

PHOTOGRAMMETRIC SILHOUETTE STUDY AND SILLE EXAMPLE

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KEY WORDS: Cultural Heritage, Documentation, Rolove, Conservation, Silhouette

ABSTRACT

Sille is a residence unit that is 8 km north-west of the city centre Konya and is located of the middle of Anatolia region. It is located between valley in the mountains area. This place accepted the extend of Toros Mountains and in the north skirt of extinct volcano crater.

Sille is an open museum with mosques, fountains, baths, churches, engraving church, bridges, and other historical places. Sille is a treasure that makes hosting for different societies during 5000 years history and it is also a trade and culture centre. Preservation and development plan were accepted by administrative of municipality at Sille that ownership of such historical background and work arts. The aim of this plan is preserve the of historical texture. Rolove surveys are needed to prepare preservation aimed development plan. for places that have historical textures.

In this study; rolave surveys and street silhouette works have been done in accordance with development plan. Works have been accomplished according to photogrammetric procedures and products obtained fully digital environment.

1. INTRODUCTION

Urban conservation is a multi-faceted issue, which necessitates utilization of complex data concerning geographical, architectural, social, economical and historical aspects of the town. It requires coping with various data types and data sources. Developments in the information technologies have been providing various tools in order to handle data, among which GIS take precedence in managing complex spatial data especially for the disciplines dealing with spatial problems.

Urban conservation, being a spatial problem concerned with complex spatial data, deserves making advantages of this new technology. The aim of the Urban Conservation Project is to document, analyze and evaluate the physical, economic and social characteristics of a historic urban tissue so as to develop proposals related to its conservation. (Cayci 2003)

Since the 1980's many "Urban Conservation Plans" has been produced in Turkey, parallel to the development of the planning process. These studies which contain the research, evaluation and planning phases use a variety of tools from conventional methods to "information technologies-GIS". (Basagac 2003)

2. SITE DESCRIPTION

The tiny village of Sille, where the first rock carved monasteries of the world were built, is an ancient settlement, leaning on the two slopes of a valley located in the 12km of the Northwest of Konya. In this area there are many monumental works such as a church dated back to 327 BC, rock churches remaining from earlier periods, and baths and mosques from the Ottoman period. Besides, the most of the historical settlement composed of civil architectural monuments. Today the whole area of historical pattern which is

33 ha, is under a conservation scheme as "Urban Conservation Area".

Sille was announced as an Archaeological Conservation Area of Urban and 1st Grade approved by the Konya Conservation Council of Cultural and Natural Assets with a decision dated of 19.06.1995 and registered of no.2292. The area was kept out of the urban development in the Master Development Plan of Konya with the scale of 1/25000 (Konplan2020) and defined as "Urban Conservation Area". (Erdem 2003).

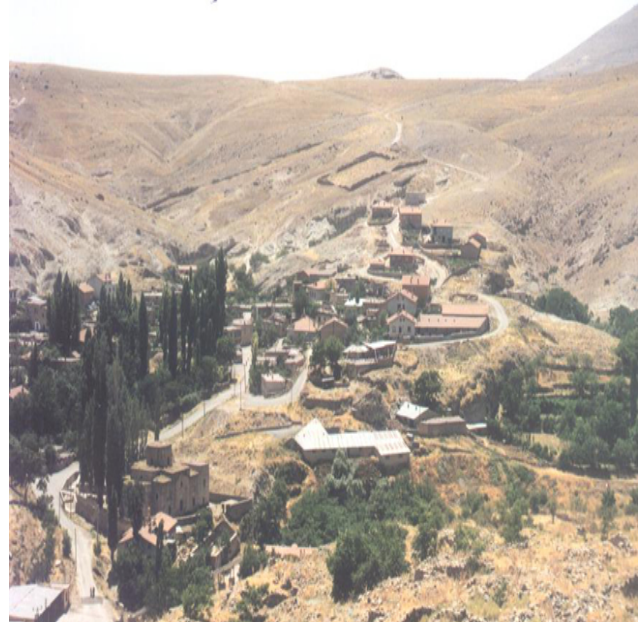


Figure 1. General view of Sille

3. PHOTOGRAMMETRY

Photogrammetry is the art, science, and technology of obtaining reliable information about physical objects and the environment through the processes of recording, measuring, and interpreting photographic images and patterns of electromagnetic radiant energy and other phenomena. From the Manual of Photogrammetry, Fourth Edition, published in 1980 by the ASPRS. It should be noted that the term art is applied as meaning skill which is obtained through experience.

The history of photogrammetry is classified into the four generations as follows:(Murai 2002)

1. First Generation: 1850-1900; the history of photogrammetry started after the invention of photography in 1839. The main technologies were terrestrial and balloon photogrammetry.
2. Second Generation: 1900-1950; the epoch was the invention

of airplane in 1905. Since then aerial survey has started with optical and mechanical technology, that is analogue photogrammetry.

3. Third Generation: 1950-present: the epoch was the invention of computer in 1950's which enabled analytical triangulation though analogue photogrammetry was still available.
4. Fourth Generation: 1990-present; the epoch was invention of digital cameras or CCD sensors which made possible digital photogrammetry, though analytical photogrammetry is still working together.

4. CASE STUDY

4.1 Field Works

Topcon 3005 reflector-less total-station was used to measure target and traverse net coordinates. Traverse station points established to produce topographic map in the project area. Firstly topographic map was produced. (Figure 2)

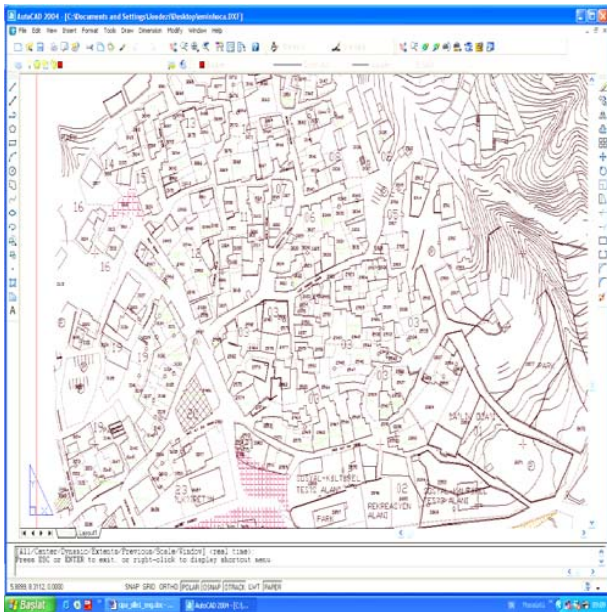


Figure 2. Topographic map of Sille

After the producing of topographic, map a wide avenue was selected as being pilot project. About 15 target points were measured for every house in order to be able to make exterior orientation. As mentioned above the total station has also the capability to work in reflectorless mode. So, reflectorless mode was selected surveying at the target points. All points were measured in Turkish national reference coordinate system.

4.2. Calibration

Photographic session was executed with Kodak EasyShare DX4530 digital camera that we have calibrated in our laboratory with EOS systems Inc. Photomodeller software for calibration, obtaining both the principal distances and the position of the principal point and K1, K2 constants to value the radial symmetric distortion of the lens. This camera produces TIFF and JPEG images. In this project we used JPEG formats.

Calculated Camera parameters are

Focal length : 8.129

Principal point X: 3.560

Principal point Y:2.579

Lens Distortion K1: 0.002444

Lens Distortion K2 :-5.881E-5

Lens Distortion P1 :2.177E-5

Lens Distortion P2 :9.482E-5

4.3- Photogrammetric Evaluation

The silhouette is a concept, which can only be fixed with predefined features. The silhouette belonging to a specific area can be obtained differently according to the predefinitions. The parameters of these definitions are the distance to the object, the height of the station and the plane, on which the silhouette are projected. (Kulur 2003)

In this silhouette project Kodak DCS 4530 digital cameras was used to take photographs. The photographs were taken by the digital photogrammetric methods.



Figure 3. One of widest avenue in Sille

Evaluation procedures have been made by Photomodeler software. Photomodeler is a windows based software that translate surveys and photographs to 3d models..132 photographs were taken for only one street.(Figure 4)

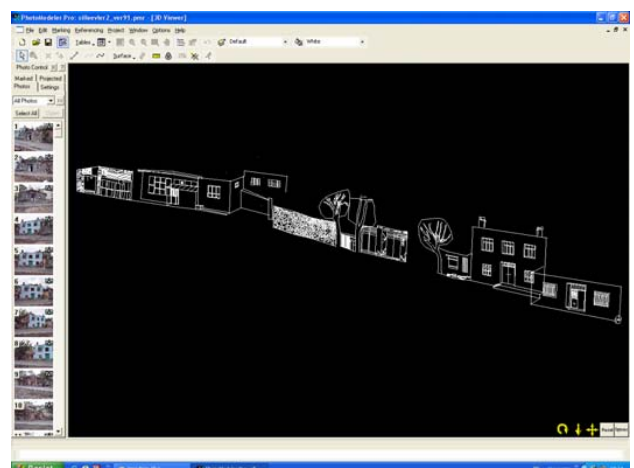


Figure 4. Photographed street

All photographs were transferred photogrammetric software. Natural points(window corner, end of the crack, corner of the certain stone) were selected as a target points. These natural points were used as a control points to execute exterior orientation. After the adjustment procedure accomplished ,

photogrammetric evaluation procedure was completed by the photogrammetrists. All data exported in Autocad environment. Namely, obtained results were in dxf format and city planners and urban conservators used this data in dxf format. Conservation experts and city planners used photogrammetric data in Urban Conservation Plans. (Figure 5)

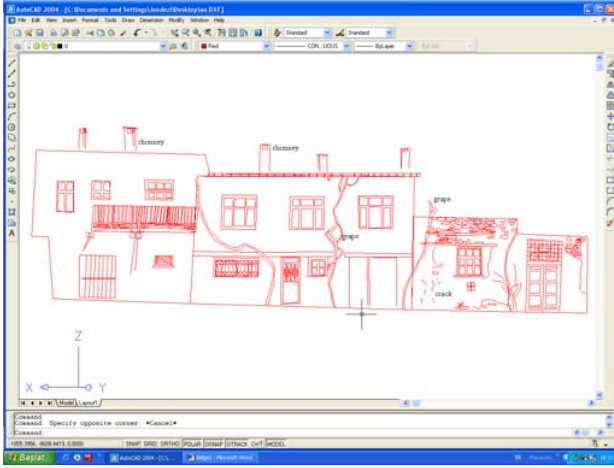


Figure 5. Facade drawings

4. CONCLUSION

This project is an Conservation aimed development Project and still in progress. Many disciplines, such as photogrammetrist architects urban planners conservation experts are working collectively . A small part of the project(pilot Project) was completed at this time. In this Project photogrammetric methods have been used at the first time for Street Silhouette. This method has many advantages according to the classical methods. One of the main superiority is to obtain all products in digital format. Digital data make easy a lot of works for urban planners and conservators to carry out Conservation Plans.

Geographical Information Systems (GIS) can help us to store, manage and display geographically referenced data so that geographically positioned sites which is linked to the vector type features on the maps and this information. Complicated data obtained can be controlled by means of the queries in GIS., GIS also ease the applications of conservation aimed planning decisions clearly, according to traditional evaluation methods. So. Next step of this Project is to establish the GIS system in order to manage data better and easily. Digital photogrammetric techniques will be use intensively for this project

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ADDITION CAD DRAWINGS

