

EXTRACTING OF STONE PLAN OF HARBOUR STREET IN KNIDOS ANCIENT CITY

H. Karabork^a, F.Yildiz^a, M.Yakar^a, L.Karasaka^a, H.M.Yilmaz^b, R.Ozgan^c

^aSelcuk University, Engineering Faculty, Geodesy and Photogrammetry D. Konya-TURKIYE hkarabork_fyildiz_yakar_lutfiye@selcuk.edu.tr

^bNigde University, Aksaray Engineering Faculty, Geodesy and Photogrammetry D. Aksaray-TURKIYE hmyilmaz@nigde.edu.tr

^cSelcuk University, Faculty of Arts and Sciences, Archaeology Department, Konya-TURKIYE rozgan@selcuk.edu.tr

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ABSTRACT

The stone plan in archaeology is important for determining time and function of the structure. Photogrammetric methods are selected in order to create the stone plan of the harbour street in Knidos. In order to take aerial images, a crane is used with a specific mechanism on it. Images are taken with Kodak DSC 450 digital camera from approximately 10 metres height. Ground control points are measured with Topcon GPT 3007 Total Station Instrument. Photogrammetric restitution is performed with Photomodeler software. Overall, The stone plan of harbour street is added to topographic map being 1/1000 scale.

1. INTRODUCTION

The history of Knidos Ancient City, which is located in Datca (Mugla) Province, is known since B.C.700. Knidos is located in the most point of peninsula called "Datca Peninsula". This peninsula covers the border between Aegean Sea at North and Mediterranean Sea at South. Today, this area which is belonged to Mugla Province had taken part in border of Karia area on ancient period. The archaeological excavations are managed by Prof. Dr. Ramazan OZGAN. The documentation of the Harbour Street that is one of the structures found in excavations is undertaken by archaeologist manually. In this study, photogrammetric methods are selected to create the stone plan of the harbour street in Knidos.

2. MATERIAL AND METHOD

The harbour street is plotted by photogrammetric methods. Starting from a passage at small harbour, the street continues until propylon that opens to the holly place where Apollon Karneios Temple and altar are located. At this point, the harbour street and the east west street, which is considered to be the main street of the city, intersect. It is restricted by isodomic walls in east and west directions. Harbour Street, being about 10 metres wide and 300 metres long, provides the connection to the most important places. First, a drilling, being 10 metres wide and 10 metres long and located in the North of the Military Harbour, was performed in 2001. Afterwards, A part of the street, size of 40*10 metres, was excavated. With these works, the beginning of the street from the small harbour was revealed.

The photographs of harbour street are taken with Kodak DSC 450 digital camera. This camera is a non-metric camera. Its image size is 2580*1932 pixel. The camera is calibrated for 8 mm focal length by using Photomodeler software. The calibration parameters are as follows;

$f = 8.1292 \text{ mm}$
 $W = 7.0920 \text{ mm}$,
 $H = 5.3151 \text{ mm}$
 $x_0 = 3.5599 \text{ mm}$, $y_0 = 2.5789 \text{ mm}$
 $K_1 = 0.002444$, $K_2 = -5.881 \text{ E-5}$
 $P_1 = 2.177 \text{ E-5}$, $P_2 = 9.482 \text{ E-5}$

where:

f :=focal length

W, H = sensor area

x_0, y_0 :=coordinates of principal point

K_1, K_2, P_1, P_2 = distortion parameters

In order to take aerial images, a crane is used with a specific mechanism on it (Fig.1).



Figure.1 A crane used with a specific mechanism on it

Ground control points are measured with Topcon GPT 3007 Total Station. Distance measurement precision of the Topcon GPT 3007 Total Station is $m_s = \pm(3 \text{ mm} + 3 \text{ ppm})$ and angle measurement precision is 2.7 mgon.

3. APPLICATION

In order to create the stone plan of the street, aerial photographs are used. The ground control points are located so that each photograph includes at least 4 suitable distributed points. Drawings were transferred into Autocad (Fig.2).



Figure.2 Drawings of stone plan of Harbour Street in Knidos

Overall, It is added to topographic map being 1/1000 scale (Fig.3).

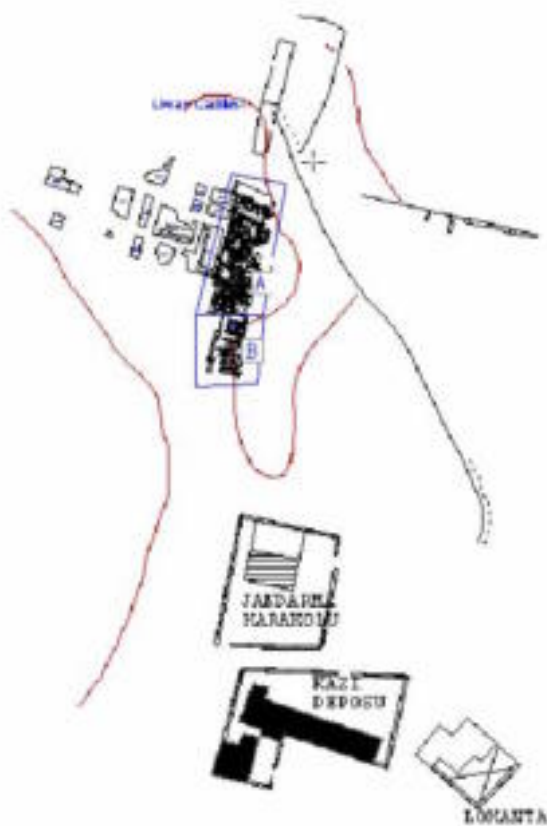


Figure.3 A part of topographic map being 1/1000 scale

4. CONCLUSION

In this study, the stone plan of the parts of the street that are extracted by 2004 is obtained. In comparison terrestrial measurement technique, the photogrammetric method is considerably faster. Since the stone plan in archeology makes possible to determine construction date and function of the structures, the documentation in digital form is an important issue.

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