

Final Thesis Master of Science Building Engineering

Title:Refurbishment project of industrial buildings for a museum complex in Turin.

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# **1-Introduction**

Abandoned sites and buildings create physical disorder in a community. At some points, these sites should be refurbished to maintain the health and safety of a community. Abandoned buildings can create a lot of public interferences such as crime, fear, arson, accidental fire [1].

In Turin for example, in Regio Parco region, there are many abandoned old buildings and sites and many which were recently re-functionalized. Despite these abandoned buildings, the region is full of residential apartments, schools and public places. The existence of active community in this neighborhood rises the importance of reconfiguring these abandoned buildings to improve the neighborhood's health, safety and quality of life.

There are many municipality laws to be met for reusing an area in the community and these norms and laws should be followed to maintain the culture of the community and national laws (Italy). In this thesis an abandoned (partially) site, formerly used as a warehouse for military products is considered for reconfiguration. Since the region was formerly an industrial zone, it lacks cultural places such as auditorium and museums. The purpose of the project is to re-functionalize this site to a cultural place respecting the regional and national law.

In the following, a brief background of some cultural places (that fit the sites reconfiguration purpose) is explained followed by a description of the site and its potentials. In chapter 4, the detail of the designs for the new buildings and view of the whole new site is shown. In chapter 5, some parts of the buildings are explained in terms of structural elevations. Finally, the references are provided.

## 2- Background

In this thesis, an abandoned site is reconfigured to be used as museums and auditorium. The purpose of museums is mainly to collect, preserve and interpret artistic, cultural and educational items. Auditorium is a place that people can observe and hear performances such as theatres. Museums and auditoriums help to improve public knowledge and maintain regional or national culture. Turin is a very rich city in terms of museums in general; However, in Regio Parco region (the region where the site is located), the community lacks cultural places like museums and auditoriums. In this chapter, Turin's cultural facilities and the background of specific museums that are suggested to be built in the site, are briefly explained.

### 2.1-Turin Cultural Facilities

Turin is one of the richest cities in Italy in terms of Museums. Many tourists travel to Turin just for the unique museums such as museum of Egypt, museum of Cinema and Automobile museum. In 2015, museums of Turin hosted 4.7 million people [2].

#### 2.2-Musical instruments museums

Musical instruments museums are modern museums for displaying musical instruments. Although, the purpose of these museums can be different. Some musical instruments museums display unique instruments made by famous instrument makers. For example, Violin Museums in Lombardy displays unique violins such as violins made by famous Stradivari [3]. There are also instrument museums containing variety of instruments from all over the world to highlight the effect of culture on music and music instruments. Very few musical instrument museums focus on the evolution of the instruments such as museum of mechanical musical instruments in Modena, showing the evolution of the instruments from 17<sup>th</sup> century until recent years [4]. In the following, some of the most important musical instruments museums around the world and in Italy are introduced.

The musical instrument museum in Phoenix, USA is the biggest museum of its kind. The museum was opened in 2010 [5] and as of now it contains more than 15,000 instruments from 200 countries and regions. Figure 1 shows photos the phoenix museum from outside, a section dedicated instruments from Thailand (bottom left) and Turkey (bottom right).



*Figure 1: Museum of musical instrument, Phoenix. On the top an outside view, in the bottom left the Thailand section and in bottom right Turkey section.* 

Musical instrument museums in Brussel in one of the most ancient museums for displaying musical instruments. Its first assemble was made in 1877 with a collection of 100 Indian instruments solely available for students to see and it was part of the Royal Conservatory of Brussels [6]. During 19<sup>th</sup> and 20<sup>th</sup> century the museum grew substantially and now it displays more than 8,000 instruments [7]. Figure 2 shows some photos of the museum from inside and outside.

Although Italy has been a leading country in classical music composing and instrument making, a few museums are dedicated to musical instruments in Italy. The museum of musical instruments in Milano Castello holds great collection of various musical instruments mostly created by Italian instrument makers [8]. Initially, the museum was founded in 1963 to display Natale Gallini's pianos which were formerly purchased by city of Milan. Over the years different collections joined the museum either through acquisitions or donations [9]. Figure 3 shows photos of two different parts of the museum.



Figure 2: Photos of Musical Instrument Museum in Brussels.



Figure 3: collection of violins in museum of musical instruments in Milan

Trentino, Bologna, Modena, Lombardy, Florence and Rome have also museums of musical instruments.

#### 2.3- Tree Museum

One of the most modern and rarest types of museums is tree museum. They are mainly created to display variety of plants and trees from different eco systems around the globe to show the beauty of green nature. This kind of museums are built both inside (green house) and in an open space.

One of the recent out-door tree museum was built in Zurich, Switzerland, in 2010. The museum has an area of 75,000 square meter [10]. The museum itself hold at least 3000 plants and trees. The trees inside the museum are from tree collection of Enzo Enea, the famous tree collectors in the world. Figure 4 shows some photos of the Enea tree museum. The purpose of the museum is to appreciate trees in a way of integrating beauty, sustainability, history and lifetime [11].



Figure 4: Enea tree museum.

Botanical museum of Berlin is another example of this kind of museums. Botanical museums similarly to tree museums collect and display variety of plants. The museum is 43,000 square

meter and contains more than 20,000 plant species including trees [12]. The Museum was constructed between 1897 and 1910 under the supervision of Adolf Engler, the German architect, to display exotic national plants. The Museum includes both open-air sections and greenhouses made of glass structures [13]. The Museum attracts half a million tourists a year [12]. Figure 5 shows the open-air and greenhouse photos of the museum.



Figure 5: Berlin Botanical Museum.

In Italy, Renzo Piano, the famous architect, built sphere-shape green house (biosfera) in Genova, in 2001. The green house has a glass and steel structure in old port region (porto antico) of Genova. The whole structure is 60 tones and it has area of 200 square meters. Today, the visit to the green house is part of the tour to the Genova aquarium [14]. The museum houses more than 150 plants and animals [15]. Figure 6 shows some photos of the Biosfera.



Figure 6: Biosfera green-house in Genova.

#### 2.4- Light and Water Museums

One of the most beautiful aspects of nature occurs when light and water are combined. This is the concept of one of the most innovative museums. There are very few museums of this kind built in the world. Although, many on-going light and water museums project exist which shows people's desire to visit these museums. In the following, some of the existing and still under construction museums of light and water are represented.

Water museum in Lanjaron (Spain) was built in 2009 by Juan Domingo Santos. The museum has an area of around 500 square meters [16]. The project started by looking for a location with natural water resources. The area of the museum is along the Lanjaron river next to the

irrigation ditch. The museum reflects a great combination of local architecture, water and light [17]. Figure 7 shows the photos of Lanjaron water museum.



Figure 7: Lanjaron water museum.

Another example of artistic combination of light and water in a museum is the beautiful Louvre museum of Abu Dhabi. The museum with 24,000 square meters of area was officially opened on November 2017 [18]. Though the museum is generally an art museum, the combination of light and water is used in many parts of the museum. The great pools inside the beautiful structure has given the museum a spirit. The reflections of lights on the walls of the building shows the spectacular architecture. Figure 8 shows some photos of this museum.



*Figure 8: Louvre museum of Abu Dhabi [19]* The use of light in the museum can be better shown in the photos in figure 9. It is a grea example of combination of light, water and architecture



Figure 9: Louvre Museum of Abu Dhabi.

In far east of the world, in Japan, museum of Sayamaike is dedicated to the history of Japanese water engineering in combination with local heritage. The museum is located on the edge of an artificial lake called Sayamaike pond. The museum was built in 2001 by Tadao Ando [20]. The architecture of the museum is a great example of harmony between architecture, light and water. Figure 10 shows some of the pictures of the museum.



Figure 10: Sayamaike museum in Japan.

Another example of praised water museum is museum of Agua in Lisbon, Portugal. The Agua Museum is the only Portuguese museum that has been awarded the council of Europe prize in 1990. The museum is run and maintained by the Portuguese water utility company Epal. Figure 11 shows some photos of this beautiful museum [21].





Figure 11: photos of Agua museum of Lisbon.

#### 2.5- Auditoriums

Auditoriums are places for the people hear and watch performances such as theatres or operas. Usually, the auditorium is divided into two zones. First, the main hall which is in front of the stage with a sloped series of seats to avoid vision interference. Second, the balconies or private boxes where people can watch the performance from higher ground (in case of the boxes, private higher ground). The sound quality of the auditorium is significantly affected by the architecture of the auditorium. To be more specific, the shape of the auditorium, the layout of boundaries, arrangement of seating and the material can play a key role between a bad and fantastic auditorium. In the following, couples of famous auditoriums around the world are introduced.

The historical opera house Palaise Garnier in Paris was built between 1861-1875 and it can house more than 1,950 people during performances. The auditorium has a traditional Italian horse shoe shape seating. Its stage is one of the biggest in the world and it can be used for 450 artists at the same time. The painting on the ceiling was painted by Marc Chagall and it displays scenes from famous operas by great composers such as Mozart, Wagner and Ravel. Figure 12 shows some the pictures from this historical auditorium and the main hall leading to the balconies and stage.



Figure 12: Palaise Garnier

One of the recent successful music complexes in Italy is Parco della Musica in the capital. It was designed by Renzo Piano and the construction finished in 2002 [22]. The complex consists of three auditoriums and an out-space concert section. The whole land has an area of about 30,000 square meters [23]. The three auditoriums, Sala Santa Cecilia, Sala Sinopoli and sala Petrassi have 4700 seats [24]. The design of the complex was changed by Renzo Piano during the construction due to the discovery of an ancient villa dating back to the 6<sup>th</sup> century [22]. Currently, Sala della Musica is one of the most visited music complexes in Europe. Figure 13 shows some of the complex's photos taken from the auditoriums.



Figure 13: the Parco della Musica from both outside and inside.

Another good example of auditoriums in Italy is La Scala in Milan which is used as classic theatres and operas. The theatre is considered one of the best theaters in the world. Its history dates to 17<sup>th</sup> century when it was built to replace the burnt Regio Ducale theatre. The auditorium went through major renovations between 2002 and 2004 and now it can house more than 2,000 people. Figure 14 shows some pictures of La Scala before and after renovation.



Figure 14: The photos of La Scala.

# **3-Site Introduction**

In this chapter, the site that is being reconfigured is introduced in terms of history, position and dimension. Afterwards, new concepts are introduced that are suitable for the site. The norms regarding the site are provided and in the end some of the proposals are applied on the new outline for the site.

### 3.1- Position and dimension

The abandoned complex that is known as M.Ar.Di.Chi (Magazino di Artiglieria a Difesa Chimica di Torino) is located in Regio Parco region. It is between Via Bologna and Via Cimarosa in one side and it is between Via Mante Verdi and Via Sempione from the other side. From the east side it is close to a formerly textile factory (currently, it is part of Lanificio factory). In the south part of the site, Regio Parco canal separates the site from the cemetery of Monumentale. Along Via Bologna there are many existing industrial buildings and many abandoned buildings formerly used for industrial purposes.



Figure 15: map view of M.Ar.Di.Chi site

In many cases, the formerly industrial buildings have been reconfigured to residential buildings. Around the site many public places such as schools and parks can be found. Figure 15 shows the map view of the site. In figure 16 and 17 some pictures from different parts of the site is displayed.



Existing building of the site (Palazzina)

west part of the site



one of the building's (palazzina) yard

Existing building of the site (Palazzina)



Inside abandoned shed Figure 16: The M.Ar.Di.Chi site.

Inside abandoned shed



The site land

the site land



Sheds (land view) Figure 17: the site's photos

Sheds

The land covers an area of about 43,000 square meters which is bounded with brick walls. It is consisting of fifteen buildings which most of them are abandoned or in some cases they are unsafe. The site included five more buildings which were demolished in past years.

In Turin's general municipal regulator plan (piano regulatore generale comunale-PRGC), the site is classified as an area to be transformed or refurbished (Zona urbana di transformazione-ZUT).

#### 3.2-History of the site

The history of this complex (M.Ar.Di.Chi) has started in the 18<sup>th</sup> century. In this period, Turin from political, industrial and economical point of view was significantly developed as it was the capital of the Italy. The development was focused on the suburb in that period. Mos of the industrial factories and companies were located in via Bologna.

In 1911, during industrial development, already famous Lanificio Fratelli Piacenza textile company opened another branch in Turin. The new branch was located in M.Ar.Di.Chi site very close to the Filatura di Tollegno factory which was built in 1900. The construction of the primary sheds was given to Pier Maria Dogliotti who had formerly built the Tollegno factory in 1900. Two years later in 1913, to build the second phase (more sheds and buildings) the engineer Giovanni Chevalley and the architect Carlo Ceppi were employed. Between 1913 and 1928 the facilities of this site were further developed with the cooperation of engineer Annibale Tiali, Surveyor and Antonio Milano. Mr. Milano developed the third phase of the sheds in part of the site close to via Bologna. Figure 18 shows a picture of the site's building between 1911 and 1913. The old plan of the site is shown in figure 19.



Figure 18: M.Ar.Di.Chi site between 1911 and 1913.



6 AGOSTO 1913 NUPVE COSTRUZIONI ANTE POSTE ASLI SHED OSP TAVITI CALDA E MOTORI E TINTORIA

Figure 19: the plan of the site for the textile factory in 1913.

According to the reports in 1914, 79 men, 142 women and 144 children were working in the textile company inside the site. In 1917, Fiat bought the textile company. With pressure of the world war the site was reconfigured to manufacture military machines, trucks and tools.

In March 4<sup>th</sup>, 1937 the Fiat company is given to the state government and in 1943 officially the site is attached to property of ministry of defense. In the beginning, it was used as the artillery of Turin and then a warehouse for artilleries. Currently, part of the site is an artillery museum.

### 3.3- Why this site?

Most castles and museums in Turin are in the city center. There are many regions with few cultural places such as museums. Barriere di Milano is one of these regions. By dispersing touristic and cultural places in all parts of the city, the whole city can benefit from the positive aspects of cultural places. As it can be seen in figure 20 Barriere di Milano region (zone 17) does not have any museum.



Figure 20: The concentration of the museums in Turin

The Mardichi is an abandoned and unused site and It is in Barriere di Milano region of Turin. This previously industrial zone has a lot of residential buildings and a few cultural places. Because of the empty spaces in the region, new residential buildings are built constantly. To maintain the safety of the region and also increase the quality of the living in the region we chose this abandoned site to build a cultural complex.



Figure 21: Cultural places adjacent to the site's location

#### ZONA BARRIERA DI MILANO

#### CINEMA TEATRO MONTEROSA

#### ATELIER TEATRO FISICO

L'ATELIER TEATED ENERG É UN ANNOLAZIONE CULTIBRIE NATA PER PROVUCIVENT LA DIFILISIONE E LA FORMAZIONE DELLE ARTI PERFORMA-TIVE TEATED, DANZA ARTI GRECINSI, MUSICA, ETC, E IN PARTICOLASE DEL CONCETTO DI TEATRE DISCO, AVVALIENDOSI DEL METODO PEDASOSICO ELABORATO DAL BRANDE MASTITO JACQUES LECOD DI PARISI, L'ATE É STATO FONDATIONE INSI DA PHILIP RADICE CONL'UNEVERO DI PARISI, L'ATE É STATO FONDATIONE INSI DA PHILIP RADICE CONL'UNEVERO DI PARISI, L'ATE É VILLO DI ALCOREDAZIONE DOVE L'REDESSIONISTI E CULASIBARTI CIC-VARI ALTE PEDANDO INCONTRASI PER UN RELINDECO E ALMOLANTE SCAMILO ARTISECO F ELITERATI



#### LEGENDA

AREE VERDI ATTREZZATE, PARCHI URBANI E PARCHI FLUVIALI CINEMA TEATRO MONTEROSA TEATRO FISICO PHILIP RADICE ORATORI Oratorio Salesiano Michele Rua Oratorio Parrocchia Gesù Operaio.

Oratorio Parrocchia Maria Regina della Pace.

Oratorio Parrocchia San Gaetano da Thiene.

Reconfiguration of the abandoned building can enhance the region's safety and turn it into a cultural complex can increase the life quality and attract more and more tourist to the region. The only cultural places near the site are a theatre and a cinema and four oratorios. Name and location of the cultural places and a brief description of the cinema and theatre is shown in the figure 21.

The site has bus access from the north and west side. In the addition, the line 2 of Turin subway according to the contracts, is supposed to pass the east side of the site which makes the site very easily accessible. Figure 22 shows the bus tracks line 2 subway future stops near the site.



Figure 22: public transportations near the site

#### 3.4- Proposals

Nowadays, we observe development and display of cultures. Specifically, in Italy, culture, art and music play a key role in the society. Italy has a great history of having and building museums which reflect its importance in the nation. Turin is one of the leading cities in this aspect. However, Turin still does not have a monumental music museum despite its importance among museums. For these reasons, we decided to design a musical instrument museum in Turin as a project so that Turin could complete its collection of museums.

On the other hand, plant museum, museum of light and water are very modern and rare museums worldwide. And, these museums can attract a lot of tourists to a city using the beauty of nature and natural phenomenon. Unfortunately, Italy is far behind other western countries in building these kinds of museums. Since the project site is near a river and the site is very big in size, as part of the project these museums are suggested.

#### 3.5- Reconfiguration outline

The new complex includes a new auditorium in the south part of the site. The existence of a musical instruments museum completes the musical aspect of the complex along with the auditorium.

The auditorium is connected to a bar, a restaurant and a small commercial center. These parts of the complex are designed for the entertainment of the people during their waiting time for the performances in the auditorium, and before and after their visit to the museums.

According to the municipality laws, the office building in the north part of the site cannot be demolished or changed. So, this building is kept as it is and it is left with the same function. Another existing building in the north of the site is suggested to be used as a library. In harmony with the museums, the library can include vast range of books about music and nature.

Currently the three buildings in the middle of the site are used as a unique museum of artillery. In the new configuration, we divided it into three separate buildings to become museum of musical instruments, Museum of plants and light and water museum. These three suggested museums are close to each other and they are connected through a glassy corridor.

Figure 23a shows currently existing buildings inside the site. The buildings that are supposed to be demolished are shown in green color and they are highlighted with black dashed lines. The white buildings (highlighted with red dashed lines) in figure 23a are going to remain unchanged in the new configuration.

Figure 23b represents the new buildings in the new configuration in pink (highlighted with black dashed lines). The unchanged buildings are plotted in white color.



Figure 23: position of the buildings in the new outline of the site.

# 4-Design

In this section the detail of the refurbished site is presented. The site plan, the buildings plan, building's sections, elevations and views of the designed site are presented in this section respectively.

#### 4.1- Site Plan

The project site includes 7 buildings in which the northern building is suggested to become a library. The position of the buildings can be observed in figure 29. The building in the west side remains unchanged as an office building. In the center of the site from the north to the south, museum of light and water (suggested) and museum of musical instruments are located.

In the southern part of the site, commercial center, the main building (where the restaurant and bar are located) and the auditorium are placed, respectively from west to east. The main entrance is in the south part of the main building.

From the northern part of the site which is connected to via Bologna, 2 doors are designed for the entrance of technical vehicles. In the west part of the side, an exclusive door is dedicated for the entrance to the office building from the cross-section of Via bologna and Via Domenico Cimerosa. The door in the western part of the site in via Domenico Cimeroso is introduced as the main entrance to the site. In addition, an exit door in the southern part is placed to via Clausio Monte Verdi. This door is close to exit door of the Auditorium and the main building.

As it can be seen in figure 29, a water pool is placed inside the site. The depth of the pool is set to be 0.5 meter. The boundaries of the site objects (such as gardens) whether they are curve like or a line are in accordance with the site's outer boundary.

On top of the water pool two places are designed for the people to sit and enjoy the view of the site. The platform above the pool is held by the columns which are placed inside the pool. A wooden path connects the site to the platforms and the platforms to each other. The beams under the pathway are connected to the columns to withhold the structure.

The idea behind the platform on top of a water pool is taken from couple of scenes from the movie "Blade Runner 2049". In figure 24 pictures of the scenes from the movie, where the concept was taken, are shown.



Figure 24: Scenes from the movie "Blade Runner 2049".

These platforms above the pool are also accessible from the balcony of the main building where the restaurants and the bar are located. Walking from the main building's balcony, People can experience an exciting path to the platforms and then the site's ground. The path from the balcony leading to the platforms above the pool is a curved wooden ramp with 91m of length and steep of 8%. the idea of having this ramp was taken from the Oslo Opera House which was built by Snohetta (The architect) in Oslo, Norway. Figure 25 shows the Oslo Opera House.



Figure 25: Oslo Opera House

In addition to Oslo Opera House, Valetta City Gate built by Renzo Piano in Malta uses the same idea for the ramp. Figure 26 shows the photos of this beautiful structure in Malta.



Figure 26: Valetta City Gate, In Malta.

The Columns holding the structure of the ramp go into the water and the pool. The reflections from the water can also be seen on the columns during the day. The idea of placing columns of a structure (ramp) inside water pool was taken from Art museum of Beyeler Foundation and Modern Art Mueuseum of Fort Worth. The Beyeler Foundation museum of art is in Switzerland and it was designed by Renzo Piano. Figure 27 shows a picture of the museum.



Figure 27: art museum of Beyeler Foundation, Switzerland.

On the other hand, the modern museum of Fort Worth is built by the great architect Tadao Ando and it is in the United States. Figure 28 shows the pictures of Forth Worth Museum.



Figure 28: Museum of Forth Worth, In the USA.

In the center of the site, wooden pathway is placed along the view of the site from the glassy corridors between the buildings. The wooden pathway enhances the desire to the site when walking between the buildings.





Figure 30 and figure 31 show different view of the site.

Figure 30: Site views





Figure 31: site views

#### 4.2- Design Plan

The previous building plan of the museum in the site with some minor changes is split into 3 parts where each of them represent a museum. From the north to the south, the first museum is the plant museum. The building in the middle is going to be light and water museum. These two museums (Plant museum and museum of light and water) are connected with two corridors covered by glass structure. The site can be seen from inside the corridors. In each corridor two doors are placed. The doors on the right part of each corridor are for access to site and the doors on the left part of the corridor are designed for emergency exit. The previous plan design for these two buildings (plant museum and museum of light and water), include only columns and they are kept as it is for the new function.

#### 4.2.1- Museum of Musical Instruments

The southern building of these triple buildings is designed as a musical instrument museum. The former plan for columns and the windows are kept unchanged. In the meanwhile, the whole museum is completely designed. A door is planned on the east part of this museum to be used as the entrance for the building. The two doors on the west side of this building are the emergency doors. A L-shaped corridor with a glass structure is placed in the south part of the museum of musical instruments and it continues to north part. The corridor has a door on its west side. This corridor is designed to be used to form a line of people trying to enter the museum. The ceiling of this corridor is designed with the same material as the roof of the museum. The ceiling has also glassy part to let the light enter the corridor also from the roof.



Figure 32: Asia Museum of Modern Art, Taiwan.

The entrance to the corridor (the main entrance to the museum) is placed in the east and north part of the corridor. In this sense, people wanting to exit the line and the museum can use these doors. In addition, these doors can be used as emergency exits.

The glassy entrance to the museum creates an especial entry to the museum. The idea was taken from the Asia Museum of Modern art in Taiwan. The Asia museum of modern art was designed by great Tadao Ando. Figure 32 shows a picture of the museum. In this building the entrance of the museum has become especial by the innovative design of the corridor.

In the west side of the site's building for museum of musical instruments windows are placed with attention to the glassy corridor. In this way, light enters the museum both from the glassy part of the roof (corridor's roof) and the windows.

Inside the museum and between the empty spaces within each two columns, the lighting equipment for the showcases are located. On both side of the columns the showcases themselves containing the musical instruments are placed.

The designed museum of musical instrument is consisting of 3 parts. A section is dedicated to wind musical instruments (aerophones) such as flute, trumpets and clarinet. second section belongs to the stringed instruments (chordophones) such as violin, cello and alto. Another section is dedicated to percussion instruments such as handpan and cajon.

For each part an entrance and exit door is considered. To facilitate the passing of visitor who want to visit specific part of the museum, a direct path between each two parts is considered. Having this path allows the visitors to skip a whole part of the museum. In different paths of the museum and between some of the showcases benches are placed for the people to rest. Behind these benches which are between two columns, is filled with plants and flowers. In this way the resting place can be more joyful for the visitors.

3 different design plans are suggested for the musical instrument museum which can be observed in figure 33. The 3 plans are like each other and the differences can be seen in the design of the 3 parts of the museum and design of the entrance. The plan in figure 33c is considered as the best solution.



## a)



## b)



Figure 33: Musical Instruments Museum plan.

c)







(B) Section B 1:200

Figure 34: Museum of musical Instruments sections.

Figure 34 shows two sections from the museum of musical instruments. As you can see in the figure, isolated foundations are used under each beam for the building.

In addition, for air conditioning a utility room is placed in the north-west part of the museum. The piping of the air conditioning system is shown in the section with a paled color. A view from this area is shown in figure 35.



Figure 35: A view from the museum.

#### 4.2.2- Commercial Center

A two floor Commercial center in the south west of the site is designed. In the ground floor, 4 single floor shops and 6 two floor shops are located. The first floor, includes 2 big two-floor shops. All these shops are used to sell musical instruments. The two commercial center floors are connected through stairs and elevators. The plan of the ground floor of the commercial center can be seen in figure 36. The first-floor plan is shown in figure 37.

In one of the corridors in the first-floor railings are placed instead of walls. This facilitates the view of the ground-floor and the shops inside it. Another corridor in the first floor has an access the roof of this building which is designed to be a balcony.



Figure 36: Commercial center ground floor plan.



Figure 37: Commercial center first floor plan.

An individual entrance is designed to each floor. The ground floor is connected to the main building through a glassy corridor. Two additional emergency exits are placed in the ground floor. The first floor, is connected to the main building's balcony in the first floor through a glassy bridge. In this way people can enter and exit the commercial center. The idea of having a glassy bridge for the commercial center was taken from Astrup Fearnley museum of modern art, the museum of European, Mediterranean civilization (MUCEM), Valletta city gate and High museum of art and High museum of art. Figure 38 shows Astrup museum of modern art designed by Renzo Piano in Oslo, Norway.



Figure 38: Astrup Museum of modern art.

Pictures of museum of European and Mediterranean civilizations are shown in figure 39. This museum was designed by Rudy Ricciotti and Roland Carta and it was built in Marseille, France.



*Figure 39: museum of European and Mediterranean civilizations* 

Figure 40 shows pictures of Valletta city gate in Malta which was built by Renzo Piano.



Figure 40: Valletta city gate

The High museum of art in Atlanta which was another inspiration for the building of the glassy bridge, is shown in figure 41. This museum was also built by Renzo Piano.



Figure 41: High museum of art.

The Commercial Center is consisting of 4 rectangles which grow in length and height from west to east. The first rectangle has the height of 3.5m and this height is increased to 14 meters in the last rectangle. From west to east, each of these cubes show 3.5 meters growth in height. This building and stepped roof top are similar to the museum's roof.

Each of these cube like volumes have a thin glassy wall. In addition, a tape of glass is around the concrete roof. In this way, in each day of each season the thin tapes of light enter the building from the roof and the walls and they don't disturb the sight of the visitors. In addition, the appearance of the light on the ground is very delightful and pleasant in this way. The idea of having roof with steps and also glassy tape around the building's wall was taken from Princess Alexandra Auditorium, John Curtin school of medical research and Hanoi museum.

The Princess Alexandra Auditorium built by Associated Architects LLP is shown in figure 42. The auditorium was built in Yarm, UK.



Figure 42: The Princess Alexandra Auditorium

The project of John Curtin school of medical research was built in Canberra, Australia. The school is shown in figure 43.



Figure 43: John Curtin school of medical research.

A section of Hanoi museum is shown in figure 44. This museum was built by GMP Architekten company in Hanoi, Vietnam. Figure 45 shows commercial center's section.



Figure 44: Hanoi museum.





Figure 45: Commercial Center's section.

#### 4.2.3- Main Building

The Entrance to the main building is the entrance door to all three buildings in the south of the site. In addition, the main building has an exit door in the south. In this sense, an exclusive exit door is dedicated to the people using these three buildings. This exit door opens to Via Claudio Monte Verdi.

The main building is consisting of 2 floors. The ground floor includes a restaurant. A bar is located partially at ground floor and partially at semi-first floor (3 meters above ground floor). The semi-first floor is dedicated to tables and seating to give the costumers a better view of the building.

In the middle of this building a great ramp with 156m length and steep of 8% connects the ground floor to first floor (Big balcony). The ramps diameter increases as it goes up. In the center of this ramp a 12-meter tree is placed. A roof is placed on top of the balcony to cover the ramp and the glassy walls. The roof avoids the energy leak to the outside.

The ramp is connected to the ceiling through groups of 2m apart cables. 118 cables keep the ramp structure stable. The cables are connected to clamps under the ramp and to top of the ceiling. The idea of this floating curved ramp was taken from Hanoi museum. Figure 46 shows the pictures of Hanoi Museum in Vietnam.





Figure 46: Hanoi museum.

The balcony on the first floor of this building has an area the same as the roof. In the center of the balcony the ramp and the glassy walls are located. The balcony is connected to the commercial center and the auditorium through bridges. The balcony's idea is taken from the project of Stavros Niarchos foundation cultural center built by Renzo Piano. The foundation in figure 47 is built Athens, in Greece.





Figure 47: Stavros Niarchos foundation cultural center.

From the other side, the balcony is connected to the site through a ramp. As it was mentioned before, the ramp passes above the water pool.

The balcony's ceiling as it can be seen from figure 48 has glassy parts. These glassy parts are pieces of the piano sheet composed by the famous composer from Turin, Ludovico Einaudi. Einaudi's song carved on the ceiling is called "run". Reflection of the Einaudi's piano piece can be seen inside building and people can walk on these reflections. The "run" piece piano sheet, and the part of the sheet on the roof and the roof itself are shown in figure 48.

In addition to these, a piano is dedicated to the balcony to perform Einaudi's works while people can enjoy the reflections of his work on the ground and the view of the site from the balcony.

The curve glassy roof above the ramp is in line with the music sheet on the main roof. So, it allows the reflections of the notes to the ramp. The composition of the ramp's roof and view of reflections on the ground can be viewed in figure 48.

The plan of these two floors (main building) is shown in figure 49 and 50. The sections of the two floors can be viewed in figure 51.



Figure 48: Balcony's roof and ramp's roof view. And, the piano sheet by Einaudi.



Figure 49: The ground floor of the main building



Figure 50: The first floor of the main building plan.



Figure 51: The main building section.

In addition, 4 views of the ramp and the balcony are shown in figure 52 and 53.



Figure 52: Ramp and balcony view.



Figure 53: Ramp view.

1-meter beams on the roof of the balcony connect the columns from the ground floor to the ceiling. Structural tubes between the roof of the ramp and the balcony are located and they are connected to the balcony roof beams. In addition, between the balcony's ground and the roof and around the curve wall (around ramp) 8 columns are located to stabilize the ramp's roof.

#### 4.2.4- Auditorium

In the east side of the site, the Auditorium is located. The auditorium is consisting of 748 seats on the main floor and 165 seats in the balcony. In total, there are 913 seats available in the auditorium. In line with the columns of the auditorium, columns under the row stairs stabilize the stairs. These columns are connected to the main columns by 30 cm beams. In the auditorium balcony, under the stairs steeped ground is placed and it is connected to the first floors main ground. Below the steeped ground is connected to the main columns using a big (1-meter) beam and it keeps the steep ground stabilized. Ground floor and the balcony are connected through 4 stairs. In addition, the auditorium is connected to the balcony of the main building through a bridge corridor.

The Auditorium has 6 emergency exits to the north and 4 emergency exits to the south. The southern emergency exits open to the south of the site and then to Via Caudio Monte Verdi. The same as museum roof, clay tile material is used for the steeped roof of the auditorium. The auditorium roof is split to 3 parts. Each part with some elevational change connects to the next part. In case of heavy rain, this design prevents batch discharge of the rain water. Figure 54 shows the auditorium section. Figure 55 shows level 1 and figure 56 represents level 2 plan. The detail of the auditorium can be viewed in figure 57.



E Section F











Figure 57: Views of the auditorium.

## 5- Elevations & destination of the buildings

Figure 58 shows all elevations of the buildings. Figure 59 shows the destination location of the buildings.



West Elevation 1 : 550

Figure 58: Buildings elevations

a)

### Presentation scheme



1 Level 1 with destination of locations 1 : 1000

### Presentation scheme



1 Level 2 with destination of locations 1 : 1000

Figure 59: destination of the buildings. A)level 1, b) level2.

b)

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