

THE IMPORTANCE OF DIGITAL METHODS IN PRESERVATION OF CULTURAL HERITAGE THE EXAMPLE OF ZIRNIKLI MANSION

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ABSTRACT

Documentation in maintaining cultural properties is a highly important stage of work for determination of the unique properties. The researches having been carried out over years to increase the accuracy of documentation enabled it to reach such a point that the properties can be scanned by 3D laser scanners today. In order for the lost parts of the civil architecture examples required to be preserved in the context of cultural texture to be found and reconstructed, precise measurement have gained importance in documentation of the current status. Over years, major losses have arisen in the cultural texture situated around Erzurum Castle where the unique architectural examples are placed together. In this study, the importance of the 3D documentation in preserving the cultural properties is discussed in the context of Zırnıklı Vehbi Bey Mansion situated near to the Castle. The CAD drawings of this structure which has significantly lost its spatial integrity has been generated from the 3D laser point clouds, then the restitution and the restoration projects of the monument have been prepared accordingly.

INTRODUCTION

Turkey, situated in an archaic geography, has great resources in terms of cultural properties. There are cultural landscapes, monumental works of art and traditional architectural textures where the masterpieces from every period of history are placed together. But unfortunately, there are also so many losses in the ratio of the intensity of these value. The main reason of this is the insufficiency of material and manpower resources required for documentation, project design and implementation. Today, the fact that the usage of 3D laser scanning methods accelerating the documentation process has become widespread makes important contributions to the texture-related works. Digitization of the cultural properties helps them preserved, presented and introduced. Likewise, the fact that the data has been gathered as georeferenced increases the accuracy of the project in order to complete the texture and make the structural integrations.

Erzurum is one of the many areas having a distinctive traditional domestic architecture in Turkey. The housing texture which was formed in the immediate surroundings of Erzurum Castle situated in the city center has been evacuated due to the immigration of the landlords to the big cities as from 1970s and estreped and wasted over years. However, even though they have lost their integrity to a large extent, the restitution of the original version can be made thanks to the laser scanning method.

In this study, it is aimed to emphasize the importance of the 3D laser scanning methods in the context of preservation and conservation as well as documentation of the cultural property specifically based on Zırnıklı Vehbi Bey Mansion in the city of Erzurum.

2. DOCUMENTATION METHOD

The digital documentation of cultural property is a complex work, each stage of which requires a high level of algorithm, new software and advanced software applications (Pavlidis et al., 2007). Depending on the dimension and characteristics of cultural property, different methods are used together.

For documentation of cultural property current status, the whole or some of the conventional methods, photogrammetry, geodesy, 3D Laser Scanning methods (see Table 1). The position of the cultural property to be measured in the land, the status of maintaining its integrity and architecture are the criteria which need to be considered in determination of the methods to be used in documentation.

Features of the Cultural Asset		Documentation Technic			
		Traditional Methods	Geodesic	Photogrammetry	3D Laser Scanning
Integrity Status	Integrity Protected				
	Integrity Not Protected				
Architectural Program	Simple				
	Rich				
Architectural Detail and decoration level	Simple				
	Rich				
By Cultural Asset Category	Single Structure				
	Group of Structures				
	Monument				
	Cultural Texture				

Table 1. Documentation Techniques Depending on the Characteristics of Cultural Property

2.1. Data Collection

The point cloud data is collected by conducting sessions in and out of the structure by 3D laser scanning devices. In addition, geodesic measurements are performed and the

structure is coordinated. During measurement, a sketch of the structure is drawn.

The photos will be taken as calibrated digital cameras. Laser scanning configurations are chosen in line with the status of details of the structure. This precision is 2 to 4 mm.

2.2. Data Pre-processing

Pre-processing data consists of two stages. The first stage is the stage in which the data obtained from a large number of laser scanning sessions are combined. It is the stage of colorization by the colors assigned from the photographs taken by the camera placed on the top of the laser scanner, and laser point clouds are georeferenced and combined with the precision of 2mm.

The combined point cloud data obtained from laser scanning is saved as .las or other formats, then exported to the software that can be used for CAD drawing phase.

2.3. Project Design:

Cultural property is designed in accordance with the national and international criteria. The cultural property are protected under the law numbered 2863 in our country. Works for documentation of cultural property are described by the resolution numbered 660 before the Ministry of Culture and Tourism and the projects are prepared accordingly. The projects prepared in line with the resolutions are required to be approved by the Council of Monuments of the same Ministry again. Restoration works are carried out based on the project approved by this Council consisting of independent professionals and academicians¹.

Documentation of the cultural property current status is completed with the analytic study sheets in which deformations and the materials used are examined, in addition to measuring and drawing stages. Laser scanning technology is especially more important for the technical drawing of the structures which have lost their integrity. The 3D scanning can reveal the traces of a structure which is totally out of condition and thus, a unique plan and facade can be read.

3. ERZURUM ZIRNIKLI VEHBİ BEY MANSION

The majority of the cultural property situated in Turkey survives in the context of the urban cultural texture. Every region has its own domestic architecture. One of our regions where local architecture shaped generally by the climate and land conditions is seen is the area of the Castle of Erzurum.

3.1 City of Erzurum

Situated in the northeast of Turkey (see Fig. 1), the city of Erzurum is known for its high altitude lands and harsh climate. Continental climate conditions prevail in most of the city lands. It is covered by snow during one thirds of the year. Erzurum, being the only settlement which is 1959 meters high from sea level in Anatolia, is situated in the southwest of an upland.



Figure 1. Position of the City of Erzurum inside Turkey

Having been a residential area since the ancient times of history, Erzurum is one of the largest cities of the Eastern Anatolia Region today. This region has been captured and ruled throughout history by a great number of tribes and peoples such as: Urartians, Cimmerians, Scythians, Medes, Persians, Parthians, Romans, Byzantines, Sassanians, Arabs, Seljukians, Mongols, Ilkhanids and Safavids, etc. From 1514, it fell under the rule of the Ottomans. The geographical position of the city has gained importance politically, culturally and militarily throughout its history. The fact that it had been situated on the old "Silk Road" and that it has fertile lowlands played a significant role in selection of the city as a residential area throughout history.

In spite of its harsh climate, a city was founded with the efforts of the Eastern Roman Empire early in the 5th cc in Erzurum which it is thought to have had a cultural union as from 4000s B.C. This city referred to as Arzen/Erzen which had been under the rule of the Urartians and Sassanians came under the domination of the Turks after the conquest of the Eastern Anatolia with Malazgirt War in 1071 (Yılmaz, 2011). In 1080, after it was started to be ruled by the Saltukogulları which was a Seljukian clan, the Islamization period was begun in Erzurum and intensive building works were carried out with the construction of important structures such as the castle, tower and Ulu Mosque and dome. After the invasion of the city by the Mongols in 13th cc, the city was dominated by many other rulers. The city was destroyed due to the handovers between Karakoyunlular, Akkoyunlular, Celayirli (Gündoğdu, et al., 2010).

In Erzurum, becoming an important state center in the east under the rule of the Ottomans within the period of 16th-19th cc., the region surrounded with city walls and having an inner castle and stone houses with flat roofs were stated by those visiting this region. The voyager and merchant, Jean B. Tavernier who stopped by Erzurum during his journey to Iran in 1632 shared his observations that Erzurum was a large city with its suburbs out of the castle and that the walls of the castle and the houses were built with woods and soils (Sakaoğlu, 1995).

As from the 19th century, the texture of the city has been destroyed due to the economy, wars and earthquakes. The earthquakes which have been a milestone especially for the Houses of Erzurum have damaged the city texture significantly. During the earthquake of 1852, 84 houses in the city center were completely destroyed. The damage and loss were even greater in the earthquake of 1859; more than two thirds of 7000 houses collapsed. In the same year, the Construction Assembly of Erzurum founded in the province made almost 2000 houses habitable (Gündoğdu et al., 2010).

¹ 2863 sayılı Kültür ve Tabiat Varlıklarını Koruma Kanunu", www.mevzuat.gov.tr

The geographical position of the city has gained importance politically, culturally and militarily throughout its history. The fact that it had been situated on the old "Silk Road" and that it has fertile lowlands played a significant role in selection of the city as a residential area throughout history. In the city which is covered by snow most of the year, architecture has developed according to this cold climate. The houses consisting of the rooms entered through each other in order to create warm spaces, and of the closed yards are masonry. Bonding timbers were used as bonding elements in the structures constructed with the mixture of ashlar and rubble. Another characteristic in the structures is the double joinery and door applications used to ensure protection from cold. Although the roofs are generally straight, they are domed in the "Tandoori Houses" where there are different grades in different rooms and the dovetail joints special to this region are used.

Being one of these houses, Erzurum Zırnıklı Vehbi Bey House is a mansion built in 1739 and the oldest structure in the region. The mansion derived its name from "Zırnık (Arsenic)" which was merchandised by Vehbi Bey who was the owner of the house. The structure is a large mansion with overhangs and two floors (single floor above the ground) having two sections consisting of haremlik (women's part) and selamlık (men's part). On the both floors, rubble masonry with bonding timbers has been used, partially bricks have been included in the facade of first floor. New additions were made to the structure due to the necessity over time. It collapsed rapidly after its owner moved to the new part of the city in 1990 because its maintenance required so much effort.

3.2 Traditional Houses of Erzurum

The houses of Erzurum were built according the conservative lifestyle. The houses; were built based on the Turkish Islamic principles and customs and planned so as to protect the privacy and intimacy even within the family. There are three types of houses in Erzurum, including civil architectural examples with inner courtyards and planned as tandoori houses. They are a single floor-houses, two-floor-houses and mansions. The single-floor houses consist of one room, tandoori house, courtyard, cowshed and a hayloft.² The two floor-houses are the most widespread ones having a tandoori house on the ground floor, and so many rooms downstairs and upstairs. The mansions were the houses built by wealthy people and planned as haremlik and selamlık; the rooms, tandoori houses and other sections of which were arranged delicately (Karpuz, 1984). The main plan scheme of the Houses of Erzurum is set by the association of the courtyard and tandoori house on the ground floor. The courtyard entered from the main room opens to the side rooms, upstairs and tandoori house. Therefore, it appears to be an important distributing and arranging space. This space, having a dome-like cover is bulky, so no other space can be built on. There are a furnace, a wooden terrace, cupboards and shelves in the tandoori house. It is a multi-functional space which includes the activities of sitting, having a rest, cooking, lying, etc. The tandoori house, for which the climate is also influential in terms of its usage, can be defined as a living space of the Houses of Erzurum.

The structures were built in masonry system. Accordingly, the wall thickness varies between 70-90cm on the ground floor.

The walls upstairs where the floor overlaps have a thickness of 40-65cm and this creates pullback. The bonding timbers are used in order to fortify the walls against earthquakes. While these bonding timbers run on the inner and outer surfaces of the wall, they also connect to each other with bonding timbers. Bonding is overlapped and fixed with metallic elements. The gaps between the bonding timbers do not exceed 1 meter vertically.

The ceilings of the rooms are with timber beams. The decorated ceilings are mostly in the form of a boat. These ceilings are rich for wooden decorations and decorated with wood inlay. The main building material in the houses of Erzurum is stone. Stone materials were used in the walls, sub-basements, foundations and facades of the houses. The bricks were widely used in the partitions, the first floor-facades and chimneys. The beams that bind the walls, internal-external woodwork, floors, ceilings, platforms, windows, alcoves and stairs are made of wood. The soil is the main cover material and the binding material of walls in the houses of Erzurum.

3.3 Zırnıklı Vehbi Bey Mansion

It is the mansion situated in the texture around Erzurum Castle, built in 1739 and the oldest example of the houses of Erzurum, having been survived until today. It is located at the address of Mirza Mehmet Mahallesi Seyyid Efendi Sokak. A part of the structure has survived. It is a mansion with two floors. The mansions were the houses built by wealthy people and planned as haremlik and selamlık (see fig. 2); the rooms, tandoori houses and other sections of which were arranged delicately (Yılmaz, 2010). The structure is located in the parcels numbered 1, 2, 3, the island numbered 515 between the streets of Hüseyin Efendi, Sait Efendi and Çeşme (Figs. 3 and 4).



Figure 2. The Selamlık (on the left) and haremlik (on the right) sections of the mansion

The structure is a large mansion with overhangs and two floors (single floor above the ground) and having two sections consisting of haremlik (women's part) and selamlık (men's part). The main room of selamlık corbelled on both facade brought depth to the streets. On the both floors, rubble masonry has been used, partially bricks have been included in the facade of first floor. New additions were made to the structure over time depending on the necessity. These additions were developed at the back of the selamlık and haremlik sections. Additional sections consist of the those which are included in the houses of Erzurum. In brief, this is a mansion where three houses are combined.

² It is the place where winter food, grass, hay, etc. of the animals are stored.



Figure 3. General Condition of the Mansion



Figure 4. Usage of timbers and bricks

The house consisting of the haremlik and selamlık sections has undergone changes recently. So these two sections have been disconnected. The corbelled section in the corner is selamlık, and the section southwards is haremlik. In the Haremlik Section, the main gate opens to a courtyard. The sections through which the tandoori and cowshed are entered are closed. The stairs with two handrails open to a wide hall. Two regular rooms open to the hall. At the sides of the rooms, there are sofas one of which has a cabinet with flowers. In the hall, there is also a coffee house.

From the second courtyard of the selamlık, the stairs with two handrails having a platform in the middle go up the first floor. There is a mezzanine floor at the level of the platform of these stairs. The stairs starting from the platform of this mezzanine floor reach a hall having a form of "reverse L". Three rooms open to this hall from the same direction. The small one in the middle is the storeroom. The interiors of these rooms have been changed to a large extent. The main room corbelled on both sides partially maintains its novelty.

The walls forming the facades of the structure are thick. The mansion, the ground floor facades of which is quite plain, is made of horizontal stonewalls with bonding timbers. The facades of the structure rising on the stonewalls with bonding timbers are non-plastered. It is seen that the corners of the structure are bonded with ashlar on the facades. The wall surfaces remaining after the corners are continued with either rubble masonry or ashlar masonry. In both cases, the bonding timbers are seen as horizontal bands in the facades.

The ground floor masonry is discontinued in the north of the first floor. Here, wooden frames have been filled with bricks. On this floor, ashlar is used in the corners of the structure

except for the pavilion corner. The facades of Zırnıklı Vehbi Bey mansion has a rich architecture as in the typical Turkish houses. In the north of the house, the pavilions overflowing on both directions on the first floor and the facades are enlivened. The pavilion is supported with the wooden cantilevers underneath. The windows are ranked symmetrically in this pavilion.

The windows are smaller in Erzurum due to the climate conditions and widen as a loophole due to the thickness of walls. The windows are in the form of small openings because there are a hayloft, a cowshed and a storeroom on the ground floor. The openings are seen as gaps on the wall surfaces because the window frames are not placed outside. The sashes of the other windows are built in 4 divisions with the laths in themselves. Their frames are placed outside and have wide moldings. The windows have double sashes. The windows downstairs and upstairs have grab rails. The windows are placed between two bonding timbers in the structure.

Today, the structure has two entrance gates. Three gates are situated in the direction of Hüseyin Efendi Street and the other three in the direction of Sait Efendi street. In the structure, double and single-leaf wooden doors are used. One of the doors is metallic. The door trims are wide as in the windows. There are illuminating windows above the doors.

The floors are separated from each other through wooden floor stringers. These stringers are composed of bonding timbers horizontally running on the timber beams. They have given briskness to the facade as eaves corbels. The eaves are overflowing. These overflowing sections are the timber beams used on the ceiling. The stone gagoye placed on the facades of a typical house of Erzurum is also used in this structure. The wooden elements extending outwards from the facade, which are frequently seen in a typical house of Erzurum also appear in this structure. The length of these elements called "kont" anchored on the wall is 1-1.5m. These konts placed on the bonding timbers serve as a scaffold during the renovation of the structure (Fig. 4).



Figure 5. Structural Status of the house during scanning phase

4. ERZURUM ZIRNIKLI VEHBI BEY MANSION PROJECT

3.1. Data Collection

Scanning process of the structure located on an area of about 1195 m², 800 m² of which is ruined was quite challenging (Fig. 5). It was started in March, 2012, and completed within 1 week due to the cold weather conditions. In the measurements, 3D laser scanning and conventional methods have been used together.

The laser scanning team consisting of 3 persons gathered data of the house by performing 19 sessions inside and 16 sessions

outside, a group of 4 architects measured the doors, windows, profiles, etc. details (Fig. 6).



Figure 6. Field Works

During scanning phase, Leica HDS 4500 laser scanner has been used, the control points have been measured by Total Station. This laser scanner is using a Phase-Shift method, has a field of view of 360°x310°, with a scanning speed of 500000 points per second. Its angular resolution is 0.018° and scanning accuracy is 4mm at 20 m.

Cylone 8.0 software has been used for the georeferencing of scanning data collected in the field, the division of the point clouds and following processing steps.

ZMap program from MenciSoftware, Italy has been implemented for 3D or 2D CAD drawings from laser point cloud data. However, final CAD drawings were in 2D because it was required like this by the architectural council. These 2D drawings are prepared for plans, sections and views and exported to Autocad format of DXF or DWG (Fig. 7). Such a workflow for CAD drawings was also presented by Dursun et al. (2008) and Kersten et al. (2009).

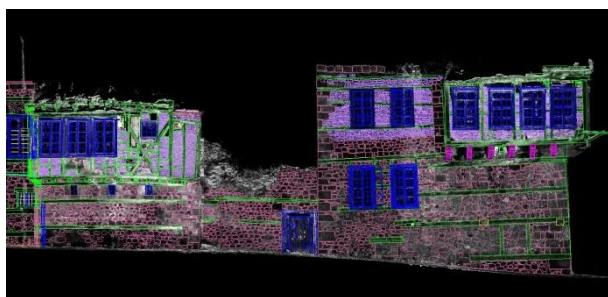


Figure 7. 3D CAD Drawings by ZMap Software.

3.2. Analytical Building Survey

The survey prepared in accordance with the resolutions has been completed a group of 4 architects within 3 months. In 2D CAD drawings, the authentic and non-authentic materials and deformations of the structure have been processed. The reason of the deformations the structure was exposed to can be grouped under two titles.

a) Deformations Resulting from Climate Conditions

In the Houses of Erzurum, the compressed soil roof surfaces prevent the snow from floating down, however the snow on the roofs should be removed before it starts to melt and the soil surface should be compressed. When this treatment required to be performed every year is interrupted, it causes the structure to be exposed to water and be deformed unavoidably. Zırnıklı Vehbi Bey Mansion was exposed to

water and the snow water coming from the roof damaged the roof elements and other structural elements due to the failure of such treatments after it stayed empty.

b) Deformations Resulting from Usage

As a result of that the sociocultural structure of the mansion and its immediate surroundings changed, that the first owners migrated to other parts of the city or to the big cities, the doors of the mansion were broken and opened for intrusion. Because it was a large mansion, the floors and walls of the structure were dug in order to find a treasure.

In the survey, the materials of the structure have also been defined in addition to its architecture. The definition of the authentic materials of the structure casts light on the parts to be preserved authentically in the restoration project. In the survey report attached to the survey drawings, usage with the spatial deformations and deformations resulting from the climatic factors or improper interference are specified in the context of preservation of the authenticity and integrity of the structure (Fig.8).

3.3. Restitution Project

The forms of interference that the structure has been exposed to over years, spatial modifications resulting from usage and losses relating to the authentic materials cause the authentic architectural value to be damaged. Based on the evaluation of the authentic sections set out in the analytical survey containing the current status, the regional structural typology, architectural period, the old dated documents of the structure (old photos, maps, drawings, etc.), the most authentic version of the structure is expressed in the Restitution Project. The restitution project consists of a few stages.

Analysis of the Structure: The parts having original materials and construction technique are set and the preserved and lost parts are fixed based on traces found.

Obtaining documents: Details such as the date and architect of the structure if possible, the current and former status of the urban texture in which it is situated, the function of the structure, etc. are researched. In this research, oral interviews with the current and former owners of the structure, information gained from the historians, old maps, old photos and old drawings, if any are tried to be obtained.

Evaluation and project: The observations gained from the structure itself are evaluated with the historical research documents and the periodical analysis and the restitution project of the structure are prepared.

The data gathered from the survey analysis in Zırnıklı Mansion have made it possible to reveal the authentic parts of the structure and to identify the additions. The parts which had collapsed were able to be set as coordinated through the 3D laser technology and an authentic planning scheme could be read (Fig. 9).



Figure 8. 2D CAD Drawings

The oral researches (from family members of hauseholders) is have shown that the structure was enlarged due to the marriages in the family. The number of nuclear families who had lived there has determined the planning scheme of the structure. The rooms entered through each other and the rooms opening to the open and closed courtyards, which represent the general characteristics of the Houses of Erzurum also manifest themselves in this structure. Once the individuals living in the structure started to migrate to the new parts of the city and to the big cities, the deformation process of the structure gained speed.

The restitution project has been designed by conservation and completion of the authentic parts of the structure, 2D CAD drawings and reports have been prepared.



Figure 9. 2D Restitution Drawings

3.4. Restoration Project

In the restoration project prepared on the basis of the Restitution Project, the functions anticipated in the Urban Design Project of the Castle and its Surroundings within Borders of Zoning Plan for Preservation Purposes, new functions have been given to the structure in accordance wit ts

original architecture considering the physical conditions and position, then a restitution project has been prepared for conservation of the structure. In this context, it has been recommended that the structure having a wide session and a rich architectural program could be used as a museum, a guesthouse or a public training center (Figs. 10 and 11).

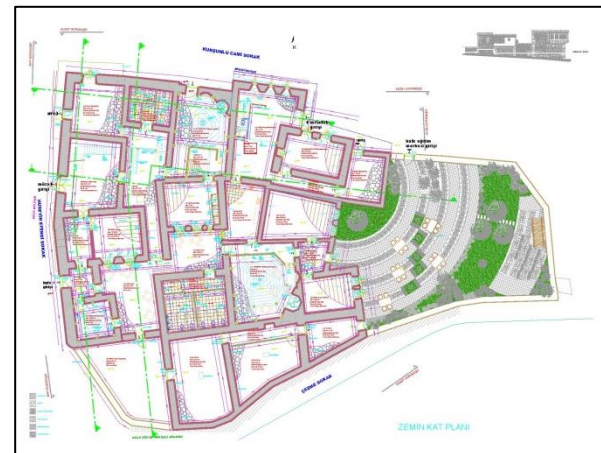


Figure 10. 2D Restoration Drawings-Ground Floor Plan

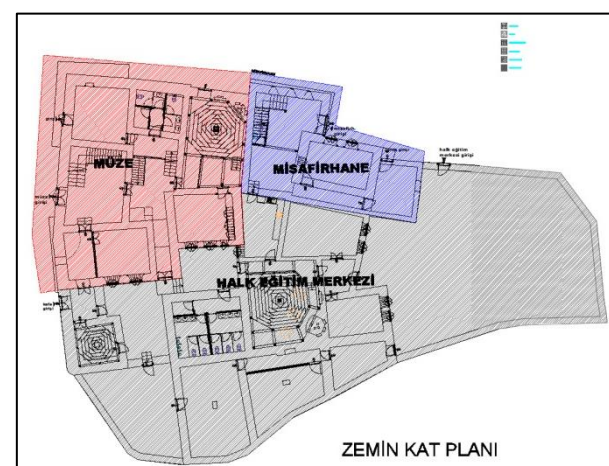


Figure 11. Restoration Project-Functions

The restoration decision has been made as dismantling and reconstruction of the structure considering the structural status of the mansion, that the region is an earthquake zone and the construction system is masonry. The parts used as Haremlik and Selamlık authentically have been given the function of a museum and the ethnographic works relating to the culture and art of the region have been enabled to be exhibited. The part used as an outbuilding has been planned as a guesthouse and it has been thought that the academicians, students, public officials coming out of the city could be hosted there. The rooms in the south of the structure have been designed as a public training center where the people in the region will be trained so as to contribute to the individual, familial and local economy, workshops are organized and social and cultural bonds can be established.

Museum section

The part of the structure given the function of a museum can be entered from the western facade (Fig. 12). The Entrance Hall is accessed from a double-leaf wooden door with "Z2 belt. This space has been designed as a place which direct the users and where there are the panels and a help desk providing the necessary information. Another exhibition hall (Z09 HALL) is accessed from the opposite side of the entrance and the administrative sections are accessed from the stairs on the left. The exhibition hall upstairs is accessed from the wooden stairs, the first 5 steps of which are stone and the others of which are wooden, situated on the right of the entrance. The floor of the space is covered with natural stones and the ceiling has a timber beam. The walls are plastered.

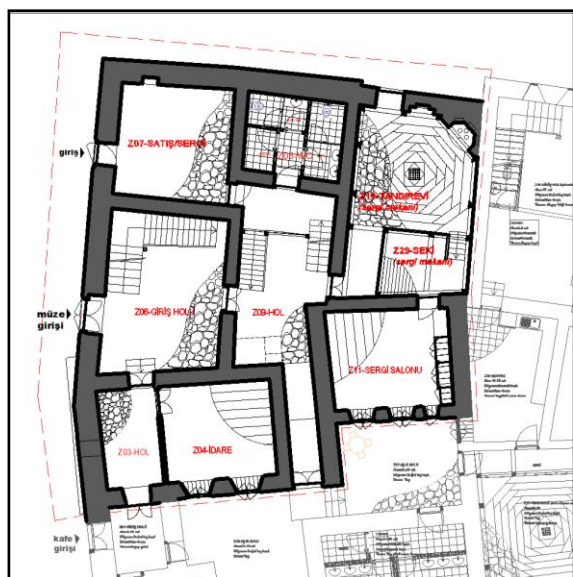


Figure 12. Restoration Project- Spaces of Museum Section

Z03-Hall/ Z04-Administration (Management)

It has been thought that these spaces could be used as the management space of the museum. The space is reached through the Museum entrance hall (Z06) and Cafe entrance hall (Z01). The halls are used as a passage area. A secretary desk is arranged in the space. The Management room is accessed from here. This room is arranged as a room to be used by the administrators. It has been thought that desks and cabinets would be placed in this room. The room is illuminated by 2 windows opening to the open courtyard (Z12). The wall separating the rooms is plasterboard.

Z07- Sale

This section has been designed as a room where the objects created by the Public Training Center and the objects special to Erzurum are sold. It has an entrance independently of the museum. This room is entered from a wooden two-leaf door with a "Z" belt in the west. An artificial lighting system has been used in the room where there is no window opening. The ceiling of the room is covered with wood. In the middle of the ceiling, there is a wooden core having a star fitting with 10 arms. The wall of the room is plastered and the ceiling is covered with saltasi. There is a controlled entry from this room to the exhibition hall of the museum.

Z09- Hall

It has been designed as an exhibition hall and a passage area in the museum. The doors are opened to this room from the Entrance Hall (Z06), Sales Room (Z07), open courtyard and tandoori house. From this room, first the exhibition hall on the mezzanine floor and then the exhibition hall upstairs are entered through the wooden stairs, the first 5 steps of which are stone. The floor of the room is covered with saltasi. The walls are plastered and the ceiling has a timber beam. This room opens to the open courtyard (Z12) through a narrow and long corridor.

Z10- Tandoori House Z29-Terrace

The tandoori house of the structure has been reconstructed in line with the restitution project. This is a place where the activities such as sitting, having a rest and cooking, etc. are performed authentically. It has been thought that authentic household items would be exhibited in this section. The authentic details such as kurun, tandoori furnace and shelves are exhibited for visitors. The space used to be entered from a wooden gate from outside originally. This door has been recommended not to be used in order to control the entry and exit of the museum.

Tandirevinin kare planlı kısımlarına yerleştirilen kare kesitli ahşap dikmelerin üzerine 1 kare, 1 sekizgen yapmak suretiyle ağaçların üst üste bindirilmesi ile oluşturulur. There are wooden shelves between the wooden posts. There is a watering trough in the inner wall of the entrance gate. There is a square skylight on the top. There is a tandoori head on the left corner of the wall of the original entrance. The floor of the space is covered with natural stones. There is a wooden platform higher than the ground level just opposite side of the original entrance. There is an access to the basement floor underneath the platform. The platform surrounded by a wooden guardrail opens to an exhibition hall (Z11).

Z11- Exhibition Hall

In the space designed as an exhibition hall, the original alcove is also exhibited. The space is illuminated by 3 windows, including 2 big and 1 small. The windows widen inwards. They are double-skin, woodwork and with grab rails. The floor of the space is covered with wood, the ceiling is with wood lath and the walls are plastered.

Mezzanine Floor

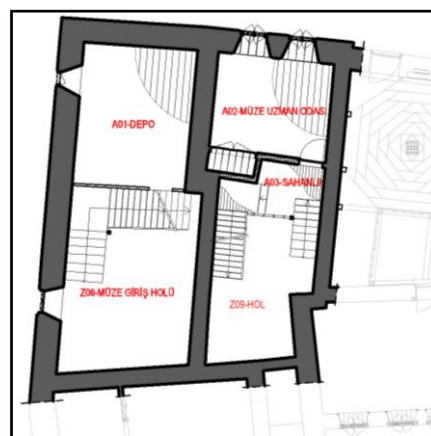


Figure 13. Restoration Project- Spaces of Museum Section

A01- Storehouse

The exhibition hall upstairs is accessed through the wooden stairs, the first 5 steps are stone, from the entrance hall of the museum. A space on the mezzanine floor is accessed through the wooden stairs platform. The space is surrounded by wooden guardrails. As the height of the space is low, it has been decided to be used as a storehouse. It has been thought to exhibit the objects in the parts visible as going up the stairs. The space is illuminated by a small window opening to the western facade. The floor of the space is covered with wood, the ceiling is with timber beam and the walls are plastered.

A02- Experts' Room / A03 Stairhead

The exhibition hall upstairs is accessed through the wooden stairs, the first 5 steps are stone, from the Museum Z09 Hall. It has been decided to use the space entered from the stairs platform (A03) as an Experts' Room. The space is entered with a single-leaf wooden door from the platform. There is a wooden alcove in the space. The space is illuminated by 2 windows opening to the northern facade. They are double-skin, woodwork and with grab rails. The windows widen inwards. The ceiling of the space made of wooden lath (Figure 13).

First Floor

In the structure originally built as Selamlık and Haremlık, these two sections do not have any connection with each other upstairs. The space upstairs has been arranged as an exhibition hall. The outer walls of the first floor is made of stone, the outer walls of the rooms numbered 109-111-112 are made of bricks and the inner dividing walls are made of plasterboard.



Figure 14. Restoration Project- 1st floor-Spaces of Museum Section

1st Floor Plan (Restoration Project)

107- Hall

The exhibition hall upstairs, Hall(107) is accessed through wooden stairs from the entrance hall. From this hall, The Lounge (106) is entered through a double-leaf woodwork door. The room is illuminated by a small woodwork window.

The stairwell is surrounded by a wooden guardrail. This room has been arranged as a passage area. There are an information board and the local objects exhibited in the room (Fig. 14).

106- Lounge

This room has been designed as a room where the museum visitors can have a rest. Authentic wooden sofas have been placed in front of the windows for the use of visitors. The room is illuminated by are double-skin and woodwork windows with grab rails. The ceiling of the space is covered with wood lath and the floor is made of wood. The doors of the other exhibition halls open to this space.

105- Hall / 102- Exhibition Space

This space is entered through the door on the left wall of the entrance of the Lounge (106), and from this space, the room(102) originally used as a storeroom is accessed. It has been thought to exhibit original woven works and handcrafts in this space having a narrow and long rectangular plan. The floors of the spaces are covered with wood and the ceilings are covered with wood, as well. The exhibition space is illuminated by a small woodwork window.

108- Hall

The access to this space used as an exhibition and transitional area has been enabled through wooden stairs from the Hall (Z09) on the ground floor. The stairwell is surrounded by a wooden guardrail. There are 2 levels on the floor of the space. There is an access to the roof from this space through a woodwork door. It has been recommended to use this door in a controlled manner. The room is illuminated by a small window. The floor of the space is covered with wood and the ceiling is covered with wood laths.

110- Exhibition Hall

There is an access from the Hall(108) to this space through a double-leaf wooden door. This room has been arranged as an exhibition hall. The space has 2 windows facing the front facade and 1 window facing the side facade. The windows are double-skin, woodwork and with grab rails. The floor of the space is covered with wood and the ceiling is covered with wood laths.

There is an access from this space to the other exhibition halls.

109- Corridor

This corridor is accessed from the exhibition hall numbered 109 through a double-leaf door with a wooden platform. This room has been arranged as an exhibition hall. The other exhibitions halls upstairs open to this space. The corridor is illuminated by the windows placed opposite of the entrance and in the corner. The floor of the space is covered with wood and the ceiling is covered with wood laths. The space is corbelled to the street on the eastern facade.

111- Exhibition Hall

The space is entered from the corridor (109) through a 2-leaf door with a wooden platform. Te space arranged as an exhibition hall is corbelled to the street. There are 6 windows 3 on the front facade and 3 on the western facade, illuminating the space. The floor of the space is covered with wood and the ceiling is covered with wood laths.

112- Exhibition Hall

This space was originally used as a coffee house of the selamlık section. It has been thought to exhibit the items that fit its original function. The space is entered from the corridor(109) through a single-leaf door with a wooden

platform. The window just opposite the entrance illuminates the room. The floor of the space is covered with wood and the ceiling is covered with wood laths.

Public Training Center

The section in the south of the structure has been given the function of Public Training Center. These spaces have been designed as the workshops where the people of the region would be trained so as to contribute to the individual, familial and local economy. A cafeteria has been arranged in this function. It has been thought that this cafeteria would provide service for both the visitors of the museum and and the people participating in the workshops (Fig. 15).



Figure 15. Restoration Project- Spaces of Museum Section

Cafeteria

Z01- Entrance Hall

The Entrance Hall (Z01) of Cafeteria is accessed through a wooden door opening to the western facade of the structure. From this space which is a distribution area, there is an access to both the management room of the museum and the Open Courtyard(Z12). The door on the right wall of the entrance opens to the sitting rooms. The floor of the space is stone and the ceiling is covered with wood laths (Fig. 16).

Z02- Sitting Room

This room is entered from a wooden single-leaf door from the entrance hall(Z01) The ceiling of this space with a square plan is a dovetail ceiling carried by wooden posts on four corners. There is a skylight in the middle of the ceiling. It has been thought that the room would serve for the people visiting coming to the cafeteria. There are sitting and resting areas in the space.

Z12- Open Courtyard / Z27- Ope Courtyard / Z28- Garden

This room is entered from a wooden door from the entrance hall(Z01). Sitting and resting areas have been arranged in this open-top space. The floor of the space is covered with natural stones. There is an access to the garden through a door on the right wall of the space entrance. A landscape design has been created in the garden. An access to the workshop classrooms is provided from the garden.

The wet areas (Z18) arranged for both those using the cafeteria and working in the workshops can be accessed from the open courtyard (Z27).

Z16- Kitchen

It has been designed as a kitchen that serves for the cafeteria. The space is accessed from the wooden platform in the cafeteria (Z17-tandoori). The room is illuminated by a window opening to the open courtyard. The kitchen also serves for the guesthouse. The floor of the space is covered with ceramic. The original ceiling of the space is with timber beam. A rockwool suspended ceiling has been used for the timber-beam ceiling.

Z17- Tandoori(Cafeteria Sitting Area)

This area has been arranged as a closed sitting and resting area. The area was originally used as a tandoori house. The space has been built exactly the same in accordance with the restitution project and anticipated to be used as a cafeteria. There is an access to this space from the open courtyard(Z27) and the entrance hall of the workshops (Z05). There is a platform higher than the floor in this space. This space is accessed from this platform by going down the wooden stairs. The platform is surrounded by a wooden guardrail. There is a tandoori in the corner of the opposite wall of the platform. There is a stone kurun on the wall adjacent to the stairs. The floor of the space is covered with natural stones. The ceiling of this space with a square plan is a dovetail ceiling carried by wooden posts. The skylight in the middle of the ceiling illuminates the space.

Workshop Classrooms

In this part of the structure, the workshop classrooms of Public Training Center have been designed. These spaces have been designed as the workshops where the people of the region would be trained so as to contribute to the individual, familial and local economy. The items designed in these classrooms can be both exhibited and sold.

Z28- Garden

The workshops are accessed through a door on the garden wall in the northern facade. From this facade, there is an access to the garden (Z26) through a woodwork door. Landscape design has been created in the garden area. It has been thought to create open working spaces depending on the weather conditions. In the garden, there are 2 doors, one opening to the administration and the other to the workshops.

Z25- Entrance Hall

There is an access to the entrance hall(Z25) from the garden to the administration and workshops through a wooden single-leaf door. It is also possible to reach the cafeteria from this space. The floor of the space is covered with natural stones and the ceiling has a timber beam

Z22- Administration(Management)

It has been thought that the space reached through the entrance hall (Z22) would be designed as a management room that serves for the public training center. Tables and cabinets have been placed in the space. The space is illuminated by 2 windows facing the garden. The windows are double-skin, woodwork and with grab rails. The floor of the space is covered with wood and the ceiling is covered with wood laths.

Workshop Classrooms -Z23- Z21- Z20- Z19- Z30

The workshop classrooms in the public training center have been designed in these spaces. An internal arrangement will be made according to the purpose of use. The floor of the space is covered with natural stones and the ceiling has a timber beam. Except for the classroom numbered Z23, the other classrooms have no window. The inner spaces are illuminated by skylights in the ceilings. Since it has been thought that more light would be required depending on the function, it has been recommended to equip these spaces with artificial lighting.

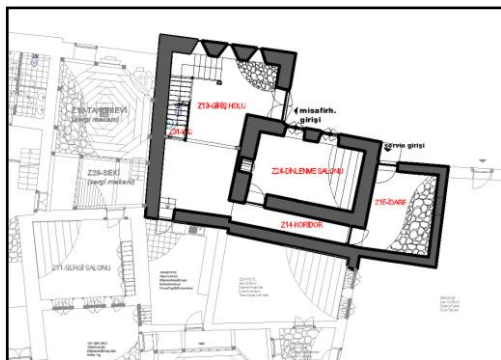


Figure 16. Restoration Project- Spaces of Cafeteria Section

Guesthouse

The section originally used as an outbuilding has been given the function of guesthouse. In this section, there are spaces to be used by the guests visiting Erzurum.

Ground Floor

The reception, waiting, administration and wet areas of the guesthouse have been arranged on the ground floor.

Z13- Entrance Hall

This space has been arranged as a reception and waiting area of the guesthouse. There are stairs at the entrance going upstairs. The lower section of the stairs has been anticipated to be used as a WC. A reception desk has been designed in the entrance hall having a wide space. A cloakroom has been arranged next to the reception desk. There is also a waiting room for the use of guests inside this space. The space is illuminated by 3 sunroofs on the right wall of the entrance. The floor of the space is covered with natural stones and the ceiling has a timber beam.

Z14- Corridor

This space having a narrow and rectangular plan provides access to the sitting and management rooms. The floor of the space is covered with natural stones and the ceiling has a timber beam.

Z15- Administration

This room has been designed as the management room of the guesthouse. It is possible to enter the space reached through a corridor in the guesthouse with a separate door on the facade. It has been thought to make arrangements that fit for the function. The floor of the space is covered with natural stones and the ceiling has a timber beam. There is a small skylight

facing the garden in the space. Artificial lighting has been anticipated to be used in the space in line with the function.

Z24- Lounge

In this space accessed passing through the corridor, a common area where the people using the guesthouse can sit and relax and watch TV has been designed. The space has 2 windows facing the facade. The windows are double-skin, woodwork and with grab rails. The floor of the space is covered with wood and the ceiling is covered with wood laths. There is a niche used as a cabinet on the left wall of the entrance of the space.

First Floor

It has been designed as an accommodation area of the guesthouse on the first floor of the structure (Fig. 17).

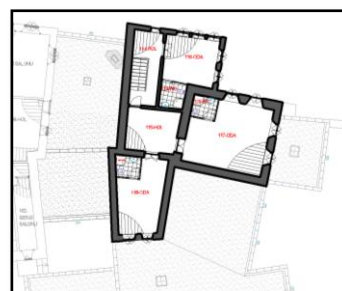


Figure 17. Restoration Project- Spaces of Guesthouse Section (1st floor)

Hall- 114- 115

The accommodation area upstairs is accessible from the entrance hall of the guesthouse through the stairs, first 5 steps of which are wooden. From this area (114), the room numbered 116 and the hall numbered 115 are accessed. The space is illuminated by a skylight facing the facade. The platform of the stairs is surrounded by a wooden guard rail. The other rooms are accessible from the hall numbered 115. The connection of two halls is provided through a woodwork door. Artificial lighting has been anticipated to be used in this space having no window. The floor of the space is covered with wood and the ceiling is covered with wood laths.

Room 116- 117- 118

The rooms accessible through the hall (115-114) on the first floor have been arranged as guestrooms. Wet areas have been designed inside the rooms in line with the function. In these spaces created by plasterboard partitions, the raised floor and suspended ceiling have been arranged. The floor of the space is covered with wood and the ceiling is covered with wood laths.

Basement Floor

There are 3 spaces on the basement floor of the structure. These spaces are accessible underneath the platform in the tandoori house in the museum and from the corridor of the guesthouse. It has been thought that 2 of these spaces would be used as storehouses and the other as a technical room (Fig. 18).



Figure 18. Restoration Project-Basement Floor

Facade

The external walls of the structure have been rebuilt with the original materials (rubble stone and bonding timber) in original dimensions. The facade of the structure has been ended with the ashlar wall coping. Gargoyles have been placed on necessary parts of facade.

The doors and windows have been arranged in line with the original details. At the entrance of the structure, the "Z" type double-leaf wooden door which is typical in the Traditional Houses of Erzurum has been used. Also, a light double-leaf wooden door called "TIRHIC" seen at the front of the outer doors in the traditional domestic architecture of Erzurum has been used. Brickwork parts have been plastered and stone parts have been left unplastered (Figs. 19, 20,21,22).

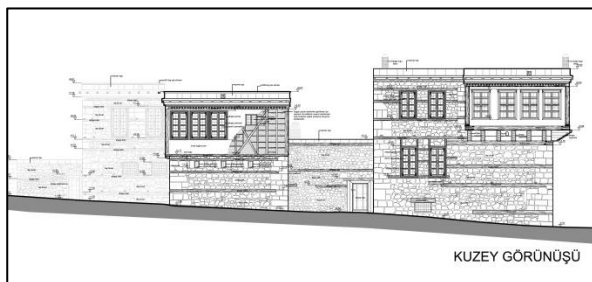


Figure 19. Northern View (Restoration Project)

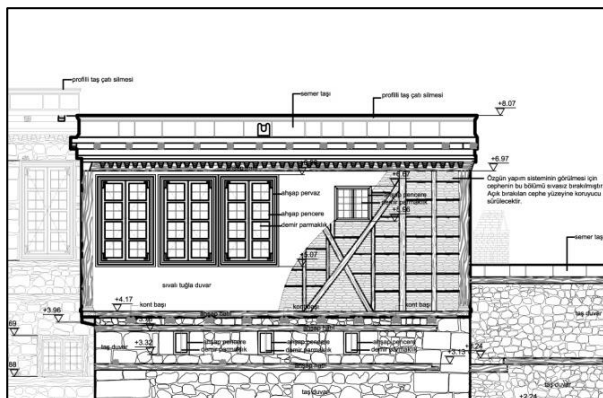


Figure 20. Northern View - Facade Detail (Restoration Project)

A part of the northern facade has been left unplastered for the original construction system to be seen. A preservative will be put on the facade left open (Fig. 20).

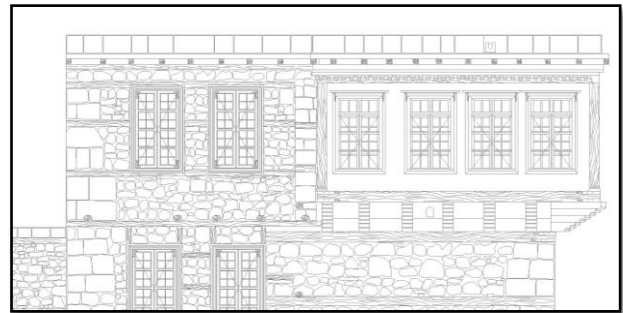


Figure 21. Northern View - Facade Detail (Restoration Project)

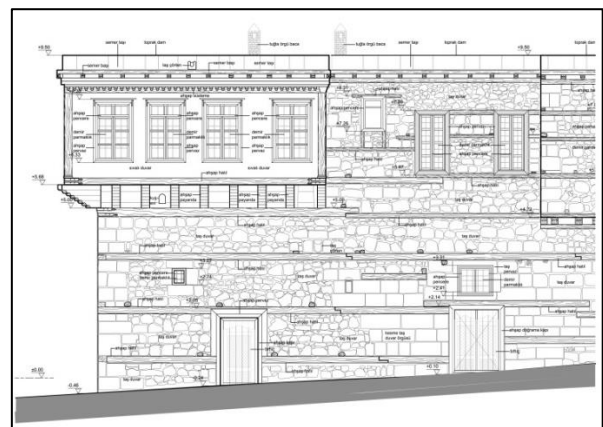


Figure 22. Western View - Facade Detail (Restoration Project)

The mechanical, static and electrical projects have been submitted to and approved by the council of monuments in line with the restoration project. The implementation has been started in 2015. In accordance with the project, first numbering and dismantling works have been performed and the foundations in the lost sections have been opened. In the implementation, completely conventional methods and conventional materials have been used.

4.CONCLUSIONS

Through 3D laser scanning method, Zırnıklı Vehbi Bey Mansion has been ensured to be transferred to the next generations as one of the oldest and most beautiful examples of traditional houses of Erzurum. In this study, the documentation of the house which is the first and the most important step has been completed with difficulty because the structure was abandoned, that it was not structurally stable and most of it was already destroyed. In such a structure, it is not possible to perform the buildingsurvey through the conventional methods.

At this point, the 3D laser scanning method has provided big advantages in such a cultural property sitting on the whole block and consisting of the rooms opened to each other as in the cultural texture of Erzurum.

The 3D laser scanning technologies save time in preservation of this kind of texture, prevent detail losses and enable

application and reconstruction even though the structures are destroyed especially for the reason that it ensures data gathering rapidly and in high accuracy in the cultural texture where the cultural property gain an integrated meaning.

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