



AVIATION INFRASTRUCTURES

JSF Project References

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MARISTAER GROTTAGLIE AIRBASE - J.S.F. F35 PHASE IN PROGRAM - ARCHITECTURAL AND ENGINEERING ACTIVITIES




 New fence line


 JSF F35 Hangar

 New roads and urbanisation

 New Defense Building

 New CND Laboratory

 New COCA Tower

 New entrance to Base



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MARISTAER AIR BASE, NEW HANGAR BAY FOR JSF (JOINT STRIKE FIGHTER) F35

Client: Italian Ministry of Defense - Air Force

Location: Grottaglie, Italy

Period: 2012-2014



Scope of work: final design of the new aircraft maintenance and repair Hangar Bay and its appendices to accommodate the F35 aircrafts at the Grottaglie Air Base of the Italian Navy.

The complex is composed of the hangar itself (Bay) and its appendices. The Bay room, with a surface of 1500 m² and main span measuring 40 m, is the place where maintenance operations on the aircraft are carried out.

Appendices include offices, warehouses for spare parts, workshops and laboratories for maintenance operations of on-board equipment.

The activity carried out included architectural and structural design, geological and geotechnical evaluation of the area, design of mechanical, electrical and special plants.



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The volume of the Hangar Bay is independent from that related to appendices in order to enable prefabrication of its sections and easy installation on site.

The maximum height is 18.30 m at the highest point of the truss roof of the Hangar Bay.

Inner volumes develop over different heights: from 12 m (Hangar area) to 8 and 4 m (appendices area).

The entire building is divided by two expansion joints in three independent bodies of rectangular form. The main volume of the Hangar is entirely devoted to serve the Bay. The three appendices are mainly constituted by a pre-cast panels building whose rooms are distributed to form a "C" shape around three edges of the Hangar Bay, which is centered placed. All adjacent rooms are accessible from both outside and inside of the bay and also accommodate additional machinery for complementary maintenance works.

The two lateral bodies have dimensions 53.50 mx 15.50 m, whilst the intermediate casing measures 54.00 mx 15.50 m.

All workshops are served by dedicated cranes.

Technical rooms are hosted in a 10 x 18 m building, which comprises thermal plant, compressors room, water management and electric sub-stations.

The pitch for aircraft washing is constituted by a paving of about six thousand square meters, comprised between the inlet side of the new Hangar and the rear part of the existing one. In the southeast area the new Command and Control building is planned to be placed.

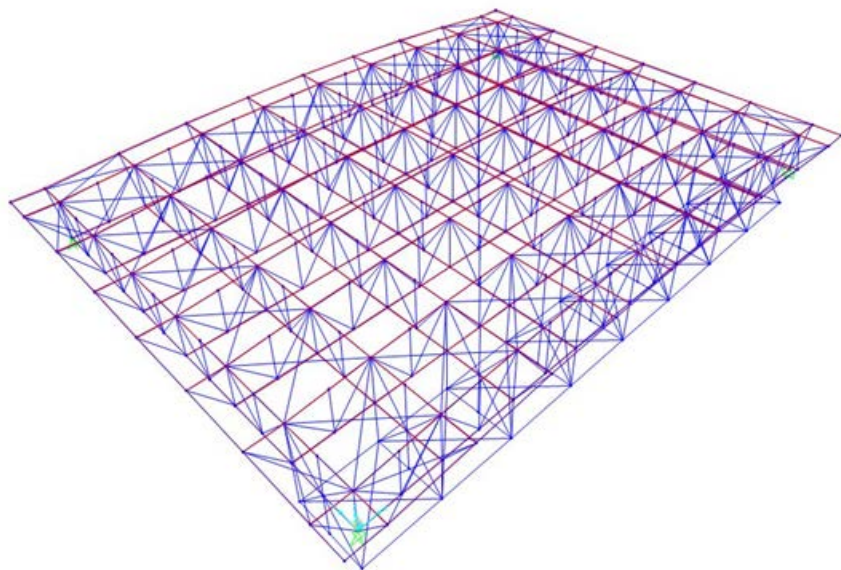
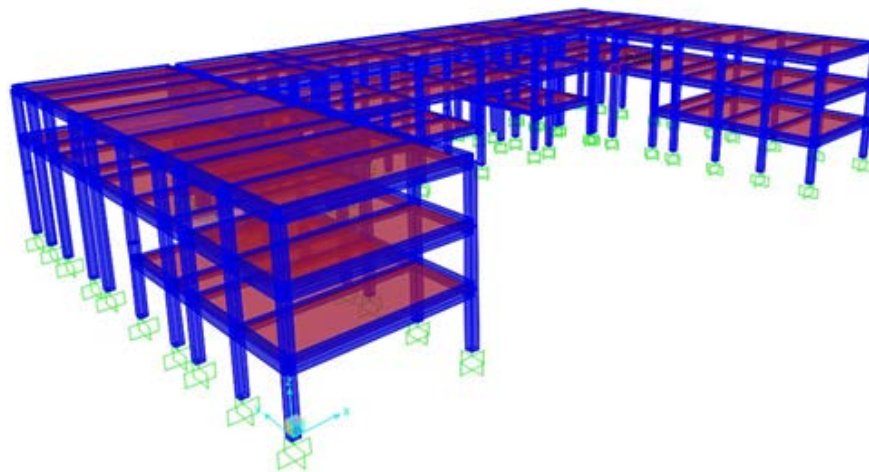


The three bodies are characterized by a sequence of portals parallel to each other, arranged with variable distance between 3 m and 10 m.

Portals of the two lateral bodies are formed by two columns connected in the longitudinal direction of the bodies by the 1 m high edge beams and in the transverse direction by the beams embedded in the floor thickness.

The floors are composed of precast prestressed hollow core slabs of 15,50 m length and 50 cm height.

The floors have the dual function to create a smooth surface and establish a bond of rigid diaphragm in the plane.



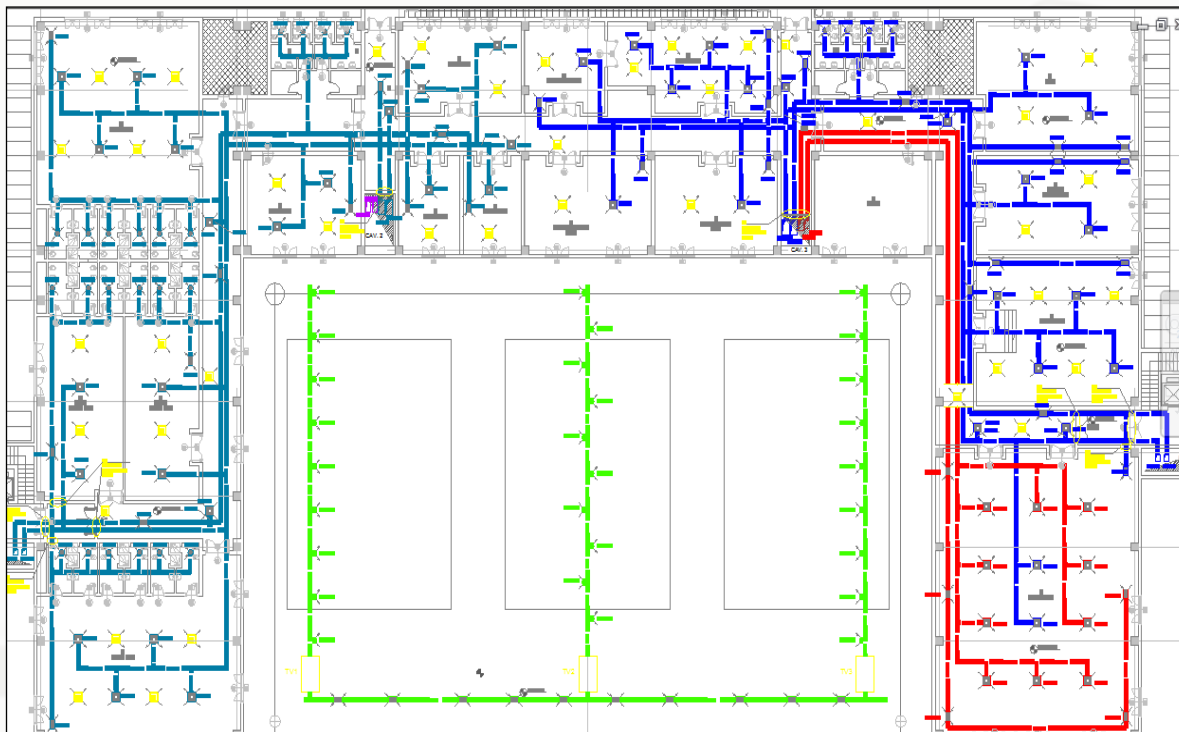
Horizontal actions acting on the building in the longitudinal and transversal direction are balanced by the 3D base columns constraint.

Connections between columns and transverse and longitudinal beams are designed to react as a solid constraint. In both directions the stiffness and resistance against horizontal forces is therefore entrusted fully to the portals.

The RC columns, with 700 mm x 700 mm size, as well as other RC/PC structural elements, are REI180 fire resistant, with a concrete cover of 6 cm.

The roof reticular structure of the Hangar Bay is composed of the two-dimensional lattice girders arranged so as to form a lattice space with a grid of 6.20 m x 5.90 m size. The trusses height is varying (from 3.4 to 4.6 m) to fit the roof curvature in the direction parallel to the main facade of the Hangar.





The M&E System concept is strictly connected to the specific requirements of the Air Force.

The main Maristaer air base area is provided with an utility network system in order to supply main services to each plot (Hangar, Traffic Control Tower and the Laboratory, offices , etc.). All M&E systems of each plot area are connected with the main utilities network at the boundary of each plot area.

In particular, the Hangar plot area is provided with HVAC system, fire fighting system, compressed air, water supply system, plumbing, nitrogen supply system, sewage drainage system, electrical system, ITT.

The boiler house, the air compressor room and the water supply pumping station are located in a technical building close to the main Hangar building. The fire fighting system is designed according to the NFPA 409. The fire fighting reservoir and the pumping station are located in the basement of the technical building.

The HVAC Chillers, AHU's are located in the Hangar building floor.

The Hangar HVAC concept is resumed in the following:

- Hangar bay: all air system
- Offices: primary air + fan coil system
- Shops: all air-conditioning system
- Seat shop: Dedicated ventilation
- Canopy shop: Dedicated ventilation

The main M&E distribution system of the Hangar, Traffic Control Tower and the Laboratory, run through vertical shaft placed close to the stair blocks.

The floor distribution comprise secondary branches installed in the false ceiling, running through the main corridors and serving each room.

The general criteria of Electrical System are resumed in the following.

The Electrical System is supplied by a MT-BT cabinet - the electrical lines are end points of the secondary switchboards located in each zone.

In each room accommodates a sub-switchboard which contains the safety switches.

The most important functions are managed by the centralized system of supervision and control through Profinet interfaces.

Transformers are independent and mutually substitutable.

All switchboards present three sections: one normal, one privileged and one of continuity.

The privileged supply, provided by the Air Base, is low voltage.

The section of continuity is UPS-based. It is used as supply for devices such as e.g. computer, etc..

The M&E system is managed by the Supervision and Control System.

Fire detection system

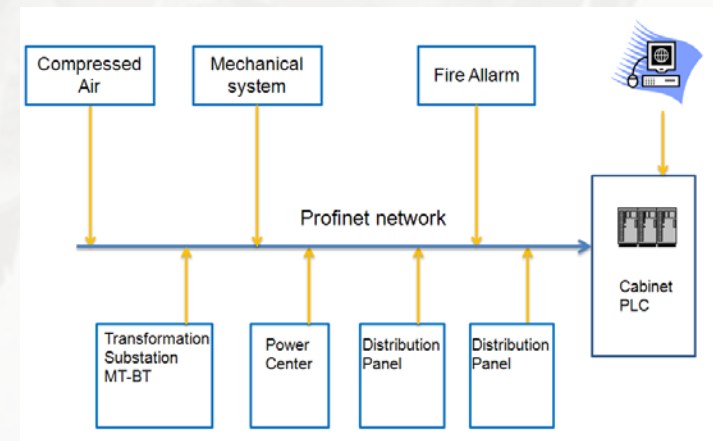
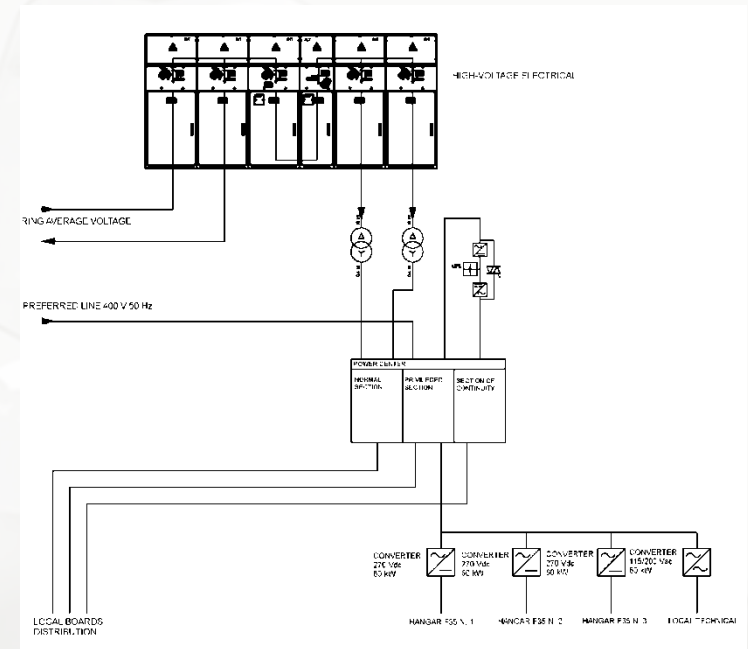
- Hangar bay: temperature sensors "ATEX" linked to the system management unit placed in a dedicated room.
- Building: smoke detectors and/or heat detectors connected to dedicated addressing unit.
- The fire detection system is linked to the main control system.

Safety system

- The building is tested for protection against lightning in accordance with IEC 62305.
- All facilities are connected to the grounding of the building.
- All switchboards are be equipped with appropriate "SPD".

Switchboard

- The Electrical System is supplied by a MT-BT cabinet, the electrical lines are end points of the secondary switchboards located in the respective zones.
- Building: sub-switchboard which contains the safety switches.
- Hangar Bay: switchboard to supply the electrical utilities.
- All control and management functions are linked to the main control system through Profinet interfaces.





MARISTAER AIR BASE, NEW AIRPORT TRAFFIC CONTROL TOWER

Client: Italian Ministry of Defense - Air Force

Location: Grottaglie, Italy

Period: 2013-2014



Scope of work: final design for the Air Traffic Control (ATC) Tower at the Grottaglie Air Base of the Italian Navy.

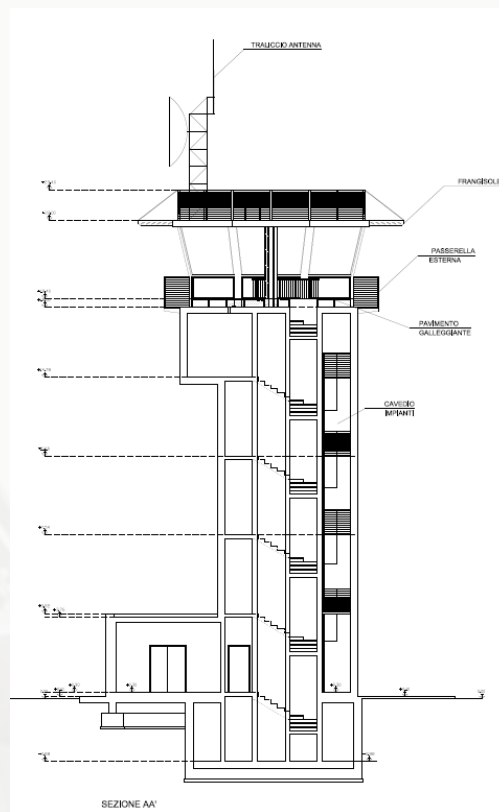
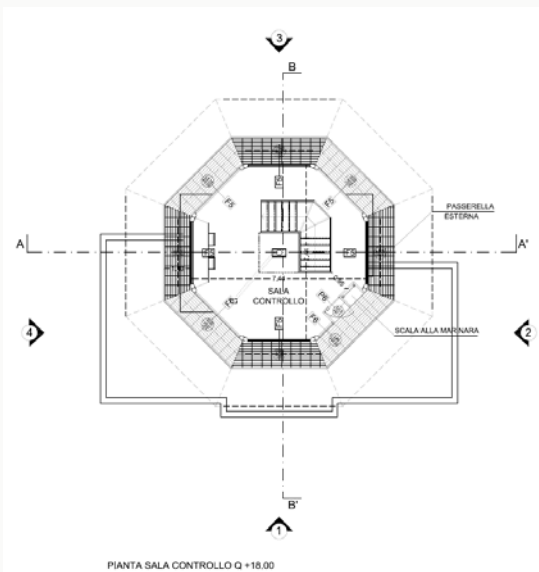
The tower building is divided into two main distinct functional areas: the ground floor housing the services of supervision and the one at level +18.40 m housing the operations room of air traffic control. The two rooms are physically connected by a staircase and an elevator whilst functional connection is through a shaft on the back of the structure, accommodating cables for power supply and data transmission. The volume of the building is about 1,153 m³.

Two more rooms integrated at the side of the ground level are dedicated to services and technical volumes.



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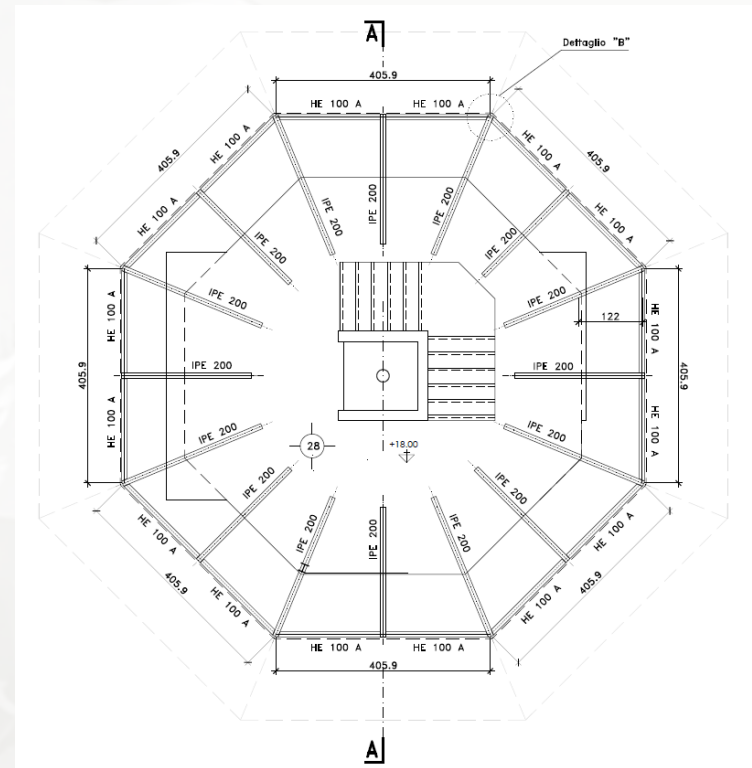
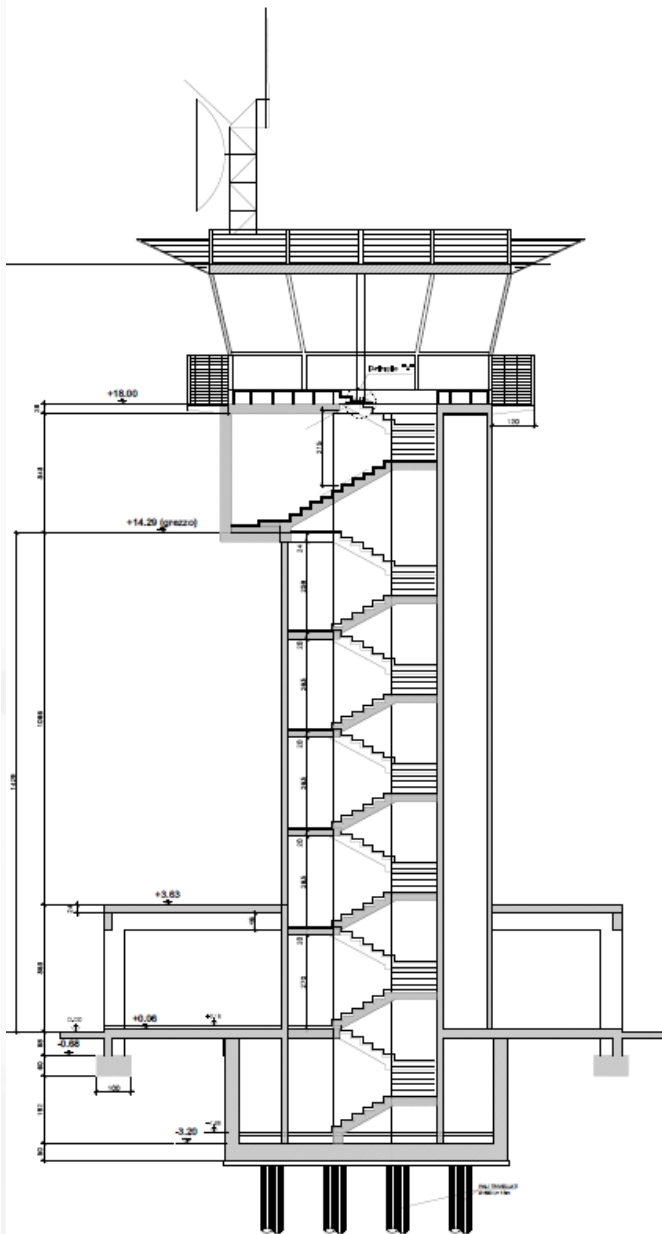




The control tower has plan dimension of 4.70 x 4.70 m and a total height of 22.0 excluding the radar system.

The underground volume has a depth of 3.20 m from the ground level to create a sight accessible area.





The structural system of the control tower is composed of an internal core of cast in situ reinforced concrete of 20 cm thickness, which encloses the vertical connections (staircases and elevator). The reinforced concrete central core has the role to withstand the horizontal actions, namely wind and earthquake. The central core reaches the height of 18.00 m while the upper 4 m are made of a steel moment resisting system. The steel structure represents the roof and the floor of the control zone.



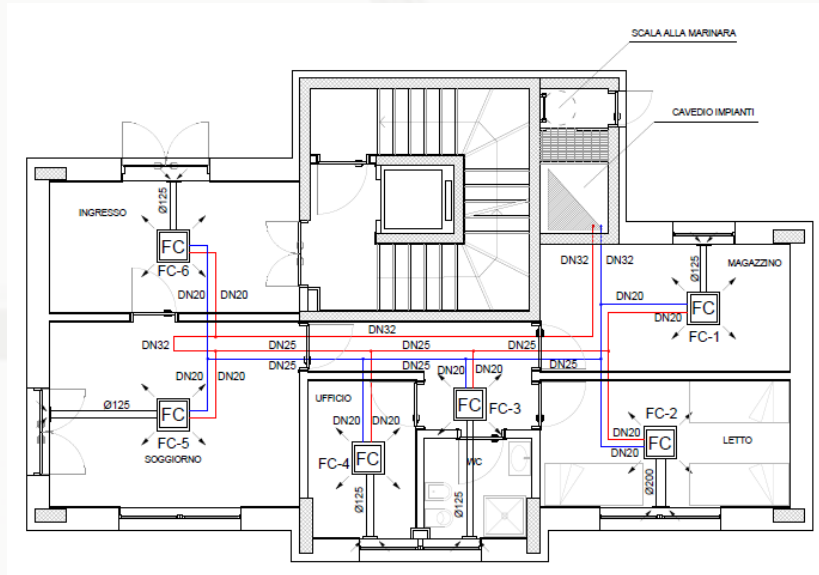
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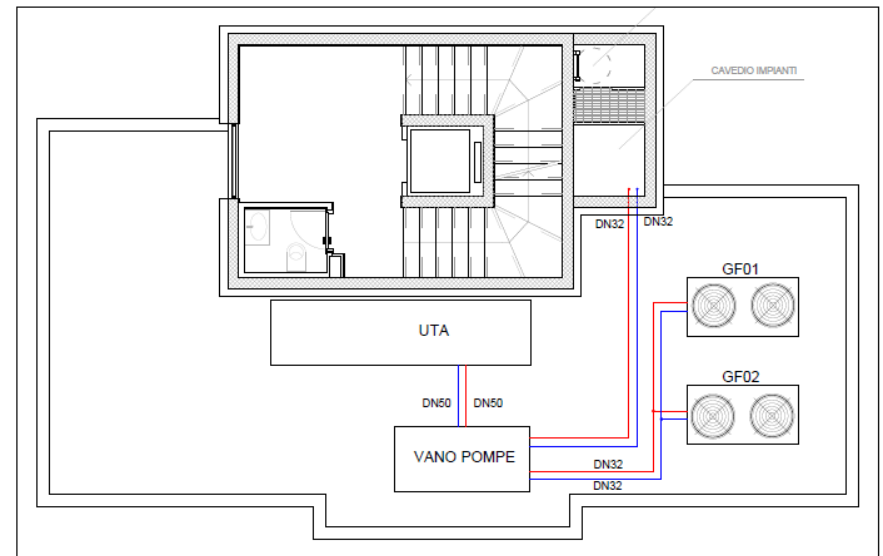


The M&E System concept is strictly connected to the specific requirements of Traffic Control Tower.

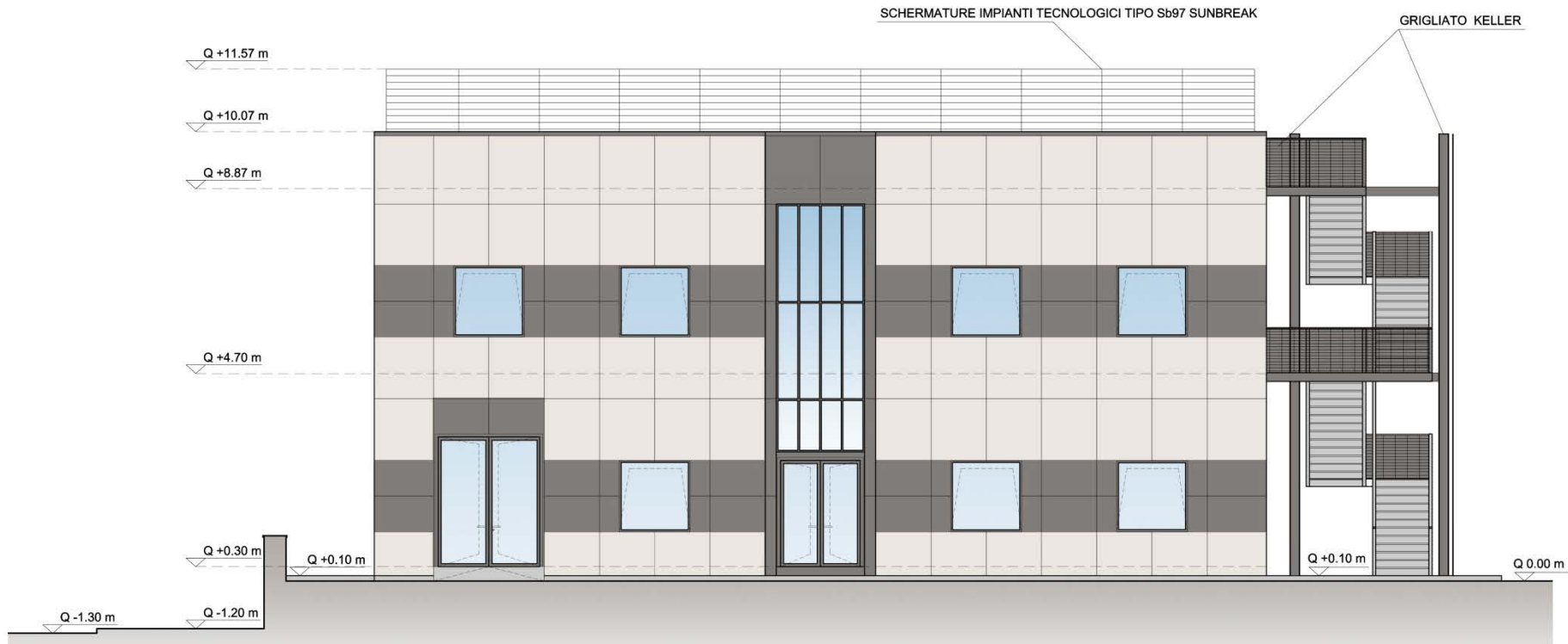
The M&E distribution system of the Traffic Control Tower runs through vertical shaft close to the stair blocks. The floor distribution comprises secondary branches installed in the false ceiling, running through the main corridors and serving the ATC main room.



HVAC system ground floor



HVAC system first floor



MARISTAER AIR BASE, NEW CND LABORATORIES

Client: Italian Ministry of Defense - Air Force

Location: Grottaglie, Italy

Period: 2014-2015



Scope of work: final design for the new calibration laboratories of the Grottaglie Air Base of the Italian Navy.

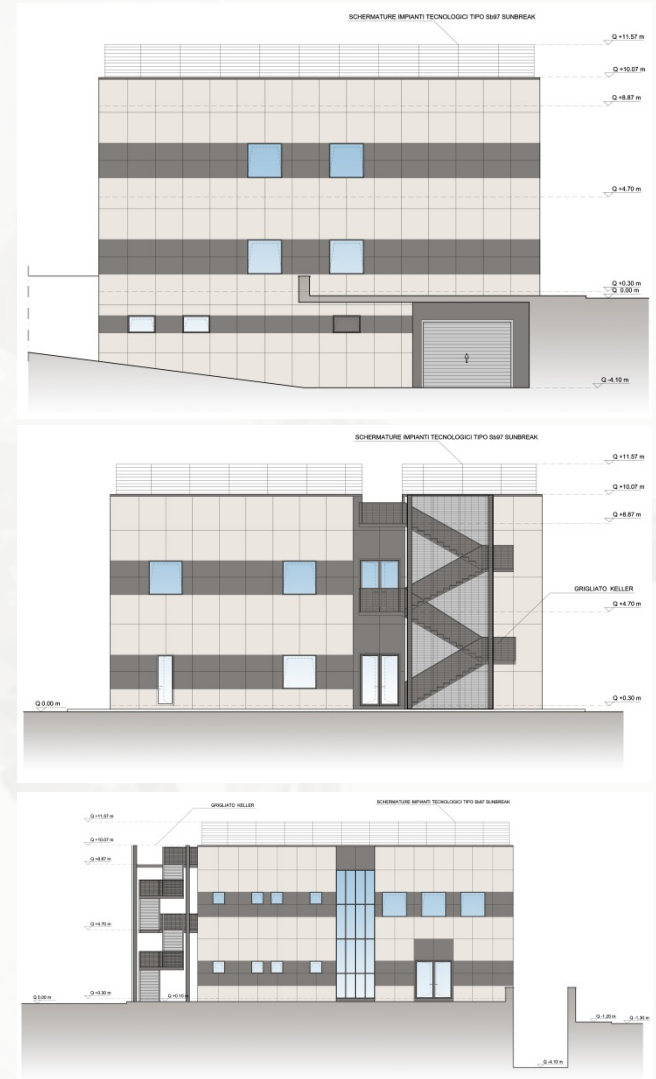
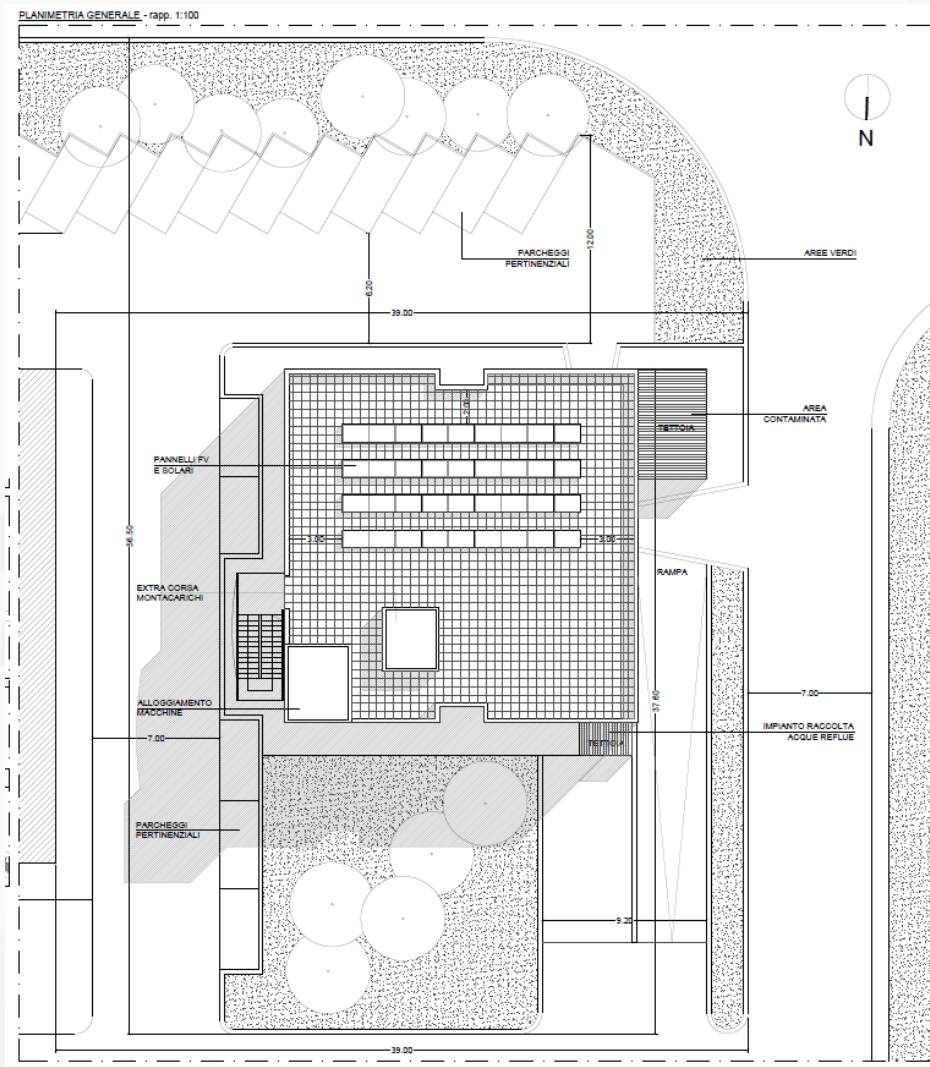
The volume of the Laboratory has dimensions 20 m x 20 m, with an height of 8.70 m above ground (5.700 m³). The building presents three floors internally linked through staircase / lift. All floors have an interior height of 4.00 m. The basement, located at -4.10 m is used as a warehouse, except for two distinct areas that accommodate the low compressed air plant and the X-ray room. The ground floor is divided into functional areas, hosting offices, reception, storage materials, two utility rooms, penetrant liquids and magnetoscopic (PT and MT) rooms, oils and fuels (SOAP) analysis, ultrasound and UT/ET alternate current. The first floor at + 4.70 m is composed of different kind offices and archiving services. The roof level hosts ventilation systems and PV panels.



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The new laboratory is located close to the building n° 40 (Avionic Laboratory), connected to the external area, and to building n°42. The external is completed with green areas.

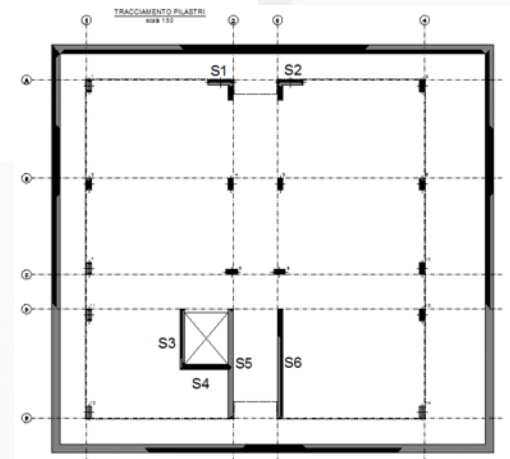
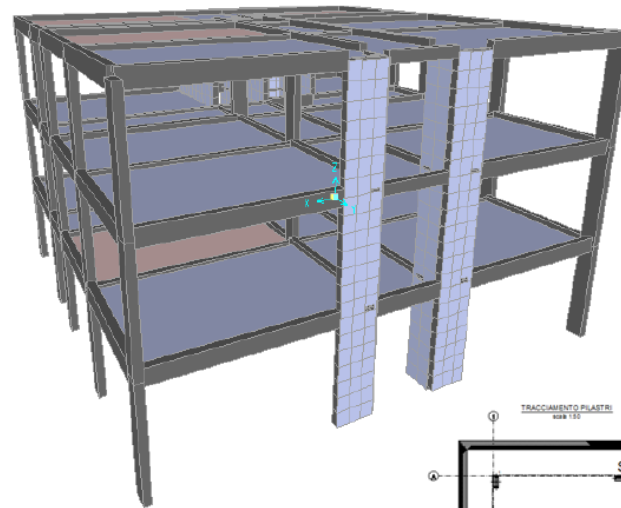
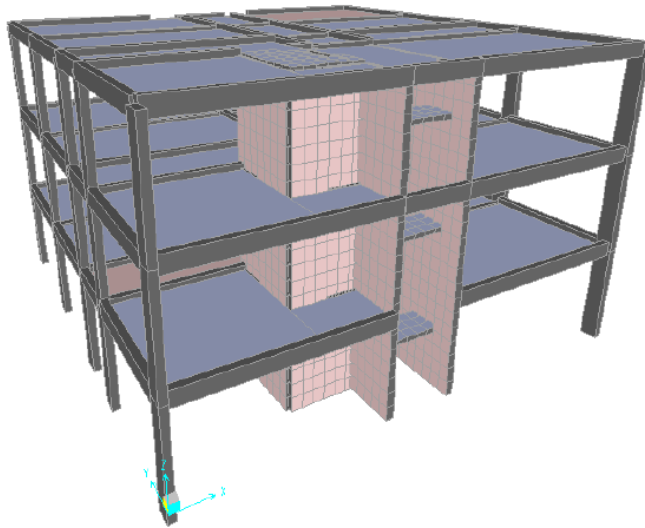


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The vertical structures are made of cast on site pillars and vertical walls, whilst the horizontal structures are made of predalles elements (reinforced concrete slabs with embedded reinforcement, suitably spaced from each other with the interposition of lighter elements made of expanded polystyrene).



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MARISTAER AIR BASE, JSF URBANISATION

Client: Italian Ministry of Defense - Air Force

Location: Grottaglie, Italy

Period: 2015-2016



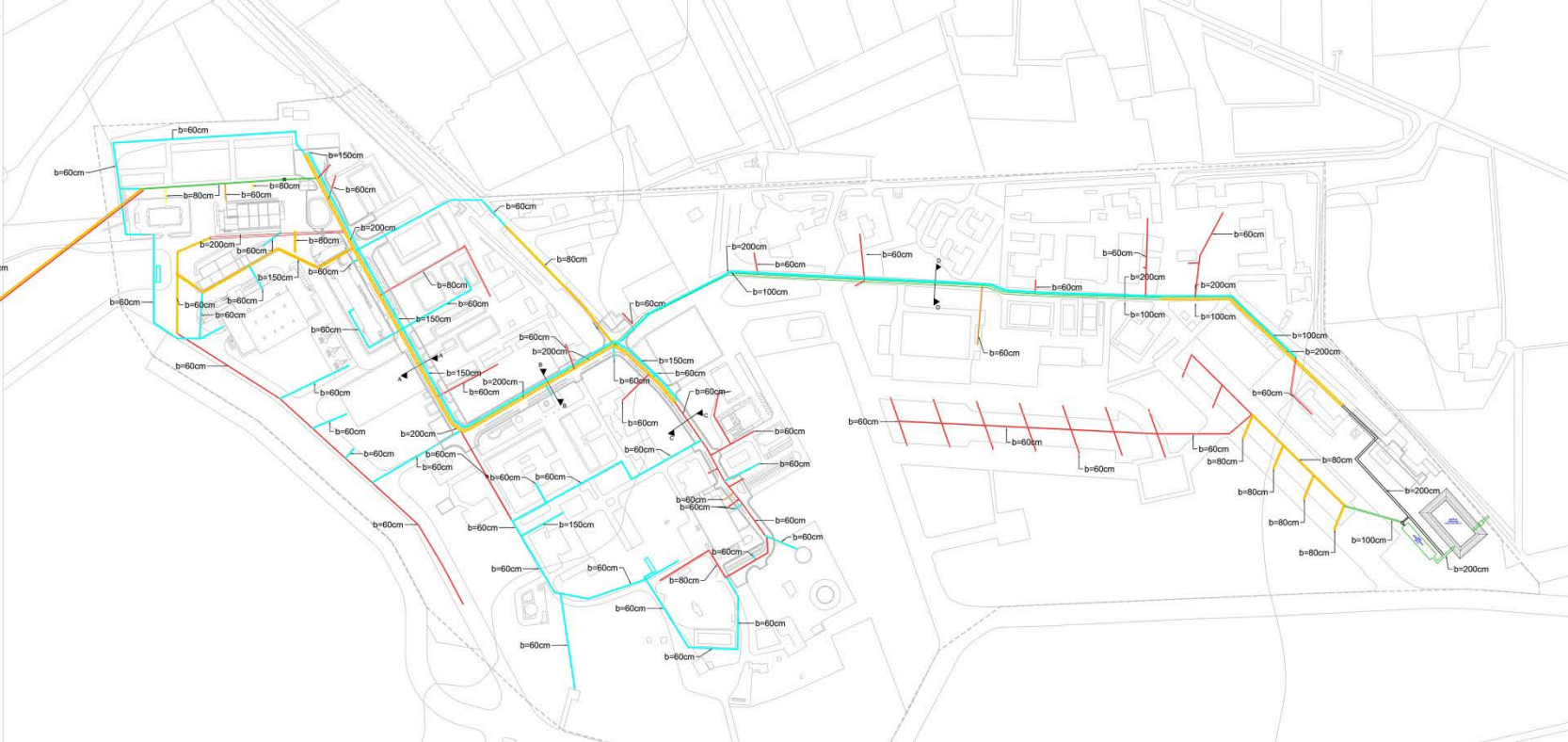
Scope of work: The Urbanization of the northern and central areas of the Maristaer base, is part of a whole General Program JSF adjustment of the base following the acquisition of new aircraft F-35 Lightning II. Operational requirements and management of the new aircraft necessitate the upgrading and adaptation of the infrastructure of the base, thus requiring the construction of new buildings for use by logistic and operational personnel in charge of the new aircraft services.



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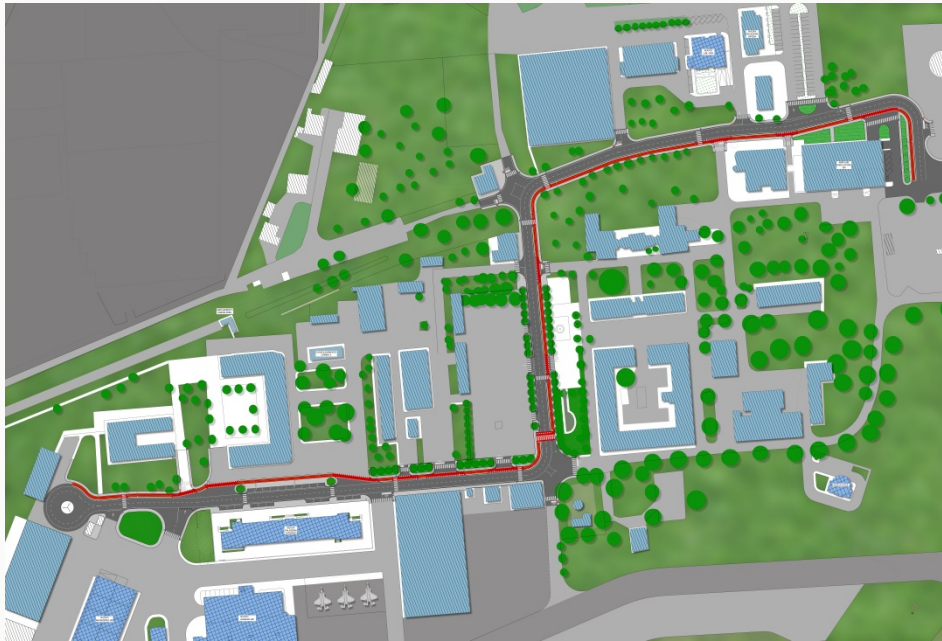


The urbanization works affect main ridges and branches of the building settlements services. In order to ensure the full operation of the base during the work, the full functionality of existing installations have to be maintained, thus avoiding any damage to the existing network infrastructure. In particular design activities regard: adaptation of the main road network, upgrade of electrical substations, sewage network, collection and disposal rainwater system, potable water distribution network, fire fighting water line, gas distribution network, data network, irrigation system line.

The urbanization works will also comprise:

- upgrade of electrical substations
- sewage network
- collection and disposal rainwater system
- potable water distribution network and irrigation system line
- fire fighting water line
- gas distribution network
- data network

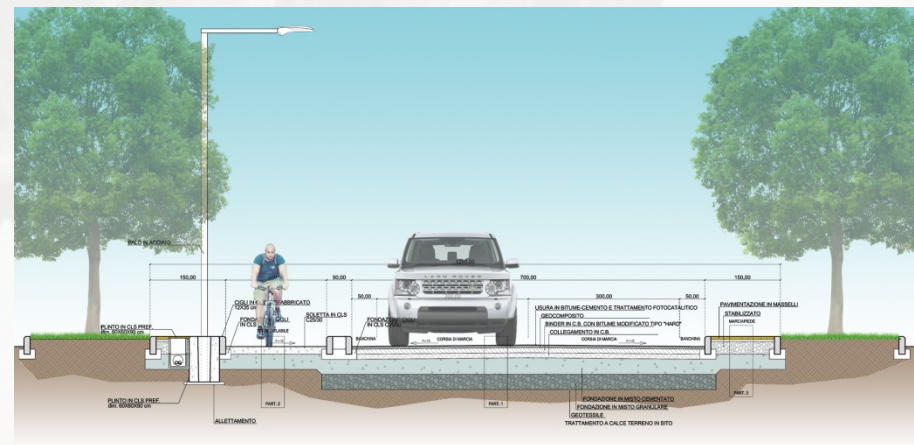
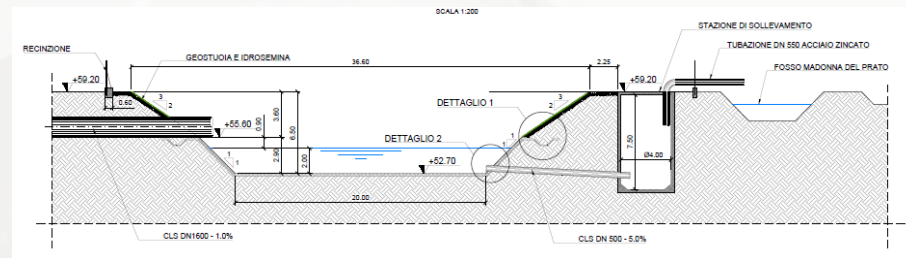
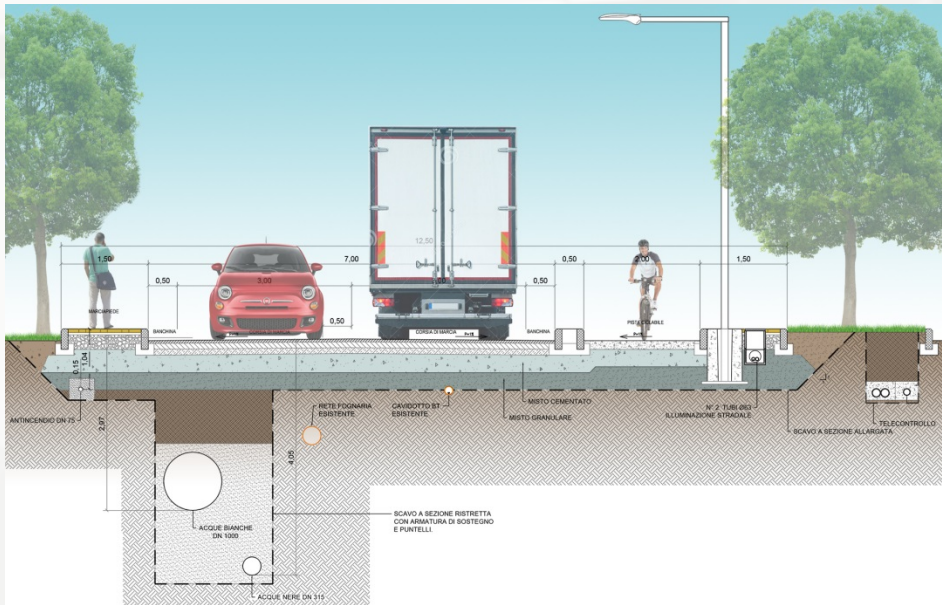


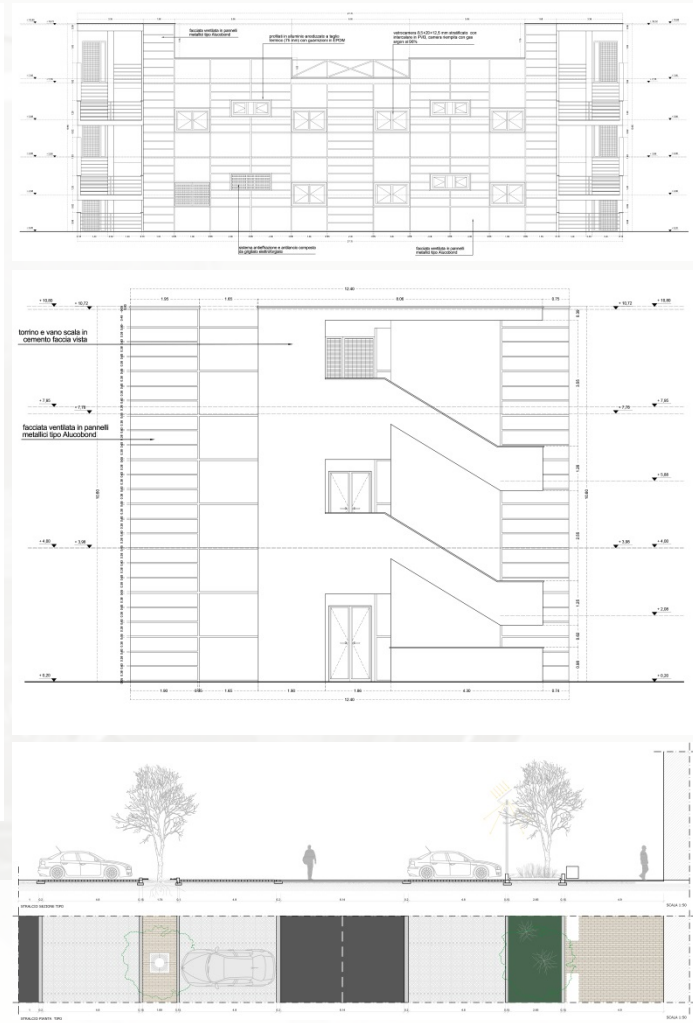
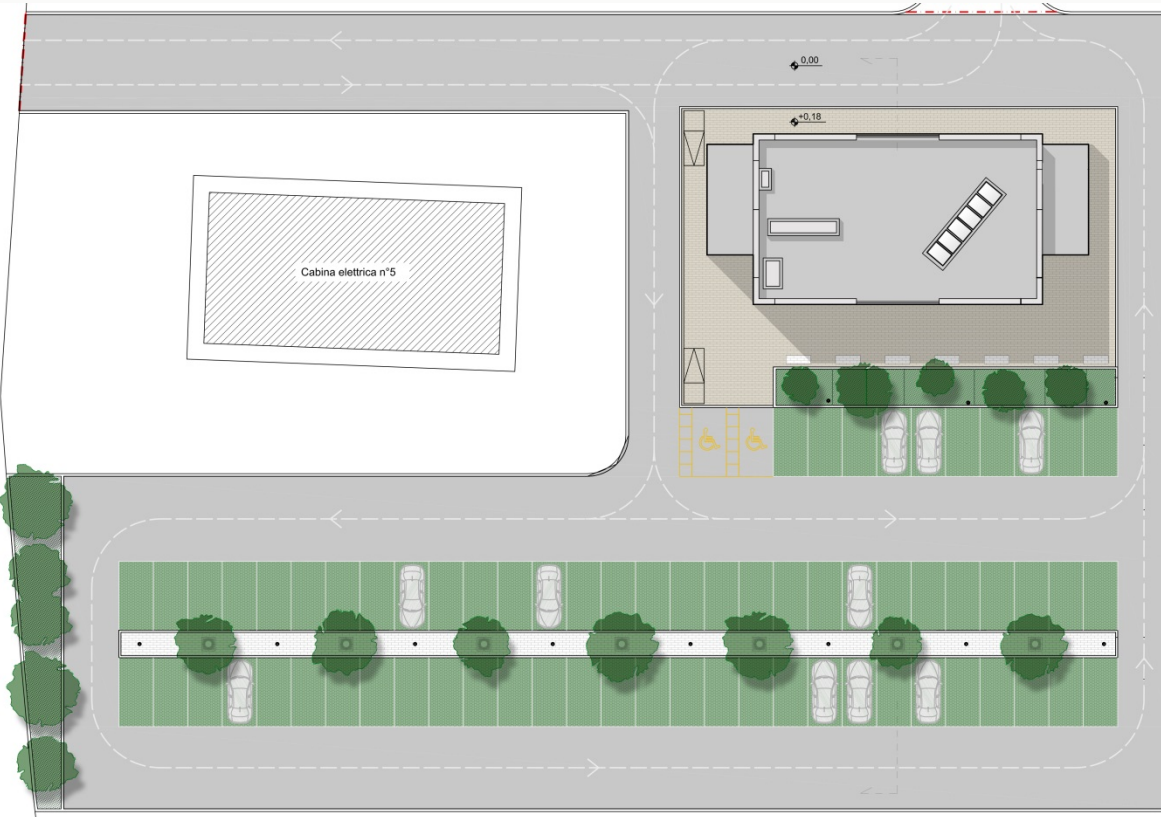


All the aforementioned systems are installed underground and the required operations have been planned to anytime guarantee respect to the existing plants. Connections between existing and new buildings has been analyzed in the view to safeguard requirements specified by the technical referees of the base.

The urbanization of the northern and central areas includes an upgrade of the main road that connects the northern and the southern part. The new road has been designed considering the operation of the long vehicles needed for the F35 assembling. The new road includes two main rounds about and new green areas.

The design of the road takes into consideration all the requirements for the provisional works needed to avoid service interruption of the existing installations.





MARISTAER AIR BASE, JSF DEFENSE BUILDING

Client: Italian Ministry of Defense - Air Force

Location: Grottaglie, Italy

Period: 2014-2016

Scope of work: The need associated to this asset raises from the Defense Administration strategy to provide the Grottaglie site with a new facility dedicated to the centralization of the defense control system. The final design enhances the concept of flexibility of volumes together with the use of last generation building components and plant systems, which conform to the highest standards in terms of durability (performance efficiency through time) and environmental sustainability .



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The final design of the Defense building has been developed through the following points. The structure consists of a rectangular three floors main body vertically connected by two external stairwells, oppositely placed on the short edge. A suitable architectural inclusion of the building and parking areas in the ambient context has been studied. All functions required to be accomplished within the building volume have been clearly identified and fulfilled, thus including an accurate optimization of internal layout. Security and accessibility systems, electrical system, lighting and grounding, special plants, waterworks and sewage, heating / solar thermal have been suitably accommodated.

Particular emphasis has been given to the analysis of technical solutions possessing a higher degree of environmental compatibility (use of non-hazardous to health and easily recyclable materials, installations and building envelope with high efficiency in order to minimize energy consumption and visual pollution) as well as maximizing safety aspects of place for users.



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The underground floor, accessible through the two external staircases serving the entire building, presents an area of about 230 square meters, whilst additional 150 square meters are occupied by the ground-structure interspace and technical volumes. The ground floor is the functional and operational core part of the building. It accommodates the Security Brief-room and the Security Control Service, two personnel identification and registration offices, defense service and NBC defense offices, secretary and weapons and ammunition rooms.

The first floor is dedicated to host the Base military personnel and it is provided with 8 double rooms, each with independent toilets. The roof floor, whose access is protected with a lockable gate, accommodates either the solar panels or mechanical equipment of the air conditioning system.

The vertical façade modules form a highly performant ventilated wall, being composed of an insulating layer and of internal fiber-gypsum plating. The fixtures, fully integrated in the façade, are made of aluminum alloy with triple seal and thermal break, with shatterproof glass chamber.



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