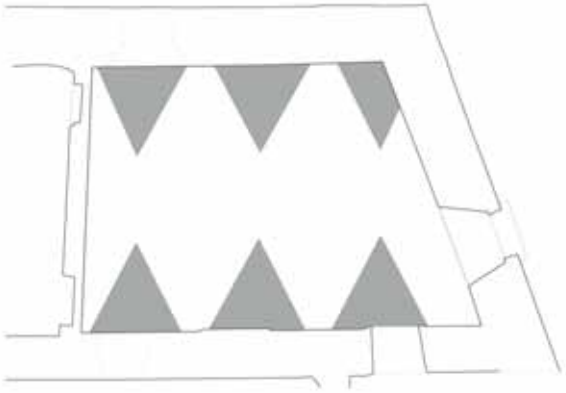
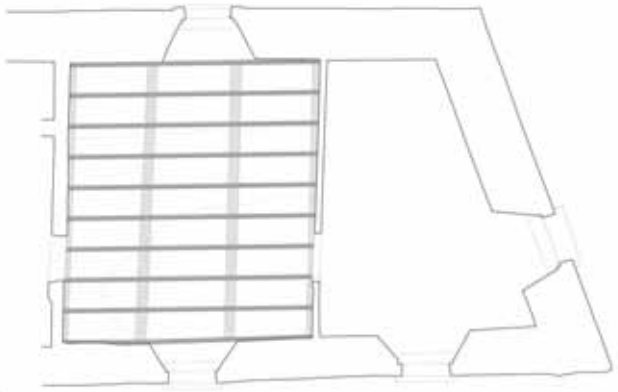
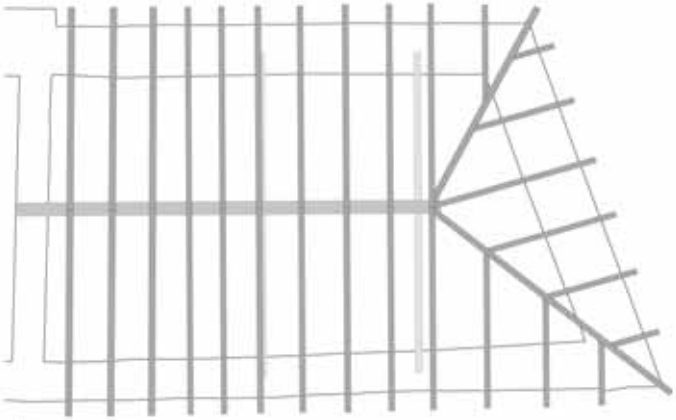
HORIZONTAL STRUCTURES | PLANS



PLAN A



PLAN B



ATTIC

HORIZONTAL STRUCTURES | AXONOMETRIC VIEW

AXONOMETRIC VIEW OF BARREL VAULT WITH LUNETTES

AXONOMETRIC VIEW OF WOODEN FLOOR

AXONOMETRIC VIEW OF ROOF SYSTEM

Structurally, the ground floor contains a barrel vault with lunettes. The loads are distributed across the vaults to create a larger span.
As with all arch-based constructions, there is an outward thrust generated against the walls underneath the barrel vault.
The walls, on which the barrel vault is entrained, are masonry structures.
This part of the castle was built after the XVI century.
In order to reinforce these walls, during the renovation of the XVIII century, was built a buttress on the south facade.
This buttress, that also covers a door that goes in the underground floor, is made of masonry.
This kind of vault allows openings in the facade and present a longitudinal important crack that runs along the whole vault.

The horizontal structure of the first floor is made of wood.
This kind of structure are less durable than masonry structure, even it could be strongly repaired or fully substituted over time.
The bidirectional floor is made by a double framework with six timber beams, which dimensions are around 30 x 23 cm, on which are entrained ten secondary beams, which dimensions are around 12 x 9 cm.
On this structure there is a system of plankings covered by poor mortar work.
The structure doesn't present pavement because the floor over is not walkable.

The roof system of this part of Castel Malegra is made with a wooden structure.
This kind of structures are less durable than masonry structure, even it could be strongly repaired or fully substituted over time.
The wooden trusses that bear the roof system are on average well preserved because roten trusses were replaced during the renovation works in 1958.
This kind of structure presents different characteristics that differenciate it from the "Piemontese" or "Lombardo" typology.
In fact the secondary system that bears the roof is separated by a ridge pole from the main trusses. Then we could find the sheathing from wooden boards, boarding poles and the cover made all Prode.

LOAD DISTRIBUTION SCHEMES

SECTION B-B'

SECTION C-C'

Snow load to this part of the building is collected by the wooden roof system: in absent of purlins, the load and self weight of the roof are transmitted by the rafters directly to the walls (P1) and to the ridged post of the wooden trusses. P2 - axial forces in the rafters of the wooden trusses. P3 - tie force in the wooden trusses.
Distributed loads are collected by the floor system (wooden beams on the third floor). P4 - vertical load to the main wooden beams. Main wooden beams transmit load horizontally to the bearing masonry walls (P5). The last ones vertically transfer load to the foundations and then to the ground.
Distributed loads of the first and ground floors are transmitted to the walls by vaulted systems. The cuneles distribute the compression strain - allow the opening of the doors and windows (P6).P6 is resistance to the outward thrust. P7's and P11's (ceilings tend to buckle the walls outward). P12 - resulting load for the foundation.