وزارة الثقافة – لبنان بيت الفنون والثقافة – بيروت المركز اللبناني - العُماني

THE HOUSE OF ARTS AND CULTURE IN BEIRUT / The Lebanese - Omani Center

"Love and adoration is the begging and the end of our doings", Khalil Gibran, Boston 1908

Architectural Design Approach

Just like Andalusia was described as the "East of Europe", thus Lebanon-Beirut can be described as the "Europe of East". A country and a city, which in spite of hardships remains very democratic and creative, artistic and spiritual. Country of the great philosopher, poet, writer and painter Khalil Gibran, whose work constitutes the main background of our concept, comprehending fully that the **"House of Arts and Culture"** ought to be simple and not glorious, vivid and not imposing, liberating and not intimidating, democratic and not tyrannical… That is the reason for its name: a "**House**" and not a "center". A "**House**" open to everyone, especially the youth, not only the elite…

Thereby we consider the workshops and particularly the ones of dancing, plastic arts, theatre and music, as a separate building inside the Building, representing the **Heart of the "House"**. We also consider it our obligation to propose the maximum possible mixture amongst the people that coexist in the "**House"**, employees, visitors and those who follow various workshops, giving them the opportunity to an effortless acquaintance, dialog and activity. Loyal to that principle, we underline the "resurrection" and inflorescence of Lebanon, through the symbolism of deconstruction at the main entrance of the **"House"**.

Essential is considered also the creation of the "hanging gardens" of Beirut at the east side of the building, that adjoins with the underground (and ground) crosswalk, gardens that can also be used as emergency exits. Green, water, earth (rock and stone) and in some cases fire, accompany the visitor in every level of the building. Great attention was also given to the clarity of the solution and aesthetical attraction, easy orientation and functionality, variety of spaces and color. Every possible way of saving energy, through geothermics, passive and active systems of bioclimatic architecture and ecology, constitute the basic parameter of our proposal.

Regarding the multimedia (small) theatre and cinema, we propose, in some cases, to open and transform them in one, using the theatre and music workshop, placed on that level, as stage… So, flexibility was, from the beginning, an additional essential parameter of the whole concept, converting the slogan "maxmix" to "maxmixflex".

Great attention was also given to the use of new architectural materials, such as the diaphanous concrete LiTraCon, used in the workshops above, bringing the visitor in a continuous contact with the Heart of the complex and tomorrow's conscious artists. We also propose some other (new) materials, as isotopic and anisotopic membranes and especially the solar integrated membranes, new fabrics such as: PVC coated polyester, PTFE - coated fiberglass, metal fabrics, photonic textiles, pneumatic structures, stretched transparent fabrics and adjustable tents, as well as green walls at the hanging gardens and other parts of the building.

For the easiest localization of the **"House"**, we thought necessary to create a signal mark, which symbolizes the free "whole man"… For the best "reading" and orientation to the different unities of the building, we estimate essential the alteration of exterior facades. The overhead of delivery, as well as the rest of the north side of the building, is proposed to be used as an outdoor exhibition area for large scale

sculptures, which, combined with green, water, artificial lighting and various modulations, will consist an additional pole of attraction to the complex and especially to the frequenters of the restaurant.

Thus the Beirut's **"House of Arts and Culture"** will represent an effective reply to the architecture of vanity and barbarity of our times, that has completely abandoned harmony and actual Human needs!

Traffic Layout

The design of the traffic layout and operation of the underground car park is based on the assumption that entry is free to users. This means that there is no need for the installation of equipment to control the entry and exit of vehicles and cause delay.

Vehicles exiting the car park will converge into the road traffic stream using a dedicated lane for this purpose. If this is not possible due to geometrical and traffic restrictions, it may be necessary to install traffic signals at the exit of the car park in order to facilitate the safe exit of vehicles from the building at peak traffic periods.The unloading of heavy goods vehicles will take place in the designated on–street loading bay location. Goods will be unloaded onto the specially designed elevator, which is to be accessed from the ground within the property's pavement. From there, goods will be lowered to level –1, –2 & –3 from where they may be transferred to the building's interior elevator and thereon to anywhere in the building.

Visitors using public transport, cab and limo services can access the building via the adequately designed bay area in front of the building's main entrance.

Acoustic Treatment

The areas that require special acoustic treatment are the Large Theatre (Performance & Conference Hall), the Multimedia Theatre and the Cinema Theater.

The Large Theatre is designed to work primarily as a music and drama hall (opera, concert etc) but must be versatile enough for speech use (supported by a speakers system). The achievement of high quality acoustics relies on the geometric design of sound reflectors, the selection of highly absorptive surface finishes, the use of a state-of-the-art artificial reverberation system and the proper insulation of the hall. The stage wall and part of the ceiling are made of sound cedar wood and shaped in curves so as to reflect sounds from the stage concentrated to the audience sections (ground, first and second level). The side walls of the hall are covered (20%) with diffusers so as to direct better early reflections to the side part of the audience. The side walls and the back walls of the hall are covered with sound absorbing panels of rockwool - fabric and perforated rockwool - perforated wood so as to reduce the back-stage effect and increase the definition and clarity of the hall. The superior acoustic behavior of the hall is based on an artificial reverberation system, which uses microphones to capture the primary stage sound, a reverberation controller with programmable settings and speakers of the highest quality distributed throughout the hall.

The Multimedia Theatre is designed to have superior acoustic behavior for natural speech, although a sound system will be also integrated in the hall for other uses. The acoustic treatment relies on the optimum use of diffusers, due to its versatility. In this way any directivity effects for the frequency range of interest are minimized. 80% of the ceiling surface is covered with diffusers, as well as 10% of the side walls. The rest of the ceiling and the back walls (behind the two audience sections) are covered with highly sound absorptive materials (rockwool - fabric panels) so as to reduce unnecessary sound reflections and achieve improved speech definition. Sound absorbing carpet will be used to cover the whole floor except for the stage area.

The Cinema hall features highly absorbing surface finishes: The walls and ceiling are covered with thick fabrics, while parts of the side walls and the back wall are covered with rockwool - fabric acoustic panels (20% coverage). Additionally, the floor will be covered with thick carpet. The sound system is selected to meet the highest standards of modern audio-visual equipment, being compatible with the latest surround audio formats.

The insulation properties of all the above halls meet the highest standards and are achieved by using “room-into-room” principles, anti-vibration and heavy mass layer materials to disrupt sound transmission.

Structural Design Methodology

The building is constructed mainly of reinforced concrete with some elements in structural steel, as the trusses under the theater roof. It has solid concrete slabs. The dimensions of the beams that support the slabs are specified on the basis of resistance capacity, economic and functional requirements.

Both vertical and horizontal loads are received by means of a system of walls mounted in spatial frames. The amount, size and position of the column/walls is chosen in a way to provide small relative displacements and sufficient torsional rigidity, under the solicitation of the horizontal seismic actions. The addition of the four wall shafts at the corners of the structure, is of critical importance in the building’s structural system. The size of the frame columns is chosen in a way, so that it maintains low compression stresses, which are important for the ductility of the structure and also enables the constructibility of the frame nodes. The foundation of the building is done with a raft foundation slab.

All the calculations and the estimation of the section stresses (Static and Dynamic) are made using software that applies the finite elements method. Specifically the software program ETABS, SAP etc. is used.

The structure analysis is done with a space frame model, where the columns, beams and walls are modeled as beam elements with accurate dimensions. The slabs are modeled with finite elements that follow accurately their geometry, height etc. The dynamic analysis is conducted under the assumption of the diaphragmatic function of the structure, i.e. the slabs in each level are considered almost undeformed in their own plane. The soil flexibility is modeled using springs (linear elastic foundation), with the value of the modulus of vertical subgrade reaction taken from the Geotechnical study.

The reinforcement calculations are finally based on the section forces envelopes, as they are provided by the Codes and Standards applied in the design. The applicable codes are to be chosen between international and local codes, such as the Eurocodes (EC), the British Standards (BS) and also the Local Codes. Basic construction material is the reinforced concrete of min. grade C25/30. The reinforcement bars used are of grade B500C. The prestressed concrete min. grade for the Theater’s Balcony structure is C30/37. The prestressed concrete’s Steel tendons are of min. grade 1570/1770.

Bioclimatic & Energy Saving Design

The Bioclimatic & Energy Saving Design of the **“House”** is based on the use of Shading systems, functional organization of the indoor spaces, improved internal thermal capacity and thermal inertia, implementation of passive heating & cooling, natural lighting (predicted Internal Reflected Component IRC ≥ 50%), natural ventilation, appropriate formation and gardening of the open spaces, use of green walls, roof gardens, plants & water elements and best heat insulation.

In order to achieve best use of Renewable Energy Sources & Energy Saving we propose: Geothermal Heating & Cooling for the hole building through Vertical Heat Exchangers & Water Cooled Heat Pumps, Solar PV panels for electrical local use Energy production, Heat Pump Water Heaters and high efficiency solar panels for Hot Water, Small scale Combined Heat & Power Generation (CHP) system, Use of low energy consumption equipment (pumps with inverter, low consumption lights, energy class A refrigerators, PC's etc), Power Planners & cosf improvers for Internal Electrical Loads, CO2 sensors for ventilation systems regulation, Best heat insulation for the ducts & piping networks, Rain Grey Water Storage Tanks (2X250m³ located in –6 level of the building), Use of Building Energy Management System for energy planning & consumption arrangement.

Based on sustainable and environmental friendly use of water, it is recommended that runoff water from the ceiling and other parts of the building, as well as water from the washing of the garage, will be collected. Grey water will be recycled back to the building by the use of a pump, in order to be reused as service water (e.g. fire fighting, irrigation purposes, cleaning of the building, toilet flushing). Grey water tank, pump and pipe network is designed based on water consumption levels of customers and employees. Excess grey water will be discharged to the sewerage network.

Remaining Engineering Services

The main concept of the engineering services is to deliver a low-energy building, but at the same time to satisfy the demanding requirements of all activities in the **"House"**, with an operational and reliable manner. The Technical Rooms of the **"House"** are mainly situated in basement levels, -2,-4,-5 or -6, but also above ground, in the technical floor below the large theater level. Consideration has been given to the vertical communication of all type of networks –piping, ducting or cabling– by providing mechanical shafts of appropriate dimensions. Mechanical equipment is also installed on the roof level, but special provision is made to eliminate aesthetical or acoustical issues.

Level	Main Use
-6	Parking, Technical Rooms-Storage, Water Reservoirs
-5 & -4	Parking & Technical rooms
-3	Parking & Technical rooms
-2	Parking & Miscellaneous spaces
-1	Parking & Delivery
0 & +1	Reception, Dance Workshop, Restaurant- Cafeteria-Bar, Shops & Loading bay
+2 & +3	Exhibition Spaces & Art Workshop
+4 & +5	Small Theater, Cinema & Theater – Music Workshop
+6	Orchestra-pit, Platform lift area, Storage, Technical rooms
+7 & +8	Large Theater & First Gallery
+9	Second Gallery & Cinémathèque
+10	Large Theater & Documentation Center
+11	Large Theater & Administration
+12	Roof Garden, Photovoltaic surfaces, Technical Rooms

P.S. The rest of the plans, which couldn't appear, on the boards are presented on the CD-Rom.