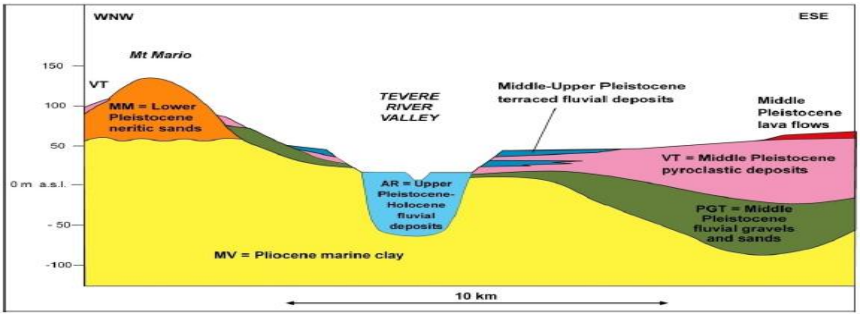
CRYPT RESTORATION ACTIVITIES

OF THE CHURCH OF SANTA AGNESE IN AGONE
IN PIAZZA NAVONA – ROME

PRELIMINARY ANALYSIS

The activity for the restoration of the Crypt of Santa Agnese in Agone began in March 2017 with a historical-scientific research aimed at evaluating its state of conservation. The Crypt of St. Agnes in Agone is located in Piazza Navona, in the historic center of Rome, where the Domitian Stadium was located from the 1st century AD. The Crypt is the only surviving part of the primitive church built on one of the arches of the Stadium, right on the site of the martyrdom of the thirteen-year-old girl Agnes in Agone in 305 AD.
The Crypt is currently closed to tourists because, after its last renovation in 1893, it was subject to natural catastrophic events (flooding of the Tiber river, heavy rains, etc. ...) that have ruined the ancient frescoes on the walls and ceiling.



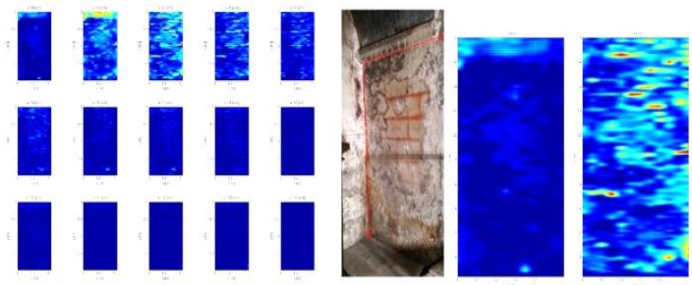
he Crypt is 12 meters above sea level, while the ground floor of Piazza Navona is 15 meters above sea level. The aquifer is located between 8 and 10 meters above sea level. In addition, under Piazza Navona, an ancient network of canals for the runoff of water has been identified at 13 meters above sea level.

PROGRAM OF ACTIVITIES

This information allows you to state that the presence of water is due to:

- Adsorption from the internal environment (as steam water);
- The capillary rising of water from the subsoil;
- The descent of water (due to rain).

Radar analyses have been performed on different surfaces of the Crypt in order to determine the presence of water. As shown in the following images, it is evident the presence of water up to a height of 50 cm from the floor. This is due to capillary rising phenomena.



The chemical and morphological analyses have shown the presence of calcium sulfate on the frescoes that have led to exfoliation, efflorescence and detachment of frescoes from the plaster.

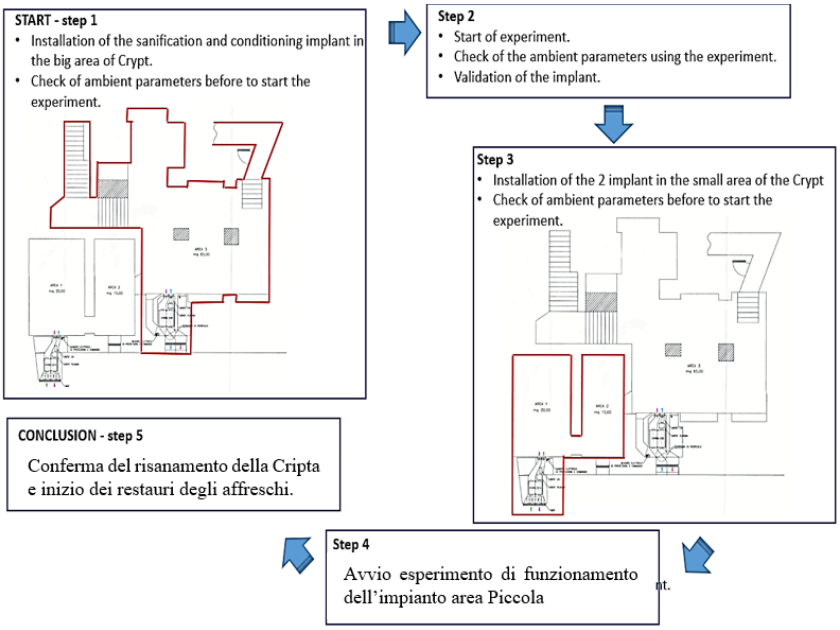
Against these results the planned interventions are:

- Promote ventilation;
- Limit the access of rainwater;
- Control humidity and temperature;
- Sanitize the indoor air.

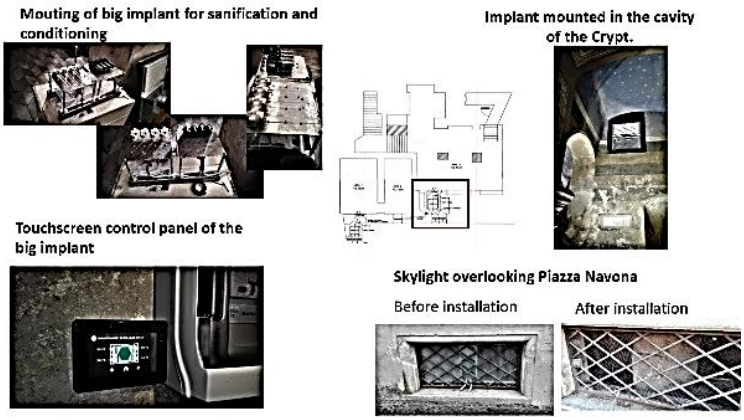
To manage and control the climate in the Crypt are used:

- Air conditioning systems located near existing openings.
- CNT (Charge Neutralization Technology) systems for neutralizing the electrical charge of the water on the floor in contact with the walls (to avoid capillary rising).
- Environmental sanitation system based on the use of a cold plasma to break down volatile organic compounds (VOC), atmospheric particulate matter and many varieties of viruses, bacteria, mold and fungi that could further damage the frescoes.

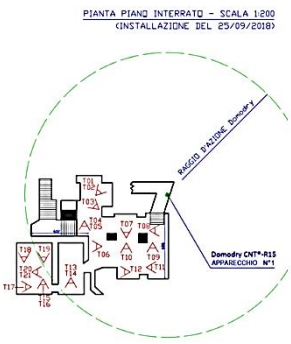
The operation of these systems aims to provide a favorable environment for the conservation of the frescoes in order to proceed to the consolidation phase and a careful restoration of the painted surfaces. The sanitation and environmental reclamation activity follows the flow reported in the following scheme:



EXECUTION OF ENVIRONMENTAL REMEDIATION CRYPT RESTORATION ACTIVITIES



At the beginning of October 2018 in the largest environment of the Crypt the first plant was installed to start the first experiment in order to evaluate the effectiveness and efficiency of sanitation and remediation (see image on the left).



Together with this system, a system of neutralization of the electrolytic charge of the water has also been installed to avoid the effect of the capillarity of the water coming from the subsoil (see the picture on the side: salient water).

THE HUMIDITY OF THE CRYPT TO STABILIZE

In July 2020 the temperature stabilized around 19°C, while the humidity, decreased compared to the initial value, and stabilized around 75-80 C until the end of March 2020, then rose and stabilized around 90 - 92 C from April to the end of August 2020.
It must be taken into account, as reported above, the position in which the Crypt is located; it is in fact close to the Tiber River with a substrate soil in which water permeation is very favorable; in addition, two meters below the Crypt flows an aquifer and under Piazza Navona there is a network of channels for the runoff of water.

One wonders: the humidity conditions reached, are they considered sufficient to consider the environment "under control", since these temperature and humidity values fall within the typical range of hypogeal rooms in the same territory?

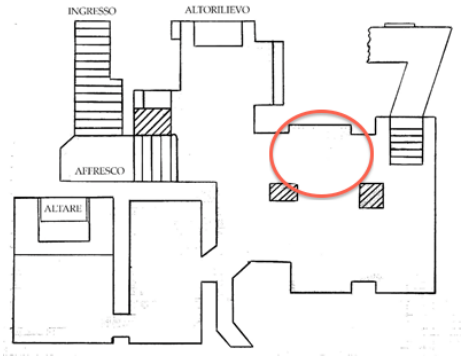
During the year 2020 the IREA Institute of the CNR carried out radar measurements of masonry and floors in the same areas investigated at the beginning of the experiment, finding the reduction of humidity and the presence of water in the masonry. Further georadar investigations will be conducted in October 2020 to complete the experimentation of the first area of the Crypt.

This will be followed by the environmental remediation of the second smaller area of the Crypt which includes a smaller environment and the medieval chapel. It is assumed that the experimentation of the air conditioning and environmental remediation plants is faster because the operating conditions of the plants have been identified after several variations during the first experimentation and the area of the second experimentation and therefore its volume is smaller.

In the first months of 2020 a MIBACT official, having taken note of the progress of the experimentation, suggested the possibility of a partial restoration of the treated area of the Crypt, in order to evaluate if the thermo-hygrometric conditions reached were suitable for the restoration of the frescoes. The work was carried out in the main hall of the Crypt in May and June 2020. The inspection carried out one month after the end of the partial restoration intervention, confirmed that the work has not undergone any alterations; it will be monitored at regular intervals in the hottest and coldest periods.

EXECUTION OF THE PARTIAL RESTORATION OF THE CRYPT AREA TREATED BY THE AIR CONDITIONING AND ENVIRONMENTAL RESTORATION SYSTEM

The intervention involved the restoration of the dry-painted surfaces in the main hall of the Crypt of the Church of S. Agnese in Agone.
The areas involved are:
- The arched wall and side pillars with fake ashlar decoration;
- Vault with representation of the four Evangelists.



STATE OF PRESERVATION

Walls

The pictorial surface was very decoted and in some areas, even completely detached: an immediate intervention was carried out to protect the dangerous portions of color.

The high percentage of humidity created saline efflorescence on almost the entire lower part, about one meter from the floor.




Vault

In the higher area the color was dusty and decoed; some areas show very evident color drops and widespread abrasions. During a manual typing analysis, small areas of detachment between the plaster and the masonry emerged. Medium-sized cracks were found along the attack profiles with the walls

RESTORATION WORK

The restoration work consisted of the following steps:

1. Pre-consolidation of the paint film over the entire surface with a 5% acrylic resin solution (MICROACRIL) in distilled water with the aid of Japanese paper (repeated up to three times).
2. Extraction of soluble salts with repeated cycles of localized Seppiolite packs. Depth consolidation with localized injections of mortar based on natural calcium free from efflorescence salts (PLMI).
3. Consolidation of the paint film with injections of acrylic resin diluted to 3% (ACRIL) with the help of Melinex foil.
4. Dry cleaning with scalpels, brushes and vacuum cleaners.
5. Solvent cleaning with localized compresses with ammonium salts solution (ammonium carbonate) and repeated rinsing with distilled water.
6. Micro-stuccature in small cracks carried out with PLM-S.
7. Grouting with mortar without soluble salts and for grain size similar to the original mortar.
8. For the pictorial retouching and the aesthetic presentation of the product, with the D.L. it was decided to close the images where there were clear references to follow, using fixed and consolidated watercolors; the grouts were always chromatically accompanied with watercolors.
9. Final protection for nebulization of Microacril at 1%.

Below are some examples of pre- and post-operative restorations:

Pictorial portion above the pillar before and after the restoration.


Detail of a sail before and after the restoration.


Complete vault before and after restoration

Vault after the restoration.

The inspection carried out one month after the end of the work, confirmed that the restoration work has not undergone any alterations; it will be monitored at regular intervals during the period that will involve the higher temperatures of both hot and cold.

PROGRAM OF ACTIVITIES FOR THE CONTINUATION OF THE RESTORATION AND RESTORATION OF THE CRYPT

The activity inside the Crypt will continue to complete by the end of the year the testing of air conditioning and environmental remediation systems in the larger environment and the installation of

machinery and start testing in the smaller environment at the beginning of next year with the aim of completing the overall remediation of the Crypt by July 2021.

In parallel with the completion of the experimentation in the larger environment, it is intended to continue the restoration work in order to accelerate the opening to the public of the premises of this environment. However, due to cost issues, the possible fragmentation of the restoration interventions according to the areas of intervention is also being evaluated. This obviously depends on the public and private donations, financing and subsidies that will arrive.
The subsequent restoration activities will also affect the second environment. It is assumed that such restoration work can begin in the second half of 2021.

Once the restoration of the entire crypt, the site of the Martyrdom of St. Agnes, has been completed, it will be necessary to plan the most suitable lighting design as well as all the protective devices for the pictorial surfaces and safety for the faithful visitors. In this way it will be possible to open this place of historical, artistic and cult interest to the public.

The information in this document is updated to August 2020.
For more information about the restoration of Crypt, you can send an email to luca.mazzola@emasst.com or visit the websites:
www.santagneseinagone.org
www.emasst.com