level of price control on each sections are needed for overall management purpose.*	◔	●	○	●
COMPLEXITY	*"24 SLUSSEN" Is a ambitious and complex project on its own, and as a part of this large-scale regeneration work, it requires a series of organised coordination and preparation work. With lighting as a feature, tests and adjusts are expected to happen at a later construction period.*	○	○	●	●
BUILDABILITY	*The public terraces are set on top of existing concrete columns, which means accurate trimming and repairing is the key to start. Specialists are required for different aspects of the design throughout the whole process to make sure the design ideas can be realised to an optimum level.*	○	○	●	●
PUBLIC vs PRIVATE	*This is a public space project with City Council as a client, funded by the state. Therefore, the public's voice and participation should be highly valued and reflected through design decisions.*	○	○	◔	●

PROCUREMENT ROUTES

Since the overall demolishing work started on site last year, City Council has appointed some of contractors already.

- "The City of Stockholm has, in public procurement, selected Skanska as contractor for the two largest projects in the framework of reconstruction of Slussen, Stockholm. "

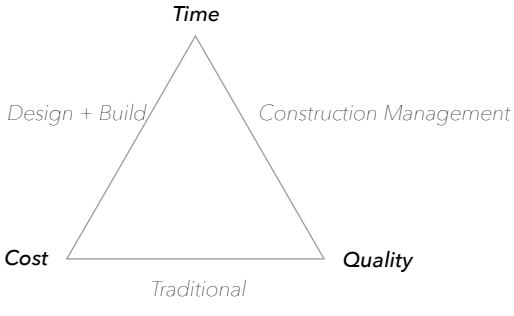
- "The City of Stockholm Development Office has designated JM Construction to be its general contractor for the construction of the quay in the Slussen project."

From the information published on websites, I found that Skanska and JM construction have been appointed as contractors of different parts in Slussen Regeneration project. Therefore, Construction Management is the procurement route that City Council took. Based on the analysis above, I think Construction Management is a reasonable decision for a project with long duration and huge complexity. As for '24 SLUSSEN', subcontractors with different roles are encouraged. This can be divided based on the planned construction sequence, which means have one subcontractor be responsible for terrace, one for concrete framework of five facilities, and one for bespoke lighting, etc.

JM Entreprenad

SKANSKA

PROCUREMENT METHODS

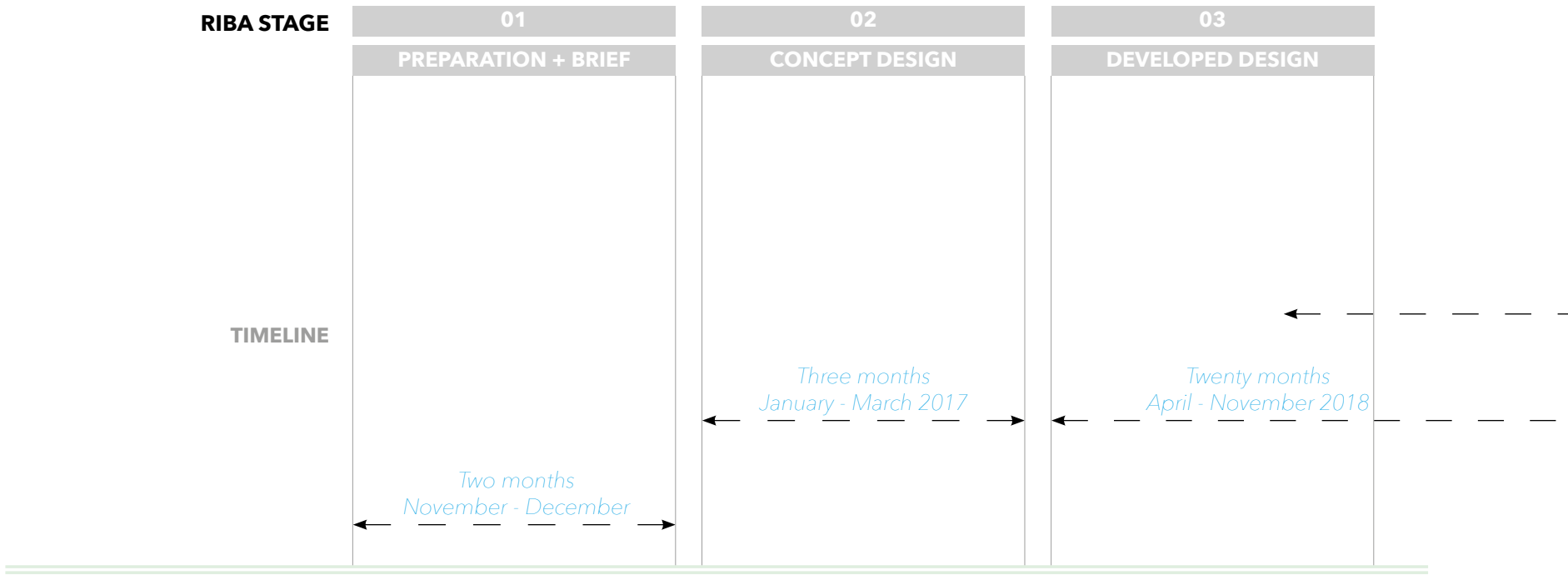


BESPOKE ITEMS

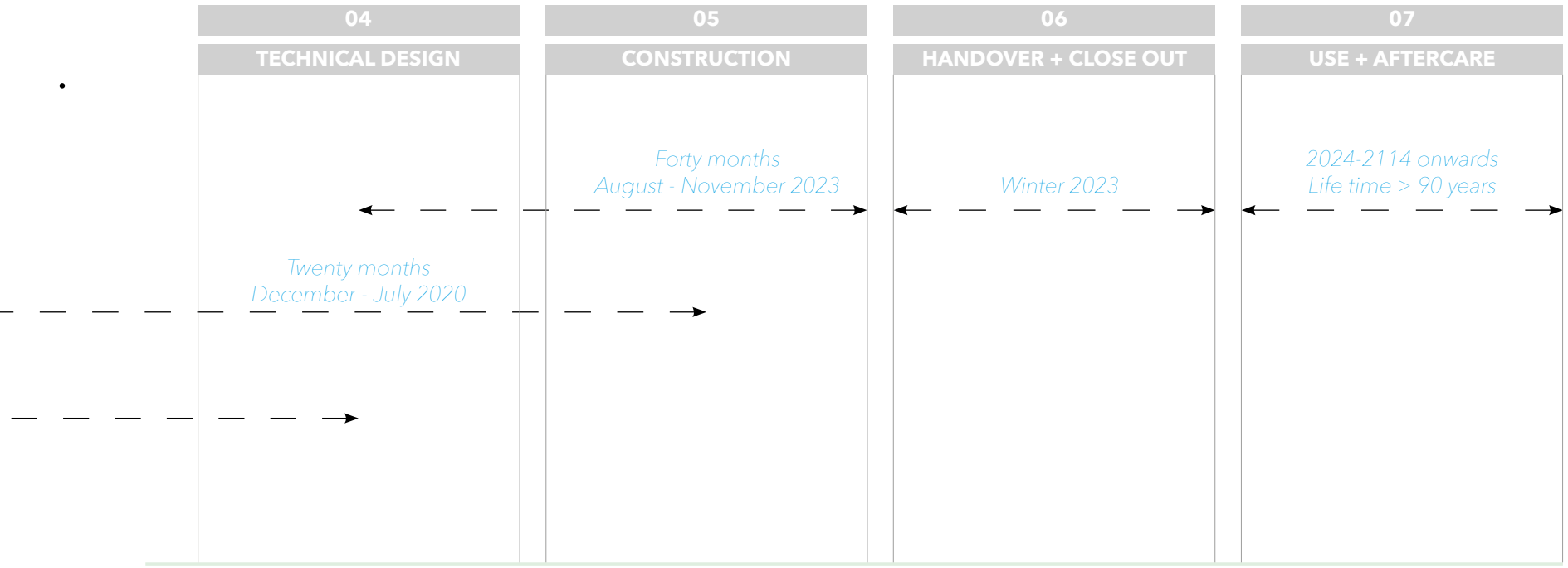
Since lighting is specially designed in this project, light materials and installations need to be made specific to the building and site. Besides, this section will be introduced in a relatively later stage within the overall construction period. Particular subcontractors who is experienced in large public space and lighting constructions might be appointed to realise this part of the building.

WARRANTIES

The construction of this overall project lasts 10 years with has many consultants and sub-contractors. There can be a series warranties, some of which might be bespoke. Since it is expecting large number of visitors, given its programme and site location, it is essential to keep them for future maintenance.



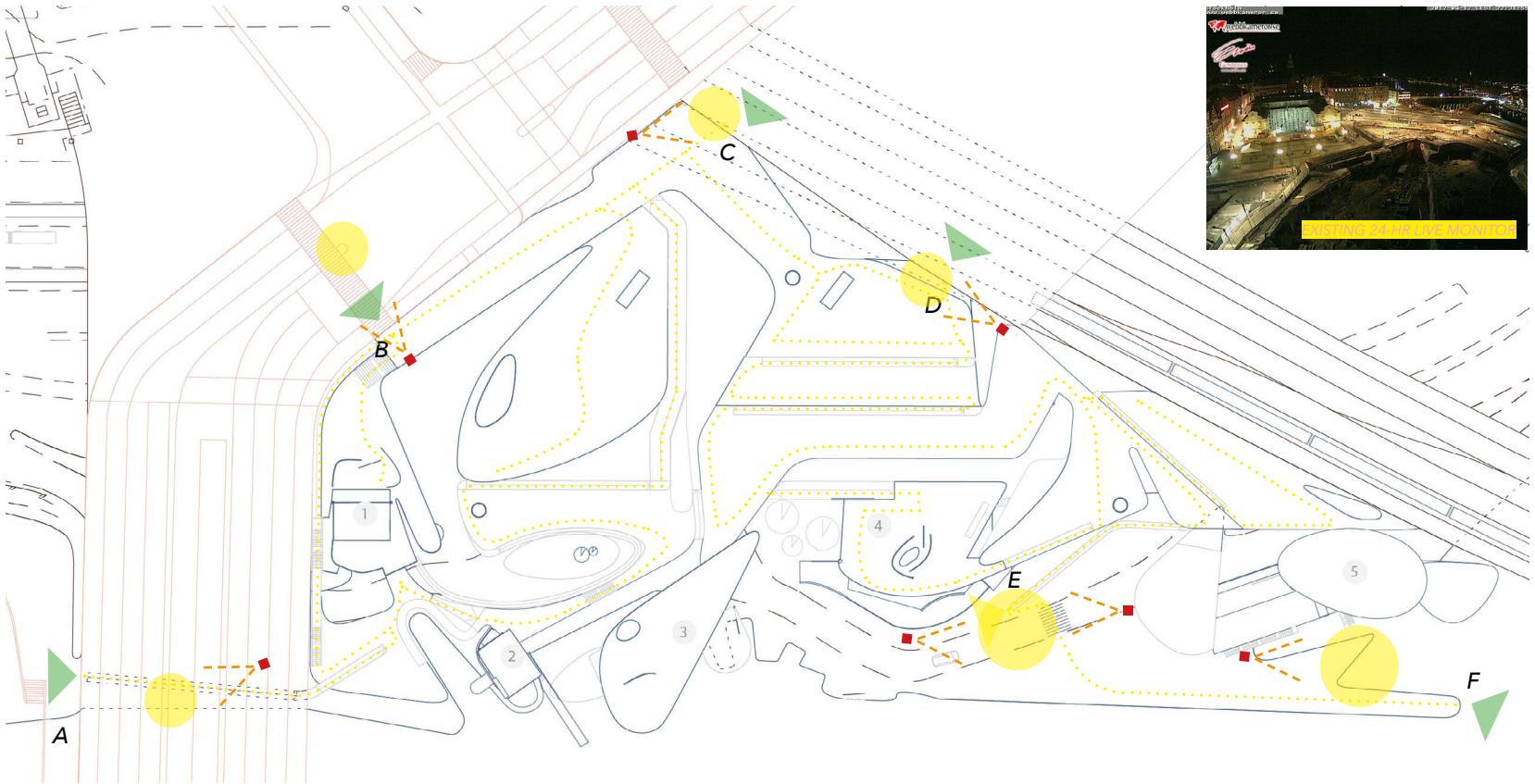
KEY TASKS	*City Council as client, identifies the main objectives of this project. Site information is examined, extra surveys are organised. Clients set initial brief. Additional design competition on river front public space is advertised.*	*Outline proposal for Slussen river front public space, structural and services strategy are prepared. Envirmental, sustainability and access strategies set out. Planning consultant is appointed. Project brief is finalised and issued.*	*Prepare developed design drawings; draw up specifications and structure + services strategy, based on discussions with Structure Engineer and M+ E Engineer. Construction and Health + Safety strategies are reviewed. Consider BREEAM accessment.* *Planning application is submitted by the end of this section.*
PROCUREMENT	*The City of Stockholm needs to (1) set out procurement strategy, (2) arrange surveyors, (3)prepare appointment documents and (4) hold design competition on river front public space, judged by the City Council and the public. Architect of winning design is appointed.*	*Structural Engineer, M + E Engineer and Environmental Engineer are appointed by City Council.*	*Main contractor is appointed by City Council. Concrete contractor is also appointed.*
PROGRAMME	*City Council refines the programme with site boundaries and restriction, as well as specific function and area requirements. Director of Development set out the estimated duration and cost for this river front public space development.*	*Public's opinions are taken into consideration and reflected on design amends. Payment from concept phase onwards is made to contractors and architects.*	*Regular meetings with consultants and lighting specialists on design and light performance. Other consultants for concrete, timber and glass material also give suggestions and revise the design. Renders and models are made for communicational purposes, which make sure the different parties in this process are on the same page.*
OVERALL SCHEDULE	*Implementation Agreement signed by City Council. Prepare on-site blasting work. The purpose of blasting is to make room for a new concrete structure that will house business premises and a pedestrian tunnel to the new bus terminal.* *Masterplan provided by Foster + Partners.*	*The foundation of the new main bridge is under construction and expected to be finished by the end of 2017. On Stadsgårdsleden, new piers are built and the original bus terminal is excavated. The foundation and concrete work on the Katarinavägen also starts.*	*The temporary bus terminal Nacka and Värmdö buses on Stadsgården are in use. Demolition of the central part of the lock, Excavation, foundation and concrete work for the southern abutment of the new main bridge.*
KEY SUPPORT TASKS	*Review the public comments on the overall regeneration plans and hold public consultation if necessary, since Slussen has a significant historical value for Stockholm and its people.* *Set Common Standards for Quality and Design Assurance and determine the Project execution plan with timetable.* *Additional communicational assist might be needed for organising work between Swedish and British teams.*	*Public protest is unavoidable, therefore, it is essential to keep communication frequently and smoothly through public consultation, which not only helps the design team to fulfil the request of the local residents, but also helps the local to understand what new Slussen would offer them with. Though it is unlikely to competely alter the objections of some, attitude and actions matter.*	*Purchase VantaBlack spray paint for testing its material performance on site to see if it can serve the purpose of disappearing in the darkness.*
PUBLICITY DROPS	*Lauching websites, VR experience of this ongoing project.* *Keep the public informed on the lastest decisions, progress and changes.* *Pin up image boards with future vision of Slussen around site area.* *Using social media like Instagram, Twitter, and Youtube to build a closer connection with the public.*	*Hold regular public consultation and actively engage them with the design developments.* *Set up votes and discussion panels with the local on making several design decisions, if necessary.* *The aim is to make it clear that we, as design teams, share the same value with the local residents, and the actual designer of this public space is always 'the public'.*	*Websites, VR experience and social media accounts should be managed and updated regularly to keep the information correct and open to the public.* *Leaflets on '24 Slussen' can be picked up from the temporary bus terminals and bus stops around Slussen to help people understand the undergoing changes and encourage them to participate in the design votes and share their opinions.*
AGENTS INVOLVED	*Client(City of Stockholm Council)* *Surveyor* *Quality Service* *Competing Architects* *City of Stockholm Council* *Swedish Association of Local Authorities and Regions*	*Client(City of Stockholm Council)* *Surveyor* *Quality Service* *Architect* *Swedish Association of Local Authorities and Regions* *Structural Engineer* *M+E Engineer* *Planning Consultant* *Environmental Consultant*	*Client(City of Stockholm Council)* *Quality Service* *Architect* *Swedish Association of Local Authorities and Regions* *Structural Engineer* *M+E Engineer* *Planning Consultant* *Planning Authority* *Environmental Agency* *Main Contractor* *BREEAM Assessor* *Lighting Specialist*



04 TECHNICAL DESIGN	05 CONSTRUCTION	06 HANDOVER + CLOSE OUT	07 USE + AFTERCARE
Planning application is granted by the end of this section. Technical design information prepared by Design Team and checked by architect and signed off by City Council. Prepare detailed specifications and review construction schedule. Building Regulations Submission prepared.	*Coordinate with the overall Slussen Regeneration and commence site preparation. Check site accessibility for delivering large material to site. Final detailed specifications need to be sent to specialist contractors. Specialist subcontractors begin testing and making bespoke light elements and pre-made pieces.* *Construction work starts on site with concrete work first.*	*Quality Service and City Council examines the building. Complete building BREEAM assessment.* *Project information as built is updated and open to public, featuring fire drawings.* *Check way-finding legibility and efficiency.*	*Post-occupancy evaluation is carried out.* *Official opening night with firework performance on New Year's Eve.*
Specialist and subcontractors produce mock-ups at 1:1 scale to test construction techniques.	*Concrete contractor is appointed, as well as subcontractors, including light specialists and landscape architects.*	*All contracts signed off. Clean up operation of site.*	*Service contractors and lighting maintenance team commences services.*
The information need to be passed on to construction contractors to commence work and get prepared.	*Construction started with delivery coordination. In this case, large building materials will be pre-made and shipped to site.* *Concrete column trimming needs sound proof. Give notice to people who might be affected.*	*Construction completes. Final check and handover strategies are implemented.* *Acoustic performance of garden cinema might need to be tested by specialists to make sure the audience experience is at an ideal level.*	*Building in operation.*
Excavation, foundation and concrete works are carried out in the central part of the lock, on top of today's bus terminal. The main bridge shipped in and assembled. Katarinavägen open again, and the new main bridge is in use. Demolition of the western part starts. The new bus terminal will be constructed.	*Excavation, foundation and concrete works are carried out in the central part of the lock, on top of today's bus terminal. The main bridge shipped in and assembled. Katarinavägen open again, and the new main bridge into use. Demolition of the western part starts. The new bus terminal will be constructed.*	*Stadsgårdsleden decked over. New river front public area and the new bus terminal are taken at the earliest in operation.*	*The western parts are estimated to be completed finished by 2026.*
Test the light installation by using 1: 5 model on site. If there is excessive light emission from any surrounding environment, light control curtains might be needed to ensure the lighting performance.	*A large workshop is required for producing the bespoke building pieces, such as bent brass tube for handrails, and assembled LED strips for the luminous installation. In order to test the lighting product efficiently, a 24-hr dark zone, which mimics the lighting condition on site, is needed in the workshop. Besides, delivery through ships are preferred for large pieces. The location of the workshop should be on the west side of the site since Slussen lock is closed.*	*Lighting effect and CCTV position need to be tested for security reasons.* *Due to light design, special treatments of stairs, handrails, paving and walls can be found in '24 SLUSSEN'. It is necessary for City Council members to test these details in person on site. For instance, stairs with special treatments should be walked through by City Council and the architects together to discuss if any extra signs or protections are need.*	*The life of different LED lights and incandescent lights varies. Some might last for less then 5 years. Therefore, regular check and maintenance is essential for keeping '24 SLUSSEN' operating in its best.* *Torches might need to be provided to individuals upon request at each entranceto the site.*
A formal publicity launch is necessary at this stage to announce the new stage of this project. *Keep updating relevant information about the project.*	*An overall construction process can be recorded live and shown on Youtube channel, which helps the public to monitor this process and witness the change happening.*	*A Soft Launch will be hold during the day for City Council and the representatives of 'Stockholm residents', the ones who contribute the most on 'design votes' or have given valuable opinions.* *Another night launch will be hold on Christmas Eve with lighting performance.*	*The Major of Stockholm will formally launched '24 Slussen', as a part of Slussen regeneration plan.* *Pontoons and boats are welcomed to gather around the site for films, Fireworks and performance on the official opening*
Client(City of Stockholm Council) *Quality Service* *Architect* *Landscape Architect* *Structural Engineer* *M+E Engineer* *Main Contractor* *Subcontractors* *Lighting Specialist* *Concrete Specialist*	*Client(City of Stockholm Council)* *Quality Service* *Architect* *Structural Engineer* *M+E Engineer* *Main Contractor* *Subcontractors* *Site Manager* *Building Apprentices* *Lighting Specialist* *Concrete Specialist*	*Client(City of Stockholm Council)* *Quality Service* *Architect* *Main Contractor* *Site Manager*	*Client(City of Stockholm Council)* *Quality Service* *Architect* *Main Contractor* *Site Manager* *Residents in Stockholm*

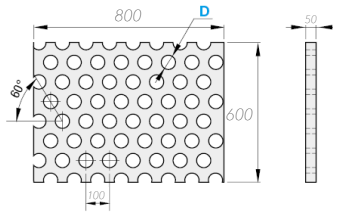
SAFETY CONSIDERATIONS

SECURITY CAMERA LOCATION



LIGHT-WEIGHT STAIRS AND RAMPS

Light-weighted stainless steel meshes and perforated steel panels are applied to overall circulation to make translucent separation between movements. It also amplifies noise of people walking, which adds acoustic effect to keep everyone noticed when there's people passing around.



RISKS CONSIDERATIONS

RISKS IN CONSTRUCTION

PROCEDURE	RISKS	PRECAUTIONS TAKEN
EXCAVATION WORK	- Concrete blasting accident - Falling into excavated groundwork areas - Damage to ears from noise/vibration from machinery	- Excavations will be clearly marked out on site. - Stop signs and blocks will be placed at the edges of the excavated areas to prevent falling of persons.
CONCRETE TRIMMING	- Ringsaw falling off - Small pieces of concrete flying out	- Machinery should be fixed on a stable platform. - Face masks, gloves and protections should be worn.
CONCRETE FORM-WORK	- Falling off - Collapse of form-work	- Concrete specialists should be employed for this work and be fully trained and experienced.
CONCRETE POURING	- Chemical burns from cement - Damage to ears from noise/vibration from machinery	- Protections should be worn. - Concrete specialists should be employed for this work
LIFTING CONCRETE PIECES	- Crane accidents	- Pre-checking and work coordination are required.
WORKING AT HEIGHT	- Falling off	- Safe working platforms and ladders are required.
MOVING MATERIALS ON SITE	- Injury caused by lifting heavy goods - Shape items scratching	- Maximum weight lifting standards should be set up. - Machine/ vehicle delivery and lifting is preferred.
MOVING AROUND THE SITE	- Falling off or tripping over - Structure collapse	- Site boots and helmets should be worn. - Estimation of structural risks is needed beforehand.
VEHICLES ON SITE	- Collisions between vehicles	- Designated delivery and drop-off points will be set out.

RISKS IN USE

RISKS	PRECAUTIONS TAKEN
TRIPPING ON STEPS + RAMPS	- Steps and ramps are made by non-slippery materials. Handrails are installed on both sides. 'CAUTION' will be put at where necessary.
LAKE SWIM RISK	- Life savers will be in duty by the outdoor swimming zone. On extreme weather conditions, access to swimming zone will be closed.
FALLING OF FROM TERRACES	- Terraces are made by non-slippery materials. Handrails are installed around the terrace. 'CAUTION' will be put at where necessary.
VISION IN THE DARKNESS	- Torches can be provided upon request.

Night security of public space has always been a concern, especially under the current global condition. Since Slussen has always been a busy transportation hub at the heart of Stockholm, It is crucial to design the location of security cameras and lighting beforehand. CCTV are placed at six entry points to the site with lighting condition designed for capturing the faces of people passing the site. 24-hour live monitoring cameras can also be placed above the site(for instance, on top of the street lamp by the new traffic road). Also, night vision camera can be installed around the site with security staffs monitoring.

Besides, the site is always overlooked by the buildings to its south and the other side of the lake. Therefore, as an exposed public space with people passing by, small crimes like thefts are likely to be spotted. As for some dark areas on the site, pedestrians are advised to be more cautious and take care of their own belongings.

ROLE OF ARCHITECT IN CONSTRUCTION STAGE

Weekly site visiting by at least two architects from design team to update site progress. Meeting with additional consultant teams should be arranged when necessary. Prepare for regular meeting with contractor and clients to update the progress.

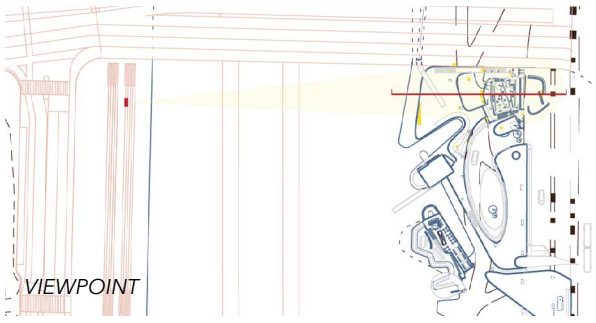
COMMUNICATION WITH CLIENT

Any design, construction, cost or programme change should be made under client approval. City council should be advised on regular maintenance and appoint or instruct staffs about running the facilities.

QUALITY CONTROL

MARK OUT THE PARTICULAR VIEWPOINT

Since the special lighting design is based on the view from one fixed viewpoint on the other side of the river. It is necessary to mark out this viewpoint when the construction of terraces finishes on site. This particular viewpoint should be preserved for the project so that architects and builders can always check the position of lights during the day, and test the lighting performance at night.

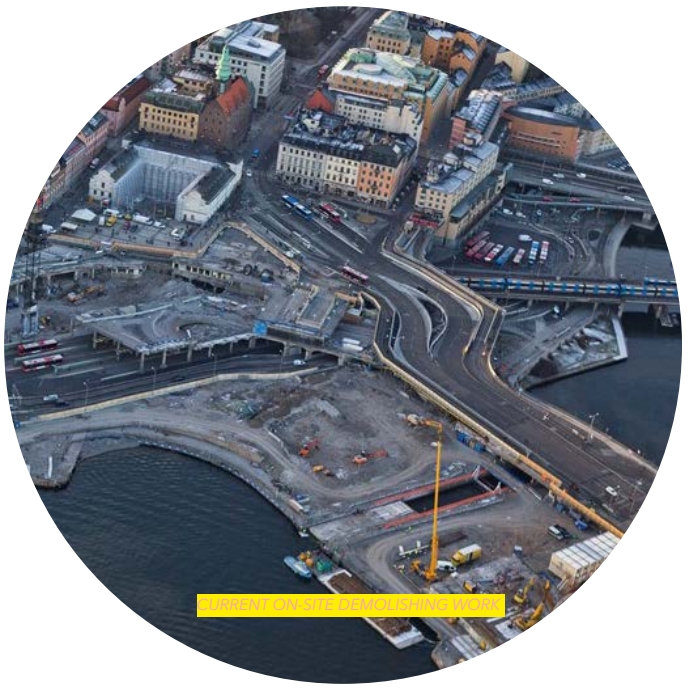


LIGHT TEST ON SITE

The lights need to tested from two aspects: for pedestrians on site, and for views across the river. A balance needs to be found between the darkness and the brightness in a way that lighting is not too bright for pedestrians to walk pass, or directly shine at their eyes; lighting is not too dark to be seen from the other side of the river or blend into the context. When architects and builders are making adjustment on site, there should always be two groups of people- one standing on site to modify the light luminance and position; the other playing the role of pedestrians to make sure the experience of walking through or looking at the site is as close as possible to the design.

LIGHT MAINTENANCE

Given the limited life-span of lights, an annual thorough checking by technicians are suggested. A regular replacement of light bulbs or LED strips are expected, in order to keep '24 SLUSSEN' operate in its best condition.



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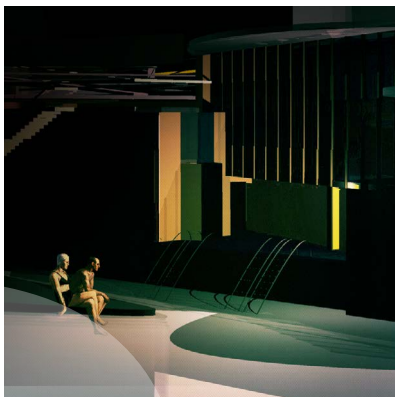
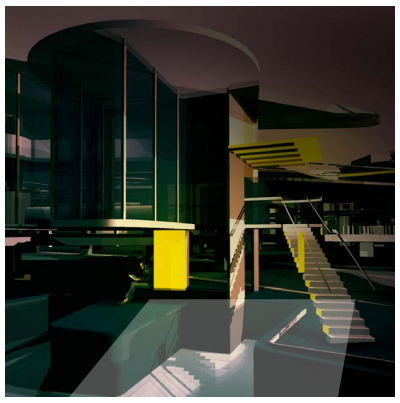

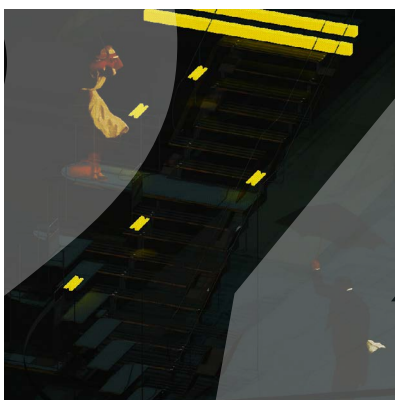
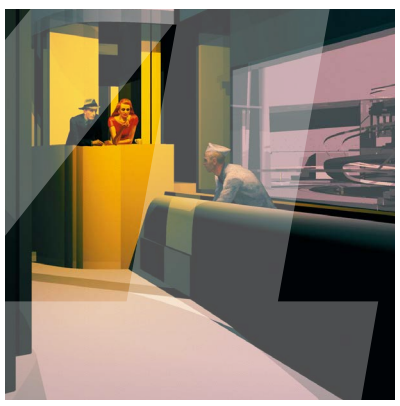
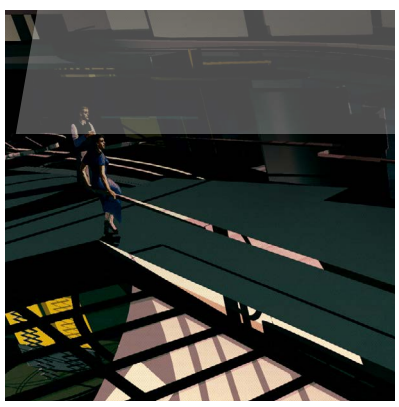
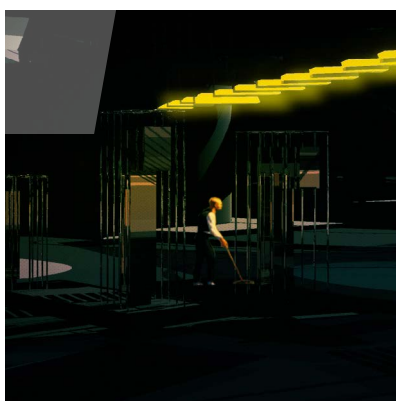
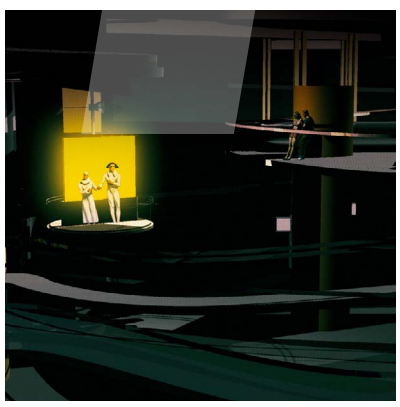

Project Title| ***24 SLUSSEN***

Unit Tutors| ***Abigail Ashton + Andrew Porter + Tom Holberton***

2016-2017