

# Non-destructive techniques in the consolidation works of the Church of S.M. of Itria in Piazza Armerina (EN)

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## ABSTRACT

A real case of consolidation works is presented in which only field testing methods can reveal the causes of instability. This paper is an update of the one presented at the SAHC 2018 conference, concerning the study of the partial collapse of the Church of Itria in Piazza Armerina (Sicily, Italy) [1]. The previous paper bore hypotheses and design solutions based only on indirect investigations, theoretical formulations and checks with software.

The consolidation works, started in November 2018 and still in progress, have made it possible to formulate new and documented hypotheses on the collapse and to integrate and partly modify the solutions hypothesized previously.

In particular, the reconstruction techniques of the wall and chains have been confirmed [2]. The new interventions have, instead, concerned the consolidation of the foundation soil which was found to be insubstantial, following electrical tomographic investigations with 3D resolution, due to the presence of voids.

At the same time, inspections were carried out on an old masonry sewage pipe which revealed several points of discontinuity through which large quantities of water entered under the walls of the church causing the removal of inconsistent elements from the ground and the foundation masonry.

The inspection of the collapsed wall foundation, which could not be carried out before the start of the works, also revealed substantial damage.

At first, the reconstruction of the collapsed wall was done and the restoration of the existing wall structures, to eliminate the causes of the collapse through the intervention on the sewage pipe and filling the voids under the foundations.

The most important intervention, which required the use of innovative materials, forefront equipment and skilled labor, involved the filling the voids under the foundations through perforations every 50 cm, both on the inner and outer wire of the collapsed wall. Clamped canes were set in order to intercept the voids highlighted by the tomography. A 100% expansive mortar was injected at low pressure through the canes, filling one cane at a time and progressively raising the point of exit of the mortar until the higher far end.

After this consolidation, the foundation and the wall were rebuilt with local limestone ashlar to have fair faced aspect as the original masonry. At the end of the work, further tomographic tests are planned to verify the validity of the interventions carried out.

## REFERENCES

- [1] Villari L., *Storia ecclesiastica della città di Piazza Armerina*, Società messinese di Storia Patria, Messina (1988).
- [2] Basiricò T., Campione S., Cottone A., "Partial collapse and reconstruction of the vault of the Cathedral in Piazza Armerina (Sicily, Italy)", in *Structural Analysis of Historical Constructions: Anamnesis, Diagnosis, Therapy, Controls*, pp. 1683– 1690, (2016).