PROJECT FOR A MULTI-PURPOSE BUILDING AND REDEFINITION OF A CENTRAL AREA IN CERNUSCO LOMBARDONE IN ITALY-ARTERY OF CERNUSCO

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Abstract- The Municipality of Cernusco Lombardone, Italy held a competition among the students of Politecnico di Milano. The key requirement was to design a sustainable built environment of a multi-functional buildings in the given area. This project was awarded as winner project in 2014.
The concept to transform this area into a more vital and vibrant based on making this park 'the Artery of Cernusco', through which the movements and the life of the city will pass and remain every day. This artery will be developed in the most important axis of movement of the park, connecting different public spaces as a transitional path between different experiences. The real artery, an organic inviting path will cross the third and biggest public space: the park. It is designed this connection as an activity path a journey where the users can enjoy any kinds of recreational activities.
As a program in the architectural spaces, it is designed as a multi-purpose building which serves as exhibition area, conference hall, library in a small scale and a gym. Since this multi-purpose building is also a technology-oriented building this complex is integrated with technological units. In order to produce energy, three strategies are defined: the installation of BIPV cells (building integrated photovoltaic) over the shading structures, the use of mono or poly-crystalline silicon photovoltaic cells over the green roof and the use of solar powered street lights. For the heating during winter or cooling in summer needs, the installation of a geothermal heat pump which works sending water deep into the soil and carrying it back up only by the pressure difference is suggested.
To conclude, in this area of Cernusco Lombardone, the connection of spaces is thought to be weak, thus, they are considered to be strengthened by interaction of spaces and the community by several activities in the complex with eco-friendly installations.

Index Terms- Architectural Design, Multi-Purpose Building, Public Spaces, Sustainable Design

I. INTRODUCTION

In the academic year 2013/2014, a competition was announced in the area Cernusco Lombardone, Italy by the Municipality of Cernusco Lombardone. The aim was to design the area that the municipality had addressed by redefining the central area of Cernusco Lombardone in which there were going to be 3 prizes and 2 mentions at the end of design.

The theme of the competition is to consider the central area in Cernusco Lombardone by creating new functions, spaces and services in order to take attention of the residents in this area. The area, having value with its landscape, is unfortunately not well-connected with its territory. For this reason, one of the issues to be considered is to solve several problems such as the relationship with the historic city center, and integrating the area with its surroundings. The key issue in design should solve the several problems both in urban context and townscape. The design proposal is expected to be very flexible with its spaces while integrating the existing buildings in the area. More specifically, the targets of the project area are:

-promoting walkability, livability while giving value to the city center, especially fostering the Piazza della Vittoria

-providing a solution for the local parking areas. A small new public underground parking (not more than 60/70 plots) will be acceptable
- designing the park, which will also provide weekly local market, interacting with the existing territory
-redesigning the area with its park surrounded with existing buildings. The functions of the new spaces are as multi-functional space as a conference hall (150-180 seats), a modular exhibition area, offices for local organizations, doctor's clinic for ambulatory care, gymnasium for physical activities, flexible spaces to be used for the local associations with modular solutions.

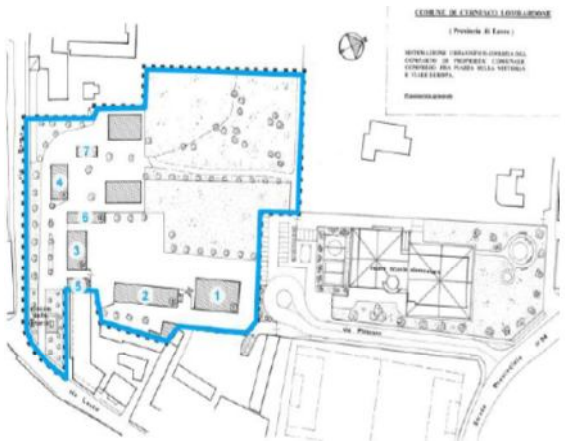


Figure 1: the site

As the map on the previous page "Fig. 1" indicates:
Building 1: already refurbished, head quarter of the 'Libertas Cernuschese' nursery on the ground floor, public library
Building 2: to be demolished and reconstructed gym exhibition halls
Building 3: to be refurbished, civic hall, Youth Aggregation Center Headquarters of the 'A.Pirovano' band
Building 4: already refurbished, Early Center & Residence, accommodation of the E.R.P. Building
Building 5: free transformation / some constraints & to be preserved arches and elevation, surgery communal
Building 6: free transformation / some constraints & to be preserved arches and elevation, Housing Bocciofila Fulgor and block services
Building 7: Headquarters of the Ass. Alpini (Insurance company)

This competition was held among the students of 1st year of International MSc Degree in Architectural Engineering at the Politecnico di Milano under the guidance of the professors who teach Architectural Design Course. As a result this project in this paper, had come with the winner prize among other projects [1].

II. URBAN DESIGN

A. The site and its surroundings

The project site is located in Cernusco Lombardone, Lombardy Italy. It is 30 km at the north of Milan and 15 km at the south of Lecco. Cernusco Lombardone, having area of 3.78 km2, has 3865 inhabitants.

In terms of the morphological analysis of the site, as seen below, "Fig. 2", the site can be approached in three different ways: by car, or walking from Via Pirovano, passing in front of an elementary school; from Piazza della Vittoria and from the train station due to Via Vittorio Emmanuelle II.

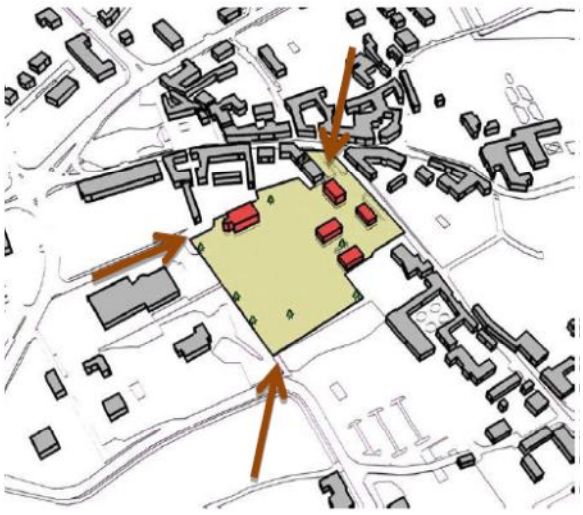


Figure 2: the existing condition of the site

When the site is analyzed, four sections as strengths, opportunities, weaknesses, and threats are considered in design phase.
As for the strengths of the project site, there is existence of a strong visual connection between the buildings and the green area. The existence of large open green spaces is also the other positive factor. Moreover, the weekly market is going to be held in the site. In terms of land use, the site counts with most of the essential facilities such as gym, library, multi-functional space and basketball court. When mobility and accessibility are taken into account, the location of the site is very close to the Cernusco-Merate train station. It is also easily accessible from three points, two of them by car and on foot, and the other one, only on foot.
As for the opportunities in the project site, the buildings, having built at the beginning of XX Century, have a historical value for the inhabitants. In terms of the land use in the area, some of the buildings at the city center are already refurbished. Moreover, the historic is very close to the other public facilities such as the municipality, the primary school, the cathedral and sports club. In terms of mobility and accessibility in the area, Cernusco is connected by highways and railways to the cities of Milan, Lecco and the provinces of Como and Bergamo [3].
There are also several negative aspects of the area. As for weaknesses, there are poor structural conditions of some of the buildings in the site. Moreover, the green public areas are being under-utilized due to lack of activities. There is also difficulty to connect the park of the center of the city with the cycling paths of the surroundings due to the difference of heights.
As one of the main threats, the lack of parking spaces in the city center forces people to leave their cars on the streets. Secondly, the city center is isolated because of different infrastructure barriers, such as the railway and the highways that divide the town disallowing pedestrians to cross from one side to the other.

B. Urban Concept

Focusing more on weaknesses and threats, the concept in the project arises to link the voids due to their lack of connection. In order to transform this area into a more vital and vibrant one, this park is thought to be 'The Artery of Cernusco', through which the movements and the life of the city will pass and remain every day. In the image below, "Fig. 3", it is depicted the design which suggests the connection of the entry point to the site when approached from the station, with the plaza in the south part.



Figure 3: the proposal

As the three open spaces, such as the Piazza della Vittoria (in the south), the site (indicated with blue hatch), and the green space are considered, the connection of them are thought to be fostered, which is one of the key aims of this project. In fact, there is an interesting ratio of dimensions of the width/height as 1:1,2 in these three spaces. This ratio, as seen in the image below, "Fig. 4", is thought to be fostered with the location of the new buildings. For that reason, they are placed as indicated below with diagonal shades.

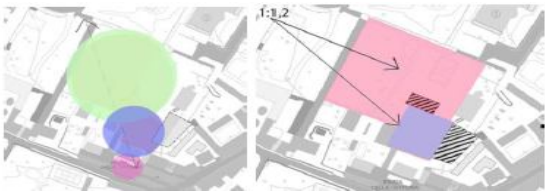


Figure 4: the proportions in the site

C. Urban Connection

As a result of the study phase of the territory, the main axis in the site is influenced by the artery links the urban spaces and the roads intersecting with the site, an inviting activity path is designed within the site. This artery will be developed in the most important axis of movement of the park. It connects different public spaces as a transitional path while it provides different experiences.

From the new square, it is possible to take two ways, one to the library and the elementary school, and the other is leading to the station. As defined the last one more important, and the real artery, an organic inviting path crosses the third and biggest public space, the park.

As the final masterplan below, "Fig. 5" indicates, the organic inviting path crosses the third and biggest public space which is the park. The slopy part of the site is determined to be a gathering point for young adults. Here, there will be multiple activities such as skating, chatting, having food, etc. Some stairs and places to sit will be integrated into these hills and connected to the main axis in the site. Moreover, the entrance from the train station is doubled in width and accessible ramp mechanism is planned for handicapped people. In addition, the weekly market is to be placed in the south part in a linear way in order to emphasize the main axis in the site and get benefit from the shade of the trees.



Figure 5: the final masterplan

III. ARCHITECTURAL DESIGN

The new square is located immediately after passing across a shaded area where now there are an arcade and two small buildings. This conversion will give more space to this entrance, and it is more appropriate for the new conditions. The new square will be defined in its four flanks by two existing buildings; one residential and one public, and two new buildings with all the facilities required by the citizens. These facilities are one restaurant and one bar, or café and an organic inviting fountain which will be attractive for children in summer. This new area can serve also in different occasions as a flexible space that can accommodate a big amount of people in a big event.

There is also the possibility to reach the library and the primary school from the new square. This connection will be used also for the weekly market, which is why it was decided to build a shaded corridor between the square and the entrance that is close to the school. This structure will serve to protect the shoppers from the sun while in the other days, it can be used for relaxation due to the existence of some benches.

The activities in this site are arranged and well-connected as depicted in the image below, "Fig. 6". One important thing is the car park area. As all the parking areas are removed from its existing positions to give more space for people, it is moved under the ground. This new space, accessible from Via Roma, will be able to lodge 70 cars and 3 additional spaces for disabled people.



Figure 6: architectural integration

Below, "Fig. 7" the image shows the plans of two buildings designed in the site.

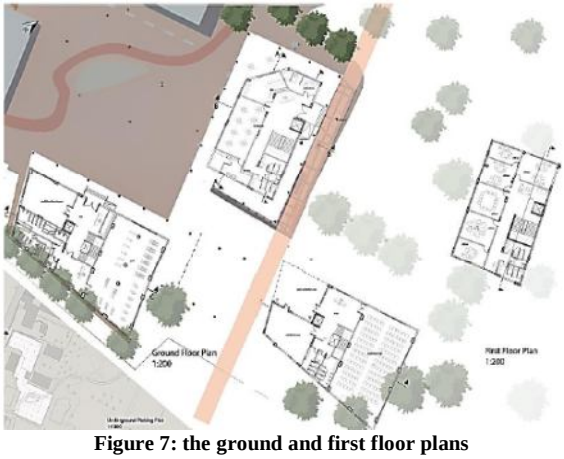


Figure 7: the ground and first floor plans

The two new buildings around the square are characterized by its modern architecture, but taking care to respect the existing urban texture and the heights of the existing buildings in the site. The building in the north of the square has in its ground floor a restaurant and a bar leading to the square, while the main entrance is located on the park. Through it is possible to access the ambulatory clinic and public toilets for the users of the park. The first floor has three comfortable offices, with a shared reception, foyer and meeting room. On the second and final floors, people will find a public terrace covered by a shading structure that will give the possibility to the public to gather or even relax while looking at the square, the park or the further Montevecchia Regional Park and that can be used also for an open air special event without interfering the life of the rest of the park.

As the figure below, "Fig. 8" indicates, the building in the east of the square is composed of the ground floor by a multi-purpose area and a gym with a private reception and bathrooms, as seen below. The first floor counts with a conference room for 150 people, public toilets an exhibition area and a shaded terrace that can be used for an open air exhibition.

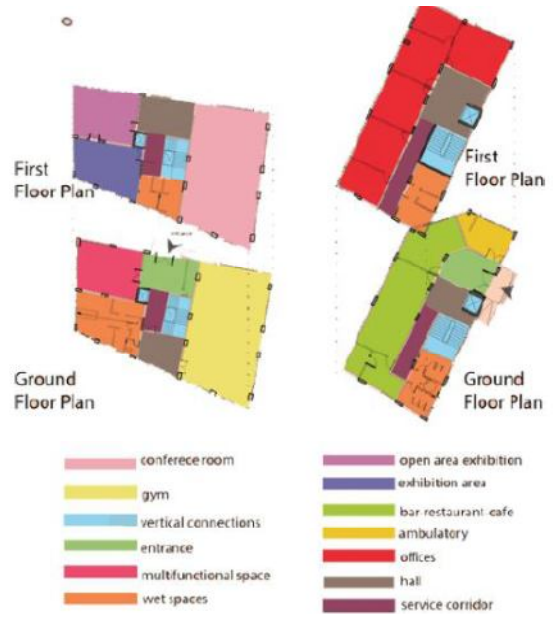


Figure 8: Spaces in floor plans



Figure 9: Section



Figure 10: Elevation of restaurant and meeting area

IV. TECHNOLOGICAL DESIGN

In terms of the sustainability of the renovated park and the new buildings, several strategies are proposed in order to save and produce energy and to promote a civic-responsible behavior. For saving energy, the use of shading structures, as seen below, "Fig. 11", are thought. These will reduce the entrance of light and solar radiation of the summer into the two new buildings, reducing the need of cooling systems.



Figure 11: the axonometric view

A green roof is projected in the eastern new building that will reduce the passing of heat to the conference and exhibition halls. Moreover, green roof has multiple advantages both for the community and the environment. In terms of the community, it reduces air-conditioning costs in summer while it also reduces heating costs in winter due to the fact that it behaves as an exterior insulation in the buildings. It also reduces noise in the area. As for aesthetics, it provides green space, which creates good view for the users and whole territory. When green roof is considered in environmental aspects, it is beneficial for the environment. It reduces carbon monoxide impact in the area. In the image below, "Fig. 12" the layers of green roof is shown. As depicted, from the top to the slab of the building, the layers are as follows:

-cultivation ground
-felt separator
-gravel drain
-thermal insulation
-anti-root and waterproofing membrane
-separation layer
-sloped slab
-reinforced concrete slab

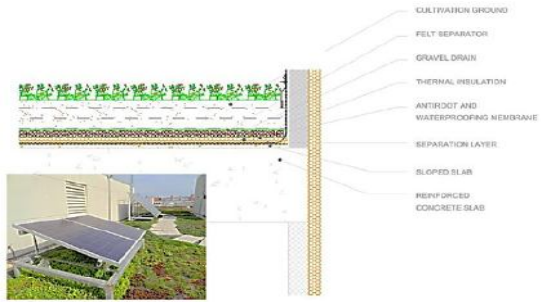


Figure 12: green roof detail

As the images below, “Fig. 13” and “Fig. 14” indicate, the other technological strategy used in the buildings is the triple glazed windows on aluminum frames filled with argon to provide excellent thermal and sound insulation. As seen in the image on the right column, “Fig. 14”, these windows will count with adjustable light shelves to capture and reflect the sunlight and heat further into the building during the winter season while in summer they can be adjusted to disallow this effect.

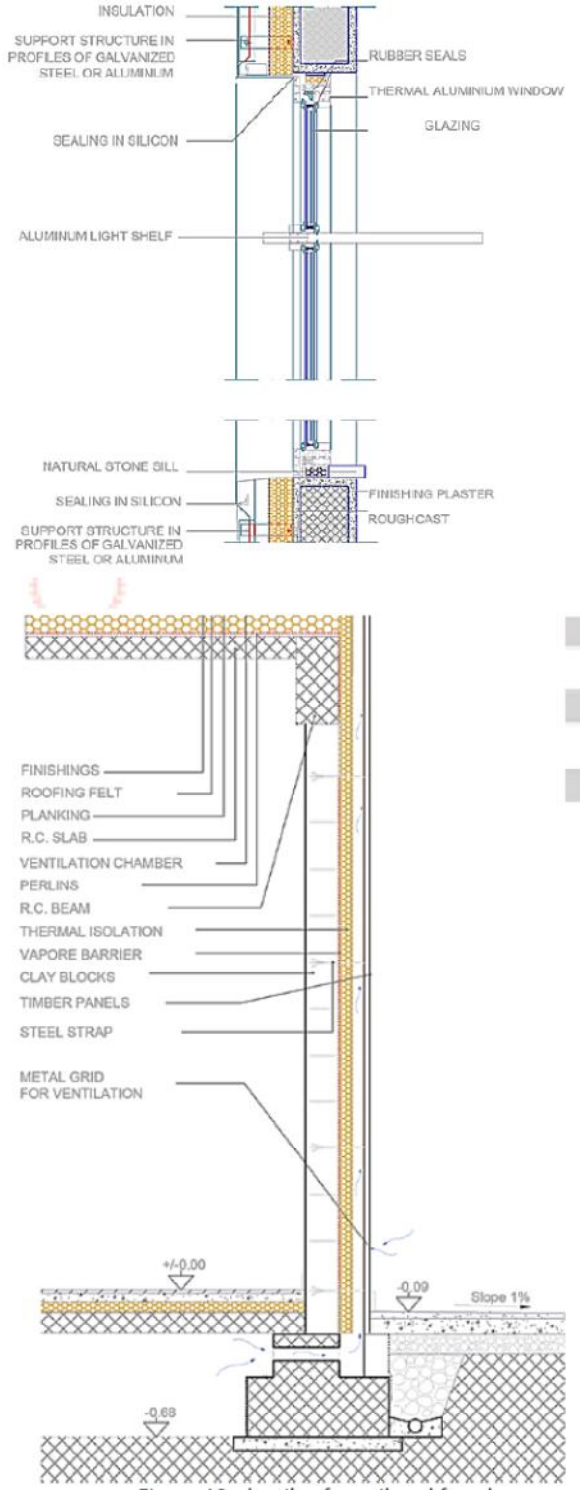


Figure 13: details of ventilated facade

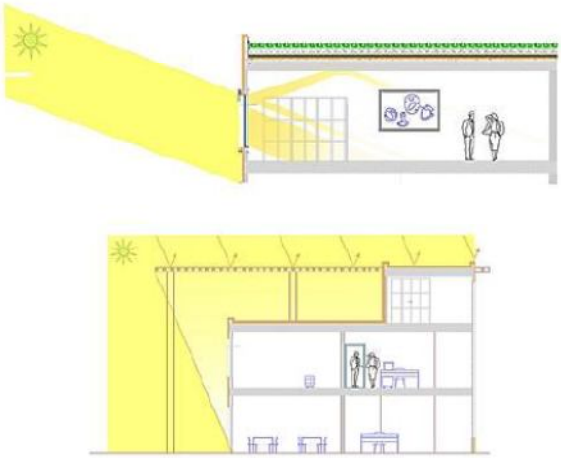


Figure 14: lighting

In order to produce energy, three strategies are defined: the installation of BIPV cells (building integrated photovoltaic) over the shading structures, the use of mono or poly-crystalline silicon photovoltaic cells over the green roof and the use of solar powered street lights.

For the heating during winter, or cooling in summer needs, it is suggested the installation of a geothermal heat pump which works sending water deep into the soil and carrying it back up only by the pressure difference. The cold, or hot water will exchange heat with the soil to achieve a certain desired temperature to be delivered into the building reducing in this way the energy consumption.

It is also thought to promote the civic behavior in two ways: by the installation of triple recycling bins, which combined with cultural activities will introduce the habit of recycling in the homes of Cernusco Lombardone; and by the installation of bike parking areas in strategic points in the entrances of the site to promote the use of this means of transport.

V. AFTER DESIGN

The image below, “Fig. 15” clearly defines the three open spaces; Piazza della Vittoria, the square designed and the park with flexible path, with its architectural design and technological units applied.



Figure 15: after design

CONCLUSION

In conclusion, this project has importance not only for the community of Cernusco Lombardone, but it has a crucial role for the visitors due to the location of the site. It is also located in the historic city center, which makes the site more valuable. After observing the site, it is thought that the area is not attractive by the community due to lack of activities and poor connection of open spaces. For this reason, the key issue of this project is leading it to be well-connected while designing architectural spaces with their high technologies.

REFERENCES

[1] A. A. Elesawy "Competition Brief, 12° Edition Study Award, Laure Larouzé" A.A. 2013/2014

[2] Drawings are taken from here: http://www.comune.cernuscolombardone.lc.it/piano_territorio.php?sez=66&, 20th July, 2017

[3] location of the area was retrieved from: http://www.italiapedia.it/comune-di-cernusco-lombardone_Storia-097-020, 20th July, 2017

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