Zorlu Center Architecture and Urban Design Competition



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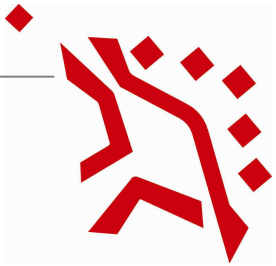
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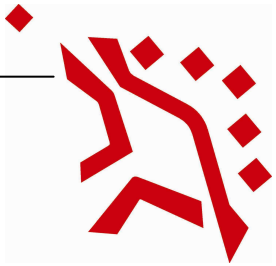
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Introduction

When Istanbul is the "Cultural Capital of Europe" in 2010 special attention will be on the question how this unique metropolis with its rich urban and cultural heritage is managing the transition into the 21st Century.

In the course of history Istanbul has grown from an ancient metropolis to a modern megacity. It faces the same problems of megacities worldwide: Heterogeneity, loss of urban space, out-of-control growth, infrastructure problems and environmental pollution that substantially affects the quality of life.

With our design we would like to give a suggestion on how to reconcile necessary urban density with the human need for quality of life and quality of place and on how to responsibly build a vital piece of the city.

In the following we will present our analysis of the situation and give a brief outline of our strategic approach.

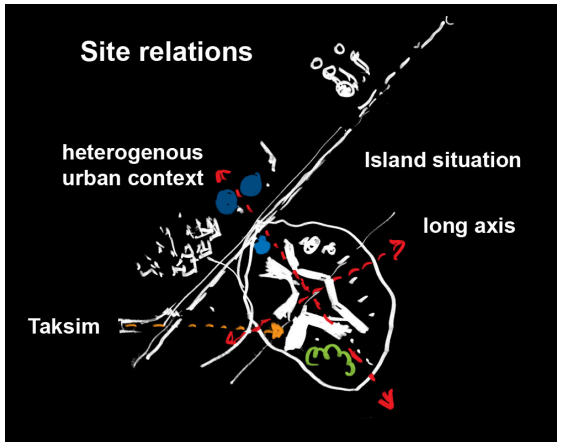
1 . Urban Analysis and Strategies

1.1 Island

Analysis

Although the property is at a central location within the city it is an island. It is surrounded by major transportation axes, however its only access to the city is on the north and west sides.

Residential developments (bedroom communities) are located to the east and south. The overall surrounding urban texture is inhomogeneous. Due to the major transportation routes passing along the western side of the area there are no direct neighbours to the west.



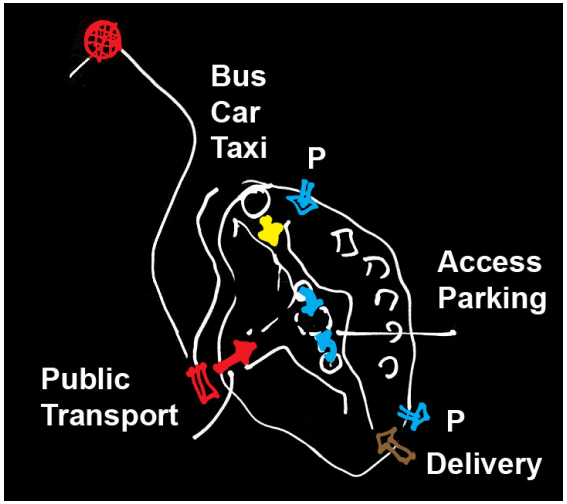


Strategy

The key to the solution is to accept the island situation and take advantage of it. Zorlu Center will be a protected and self-sustaining environment that reaches out and establishes numerous actual and metaphorical links with the city.

A series of commercial, cultural and social venues will generate a continuous stream of visitors from the outside. Zorlu Center will be a destination for all of Istanbul, adding an exciting and attractive new public space to the city.

The center will connect and reach out to the proximate environment and transportation network. The pedestrian bridges that are part of this scheme are a physical and a visual manifestation of this connection. The overall accessibility of the site will be substantially improved by various infrastructure measures.



1.2 Plateau

Analysis

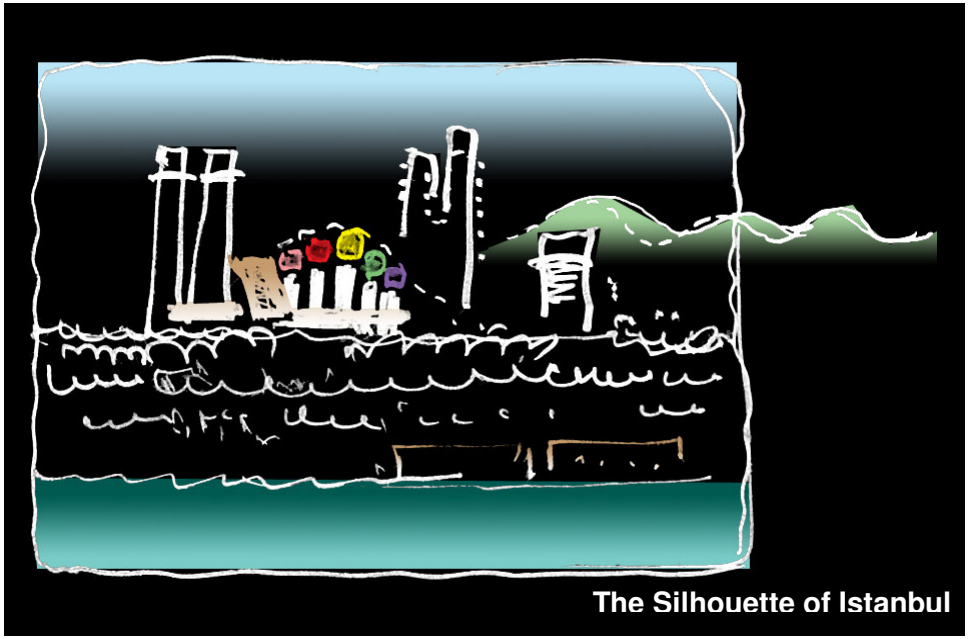
The topographical situation of the site being a raised plateau overlooking the Bosphorus offers a potential for spectacular views from all points. The topography also makes the property a highly visible and prominent part of the cityscape.

Strategy

Zorlu center seeks adequate presentation in the cityscape. It will reflect its 21st century origin and show innovative character. It will have an attractive and positive impact on the city silhouette. Shape, colour and light will create a sense of identity for inhabitants and visitors alike. The composition of the high-rise ensemble is a tribute to the hilly landscape of Istanbul.

In order to maximise views for all inhabitants the residences are constructed as high-rise buildings that are carefully arranged at the back of the site - each offering the best possible views without obstructing the other. A low-rise scheme could not possibly achieve that.

The perceived building mass is substantially reduced by utilising the slightly sloped topography.


The Silhouette of Istanbul

1.3 Site at the Intersection of Major Transportation Axes

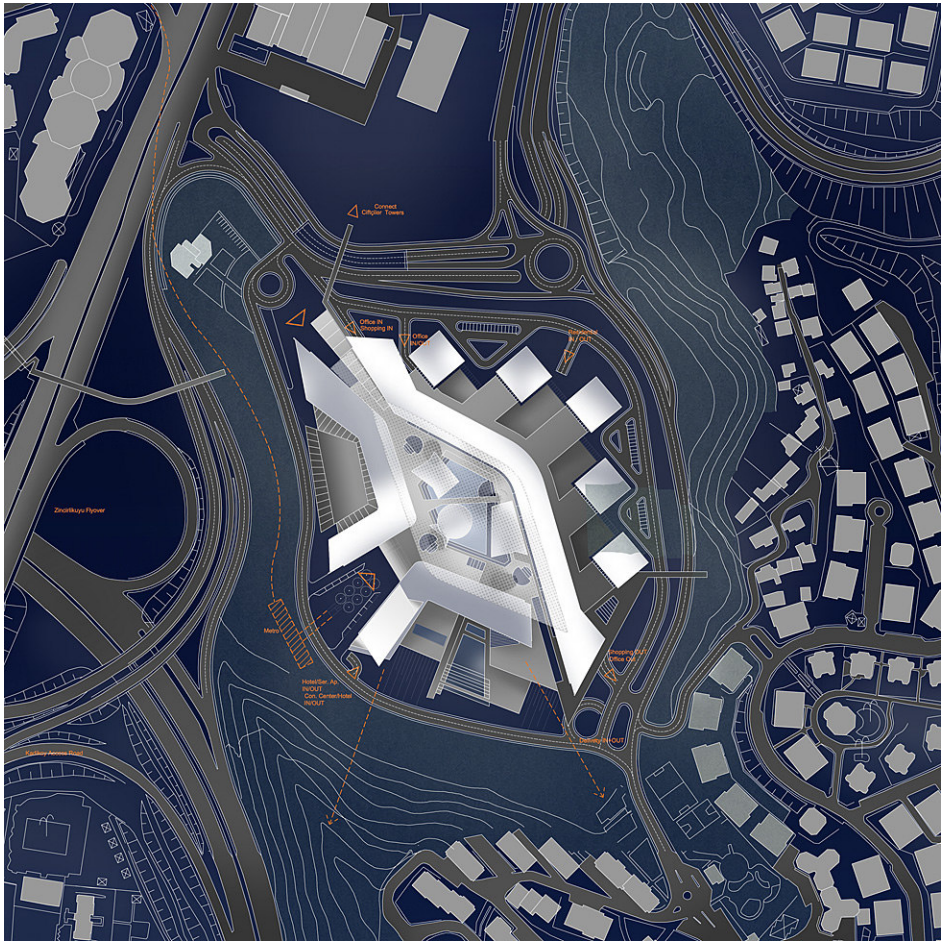
Analysis

Vital transportation axes pass near the plot, they have to continue to function. At the same time accessibility to the site has to be improved.

Strategy

Traffic flow is kept at the perimeter of the site – except for underground parking there is virtually no vehicle traffic on the inside of the complex.





1.4 Gateway to the New City

Analysis

When coming from the city center the complex marks the beginning of the Central Business District. Every day at least half a million people commute across the Bosphorus bridge and pass the Zorlu Center site.

Strategy

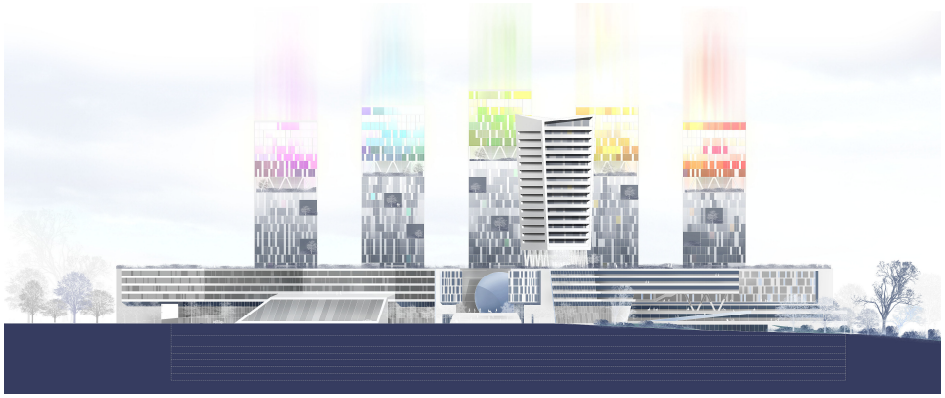
Create a landmark that is visible in an urban scale and that underlines the unique location.

1.5 Dialogue and Assertion: Integration into the Urban Fabric

Analysis

The site is surrounded by a heterogeneous mixed-use urban fabric on the north and west side and by a rather homogeneous residential area on the east and south side. The obtrusive silhouette of TAT towers rises in the northwest almost dwarfing the former General Directorate of Highways building in front of it that falls under the scope of conservation legislation.







Strategy

Establish a group of 5 high rise buildings which as a group assert themselves in the skyline against the other high rise buildings without necessarily having to top their height. The additional high-rise of the serviced-apartment building in front of the complex complements the group of the 5 residential towers and defines the area of the Zorlu Center adding a sense of depth.

The main axis of the complex is orientated towards the former General Directorate of Highways building. The building becomes part of the overall urban design scheme through the opening gesture of the new buildings. Its importance is emphasised by its unique standalone position.

The new residential buildings have a counterpart with the existing residential developments across the street.

1.6 Human Scale

Analysis

Istanbul is a megacity with a heterogeneous urban fabric. Besides the old town island-like and dense areas are characteristic for the city.

Strategy

To create a protected urban space that sets its own scale. A human scale is maintained while alternating the height of the buildings. The central urban plaza is surrounded by low-rise buildings. The number of storeys increases out of the sight of pedestrians.

The new public space is covered providing a sense of protection and identity, an oasis inside the city. The complex will be attractive for visitors and provide a high-quality living environment for the inhabitants.



2 . Design Idea and Concept

The main idea is to create a building ensemble around a central urban space. With unique character it will make Zorlu Center one of the city's main attractions, an urban forum for the citizens of Istanbul and visitors from all over world.

Longitudinal structures establish a sense of dynamics and modernity and draw the visitors to the inside of the complex where a broad range of attractions awaits them.

The public buildings are grouped around the central space and are connected by it. The residential buildings are positioned with a little more distance to this space around city-oases that have a more private feel.

The entire complex is connected in all directions with bridges and crossovers. It is interwoven with the surrounding greenspace and opens up towards a panoramic view of the Bosphorus to the south.

2.1 North Entrance

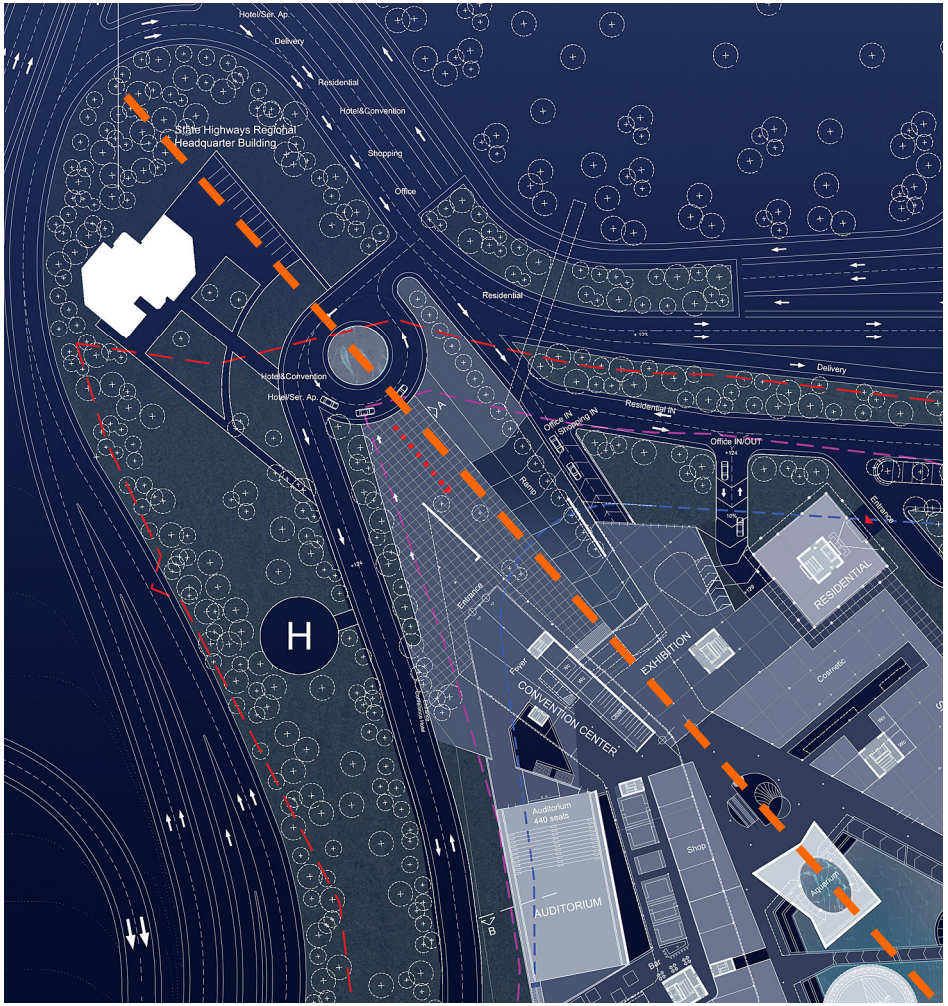
The north entrance area is the introduction to the site and the main distribution point. It establishes a shared urban space with former General Directorate building and is the gateway to the complex.

2.2 Main Axis and Urban Diversity

From the entrance the visitor reaches an elevated plane that puts him above the busy traffic flow around the site.

The prevailing direction of the complex is marked by a central axis with a northwest-southeast orientation. Along this axis bent linear buildings create diversified urban spaces. The narrowing and widening of spaces that comes with the curved form of the buildings creates a multitude of different spatial experiences for the visitor. Towards the end of the axis the complex opens up an "urban window" towards a magnificent view of the Bosphorus, embedded in the pleasant green of the landscaping.





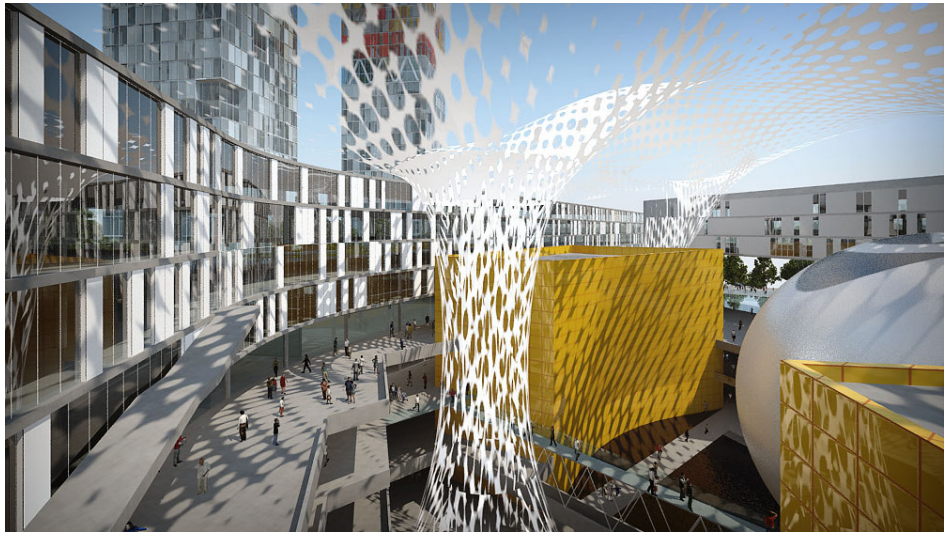
2.3 Central Urban Space

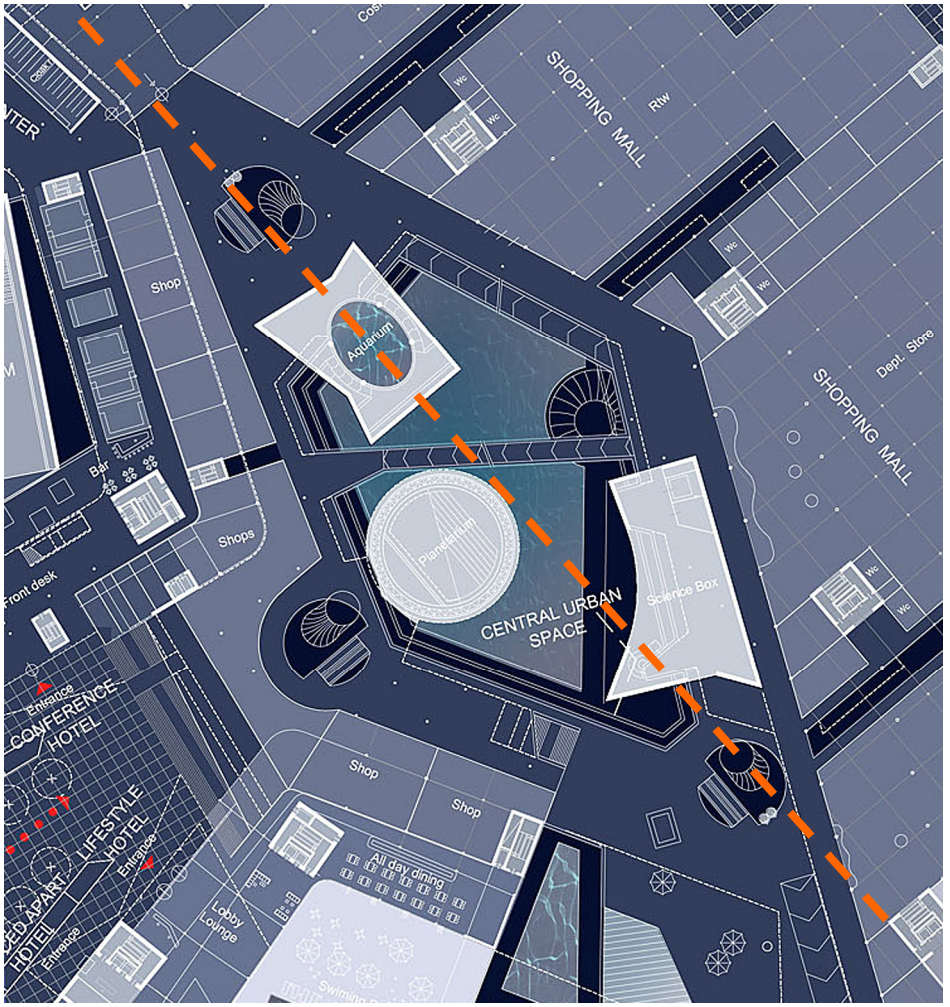
The internal courtyard of Zorlu Center is also the center of all cultural and commercial activities on the site. It is conceived as a large urban space for a great number of visitors and special events.

It is a point of orientation connecting different levels with escalators, ramps bridges and elevators. A sunken plaza in the middle is surrounded by galleries, providing day light and fresh air for the lower levels.

Aquarium, planetarium and science box are the designated functions located in single buildings along a central lake. These buildings define subspaces and thus provide a sense of place at a human scale.

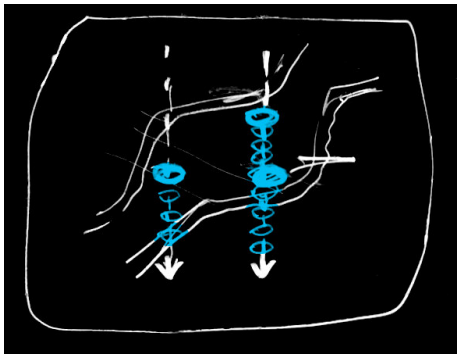
The Science Box displays hands-on examples of emerging technologies addressing today's challenges of growth and sustainability. It shall arouse the visitor's interest in science and engineering and underline Zorlu Groups role as a responsible technology leader.

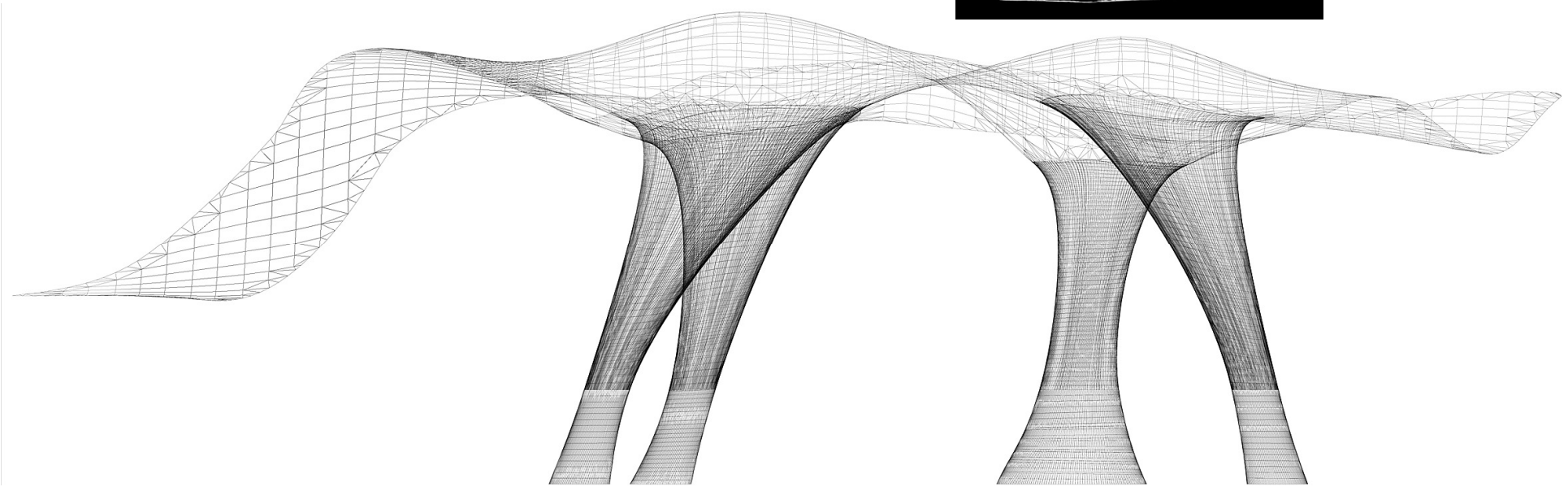




The scientific and educational theme at the heart of the complex is intentional since it is more than just a purely commercial development.

It is expected that these functions will appeal to the population of Istanbul, since they are not offered anywhere else in the city.





The central urban space is covered by a perforated translucent roof of alternating height and curved forms. On the roof photovoltaic-modules are used as shading devices. It is possible to see the sky and take advantage of the day light on one hand and be protected from sun, rain and snow on the other. The shell like roof seems to float over the urban space without connecting to the adjacent buildings, thus the natural circulation of air is preserved.

2.4 West entrance and Hotel Plaza

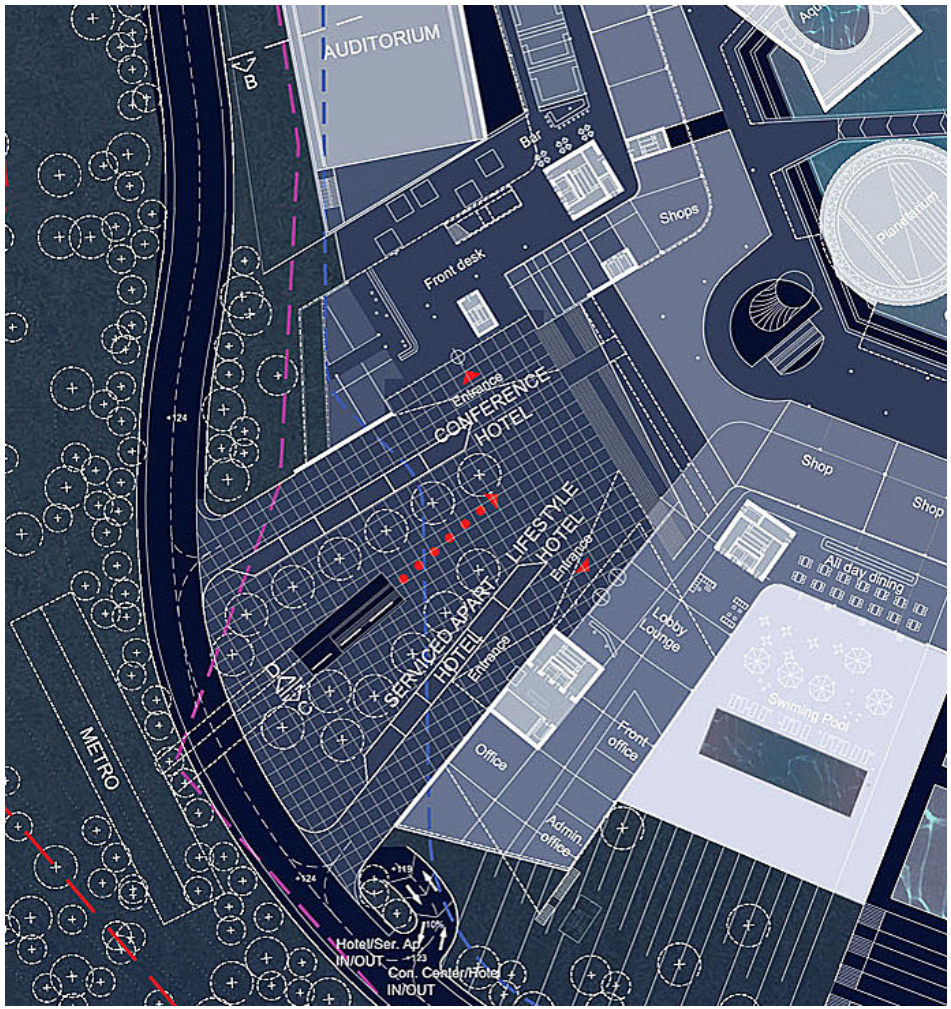
The hotel plaza is the western entrance to the complex. Here visitors using the new Metro Shuttle connection coming from Gayrettepe station arrive at Zorlu Center. Just like at the main entrance two buildings create a gateway situation to the inside of the complex with a narrowing passage that leads up to the main level. The drop-offs and entrances to the conference hotel and lifestyle hotel are located here providing easy visitor access for both hotels.

2.5 Convention Center and Conference Hotel

The convention center is oriented towards the entrance plaza on the north and to the green belt on the west side. It is embedded in the U-shape of the conference hotel.

The building mass rises out of the green belt and forms a hill in the courtyard of the hotel. Due to its nature as conference hotel with frequently changing guests it is placed on the busiest corner of the complex.





2.6 Life Style Hotel and Serviced Apartments

The Lifestyle Hotel accommodates guests seeking relaxation and sophisticated enjoyment rather than business travellers. The associated Serviced Apartments are reserved for long time guests who prefer the amenities offered by a hotel.

The buildings occupy the most attractive spots on the site. At this point the inner courtyard is situated at the Park, slowly terracing down into the surrounding landscape. All rooms command an excellent view of the Bosphorus. The serviced apartment tower is a highly visible landmark.

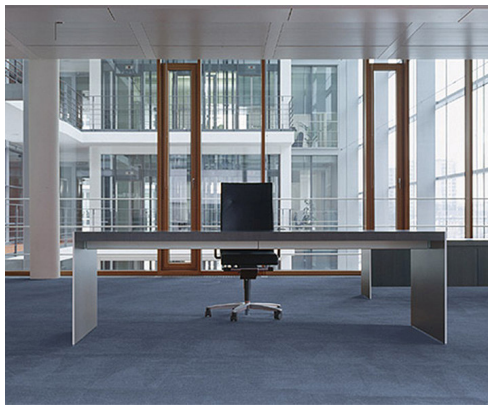


2.7 Offices

Together with the hotel buildings the linear office building defines the central urban space of Zorlu Center. The linear organisation of the office buiding allows for a better mix with commercial functions.

Layout and subdivisions of the leasable area are totally flexible and can be adapted to the tenants needs. The offices face the vivid urban center of the complex.







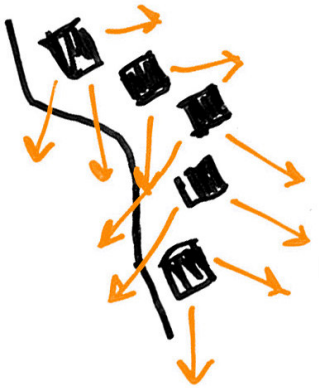
2.8 Residential Towers

The eastern portion of the property is exclusively reserved for residents. This includes separate controlled access on a private section of the ringroad. The residences form an independent community with all the amenities of Zorlu Center just at the doorstep.

In order to offer the best possible views from every apartment the residences are located in ecological high-rise buildings. A double-layer façade that enables natural ventilation, better sunshading and insulation on all levels will generate annual energy savings of about 30%.

In between the luxury apartments in the lower and middle parts of the towers and the sky-villas on top a double-storey sky garden provides an exclusive greenspace for the residents. The towers colored tops create an identity for each building.

An extensive sports- and leisure complex that includes gyms, tennis court, driving range, indoor and outdoor swimming pools and much more is available for residents at the level 1 roof park at the base of the towers.



Residential Views



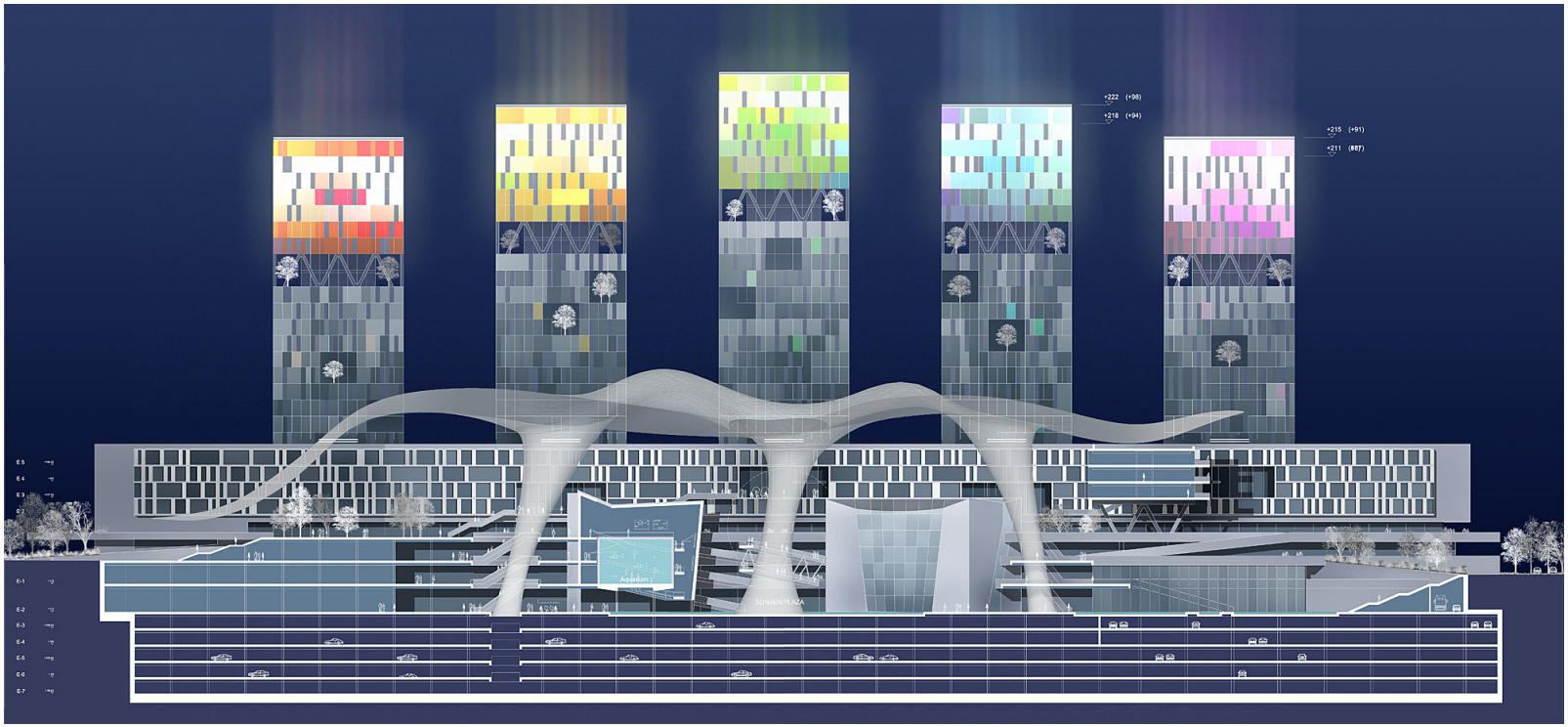
2.9 Residences for the Elderly and Healthcare Facilities

The Residences for the elderly are an integral part of Zorlu Center's residential community, occupying the tower at the southeast of the plot. The healthcare and social facilities associated with it are located in the foot of the building and expand towards the central part of the complex. It is also connected to the community kindergarten.

2.10 Retail and Entertainment (Shopping Mall)

A vibrant mix of retail and entertainment functions, interspersed with cultural functions, is organized on four levels around the sunken plaza of the central urban space. Stairs, ramps, escalators and elevators connect the different levels providing the visitors with a multitude of perspectives on the whole complex.

The focus towards the sunken plaza facilitates visitor orientation from every point of the shopping mall. The generous opening brings daylight to every level, enhancing the ambient quality of the place. The Kids and Family entertainment center and the food-court have a connection to the landscape garden in the south.



2.11 Security and Delivery

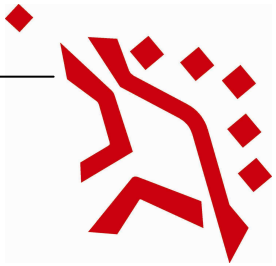
Zorlu Center is to be conceived as a public urban formation, accessible to all people of the city as an integral part of the city. However security issues of a private property have to be dealt with.

The proposed ensemble is designed in such a manner that the buildings form narrow entrance areas for the visitors easily allowing access controls. At the same time staff and service entrances have to be secured. About 3000 people are expected to work every day in the hotels, convention center, shopping mall and offices.

To organize the intricate daily delivery activities and parking for all different functions is challenging. An enclosed underground delivery system is suggested in order to strictly separate the pedestrian circulation from delivery and parking.

The presented scheme holds potential solutions for all the above mentioned issues of which not all can be addressed within the limits of this competition.





2.12 Total Construction Area

Conference Hotel	33.924 m²
Life Style Hotel	23.017 m²
Serviced Apartments	23.720 m²
Shopping Above Ground	28.411 m²
Cultural And Social	22.666 m²
Office	22.744 m²
Residence	82.808 m²
	237.290 m²
Shopping Below Ground	79.088 m²
Parking	266.000 m²
	345.088 m²
Total Construction Area	**582.378 m²**

3. Landscaping

The new Zorlu Center is nestled in the slope of the Bosphorus taking extensive advantage from the different site aspects and conditions. All functional areas have a unique character and their own address and identity. These functions, hotels, shopping, residences, offices and public venues are positioned around a central plaza with sunken courtyards and gardens. This unique layout allows almost all functions to have public access, semi public areas as well as the important private areas.

The site design takes into account the prime views to and from the bridge to create and reinforce the unique and exclusive setting without competing with the other high rise developments of the Istanbul sky line.

The center takes advantage of the prime access available and exploits the views over the Bosphorus. Views from the lower levels are filtered by the remaining and augmented planting between the complex and highway. The upper floors have extensive views of almost 360 degrees.

Additional planting with endemic and existing species such as Pine, Cypress, Beech and Plane trees along the perimeter property boundaries and service access roads reduce the visual impact of the lower floors with ancillary functions. All areas outside the perimeter road are for the extension of landscape open space to blend in with the adjoining landscape. A physical barrier to control site access is required but will be hidden within the planting.

All venues have an address and can be driven to for taxis and drop-off visitors. These venues have also a direct access to the internal courtyard and main retail center.



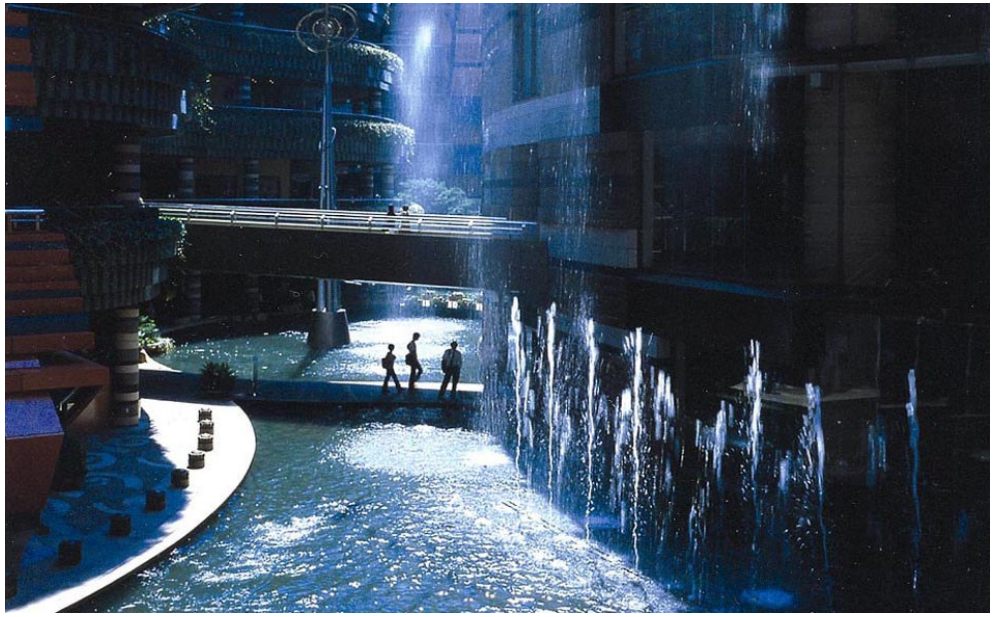
Hotel

The south facing terraces allow for extensive views over the Bosphorus and an optimal orientation for extending the outdoor season. Outdoor dining and entertainment in the evening are also highlights that will add to the exclusive setting.

A sunken courtyard with water stairs and features reduce the daily background traffic noise and improve the microclimate. The orientation and angle allow the daylight to extend into the lower floors.

Residential

The residential towers have two type of landscapes for rest and recreation. Sunken courtyards in front of each tower allow for a representative entrance area as well as a private space for passive recreation. Access is only for residents and their guests.
One level higher are the active recreation areas for the inhabitants of the towers. Tennis, street-ball and swimming are among the choice of sports that are suggested. The roof areas are landscaped with small playgrounds and sitting areas whilst incorporating the recreation facilities. Views from the north-west to east enhance the quality of these areas and take advantage of the siting.



Zorlu Center

The internal courtyard of the Zorlu center is hard landscaped urban space with adequate space for a large visitor expectancy and events. Temporary and mobile greenery add to the setting, controlling visual and public access according to requirements.

A mixture of stairs, ramps and elevators give a dynamic and interesting access to all levels allowing a comfortable use by all visitors.

The set back balconies allow to create a forum atmosphere giving a views deep into the forum allowing special events to be held within the center and letting light into the lower levels.

Water bodies with special features in the lower levels add to the micro-climatic conditioning. These features can be covered by stages or podiums during events.

Floor pavements are large scale formats allowing for easy maintenance. Differences in the material colors on each level help with the orientation. Areas not open to the public have a different pattern and format to assist the orientation.



4. Traffic Concept

Zorlu Center, planned as a micro city with a mixture of various urban functions such as residences, hotels, conference and cultural center, offices and shopping with a multitude of social and cultural activities is generating an enormous traffic volume particularly through the motorized individual traffic, with highly varying requirements concerning transport safety, capacity, floor space required, check- and control mechanism.

Therefore the proposed road development system is based on the idea of a preferably early and clear segregation of different specific traffic flows. The future ring road on the plot is considered the main distributor.

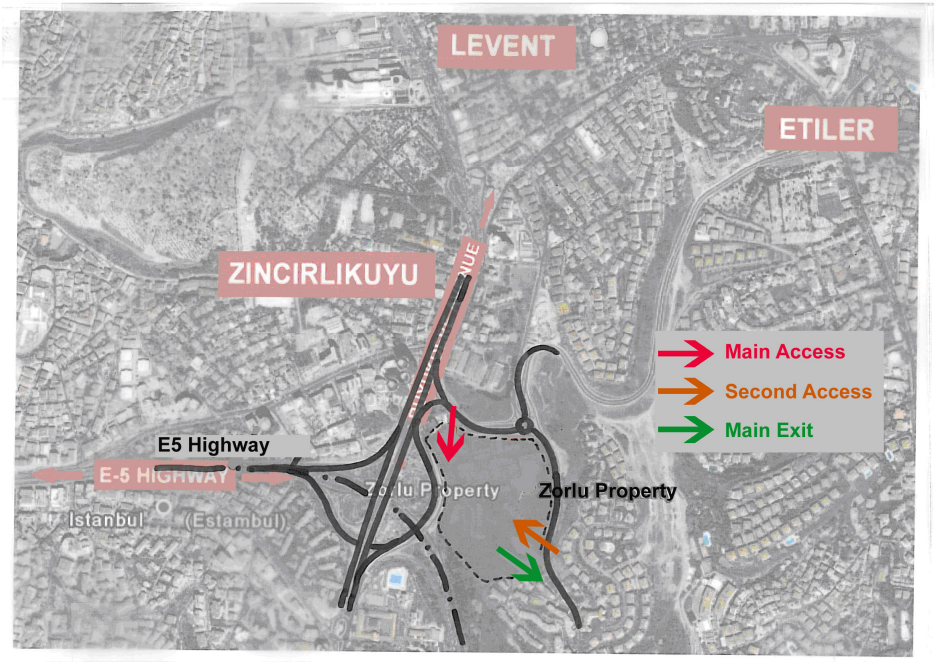
4.1 External development of the Motorized Individual Traffic

The existing main access to the Zorlu Center site is situated on the north, located near Büyükdere Avenue and Highway E5. The Highway connects the Asian part of the city across the Bosphorus Bridge. The maximum expected specific traffic volume is concentrated here, overlapping with considerable general through traffic. To avoid capacity problems an equalization of traffic streams is carried out by spatially separating site access and exits.

The site access at the north is predominantly serving as the main access for all operations on the Zorlu Center. The second access at the southeast of the site is serving as the main exit, from which all important destinations can be reached. The southeast access can also serve to connect the extensive housing areas along the Bosphorus with the Zorlu Center in a short and direct manner.

With an estimated traffic volume of about 30.000 until 40.000 vehicle/24h (including taxi and busses) there is no other separate located site access necessary for capacity reasons.

figure 1 Basic principle of the external road connection



4.2 Internal Traffic Development

The characteristic element of the internal road development system is a precocious und clear segregation of different specific traffic modes based on the different traffic load curves utilizations, check- and control mechanism as well as garage organisation / regulation with a consistent involvement of the inner ring road that takes over significant distribution functions.

At the northern main access there is an early separation of the intensive traffic-intense functions like Shopping, Office, residential, hotel and convention as well as delivery. Along the inner ring road individual access and exit ramps are located leading to the individually organized underground parking zones. Drop-offs at the hotels and residences ensure short routes and at the same time help avoid needless traffic loads particularly in front of high-quality residences.

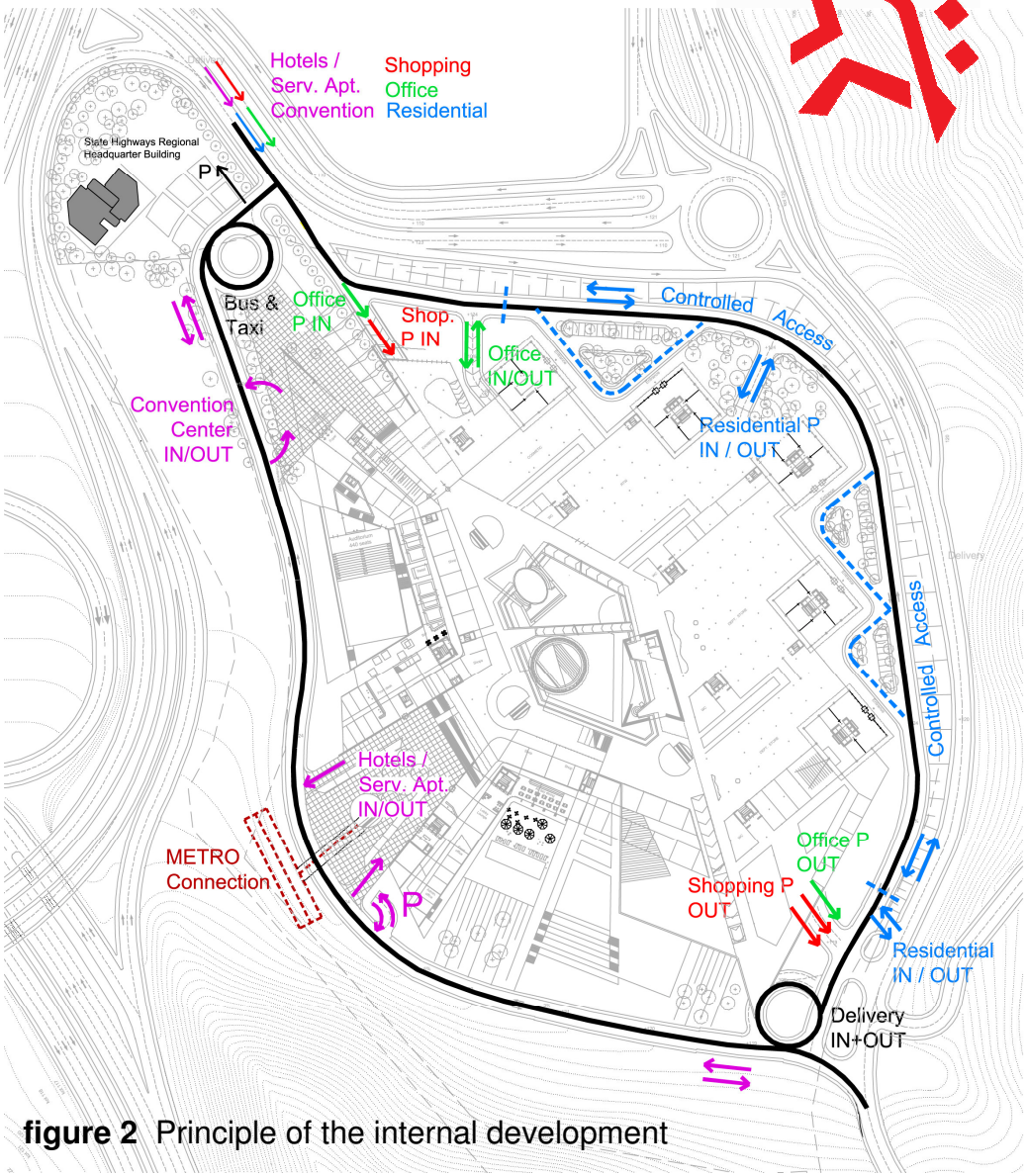


figure 2 Principle of the internal development

4.3 Delivery

Delivery is handled with a well proven, modern peripheral delivery concept, which guarantees short delivery distances on the site for all functions like shopping, office, hotel, and restaurant.

The main delivery access and exit is the southern site access. This rules out that unnecessary freight transport is polluting the sophisticated urban development entrance in the northern part of the site. Close to the site access the delivery can reach the second ring delivery road via ramps, which are located in the underground and serve the peripheral loading zones.

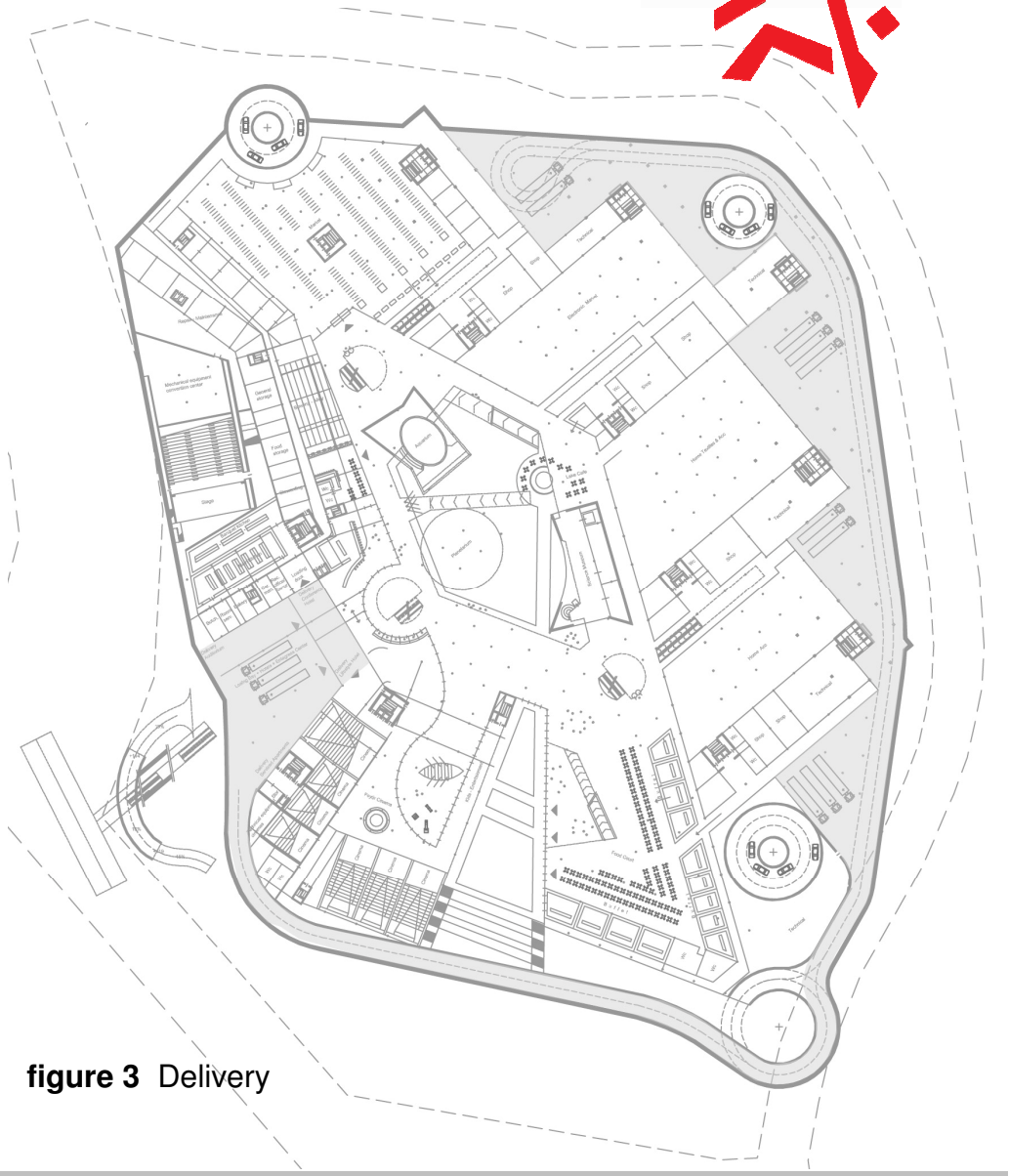


figure 3 Delivery

4.4 Public Transport

The public transport means like dolmuş, taxi and bus are handled flexibly, by using the two external transport connections in both directions without any restrictions. Due to its position in the main road system the northern connection serves as main access with a generously dimensioned drive up area for busses and taxis. The taxi traffic can generally reach all areas of the Zorlu Center without any restrictions.

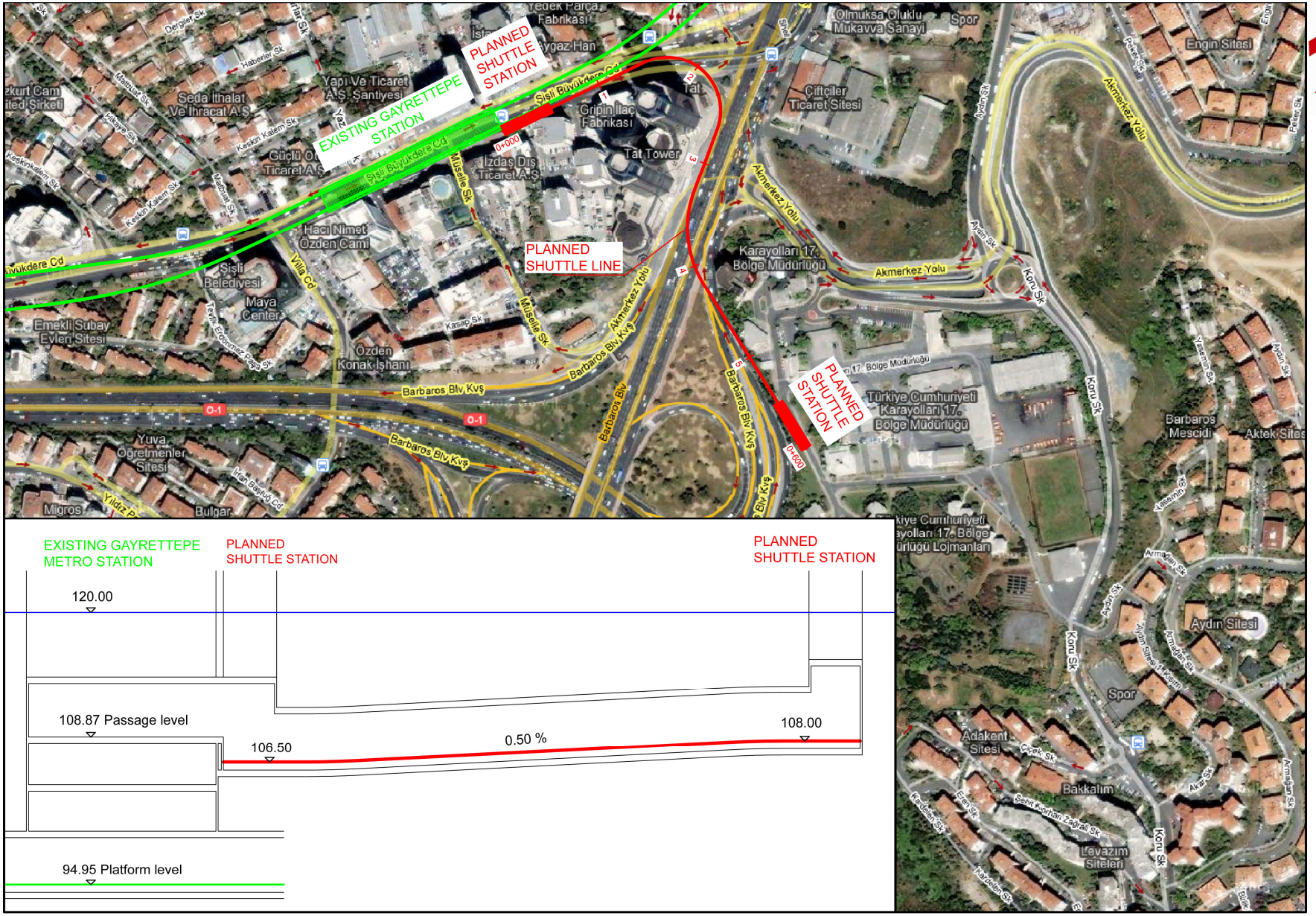
Due to a close tie-in with the surroundings the pedestrians can also reach Zorlu Center without detours. There is no direct metro connection that could guarantee quick access to the city center without using private transportation that always involves the risk of getting stuck in traffic. A fast PTS system like for example a monorail that connects Zorlu Center with the existing Gayrettepe metrostation is an attractive vision for future development.

4.5 Metro Connection

The closest metro station to the plot of Zorlu Center is the Gayrettepe metro station. The site altitude in this area is approximately +120.00m. The respective elevation of the rail top edge is +94.95m. The Gayrettepe station consists of four levels: platform, concourse, passage and parking. The connection to the Zorlu Center will be realized on the passage level of the 4th Levent side, at a height notation of +108.87m. It seems reasonable to connect the Zorlu Center with the metro station at the passage level when the accessibility for the passengers and the practicability of the construction are considered. Such a connection would not affect the operability of the metro; neither during construction nor during the transportation of the passengers. Following existing inner city roads, the chosen track does not cause any loss for private property owners.

Technical properties:

- Length of the line is 600m
- Slope of the line is 0,005 (0,5%)
- At this stage it is planned that there will be two one way stations at Gayrettepe and Zorlu Center. The size of the stations and the number of the wagons are to be determined according to the demand. The connection will be conceived as shuttle
- If the system has to work as a one way shuttle the sequence would be approximately 5-6 minutes
- The number of passengers carried to the metro station would reach 8.000 if two wagons, each 50 meters long, are employed



CAFER BOZKURT architecture Istanbul
'asp' architekten stuttgart
Mete Arat Cem Arat

5. Structural Brief

5.1 General Remarks

Except the two structures, described under para 2 and 3 below, all other buildings are more or less conventional concrete structures with following features:

- standard column spacing is 8.0 m by 8.0 m
- deck slabs for this span and also for larger spans in some areas are solid reinforced concrete slabs, supported by concrete girders, spanning from column to column
- the slab / girder system rests on reinforced concrete columns, which are rigidly connected to the girders and slabs; they transfer the vertical dead and live loads down to the foundations
- each of the 5 high-rise buildings shows a central core for lifts and stairs, which by its surrounding walls stiffens the structure horizontally and transfers all wind and seismic loads down to the ground. These core units are continuous from the top to the foundation level.
- From level E4/E3 downwards additional cores as well as outer and inner walls are available for the transfer of horizontal forces; the deck slabs will distribute these forces to all stiffening elements in the building.

By carefully designing distribution of reinforcement, especially in the joints between connected structural elements, the concrete structure gets sufficient ductility to withstand earthquakes without serious damage.

The number of dilatation joints shall be minimized to ease operation and maintenance of the building, but, due to the big difference in height and weight of different parts of the building, and consequent different settlements cannot be avoided completely.

5.2 Inclined Building of Serviced Apartments

The inclination of the building requires special additional components to allow the transfer of the vertical dead and live loads. The structural concept is as follows:

- the deck slabs, again supported by girders, span in transverse direction and are supported only along the two outer vertical walls and along one wall at the central access aisle. Thus this span is different with 9 + 11 m

- along these 3 support lines there are girders below each slab, which carry the slab itself and intermediate columns, which carry the floors above and which may be located at any position on the girder, parallel these girders are the posts of 3 main trusses in these 3 support planes which are complemented by storey-long diagonals

- these 3 main trusses are inclined in elevation, as the whole building is, but due to their width of about 30 m are stiff enough to transfer not only the vertical and horizontal loads of the building but also take care of the bending moment created by the vertical loads due to the inclination of the building. Adequate stiffness for horizontal loads in transverse direction is guaranteed by the core, which is vertical and continuous throughout the building.

- As an alternative, the 3 main trusses can be replaced by 3 solid concrete walls, which can directly support the deck slabs linearly and which would make the structure much stiffer in longitudinal direction.
  Of course these walls would require openings for doors (inner wall) and for windows (2 outer walls), but which could easily be arranged without disturbing the overall wall stiffness too much.

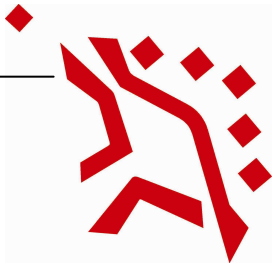
- Obviously the 3 load-carrying trusses / walls will "penetrate" through the parking levels down to the foundations, requiring adjustment of the parking space in this area.

5.3 Central Roof

The central roof shall provide shade mainly and float like a cloud above the central plaza. Hence a light, filigree and translucent cover is required.

The proposed structure presents an undulated, double-curved dome with triangular meshes. Its shape has been found on the basis that it shall be supported only at some points along the outer edges and at the four predetermined interior locations and that it shall act mainly as a shell, that means, transfer most loads to these support points mainly by axial forces and not by bending moments. Thus the components, forming the shell, remain slender and light compared to clumsy, heavy girders, necessary to transfer bending moments.

They are arranged in triangles, to get the necessary stiffness in the shell surface, and are preferably of rolled steel sections, to minimize their size and their weight.



The transition from the curved roof into the curved support columns is smooth and without kinks to maintain the shell-like behaviour also in this part of the structure.

The triangular steel gird can be covered by any translucent cladding:

- opaque glass, which would require a secondary structure of purlins, due to the limited span length of the glass sheets

- polycarbonate sheets, which are lighter than glass and today also have an excellent long-term behaviour

- membrane from PTFE-coated glass fibres with a light transmission of up to 20% and a lifetime of more than 30 years

With this combination of filigree steel main structural components and a light translucent cladding in an irregularly curved shape a roof shall be created, which will not only be aesthetically pleasing but which will also be very economic due to its shell behaviour mainly.

5.4 Material

The material quality of the concrete structures has to be BS50 (lck=500kg/cm^2). The reinforcement to be employed is BC III, (fjk=4200kg/cm^2).

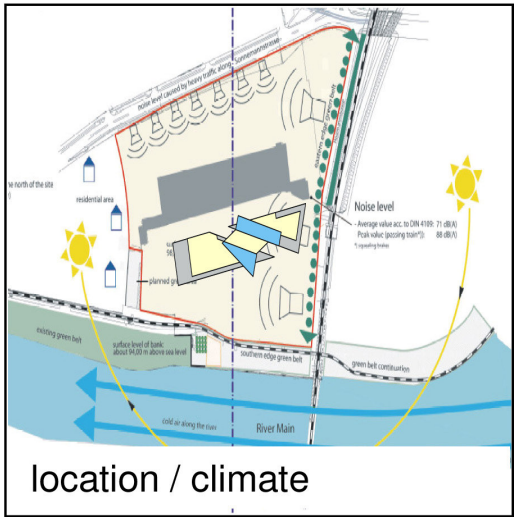
6. Energy Design

A COMPREHENSIVE ECOLOGICAL URBAN DEVELOPMENT FOR THE 21st CENTURY

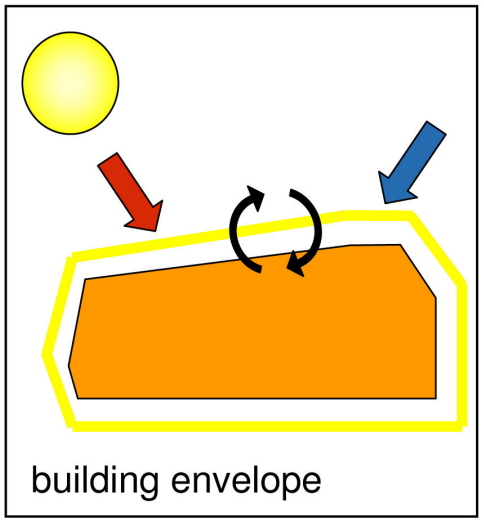
6.1 Introduction:

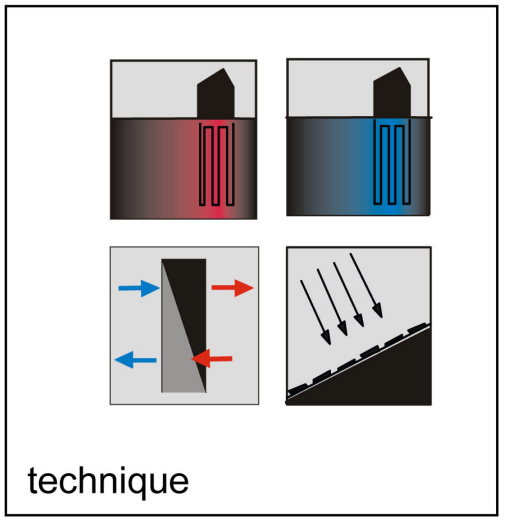
In the last years, the issue ecology has become more and more important. The assured delivery of energy is a very important thing, yesterday, now and in the future. The best way to be independent is to reduce the energy consumption and use local and renewable energy sources.
Our objective is to design a complex of buildings, with very low energy consumption on a high comfort level.

The following are the main components to form an integrated concept:



location / climate


building envelope


technique

integrated concept

6.2 Location / Climate:

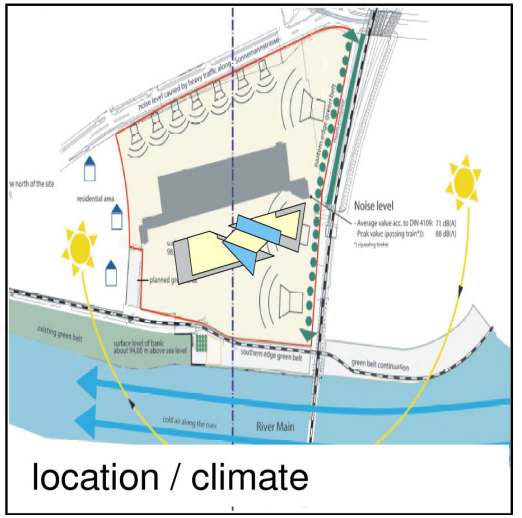
The city has a **temperate-continental climate**, with hot and humid summers and cold, rainy and often snowy winters.

Humidity is generally rather high which can make temperatures feel much warmer or colder than they actually are.

The **summer** months between June and September bring average daytime temperatures of 28°C. The **warmest month** is July with an average temperature of 23°C, the coldest is January with 6°C.

The city is quite **windy**, having an average wind speed of 17 km/h.

Annual **solar radiation** of 1500kWh/m²a on the horizontal. Yearly **precipitation** for Istanbul averages 870mm.



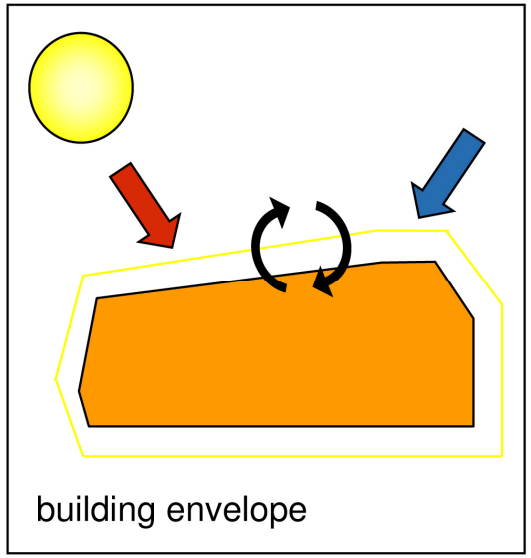
location / climate

6.3 Building Envelope:

A building envelope is the **separation** between the interior and the exterior environments of a building. It serves as the **outer shell** to **protect the indoor environment** as well as to facilitate its climate control. Building envelope design is a specialized area of architectural and engineering practice that draws from all areas of building science and indoor climate control.

Building envelope design includes four major performance objectives:

- Structural integrity
- Moisture control
- Temperature control
- Control of air pressure boundaries


building envelope

Room module - Residential room:

The high insulated **building envelope** protects the indoor environment and uses the **passive solar winnings**.

Water-carrying **capillary tube mats** are installed directly below the surface of the room enclosure surfaces, allowing smooth temperature control of ceilings, walls and flooring. The transfer of energy between users and the activated surfaces is achieved predominantly using radiation.

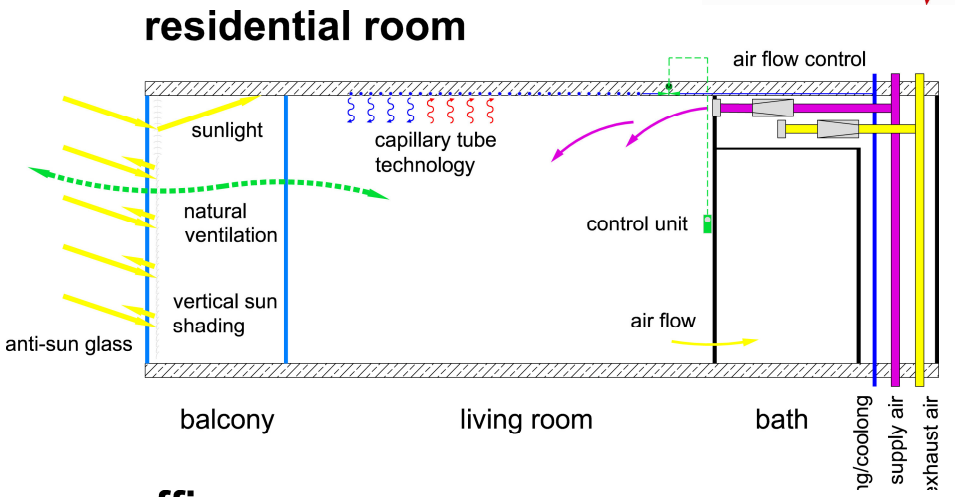
Beside the natural **ventilation**, a mechanical ventilation supplies the rooms with fresh air. In winter a high efficient heat recovery system will minimize the losses by ventilation. In the hot and humid summer the outside/supply air will be dehumified by the solar climatisation system (DEC).

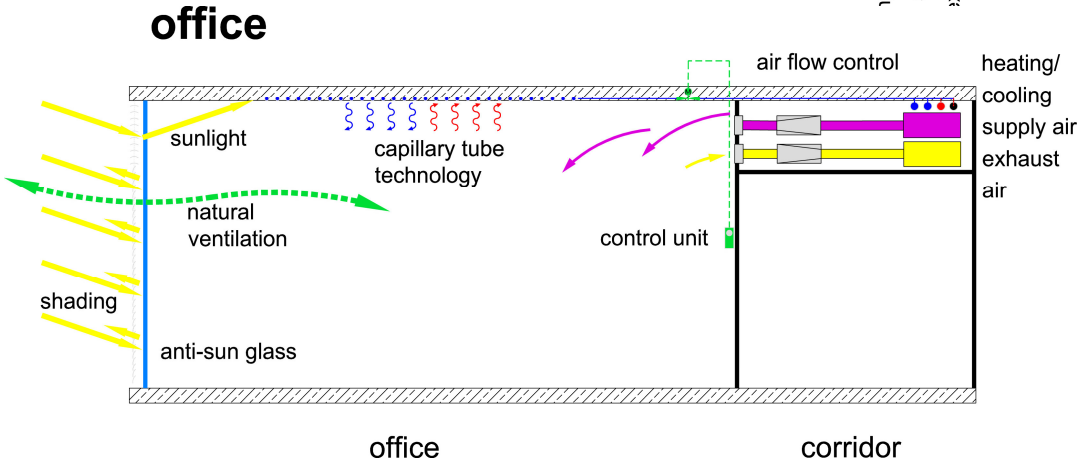
Room module - Office:

The high insulated **building envelope** protects the indoor environment and uses the **passive solar winnings**. The special shading system enables the occupants an antiglare workplace, by using simultaneously the sunlight. An economized use of the artificial light is possible.

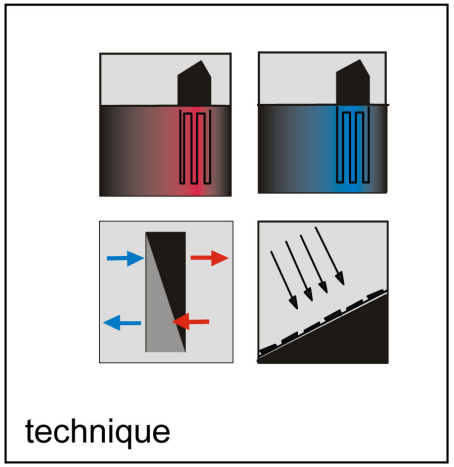
Water-carrying **capillary tube** mats are installed directly below the surface of the room enclosure surfaces, allowing smooth temperature control of ceilings, walls and flooring. The transfer of energy between users and the activated surfaces is achieved predominantly using radiation.

Beside the natural **ventilation**, a mechanical ventilation supplies the rooms with fresh air. In winter a high efficient heat recovery system will minimize the losses by ventilation. In the hot and humid summer the outside/supply air will be dehumified by the solar climatisation system (DEC).





6.4 Technique:



Thermal Solar Collectors and DEC

Thermal solar collectors will be used, to produce **hot water** and to supply the **solar climatisation** (DEC - desiccant cooling system) in the residential buildings / hotels.

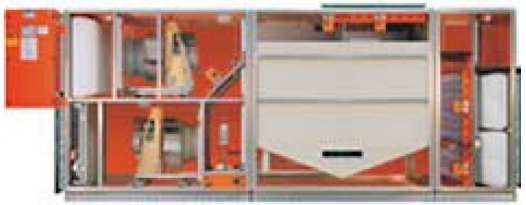
With an annual **solar radiation** of 1500kWh/m²a on the horizontal, the use of thermal solar collectors will be very efficiently.

Desiccant Cooling System - In a typical desiccant cooling application a desiccant material in the dehumidifier removes moisture from the process air.

During **dehumidification heat** (solar energy or CHP) is released so that the dry-bulb temperature increases. The dry-bulb temperature is then reduced in the first step by a heat recovery system and in the second step by an auxiliary cooling system (e.g. mechanical compression, evaporative cooling).

Therefore, in a complete desiccant cooling system, latent and sensible energy are handled separately and more efficiently by components designed for that load.





Geothermal Storage

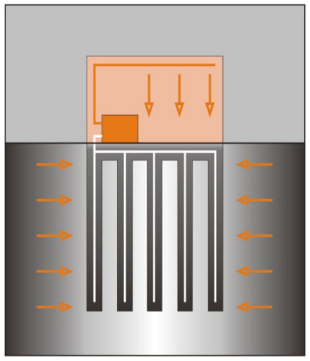
The ground will be used as a **seasonal geothermal storage**.

Priority goal in today's buildings planning process is to reduce administration costs while raising energy efficiency and using comfort.

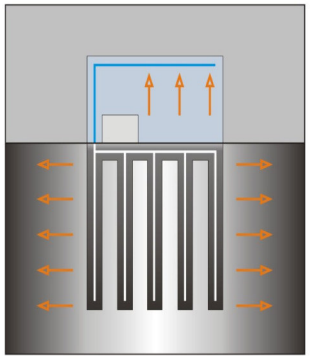
On this background more and more buildings in the last five years were realized using energy piles, borehole- and foundation heat exchangers for heat and cold supply.

Winter:
During heating period heat is abstracted from the ground and with help of heat pumps raised to a higher temperature level to be used for the heating of the building.

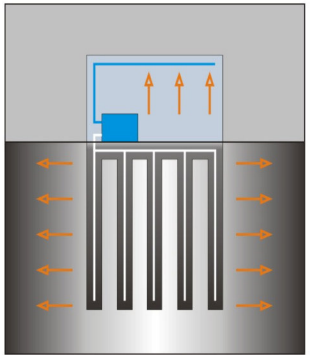
Summer:
The ground cools down and during summer months is used as heat sink to cool the building.



heating with heat pump



„free cooling“



cooling with chiller

CHP:

COMBIND HEAT AND POWER UNIT (CHP) with NATURAL GAS and HYDROGEN (later) - Spotlight of the heating system is the CHP.

Combined heat and power is the use of a heat engine or a power station to simultaneously generate both electricity and useful heat.

Supplied by **natural gas** and later hydrogen it will produce electricity and heat in a very ecological way.

Winter:
In wintertime the CHP system will be used to heat the rooms.

Summer:
In summer, when there is no heating demand, cold water will be produced by a absorption chiller. The result is a long operating time of the CHP system and a high electricity yield.

Photovoltaic:

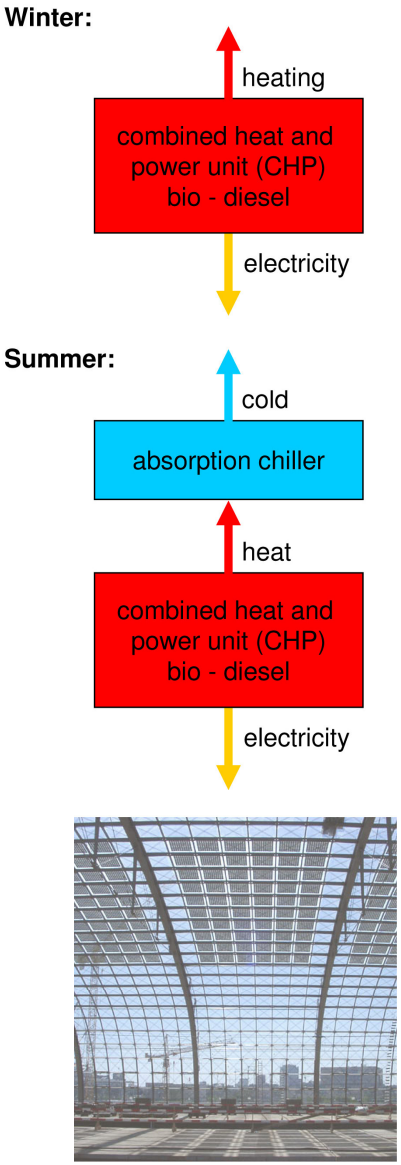
An other ecological way to produce electricity is to install PV-systems on the roof of the buildings.

In the center of the building complex the **PV-modules** are used as shading devices.

A big **display** will inform the people about the amount of the produced electricity and the avoided CO2.

The generation of solar electricity will bring the building complex further to a zero emission building complex.

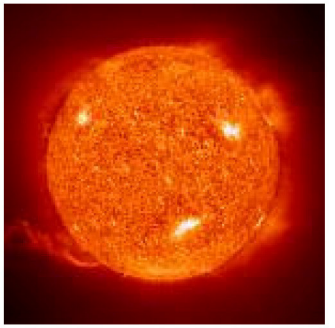
The **center** is well naturally ventilated, and expands the useable time of this place over the year.



The total solar energy available to the earth is approximately 3.850 x 1021 Joules per year ...

… we will use it to warm up our drinking-water, drive our solar-climatisation and to produce electricity

... to save the resources of our world.



Natural gas…

… we will use natural gas to drive our combined heat and power unit (CHP) and the heat generator

... to use the local available energy sources.



Heat flows constantly from its sources within the Earth to the surface. Global terrestrial heat flow is about 45 x 1012 W ...

… we will use it as geothermal storage and heat-source / cooling-energy

... to use the capacity of the environment.



Strategy:

THERMAL SOLAR COLLECTORS - Thermal solar collectors will be used, to produce hot water and to supply the solar climatisation (DEC - desiccant cooling system) in the residential buildings / hotels.

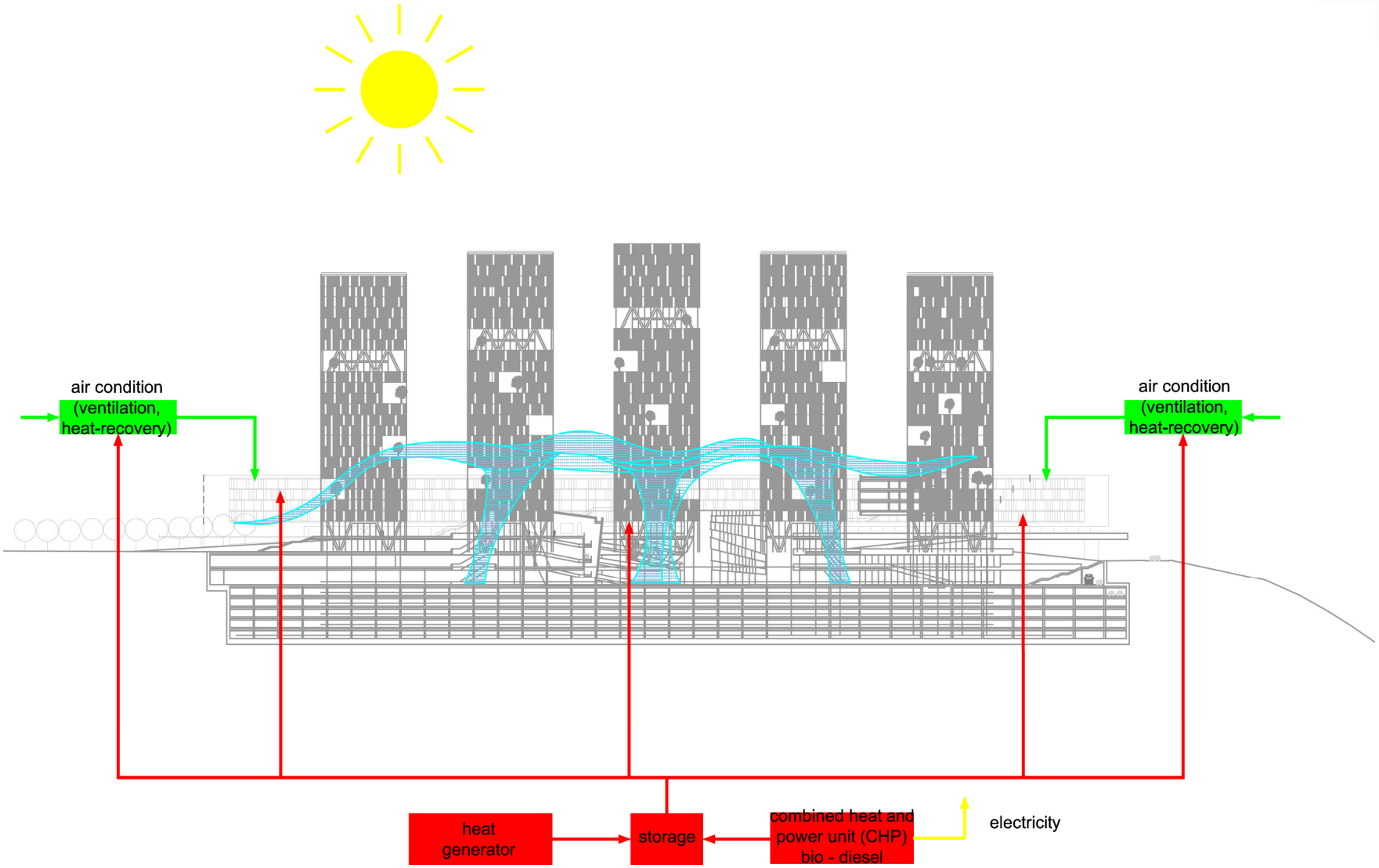
GEOTHERMAL STORAGE - The ground will be used as a seasonal geothermal storage. In winter the ground will be used as heat source for the heat-pump. In summer it will supply the capillary tubes with cold water (free cooling, only a circulation pump is necessary).

COMBIND HEAT AND POWER UNIT (CHP) with NATURAL GAS - Spotlight of the heating system is the CHP. Supplied by natural gas it will produce electricity and heat in a very ecological way. In wintertime the CHP system will be used to heat the rooms. In summer, when there is no heating demand, cold water will be produced by a absorption chiller. The result is a long operating time of the CHP system and a high electricity yield.

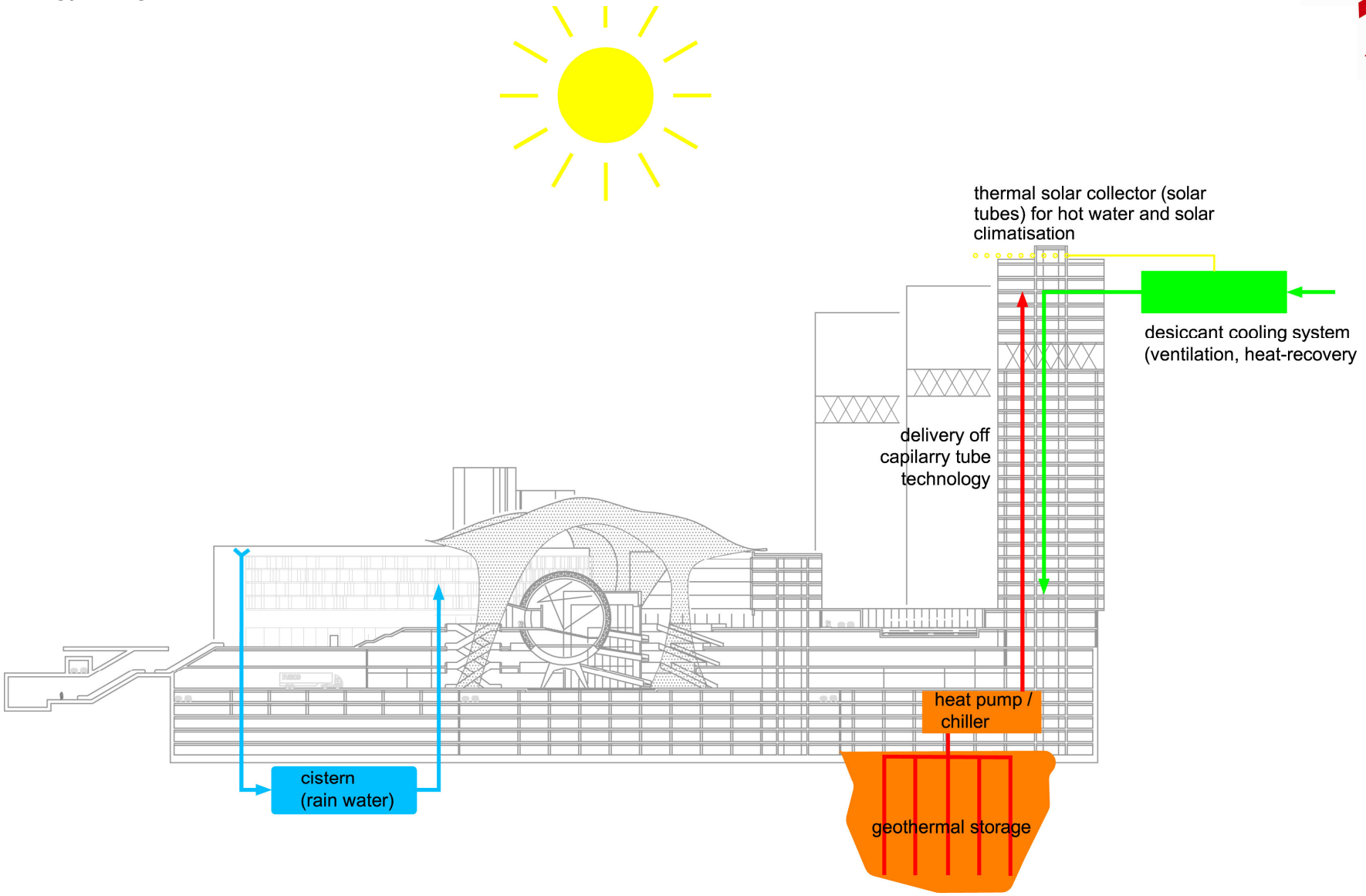
VENTILATION:
It is possible to ventilate most of the rooms by natural window ventilation (residential building, hotel, office). To save energy and reduce the heat losses by ventilation, a mechanical ventilation with a high efficient heat recovery will be used. In summer, when the humidity of the outer air is very high, the mechanical ventilation (DEC - solar climatisation) will be used to dehumidify the supply air

PHOTOVOLTAIC (PV):
An other ecological way to produce electricity is to install PV-systems on the roof of the buildings. In the center of the building complex the PV-modules are used as shading devices. A big display will inform the people about the amount of the produced electricity and the avoided CO2.

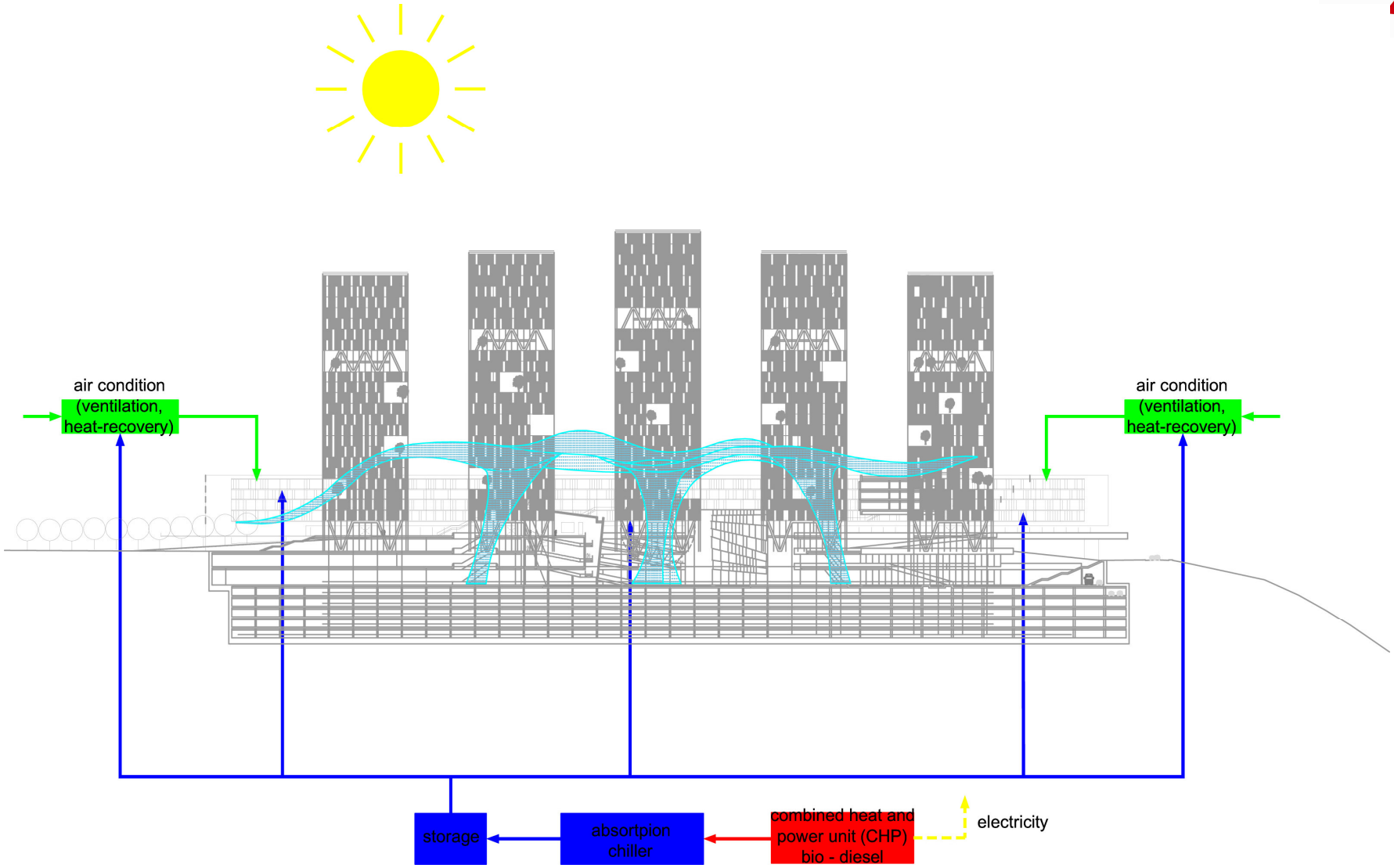
Energy Design Winter 1



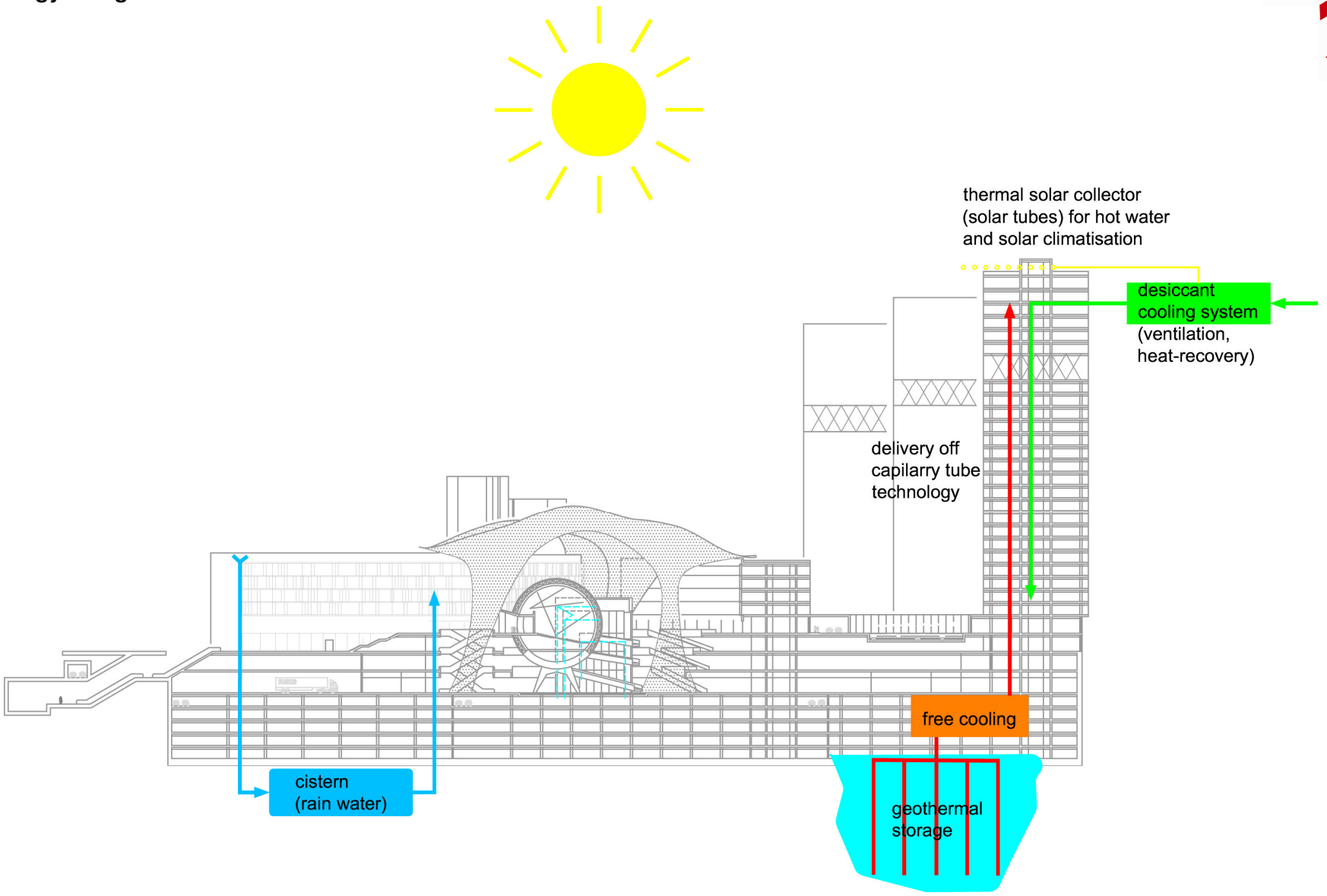
Energy Design Winter 2



Energy Design Summer 1



Energy Design Summer 2



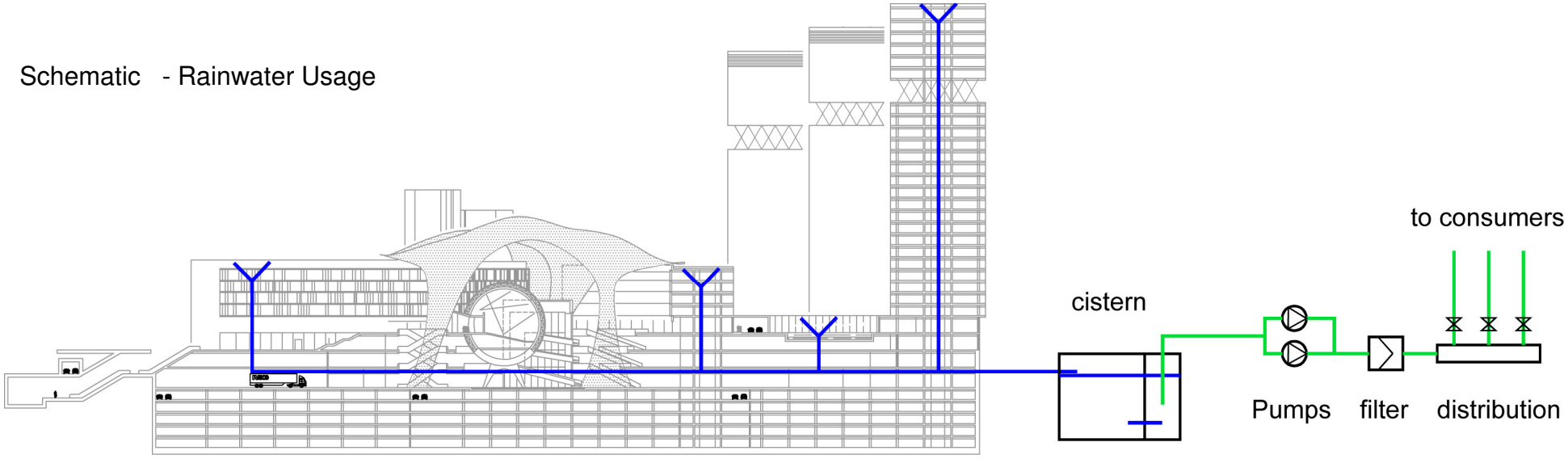
7. Technical concepts

7.1 Plumbing

In the buildings of Zorlu Business Center all sanitary areas will be equipped water tap with reduced water consumption. All Rain water from the roofs of Zorlu Business Center will be collected and stored in the lower levels of the building in a cistern as grey water. The grey water will be used for irrigation of the garden areas of Zorlu Business Center and for toilet flushing in the skirt building. For this an additional water supply system for grey water will be installed which has to be completely independent from drinking water supply to avoid hygienic problems.

The grey water will additionally be used for technical purposes for supply of the building. Excess rain water amounts will be led to public sewage system. In later project phase it can be checked, whether a grey water supply for the residential and hotel areas in the high-rises is economic. The big heights will cause higher demand for pumping facilities with high power demand.

Schematic - Rainwater Usage

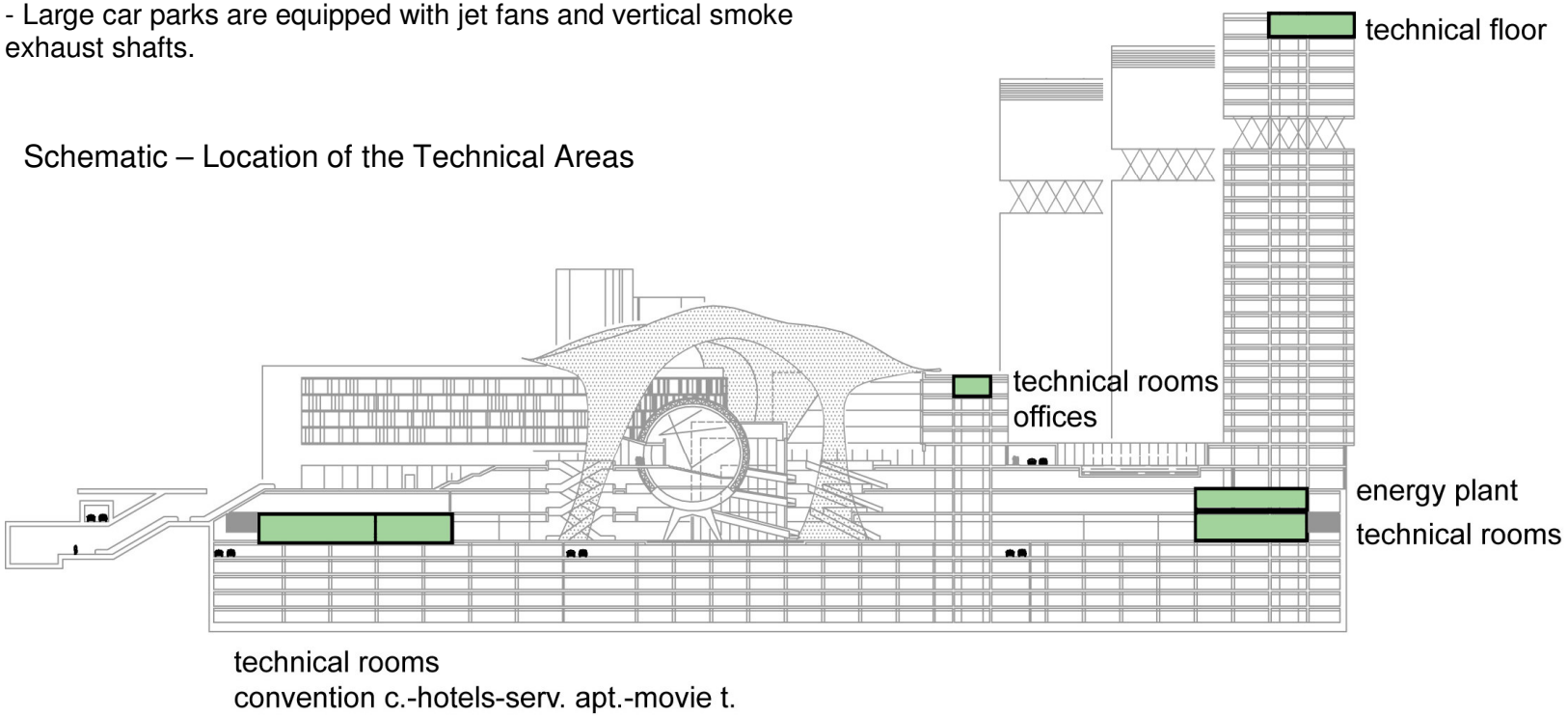


7.2 Fire System and Sprinkler

The complete levels of Zorlu Business Center will be equipped with sprinkler system as an active system for fire extinguishing. Hydrants for fire fighting will be installed additionally in all levels near the staircases in accordance with fire fighting regulations of Istanbul.

- Main fire water tank is located at the lowest level of the buildings and stores minimum 200m³ of water.
- The chemical, water spray and non hazardous gas extinguishers will be used according to the codes.
- All areas of the building can be evacuated from smoke by heat resistant fans.
- Large car parks are equipped with jet fans and vertical smoke exhaust shafts.

Schematic – Location of the Technical Areas



7.3 Plant Rooms and Supply Lines Layout

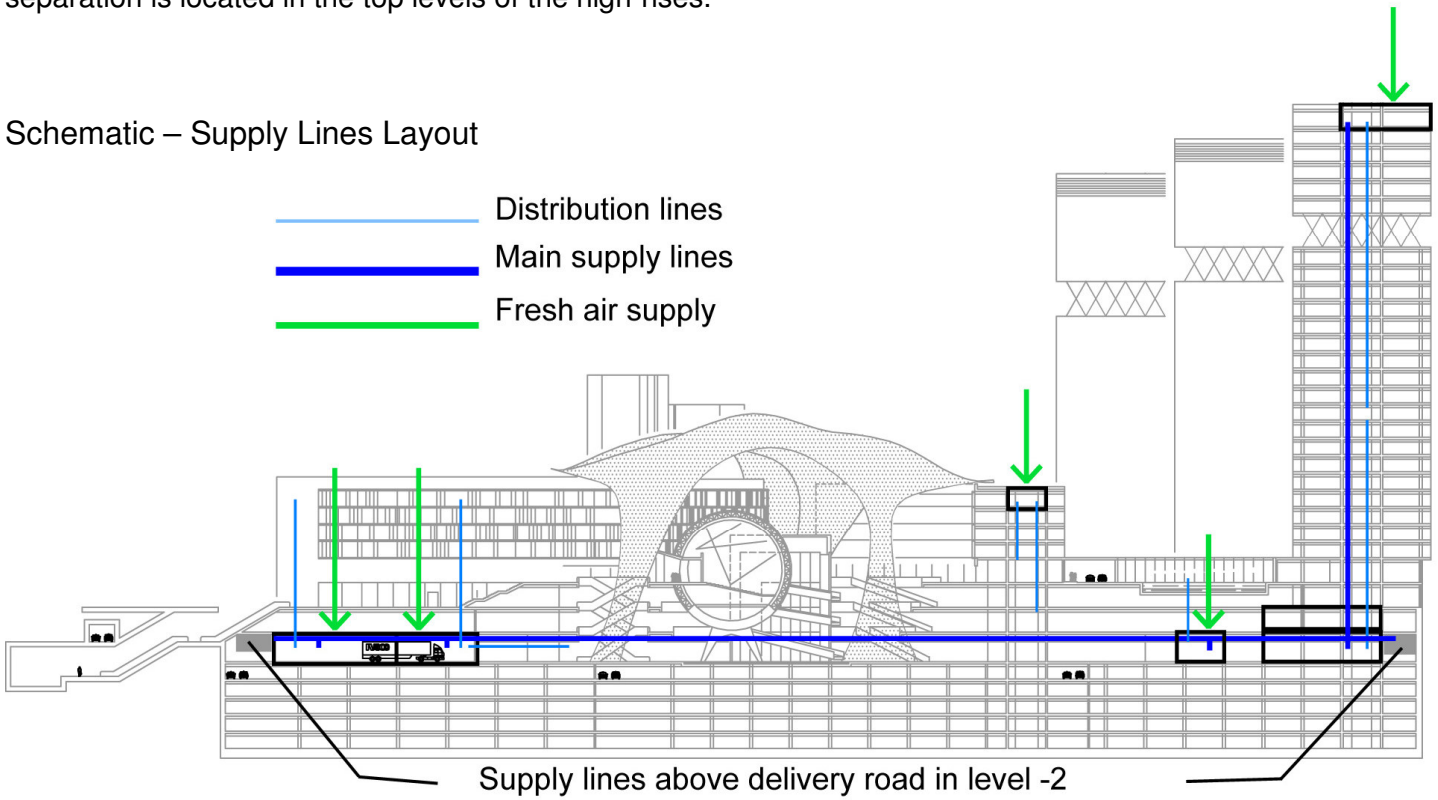
The main technical plant rooms of Zorlu Business Center are located in levels –1 and –2. They are located near to main consumers and plant rooms of related building area. The plant rooms for office areas are located in the last floor of the office building.

The highrise building has to be separated into two pressure levels for the distribution of all water based systems. The substation for pressure separation is located in the top levels of the high-rises.

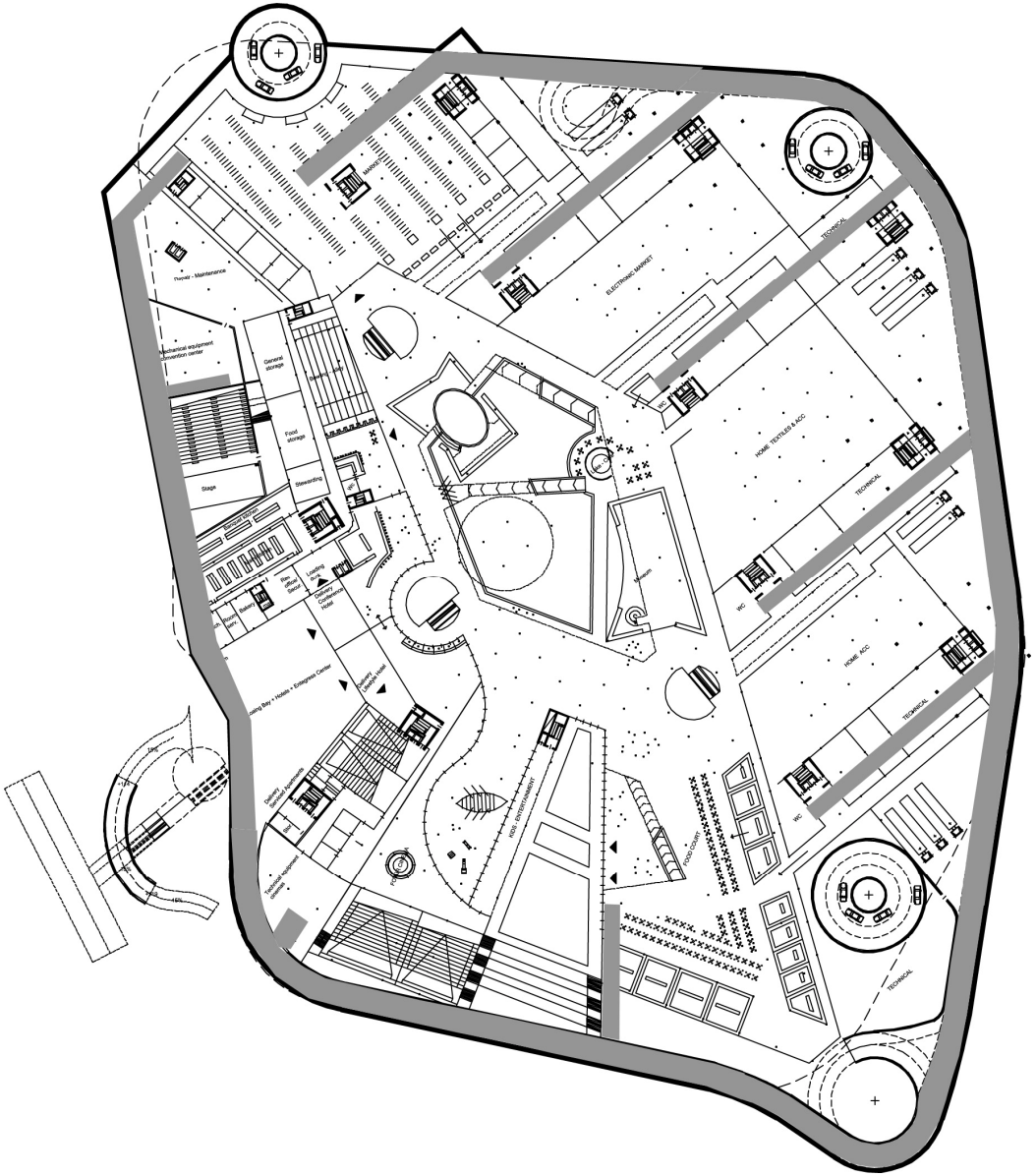
The main distribution lines to connect the plant rooms with the main energy station are located in level –2 above the internal delivery road.

Fresh air for ventilation and air conditioning of the different areas is mainly taken from the roof area. If possible it is tried to position air intakes in the surrounding green areas.

Schematic – Supply Lines Layout



Schematic – Main Distribution Level -2



8. Electrotechnical and Information Technology

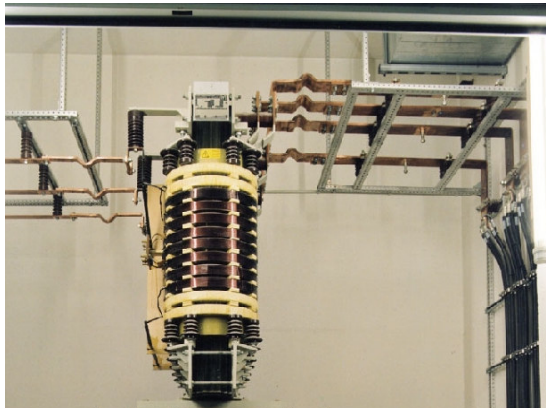
8.1 Power Supply and Distribution

We assume with the new buildings a trend-setting power supply is necessary.

According to a preliminary estimation, we must assume a power demand of approx. 25 MVA – 30 MVA for the all buildings on the whole area of Zorlu Center Istanbul. For a power demand of this order, a high voltage feed is required. At this point in time, the availability of the external supply is difficult to assess, as this depends, among other things, on what facilities can be provided by the power supplier. Our concept proceeds from the assumption that it will be possible for us to receive 3 special cable from the power supplier. The concept is designed in a modular way, so that 3 ring feeds may be integrated at a later point due to more detailed information. The High Voltage level in Istanbul is 34,5 kV. As we will cover the risk of failure to a large degree by diesel generator and Cogeneration plant aggregates. Additionally, we provide the complete security technology in Zorlu Center by the solar roof. We achieve a complete independence of the supply of security equipment. At the direction of the VIP Zorlu Center is the measure mandatory.



The high voltage system is structured in such a way that switching off each transformer in the case of failure or during maintenance is possible. The switchboards are planned in SF6 technology, as the casing of this system is particularly immune to pollution by dust and other contamination.



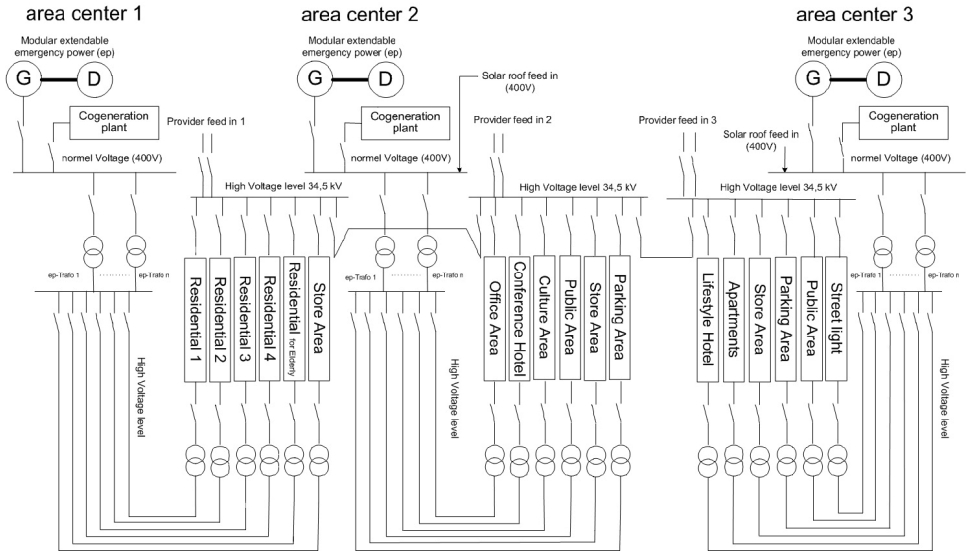
The transformers are planned as dry transformers in cast resin technology. The safety concept is laid out in such a way that in the case of failure or during maintenance one transformer can drop out without any adverse effect to operation. Through forced transformer ventilation, which is switched on in the case of failure, the other transformers may be run in long-term overload operation (140%).

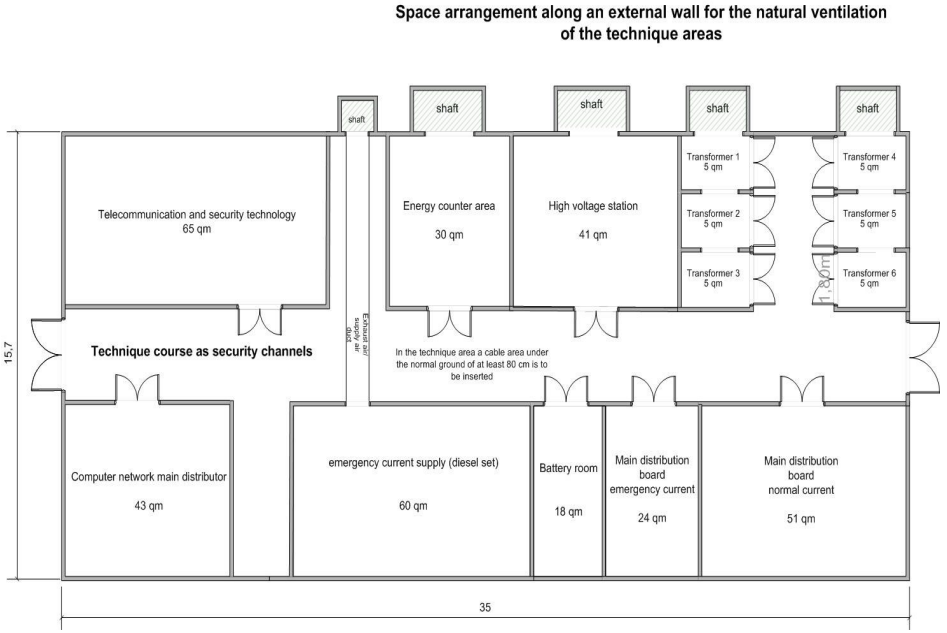
Considering the power of 25 MVA till 30 MVA and the aforementioned safety concept, 6 transformers per area power centre, (that means 18 over all) of 1600 kVA are planned.

We suggest a natural ventilation of the transformers areas.

Supply structure:

The supply structure includes three area centers based on the high-voltage side. From this place remote transformers will be realised for the particular consumer types and buildings. They are also central the emergency devices of electricity supply in the same place, so that the emergency power can be modular expanded after the performance requirements.



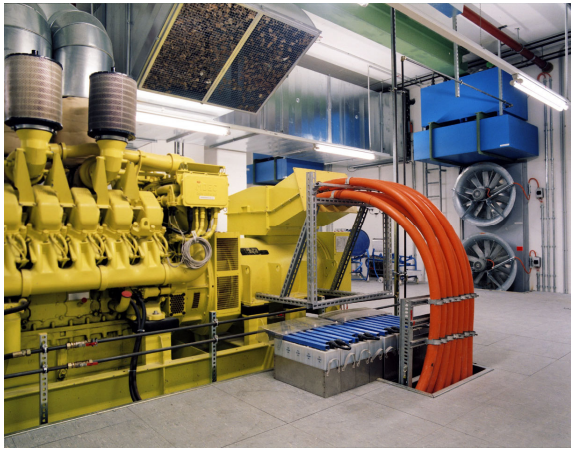


8.2 Emergency Power Supply

One of the most important plants in an internationally living and culture centres, is a emergency current supply. All large City quarters of the world secure their business and living quality in case of an error by emergency power supply aggregates.

In order to guarantee the supply of safety systems (IT- and Security-Systems , sprinkler pump, defumation vents, safety lighting etc.) in the case of danger, relevant systems for the supply of necessary power are planned.
single battery
Emergency power supply aggregate
Systems for uninterrupted power supply (UPS)

The operation of the aforementioned systems takes place according to national regulations. We suggest that the safety lighting in escape routes and gathering points be laid out for 1 lx and a time of autonomy of 3 hours. Escape routes are to be indicated by pictograms that are lighted from behind.
The battery system is designed so that in the case of danger, the safety lighting may be switched off without turnaround time. The battery-driven emergency power supply is mainly meant to cover the time until the diesel aggregate is in stable operation and can take on the full load. UPS systems are employed for special uses, such as safeguarding power supply, e.g. for the saving of data in electronic data processing systems.
The layout of the diesel aggregate must be done during the further course of planning. At the moment we assume that we will need approx. 3 – 4 MVA power. The diesel generator combination will be laid out such that after power failure the diesel generator runs in stable operation within 15 seconds. In order to ensure unproblematical actuation for the puposes of testing and network return, a synchronisation system is designed.



8.3 Communication and information systems

Communication systems within working, event and living area are increasingly important. In business and also hotels, stores and private living sites today many services are realized over the LAN.

The manufacturers of devices and plants are equipped with appropriate interfaces.

Video monitoring devices (CCTV), store systems and also the large screen-displays are today all equipped with a TCP/IP interface. Also the building automation uses today the TCP/IP - protocol for the control of the technical equipment.

This fact must be catered for by according technology. The information technological infrastructure is therefore laid out in such a way that the present as well as the options for the future can be integrated.

The network structure results from the different user areas which must be separated physically from each other:

Store area

Office area

Hotel area

Exhibition area

Culture are

Private area

Within all area a technical mixture of fixed cabling and the „Wireless LAN“ – technology is proposed. Visitors, customer, employees who come to the Zorlu Center can use the communication network of Zorlu Center.

8.4 Information and Display System

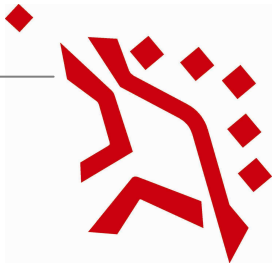
The aforementioned system helps the visitor to inform and orient him/herself fast in the Zorlu area. Particularly helpfully is the plant if different events at different places are taking place. The system is structured in a multifunctional way and also allows for visualising advertisements and information apart from the general messages. The system is meant, among other things, for planning events and describe the right way or use for commercials . In this context, individual information such a logos etc. may be parameterised and integrated in the system. The system must allow for switching on conventional screens, plasma – flat screens as well as large plasma displays for internal and external use. The system architecture enables easy and flexible use with regard to extension and change.

Essentially, the system consists of a client-server-architecture. The individual appliances will mainly be small LCD displays at the event rooms and large displays in the main entrance hall.

8.5 Other Telecommunication Systems

Telephone System

At the moment, there is strong competition among the systems. The conventional digital systems are competing with the „Voice over IP“-systems (VOIP). The development of the steadily decreasing telecommunication costs is the main argument for companies and administrations. During the further course of planning, a decision for one system must be made regarding future development, taking into consideration the costs of investment. In our concept, we are momentarily proceeding from a conventional digital telephone extension system. Each workplace will receive at least one telephone connection. The usual functions of a digital telephone system will be provided. For the installation of the telephones structured cabling is used.



Fire Detectors

The layout of the fire detection system will be coordinated with the local authorities and the user, who should also draw on his insurance. It will be a modern fire detection system in bus technology with Loop structure. It is to be assumed that usual press button indicators and automatically indicators will be made use of. In particularly sensitive areas (e.g. depots) a smoke suction system should be used. This system detects up to 1000 times earlier if smoke develops than other smoke detectors. The fire detection centre as the point of contact for the fire brigade should be coordinated with the fire brigade. For the moment, we assume that it will be located in the entrance hall.

Burglar alarm

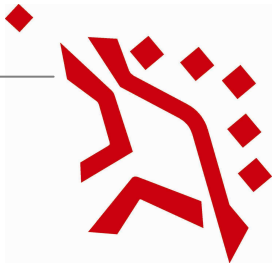
We suggest that in the area of the entrance doors and the accessible windows an alarm system be installed. Opening and closing should be monitored. In areas in which objects of unique cultural worth are stored, there should be additional monitoring regarding breakthrough or climb-through. In coordination with the user, motion detectors are implemented. The decision regarding burglar alarm must be agreed upon between owner, user and insurance.

Danger signal / loudspeaker system / PA-System

For evacuation in case of danger a comprehensive loudspeaker system is planned. This system is conceived in such a way that music may be played in. The system must be understood in combination with the fire detection system and guarantees orderly evacuation in case of danger. For the congress center, a separate system is planned which ensures high quality sound.

Video system (CCTV)

For additional protection of the area and buildings, a video system is planned. Cameras with a fixed lense, with zoom lense and dome



cameras are used. A digital image storing system makes recording possible. The video pictures of the individual monitors in the video wall are represented in four quadrants per monitor. The video system is planned with a video crossbar on the basis of TCP/IP solution.

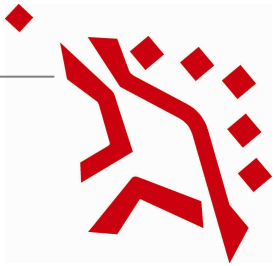
Antenna system / satellite
In the further course of planning, a satellite system consisting of satellite dishes, head end, distribution network and connection sockets is planned. The distribution network will receive suitable amplifiers for maintaining signal quality. The head end is suitable for reverse channel, so that a house-internal feed possibility can be created in defined places. The placement of connection sockets must be decided upon during the further course of planning.

Building automation

CIB - Computer Integrated Building

Building automation is the instrument with which to implement the needs of the user and operator on the technical level, while taking into consideration the economical, ecological and operational aspects. A modern building, taking into consideration the demands of highly developed society regarding comfort and security, is an extremely complex entity, which can only be economically managed, controlled and used by employing microelectronics.

Within the framework of the planning process we pursue the aim of achieving the optimum for the building owner with regard to the parameters investment costs, running costs, need realization, comfort and ergonomics in relation to the uniqueness of the architectural concept. In addition, the security of persons and operation and the minimization of reaction time in the case of events such as danger, disruption, maintenance and failure are important planning parameters for a building so much in the view of the public.



Furthermore, our job consists in selecting, documenting and processing from the wealth of information provided by the individual systems of the building and safety technology with the help of the building automation system, so that the building remains flexible and effective in operation. In order to implement an economical building automation system, company-neutral network protocols exist (BACnet, ISO-protocols in TCP/IP), so that the use of proprietorial systems can be kept to a minimum.

- Building automation solutions in competition through a license-free communication protocol
- Opening of the market through producers operating worldwide
- Producer-independent maintenance and extensions
- Opening of the market on the part of the builder

9. Lighting Concept – Planning Approaches

The demands contained in the following regarding the lighting concepts for the Zorlu Center Istanbul are meant to support the architectural and design concept. The lighting is an architectural element due to the light fitting on the one hand and on the other through the lamp, which lends room and dimension to the building frame. Apart from the design-related aspects of lighting the lighting concept supports the feeling of safety, the functions in the public areas and serves easy orientation. Regarding the lighting of the building, there is a difference between the effect inside, i.e. the effect of the room when entering the building and during the stay inside it, and the outside effect at night. The light should support to a large extent the essential aspect, the promotion of high quality sojourn and comfortableness.

The lighting within the public traffic areas will be of a sober and functional nature, making immediate orientation possible. Indicator signs and direction systems will be highlighted by the illumination, so that the visitor's eye concentrates on the essential information directly on entering the area and buildings. Active direction systems, i.e. signs with self-luminosity or lighting from behind, are to be seen within this context. The colour of the lighting in the public traffic areas is geared towards quick orientation, i.e. good reproduction quality will promote the aforementioned functions.

The lighting will thus take up and support the individual functions in the building.

We advise daylight-dependent lighting control, so that lighting can be extremely economical.

In the area of the central roof props and other corresponding building parts, we suggest lighting via secondary beamers. Among other things, these are to serve the function of breaking up the regularity of the necessary basic lighting





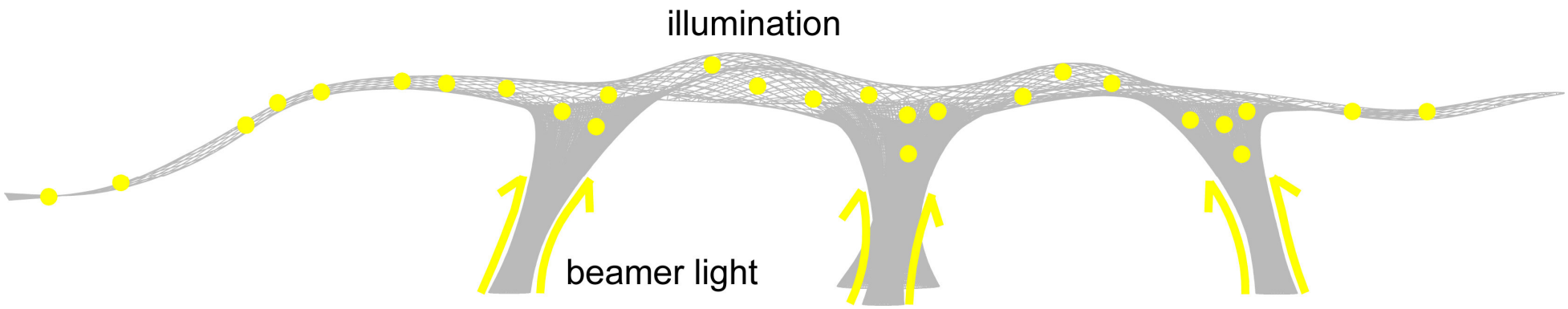
Façade Accentuation

Facade accentuations by lighting technology underline the effect of the area, the buildings and central roof by night. The night effect is of great importance in creating a landmark. Therefore, this effect should be achieved by combining technical possibilities with creative ideas.

For accentuating the above-mentioned façade and tent areas; we plan to use, among other things, modern LED technology. In combination with beamers mounted in the socket area a homogeneous and respectable night image is to be created.

Roof Lighting

The translucent roof works in the darkness. The lighting system is integrated in the roof structure and lets the solidium filigran appear. Dynamics can be produced by light control. Colours of light can be mixed by coloured lamps.



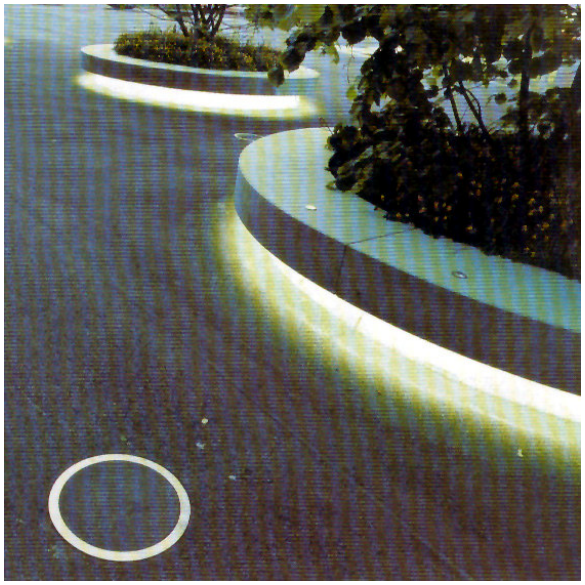
Open Space Lighting

Surfaces – Ways – Plants

The roads of the exterior installation have their own area lighting. Besides the basic lighting of the open spaces with spotlights individual light lines in the ground and way lights on masts provide guidance.







Suit

A hotel room is first a strange room in which the guest must be reoriented. If the light is the occurrence of the Hotel-Card counters already turned on and it allows a good view of the elements of the room. Presence sensors help for energy saving. About a self panel in the entrance area, at the desk, on the bed and bathroom are made by pressing a key pre-light situation. Proceeding on the controls associated with fluorescent lamps and low-voltage lights dimmed equipped, in addition, the control of room temperature and blinds.



The general lighting is done exclusively with fluorescent lamps in anglesand with compact fluorescent lamps in the wall, paving and floor. The accent lighting provides directional light through metal halide HQI CDM-Tm 20W for atmosphere.







Reception

For most visitors is the first way to the Hotel reception. This must be clearly recognizable as a focal point. In the foyer light facilitated the orientation, the backlit desk are clearly marked. Ceiling light channels, equipped with dimmable fluorescent lamps will be fitted down lights interrupted. The combination of directed light and general illumination light loosens the atmosphere. The Foyer integrated seating areas receive additional lighting, as it is being read.

For the general lighting of the restaurant, we plan fitted downlights. About the tables are glare, the seats allocated hanging lamps, wall lights supplemented by additional direct - indirect bright light to brightening the walls and ceilings. Separately, the lighting systems connected. The impression of the room is changing, and the space is structured in separate areas such as buffet, bar and tables.





Wellness

A most important aspect of wellness areas is the atmosphere created by colored light, the light intensity and spectral distribution on the well-being of the people takes effect.

We will realize the basic lighting with compact fluorescent lamps. The warm light with 3000 Kelvin color temperature creates a feel-good atmosphere.

Special lighting systems shine on kick point between wall and ceiling. The areas of the wall and ceiling areas are more luminous. In these lamps lighting system can be used colored slides.

The Basic lighting, we plan impressive moments with RGB LED light modules, fiber optic light points and the pool lighting.

Hotel – Reception – Restaurant – Wellness

The programming of different lighting scenes allows for a smooth change-over of the lighting. So we can similarly adapt the lighting to the changing daylight conditions and the open space zones. All the lights are in a DALI- lighting control system.





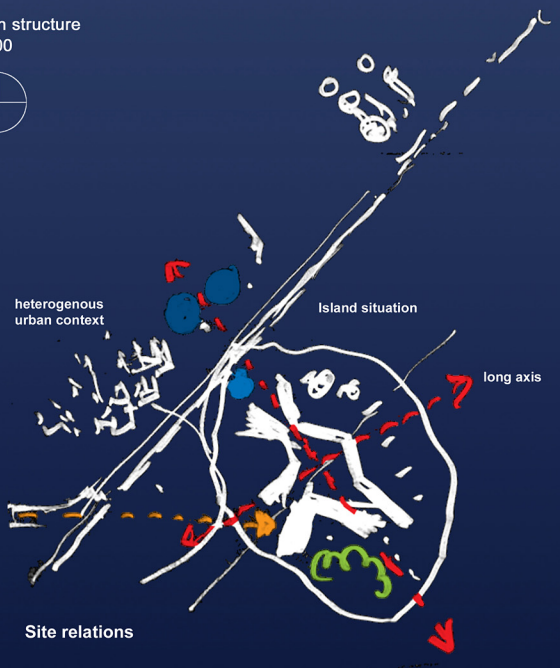




Zorlu Center Architecture and Urban Design Competition



Urban structure
1/5000



Site relations

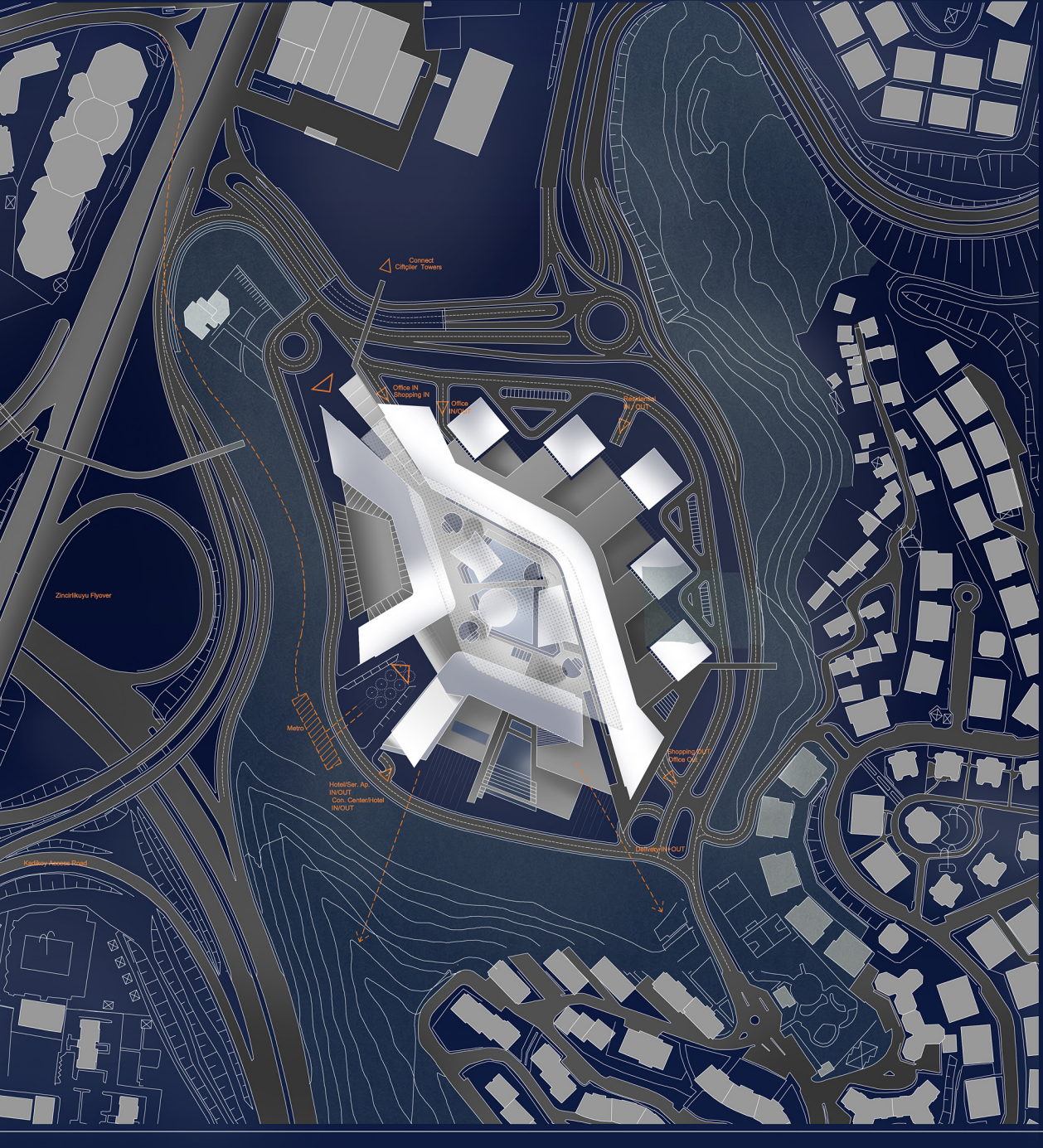


Center:
- Cultural Center
- Center of Shopping Mall
- Orientation for the whole complex

Center: human scale

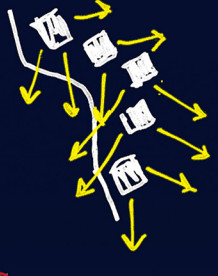


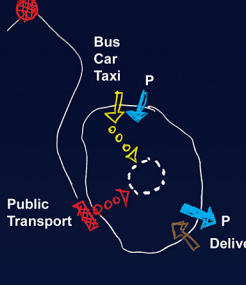
Big masses
at the periphery





Residential Views







Istanbul



Overall Plan
1/1000



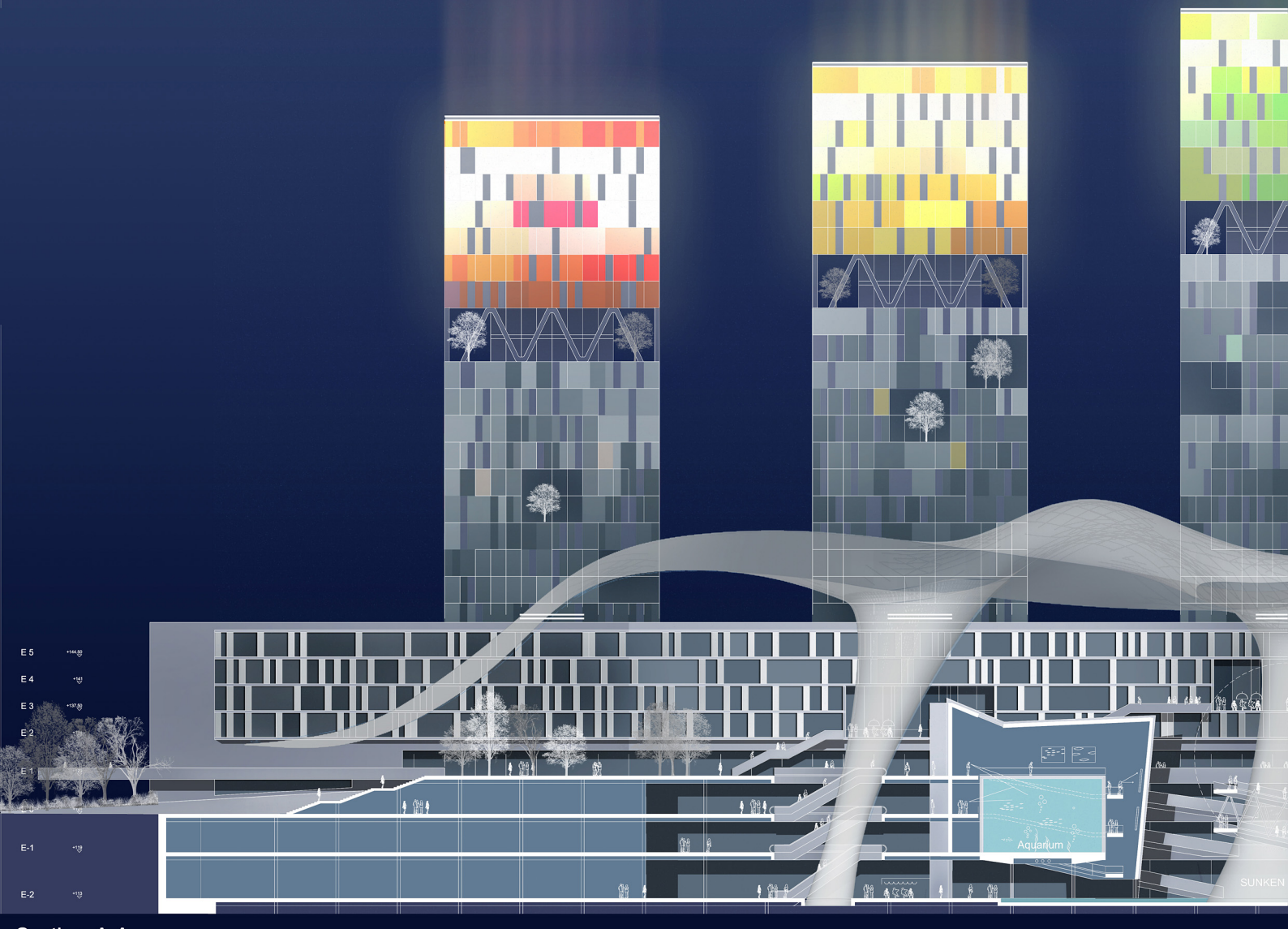
Site Plan
1 / 500



View from the North Gate



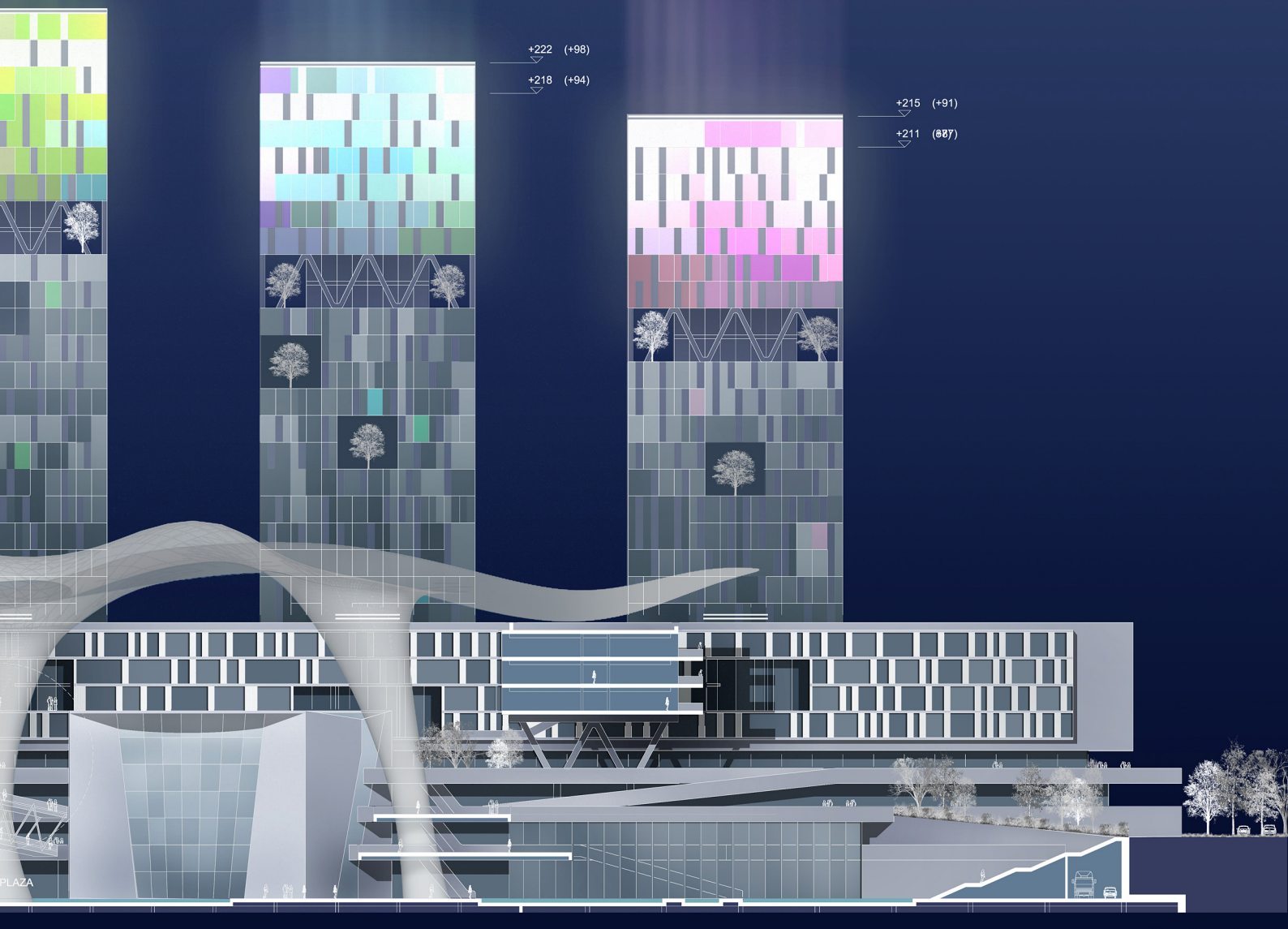
View from the West Gate



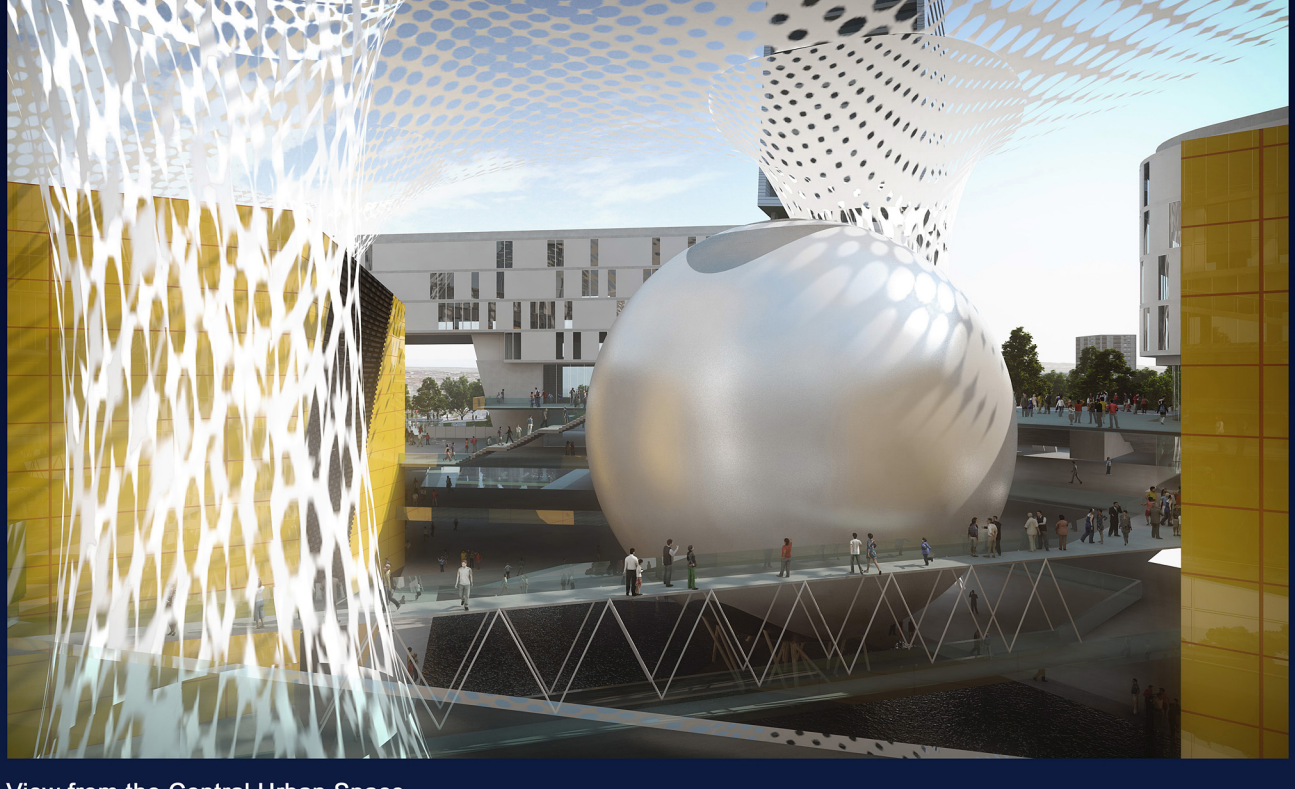
Section A-A
1 / 200



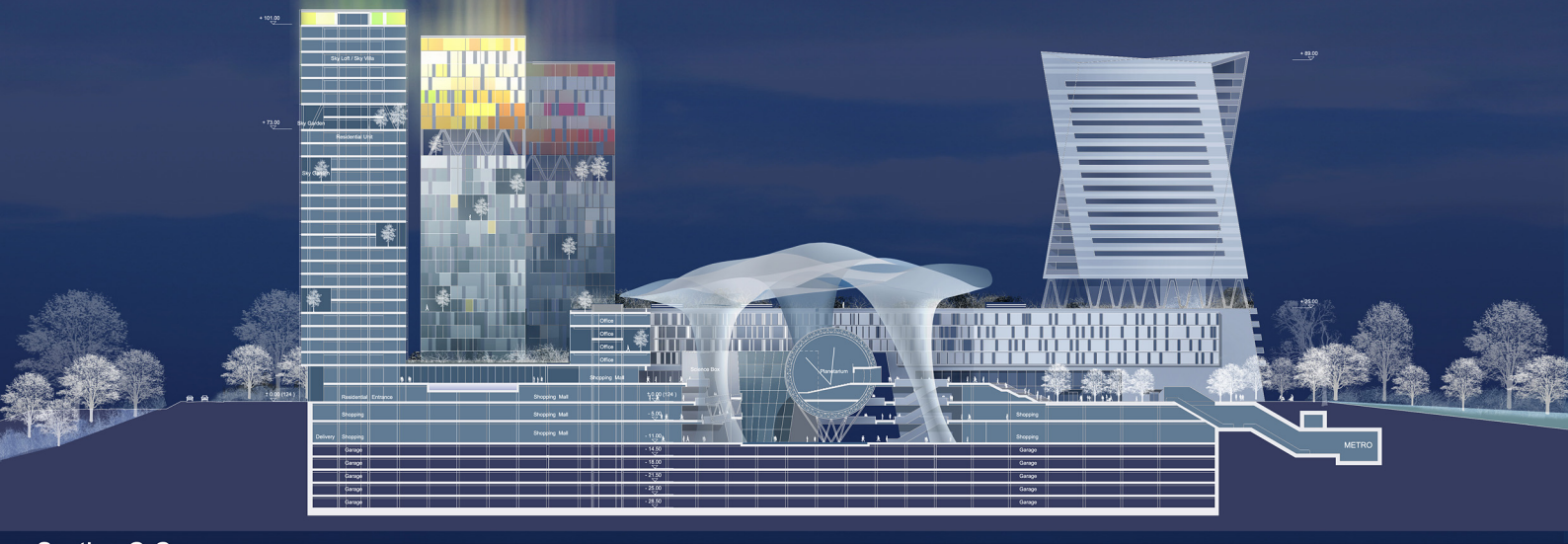
Aerial View from North-West



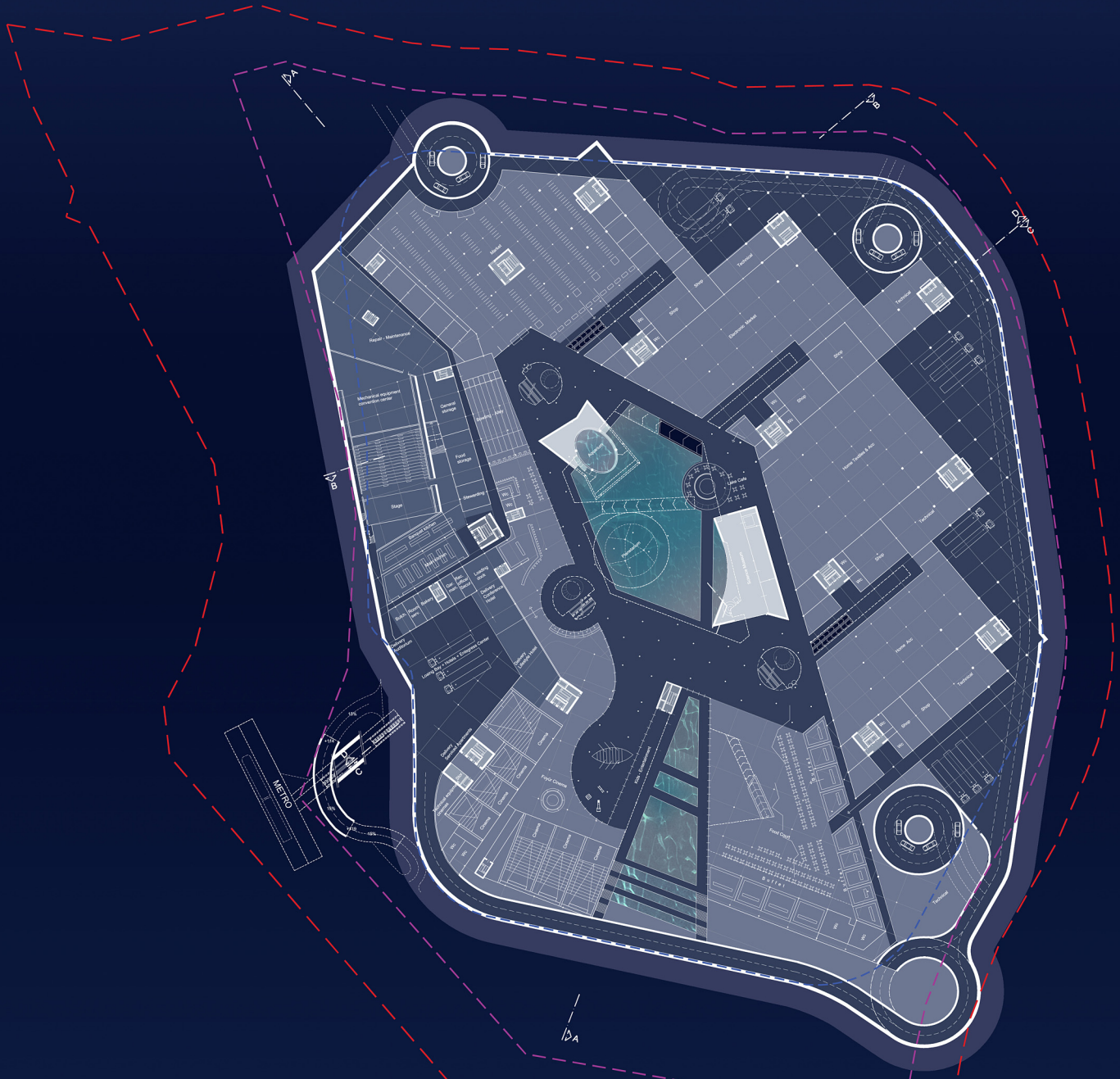
Section A-A
1 / 200



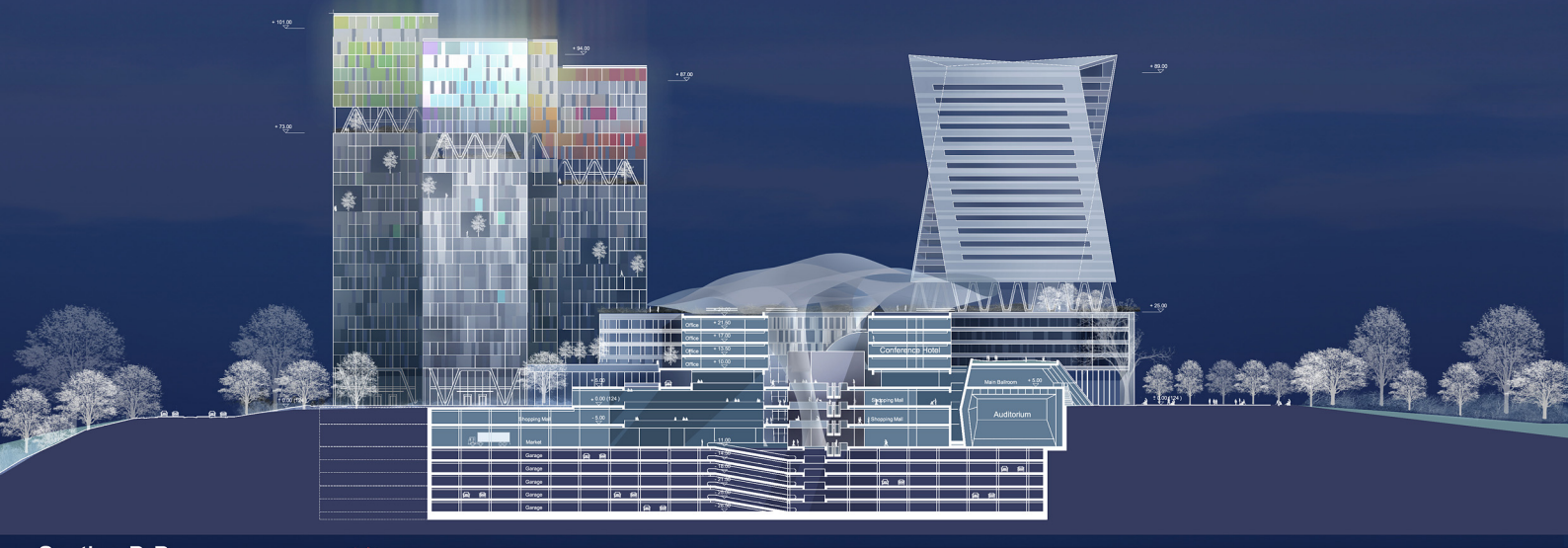
View from the Central Urban Space



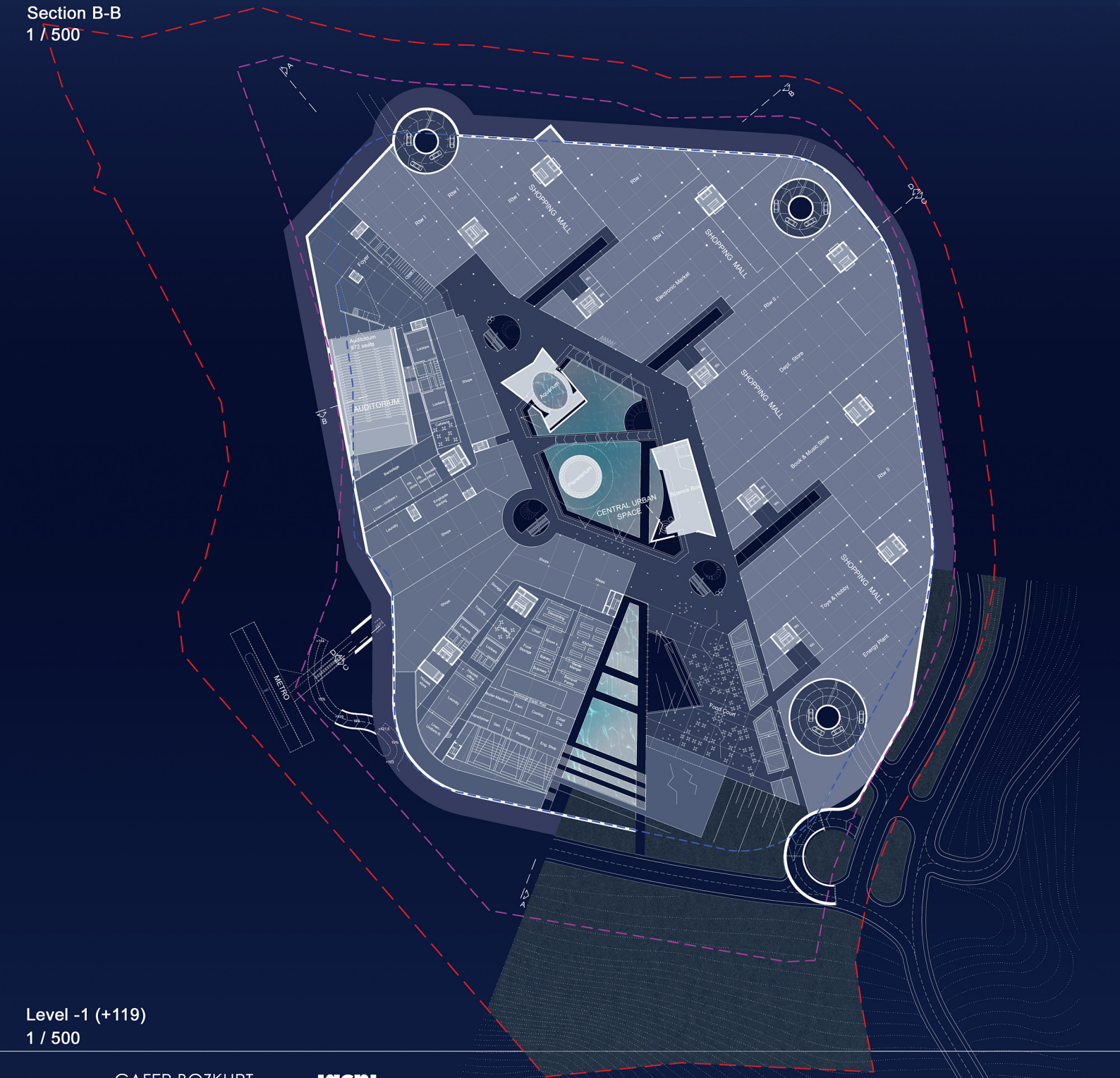
Section C-C
1 / 500



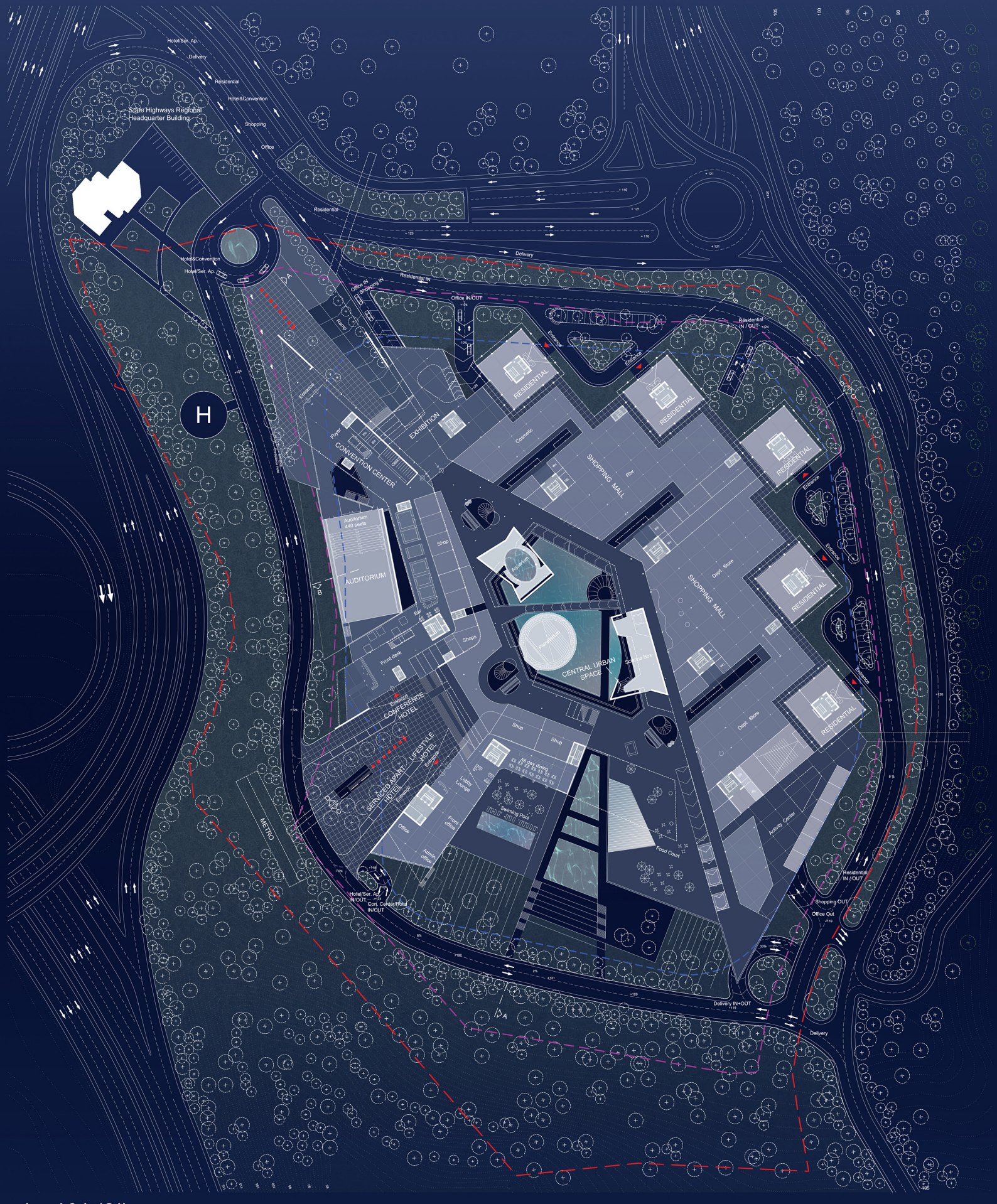
Level -2 (+113)
1 / 500



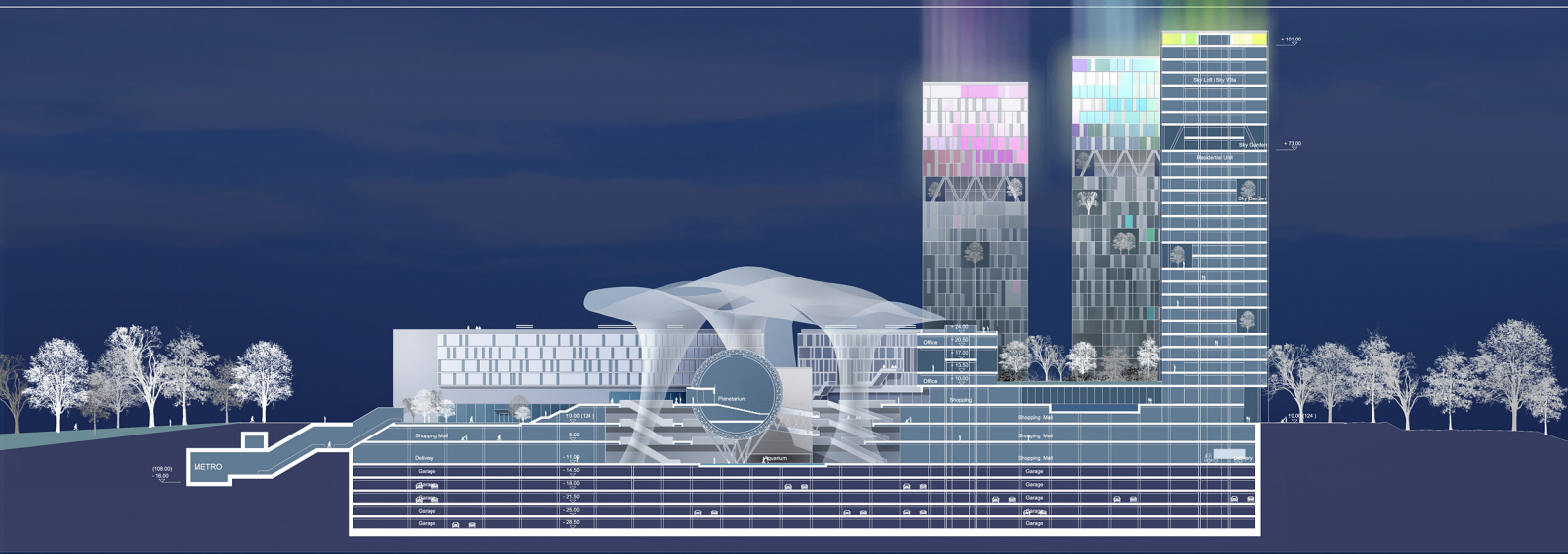
Section B-B
1 / 500



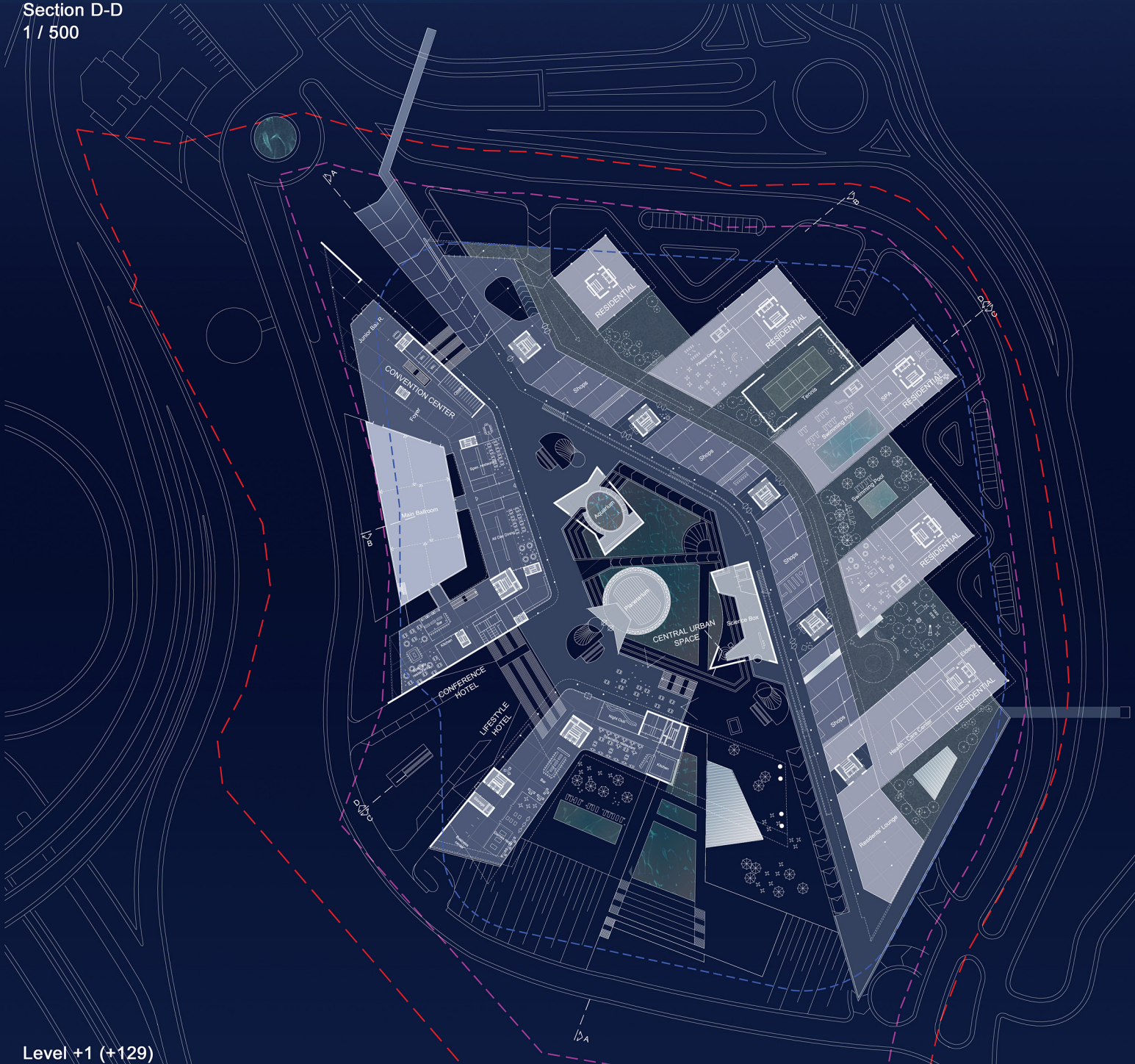
Level -1 (+119)
1 / 500



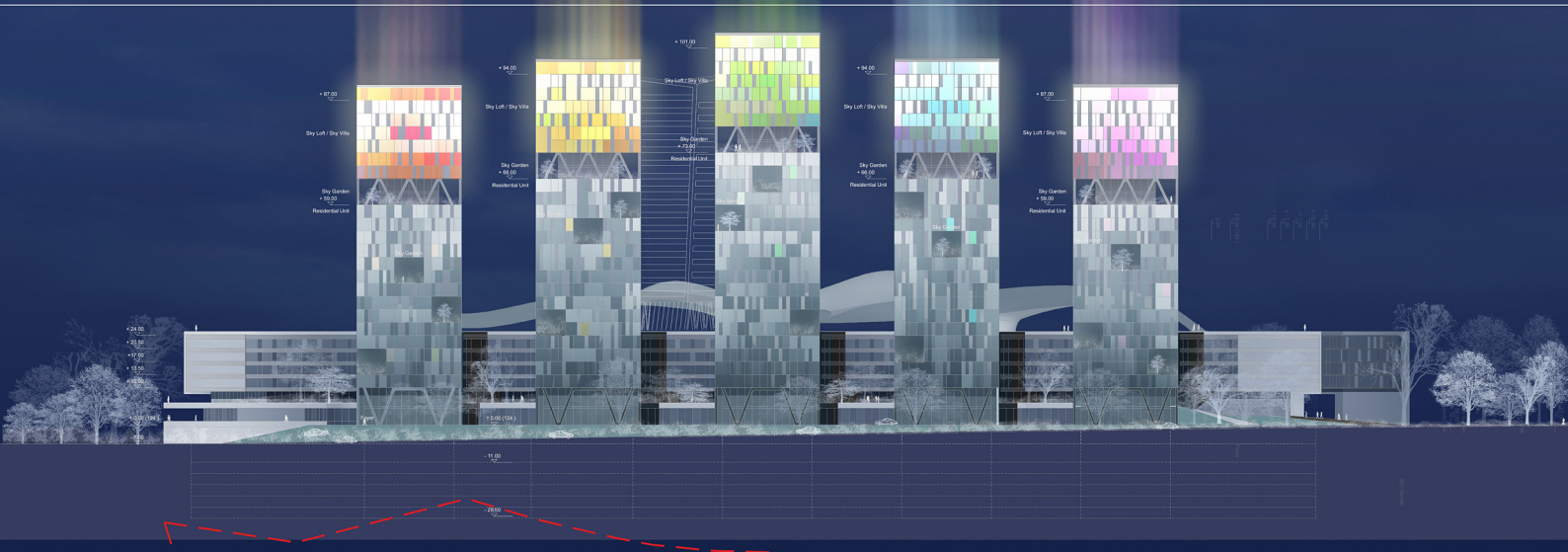
Level 0 (+124)
1 / 500



Section D-D
1 / 500

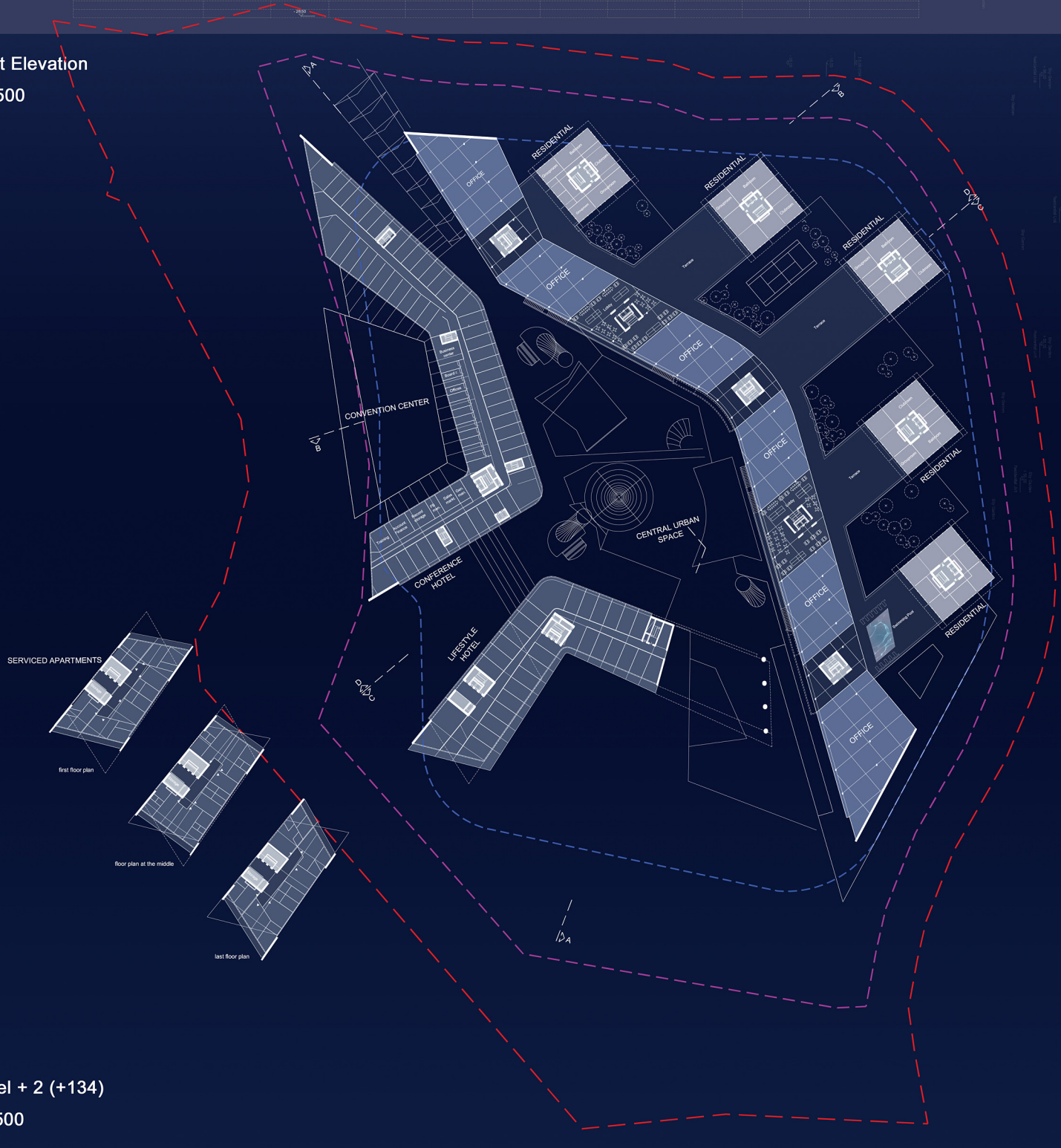


Level +1 (+129)
1 / 500



East Elevation

1 / 500

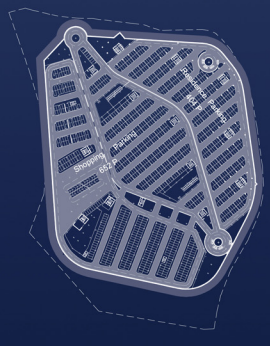


Level + 2 (+134)

1 / 500



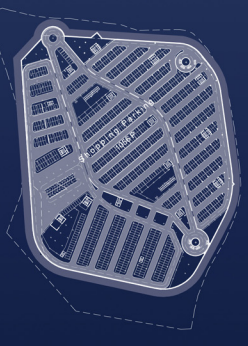
LEVEL - 4 (106)



LEVEL - 5 (102.5)

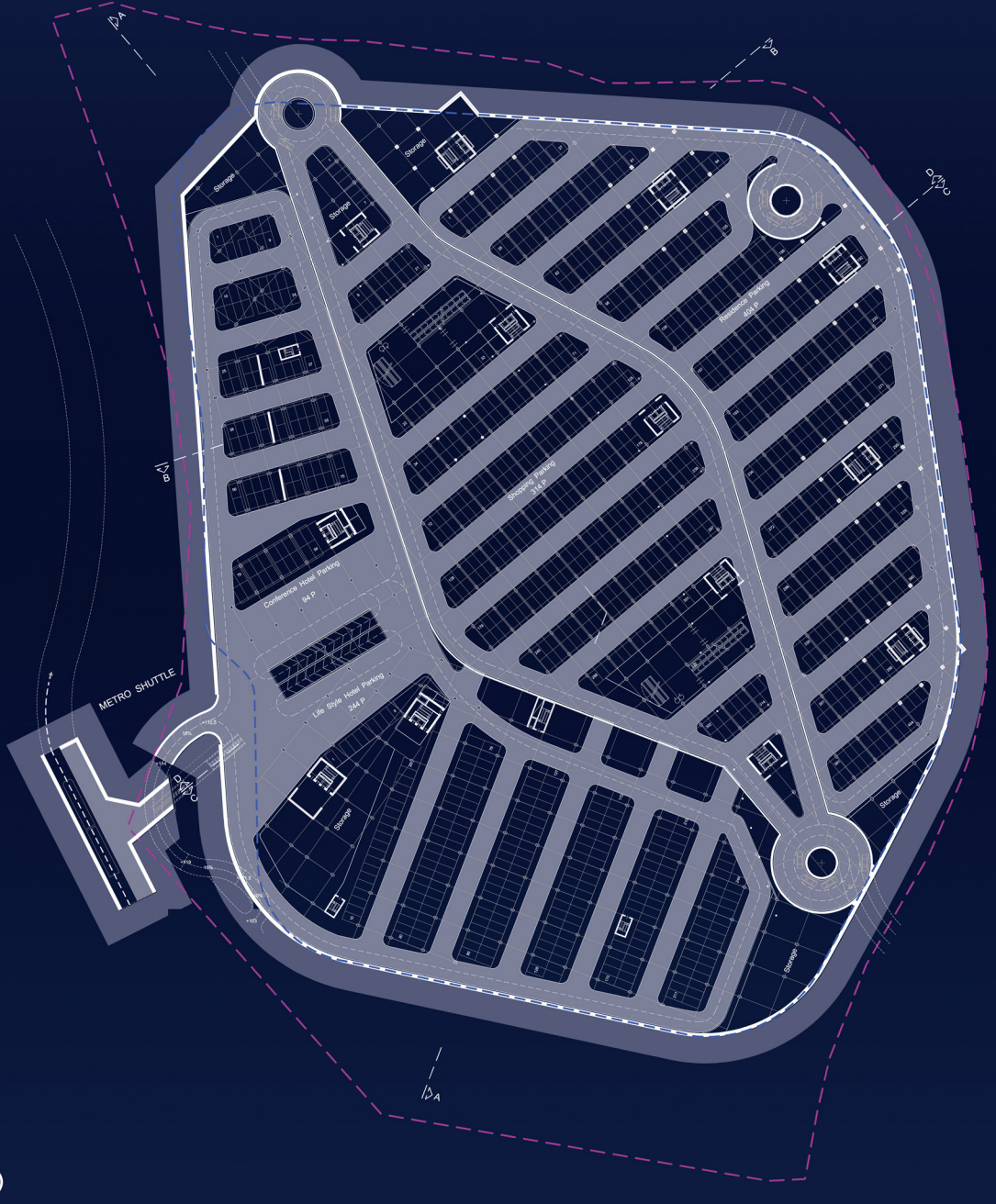


LEVEL - 6 (99)

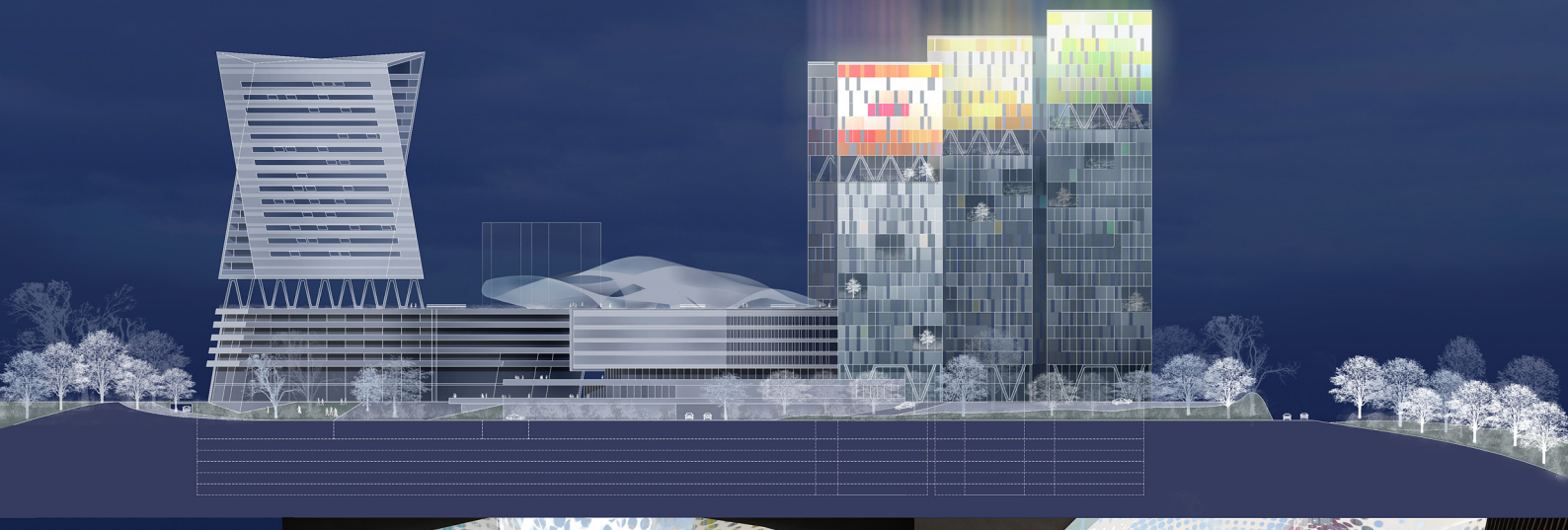


LEVEL - 7 (95.5)

1 / 2000



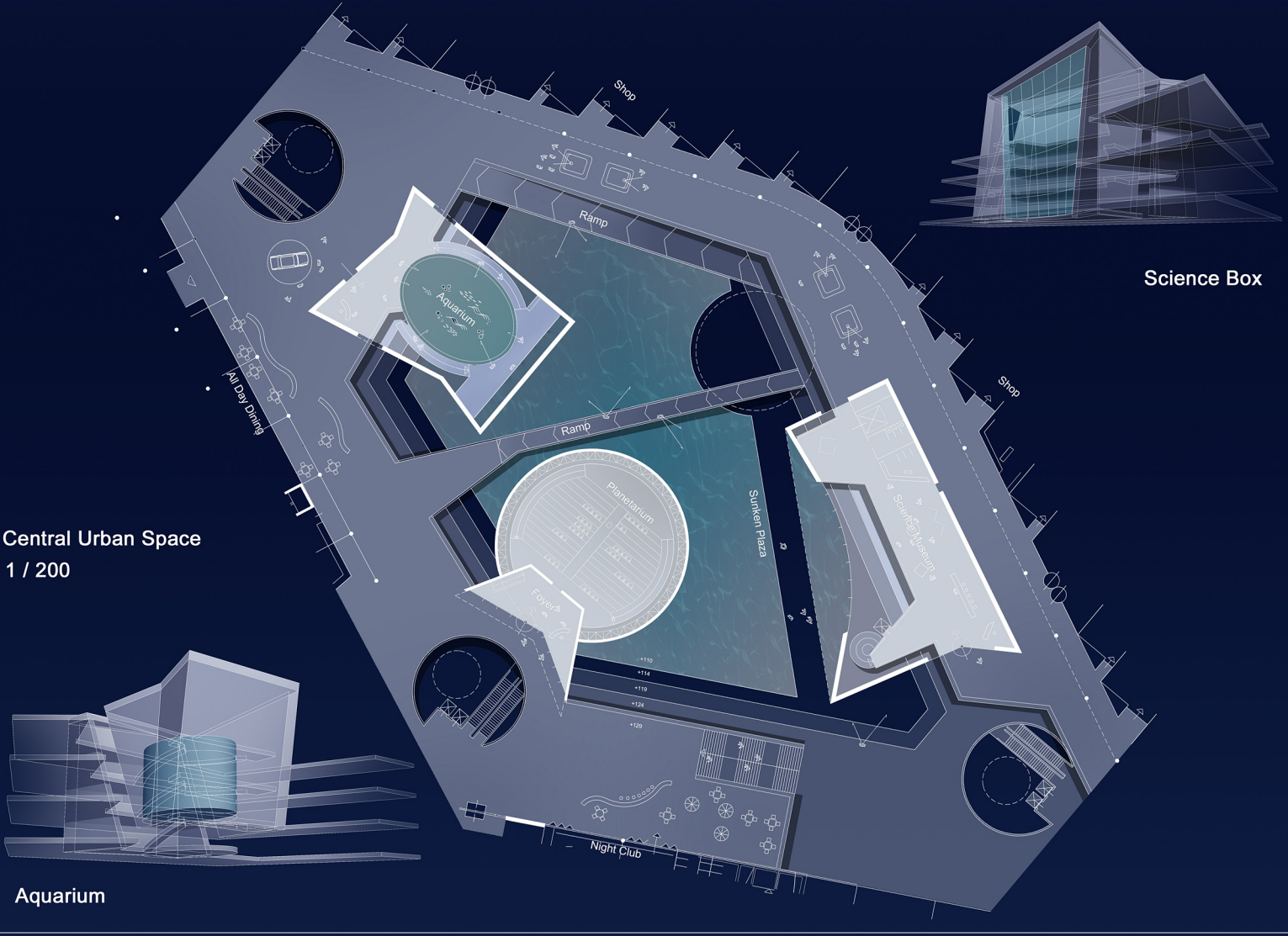
Level -3 (+110.5)
1 / 500



South Elevation
1 / 500



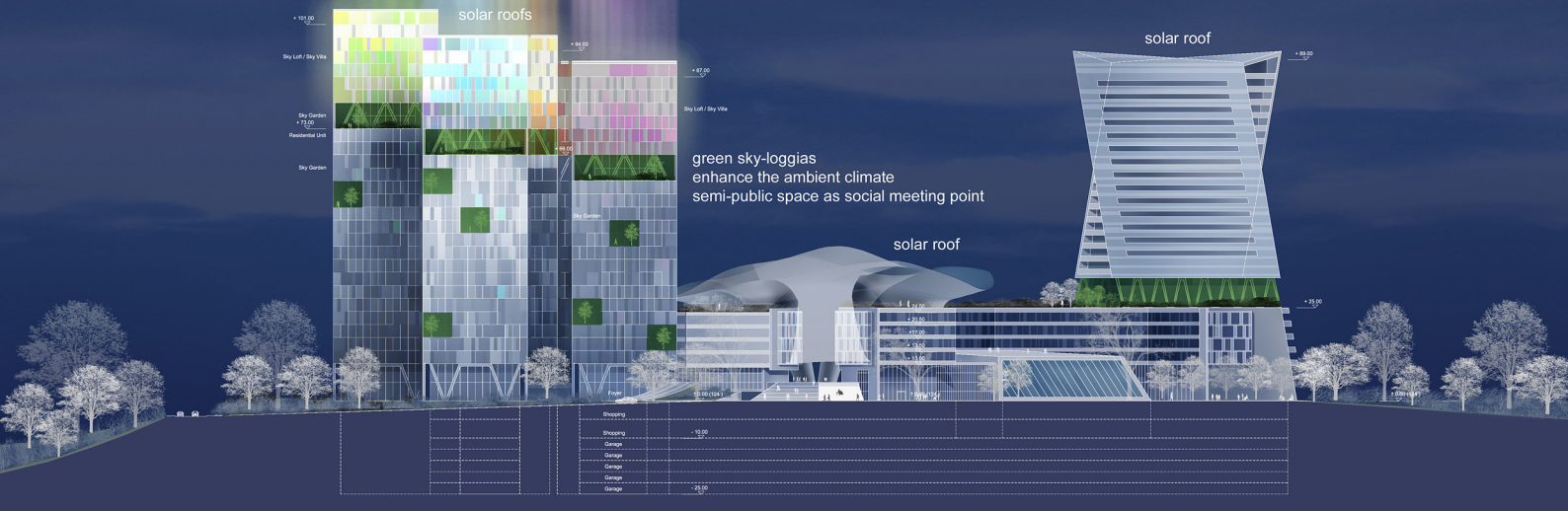




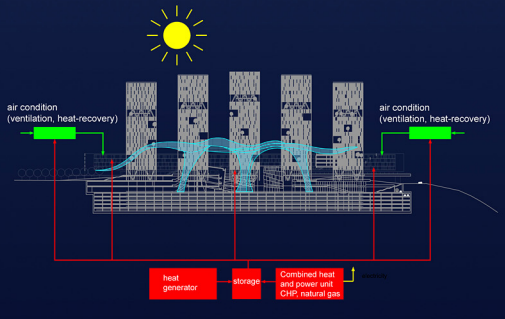
Science Box

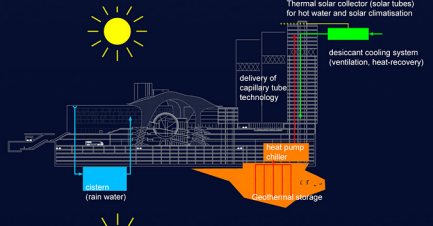
Central Urban Space
1 / 200

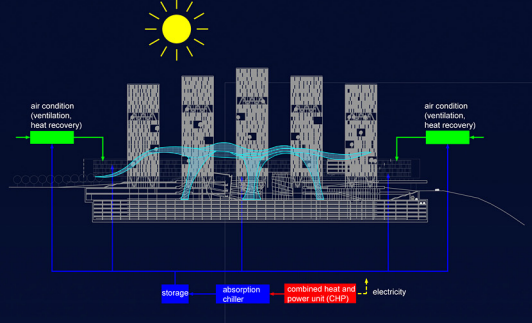
Aquarium

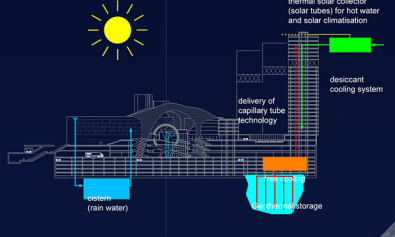


ENERGY DESIGN: A COMPREHENSIVE ECOLOGICAL DEVELOPMENT FOR THE 21st CENTURY



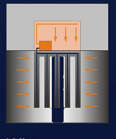




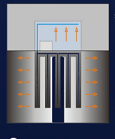


Geothermal storage

The ground will be used as a seasonal geothermal storage to reduce administration costs while raising energy efficiency and using comfort. Foundation heat exchangers cover a substantial part of the heat and cold supply of the complex



heating with heat pump



„free cooling“



Cooling with chiller

Winter:
During heating period heat is abstracted from the ground and with help of heat pumps raised to a higher temperature level to be used for the heating of the building.

Summer:
The ground cools down and during summer months is used as heat sink to cool the building.

Room module

The high insulated building envelope protects the indoor environment and uses the passive solar winnings.

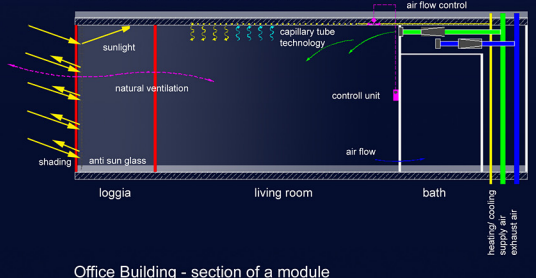
Water-carrying capillary tube mats are installed directly below the surface of the room enclosure surfaces, allowing smooth temperature control of ceilings, walls and flooring. The transfer of energy between users and the activated surfaces is achieved predominantly using radiation.

Beside the natural ventilation, a mechanical ventilation supplies the rooms with fresh air. In winter a high efficient heat recovery system will minimize the losses by ventilation. In the hot and humid summer the outside/supply air will be dehumified by the solar climatisation system (DEC).

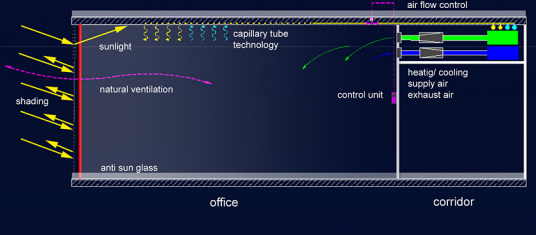
Office:

The special shading system enables the occupants an antiglare workplace, by using simultaneously the sunlight. An economized use of the artificial light is possible.

Residential Towers - section of a module



Office Building - section of a module



Solar Roof

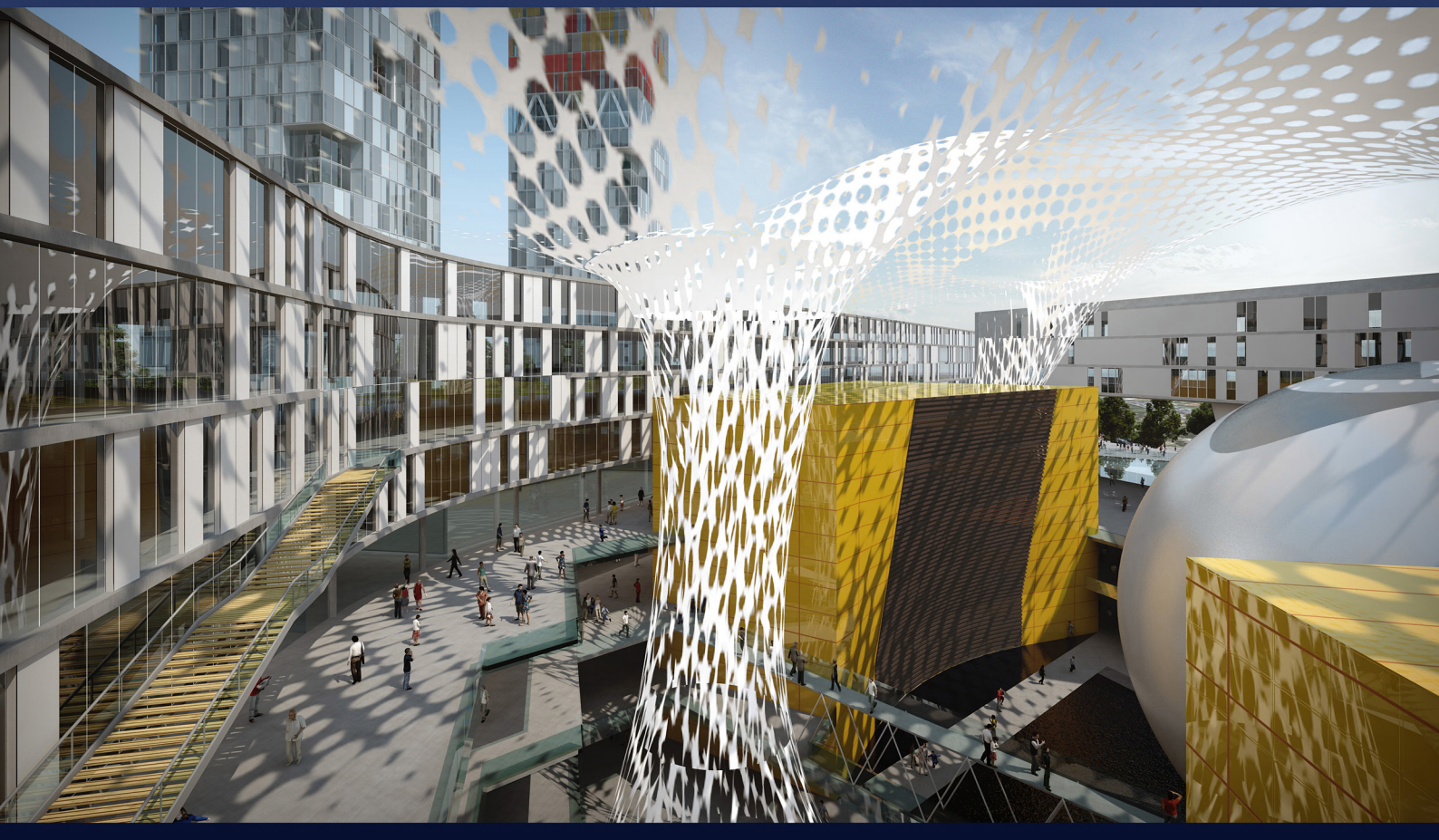
- generating energy
- sunshading
-protection from rain and wind
- illumination at night
-rainwater collection



View from South



View from West



View from the Central Urban Space



View from the Sunken Plaza



Aerial View from South-East



Aerial View from North

Editorial

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