



DEPARTMENT OF ARCHITECTURE AND DESIGN
A.A. 2019 - 2020
MASTER DEGREE COURSE IN ARCHITECTURE FOR THE SUSTAINABLE PROJECT

ATELIER COMPATIBILITY and SUSTAINABILITY of ARCHITECTURAL RESTORATION

Teachers
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Collaborators
RESTORATION: arch. Luca Malvicino
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GEOMATICS: arch. Lorenzo Teppati

**MONTANARO (TO)
Castello dei Conti Frola**

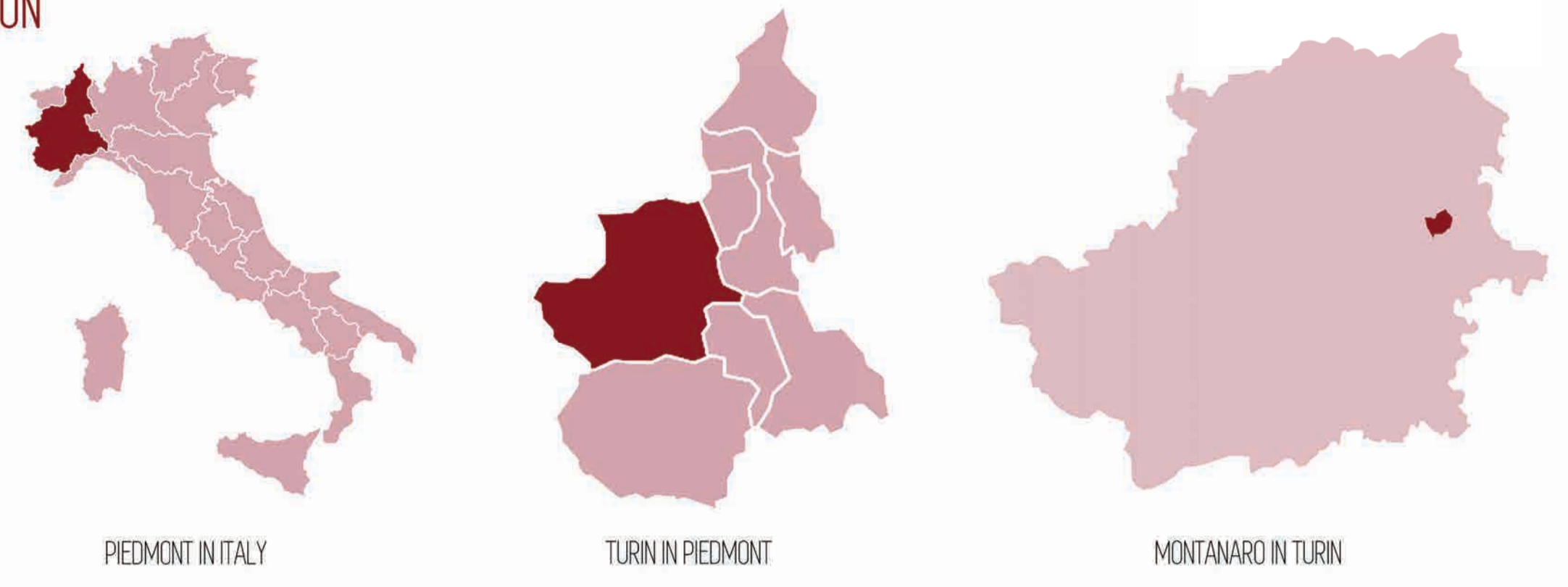


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GROUP 04
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Territorial Framework Montanaro-Canavese Castle of Montanaro

LOCATION



MONTANARO ABOUT THE MUNICIPALITY
Montanaro is a municipality in Metropolitan city of Turin, in Piedmont, Italy. It is located 20 kilometers northeast of Turin, surrounded with municipalities like Caluso, Foglizzo, San Benigno Canavese and Chivasso. It has a population of 5283 people, with the density of 253.9 people per km². The people of Montanaro, with an old age index slightly above average, live mostly in the municipal capital.

The territory, made particularly fertile by the presence of springs, has a varied geometric profile, with slight differences in altitude. The inhabited area, intersected by a dense network of irrigation canals, shows signs of building expansion.

The center, with medieval origin, has an economy based on agricultural, industrial and tertiary activities. A few different functional areas recognized in the urban scheme of Montanaro. The central area is mainly residential, while the area of production is located mostly on the northeast of the municipality. The area of natural value follows the west border of the municipality along with the River Orco.

MONTANARO HISTORICAL BACKGROUND

The municipality of Montanaro is one of the most ancient towns of the lower Canavese, which began to take its shape around the tenth century in the north-east direction of the castle on which passed the ancient Via Franca which continued towards Vercelli.

From the 11th century Montanaro became part of the possessions of the abbey of Fruttaria facilitating the demographic and economic development of the country, making it one of the richest villages in the Canavese area. The abbey lands initially included the land of the municipalities of San Benigno, Feleto, Lombardore and Montanaro.

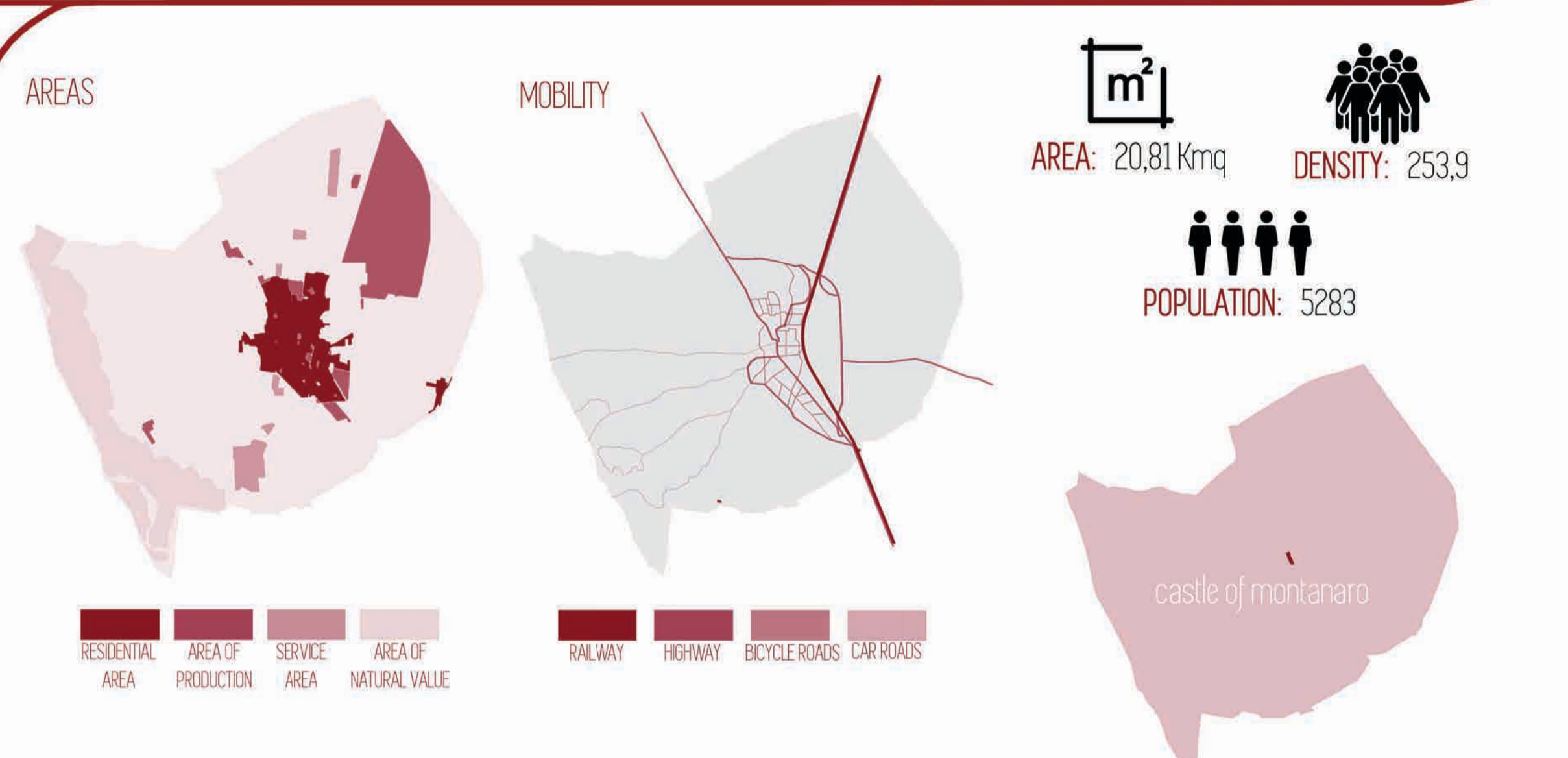
The area that had previously been uncultivated land was thus entrusted to the lords who cultivated and administered it.

In the mid-twelfth century, the inhabitants moved to the south-west for safety reasons and for greater availability of water. The expansion in the thirteenth century point towards Chivasso with a concentric development beyond the walls.

With the passage of time many of the lands passed into the hands of the Savoia family and in 1585 Pope Sixtus V decreed the suppression of the monastery. This is a negative period which corresponds to the entry of the Savoys in 1577, following numerous revolts against the latter, which was not well received. Tai insurrections will lead Pope Benedict XIV to renounce the dominion of the abbey of Fruttaria in 1741, putting the municipality in the hands of the Savoys.

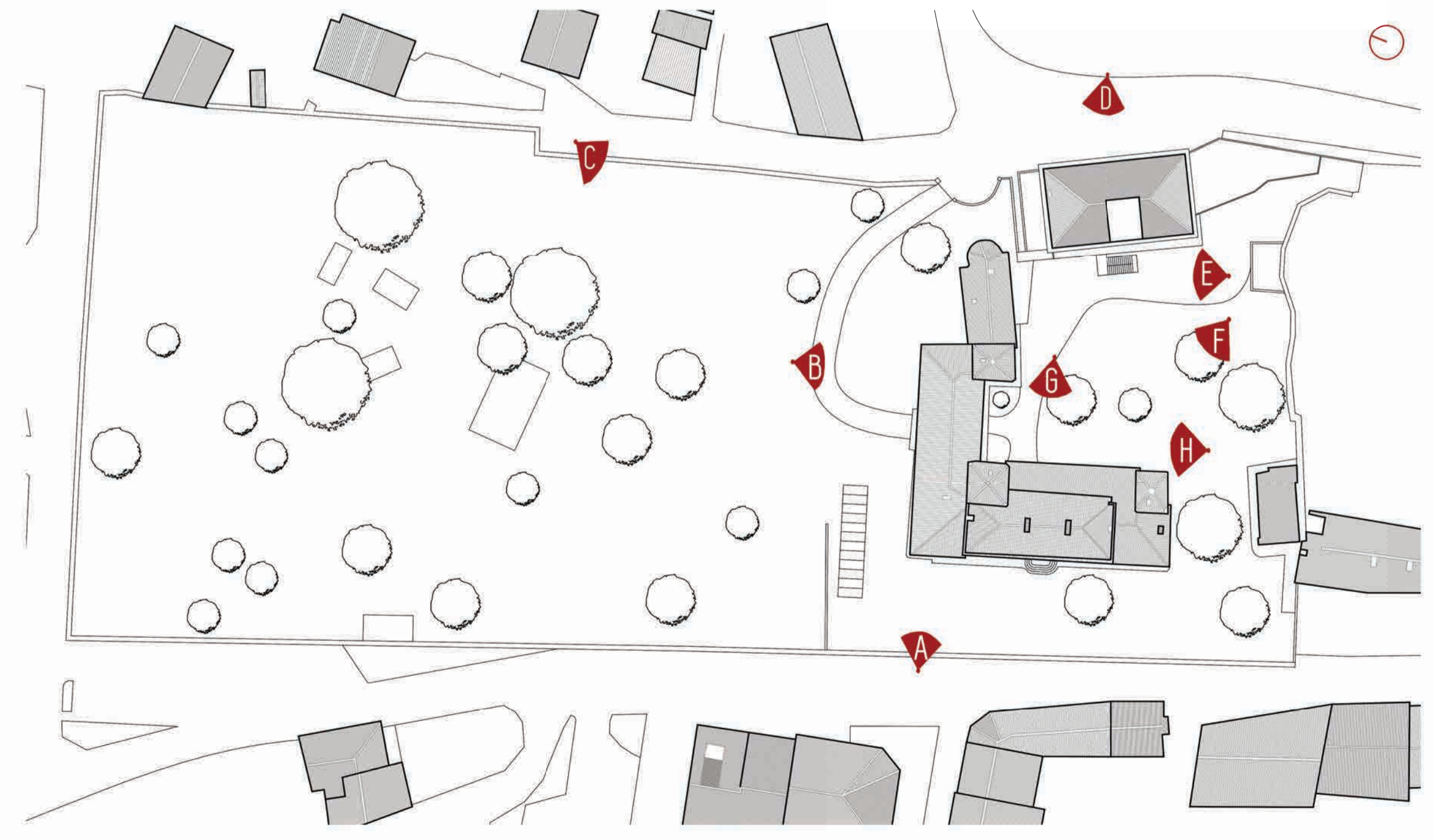
After the definitive settlement of the Savoy family, a rapid and radical renewal of Montanaro began, a new land register and improvements to the roadways were created. They began to build in the seventeenth and eighteenth centuries along the exit roads of the gates and then at the beginning of the nineteenth century to an expansion of the housing nucleus in an easterly direction.

Today the municipality looks like a collected historical center, with an irregular pentagonal shape due to the presence of the castle, outside the nucleus are the expansion areas characterized by different building types.



CASTLE of MONTANARO
Montanaro Castle is one of the most important architectural elements in the country and in the village. Montanaro which has its main fulcrum in the castle. The territory of the castle is bordered by via Silvio Pellico, via Pettit, Piazza Rimmembranza, via Mazzini and Vicolo Arduino. The inside of the walls includes: The castle, a building built in the sixties, the seventeenth-century park, a private house, the parish church of San Nicolaio and the old community house with the bell tower.

The main driveway and pedestrian access is located towards Via Mazzini which is accessed by a ramp. On the same street there is a second driveway and pedestrian access which serves as access to the park; there is also an entrance with only pedestrian access inside the building of the sixties. A further entrance to the castle is represented by the long ramp that connects the latter with the square in front of the two churches; and one of the oldest entrances to the castle which towards the end of the seventeenth century became the main access to the building - now however no longer in use. As for the park, the main entrance is on via Pettit.



- 1 CASTLE MONTALDO DORA
- 2 CASTLE OF RIVAROLO
- 3 CASTLE OF CANDIA
- 4 CASTLE OF SAN GIORGIO

- 5 CASTLE OF MAZZE'
- 6 CASTLE OF AGLIE'

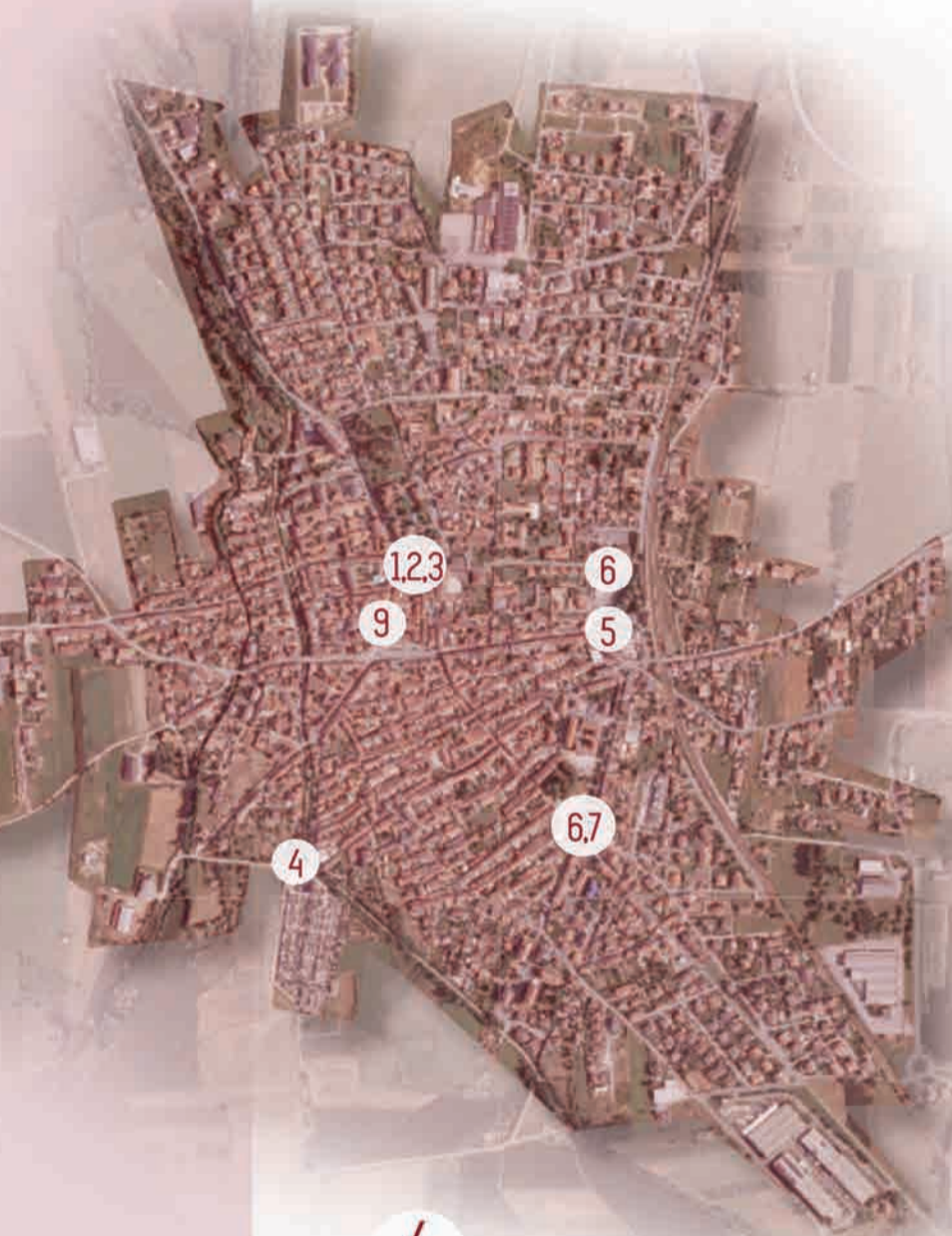
- 7 CASTLE OF VALPERGA
- 8 CASTLE OF IVREA

The castle dates back to the mid-twelfth century, over the centuries it has undergone multiple destructions, rebuilds and renovations, until it assumed, in 1890, with the restoration designed by Alfredo d'Andrade, the aspect it has preserved to this day. The castle is an integral part of the Roman village.

The castle of Malgra, an elegant residence with a park built between 1333 and 1336 by the feudal lord Count Martino di San Martino was subject to various expansions on several occasions in the following centuries. Originally there were two buildings in the building. United by a wall and a circular tower that still exists.

The castle of Candia and the nineteenth-century reconstruction of the ancient castle of Canasia Canavese that once dominated the village. The construction does not appear homogeneous: in part it is with exposed bricks, such as the tower with Ghibelline battlements, which has a structure similar to the ancient tower of the castle of Castiglione.

The already existing castle of San Giorgio presided over the local castrum with defensive purposes as early as the 10th century. Only in the twelfth century was it rebuilt in the form of a set of buildings from the counts of Biandrate. The castle consists of two distinct parts, connected by an elevated brick bridge.



LANDMARKS OF MONTANARO

- 1 CHURCH OF SAN NICOLAIO AND ASSUNTA
- 2 CHURCH OF CONFRATERNITY OF SANTA MARTA
- 3 BELL TOWER OF THE CHURCH OF SANTA MARTA
- 4 SANCTUARY OF THE MADONNA DI LORETO
- 5 CHURCH OF SAN GRATO
- 6 CHURCH OF SANTA MARIA DELL'ISOLA
- 7 BELL TOWER OF THE CHURCH OF SANTA MARIA DELL'ISOLA
- 8 CIVIC LIBRARY-CA' MESCARLIN
- 9 "GIOVANNI CENA" MUSEUM





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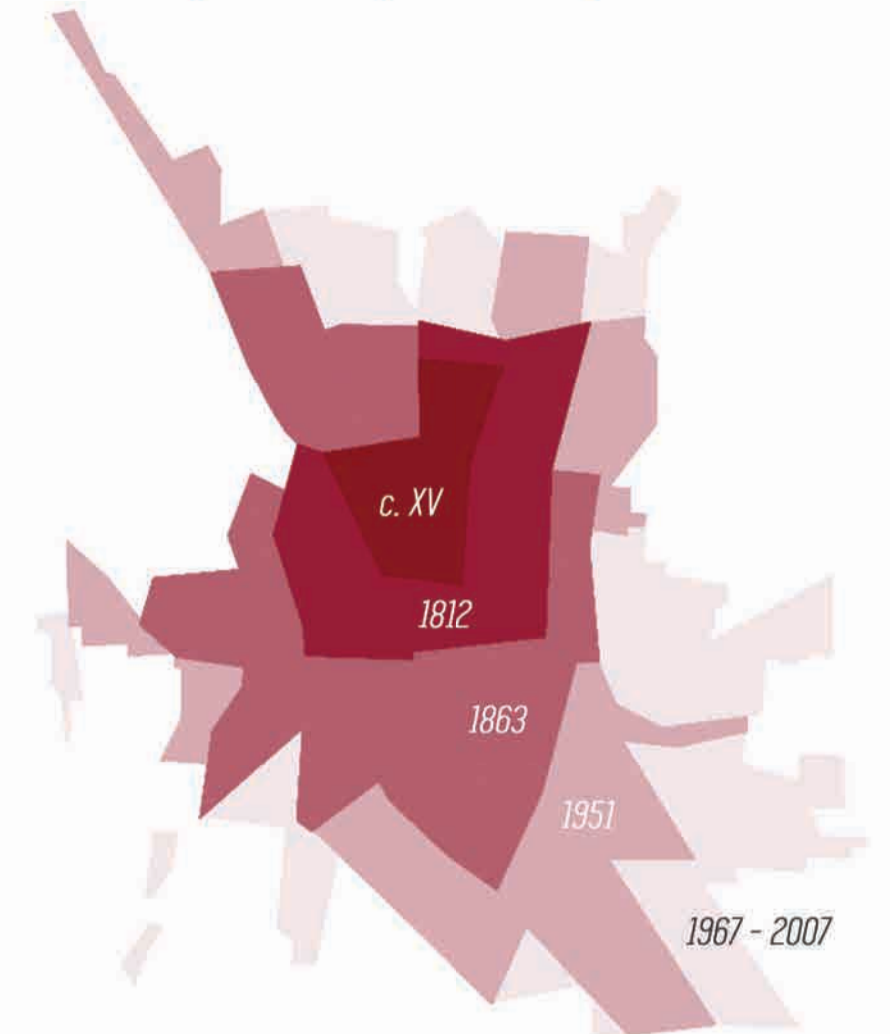


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Historical Framework Montanaro-Canavese Castle of Montanaro

History and expansion of Montanaro



X - XVI centuries
Montanaro started its development around the 10th century, it began to grow surrounding the castle. The ancient city was surrounded by walls that limited the expansion but in 1314 construction began in the "aral", outside the walls, towards Chiavaso e San Benigno.

XVII - XVIII centuries

Outside of the ancient city center we can see the expansion areas. The western area developed in a regular and very condensed way. The south and north eastern areas are delimited by agricultural lands and the main streets.

1859
The city of Montanaro increases its population density and many new important buildings are created such as Casa della Comunità, Campanile del Vittone, Santa Marta Church and San Nicolao Church. Piazza Vittorio Emanuele becomes a node between the main streets and the expansion of the city continues towards the South.

2000s

The expansion of Montanaro continues and the city increases its size a lot. The big rectangular area that contains the castle can be distinguished as one of the biggest green areas in Montanaro. Montanaro also gained a new grid because new streets were added to the main circulations that defined the different blocks as a way to respond to the needs of the community and to the new interventions. Nowadays Montanaro is perceived like a historical city with the Castle as the main nucleus. The agricultural areas moved outside and continue to surround the city.



before 13th century

Structure with different purposes in strategic position on the road from Rivarolo to Chivasso and Monferrato.

1250
The Castle of Montanaro belongs to the Count of Marzano Orio

1255
On 16 August the castle was sold to the monks of San Benigno and becomes the official residence of the abbots of the Abbey of Fruttuaria. The castle of Montanaro remained the official residence of the Abbots of Fruttuaria until 1800.

1408

A special concession is granted to the population with temporary extensions of land for the construction of a shelter, therefore the fortification of the area takes place by the community. Some historical remains of the fortified structure such as the two towers allow the identification of the shelter spaces.

1526-1533

Cardinal Ferrero becomes abbot and the castle is rebuilt in sixteenth-century forms: a building bordered by the "Torre della Zecca", the central tower of the prisons. The building, between 1527 and 1533, has a U-shape.

1646

The abbot's appointment passes under the power of the Savoy. Prince Tommaso buys the church of S. Gervasio with a large green area. The court engineer Carlo Morello designs the new park and gives a pictorial testimony of the castle at that time.

1748

The papal state ceded the abbey lands to the Savoy. Attention is concentrated in this period on the church square, as can be seen from the map of Casarini, but the shapes of the castle do not vary.

1855

In 1837 the castle inherited from Avv. Eugenio Frola, son of Pietro Giuseppe. In 1855 it was restored on neo-Gothic models widespread in that period.

1885

The castle changed ownership, passing into the hands of the Conte Frola who transformed it into an elegant residence and then sold it as a legacy to the Opere Pie di Montanaro. The current structure of the Castle dates back to this reconstruction by Camillo Boggio. The whole area is rebuilt from scratch, except for the two sixteenth-century towers. It reduces the height of the sleeves, demolishes the porch, adds a lounge, the porch to the east, the veranda on the upper floor and the tower on the South side.

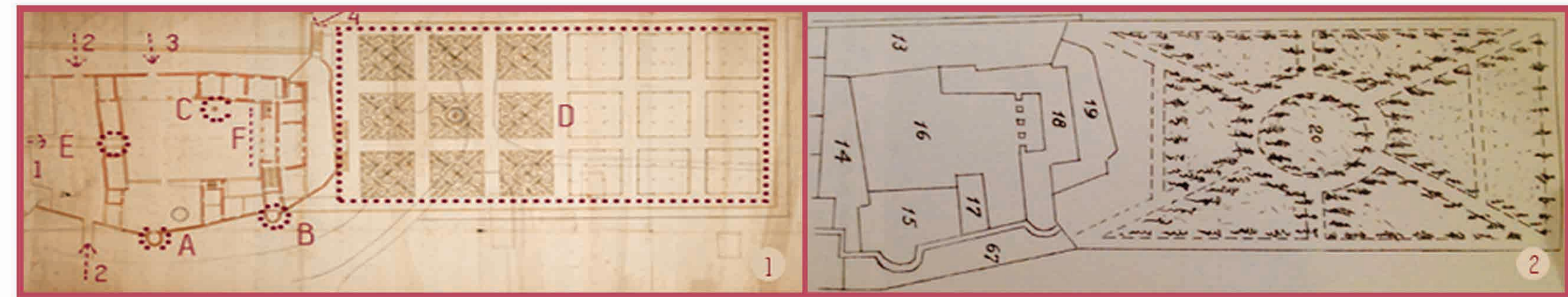
1951

After the death of Giovanni Frola, the castle moved by his will to local Opere Pie to become home to the nursing home for the elderly. In this period, therefore, the castle was adapted to become a residence for the elderly.

today

Montanaro Castle Timeline

Montanaro Castle



A Fourteenth-century circular turret. Curtain and watchtower
B Fourteenth-century circular turret; mint tower (XIV-XVI century)
C Water well inside the courtyard / courtyard
D Castle garden: "Italian" garden with boxwood plants
E Castle entrance door
F Castello: internal elevation with arches
1 main access via ramp and drawbridge
2 access doors through the fencing walls
3 entrance door accessible via the ramp of the Vittone
4 door "of the bridge"

The Morello project includes an Italian garden to the north with boxwood beds, arabesque tracers with geometric motorbikes; to the west of this garden a much larger Second is indicated, with square flower beds, probably destined for an orchard. The plan of the castle shows a U-shaped building which closes an internal courtyard, delimited by a portion of walls and closed to the south by buildings, in the middle of which the door with the drawbars opens. To the east two oval towers protrude from the walls, of which the mint remains. The internal façade shows four arches on the ground floor, as they appear in the painting kept in the castle (dating back to the first half of the nineteenth century). To the west were the house of the Giudice and Massaro (without a portico with a veranda and a square tower, added later in 1898), with an enlisting well. Beyond the wall of the shelter ran the moat, irrigating the internal garden. A century later, in 1750, the garden appeared very different, as evidenced by the Regular Type of the premises of the Municipality of Montanaro, traced by the topographer A.Casini. Two surviving secular trees are still visible inside the park: a large red beech and a sequoia. Both protect from the State Forestry.

CASTLE of MONTANARO through the years

- 1840** Clemente Rovere, il Castello di Montanaro, 1840
- 1853** Enrico Gonin, Montanaro Castle in a lithograph, 1853, from Album of the main feudal castles of the Savoy monarchy
- 1885** Francesco Gonin, The castle of Montanaro before the restoration of 1885, a painting preserved in the castle
- 1890** Clodoveo Clara, oil painting on canvas, Castle, 1890, Church of San Giovanni and Santa Maria
- 1906** Castello di Montanaro, postcard, 21 April 1906
- 1906** Panorama and Senatore Frola Castle
- 1941** Castello di Montanaro, postcard, 1941
- 20th century** Montanaro Canavese, Senator Frola Castle, postcard, 20th century
- 1960s** Castello di Montanaro, postcard, 1960s
- today** Montanaro Canavese, Senator Frola Castle, postcard, 20th century
- today** Castle of Montanaro, today



Survey Process Montanaro survey Photogrammetry and Laser scanning

MAP DEVELOPMENT

To develop the diagrams and maps for the urban and historical analysis of Montanaro we searched the information in the Geoportal from the Region of Piemonte. This portal is a public web page from which we can extract the information that we need in order to proceed with the analysis of the different characteristics of our site and its surroundings.



Once we got the data from the Geoportal we need to introduce it into QGIS or any other GIS processing software to be able to add each one of the relevant layers in order to create the maps for the analysis.

Once we have the information in the software we can visualize, manage, edit, analyse data, and compose printable maps that reveal deeper insights into data, such as patterns and relationships that help us to make decisions during the design process.

The official information taken from the Geo-portal of Piedmont was stored, manipulated, analyzed, managed, processed and understood in order to choose the layers corresponding to the data that we considered more relevant in the development of our site analysis.

PHOTOGRAMMETRY

Photogrammetry is the use of photography in surveying and mapping to ascertain measurements between objects. It is the science and technology of obtaining reliable information about physical objects and the environment through the process of recording, measuring and interpreting photographic images and patterns of electromagnetic radiant imagery and other phenomena.

The photogrammetry process uses the Structure from Motion (SfM) reconstruction which generates a 3D alignment based on the camera poses and the structure techniques.

The photogrammetry process does not begin with the software, it starts on the site with the data collection. In order to take the points and the photos that will help us to develop the photogrammetry stage some devices like drones, GPS, and total stations were needed to generate the information contained in the pictures and coordinates that were provided to us to be processed as a useful tool for our project.



Once we gathered the information we need to insert the photos on a processing software like Metashape or Photoscan this kind of softwares are able to perform photogrammetric processing of digital images and generate 3D spatial data to be used in GIS applications, cultural heritage documentation, and visual effects production as well as for indirect measurements of objects of various scales. This data can make the decision making process easier for us as architectural designers.



Step 1

The first step of the photogrammetry process consist of inserting the pictures and running the alignment process (SfM) in order to get a preliminary 3D disperse point cloud of the site.

The alignment was made in its original size (ultra high accuracy) with a generic pair preselection where overlapped pictures are selected automatically on the base of a coarse match.



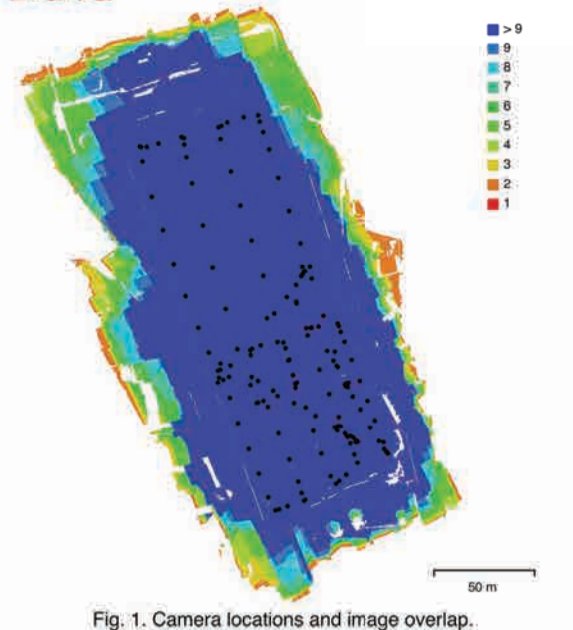
Outcomes generation

Once the points are georeferenced we can proceed to produce the digital images and generate the 3D spatial data to be used in order to help us with the analysis, development and design of the restoration project.

- Dense cloud and depth maps: Processed in ultra high quality with an aggressive filtering mode. The result was a dense pointcloud with 189642.174 points and a depth maps count of 157.
- 3D Model: Processed in medium quality with an aggressive filtering mode. The result was a 3D model with 725.956 faces with a texture size of 4.096.
- Orthomosaic: Image size of 12.145 x 16.436 px - 1.82 cm/px
- Digital Elevation Model (DEM): Was processed from the model with the interpolation enabled. The result of this process was 3.785 x 4.818 px - 7.27 cm/px.



Survey Data



Number of images: 157
 Flying altitude: 62.4 m
 Ground resolution: 1.82 cm/px
 Coverage area: 0.0351 km²

Camera stations: 157
 Tie points: 110,367
 Projections: 546,539
 Reprojection error: 0.54 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
NEX-5, E 16mm F2.8 (16mm)	4592 x 3056	16 mm	5.23 x 5.23 µm	No

Table 1. Cameras.

As a first step camera calibration was made. Camera calibration is the process of finding the true parameters of the camera that took your photographs. Some of these parameters are focal length, format size, principal point, and lens distortion. It is also known as Interior Orientation.

Ground Control Points

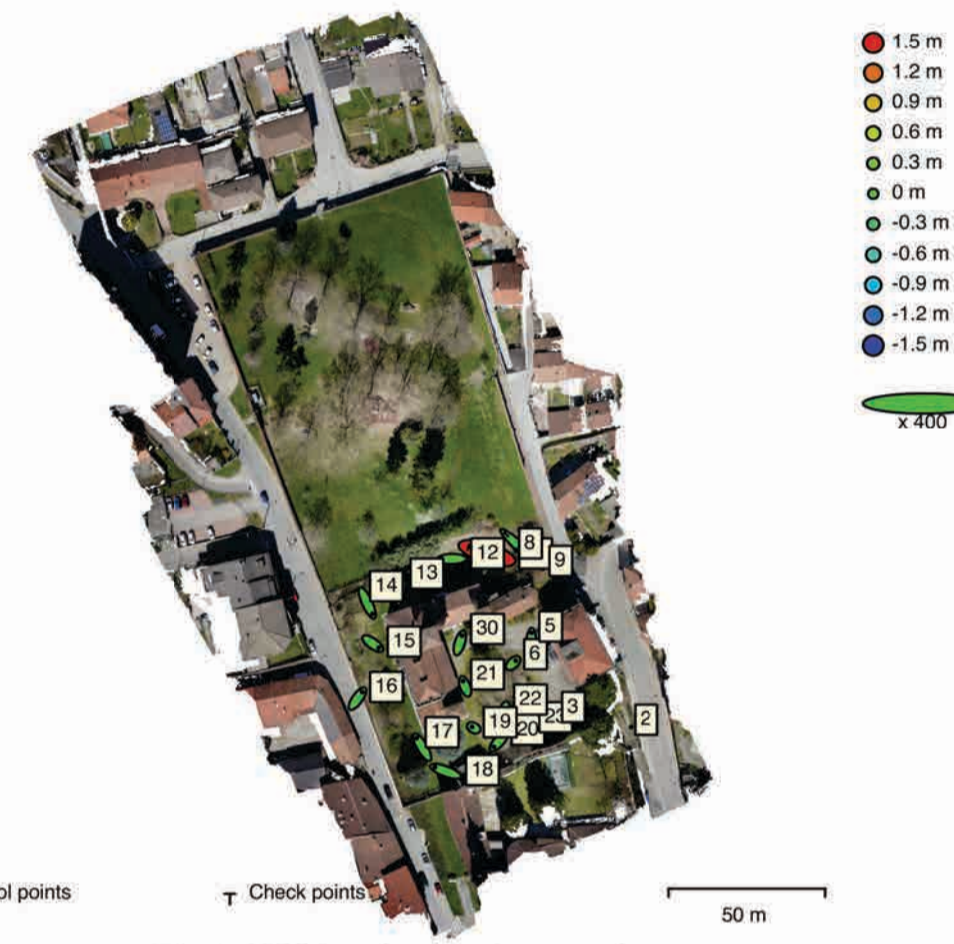


Fig. 3. GCP locations and error estimates. Z error is represented by ellipse color. X,Y errors are represented by ellipse shape. Estimated GCP locations are marked with a dot or crossing.

Count	X error (m)	Y error (m)	Z error (m)	XY error (m)	Total (m)
16	0.00910485	0.0108233	0.00470759	0.0141436	0.0149065

Table 3. Control points RMSE.

Count	X error (m)	Y error (m)	Z error (m)	XY error (m)	Total (m)
2	0.0292862	0.0200847	1.05684	0.0355116	1.05743

Table 4. Check points RMSE.

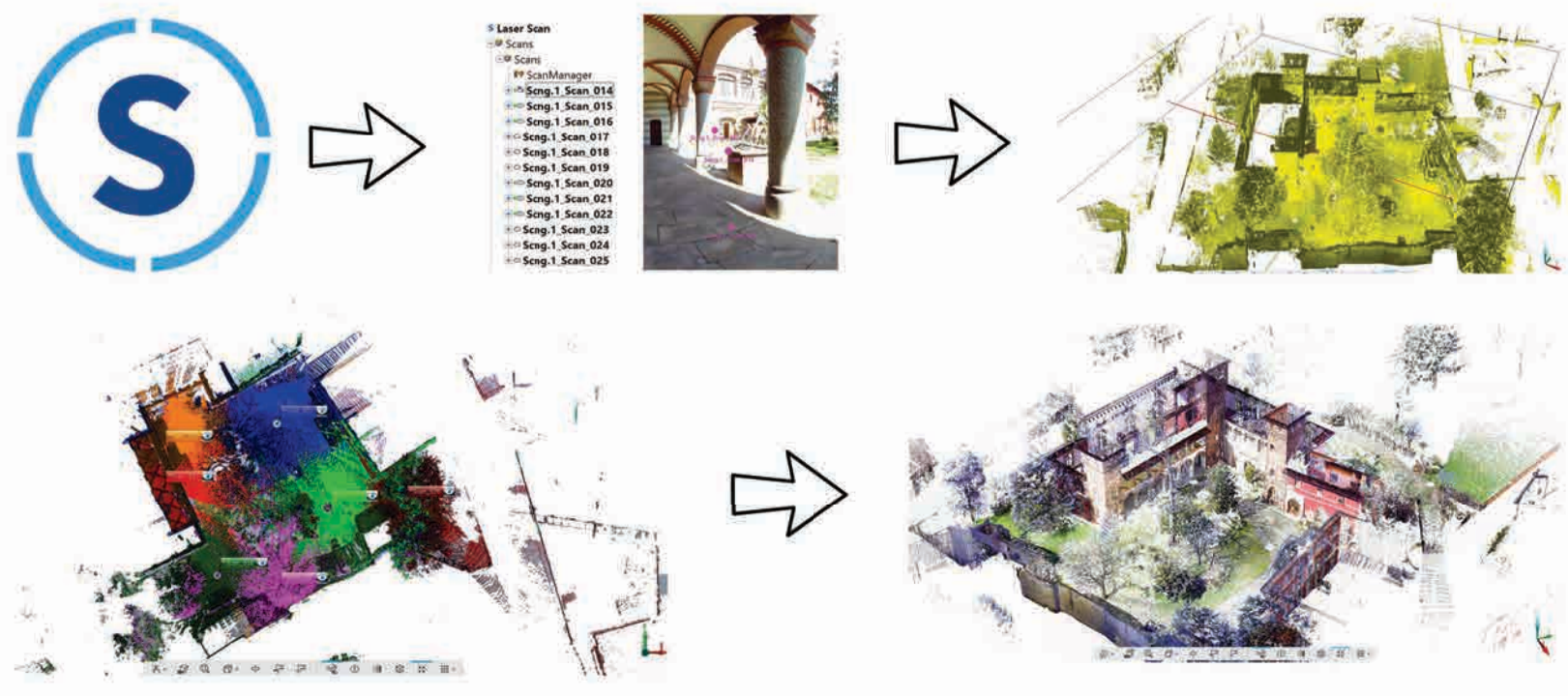
LASER SCANNING

Laser scanning is a process that allows us to obtain the shape and the textures of the objects that we are scanning, in this case the facade of Montanaro Castle.



The survey starts on site, where the scanner measures the building, the scanning files delivered by the laser scanner were processed in a dedicated software called Scene in which the scanned data is converted into a pointcloud from which we can extract the shape of the building and its textures.

Scene software uses a Cloud to Cloud algorithm from a previous rough alignment of the scans. The maximum alignment error was 4,49 mm and the percentage of <4mm achieved was 45,6%. After processing the result was a 180374.453 points pointcloud.



POST-PROCESSING

SITE PLANS



Exporting the georeferenced orthophoto of the whole site in metashape. Size: 12.145 x 16.436



The georeferenced orthophoto was placed on QGIS. It was joined with the orthophoto of the surroundings from the 2015 orthophoto file.



Extraction of the roof contours from the photogrammetry point cloud using the section tool in CloudCompare to create the 2D representation of the castle's roof plan.



Archicad was used for drawing the contours of the castle roofs, the surroundings and the different aspects of the proposal over the orthophotos.

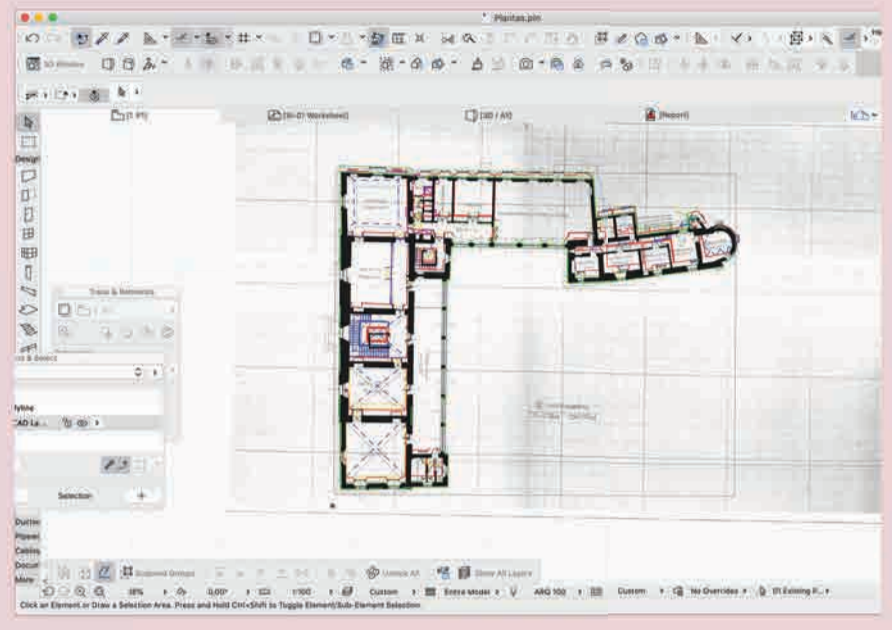
FLOOR PLANS



The site pointcloud from metashape with 189642.174 points and the castle pointcloud from Scene with 180374.453 points are extracted.



CloudCompare's section tool was used to extract the contours of each floor from the pointclouds to get the exterior border of the castle.



An image of the sectioned pointclouds and mesh was extracted to get the information of the projections on each floor and the cut height and border on the second floor.



Archicad was used to combine the data of the pointcloud sections, the generated images, the original raster plans in .jpg, and the .dwg vector maps to get the most approximately correct information combined in the floorplans. A 3D model of the floorplans was also produced in Archicad thanks to this plan.

ELEVATION AND SECTION



The site pointcloud from metashape with 189642.174 points and the castle pointcloud from Scene with 180374.453 points are extracted.



- 1) Extraction of different section contours.
- 2) LiDAR pointcloud simplification, 90224.592 points = 50% less.
- 3) Pointcloud sectioning to extract the castle, 29749.150 of points.
- 4) Exporting facade images from pointcloud with a 5 mm grid.
- 5) Generation of mesh from laser scanning pointcloud using the Poisson method with octree level 11 equivalent to 15 mm.



- 1) Simplification of the laser scanned mesh and reduction of triangles. From 9007.590 to 1899.999 faces
- 2) Re-texturing the mesh with a photo of the castle that shows the facade of interest with maximum alignment error of 1,77 and exporting the file as .obj.



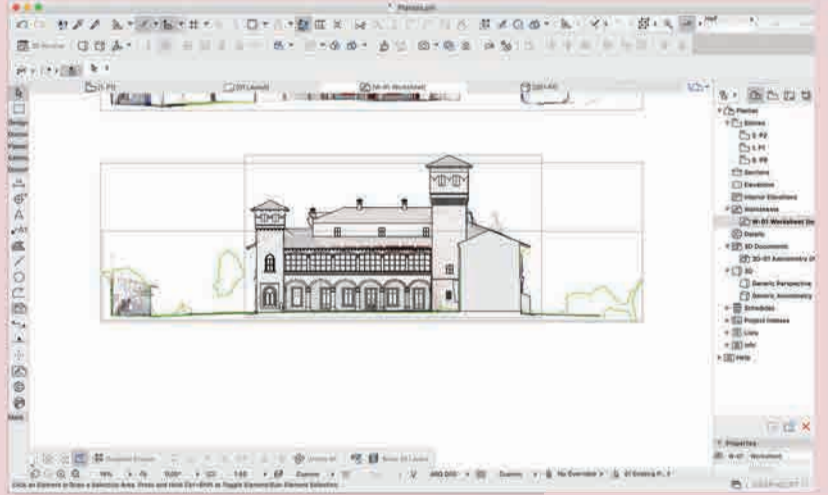
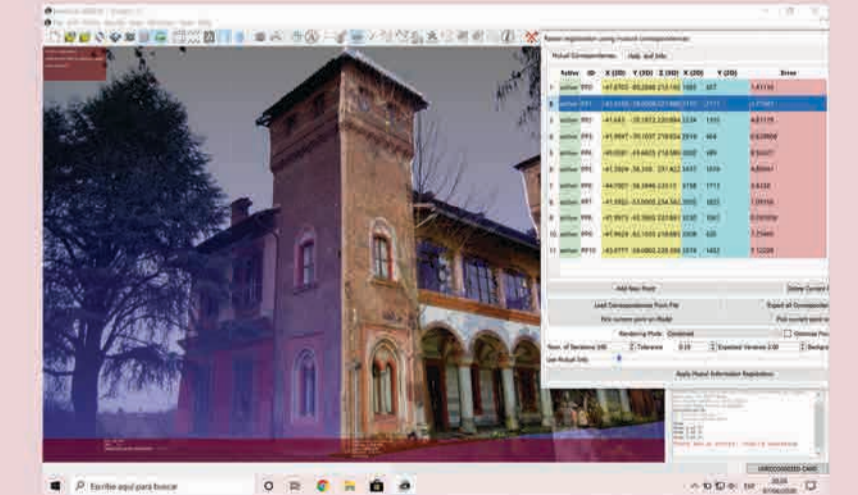
Rhino was used for rendering the facade mesh with the textures that comes from the texturing process in meshlab.



Photoshop is used to improve the quality of the pointcloud images and to combine them with the renders that correspond to the mesh from the original laser scan textures, the mesh with the image texture, and the photogrammetry mesh with the roof information.



Combining the data of the pointcloud sections and the generated images to be able to draw the facade in scale 1:50 and recognize the characteristics and deteriorations of the facade.



3D MODELS



The site pointcloud from metashape with 189642.174 points and the castle pointcloud from Scene with 180374.453 points are extracted.



- 1) Extraction of different section contours.
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- 4) Generation of mesh from laser scanning pointcloud using the Poisson method with octree level 11 equivalent to 15 mm.



- 1) Simplification of the laser scan mesh and reduction of triangles. From 9007.590 to 1899.999 faces
- 2) Texturing: the site mesh from photogrammetry uses the texture from metashape; the castle's mesh was re-textured in meshlab with photos of the castle.



Rhino was used for editing and rendering the axonometry of the castle and site meshes combined.



Archicad was used to create a 3D model of the proposal and the external part of the project. It was used to generate the new buildings and renovations of the existing ones.



Twinnom was used to combine the 3D model from archicad with the different meshes obtained from the survey. It was used to add vegetation and generate a fly through of the project.

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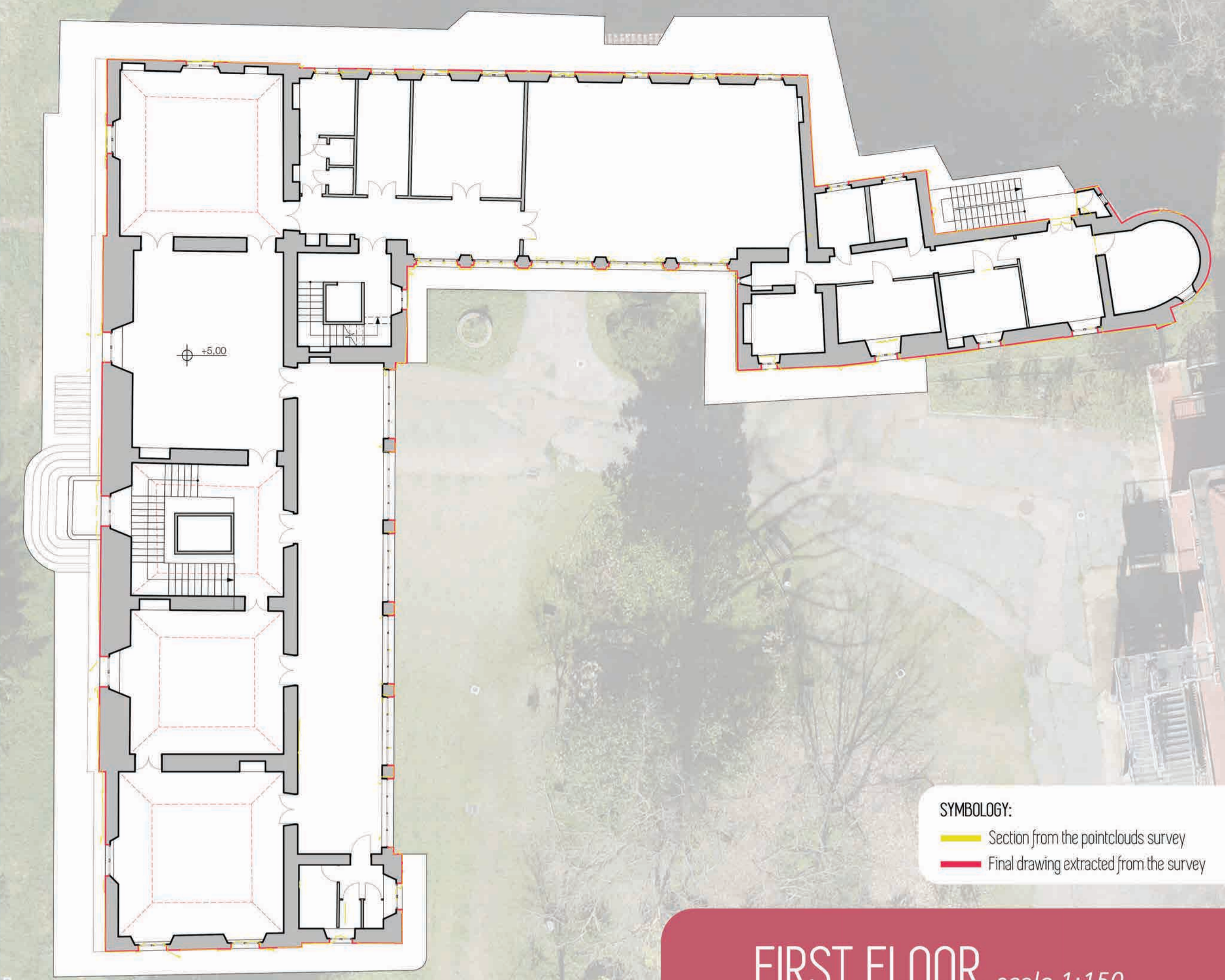
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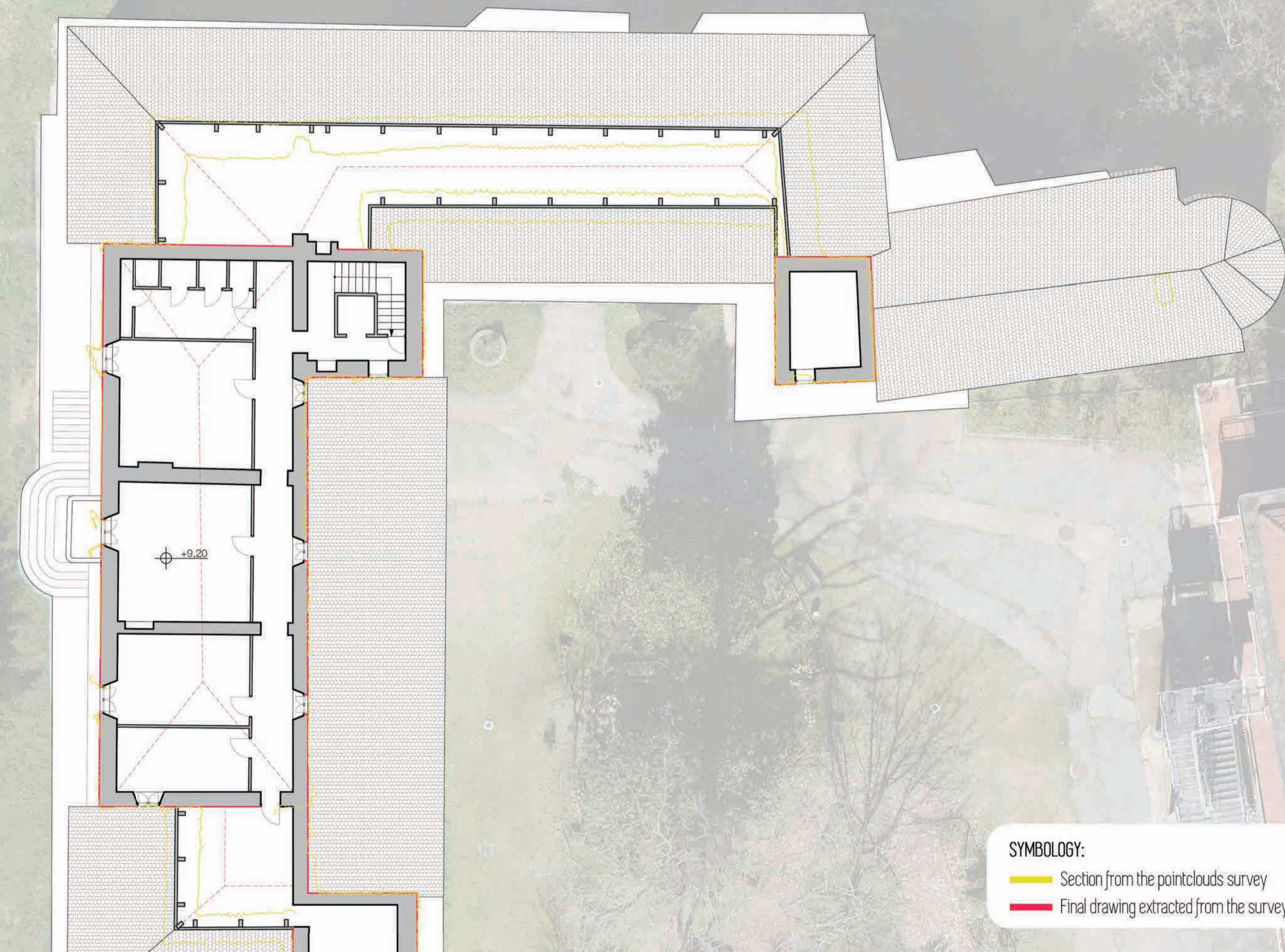
SYMBOLGY:
— Section from the pointclouds survey
— Final drawing extracted from the survey

GROUND FLOOR *scale 1:150*



SYMBOLGY:
— Section from the pointclouds survey
— Final drawing extracted from the survey

FIRST FLOOR *scale 1:150*



SYMBOLGY:
— Section from the pointclouds survey
— Final drawing extracted from the survey

SECOND FLOOR *scale 1:150*



3D MODEL *scale 1:250*



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FOR THE SUSTAINABLE PROJECT

**ATELIER COMPATIBILITY
and SUSTAINABILITY of
ARCHITECTURAL RESTORATION**

Teachers
RESTORATION: prof. Francesco Novelli
GEOMATICS: prof. Erik Costamagna

Collaborators
RESTORATION: arch. Luca Malvicino
GEOMATICS: arch. Alessandra Spreafico
GEOMATICS: arch. Lorenzo Teppati

**MONTANARO (TO)
Castello dei Conti Frola**

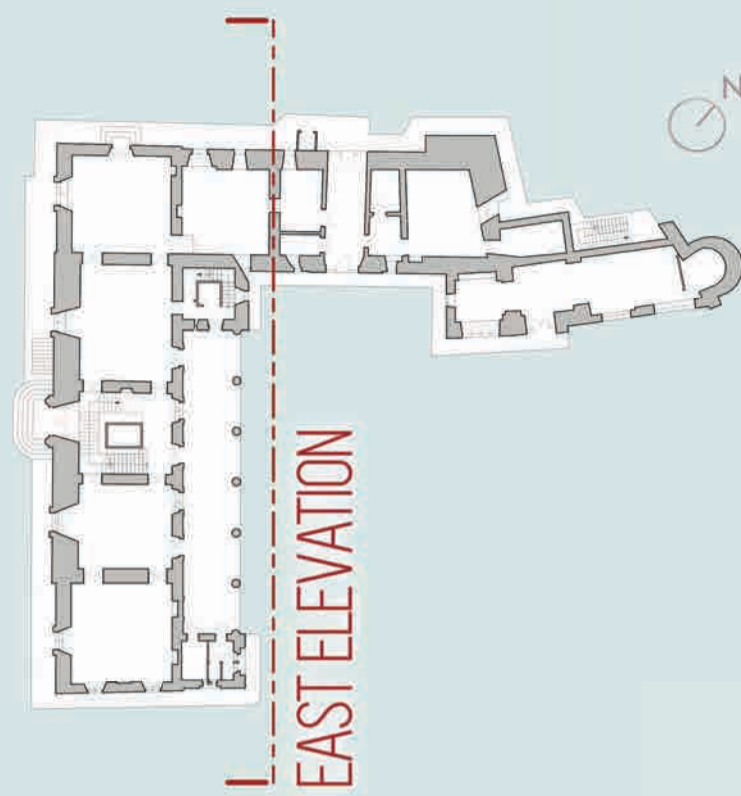


- Panel 1
TERRITORIAL FRAMEWORK
- Panel 2
HISTORICAL FRAMEWORK
- Panel 3
SURVEY METHOD
- Panel 4 - 5
ARCHITECTURAL SURVEY
Panel 5: Elevation and Section
- Panel 6 - 8
CONSTRUCTION SYSTEM ANALYSIS
- Panel 9 - 10
MATERIALS, DEGRADATIONS AND
INTERVENTIONS ANALYSIS
- Panel 11
CONCEPT OF THE PROJECT
- Panel 12
MASTERPLAN
- Panel 13 - 21
REFUNCTIONALIZATION PROJECT

GROUP 04

Gözde Akgün, 275557
Ayşenur Bahçeci, 275559
Adriana Carolina Bravo Celi, 277064
Andrea Matevska, 275350
Anja Pejović, 270012

SYMBOLOLOGY:
Section from the pointclouds survey



ORIGINAL IMAGE

EAST ELEVATION scale 1:50

SECTION A-A scale 1:50



DOORS & WINDOWS

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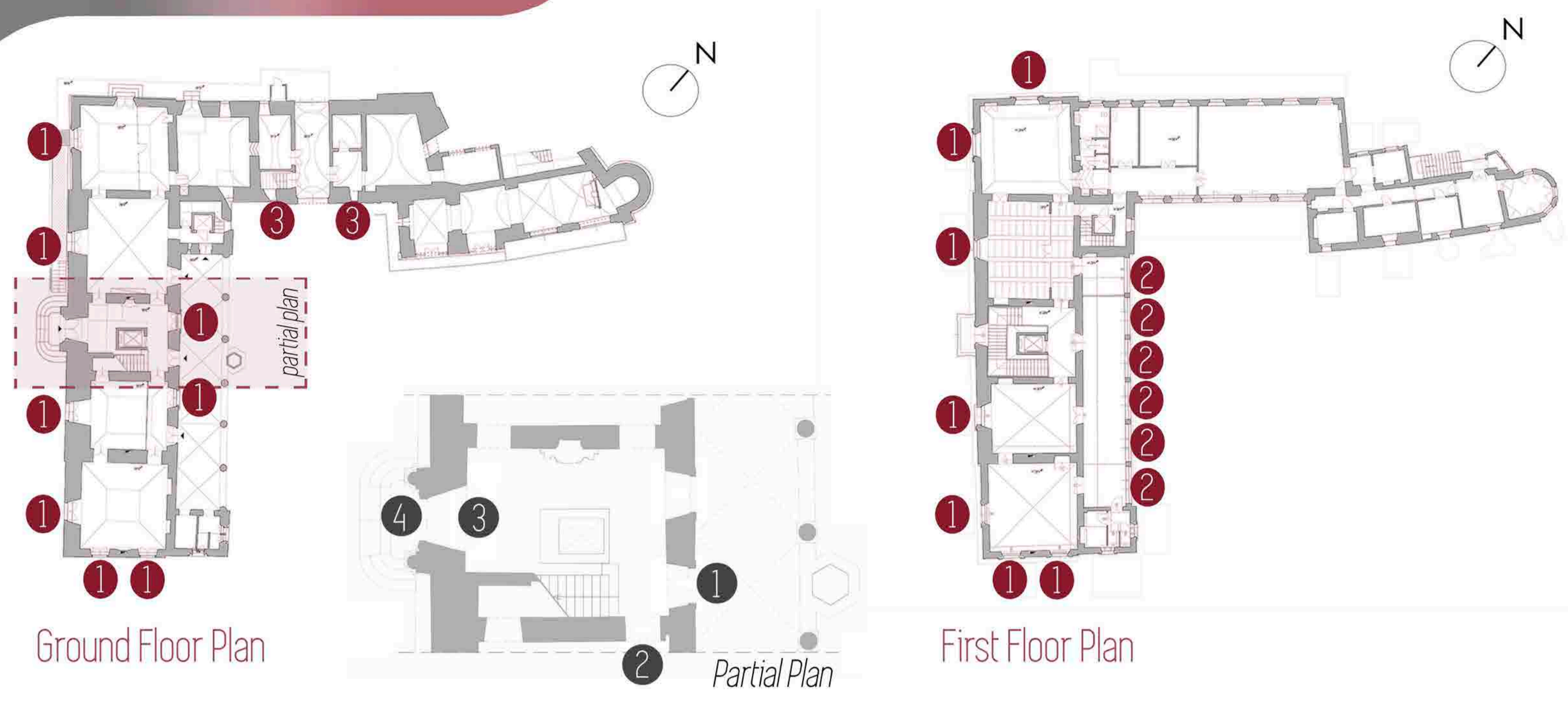
MONTANARO (TO)
Castello dei Conti Frola



Panel 1 TERRITORIAL FRAMEWORK
Panel 2 HISTORICAL FRAMEWORK
Panel 3 SURVEY METHOD
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Panel 9 - 10 MATERIALS, DEGRADATIONS AND INTERVENTIONS ANALYSIS
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Panel 12 MASTERPLAN
Panel 13 - 21 REFUNCTIONALIZATION PROJECT

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WINDOW 1

2-leaf wooden window
external + internal 2-door shutters

glazed wooden window with 2-leaf

SIMILARITIES:
Both wooden windows with 2 leaves
Style of the sample shutters are aesthetically similar to those of the castle

DIFFERENCES:
Windows of the castle don't include a fixed upper part
Shutters of the castle window are not sliding

WINDOW 2

fixed wooden window

facade inwards facade outwards

wooden glazing for industrial buildings

SIMILARITIES:
Both wooden grid framed windows mostly fixed.

DIFFERENCES:
The sample from the manual has a top part with a horizontal pivot opening system.

WINDOW 3

fixed iron window

iron security railings

SIMILARITIES:
Both fixed security windows with iron railings arranged as grids.

DIFFERENCES:
The security windows of the Montanaro castle have additional layers composed of thinner security lines.

DOOR 1

SIMILARITIES:
2-leaf doors with one fixed door
glasses inside wooden frames
similar design styles

DIFFERENCES:
no fixed window, no blindings in Montanaro Castle but has stucco cornice.



DOOR 2

SIMILARITIES:
2-leaf wooden doors with single handle
similar design styles

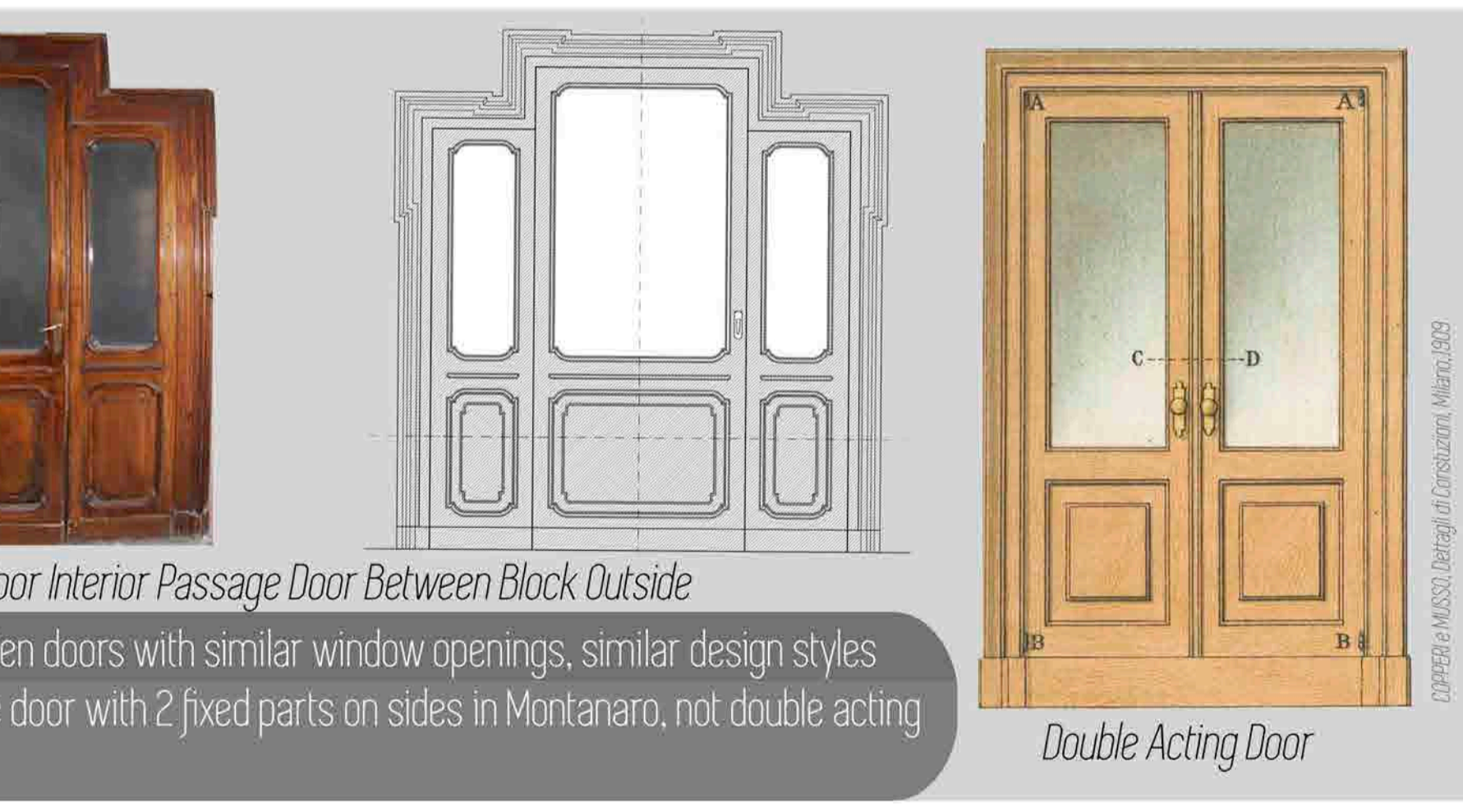
DIFFERENCES:
upper part of sill is not straight in Montanaro Castle but has stucco cornice



DOOR 3

SIMILARITIES:
wooden doors with similar window openings, similar design styles

DIFFERENCES:
single door with 2 fixed parts on sides in Montanaro, not double acting door with 2-leaves.



DOOR 4

SIMILARITIES:
2-leaf wooden doors
wooden ornaments
similar design styles

DIFFERENCES:
both have wooden ornaments but with different style details





DOORS

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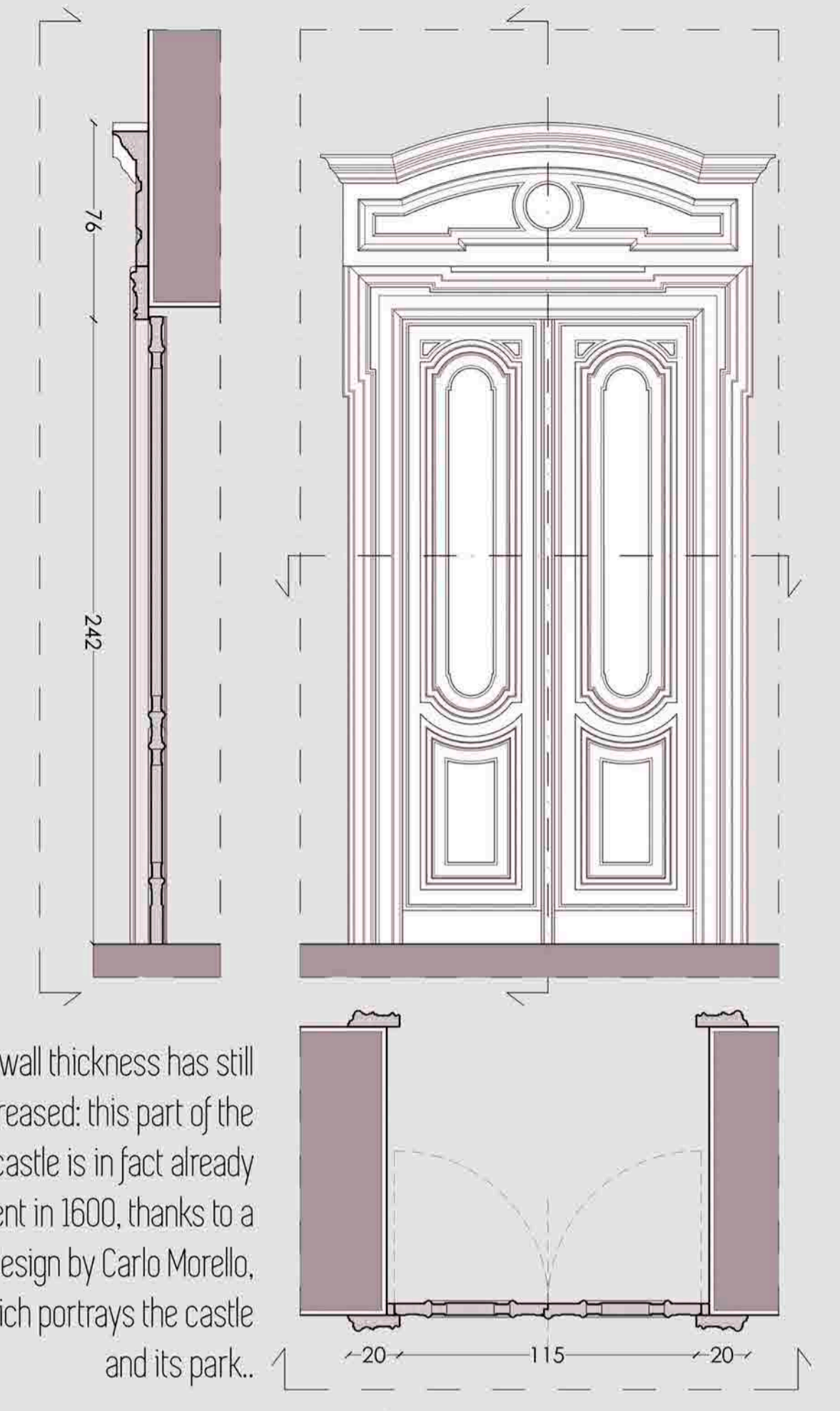
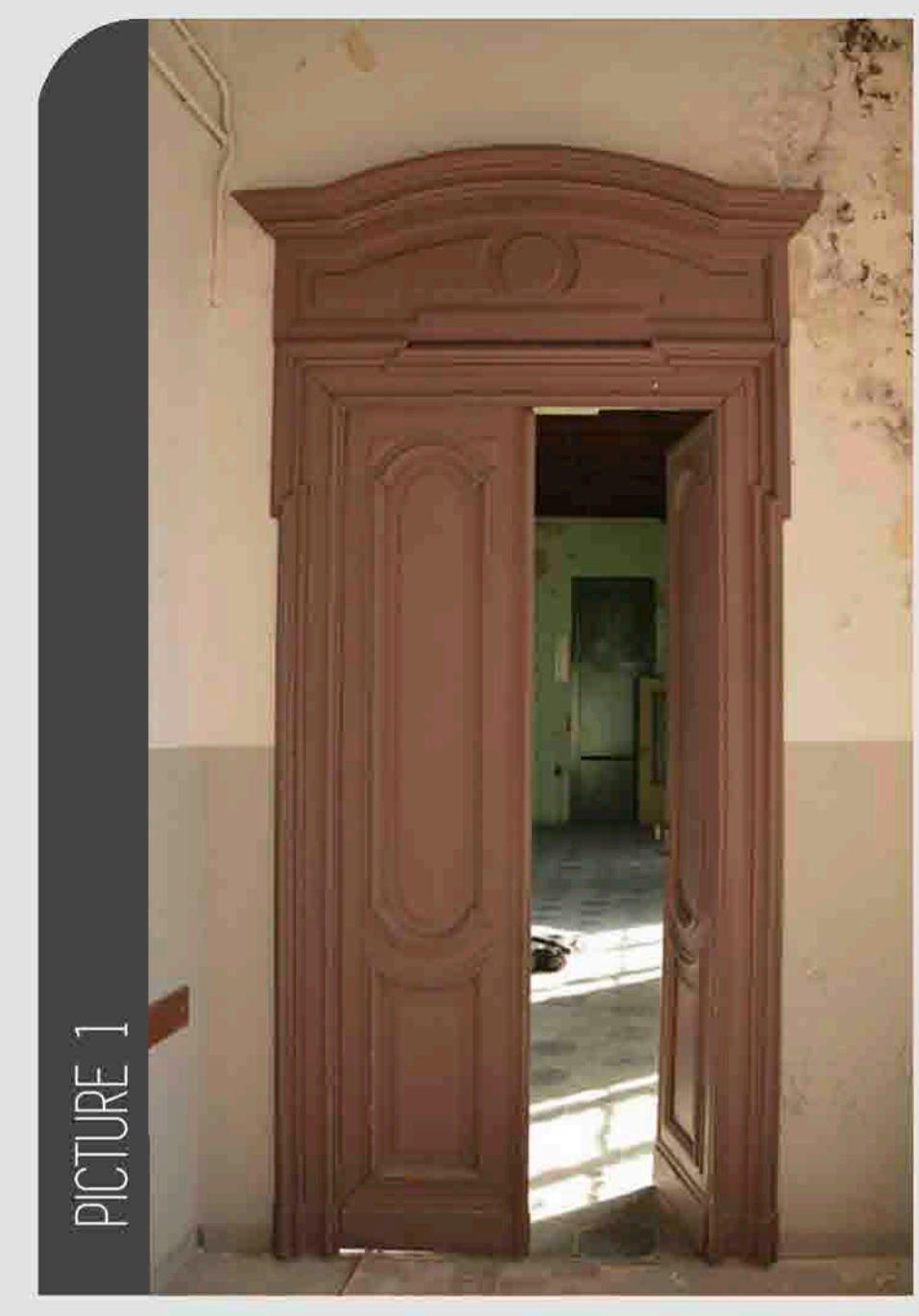
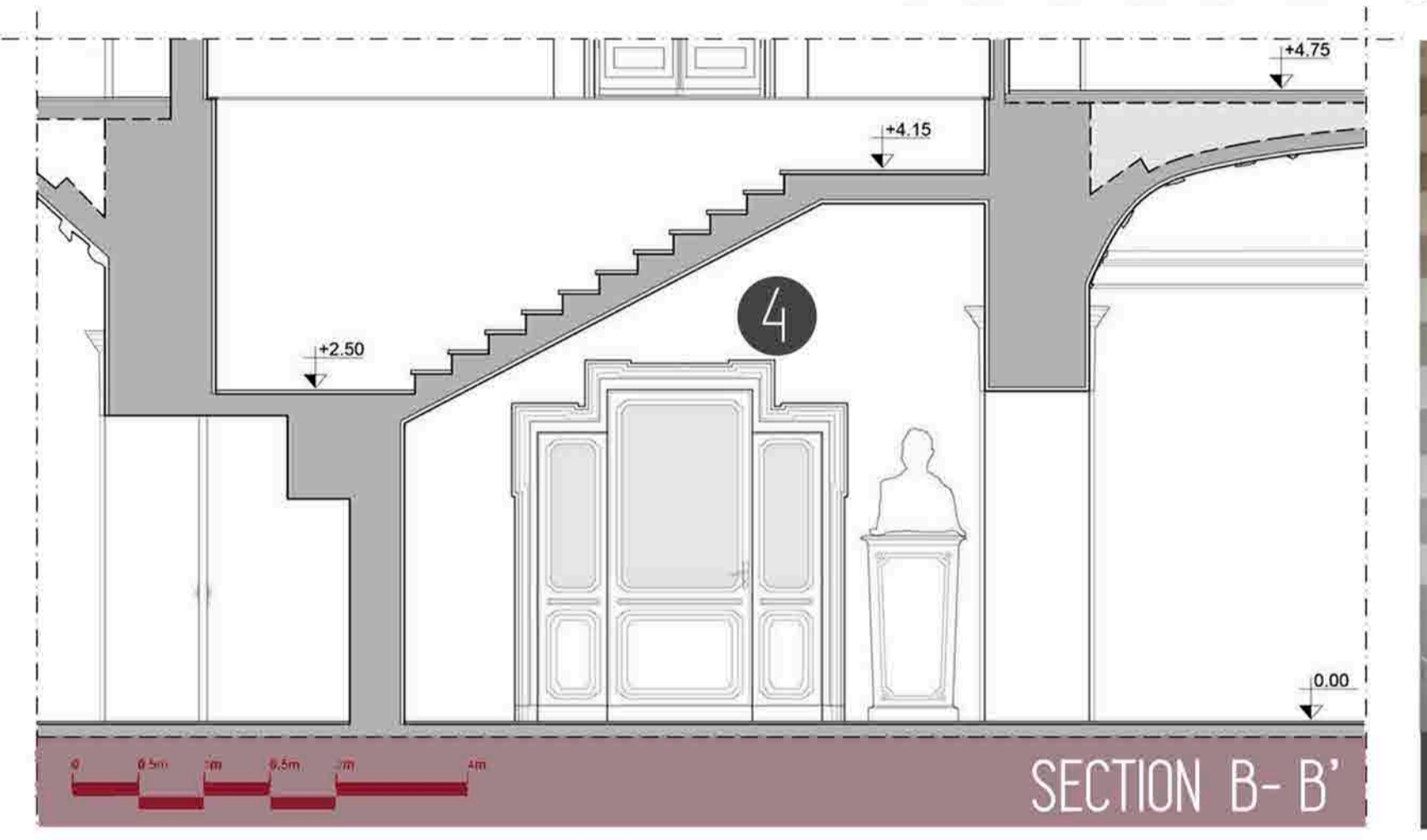
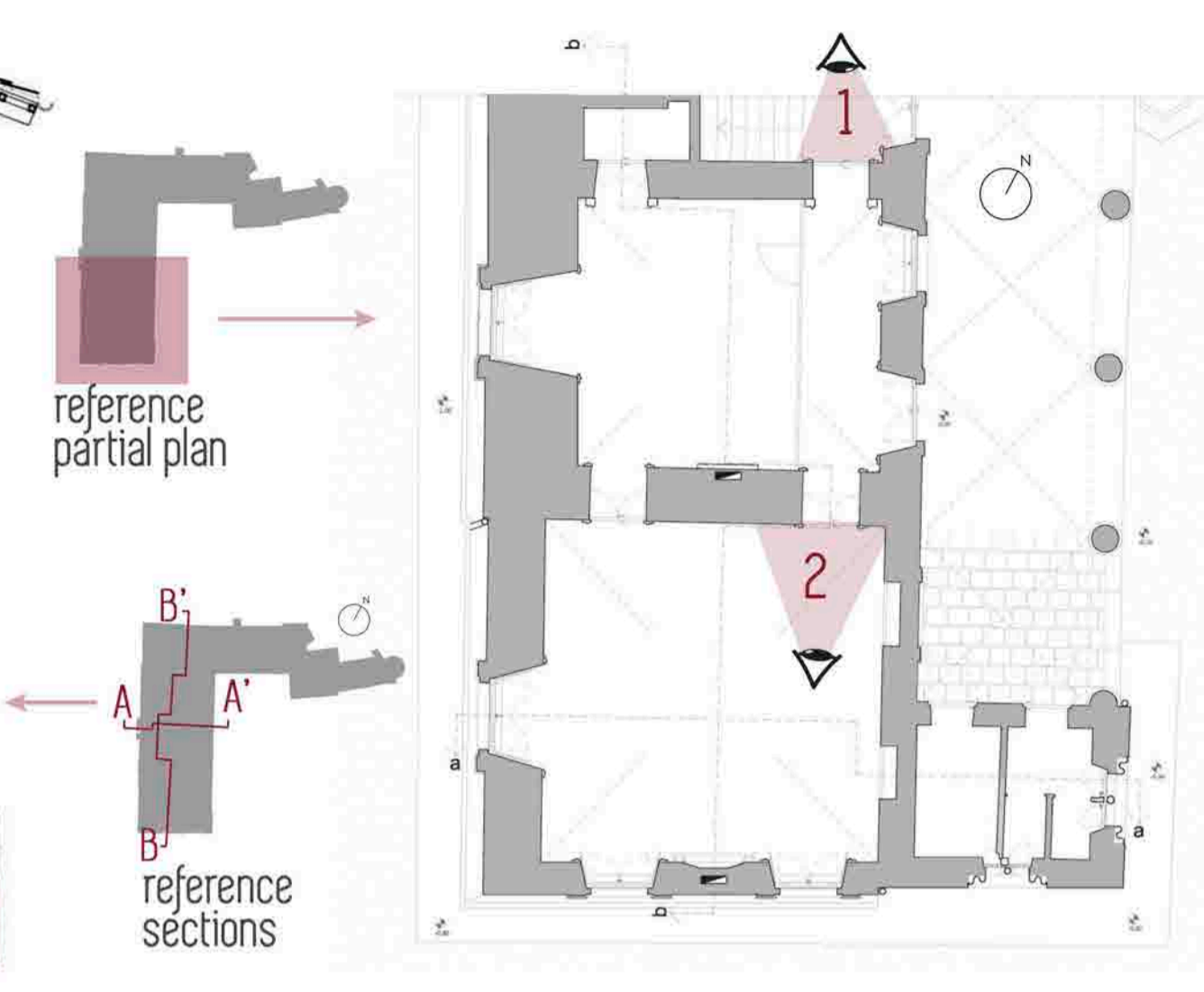
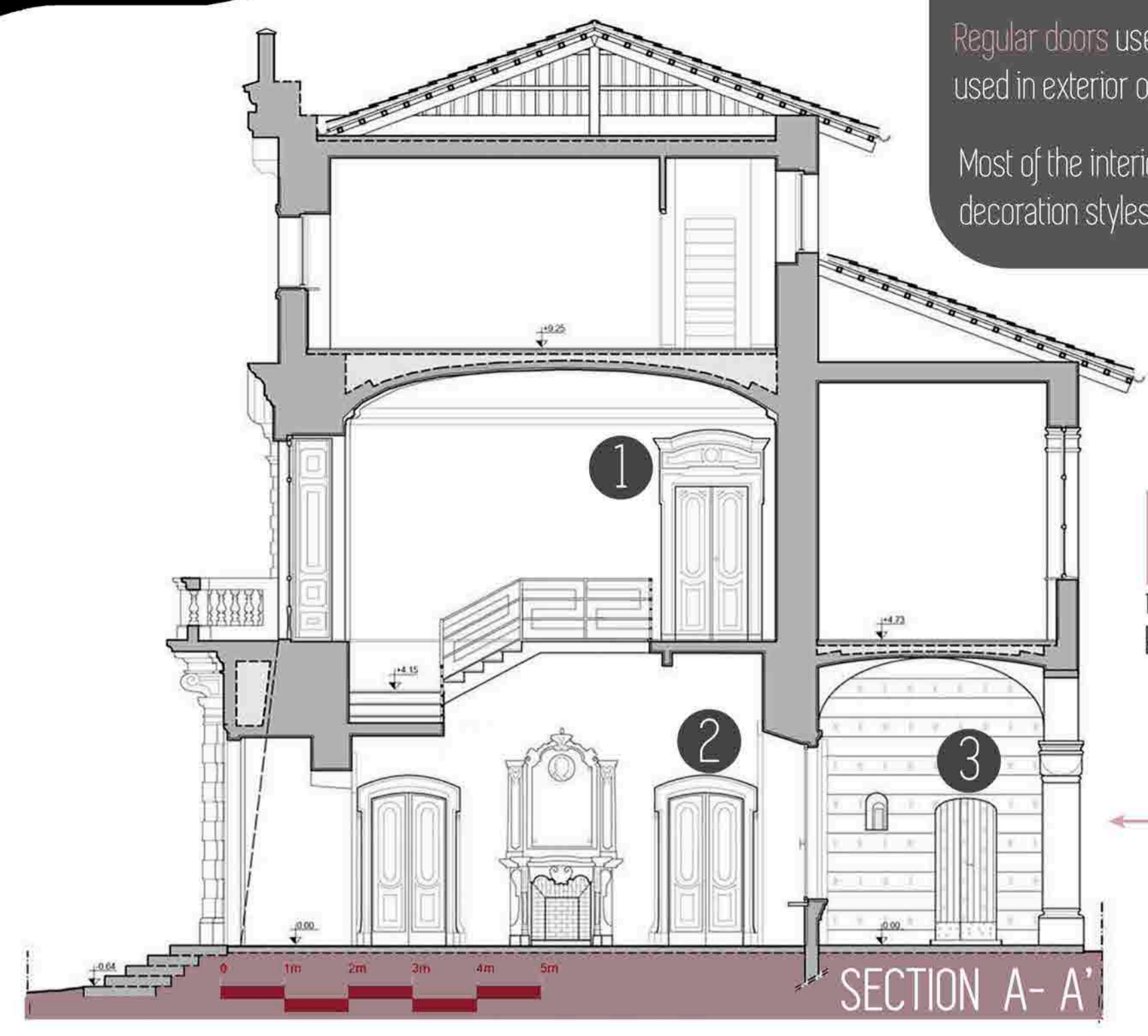
- Panel 1 TERRITORIAL FRAMEWORK
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Doors of the Montanaro Castle can be explained in two different categories, french style doors with window openings and regular doors.

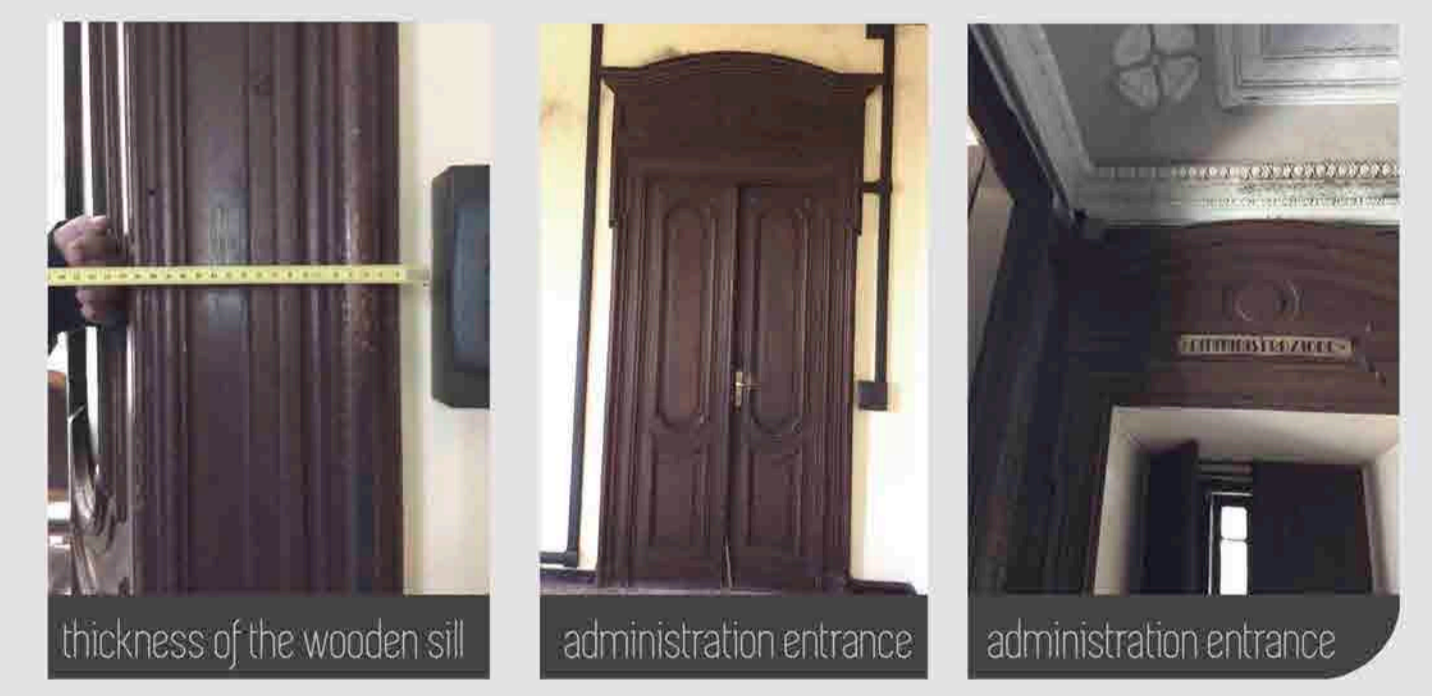
Regular doors used in both exterior and interior openings while window-doors are only used in exterior openings.

Most of the interior doors on the ground floor and upper floors have the same design and decoration styles.

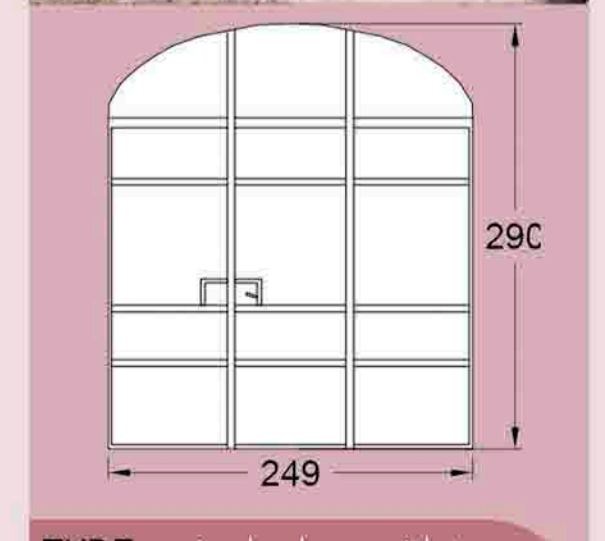
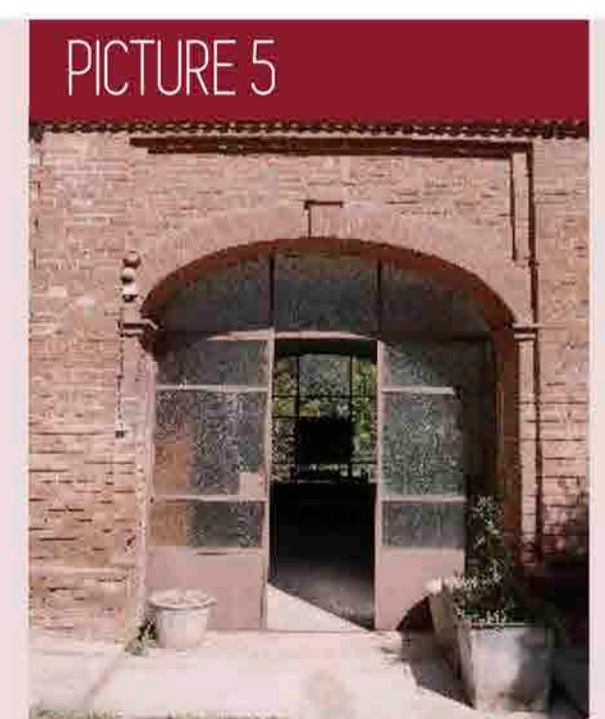


The wall thickness has still increased: this part of the castle is in fact already present in 1600, thanks to a design by Carlo Morello, which portrays the castle and its park.

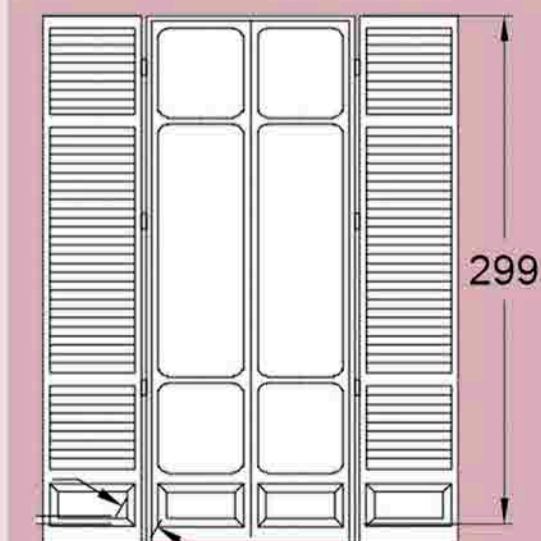
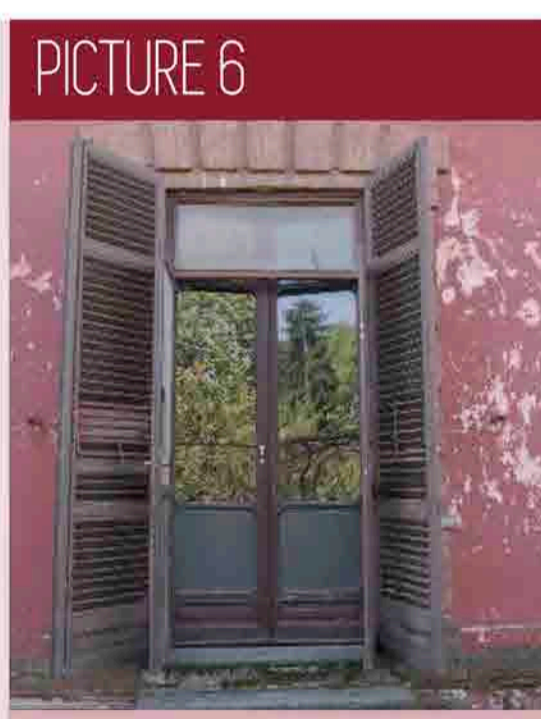
PICTURE 1 - wooden door
This style of 2-leaf wooden door has been commonly used in many openings on groundfloor and first floor. Their wooden sill has basic geometric shapes as decoration. Only two cases among these type of doors have a greater thickness walls.



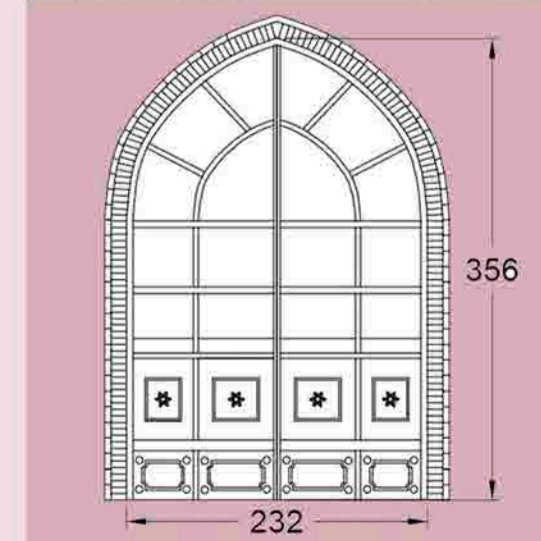
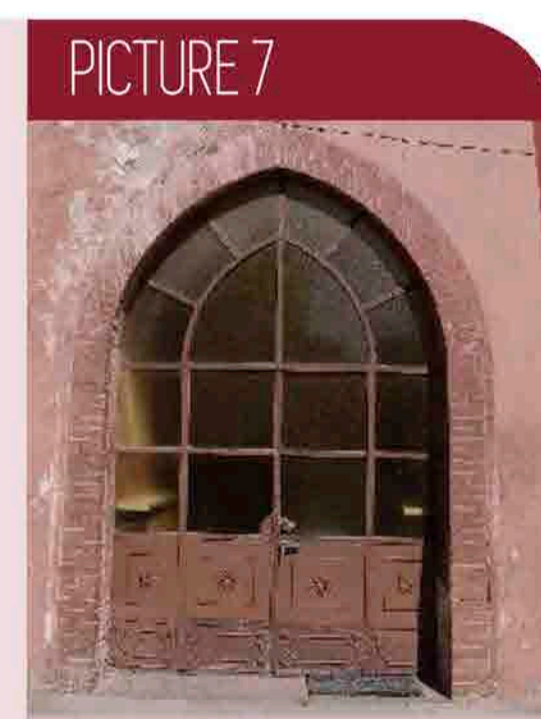
WINDOW DOORS INTERIOR & EXTERIOR DETAILS



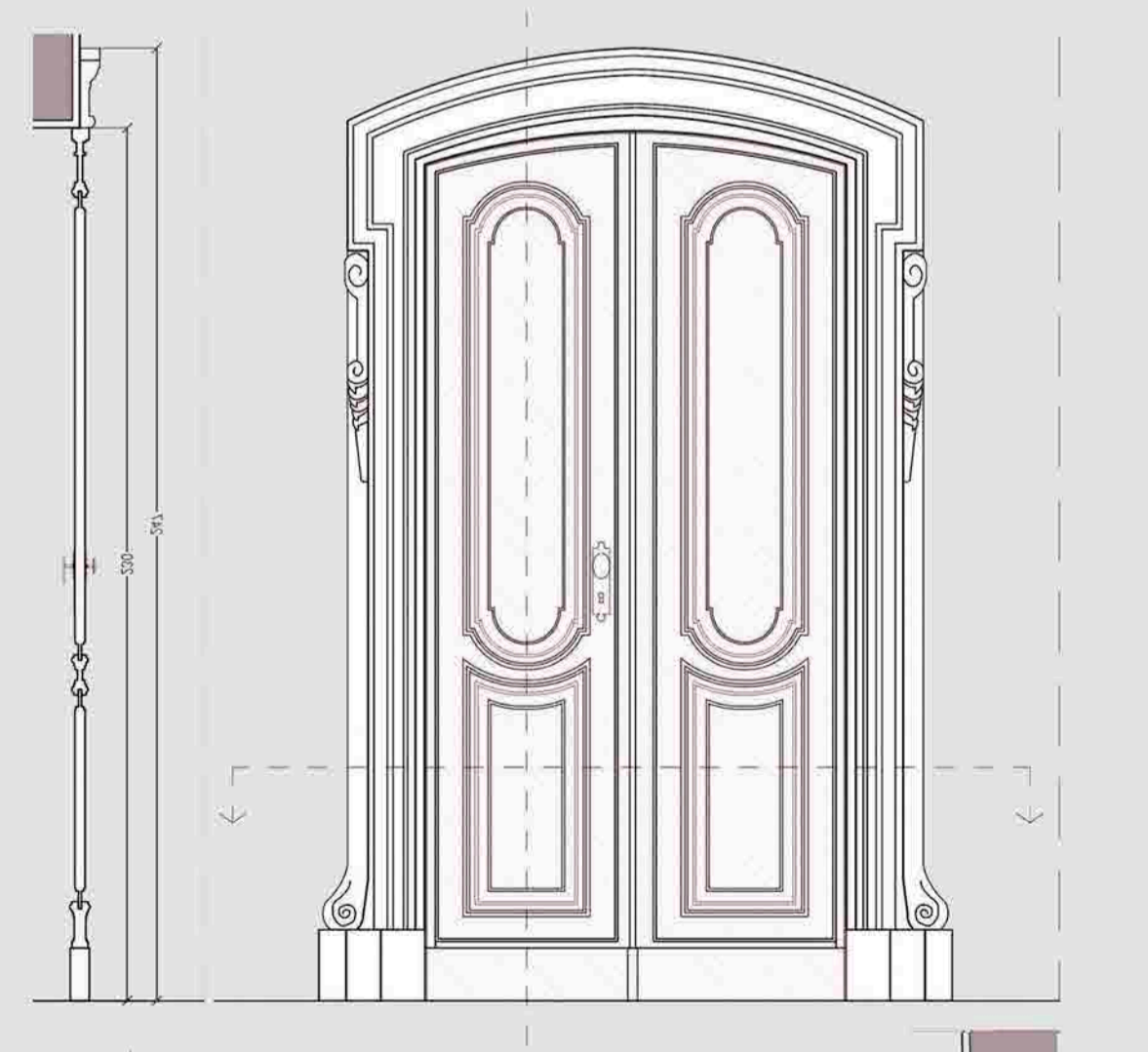
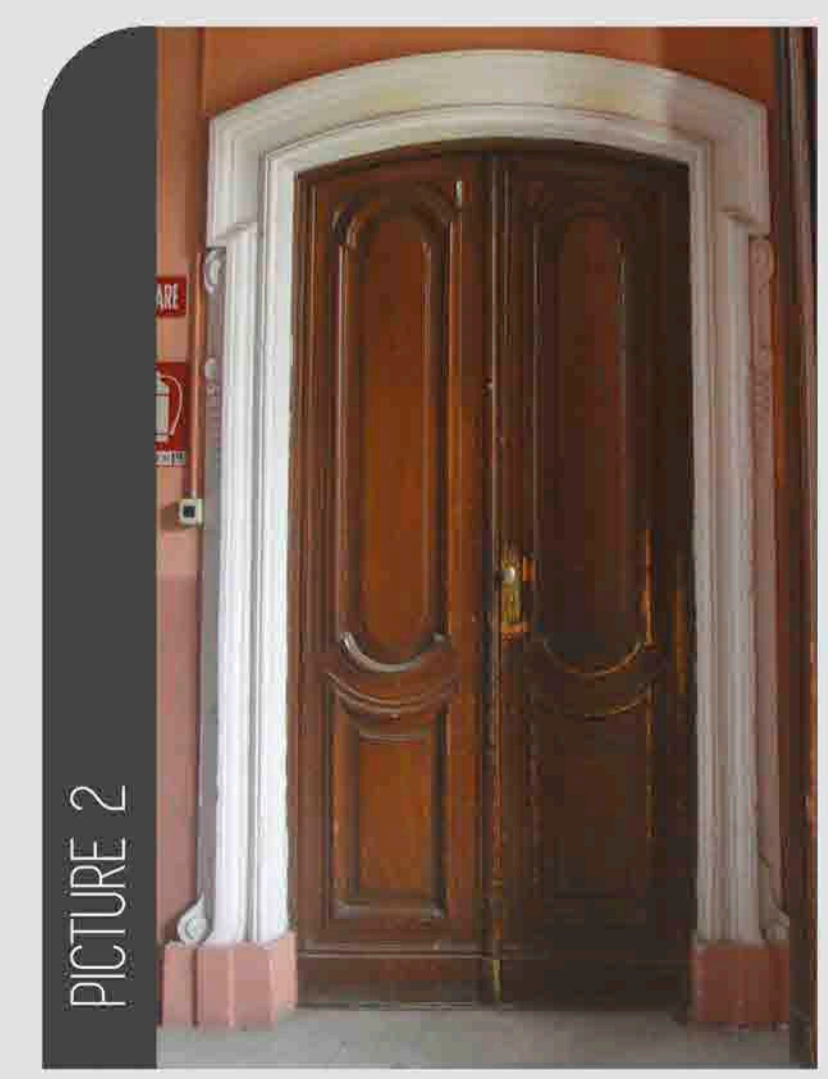
TYPE: single door with two fixed window structures
MATERIAL: iron, glass



TYPE: two leaf window door
MATERIAL: wood, glass



TYPE: two leaf door with two fixed window structures
MATERIAL: iron, glass



PICTURE 2 - wooden door
This style of wooden doors has been used in multiple places inside the castle and can be seen in groundfloor entrance to the refectory. The door has stucco cornice around itself and one fixed door leaf.



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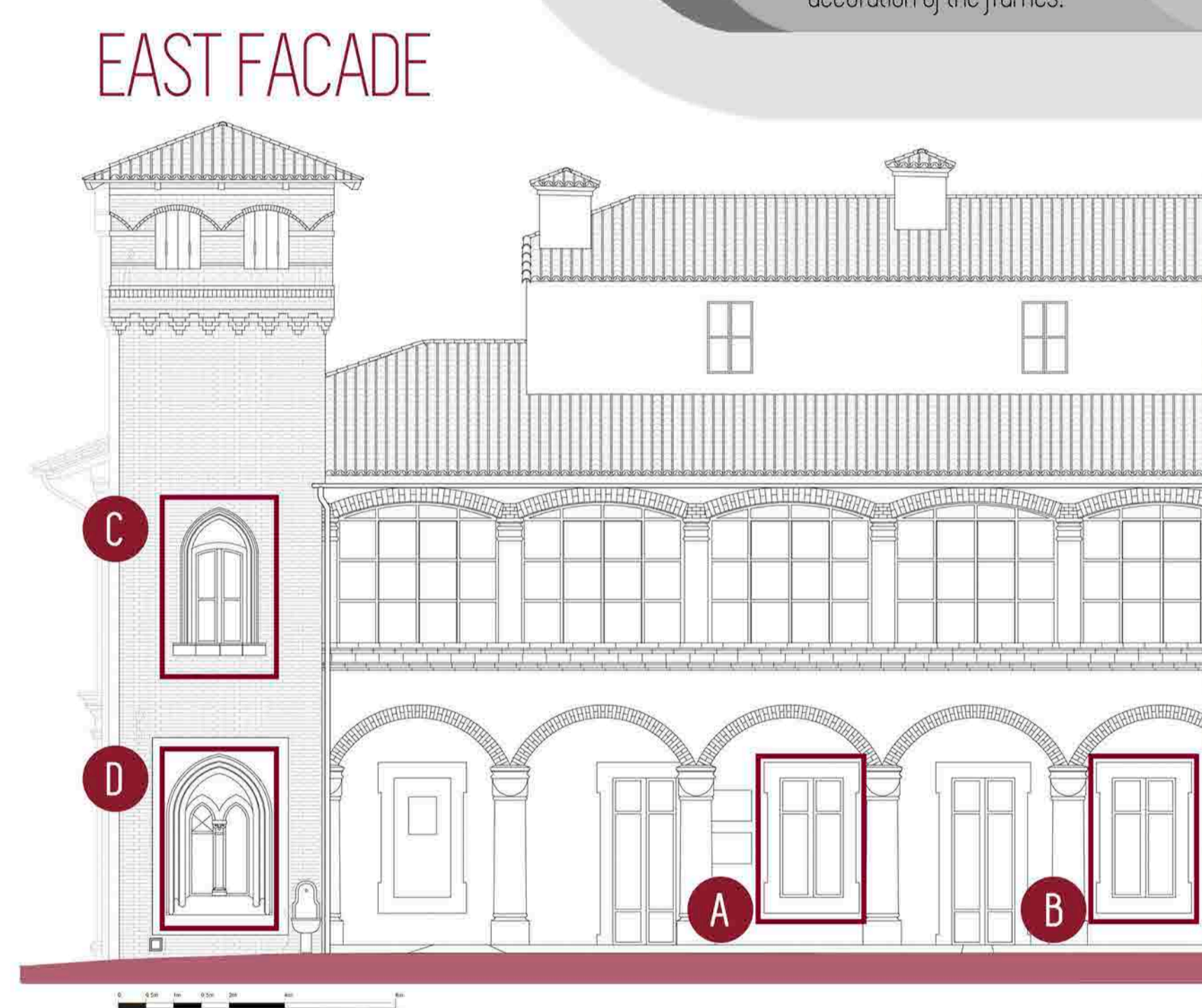
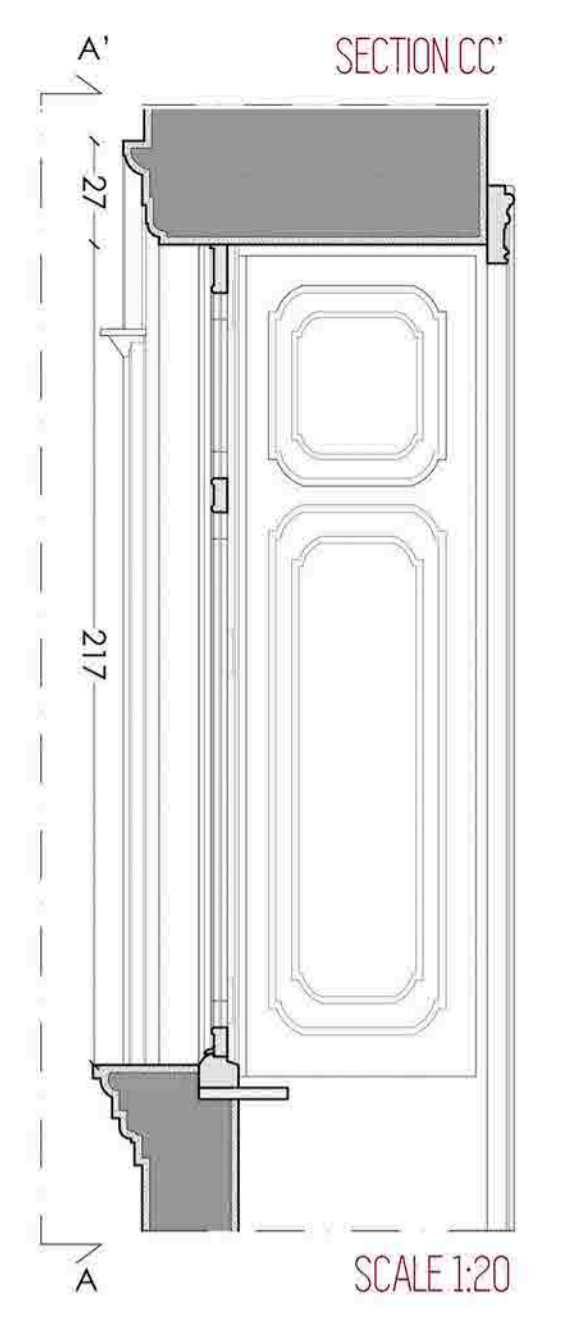
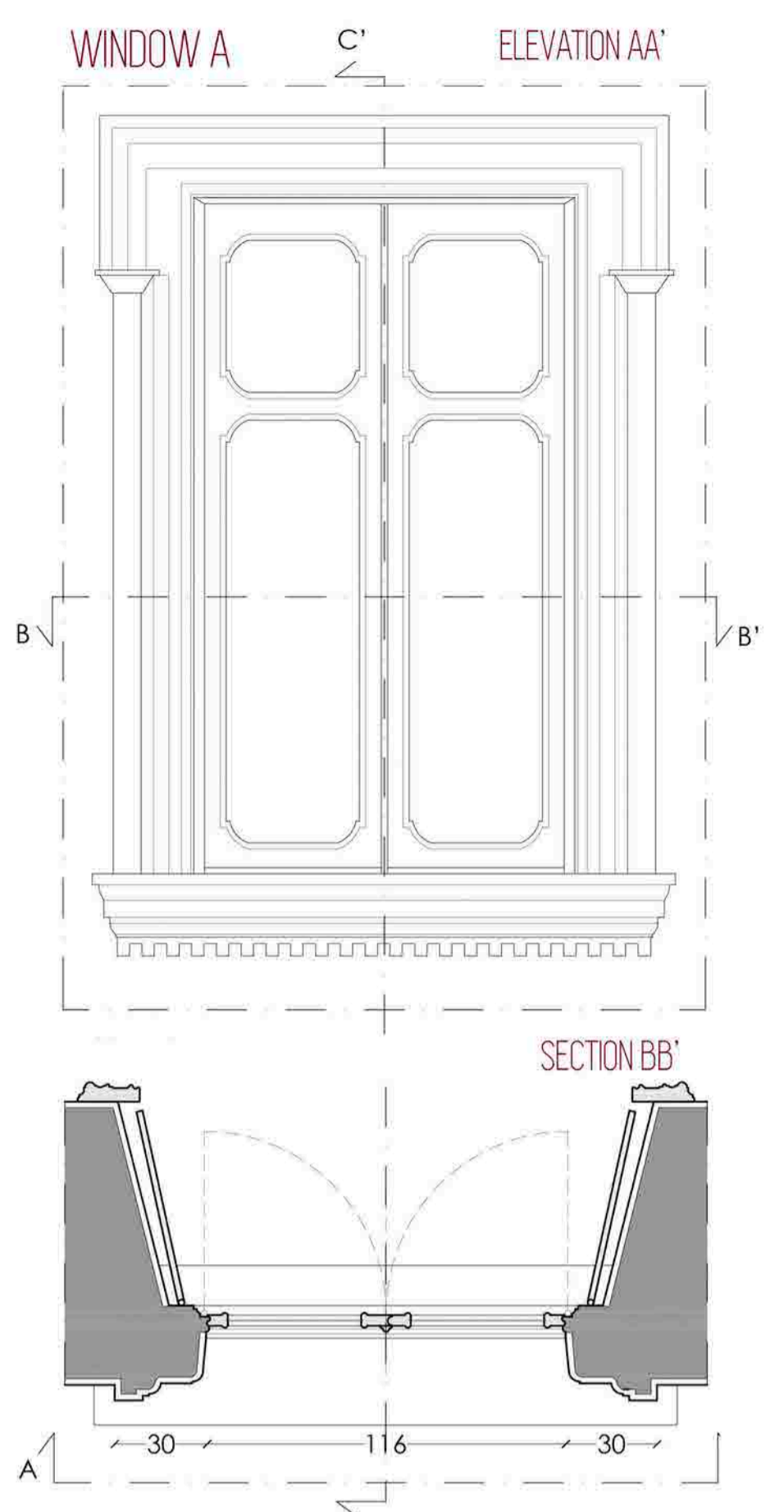
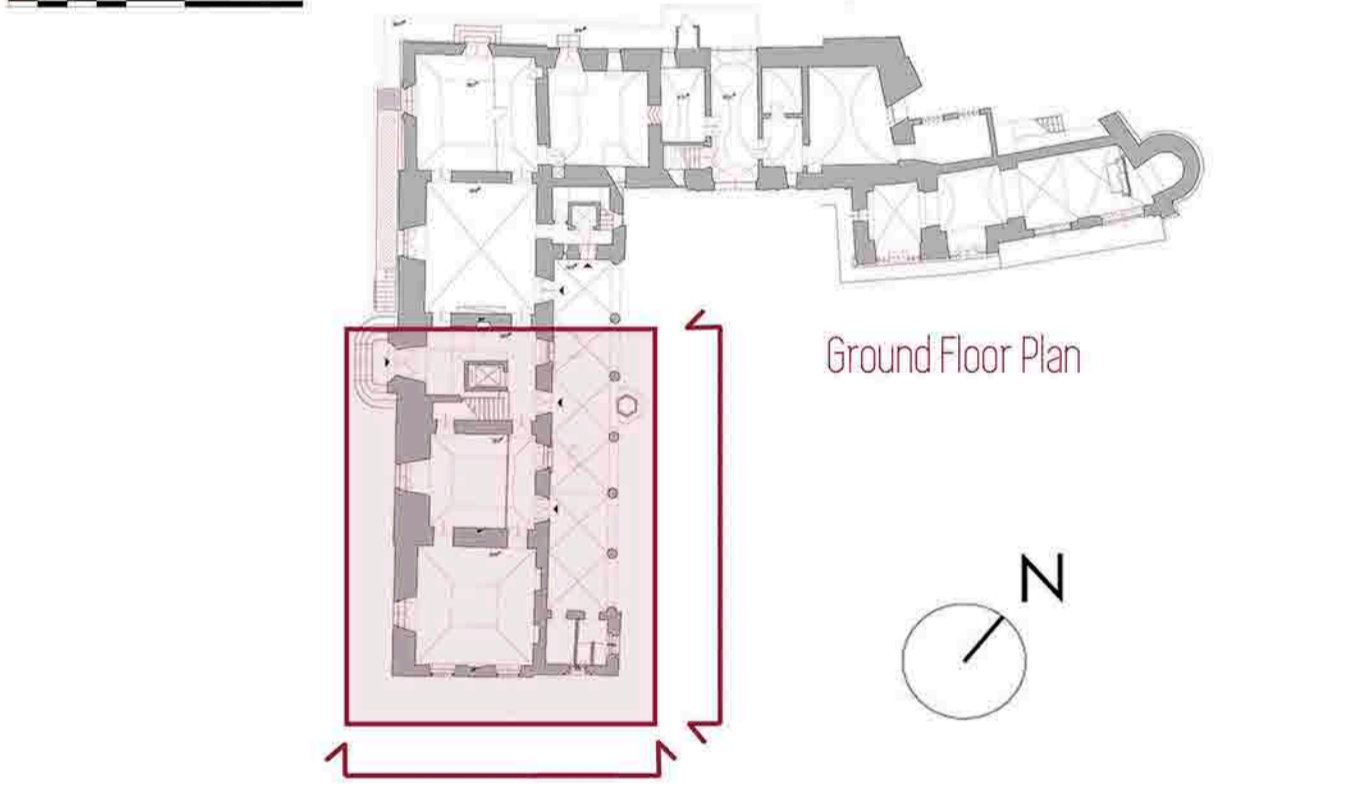
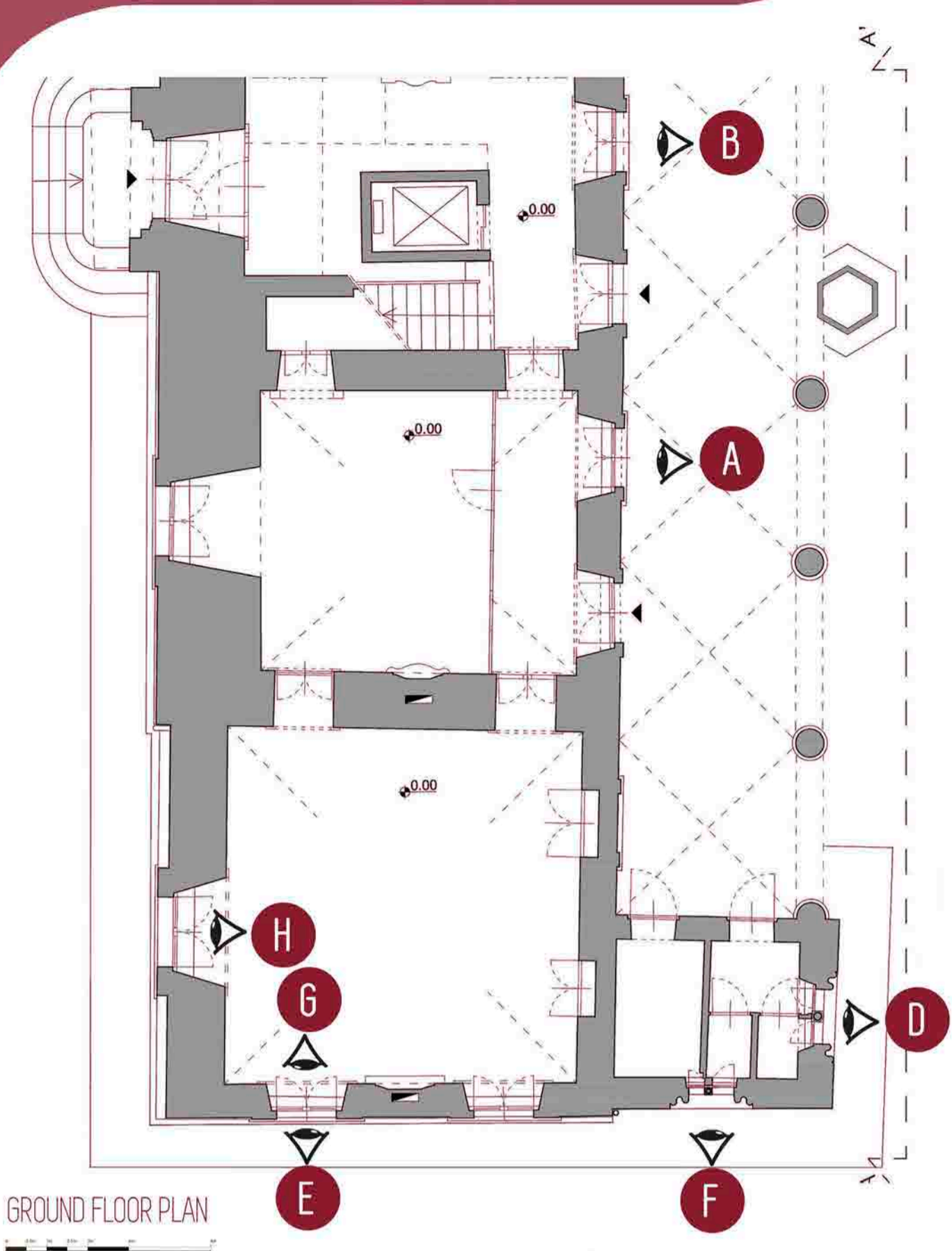
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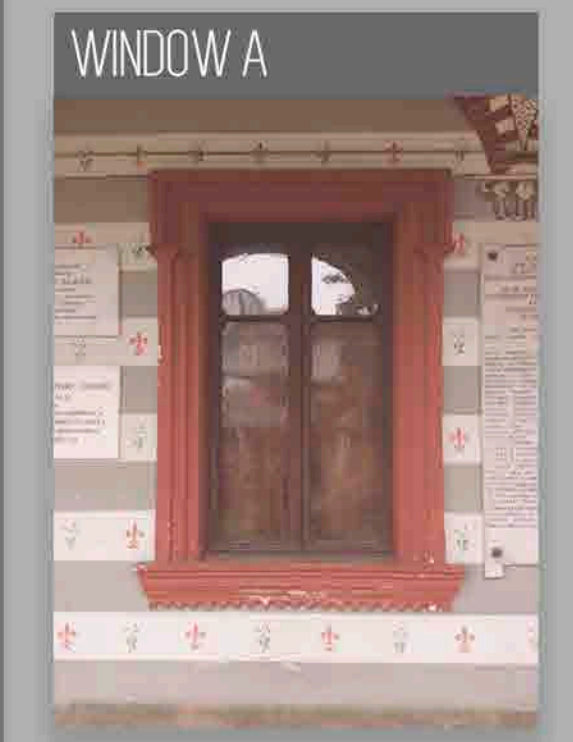
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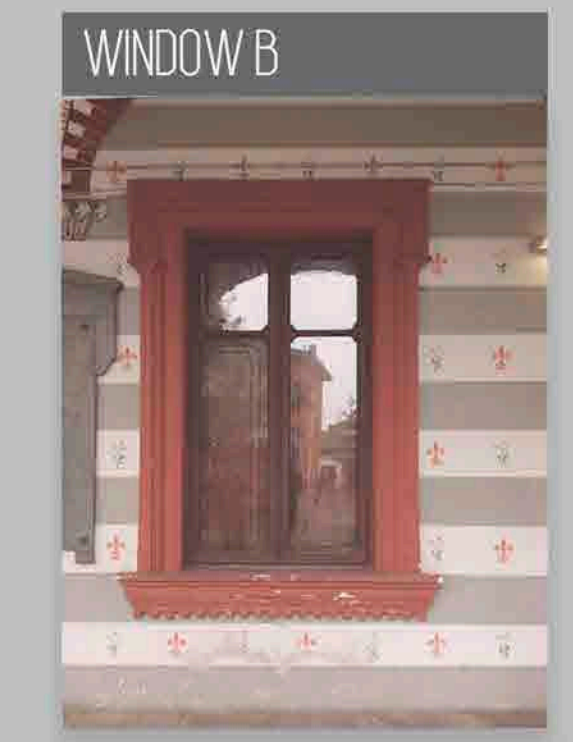
WINDOWS



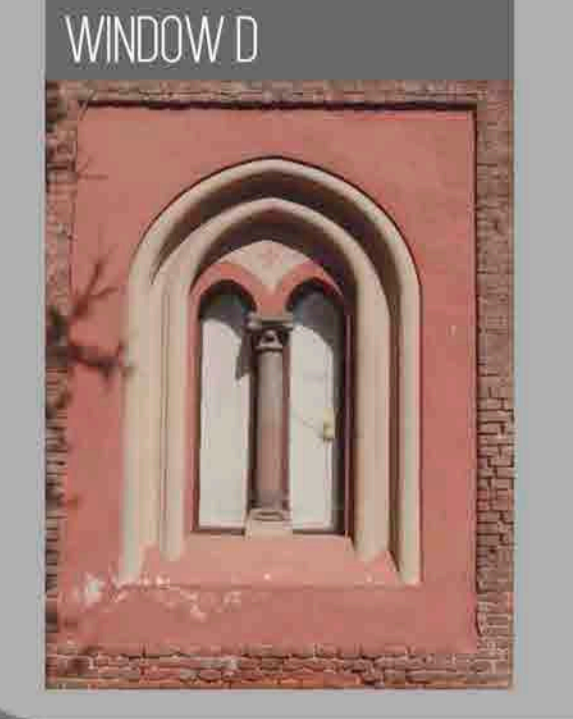
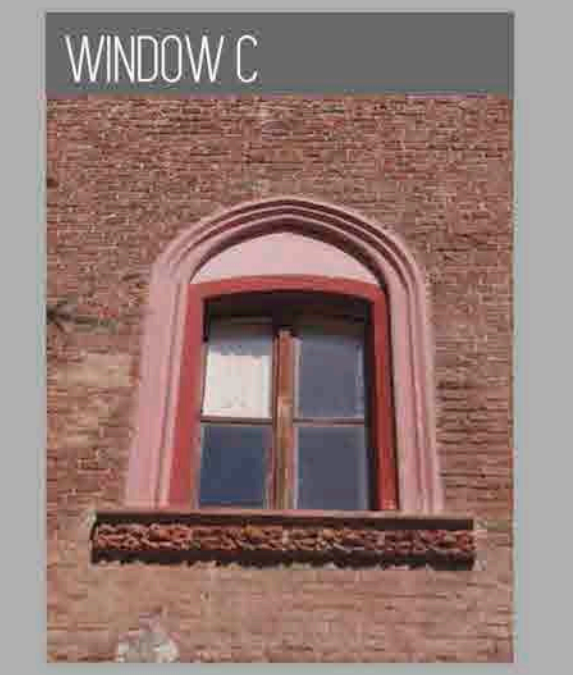
East façade: front view of the porch



The redesign of the door and window frames of the porch highlighted the different size and decoration of the frames.



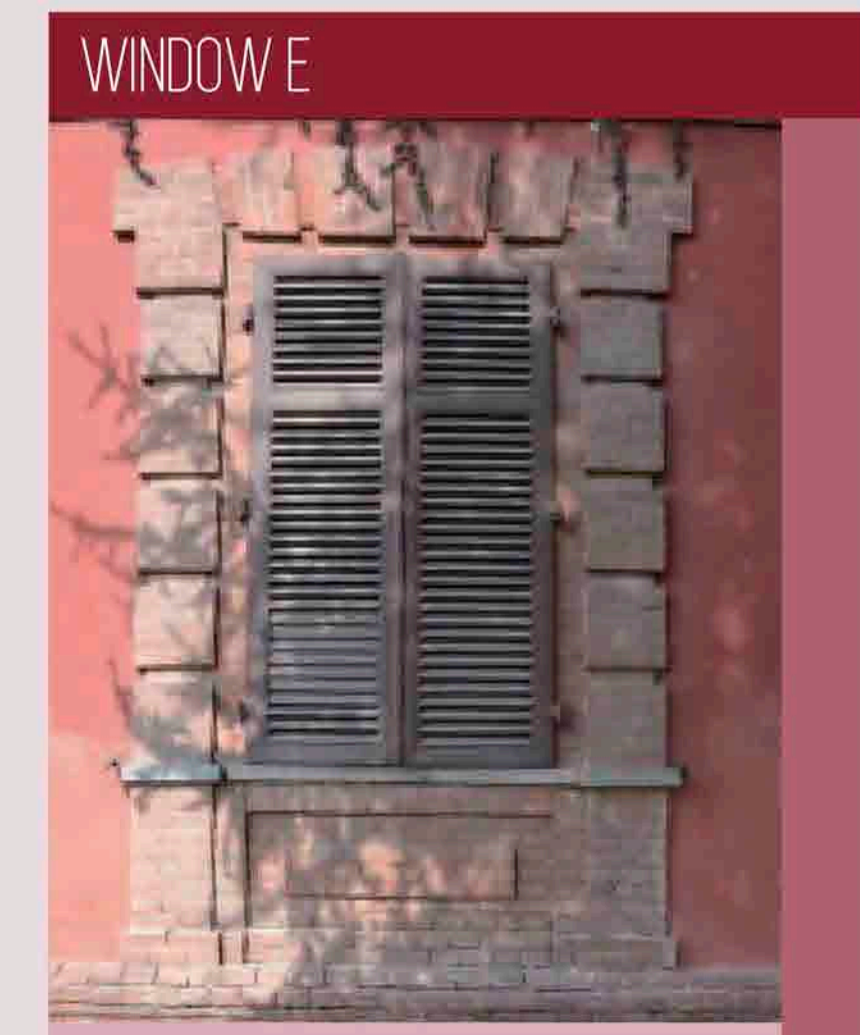
It can be seen that, compared to the frame A, there is less detail in the frame and that the latter has a greater height.



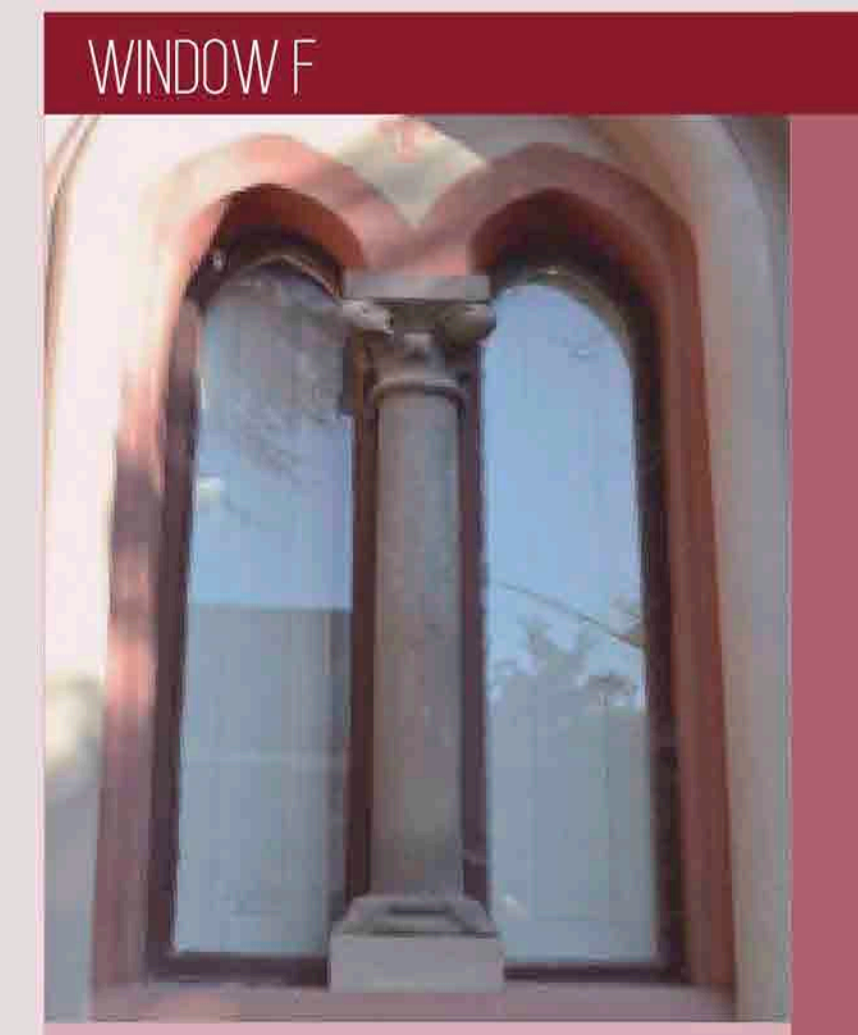
SOUTH FACADE



PHOTOGRAPHIC DOCUMENTATION



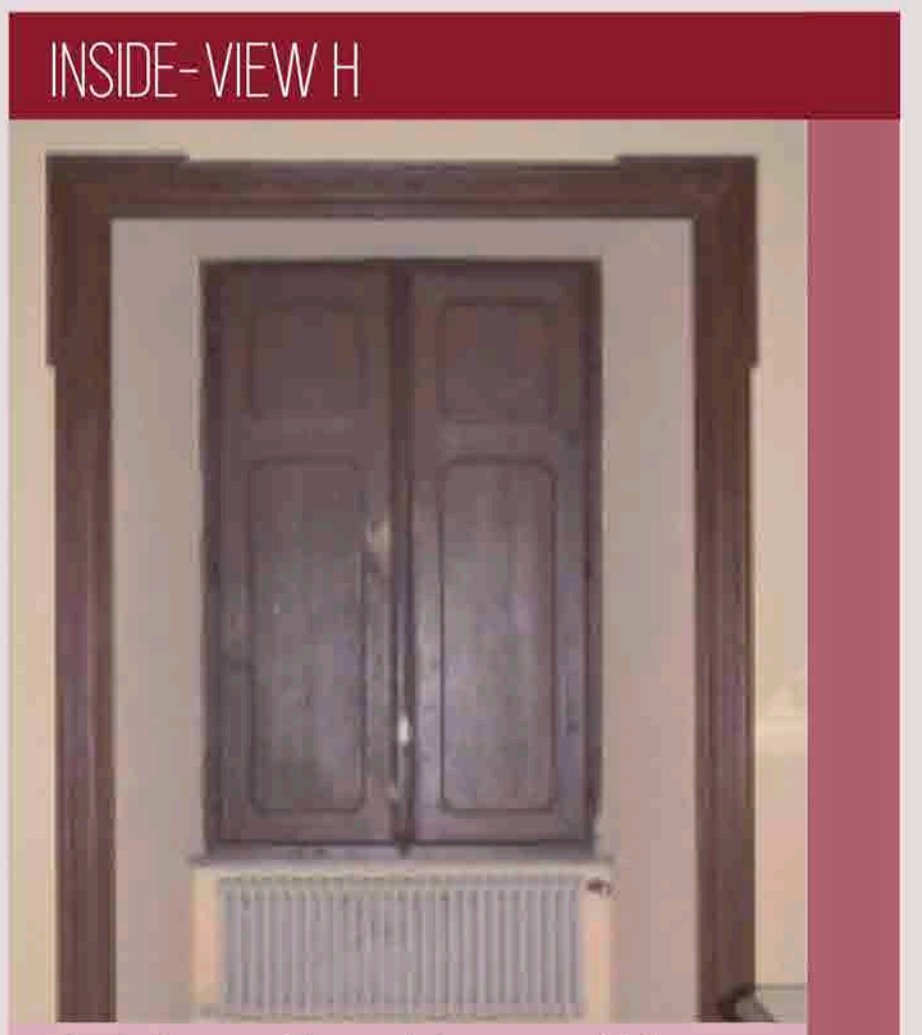
Detail of an entire opening on the south side



This photo shows one of the windows decorated Boggio present in the tower and still well-preserved in its entirety, except for some chipping on the right glass.



The wall on which the window is located is the least thick of the two halls: this portion is in fact the last one built during the castle's revolution phase.



The thickness of this wall changes and following historical research this was part of the surrounding wall that surrounded the castle, therefore it had a considerable thickness compared to those of the rest of the room.



MATERIAL ANALYSIS

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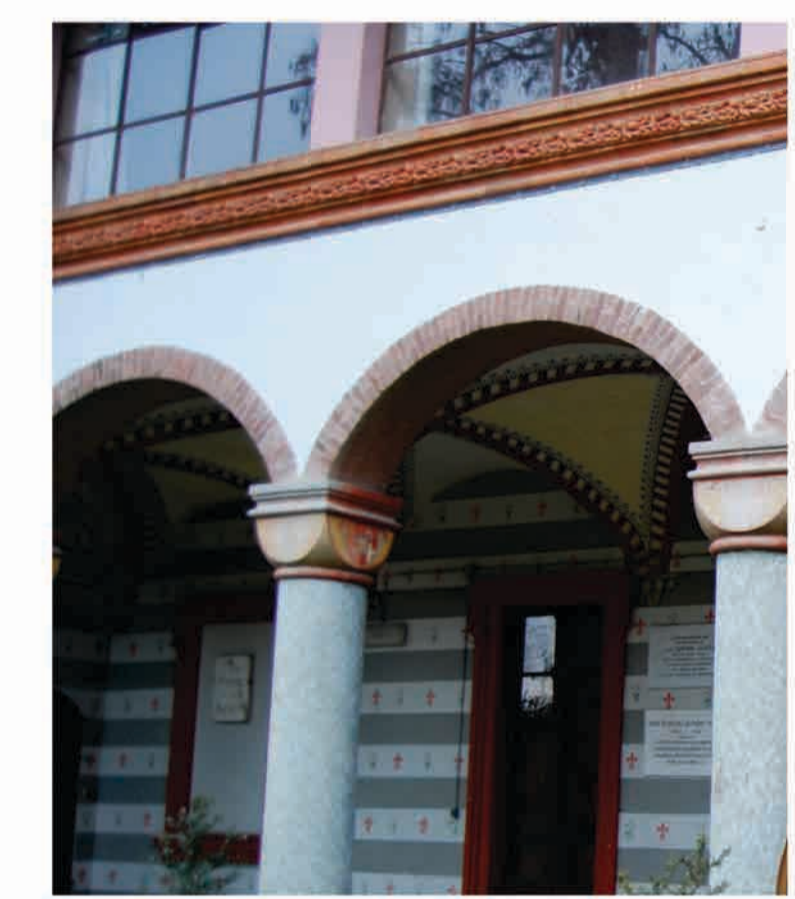
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SURFACES



Brick Tower



Different coloured plaster surfaces

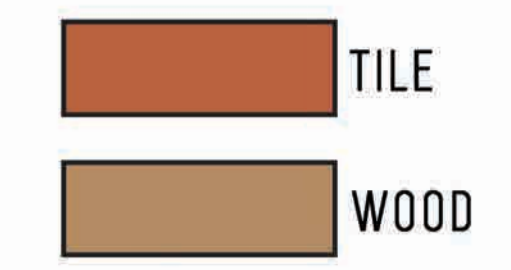


Plaster and brick exterior walls



Plaster and brick exterior walls

ROOF

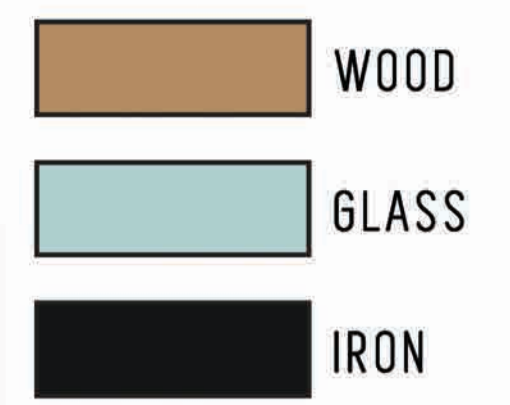


Spanish Tiles are made from terracotta clay.



Wooden structure under roof

OPENINGS



Windows have wooden frames inside of the plastered decorative frames.



Doors have wooden frames inside of the plastered decorative frames. Doors also have iron details.

PIPES



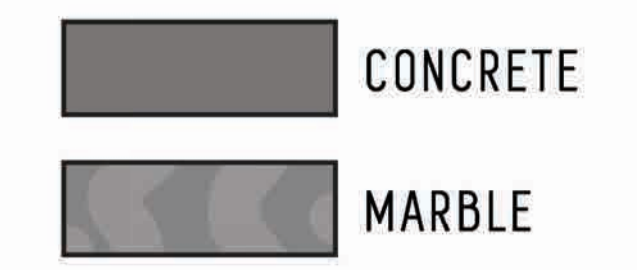
Plumbing feature and electrical connection holes on the facade.

COLUMNS



Stone columns have been painted.

FLOOR



Floor on the entrance has stone and concrete.



Scale: 1/75



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Panel 10: Degradations and Interventions

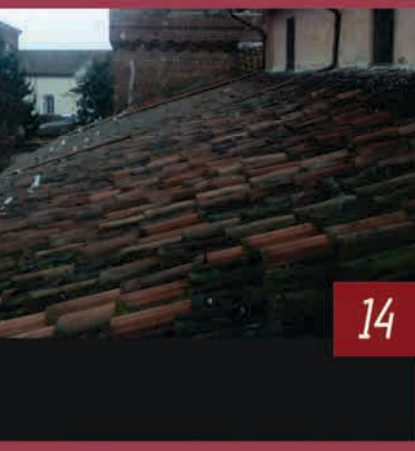
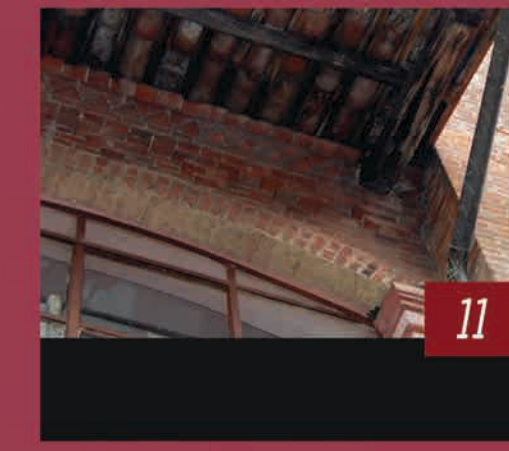
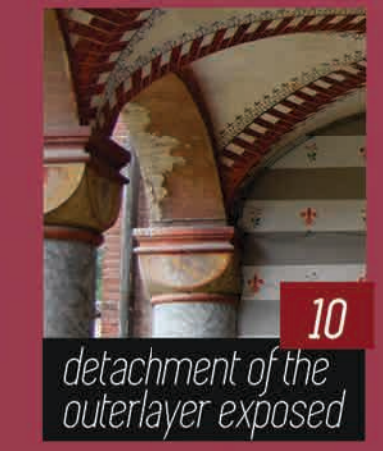
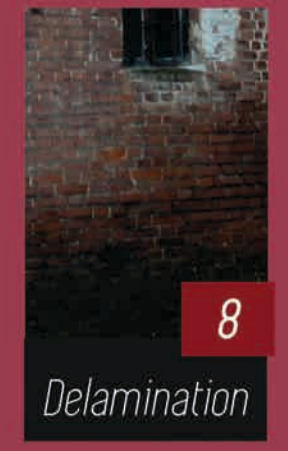
Panel 11
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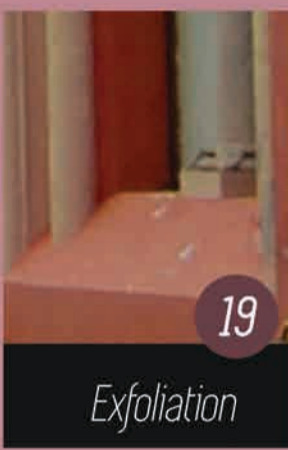
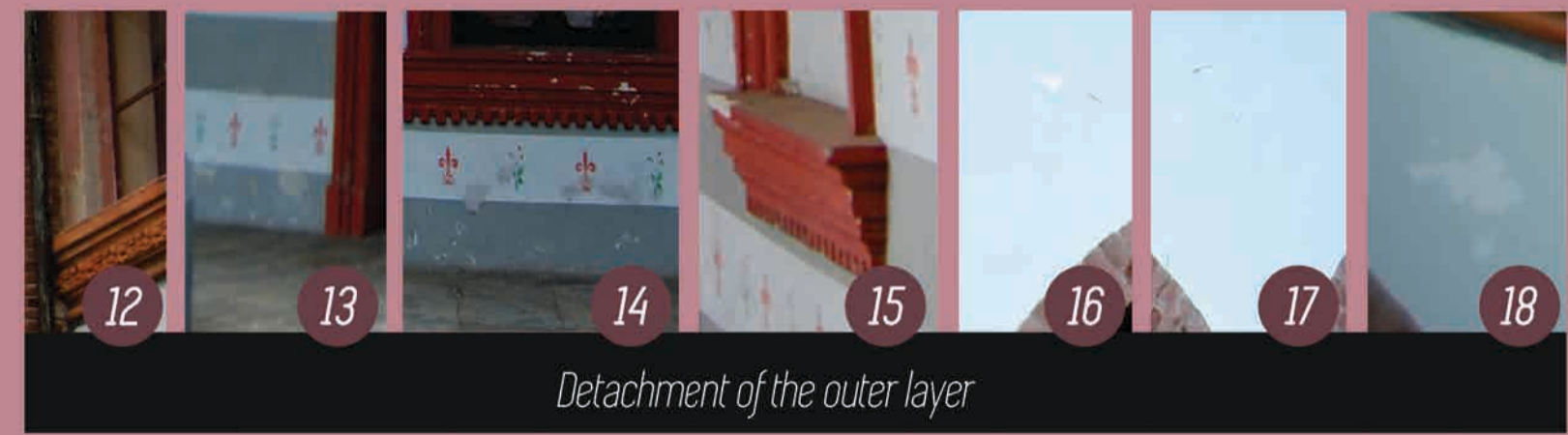
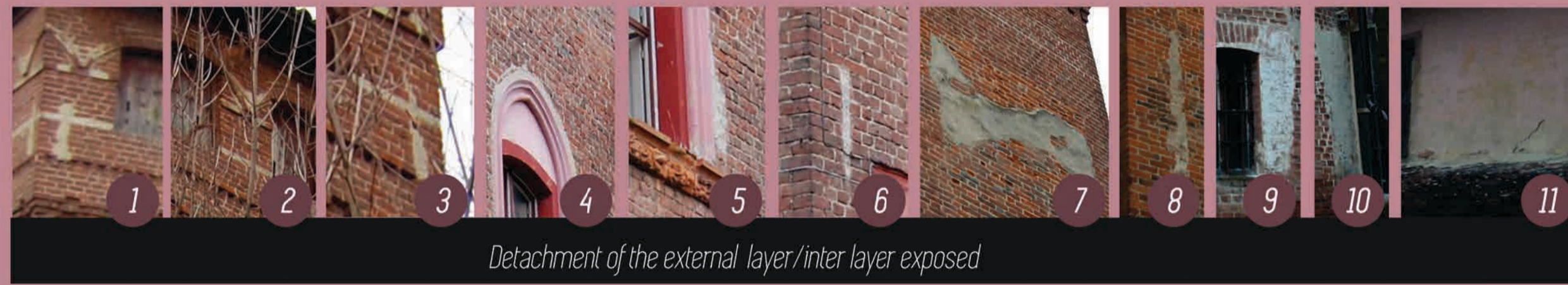
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DEGRADATION DUE TO THE WATER



INTERVENTIONS:
1.- Cleaning and solving the problem causing interstitial humidity.
2.- Cleaning and solving the problem that causes the detachment of the plaster.
3.- Reintegration of the damaged layer
4.- Cleaning and resolving problems of the delamination.

CORTICAL DEGRADATION

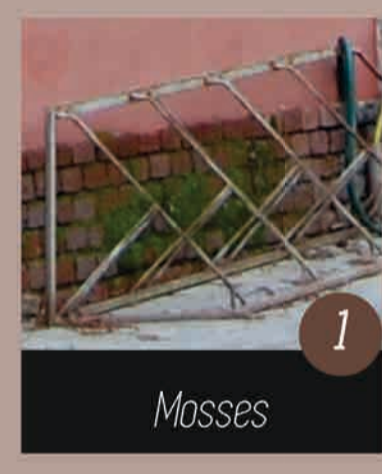


INTERVENTIONS:
1.- Cleaning and reintegration of the damaged part. Subsequent protection with special products.
2.- Cleaning, consolidation and reintegration of the damaged part. subsequent protection with **SPECIAL PRODUCTS**.
3.- Cleaning and solving the problem that causes the detachment of the plaster.
4.- Cleaning and solving the problem that causes the detachment of the plaster.
REINTEGRATION OF THE DAMAGED LAYER
5.- Cleaning, consolidation and integration of the damaged part. Subsequent protection with the appropriate products.
6.- paint removal, sanding and protection of the damaged part with special products.

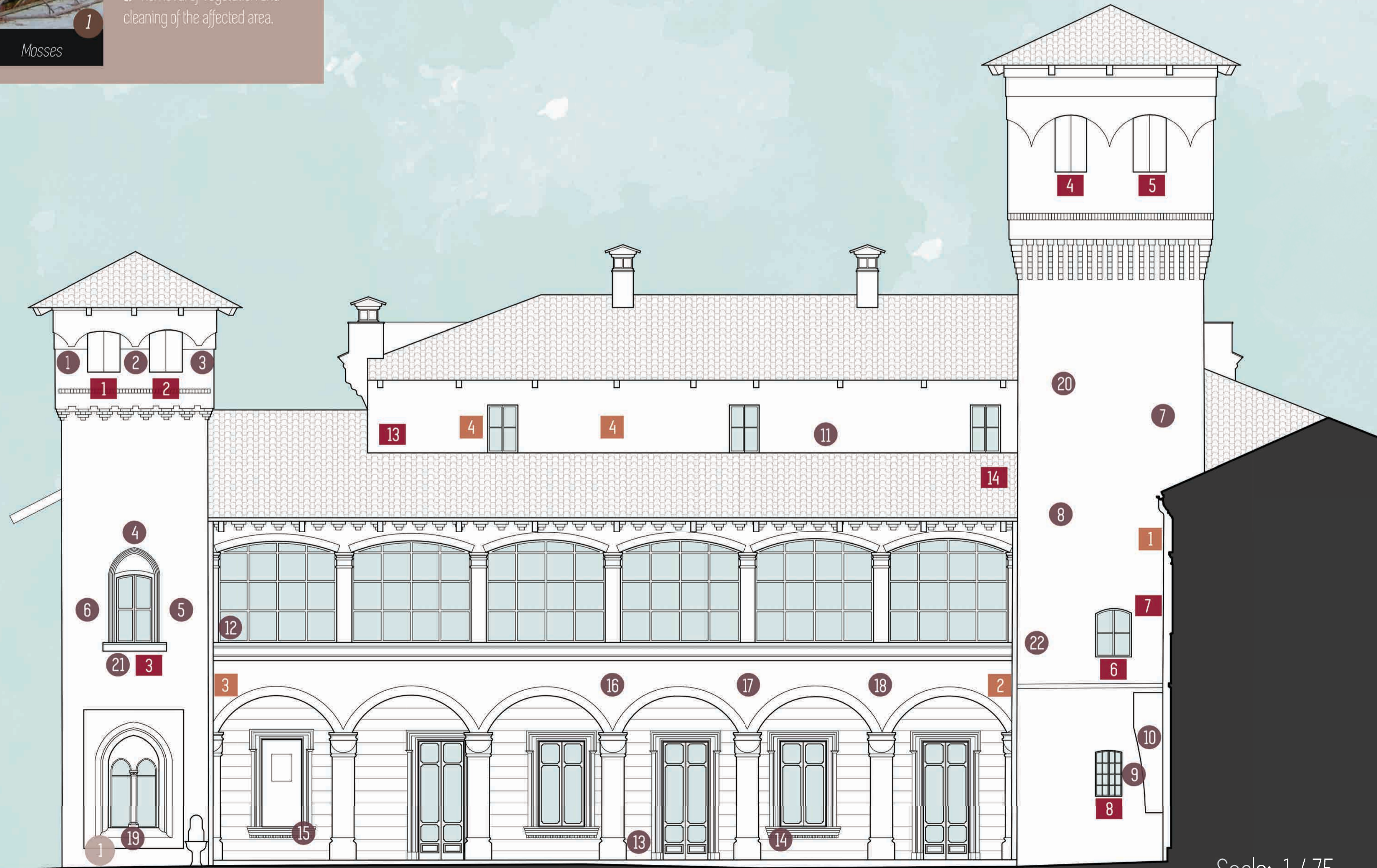
DEGRADATION BY APPPOSITION



BIOLOGICAL DEGRADATION



INTERVENTIONS:
1.- Removal of vegetation and cleaning of the affected area.



Scale: 1/75



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CONCEPT

Canavese region is famous for its culture of wines and numerous vineyards. The Canavese wine tour offers an experience of wine tasting in the local vineyards and wineries close to the city of Torino. The journey through the Canavese wineries consists of seven stops. Starting from Torino, the tour goes through Montanaro, Caluso, San Giorgio Canavese, Cuceglio, Ivrea, Piverone and finishes in Salussola. It is an opportunity for tourists to enjoy a local tradition or a getaway from the city life for the residents of Torino or nearby cities.

1. Montanaro
2. Caluso
3. San Giorgio Canavese
4. Cuceglio
5. Ivrea
6. Piverone
7. Salussola

CANAVESE WINE TOUR

REFERENCES

WIMU - MUSEO DEL VINO

Barolo, Piemonte

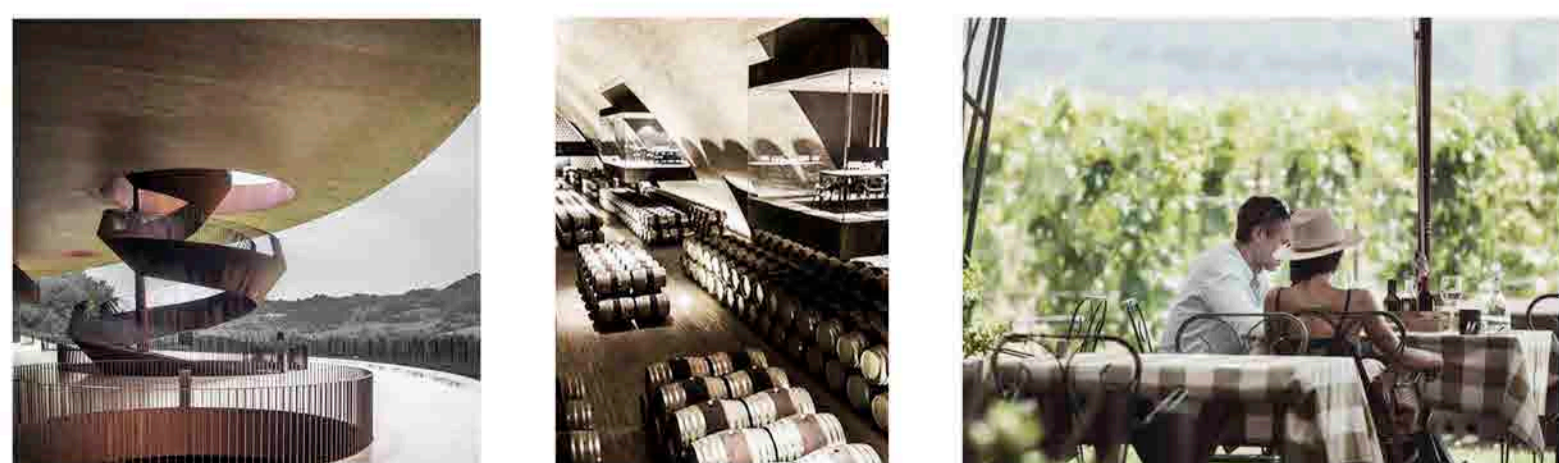


The most innovative wine museum in Italy and among the most important in the world stands in the heart of a territory famous for its wines and inside a castle with a thousand-year history.

The visit route is an immersion in the culture of wine; the suggestion of going into its myths corresponds to the physical descent from the panoramic terrace to the cellars of the castle, home of the Barolo Regional Enoteca. The course follows the discovery of wine in history and art, in the kitchen and in cinema, in music and literature, and in universal myths and local traditions.

ANTINORI NEL CHIANTI CLASSICO

Bargino, Toscana



A unique example of contemporary architecture that fits seamlessly into the landscape of the rolling Tuscan hills. Its most spectacular feature is an elegant spiral staircase that connects the building's three levels. The cellar, meanwhile, has more of a feel of a place of worship than a place for storing wines.

This is a place where visitors will be seduced by the finest Tuscan wines, the Marchesi Antinori classic and contemporary art collections, the charming Rinuccio 1180 restaurant and plenty more besides. For a guided winery experience, Antinori offers three different tours designed to give a personalised experience that suits one's interests.

CANAVESE WINE TOUR

MONTANARO
CASTELLO DI MONTANARO
AZIENDA GNAVI CARLO

SAN GIORGIO CANAVESE
AZIENDA AGRICOLA CIECK
ORSOLANI

IVREA
FERRANDO AZIENDA VITIVINICOLA
PIVERONE
CANTINA DELLA SERRA

SALUSSOLA
DIONNALLA VILLA CA' BIANCA



CANAVESE TRADITION

The valleys of the Canavese, particularly Alto Canavese and Valle sacra, are known for the production of vegetables and fruit, especially berries and delicious apples, through the integrated or organic method. From these, local farmers obtain jams, juices, creams, sauces, pickles, and other specialties. The beautiful vineyards that characterize the landscape of gentle hills around the Sacro Monte di Belmonte produce a light red wine and sparkling from Nebbiolo grape. Not only wine, an excellent natural craft beer is also produced in the region as well as other liquors such as Alpine genepy.



Canavese Wines
Region: Aglie, San Giorgio Canavese, Caluso



Canavese Wines
Region: Canavese



Craft beer
Region: Castellamonte



Fruit Liquors
Region: Valprato Soana

MONTANARO TYPICAL PRODUCTS

Toma verda 'd Montanar Cheese

Pericono del Montanaro Cheese

Ricotta del Montanaro Cheese

Salame Montanaro

Salame d'patate Montanaro

Prosciutto cotto Montanaro

Torta di pere e zucca di montanaro

Grissino Strato

Canestrelli di Montanaro



MASTERPLAN

JOURNEY THROUGH THE CASTLE COMPLEX

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Collaborators
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MONTANARO (TO)
Castello dei Conti Frola

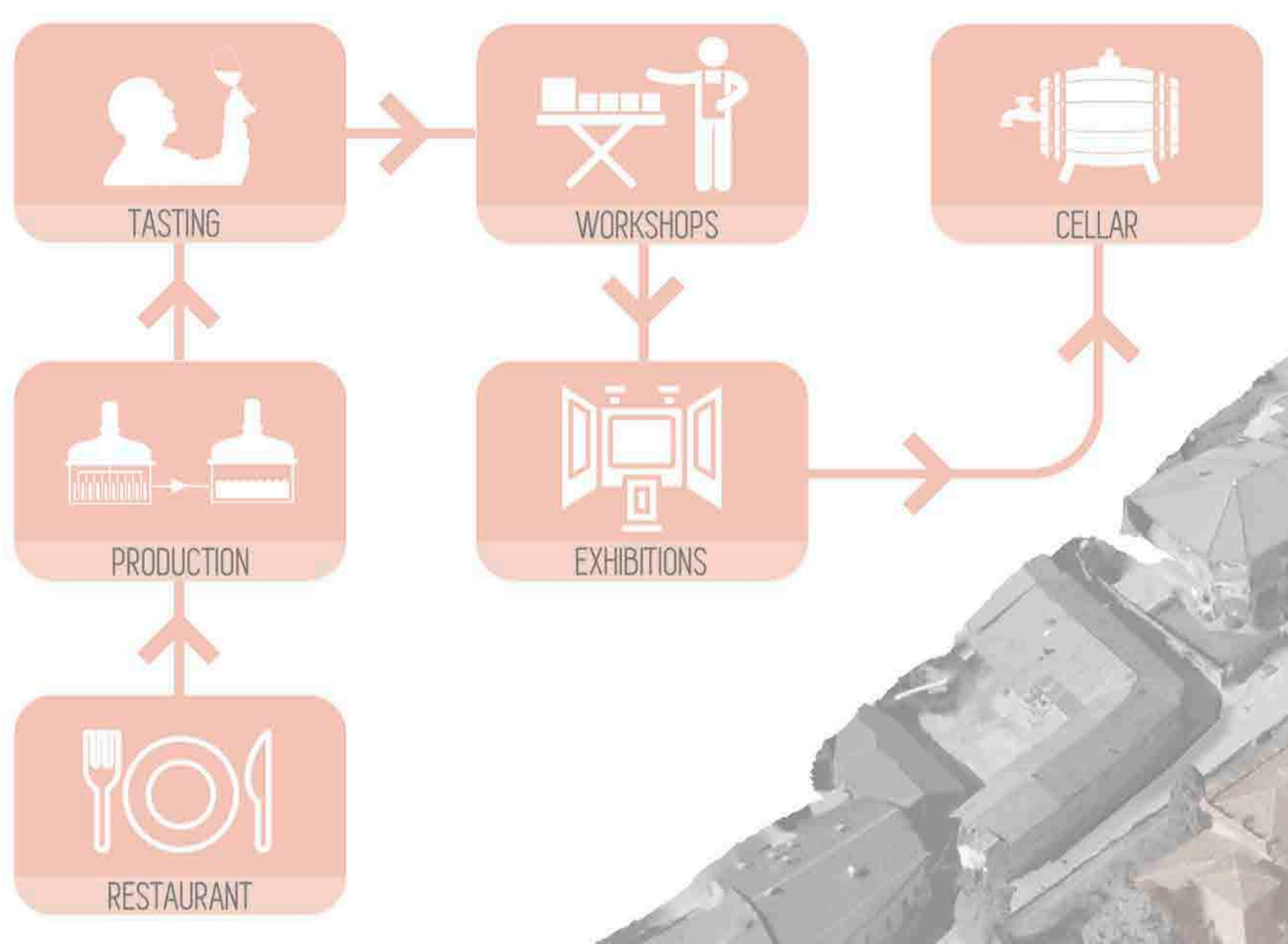


- Panel 1 TERRITORIAL FRAMEWORK
- Panel 2 HISTORICAL FRAMEWORK
- Panel 3 SURVEY METHOD
- Panel 4 - 5 ARCHITECTURAL SURVEY
- Panel 6 - 8 CONSTRUCTION SYSTEM ANALYSIS
- Panel 9 - 10 MATERIALS, DEGRADATIONS AND INTERVENTIONS ANALYSIS
- Panel 11 CONCEPT OF THE PROJECT
- Panel 12 MASTERPLAN
- Panel 13 - 21 REFUNCTIONALIZATION PROJECT

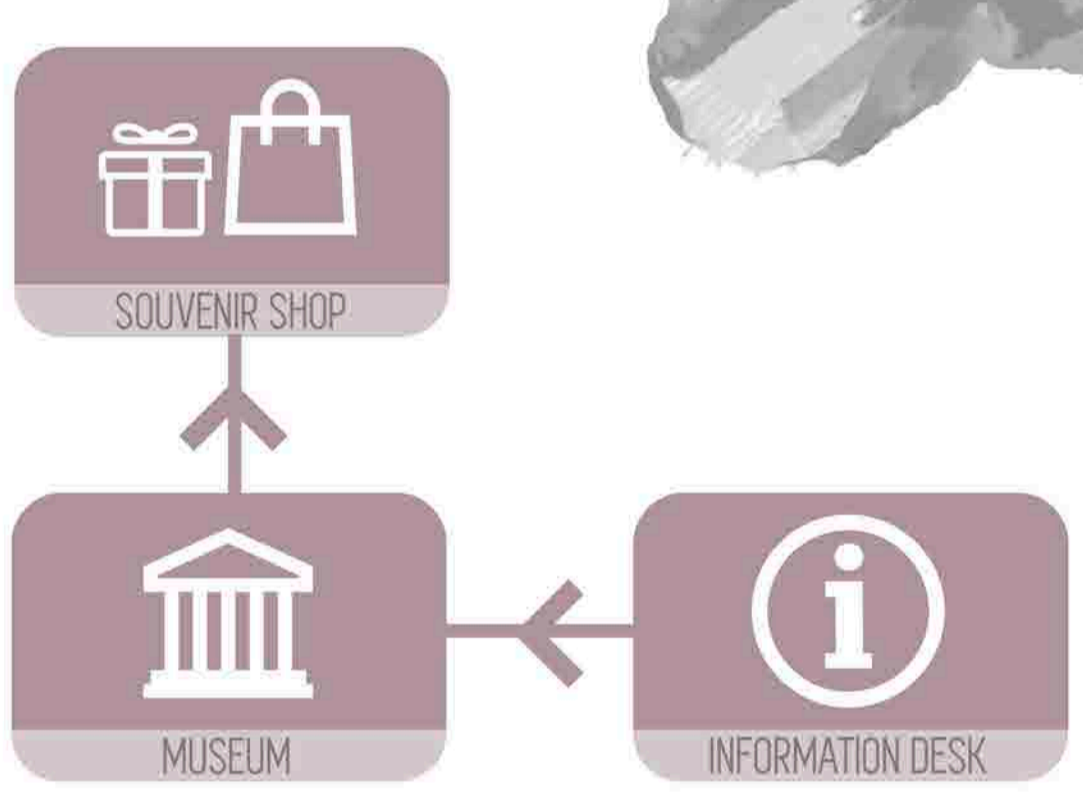
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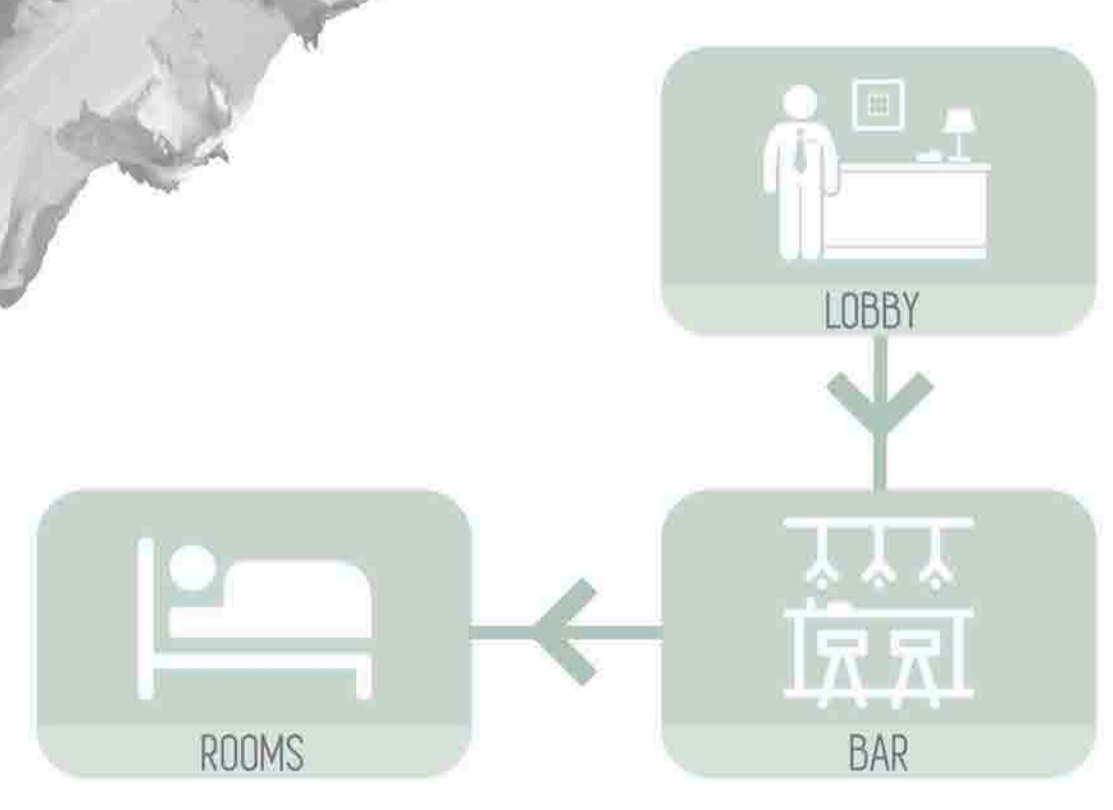
CASTLE



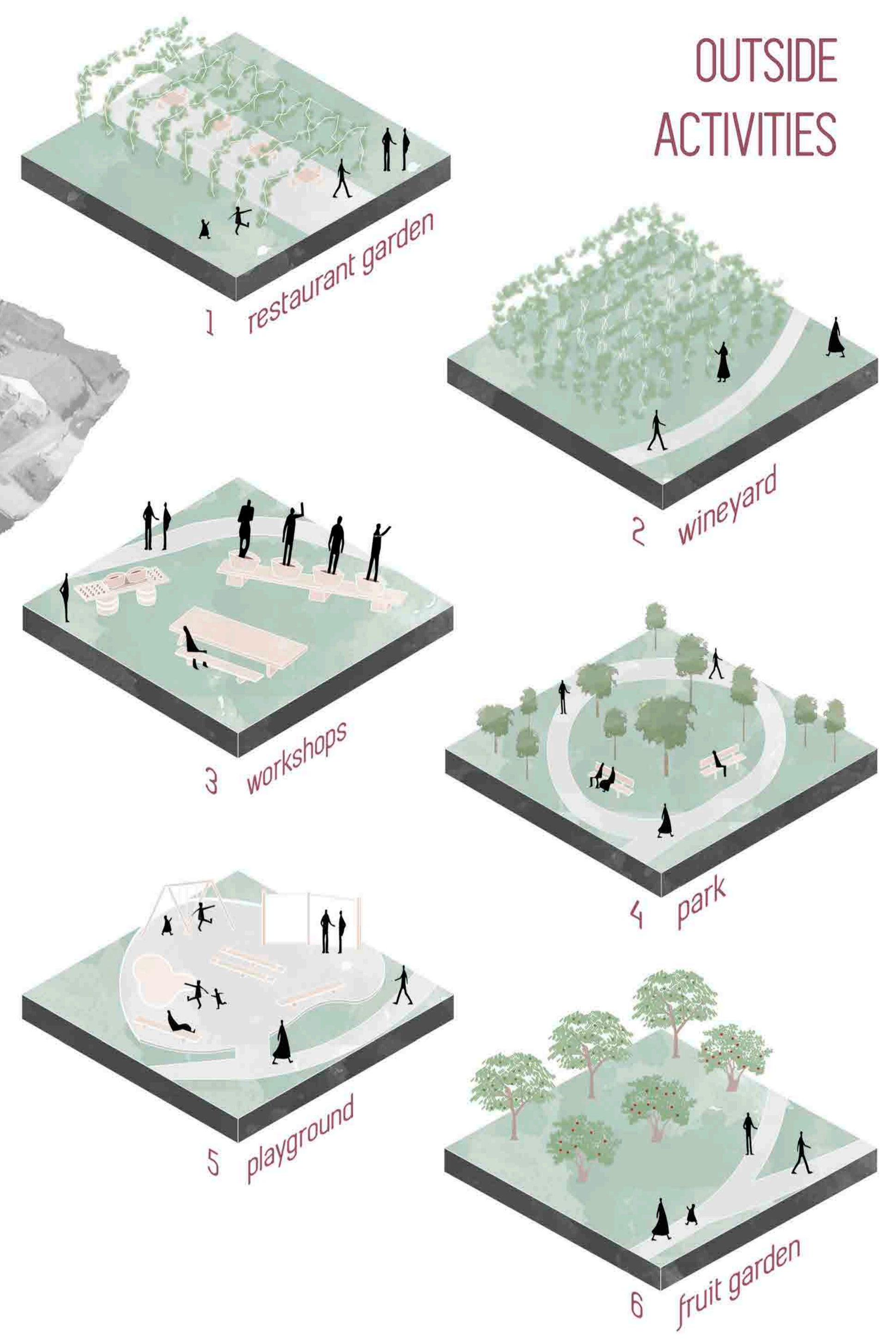
ENTRANCE BUILDING



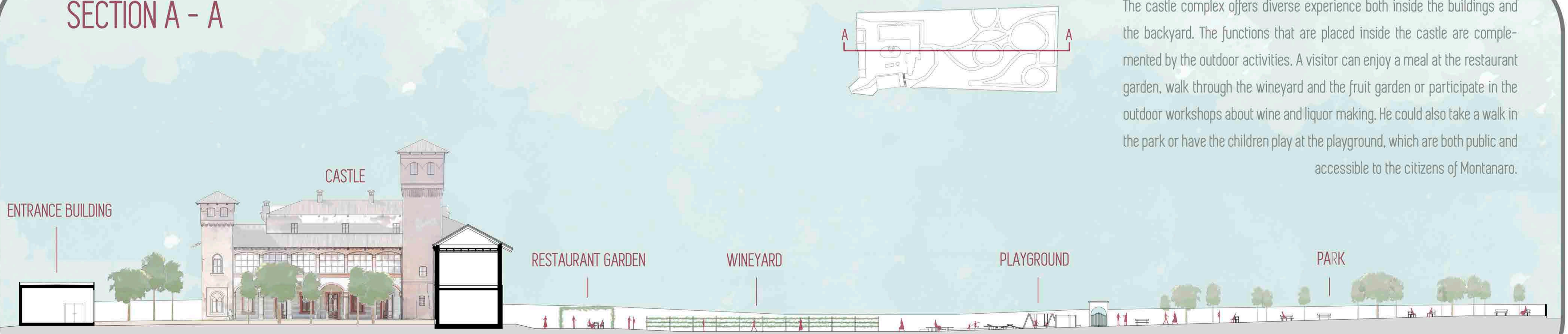
ACCOMMODATION



OUTSIDE ACTIVITIES



SECTION A - A



The castle complex offers diverse experience both inside the buildings and the backyard. The functions that are placed inside the castle are complemented by the outdoor activities. A visitor can enjoy a meal at the restaurant garden, walk through the wineyard and the fruit garden or participate in the outdoor workshops about wine and liquor making. He could also take a walk in the park or have the children play at the playground, which are both public and accessible to the citizens of Montanaro.



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- Panel 13 - 21 REFUNCTIONALIZATION PROJECT
- Panel 13: Site and Castle Functions

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SITE PLAN

PARK



FRUIT GARDEN



VEGETABLE GARDEN



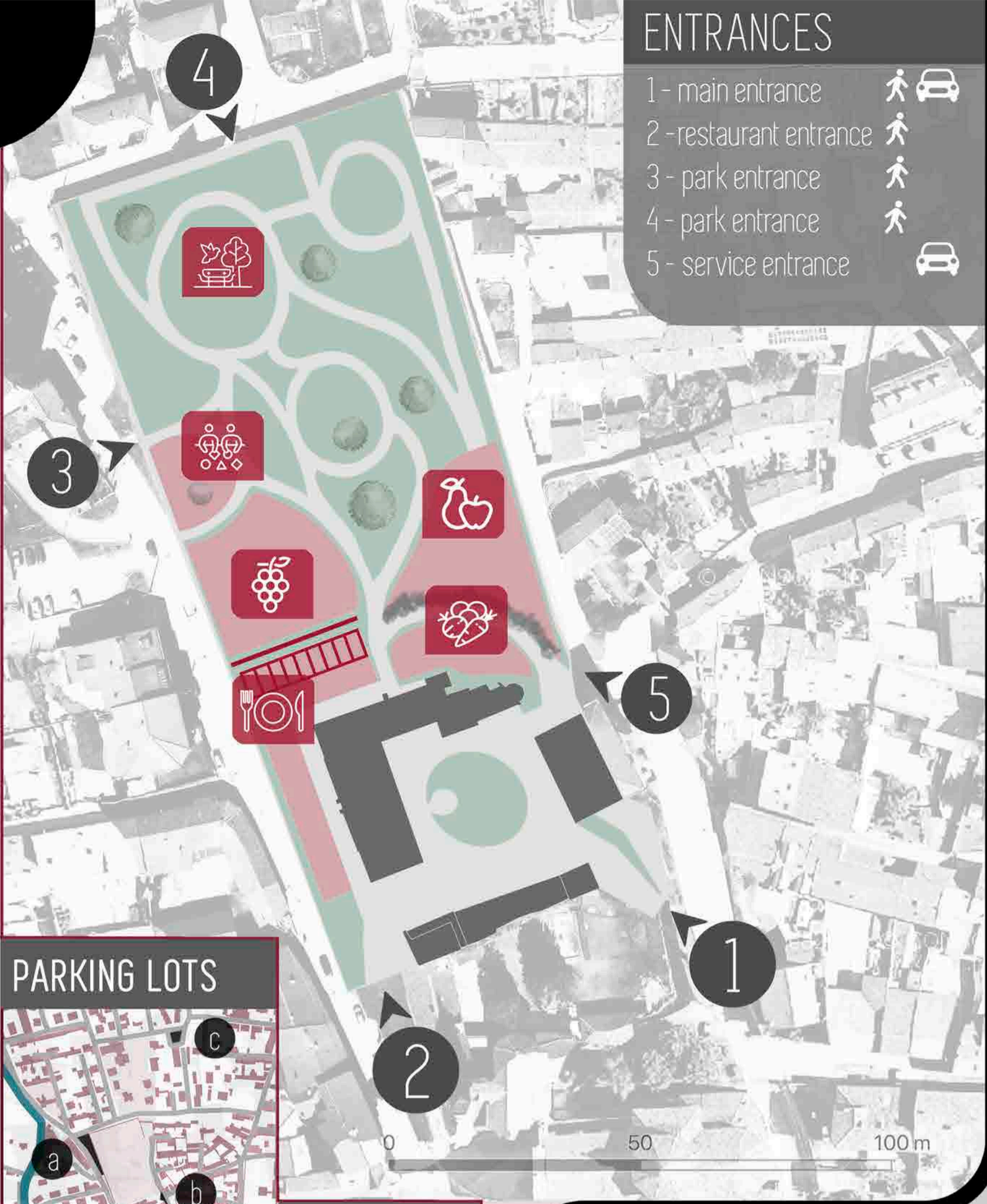
OUTDOOR WORKSHOP



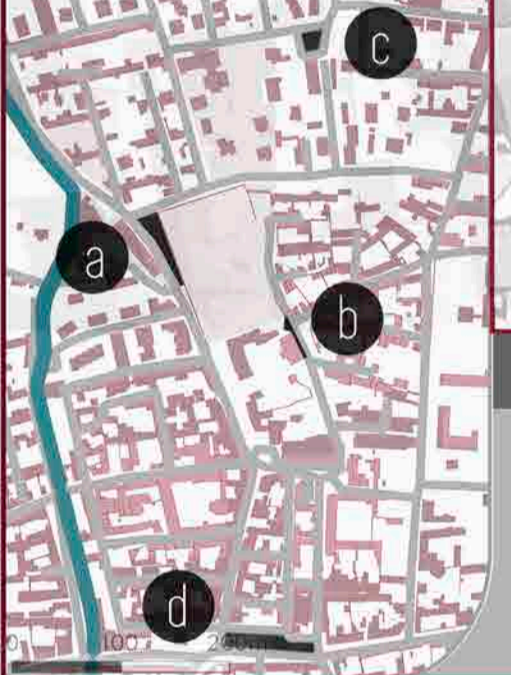
VINEYARD



OUTDOOR DINING



PARKING LOTS



- DISTANCES
- a - 100m
 - b - 20m
 - c - 400m
 - d - 300m

ENTRANCES

- 1 - main entrance
- 2 - restaurant entrance
- 3 - park entrance
- 4 - park entrance
- 5 - service entrance

FUNCTION DIAGRAMS

1 Exhibition

"Liquor & Wine History of Canavese" exhibitions

2 Workshops

Workshops for Wine & Liquors, traditional foods of Canavese Cuisine

3 Production

Productions of Canavese Region's Craft Beer, traditional wines like Erbaluce, Fruit Liquors made from berries, apples and chestnuts

4 Tasting

Wine & Liquor tasting

5 Food & Drink Shop

Shop to sell the products of Canavese Region, both produced in & out of the Castle Complex

6 Restaurant

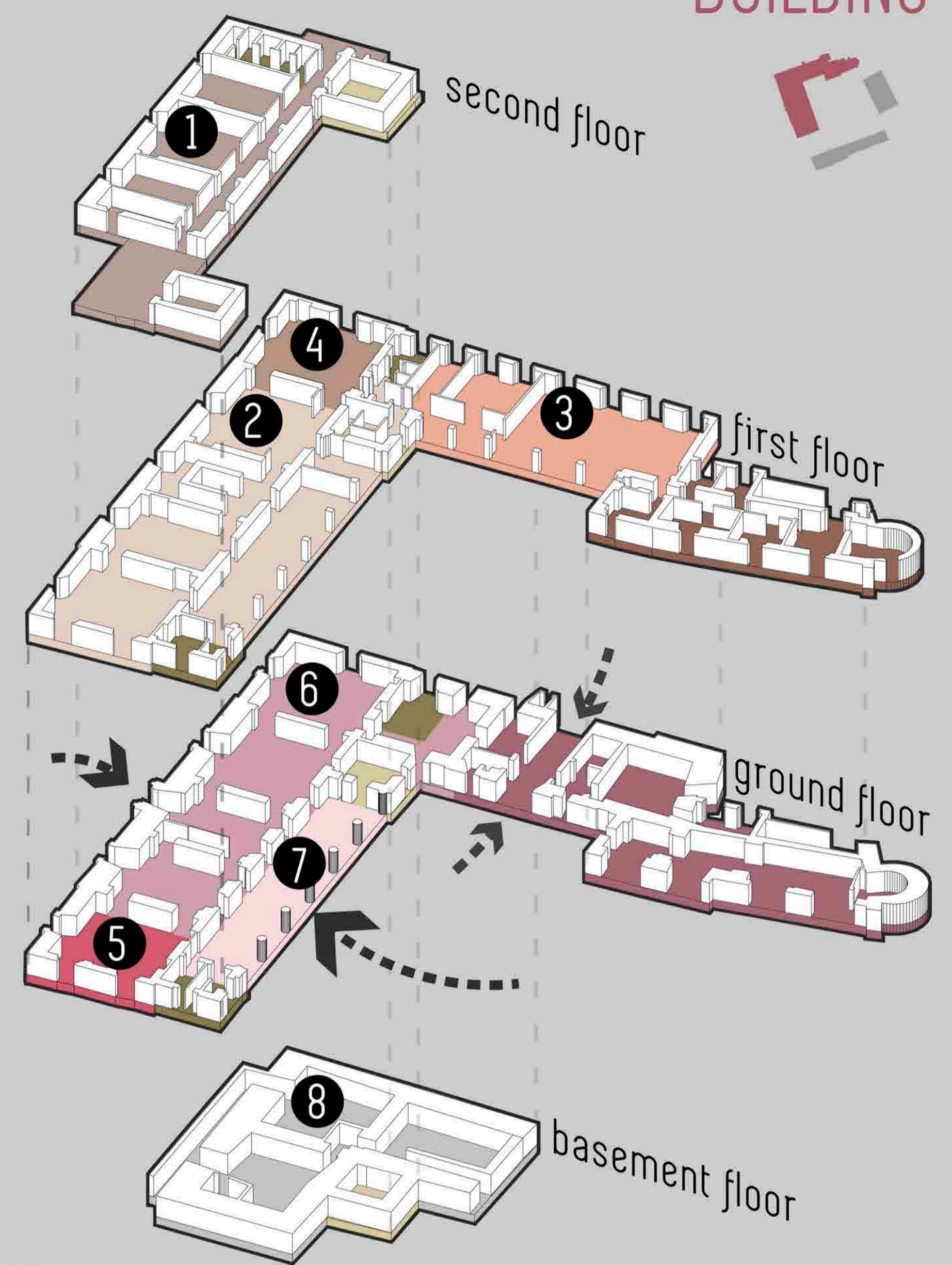
Italian Restaurant for introducing Canavese Cuisine and Castle Complex's products such as wine, liquors, vegetables.

7 Outdoor Restaurant

Restaurant's outside area for enjoying open air. This outdoor area faces the complex's courtyard and sees the accommodation and souvenir shop, as well as the main entrance

8 Cellar

Underground cellar floor for preserving the alcoholic drinks. Drinks like wine require a specific temperature and humidity degree, without being exposed to sunlight



Exhibitions	[Color swatch]
Wine & Liquor Workshops	[Color swatch]
Wine & Liquor Tasting	[Color swatch]
Production of Wine & Liquors	[Color swatch]
Administration Offices	[Color swatch]
Food & Drink Shop	[Color swatch]
Restaurant	[Color swatch]
Restaurants Outdoor Area	[Color swatch]
Kitchen	[Color swatch]
Wine & Liquor Cellar	[Color swatch]
Stairs	[Color swatch]
WC	[Color swatch]

CASTLE BUILDING





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MONTANARO (TO)
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- Panel 14: Outdoor activities images

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OUTDOOR ACTIVITIES



Render from Outdoor Traditional Winemaking Workshops

1



Render from Outdoor Playground Area for Kids

2



Render from Outdoor Courtyard and Entrances to The Castle, Accomodation Building, and Entrance Building

3



Render from Outdoor Dining Area

4

Outdoor Activities

The Outdoor area of the Castle Complex has many opportunities for outdoor activities. A park, fruit gardens, vegetable gardens, a vineyard, outdoor dining area, playgrounds for kids are the activity areas on the backyard of the complex. Workshop Area for traditional winemaking workshops (picture 1) are for attracting people to the complex by including them in the process as an activity. Playground Area for Kids to enjoy their time while their guardians can enjoy the complex's activities (picture 2). An outdoor Dining Area other than the Restaurant's area for bigger events or bigger crowds. Outdoor dining area under the ivy and next to the vineyard. Food and drinks provided from the restaurant on the castle, to be used on special occasions (picture 4).



- 1 - Outdoor Workshop Area
- 2 - Kids Playground Area
- 3 - Courtyard
- 4 - Outdoor Dining Area



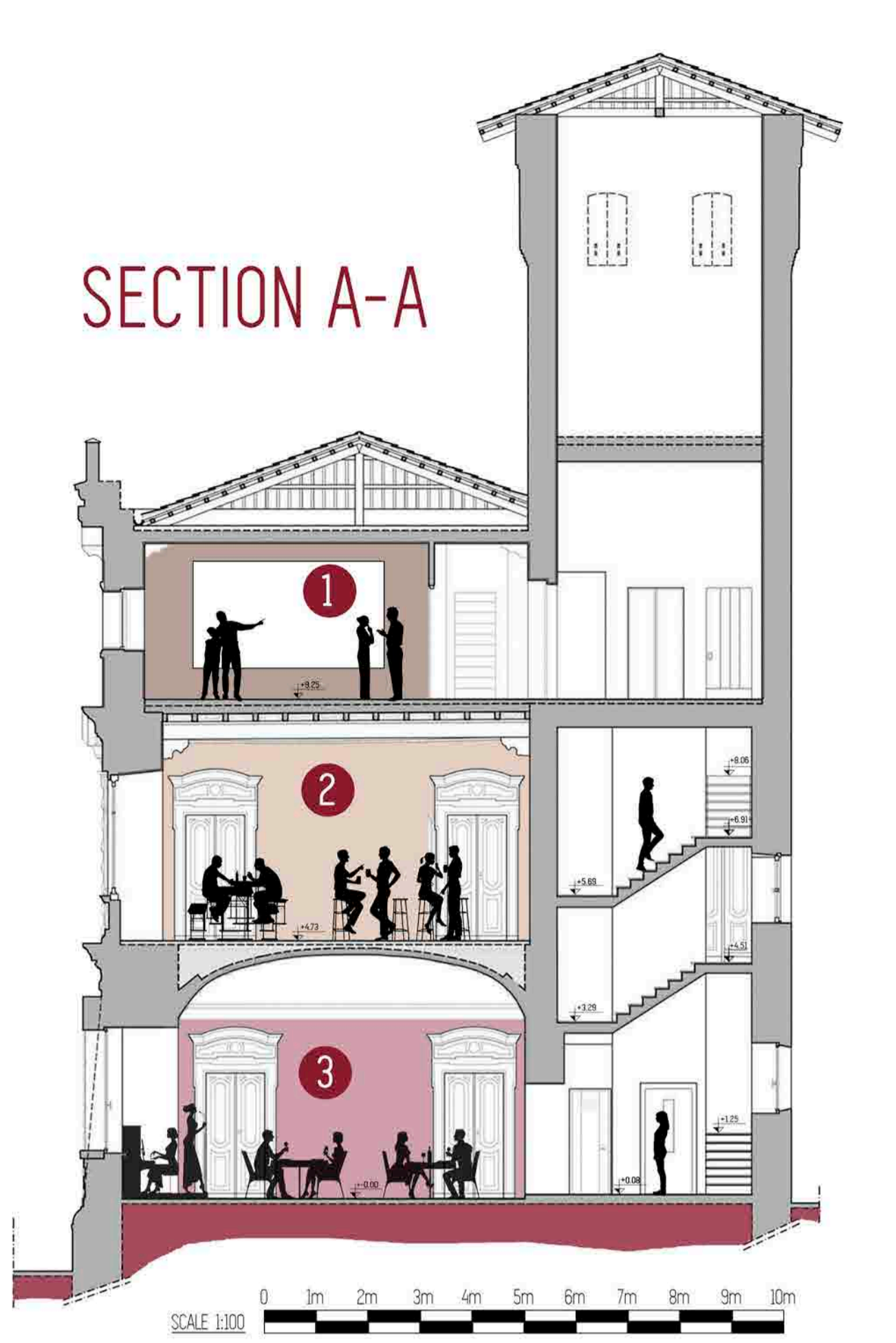
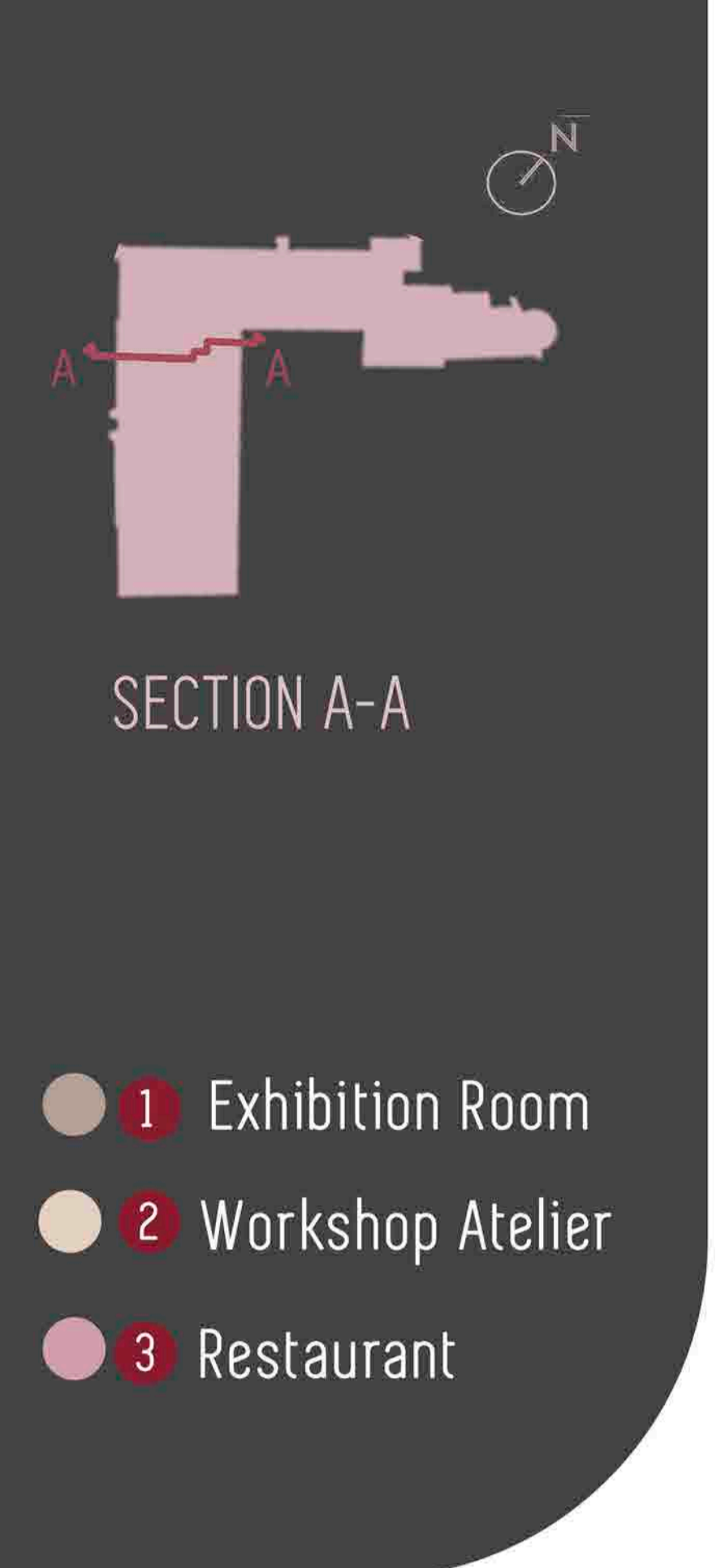
THE CASTLE

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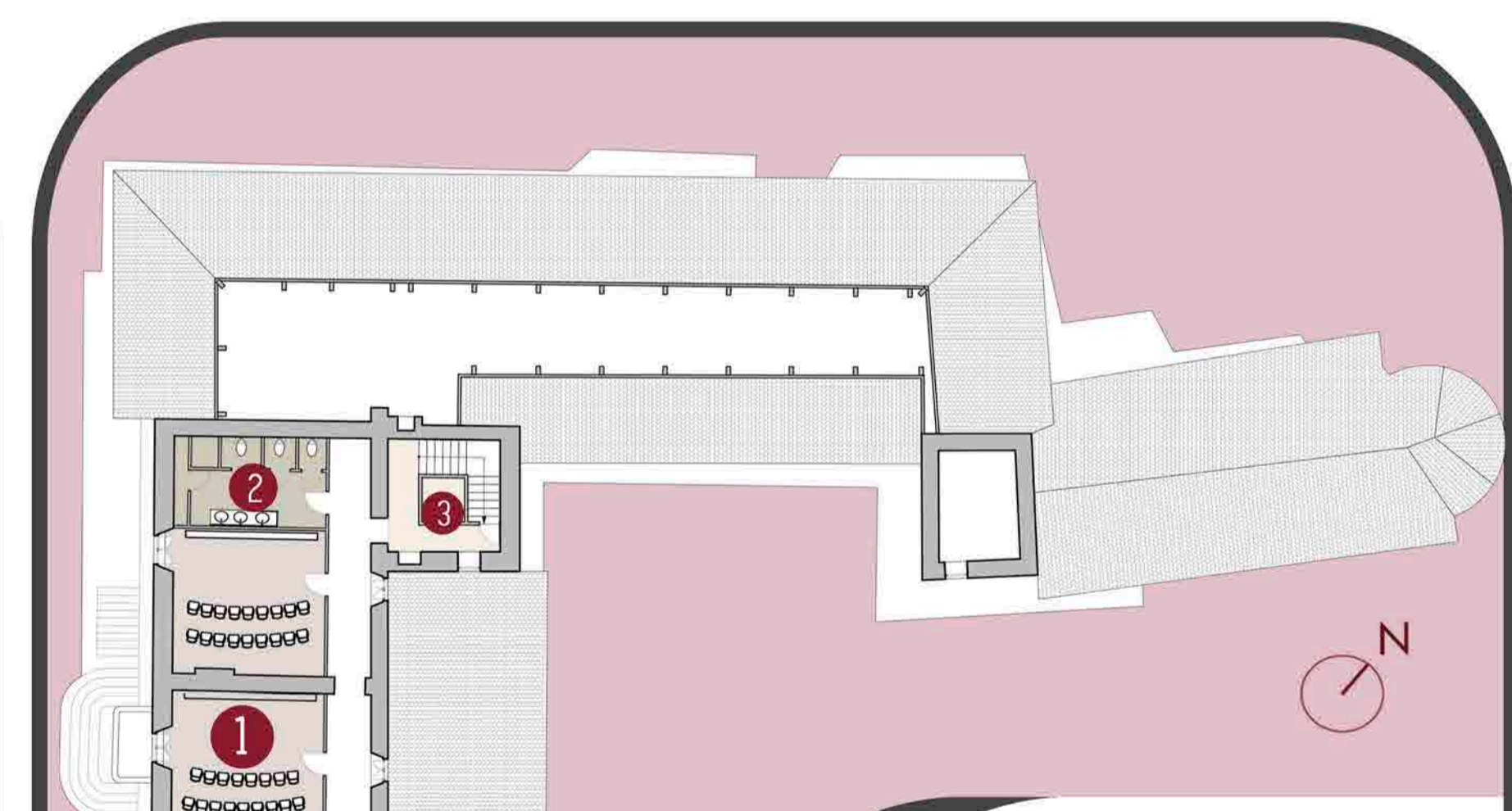
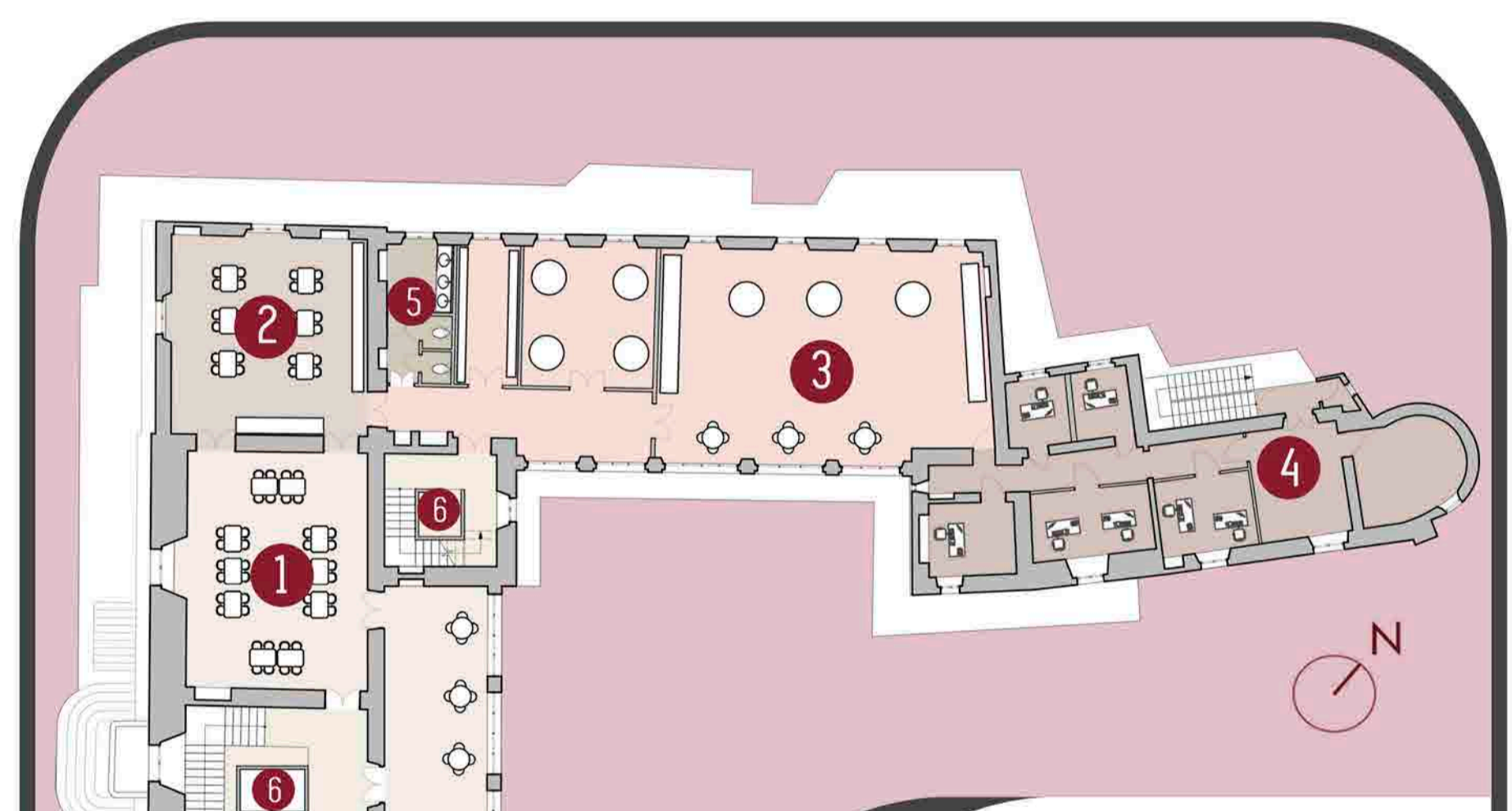
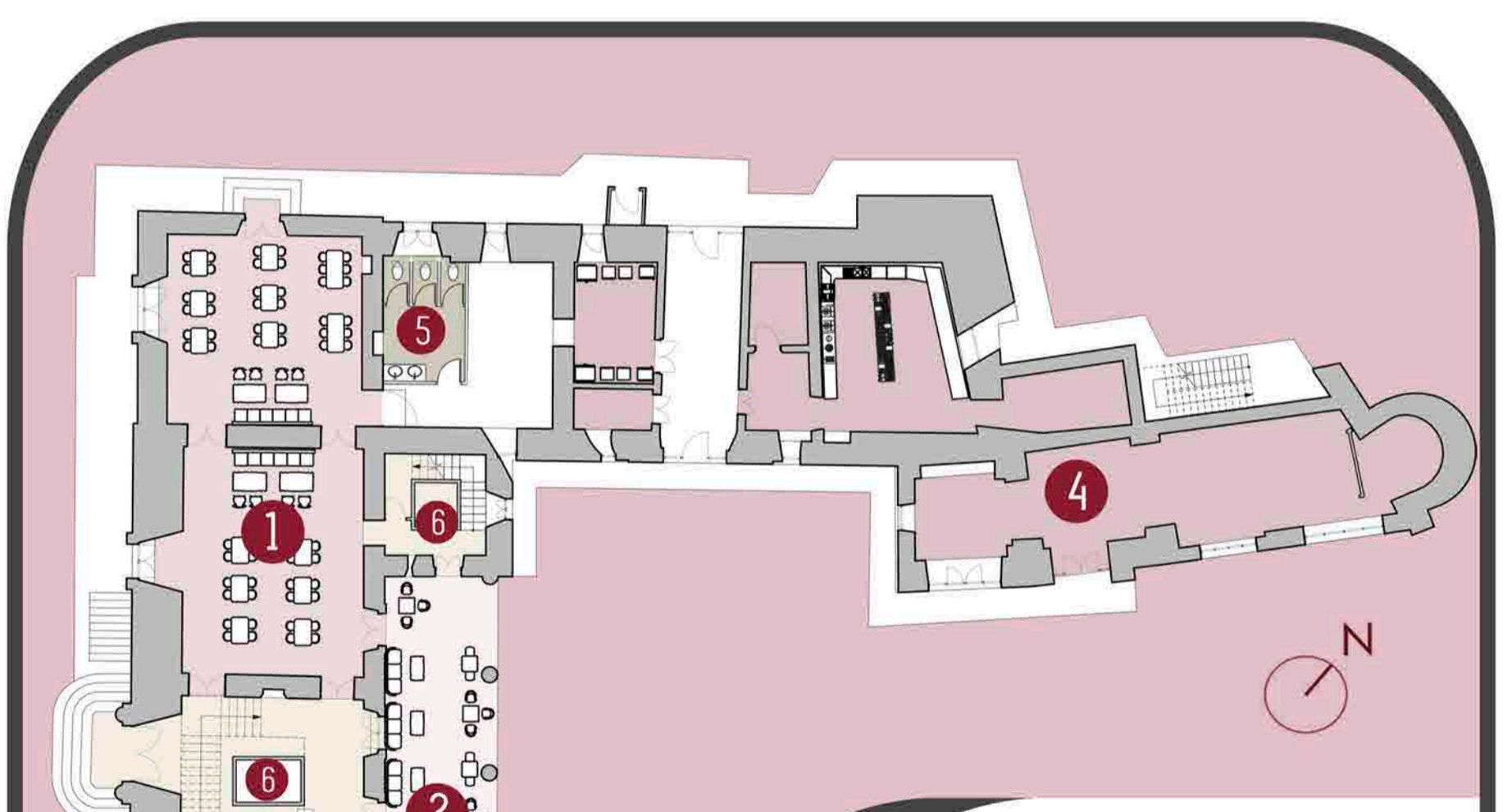
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MONTANARO (TO) Castello dei Conti Frola



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- Panel 6 - 8 CONSTRUCTION SYSTEM ANALYSIS
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- Panel 13 - 21 REFUNCTIONALIZATION PROJECT
- Panel 15: Castle refunctionalization



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EXTERIORS - CASTLE

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MONTANARO (TO)
Castello dei Conti Frola



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 - Panel 12 MASTERPLAN
 - Panel 13 - 21 REFUNCTIONALIZATION PROJECT
- Panel 16: Exterior Castle Images

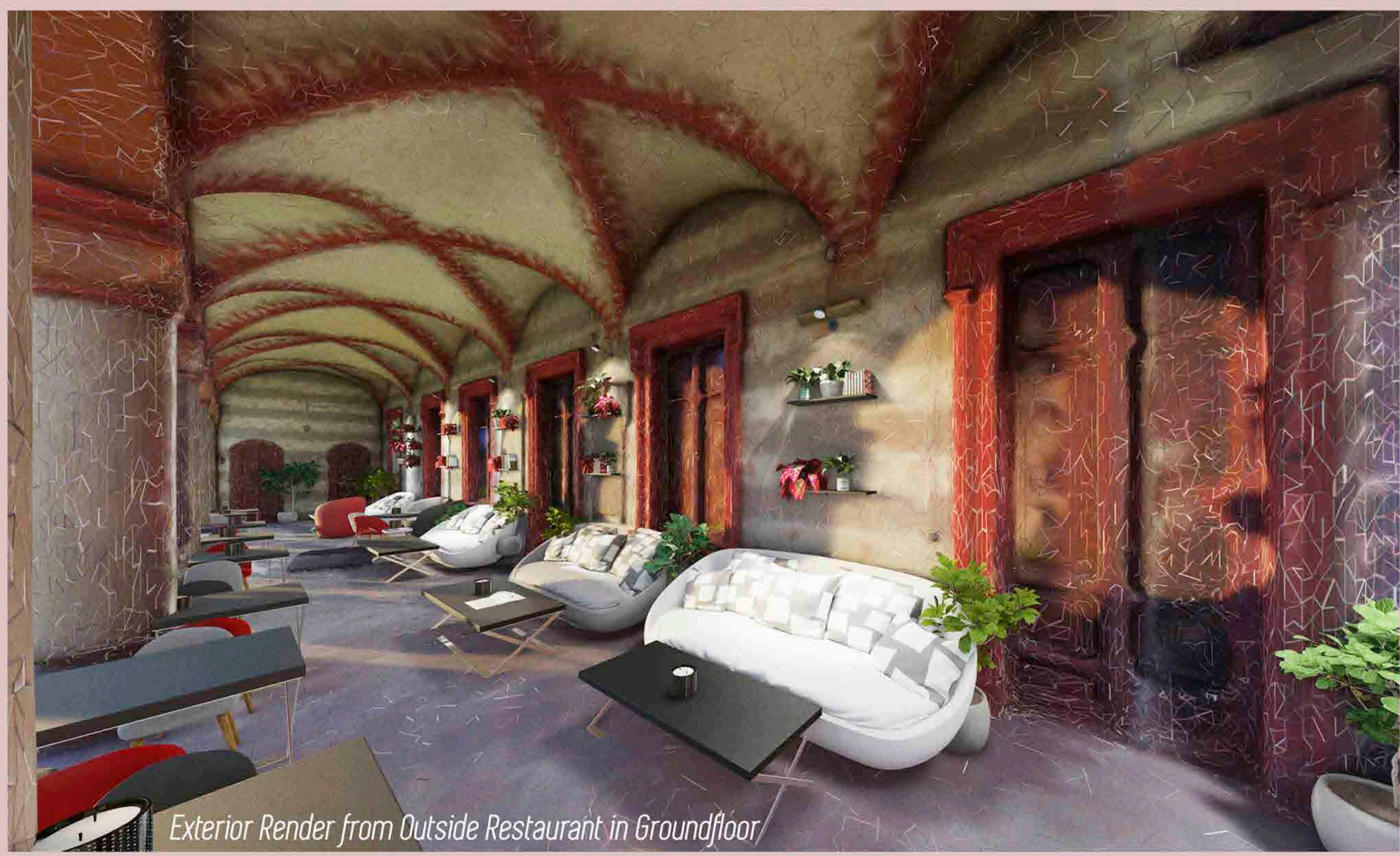
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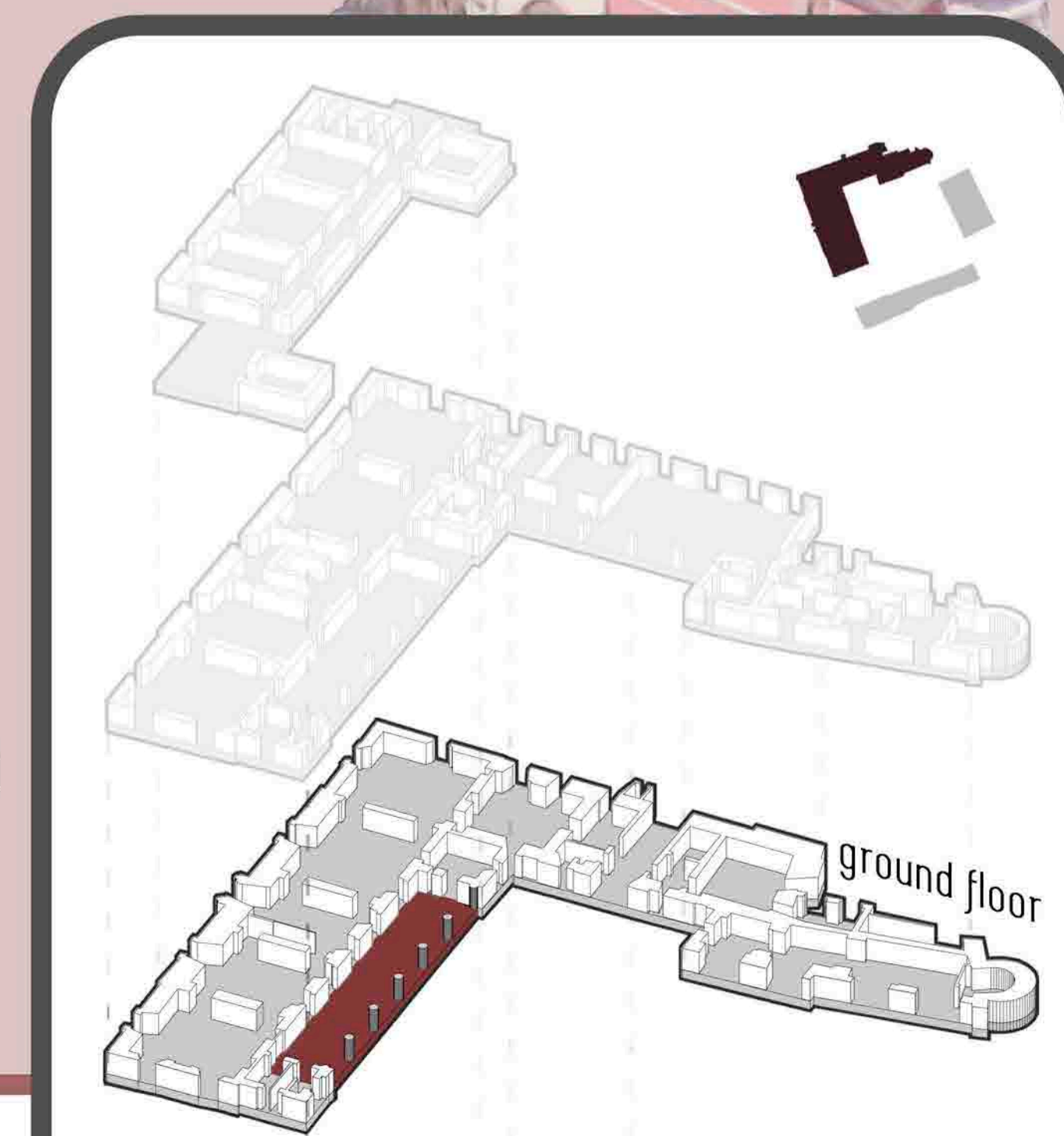
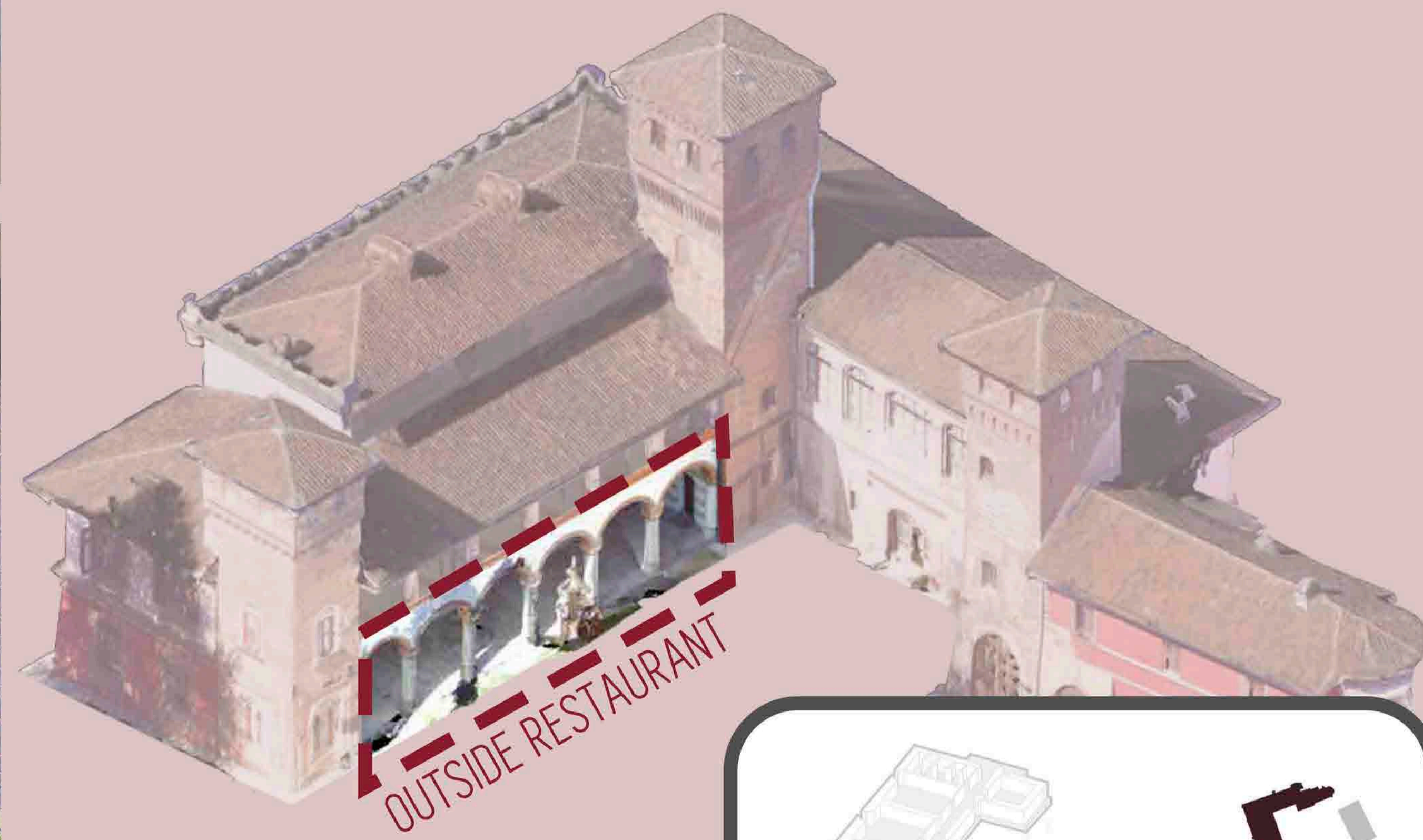
Exterior Render from Outside Restaurant in Groundfloor



Exterior Render from Outside Restaurant in Groundfloor



Exterior Render from Outside Restaurant in Groundfloor



Outside Restaurant in Courtyard

Restaurant's outside area for enjoying open air while dining. This outdoor area faces the complex's courtyard and sees the accomodation and souvenir shop, as well as the main entrance. Castle's original vaults on the ceiling, wooden doors and windows, paintings on the walls and decorations are protected in this area.



INTERIORS - CASTLE

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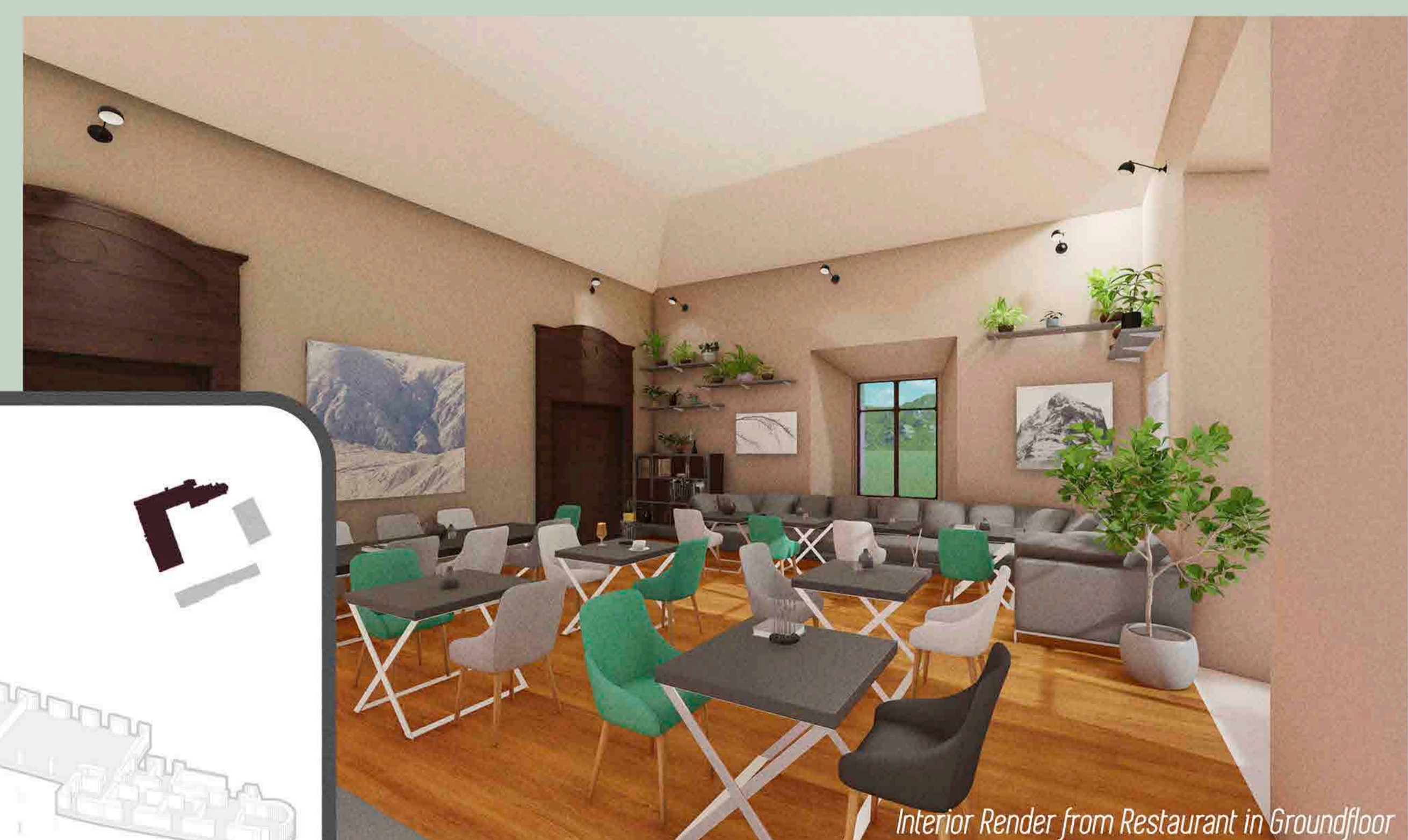
Interior Render from Restaurant in Groundfloor



Interior Render from Restaurant in Groundfloor



Interior Render from Restaurant in Groundfloor

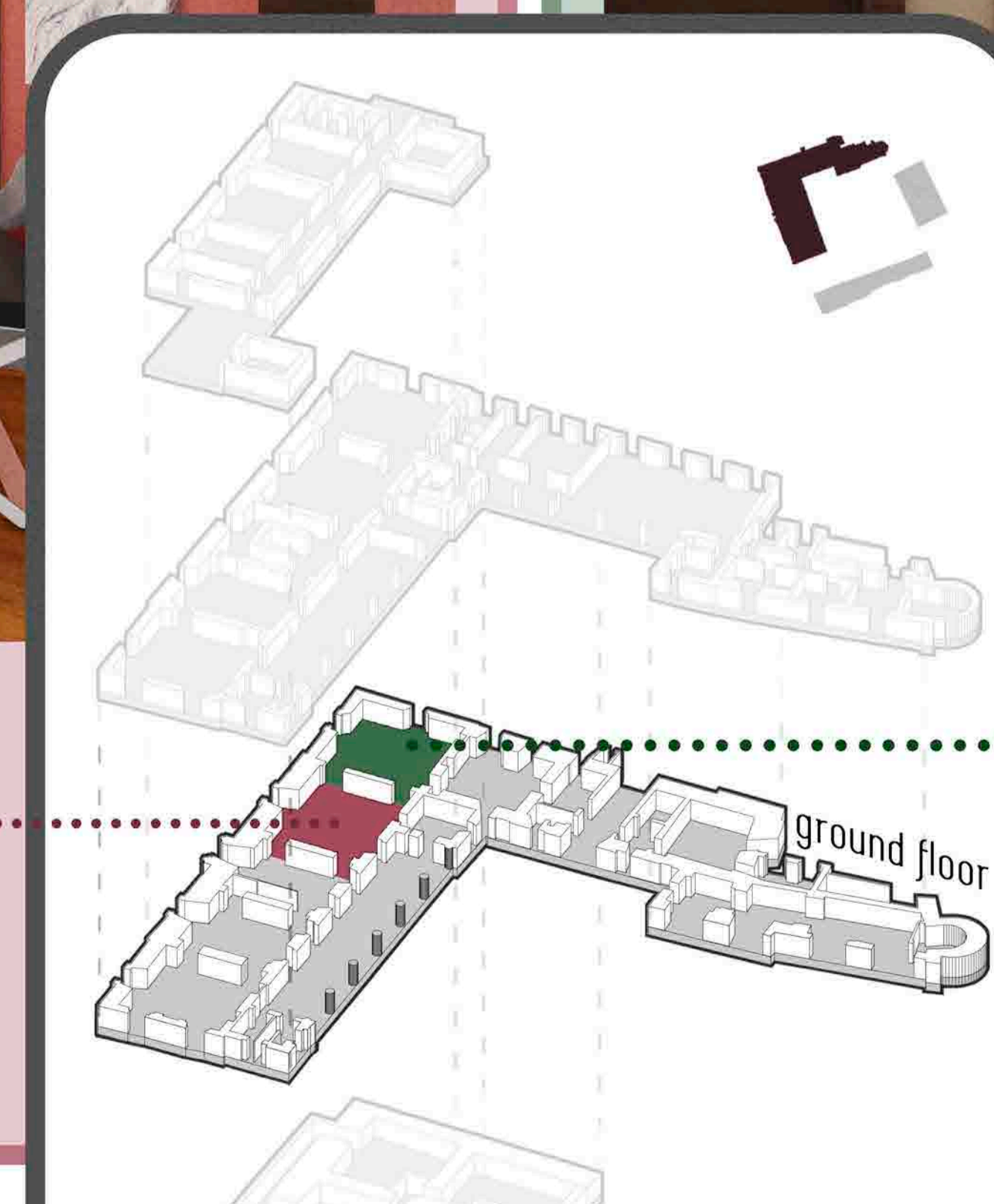


Interior Render from Restaurant in Groundfloor

MONTANARO (TO) Castello dei Conti Frola



- Panel 1
TERRITORIAL FRAMEWORK
 - Panel 2
HISTORICAL FRAMEWORK
 - Panel 3
SURVEY METHOD
 - Panel 4 - 5
ARCHITECTURAL SURVEY
 - Panel 6 - 8
CONSTRUCTION SYSTEM ANALYSIS
 - Panel 9 - 10
MATERIALS, DEGRADATIONS AND INTERVENTIONS ANALYSIS
 - Panel 11
CONCEPT OF THE PROJECT
 - Panel 12
MASTERPLAN
 - Panel 13 - 21
REFUNCTIONALIZATION PROJECT
- Panel 17: Interior Castle Images



Restaurant

Italian Restaurant for introducing Canavese Cuisine and Castle Complex's products such as wine, liquours, vegetables. This restaurant area has a piano for live music events. Original doors and windows of the castle is protected in this room

Restaurant

Connected with the other restaurant area ,this restaurant area has similar functions. According to the density of the customers, this room can be closed for certain hours. Also, this room can be used as a breakfast room for guests. Original doors, windows and the vault is protected in this room.

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INTERIORS - CASTLE

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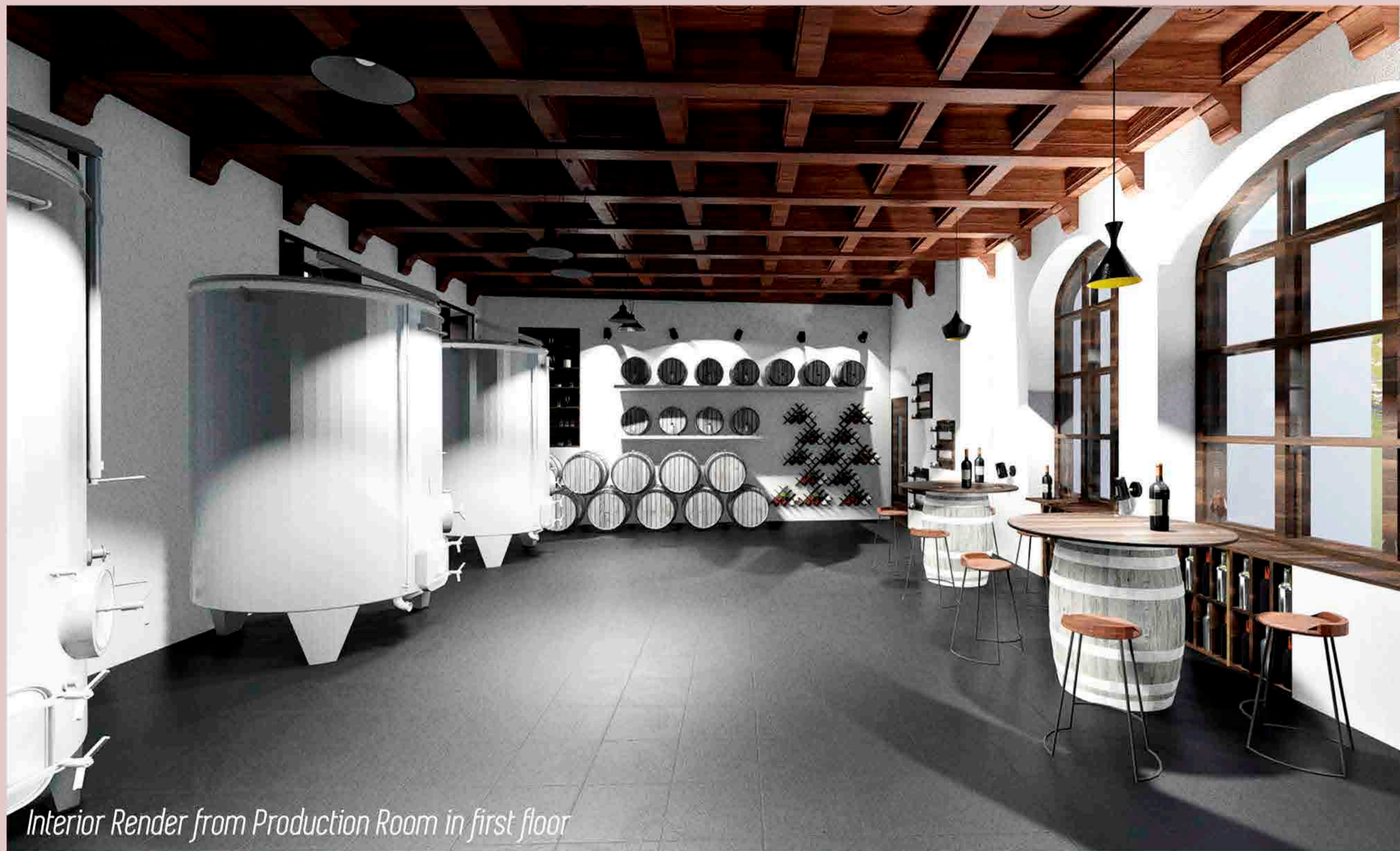
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MONTANARO (TO)
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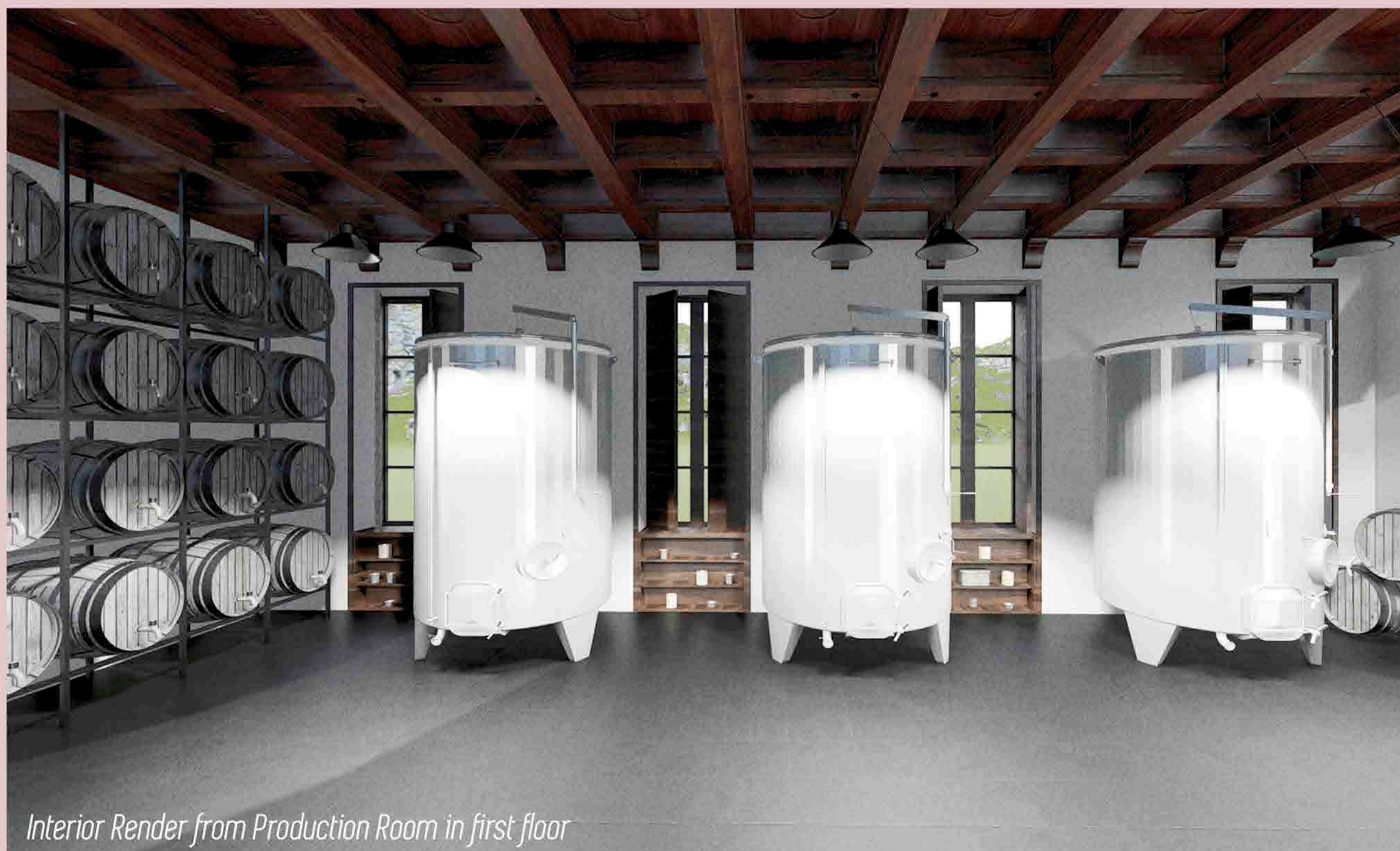
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CONCEPT OF THE PROJECT
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MASTERPLAN
 - Panel 13 - 21
REFUNCTIONALIZATION PROJECT
- Panel 18: Interior Castle Images



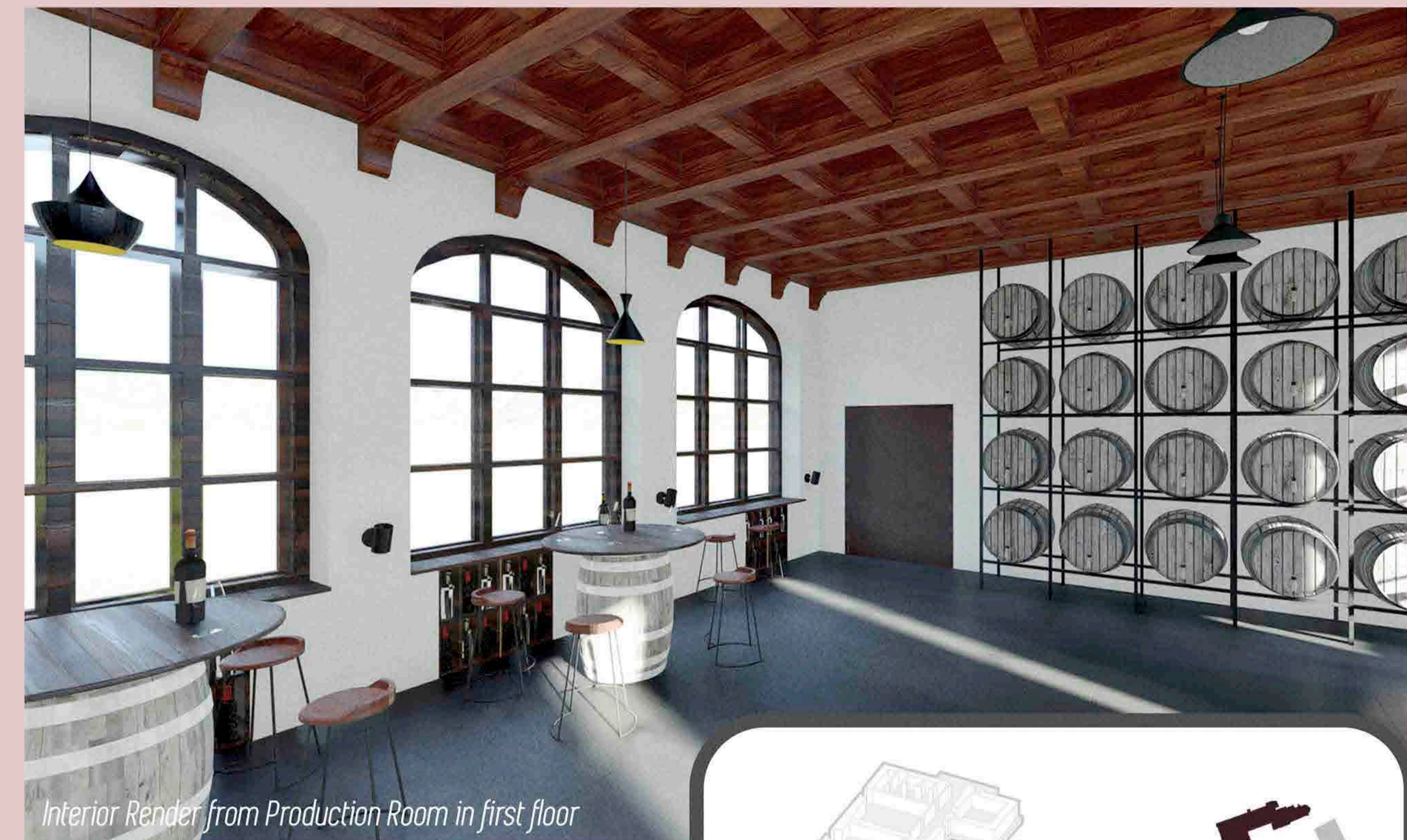
Interior Render from Production Room in first floor



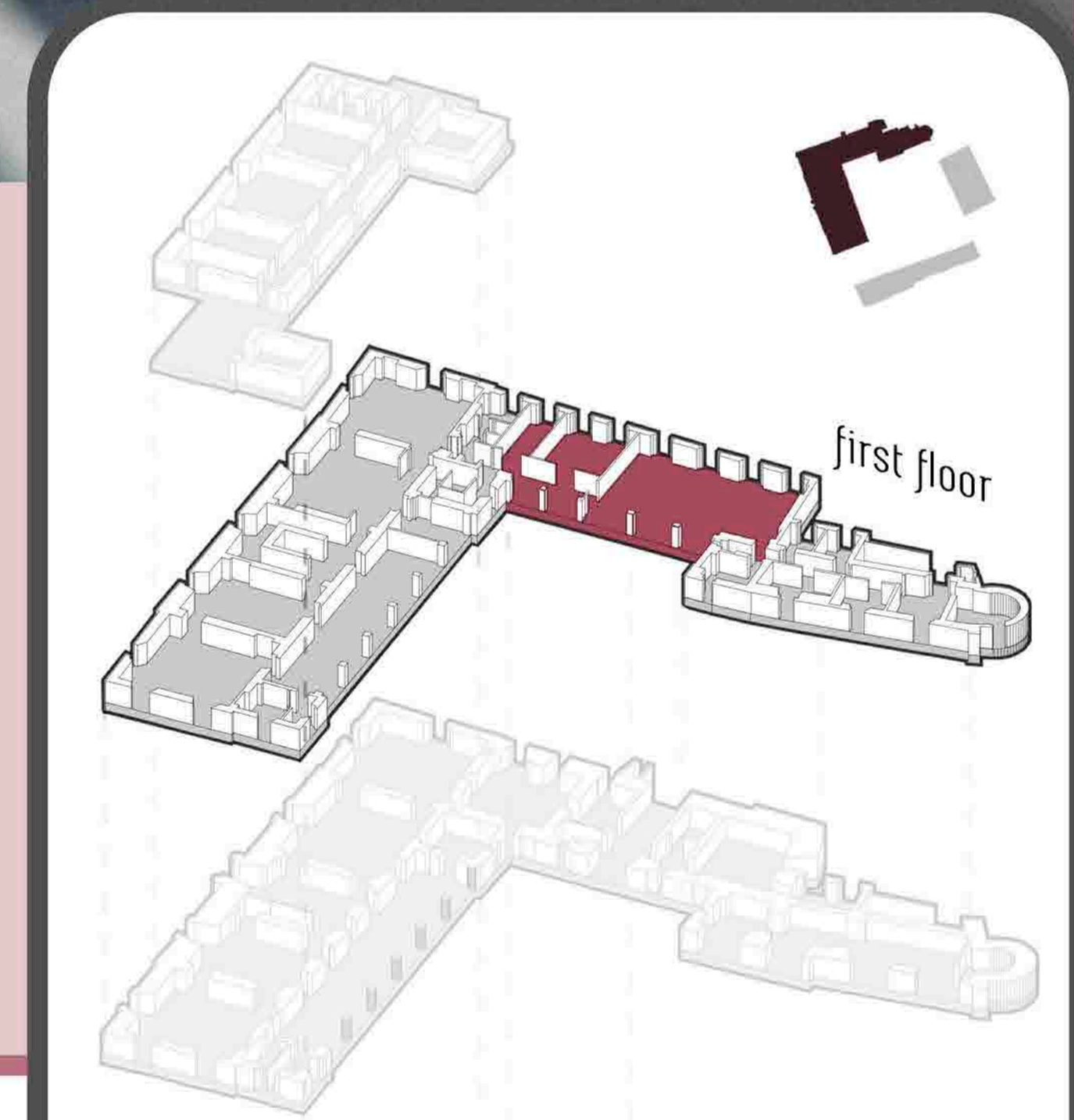
Interior Render from Production Room in first floor



Interior Render from Production Room in first floor



Interior Render from Production Room in first floor



Production Room

Production Area of the Castle for Canavese Region's Craft Beer, traditional wines like Erbaluce, Fruit Liquors made from berries, apples and chestnuts. Production room also has a small tasting area and storage. This area has all of the necessary equipments to prepare beers, liquors and wine. The sunlight is controlled with blindings. Castle's original wooden ceiling, wooden doors and windows are protected in this room.

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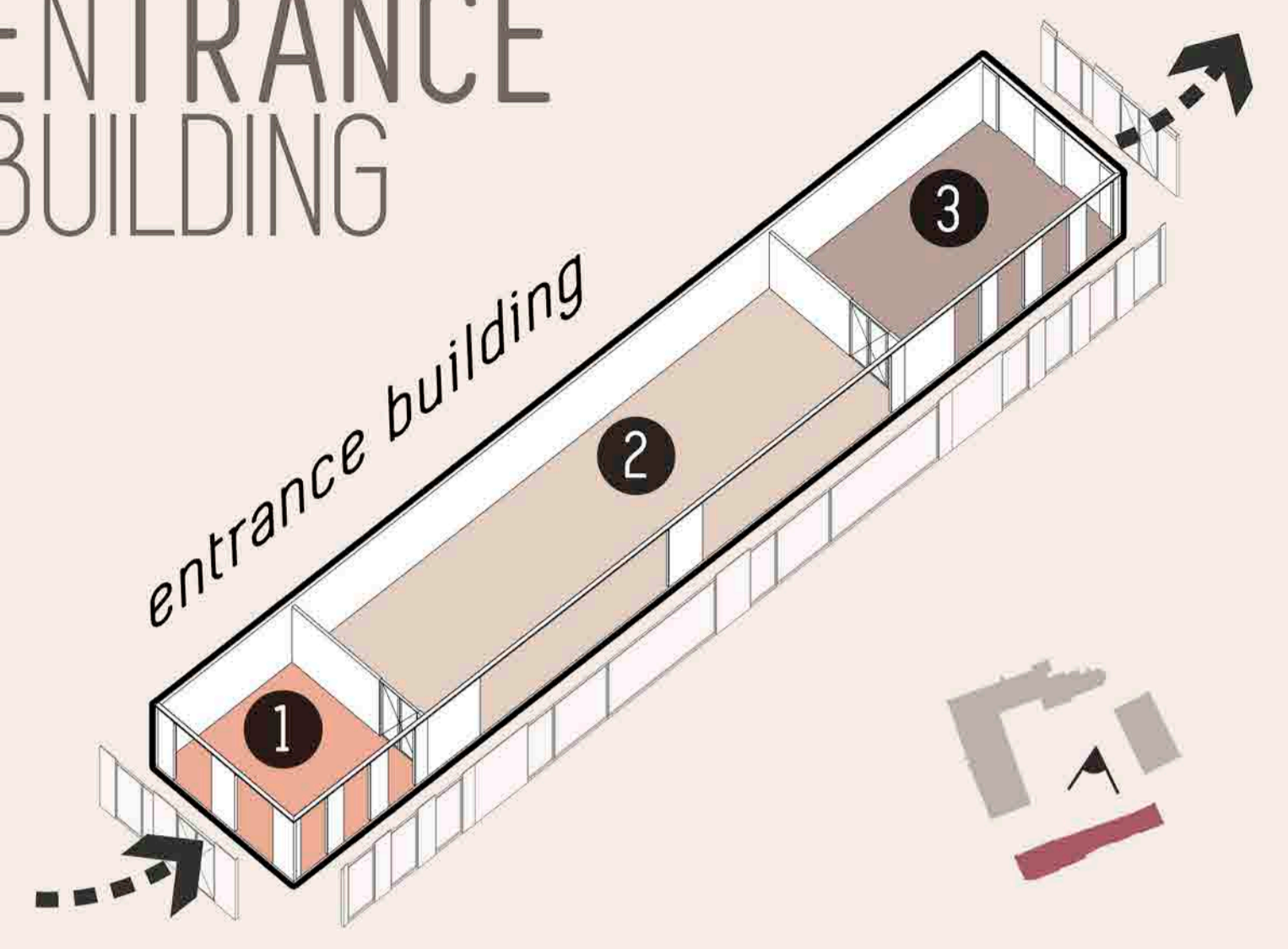


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Panel 19: Entrance and Accommodation

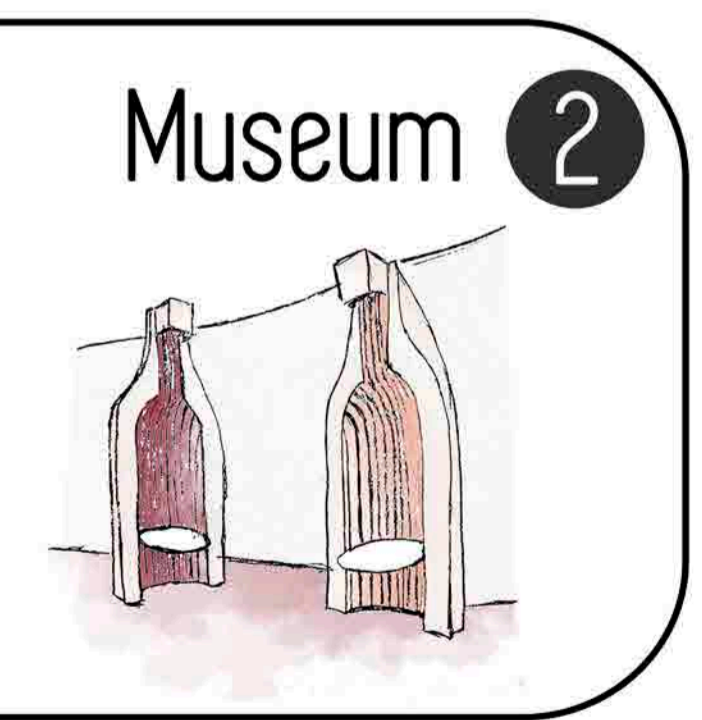
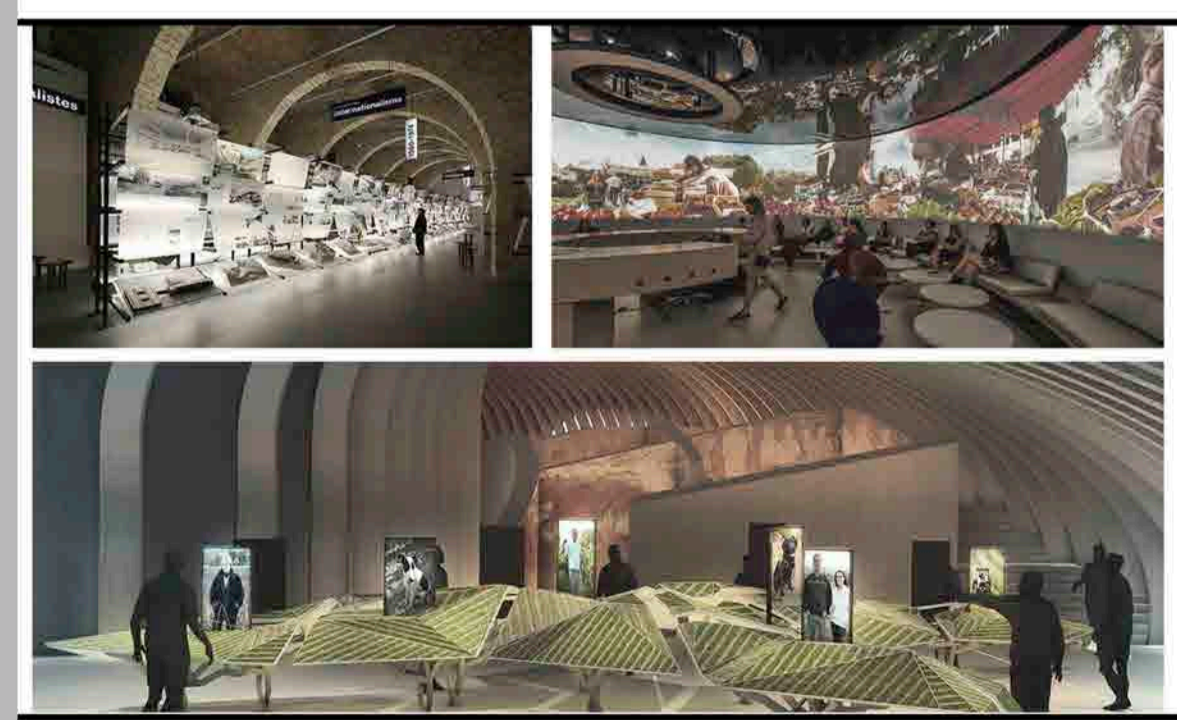
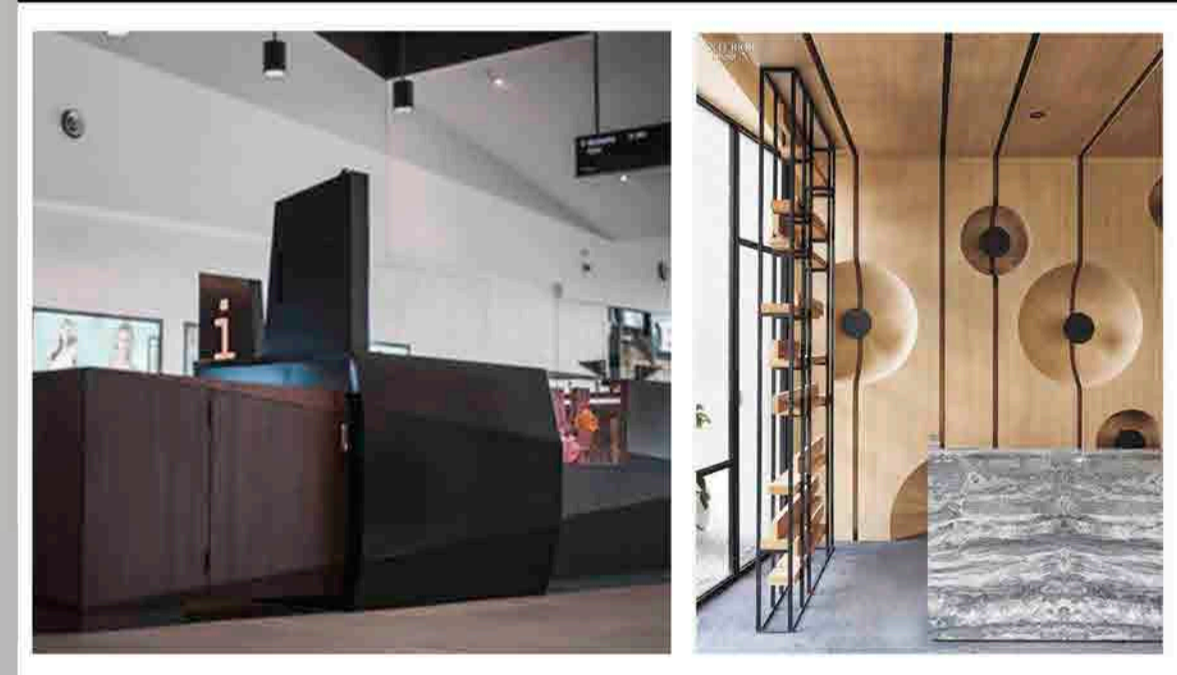
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FUNCTION DIAGRAMS

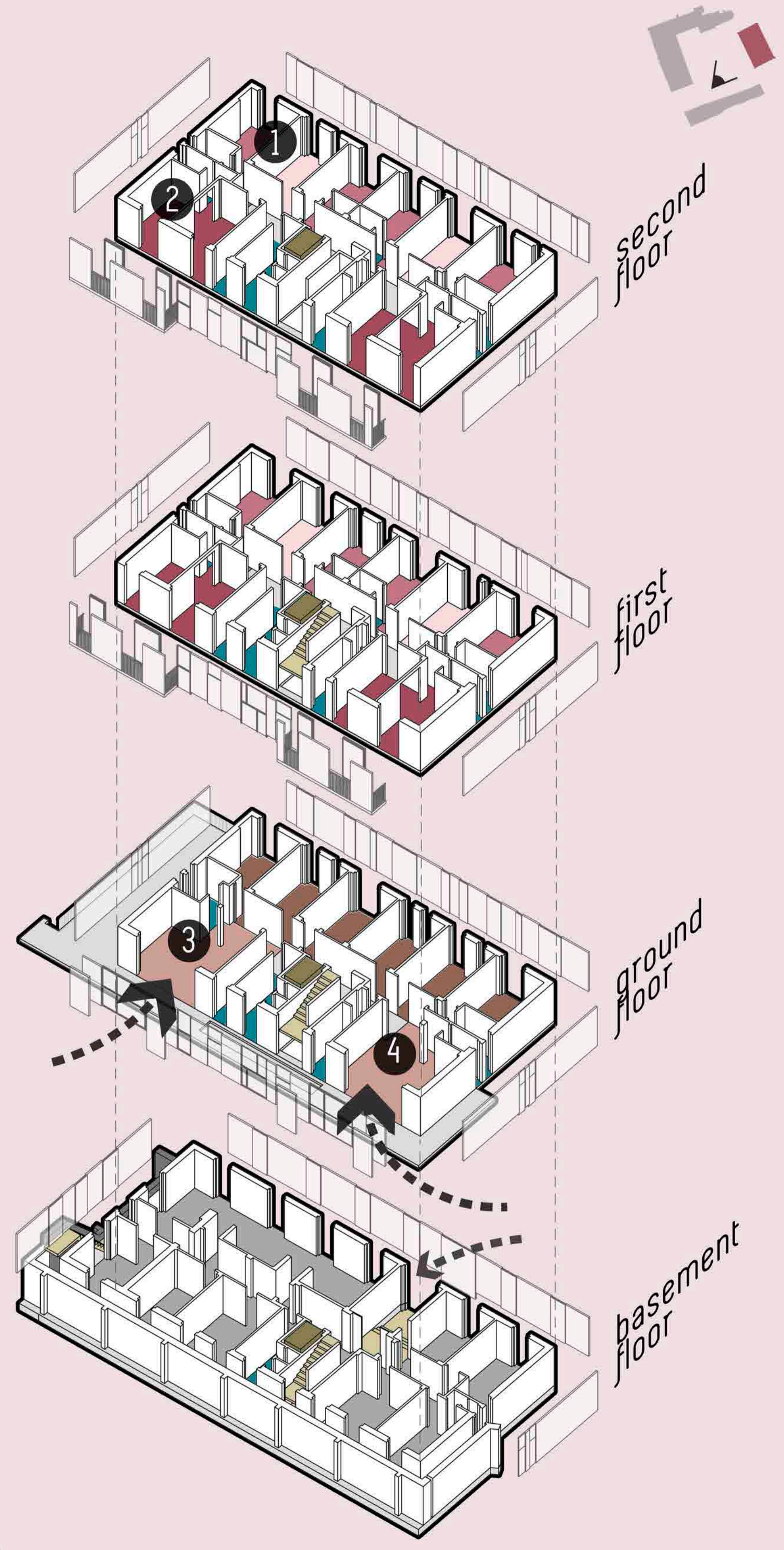
ENTRANCE BUILDING



Entrance Building is located in the main entrance of the Castle Complex. It welcomes visitors upon arrival, with an info desk and a small museum about the history of Montanaro introducing also to Canavese cuisine before leading them to the exclusive restaurant of the complex. A souvenir shop is located at the end for gifts and products from the region.



ACCOMMODATION BUILDING



EXISTING BUILDING

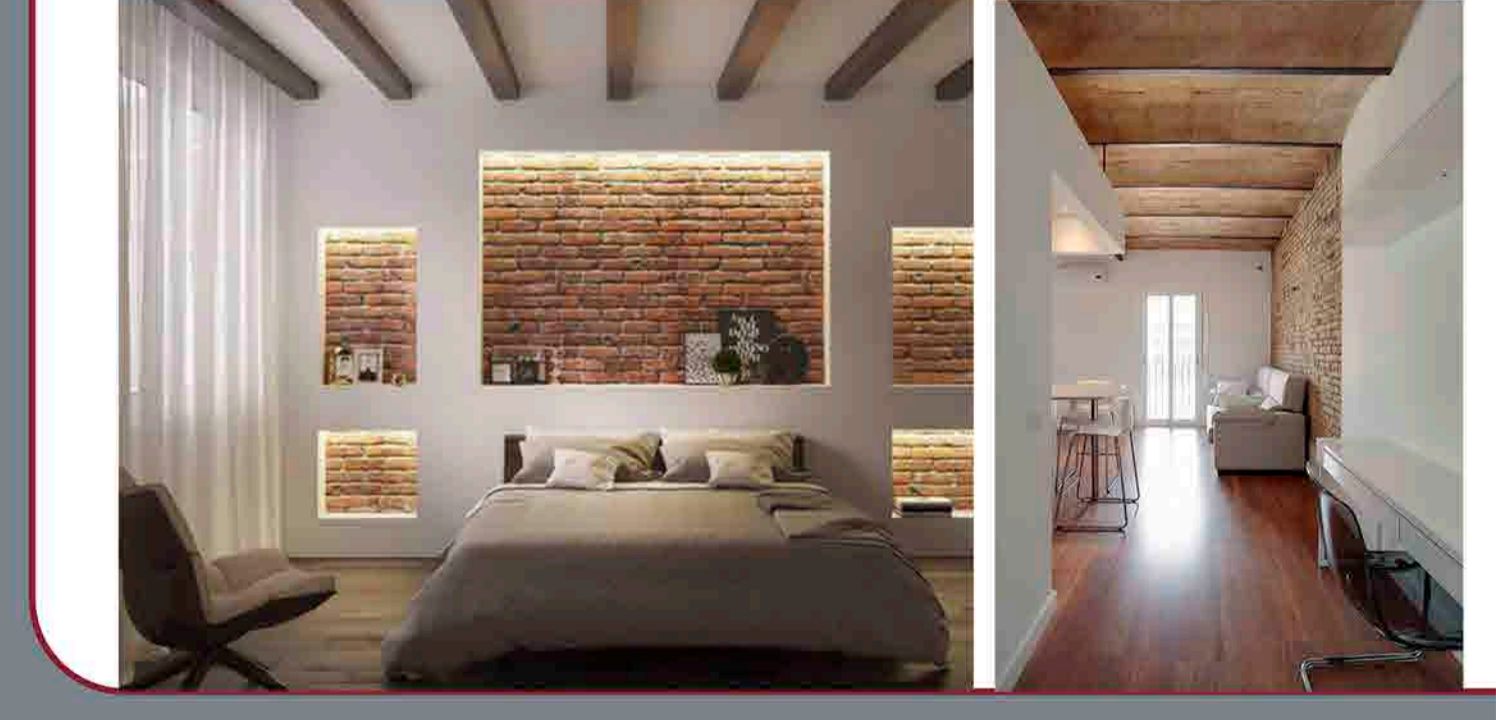


NEW FACADE PROPOSAL



1 2 Standard and Deluxe Rooms

Double, twin or deluxe rooms for the visitors who want a night stay in the Montanaro, enjoying also the restaurant located inside the Castle Complex.



3 4 Lobby & Bar

Lobby area facing the courtyard of the Castle Complex, for those who stay in the hostel. Small bar and kitchenette for breakfast.





ENTRANCE BUILDING

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MONTANARO (TO)
Castello dei Conti Frola

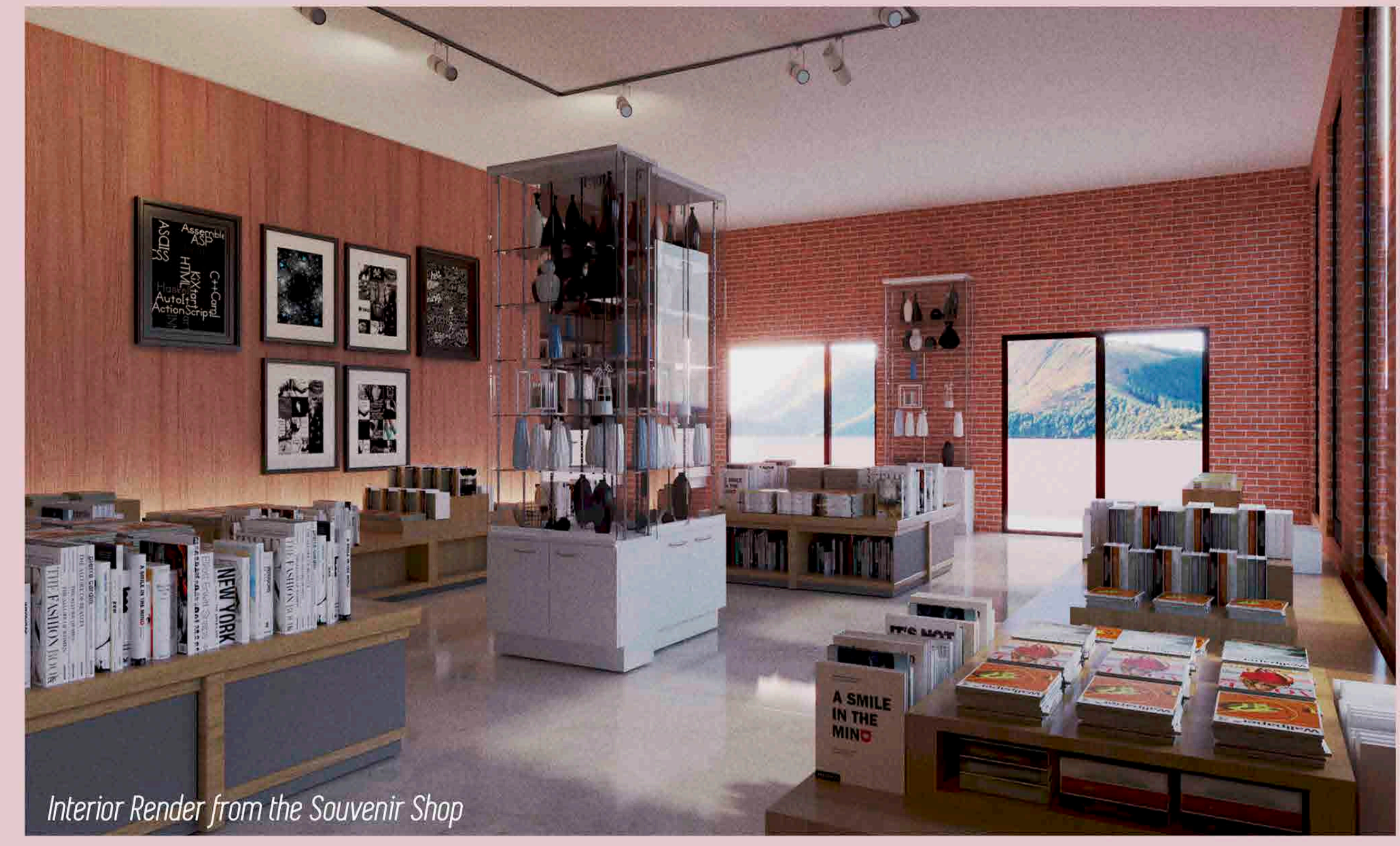


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MASTERPLAN
Panel 13 - 21
REFUNCTIONALIZATION PROJECT
Panel 20: Entrance refunctionalization

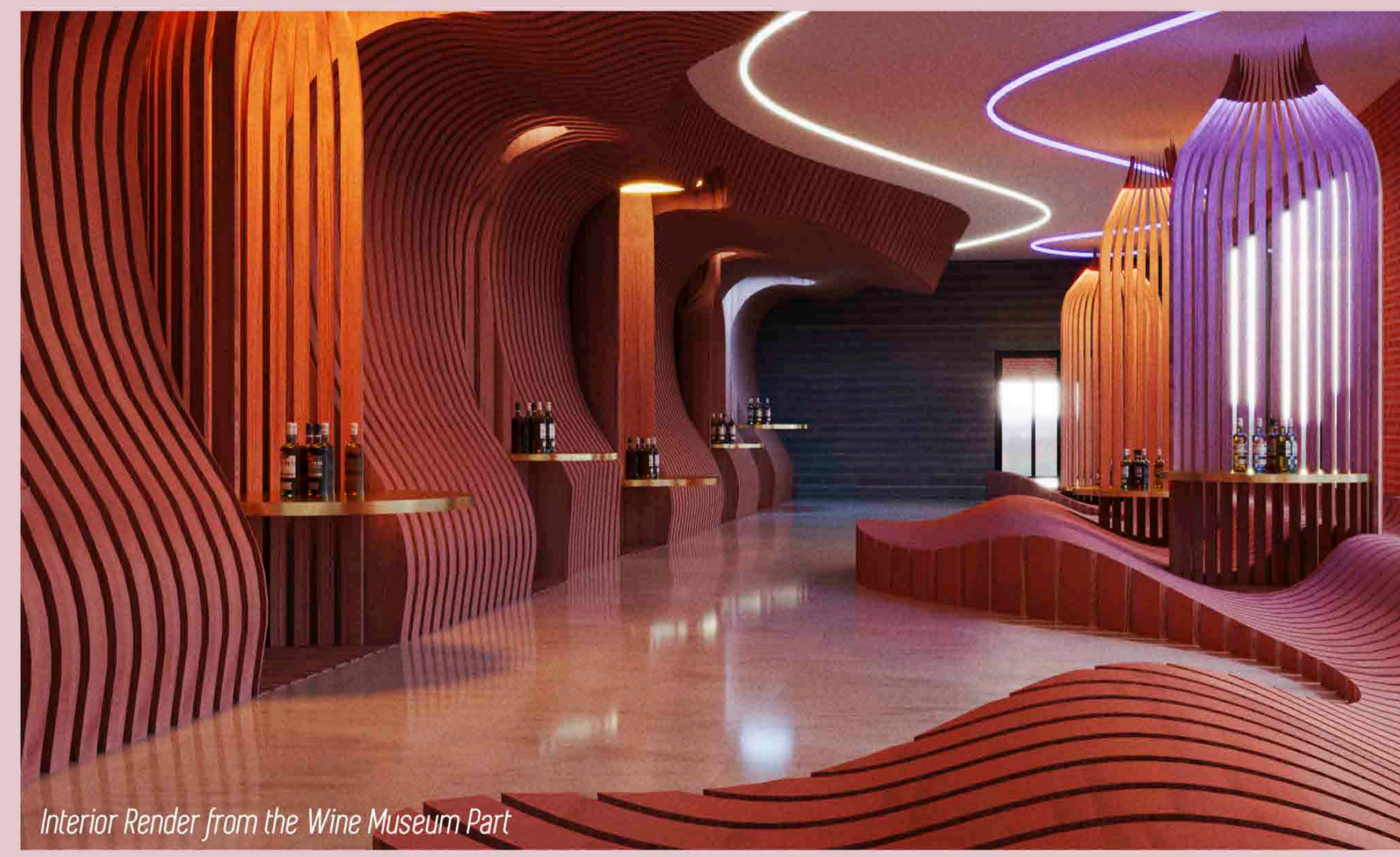
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Interior Render from the Info Point



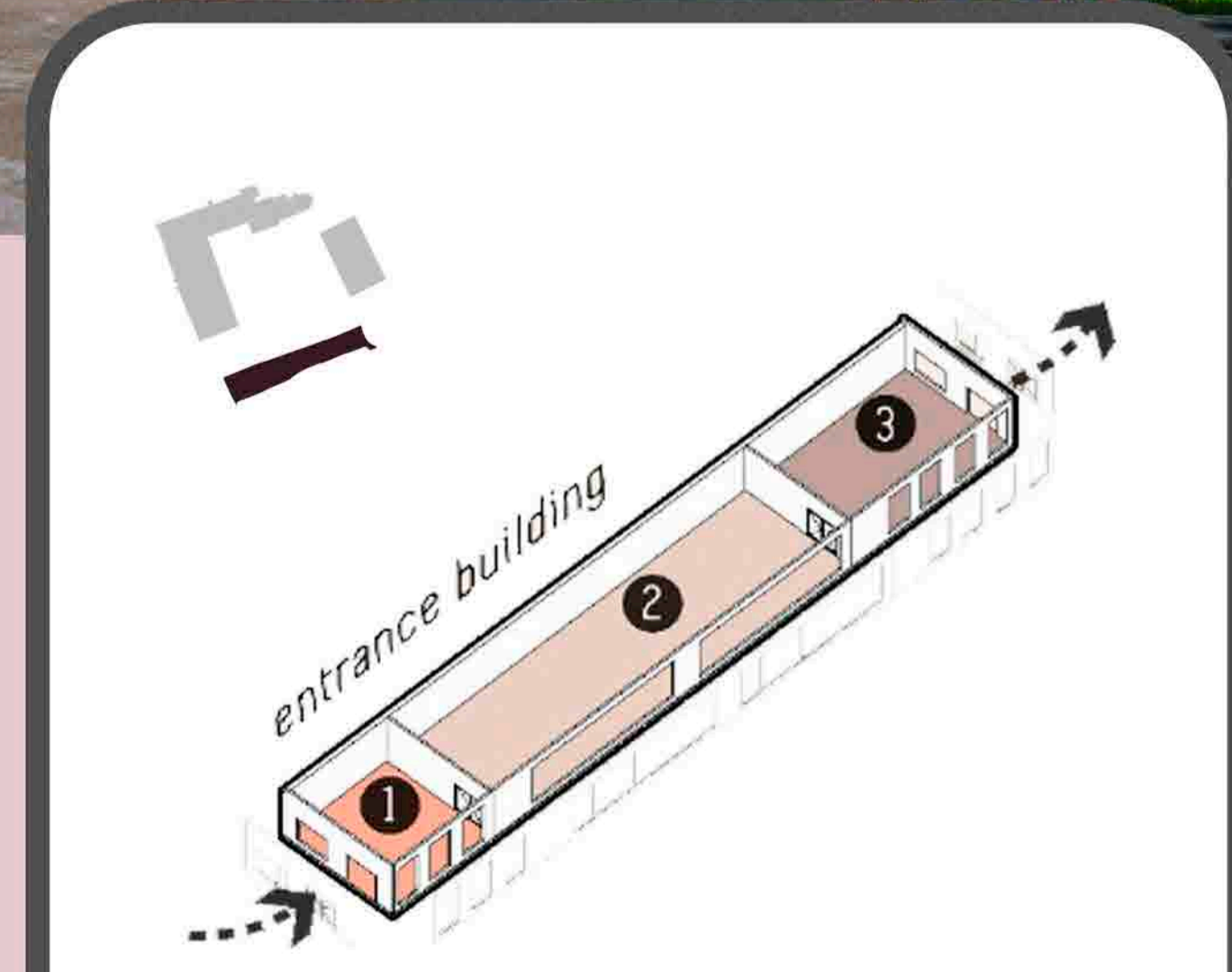
Interior Render from the Souvenir Shop



Interior Render from the Wine Museum Part



Exterior Render from the Entrance building



1 info point
2 museum
3 souvenir shop

Info Point, Museum & Souvenir Shop

The Entrance Building of the Complex, includes an Info Point where people can gather the informations they need about the Castle and also enter the Museum part where they can learn about the types of wine and liquors that are produced in the Castle. The building also provides a Souvenir Shop where people can buy different types of souvenirs to keep a memory from their experience.



ACCOMMODATION BUILDING

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GEOMATICS: arch. Alessandra Spreafico
GEOMATICS: arch. Lorenzo Teppati

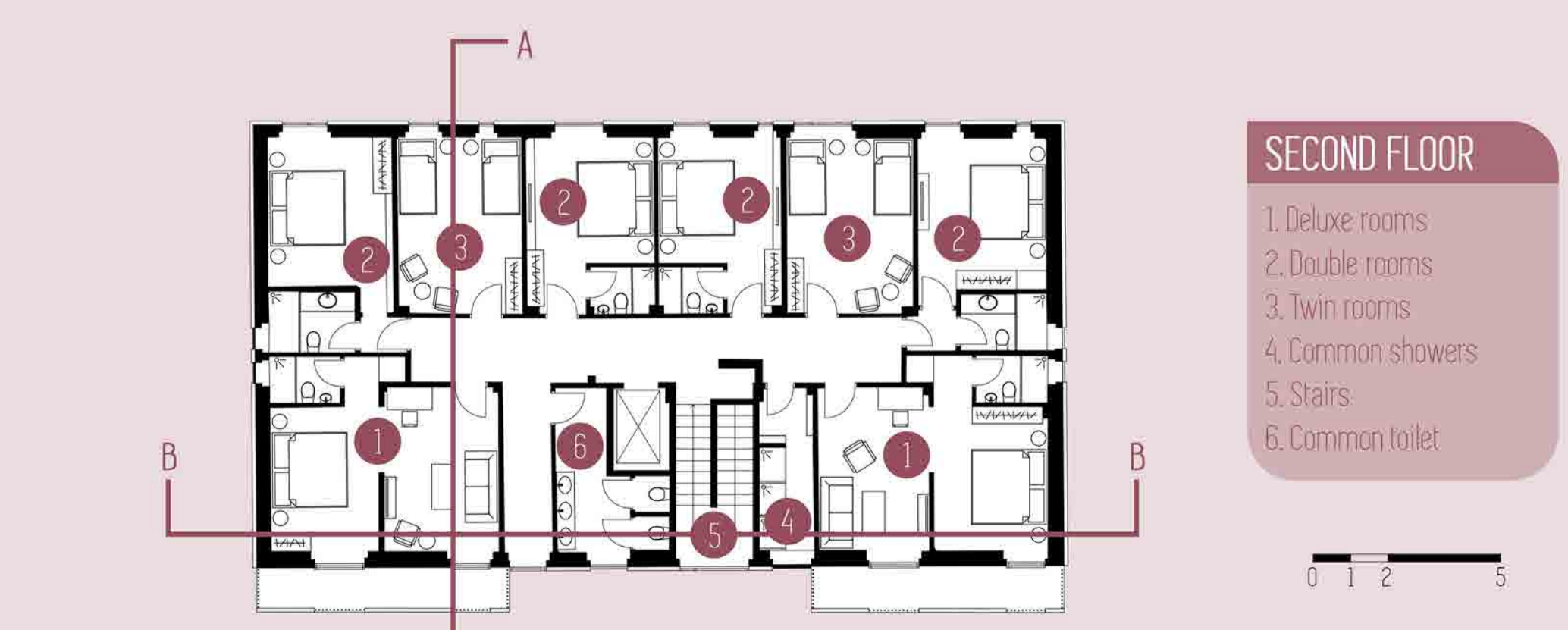
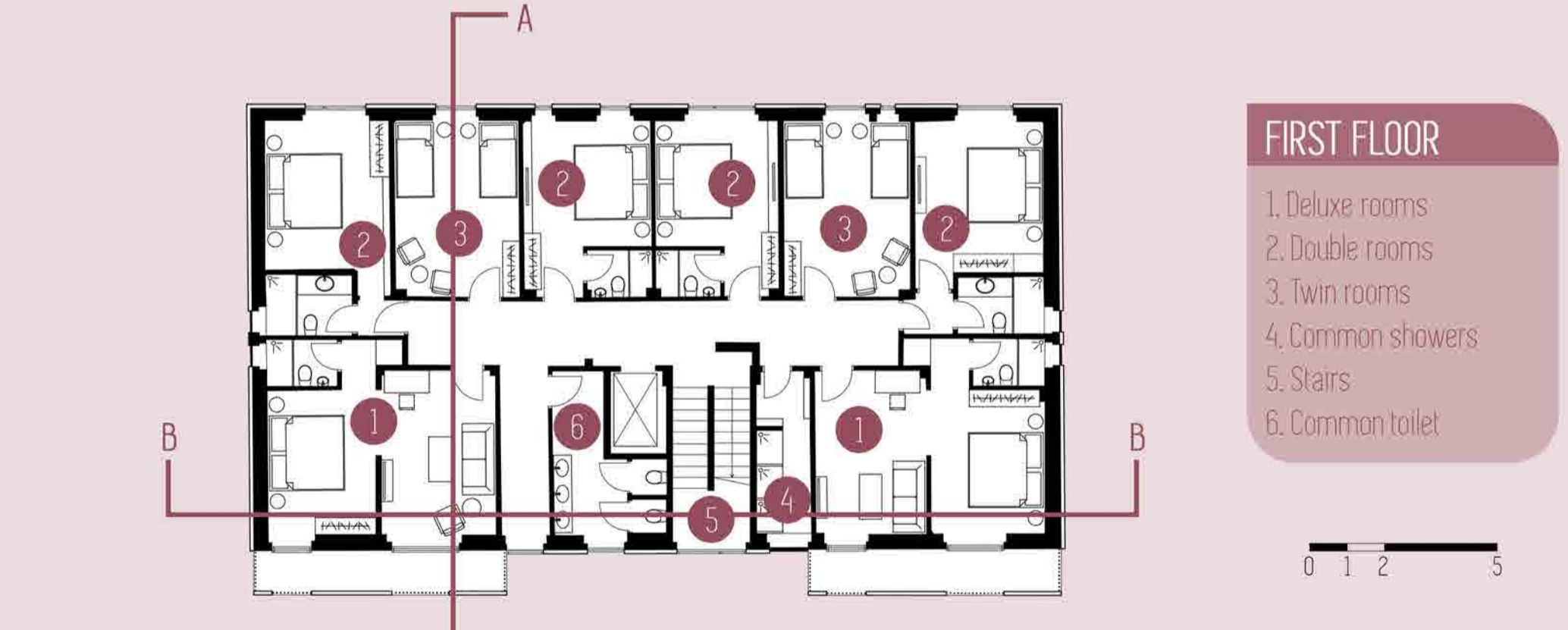
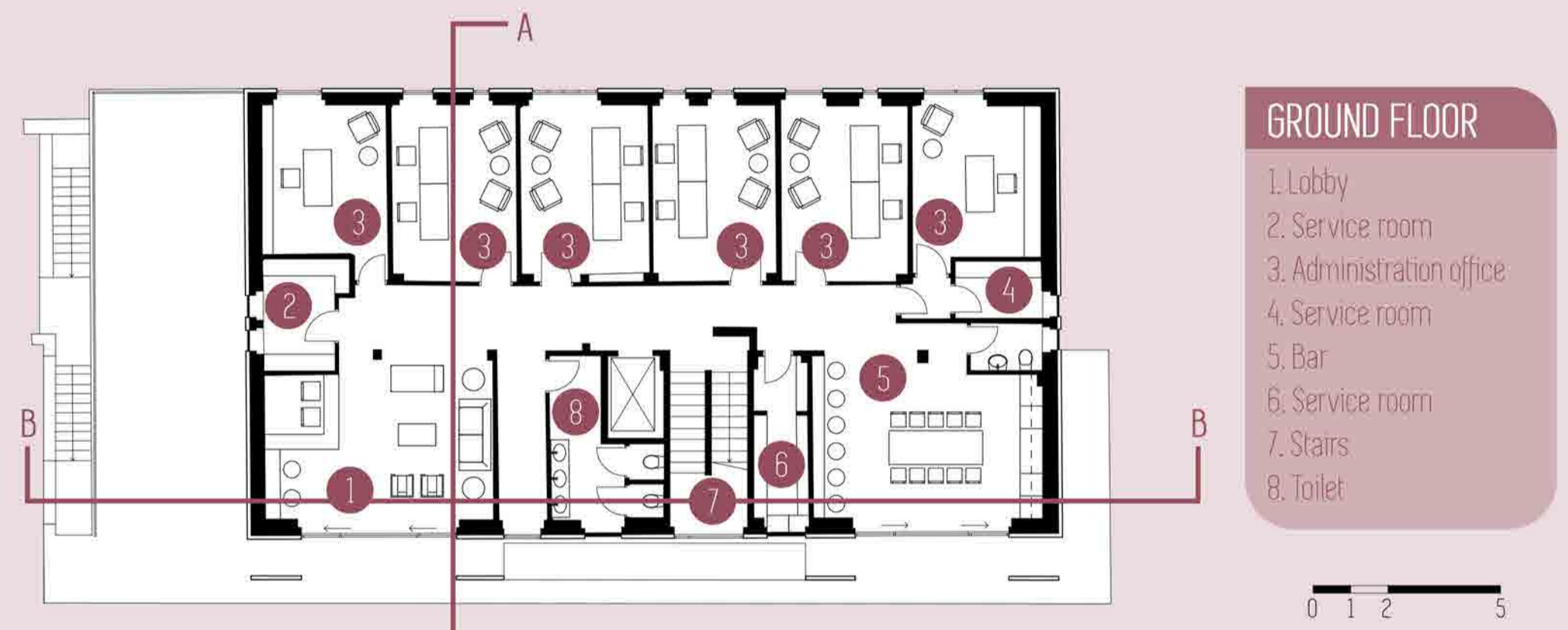
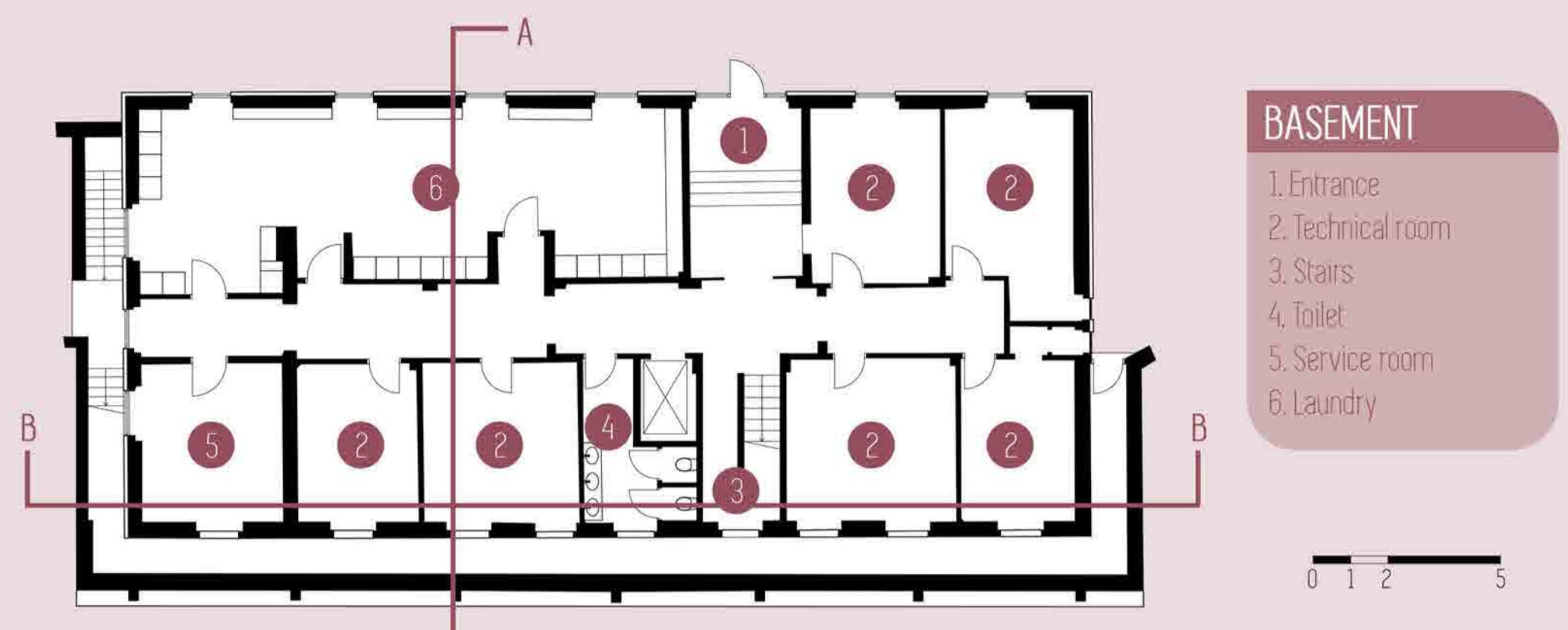
MONTANARO (TO)
Castello dei Conti Frola



- Panel 1 TERRITORIAL FRAMEWORK
- Panel 2 HISTORICAL FRAMEWORK
- Panel 3 SURVEY METHOD
- Panel 4 - 5 ARCHITECTURAL SURVEY
- Panel 6 - 8 CONSTRUCTION SYSTEM ANALYSIS
- Panel 9 - 10 MATERIALS, DEGRADATIONS AND INTERVENTIONS ANALYSIS
- Panel 11 CONCEPT OF THE PROJECT
- Panel 12 MASTERPLAN
- Panel 13 - 21 REFUNCTIONALIZATION PROJECT
- Panel 21: Accomodation refunctionalization

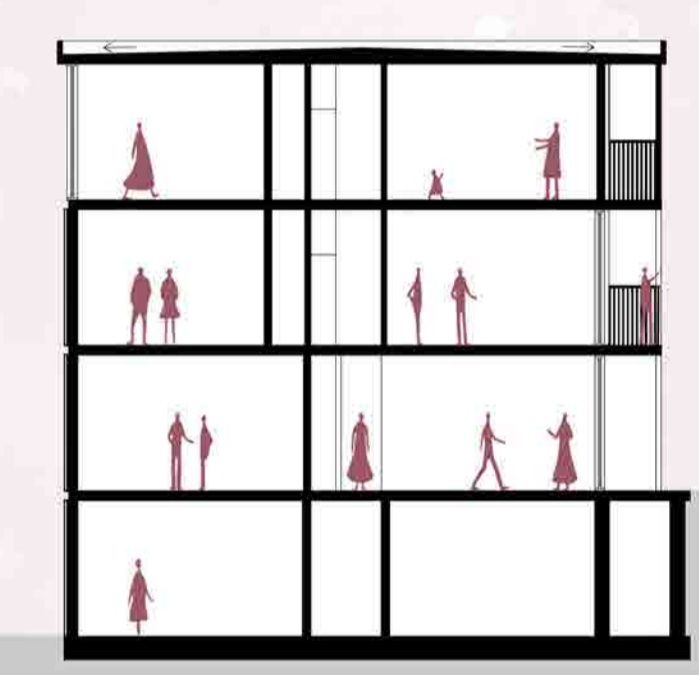
GROUP 04
Gözde Akgün, 275557
Ayşenur Bahçeci, 275559
Adriana Carolina Bravo Celi, 277064
Andrea Matevska, 275350
Anja Pejović, 270012

FLOOR PLANS

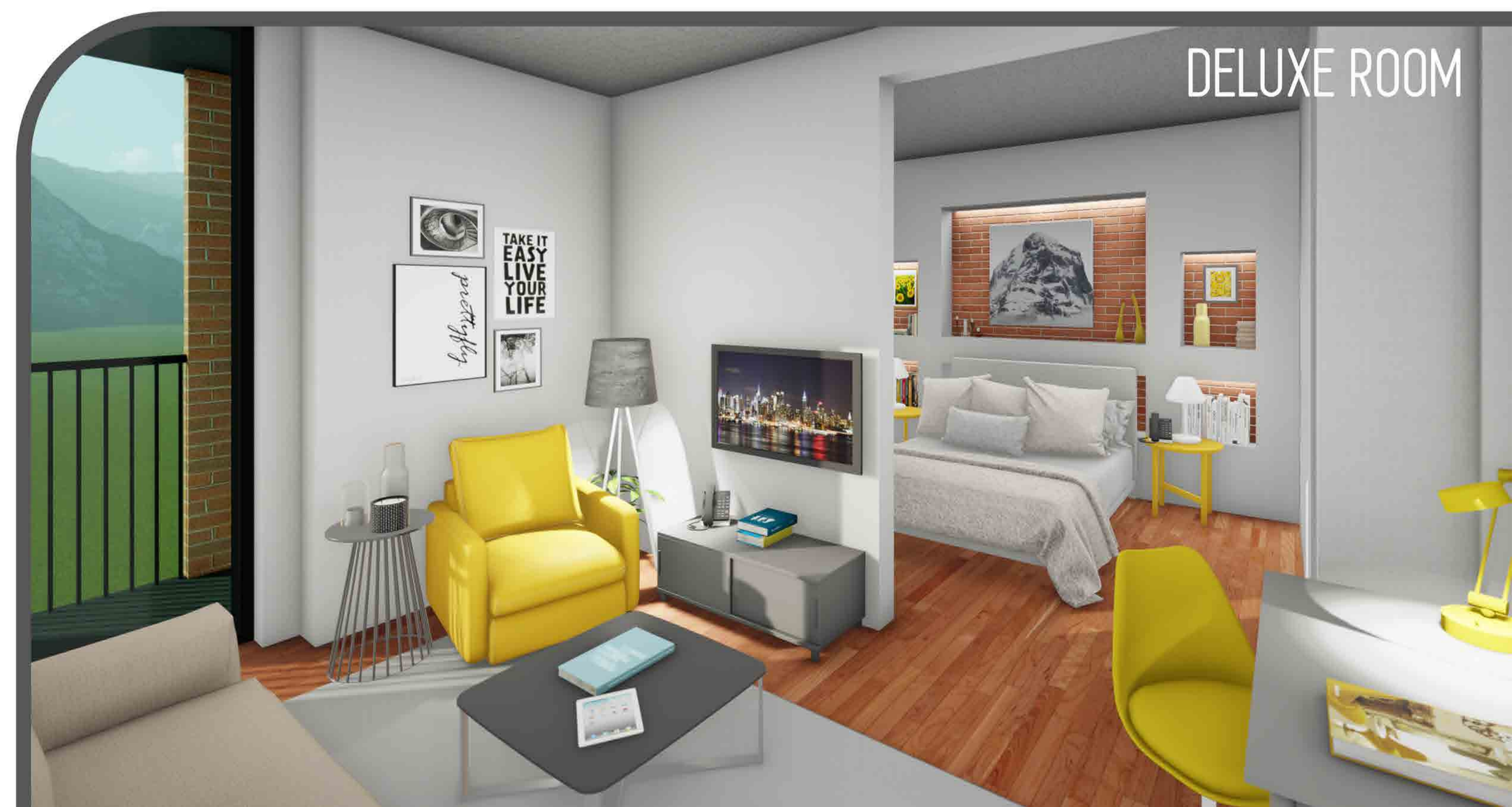
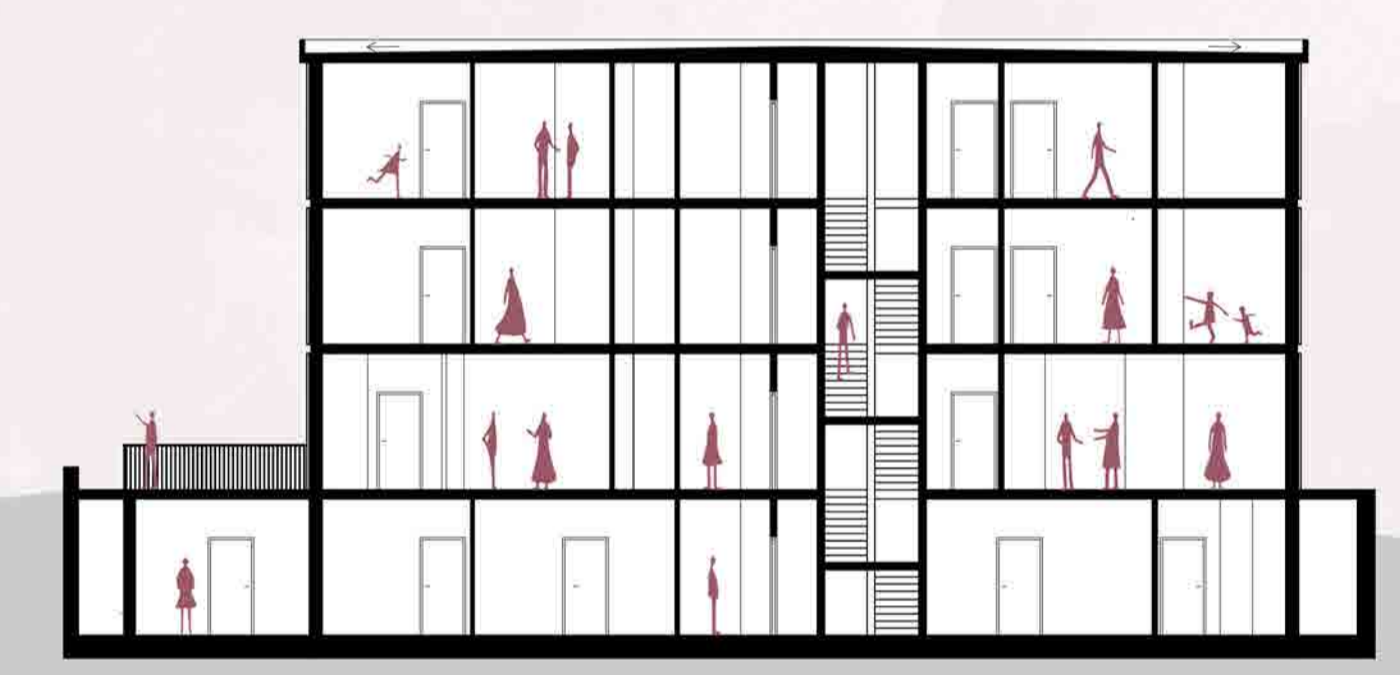


EXTERIOR

SECTION A - A



SECTION B - B



DELUXE ROOM