



POLITECNICO
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Honors thesis

Master of Science in Sustainable Architecture

Abstract

**Laser-scanning techniques and photogrammetric method
for an interpretation of the constructive characters of the
ancient historical heritage. The case of Susa**

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For the purposes of analyzing and protecting the architectural and landscape heritage, we know how essential it is to achieve as complete knowledge as possible, in order to investigate architectural assets in their complexity and in their relationship with the context. The prerequisite for the processes of protection and safeguarding of artefacts is therefore documentation, an operation that makes use of different techniques and disciplines. Alongside the analysis of documentary and archival sources, with the same level of importance, there is the collection of geometric and morphological data, exemplified by the metric survey and the relative graphic rendering: these two moments are both fundamental and inseparable.

During the survey operations it is now essential to have the most up-to-date geomatics techniques alongside the more traditional methods. This thesis, which has as its object the study of the archaeological complex of Susa and, in particular, part of the fortified wall and the Celtic altar with cupels adjacent to it, aims to clarify the potential and advantages of the different techniques, illustrating the different methodologies and how they can constitute a valid support for the analysis of architectural objects.

The first phase of the work concerned the acquisition of data in the field, through the use of low-cost technologies, which underline how the process of conservation and enhancement can be sustainable. The 3D metric survey involved the use of aerial and terrestrial photogrammetric techniques and LiDAR techniques, and was conducted together with the student team of the Politecnico di Torino "Team DIRECT" (Disaster and REcovery Team). Very accurate data were obtained which allowed the generation of 3D models from which it was possible to obtain two-dimensional drawings.

The second phase involved a "passage of scale": from the study of the site more generally, attention was paid to the detailed study of the north-western section of the boundary wall, an artifact dating back to the second half of the III AD, which today it is part of a complex reality and has been subject to numerous stratifications over the centuries. A flatness analysis was first conducted, aimed at verifying the presence of detachments and deformations of the curtain wall, then attention was paid to the stratigraphic analysis. The choice to rely on this discipline derives precisely from its nature: drawing its origins from archaeology, the stratigraphy applied to the elevated can be configured as a new key to reading and critical interpretation of the wall facings, allowing to advance hypotheses on the construction path of the artifact.

The awareness that this type of analysis reaches hypotheses rather than absolute truths demonstrates how the real intent is to implement a methodology that has already been codified for some time, using the most modern techniques of Geomatics, to bring the analysis process to a level most updated. The hope, therefore, is to reach a knowledge of the architectural object that is transversal and in some way "renewed", with the hope of providing a new cognitive contribution to a reality already subject to previous studies and still a source of perplexity.

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