

# THE PHOTOGRAMMETRIC EVALUATION OF THE TILES ON TURKISH TRADITIONAL BUILDINGS, AN EXAMPLE FROM KONYA

S. A. Güleç<sup>a</sup>, M. Yakar<sup>b</sup>, M. Korumaz<sup>a</sup>,

<sup>a</sup> Selçuk University Faculty of Engineering and Architecture, Department of Architecture, Konya, Turkey, gulec.armagan, mkorumaz@gmail.com

<sup>b</sup> Selçuk University, Faculty of Engineering and Architecture, Department of Geodesy and Geoinformation, Konya, Turkey- murat.yakar.konya@gmail.com

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The art of tile -earthenware glazed tiles- which is one of the oldest and traditional Turkish arts, are usually used in architecture and products such as pots and bowls as ceramics. Çini, which is a branch of ceramic art that developed in Central Asia, was brought to Anatolia by the Seljuks. It occupied a very important place in Ottoman architectural decoration and had very prominent place in the history of Islamic art. This branch of art had embellished mosques, madrasas (theological schools), tombs and palaces, kiosks, fountains, internal and external parts of similar buildings and Seljuk mosques, madrasas, tombs and palaces were decorated with exquisite tiles. From very old times, Turks had preferred to embellish their buildings with tiles and they had started to adorn their places of worship with the tiles. This preference became a tradition in the period of Anatolian Seljuks, continued in the period of Ottoman and this traditional art continued until the first years of Republic. Today, tile ceramic productions are made by contemporary techniques. The forms of the tiles are generally vegetal and geometric motifs. Wide surfaces can be covered with union of small tiles and they can be constituted only one motif in some situations. Many tiles on many historical buildings in our country had been lost because of wars, demolishing and robbery or they had been demolished. Today, in documentation of historical buildings with tiles, controller establishments particularly emphasize the necessity of the documentation of the surfaces with tiles and they make this documentation indispensable. Because of this obligation, especially designers get copies of these tiles by moulage one by one with very difficult working. With this method, transparent papers are spread over the tiles and motifs are drawn one by one with hand and with patient working. It can be seen an easy way to copy the tiles especially in the inside of the building, but when it is in outside of the building, their copy or measurement can become very difficult way because of the time problem, height of the building, weather conditions. For measuring and copying them, close range photogrammetric method will be very useful and it will facilitate the measurement, copying and drawing process in such situations. In the extent of this study, evaluations will be made on the tiles on a historical building facade which of measured drawings prepared and orthophoto images of these tiles prepared with photogrammetric method. And also in the study, evaluations about the simplicities that photogrammetric method brought to muralists and painters of ornaments who are collaborate with architects will be made with the completing these drawings in the computer.

## 1. INTRODUCTION

The art of Turkish Ceramic Tile among traditional Turkish handicrafts survived from the era of Uighurs to the present day was found on floor coverings of some temples to that era after excavations conducted in the years of 1902 and 1903 (Aslanapa,1999). Moreover, it was determined that ceramic tiles had been used initially with the name of “*tegula*” in the Roman era for “*roof tiles*” (Lemmen,1993). This art survived its existence even after the era of Uighurs and has been successfully arrived until now. Ceramic tile which can be seen at every period has a great importance in terms of Turkish Art.

The art of Turkish ceramic tile was at its peak in the Turkish art in 13<sup>th</sup> Century in Anatolia; decorative ceramic tiles used in architectural masterpieces, and it became successfully as one of the main factors also in Seljukian architecture. 16<sup>th</sup> Century has been known as the most brightest and brilliant period of both Turkish Art and art of ceramic tile (Kuban, 2004). In this era ceramic tiles were subjected to significant changes in terms of color and design, which helped them to be further, improved in the forthcoming periods, particularly in the Ottoman era. Center of this art is two places (İznik and Kütahya) in Anatolia. The end of 17<sup>th</sup> Century was the halting period of this art, and problems occurred in Anatolia slowed down development of this art. Particularly “*Celali*” riots in Anatolia slowed down production of workshops in İznik which was the place for production of ceramic tiles, and in 18<sup>th</sup> Century Kütahya superseded İznik. But, after this period ceramic tiles lost their

importance, left their places to oil painting decorations and ornamentations (Kuban,2004).

## 2. CERAMIC TILE IN ARCHITECTURE

Use and development of art of ceramic tile used for decorative purpose by Turkish people for inner and external architecture started with the Grand Seljukians who created the first ceramic tile masterpieces in Iran(Çini,2002). Although ceramic tiles produced by various nations lived in the territory of Anatolia and ceramic tiles of Seljukian and Ottoman eras were different from one another, we have come across with ceramic tiles at all architectural works at each period. Particularly, use of ceramic tiles in architectural works starting in Anatolia with Turks reached at a rather significant level at Seljukian era. Ottomans developed also different techniques in ceramic tile production after Seljukians and continued to use ceramic tiles in their architectural works.

Relationship of this ornamental and decorative art augmented in time with various techniques with architecture has been created always within a limited framework. The pioneer in this framework has been always the architectural masterpiece; ceramic tiles depended always to the architectural art, it never became the leader. Besides, it is an important reality that ceramic tiles created an effect of locality by creating a colorful ambient in architectural masterpieces, particularly in inner locations. Utilization of decorative ceramic tiles in Turkish architecture dated back to ancient times. This decorative art which has been seen rarely even in architectural works of

Uighur, Karahan, Gazne and particularly the Grand Seljukians had been used widely in architectural structures of Anatolian Seljukian Era. In this Era, particularly in religious buildings ceramic tiles have been much more remarkable. In Seljukian Era however center of decorative ceramic tiles was Konya (Dimiriz, 1994). Ceramic tiles ornamenting and decorating the buildings here have shown themselves in the city. Niche of Konya Alaaddin Mosque, liwan of “*Sırçalı Medrese*” (glass decorated Moslem Theological School), Konya “*Karatay Medresesi*”, Sahip Ata Mosque and its complex buildings are among significant samples which reveal development and widespread use of ceramic tiles in Seljukian Era.

Ceramic tiles were intensively used both in civil and religious architecture specifically in the first and second half of 16<sup>th</sup> Century. Decorative design on ceramic tiles was determined according to patterns prepared by painters of the building to be constructed.

Use of ceramic tiles on outer surface of buildings is rather less than those used internal locations. Specifically in the Era of Ottoman Empire in 14<sup>th</sup> century use of ceramic tiles on exterior wall was rather less. According to DEMİRİZ, its reason has been explained as follows: Ceramic tile is an art related with surface and is expressed with color. However, as it is expressed with color it is thought that even the most abstract composition of ceramic tile will be in difficulty to match with the architectural mass and will spoil the expression by affecting massive integrity. Therefore in Ottoman Era extravagancies which may cast shadow on definition of mass were avoided, and use of ceramic tile on exterior façade of building was decreased as much as possible, it was used only on certain parts of the building for the purpose of decoration and making colorful. Instead, hewn stone coverings were mainly used on exterior façade of the building.

Besides, examples representing use of ceramic tiles interior locations are rather great. Mimar Sinan applied specifically red ceramic tiles majestically at his most buildings by developing it in unison and in orderly settings with the architecture, and tried to create a certain rhythm in internal locations.

The reason why ceramic tiles have been used in the architecture is due to its being decorative, creation a colorful ambient inside and practical to some extent. First of all surface of ceramic tile is hygienic and easy to clean up. The fact that ceramic tiles are water-tight, resistible against fire and capable of radiating heat have been the factor of preferences. Ceramic tiles are both symbolic and didactic. In addition to their being visual, they are also important in terms of both texture and color. Therefore, they create a strong visual attraction in the interior location. Furthermore, their usability both on inclined and straight surfaces, their detachability without inflicting damage on the structure are the features that make them different from architectural elements.

### 3. DOCUMENTATION OF CERAMIC TILES

Ceramic tiles whether interior space or exterior space, are worn out and deteriorated in the course of time due to various causes. Some of these causes are flow of paint, flow of dust, drying of glaze on it, fine cracks, peeling off or formation of long lines of cracks, etc. (Çini,2004). On ceramic tiles on exterior surface of the building in addition to deteriorations listed above wear and tears arising from atmospheric effects, natural effects or human effects have been occurred in the course of time. In such a case

these ceramic tiles which have a significant place in Turkish art are required to be restored. But, as is know, in order to perform a true and correct restoration first of all a true and healthy documentation study must be carried out.

In studies regarding restoration and inventory of ceramic tiles, building surveys (statements) to constitute basis for restoration projects have had considerably significant place. At phase of preparation of building surveys replica of moulage (impression) of each tile of different type is taken and drawn on tracing paper with free hand, and separate drawings have been made also for pieces of ceramic tiles added later for the purpose of covering defective parts formed on decorative designs of ceramic tiles called “*patch*”. Drawings made by free hand are not satisfactory for certification and documentation. In addition to these drawings it is required that photograph of each one of tile and each one of work drawn must be also taken. Therefore photographs of all panels and tiles are taken. But, since during photographing all existing ceramic tiles are to be determined and documented, taking photographs would be relatively difficult and even sometimes costly, therefore in the course of such kind of studies it is considered to be sufficient to take photograph of only one of tiles with the same design (Orman,2000).

In documentation of the tiles, graph paper is useful in the tile design stages to transfer a design from paper, picture, photocopy and create the 'exact' look desired. While tracing the pattern, you must be sure to join all the lines up so that the design is complete. It is very easy to miss something out when drawing an intricate shape. Data obtained at the end of all of these studies are entered in computer medium and ceramic panels and tiles are defined according to their features and their photographs and surveys have been prepared after taking their hardcopies.

### 4. DESCRIPTION OF THE BUILDING

The Building is a historic structure belonged to the 1<sup>st</sup> National Architectural Period located in historical city center of Konya province, its original function was to serve as post office building and today it has been used jointly by PTT and Türk Telekom. Karatay district of Konya is located at “*Mevlana Avenue*”. At present the ancient PTT Central Building which is located at South-West of Konya Provincial Building, East of the ancient Building of “*Ziraat Bankası*” (Agricultural Bank) and South of “*Kayalı Park*” is one of the examples of Turkish Architecture (1<sup>st</sup> Architectural Period) in neoclassical style. This building, whose construction started in 1925 and completed in 1928, is the work of architect Faik ÜLKÜ. The Building has been registered within sit (protected) area required to be protected by the resolution No. 8652 of 18.10.1975 promulgated by “*Yapı Gayrimenkul Eski Eserle ve Anıtlar Yüksek Kurulu*” (Supreme Board of Building Real Estate Ancient Masterpieces and Monuments).

Since the building has been constructed in the style of 1<sup>st</sup> National Architectural Period, it is a significant structure in terms of artistic and architectural history. It reflects the architectural stream of the period which was dominant in our country. While interior space of the building has a simple understanding of location free from decorations and exaggerations, exterior façade of the building has been enriched occasionally with ceramic tile coverings in conformity with features of the neoclassical style, and decorated and ornamented with vaults with profile made of stone imitation plaster, strips

and frames. Vaults over windows were designed separately at each floor as the general characteristics of the period, so it has been thought that both the past has been glorified again and character of façade is to be augmented.



Photo 1. Front façade of the building.



Photo 2. Old photograph of the building in 1950s

## 5. PHOTO-GRAMETRIC EVALUATION

At the time of documentation of the building NIKON D70 machine has been used, and evaluations have been performed at Photo modeler 5.0 software. After getting orthophoto and making evaluation in photomodeler software, drawings of the building were made in Autocad software.

## 6. DOCUMENTATION

Documentation of a cultural heritage in architecture is not itself an objective. An objective of documentation aims to provide data to other users. Selection of proper method, preparation of work progress schedule and the finish product are considerably important in documentation process. According to Carnobell (1989), although the architectural archive belongs to the so-called architectural precision survey, it is nonetheless a recording of a more generalist frame, for being less detailed, allows a systematic documentation of the main monument building (Pereira et al, 2004).

Objects of cultural heritage are showing differentials and discrepancies very much in terms of characteristics of buildings like sizes, etc. Therefore it is relatively difficult to group them in systematic manner. The following sequence of conservation

sub-systems explained by Rosvall seems to be good approach to such a systems because of showing the relation between the

subsystems and the influence of measures taken preventive in one subsystem on the others:

- ...”Natural environment; a global system, which encompasses
- Ordinary landscapes, constituted by
- Cultural landscapes, which include
- Built environments, where we find
- Cities and conurbations, which consist of
- Building and other spatial structures and
- Artifacts (4)

As it would be understood hereinabove, works of art have a very significant place in studies of documentation which will constitute basis for the protection projects. And as they are an integral part of the building, separate studies must be done thereon and eventually they must be documented.

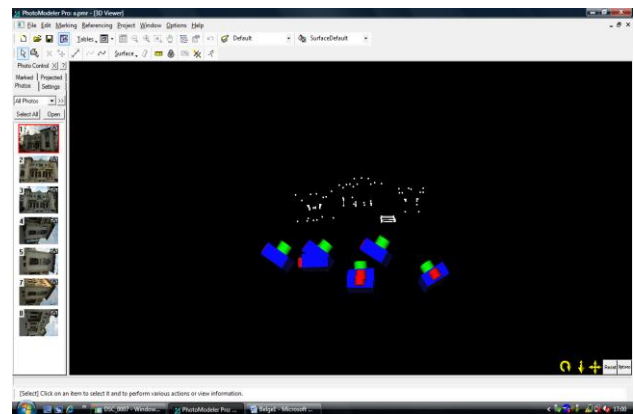


Photo 3. Camera Stations.

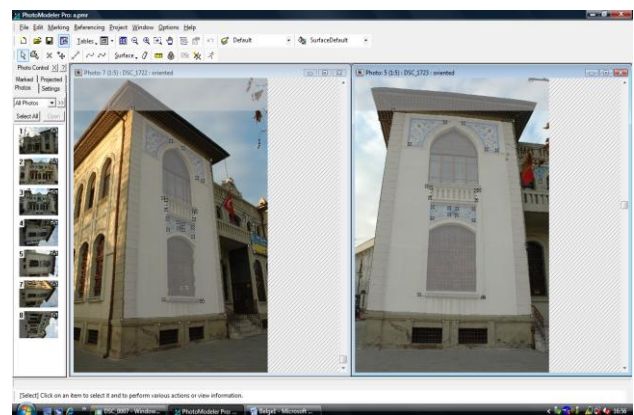


Photo 4. Photogrammetric study of the building façade.

What is important here is that primarily sizes of the object, documentation of which will be made and intended use of the end (finish) product are to be determined. The purpose in documentation of such kind of artifacts (works of art) is that two and three dimensional data of the object should be obtained accurately and correctly. And the scale in the course of such kind of documentation works is large scales as 1:2 scale or 1:5 scale. To work with such large scales requires to establish face

to face contact and to carry out study one by one with the object to be documented.

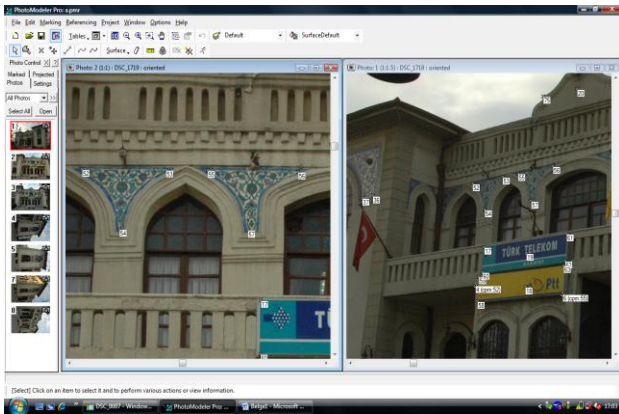


Photo 5. Photogrammetric Evaluation in Photomodeler.



Photo 6. Ortho of tiles.

In creating such artifacts impact of people's residential manners and areas and materials produced from that district has been great. Therefore, in documentation of artifacts it is required that not only the object itself but also its surrounding topography should be included in documentation process and as such should be specified in the documentation (Boehler, W., Heinz, G., 1999). Because, an architectural archive, in addition to documentation of buildings in detail, is an event which contains such descriptive information as history, style of the building and features of the period, artifacts, etc. and which requires a large scale research.

Another important particular in such kind of documentations is however data related with texture of the building or object. In understanding integration and correlation of the existing situation and subsequently made annexes with one another and realization of their relationship with other objects it is considerably important to have them located on a certain historical background (Boehler, W., Heinz, G., 1999).

Alternative vision-based technologies used in documentation of various small instruments, daily articles, dresses, wall paintings and frescos in photometry are listed as follows;

- shape from silhouettes
- shape from structured light
- shape from shading
- shape from texture



Photo 7. Orthophoto of the façade with tile

-shape from video cues

-shape from focus/defocus (Fryer et al, 2007).

In documentation of plain surfaces like picture, fresco, painting, etc. when photometric techniques and photograph cameras are taken into consideration, it is seen that monoscopic technique allowed obtaining data process much more easier and faster than that of obtained through stereoscopic technique. Monoscopic photogrammetry is commonly kept in mind simple technique which can be used by non-photogrammetrists but it is appropriate only for the linear features and detailed of limited complexity (Pereira et al, 2004).

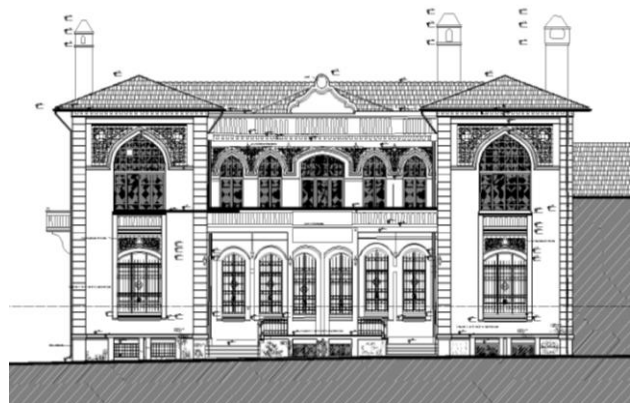


Figure 1. Façade drawing of the building in Autocad.

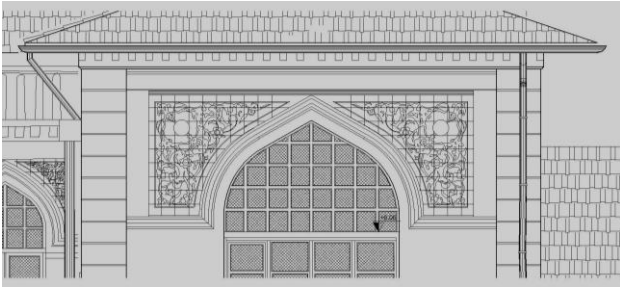


Figure 2. Drawing of the façade with tile.

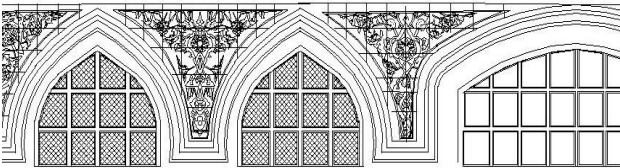


Figure 3. Drawing of the façade with tile.

## 7. EVALUATION AND CONCLUSION

Documentation is an end product which comes into existence through correlation of numerous scientific branches. People involved in the documentation process should have a good feedback and knowledge of current techniques. Before making a decision on selection of a proper method during documentation process consultations must be absolutely made with experts and opinions of experts on different disciplines must be procured.

Production of documentations pertaining to such kind of artifacts is extremely important in respect to the architectural point of view. These data are used:

- in making their restorations or reconstructions,
- in determination of changes – color changes, deformation, etc.- occurred in time on them.

Furthermore, these data may be used also for different purposes. They may be used

- in obtaining sample models for exhibitions,
- in making their reproductions (copies). Such kind of copies may reach to experts. They may be exhibited at a certain place and may reach to visitors. As a different evaluation area museums may also be thought for them. Data for these works of art may be seen via internet (Fryer et al, 2007).

The fact that techniques used in documentation and certification of cultural heritage is assorted is inevitable in the present day technology. Reproduction of ortho-photographs of such works of art as picture, wall-painting, fresco, etc. ensures both transferring data into digital medium much more easily and shortening times for works which might otherwise be spent more if it would be performed in situ. It makes determination in time of deformations of sections which were taken at different times and their Ortho produced rather easier. This however renders assistance in creation of a healthy archive. Furthermore, in documentation of artifacts such as pictures, ceramic tile, etc. available in inaccessible spaces of the building, Ortho-photographs prepared through photographs taken have been remarkably helpful in production of drawings and obtaining texture data of these artifacts (works of art). Since

digital Ortho-mosaics, included in photogrammetric techniques among architectural documentation techniques, cover texture data as well, they are considerably important. Of course, it should not mean that other methods are not used in architecture or attached less importance (Grammatikopoulos, 2004). In such kind of superficial documentations it has been much more preferred by architects for it patterned the surface and provided information on texture.

It is absolute reality that moulage impression (rubbing) made through classical (conventional) methods and methods of sketches are helpful in obtaining bi- dimensional data. Making rubbing directly on a paper or on plastic sheets is a general method used in documentation of such kind of artifacts. While establishment of close contact and touching with such kind of artifact ensure an advantage like solution of problem directly, it brings a field study requiring long and strenuous efforts. However, in addition to this method, it is necessary that these data must be photographed as well. Use of photographs in such kind of documentation is qualitative and universal. At the phase of photographing, resorting to both scaling it and to Ortho-photographs which are digital data in which deformations are displayed would clearly ensure to facilitate in obtaining faster and digital documentation. Furthermore, thus these data may be stored in digital medium at desired size and dimension.

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