LIGHTING DESIGN
for Riviera Food Court

A Graduate Study

Iiris Rousku
Metropolia University of Applied Sciences
Degree Programme in Design
Interior Architecture

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University: Metropolia University of Applied Sciences
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Author: Iiris Rousku
Title: Lighting Design for Riviera Food Court

Supervisors:
Petra Lassenius
Ville-Matti Vilkka
Andrea Mantello, Senior Lighting Designer, Architect
Zeynep Kaban, Project Lighting Designer, Interior Architect

Abstract

As lighting has such an undeniable impact in our experience and mood in what respect it can be controlled in a shopping center food court? The object of the project was to delve into food court lighting and to create a lighting scheme according to the evolving needs in food courts. The issue is fairly topical as the design approach in shopping centers is facing changes as shopping centers are becoming entertainment centers.

Before there were no efforts made with respect to the food court's lighting, partially due to technical but also economical reasons. They have usually been an open space broadly lit, flat without bringing out depth and details of the space. However, the rapidly developing LED technology gives new possibilities. I have raised some advantageous points about the LED technology and showed how it could be utilized in establishing food court's positive contribution into the visitor's well-being.

My thesis project is the concept and schematic design created for Riviera Shopping Center. The design is based on literature and research in the field of architectural lighting design. I have shared conversations with professionals throughout the project and tried to apply the knowledge I have acquired into it. I have also analysed relevant projects elsewhere in the world and I will focus on one of them briefly.

The thesis has been conducted in collaboration with a Belgian lighting design practice ACT Lighting Design. It includes a lighting design concept and preliminary schematic designs including lighting calculations and lighting fixture layouts. It gives a sight of how the food courts could be in the near future.

Writing this thesis and raising the different points and aspects of lighting design in shopping center food courts brought me to the conclusion of its undeniable importance. The aim of the thesis has been achieved and it could now be taken to the last phase of the design process; design development.

Key words: light, lighting design, dynamic lighting, food court, mood

Tiivistelmä

Valaistuksella on suuri vaikutus tilakokemukseen ja tunnelmaan. Opinnäytetyössäni nostan esille ostoskeskuksen ravintolamaailman valaistukseen liittyviä seikkoja. Tarkoitukseni oli tutkia ravintolamaailman valaistusta ja luoda valaistussuunnitelma ravintolamaailman kehittyviin tarpeisiin. Opinnäytetyöni aihe on ajankohtainen, sillä ostoskeskusten suunnittelu on muutosten edessä; ostoskeskuksista on tulossa viihde- ja kaupunkikeskuksia.

Perinteisesti ravintolamaailman valaistuksen suunnitteluun ei ole panostettu muun muassa teknologian ja ekonomian vuoksi. Ravintolamaailmat ovat usein olleet isoja halleja, joissa on tasainen, voimakas valaistus, joka ei tuo esiin tilan syvyyksiä eikä yksityiskohtia. Nopeasti kehittyvä LED-teknologia antaa kuitenkin uusia mahdollisuuksia. Olen nostanut opinnnäytetyössäni esiin joitakin LED-teknologian etuja ja osoittanut, kuinka niitä voisi hyödyntää edistämään ravintolamaailman viihtyisyyttä ja asiakkaiden hyvinvointia.

Opinnäytetyöprojektini on valaistuskonsepti ja skemaattinen suunnitelma Riviera ostoskeskuksen ravintolamaailmaan. Suunnitelma perustuu arkkitehtonisen valaistuksen kirjallisuuteen ja tutkimuksiin. Keskustelin aiheesta alan ammattilaisten kanssa ja hyödynsin saamaani tietoa suunnittelun tukena. Lisäksi analysoin vastaavia projekteja muualla maailmassa. Esittelen yhden niistä opinnäytetyössäni lyhyesti.

Opinnäytetyöni on tehty yhteistyössä belgialainen valaistussuunnittelutoimisto ACT Lighting Designin kanssa. Se sisältää valaistuskonseptin ja skemaattisen suunnittelun, johon kuuluvat muun muassa alustavat valaistuslaskelmat ja työpiirustukset. Opinnäytetyöni antaa viitteen, mihin suuntaan ravintolamaailman valaistussuunnittelu on menossa.

Opinnäytetyössäni esille nostamani ostoskeskuksen ravintolamaailman valaistukseen liittyvät seikat johtivat johtopäätökseen valaistuksen kiistattomasta tärkeydestä. Opinnäytetyöni tavoitteet saavutettiin ja syntyi konsepti, jonka voisi ottaa suunnitteliprosessin viimeiseen vaiheeseen; suunnitelman kehitykseen.

Avainsanat: valo, valaistussuunnittelu, dynaaminen valaistus, ravintolamaailma, tunnelma

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1. Introduction

1.1 Preface

I will focus on in this thesis to a shopping center food court lighting design process. The issue is fairly topical as there are several shopping malls under construction in Moscow and all over the world. Shopping centers are facing changes as they are becoming entertainment centers. There is also a rise in the food court design (Broadway Malyan 2014) and, therefore, deepening the design approach of food facilities is essential.

So far, food courts have been designed for quick turn-over. Since the rise of healthier lifestyle, the demand for quality food and quality spaces has increased. The change also hits the food courts and thus needs an upgrade and way more attention from a lighting designer. It is well known that light affects mood, well-being, and physical health and, therefore, investing in a proper lighting is essential. This change is a great opportunity for lighting designers to implement their creativity as light is an excellent tool for altering the space, effecting mood, and creating unique experiences.

This thesis will include a discussion on architectural lighting design through the project highlighting the aspects that are important when working on lighting design for food facilities in shopping centers.
I will use existing research concerning food courts and also restaurant lighting as it is relevant to the topic and could bring ideas to be implemented in food courts.
I have the possibility to discuss the topic with senior lighting designers who have their history in working with light and experience in implementing their knowledge into practice. The discussions will cover topics such as lighting design, restaurant lighting, light and the effects it has on human beings. I will then base my own design on the knowledge already existing on the topic that I have found through my research and discussions with the professionals.

The main contribution of this thesis is to bring together the issue of food court lighting and discover the opportunities it has to offer. The objective is to respect the architectural design and the aim of the client in their intention to follow the evolution and direction that shopping centers are taking.

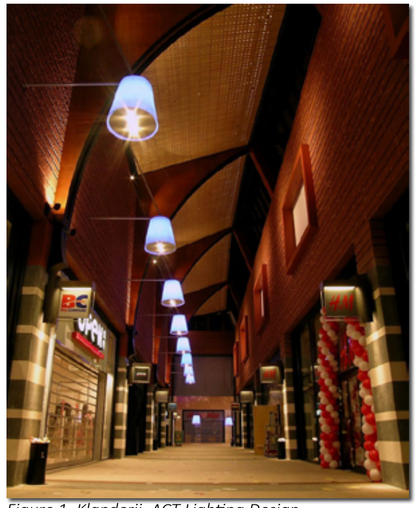


Figure 1. Klanderij, ACT Lighting Design.

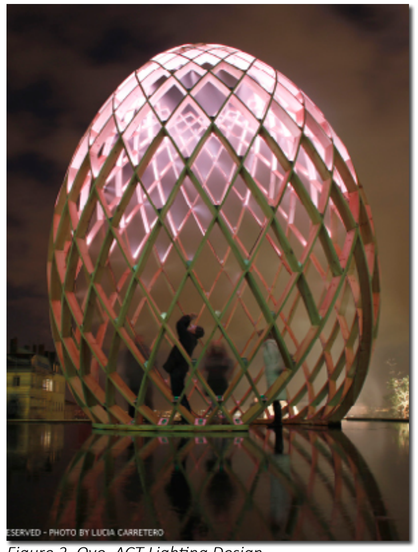


Figure 2. Ovo, ACT Lighting Design.

1.2 Commission and the principal

I am currently working for a Belgian company ACT Lighting Design and I will do my thesis through collaborating with ACTLD. The company is working on a shopping mall Riviera that is under construction in Moscow, Russia. The overall lighting design has been executed and now is the time for focusing the lighting concept on demanding areas that has special requirements, such as the food court. The task will include a lighting concept and required documents such as preliminary lighting calculations and lighting fixture plans.

I have only included in this thesis concept and schematic design phases and left out the design development phase, as it is more technical and time consuming. Due to geopolitical reasons I have decided not to limit myself in this thesis entirely by the restrictions of the project, those being mostly economical, but rather leave room for creativity as much as possible yet considering about sustainability and reasonable design.

Belgium based ACT Lighting Design agency has provided lighting design services for over 20 years through its three departments: architectural lighting design, entertainment lighting design and light art installations. ACTLD excel in those three domains and benefit from the synergy of the three departments due to the experienced team from diverse backgrounds and expertise' such as architecture, lighting design, interior design, set design, theater and graphic design. (ACT Lighting Design 2015.)

ACTLD illuminates projects such as heritage sites, shopping malls, urban spaces, city master plans, office centers, where it focuses on originality, visual impact, strong statement and integration to the existing architecture while aiming to improve the human experience. For entertainment ACTLD creates full set-, lighting-, video- and content design with special effects creating a memorable experience for the public. In all projects ACTLD is undertaking the attention to aesthetics, function, flexibility and maintenance while focusing on long-lasting human experience and sustainability. (ACT Lighting Design 2015.)

“We are visualists, we are, technicians, we are builders and sometimes we are even ’magicians’, using light and dark to allow the world to see and experience the ordinary in an extraordinary way.”
(Horton 2015, 18)

1.3 Theoretical framework

The theoretical framework of this thesis is architectural lighting design. Architectural lighting design is about rendering our surroundings visible and enabling the conduction of visual tasks. In addition to the functional aspect it is also utilized to increase the aesthetic appearance of a space, building and objects.

The quote is a beautiful summary of lighting design; it is not only about light but also about the absence of it – darkness. And when it comes to experience, light is used as the main medium of expression in creating a sense of space and atmosphere (Donoff 7th August 2013).

The above mentioned aspects are the main points I will address in this thesis. I will introduce the lighting design principles that I have used as a base for my design in the following subsection of this thesis. I will cover the topic very briefly due to the time frame of the work in comparison to the broadness of the field of lighting design.

Architectural lighting design in its full meaning is very diversified field and requires knowledge from various disciplines. Barbara C. Horton, the president of IALD (International Association of Lighting Designers), divides the lighting design principle into three categories: scientific knowledge, engineering principles, and artistry (Horton 2015, 18). Artistry refers to adding an expressive layer in architectural setting for example by creating illusions with light and illustrating reality with projections.

Lighting design integrates knowledge of the natural sciences and the social sciences, technology and engineering, the physics of light and the physiology and the psychology of light perception – ergonomics. (Rozot 2015.) Knowledge of these sciences, and experience, are required in order to achieve good lighting.

Following all these principles the aim is to create visually interesting lighting solution that is also ergonomically satisfying. I will take into account the existing space and its use and try to bring additional value in addition to the functional side. I will consider about the ecological and economical aspects such as energy efficiency and balance between the price and quality. These aspects are significant as architectural lighting is meant to last time comparing to temporary lighting installations that are created only for certain period.

The global concern of sustainability also applies to lighting. When for example choosing lighting fixtures we should consider about the whole process of the fixture untill the end. Besides the material sustainability we also should focus on precise design, to ensure adequate light where it is needed, and exploit all the time developing technology for our advantage.

1.4 Lighting design principles

In this subsection, I will introduce the design parameters that I followed in the project. One of the most inspiring books that I read during the process is Architectural Lighting Design- Designing with Light and Space by Hervé Descottes and Cecilia E. Ramos, 2011. The lighting designer Hervé Descottes introduces six visual principles as design parameters that his lighting design practice uses in their approach to lighting design.

ILLUMINANCE lux

Illuminance means light emitted by a light source that lands on a surface. The unit is lux. It is essential in bringing shape and clarity to a space. It helps in navigating in a space and performing the required tasks. It might even be advantageous to use lower lighting levels than what the convention demands. (Descottes & Ramos 2011, 14, 16). I suppose what he means here is that tasks that really demand the minimum lighting levels should be respected but elsewhere providing adequate lighting is enough. Anyhow for this project the recommended lighting levels should be respected as it is about a public space. For restaurant lighting levels depends on the concept of the restaurant.

The contrast of light and dark and everything in between are used as tools in perceiving space. It constructs our understanding of space. With the gradient designer can alter the space. (Descottes & Ramos 2011, 20.) Illuminance gives the possibility to emphasize what there is to highlight.

LUMINANCE cd/m²

Luminance is an objective measure of light intensity per area. Mind that it is different from brightness that is a subjective experience when looking at the area. Luminance ratios are describing the luminance difference between objects or surfaces. It serves for creating hierarchy and direction in space. (Descottes & Ramos 2011, 30.) Illuminated surfaces define space and vertical luminance is of greater significance for brightness impression and orientation (Erco 2009, 93-94).

Good lighting concept has a balance between illuminated and luminous components. It can be realized for example by using diffuse lamp shades or luminous surfaces as lighting components.

COLOUR AND TEMPERATURE

The color of light has strong connection to the perception of space and time and it can alter the way in which we perceive objects and spaces. It has the power of transforming familiar into exotic and help us to discover new spatial and formal relationships and atmospheres. (Descottes & Ramos 2011, 40.) Color perspective applies in light too, for example colder colors seems to be further. I previously mentioned juxtapose of light and dark but besides that there is the juxtaposing with colors and warm and cool white light.

HEIGHT

The height of a light source in relation to the space determines how we understand, occupy and explore the limits of a space. The height can be used for controlling the luminance levels and duration of time. It can be used for creating a feel of expanded space or visual intimacy. (Descottes & Ramos 2011, 52.) Just like sunlight the artificial light could be used in various heights according to the time of the day. It introduces new sensations and duration of time influencing the speed, emotion and use of a space (Descottes & Ramos 2011, 57).

DENSITY

By varying quantity and composition of light sources we can control the movement and rhythm of a space. Integration with the architecture may emphasize the architectural composition. (Descottes & Ramos 2011, 60).

DIRECTION & DISTRIBUTION

Direction is the course of light that it is focused on. It can be direct or indirect which means that it is reflected through other surface. Distribution means the angle in which the light is emitted. Distribution varies from narrow to medium and wide beam, from few degrees up to over hundred depending on the optic of the luminaire. For defining and revealing the limits of a space this is the most powerful tool (Descottes & Ramos 2011, 73). By molding the light by interfering to the aim, shape and beam characteristics of a light source we can alter its direction and distribution (Descottes & Ramos 2011, 70).

Direct light creates very sharp shadows that helps perceiving spatial layouts while indirect leave almost no shadows therefore making it harder for perceiving a space and objects. A mix of direct and indirect light seems to be the best option as it creates soft shadows and the forms and structures are then easily recognized.

All these lighting design parameters offers opportunity for countless solutions providing a lighting designer a vast playground to implement and regenerate their creativity. It also helps in addressing all necessary aspects in lighting design.

Figure 3. Potomac Mills food court, USA.

How to utilize the developing technology to answer the changing needs?

Figure 4. Kadena Shopping center food court, Japan.

1.5 Design problem

One of the problems concerning food courts is the attitude towards them. Food courts are designed for quick turnover (IESNA 2000, 522), and, therefore, they are everything but welcoming and comfortable for staying for longer than what eating fast food takes. There has not been attention paid to the importance of food facilities in shopping centers and their effect on the clients and role as a marketing tool. And what comes to lighting it is usually uniform and either excessive or inadequate as seen in the figures.

The break for food should be a comfortable experience as it is about having a break to rest and to gain energy through nutriments. It is also often a social event and should preferably provide good conditions for enjoying the occasion. The restaurant area could be a marketing tool due to its attractivity and comfortable environment. The aim should be to provide better conditions also through light for lingering and relaxing, enjoying food and atmosphere and thus getting clients to spend more time and money on goods in the shopping center.

As food courts have potential that could be harnessed, then how could a lighting designer contribute to improving the space in order to provide a cozy and comfortable eating experience in such a hectic place shopping center food courts usually are? What are the determining factors, characteristics and elements for achieving the aim? And economy-wise, how to get the customers to enjoy the shopping experience more, and spend more, through providing comfortable and relaxing experience. Why it should be done?

Figure 5. Cepa Shopping Center, Turkey.

Figure 6. Different typologies in Melbourne central food court.

"Food court design is about creating a sense of place and atmosphere, an inspiring environment and deeply satisfying emotional and sensory experience."
(Broadway Malyan, 2014).

Figure 7. Melbourne central food court.

Figure 8. Melbourne central food court.

1.6 Food facilities in shopping centers

This subsection will take a look to the significance of food facilities in shopping centers and the direction food courts are taking. Good design in food facilities attracts clients and this aspect is adressed in this thesis. Lighting is an important element in the aim mentioned in the quote above and for the following issues.

Food courts are designed to be one of the key elements keeping customers in the shopping center (IESNA 2000, 531). However one of the most frequent mall problems is too limited selection of restaurants (Verde & Wharton 2008, 4). The demand for high quality food and variety of choice of the restaurants is increasing (Hu & Jasper 2007, 30-33). The competitiveness of shopping centers lies behind the diversity of stores and restaurants.

Besides the lack of various restaurant choices shopping centers has a lack of resting places for people to take a break from walking around, and occasionally waiting for their companies (Hu & Jasper 2007, 25.) Therefore, more attention should be paid for such places. This is something that food courts serve to. Besides food, comfortable setting for resting should be provided.

UK's leading data intelligence company CACI has recently revealed a research analysis concerning food facilities in retail spaces. The analysis indicates that there is a strong link between retail spend and catering options. According to the research the consumers who use catering spend nearly 50 per cent more on retail goods comparing to those who do not. (Broadway Malyan 2014.)

In terms of influencing the amount of time and money that customers spend a good design is a key driver in the success of catering options. (Broadway Malyan 2014). This all shows the importance of food services and their appropriate design in shopping centers.

The food court trend is moving towards high quality interior design in addition to high quality food. This is resulting into more sophisticated food court design besides other offerings and experiences in order to attract customers. Now the objective for food court is to create attractive, convenient and comfortable eating and gathering points. (Broadway Malyan 2014.)

As shoppers are of both genders and of all ages the different types of food consumption should be taken into account. Everything should be present from quick eating to fine-dining. This also applies to the typology of the space. Different types of sofas, chairs and table sizes for all types of social groups including more intimate and private spaces. (Broadway Malyan 2014.)

This demand and the rising trend can be seen in the Riviera Shopping Center. A great amount of the third floor is dedicated for food services and entertainment. The restaurant area has several types of seating typologies along the arcades leading to the main seating area. The main area also has different typologies from small round tables to larger group tables. In addition, along the route to the balcony facing the river there are lounge areas for relaxing apart from the dining tables. Several skylights are introduced in the midst of the space, one being on top of the kid's playground.

Figure 9. Graffiti Cafe by Studio MODE. Evenly lit space with high illuminance.

Figure 10. Fletcher Hotel in Amsterdam. KOLENIK eco chic design. Cosy atmosphere with varying lighting levels.

Figure 11. Atmospheric lighting in a restaurant.

"Light plays a key role in establishing the mood or atmosphere in food service spaces"
(IESNA 2000, 529).

1.7 Lighting in food facilities

This subsection will delve into the factors that should be considered when making lighting design for food facilities. In spaces that has a specific function the design should begin with defining the task to be completed in the space. In the case of Riviera the tasks are various and will be delved into more detail later on in this thesis.

Dining spaces are of three categories:
- Intimate cocktail lounges that usually have very low lighting levels
- Leisure spaces where eating is the most important activity. They have restful atmosphere and unobtrusive lighting between 50 lux and 100 lux
- Quick service restaurants that has fast customer turn over. The space is purposely designed to stipulate the feeling of economy and efficiency with very high uniformly distributed lighting levels of 500-1000 lux. (IESNA 2000, 530.)

So far, the latter has been the case of many food courts. Anyhow, as mentioned previously, the direction of food court design is changing. And the lighting levels can be applied more according to the food vendors and the clientele. The restaurant area in Riviera is certainly the second category; leisure eating with lower lighting levels for restful atmosphere to encourage clients to linger and relax.

In food facilities, the atmosphere is important in addition to food. Psychological effects are important factors such as the making people feel comfortable and attractive with soft lighting. Designer should consider which factors contribute in creating a pleasant atmosphere for eating and what kind of lighting moods could and should be provided.

The use of daylight is essential and combining it with artificial light. With this combination designer can develop and reinforce almost any visual mood and satisfy the visual needs in any space. Lighting control system helps in creating various moods according to the time of the day and year. It also helps to balance the efficiency while considering energy consumption. (IESNA 2000, 522, 530-531.)

Proper color rendering, the ability of light source to reveal the colors of objects, is required especially in food services. Besides bringing visually out the best of the food lighting should make a positive contribution to the experience of people to be seen in a public space. With improper lighting one may ruin the appearance of food and cause the customers look unwell.

The color temperature should be chosen appropriately. Warm light creates a cozy feeling, especially light that is closer to the color of a candle. Also the type and location of luminaire counts whether it is downlight in the ceiling, on the wall illuminating the vertical surfaces or a suspended luminaire on top of the table providing very intimate atmosphere.

The luminance ratio should be in appropriate balance in the area for example with the counter area of the food vendors and the seating area in order to focus attention to tenants' graphics. The contrast should be balanced discreetly to avoid a cheap regional mall feel. The ratio of 1:3 can be perceived with eye.

Last but not least is the cleaning of the space as it should be possible in normal hours. Even with ensuring adequate illuminance levels for cleaning, around 100-200 lux, designer won't necessarily have to compromise the atmosphere. (IESNA 2000, 530-531.)

1.8 Case study

During the design process I visited several interesting food facilities. I chose to present here the food court of the biggest indoor shopping center in Brussels in shopping center City2 as it represents to me a traditional food court.

The ground floor consist of several restaurants and the food court area is surrounded by various food vendors. The food court is divided into two levels. The second level is recently buildt. The space is bathed in the day light and it has been taken into account in the design as there is no light provided in some of the areas that the day light reaches.

What I found cozy is the contrast of light and dark, well lit tables and less lit surroundings. But what bothers is the lighting level changes on the tables. Narrow beam downlights are introduced in the lower level but unfortunately they do not cover all the tables. Therefore some of the tables were not lit, others had intense spots of light here and there. It is not pleasing ergonomically and aesthetically. All lights were on day time. The cloudy sky could have provided enough light for the diners.

Both levels are partially lit by metal halide luminaires that are placed underneath the escalators. Also the downlights are metal halide that is energy efficient light source in comparison to incandescent and halogen lamps. Many of the restaurant around the food court had only downlights providing only general, even lighting level.

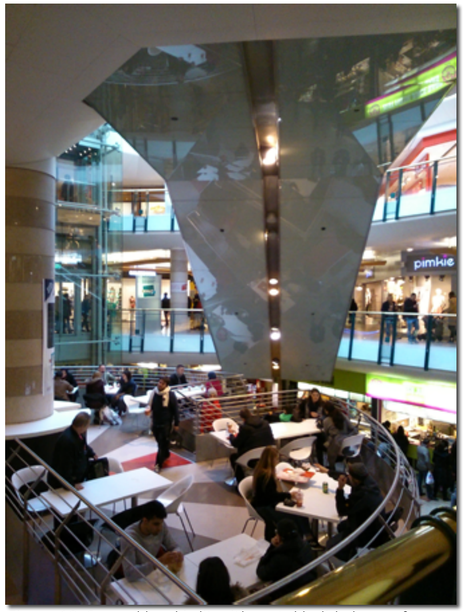


Figure 12. Second level is lit with metal halide lamps from underneatch the escalators

Figure 13. Right side of the food court bathes in daylight.

Figure 14. The first level is light with downlights.

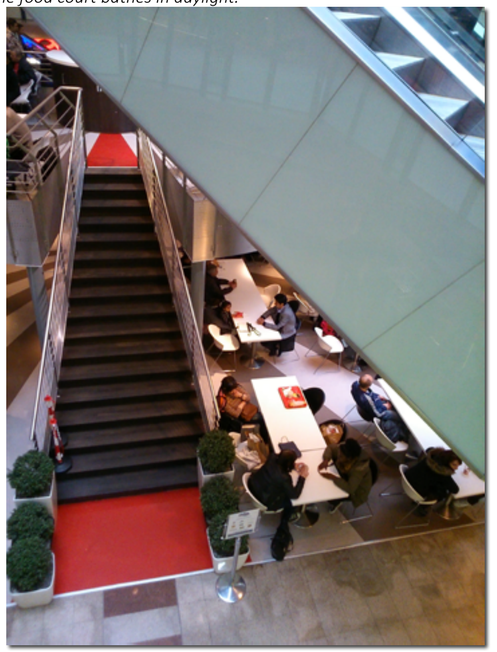


Figure 15. Some of the tables are not well placed for lighting.

2. Context

2.1 Riviera Shopping Center
2.2 Architectural concept
2.3 General lighting concept
2.4 Food court concept and materials

Figure 17. Riviera Shopping Center. View from West-East. Visualisation.

2.1 Riviera Shopping Center

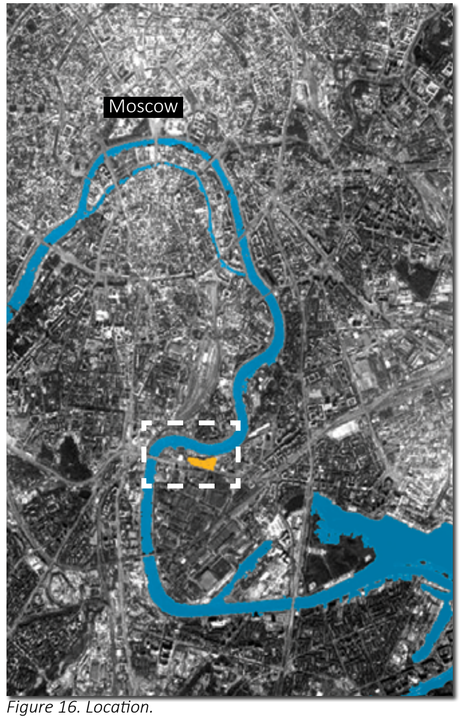


Figure 16. Location.

Shopping center and entertainment market has been booming for the growing middle class in Moscow despite the crisis (The Moscow Times, 11.03.2013). The biggest shopping center in Russia opened in the end of 2014. There are four new shopping centers in Moscow that the lighting design practice ACTLD has been working on and Riviera is one of them. They all entail creative lighting solutions to create events and different experiences in addition to the functional lighting.

Riviera shopping and entertainment enter is designed by an American architecture practice 5+design. The mall is under construction and is supposed to be inaugurated in the end of 2015. It will have over 300 shops, cafes and restaurants. It will have variety of national and international brands. (Riviera leaflet 2014, 3, 5.)

It has a beautiful location as it is next to the Moscow River and providing views over the city of Moscow. The mall will be accompanied by a cultural, residential and office district that will be build in the near future. (Riviera leaflet 2014, 11.)

The third floor will be one of the main attractions with its various entertainments for both adults and children such as a cinema and a playground. North terraces are facing the river. The location is strategical as it will push the shoppers to go through all the floors. It also provides peaceful space as it is on the top floor.

The word food court was not mentioned at all in the brochure introducing Riviera shopping center but rather as “galleries of restaurants” and “extensive assortments of restaurant facilities”. (Riviera leaflet 2014, 11-12) which alludes to sophisticated food facilities rather than traditional fast food services.

2.2 Architectural concept

The concept is inspired by the city itself; the golden domes and Moscow river flowing next to it. The concept could be described as:

Nature - Ambient - Gradient - Colours - Texture - Shape - Depth

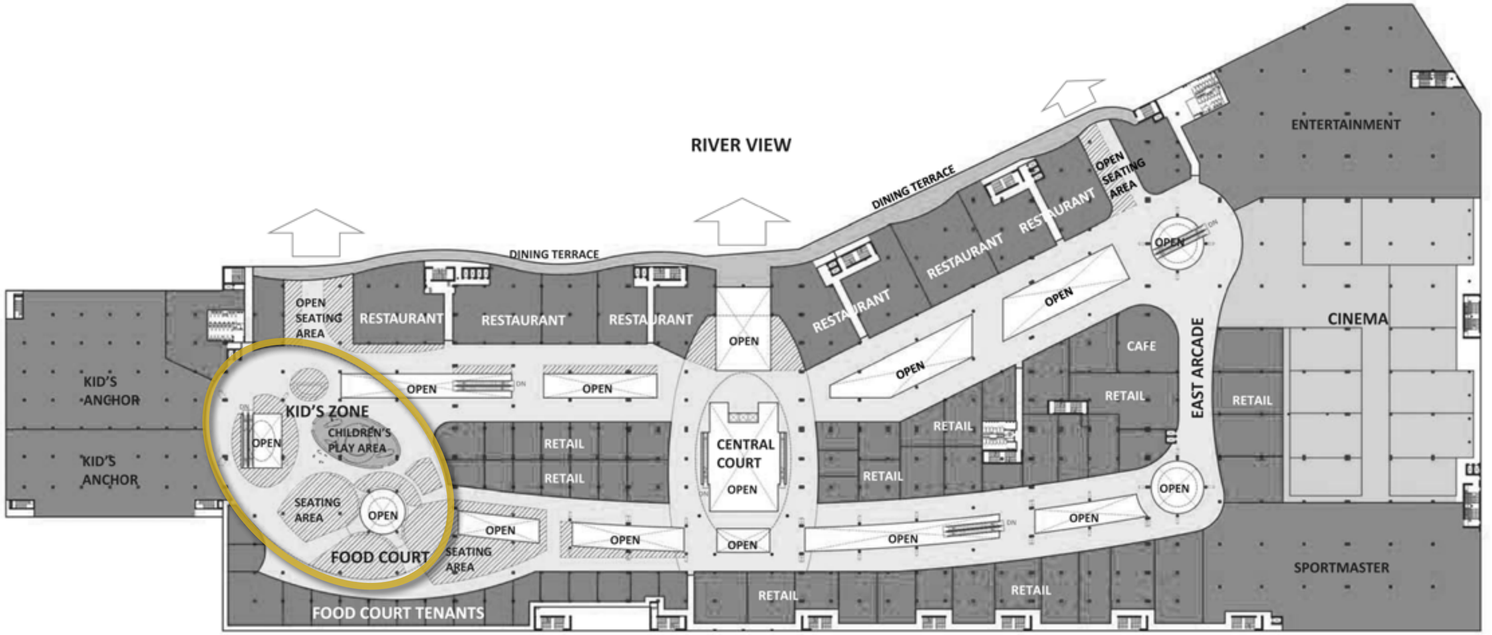


Figure 21. Third level has food court, several restaurants, cinema and kids' anchor.

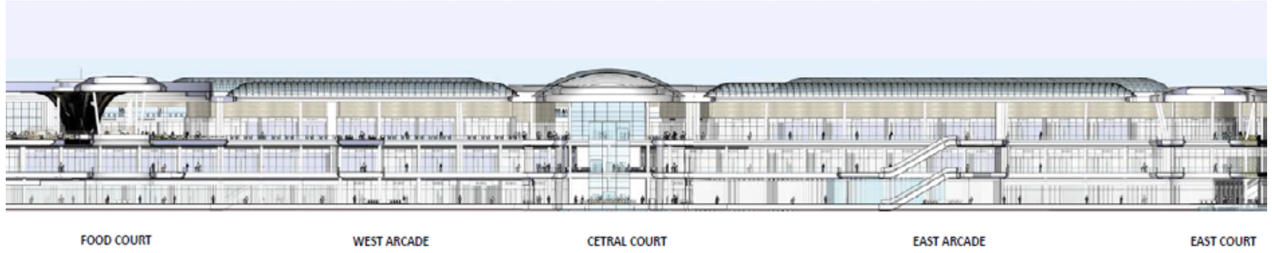


Figure 22. Longitudinal section.

Figure 23. James Turrell - Stone Scape

Figure 18. Dramatic winter, deeper richer colours.

Figure 19. The river edge create dramatic gradients.

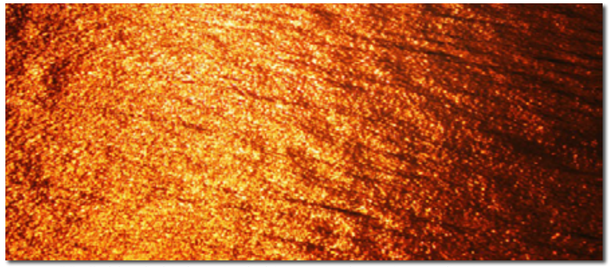


Figure 20. Golden light, long twilights create dramatic gradients

2.3 Food court concept and materials

The food court will have several different seating typologies including lounge spaces. It includes a small playground for children in the midts. It is surrounded by food vendors.

The materials in Riviera food court are very light except for the floor that is partially dark as show in the plan. The seating areas has light floor and tables that is already proposing brighter experience on those areas. The contrast of light and dark materials can be emphasized with light resulting in an interesting space.

The material and color choices in a space are important when it comes to lighting. Light, matt materials are favorable for light. Materials with light color reflect light more and therefore results in brighter experience. Matt surfaces disperse the light.

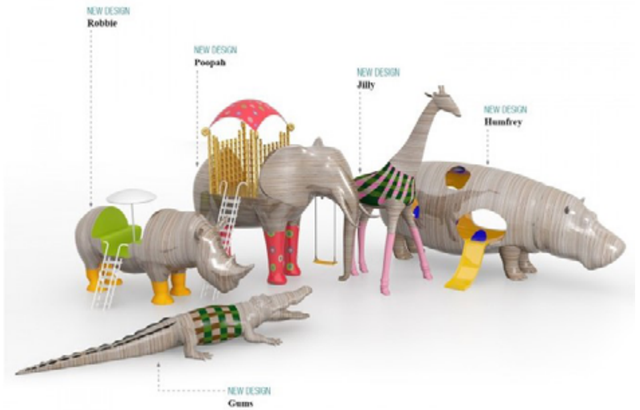


Figure 29. Safari animals in the kids' area.

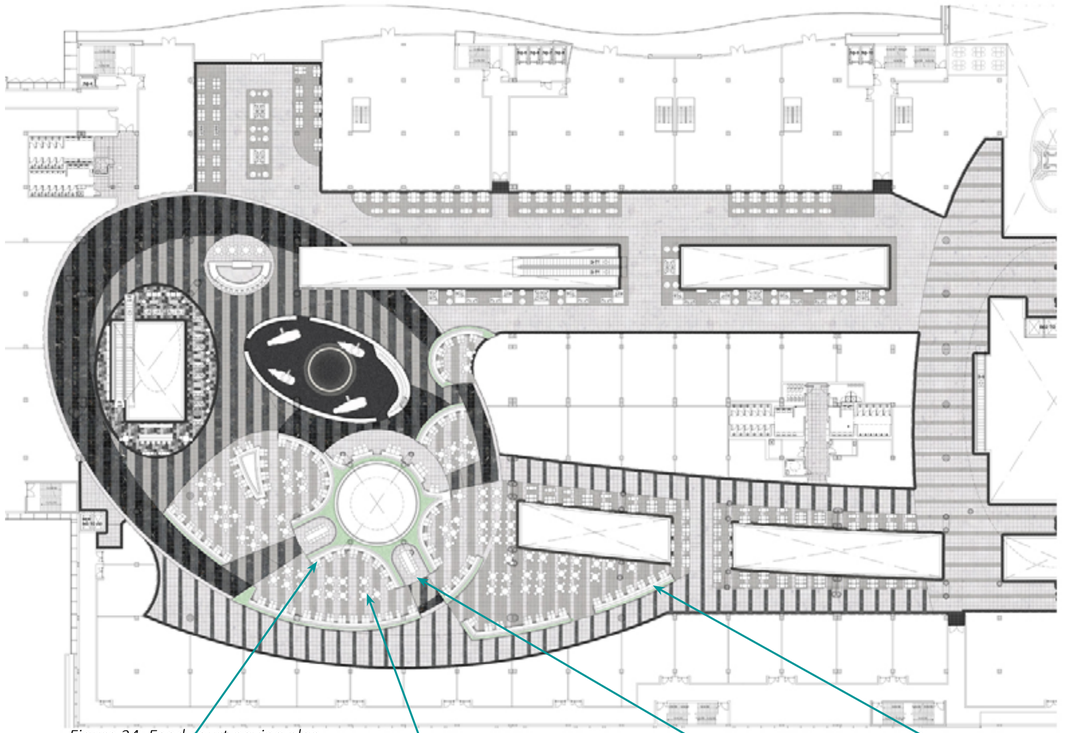


Figure 24. Food court paving plan.

Figures 25-28. Furniture examples from the architect.

Figure 112. Ceiling mock-op. The final ceiling will be 18cm wide wood planks with black 2cm seams.

Figure 113. 3D wall panel on top of the shops.

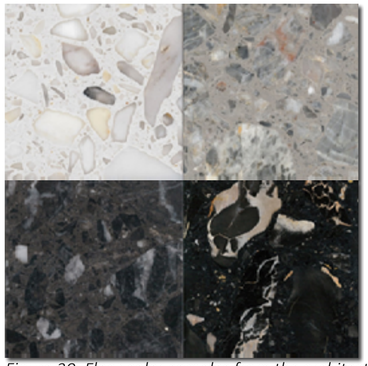


Figure 30. Floor color samples from the architect

2.4 General lighting concept

ACTLD's lighting concept consist of several key words that are derived from the concept of the architect:

Relaxing
Mood
See
Sense
Feel
Dynamic
Dimension

SIGHT	Light, colour, dynamic installation
SOUND	Mood maker, music of nature
TOUCH	Material, textile
TASTE	Food stools
SMELL	Nature, fragrance

SEE + SENSE = FEEL

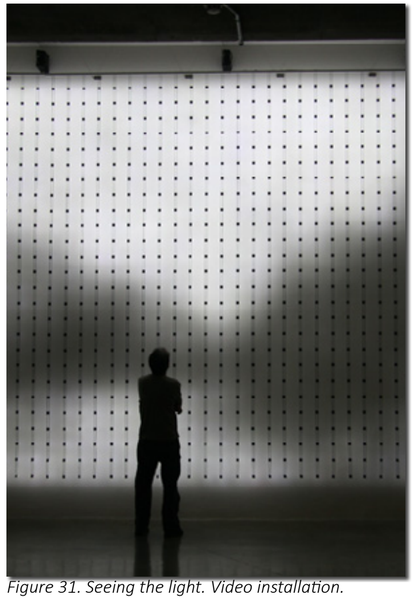


Figure 31. Seeing the light. Video installation.

Figure 32. Sensing the light. Water light graffiti.

Figure 33. Feeling the light. James Turrel Aten Reign.

3. Concept

3.1 The aim and challenges

AIMS

The aim is to develop a lighting design which takes advantage of the theoretical framework of architectural lighting design using the design principles as analytical tools. The desired state for the food court is to have a flexible and comfortable setting for eating and resting that could be easily altered. The aim is to create a pleasant feeling and lively moods changing in a slow rhythm throughout the day.

Ergonomically each task should be considered individually and addressed with appropriate concept. The lighting should take into account the aesthetic values of the architecture and bring out the best of it.

Sustainability should be taken into account. For lighting it means for example energy efficient solutions, lighting control and quality light sources.

CHALLENGES

The main challenge is the context as lighting shopping centers follows certain lighting level recommandations. The space will house various tasks and uses and different users and adequate lighting has to be ensured for each task. It is not possible to play with the lighting levels as in a restaurant.

Besides lighting levels the change of the light color temperature is an easy way of altering a space and mood and effect of light on human being. However light color should be appropriate for the space and there for great changes are not possible.

The space is very broad and rather high, 7.5 meters. The height brings its own challenges for example for luminaire selection as they have to be very powerful comparing to lower heights. The materials has been chosen for the space and no changes are possible. The ceiling for example has been fixed to be 18 mm panels and the ceiling recessed luminaires should fit into the same dimension.

3.2 The lighting concept

In this section, I will describe the matters the concept is based on. This section will only contain conceptual ideas. I will explicate the implementation of the concept in the following section that will discuss the schematic design.

The inspiration derived from the architect's concept are the flow of the river, gradient colors, golden light and spark. From the keywords of ACTLD I highlighted the most convenient words for this type of a space; relaxing, mood and dynamic.

The space consists of several seating typologies, area for children and circulation through the space to the shops at the very end of the mall. In order to cover all the areas with their specific needs I have split the concept into three parts: lighting typologies, layers and moods. The typologies are composed of different layers that are subordinate to the defined moods. The division is done in order to bring out the best of the space, and the atmosphere.

TYPOLOGIES

Lighting typologies are following the typologies of the space; circulation, seating typologies and special features. It will take into account the needs and possibilities of each area.

LAYERS

The lighting solution will be created in three different layers: general, focal glow and vertical lighting as the most energy efficient lighting installations are based on a balance of the three different levels (Gary Steffy Lighting Design INC. 2000). The layers will complement the typologies.

MOODS

The idea behind the moods was to utilize the possibility for dynamic lighting, imitating the natural daylight rhythm, in order to contribute to the well-being of the shoppers. In addition to white light there will be a possibility for emphasizing the light scheme and also creating different moods by color light. I will present three different lighting schemes that will be established during a day in succession.

JUXTAPOSITION

Light- dark

public- private

functional- decorative

public space - restaurant

wasting energy - getting energy
(walking and shopping) (eating and resting)

busy (shopping) - relaxed (sitting and eating)

morning 2700K - day 3000K- evening 2500K

3.2.1 Typologies

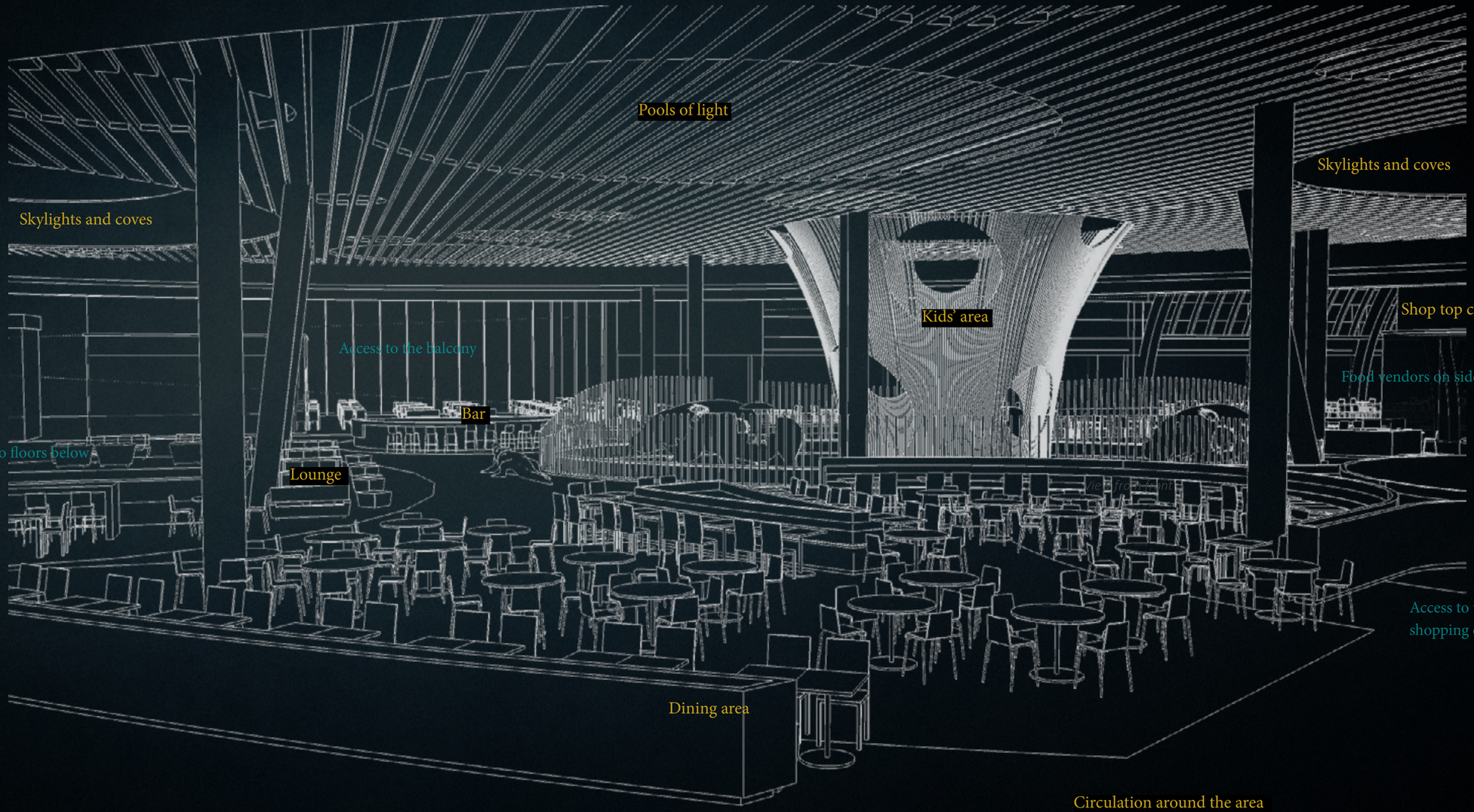


Figure 34. View from South.

3.2.1 Typologies

This subsection will describe the lighting typologies. It will cover the description of the type and explanation what it will entail lighting-wise. In designing the lighting I have used the six lighting design principles that I have introduced in the first section of this thesis. The lighting typologies are defined according to the space typologies. The lighting typologies are:

Circulation
Dining
Lounge
Kids' area
Bar
Skylights and coves

CIRCULATION

The idea for the circulation area was to have calming effect when approaching the restaurant area. This can be created by slow brightness regression. The circulation in the midst of the dining area will be lower lighting level than the dining.

DINING

The main objective for the dining area is to provide adequate quality lighting for eating and resting. Dining in such a wide, open space may cause craving for privacy. This need can be responded for example by adjusting the height of the light fixtures. By proposing narrow beam downlights and suspended luminaires on top of the dining tables we could provide more intimate experience for the clients. Besided creating privacy it also reduces the scale of the space that is needed in this case.

To make it more dynamic, vivid and interesting the suspended luminaires could be arranged in compositions with different densities and heights. Well thought composition helps when creating hierarchy and influences the way we perceive and navigate in a space (Descottes & Ramos 2011, 69). To avoid unequivocal lighting, pools of light will be used in the main dining area. The pools of light are lighting the inside of the ceiling giving diffused light.

LOUNGE

This typology is similar to dining except for the type of the luminaire. For this area, I propose floor standing luminaires following the design of the suspended luminaires of dining areas. Standing luminaires could bring warmth to the space. The luminaires provide diffuse light besides direct light as it can be soothing and relaxing when no certain task is required. By employing both direct and diffuse light we might lose the effect of light creating privacy.

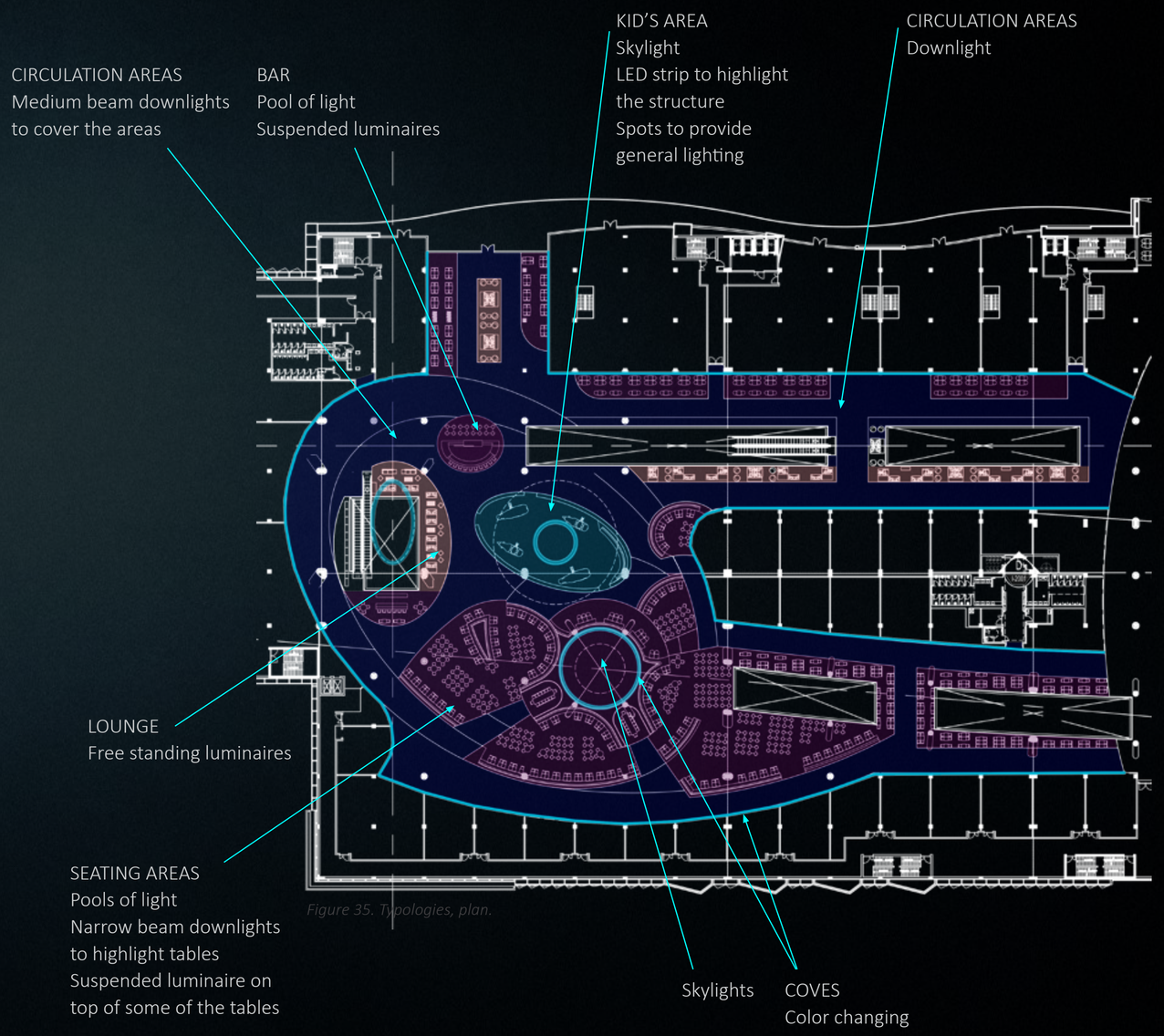


Figure 35. Typologies, plan.

3.2.1 Typologies

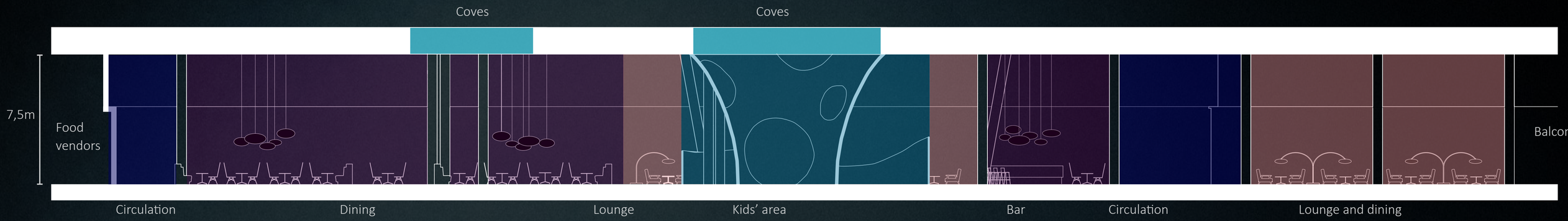


Figure 36. Typologies, section.

KIDS' AREA

The kids' area is a key feature in the food court. It will follow the concept of calming and relaxing atmosphere. The aim is to provide adequate lighting for playing but still keeping the calm effect. Both diffuse and direct light would be good in order to not create too sharp shadows. The vertical surfaces will be lit as they are more important in perceiving the form and limits of the space. On top of the kids' area there is a skylight and color cove lighting.

BAR

The bar is a working area and, therefore, it needs adequate lighting for the task. It will have suspended luminaires on top to link it to the dining area, to reduce the scale and to highlight the position of the bar.

COVES

The space has different types of coves; on top of the food vendors and on the skylights in few levels. They will be of two types; mixing white and color light and only color light. These lighting schemes will be combined with the other typologies.

3.2.2 Layers

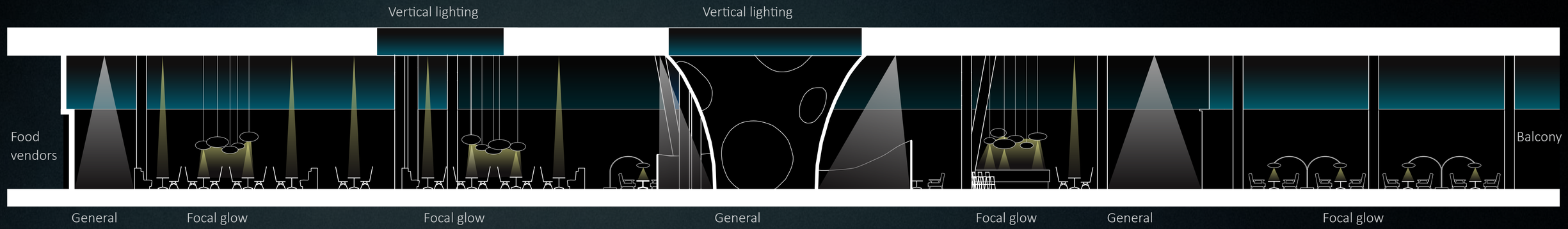


Figure 37. Layers, section.

LAYERS

Layers are applied on the typologies and the layers are overlapping each other depending on the typology. The layers are divided into three categories: general lighting, focal glow lighting and vertical lighting.

LAYER 1: GENERAL LIGHTING

The role of general lighting is to provide adequate lighting. This layer will contain the circulation areas, kids' area and the bar. The kids' area and bar will have a combination of focal glow. All these areas has a certain task to deliver therefore certain light levels has to be established. This layer is dominant as it ensures the over all lighting. The other layers are to balance it.

LAYER 2: FOCAL GLOW

Focal glow is pointing out important elements. In this case it refers to the dining and lounge areas. Dining is the main task in this space and therefore I wanted to highlight it and put extra efforts on it to create a bit deeper experience. In order to ensure relaxing feeling the light is color tunable and dimmable.

LAYER 3: VERTICAL LIGHTING

Vertical lighting in this case is mainly used for decorative lighting that are the coves around the restaurant area and on skylights. It will be color changing light in order to provide different moods in the space. The kids' area will have vetrical white light graze inside the sculpture and also outside the fence bordering the kids' space.

3.2.3 Moods

I have created three different moods for the space. The mood changes applies as lighting level changes in the whole area. In the dining area the color of white light will change and the cove lights will change color throuhgout the day.

Light is one of the key factors in creating mood and atmosphere in a space (IESNA 2000, 529). It also affects productivity, well-being and behavior. These factors should be addressed in lighting design.

The moods are partially imitating the natural cycle of light. Artificial lighting does not correspond natural light but it can still change the intensity and color of light and therefore affect human beings through biological rhythm and wakefulness.

The moods are employed according to the time of the day and year. They are created by combining the different layers and typologies, the lighting levels and the color of light. The solution for realizing the concept lies behind the LED technologies as will be seen in the following section of this thesis.

The lighting control systems provides countless possibilities for controlling the light, its intensity, color, change and rhythm. The further development of the mood concept will be in the design development phase of the whole project.

Figure 38. Color scale from morning to evening.

Video 1. Moods in succession through a day.

3.2.3 Moods - timeline

Figures 39-41. Photos of color changing light.
Figures 42-44. LED colour temperature comparison: 3000K-2700K-2500K.

MORNING

Lighting in the dining area will be soft, mimicing incandescent lamp. Lighting levels can be a bit lower. The coves will have yellow mode like sunrise preparing for the day.

DAY

Lighting levels are at the maximum as shown in the subsection 4.4 Lighting levels. The light color will be 3000 K as in the whole shopping center. The busiest hours in the center the cove lighting will be sky blue.

EVENING

Lighting levels can be dimmed down and the dining area has very warm white light, 2500 K, calming down the customers preparing for the night. It will be accompanied with amber light in the coves.

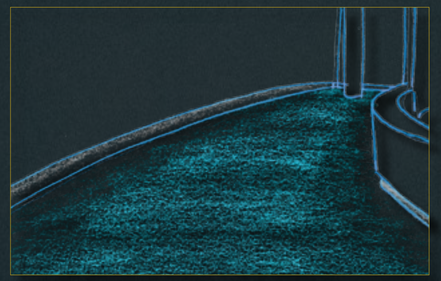
4. Schematic design

4.1 Schematic design

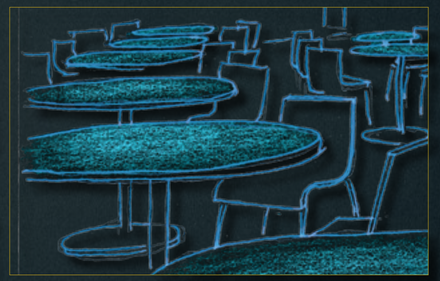
After the concept, it’s time to go for the design; how to implement the concept. This section will start with the analysis of the daylight in the space and a quick overview of the LED technology.

Thereafter the section is divided according to the six lighting typologies:

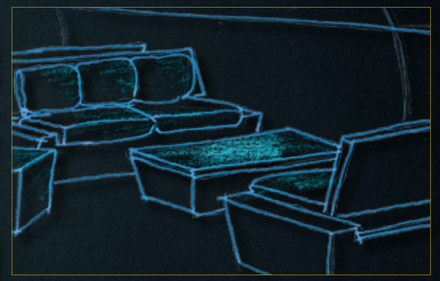
Circulation



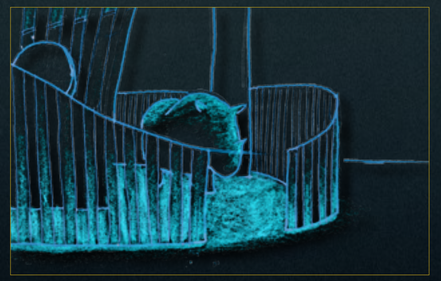
Dining



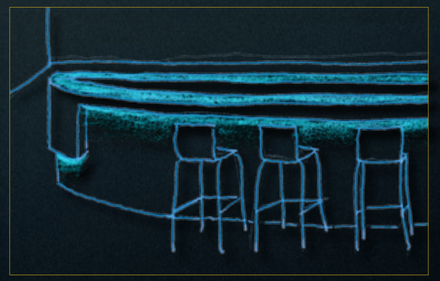
Lounge



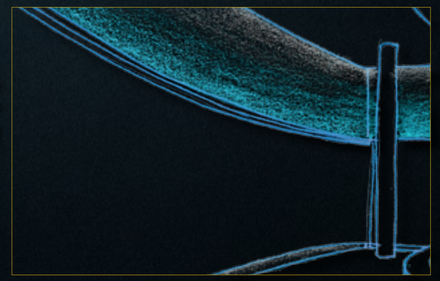
Kids’ area



Bar



Coves



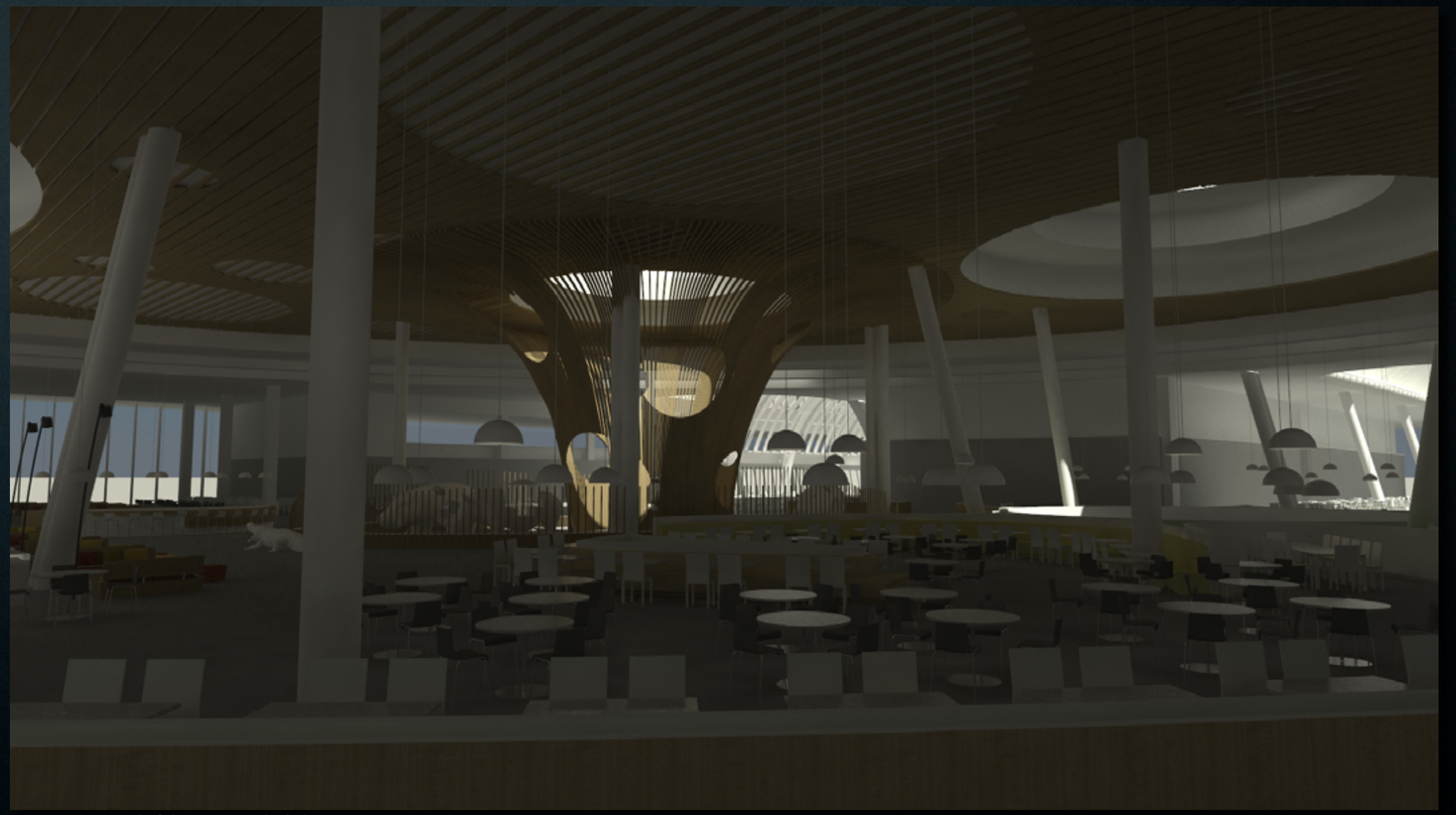
Figures 45-50. Sketches of typologies.

Each subsection will include a specification for a light source such as color rendering, luminous flux and color temperature. I will note down the energy efficiency and also glare control if applicable. I will also discuss the six visual principles introduced in the first section of this thesis and how they have directed the design. Each lighting typology entail reference images, sketches, explanations and preliminary calculations.

4.2 Daylight in the space

The design of artificial light should always start with the analysis of the natural light in a space. Natural light changes constantly, throughout the day and the year. Not only the position but also intensity and color varies according to the position. By using certain positions, colors, hues and saturation we can obtain the natural light kind of an effect on people and use it as an indicator of time (Descottes & Ramos 2011, 51).

As seen in the figure, only the kids' area is bathing in sunlight. The other two skylights are on top of voids in order to receive daylight to the lower levels. On right there are skylights in the corridors leading to the shopping center. The figure is taken at noon in Moscow in August.



Figures 51. Visual of the space in daylight.

4.3 LED technology

As the aim is to create dynamic lighting schemes with various intensities, colors and tuning white light, then how can it be realized? The solution lies in lighting technologies.

The term dynamic lighting refers to mimicking the daylight. From the beginning of the project I was interested in using dynamic lighting that is following the rhythm of the day and could be easily transferred into event lighting. The change of the light, its color and intensity, during the day and throughout the year will be implemented in the project by lighting control systems and appropriate luminaires.

The advantage of LED in comparison to other light sources is dimming and color mixing (OMS Lighting, 50) and that is essential in dynamic lighting. The spectrum of LEDs is possible to smoothly mix for creating the dynamic color effect unlike with the traditional light sources (OMS Lighting, 50) and this is the main reason why I see the LEDs to be the most suitable option for this project.

Another reason to occupy LED technology is energy efficiency. Lighting takes up almost 20 % of the whole global electricity consumption (IEA, 2015). Due to LED technology energy efficiency is increasing. Energy efficiency is measured how much light is emitted per watt. In retail spaces often used metal halide lamp has high energy efficiency: 75-100 lumens per watt (Wikipedia, 2015). However LED is now reaching over 200 lumens per watt (Archenhold, 2014). For comparison the traditional incandescent lamp emits up to 16 lumens per watt.

4.3.1 TUNING THE WHITE LIGHT

The solution for implementing the concept of changing moods throughout the day by varying light's color temperature and intensity lies behing LED technology. This subsections covers two of those.

4.3.2 TUNABLE WHITE TECHNOLOGY

One of the possibilities LED enable is tuning the color temperature of white, mimicking the outdoor lighting conditions. The intelligent drivers for the LED technologies allow changing the color temperature of white from warm 2200 K color temperature to cool, over 6 500 K (OMS Lighting, 52). It is called the next generation of lighting. The benefits of this new functionality include attraction and flow of customers in a retail environment, and providing a welcoming atmosphere in a hospitality setting (Garg & Posselt 2008, 1.) This brings about control, interactivity and design freedom. By installing one luminaire we can still have countless possibilities.

4.3.3 BLACK BODY DIMMING TECHNOLOGY

Another technology that I could use in the project is black body dimming technology also known as warm dim. This technology enables the dimming of LEDs' resembling the dimming of an incandescent light source – color temperature changing to warmer due to dimming down (Juno Lighting Group, 4). The color temperature range is from fully dimmed 1800K up to 3500K at full power (Juno Lighting Group, 6).
From these two promising technologies I have chosen to use the tunable white as it provides more possibilities. Warm dim is more suitable for example for restaurants where the lighting levels can be dimmed down very low. In the case of a shopping center the tunable white is better option as changing color won't be decreasing the lighting levels as much as for warm dim.

2200 K

2500 K

2700 K

3000 K

3200 K

3800 K

Figures 71-76. Mock-up: different color temperatures of white light.

4.4 Lighting levels

The image illustrates the lighting levels applied according to the standards (Zumtobel 2013).

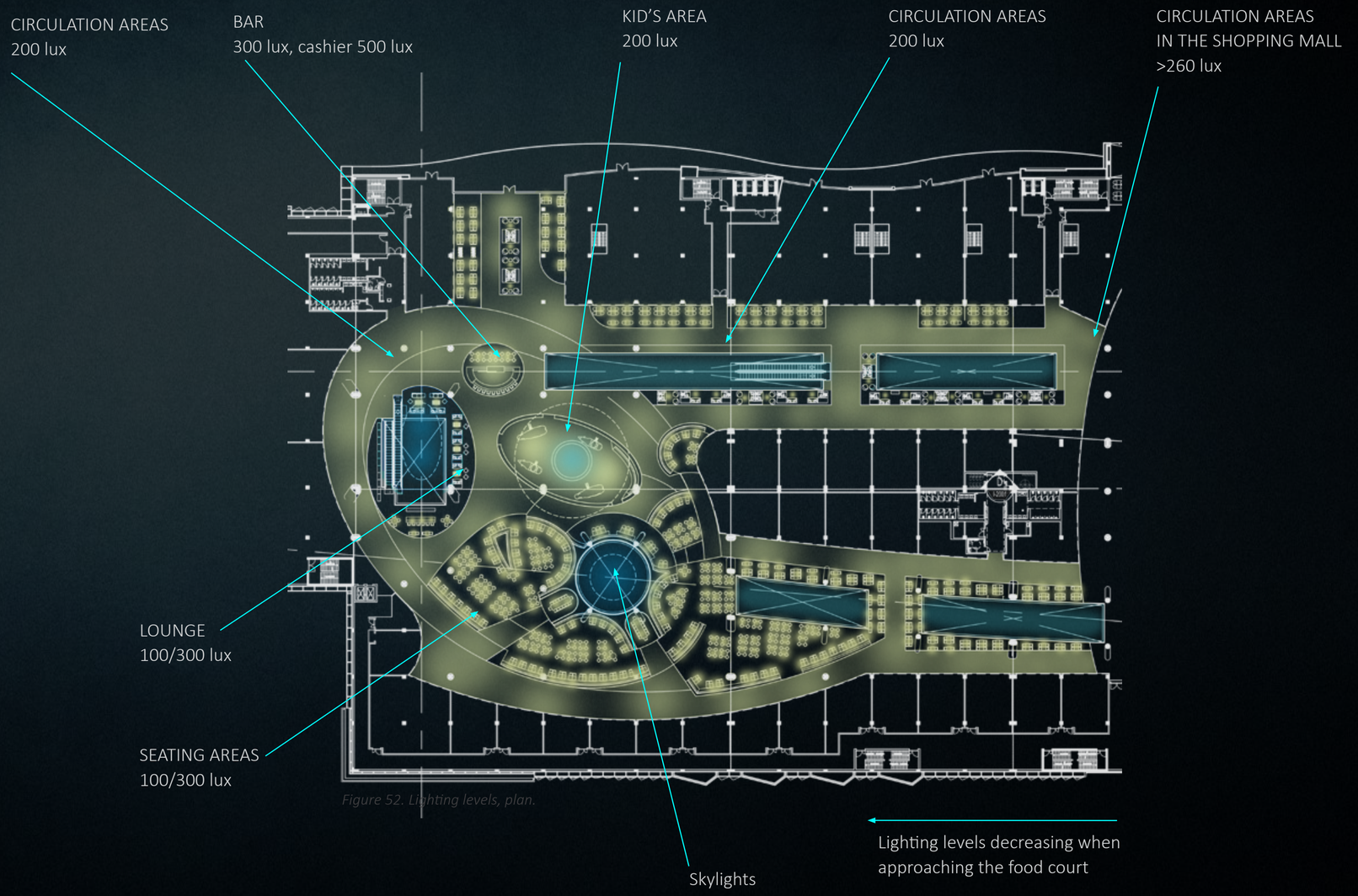


Figure 52. Lighting levels, plan.

4.5 Circulation

Circulation is a general lighting area. It will be realized with ceiling recessed downlights. The light will be directed straight down on the horizontal surfaces. The density of the luminaires will be even throughout the space despite few places where more light is required, for example in front of escalators and toilets.

The lighting levels in the circulation areas in the whole shopping center are set above 260 lux. In the food court area it will be a bit lower, around 200 lux, to provoke relaxation. As the space is quite high, 7,5 meters, the downlights will have medium beam angle and the lumen output will be 4000 lm. The control system will be DALI. Light color temperature will be fixed in warm white, 3000 K, as it is used elsewhere in the shopping center and it is a very pleasant light color temperature in public spaces. For circulation color rendering can be the usual plus 80 as it does not require such a good color rendering as shops and restaurants.

The lighting will be even and it serves as a background for the dining space that will have changing light hues and intensities.

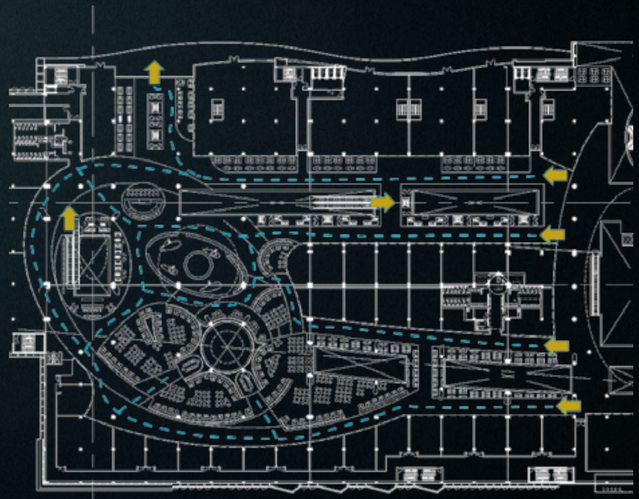


Figure 53. Keyplan, circulation and accesses.

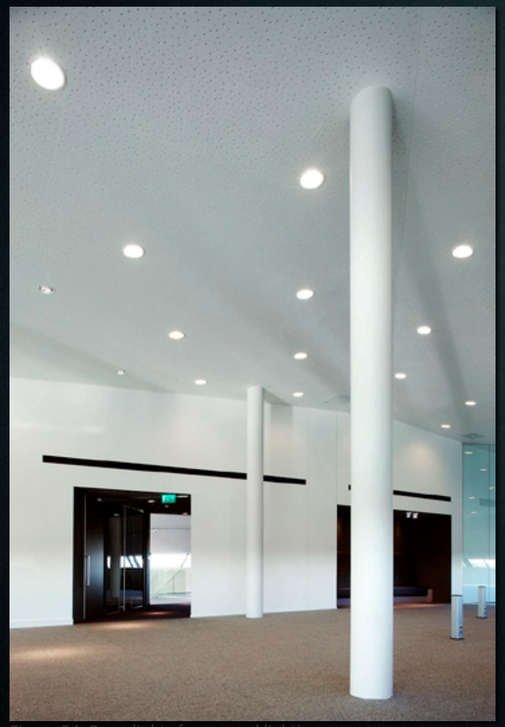


Figure 54. Downlights for general lighting

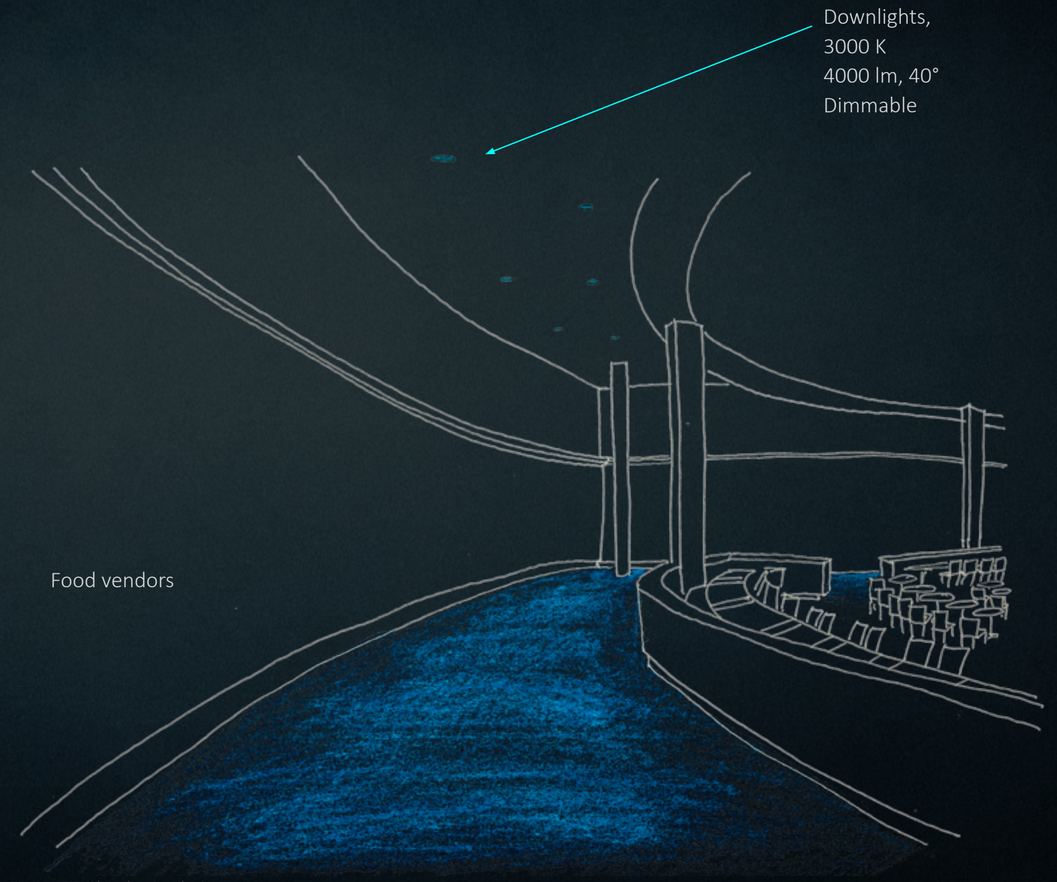


Figure 55. Sketch, circulation.

Lighting level 200 lux

Figure 56. Downlight.

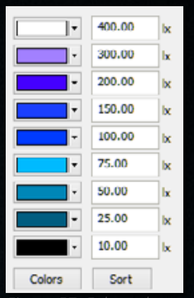


Figure 57. False color scale.

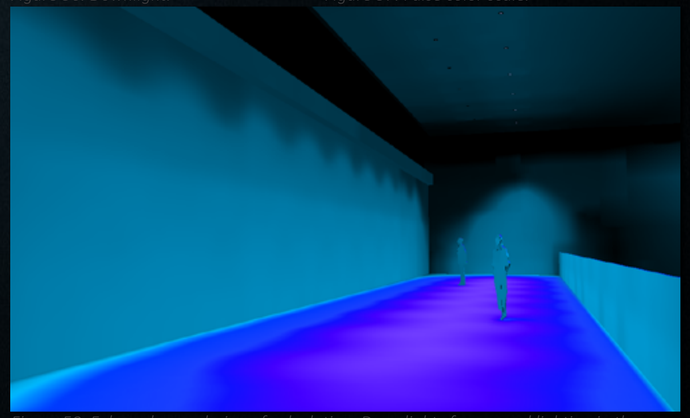


Figure 58. False color rendering of calculation. Downlights for general lighting in the circulation areas are in two lines. It does not interfere to the decorative lighting on top of the wall that is seen black in the image.

4.6 Dining

The dining is the main area where the moods are applied. The moods will be created by altering the light color from very warm white to colder white. It will be realized with narrow beam downlights, suspended luminaires and diffuse light from pools of light in the ceiling.

The lighting will be established with tunable white technology that enables full dimming and changing the color temperature from 2200 K up to 6500 K. For this project it will be only used up till 3000K. The tunable white luminaires are controlled with DMX lighting control system.

The color rendering is an important aspect in such a space. It gives vivid color for the human skin and food, therefore, I propose to use very high color rendering, >90 CRI, in the dining area.

The general recommendation for average lighting levels on tables is around 200 lux (Zumtobel 2013). The tables are well lit, up to 300 lux, and the surroudings are a bit darker in order to highlight the tables and to create contrast.

An easy way to create a sense of private spaces for the diners is bordering the space with light. This can be done with narrow beam luminaires and bringing light closer to the perceiver by suspended luminaires.

The dining area will have diffuse light besides the direct lighting on horizontal surfaces. The elements called pools of light are scattered on top of the dining area providing diffuse light from inside the ceiling. It will be dual color LED strips that can be altered according to the desired moods in the space.

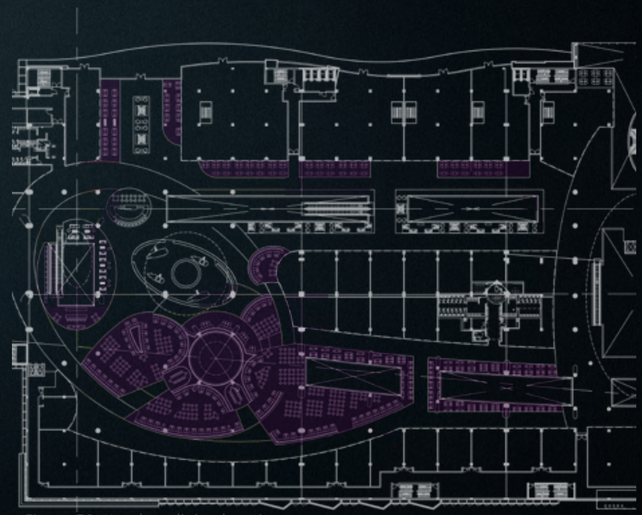


Figure 59. Keyplan, dining locations.

4.6.1 DOWNLIGHTS

There will be a narrow beam downlight for each table that are connected to the fixed furnitures. The downlights are adjustable in order to provide flexibility. The luminaire should have over 2200 lumen output and the beam angle should be less than 12° in order to be able to create the desired feeling of individual spaces.

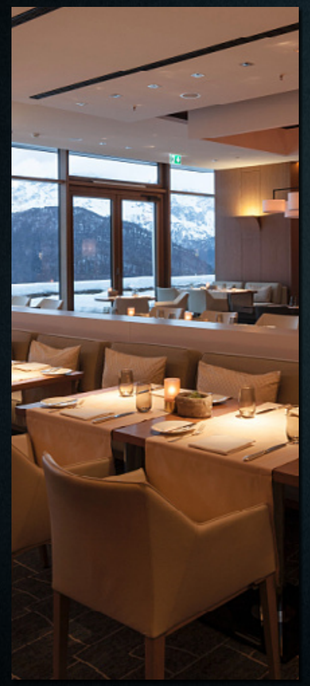


Figure 60. Reference image: the effect of narrow beam downlight on dining tables.

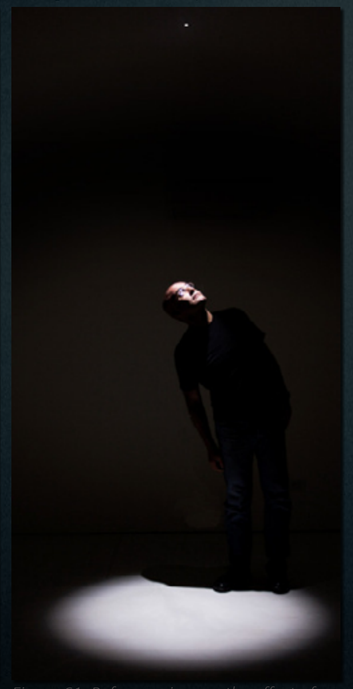


Figure 61. Reference image: the effect of narrow beam downlight.

Figure 62. Sketch, dining.

Lighting level 200 lux

Figure 63. Downlight.

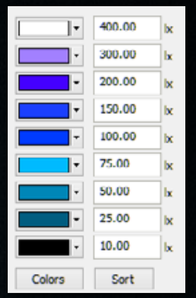


Figure 57. False color scale.

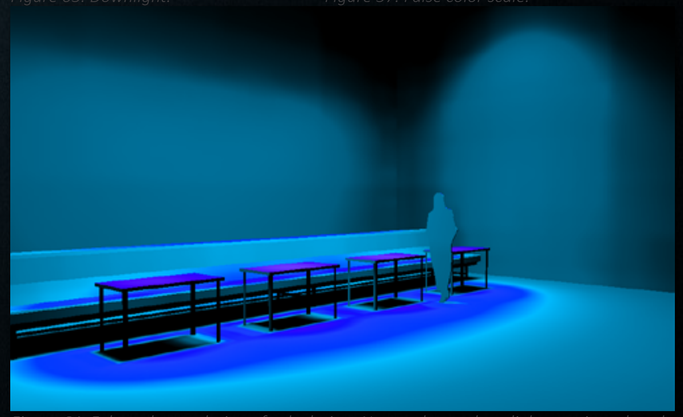


Figure 64. False color rendering of calculation. Narrow beam downlights are introduced for the dining area to create sense of privacy that could not be reached with wider light distribution.

4.6.2 SUSPENDED LUMINAIRES

The tables in the midst of the dining area will have suspended luminaires. The composition of suspended luminaires is realized in different sizes and heights. They help in decreasing the scale of the space, creating atmosphere and they serve as an eye-catcher.

The suspended luminaires are on top of the round tables as they are most likely moved during the day and therefore the downlights adjusted on each table would not work. Therefore, the suspended luminaires should have a wide beam angle in order to cover a bit wider area. The lumen output will be 1200lm. This luminaire has to be custom made as the tunable white technology has not yet reached the pendant luminaire sector.

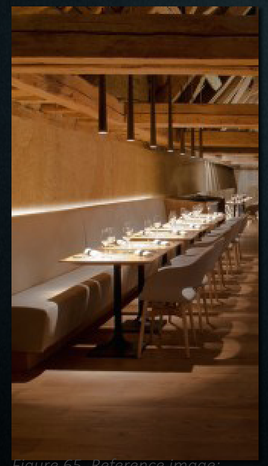


Figure 65. Reference image: suspended luminaires on top of each table creating private space.

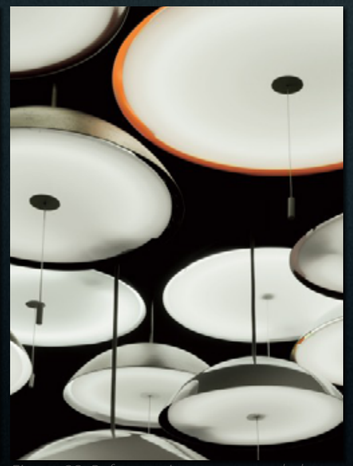


Figure 66. Reference image: suspended luminaires in different heights.

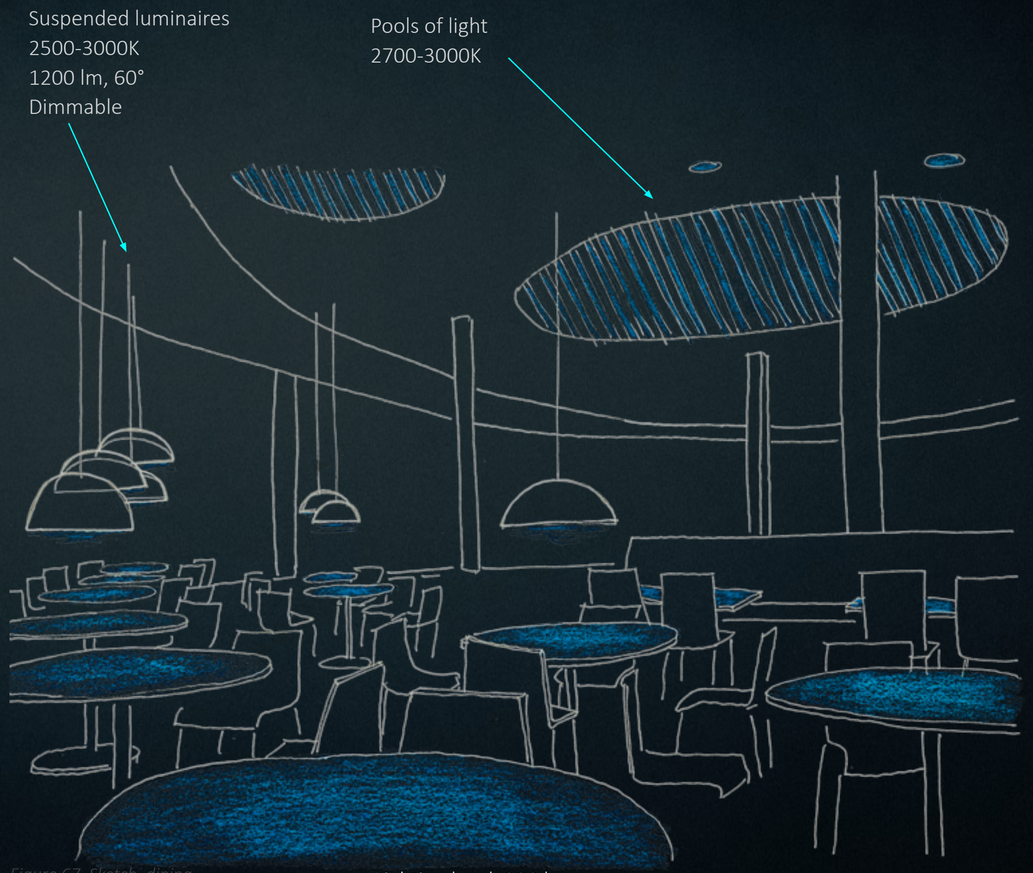


Figure 67. Sketch, dining.

Lighting level 200 lux

Figure 68. Diffuse light from ceiling.

Figure 69. Dual color LED strip.

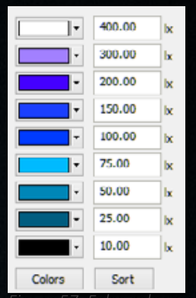


Figure 57. False color scale.

Figure 70. False color rendering of calculation. Suspended luminaires are introduced for the dining area to create sense of privacy and decrease the scale of the space and bring the light closer to the diners.

4.7 Lounge

The lounge area is very similar to the dining. The difference is the height of the light source. Lounge area will have floor standing luminaires. The luminaires are to reduce the scale of the space, to create atmosphere and privacy to the customers occupying the spot. The luminaire could be tunable white but for lounge even fixed 2700 K could work.

Illuminance level is around 200 lux and has the possibility to be dimmed down. Lighting control system is DALI. The luminaires would be quite close to the setting and there is one for each table. The color rendering does not necessarily need to be as high as for dining.

The floor standing luminaire will be similar to Sampei by Davide Groppi (figure 78) and will be designed in the design development phase of the project.

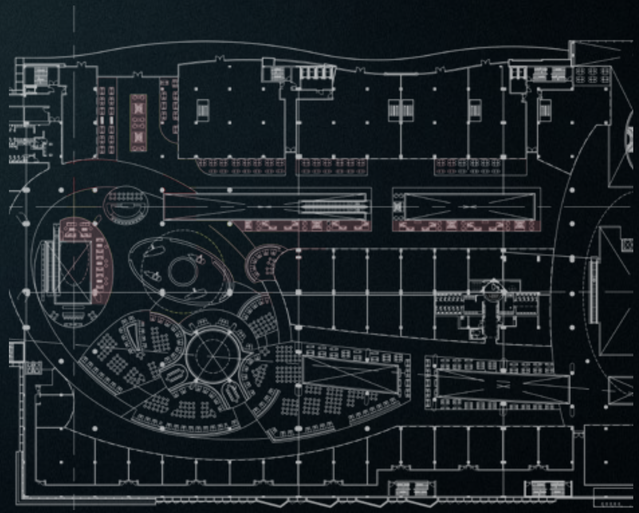


Figure 77. Keyplan, lounge locations.

Figure 78. Reference image: Sampei floor standing luminaire, Davide Groppi.

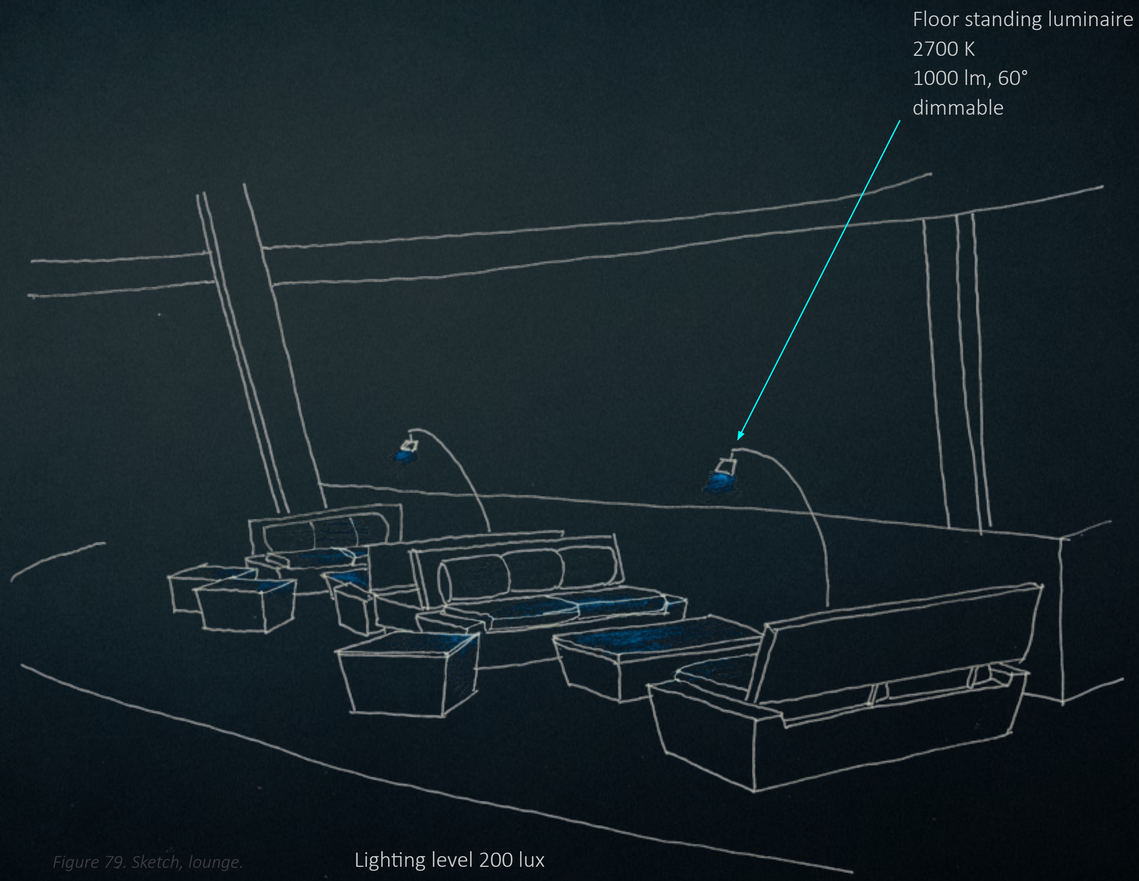


Figure 79. Sketch, lounge.

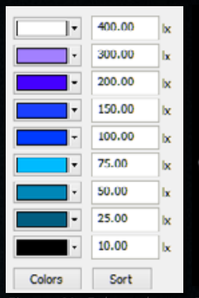


Figure 62. False color.

Figure 80. Retrofit LED lamp.

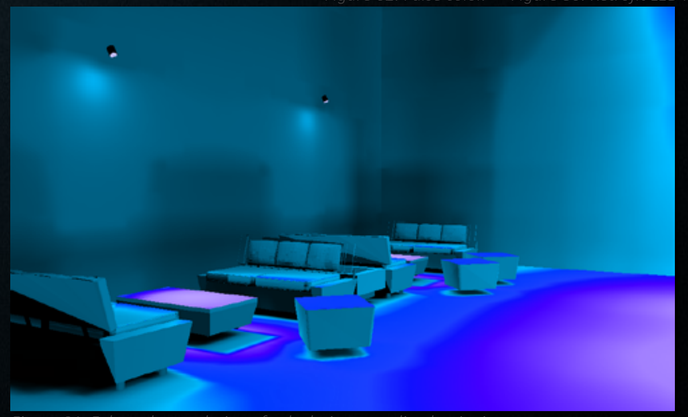


Figure 81. False color rendering of calculation, standing luminaires.

4.8 Kids' area

The aim is to provide adequate lighting for children to play and also to highlight the structure and bring out the shapes of the safari animals in the area. For this area it is important to take care of the glare the luminaires might cause. This can be done for example with honey comb accessory applied to the fixture.

The main lighting tool will be downlights that are directed to cover the horizontal surfaces. The light distribution is narrow so that playful spots on floor will be created. The color temperature would be fixed to 3000 K. The area will have average 200 lux on the floor. Color rendering will be good, over 90CRI. Lights will be controlled with DALI system.

Lighting vertical surfaces generates impression of brightness. The structure will be grazed with LED strips from inside and the fence, that is bordering the play area, from outside. Lighting the structure from inside creates an interesting contrast with the outer surface. The circular holes are emphasized by the light.

The color temperature for LED strips is dual color 2700 K and 3000 K and it would follow the moods being low color temperature in the morning and evening and during the day 3000 K. Dual Color LED strip is DMX controllable.

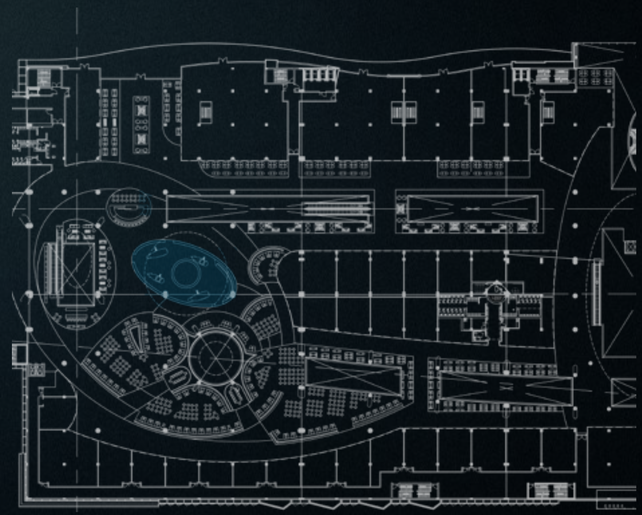


Figure 82. Keyplan, kids' area location.

GENERAL LIGHTING

Downlights, 3000K
3000 lm, 20°
adjustable
dimmable

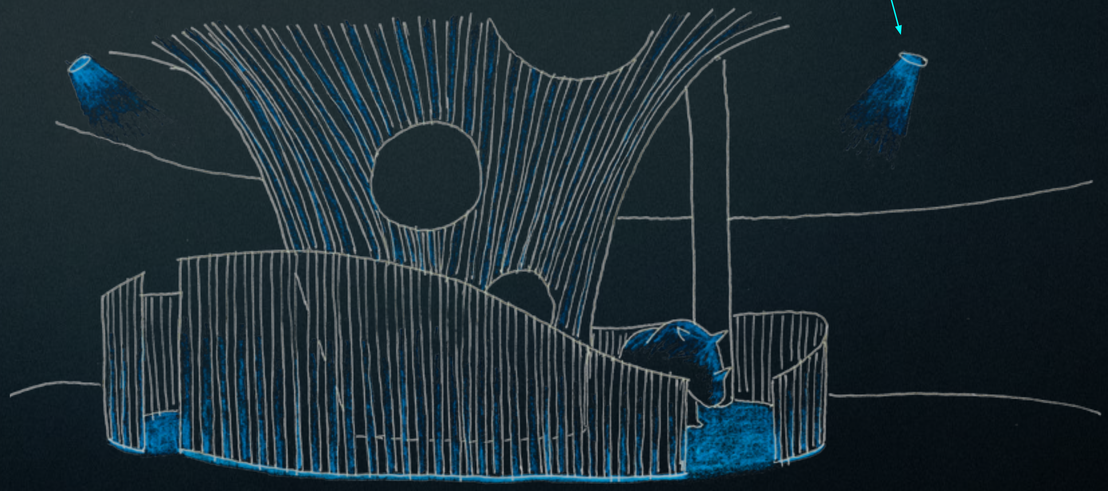


Figure 84. Sketch, kids' area.

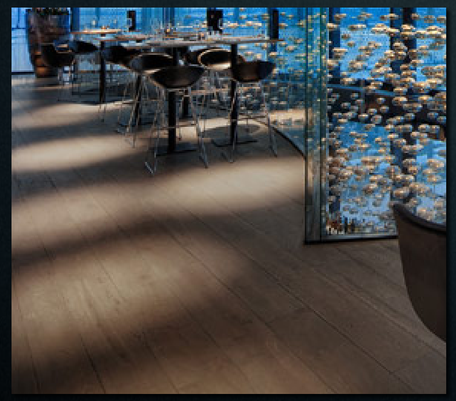


Figure 83. Spots on the floor.

Figure 85. Downlight.

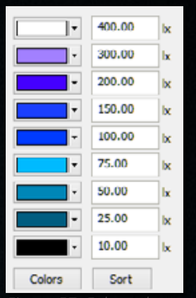


Figure 57. False color scale.

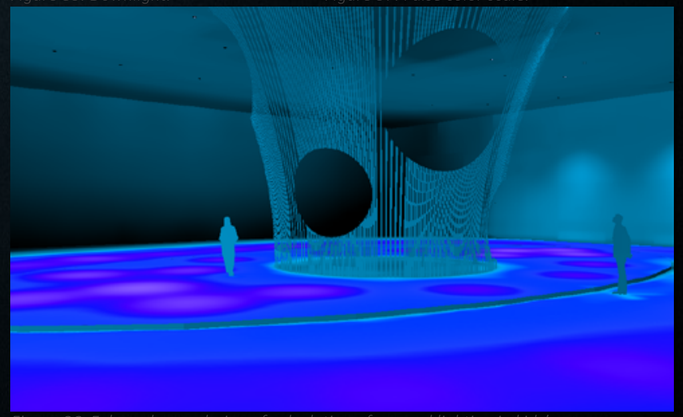


Figure 86. False color rendering of calculation of general lighting in kids' area.

Lighting level average 200 lux

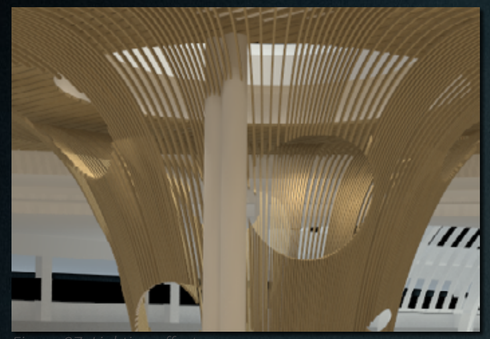


Figure 87. Lighting effect

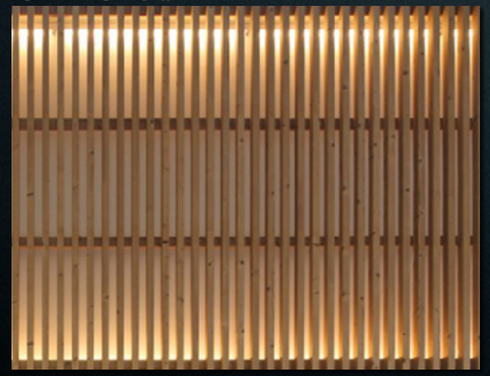


Figure 88. Lighting effect

LIGHTING THE STRUCTURE

2700 and 3000K
The structure will be lit inside creating interesting contrast with the outer surface of the structure and the circular holes that are revealing the light.

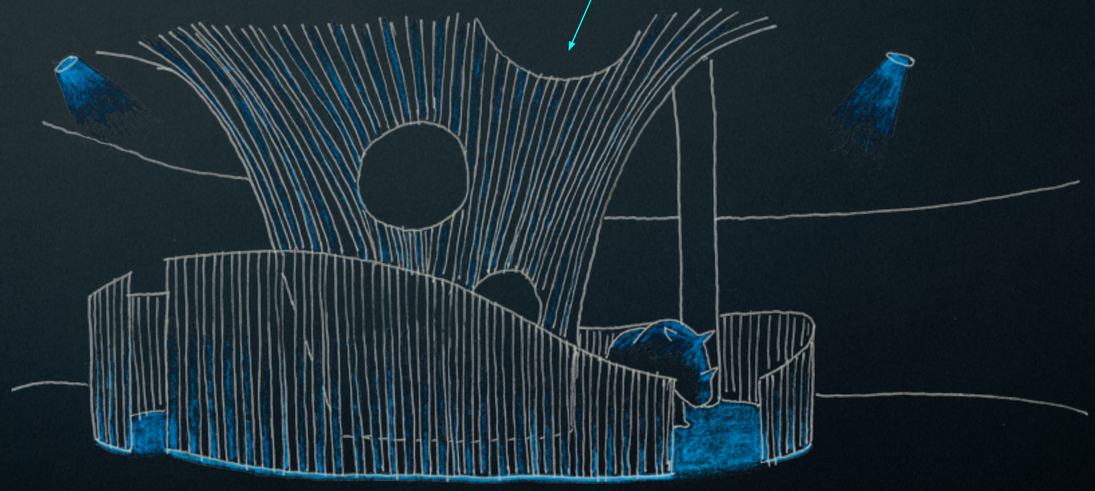


Figure 89. Sketch, kids' area.

2700 and 3000K
Fence lit outside with recessed LED strip bringing out the shape of the area.

Figure 69. Dual color LED strip.

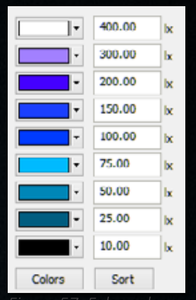
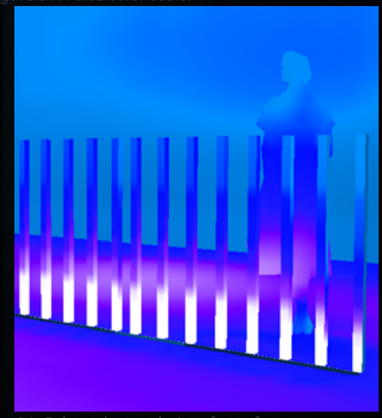


Figure 57. False color scale.

Figure 90.False color, structure from out.



91. False color rendering, fence from out.

4.9 Bar

The bar is not fully defined by the architect, therefore, the design presented here is only indicative.

The general working light in the bar will be realized with downlights. The downlight will be medium beam angle and 3000K as in the corridors. The downlights will provide light also on the tables close to the bar. As the bar is a working space the illuminance level on the counter should be 500 lux and otherwise 200-300 lux (Zumtobel 2013).

To draw attention to the bar and to highligths its position I propose a composition of suspended luminaires on top of it. The luminaire is the same as in the dining area and has the same idea of a composition of different sized luminaires in different heights. There is no need for tunable white option for the luminaires in this area.

Figure 92. Keyplan, bar location.

Figure 66. Reference image: suspended luminaires

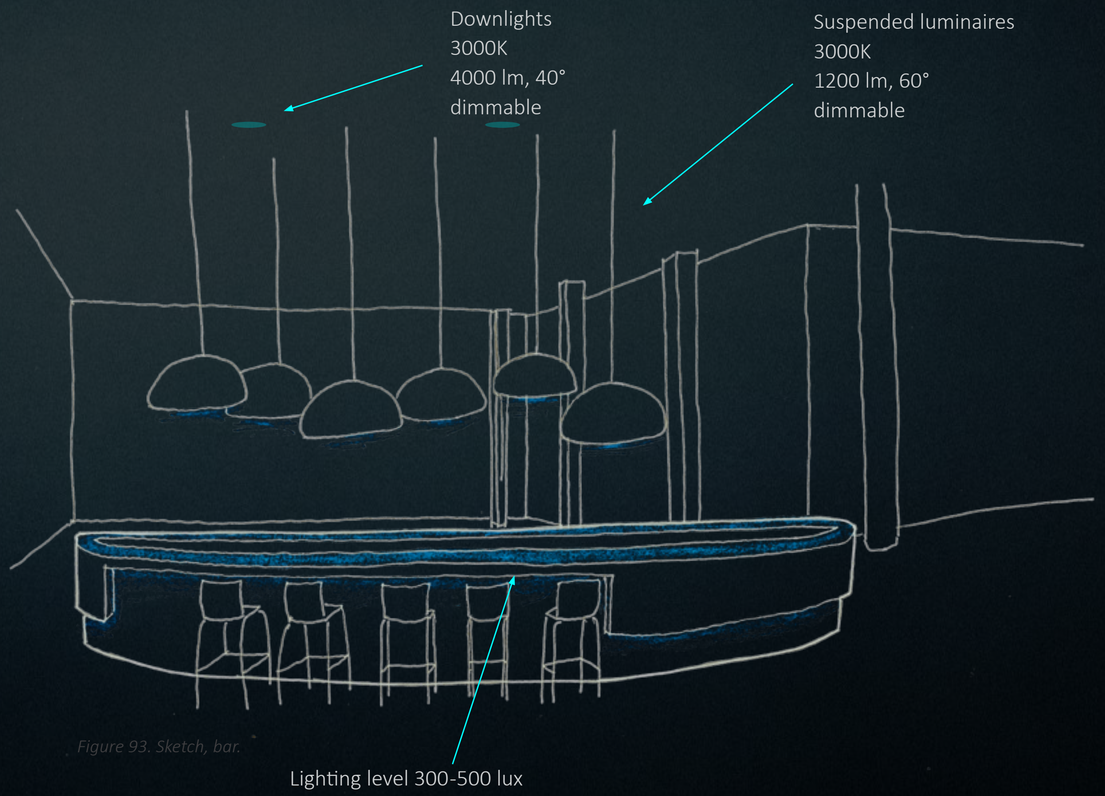


Figure 93. Sketch, bar.

Figure 56. Downlight.

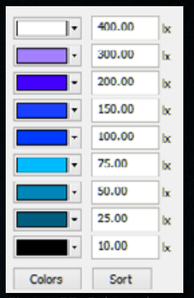


Figure 57. False color scale.

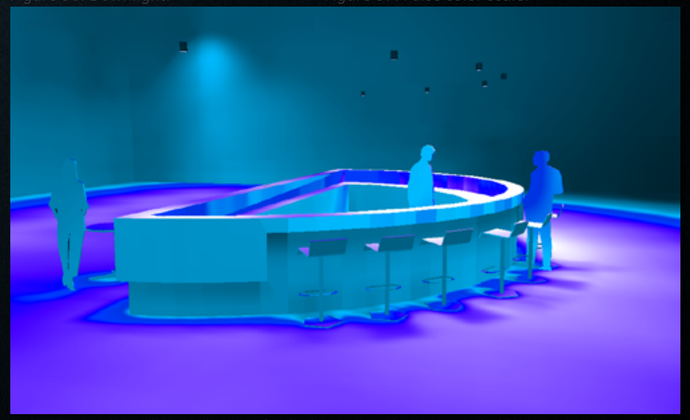


Figure 94. False color rendering of calculation. Bar has suspended luminaires on top of it to highlight its position.

4.10 Cove lighting

4.10.1 SKYLIGHTS

The three skylight cove lights will be color changing luminaires creating gradient color towards the skylight.

The light intensity are quite high so that the effect could be seen also in daylight. The luminaires are placed close to each other, 30 cm, in order to have continuous light.
The luminaires are places so that it grazes the surfaces from down. The luminaires are RGB and therefore they are controlled with DMX system.

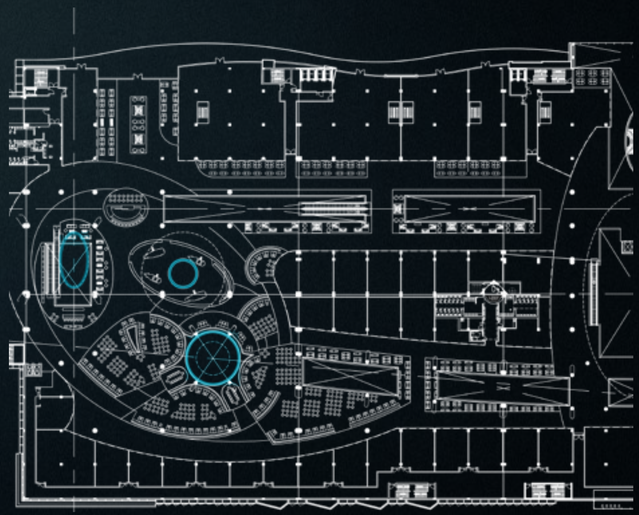


Figure 95. Keyplan, skylights locations.

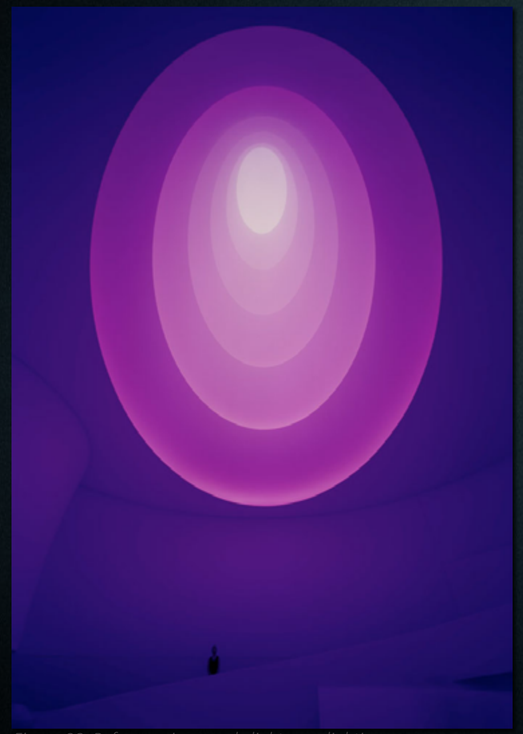


Figure 98. Reference image: skylight cove lighting.

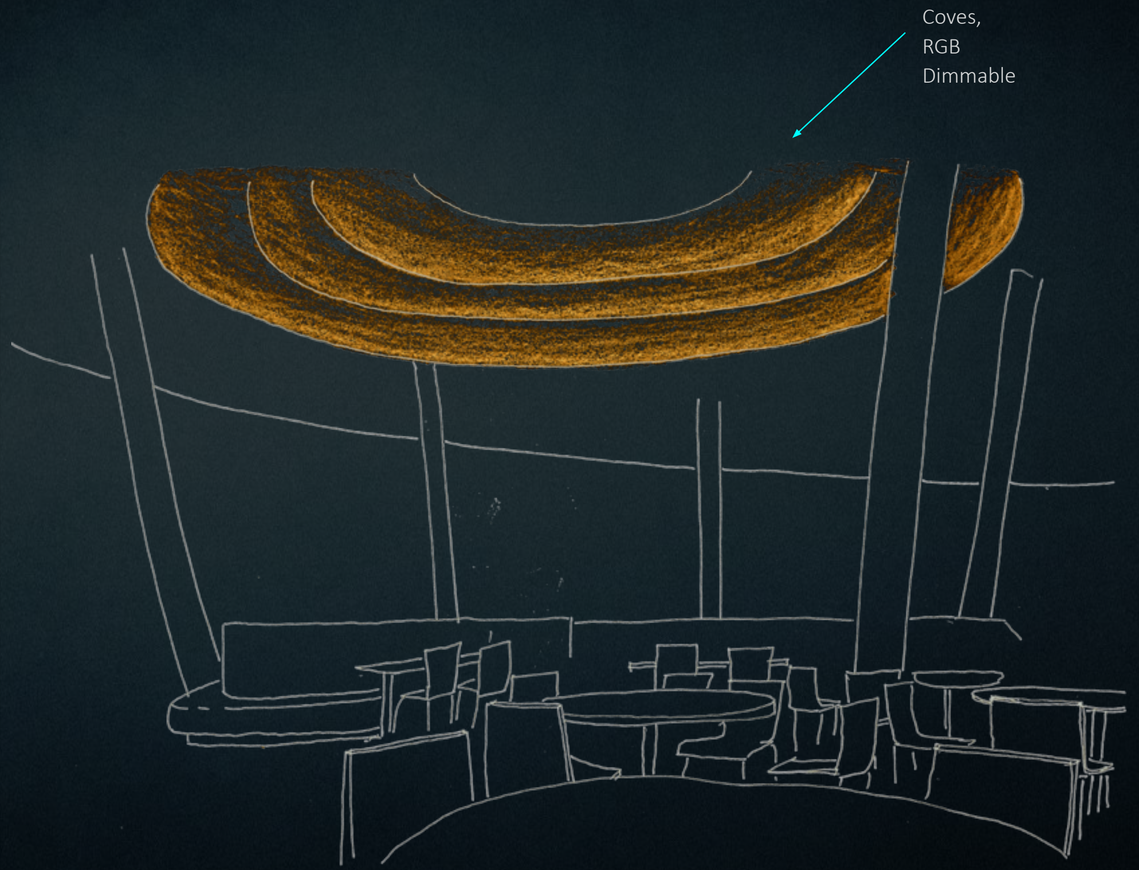


Figure 100. Sketch, skylight coves

Figure 97. Reference image: luminaire in cove. Realisation of the cove lighting on right.

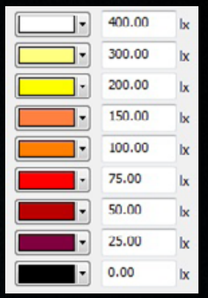


Figure 96. False color scale.

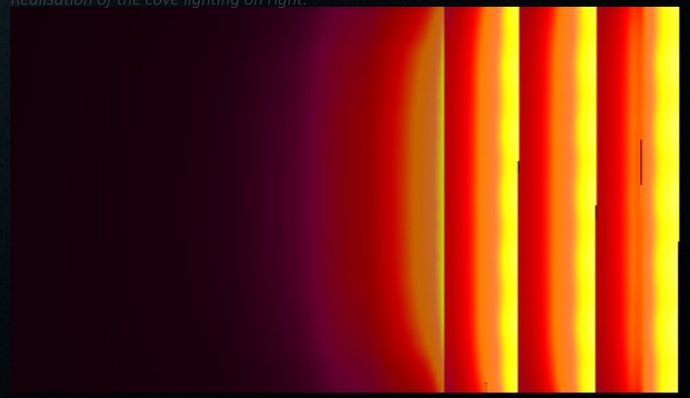


Figure 99. False color rendering of the coves. Aim is to have gradient color.

4.10.2 SHOP TOP COVE

There is a wavy decorative wall on top of the shops resembling the flow of the river alongside the shopping center. To get most out of the three dimensional pattern it should be lit. The wall is white and is therefore easy to alter with light.

It will be lit with white from the top and color from the bottom. The white light on top diminishes the effect in comparison to color light on top and creates beautiful hues with the color light and more sophisticated impression. The color light should still be strong enough to deliver intense effect.

The position of color light coming from down can be used in creating the moods to resemble abstractly the sunrise and sunset.

The color changing light source is DMX controlled. White light only needs the possibility to be dimmed down therefore DALI is enough for its control.

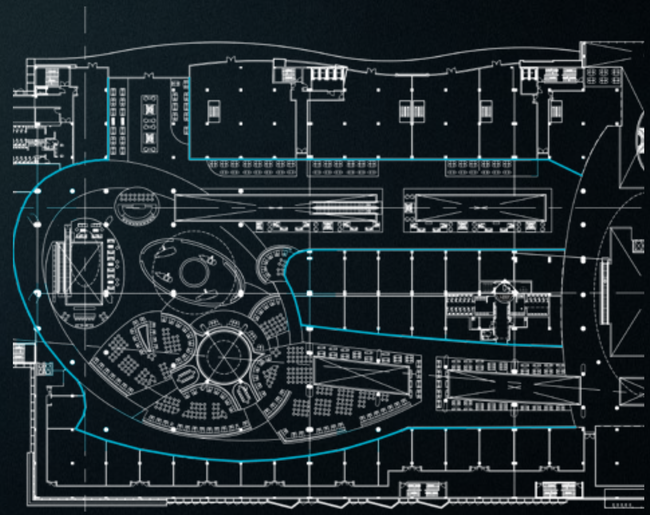


Figure 101. Keyplan, cove locations.

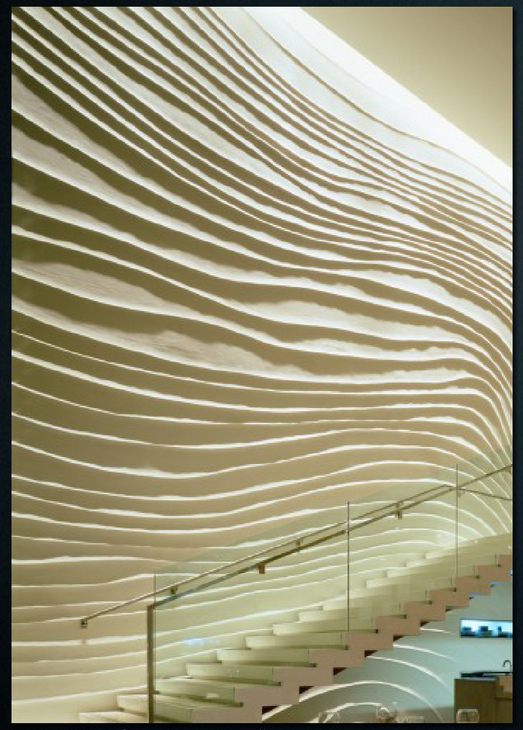


Figure 102. Reference image: wall grazing.

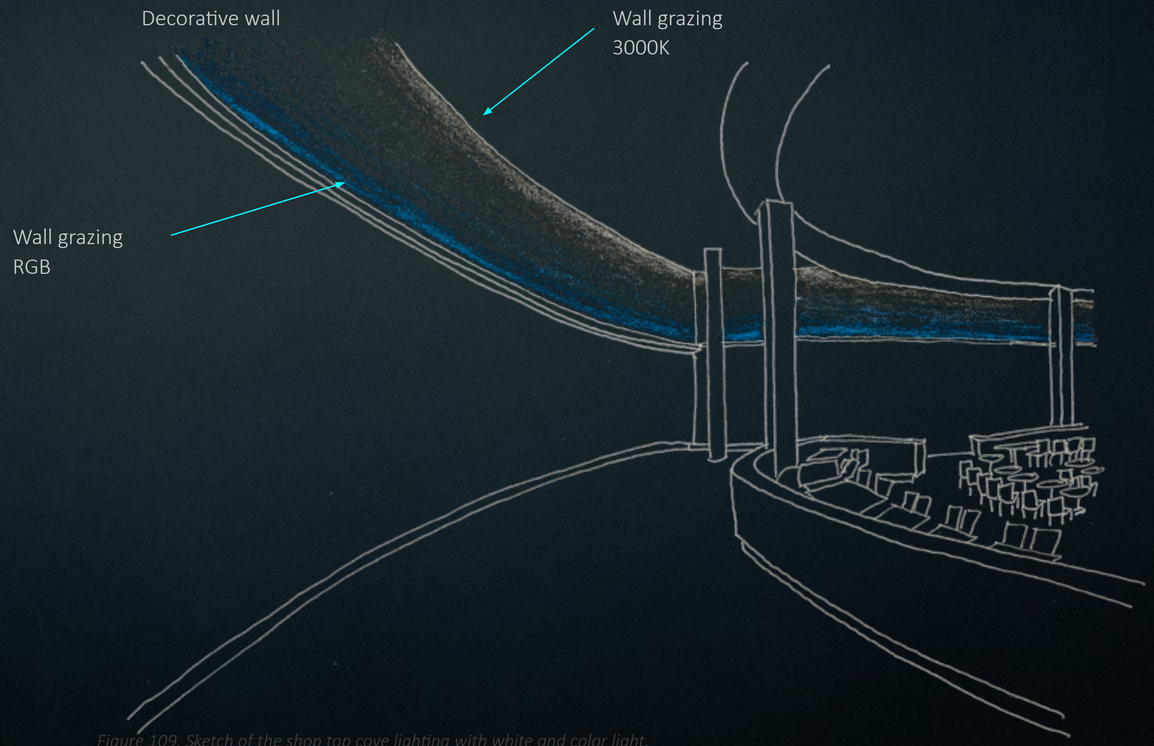


Figure 109. Sketch of the shop top cove lighting with white and color light.

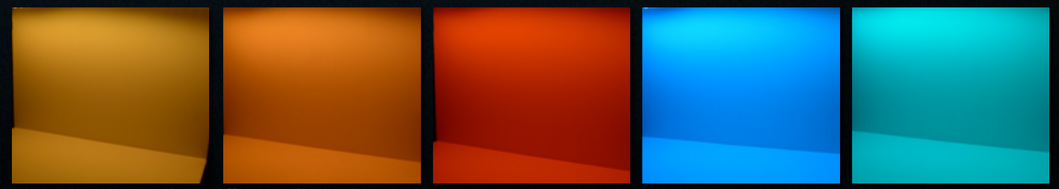


Figure 104-108. Mock-up: different colors with RGBW LED strip.

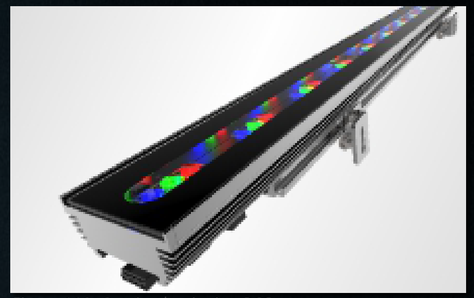


Figure 110. Grazing luminaire, RGB.

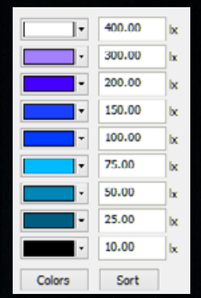


Figure 57. False color scale.

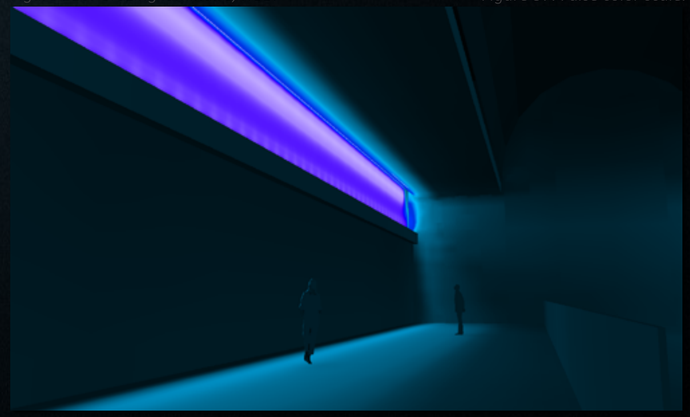


Figure 103. False color rendering of calculation. Light on top of the wall emphazises the height to the space.

4.11 Lighting control

As mentioned, all lighting typologies are either dimmable, color changing or both and requires a control system. Lighting control system provides possibilities for full control of lighting schemes.

Lighting control improves energy efficiency by for example dimming down lighting levels during the day when daylight is available. There are different types of lighting control systems. The control systems used in this project are DALI, that allows for complex lighting systems programming and combination, and DMX, for RGB color mixing.

I did not create complex lighting schemes for this project but there is the possibility for creating various lighting schemes for special occasions. The video shows an example of creative use of light through DMX control.

"Controls are to minimize energy use while delivering 'the right light, at the right time, in the right place"
(Horton 2015, 19).

Video 3. An example of a creative lighting using DMX lighting control. Plaisirs d'Hiver, ACT Lighting Design.

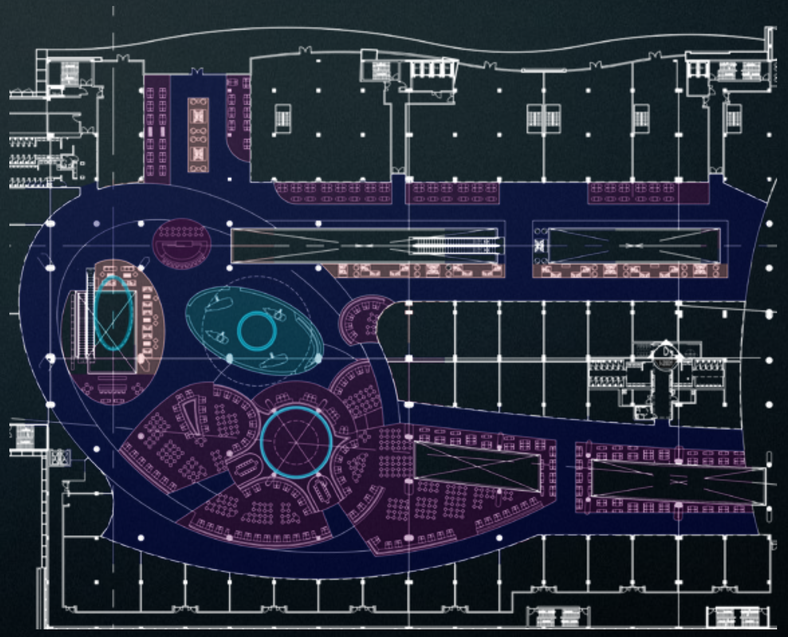


Figure 111. Lighting control groups.

DALI control groups:
1. Circulation
2. Kids' fence
3. Lounge
4. Kids' area

DMX control groups:
1. Dining downlights
2. Dining and bar suspended
3. Kids' structure
4. Skylights
5. Shop top coves

5. Conclusion

5.1 Executive summary
5.2 Conclusion and discussion

References
Visual references
Appendices
    Visuals
    Lighting fixture layout

5.1 Executive summary

The aim of this thesis was to design a flexible lighting solution creating a cozy atmosphere for the food court at Riviera Shopping Center. The project included concept and schematic lighting designs. The project was conducted in collaboration with a Belgian lighting design practice ACT Lighting Design.

In the first section of this thesis, the framework of this thesis, namely architectural lighting design, was introduced. Then, a further explanation of the architectural lighting design parameters followed that were used in the design process. The section also includes an indication of the importance of high quality design in food courts in shopping centers and the significance of light as a tool in achieving the aim of pleasant food courts. Relevant aspects of lighting design in food facilities were raised.

In the second section, the context of the project was introduced; Riviera Shopping Center. It included a brief presentation of the general architectural and lighting concepts and the food court.

The concept design presented in the third section of this thesis was then based on the research carried out in the previous sections. The lighting concept was based on the typologies of the space and was created by different layers in order to cover all the tasks in the space. Added value was achieved by introducing dynamic lighting solution. Different moods were created for the space using latest LED technology.

The fourth section then delved into the implementation of the concept. It included light source specifications, explanations and preliminary lighting calculations. The lighting fixture layout has been included as an appendix to further explain the luminaire arrangement in the space.

The project was carried out until the point where it would have been taken to the design development phase. The project is still on going and the solutions presented in this thesis will be partially applied. The project will be inaugurated by the end of 2015.

5.2 Discussion

Light is an important part of architectural design. It is a very delicate and powerful tool to design with. It plays a significant role in creating a mood, atmosphere and intimate feeling in a space in addition to the functional aspect.

There is no single correct lighting solution. In this thesis, I have presented a solution that is closer to a cozy restaurant lighting rather than a traditional, even lit food court lighting. The proposed solution is established through different lighting typologies, layers and moods in order to provide flexibility and various atmospheres to attract customers and to provoke the well-being of the visitors.

The aesthetic aim of the thesis has been met as the space is more interesting and bustling with the proposed lighting solution. Each task was considered separately providing better opportunities to cover the needs.

All products used are energy efficient and high quality luminaires and light sources. Anyhow, I have been pondering upon the choice of introducing more luminaires than what would have been possible in a regular case. I also thought of the reason for using diverse solutions and new technology that is still more expensive than standard products. I am certain of the lighting choice that I have made in the project as it brings so much added value to the space due to its complexity and flexibility.

In my view, this is only the beginning of discovering light and designing with it. The process showed me the importance of mastering a wide range of expressive tools in a design process. The project taught me the importance of observing and exploring our surroundings constantly and daring to try different options brings about the joy of discovering brilliant solutions.

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Figure 2. Ovo. ACT Lighting Design 2013.
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Figure 4. Kadena Shopping mall AB BX Food Court. UJ 2012. <www.texaninthephilippines.com/2012/08/21/
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Figure 6. Melbourne central food court. <benperman.com/2012/10/10/agency-feature-part-1-the-uncarved-block-melbourne-central-food-court>
Figure 7. Melbourne central food court. <benperman.com/2012/10/10/agency-feature-part-1-the-uncarved-block-melbourne-central-food-court>
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Figure 9. Graffiti Cafe. Design-Milk 2012. <design-milk.com/graffiti-cafe-by-studio-mode>
Figure 10. Fletcher Hotel in Amsterdam. KOLENIK eco chic design 2013. <freshome.com/2013/03/22/
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Figures 12-15. Photos of City 2 food court. Author's 2015.
Figure 16. Situation map. Author 2015.
Figure 17. Visual. 5+design 2014.
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Figure 20. Golden light. 5+design 2014.
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Figure 22. Section. 5+design 2014.
Figure 23. James Turrell: Stone Scape. Stone Scape 2015. <www.stonescape.us/property/skyspaces.html>
Figure 24. Paving plan. 5+design 2014.
Figures 25-28. Furniture examples. 5+design 2014.
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Figure 30. Paving examples. 5+design 2014.
Figure 31. Jim Campbell: Home Movies (1248) 2008. Bucknell University 2013. <www.bucknell.edu/news-and-media/2013/january/samek-art-gallery-exhibition-at-the-threshold.html>
Figure 32. Water light graffiti. Antonin Fourneau 2015 <bizbash.com/french-artist-antonin-fourneau-practices-water-light-graffiti-process/
gallery/130517#sthash.BEmUzB0k.Tujfqy0Q.qjtu>
Figure 33. James Turrel: Aten Reign in Guggenheim museum in New York in 2013. Out of the Yards 2015. <www.outoftheyards.com/james-turrell-aten-reign-guggenheim>
Figure 34. Typologies. 3D model by 5+design, modified by author 2015.
Figure 35. Typologies plan. Plan 5+design, modified by author 2015.
Figure 36. Typologies schematic section. Author 2015.
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Figure 51. Visual of the space in daylight. Benjamin Callaert 2015.
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Figure 55. Circulation sketch. Author 2015.
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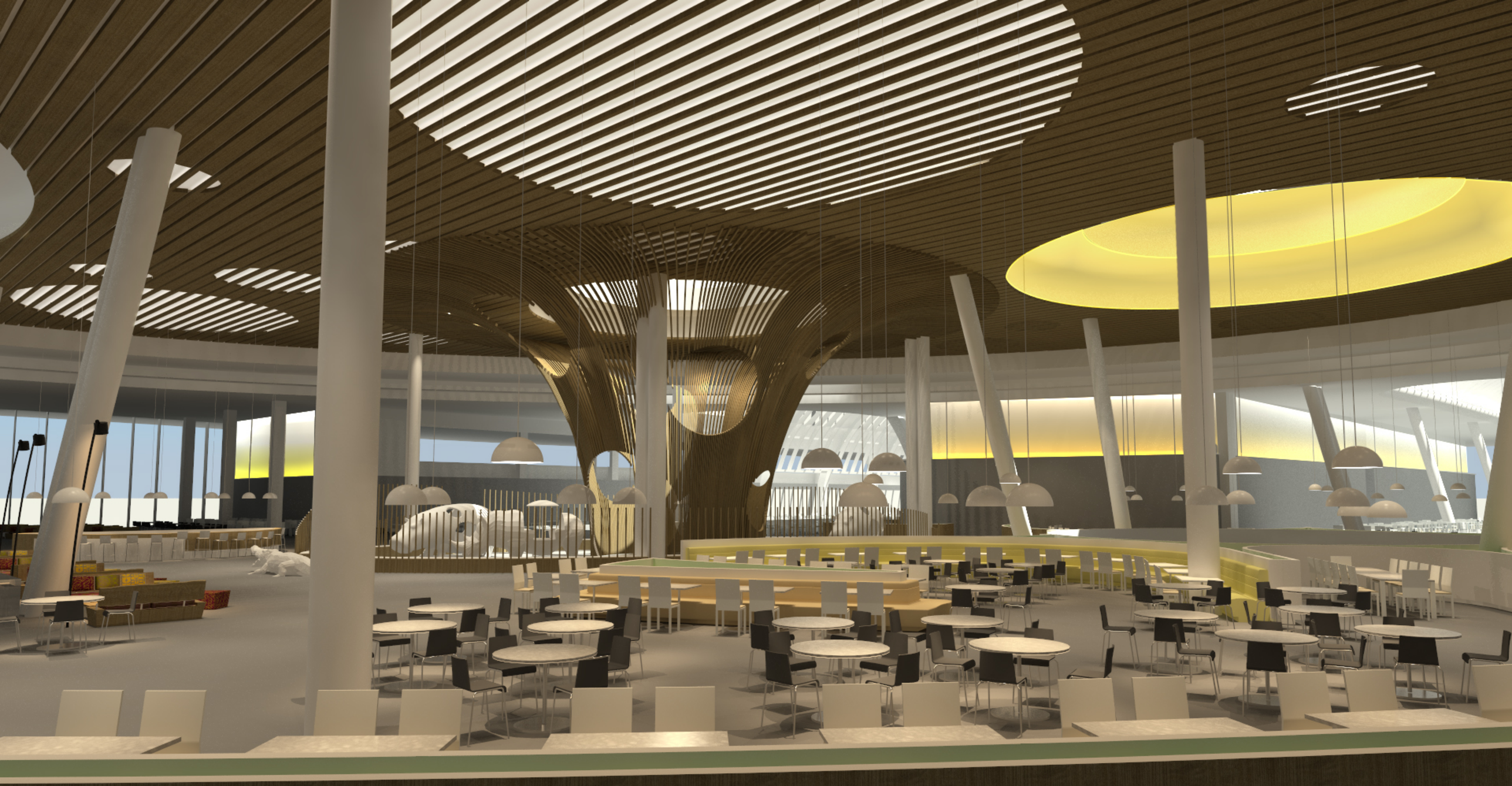
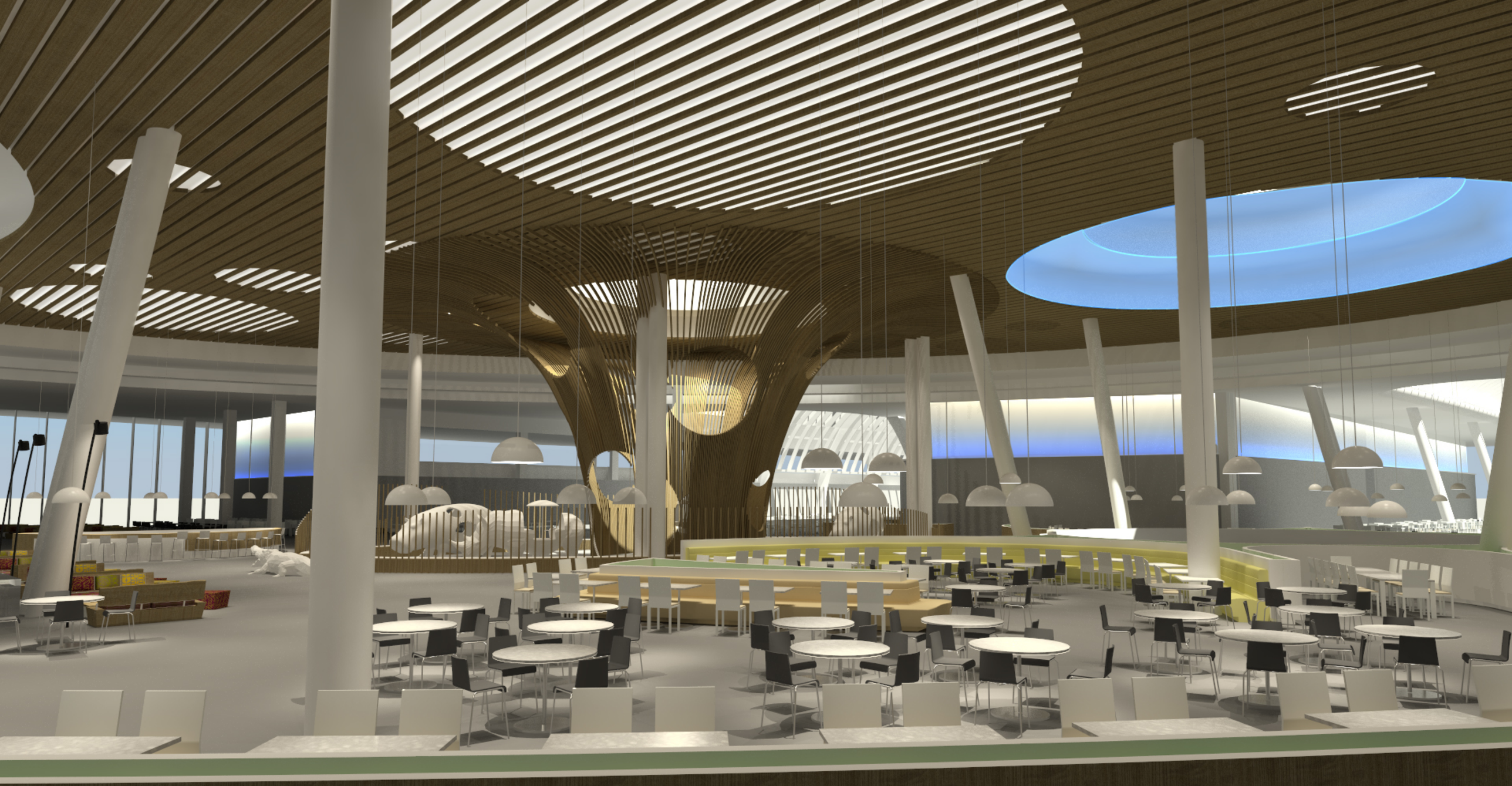
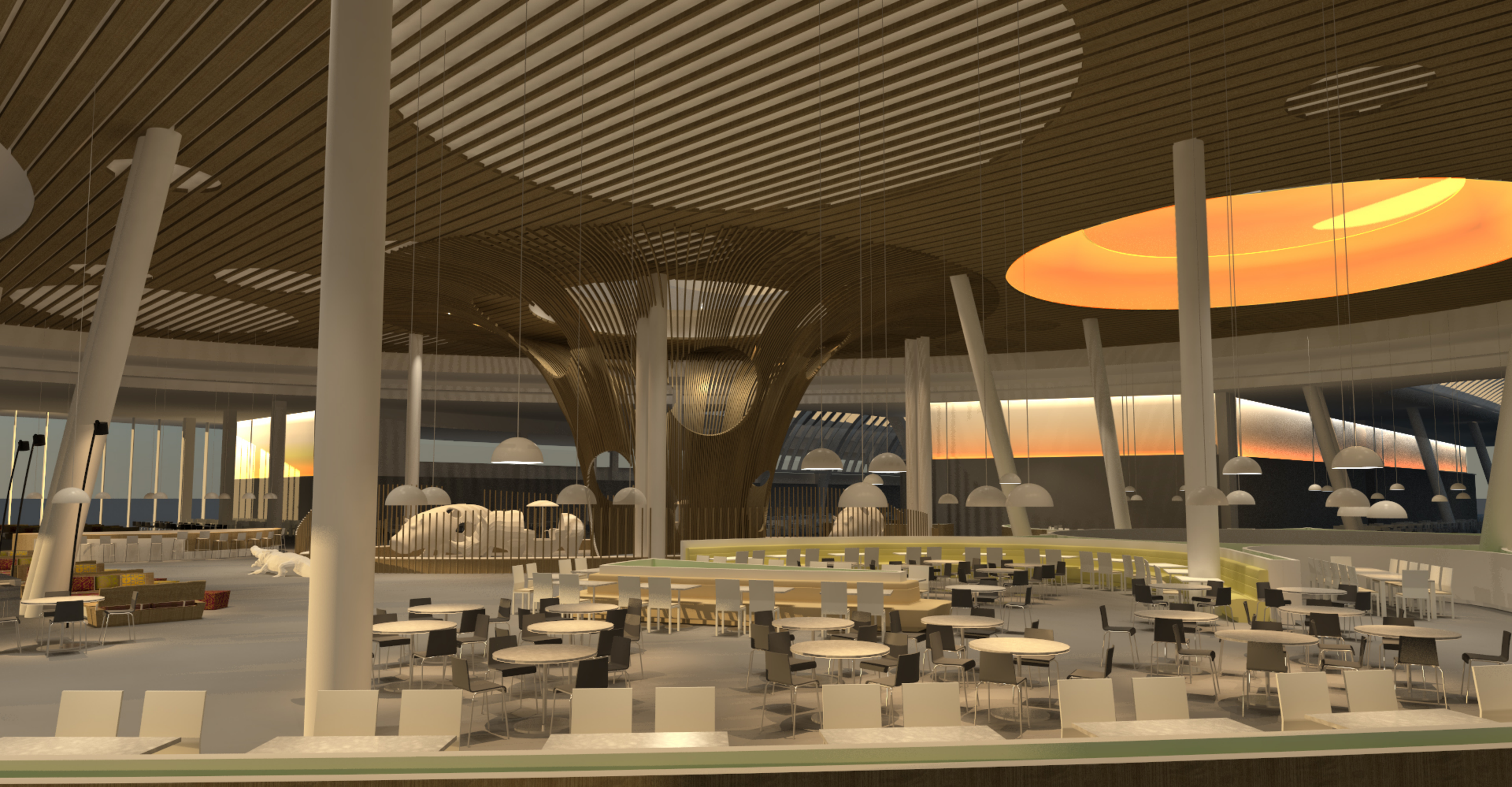
Figure 62. Dining sketch. Author 2015.



Appendix 1. Morning time mood.

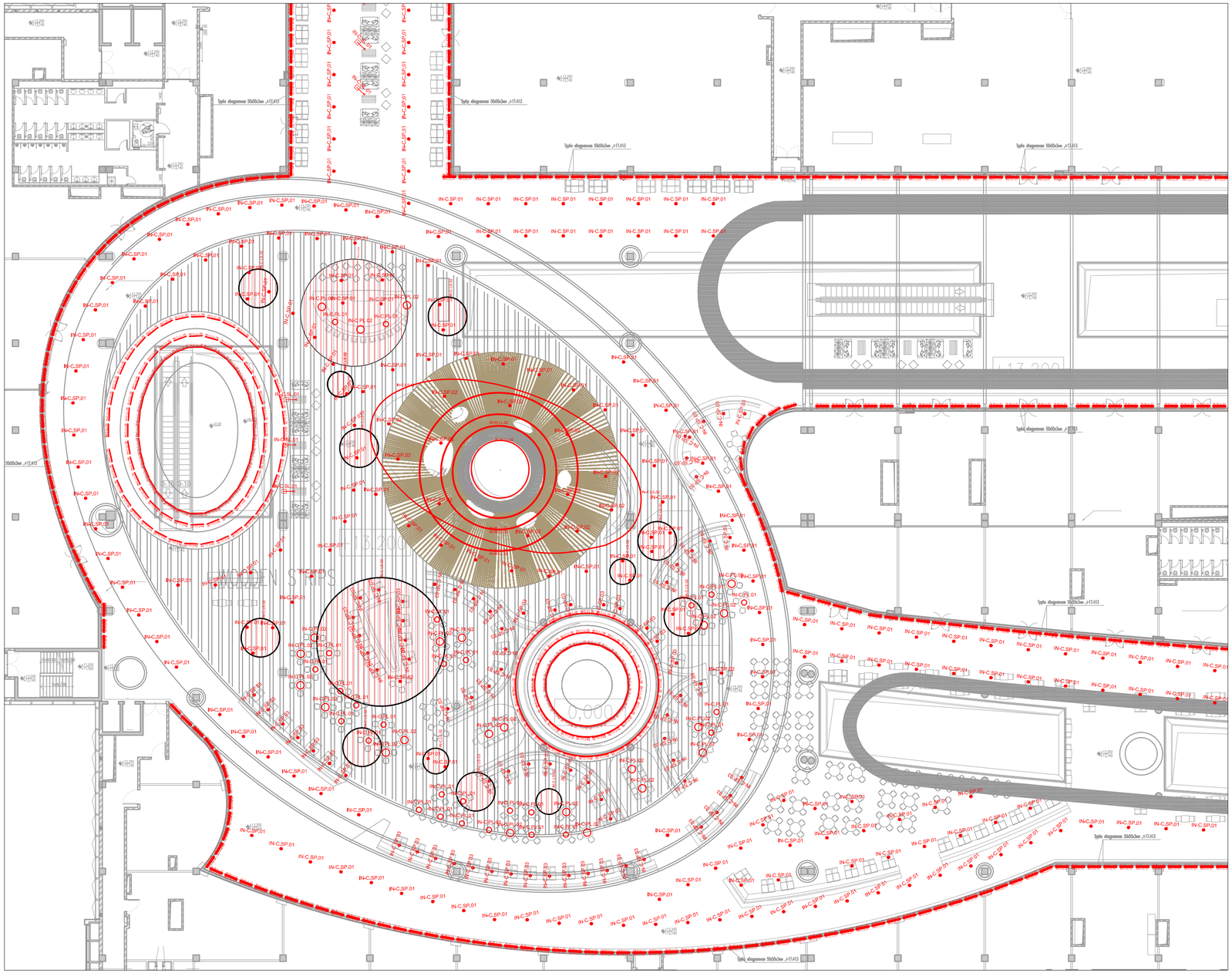


Appendix 2. Midday mood.



Appendix 3. Evening mood.

Appendix 4. Lighting fixture layout



Legend	
Preview	Description
IN-C.SP.01	Downlight, 40°
IN-C.SP.02	Downlight, 20°
IN-C.SP.03	Downlight, 10°
IN-C.PL.01 IN-C.PL.02	Suspended luminaire
IN-C.SL.01	Standing luminaire
IN-W.LL.04	Grazing Light, white on top cove, RGB on lower cove
IN-C.LL.06	Skylight cove light, RGB
IN-C.LL.08	Skylight cove light top, RGB
IN-W.LL.02	Led Strip in structure
IN-F.LS.02	Led strip, recessed
IN-C.LS.02	Led Strip - Pool of light

PROJET: Riviera Shopping Mall, Moscow, Russia	TITLE: L03 +13.200 FOOD COURT		DATE: 2015/04/20	STAGE: SCHEMATIC DESIGN	CONSTRUCTION:
		A FOOD COURT SCHEMATIC DESIGN 2015/04/20	SCALE: 1:350. A3	DRAWN: IIRIS ROUSKU	

ARCHITECT: 5+design, 1024 North Orange Drive, Suite 215, Hollywood, CA 90038, T. 323.308.3589, F. 323.308.3557, www.5plusdesign.com

LIGHTING DESIGN: ACT LIGHTING DESIGN, Av. Wielemans Ceuppen 45 1190 Belgium, + 32 2 340 60 30, www.actlightingdesign.com