

PHOTOGRAMMETRIC STUDIES ON STOA IN ANCIENT CITY OF KNIDOS (DATCA-MUGLA)

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ABSTRACT

The history of Knidos ancient city, which is located in Datca (Mugla) Province, is known since B.C. 700. 5*3.8 m² dimensioned small rooms, called as Stoa, were built in front of the terrace walls of Knidos ancient city. Stoa, thought as an complex structure, is a group of rooms in which commercial products were kept and sold. Terrain and office works are done for photogrammetric restitution. Drawing and restitution of Stoa which is taken out by surface excavation up to July 2002 are determined. Ground control points are measured by Topcon GTS 701 Total Station. Front photographs of Stoa are taken with Leica R5 (50 mm objective) optic camera. Films are scanned with HP Photo Smart Scanner in 2400 dpi optical resolution and transferred into Pictran software. Images of interior walls of Stoa are taken with Nikon Coolpix 950 digital camera and images transferred into Pictran software. Root mean square of the ground control points are computed as $m_x = \pm 2\text{cm}$, $m_z = \pm 1\text{cm}$, $m_y = \pm 3\text{cm}$.

1. INTRODUCTION

Knidos is located 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 belong to Muğla Province had taken part in border of Karia area on Ancient period. The stoas in which commercial goods both bought and sold were a important part of historical structure in Konidos Ancient City. Each sota has a dimension of 5 m*3.8m. All stoas-door open to South (Fig.1). Since century stoas have been destructed due to meteoroligical condition and other reasons. The aim of this study is to obtain photogrammetric rolove in order to realize restoration process of stoa in Knidos Ancient City as similar to its original. Excavation in Knidos Ancient city has been carried out by Prof. Dr. Ramazan OZGAN

in cooperation with the Ministry of Culture and Tourism in Turkey, since 1987.

2. MATERIAL and METHOD

In this sudy, firstly plan of stoa was obtained by geodetic method (Fig.2). For this, new ground control points were established in Knidos Ancient City with the use of triangulation point and polygon which were established previously. Coordinate of new ground control points were calculated. Photogrammetric rolove of stoas were obtained from east, west and south sight of stoas. In order to use in the photogrammetric restitution, ground control points for which disturibution were convenient were marked on Stoas and measured by Topcon GTS 701 Total Station in National Coordinate System(UTM). Distance precision measured by Topcon GTS 701 Total

Station is $m_s = \pm(2 \text{ mm} + 2 \text{ ppm} \cdot D)$ and precision of angle is $\pm 1''$ as dictated by user manual. All photographs were taken with two different cameras (Leica R5 optic camera and Nikon Coolpix 950 digital camera). The photographs taken with Leica R5 optic camera were transformed from analog form to digital form by HP Photo Smart Scanner. The calibrated parameters of Leica R5_50 camera are

- a- image coordinates of principal point
 $x_0 = 0.013 \text{ mm}$; $y_0 = 0.065 \text{ mm}$
- b- focal length
 $c = -50.696 \text{ mm}$.

The calibrated parameters of Nikon Coolpix 950 camera are

- a- image coordinates of principal point
 $x_0 = -0.0113 \text{ mm}$; $y_0 = -0.00605 \text{ mm}$
- b- focal length
 $c = 7.06014 \text{ mm}$.

Root mean square of the ground control points are computed as $m_x = \pm 2 \text{ cm}$, $m_z = \pm 1 \text{ cm}$, $m_y = \pm 3 \text{ cm}$.

In this study, PICTRAN software developed by Technet GmbH (Germany) was used.



Figure.1 Knidos Peninsula and A View of Stoa

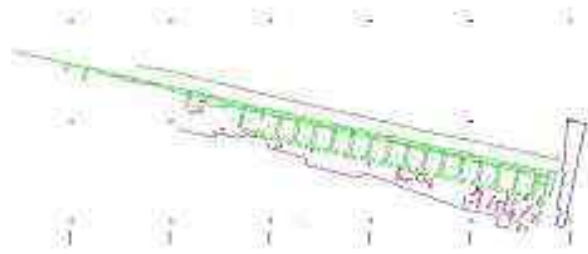


Figure.2 Plan of Stoa

3. APPLICATION

Photogrammetric restitution for south front of stoa was evaluated by PICTRAN software. The photographs taken with Leica R5 optic camera were used at photogrammetric restitution of south front. A Total 21 overlapped photographs were used in this study. These photographs were divided to two phases. In order to get link between two phases, three photographs from each phases were shared in two phases. Photogrammetric restitution was obtained by Pictran software and drawing of stoa were transferred into Autocad. East front and west front of each stoa were separately evaluated by Picran software. For this process, photographs taken with Nikon 950 digital camera were used and drawings were transferred into Autocad(Fig.5).

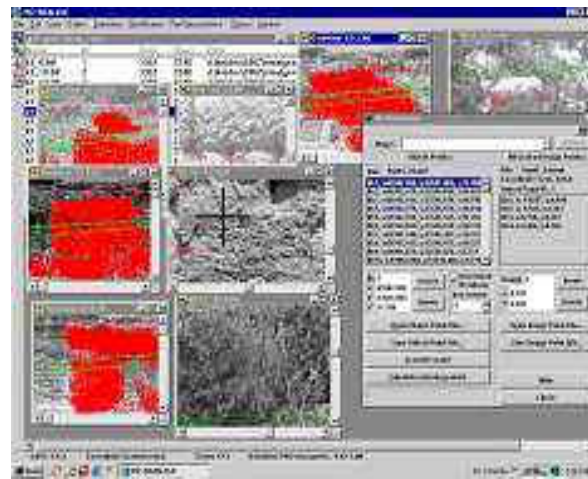


Figure.3 A View From Photogrammetric Restitution in PICTRAN



Figure.4 South Front Drawing of Stoa

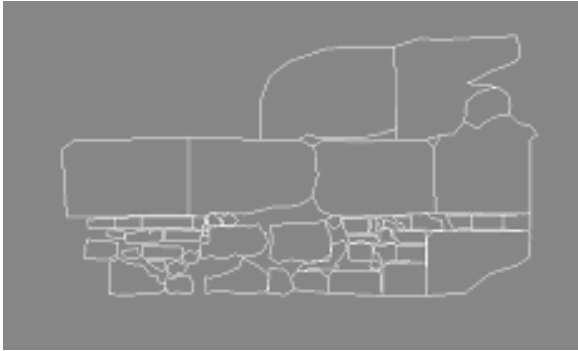


Figure.5 East Drawing of 17. Stoa

4. CONCLUSION

Geodetic plan and photogrammetric rolve of 20 stoas for which land work have been completed and excavated up to July 2002 were obtained. Land work in this study was completed approximately on 4 days. Duration of this method perhaps seems to be very short while compared with other methods durations. Depending on obtained drawing and digital data, detail data about stoa which will be used for stoas on next works were obtained at a very high geometric accuracy. Owing to photogrammetric method, both data in dxf form and photogrammetric restitution results as digital can be saved easily. These data can be used in following works. Therefore, compenent of new stoa which will be excavated by Archeology team in this area and others component of Knidos Ancient City can be entegrated in this work.

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