

The Basilica of Santa Caterina d'Alessandria in Galatina (Lecce, Italy): NDT surveys for the conservation project

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Abstract –

The basilica was built between 1369 and 1391, by order of Raimondello Orsini del Balzo. The building, on Raimondello's death in 1405, will be completed by his wife, Princess Maria d'Enghien, and then by his son, Giovanni Antonio Orsini Del Balzo. A study, using non-destructive techniques (NDT) was undertaken inside and on the façade of the Basilica to investigate the oldest structure of the church and to help in restoration work. The NDT analysis showed interesting results.

I. INTRODUCTION

Non-destructive techniques (NDT) includes Ground-penetrating radar (GPR) [5]. It is well known that is a near-surface geophysical technique that allows us to investigate and map buried archaeological features and the conservation state of some building structures. The method consists of measuring the elapsed time between when pulses of radar energy are transmitted from a surface antenna, reflected from buried discontinuities, and then received back at the surface. When the distribution and orientation of those subsurface reflections can be related to certain aspects of archaeological sites such as the presence of architecture, use areas or other associated cultural features, high definition three-dimensional maps and images of buried archaeological remains can be produced. A growing community of archaeologists, architects and restores has been incorporating ground-penetrating radar (GPR) as a routine preventive procedure for landscape and structural analysis [1, 2, 3, 4, 5]. The efficacy and applicability of GPR in the detection of invisible structures have demonstrate by several authors [2]. Ground-penetrating radar surveys were undertaken inside the Basilica and on

its walls to both ascertain the extent and location of the oldest structures related to the Basilica and to study the conservation state of the walls.

II. RESULTS AND DISCUSSION

The GPR surveys were carried out with the IDS Hi-Mod system using both the dual-band 600 MHz - 200 MHz and 900MHz antennae.

On the walls the data were acquired in continuous mode along 0.05m spaced survey lines, using 512 samples per trace, 60 ns time range for 900MHz antenna, manual time-varying gain function. In this paper, the results of area A were shown (Fig. 1).

The data were subsequently processed using standard two-dimensional processing techniques by means of the GPR-Slice Version 7.0 software [6]. On each GPR processed profile (Fig. 2a) several reflection events are present. Particularly a reflection event was interpreted as probably due to a vertical wall. In Fig. 2b the data set is displayed with depth slices. Relatively strong continuous reflections are visible on the depth slice. In this case, the shape and dimensions of the vertical wall are clearly evidenced.

III. CONCLUSIONS

The NDT survey by GPR allowed the acquisition of new data about the walls structures. In the area A The reflection event labeled vertical wall in Fig. 2a demonstrate the probable structure related to an older Greek church.

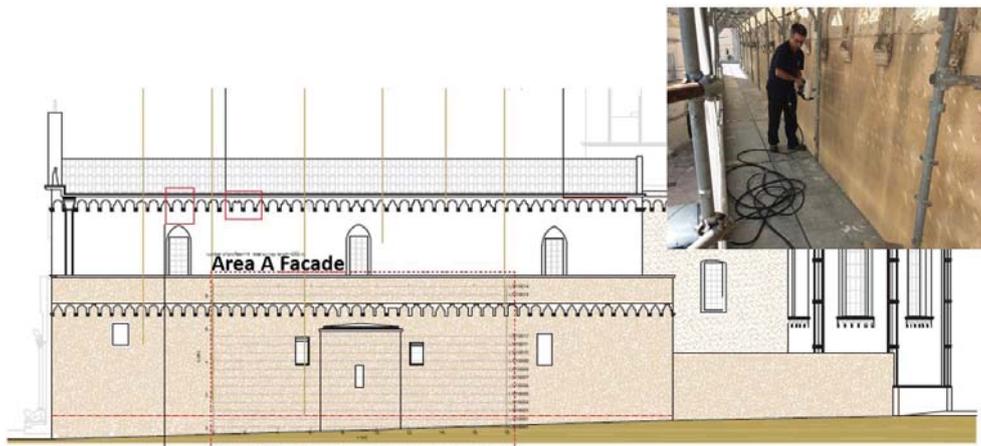


Fig. 1. The surveyed areas

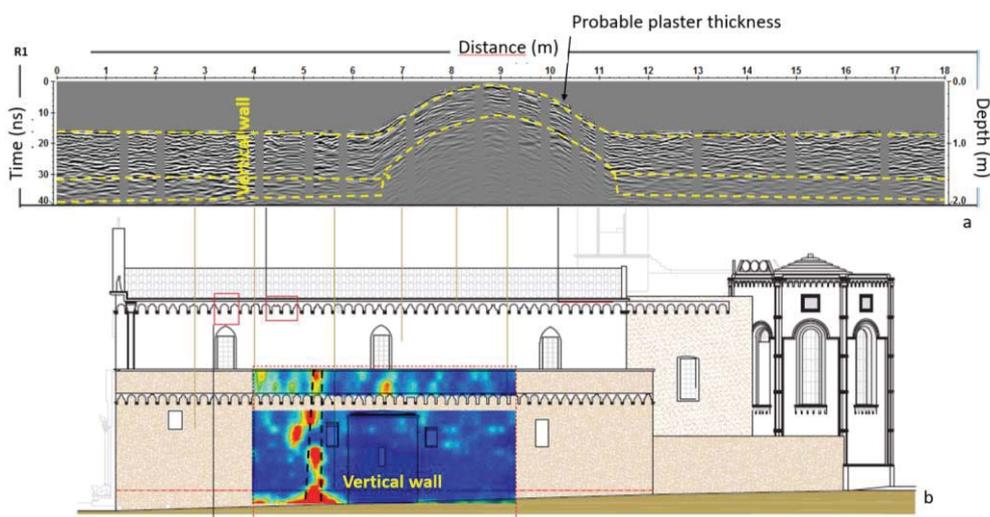


Fig. 2. a) GPR processed section; b) depth slice at 0.8m depth

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