

## **ARCHITECTURAL PROJECT'S REPORT TAP G INHABITABLE COMMUNITIES**

International Competition for the Extension of Bocconi University Campus

### *PREAMBLE*

The program sets the scope to expand the Bocconi University Campus, incorporating three different parts:

*Classrooms for Masters and Administrative offices, spatial units repeated*

*Student Residence, the repeating units are individual or shared apartments*

*Public buildings for the campus, with cafeteria, shopping and recreation centre*

### *PROBLEM SOLVING STRATEGY*

#### **01. Overlay layers**

The project is established from a mesh of 7'80 to 7'80 meters that organizes the spaces and the program.

The program takes the modular grid as a structured logic, which allows the layers of the program to superimpose in two directions. The creation of a modular structure makes the project into a versatile building, able to adapt to changes over time. The bidirectionality in which the programs are overlapped generates and defines open spaces, public and private. This ensures interaction between the different uses of the campus.

In this composition of volumes of two overlapping directions, one perpendicular to another, each program takes one direction and is clearly identified within the whole composition. In a way that each of these uses generates an added value by taking a prominence. The vertical connection between the different programs matches in the points of support between volumes.

The volumes oriented east - west always rely on volumes north - south, so the pieces of office rest on parts of the departments and the residence is based on parts of the restaurant and common areas.

#### **02. Permeability and Filter**

The volumes of the project disconnect themselves from the ground, leaving the floor free. The only points of contact with the ground are the tiered lecture theatres that are understood as different elements from the rest of the classrooms and vertical circulation spaces that appear as a light box supporting the buildings.

The access to the communication cores is always made through a porched area generated by the floating volumes. These porches create a visual filter but not a physical one, between public spaces to private spaces on campus. These areas get a multiplicity and permeability in circulation throughout the campus, as well as a particular spatial feeling in their relationship, outdoors - indoors.

### 03. Organic verticality

The porches created in the ground level are seen as a forest of pillars that integrates with the forest of trees that make the campus environment.

In this way the verticality created by these elements comes to be a determining factor for our project. The facade is composed of vertical elements, following a modular fragmentation by use and impregnation of organic materials establishing a direct connection to the environment.

The campus is seen as a forest, formed by the surrounding trees and the building itself, which acts as a filter between the inside and outside of the campus.

#### *NETWORK AN IN-BETWEEN*

The project organizes the program in four distinct areas.

The department buildings have a direct connection to the existing Campus Bocconi directly related to Roberto Sarfatti road. The department entrances are located to utilize the direct connection point to Ulisse Gobbi road. Suggesting this pathway as a link between the current and proposed Bocconi Campus.

The access to this hall is made through the main porch that leads directly to the forum of the departments. This space is understood as a distributor to the classrooms because from here you can access any communication core.

The connection between the departmental groupings and the shopping center is made through the porch next to Tuscany road, in this way we guarantee a direct covered connection between the different programs. This access remains directly linked to Gian Carlo Castelbarco road, turning it into a more commercial one.

The sports complex is founded in continuation to the commercial area directly related to Toscana road, which has a more augmented presence of vehicular traffic, creating a facade that sets perimeter limits.

Its location creates a more comfortable access road, facilitating its use independently of the whole campus.

At the other end of the plot the residence and restaurant area are placed directly related to Luigi Castiglioni road, that enters the campus, generating a distribution square (housing forum), which directs users to the different communication cores of the residence and restaurant.

The access to the computers area is made through the underground light patios that are founded in the distribution square (housing forum).

#### *CIRCULATIONS*

Access to the departments on the ground floor, is done by the means of porches, these will always lead to a communication core. To these cores one can access both, from the underground level as from any other building level and from which you can circulate horizontally in a continuous and uninterrupted way throughout the departmental area.

As in each department the horizontally and vertically connection is allowed, in the residence, the

communication is done through the distribution square (housing forum) which allows access to the communication cores. From these cores, access to the housing is exclusively allowed.

In the underground plant the horizontal connection between all the departmental cores and the residency is ensured. The underground corridors are lit and ventilated through patios and outdoor lighting also the addition of embedded lighting on the ground floor.

The passable roofs allow circulation and connection between different parts of offices located on the departmental building.

All the different uses are connected and in the same time allow their delimitation through filters in the communication cores.

## *PROGRAM*

### **01. Classrooms**

#### *the module and aggregation unit*

Based on the 7'8x7'8 meters structural mesh a different size type classrooms are created. The different types can be formed from a single module, or from the aggregation of two modules forming grouped unit, in the case of the theoretical ones. Or, that the structural module contains two classroom modules and a circulation area, in the case of working classrooms.

The different types of class unit are grouped according to the mesh forming an aggregation unit taking on a cruciform shape. This one is organized by classrooms from edge to edge which are accessed from a central corridor that is connected to a communication core.

The communication cores contain services and elements of vertical circulation and a lobby space. This being the single point of aggregation unit that comes in contact with the ground floor.

The working classrooms are oriented to the west considering that its use is predominant in the afternoon, however theoretical classrooms are oriented east because of their predominant usage in the morning.

The modulation gives the aggregation unit a flexibility that will be able to absorb future changes in the conformation of this.

As we formerly noted the tiered lecture theatres are at a different point from the rest of the departmental building. Which are created from eight structural modules containing two tiered lecture theatres and a central access corridor that make the aggregation unit. These have the peculiarity of having a harrowing downward slope floor. They are partially buried in the ground to ensure access from ground floor to the highest point of the space.

#### *implementation of the aggregation units*

The classroom is composed from the union of the aggregation unit of the tiered lecture theatre from edge to edge and the aggregation unit in the cruciform. This new aggregation unit is repeated and distributed on the ground following the generator mesh of the project.

The gaps that are generated on-site and the aggregation system composing the classroom become outdoor spaces like a forum linking the different parts.

## 02. Offices

### *the module and aggregation unit*

Out of the structural mesh of 7'8x7'8 meters they are created a modules that contains two office spaces served of a distributor space, these ones constitute the aggregation unit.

The aggregation unit of the offices is created from the horizontal repetition of the module forming a supported bar above disparate departments.

The offices are oriented to the north and the distributor spaces to the south. This last one connects all the offices of each plant from one extreme to other, taking as a starting and ending point a communication core that reaches the ground floor.

### *implementation of the aggregation units*

Office bars will be placed above the department units leaning on their roofs. These different blocks are interconnected through the passable roofs.

## 03. Residence

Within the residency program the residence for professors and the one for students are distinguished.

### **Students' residence**

#### *the module and aggregation unit*

Out of the structural mesh of 7'8x7'8 meters they are created some apartment modules of 4 or 2 dwellers. This module consists of a living space which includes a kitchen and a dining area separated from the bedrooms for a circulation space that absorbs the height between the living slab and the slab of the bedrooms. According to the 4-tenant apartments there are found two bedrooms at +1'50 meters and two more at -1'50 meters from the kitchen space. Concerning the 2-people apartments there are two types, one with the two bedrooms at +1'50 meters above the living area and the other one that contains them -1'50 meters below this common space.

The bedrooms of the module are oriented to the north, while the kitchen-living room is facing south.

The creation of the units is done by stacking two modules of 4 people and a module of 2 people.

The different levels inside the apartment modules allow us to make different combinations and create various types of units attending to the need.

According to the combination of modules they are created gaps on the façade used as private terraces for continuous apartments which at the same time thanks to the shift of floors allow the illumination of the stairs of the apartments below.

The unit of aggregation of the residence is generated from the horizontal repetition of the created unit out of the sum of all modules forming, like this way, a bar.

Each bar consists of 8 apartments for floor and two cores of circulation. Each core serves four 4 apartments, two through the two private terraces and two more through direct access from the core of communication, singularity that reduces the number of circulation cores so as to ensure maximum permeability in the ground floor.

### *implementation of the aggregation units*

There are generated three bars of residence that are placed perpendicularly above the restaurant bar and communicated with each other through the passable roofs becoming community spaces for the residence.

### **Professors's residence**

#### *the module and aggregation unit*

This is singular point of the project in which we break the logic of the structural mesh. The module consists of a central and vertical communication core which serves either two 4-tenants apartments or two 2-tenants apartments plus two 1-person apartments.

The bedrooms are oriented southwest and northeast and the rest of spaces southeast and northwest.

These modules of plant's types are repeated vertically forming a tower of eleven floors.

#### *aggregation system*

The tower is placed above the residence bar with a twist, breaking the generating directions of the project. This twist occurs in order to make the tower to be guided to Milan's center and also identifies a key point of the project becoming a reference landmark at the end of Luigi Castiglioni's road, and the highest point of itself.

## **04. Restaurant**

The restaurant is located perpendicularly below the residence bars, and we can distinguish four zones in it. Two of them are buried 3'00 meters, lighted up and ventilated through the yards and connected directly to the campus parking. A third area placed at +1'50 meters occupying the ground floor of the central residence bar. This area provides access to the roof of the underground restaurant, which becomes a terrace-café that relates the two bars of the residence. The fourth area is directly related to the housing forum, which is accessed through a gateway above the lighting and ventilation patios which divide the Forum. This space has a back porch area directly related to the distributor square of the school.

The area that includes internet boxes, email, instant office and video-conference are buried 3 meters deep, all lighted up and ventilated through the patios located within the housing forum. The access to these spaces is through these patios.

## **05. Shopping Mall**

These spaces are not modulated but still follow the mesh structure that governs the project. It consists of a bar placed below the offices which comprises a travel agency and a bank office in the ground while the first floor hosts a second group compound of a computer store and the merchandising store of the university.

The access hall of the mall is through the porch created from one of the wings of the cruciform and connects through another porch, this being an extension of the one previously mentioned, with the hall of recreational center. It generates an external access through the roof of the central shopping center, which is directly related and connected to the first floor's recreation centre lobby where are found cinemas and entertainment areas.

## **06.Recreation centre**

This part of the program is understood as a mass acting like a physical limit between the plot and the street. It is organized with the same structural logics that generate the whole project.

This mass includes itself both swimming pools, the Olympic and the training pool, the locker room, the reception area and the restaurant.

On the first floor there are located the leisure area related with the shopping mall. This leisure area is composed by; music, multimedia and experimental labs as well as the telescopic ring seating.

On the second floor there is the nursery around an interior patio, which makes possible having a protected open space for children. On the same floor we can also find the fitness and weights area with their own dressing rooms.

On the third floor we can find the gym and, ending on the fourth floor, the service area of the sports centre, distributing the offices, meeting rooms and dance floor.

There are two different ways to enter at this recreation centre, one of them through the covered area that connects this center to the shopping mall (on ground and first floors), and the other from Giancarlo Castelbarco Street through another covered area used by the sports centre's restaurant.

## **07.Parking**

The entrance to the parking is located at Giancarlo Castelbarco Street parallel to the stick shaped shopping mall. The parking area is linked to the different communication cores of the campus creating and interconnected buried grid.

The parking area is organized in two levels, the first one with capacity for 200 cars and the second for 300. The closest areas to the communication cores are designed for bicycles, motorcycles and handicapped cars. On that levels are also located several enclosures for facilities, such as heat pump or air conditioning system.

## *SYSTEMIC, COMPONENTS AND ECO-TECH APPROACH*

### **01.structure**

The structure chosen is a structuring grid compound by concrete pillars of 40x40cm each and a lightened sandwich slab to solve great distances with a total thickness of 30cm (7+16+7).

The structural slab is lightened with EPS blocks. Despite being a slab system, this type of solution provides some freedom between support distances (between 8 and 14 meters) and can achieve different slopes up to 20%. It is important to consider that the lightness of those slabs provides an easier elevation of its components making the construction process faster.

Once it the formwork is removed, the surface of this structure can be visible without any other treatment. This point represents a significant saving in ceilings covering. Especially if we consider that the continuous 7cm lower sheet of concrete allows the hanging of different paths of facilities without damaging it.

This design element also offers good fire resistance because the iron bars are protected by concrete; as well as a good soundproofing due to its interior composition.

Besides the already mentioned, there are two different points, the offices and the tiered lecture theatre.

Offices are designed as a stick held above the departments. To hold these stick shaped offices we use Warren beams which can overcome distances of more than 20m. These beams are composed

by HEB 140 metallic sections coated with perlite mortar and all of this coated with squared metallic sections of 20x20cm.

The tiered lecture theatres are identified by being concrete boxes embedded in the ground. There are made by reinforced concrete walls on-site of 30cm thickness.

## **02.building envelope and technical skins**

The proposed façade for the campus extension is composed by the combination of three vertical modules which achieve different thermal and luminous requirements.

Following the same structural logic of the rest, the 7,8x7,8 grid is divided in parts of 1,3m so these modules became integrated in the general structural organization of the project.

The composition of the façade from modules, allows a flexible and variable changes in function of the use, according the possible replacement and substitution.

These 1,30m modules are formed by several 4 meter height layers embedded into a metallic section anchored from slab to slab. According to the layers that comprise them, there are three different modules.

### *Opaque Module*

Precast concrete panel of 20cm with 8cm of thermal insulation on the inner side. This panel is attached to the slab by a metal plate and a hidden anchored and separated 5cm from the slab edge which allows the chamber ventilation.

On the inner side there are two plasterboards of 13mm separated 2cm and held by a 7cm substructure embedded in the thermal isolation.

### *Translucent Module*

The outer layer is a fixed aluminium joinery with a 10,5cm edge frame type Schücco with double glassing and air chamber ((6+16+6)+50+8mm). And the inner side is a precast translucent concrete panel type alabaster.

This material does not need coatings and has a high durability and impact resistance. It also provides natural light into the building, which is electric energy saving, while ensures privacy.

The solar radiation is filtered through the first layer, heating the air inside the chamber, and this heat enters the building delayed because of the thermal inertia of the concrete sheet. To improve the thermal behavior of the module it is created an air chamber between the outer and inner sheet with the ability of ventilate it in summer and be sealed in winter.

### *Organic Module*

The outer side of the module is a solar protection consisting of two layers of vertical slats which pivot about a central axis allowing different orientations according to many situations and requirements. The first layer is made by wood slats that give a continuous and regular shadow, and the second one is made by wicker slats which produces an organic and discontinuous shadow. The inner side of the panel is a practicable aluminum joinery type Schücco again.

### 03.framing

The façade of the department units are composed by the combination of these three different modules according to lighting requirements that each space needs. The kind of combination between the three different modules, the façade becomes a variable element according to each floor or area, as in each plant the department typologies are variable.

From the inside it is possible to adjust the lighting level by calibrating the slats for many different uses or users requirements. At the same time, this interaction between the user and the façade to adjust the interior conditions also affects the external sight of the entire building.

The façade of the residence is also compound by the same modules. The south façade is compounded of a succession of terraces that alternate their position where the organic module is altered. In this case, the organic module allows opening or closing this terrace converting it in a closed space in winter or an open exterior terrace in summer altering the form factor of the building.

#### *Points of contact and integration with the environment*

That parts of the building that come into contact with the ground level, communication cores and tiered lecture theatre, have a vertical slat made façade with two floors height and also have a bigger size being orientable around a central mechanised axis. These bigger slats have two main functions, protecting those glass boxes from impacts and being a solar protection from de solar radiation. They have also the visual function to merge with the environment through the sense of verticality similar to a forest.