OBTAINING OF ROLOVE FOR SOME HISTORICAL WORKS OF ART IN THE ERMENEK (KARAMAN) TOWNSHIP BY PHOTOGRAMMETRY

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ABSTRACT:

In this study, drawings of 14 historical house, 3 mosques and 2 silhouette of the street in the Ermenek were carried out by the means of Photogrammetric method. The photographs were taken with calibrated Nikon D200 digital camera. The ground control points were measured by Topcon 3007 Total Station. Photogrammetric restitutions and drawings were carried out by Photomodeler and AutoCAD software.

1. INTRODUCTION

Turkey has very historical and cultural heritage. Documentation, conservation and restoration of these heritages are very important in terms of human history. There are some methods to document historical and cultural heritage. These methods are classic, topographic, photogrammetric and laser scanning methods (Böhler and Heinz 1999, Scherer 2002). Close-range photogrammetry is very fast and reliable. In order to measure, document, model and monitor almost anything which is visible in a image, this method can be used.

In this study, drawings of 14 historical house, 3 mosques and 2 silhouette of the street in the Ermenek were carried out by the means of photogrammetric method. The images were taken with calibrated Nikon D200 digital camera. The ground control points were measured by Topcon 3007 Total Station. Photogrammetric restitutions and drawings were carried out by Photomodeler and AutoCAD software.

2. ERMENEK PROVIENCE

Ermenek is one of the most ancient urban centers that human being lived. Its history based on caves and stones era. It is known as the most important city in the Hapolla region in 2000 B.C. After 2000 B.C., different State such as Arzava, Hittites, Fyrik, Assyrians, Babylonians, Lydia, Persian Empire, Seleucids, Bergama Kingdom, Roman Empire, Byzantine Empire, Seljuk and Ottoman Empires were ruled in the Ermenek. Historical sites and cultural heritages such as Dalisandes historical city, rock graves, historic church, mausoleum, mosques, madrasas, and bridges are located in the Ancient City Ermenek. Most of the house in the Ermenek have abandoned and have not been repaired and has been exposed to natural destruction because it is away from great residential areas and a portion of Ermenek people have migrated to urban centers for the job concern. However, the house to continue living has survived. Konya Cultural and Natural Heritage Protection Committee has registered and made a protection program for the Ermenek houses and other historical heritages. Roloves of these historical heritages in the Ermenek Township should be drawn in order to do a protection and reconstruction plans.

3. APPLICATION

A local network covering Ermenek house is created to measure of ground control points. Ground control points are measured with Topcon GPT 3007 Total Station. Distance measurement precision of the Topcon GPT 3007 Total Station is ms=±(3 mm+ 3ppm) and angle measurement precision is 2.7 mgon. 280 ground control points are measured in this study.
The images of Ermenek houses are taken with Nikon D200 digital camera. This camera is a non-metric camera (Fig.1). The camera is calibrated by using Photomodeler software. The calibration parameters are as follows;

f = 18.1411 mm
W = 23.9155 mm ,
H = 16.0000 mm
$\mathbf{x_0}$ = 11.7246 mm , $\mathbf{y_0}$ = 8.3044 mm
$\mathbf{K_1}$ = 0.000539, $\mathbf{K_2}$ = -2.762E-7
$\mathbf{P_1}$ = 2.171 E-5, $\mathbf{P_2}$ = -1.638 E-5
Image size = 3872*2592
where:
f =focal lenght
W,H = sensor area
$\mathbf{x_0}$, $\mathbf{y_0}$:=coordinates of principal point
$\mathbf{K_1}$, $\mathbf{K_2}$, $\mathbf{P_1}$, $\mathbf{P_2}$= distortion parameters

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Table 1. Nikon D200 digital camera and its some properties.

NikonD200 	
Sensor	• 23.6 x 15.8 mm CCD (DX format) • 10.2 million effective pixels
Image sizes	• 3872 x 2592 [L] • 2896 x 1944 [M] • 1936 x 1296 [S]
File formats	• RAW (compressed / uncompressed) • JPEG (3 levels)
Auto focus	• 11/7 area TTL • Multi-CAM 1000
AF area mode	• Single Area AF • Continuous Servo AF • Group Dynamic AF • Closest Subject Priority Dynamic AF
Metering	• 3D Color Matrix Metering II • 1005 pixel CCD
Sensitivity	• ISO 100 - 1600 • Up to ISO 3200 with boost
Shutter speed	• 30 - 1/8000 sec • 1/250 sec X-Sync speed
Continuous	• 5 fps • 37 / 22 frames (JPEG / RAW)
White balance	• Auto • Six presets • Manual preset (four) • Kelvin temperature • Fine tunable
Image params	• Six preset looks • Sharpening: Auto, 6 levels • Tone: Auto, 3 levels, Custom • Color: 3 modes • Saturation: Auto, 3 levels • Hue: -9° to +9°
Viewfinder	• Eyepoint 19.5 mm • Frame coverage 95% • Magnification approx. 0.94x • B-type Bright View Clear Matte II

Restitutions and drawings of images of objects are realized by Photomodeler Software. PhotoModeler Software is developed by Eos Systems Inc. PhotoModeler photogrammetry software provides image-based modeling, for accurate measurement and 3D models in engineering, architecture, etc.

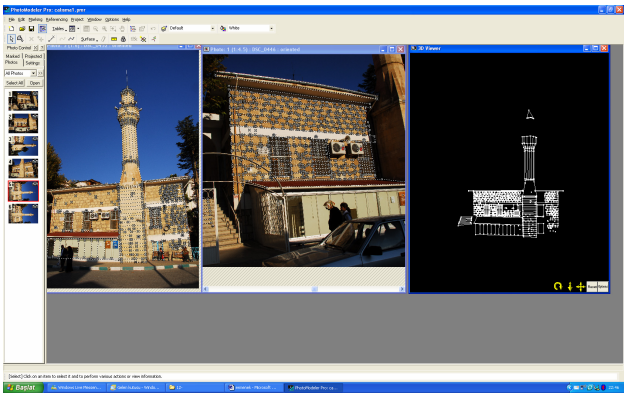

Figure 1. Restituion and drawing with Photomodeler software

Drawings of 14 historical house, 3 the mosque and 2 silhouette of the street in the Ermenek were carried out by the means of Photogrammetric method.

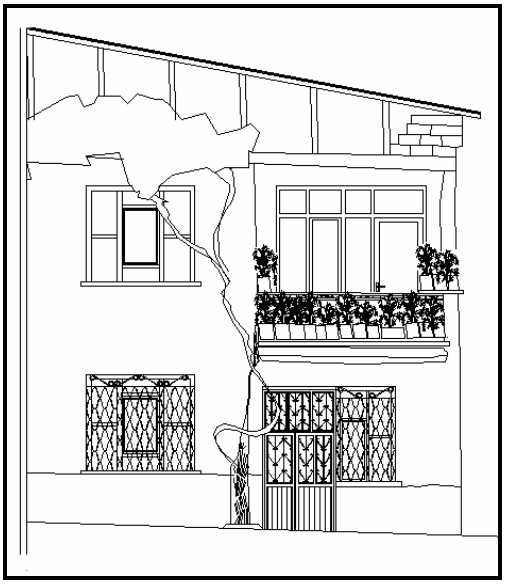

Figure 2. Some drawings of Ermenek Houses

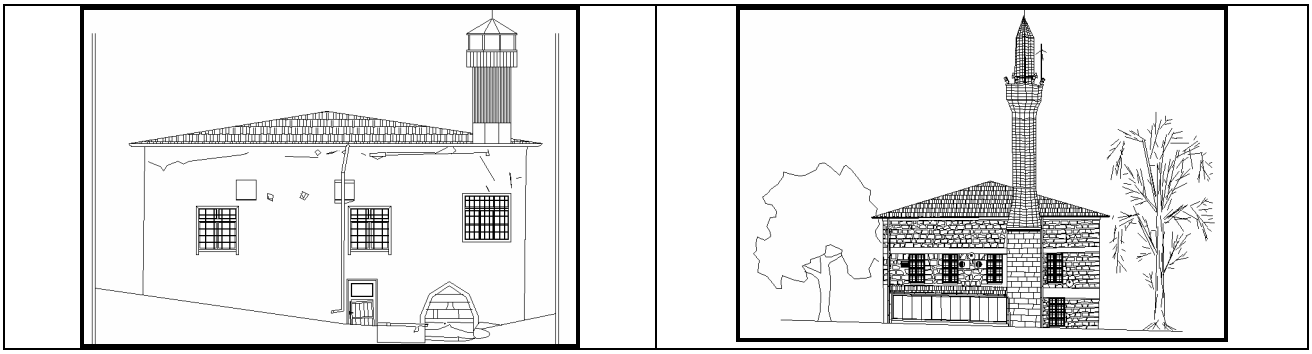

Figure 3. Some drawings of Mosques

Figure 4. Some drawings of silhouette of the street in the Ermenek

4. CONCLUSION

In order to restore historical and culturel heritage, documentation of these heritages is required. Close-range photogrammetry is very fast, powerful and reliable for documentation of restore historical and culturel heritage. Data obtained from photogrammetric method can be archived as digital and based on restoration of heritages. In this study, Drawings of historical houses, the mosques and silhouettes of the street in the Ermenek were successfully obtained by the means of Photogrammetric method.

REFERENCES

W. Böhler, G. Heinz, Documentation, surveying, photogrammetry, XVII CIPA Symposium. Recife, Olinda.Brazil, 1999

M. Scherer, About the synthesis of different methods in surveying, XVIII International Symposium of CIPA,Potsdam, Germany, 2002.

I. Turan, S. Gezer, „Tekerin Degmedigi Yer“ Ermenek, Arkitekt, Number:422, 35-45

URL1.
http://www.dpreview.com/reviews/nikond200/(11.08.2009)

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