A crypt in the wood

Digital survey of the ruins of St Salvatore's Abbey in Giugnano, Italy

Sara MAGGI, Università degli Studi di Firenze Scuola di Architettura, Italy[1]

Keywords: Digital Survey, ruins, 3D laser scanner, medieval archaeology, abbey

Abstract

This study is developed in a project of knowledge about the current state of the Abbey of St Salvatore in Giugnano, through the use of cutting-edge methodologies in the field of architectural survey.

The ruins are located in the middle of a grove of holm oaks, on the property of the Agriturismo San Guglielmo, along the Bai river in the Bruna valley; the location, close to a stream and in an area rich in raw materials, is not to be considered casual, in fact, besides being a place of prayer, it was also the site of an intense metallurgical activity. The relationship between the viability and the position of the monastery is narrow, in fact, near theabbey, an important road crossroads was inserted into which the two main routes of the Grosseto plain passed towards the hinterland inland.

The monastery has a rather troubled history. Born under the Benedictine order in the XIII century, it became a grangia of the Cistercian abbey of San Galgano in Monte Siepi. The hermits of Sant'Agostino acquired its jurisdiction at the beginning of the XIV century. However within a few years, it was then deemed a profitable loss and put back on the market.

From this moment on there are few information about San Salvatore a Giugnano, probably due to a gradual decline of the religious and metallurgical activities after the abandonment of the monastic order.

Today the crypt and the Gothic Aula are badly deteriorated, so it would be primarily needed to secure the structures and build a new entrance to the crypt.

After having acquired the historical knowledge, the work proceeded with a contactless 3Dacquisition survey: a measurable 3D prototype of the remains has been obtained using a laser scanner (model Faro X330), carefully designed to avoid shadedareas or loss of information. The survey was completed by a photogrammetric campaign developed with Reality Capture software.

The result of the laser scanner survey is a 3Ddiscontinuousmodel that comes from a scanning progressionregistered by specific software (AutodeskRecap_Pro) creating apoint cloud.

The 47 acquired scans have been processed in this semi-automatic software that recognizesand collimate the targetand homologous points into a unique 3D measurable model.

Next step was to merge the dimensional Recap model with the photogrammetric Reality Capture's one, in order to finally provide a highly detailed - chromatic textured representation of the ruins. That has been achieved with the following process:

- using *Align Images*on the photos obtained during the photogrammetric campaign, it has been created a dense cloud of coloured aligned dots;
- build a triangular mesh;
- apply a coloured texture to the mesh, obtaining a continuous and textured 3D model (Fig.1).

[1] Author's address: Sara Maggi, Università degli Studi di Firenze Scuola di Architettura, Via dei Canneti n 10, 53045 Montepulciano (SI), Italia; email: sara.maggi1@stud.unifi.it

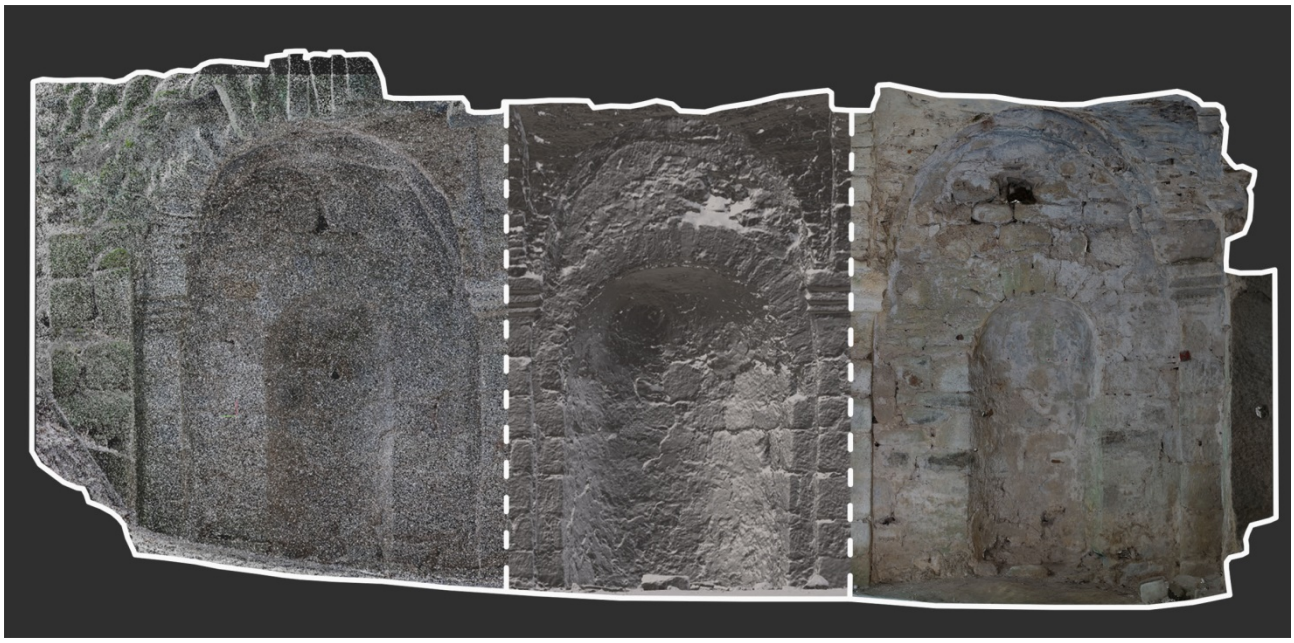

Fig. 1. Transition from the point cloud model to a mesh textured model

An in-depth study has been besides carried out about the historical and territorial context by consulting various indirect sources preserved both in private and public archives, in order to better understand the place where this monastic complex is set and trace the main events of its history.

This is followed by an in-depth study of the materials and technologies applied in the construction phase, seeking the unit of measurement applied to the construction of the abbey and comparing it with other similar realities both at regional and extra regional level.

It was therefore possible to assume that the reference unit of measurement for the construction of the Roman crypt and of the Gothic Aula was the Florentine arm (0,5858 m) and its half both (Fig.2).

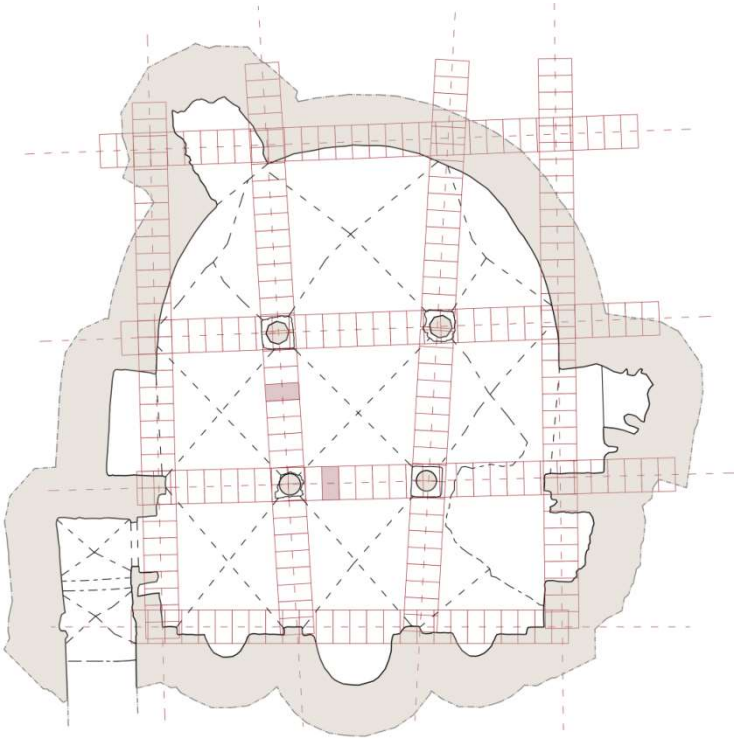

Fig. 2. Study of the unit of dimensional layout of the crypt

Of the monastery, to date, only the hypogean Romanesque crypt have been preserved, portions of perimeter walls of a rectangular Gothic Aula of later date and on the surface, hidden by vegetation, there are faint traces of walls that can be traced back to the church.

The crypt looks like today as completely underground space, which can be accessed only through an open breach on the ceiling of the vault (Fig.3). The plan has a rectangular design extended by a large semicircular oriented apse, where there are three loopholes, now obstructed. The room is divided in three naves and the roof is realized by a system of cross vaults which is supported by four columns. Every column capital has a different decoration.

The Gothic Aula has a rectangular plan, but only two outer walls still exist. Probably the entrance of this church was in the East wall, some traces of an arch springer are visible in this area.

Once acquired a good knowledge, the studymoved on to analyse the strengths and weaknesses that affect the building and the place where it is set, then trying to propose solutions on a critical issue scale.The work got completed defining some design guidelines for the future protection and a possible new use, supported by smart and modern communication strategies.

Fig. 3.View from the inside of the crypt

References

Brogiolo G.P. and Cagnana A. (2012). Archeologiadell'architettura: metodi e interpretazioni, Florence

Farinelli R. and Marrucchl G. (2005). Roccastrada e ilsuoterritorio. Insediamenti, arte, storia, economia, 2005, Florence

Rutishauser S., (1993). Genèeseetdéeveloppement de la crypte à sale en Europe du Sud, in "Les cahiers de Saint-Michel de Cuxa", Vol 24, Paris.