Construction Techniques and Materials of the Ottoman Period Baths in Seferihisar–Urla Region

By

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ABSTRACT

It is a well known fact that, in the past, together with the function and size, stylistic and architectural features of public as well as individual buildings were mostly determined by the conditions of physical and social environments where they took place. In historic buildings, in addition to stylistic ones, the achievements in the architectural features, such as scale, plan layout, mass and façade orders and spatial quality largely depend on the choice of suitable materials and construction techniques. This is also available for public baths belonging to the Ottoman Period, which is the subject of the study.

For this purpose, some baths located in Seferihisar and Urla nearby surroundings of İzmir, from Ottoman Period were selected to determine their architectural layouts, characteristics of construction techniques and building materials, in addition to installations belonging to lighting, water supply, waste water disposal and heating systems. Despite their modest scales, they evidently reflect the general outlines of Ottoman bath architecture and the way of life of the period. In addition, they also offer information on the traditional construction techniques and material use identical to the region, but, being out of use today and negligence for years, these buildings are about loosing their characteristic values rendered them historic identity. Despite the absence of their inscription panels, the baths investigated were dated back to the 15th and 16th centuries with reference to their architectural features, material use and construction techniques.

To be based on sound interventions for their preservation, the study has been concentrated on the documentation of the information about original building materials and construction techniques through field surveys implemented in the buildings themselves, and the evaluation of the collected information in the light of their architectural layout. Field surveys are consisted of architectural measurements carried out with conventional techniques, and the documentation through photographs and free-hand sketches for details of architectural and technical importance to be converted into graphics using a version of *AutoCAD* software program.

Owing to the rich local sources around, limestone was the prominent type of load bearing building material in all the walls of the baths studied. Brick, in this respect, although found to be of secondary importance was also abundantly used both

structurally and decoratively in many parts of all baths either alone or together with stone in varying combinations of alternating bond techniques. Reused stones were also found to be used on the sides of the door and window openings, and at the corner of the walls and drums on the exterior. Within this structural layout lime mortar took its own part as bonding agent between stone and brick bounds. Timber beams at certain levels were used in the baths as another structural material surrounding the building horizontally to transmit the vertical loads of the upper parts evenly to the lower parts and to the foundations eventually.

The exterior faces of the walls of the baths had no plaster. However, interior faces of some spaces, such as *'soyunmalık'* where there was no danger of water or water vapor attack the lime plaster was applied to the wall surfaces. Other spaces, such as *'ılıklık'* and *'sıcaklık'* in a direct contact with water and vapor *'horasan'* plaster was widely applied for protective as well as decorative purpose. It was also applied at the exterior faces of the domes and vaults for the purpose of insulation against rain wash.

Being important installation means, terracotta pipes were notably used in the baths. The vertical pipes belonging to heating system served as flue pipes and the horizontal ones for water supply. Another type of terracotta pipes took place in the vaults and domes *oculi* for lighting purpose.

The first section of the thesis is devoted to the aim and definition of the problem, and methodology of the study which is composed of descriptions, terminology and literary sources utilized. The second section covers the introduction of historical background of Seferihisar-Urla region and the examined baths where they were located. In the third section, the baths were separately analyzed in detail with respect to the construction techniques and material use. The overall evaluation of the results obtained throughout the study is given in the fourth section. The last section includes the concluding remarks.

ÖZ

Geçmişte, bireysel yapılarda olduğu kadar kamuya ait yapıların işlev ve ölçekleriyle, sanatsal ve mimari özelliklerinin, içinde yer aldıkları fiziksel ve sosyal çevre koşullarınca belirlendiği iyi bilinmektedir. Tarihi yapılarda, sanatsal özelliklere ek olarak, ölçek, plan kurgusu, kitle ve cephe düzenleri ile mekan kalitesi gibi mimari özelliklerde sağlanan başarı, önemli ölçüde uygun malzeme ve yapım tekniklerinin seçimine bağlıdır. Bu durum, çalışma konusu olan Osmanlı Dönemi hamam yapıları için de geçerlidir.

Bu amaçla, mimari özelliklerini, uygulanan yapım tekniklerini ve yapı malzemesi kullanımını, ve bunlara ilave olarak aydınlatma, kullanım suyu, atık su ve ısıtma sistemlerine ait tesisatı saptamak üzere İzmir yakınlarında Seferihisar ve Urla'da yer alan Osmanlı dönemine ait birkaç hamam yapısı seçilmiştir. Mütevazi ölçeklerine karşın bu yapılar, Osmanlı hamam mimarisinin genel çizgilerini ve dönemin yaşam biçimini net biçimde yansıtmaktadırlar. Aynı zamanda, bölgeye has yapım teknikleri ve malzeme kullanımı konusunda da bilgi sunmaktadırlar, ancak uzun yıllar kullanım dışı kalmaları ve ihmal nedeni ile tarihi kimliklerini kazandıran tipik özelliklerini yitirmek üzeredirler. Kitabeleri olmamakla birlikte, mimari özellikler, yapım teknikleri ve malzeme kullanımı dikkate alındığında çalışılan hamamların yapım tarihleri 15. ve 16. yüzyıllar olarak tahmin edilmektedir.

Çalışma, bu yapıları korumaya yönelik sağlıklı müdahaleler için temel oluşturmak üzere, yapıların kendisinde gerçekleştirilen arazi çalışmalarıyla özgün malzemeler ve yapım tekniklerine ait özelliklerin belgelenmesi ve toplanan bu bilgilerin mimari kurgu ile birlikte değerlendirilmesi üzerine yoğunlaşmıştır. Arazi çalışmaları, yapıların klasik yöntemlerle kısmi ölçümleri, bir *AutoCAD software* programı kullanılarak grafiklere dönüştürülmek üzere mimari ve teknik önemi olan detaylara ait serbest-el çizimler ile bunların fotografik belgelenmesinden oluşmaktadır.

Çevrede zengin kaynaklarının oluşu nedeni ile kireç taşı, taşıyıcı yapı malzemesi olarak çalışılan hamamların bütün duvarlarında ana yapı malzemesi durumundadır. Tuğla ise taşıyıcı malzeme bağlamında kullanım bakımından ikincil duruma düşmekle birlikte gerek kendi gerekse taşla birlikte çeşitli almaşık örgü teknikleriyle tüm hamamların pekçok bölümlerinde bolca kullanılmıştır. Bazı örneklerde, kapı ve pencere açıklık kenarlarında, dışta duvar köşelerinde ve kasnaklarda devşirme kesme taş

görülür. Kireç harcı ise strüktür sisteminde bağlayıcı malzeme olarak taş ve tuğla örgüleri arasında yerini almıştır. Diğer bir strüktürel yapı malzemesi olarak ahşap, yatayda tüm yapıyı çepeçevre dolaşarak üst yapıdan aldığı yükleri homojen biçimde alt kısımlara ve dolayısıyla temellere aktarmak üzere kullanılmıştır.

Çalışılan hamamların tamamında duvar dış yüzleri sıvasızdır. Su ya da su buharına maruz olmayan soyunmalık gibi mekanlarda kireç sıva kullanılırken, ılıklık ve sıcaklık gibi doğrudan su ile temas halinde olan mekanlarda ise yalıtım amaçlı olduğu kadar süs malzemesi olarak da horasan harcı kullanılmıştır Horasan harcı yağmur sularına karşı yalıtım malzemesi olarak kubbe ve tonoz dış yüzlerinde de kullanılmıştır.

Tarihi yapılarda sıhhi tesisat bağlantı elemanı olan pişmiş kilden yapılan künk ya da pöhrenk büzleri incelenen hamamlarda da yoğun olarak gözlenmiştir. Isıtma sistemine ait düşey büzler duman atılmasını sağlamak, yatay olanlar ise sıcak veya soğuk su dağılımını sağlamak üzere kullanılmıştır. Kubbe ve tonozlarda ise benzer künkler ışık alımını sağlamaktadır.

Tezin ilk bölümü amaç ve sorunun tanımı ile, sözel tasfir, özel deyimler ve yararlanılan kaynakların kısa açıklamalarından oluşan çalışma yönteminin tanıtımından oluşmaktadır. Çalışılan hamam yapıları ile bunların yer aldığı Seferihisar-Urla bölgesinin tarihi geçmişine yönelik bilgiler ikinci bölümde yer almaktadır. Yapım teknikleri ve malzeme kullanımı bağlamında her bir hamam yapısı için ayrı ayrı yapılan analizler üçüncü bölümde, çalışma süresince elde edilen bilgilerin değerlendirilmesi ise dördüncü bölümde sunulmuştur. Son bölüm ise elde edilen sonuçların genel bir özetini vermektedir.

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CHAPTER 1

INTRODUCTION

1.1. Aim and Content of the Study

Investigations on Ottoman buildings revealed that the use of material and construction techniques were closely related to the function, mass order and size, and local characteristics of the settlements where they took place. The investigations on the local characteristics of materials used and related techniques of the period also implied that there is a necessity of detailed architectural documentation to understand the Ottoman architecture better and to give its right place in the history of architecture it deserves.

The objective of this study is to determine the properties of materials and construction techniques employed in the architectural components of some Ottoman baths found in small settlements in Urla and Seferihisar neighborhoods of İzmir.

The materials mainly used in these buildings were stone, brick and lime mortar as binder. Timber was also used as beams placed in the walls to distribute loads vertically. Stone, both in the form of rubble and cut stone was the major structural material in the walls. Reused cut stone also found to be used on the sides of the door and window openings, and at the corner of the walls and drums on the exterior. Brick, on the other hand, was generally used in the upper parts of the masonry such as arches, vaults, and domes. The exterior faces of the walls had no plaster, while interior faces were usually plastered. In those parts, as well as the exterior face of the domes 'horasan' was the mostly used plaster type. Terracotta pipes belonging to the water installation, heating and lighting systems were the other construction elements used in the examined baths. The lime mortar characteristics of the studied baths are investigated in the thesis titled "*Investigation of Lime Mortar Characteristics for the Conservation of the Ottoman Baths in Seferihisar-Urla Region*"(Çizer 2004).

The baths of Ottoman Period built either in small or larger settlements reflecting some certain aspects of the lifestyle of the period should be taken into consideration as historic evidence worth preserving. Despite their relatively small sizes and great

negligence for years the studied baths still preserve their authentic characteristics such as plan layout, mass order, spatial features construction techniques and most of the original materials. Although they have no inscription panels, a close examination and evaluation toward their architectural features imply that they can be dated back to the 15th and 16th centuries.

The name and the places of the baths studied are as follows:
Çifte Hamam (Hersekzade Ahmet Paşa Hamamı), Rüstem Paşa Hamamı, and Yeni Hamam located in the center of Urla Town, Kamanlı Hamamı (Yahşi Bey Hamamı) in Kamanlı neighborhood and Özbek Village Hamamı; Seferihisar Büyük (Great) Hamam, Küçük (Small) Hamam located in the center of Seferihisar Town, Kaleiçi Hamamı in Sığacık neighborhood, Ulamış Village Hamamı, Düzce (Hereke) Village Hamamı.

It has been necessary to document construction techniques and original materials that form the architectural elements of these studied baths before they disappeared due to the fact that no precautions have been taken to protect them.

1.2. Definition of the Problem

In general in the Ottoman baths, the planning characteristics, spatial components, mass order, construction techniques, installation systems consisting of water and heating systems have similar features. However, the use of materials differs in detail dependent on the conditions of settlements in which the baths were built, and their sizes and reveals local tastes, experimentations and adaptations.

The Ottoman baths in the vicinity of Urla and Seferihisar have been damaged due to abandonment, lack of maintenance, natural effects, and vandalism done by humans and the architectural values and original construction materials they had have disappeared gradually. In addition, as a result of the fact that the settlement pattern has changed in the surroundings of the baths, in the settlements where they are located and interventions to the building directly, the mass order has been negatively affected.

The evaluated architectural features in the studied baths date back to the 15th and 16th centuries. The subject of this research, are the indicators of the social and cultural life in small settlements in the Ottoman period. The historical identities of these local examples will be able to continue depends on the conservation of the original construction techniques and materials. For this reason, these baths were chosen as the

subject of this research and since no precautions have been taken to conserve them it is necessary to document their current situations before they lose their construction features, and are further damaged.

The construction technique during these periods and the study of the materials will provide the determination of original qualifications to be conserved and will lead to protection decisions of their historical identities.

On the other hand, this study is significant in terms of contributing to previous researches by documenting the local construction features of Ottoman baths and the use of materials.

1.3. Methodology

The method used in this study consists of two parts. The first part is field survey conducted between June and September 2003. Field survey involved measurements of baths carried out through conventional measurement techniques not in detail but to produce plan layout, sections and elevations roughly. Measured drawings were supplemented with free-hand sketches covering the structural elements such as walls, domes together with transition elements, vaults and arches, the layout of timber beams in the structure as well as lighting, heating, and water installation elements which produced both water supply and waste water disposal. This part of the work was also supplemented with photographic documentation to be utilized in graphical presentations together with free-hand sketches. Information collected during surveys has been documented by graphical presentation techniques using an *AutoCAD* software drawing program. The results of those visual analyses have also been abstracted in charts separately prepared for each bath.

First, hand drawings were prepared dealing with the construction techniques and materials. Further, necessary measurements were taken in order to prepare revised drawings. At the same time, the drawings were supported by photographs to control and correct mistakes.

In the measured surveys of the buildings conventional surveying methods and equipment were used. A datum line of a certain level decided the horizontal and vertical measurements. Heights of the elements are written as whole measurements from the present ground level to the upper point of the element.

The photographs were taken in two sections. Graphic description has mainly two sections from exterior and interior. In addition, the photographs were taken deal with details of the construction techniques of the architectural elements to prepare measured drawings.

The evaluation of the data obtained from field survey has been done in the form of plan and section measured survey drawing with abstraction symbols. In the analyses of the water system, the drawings were also prepared by similar methods. Information obtained from local construction techniques found in the nearby settlements were also taken into consideration in the evaluation. The plans and sections of measured drawings consisting of the visual materials were prepared in 1:100 scaled drawings, and the drawings in details belonging to construction elements in 1:10-1:20 or 1:50 scaled drawings.

1.3.1. Terminology

According to the function and the temperature differences a bath called "*Hamam*" in Turkish is composed of three main spaces:

Soyunmalık: The cold part, including entrance, disrobing boxes and sometimes toilets, is called '*soğukluk*' or '*soyunmalık*' (named Frigidarium or Apodytorium in Roman Thermae).

Ilıklık: The warm part is formed for the purpose of refreshment called '*Ilıklık*' (named tepidarium or alipterium in Roman Thermae)

Sıcaklık: The hottest part, including a central space surrounded by semi-open spaces called 'eyvans' and private boxes called '*halvet*'. This space is called '*sıcaklık*' (named caldarium in Roman Thermae). The most important unit of any '*hamam*' for the production of hot water should also be mentioned with '*sıcaklık*' space. This unit is called '*külhan*' and it is composed of a furnace and a water reservoir.

Regarding the spaces and other units, Turkish terms will be used throughout the thesis.

1.3.2. Sources

The building itself, from which firsthand information is obtained was accepted as the primary source on that the visual documentation of the study was based on. Among the baths, Seferihisar Büyük Hamam were studied in the course of "Res. 502 Design in Architectural Restoration II, spring term, IYTE, 2002" by K. Reyhan and Ö. Çizer; Urla Çifte Hamam and Urla Kamanlı Hamamı were studied by METU students during spring term in 2002. However, the documents of METU students were not used in this thesis while the documents of Seferihisar Büyük Hamam obtained in the studied course in IYTE were revised for this thesis. In addition, literary sources were also utilized for comparative information as well as comparison regarding the construction techniques and use of materials of Ottoman period buildings. These sources are as follows:

Aru, K. A., 1949. "*Türk Hamamları Etüdü*" (The Preliminary Study of Turkish Baths). The study is of great importance since the fundamental characteristics of Tukish baths were examined thoroughly. In this study, after general information about baths, the role of baths in Turkish Architecture was questioned and baths were classified by detailed investigation.

Batur, A., 1970. "*Osmanlı Camilerinde Almaşık Duvar Üzerine*" (On Alternating Bonding System of the Walls in Ottoman Mosques). In this study, alternating bonding system on the walls of Ottoman Mosques in Marmara Region around 13th and 18th centuries were examined. The study concludes that the properties of construction are closely related to the construction technique and material of the period.

Bakırer, Ö., 1972. In the article "*Anadolu Selçuklularında Tuğla İşçiliği*" (Brick Workmanship in Anatolian Seljuk Architecture), the usage of bricks and its importance as a construction material were emphasized. It is of importance in terms of showing the contributions of brick to architectural improvement and techniques of brick bond.

Batur, A., 1974. In his Ph.D. thesis "*Osmanlı Camilerinde Kemer*" (Arch in Ottoman Mosques), the relation between structure and shape was examined. In this scope, the arch was chosen and the functional relation of the reflection in Ottoman Mosques was examined.

Bakırer, Ö., 1980. "*A Study on the Use of Brickbonds in Anatolian Seljuk Architecture*" and Bakırer, Ö., 1981 "*Selçuklu Öncesi ve Selçuklu Dönemi Anadolu*

Mimarisinde Tuğla Kullanımı " (The Use of Brick in Anatolian Architecture before and during the Anatolian Seljuk Period). In these studies, brick work was analyzed in two groups as brick bonds and brick revetments. The type, size and bonding techniques of bricks in addition to their use in the construction methods and distribution in different types of buildings were examined.

Yavuz, A., 1983. "*Anadolu Selçuklu Mimarisinde Tonoz ve Kemer*" (Vaults and Arches in the Anatolia Seljuk Architecture). This book analyzed arch and vault examples in detail found in Anatolian Seljuk Period. In this study, the types of arches and vaults were classified supplemented with drawings and photographs. Dealing with these structural elements in details in terms of construction techniques and the use of materials, detailed information was presented considering their shapes. Visual presentations are of great importance in terms of revealing the improvements of these elements in Anatolian Seljuk Architecture.

Yorulmaz, M., Ahunbay, Z., 1986. "*Sinan Camilerinde Taşıyıcı Sistem ve Yapım Teknikleri*" (Construction Techniques and Structural System in Sinan Mosques). The article consists of two steps. The first examined structural system elements which Mimar Sinan used in mosque he had built in the 16th century under the heading "*Mimar Sinan Camilerinde Üst Yapı Taşıyıcı Sistemi*" (Superstructure system in Mimar Sinan Mosques), each one of the elements consisting of the structural system in masonry system dealt with analyses based on observation. The examination of these has made it easier to comprehend the shape and utilization of structural system and have informed us as to the construction system of the period. The second was examined under the heading of "*Sinan Camilerinde Yapım Tekniği ve Malzeme*" (Construction Techniques and Material, in Sinan Mosques), construction techniques which he applied in the structural system and use of material in each one of the elements. This study evaluated construction materials individually, construction technique and use of material is of similar characteristics to our study.

Kolay, İ. A., 1999. "*Batı Anadolu 14. yüzyıl Beylikler Mimarisinde Yapım Teknikleri*" (The Construction Techniques in the 14th century West Anatolia Architecture of Principalities). In this study, construction techniques of architecture of the Principalities were examined. Construction techniques examined under the main headings of construction, material and decoration, before the period of the Principalities were compared with the Principalities period. In terms of considering the improvement of construction techniques make up on important study.

Tanyeli, G., 1990. "*Osmanlı Mimarlığında Demirin Strüktürel Kullanımı*" (The Structural Utilization of Iron in Ottoman Architecture), (unpublished Ph. D Thesis, ITU). The utilization of iron in construction in the 15th and 18th century in Ottoman architecture was examined in this study. The role of iron as a construction material was made clear in spatial components.

Bakırer, Ö., 1995. "*Anadolu Selçuklu Mimarisinde Yapı Malzemeleri*" (Building Materials in Anatolian Seljuk Architecture). This is a research of the materials used in Anatolian Seljuk architecture. The building materials were examined according to their distribution and use in different types of buildings.

Önge, Y., 1995. "*Anadolu'da XII. - XIII. yüzyıl Türk Hamamları*" (Turkish Baths in Anatolia in the period of 12th and 13th centuries) makes up one of the important essential sources in researches as to the baths. This study consists of very important information about development of bath architecture which has rarely been a matter of research. This study consisted of two steps, in the first detailed information was given about bath architecture and the latter introduced with the aim of being comparing some baths examples with their catalogue information. In terms of presenting detailed information about bath architecture, it is of great importance.

Uluengin, F., 2001. "*Classic Construction Details of Ottoman Monumental Architecture*". This study includes the duration of construction of each one of construction elements. Classifications were done according to the duration of construction and the effect of material, used in this period. Presentation were done both written and visually. Visual material consists of dimensions, belonging to construction elements 1:10-1:20 drawings and photographs.

Yavuz, A., 2002. "*Anadolu Selçuklu Mimarisinin Yapı Özellikleri*" (Construction Techniques in Anatolian Seljuk Architecture). In this research the construction techniques used in the Anatolian Seljuk architecture was examined taking into account the structural elements.

Bakırer, Ö., 2002. "*Tuğla, Ahşap ve Cam*" (Brick, Timber, and Glass). In this study; brick, timber and glass used in the buildings of Anatolian Seljuk Architecture were examined.

This thesis is significant in terms of contributing to previous researches by documenting the local construction features of Ottoman baths and the use of materials.

CHAPTER 2

LOCATION AND HISTORICAL INFORMATION

2.1. Location of Seferihisar - Urla Region

Urla is located to the west of İzmir. It is located in the middle of the Urla Peninsula that extends into the Aegean Sea to the north. Urla adjoins the major towns of Çeşme which has an harbor on the opposite side of the Sakız (Chios) Island to the west Seferihisar to the south, and Güzelbahçe to the east (Figure 2.1).

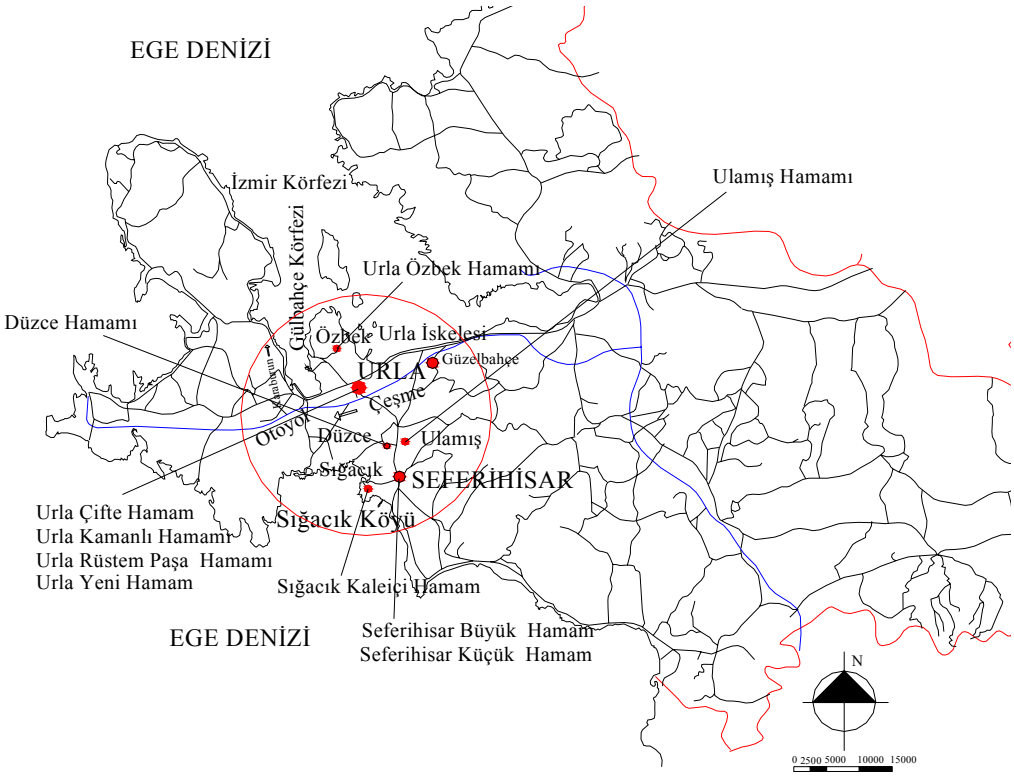


Figure 2.1. Map of the Region, Location of the Baths in the Region.

In the 15th and 16 th centuries, the region had major commercial activity between Chios (Sakız Island) – Çeşme and Anatolia. Because of its location in this period there were important trade routes from here to central Anatolia. A lot of new settlements were

established and many public, religious, and education buildings were built during this period due to these commercial activities. Some of these settlements are Kamanlı and Özbek near Urla, Düzce (Hereke), Ulamış, and Sığacık near Seferihisar as well. There are still a lot of monuments on these settlements today. One group of them are baths which are the subject of this thesis. The baths are situated in the centre of Urla and Seferihisar and close districts or villages Kamanlı, Özbek, Düzce, Ulamış, and Sığacık.

2.2. Historical Information about Seferihisar Urla Region

In Seferihisar – Urla region, the first settlement had been established in 4000 BC according to the excavations which are ongoing. The history of the settlements is dated back to the Chalcolithic Ages. It has been accepted that the first known settlement in the region was Ionian. In sequence, the Ionian cities Teos (Seferihisar), Laros, Lebedos, Erythrai (Çeşme), and finally Klazomenai ”Urla” were established during the ancient times in the Urla-Seferihisar region. Then, in chronological order the region was controlled by Lydians, Persians, Roman, Byzantine, Seljukids, and Aydınoğulları before the Ottomans. The chronological sequence of settlements, based on the archeological excavations, revealed the construction techniques and materials of the mentioned periods. The main living source of the region has been sea-trade from the ancient period up to now. Çeşme (Erythrai) was a major trade center in the ancient periods, and commercial activities had continued to the Roman, Byzantine and Otoman periods. The region was completely taken under the rule of Ottoman by Murat II. in 1425 (Baykara, 1974).

During the 15th and the 16th centuries the region had a great social and economical development due to the trade between western Anatolia and Central Anatolian cities. As a result of the significant commercial activities, the population of Muslims increased in Western Anatolia. It could be explained why the baths were constructed in not only large settlements but also small ones according to the increasing Muslim population.

Where the commercial activities are concerned many buildings were constructed by using traditional construction techniques and materials obtained from the region. The relation between construction techniques and materials used in building technologies

had been carried over from the ancient time to the Ottoman period, when the studied baths were constructed.

2.3. Historical Evolution of Baths

Physical cleanliness was a religious obligation in ancient times. These religious rules on cleanliness continued through to the Hellenistic and Roman periods. In those periods, there were several baths both as private and as part of complex buildings like gymnasium or bath-rooms in some private houses.

Baths were completely developed in the Roman period. Romans developed the baths in a complex form of public baths. These were organised not only for physical cleanliness but also as social centers where social, cultural and sport activities took place.

In the Roman period, the thermae (bath) were raised on a high platform with pillars called “hypocaust”, which was the most important feature of Roman baths. The baths were heated in this way. The most significant examples of Roman bath were Caracalla Bath (constructed in 206-217 AD) and Diocletion Bath (constructed in 298-366 AD) that have survived until today. In these examples, there was a dominant central hall. The “Tepidarium” or warm room had been juxtaposed to the central hall which reached the “Caldarium” or hot room. On the other side of the central hall, the “Frigidarium” was located containing an unheated swimming pool. On each side of the Frigidarium might have been a “Locanicum” and “Apoditeria” or dressing rooms (Figure 2.2).

The baths were heated by the hot air produced by the fire for heating the water in the furnace room. The hot air circulated underneath the floors of the “Locanicum”, “Caldarium”, “Tepidarium”, of the “Apodyteria” lastly. In conclusion it want out from the terracotta pipes “tubulae” in walls.

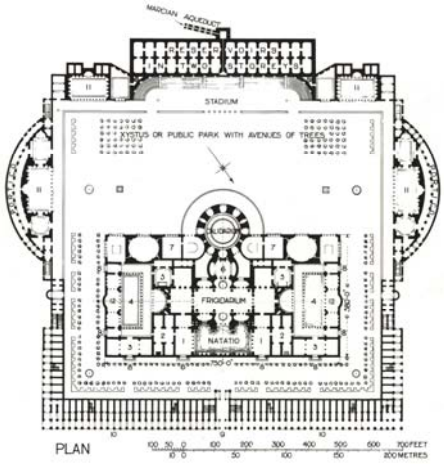


Figure 2.2. Caracalla Thermae in Rome (Fletcher 1996, p.275).

The Byzantine period, baths were built in the order of Roman thermae but without the monumentality. The public bath continued to be used as social spaces, where social activities took place.

In the Islamic religion, ritual cleanliness is an obligation; therefore, Islamic rulers gave great importance to the building of baths (*hamam*) in their cities. Owing to the fact that baths were almost a symbol of power by the Ottomans (Kuban, 1998). Islamic hamams were different from the classical bath for their own needs. In that period, several big baths were built. The first Islamic baths were Qusayr-i Amra in El Azraq, Jordan (8^{th} century) and Bath-as-Sarakh in Amman, Jordan (8^{th} century). The baths consist of three sections "apodyterium, tepidarium and caldarium" having a regular sequence of rooms. Since the religion of Islam needs running water for cleanliness, pools are not found in Islamic Baths (Figure 2.3 and Figure 2.4).

The development of the baths during the Islamic period occured in the Anatolian Seljuk and Ottoman period. The plan of Roman thermae was changed during these periods. Although baths have many similarities to Roman thermae at that time. In addition to these, in that period various plans were created and applied.

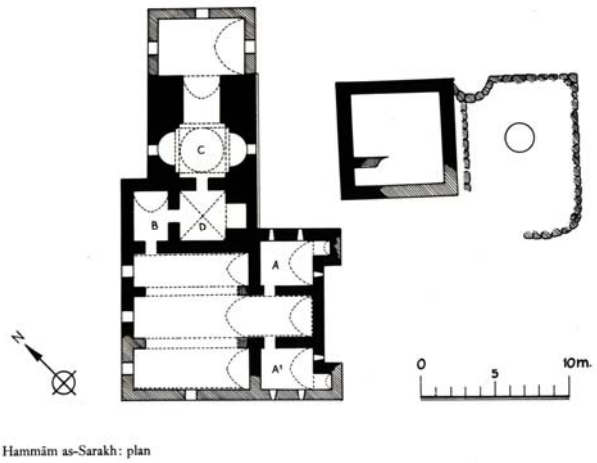


Figure 2.3. Bath as-Sarakh in Amman, Jordan, In Islamic Period (Creswell 1989, p.166)

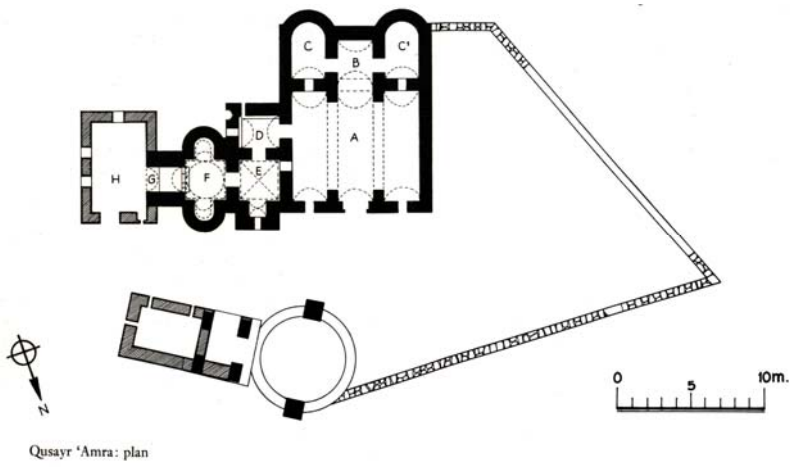


Figure 2.4. Qusayr 'Amra in Amman, Jordan, In Islamic Period (Creswell 1989, p.106)

In the Otoman period, Baths generally consists of four major parts (sections)- "*soğukluk*" (Frigidarium-cold entrance space), "*ılıklık*" (Tepidarium, warm space), "*sıcaklık*"(caldarium-hot space), and water tank with "*Külhan*"(Furnace).

- The dressing hall- known as "*camekan*"- was generally a domed hall with a marble pool "*Şadırvan*" at the centre and a high stone seat along its walls where dressing and resting took place. In some baths, the dressing hall was two-storeyed named as "*Şırvan*" which was constructed with timber.

- In the spatial organization, there was generally a transition space between the dressing hall and the tepidarium called "*Aralık*" after the dressing hall. This space was domed or vaulted and small in size. It was seen as one of the most important spatial

components of the baths belonging to the early Ottoman period in Anatolia. By the 16th century, the space had started to dissappear and then completely disappeared.

- The apoditerium "dressing hall" was followed by the warm space "tepidarium". The tepidarium was the transition space between the dressing hall and the caldarium unit, where the bath was prepared to the "*sıcaklık*" (the caldarium of the Romans). It consisted of several rooms such as toilet and shaving space.

- "*Sıcaklık*", which was the most important part of the baths, was comprised of various plans. The caldarium consisted of *halvets* that were private batting rooms and Iwans. In the Ottoman period, various combinations of *halvets* and iwans were applied. In the Ottoman period, there were many variations of the caldarium which developed many specific plans of baths in Anatolian Architecture.

Turkish baths are generally classified according to the plan of the caldarium that reveals a complete diversity in its spatial order. Taking into consideration the classification method of S. Eyice baths will be analysed in six plan types:

- Cross-axial plan with four iwans and four corner units (*halvet*). In this plan, it is also possible to see the variations including two *halvets* and single, two or three iwans.
- *Sıcaklık* with a star- shaped plan type. It has a polygonal plan with variable side number. Deep niches covered with vaults in the shape of iwans are placed around tihs polygonal plan.
- *Halvets* arranged around a square planned main *sıcaklık* space in square plan type. This plan type consists of a square main *sıcaklık* space and *halvet* on one, two or three side of it.
- Multi-domed *sıcaklık*. The domed main *sıcaklık* space consists of domed side spaces and *halvets*.
- The plan has *soyunmalık*, *sıcaklık* and *halvets* of the same size. All spatial components of *hamam* are approximatelly in the same sizes. These spaces is connected to each other and covered with domes.
- The type of plan that has elongated rectangular *sıcaklık* with a domed central unit and two *halvets*.

According to the classification of S. Eyice, the studied baths are generally in the plan type that has elongated rectangular *sıcaklık* with a domed central unit and two *halvets*.

CHAPTER 3

ANALYSES BASED ON CONSTRUCTION TECHNIQUES AND MATERIALS USED IN THE BATHS

3.1. Descriptive Analyses

3.1.1. Ulamış Hamamı

3.1.1.1. Date

The building has no inscription. However, it can be dated to the 16th century taking into consideration the widening of the square-planned, domed *ılıklık* space with two side sections covered with a vault (Önge 1995, Çakmak 2002), (Figure 3.1).

3.1.1.2. Plan Characteristics

The building has a lengthwise rectangular plan, extending along an axis in the north-south direction of the main spatial components. Its exterior dimensions are 8.30 x 10.65 m. (Figure 3.2). The bath, which does not include a *soyunmalık* space, consists of a *ılıklık*, two *halvets* and a water reservoir. The *ılıklık* is located as the main space of the *sıcaklık*. The *sıcaklık* consists of a rectangular planned space, containing a domed unit in a square plan at the centre, and rectangular barrel vaulted sections on two sides, and two *halvets* attached to it from the north. It can be evaluated within the type of plan that has elongated rectangular *sıcaklık* with domed central unit and two *halvets* (Eyice 1960).

The entrance is provided from the west, through a 65 cm. wide depressed pointed arched door with a opening 65 cm. in width and opens to the *ılıklık*. Entrance opening is located inside a niche 20 cm. in depth and ruined on the upper part (Figure 3.3). The *ılıklık*, located as *sıcaklık*, is situated in the south and its interior dimensions are 2.50 x 5.60 m. The domed square unit is 2.50 x 2.60 m. and is opened to the barrel vaulted side sections on two sides, by depressed pointed arched openings. The two square-planned and domed *halvets*, each having interior dimensions of 2.50 x 2.50 m., were located at the north of the *ılıklık* / main *sıcaklık* space. These spaces are entered through depressed pointed arched door openings, from the *ılıklık* to the *halvets* (Figure 3.4). On the north walls which are between the water reservoir and *halvets*, the traces of basins point out the existence of basins and stone seats on their sides. On the wall between the water reservoir and the west *halvet*, a depressed pointed arched observation window 50 cm. in width was arranged.

Water reservoir, located to the north of the *halvets*, is rectangular planned and barrel vaulted, with 1.35 x 5.60 m. interior dimensions. On the west wall, there is a 40 cm. wide semi-circular arched window opening. It can be considered that this opening was constructed with the aim of controlling the water level regularly from the outside.

3.1.1.3. Construction Technique and Material

The building was built with rubble stone, brick and timber in the masonry system. The exterior walls are 70-75 cm. in thickness, and the interior walls are 60-65 cm. in thickness. The walls were not plastered on the exterior, but plastered on the interior. Horasan plaster was used as the covering material for the surfaces. The traces of horizontal timber beams in the walls, point out the use of timber beams in the construction technique. The vault and the domes, constituting the superstructure, were built with brick and mortar as binding material, and their surfaces were plastered. The exterior surfaces of the domes were covered with horasan plaster. On the vaults and domes of the *ılıklık* and the *sıcaklık* cupolas and oculi were arranged. The horizontal terracotta water pipes belonging to the water system were placed along the walls of the *sıcaklık* spaces. In the transition zone to the dome of the main *sıcaklık* space, two rows of moulding and muqarnas decorations at the corners were arranged.

3.1.1.3.1. Structural System

The walls, which constitute the vertical supporting system, were built with rubble stone bonding as rubble stone / large pieces of bricks in the joints. The vaults and domes, which constitute the superstructure, pendentives and the drum over the pendentives, constituting the transition elements were constructed from brick.

3.1.1.3.1.1. Walls

The exterior and interior walls were built with rubble stone bonding as rubble stone / large pieces of bricks in the joints.

Exterior Walls:

The walls of the *sıcaklık* spaces were built with the rubble stone bonding technique with large pieces of bricks in the joints (Figure 3.5). Brick pieces in the rubble stone bond were placed into the lime mortar filling the emptiness among rubble stones parallel to the horizontal joints on the surface and in the thickness of the walls. However, in the section of the walls, rubble stone and the mortar were filled in random. The north wall, belonging to the water reservoir, was built with rubble stone. The joints between the rubble stones were filled with small pieces of stones and mortar. On the exterior walls, timber horizontal beams about 10 x 20 cm. dimensions surrounding the structure were placed (Figure 3.6). The timber elements about 10 x 15 cm. dimensions perpendicular to the horizontal timber beams point out the existence of timber beams inside of the walls. The three rows of brick arranged 2.30 m. in height from the ground level, on the interior surface of the east wall of the east *halvet*, imply the existence of timber beams placed at such a height. On the interior surfaces of the exterior walls of the *sıcaklık* spaces, the horizontal terracotta pipes belonging to the water system were placed 60 cm. and 70 cm. in height from the original floor level (Figure 3. 7). On the transition zone of the *halvets*, moldings built with three rows of bricks, 17 cm. in height, were arranged.

Interior Walls:

Interior walls were built with rubble stone and large pieces of bricks in the joints. The three rows of brick, 2.30 m. in height from the ground level, on the south wall of the west *halvet* in the direction of *ılıklık*, indicate the existence of timber beams passing at this height. The walls of the main space of the *ılıklık* / *sıcaklık* and the *halvets* were covered with horasan plaster. Until the height of 1.00 m. from the ground level, horasan plaster was used in one layer 3-4 cm. in thickness, and on the upper parts it was used in two layers, the lower layer having the thickness of 2 cm. and the surface layer being 1 cm., for a total thickness of 3 cm. On the north walls between the water reservoir and the *halvets*, the traces of basins indicate that terracotta pipes were placed on these walls.

3.1.1.3.1.2. Transition Elements

Transition to the dome from the wall in *halvets* was provided with pendentives, in the main unit of the *ılıklık* / main *sıcaklık* space with pendentives and drum over them. The pendentives were built with brick, and the drum was built with brick on the interior while rubble stone and brick on the exterior.

Pendentive:

In the main unit of the *ılıklık* /main *sıcaklık* space and in the *halvets*, pendentives, which are in the concave triangle shape at the corners, were constructed with brick forming 3-4 cm. joints and their surfaces were plastered. The ending points of the pendentives in the main unit of the *ılıklık* / main *sıcaklık* space have floral decorations. On the transition zones of the *halvets*, mouldings built with three rows of bricks approximately 17 cm. in height, were arranged between the pendentives and the springing level of the domes.

Drum:

In the main unit of the *ılıklık* / main *sıcaklık* space, a drum over the pendentives in the transition zone to the dome was constructed. It was built with brick forming 3-4 cm. joints and its surface was plastered. The drum was octagonal planned and 80 cm. in height on the interior and 60 cm. in height on the exterior. It was arranged in two rows; each is 40 cm. in height and separated with mouldings. The lower part was embellished with geometric patterns, and the upper part has a row of muqarnas decoration made of low depth plaster. The corners were emphasized with more opulent muqarnas decorations, built with brick.

3.1.1.3.1.3. Superstructure

The square unit of the *ılıklık* / main *sıcaklık* space and the *halvets* were covered with domes, and the rectangular side sections of the *ılıklık* / main *sıcaklık* space and the water reservoir were covered with barrel vaults. These elements were built with bricks and covered with horasan plaster on the interior. It is understood from the remains of the plaster that their exterior surfaces had also been plastered.

Dome:

The square unit of *ılıklık* / main *sıcaklık* space and the *halvets* were covered with domes. They were built with bricks and mortar as binding material, forming 3-5 cm. joints. The whole bricks with 21x31x3-4 cm. dimensions and half bricks with 16x21x3-4 cm. dimensions were used in the bond. The domes of the *ılıklık* space and the *halvets* are 2.35 cm. in diameter and 30-35 cm. in thickness. On the domes, oculi, formed with terracotta pipes, were placed in two circular rows. On the *ılıklık* dome, a hemisphere cupola having oculi was located.

Vault:

The side sections of the *ılıklık* / main *sıcaklık* space and water reservoir are covered with barrel vaults. The vaults which are 30-40 cm. in thickness were built with

brick and mortar as binding material. The vaults of the *ılıklık* space were covered with horasan plaster on the interior. The exterior surfaces are covered currently with plants and debris. On the vaults of the *ılıklık*, three oculi, formed by terracotta pipes were placed along the middle axis. The springing levels of the vaults in *ılıklık* are 3.80 m. in height from the original floor level.

3.1.1.3.1.4. Floors

The floor covering could not be determined since the floor of the *ılıklık* was filled with debris. In the *halvets*, the floors were covered with cut stones over the masonry walls which constitute the *cehennemlik* that heated the floors. However, since the stone covering has been damaged currently, its sizes could not be determined.

3.1.1.3.2. Lighting System

Lighting was provided through the oculi and the hemispherical cupola on the superstructure. Hemispherical cupola is only on the *ılıklık* dome and a 55 cm. in height and 65 cm. in diameter. The hexagonal and star shaped oculi were arranged on it (Figure 3.8). In addition, hexagonal and star shaped oculi can be seen on the dome and the vaults of the *ılıklık* (Figure 3.9). These are, 25 cm. in width on the interior and 19 cm. in width on the exterior narrowing towards the outside, and were formed by placing terracotta pipes among brick bond. Three oculi along the middle axis of the vaults, and two circular rows on the domes decreasing in number towards the top, were located.

3.1.1.4. Installation System

Located in the northwest of the bath, the well, water reservoir and the terracotta water pipes providing the flow of water to the *sıcaklık* space, are the elements, belonging to the water system. The furnace probably located under the water reservoir,

cehennemlik under the floor of the main *sıcaklık* space and the *halvets* are the elements of the heating system.

3.1.1.4.1. Water System

The well, located in the northwest of the bath, is the source of the clean water. The water reservoir situated in the north of the *halvets* and the terracotta water pipes in the walls of *sıcaklık* constitute the clean water system. Terracotta water pipes were placed in two rows; 60 cm. and 75 cm. in height from the original floor level for cold and hot water. The cold and hot water were brought to the basins in the main *sıcaklık* space and *halvets*. In the *halvets*, there are basin traces on the walls between the water reservoir. The waste water channels could not be determined since the floor was filled with debris.

3.1.1.4.2. Heating System

The furnace under the water reservoir and *cehennemlik* could not be observed since the ground was filled with debris (Figure 3.10). On the other hand, the locations of the flue chimneys could not be determined since the superstructure was covered with plant and earth.

Figure 3.2. General View of the Ulamış Hamamı

Figure 3.3. Ulamış Hamamı, The Entrance of the *Hamam* from the West

Figure 3.4. Ulamış Hamamı, The Door Openings from the Main *Sıcaklık* Space to the *Halvets*

Figure 3.5. Ulamış Hamamı, The Exterior Walls

Figure 3.6. Ulamış Hamamı, The Timber Beams in the Walls

Figure 3.7. Ulamış Hamamı, Terracotta Pipes in the West *Halvet*

Figure 3.8. Ulamış Hamamı, The Use of Oculi on the Dome of the West *Halvet*

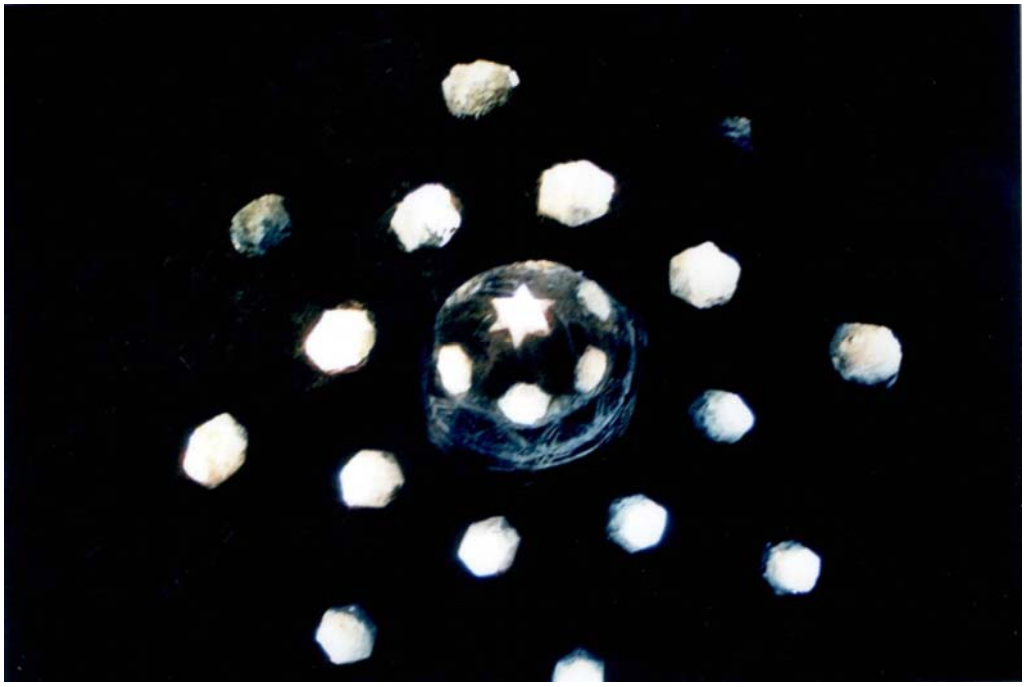


Figure 3.9. Ulamış Hamamı, The Use of Cupola on the Dome of the Main *Sıcaklık* Space

Figure 3. 10. Ulamış Hamamı, The Water Reservoir

3.1.2. Düzce (Hereke) Hamamı

3.1.2.1. Date

The building has no inscription. However, it can be dated to 16th century taking into consideration squinches provide transition to the dome, the two rows of windows on the lower and upper levels in the *soyunmalık*, and the enlargement of the square planned, domed *ılıklık* with two side units covered with a vault (Önge 1995, Çakmak 2002), (Figure 3.11).

3.1.2.2. Plan Characteristics

The building which has the exterior dimensions of 9.25 x 19.80 m. and a rectangular plan lies in the north-south direction. In the middle of the east wall, a unit was arranged with dimensions of 3.00 x 3.77 m. which projects out from the main building. On the east of the building, there is a cistern[1] which has the exterior dimensions of 2.75 x 4.65 m. and which is connected to the water reservoir by a canal 6 m. in length. On the west of the building, in the continuity of the west and the east walls, the ruins of garden walls are observed. It is thought that these walls surrounded an open space related to the furnace (Figure 3.12). The building consists of *soyunmalık*, *ılıklık*, three *halvet* units and a water reservoir. The *ılıklık* is located as the main space of the *sıcaklık*. *Sıcaklık* consists of a rectangular planned main *sıcaklık* space, containing a domed unit at the centre and rectangular barrel vaulted sections on two sides, and *halvets* which were connected one from the east and two from the south. The building can be evaluated within the type of plan that has elongated rectangular *sıcaklık* with a domed central unit and two *halvets* (Eyice 1960). On the other hand the third *halvet* on the east side differs from the plan type.

The entrance is from the west through a depressed pointed arched opening with a width of 90 cm. and opens into the *soyunmalık* space. The entrance opening is placed in a depressed pointed arched niche of 12 cm. in depth and 130 cm. in width. The

[1] Cistern: Built of stone or brick, underground store to collect rain water, Hasol, p.397. In this example cistern was built over the circular planned water chamber with rubble stones for walls, and supported by brick arches adjacent to the north and west walls.

soyunmalık, which is square in plan and covered with a dome, was located on the north and its interior dimensions are 7.80 x 8.55 m. At present, the central part of the dome is collapsed. On the sides of the square, the depressed pointed arched niches with 20 cm. in depth were arranged. The arches of the niches were articulated to squinch arches constructed like exedra on the corners. On the north and east walls, rectangular windows in the niches; on the east and west, on the lower part of the dome, depressed pointed arched windows were arranged. The rectangular windows are placed in depressed pointed arched niches with 12 cm. in depth on the exterior. On the junction corner of the east and south walls there is a niche in which water pipes were placed. These pipes point out the water connection to the *soyunmalık* space (Figure 3.13). Since the ground is filled with debris, the floor and stone seats could not be observed. The entrance from this space to the *ılıklık* / main *sıcaklık* space is provided from the depressed pointed arched opening with 67 cm. in width placed on the south wall in a niche.

The rectangular *ılıklık* / main *sıcaklık* space is placed on the south of *soyunmalık* space with interior dimensions of 3.77 x 7.80 m., with a square planned domed unit and rectangular planned and barrel vaulted side sections. The rectangular planned and barrel vaulted side sections are separated from the square planned domed central space by semi-circular arches which are on the east and west. This space is in the location of the *sıcaklık* space because of its spatial feature and the trace of basin on the west wall and terracotta water pipe cavities on the walls (Figure 3.14). On the north and south walls of the domed unit, there are semi-circular arched niches of 21 cm. in depth in which the entrances of the *halvets* and *soyunmalık* were arranged (Figure 3.15). On the south of the *sıcaklık*, there are two domed *halvets* which have interior dimensions of 3.05 x 3.55 m. and entered by depressed pointed arched door openings and on the east there is a domed *halvet* which has the dimensions of 2.27 x 2.25 m. The basin traces on the south walls of each *halvet* point out the existence of a basin and stone seats on the sides. On the wall of the *halvet* in the south-east, facing the water reservoir there is a depressed pointed arched observation window with dimensions of 45 x 68 cm, and in the south-west *halvet*, on the same wall there is an opening like the slit window with dimensions of 10 x 60 cm.

Water reservoir was located on the south with a rectangular plan and barrel vaulted. Its interior dimensions are 1.35 x 6.8 m. The cistern which was placed on the east side of the building, on alignment of the water reservoir, was connected with a

canal of 6 m. in length (Figure 3.16). The interior dimensions of the cistern are 1.35 x 3.25 m. and it has a lengthwise rectangular plan lying in the east-west direction. Today the superstructure of cistern has collapsed but the ruins of springing level of vault point out the barrel vault covering. It is supported with arches which are 70 cm. in width and adjacent to the north and south walls and there is a circular planned water chamber inside the cistern.

3.1.2.3. Construction Technique and Material

The building was constructed from rubble stone, reused cut stone, brick, and timber in the masonry system. On the exterior at the corners of the walls and drum, on the sides of the doors and windows, reused cut stone were used. The exterior walls are 72-75 cm. in thickness and interior walls are 70-74 cm. in thickness. The walls were not plastered on the exterior, but plastered on the interior. The traces of timber beams in the walls point out the use of timber beams in the construction technique. In the walls, timber beams about 10 x 13 cm, in two rows with different heights from the ground were placed. Vaults and domes were built with brick and mortar as binding material and the surfaces were plastered. The external surfaces of the domes were covered with horasan plaster; the lower parts of the domes were covered with traditional tiles. On the vaults and domes of the *ılıklık* and *sıcaklık* spaces, oculi and hemispherical cupola were arranged. Terracotta water pipes belonging to water system were placed along the walls of bathing spaces. In the *ılıklık* / main *sıcaklık* space, on the surface of the drum above the pendentive in the transition zone to the superstructure was embellished with muqarnas decoration.

3.1.2.3.1. Structural System

The walls, constituting the vertical support system, were constructed with rubble stone bonding as rubble stone and large pieces of bricks in joints, and alternating bonding as rubble stone / brick. Vaults and domes, which constitute the superstructure, were constructed from brick. Squinches, pendentives, plane triangles, drums constituting transition elements were constructed with brick on the interior while on the exterior they were constructed in similar bonding technique with the walls.

3.1.2.3.1.1. Walls

The exterior walls were constructed with rubble stone bonding technique as rubble stone and large pieces of bricks in the joints; and alternating bonding technique; interior walls were constructed with use of rubble stone, bricks in some places and large pieces of bricks in the joints.

Exterior Walls:

On the west facade and on the projected wall of the third *halvet* on the east, alternating bonding technique was used. In this construction technique; in the horizontal joints one or two rows of brick bonds were placed between rubble stones while in the vertical joints large pieces of bricks were placed into the lime mortar parallel to the horizontal joints. At the corners of the walls, on the sides of the doors and windows, one row of brick and one row of reused cut stone encircled by brick were used. On the east and north walls, rubble stone and large pieces of bricks in the joints, at the corners one row of reused cut stone and one row of brick alternating bond were used. On the south exterior walls, use of rubble stone and large pieces of bricks in the joints are observed. On the exterior walls, there are timber beams with dimensions of 10 x 15 cm. which are horizontally placed with 50 cm. in height from the ground level on the south exterior wall and 1.65 m. on the east exterior wall. The timber beams were placed behind three courses of brick bond close to the surface. These beams were tied with timber elements which were placed perpendicular to the beams. These perpendicular timber elements point out the use of timber beams in the interior surfaces of the walls. In *soyunmalık* space, near the corners, gaps that are considered as gaps where timber elements were placed with dimensions of 20 x 20 cm. and with 1.15 m. and 1.25 m. height from the ground level. In interior surfaces, timber beams were located at the same level with the exterior timber beams which are 1.50 m. in height from the ground level on the west, 1.65 m. in height on the east, and 1.96 m. in height on the south walls. Above the entrance door and window openings, timber lintels were placed and over the lintels relieving arches were designed. The timber lintels are 2.23 m. from the ground level and they have the dimensions of 10 x 13 cm. On the interior surfaces of the walls of *ılıklık* / main *sıcaklık* space and *halvets*, two rows of terracotta pipes were placed at the heights of 80 cm. and 105 cm. from the ground. The presence of terracotta pipes was

determined along the east walls of the southeast and east *halvets* and west wall of the southeast *halvet*. On the interior surfaces of the *soyunmalık* walls above the transition elements, mouldings 12 cm. in height were arranged with two rows of bricks.

Interior Walls:

The interior walls were constructed with rubble stone and bricks in some places. The *soyunmalık* walls were covered with lime plaster, the walls of the *ılıklık* and *halvets* were covered with horasan plaster. Horasan plaster has the thickness of 3.5 cm. and 1.35 m. in height from the ground level. Above the surfaces of this level horasan plaster was applied thinner with a thickness of 2.5 cm. In the middle of the wall between south *halvets*, terracotta flues were placed. On the south wall of the *soyunmalık* space, a depressed pointed arched niche and on the north and west walls of the domed unit of the main *sıcaklık* space, semi-circular arched niches were designed. These niches have a depth of 21 cm. and constructed with 3-4 cm. thick joints of brick bond. On the interior walls, the door openings between spaces were placed in depressed pointed arched niches with 10 cm. in average depth.

3.1.2.3.1.2. Transition Elements

The transition elements to the dome are, squinches with a plane triangle in soyumalık, plane triangles in southeast *halvet*, pendentives in *ılıklık* / main *sıcaklık* space, southwest and east *halvets*, drum over the pendentive in *ılıklık* / main *sıcaklık* space. Squinches with plane triangle, plane triangles and pendentives were constructed with use of brick bonding technique; drum shows similarities with the brick bonding technique on the inside and wall bonding technique on the outside.

Squinch with Plane Triangle:

In the *soyunmalık*, the transition to the dome was provided by squinches with a plane triangle. Inside the squinches in the form of two centered depressed pointed arched niches extended down like exedra formed on the corners of *soyunmalık* space, the plane triangle part was constructed with brick bond having 2-4 cm. horizontal joints and thin vertical joints. The arches of the squinches were built with brick bonding technique with 3-4 cm. joints at the extrados (Figure 3.17).

Plane Triangle:

In the southeast *halvet*, transition to the dome was provided by plane triangles composed of two units. They were constructed with brick bonding technique of 3-4 cm. wide joints and the surfaces were covered with horasan plaster (Figure 3.18).

Pendentives:

In the main *sıcaklık* space, the east and southwest *halvets*, transition to the dome were provided with pendentives. They were constructed with brick bonding technique having 3-4 cm. wide joints, surrounded by a row of brick on the edge and the surfaces were covered with plaster. At the springing level of the dome, a moulding which limits the upper parts of pendentives, was arranged with two rows of bricks in height of 12 cm.

Drum:

In *ılıklık* / main *sıcaklık* space, the dome was raised with drum over pendentives. The drum has a height of 30-40 cm. on the inside and height of 45 cm on the outside. It was constructed with brick bonding technique on the inside while on the north wall, rubble stone and large pieces of bricks in joints, at the corners one row of brick and one row of reused cut stone encircled by brick were arranged on the outside.

3.1.2.3.1.3. Superstructure

The *soyunmalık* space, the domed square unit of the *ılıklık* / main *sıcaklık* space and *halvets* covered with domes, the side rectangular units of *ılıklık* / *sıcaklık* main space and water reservoir are covered with barrel vaults. These elements were built with brick bonding technique and plastered with horasan plaster on the inside and on the outside.

Dome:

The domes of *soyunmalık* with a diameter of 6.60 m., over the east *halvet* with diameter of 2.05 m. and over the southwest *halvet* 2.95 m. have partially collapsed. On the domes of *ılıklık* / main *sıcaklık* space with the diameter of 3.60 m. and southeast *halvet* with the diameter of 2.95 m., a hemispherical cupola were arranged. On the

ılıklık dome, hexagonal oculi were arranged as three circular lines and in decreasing number towards the top and built with terracotta pipes (Figure 3.19). On the dome of the southeast *halvet*, two rows of circular shaped oculi were arranged as first line four and second line five. The domes, having thickness of nearly 35-40 cm., were built with brick and mortar as binding material with of 2-4 cm. joints. Brick dimensions are determined as 21 x 31 x 3-4 cm. whole brick and 10.5x31x3-4 cm. or 16x21x3-4 cm. half brick. The domes are arranged over octagonal drums with the heights of 85 cm. at the *soyunmalık* space and 45 cm. at the *ılıklık* / main *sıcaklık* space on the outside.

Vault:

The rectangular side sections of *ılıklık* / main *sıcaklık* space and water reservoir are covered with a barrel vault. Interior and exterior surfaces were plastered with horasan plaster. Because of plastering surfaces the bonding technique could not be observed. Along the central axis of the *ılıklık* vaults, three hexagonal oculi made of terracotta pipes were arranged.

3.1.2.3.1.4. Floors

Because of the debris filling the floor of *soyunmalık*, the floor system could not be determined at the *soyunmalık* space. In the *ılıklık* and *halvets*, the floors were raised by use of cut stone over masonry walls. Today the flooring system is collapsed. But, the ruins of the stone walls in the floors can be observed.

3.1.2.3.2. Lighting System

Lighting is obtained through the windows on the walls of *soyunmalık* and on the springing level of the dome, the hemispherical cupolas and oculi on the superstructure. In *soyunmalık* space, the windows are in two types. The rectangular windows on the walls are 1.10 m. in width; the depressed pointed arched windows on the springing level of the dome are smaller and are 70 cm. in width. The rectangular windows were placed on the east and north walls while the depressed pointed arched windows were placed on the east and west springing levels of the dome. The hemispherical cupolas were located in the *ılıklık* space as a hexagonal frame base and in the southeast *halvet* as a depressed

hemispherical cupola. Over them, oculi composed of terracotta pipes were arranged. Oculi were placed on the superstructure of the *ılıklık* and *sıcaklık* spaces. These are 30 cm. in width on the inside, 24 cm. in width on the outside, continuing as the dome or vault thickness, narrowing towards the outside, in the circular or hexagonal shape. They were used in *ılıklık* vaults along the central axis as three hexagons, in *ılıklık* dome hexagonal and in the southeast *halvet* as circular in three rows. Oculi are located as three circular rows and in decreasing number towards the top.

3.1.2.4. Installation System

The cistern on the east of the hamam, which is connected to the water reservoir with a canal of 6 m. in length, the water reservoir and the terracotta water pipes are the elements that could be defined belonging to the water system. The furnace under the water reservoir, *cehennemlik* forming the floors of the *sıcaklık* spaces and the terracotta flues on the walls of *sıcaklık* space are the elements of the heating system.

3.1.2.4.1. Water System

The cistern located on the east of the hamam, is the source of clean water. Terracotta water pipes are placed in two rows for hot and cold water along the walls of the *sıcaklık* space with a height of 80-105 cm. from the ground level. Hot and clean cold water distribution was supplied with water pipes from the water reservoir to the main *sıcaklık* space and the basins in the *halvets*. The basin traces on the south walls of the *halvets* point out the existence of basins in these spaces. The channel ruins, which disposed the waste water, can be observed on the east wall of the east *halvet*.

3.1.2.4.2. Heating System

The furnace under the water reservoir, *cehennemlik* under the *sıcaklık* spaces and the terracotta flues in the walls of *ılıklık* and *sıcaklık* spaces form the heating system. The furnace section is full of debris but by observing the *cehennemlik* in *sıcaklık* spaces and the traces of terracotta flues in the walls, the heating system can be determined. The upper parts of the flues over the walls are collapsed today.

Figure 3.12.General View of the Düzce (Hereke) Hamamı

Figure 3.13. Düzce Hamamı, The Trace of Terracotta Pipes in the *Soyunmalık*

Figure 3.14. Düzce Hamamı, The Semi-circular Arch in the Main *Sıcaklık* Space

Figure 3.15. Düzce Hamamı, The Semi-circular Blind Niche in the Main *Sıcaklık* Space

Figure 3.16. Düzce Hamamı, The Water Reservoir

Figure 3.17. Düzce Hamamı, The Squinch in the *Soyunmalık*

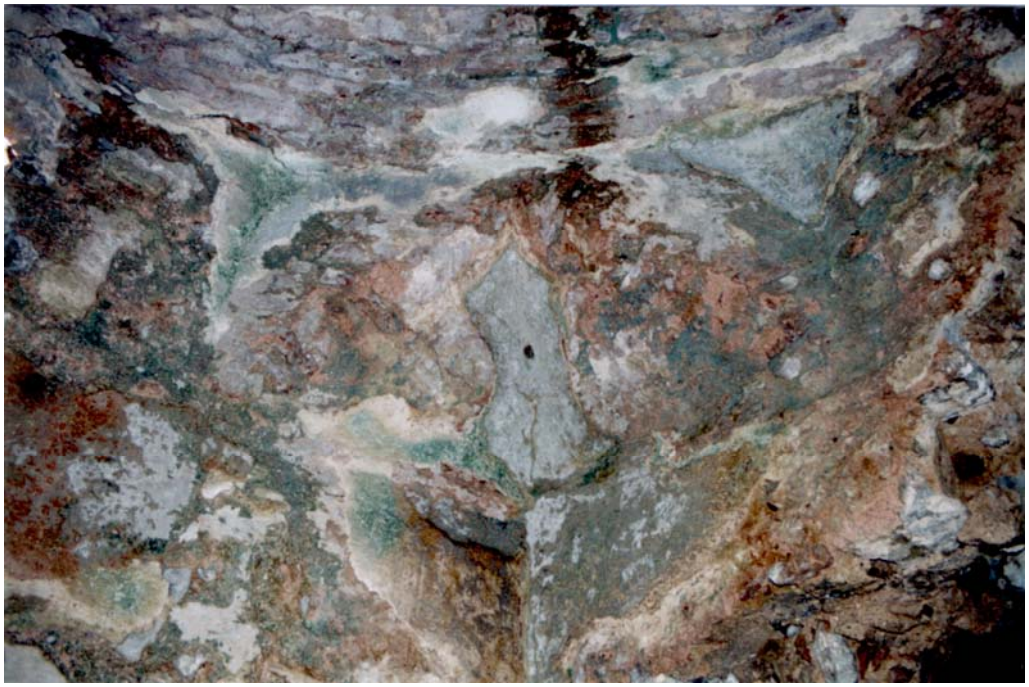


Figure 3.18. Düzce Hamamı, The Plane Triangle in the Southeast *Halvet*

Figure 3.19. Düzce Hamamı, The Dome and Use of Oculi on the Dome of Main *Sıcaklık* Space

3.1.3. Seferihisar Büyük Hamam

3.1.3.1. Date

The building has no inscription panel. It can be dated to the 16th century considering the window of the *soyunmalık*, squinches that provide transition to dome in the *soyunmalık* and in the west section of the *ılıklık*, and the enlargement of the square planned domed *ılıklık* unit with two side sections, one of which is covered with a vault and the other is covered with a dome (Önge 1995, Çakmak 2002), (Figure 3.20).

3.1.3.2. Plan Characteristics

It has a rectangular plan, whose exterior dimensions are 9.10 x 21.60 m, extending along an axis in north-south direction. It consists of *soyunmalık*, *ılıklık*, main *sıcaklık* space, two *halvets*, and a water reservoir (Figure 3.21). *Sıcaklık* is a rectangular planned space having a square planned domed unit at the centre and rectangular barrel vaulted sections at the two sides, and two *halvets* adjoined to that space from the north. This building can be evaluated within the plan type that has elongated rectangular *sıcaklık* with domed central unit and two *halvets* (Eyice 1960).

The entrance is provided from the east and today through a relieving arched opening 1.98 m. in width. The *soyunmalık*, with interior dimensions of 7.60 x 7.60 m., is a square planned and domed space in the north of the building. On the north and west walls, there are two depressed pointed arched niches which are nearly 120 cm. in width and 30 cm. in depth, while on the east wall there is a rectangular window, 98 cm. in width on the south of the entrance opening. The window opening was located in a depressed pointed arched niche which is 130 cm. in width and 15 cm. in depth on the outside. In the level of the squinches, on the sides of the square, the depressed pointed arched blind niches, which are 10 cm. in depth, were arranged. These niches were articulated to the squinch arches located at the corners. Since the floor was filled with debris, the floor and stone seats are not able to be determined. The entrance of *ılıklık* was provided through a depressed pointed arched opening 65 cm. in width on the south wall of the *soyunmalık*.

Ilıklık, with interior dimensions of 1.77 x 7.70 m. located on the south of the *soyunmalık* space, whose east section was covered with a panelled vault and the middle and west sections were covered with domes, is a lengthwise rectangular planned space. In the east there is a service section that has an *usturalık* and a toilet and in the west there is a praying space that was elevated 21 cm. in height from the ground level. The stone of the toilet still exists today. On the south wall of the praying space, a depressed pointed arched and segmented mihrab niche, 72 cm. in width, was arranged. The entrance openings from *soyunmalık* to the *ılıklık* and from *ılıklık* to the main *sıcaklık* space were placed in a rectangular niche that is 8 cm. in depth on both sides of the walls.

Sıcaklık was located in the south of *ılıklık* and passed from *ılıklık* with a depressed pointed arched door opening 67 cm. in width. This section is composed of the rectangular planned main space, whose square planned domed central unit and rectangular panelled vaulted sections at both sides to the east and west, and domed two *halvets*, equal in size, adjoining the main *sıcaklık* space to the south. The main *sıcaklık* space is in the dimensions of 3.10 m. in the north-south direction, and 3.20 m. in the east and west direction. There is a basin on the floor resting on the walls of the narrow sides in each of the side sections and there are stone seats on both sides. The *halvets*, passed with depressed pointed arched door openings from the main *sıcaklık* space, have 3.10 x 3.10 m. interior dimensions. There are basins and stone seats on both sides of it on the south wall of each *halvet*. On the north walls there is a stone seat lying along the wall and a depressed pointed arched niche with 52 cm. in width. On the south wall of the east halvet a depressed pointed arched observation window 57 cm. in width was arranged to control the water reservoir but has been filled in.

Water reservoir, with 1.35 x 7.00 m. interior dimensions located to the south of *halvets*, is rectangular planned and barrel vaulted. Today it has been divided into two parts with a wall in the north – south direction.

3.1.3.3. Construction Technique and Material

The building was constructed with rubble stone, reused cut stone, brick, and timber in the masonry system. Reused cut stones were used on the east walls belonging to *soyunmalık* and *ılıklık* spaces, and at the corners of walls and drums on the exterior.

The exterior walls are 74-76 cm in thickness and the interior walls are 70 cm. in thickness. The walls are not plastered from the exterior but they are plastered from the interior. The surfaces were finished with lime and horasan plaster. The building was surrounded with timber beams which have 10 x 15 cm. dimensions placed at 1.50 m. and 2.70 m. high from the ground level. Vaults and domes that constitute the superstructure were built with brick and mortar as binding material and plastered. The exterior surfaces of domes are plastered with horasan and the springings of the domes are covered with traditional tiles on the exterior. But today vaults and domes were covered with cement plaster over horasan plaster on the exterior. The hemispherical cupolas and oculi were arranged in the vaults and domes that cover the *ılıklık* and *sıcaklık* spaces. On the walls of bathing spaces there are horizontal terracotta water pipes that belong to water system.

3.1.3.3.1. Structural System

The walls, which constitute the vertical supporting elements, were built with rubble stone and brick in some places, and reused cut stone / brick alternating bonding techniques. At the corner of exterior walls, one row of reused cut stone and two rows of brick encircled by bricks were used. Vaults and domes forming the superstructure, squinches and pendentives forming transition elements to the dome were built with brick; whereas, the drums were built with brick on the interior and built with similar material of the wall on the exterior.

3.1.3.3.1.1. Walls

Exterior walls were built with rubble stone, bricks in some places and large pieces of bricks in joints; a row of reused cut stone and two rows of brick encircled by bricks alternating bonding techniques. Interior walls were built with rubble stone, bricks in some places and large pieces of bricks in joints.

Exterior Walls:

The east wall that constitutes the entrance façade belonging to the *soyunmalık* and *ılıklık* was built with use of one row reused cut stone, two rows of brick encircled

by bricks alternating bonding technique (Figure 3.22). The bonding technique of rubble stone, bricks in some places and large pieces of bricks in joints was used in the other part of the east wall that belongs to the *sıcaklık* spaces. The north and west facades were built with bonding technique use of rubble stones, bricks in some places and large pieces of bricks in joints. At the corners, vertically one row reused cut stone was used. Large pieces of bricks were placed into the mortar so as to fill in the emptiness among the rubble stones as parallel to the horizontal joints on the surface of the walls. In the thickness of the walls, rubble stone and mortar were filled in random. On the other hand, alternating bond has thin flush joints. Timber beams with 12 x 15 cm. dimensions that surrounded the building were placed at the height of 1.50 m. and 2.70 m. from the ground level on the exterior. The timber beams were established behind the three rows of brick bond close to the surface (Figure 3.23). These timber beams were tied with metal clamps to timber elements which were located vertically to these timber beams, inside the walls. The existence of timber elements, vertical to timber beams points out that there are timber beams inside of the walls. Timber lintels with 10 x 13 cm. dimensions were placed over the window of the east wall and over the door openings and relieving arches were arranged over them. One row of terracotta pipes, belonging to water system, were placed with 75-80 cm. in height from the ground level in the interior surface of *sıcaklık* spaces. The niches, 1.20 m. in width and 30 cm. in depth were arranged by twos on the north and west walls of the *soyunmalık* space. On the interior surface of the domed west section of the *ılıklık* space, Bursa arched blind niches and on the interior surface of the exterior walls of *sıcaklık* spaces, depressed pointed arched niches with nearly 5 cm. in depth was arranged. At the exterior, on the upper level of walls, in the shape of saw-tooth arrangements 17 cm. in height were arranged with three rows of bricks. At the interior, in the *soyunmalık* above the transition elements, the moulding built with three rows of bricks, nearly 14-17 cm. in height, were arranged.

Interior Walls:

They were constructed with use of rubble stone, bricks in some places and large pieces of bricks in joints. The surfaces of the *soyunmalık* walls were lime plastered and the surfaces of the walls of *ılıklık* and *sıcaklık* spaces were horasan plastered. The horasan plaster was 2.5 cm. thick up to 1.00 m. high from ground level. The layers, which were higher than this height, used a thinner layer 1.5 cm. thick. Depressed pointed arched niches were arranged on the north walls of the *halvets* and on the south

wall of west section of *ılıklık* space. The dimensions of semi-circular planned niches are 56 x 103 cm. in the east *halvet* and 51 x 100 cm. in the west *halvet*, and 74 x 138 cm. semi-octagonal planned and segmented in *ılıklık* space. The door openings between main *sıcaklık*, *ılıklık* and *soyunmalık* spaces are located in the depressed pointed arched niches in which the bricks were bonded with 2-3 cm. thick joints. The blind niches on the interior walls of *sıcaklık*, on the walls of domed square unit of *ılıklık* are depressed pointed arched, while on the domed west unit of *ılıklık* they are Bursa arched nearly 5 cm. in depth.

3.1.3.3.1.2. Transition Elements

The transition to the domes was provided with squinches, pendentives and drums. In *sıcaklık* spaces and in the square planned unit of *ılıklık* space, pendentives; in the west section of *ılıklık* and *soyunmalık*, squinches; and in the main *sıcaklık* space drum over the pendentives were used. Squinches, pendentives, and drum in the main *sıcaklık* space were constructed using the brick bonding technique. The drum which is on the exterior of the *soyunmalık* was built with the same bonding technique of the exterior walls.

Squinch:

The transition to the dome was provided by segmented squinches at the corners of the *soyunmalık* space (Figure 3.24). The segments were arranged into the depressed pointed squinch arch and built on the impost stone which was marble or cut stone and projected nearly a 10 cm. console. They made a 45º angle with the wall and they were built with brick bonding technique in 3-4 cm. horizontal joints that are equal to brick thickness. In addition, at the corner of the domed west unit of *ılıklık* space, the squinches were also used and they were articulated to Bursa arched blind niches on the wall surfaces.

Pendentive:

In the domed square unit of *ılıklık* and the *sıcaklık* spaces, it provided transition to the springing level of the dome. These elements were built with brick having 3-4 cm. thick joints and the surfaces were plastered.

Drum:

The dome of *soyunmalık* is located on an octagonal drum that is 1.20 m. in height on the exterior. It provided the dome to rise in height and was constructed with the same bonding technique of the exterior walls and its surfaces were not plastered.

3.1.3.3.1.3. Superstructure

The superstructure consists of vaults and domes. The *soyunmalık* space, the main square unit and west section of the *ılıklık*, the main square unit of main *sıcaklık* space, and *halvets* were covered with domes; the east section of *ılıklık*, two sides of the main *sıcaklık* space, and water reservoir were covered with vaults. These elements were bonded with bricks and covered with horasan plaster that contains soil with clay, pieces of bricks and organic materials. The exterior part of *soyunmalık* dome was covered with cement plaster on horasan later on.

Dome:

In the *soyunmalık* space, the dome 7.40 m. in diameter and in the east halvet 2.35 m. in diameter have a hemispherical cupola; in *ılıklık* space 2.35 m. in diameter and in the west *halvet* 1.35 cm. in diameter have oculi. Domes were built with brick bonding technique of 39-45 cm. in thickness. On the springing level of the domes, the moulding was arranged with three brick rows 14-17 cm. in height.

Vault:

There are two types of uses in the building; barrel vault and panelled vault. The barrel vault was only used as a superstructure of the water reservoir. The panelled vaults were used as superstructure of the east section of the *ılıklık* and two side sections of the main *sıcaklık* space (Figure 3.25). The thickness of the vaults is 35-40 cm. They were built with bricks located parallel to the long side in radial lines.

3.1.3.3.1.4. Floors

In the *soyunmalık* space, floor system could not be observed because the floor was filled with debris. In the *ılıklık* and *sıcaklık* spaces, floor was raised nearly 90 cm.

in height with use of cut stone on the masonry walls which form the cehennemlik space that heated the bath.

3.1.3.3.2. Lighting System

Lighting was provided by the window in *soyunmalık*, hemispherical cupolas and oculi on the superstructure. The hemispherical cupolas were used on the domes of *soyunmalık*, main *sıcaklık* space and east halvet. In the *sıcaklık* spaces, the star shaped oculi were placed on the hemispherical cupola (Figure 3.26). The oculi can be seen on the superstructure of *ılıklık*, *sıcaklık*, and *halvets*. On the panelled vaults, in the middle axis of rectangular part two star shaped oculi and on the curved surfaces around the rectangle one row of octagonal shaped oculi were placed. On the dome of west section of *ılıklık*, a circular row of octagonal shaped oculi and in the centre of the dome, a star shaped oculus were located. On the dome of the main *sıcaklık* space; star shaped, on the dome of the central unit of *ılıklık* and *halvets*; two circular rows octagonally shaped oculi were arranged. As the surfaces were plastered, the bonding techniques could not be observed.

3.1.3.4. Installation System

The well in the south-west direction of the bath, water reservoir, terracotta water pipes in the interior surfaces of the walls of *sıcaklık* spaces that distribute water from the water reservoir to the bathing spaces constitute the clean water system. The water channels through the floor and the toilet in the *ılıklık* space are the elements of the waste water system. The cehennemlik under the floors of *sıcaklık* spaces and the terracotta flues are the elements belong to the heating system.

3.1.3.4.1. Water System

The well on the southwest of the bath is the source of clean water. Hot and cold water flow can be supplied through the use of pipes. The pipes passing through the walls are nearly 75-80 cm. in height from the floor level. Terracotta pipes were located as one row along the walls in *sıcaklık* spaces.

Waste water system is the discharge of waste water from bathing spaces by the waste water channels on the sides of the walls and then taken outside from the toilet in *ılıklık*. Waste water that came from each *halvet* were collected in the channels along the stone seats of main *sıcaklık* space and then turned to one channel in the entrance of *ılıklık* and ended in the toilet of *ılıklık*. The water channels are nearly 12 cm. in width and 8 cm. in depth.

3.1.3.4.2. Heating System

Since a new building was built on the furnace, it could not be observed. The heating system can be observed by looking into the traces of floor and flues in *ılıklık* and *sıcaklık* spaces. Today, the existing flue chimneys have been raised using new brick materials over the exterior walls.

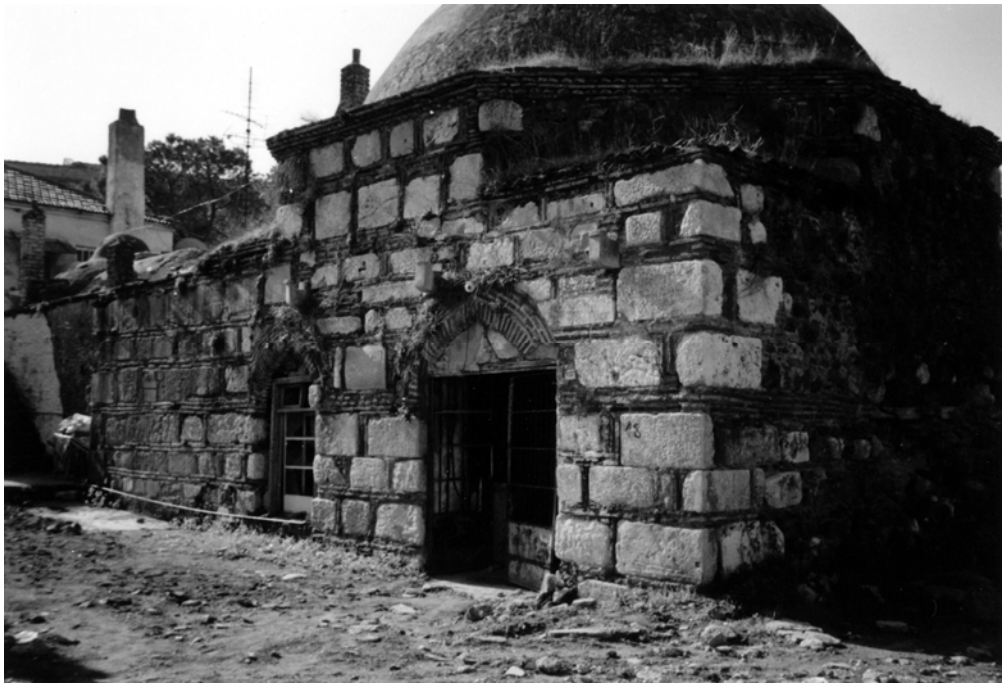


Figure 3.21. General view of the Seferihisar Büyük Hamam

Figure 3.22. Seferihisar Büyük Hamam, Reused Cut Stone / Brick Alternating Bond of the Entrance Facade.

Figure 3.23. Seferihisar Büyük Hamam, The Use of Timber Beam in the Exterior North Wall.

Figure 3.24. Seferihisar Büyük Hamam, The Squinches in the Soyunmalık

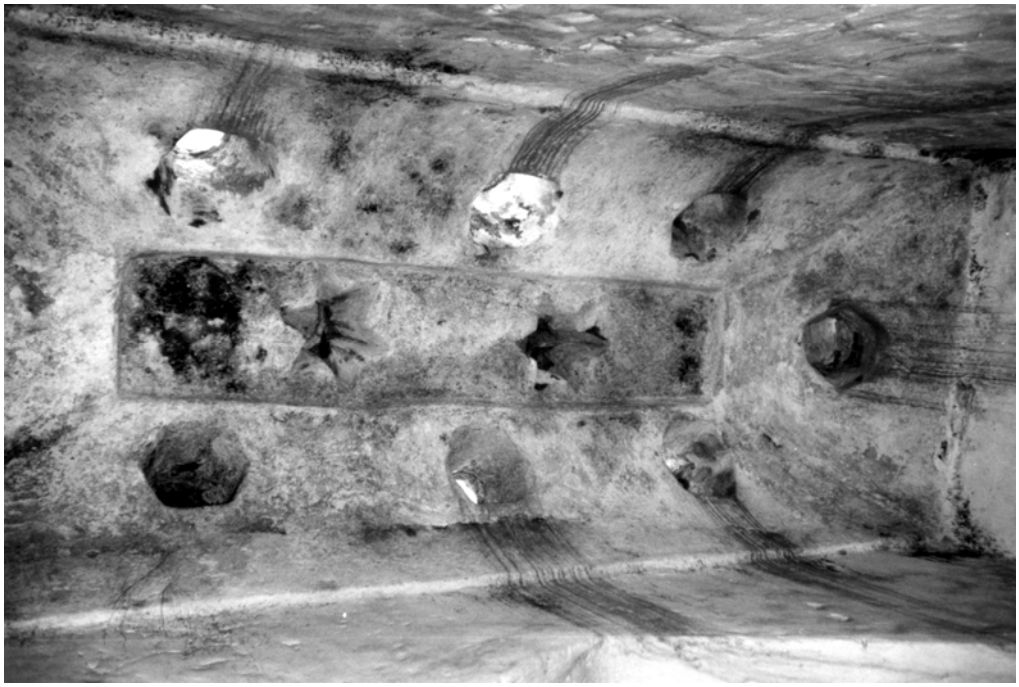


Figure 3.25. Seferihisar Büyük Hamam, The Panelled Vault in the Side Sections of the Main Sıcaklık Space

Figure 3.26. Seferihisar Büyük Hamam, The Use of Oculi and Hemispherical Cupola on the Dome of Main Sıcaklık Space

3.1.4. Seferihisar Küçük Hamam

3.1.4.1. Date

The building has no inscription. It can be dated to the 16th century considering the enlargement of the square planned domed *ılıklık* unit with two side barrel vaulted sections (Önce 1995, Çakmak 2002), (Figure 3.29).

3.1.4.2. Plan Characteristics

The building has a lengthwise rectangular plan that extends along an axis in north - south direction. Except for some wall parts of the *soyunmalık* space its exterior dimensions are 7.80 x 8.20 m. (Figure 3.30). It consists of *soyunmalık*, *ılıklık*, two *halvets*, and a water reservoir. *Ilıklık* is located as the *sıcaklık* main space. *Sıcaklık* has a rectangular planned space that has a domed unit at the centre and rectangular barrel vaulted sections on two sides; and two *halvets* adjoining from the north. This building can be evaluated within the plan type that has elongated rectangular *sıcaklık* with domed central unit and two *halvets* (Eyice 1960).

Soyunmalık is located on the east of the building and today it has been demolished. Because of the debris on the floor, the walls could not be observed. Looking at the gable wall in the east and the ruins along the east wall, it can be said that it had a timber roof. Entrance to the *ılıklık* is provided from the southwest corner of this space, through a semi-circular arched door opening 60 cm. in width.

Ilıklık, which is in the *sıcaklık* location, is situated in the west of *soyunmalık* and its interior dimensions are 2.97 x 6.30 m. Domed unit with 2.85 x 2.97 m. interior dimensions has been adjoined with barrel vault covered sections at the two sides with semi-circular arched openings. On the north of *ılıklık*, two domed *halvets* that pass from the *ılıklık* through depressed pointed arched door openings are located. The east *halvet* has 1.79 x 1.80 m. interior dimensions while the west *halvet* has 3.85 x 3.86 m. dimensions. In the middle of the south wall of *ılıklık* / main *sıcaklık* space, the trace of a depressed pointed arched opening with 60 cm. in width and that was later bonded is observed. At the northeast corner of the *ılıklık* a basin and stone seats on both sides are observed on different levels along the walls, and in the entrance axis of the west *halvet*,

there is a stone platform with 1.37 x 2.19 cm. dimensions in the centre of the space. At the northwest corner of the east *halvet*, a basin and stone seats are located on each side in an L order. On the east and west walls of the west *halvet*, a basin and stone seats along the four walls were arranged. On the wall, which is between the water reservoir and the *halvet*, a semi-circular arched observation window 56 cm. in width was arranged. On the floors, waste water was collected in the *ılıklık* / main *sıcaklık* space and was disposed from the southeast corner outside via waste water channels.

Water reservoir with 1.75 x 4.30 m. interior dimensions, in the north of *halvets*, is rectangular planned and barrel vaulted. On the east wall there are pipes that supply flow of clean water to the water reservoir.

3.1.4.3. Construction Technique and Material

The building was built with rubble stone, brick and timber in the masonry system. On the walls and transition elements the use of reused cut stone in some places was observed. The exterior walls are 73-75 cm. in thickness and the interior walls are 65 cm. in thickness. The exterior surfaces of the walls were not plastered but the interior surfaces were plastered. Lime and horasan plaster were used as surface finishing material. The vaults and the domes that constitute the superstructure were bonded with bricks and mortar as binding material and their surfaces were finished with horasan plaster. The oculi on the domes and on the vaults of the *ılıklık* and *sıcaklık* spaces and hemispherical cupolas in the centre of the domes were arranged. On the walls of *sıcaklık* spaces horizontal terracotta pipes 70-80 cm. in height, belonging to the water system were placed.

3.1.4.3.1. Structural System

The walls constituting the vertical supporting system were built with the bonding techniques of rubble stone and rubble stone / large pieces of bricks in joints. Dome and vaults that formed the superstructure were built with brick bonding technique. The bonding techniques of the transition elements that are pendentives, plane triangle and drum over plane triangle could not be determined because they were plastered. The drums were constructed with the same bonding technique of the walls on the exterior.

3.1.4.3.1.1. Walls

The exterior walls were constructed with the bonding technique of rubble stone and rubble stone / large pieces of bricks in joints while the interior walls were built with rubble stone bonding technique.

Exterior Walls:

The north wall, which belongs to the water reservoir, was constructed in rubble stone bond; the other walls were constructed in rubble stone / large pieces of bricks in joints. Brick pieces in rubble stone bond were placed into the mortar filling the emptiness among rubble stones parallel to the horizontal joints on the surface and in the thickness of the walls. On the walls reused stone blocks were used in some parts. In the *ılıklık* and *sıcaklık* spaces, on the interior surface of the exterior walls, one row of terracotta pipes that belong to water system 70-80 cm. high from the floor were placed. In side of the west wall of *sıcaklık* spaces, terracotta flues were arranged.

Interior Walls:

The interior walls were constructed in the bonding technique of rubble stone and large pieces of bricks in the joints. The surfaces of *soyunmalık* were lime plastered, and the surfaces of *ılıklık* / main *sıcaklık* space and *halvets* were horasan plastered. The pipes of the water system could not be observed since the walls were plastered. However, considering the basin faucet traces on the west walls of *ılıklık* / main *sıcaklık* space, on the walls between the *halvets* and the water reservoir, on the west side of the wall between two *halvets*, they were constructed as one row and 70-80 cm. in height from the floor. On the east wall of *ılıklık* / main *sıcaklık* space, on the walls between the *halvets* and the water reservoir and in the middle of the wall between two *halvets*, terracotta flues were arranged.

3.1.4.3.1.2. Transition Elements

Transition to the dome from the wall in *ılıklık* / main *sıcaklık* space was provided with the plane triangles and drum over it, in the *halvets* with pendentives and two rows of drums. On the interior, the bonding technique of the transition elements could not be

observed since they were plastered. On the outside, drums were constructed in the same bonding technique with the walls.

Pendentive:

In the *halvets*, these elements that provide transition to the dome are in the curved triangle shape which is formed by making the corners round. Since their surfaces were plastered, the bonding technique was not determined.

Plane Triangle:

Transition element to the dome in *ılıklık* / main *sıcaklık* space is provided by plane triangles. At the corner, a plane triangle that has one unit leads upwards (Figure 3.31). Bonding technique could not be observed as it was plastered.

Drum:

In the *ılıklık* / main *sıcaklık* space, over the plane triangle zone an octagonal planned drum 30 cm. high on the interior and 60 cm. high on the exterior was arranged. The dome of the west *halvet* was raised on a double drum on the exterior. The first drum is square planned and 85 cm. in height and the second drum is 65 cm. in height and octagonal shaped. The dome of the east *halvet* was also raised on a drum that is 30 cm. in height on the exterior. Interior surfaces were covered with horasan plaster while the exterior surfaces of the drums were not plastered.

3.1.4.3.1.3. Superstructure

Since the *soyunmalık* has been ruined, its superstructure could not be determined. However, it can be thought that its superstructure was timber roof considering the gable wall in the east. The square unit of *ılıklık* / main *sıcaklık* space and *halvets* are covered with a dome. The rectangular side sections of the *ılıklık* space and water reservoir are barrel vaulted. Domes are constructed with bricks and covered with horasan plaster. The bonding technique of the vaults could not be observed since they were covered with plants on the exterior and they were plastered on the interior.

Dome:

The square unit of *ılıklık* / main *sıcaklık* space and *halvets* were covered with domes. The domes were bonded 35-40 cm. in thickness with brick and mortar as the binding material, forming 3-4 cm. thick joints. Interior and exterior surfaces were covered with horasan plaster. Its diameter is 2.80 m. in *ılıklık* / main *sıcaklık* space, 3.60 m. in the west *halvet*, and 1.65 m. in the east *halvet*. The oculi, formed with terracotta pipes on the domes in *ılıklık* / main *sıcaklık* space and west *halvet*, are in circular two rows, hexagon shaped, and on the dome of the east *halvet* they are in circular one row and circular shaped. In the centre of the all domes the cupolas were arranged. On the hemispherical cupolas, circular shaped oculi were arranged by the use of terracotta pipes among brick bond.

Vault:

The rectangular side sections of *ılıklık* / main *sıcaklık* space and water reservoir were barrel vaulted. *Ilıklık* vaults start approximately 2.80 cm high from the original floor level. The bonding technique could not be determined since the interior surfaces were covered with horasan plaster and exterior surfaces were covered with plants.

3.1.4.3.1.4. Floors

The floor of the *soyunmalık* could not be determined because of the debris filling the floor. The floor of *ılıklık* / main *sıcaklık* space and *halvets* were covered with cut stone raised approximately 90 cm. on brick masonry walls. The cut stones used in floor covering are 57 x 69 x 7-8 cm. dimensions. Above the openings between masonry walls timber and stone lintels were determined by looking from the ruined parts of the floor.

3.1.4.3.2. Lighting System

Lighting was provided with the oculi and hemispherical cupolas on the superstructure. The hemispherical cupolas were located on the domes of *ılıklık* / main *sıcaklık* space and *halvets*. At the center of the cupolas, a circular oculus was arranged by placing terracotta pipes among the brick bond. The oculi, which were located on the domes of *ılıklık* / main *sıcaklık* space and west *halvet*, are hexagonal and in two circular

rows, on the dome of east *halvet* they are circular shaped in circular one row (Figure 3.32).

3.1.4.4. Installation System

The well in the east of the *hamam*, the water reservoir and terracotta pipes in the interior surfaces of the walls of *sıcaklık* spaces, which distribute hot water from the reservoir to the bathing spaces are the elements of the clean water system. The water channels, which take waste water outside from the southeast corner of *ılıklık* / main *sıcaklık* space, are the elements of the waste water system. The furnace that might have been located under the water reservoir in the north of the building, the *cehennemlik* that formed the floor system of *sıcaklık* spaces, and the terracotta flues that were placed on the walls of *sıcaklık* spaces are the elements of the heating system.

3.1.4.4.1. Water System

The well in the east of the *hamam* is the source of clean water, but today it has been ruined. Terracotta pipes are placed in one row along the walls of the *sıcaklık* spaces, 70-80 cm. high from the ground level. On the east and west walls of the west *halvet*, at the northwest corner of the east *halvet* and at the northwest corner of the *ılıklık* / main *sıcaklık* space a basin and stone seats on both sides were arranged. Basins are quarter circular planned in the *ılıklık* / main *sıcaklık* space, circular planned in the east *halvet* and in the east of the west *halvet*, and rectangular planned in the west of the west *halvet*. On the marble basin, which is on the west wall of west *halvet*, geometric decorations; on the marble basin and on the upper sides of the stone seats on the east wall, muqarnas decorations were arranged (Figure 3.33).

Waste water channels were arranged along the bottom sides of the stone seats of the *ılıklık* / main *sıcaklık* space, continued through a single channel in the east side section of the *ılıklık* / main *sıcaklık* space and end in the southeast corner.

3.1.4.4.2. Heating System

Since the floor level of the furnace, which is likely under the water reservoir, was filled with debris, only the upper part of the furnace niche can be observed. The *cehennemlik* was formed with masonry walls under the floors of the *ılıklık* / main *sıcaklık* space and *halvets*. The chimneys of the flues were built with terracotta pipes in *ılıklık* / main *sıcaklık* space and on *halvet* walls and still exist today. The flue chimneys, with 16 x 21 x 6-7 cm. dimensions, were raised over the wall, with brick material.

Figure 3.30. General View of the Seferihisar Küçük Hamam

Figure 3.31. Seferihisar Küçük Hamam, Plane Triangles in the *Ilıklık* / Main *Sıcaklık* Space

Figure 3.32. Seferihisar Küçük Hamam, The Oculi and Cupola on the Dome of the West *Halvet*

Figure 3.33. Seferihisar Küçük Hamam, The Marble Basin in the West *Halvet*

3.1.5. Sığacık Kaleiçi Hamamı

3.1.5.1. Date

The building has no inscription. It can be dated to the 16th century taking into consideration the windows on the walls of the *soyunmalık* space, and widening of the square planned and domed *ılıklık* space with two vaulted spaces at the two sides (Önge 1995, Çakmak 2002), (Figure 5.1).

3.1.5.2. Plan Characteristics

The rectangular planned building is extended along an axis in the northwest-southeast direction with the exterior dimensions of 7.80 x 14.60 m. It consists of *soyunmalık*, *ılıklık*, two *halvets*, and a water reservoir. The *ılıklık* is located as the main *sıcaklık* space. S*ıcaklık* has a rectangular planned space that has a square planned and domed unit at the centre and rectangular barrel vaulted spaces on two sides; and two *halvets* adjoining from the southeast. This building can be evaluated within the plan type that is elongated rectangular *sıcaklık* with domed central unit and two *halvets* (Eyice 1960). However, the entrance opening between *halvets* differs from the typical plan type.

The entrance is from the southwest through a 80 cm. wide rectangular opening and opens into the *soyunmalık* space. The s*oyunmalık*, with the interior dimensions of 5.12 x 6.90 m., is rectangular planned and covered with a timber roof in the northwest. On the northwest wall a 70 cm. wide and on the southeast gable wall a 1.10 m. wide rectangular windows were arranged on the entrance axis of the *ılıklık*. Since the ground was filled with debris, the floor and stone seats could not be observed. The entrance from this space to the *ılıklık* is provided from the southeast through a 60 cm. wide depressed pointed arched door opening.

Ilıklık, which is in the *sıcaklık* location, is situated in the southeast of the *soyunmalık* and its interior dimensions are 2.05 x 5.12 m. Domed square unit of the *ılıklık* space with interior dimensions of 2.00 x 2.05 m. has been adjoined with barrel vaulted side sections with depressed pointed arched openings. In the vaulted side sections, there are stone seats along the walls on the narrow sides. Two domed *halvets*,

of same size with 2.30 x 2.35 m. interior dimensions, were connected to each other with a 57 cm. wide door opening. The entrance was provided with a 57 cm. wide depressed pointed arched door opening from the *sıcaklık* to the southeast *halvet*. On the northeast wall and southeast walls of the *halvets*, basins were located. In the southwest *halvet*, on the wall which is between the water reservoir and the *halvets* a depressed pointed arched observation window 48 cm. in width was arranged.

Water reservoir, with 1.35 x 5.12 m. interior dimensions, located to the southeast of the *halvets,* is rectangular planned and barrel vaulted.

3.1.5.3. Construction Technique and Material

The building was built with rubble stone, reused cut stone, brick, and timber in the masonry system. On the walls, reused cut stones are observed in some places. The exterior walls are 75-80 cm. in thickness and the interior walls are 70-76 cm. in thickness. The exterior surfaces of the walls were not plastered but the interior surfaces were plastered. Lime and horasan plasters were used as surface finishing material. The timber lintels are used above the entrance door and windows openings at the *soyunmalık* space. The vaults and domes that constitute the superstructure were bonded with bricks and mortar as binding material and their surfaces were finished with horasan plaster. The oculi on the vaults and domes of the *ılıklık* / main *sıcaklık* space and on the domes of the *halvets* were arranged. On the walls of the bathing spaces, horizontal terracotta pipes belonging to the water system were placed.

3.1.5.3.1. <u>Structural System</u>

The walls, constituting the vertical supporting system were built with the bonding techniques of rubble stone and rubble stone / large pieces of bricks in joints. The corners of the exterior walls were strengthened with a vertical line of reused cut stone. The dome and vaults that formed the superstructure, pendentives and drum of transition elements were built with brick bonding technique.

3.1.5.3.1.1. Walls

The exterior walls were constructed with the bonding techniques of rubble stone and rubble stone / large pieces of bricks in joints and the interior walls were built with rubble stone / large pieces of bricks in joints.

Exterior Walls:

The exterior walls of *soyunmalık* were built with rubble stone and mortar as binding material with the use of large and small pieces of rubble stones in the bonding technique. The exterior walls of *sıcaklık* and water reservoir were constructed with bonding technique of rubble stone / large pieces of bricks in joints. In these bonding techniques, the walls were strengthened with vertical line of reused cut stone at the corners of the walls. Brick pieces in rubble stones were placed into the mortar filling the emptiness among rubble stone parallel to the horizontal joints on the surface and in the thickness of the walls. The interior surfaces of exterior walls of *soyunmalık* space were finished with lime plaster and the wall surfaces of *halvets* and *ılıklık* / main *sıcaklık* space were finished with horasan plaster. In the *soyunmalık*, in the middle of the northwest wall, a 70 cm. wide rectangular window and on the southwest wall, a 80 cm. wide door opening were arranged. In the *sıcaklık* spaces, on the interior surfaces of the exterior walls, the faucet traces 75-80 cm. in height from the ground level indicate the presence of a row of horizontal terracotta pipes belonging to the water system. On the northeast wall of *ılıklık* space, a depressed pointed arched niche with 25 cm. in width, 20 cm. in depth and 120 cm. high from the ground level was arranged above the basins. On the interior surfaces of the exterior walls of *halvets*, the depressed pointed arched blind niches that articulated to the pendentives were arranged.

Interior Walls:

The interior walls were built with rubble stone and large pieces of bricks in joints. The interior walls were covered with lime plaster at the *soyunmalık* and with horasan plaster at the *sıcaklık* spaces. Horasan plaster is applied as two layers, which has a 3-4 cm. thickness up to approximately 96 cm. high from the ground level and 2-3 cm. thickness on the upper parts. In the *sıcaklık* walls, terracotta flues belonging to the heating system are observed at the springing level of the domes.

3.1.5.3.1.2. Transition Elements

Transition from the walls to the domes was provided with pendentives in the *sıcaklık* spaces. In the *halvets*, drum was arranged over the pendentives. The pendentives were built with brick bonding technique. The drum over the pendentives was built with brick on the interior while it was built with the same bonding technique of the exterior walls on the exterior. In the *halvets*, at the springing level of the dome, a moulding was arranged with three brick courses about 17 cm. in height.

Pendentives:

In the square planned central unit of the *sıcaklık* and *halvets,* the transition to the dome was provided with pendentives. In the bond, half or whole bricks are 10.5 x 22 x 6-7 cm. or 21 x 31 x 6-7 cm. In this bonding technique, the joints are 2-4 cm. in thickness, and all the surfaces were plastered.

Drum:

In the *ılıklık* / main *sıcaklık* space, over the pendentives an octagonal planned one row drum 40 cm. high on the interior and 30 cm. high on the exterior was built. Interior surfaces were covered with horasan plaster while the exterior surfaces of the drum was not plastered.

3.1.5.3.1.3. Superstructure

The *soyunmalık* was covered with a timber roof. The timber roof was constructed by placing the timber beams over the rubble stone walls and covered with traditional tiles, however, the roof collapsed during the earthquake in April 2003. The square unit of *ılıklık* / main *sıcaklık* space and *halvets* were covered with a dome. The rectangular side sections of the *ılıklık* and the water reservoir are barrel vaulted. The domes and the barrel vaults were built with brick and plastered on the exterior and on the interior surfaces. However, the bonding technique of the superstructure could not be observed since they were plastered.

Dome:

The square unit of *ılıklık* / main *sıcaklık* space and *halvets* were covered with domes. Its diameter is 1.90 m. in the *ılıklık* and 2.15 m. in the *halvets*. The oculi, formed with terracotta pipes on the domes, are in circular two rows and circular shaped. The bonding technique of the domes could not be observed since the surfaces were plastered.

Vaults:

The rectangular side sections of *ılıklık* and water reservoir are barrel vaulted. The vaults of the *ılıklık* space are 32 cm. in thickness and have hexagonal oculi which were formed with terracotta pipes along the central axis. The interior surfaces are covered with horasan plaster. Since the exterior surfaces were covered with earth, the bonding technique could not be observed.

3.1.5.3.1.4. Floors

The floor of the *soyunmalık* could not be determined because of the debris filling the floor. The floors of the *ılıklık* / main *sıcaklık* space and *halvets* were built on the masonry walls which constitute the *cehennemlik* and covered with cut stone. The floor system was determined by looking from the ruined parts of the floor.

3.1.5.3.2. Lighting System

Lighting was provided with the oculi on the superstructure and the windows on the walls of *soyunmalık* space. One of the windows in *soyunmalık* space was located on the southeast gable wall and the other was located on the northwest wall. The window on the gable wall is about 110 cm. in width and the one on the northwest wall is 70 cm. in width. The hexagonal shaped oculi were arranged on the domes in circular lines and on the vaults. Their diameters are 30 cm. on the interior and 25 cm. on the exterior. The oculi were located on the dome in two circular rows with the same number towards the top.

3.1.5.4. Installation System

The water reservoir and the terracotta pipes along the interior surfaces of the walls in the bathing spaces, which distribute hot water from the water reservoir to the *sıcaklık* spaces, are the elements of the clean water system. The water channels, which were arranged on the floors along the walls and stone seats, are the elements of the waste water system. The *külhan* might have been located under the water reservoir in the southwest of the building, the *cehennemlik* under the floors of the *sıcaklık* spaces, and terracotta flues placed in the *sıcaklık* walls are the elements of the heating system.

3.1.5.4.1. Water System

Terracotta pipes belonging to the water system were placed in one row along the walls of *sıcaklık* spaces 75-80 cm. in height from the floor level.

The waste water channels were arranged along the bottom sides of the stone seats in the ılıklık / main sıcaklık space continued through a single channel and ended in the southeast corner of this space. The floors of the *halvets* are 20 cm. higher than *ılıklık*. The channels on the floors along the walls and stone seats are about 10 cm. in width and 7 cm. in depth.

3.1.5.4.2. Heating System

Since the floor level of the furnace was filled with debris, only the upper part of the *külhan* could be observed. *Cehennemlik* was formed with masonry walls under the floors of sıcaklık spaces. Today, the upper parts of the terracotta flues over the walls of *sıcaklık* spaces are collapsed.

Figure 3.35. General View of the Sığacık Kaleiçi Hamamı

Figure 3.36. Sığacık Kaleiçi Hamamı, The Northeast Facade, The Use of Reused Cut Stone in Vertical Line

A B

Figure 3.37.A. Sığacık Kaleiçi Hamamı, The Niche on the Southeast Wall of the Southeast *Halvet*,
B. Sığacık Kaleiçi Hamamı, The Pendentive in the Main *Sıcaklık* Space

Figure 3.38. Sığacık Kaleiçi Hamamı, The Dome in the Main *Sıcaklık* Space

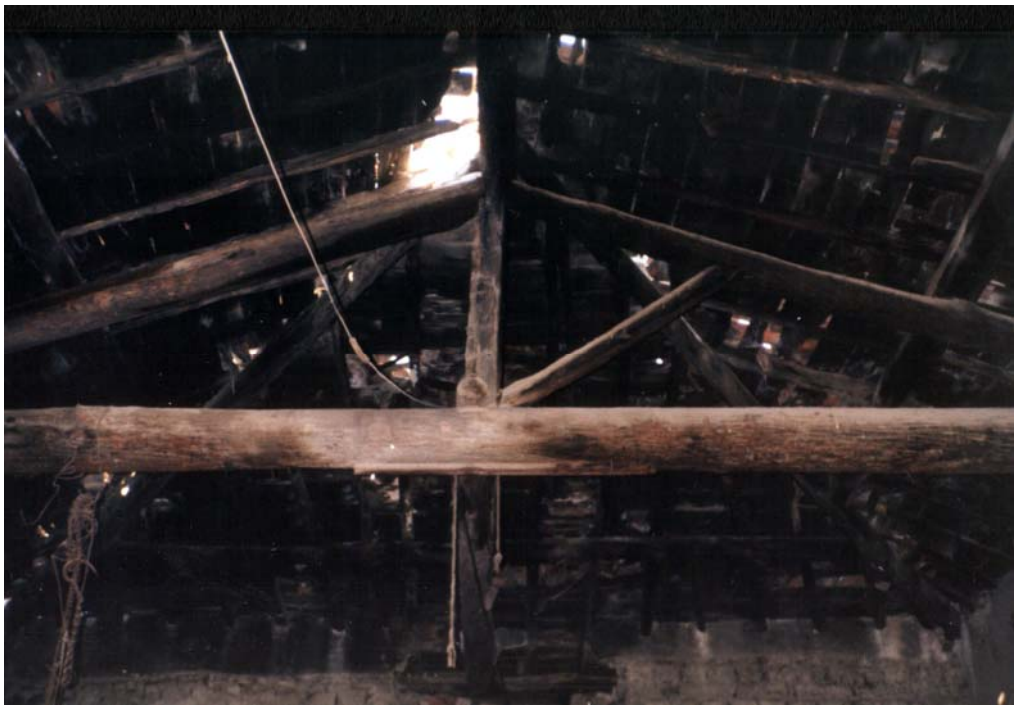


Figure 3.39. Sığacık Kaleiçi Hamamı, Timber Roof of the *Soyunmalık* Space

Figure 3.40. Sığacık Kaleiçi Hamamı, The Furnace

3.1.6. Urla Çifte (Herzekzade Ahmet Paşa) Hamamı

3.1.6.1. Date

The building has no inscription. It can be dated to the 15th century taking into consideration the widening of the square planned and domed *ılıklık* space with a vaulted section at one side, and the geometrical, floral and muqarnas decorations on the transition zones to the dome (Akyıldız 1988, Önge 1995, Çakmak 2002), (Figure 3.41).

3.1.6.2. Plan Characteristics

The bath is in Hersekzade Ahmet Paşa Külliyesi (Complex)[2] (Akyıldız 1998) which contains a mosque, a tomb, a fountain and a bath, extends along an axis in the northeast-southwest direction. It is a double bath with a men's section and women's section. Except for some wall traces in the *soyunmalık* spaces both sections are lengthwise rectangular planned with 9.85 x 16.60 m. exterior dimensions (Figure 3.42). Both sections consist of *soyunmalık*, *ılıklık*, *sıcaklık* and a water reservoir which was used as common. The rectangular planned *sıcaklık* space contains square planned central domed unit and two vaulted sections on both sides and two *halvets* in the women's section, three *halvets* in the men's section. Both sections can be evaluated within the plan type that is elongated *sıcaklık* with domed central unit and two *halvets* (Eyice 1960). However, the men's section differs from the typical plan type with a third halvet attached to the *sıcaklık* from the northeast side.

3.1.6.2.1. Men's Section

Soyunmalık was located on the northeast of the building and it has collapsed today. The walls can not be observed due to the filling of debris on the ground. The entrance of the *ılıklık* is provided with the pointed arched door opening with a width of 73 cm. on the southwest wall of the *soyunmalık*.

The *ılıklık* is a rectangular planned space 3.10 x 4.05 m. interior dimensions located on the southwest of the *soyunmalık*. It consists of a domed and square planned

[2] Today, the buildings of the complex do not exist except the mosque and the hamam.

unit enlarged with a barrel vaulted section on the southeast direction. The entrance to the *sıcaklık* from the *ılıklık* is through a pointed arched door opening 68 cm. in width towards the right corner of the southwest wall.

Sıcaklık was composed of the main *sıcaklık* space and *halvets*. The main *sıcaklık* space with 3.90 x 8.30 m. interior dimensions consists of a square planned, domed unit which has 3.90 x 3.90 m. dimension and barrel vaulted rectangular planned two side sections on both sides. The vaulted sections were separated from the central unit by semi-circular arches on the northwest and southeast. The existence of the tap panels in the middle of the northwest and southeast walls point out the existence of basins. At the southwest side of the *sıcaklık* space; two domed *halvets*, which have the same sizes as the interior dimensions of 3.70 x 3.74 m., and at the northeast side; one *halvet* with the dimensions of 3.05 x 3.90 m. were located. The traces on the walls of the southeastern *halvets*, which are juxtaposed to the water reservoir, point out the existence of basins and stone seats on both sides. On the wall of southeast *halvet* related to the water reservoir, a 60 cm. wide depressed pointed arched observation window opening was arranged. There is also a basin trace on the northwest wall of the northeast *halvet*.

3.1.6.2.2. Women's Section

The women's section can be observed from the demolished parts on the domes because the *ılıklık* entrance from *soyunmalık*, which was destroyed, was filled with rubble stones in random.

Soyunmalık which is likely located on the northeast was completely demolished and disappeared. The remains of the walls can not be observed since clumsy a storage was built in place of it. The entrance of *ılıklık*, placed on the southwest wall of the *soyunmalık* and filled with rubble stones, is provided by a semi-circular arched door opening which is observed only from interior.

Ilıklık situated on the southwest of *soyunmalık* consists of a domed unit which is enlarged with a barrel vaulted side section in the southeast and another domed space, which was entered through a depressed pointed arched door opening, flanked to it in the northwest. Stone seats were arranged along the walls in the southeast side section which was separated from the domed unit with a Bursa (panelled) arch. The entrance from the

ılıklık to the main *sıcaklık* space is provided by a depressed pointed arched door opening on the southwest wall of the domed central unit.

Sıcaklık was composed of main *sıcaklık* space and *halvets* similar to the men's section. The main space of *sıcaklık* is an elongated rectangular planned space which consists of a square planned domed central unit and depressed pointed barrel vaulted rectangular sections on both sides. The northwest vaulted section was projected from the main mass about 1.25 m. The barrel vaulted side sections were separated from the main *sıcaklık* space by depressed pointed arches as different from the men's section. In the middle of the northwest and southeast wall of each of them a basin was placed. Two *halvets* which have the same sizes were located on the southwest side of the main *sıcaklık* space. These are domed spaces which are entered from the main *sıcaklık* space through depressed pointed arched door openings. On the southwest walls related to the water reservoir of each *halvet*, on the southeast, northwest and northeast walls of the southeast *halvet*, on the northwest wall of the northwest *halvet*, a marble basin and stone seats on both sides are arranged in both *halvets*. In the *halvets* of women's section, the observation window related to the water reservoir is not existed as different from the men' section.

The rectangular planned and barrel vaulted water reservoir is located on the southwest of both sections with the dimensions of 1.95 x 15.10 m. On the southeast side, there is a semi-circular arched opening.

3.1.6.3. Construction Technique and Material

The building was constructed with rubble stone, rough cut stone, brick, and timber in the masonry system. The exterior walls are 75-80 cm. in thickness and the interior walls are 55-70 cm. in thickness. The interior surfaces of the walls were covered with plaster while the exterior surfaces were exposed. Lime and horasan plasters were used for surface finishing material. The hollows horizontal timber beams in the walls and in the transition levels point out the use of timber beams in the bonding technique. The vaults and the domes of the superstructure were built with brick or brick and rubble stone with mortar as binding material and the surfaces were plastered. The exterior surfaces of the domes were covered with horasan plaster and the springing levels were covered with tiles over the horasan plaster. Oculi were placed on the vaults and domes

of the *ılıklık* and *sıcaklık* spaces and hemispherical cupolas were arranged on the domes of main *sıcaklık* spaces. Terracotta pipes belonging to the water system were placed in horizontal two rows, along the interior surfaces of the walls of bathing spaces. Stucco decorations were made on the transition zones and mouldings.

3.1.6.3.1. Structural System

The walls were built with rubble stone bonding technique. The superstructure which was composed of vaults and domes was built with brick or brick and rough cut stone, and transition elements which are pendentives and drums were built with brick.

3.1.6.3.1.1. Walls

The exterior and interior walls were constructed with rubble stone.

Exterior Walls:

Exterior walls were built with large and small rubble stones and mortar as binding material, except the part projected to the northwest of the main *sıcaklık* space in women's section (Figure 3.43). The projected part of the women's section was built with rough cut stone bond. The hollows of the horizontal timber beams about 12 x 15 cm. are determined in the walls 2.00 m. above the ground level. The existence of the timber element traces perpendicular to the horizontal timber beams points out that the existence of timber beams inside of the walls. The timber beams were also used on the transition levels. The horizontal terracotta pipes belonging to the water system are on the interior surfaces of the exterior walls of *ılıklık* and *sıcaklık* spaces at the height of 70-80 cm from the original floor level.

Interior Walls:

The interior walls were built with the rubble stone and mortar similar to the exterior walls. Lime plaster was used on the walls of the *ılıklık* while horasan plaster was used in the *sıcaklık* spaces. The thickness of the plaster is about 2-4 cm. The horasan plaster is applied as a double layer which has a 3-4 cm. in thickness up to nearly 89-96 cm. from the floor; 3 cm. in thickness on the upper parts.

3.1.6.3.1.3. Transition Elements

Pendentive and drum are the transition elements from walls to the domes in the *ılıklık* and *sıcaklık* spaces in the men's and women's sections. Although, pendentives were built with brick, drum was built with large and small rubble stones similar to the walls. Geometrical and floral decorations were made on the transition levels in main *sıcaklık* space and southwestern *halvets*, and muqarnas decorations were arranged at the corners in southwestern *halvets* in the men's section.

Pendentives:

Pendentives, which are concave triangular shaped elements at the corners, were used to provide transition from the walls to the dome in the *ılıklık*, main *sıcaklık* space and *halvets*. They were built with brick having the joints of 3-4 cm. in thickness, and the surfaces were plastered. Three different pendentives according to the decoration arrangements on the surfaces are observed: Undecorated pendentives in the *ılıklık* space of the men's section; encircled with a 5 cm. wide border in the *ılıklık*, main *sıcaklık* space and southwestern *halvets* of the women's section; pendentives encircled by border and have floral pattern at the end in the main *sıcaklık* space and southwestern *halvets* of the men's section (Figure 3.44).

Drum:

Drum is an octagonal transition element built 4.30 m. above the original floor level in the *ılıklık* and *sıcaklık* spaces. In the southwestern *halvets* of the men's section a 40 cm. high drum in one row while in the main *sıcaklık* space, two rows as 40 cm. in height bottom row and 20 cm. in height upper row with the total height of 60 cm. were arranged. The corners were accentuated by muqarnas decorations and the surfaces between them were embellished with geometric and floral motifs.

3.1.6.3.1.3. Superstructure

The superstructure of the *soyunmalık* spaces could not be determined since they were destroyed. The square units of *ılıklık* spaces, the northwest unit of women's section, the square spaces of main *sıcaklık* spaces and *halvets* were covered with domes.

The rectangular planned side sections of the *ılıklık* spaces and main *sıcaklık* spaces and water reservoir were covered with barrel vaults. The elements were built with brick or brick and rough cut stone and the surfaces were covered with horasan plaster.

Dome:

The superstructures of the *ılıklık*, main *sıcaklık* spaces and *halvets* in the men's and women's sections were covered with dome. It was built with brick or brick and rough cut stone and mortar as binding material (Figure 3.45). In both sections, domes are 40-45 cm. in thickness. The dimensions of bricks are measured as 21 x 32 x 3-4 cm. Brick bond starts with the thickness of 1.5 cm. joints and as it goes up to the top foints thicknesses, so they exceed the thickness of a brick which is 3-5 cm. Therefore, the bricks in mortar were made to work as aggregate (Baronio 1997). In the main *sıcaklık* space of the women section's, the dome rises as octagonal pyramid on the interior and close to the top it turns into a circular shape. At the transformation level, octagonal border was arranged with a course of brick. The dome is 2.95 m. diameter in the *ılıklık* space, 3.75 m. diameter in the main *sıcaklık* space, 2.85 m. diameter in northeastern halvet and 3.60 m. diameter in the southwestern *halvets* in the men's section. The springing level of the dome in the main *sıcaklık* space is 4.70 m. above the original floor. On the domes of the main *sıcaklık* spaces, hemispherical cupolas were arranged. In addition, there are oculi in circular rows on all domes. The hemispherical cupola was arranged in the main *sıcaklık* space.

Vault:

The side sections of the *ılıklık* and *sıcaklık* main spaces and water reservoir were covered with barrel vaults, 42-45 cm. in thickness. Their interior and exterior surfaces were rendered with horasan plaster, and covered with traditional tiles over the plaster at the springing level on the exterior. The vaults were built with brick or brick and rough cut stone and mortar as binding material. The vaults of side sections in the *ılıklık* and main *sıcaklık* space of the women's section have depressed profiles and the other vaults have semi-circular profiles. Oculi ensured by terracotta pipes between the bonds of vaults were placed in the *ılıklık* and *sıcaklık* spaces of the men's section; however, the vaults in women's sections have not oculi. The springing levels of the vaults of the *ılıklık* and *sıcaklık* spaces are 3.95 m. above the original floor.

3.1.6.3.1.4. Floors

The floors of the *ılıklık* and *sıcaklık* spaces could not be determined since the debris filling the floor. In the *sıcaklık* spaces, including *cehennemlik*, the floors were built on masonry walls made of bricks or cut stones which are 90 cm. in height and covered with cut stone, 7 cm. in thickness and 56 x 70 cm. in size. Above the openings between the walls that form the *cehennemlik* space, in some places timber lintels, in other places plain, slightly curved or arched stone lintels were observed (Figure 3.46). The smoke circulated through *cehennemlik* heated the floors in this way.

3.1.6.3.2. Lighting System

Lighting is provided by hemispherical cupolas and oculi on the superstructure. The hemispherical cupolas are only located on the domes of the main *sıcaklık* spaces in both sections. They are in the form of depressed hemispherical lid which are 70 cm. in diameter and 50 cm. in height. On the cupolas, oculi are located. On the other hand, on the vaults and domes of the *ılıklık* and *sıcaklık* spaces in the men's section and on the domes of the ılıklık and sıcaklık spaces in the women's section, oculi which were formed by placing terracotta pipes in brick bond were arranged along the central axis of the vaults as two or three in number, and in three circular rows with decreasing in number towards the top of the domes. They are in hexagonal shape and 32 cm. in width from inside while 29 cm. in width from outside and in the thickness of the domes and vaults.

3.1.6.4. Installation System

The elements belonging to the water system are the water reservoir having separate sections for both hot and cold water, terracotta water pipes placed on the surfaces of the walls that distributed the hot water directly from the hot water section of the reservoir to the *sıcaklık* spaces. *Külhan* under the water reservoir, *cehennemlik* below the *sıcaklık* spaces and flues inside the walls of *sıcaklık* spaces are determined as the elements of the heating system.

3.1.6.4.1. Water System

Although the clean water system could be determined, the waste water system could not be determined since the floors are filled with debris. The clean water system consists of the water reservoir which is on the southwest of the both section and the cylindrical terracotta water pipes placed in two rows along, one for hot and the other one for cold water. These terracotta water pipes were placed horizontally, 60 cm. and 75 cm. above the original ground level on the interior surfaces of the southeast walls of the *sıcaklık* spaces in the men's section, on both surfaces of the common walls between men's and women's sections and southwest surfaces of the southwestern *halvets* in both section, and on the surfaces of the northeast wall in the southeast *halvet* and along the northwest walls of the *sıcaklık* spaces in the women's section. So the water pipes, which are in two lines for hot and cold water, are in three branches provided flowing of water from water reservoir into the marble basins. The tap panels on the walls above the marble basins indicate the tap places (Figure 3.47). They were placed into the wall bond projecting 2 cm. from the plaster surface. In the men's section, the water pipes and tap panels on the wall and only the traces of the marble basins could be determined. In the women's section, semi-octagonal planned, reused marble basins are observed (Figure 3.48).

3.1.6.4.2. Heating System

The furnace under the water reservoir, *cehennemlik* under the floors of the *sıcaklık* spaces and the terracotta flues in the walls of the *ılıklık* and *sıcaklık* spaces constitute the heating system. Since the ground level was raised the furnace was remained under the road level and it could not be observed. *Cehennemlik*, which was covered with cut stone, was built with brick or stone masonry walls which were nearly 90 cm. high. The flues which are terracotta pipes in the walls of the *ılıklık* and *sıcaklık* spaces have 15 cm. diameters and 1.5 cm. thick. They were placed vertically put over one another. The flue chimneys over the walls are collapsed today.

Figure 3.42. General View of the Urla Çifte (Hersekzade Ahmet Paşa) Hamam

Figure 3.43. Urla Çifte Hamam, The Northwest Facade, Rubble Stone Bond of the Exterior Walls

Figure 3.44. Urla Çifte Hamam, Pendentives in the Main *Sıcaklık* Space of Men's Section

Figure 3.45. Urla Çifte Hamam, The Dome of the *Ilıklık* Space in the Men's Section

Figure 3.46. Urla Çifte Hamam, The Use of Stone Lintel above the opening of the Masonry Walls in the *Cehennemlik* Section

Figure 3.47. Urla Çifte Hamam, The Use of Tap Panel on the Walls in the Main *Sıcaklık* Space of Men's Section

Figure 3.48. Urla Çifte Hamam, Marble Basin on the Floor of the Main *Sıcaklık* Space of the Women's Section

3.1.7. Kamanlı (Yahşi Bey) Hamamı

3.1.7.1. Date

The building has no inscription. It can be dated to the 15th century according to its architectural characteristics that are the square planned domed *ılıklık* space extending to a vaulted unit to one side, the muqarnas decorated pendentives and fountain niche on the main *sıcaklık* space, and the belts of Turkish triangles and lobed squinches at the corner of the *halvets* (Akyıldız 1988, Önge 1995, Çakmak 2002), (Figure 3.49).

3.1.7.2. Plan Characteristics

The building was situated in Yahşi Bey Külliyesi (Complex), which was composed of a mosque, a "*sübyan mektebi*" (primary school), a tomb, a fountain and a bath. Urla Kamanlı Hamamı has a lengthwise rectangular plan, extending along an axis in the north-south direction of the main spatial components. Its exterior dimensions are 9.15 x 19.65 m. (Figure 3.50). The building includes *soyunmalık*, *ılıklık*, *sıcaklık* spaces and a water reservoir. The *sıcaklık* space is composed of a main *sıcaklık* space and three *halvets*. The main *sıcaklık* space was composed of a square planned, domed unit and two rectangular, vaulted units placed on both sides. There are three *halvets* adjacent to the main space, one of them is in the southwest and the other two are in the north. The building can be evaluated within the plan type that is elongated rectangular *sıcaklık* with domed central unit and two *halvets* (Eyice 1960). However, the plan differs from the typical plan type with a third *halvet* on the southwest.

In the ruins of the *soyunmalık* space, there are traces of an opening 85 cm. in width which indicate the entrance of the building was in the west side. The *soyunmalık* is a space located at the south of the building and has a rectangular plan with a 6.25 x 9.15 m. interior dimensions. The remaining parts of south and east walls are 1.50 m. in height but for the west wall there is only a trace on the ground. This space makes a projection from the main mass of the building towards the east. The rectangular planned niches are placed on the east and south walls. The niches are 58 cm. in width, 40 cm. in depth, and 1.12 m. in height from the ground. Since the ground is covered with debris,

the floor could not be seen. The entrance, on the north wall of the *ılıklık* space, was filled with rubble stones in random and only a door trace can be seen today.

The *ılıklık* space, which consists of the 3.05 x 3.10 m. domed square planned unit, extended to the east direction by a barrel vaulted unit, has 3.10 x 4.25 m. dimensions. The east wall of the barrel vaulted unit has a rectangular niche of 20 x 60 cm. dimensions which the traces of terracotta pipes that provide clean water to the *ılıklık* space can be seen. The main *sıcaklık* space is entered from *ılıklık* through a 65 cm. wide depressed pointed ached door opening placed towards the left corner of the north wall.

The *sıcaklık* was composed of the main *sıcaklık* space and *halvets*. The rectangular planned main *sıcaklık* space which has 3.30 x 7.75 m. dimensions consists of a square planned, domed central unit and two barrel vaulted units on both sides. On the north wall of the central unit, there is a fountain niche with muqarnas decoration between the entrances of the two *halvets* in the north. The side barrel vaulted units are separated by a depressed pointed arch on the east and west sides of the main *sıcaklık* space. In each unit, on the west and east walls there is a basin trace which points out the presence of a basin and stone seats on both sides. Two of the three domed *halvets*, which have 2.50 x 3.00 m. interior dimensions, are in the north of the *sıcaklık* and the third one, which has 2.70 x 3.10 m. interior dimensions, is in the southwest. On the north wall of the northwest *halvet*, there is a 40 cm. wide depressed pointed arched observation window opening to the water reservoir. On each surface of the transition zone to the dome in the northeast *halvet* there is a blind niche. On the other hand, in the southwest *halvet* there are two niches which were destroyed and turned to openings on the east wall, a niche, which was filled with rubble stone in random in the left corner, and a basin trace in the middle of the west wall.

The rectangular barrel vaulted water reservoir is placed at the north side of the *halvets* with 1.30 x 7.75 m. interior dimensions. The water reservoir also has a semi-circular arched opening on the east side.

3.1.7.3. Construction Technique and Material

The building was constructed with rubble stone, rough cut stone, brick, and timber in the masonry system. The exterior walls are 80-85 cm. and interior walls are 70-80 cm. in thickness. The surfaces of the exterior walls were not plastered in contrast

the interior walls were covered with lime and horasan plaster. The horizontal timber beam traces on the walls and transition sections to the superstructure points out the presence of a timber beam. The vaults and domes constitute the superstructure were built with bricks and binded with mortar and plastered. On the other hand, the domes were covered with horasan plaster on the exterior. The springing levels of the domes were covered with traditional tiles over horasan plaster. On the superstructure, a hemispherical cupola was placed on the dome of main *sıcaklık* space and oculi were placed on the vaults and domes of the *ılıklık* and *sıcaklık* spaces. Double row terracotta pipes belonging to the water system were arranged on the walls of the *sıcaklık* spaces. On the transition zone to the superstructure in the *halvets* and main *sıcaklık* space, on the springing levels of the arches and in the niches, muqarnas decorations were used.

3.1.7.3.1. Structural System

The walls, which constitute the vertical supporting elements, were constructed with rubble stone, rough cut stone and rough cut stone / brick alternating bond. Moreover, the superstructure formed by domes, vaults and the transition elements that are pendentives, squinches and belt of Turkish triangles were constructed with brick bonding technique.

3.1.7.3.1.1. Walls

The exterior walls were constructed with rubble stone bond and rough cut stone / brick alternating bond. The interior walls were constructed with both rough cut stone and rubble stone bond.

Exterior Walls:

The exterior walls of the *ılıklık* and *sıcaklık* spaces were constructed with rough cut stone / brick alternating bond which is a course of rough cut stone encircled by bricks in some places and a course of brick with thin flush joints (Figure 3.51). The thickness of the walls was filled with rubble stone and mortar in random. The *soyunmalık* walls were constructed with rubble stone bond using large and small rubble stones and mortar as binding material. The rubble stone pieces were placed in random

between the joints. In the west wall, there are horizontal timber beam hollows at the height of 2.00 m. from ground level. In the east and south walls of the *soyunmalık* there are rectangular niches with 58 cm. in width and 40 cm. in depth towards the southeast corner. On the east wall of the *ılıklık*, a rectangular niche 25 x 60 cm. dimensions where the water pipes which provide water to the *ılıklık* was arranged. The internal surfaces of the exterior walls are covered with lime plaster in *soyunmalık* space and with horasan plaster in *ılıklık* and *sıcaklık* spaces. In the internal surfaces of *ılıklık* and *sıcaklık* spaces, terracotta pipes, belonging to the water system, were placed. On the upper level of the exterior walls, saw-tooth moulding was formed by three rows of brick bond 4.20 m. above the ground.

Interior Walls:

The interior walls were constructed with both rough cut stone and rubble stone bond. The thicknesses of the walls were filled with rubble stone and mortar in random like the exterior walls. The wall surfaces were covered with lime plaster in the *soyunmalık* space and with horasan plaster in the *ılıklık* and *sıcaklık* spaces. Horasan plaster was applied as a double layer which has a 3-4 cm. thickness to approximately 89-96 cm. high from the floor and 2-3 cm. thickness in the upper parts. On the north wall of the *sıcaklık* space between the entrances of the *halvets*, a fountain niche with muqarnas decoration *kavsara* was placed (Figure 3.52). In addition, niche traces on the wall of southeast *halvet* juxtaposed to the *ılıklık* space and a niche trace on the west wall can be observed. On the wall of the northwest *halvet* juxtaposed to the water reservoir, there is a 63 cm. wide depressed pointed arched observation window.

3.1.7.3.1.2. Transition Elements

The transition elements to the superstructure are composed of squinches in the northeast *halvet*, a belt of Turkish triangles in the northwest *halvet*, pendentives in the *ılıklık*, southwest *halvet* and *sıcaklık* main space, and drum over the pendentives in the central unit of the main *sıcaklık* space. These elements were constructed with brick and mortar and rendered with plaster.

Squinches:

In the northeast *halvet*, the transition element is lobed squinch at the corners (Figure 3.53). The springing point of the squinches is 3.60 m. in height from the ground level. This depressed pointed arched transition element was formed with the rounding of the wall corners and provided the transitions to the dome. They were constructed with brick and mortar, and covered with horasan plaster. There are blind niches between the squinces at the transition zones to the dome.

Pendentives:

The transitions to the superstructure in the *ılıklık* space, *sıcaklık* main space and southwest *halvet* were provided with pendentives. In the *ılıklık* and southwest *halvet*, the convex edges of the pendentives were bordered 5 cm in width. These decorative borders were formed with brick bond and covered with horasan plaster. It can be determined that the brick courses have 3-5 cm. joints in thickness by observing the deteriorated parts of the plaster. In the *sıcaklık* main space, the pendentives were decorated with muqarnas units which were built with brick and rendered with horasan plaster (Figure 3.54).

Belt of Turkish Triangles:

The transition in the northwest *halvet* was provided by a belt of Turkish triangles, 60 cm. in height (Figure 3.55). Today, the starting level of the transition zone is 3.60 m. in height from the existing ground level. The upper and lower ends of the Turkish triangles were arranged alternating in the form of a diamond. These elements were constructed with brick and covered with horasan plaster.

Drum:

In the square planned main *sıcaklık* space, a drum 30 cm. in height was placed over the muqarnas decorated pendentives. A moulding was arranged between the drum and pendentives. The drum was constructed with brick on the interior while it was constructed with the same bonding technique of the walls on the exterior.

3.1.7.3.1.3. Superstructure

The superstructure of the *soyunmalık* was collapsed. However, it can be thought that its superstructure was a timber roof considering the rubble stone masonry walls. The square unit of the *ılıklık* and main *sıcaklık* space and *halvets* were domed; the side units of the *ılıklık* and main *sıcaklık* space and the water reservoir were barrel vaulted. These domes and barrel vaults were constructed with brick and covered with horasan plaster.

Dome:

The *ılıklık* space, main *sıcaklık* space and the *halvets* were covered with domes which were constructed from brick and mortar. The domes, which are 32 cm. in thickness, have diameters of 2.95 m. at the *ılıklık* space, 3.16 m. at the main *sıcaklık* space, 2.60 m. at the southwest *halvet*, and 2.90 m. at the northeast and northwest *halvets*. The dome of the main *sıcaklık* space has a hemispherical cupola and the other domes have oculi.

Vault:

The superstructures of the east unit of the *ılıklık* space, the side units of the main *sıcaklık* space and the water reservoir are barrel vault, 35 cm. in thickness. The springing levels of the vaults in the *ılıklık* and main *sıcaklık* spaces are nearly 4.10 m. in height from the ground level. They were covered with horasan plaster on the interior and on the exterior. The springing levels of them were covered with Turkish tiles over horasan plaster on the exterior. It can be said that they were constructed with brick and mortar as binding material with the observation from the parts where the plaster was deteriorated. The vaults of the *ılıklık* and main *sıcaklık* space have three hexagonal shaped oculi.

3.1.7.3.1.4. Floors

The floor of the *soyunmalık* could not be observed due to debris infill. The floors of the *ılıklık* space have stone coverings over the ground. The floors of the *sıcaklık*

spaces were covered with cut stone over the masonry walls which constitute the *cehennemlik* that heated the floors.

7.3.2. Lighting System

Lighting was provided by a hemisphere cupola over the main *sıcaklık* space and oculi in the superstructure of the *ılıklık* and *sıcaklık* spaces. The hemisphere cupola is situated at the center of the dome of the main *sıcaklık* space having oculi built with terracotta pipes. The hemisphere cupola has a shape of a depressed spherical shape with a 60 cm. diameter and 50 cm. in height. The star and hexagonal shaped oculi were placed on it. Star shaped and hexagonal oculi are elements that were formed by terracotta pipes units which were placed inside the brick bond of the oculi, which has dimensions of 25 cm. at the interior and 19 cm. at the exterior and continues along the thickness of the dome (Figure 3.56). There are three hexagonal oculus which lie along the middle axis of the *ılıklık* and main *sıcaklık* space. The oculi at the main *sıcaklık* space dome, were placed in three rows using star shaped and hexagonal ones alternately. The oculi at the northwest *halvet* were arranged in three circular rows and the oculi at the northeast and southwest *halvets* were placed in two circular rows with a hexagonal shape, decreasing in number towards the top.

3.1.7.4. Installation System

The fountain, located in the southwest of the *hamam*, the water reservoir in the north, the fountain placed between the entrances of two *halvets* and terracotta pipes in two rows along the walls, which provide water from the reservoir to the *ılıklık* and *sıcaklık* spaces, are the elements for the clean water system.

The waste water channels, observed on the door sill between the *ılıklık* and main *sıcaklık* space and partially observed along the west wall of the *ılıklık*, are the elements of the waste water system.

The furnace under the water reservoir, the flues in the wall between the north *halvets* and the remains of *cehennemlik* under the floors of the *sıcaklık* spaces are defined as the elements of the heating system.

3.1.7.4.1. Water System

The source of the clean water is the fountain located in the southwest of the building. Clean water was transferred from the fountain by the cylindrical pipes which were placed along the south wall of the *soyunmalık* space. One of the branches of these pipes ends in the *ılıklık* space and the other in the water reservoir. Terracotta pipes are cylindrical pipes which were designed as to be connected to each other and the wide end is 12.5 cm. in diameter and 37.5 cm. in length (Figure 3.57).

The waste water channels that constitute the waste water system, provide the transference of the waste water from *sıcaklık* spaces to the *ılıklık* space and then outside. The only traces of the waste water channels are observed on the west edge of the door sill between the *ılıklık* and main *sıcaklık* space and along the west wall of the *ılıklık* (Figure 3.58).

3.1.7.4.2. Heating System

The furnace under the water reservoir, *cehennemlik* under the floors of the *sıcaklık* spaces, terracotta flues placed in the walls of *ılıklık* and *sıcaklık* spaces constitute the heating system.

Only the traces of the *cehennemlik* could be observed since the floor of the *sıcaklık* spaces were destroyed and filled with debris. Some of the terracotta flues could be observed from the demolished parts of the walls of the *sıcaklık* spaces. The upper parts of the terracotta flues over the walls are demolished today.

Figure 3.50. General View of the Urla Kamanlı (Yahşi Bey) Hamamı

Figure 3.51. Urla Kamanlı Hamamı, The West Exterior Wall

Figure 3.52. Urla Kamanlı Hamamı, The Muqarnas Decorated Fountain Niche in the Main *Sıcaklık* Space

Figure 3.53. Urla Kamanlı Hamamı, The Lobed Squinches in the East *Halvet*

Figure 3.54. Urla Kamanlı Hamamı, The Muqarnas Decorated Pendentives in the Main *Sıcaklık* Space

Figure 3.55. Urla Kamanlı Hamamı, The Belt of Turkish Triangles in the West *Halvet*

Figure 3.56. Urla Kamanlı Hamamı, Oculi on the Dome of the East *Halvet*

Figure 3.57. Urla Kamanlı Hamamı, Terracotta Pipes in the Main *Sıcaklık* Space

Figure 3.58. Urla Kamanlı Hamamı, The Traces of Waste Water Channel on the West Edge of the Door Opening between the Ilıklık and the Main Sıcaklık Space

3.1.8. Urla Rüstem Paşa Hamamı

3.1.8.1. Date

The building has no inscription. It can be dated to the 16th century considering two rows of muqarnas decorations on the drum in the space, hexagonal shaped oculi on the dome, and the depressed pointed arched niche on the wall (Akyıldız 1988, Çakmak 2002), (Figure 3.59).

3.1.8.2. Plan Characteristics

The only space that can be observed today is square planned with interior dimensions of 5.50 x 5.60 m. and located in the northwest-southeast direction (Figure 3.60). The plan type of the building can be determined after a further detailed excavation.

The entrance of the space is through a 97 cm. wide opening on the northwest facade. There are door traces on the southeast and southwest walls with a width of 65 cm. and a depressed pointed arched opening towards the left corner of the southeast wall. The floor and stone seats can not be observed due to the ground being filled with debris. It can be thought that the space is the main space of the *sıcaklık* considering its dimensions and muqarnas decorations on the transition zone of the dome.

3.1.8.3. Construction Technique and Material

The building was built with rough cut stone, cut stone, brick, and timber in the masonry system. The use of rubble stone in some places in the walls and cut stone / brick alternating bond with one row of cut stone and two rows of bricks on the arch were observed. The walls are 79 cm. in width. Horasan plaster is used as the surface finishing material. The interior surfaces of the walls were covered with horasan plaster, and the exterior surfaces were not plastered. The dome of the superstructure was built with brick and mortar as binding material, and the surfaces were covered with horasan plaster. The springing level of the dome was covered with traditional tiles over horasan

plaster on the exterior. Muqarnas decorations were arranged on the transition zone to the dome. Oculi were placed on the dome.

3.1.8.3.1. Structural System

The walls were built with rough cut stone, the pendentives were built with brick, and the drum was built with brick on the interior and with a similar bonding technique of the walls on the exterior. The floor covering could not be observed because of the debris on the ground.

3.1.8.3.1.1. Walls

The walls of the existing space were built with rough cut stone bonding technique.

The rough cut stones were bonded with mortar in 1-1.5 cm. thin flush joints in regular courses on the northwest and northeast. However, rubble stone and mortar were filled in random in the thickness of the walls. The walls are in thicknesses of 79-85 cm. Their interior surfaces were plastered while the exterior surfaces were not plastered. On the transition zone, muqarnas decorations 53 cm. high were arranged at the corners of the drum. A depressed pointed arched opening, built with cut stone / brick alternating bonding technique, was located towards the left corner of the southeast wall. Moreover, a depressed pointed arched door opening was placed on the southeast and southwest walls. However, these openings were filled later.

3.1.8.3.1.2. Transition Elements

The transition to the dome was provided by pendentive and drum. They were built of brick and mortar forming 3-4 cm. horizontal joints and vertical thin joints. The drum was built with the same bonding technique as the wall.

Pendentive:

The pendentive was built with brick and mortar with horizontal joints 3-4 cm. thick and with vertical thin joints and covered with horasan plaster (Figure 3.61).

Drum:

The drum is at the height of 90 cm. and hexagonal planned. It was arranged in two rows as 23 cm. in the lower and 30 cm. in the upper parts, for a total height of 53 cm. and built with brick bond. The muqarnas decorations arranged with bricks as three units were placed at the corners of hexagonal planned drum and the surfaces were covered with horasan plaster.

3.1.8.3.1.3. Superstructure

The superstructure of the space is the dome which was built with brick bonding technique and covered with horasan plaster on both the interior and exterior surfaces.

Dome:

The dome is 5.30 m. in diameter and 35-40 cm. in thickness; built with bricks having the joints of 1.5 cm. on the extrados and of 3-4 cm. on intrados. The hexagonal oculi which are formed with terracotta pipes among brick bond decreasing in number towards the top were placed on the dome (Figure 3.62). The bricks used on the dome are 21 x 31 x 3-4 cm, 10.5 x 31 x 3-4 cm, and 16 x 21 x 3-4 cm. The dome was built over the drum which is 53 cm. in height.

3.1.8.3.1.4. Floors

The floor could not be observed because of the debris on the ground.

3.1.8.3.2. Lighting System

The lighting is provided by the oculi on the dome of the space. The oculi are hexagonal shaped which have interior diameters of 25 cm. with the thickness of the dome. They were arranged on the dome in six circular rows and decrease in number to the top (Figure 3.63).

3.1.8.4. Installation System

The installation system consisting of water system and heating system could not be observed because of the debris and the walls were covered with plaster.

Figure 3.60. General View of the Urla Rüstem Paşa Hamamı

Figure 3.61. Urla Rüstem Paşa Hamamı, Arches and Pendentives in the Existing Space

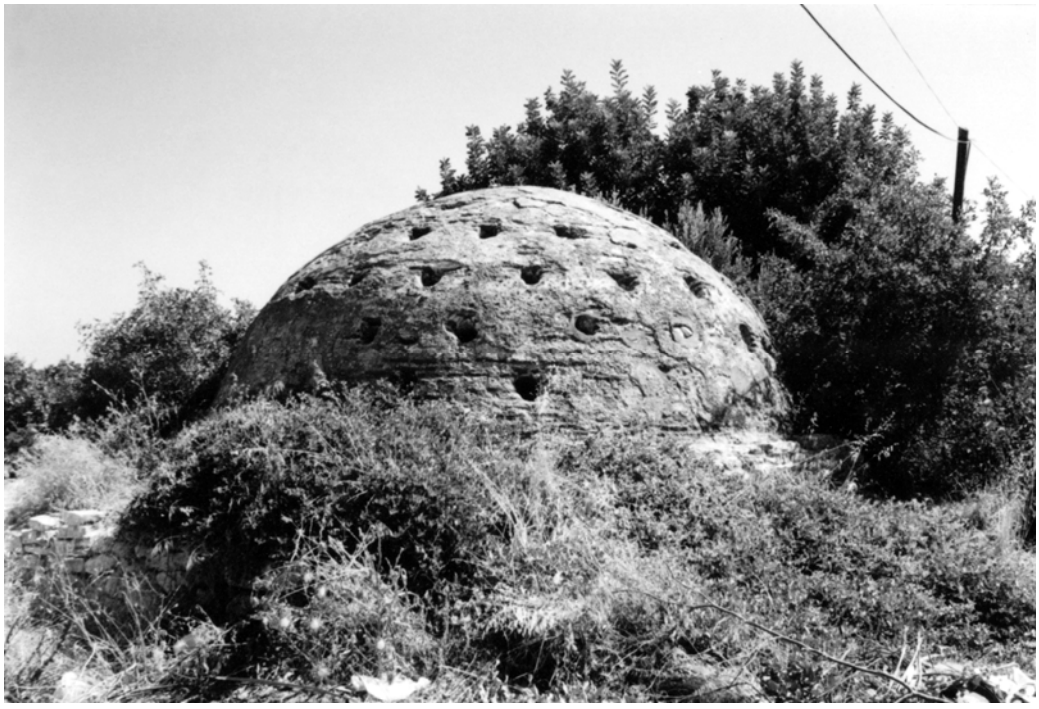


Figure 3.62. Urla Rüstem Paşa Hamamı, The Dome of the Existing Space

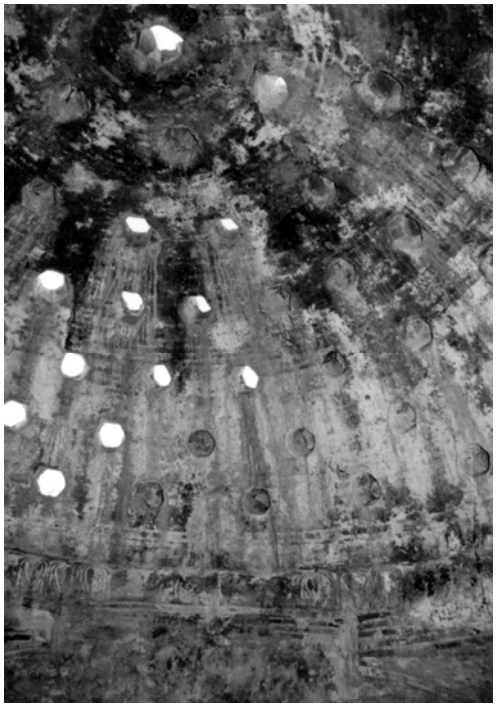


Figure 3.63. Urla Rüstem Paşa Hamamı, The Oculi on the Dome of the Existing Space

3.1.9. Urla Yeni Hamam

3.1.9.1. Date

The building has no inscription. It can be dated to the 16th century considering the plane triangles and lobed squinches provide transition to the dome (Akyıldız 1988, Önge 1995, Çakmak 2002), (Figure 3.64).

3.1.9.2. Plan Characteristics

The only three spaces that can be observed today are square planned with the exterior dimensions of 8.10 x 9.00 m. and located in the west-east. The building can be evaluated within the type of plan that has *soyunmalık*, *sıcaklık* and *halvets* of same size (Eyice 1960).The spaces were connected to each other with 65 cm. wide door openings and covered with domes.

The entrance of the first space is provided by a 70 cm. wide opening on the west wall. The first space placed in the north has a square plan with 2.90 x 2.95 m. interior dimensions. The main *sıcaklık* space is entered from the first space through a 65 cm. wide depressed pointed arched door opening placed on the right corner of the east wall.

The main *sıcaklık* space, which is placed on the east side of the building, has a square plan and 3.82 x 3.82 m. interior dimensions.

The third space is situated in the south and entered from the main space through a 65 cm. wide depressed pointed arched door opening on the left side of the west wall. Its interior dimensions are 3.00 x 3.10 m. On the west wall there is a trace of depressed point arched door opening and on the south wall there is a trace of observation window, which is filled today.

3.1.9.3. Construction Technique and Material

Since the walls were covered with marble, the transition elements and superstructure were renewed and plastered with cement, the construction technique and use of material could not be determined. The exterior and interior walls are 65-70 cm. thick. Plane triangles and lobed squinches constitute the transition elements. In the north

space and main space, transition to the dome were provided by plane triangles composed of one unit in the north space, two units in the main space. In the south space, transition elements are lobed squinches. All the spaces were covered with domes. On the domes of all spaces, the oculi were arranged in two circular rows.

3.1.9.4. Installation System

The installation system which is composed of water and heating systems could not be observed because the ground and the walls were renewed and were covered with marble.

3.1.10. Urla Özbek Hamamı

3.1.10.1. Date

The building has no inscription. It can be dated to the 16th century taking into consideration the window on the wall of *soyunmalık* space, traditional tiles covering of the domes and vaults, and the niches on the walls of *ılıklık* and east *halvet* (Önge 1995), (Figure 3.65).

3.1.10.2. Plan Characteristics

The rectangular planned building is extended along an axis in the southwest - northeast direction with the exterior dimensions of 7.00 x 13.80 m. It consists of *soyunmalık*, *ılıklık*, *sıcaklık* and a water reservoir (Figure 3.66). *Sıcaklık* spaces are two domed *halvets* juxtaposed to the *ılıklık* space which have a square planned domed unit and rectangular barrel vaulted sections at the two sides. The bath can be evaluated within the plan type that is elongated rectangular *sıcaklık* with domed central unit and two *halvets* (Eyice 1960). However, the location of the *sıcaklık* in place of the *ılıklık* and the entrance opening between two *halvets* differ from the typical plan type.

The entrance to the *soyunmalık* is from the southwest through a 70 cm. wide door opening. The *soyunmalık* has a rectangular plan, 4.10 x 5.80 m. interior dimensions and was covered with a timber roof. On the floor, stone seats were arranged along the walls. However, the floor covering could not be observed because the ground was filled with debris. The entrance to the *ılıklık* is through a 65 cm. wide door opening on the northeast wall of the space. A squarish planned section with the interior dimensions of 1.10 x 1.30 m. which might be used as a toilet had added to the *soyunmalık* space from the northwest.

Ilıklık, with interior dimensions of 2.50 x 5.75 m., located on the northeast of the *soyunmalık*, is a rectangular planned space. It consists of a square planned domed unit at the center and barrel vaulted side units on both sides. The stone seats 20 cm. in height were arranged along the walls of the vaulted units.

Sıcaklık was composed of two domed *halvets* which have 2.50 x 2.50 m. interior dimensions and connected to each other with a 65 cm. wide door opening. The entrance

was provided with a 65 cm. wide opening from the *ılıklık* to the northeast *halvet*. Basins were located at the center of the L planned stone seats which were arranged along the walls. An observation window was opened on the wall of the northeast *halvet* which is related to the water reservoir. On the northwest wall of this *halvet*, a depressed pointed niche was placed. The water reservoir is rectangular planned with the interior dimensions of 1.75 x 5.75 m. and barrel vaulted.

3.1.10.3. Construction Technique and Material

The building was built with rubble stone, brick, and timber in the masonry system. The interior and exterior walls are 60-65 cm. in thickness and the surfaces were plastered. Lime and horasan plaster were used as finishing material. The walls of *soyunmalık* space were covered with lime plaster while the walls of *ılıklık* and *sıcaklık* were covered with horasan plaster. The hollows of horizontal beams on the walls point out the use of timber beam at the bonding technique. The domes and the vaults which are the elements of superstructure were built with brick and mortar as binding material and the surfaces were covered with plaster. The exterior surfaces of the vaults and domes were covered with traditional tiles over horasan plaster. Oculi were arranged on the superstructure of the *ılıklık* and *sıcaklık* spaces. It can be claimed that the horizontal terracotta pipes belonging to the water system were placed along the walls considering the basins placed on the floors.

3.1.10.3.1. Structural System

The walls were built with rubble stone while the superstructure and transition elements were built with brick. The floors of *sıcaklık* space were covered with cut stone.

3.1.10.3.1.1. Walls

The walls were constructed in two types of bonding techniques as rubble stone and rubble stone / large pieces of bricks in joints.

Exterior Walls:

The exterior walls of *soyunmalık*, *ılıklık* and *sıcaklık* were built with rubble stone bond. Furthermore, the northeast wall of water reservoir was built with rubble stone and large pieces of bricks in joints. The wall surfaces of the southeast facade were plastered; the northeast, southwest and northwest facades were not plastered. The terracotta pipes are placed on the interior surfaces of the walls of the *sıcaklık* spaces.

Interior Walls:

The interior walls were built with rubble stone and mortar as binding material in the same technique of the exterior walls. The wall surfaces of *ılıklık* and *halvets* were covered with horasan plaster, and the wall surfaces of *soyunmalık* were covered with lime plaster.

3.1.10.3.1.2. Transition Elements

The transition to the superstructure in the *ılıklık* and *sıcaklık* spaces was provided by pendentives. The bond technique and the use of material could not be observed since the surfaces were plastered.

10.3.1.3. Superstructure

The side sections of the *ılıklık* space and water reservoir were covered with barrel vaults, the central space of *ılıklık* and *halvets* were covered with domes, and the *soyunmalık* space was covered with a timber roof. The vaults and domes were built with brick and mortar as binding material, and the interior surfaces were covered with plaster. The exterior surfaces of the superstructure were covered with tiles over plaster.

Dome:

The superstructures of the central unit of *ılıklık* and *halvets* are dome. The diameter of the dome at these spaces is 2.50 m. They were covered with horasan plaster on their interior surfaces and traditional tiles over plaster on their exterior faces. The distance between dome springing level and floor covering is about 3.10-3.45 m.

Vault:

The side sections of the *ılıklık* space and the water reservoir are barrel vaulted (Figure 3.67). They were covered with horasan plaster on the interior surfaces and the traditional tile over horasan plaster on the exterior surfaces. The bonding technique could not be observed because the surfaces were plastered. The distance between the vault springing level and the floor is about 2.60 cm.

3.1.10.3.1.4. Floors

The floor of the *soyunmalık* could not be determined because of the debris filling the floor. The floors of the *sıcaklık* spaces were built on the masonry walls which constitute the *cehennemlik* and covered with cut stone.

3.1.10.3.2. Lighting System

The lighting was provided with oculi on the vaults and domes and the rectangular window opening on the southwest wall of *soyunmalık*. Oculi were placed in the superstructure of *ılıklık* and *halvets* (Figure 3.68). In the *ılıklık* space, on the vaults of southeast side section three, at the northwest section two circular oculi were placed along the central axis of the vaults. Moreover, they were located on the domes of *ılıklık* and *halvets* in two circular rows and circular shaped. The oculi formed with terracotta pipes among brick bond of the vaults and domes, 14 cm. in diameter, 1.5 cm. in thickness, and 36 cm. in depth. The plastered vaults were covered with traditional tiles and lifting up terracotta pipes formed light chimneys (Önge 1995).

3.1.10.4. Installation System

The stream in the northwest and the well in the southwest of the *hamam* are the sources of clean water. The stream, well, the water reservoir and the terracotta pipes that distribute clean water from the water reservoir to the *halvets* are the elements of the water system. In addition, *külhan* placed under the water reservoir, the *cehennemlik* under the floor of the *sıcaklık* spaces, and the *tütekliks* in the walls of *sıcaklık* spaces are the elements of heating system.

3.1.10.4.1. Water System

The water system consists of water reservoir and the horizontal cylindrical terracotta pipes placed in one row in the interior surfaces of the walls of *sıcaklık* spaces considering the faucet traces on the walls of the *halvets*. Terracotta pipes are placed along the wall surfaces 60-70 cm. in height from the floor level. The stone basins in the *halvets* are in semi-circular planned and they have muqarnas decorations at the upper sides.

The waste water system consists of the water channels discharging waste water from the bathing spaces (Figure 3.69). Waste water coming from *halvets* were collected in the channels along the northeast wall of the *ılıklık* space and taken outside from the northwest wall.

3.1.10.4.2. Heating System

The heating system consists of the *külhan* under the water reservoir, the *cehennemlik* under the floor of *sıcaklık* spaces and the *tütekliks* in the walls of *ılıklık* and *halvets* (Figure 3.70). The furnace and chimney on the northeast of the building still exist today. The *tüteklik* chimneys over the walls are ruined today (Figure 3.71).

Figure 3.66. General View of the Urla Özbek Hamamı

Figure 3.67. Urla Özbek Hamamı, Barrel Vaults on Two Sides of the *Ilıklık* Space

Figure 3.68. Urla Özbek Hamamı, The Use of Oculi on the Superstructure in the *Ilıklık* Space

Figure 3.69. Urla Özbek Hamamı, The Waste Water Channels in the *Ilıklık* Space

Figure 3.70. Urla Özbek Hamam, The Use of Water Boiler in the Water Reservoir

Figure 3.71. Urla Özbek Hamam, The Furnace

CHAPTER 4

EVALUATION

4.1. Examination of Construction Techniques and the Use of Materials in the Construction Elements

In the studied baths the use of materials were examined separately as vertical support elements (walls), transition elements to the superstructure, superstructure elements and floor system which are the components of the structural system (Table 4.1a, 4.1b, 4.1c, 4.1d, 4.1e).

4.1.1. Vertical Elements-Walls

In all of the baths, the walls, which constitute the vertical supporting elements, were constructed of rubble stone, rough cut stone, reused cut stone, brick, timber and lime mortar as the binding material. In some examples, reused cut stones were used at the corners of the walls, sides of the door and window openings on the exterior. The use of materials differentiated the wall bonding technique. The thickness of the external walls varies from 70 cm. to 85 cm., the interior walls from 60 cm. to 80 cm. The exterior surfaces of the buildings were not plastered, whereas the interior surfaces were plastered. The covering materials on the surfaces are lime plaster and horasan plaster. On the walls at certain heights and on the transition zones there are horizontal timber beams. The beams were placed close to the surface and located in the wall in double rows. On the walls of the bathing area (*sıcaklık* spaces) there are terracotta pipes ”called *merbah* or *pöhrenk*” in a horizontal direction belonging to the water installation system, and there are vertical terracotta flues belonging to the heating system.

Rubble stone, rough cut stone, alternating bond as rubble stone / brick, rough cut stone / brick and reused cut stone / brick were used as the bonding technique.

4.1.1.1. Rubble Stone Bond

Rubble stone bonding has three different orders. Just rubble stone bond, bricks in some places of rubble stone bond and using large pieces of bricks in flush joints of rubble stone bond.

The use of rubble stone: In this bonding technique, small and large rubble stones were used by baffling vertical joints together. On the exterior part; the joint among rubble stones was built with small stones and mortar forming smooth surfaces; rubble stones and mortar were filled in the thickness of the wall in random. The corners of the walls were strengthened by using large rubble stones (Figure 4.1). The northern walls of the reservoir in Ulamış Hamamı, Seferihisar Küçük Hamam, all the walls of the Urla Çifte Hamamı except the projecting section of the northwest wall, all the walls of the Özbek Hamamı excluding the northern wall of the water reservoir, the southwest wall of Rüstem Paşa Hamamı and the walls belonging to the *soyunmalık* of the Kamanlı Hamamı were built in this bonding technique.

Use of rubble stones and large pieces of bricks in joints: Brick pieces in the rubble stone bond were placed into the lime mortar filling the emptiness among rubble stones parallel to the horizontal joints on the surface and in the thickness of the wall. In Ulamış Hamamı, Seferihisar Küçük Hamam and Sığacık Kaleiçi Hamamı, north, south walls, and except the projecting part of the east wall of Düzce Hamamı, the east walls of *sıcaklık* spaces of Seferihisar Büyük (Great) Hamam and the northern wall belonging to the water reservoir of Özbek Hamamı, this bonding technique was used for the walls of the *sıcaklık* spaces. The corners of the exterior walls of Seferihisar Büyük Hamam and Sığacık Kaleiçi Hamamı were strengthened with a vertical line of reused cut stone (Figure 4.2).

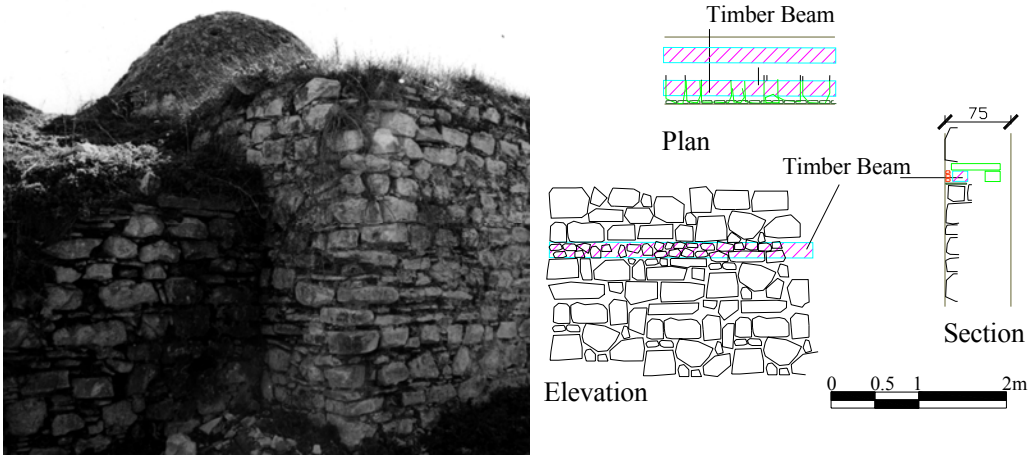


Figure 4.1. Urla Çifte Hamamı, Northwest elevation, Rubble stone bond

Use of rubble stones, bricks in some places and large pieces of bricks in joints: In rubble stone bond, bricks were placed parallel to joints among rubble stones in some places and large pieces of bricks were used in the horizontal and vertical joints on the surfaces of the walls. This bonding technique is seen at the interior walls, north and west exterior walls of Seferihisar Büyük Hamam and all interior walls of Düzce (Hereke) Hamamı (Figure 4.3).

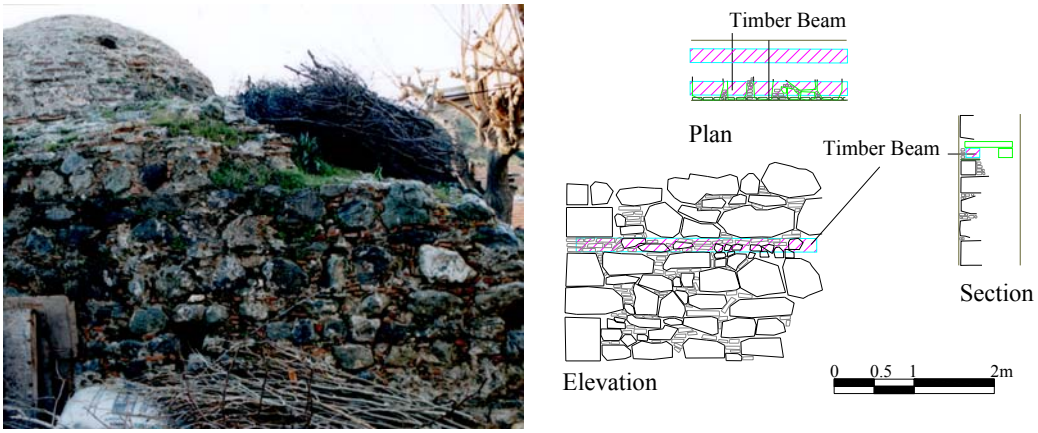


Figure 4.2. Ulamış Hamamı, East elevation, Rubble stone-large pieces of bricks in joints

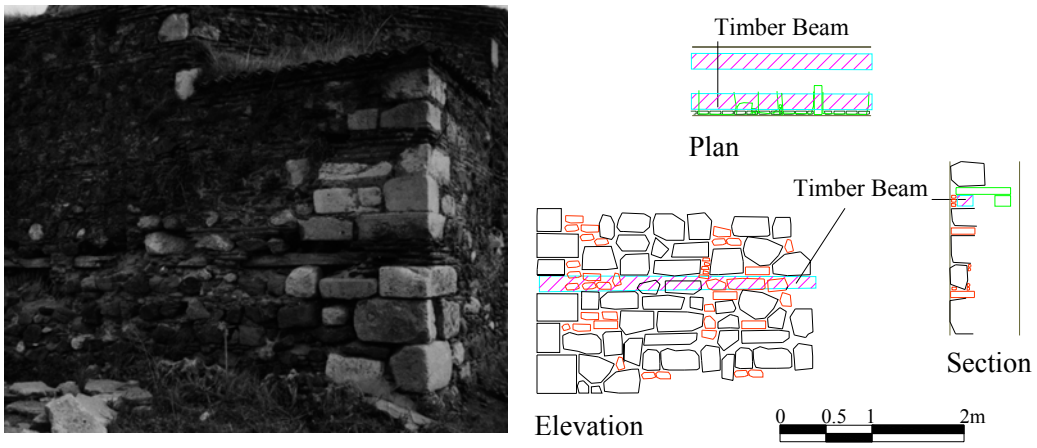


Figure 4.3. Seferihisar Büyük Hamam, North elevation, Rubble stone-bricks in some places and large pieces of bricks in joints

4.1.1.2. Rough Cut Stone Bond

On the external part; among rough cut stone, well-arranged bonds were formed with 1-1.5 cm. joints with lime mortar as binding material. The thickness of the walls was filled with rubble stones and mortar in random. The northeast and northwest exterior walls of Rüstem Paşa Hamamı and projecting part on the northwest wall of Urla Çifte Hamam have this type of bond. Both rough cut stone and rubble stones were used in the interior walls of Kamanlı Hamamı, at the corners of interior walls, smooth surfaces were achieved by using rough cut stone (Figure 4.4).

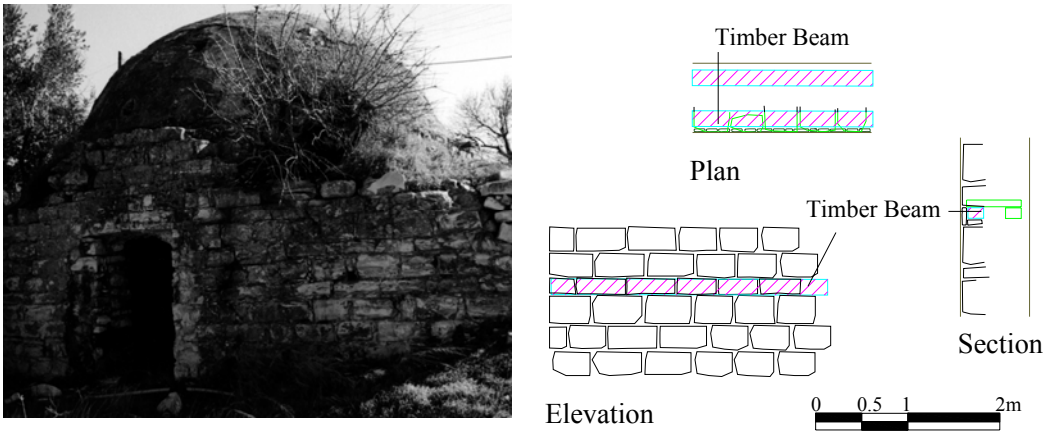


Figure 4.4. Rüstem Paşa Hamamı, North-west elevation, Rough cut stone bond

4.1.1.3. Alternating Bond

Alternating bonding technique is seen on the exterior walls is in three different types; rubble stone / brick, rough cut stone / brick and cut stone / brick.

Rubble stone / brick alternating bond: On the exterior surfaces, in the horizontal joints one or two rows of brick bonds were placed among rubble stones while in the vertical joints, large pieces of bricks were placed into the lime mortar parallel to the horizontal joints. In the thickness of the wall, rubble stones, pieces of bricks and lime mortar were filled in random (Figure 4.5). The west wall and the projecting part belonging to the third private room (*halvet*) of the east wall of Düzce Hamamı have this bond type. In addition, at the corners of the walls, on the sides of the doors and windows, one row of brick and one row of reused cut stone encircled by brick is seen.

Rough cut stone / brick alternating bond: This bonding technique is a course of rough cut stone encircled by bricks in some places and a course of brick. Exterior surfaces were built with joints 1-1.5 cm. in width, rubble stones and lime mortar were filled into the thickness of the walls. This bond type was only applied to the exterior walls of the *ılıklık* and *sıcaklık* spaces in Kamanlı Hamamı (Figure 4.6).

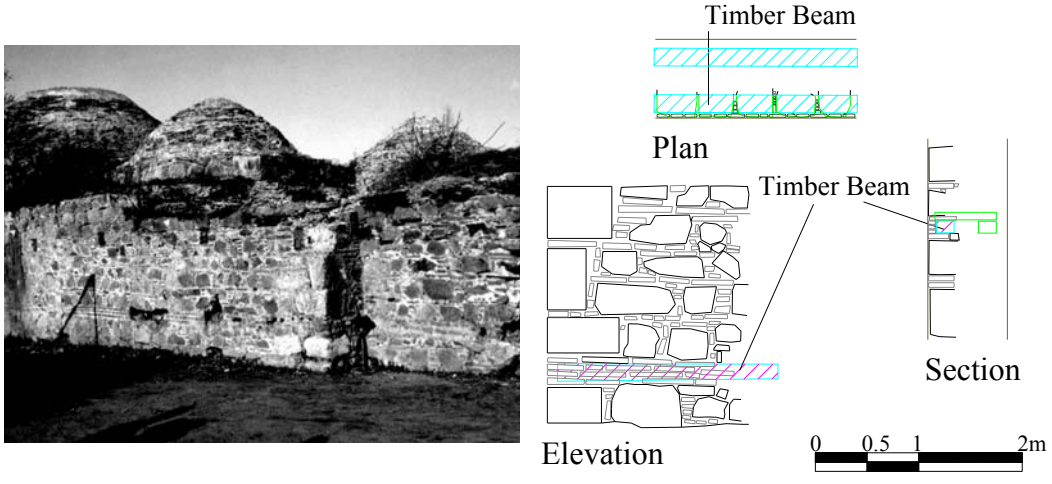


Figure 4.5. Düzce(Hereke) Hamamı, West elevation, Rubble stone-brick alternating bond

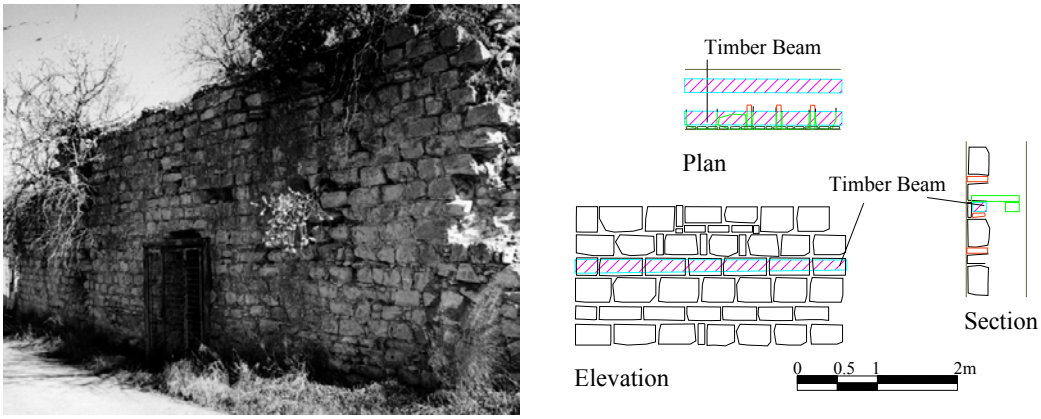


Figure 4.6. Kamanlı Hamamı, West elevation, Rough cut stone-brick alternating bond

Cut stone / brick alternating bond: This is a bonding technique that was formed by a row of reused cut stone encircled by bricks, two rows of brick with horizontal and vertical thin joints. It can be seen in Seferihisar Büyük Hamam, on the parts belonging to the dressing hall (*soyunmalık*) and warm area (*ılıklık*) of the east wall where the entrance was placed. In the alternating bond seen at the corners of the exterior walls and the sides of doors and windows in Düzce Hamamı, one row of reused cut stone and one row of brick were used (Figure 4.7).

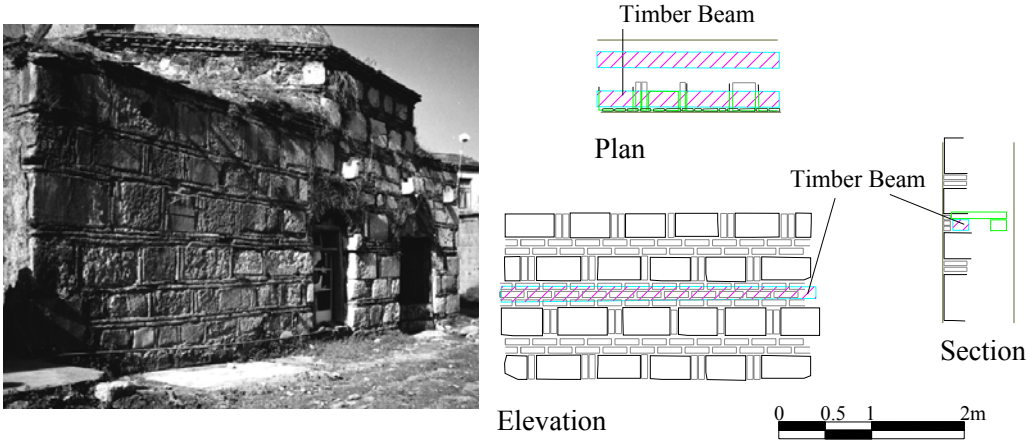


Figure 4.7. Seferihisar Büyük Hamam, East elevation, Cut stone-brick alternating bond

The use of structural timber on the walls has two different types. The first one is the timber beams that were placed at certain heights and encircled the building horizontally. The other one is timber lintels existed above the rectangular door and

window openings. Timber beams were generally placed in two rows in the thickness of the wall. The first is behind brick bond which consists of three courses and close to the surface, the other was placed in the thickness of the wall. The beams which are approximately 15 x15 cm. connected to each other by the timber elements placed vertical to the beams in the wall through the use of metal clamps (Figure 4.8).

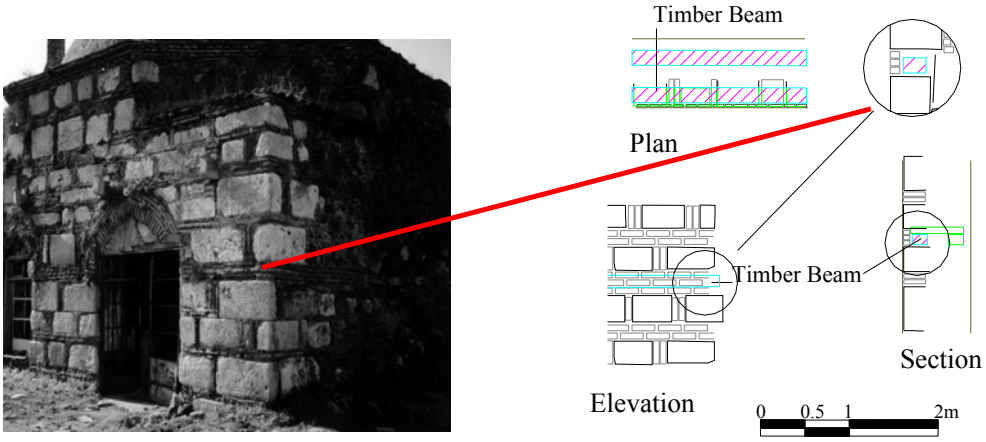


Figure 4.8. Seferihisar Büyük Hamam, North and east elevation, The use of timber beam

Timber lintels are 10x15 cm, placed above the rectangular door and window openings so as to distribute load vertically. Above them, there are relieving arches built with brick bonds. In *soyunmalık* of Düzce Hamamı, Seferihisar Büyük Hamam, Sığacık Kaleiçi Hamamı, and Özbek Hamamı, timber lintels were determined above the door and window openings (Figure 4.9).

Bricks were used on the arches of the door and the window openings in the exterior and interior walls, on the arches of the niches located on the interior walls, on the arches of *ılıklık* and *sıcaklık* spaces that open up to the side vaulted spaces and in some examples they were used inside of the niches for the purpose of decoration. In Rüstem Paşa Hamamı, at the depressed pointed arch of the southeast wall of the existing unit, brick was used in alternating bonding technique with two rows of brick and one row of cut stone. The size of bricks was measured as 21 x 32 x 3-4 cm., 10.5 x 32 x 3-4 cm., and 16 x 21x 3-4 cm. Generally used joints were thin in the intrados of the arches, 3-4 cm. in width in the extrados of the arch. The thickness of joints in the intrados and extrados of the arches is equal to the thickness of the bricks in Ulamış Hamamı and the thickness of the flush joints changes from 3 cm. to 4 cm. In Düzce Hamamı, the

extrados of the brick bond arches of the entrance door and window openings of the *soyunmalık* and in the furnace opening of Sığacık Kaleiçi Hamamı was encircled with a row of brick bond with thin joints. In the Seferihisar Büyük Hamam, of the extrados of brick arches the entrance door and window opening of *soyunmalık* in the east facade was encircled with four rows of brick bond (Figure 4.10).

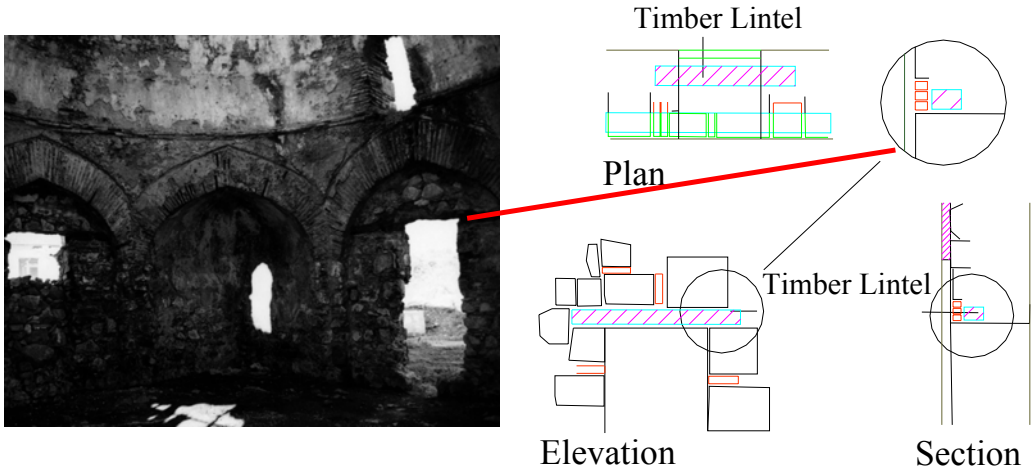


Figure 4.9. Düzce(Hereke) Hamamı, *Soyunmalık* space, The use of timber lintel

In Düzce Hamamı, on the pediment of the arched window opening on the east wall of *soyunmalık* brick is used as horizontal courses while on the pediments of the arched entrance opening and the arched window opening on the north wall of *soyunmalık* horizontal – vertical brick bond which created decorative patterns were used. In addition, bricks were used for decoration in lobed parts on the niche which is placed in the south wall of the west unit of *ılıklık* in Seferihisar Büyük Hamam and in the muqarnas arranged in the fountain niche located in the main *sıcaklık* space in Kamanlı Hamamı and the surfaces were covered with horasan plaster.

Depressed pointed arches of niches on the walls were built of bricks with 3-4 cm. flush joints. On the north and west walls of the *soyunmalık* in Seferihisar Büyük Hamam there are two niches, on the south wall of the west unit of *ılıklık* there is one niche which is decorated with lobs made of bricks. Besides, on the north wall of each *halvet*, a depressed pointed arched niche was arranged. In Sığacık Kaleiçi Hamamı, there is a depressed pointed arched niche on the northeast wall of *ılıklık*, on the northeast and southeast walls of the northeast *halvet*. In Kamanlı Hamamı, there is a rectangular niche on the east and south walls of *soyunmalık* and on the east wall of the

ılıklık while on the north wall of the main *sıcaklık* space between entrances of two *halvets* there is a fountain niche that is decorated with muqarnas units built of bricks (Figure 4.10). In addition, two niches on the east wall and one on the west wall close to the left corner in the southwest *halvet* were placed. In Özbek Hamamı, there is one depressed pointed arched niche on the south wall of the west side unit of the *ılıklık* space and on the west wall of the east *halvet*. Furthermore, in Düzce Hamamı on the surfaces of the *soyunmalık* there are depressed pointed arched niches and on the surfaces of north and south walls of *ılıklık* space there are semi-circular arched niches (Figure 4.11).

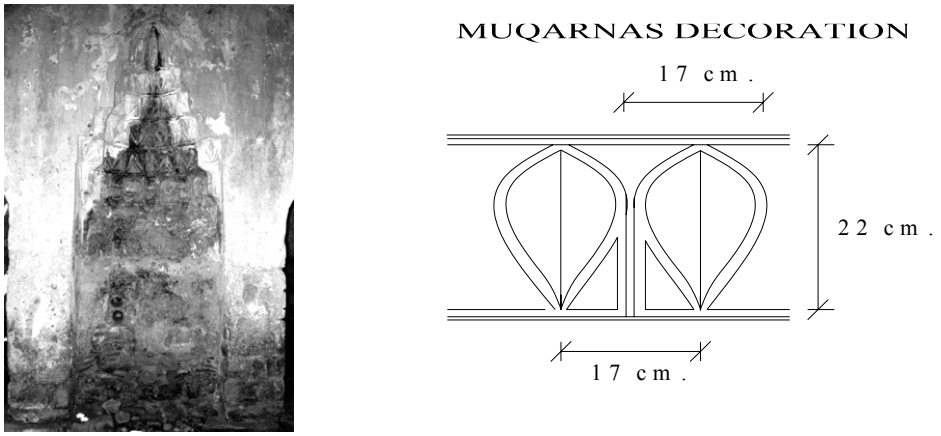


Figure 4.10. Urla Kamanlı Hamamı, The Fountain Niche in the Main *Sıcaklık* Space

Figure 4.11. Düzce (Hereke) Hamamı, The Blind Niches in the Main *Sıcaklık* Space

Bricks were used with their geometric opportunity as decoration on the facades, on the upper level of the walls and drums with saw-tooth arrangements. These arrangements can be seen in Seferihisar Büyük Hamam and Urla Kamanlı Hamamı.

There are terracotta pipes belonging to the water system horizontally along the walls of *sıcaklık* spaces. Terracotta pipes are 37.5 cm. in length cylindrical pipes that were connected to each other with 10.5 cm. in diameter on one side and 12.5 cm. in diameter on the other side, and 1.5 cm. in thickness. These pipes that provide water from the water reservoir to the bathing spaces were arranged as one or two (one on the top of the other) rows according to the dimension of the building and needs. Their surfaces were plastered with horasan. In Seferihisar Büyük and Küçük Hamams, Sığacık Kaleiçi Hamamı and Özbek Hamamı, the pipes were arranged as one row whereas in the other baths as two rows. Tap panels were placed in the wall bonding system in which pipes reach the basin point out the outlets of faucets.

Flues (*tüteklik*) which let the smoke come out from *cehennemlik* (hypocaust) space were vertically placed in the walls of *ılıklık* and *sıcaklık* spaces. They were formed by placing cylindrical terracotta pipes which are 14 cm. in diameter, 1.5 cm. in thickness, and 36 cm. in length one on the top of the other. The chimneys over the walls were raised with brick material of 16 x 21 x 6-7 cm. dimensions (Figure 4.12).

Figure 4.12. Seferihisar Büyük Hamam, The Flue Chimneys

The surfaces of the walls in the *soyunmalık* spaces are covered with lime plaster while in the *ılıklık* and *sıcaklık* spaces they are covered with horasan plaster. Horasan

plaster was applied as a double layer which has a 3-4 cm. thickness to approximately 100-120 cm. high from the floor and 2-3 cm. thickness in the upper parts.

4.1.2. Arches

Generally, in the studied baths, the arches are structural elements which were used on the squinches, in the openings of side units in the *ılıklık* and *sıcaklık* spaces, in the niches on the walls as well as in the window and door openings. According to the spaces and their openings where they were used, they were in different dimensions, shapes and materials. At the same time, arch was used as blind arch on the surface of the walls of interior spaces and in the entrance and window openings and it was used as a relieving arch in brick bonding technique in some facades. The depth of arches was usually determined as 60-75 cm. in the side sections of *ılıklık* and *sıcaklık* spaces, the door and window openings. In brick or cut stone / brick bonding technique, the arch was bonded with lime mortar as binding material. Arches were generally constructed with thin joints 1-1.5 cm. thick in the intrados and large joints 3-4 cm. thick in the extrados. However, on the opening of the southeast wall of Rüstem Paşa Hamamı, alternating bonding technique with one row of cut stone and two rows of bricks was applied. At the springing levels of arches, mostly large rubble or cut impost stones were placed inside the wall bond. When impost was a cut stone, it was in various profiles. When the side unit openings were wide, the arch opening was narrowed by forming projections in wall bonding technique. In this situation which was illustrated in Düzce Hamamı, the projected part was built with alternating bonding technique using with one row of rubble stone and two rows of brick horizontally.

The Forms of the Arches

In the studied baths, the arches were used in the forms of depressed pointed arch, semi-circular arch, and Bursa (semi-circular panelled arch) arch. A few of these forms of arch, which are Bursa arch, semi-circular arch, and depressed pointed arch, applied in the same building can be evaluated as continuance of an application, coming from Principalities period (Aktuğ Kolay 1999). The arch, whose application was seen in all baths, and was used the most common of all, was depressed pointed arch. Semi-circular

arch form, seen in the Roman and Byzantine architecture, can be observed in the arches of side unit openings of *ılıklık* and in the blind niches on the north and south walls of Düzce Hamamı, the side unit opening arches of the men's section and the door openings of the women's sections in Urla Çifte Hamamı, and in the profiles of barrel vaults. Bursa arch is determined in the arch opening of southeast side unit of the women's section in Urla Çifte Hamam and in the blind niches which were on the walls of the west side unit of *ılıklık* in Seferihisar Büyük Hamam. On facades, brick bond arches, originally date back to Byzantine Architecture, were decorated by encircling a row of brick bond with thin joints. Over the arches of the entrance door and window openings of Düzce Hamamı, and in furnace opening of Sığacık Kaleiçi Hamamı, a row of encircling brick bond can be seen. Four rows of brick bond were arranged on the arches of window and door openings on the east facade of Seferihisar Büyük Hamam. The decorations, on the arches of interior space, are determined as profiled impost stones at the springing levels of the arches, as border, formed using plaster in the depth of the arch below the level of springing levels of arch and as muqarnas, built with brick materials. In the *ılıklık* space of Düzce Hamamı, console impost stones which are concave on the lower and convex on the upper at the spring level of the arches were arranged. In Kamanlı Hamamı, one row of muqarnas decoration, which was shallow in depth, and made of plaster along the depth of the arch below the springing level was arranged. Three lobs which were built with bricks and between them muqarnas decorations which were at the springing levels of Bursa arch in the *ılıklık* space of women's section in Urla Çifte Hamam and decorative borders at the springing levels of both side units of *ılıklık* space of men's section in Urla Çifte Hamam are the other decorations. On the other hand, in Rüstem Paşa Hamamı, the arch which has alternating bond with cut stone / brick can also be evaluated as decoration (Figure 4.13).

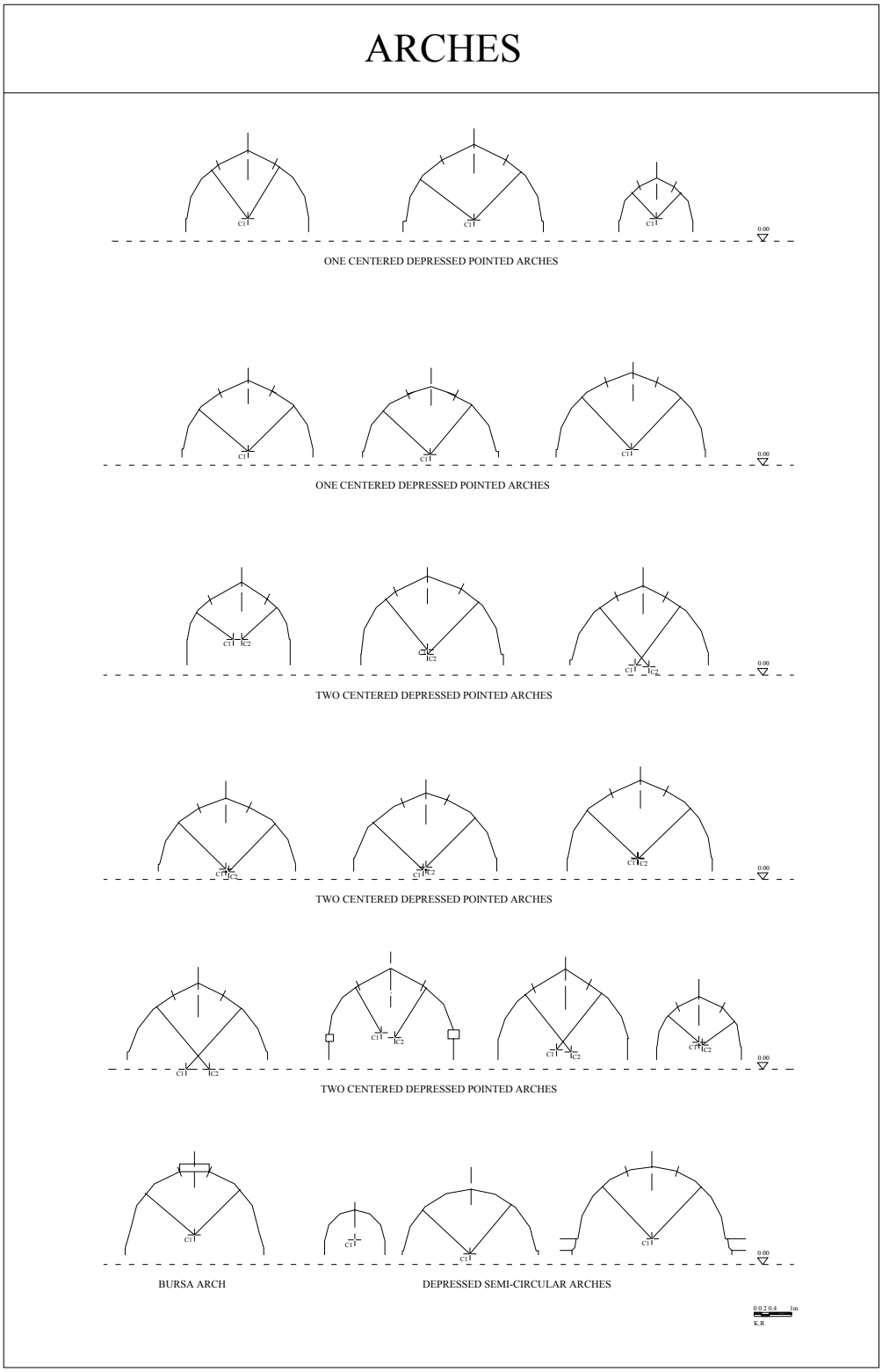


Figure 4.13. The Forms of the Arches in Baths.

4.1.3. Transition Elements

Transition elements are the structural elements that provide transition between the dome which sits on the circular base and the walls which form vertical supporting system in the square spaces. The loads that come from the dome are transmitted to the walls and then to the base through the help of these elements. In the examined baths, transition elements from square plan to the springing level of the domes are determined as; squinches, pendentives, plane triangles and belts of Turkish triangles. These elements were built of bricks and lime mortar as binding material with horizontal wide joints and vertical thin joints. Transition elements in the *soyunmalık* spaces are squinches, in the *ılıklık* and *sıcaklık* spaces are generally pendentives.

Timber beams approximately 15x15 cm. square sizes were horizontally placed in the wall bonding on the starting level of the transition elements and drums.

4.1.3.1. Squinch

On the upper part of the wall corners of the square planned domed space, the squinches in the form of vaults form a suitable octagonal base for the dome were built with bricks. On the surface of the squinches, brick was bonded with lime mortar as a binding material in regular courses with horizontal wide joints which are 3-4 cm. in thickness. The surfaces are plastered. The size of the bricks are 21x32x3-4 cm., 10.5x32x3-4 cm. and 16x21x3-4 cm. The squinch arches in the *soyunmalık* spaces are approximately 55cm. in width and were built with one and a half bricks.

In Seferihisar Büyük Hamam, in *soyunmalık* space and west unit of the *ılıklık*, in Düzce Hamamı in *soyunmalık* space, and in Kamanlı Hamamı in the northwest *halvet* transition to the dome was provided with squinches. Since the impost stone of squinch arches in the northeast *halvet* of Kamanlı Hamamı and the *ılıklık* space of Seferihisar Büyük Hamam were completely buried in the wall bond, the springing level of arch comes out from the inside of the wall bond. The squinches on the west unit of the *ılıklık* in Seferihisar Büyük Hamam started as plane triangle from the corners and revolving as they went up. The squinch arches were connected to the Bursa arched blind niches that were arranged on the surfaces of the walls. In the *soyunmalık* space of the same bath and the northeast *halvet* in Kamanlı Hamamı there are lobed squinches. The lobs of the

squinches were arranged into the depressed pointed squinch arch and built on the impost stone which is cut stone or marble and projected as a 10 cm. console. They made a 45^{o} angle with the wall and they were built with bricks in 3-4 cm. horizontal joints. Wide joints of brick bond followed the corner line of the wall along the bond and ended up on the top of the squinch arch. Behind the brick bond squinch, rubble stone, brick and lime mortar as binding material continued along wall bonding technique. The underneath part of the lobed squinch in Kamanlı Hamamı has a course of muqarnas decoration low in depth made with thin plaster. The lobs are radial patterns that begin from the top of muqarnas units to the top of the squinch arch. On the side parts of the top of squinch arches, small pendentives which were decorated with muqarnas units were arranged and constructed with brick. The end of the pendentives was decorated with floral motifs made of plaster. On the surfaces between pendentives there is a course of muqarnas low in depth made with thin plaster. In the *soyunmalık* space of Düzce Hamamı, the transition to the dome was provided by squinches with a plane triangle. Inside of the squinches in the form of depressed pointed arched niches extended down like exedra, plane triangle parts were constructed. The squinches as depressed pointed arched niches were connected to the depressed pointed arched niches bonded with brick 20 cm. in depth built on the sides of the square planned space (Figure 4.14).

Figure 4.14. Düzce (Hereke) Hamamı, The Squinch of *Soyunmalık* Space

4.1.3.2. Pendentives

In domed spaces, pendentives as transition elements to spherical upside down triangles were built with bricks by forming 2-4 cm. joints and the surfaces were plastered. On concave surfaces, bricks were bonded with mortar as horizontal courses. The thickness of bricks is generally 3-4 cm. whereas it is 6-7 cm. in the pendentives of Sığacık Kaleiçi Hamamı. In most examples, pendentives are encircled with a row of bricks 3-4 cm. on the edge with thin joints. These courses of bricks which come out from each corner with 5 cm. projection are connected by joints and along the walls they form blind niches. These blind niches are semi-circle arches in the *halvets* of Ulamış Hamamı and Seferihisar Küçük Hamam. However, they are depressed pointed arches in the *halvets* of Seferihisar Büyük Hamam, in the *ılıklık* space and *halvets* of Sığacık Kaleiçi Hamamı, in the *ılıklık* space of Urla Çifte Hamam, in the *ılıklık* space and south *halvet* of Kamanlı Hamamı and in the *ılıklık* space and *halvets* of Özbek Hamamı. On the upper part of south and north walls of the main *sıcaklık* space in Düzce Hamamı, each semi-circular arched niche that was built between the pendentives were arranged with about 21 cm. in depth.

The pendentives have four different forms according to their decoration. These are; undecorated, encircled with decorative border 5 cm. in width made from horasan plaster, encircled with decorative border and the end of the pendentive has floral pattern and the surfaces are formed with muqarnas units made of brick (Figure 4.15).

Undecorated: The pendentives are undecorated in the *halvets* of Ulamış Hamamı, the main *sıcaklık* space, southwest and east *halvets* of Düzce Hamamı, *sıcaklık* and *ılıklık* spaces of Seferihisar Büyük Hamam, *halvets* of Seferihisar Küçük Hamam, *sıcaklık* spaces of Sığacık Kaleiçi Hamamı, *ılıklık* and northeast *halvet* of the men's section in Urla Çifte Hamam, and *ılıklık* and *halvets* of Özbek Hamamı.

Encircled by border: The pendentives are encircled by 5 cm. with decorative border made from plaster in *sıcaklık* spaces of women's section in Urla Çifte Hamam, *ılıklık* and southwest *halvet* of Kamanlı Hamamı and in existing space of Rüstem Paşa Hamamı.

Pendentives encircled by border and have floral pattern at the end: The pendentives are encircled by border and have floral pattern at the end in the main *sıcaklık* space of Ulamış Hamamı, and the main *sıcaklık* space of men's section and southwest *halvets* of Urla Çifte Hamam.

The surfaces of pendentives are formed with brick and have muqarnas units: In the main *sıcaklık* space of Kamanlı Hamamı the surfaces of pendentives are decorated with muqarnas units formed with brick.

Figure 4.15. Urla Çifte Hamam, Pendentive in the Main *Sıcaklık* Space of the Men' s Section

4.1.3.3. Plane Triangle

When transition from square planed substructure to the springing line of the dome is provided by plane triangles formed by one or two units arranged on the corners, forming 3-4 cm. joints on horizontal brick bond courses and the surfaces were plastered. Brick bond starts from the corner of the wall and goes up to the top of the triangle forming straight courses on the surface with rubble stone, bricks and lime mortar as a binding material.

When a single triangle is used, it is transformed from the square plan low drum which has an octagonal plan. Then from the octagonal plan to the circular springing

level of the dome it is transformed by rounding of the corners. When two triangles are used, it is transformed into the octagonal plan arranged with two brick courses where dome is placed without a drum (Figure 4.16).

There is a single triangle unit which starts from the wall corner of the main *sıcaklık* space of Seferihisar Küçük Hamam and enlarges as it goes up. But on the corners of southeast *halvet* of Düzce Hamamı two triangle units were used. Plane triangle unit was also used inside of the squinches on the corners of the *soyunmalık* in Düzce Hamamı.

Figure 4.16. Düzce (Hereke) Hamamı, Plane Triangle in the Southeast *Halvet*

4.1.3.4. Belt of Turkish Triangles

Among the examined baths belts of Turkish triangles as transition element were determined only in the northwest *ılıklık* unit of women's section in Urla Çifte Hamam and southwest *halvet* of Kamanlı Hamamı (Figure 4.16). The corners of the base and the top of the prismatic triangle units are connected to each other by turns in the form of lozenge shape. The Turkish triangles were built with bricks forming large joints. After the corners of the bricks that form the bond lines were cut and roughly shaped, they were covered with plaster. The lower part of the Turkish triangles in Kamanlı Hamamı is limited with moulding made from two horizontal rows of brick bond.

Figure 4.17. Urla Kamanlı Hamamı, Belt of Turkish Triangles in the Northwest *Halvet*

4.1.3.5. Drum

When the transition element to the dome is pendentive or plane triangle, there is a drum built with brick bond between the springing level of the dome and transition elements and dome starts from the top of it. At the interior, the drum was built of bricks with 3-4 cm. joints and the surface was plastered. It was formed as octagonal frame between the walls and the dome on the exterior, raises and supports the dome from the exterior. Generally it has the same construction technique and material of wall bonding technique and it is without plaster. There are mouldings, which determine the top level of drum, between drum and the springing level of dome, constructed with two or three courses of brick bond.

In the main *sıcaklık* spaces in Ulamış, Düzce, Seferihisar Büyük and Küçük, Sığacık Kaleiçi, Urla Çifte, Kamanlı and Rüstem Paşa Hamams, the drum is both on the interior and exterior, in the *soyunmalık* spaces of Düzce and Seferihisar Büyük Hamam, and in the *halvets* of Seferihisar Küçük Hamam, it is only on the exterior; in the *ılıklık* and *halvets* of men's section in Urla Çifte Hamam, it is only on the interior.

In Seferihisar Büyük Hamam and Düzce Hamamı, at the corners of the drums and on both sides of window openings on the drum arranged in the *soyunmalık* of Düzce Hamamı, a line of vertical cut stone was used. The drums in the main *sıcaklık* space of Ulamış, Urla Çifte and Rüstem Paşa Hamamı are two rows, whereas in the other baths they are only one row. In Ulamış Hamamı, the geometric decoration of below part and the muqarnas decoration of upper part which has low depth are made of plaster. In this

example, the corners of drums are accentuated by rich muqarnas decoration made of brick. In Düzce Hamamı, the rich muqarnas decorations at the corners made of brick and between them a row of muqarnas which has low depth, made of plaster were arranged. In the south-west *halvets* of the men's section in Urla Çifte Hamam, on the corners there are muqarnas decorations which were made of brick and geometric and floral decorations made of plaster were arranged on the surfaces between the muqarnas. The surfaces of the drum in the main *sıcaklık* space were decorated with geometrical and floral motifs, as same as the surfaces between the muqarnas of the *halvets*. In present space of Rüstem Paşa Hamamı the corners of the drum are highlighted by decorations composed of three muqarnas units.

4.1.4. Superstructure

In the examined baths, the spaces are mostly covered with domes and vaults as superstructure that was generally built with bricks and lime mortar. However, *soyunmalık* space of some examples has timber roof.

4.1.4.1. Timber Roof

In Sığacık Kaleiçi Hamamı and Özbek Hamamı, the timber roof of *soyunmalık* spaces was constructed by placing the timber beams over the rubble stone masonry walls. Considering the presence of gable wall in Seferihisar Küçük Hamam, the size and the remains of the walls in *soyunmalık* spaces of Çifte Hamam and Kamanlı Hamamı, it can be alleged that these examples were covered with timber roof, too.

4.1.4.2. Vaults

Vaults, which are mostly the superstructure of small rectangular spaces, were built with bricks or brick-rough cut stone and lime mortar as binding material. The vaults are in two different types; barrel vault and panelled vault. Side units of *ılıklık* and main *sıcaklık* spaces were covered with barrel or panelled vault, whereas water reservoirs were covered with barrel vault. Interior and exterior surfaces of vaults were covered with horasan plaster.

Barrel vault: Depressed pointed or semi-circular vaults were built by placing the long side of brick or brick and rough cut stone vertically to the short side of the space (Figure 4.18). The thickness of the vaults differs between 35 and 45 cm. Only the vaults of *sıcaklık* and *ılıklık* spaces in Urla Çifte Hamam were built with brick, rough cut stone and lime mortar as binding material. The thickness of the vaults was formed by brick and small rubble stones with lime mortar in random over brick and rough cut stone bond. In all baths, the water reservoir and side units that belong to the *ılıklık* and main *sıcaklık* spaces except Seferihisar Büyük Hamam were covered with barrel vault. The barrel vaults generally are semi-circular but in the *ılıklık* and the main *sıcaklık* space of the *sıcaklık* of the women's section in Urla Çifte Hamamı they are depressed pointed. The vaults in the women's section of Urla Çifte Hamamı and side units of *ılıklık* and main *sıcaklık* spaces in Seferihisar Küçük Hamam are vertical to the long side of the spaces. In the other examples they are vertical to the short side. Along the central axes of barrel vaults that belong to the *sıcaklık* and *ılıklık* spaces, oculi, which were made of terracotta pipes (mebah or pöhrenk), were arranged among brick bonding technique for the purpose of lighting. On the central axis there are generally three oculi (light holes). There are only two oculi in the southeast vault of main *sıcaklık* space of men's section in Urla Çifte Hamam and in the vault of west side unit of *ılıklık* in Özbek Hamamı. The oculi in the *ılıklık* space's vaults in Özbek Hamamı are circular shaped. However, in the other baths they are hexagon shaped. In the vaults of the side units of *ılıklık* and *sıcaklık* spaces of women's sections in Urla Çifte Hamam, in the vaults of side units of main *sıcaklık* space in Seferihisar Küçük Hamam and in the vaults of all water reservoirs there are no oculi. But in the middle of the vaults in the water reservoirs of Urla Çifte Hamam and Özbek Hamamı, there is a 50 x 50 cm. dimensions square-planned opening used for lighting and the sides of it are bonded with brick. In Özbek Hamamı, the plastered vaults were covered with traditional tiles and lifting up terracotta pipes formed light chimneys (Önge 1995).

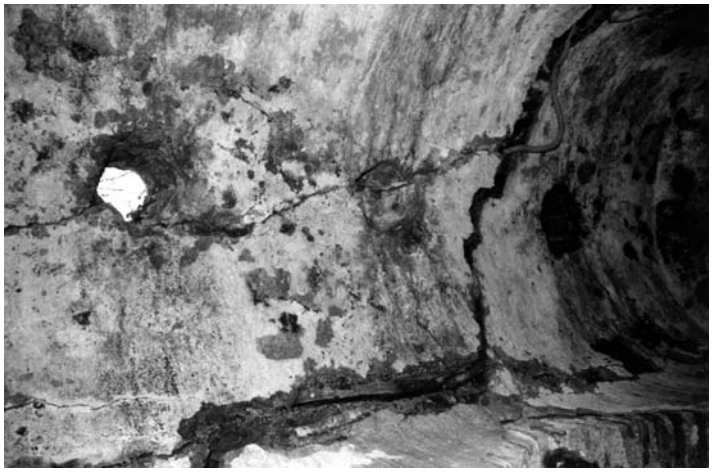


Figure 4.18. Ulamış Hamamı, Barrel Vault of the *Sıcaklık* Main Space

Panelled vault: In the panelled vaults, which were formed as a rectangular part in the middle as a result of the intersection of two barrel vaults, brick and mortar were used. Paneled vault are the superstructure only in the side units of main *sıcaklık* space and the east side unit of *ılıklık* space of Seferihisar Büyük Hamam (Figure 4. 19). In the middle axis of panelled sections there are two oculi in star shaped on the curved surfaces around the rectangle there is one row of oculi which are in hexagon shaped and they were arranged with terracotta pipes placed among brick bond. The thickness of the vaults is 35-40 cm. and the interior and exterior surfaces were covered with horasan plaster.

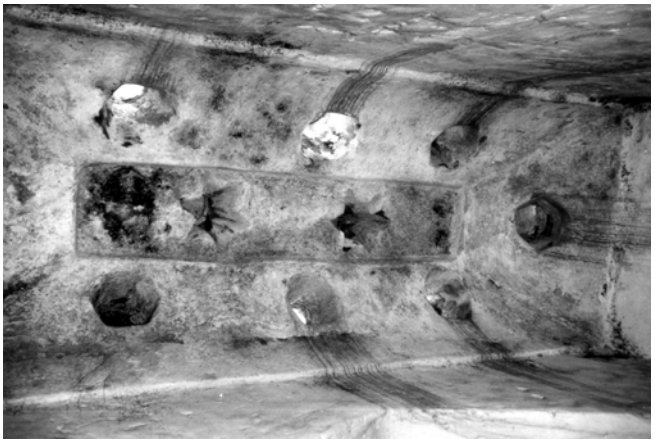


Figure 4.19. Seferihisar Büyük Hamam, Panelled Vault of the *Sıcaklık* Main Space

4.1.4.3. Dome

Dome, which is superstructure of *soyunmalık*, the middle units of *ılıklık* and main *sıcaklık* spaces, and *halvets*, was constructed with bricks and mortar as binding material. Thickness of the domes is one or one and a half brick, in other words it is 35-45 cm. The bonding system of the domes was formed by placing the units of brick radially against the centre. The dome, in the *sıcaklık* space of women's section in Urla Çifte Hamamı, rises as octagonal pyramid at the interior and close to the top it turns into a circular shape. On the level of transformation, an octagonal border was built with a course of brick (Figure 4.20). In the examples at the interior, the domes sit on the base that was formed by transition elements. However, at the exterior the domes sit either on an octagonal drum or start from the inside of the drum. Brick bonding starts with thickness of 1.5 cm. joints and as it goes up to the top it thickens, so it exceeds the thickness of a brick which is 3-5 cm. Therefore bricks in the mortar werew made to work as aggregate (Baronio 1997). Both the interior and exterior parts of all domes are covered with horasan plaster, but in Özbek Hamamı the plaster is covered by traditional tiles. On the other hand, the domes of Seferihisar Büyük Hamam were later covered with cement plaster on the top of horasan plaster.

On the top of the dome, at the keystone opening either an oculus in the shape of hexagon by placing terracotta pipes or lighting cupola in the depressed hemispherical shape were arranged. On the cupola there are also oculi. The oculi arranged among brick bond of domes ease the load of the dome and lighten the spaces. The opening that narrows towards the exterior of terracotta pipes are in the shape of hexagon, circular, star or rectangle and the interior part is between 25-40 cm. and the exterior is between 19-25 cm.

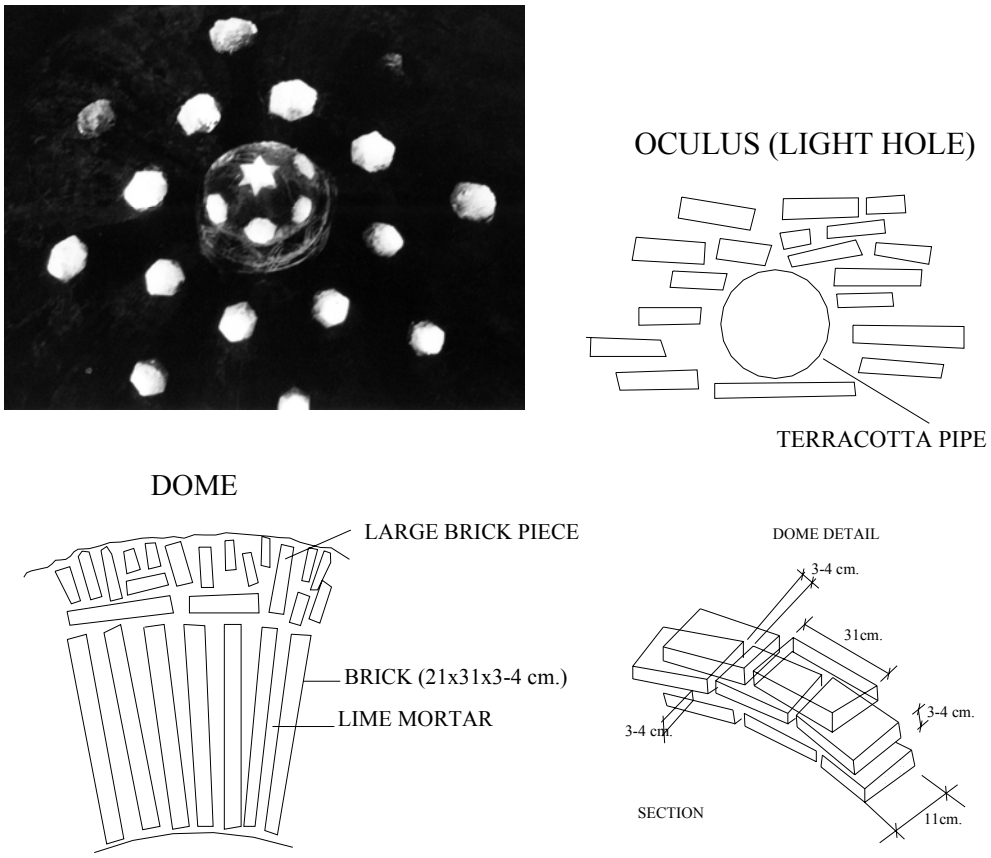


Figure 4.20. Ulamış Hamamı, The Dome in the Main *Sıcaklık* Space

The oculi belonging to the lighting system are generally in circular two lines, hexagon shaped and towards the top decrease in number. Only in the dome of the southeast *halvet* of Düzce Hamamı the first line has four oculi, the second one has five oculi which is circular shaped. In the dome of the west *halvet* of Seferihisar Küçük Hamam and the northwest unit of *ılıklık* of the women's section in Urla Çifte Hamamı, the oculi are only in one line and circular whereas on the dome of *ılıklık* in Düzce Hamamı, the men's section of Urla Çifte Hamam and the northwest *halvet* of Kamanlı Hamamı they are in three lines and hexagon shaped. On the middle space of the *ılıklık* of women's section and *sıcaklık* spaces in Urla Çifte Hamam, oculi are in three lines and circular shaped. In the dome of the main *sıcaklık* spacein Kamanlı Hamamı, they are in three lines but in each line star and hexagon shapes are lined up in order with repetition. On the dome of Rüstem Paşa Hamamı, they are in circular six lines and hexagon shaped. Furthermore, oculus in the middle of the dome in the west unit of *ılıklık* in Seferihisar Büyük Hamam and the dome of the main *sıcaklık* space are star

shaped. However, oculi only in the middle of the dome in the northwest unit of *ılıklık* space of women's section in Urla Çifte Hamamı is rectangular, on the domes of the *halvets* of Sığacık Kaleiçi Hamamı and on the domes of Özbek Hamamı they are circular shaped.

Generally, in the dome of the main *sıcaklık* spaces, the cupola, having oculi, is made of brick. The lighting cupolas were built in Ulamış, Urla Çifte, and Kamanlı Hamamı only in the main *sıcaklık* spaces, in Düzce Hamamı in the main *sıcaklık* space and southeast *halvet*, in Seferihisar Büyük Hamam in the *soyunmalık*, main *sıcaklık* space and east *halvet* and in all of the *sıcaklık* spaces of Seferihisar Küçük Hamam. The lighting hemispherical cupolas in Seferihisar Büyük Hamam are approximately 60 cm. in width and 50 cm. in height. In the present unit of Rüstem Paşa Hamamı, Sığacık Kaleiçi Hamamı, and Özbek Hamamı, there is no lighting cupola.

4.1.5. Floors

The floor system of *ılıklık* and *sıcaklık* spaces including *cehennemlik* space were built by masonry walls made of bricks or cut stone, which are 90-120 cm. in height and covered with cut stone. Above the openings between the walls that form the *cehennemlik* space, in some examples timber lintels, in other examples plain, slightly curved or arched stone lintel were determined. The size of cut stone varies in the spaces. Generally, they are 55-60x70x7-8 cm. of dimensions. The floor system of *ılıklık* and *sıcaklık* spaces in all hamam buildings except the *ılıklık* spaces of Urla Çifte Hamam and Kamanlı Hamamı are in this order. In all *soyunmalık* spaces and in *ılıklık* of Urla Çifte Hamam and Kamanlı Hamamı where there is no *cehennemlik* space, the floors are covered with cut stone on the ground was formed by stones. Today the floors of most of hamams are filled with debris and floor covering partly collapsed.

Waste water channels belonging to waste water installation system were arranged on the floors of the spaces which have *cehennemlik* beneath. The channels that were formed by placing cut stone covering which were on the masonry walls next to the walls and stone seats in steps are 10-12 cm. in width, 7-8 cm. in depth. Waste water coming from *halvets* goes along the stone seats and it turns into one channel in the *ılıklık* and eventually it ends up either in the toilet of *ılıklık* or it is discharged from a corner of the *ılıklık* space (Figure 4.21).

Figure 4.21. Seferihisar Küçük Hamam, Waste Water Channel in the *Ilıklık* Space

Basins that were placed on the floor of *sıcaklık* spaces were made of stone. For basins in women's section of Urla Çifte Hamam and some basins in Seferihisar Küçük Hamam reused materials were used. The basins are in the shape of circle, semi-circle, semi-octagon or semi-decagon. In the west *halvet* of Seferihisar Küçük Hamam and the women's section of Urla Çifte Hamamı, the marble basins have geometric or muqarnas decoration. The stone seats next to the basins were arranged as raised with bricks around 20 cm. from the floor level and covered by cut stone. In Seferihisar Küçük Hamam, the upper sides of stone seat in front of the east wall of the west *halvet*, have muqarnas decorations.

4.2. Installation System

In the studied baths, the installation system can be divided into two groups as water and heating system. The water system is a system which provides to bring clean water from a water source to the water reservoir to distribute water to various spaces from the reservoir and which arranges the disposal of waste water outside from these spaces. Heating system is a system which provides to heat *ılıklık* and *sıcaklık* spaces with *cehennemlik* arranged under the floors of *ılıklık* and *sıcaklık* spaces and reservoir.

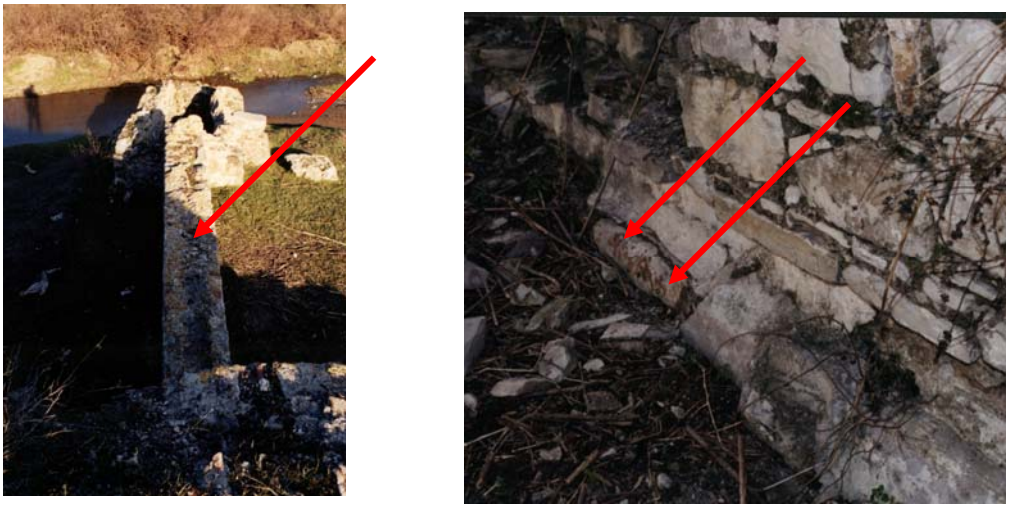
4.2.1. Water Installation System

In the studied baths, the water installation system can be divided into three sections which are supply of water from a water source to reservoir, distribution of water to various spaces from the reservoir and carrying waste water outside. Supply of water, brought into the reservoir and distribution of water to various spaces of the bath constitute the clean water system while discharge of waste water constitutes the waste water system. Water reservoir, pipes, basins, waste water channels and toilet are the essential elements which compose the water system.

Clean Water System

In the studied baths, the needed clean water is supplied from natural water sources like steam, brook, river or well and cistern (Figure 4.22). In the water system of Turkish baths, it is known that the clean water brought to the bath spaces passing through a distribution section which was a stone trough called "*maslak*" or "*maksem*". "*Maslak*" was usually in the form of a perforated stone coffer which was placed in a niche in the height of a person in the wall of the reservoir. The water which was supplied to the "*maslak*" has been transmitted to the reservoir through one of the holes at the bottom of the "*maslak*" and through another hole to the fountain in the *soyunmalık* space and *ılıklık* space (Önge 1981, Çakmak 2002). However, this type of arrangement has not been determined in the studied baths. If the reservoir was arranged as two sections for cold and hot water; the cold water was collected in the reservoir, then it was distributed by terracotta pipes to the appropriate spaces. On the other hand,

when the reservoir was arranged as one section the distribution of cold water was provided directly by terracotta pipes to the spaces. The clean water system which was arranged for hot and cold water exhibits differences. When terracotta pipes which have been placed along the walls are in one line, only hot water system, if these are two rows, a cold and hot water system was arranged. In Urla Çifte Hamam, Kamanlı Hamamı, Düzce Hamamı and Ulamış Hamamı, terracotta pipes are placed in two rows for cold and hot water, while in Seferihisar Büyük and Küçük Hamam, Sığacık Kaleiçi Hamamı and Özbek Hamamı, pipes are placed in one row for only hot water. In Rüstem Pasha Hamamı, original water system has not been determined due to the floor level filled with earth and it has not been determined in Urla Yeni Hamam because it was renewed.



A B.

Figure 4.22.A. Düzce Hamamı, The Cistern
B. Urla Kamanlı Hamamı, The Water Pipes

Cold Water System

This system was analyzed under two headings as distribution of cold water to the bathing spaces collecting in a separate section of the reservoir or distribution of it by terracotta pipes placed along the walls without collecting in the reservoir.

Distribution of cold water gathering in the separate section in the reservoir: After collection of clean water which is brought to the bath, in the separate section arranged for cold water in the reservoir, sufficient quantity is transmitted to the hot water section,

and a quantity is distributed to the bathing spaces by terracotta pipes. This arrangement was illustrated in Urla Çifte Hamamı (Figure 4.23).

A B

Figure 4.23. A.Urla Çifte Hamamı, The Water Reservoir, Having Two Separated Section
B. Ulamış Hamamı, The Water Reservoir, Having One Section

Distribution of cold water which is carried from the well or cistern at the outside, directly to the bathing spaces without gathering in the reservoir: Clean water was brought to reservoir from the cistern or well either by stone channels or terracotta pipes at the upper level of the reservoir. In this arrangement, cold water supplies of both reservoir and is directly transmitted to the taps running in the basins at the bathing spaces and to the fountain in the *soyunmalık* space. Ulamış Hamamı, Düzce Hamamı, Kamanlı Hamamı illustrate this arrangement. The traces of terracotta pipes in the southwest corner of the *soyunmalık* space in Düzce Hamamı, and in the east part of the floor level in Kamanlı Hamamı point out the fountain which supplied water. In the east wall of the *ılıklık* space in Kamanlı Hamamı, there is an opening in a rectangular profile which is in the dimensions of 20 cm. in width and 60 cm. in height and the traces of terracotta pipes are seen inside (Figure 4.24). It may be thought that this opening was arranged for a distribution element which was in the form of perforated stone trough that is generally arranged on the wall of the reservoir.

A.

B.

Figure 4.24. A.Urla Kamanlı Hamamı, Rectangular Opening on the East Wall of the *Ilıklık*
B. Düzce Hamamı, Trace of Terracotta Pipes Pointed out the Fountain in the *Soyunmalık*

Hot Water System

Distribution of hot water is done directly from the hot water section of the reservoir. It is sent to the taps running in the basins through terracotta pipes in the walls (Figure 4.25). When terracotta pipes are placed in one line, the clean water is distributed as hot water.

Hot water section of the reservoir is right above the *külhan* (furnace) which is located below the regular floor level. The fire in the *külhan*, which is the heat generating space, heats the water with a concave copper boiler.

A.

B.

Figure 4.25.A. Urla Özbek Hamamı, The Copper Boiler in the Water Reservoir
B. Urla Çifte Hamamı, The Marble Basin in the Women's Section

Waste Water System

The waste water system, providing the disposal of waste water outside from the spaces in baths, consists of toilet in *ılıklık* space which was illustrated in Seferihisar Büyük Hamam and the open channels, arranged in the floor system of the *sıcaklık* and *ılıklık* spaces. The disposal of waste water from the *halvets* of the *sıcaklık* space is provided by inclined floors towards their entrances, from the main space of the *sıcaklık* space and *ılıklık* space is provided by open waste water channels arranged on their floors. Open waste water channels are arranged along the walls and the bottom sides of stone seats by placing cut stone floor coverings above masonry walls which constitute *cehennemlik* (hypocaust) to form a stepped channel. Waste water channels are approximately 10-12 cm. in width, 7-8 cm. in depth. Waste water coming from *halvets*, pass into the open channels arranged along the bottom sides of the stone seats in the main *sıcaklık* space. They become a single channel in the entrance of the *ılıklık* space and then either in the toilet in the *ılıklık* space or from the corner of the one wall outside (Figure 4.26). In Ulamış Hamamı, Seferihisar Küçük Hamam, Sığacık Kaleiçi Hamamı and Özbek Hamamı, waste water coming from *halvets* was separately transmitted to the channels lying along the bottom sides of the stone seats in the main *sıcaklık* space and sent outside from the corner of one wall. In Düzce Hamamı, waste water coming from the southern *halvets* was transmitted to the channels in the main *sıcaklık* space and disposal from the northeast corner of the third *halvet* outside. In Seferihisar Büyük

Hamam, waste water coming from *halvets* transmitted to the channels arranged along the bottom sides of the stone seats and then it was conducted to the single channel in the *ılıklık* space and in the end the toilet of *ılıklık* space. On the other hand in Çifte Hamam and Kamanlı Hamamı, waste water coming from *halvets*, running through the channels, was channeled through the channels in the main *sıcaklık* space and was finally carried from the corner of the *ılıklık* space to outside (Figure 4.27).

A. B.

Figure 4.26. A.Urla Özbek Hamamı, The Waste Water Channels in the *Ilıklık*
B. Seferihisar Büyük Hamam, The Waste Water Channel in the *Ilıklık*

A B

Figure 4.27.A Seferihisar Küçük Hamam, The Waste Water Channel in the *Ilıklık*
B Seferihisar Büyük Hamam, The Toilet in the *Ilıklık*

The Elements Constitute the Water System

The water reservoir, terracotta pipes and basins are the elements of the clean water system, waste water channels and toilet outlets are elements of the waste water system. The clean water system is the distribution of the water through terracotta pipes placed in the walls, from the reservoir to the bathing spaces and sending it to the taps running in the basins. The reservoir was located adjacent to the *sıcaklık* space after the sequence of bath spaces which are the *soyunmalık* space, *ılıklık* and *sıcaklık* spaces. It was arranged as two sections for cold and hot water or one section for only hot water. The rectangular planned reservoir is covered with a barrel vault. It is in similar construction technique and material of the walls and superstructure of the bath. The floor and interior walls of the reservoir are covered with horasan plaster up to the level of water and the thickness of it is 3-4 cm (Figure 4.28).

A B

Figure 4.28.A.Düzce Hamamı, Entrance of Clean Water With Channel to the Water Reservoir
B. Urla Özbek Hamamı, The Water Reservoir

Beneath the reservoir, there is a furnace that heats the water and bath. In this part, there is an arched opening in the form of a fireplace which opens outside for lighting the fire. Just over the fireplace, in the middle there is a concave copper element for heating the water in the reservoir by the fire in the furnace. It is known that copper boilers were continuously maintained due to their poor material durability. Copper

boilers have the diameter varying between 90-240 cm. according to the size of the water reservoir. In the studied baths, Özbek Hamamı is the only one in which the entire copper boiler that has survived up to today. Taps running in the basins of the *sıcaklık* spaces were connected to the reservoir by terracotta pipes placed along the walls. When they are left open, heated water had been running in the basins without pressure. Amount of water in the reservoir was regularly controlled via the observation window on the wall between the reservoir and the private rooms and water was added when the necessity arose. An arched opening was arranged on the short side of the reservoir where the water entered.

Terracotta pipes, which were also called "*merbah*" or "*pöhrenk*" (Önge 1995), were made of baked clay and were placed along the walls to provide distribution of cold and hot water from the reservoir to the *sıcaklık* spaces (Figure 4.29). They are in the cylindrical form and one end is larger than the other to be connected to each other. One end is approximately 10.5 cm. the other is 12.5 cm. in diameter, 1.5 cm. in thickness and 37.5 cm. in length. They were embedded with a waterproof mortar called "*lökün*" along the walls (Önge 1995). These pipes in the walls are arranged in one or two lines for cold and hot water according to the necessity or the size of the bath. They were divided into two lines from the wall of the reservoir and placed along the internal surfaces of the walls.

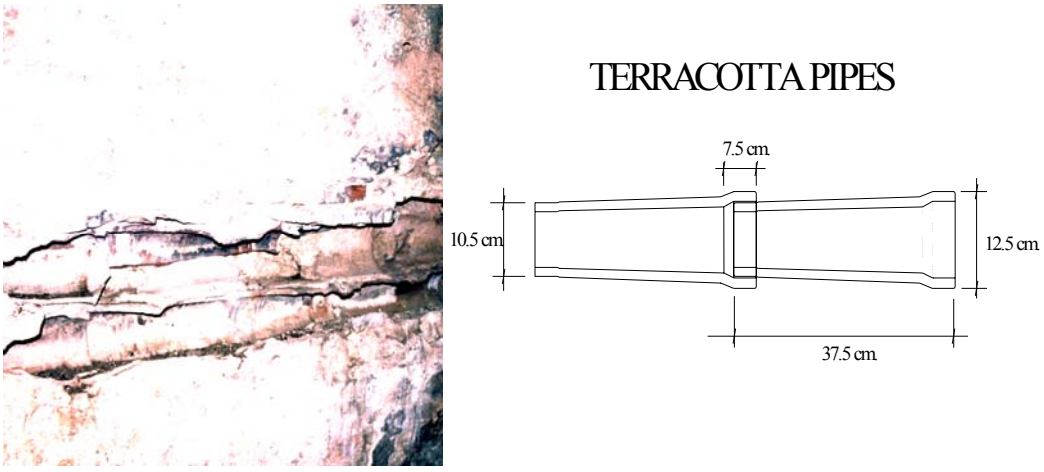


Figure 4.29. Urla Kamanlı Hamamı, Two Row Terracotta Pipes in the Northwest *Halvet*

A B

Figure 4.30.A.Urla Çifte Hamamı, Tap Panel in the Main *Sıcaklık* Space of Men's Section
B. Urla Çifte Hamamı, Marble Basin in the Main *Sıcaklık* Space of Women's Section

Most of the basins belonging to the clean water system, which were placed on the floors of the spaces of hot water, were made of stone. However, in the women's section of Urla Çifte Hamamı and Seferihisar Küçük Hamam, some basins were made of reused material. Basins are in the circular, semicircular, semi octagonal or semi decagonal form(Figure 4.30). In the west *halvet* of Seferihisar Küçük Hamam and in the women's section of Urla Çifte Hamamı, the basins have geometrical or muqarnas decorations. Stone seats on each side of the basins were arranged rising approximately 20 cm. from the floor level using brick material and covered with cut stone. Muqarnas decorations were arranged along the upper side of the stone seat in front of the east wall of the west private room in Seferihisar Küçük Hamam. On the walls above the basins tap panels were placed and outlets for taps were fitted on the panels.

4.2.2. Heating Installation System

The heating system consists of a furnace located underneath the water reservoir, *cehennemlik* arranged underneath floors of *ılıklık* and *sıcaklık* spaces, flue chimneys built with terracotta pipes vertically in the walls (Figure 4.40 and 4.41). *Cehennemlik* was built by covering cut stone on masonry walls which were nearly 90-120 cm. high, formed using brick or cut stone materials adhered with lime mortar. *Cehennemlik* section was arranged underneath the floors of *ılıklık* and *sıcaklık* spaces in all baths however, not under the *ılıklık* space of Urla Çifte Hamam and Kamanlı Hamamı. While the fire, which was set in the furnace section, provided heat for the water in the water reservoir through the help of a water boiler, the smoke circulated through *cehennemlik* space provided heat to the floors. On the other hand, the heating of spaces were supplied by circulating steam of water heated in the water reservoir. This steam passed from the controlling window to the bath spaces. The circulating steam in *cehennemlik* space was sent off outside through flues located in the walls. In addition, the floors were heated by the steam, circulating underneath the floors. In Turkish baths, the furnace furnace openings were generally located in a pointed deep arched niche in front part of furnace and a large furnace chimney, rising from the upper part of that niche, was built so as not to be consumed by fire, blown back when the furnace wing was opened. In the studied baths, a section, perpendicular to the long side of the water reservoir, projecting out in the center, was arranged and brick bond arched furnace opening was placed. That furnace chimney rising on the top of this part has been observed. This order has been understood through the traces in the examples of Özbek Hamamı, Seferihisar Küçük Hamam, and Sığacık Kaleiçi Hamamı. But, since the floor level was filled with debris in most of the studied baths the furnace section could not be observed. Furnace chimneys were built with bricks of 16 x 21 x 6-7 cm. dimensions.

Figure 4.40. A Urla Özbek Hamamı, The Furnace (*Külhan*) Section
B Sığacık Kaleiçi Hamam, The Furnace (*Ocak*)

A B

Figure 4.41. A Urla Özbek Hamamı, The Copper Boiler on the Furnace
B Seferihisar Büyük Hamam, The Flue (*Tüteklik*) Chimneys

CHAPTER 5

CONCLUSION

The baths investigated in Urla and Seferihisar are modest examples that have maintained authentic features of Ottoman bath architecture. In addition to their plain façade characteristics, different layout of the interiors and superstructures, skillful solutions of lighting, water and heating systems of Ottoman baths, they also exhibit the characteristics of the construction techniques and material use identical to the region where they were located.

The baths had no inscription panels to obtain precise information about their construction dates. However, the distinctive plan layouts, such as the extension of square-planned and domed *'ılıklık'* spaces with vaulted units in one direction, and ornamentation features, such as *muqarnas*, lobed decorations made of bricks at the transition zones and niches, geometrical and floral figures made of plaster, and decorations on basins all belonging to Urla Çifte Hamam and Kamanlı Hamamı lead one to think that they were built in the 15th century. On the other hand, the extension of *'ılıklık'* units with two vaulted spaces in two directions, and the arrangement characteristics of the windows in the *'soyunmalık'* spaces in the rest of the baths implied that they were built in the 16th century (Önge 1995).

Among these baths, the ones with relatively larger scales, such as Seferihisar Büyük Hamam and Düzce Hamamı are distinguished from others with their entrance façades rather neatly designed in terms of façade layout as well as material use and workmanship. The *'soyunmalık'* spaces of these baths were also surmounted with domes different from the others. In these baths, accesses were provided through the niches which were accentuated by depressed-pointed arches and the entrance gates placed in those niches crowned with relieving arches made of brick. Other baths were simpler in such aspects.

In all the baths, vertical load bearing walls were constructed of stone. Limestone, easily obtained in this area was the primary type of building stone used in the form of rubble as well as rough-cut stone.

Excluding the vaults and the domes of men's section in Urla Çifte Hamam where rough-cut stone was partially used, in the rest of the baths superstructure

elements, such as vaults and domes; spanning elements, such as the arches of some niches, openings of doors and windows; transition elements, such as pendentives and drums; ornamentation elements, such as *muqarnas* and lobed decorations, and furnace chimneys with flues were all constructed of brick in varying techniques. In addition, at the exterior, the saw tooth arrangements with brick on the upper level of the wall and drums which are illustrated in Seferihisar Büyük Hamam and Kamanlı Hamamı were used. Combined with stone, varying sorts of bonds were obtained by the use of brick. Such alternating bond techniques mostly found in the baths are; rubble stone / large pieces of bricks in the joints, rubble stone / in some places bricks and large pieces of bricks in the joints, and rubble stone, rough-cut stone or reused cut stone. Together with brick, reused cut stone was also used as alternating bonds at the entrance façade of Seferihisar Büyük Hamam, and in the other baths, in the sides of windows and doors as well as the corners of some walls and drums.

Being important installation means, terracotta pipes were widely used in the examined baths. The vertical pipes belonging to heating system served as flues and the horizontal ones for water supply run around the *'sıcaklık'* spaces. Another type of terracotta pipes took place in the vaults and domes which were fixed in the brick bonds that served as *oculi* providing light for those spaces.

Floor system in these baths was slightly different than those built in Roman times. As it is known, in Roman baths the floor was placed on a platform raised on pillars of stone or brick lined up with small intervals. However, in the studied baths, it was recognized that the floors were placed on platforms raised on masonry walls. They were covered with marble plates. In *cehennemlik* section, above the opening of the walls that form the *cehennemlik*, in some examples timber lintels, in other examples flat, slightly curved or arched stone lintel were noticed as original local construction techniques still seen today. Seats and basins, which can be considered as interior furniture, were also made of marble. Some of the basins were of reused material and some others were embellished with geometrical and floral figures in addition to *muqarnas* decorations.

The exterior faces of the walls had no plaster. However, interior faces of *'soyunmalık'* spaces were plastered with lime plaster, while the spaces of *'ılıklık'* and *'sıcaklık'* were plastered with *'horasan'* which provides good insulation against water. *'Horasan'* plaster was also applied on the borders and ornamentations of the transition elements.

The use of brick together with rubble stone as an alternating bond in some of the walls and as large pieces in the joints, and the use of timber beams at certain heights surrounding the baths can be considered as the techniques typical to the region employed before and that continued during the Ottoman Period (Aktuğ Kolay 1999). In addition, the techniques strengthening the corners of the walls, encircling the arches through cross courses of brick composed of one to four rows, and the saw-tooth arrangement of brick bonds at the upper parts of walls and drums could also be considered as the techniques applied before and during the Ottoman Period. On the other hand, the use of two drums on top of each other with equal heights placed around the lower parts of the dome, which was seen only in Ulamış Hamamı, could be considered as a unique technique that appeared in the 14th century Principalities of Anatolia (Aktuğ Kolay 1999). The use of lintels, of timber in some cases, and of slightly curved arch-shaped stone in others was typical to these baths and is still in use today.

It is unfortunate to admit that these baths, being out of use today, are nearly in a state of devastation due to negligence and human vandalism for years. They rapidly loose their stylistic, architectural and technical possessions together with the loss of original materials. In this respect, the study documenting the properties of original materials and construction techniques employed in these baths will be a contribution for suitable interventions to preserve them for future generations.

REFERENCES

Aktuğ İ., "*Batı Anadolu 14. Yüzyıl Beylikler Mimarisinde Yapım Teknikleri*", Unpublished Ph.D. Thesis, İstanbul Technical University, İstanbul, 1989.

Aktuğ İ., "*Batı Anadolu 14. Yüzyıl Beylikler Mimarisinde Yapım Teknikleri*", (AKM, Ankara, 1999).

Akyıldız, B., "*Urla Tarihi Doku Araştırması - Koruma ve Restorasyon Önerileri*", Unpublished Master Thesis, Dokuz Eylül University, İzmir, 1988.

Aru K. A., "*Türk Hamamları Etüdü*", İTÜ Mimarlık Fakültesi- Doçentlik Çalışması, (İstanbul Matbaacılık T.A.O. , İstanbul, 1949).

Asatekin G., "*The Eski Hamam in Ankara*", Unpublished Master Thesis, Middle East Technical University, Ankara, 1978.

Bakırer Ö., "Anadolu Mimarisinde Taş ve Tuğla İşçiliği", *Başlangıcından Günümüze Türk Sanatı*, Ankara, 1993, pp. 255-280.

Bakırer Ö., "Anadolu Selçuklularında Tuğla İşçiliği", *Malazgirt Armağanı*, (Türk Tarih Kurumu Basımevi, Ankara, 1972).

Bakırer Ö., "A Study on the Use of Brickbonds in Anatolian Seljuk Architecture", *METU: Journal of the Faculty of Architecture*, volume **6**, n.2, Ankara, 1980.

Bakırer Ö., "Anadolu Selçuklu Mimarisinde Yapı Malzemeleri", in *IV. Milli Selçuklu Kültür ve Medeniyeti Semineri Bildirileri - 25-26 Nisan 1994*, Selçuk Üniversitesi Selçuk Araştırmaları Merkezi Yayınları **13**, Konya, (1995), pp.165 - 180.

Bakırer Ö., "Selçuklu Öncesi ve Selçuklu Dönemi Anadolu Mimarisinde Tuğla Kullanımı", volume **1-2**, Middle East Technical University, Ankara, 1981.

Bakırer Ö., "Tuğla, Ahşap ve Cam", *Selçuklu Çağında Anadolu Sanatı*, (Yapı Kredi Yayınları, İstanbul, 2002), s. 291 – 308.

Baronio G., Binda L., and Tedeschi C., (1997) "Thick Mortar Joints in Byzantine Buildings: Study of their Composition and Mechanical Behaviour", in the *Proceedings of the International Conference on Studies in Ancient Structures*, Ed. G. Özşen, (July 14-18, 1997, İstanbul, Turkey), pp.235-244.

Batur A., "Osmanlı Camilerinde Almaşık Duvar Üzerine", *Anadolu Sanatı Araştırmaları **2***, İTÜ Mimarlık Fakültesi, İstanbul, 1970, s. 135- 227.

Batur A., "*Osmanlı Camilerinde Kemer 'Strüktür- Biçim İlişkisi Üzerine Bir Deneme (1300- 1730)*", Unpublished Ph.D. Thesis, İstanbul Technical University, İstanbul, 1974.

Baykara T., "*İzmir Şehri ve Tarihi*", Ege Üniversitesi-Arkeoloji Enstitüsü Yayınları n.2, Bornova- İzmir, 1974.

Baykara T., "Türk Devrinde Urla Kazası 1080-1980", *Ege Üniversitesi-Fon Saymanlığı*, volume **30**, Ege Üniversitesi, İzmir, 1991.

Baykara T., "Urla İskelesi' nde Yahşi Bey Camii' nde Bir Kitabe ve Tahlili", *Hacettepe University Journal of the Faculty of Letters* , volume **2**, n.1, Hacettepe Üniversitesi, H. Ü. Edebiyat Fakültesi Dergisi, Ankara, 1984.

Creswell K. A. C., *Early Muslim Architecture*, (Scolar Press, Aldershot, 1989).

Çakmak C., "*Tire Hamamları*", Unpublished Master Thesis, Ege Üniversitesi, İzmir, 1998.

Çakmak C., "*Tire Hamamları*", (Kültür Bakanlığı Yayınları, Ankara, 2002).

Çizer Ö., "*Investigation of Lime Mortar Characteristics for the Conservation of the Ottoman Baths in Seferihisar-Urla Region*",Unpublished Master Thesis, İzmir Institute of Technology, İzmir, 2004.

Eren H. (ed.), "Urla", *Türk Ansiklopedisi*, volume **33**, (Milli Eğitim Yayınları, Ankara, 1984), p. 88.

Ertuğrul A. D., "*Mimar Sinan'ın İstanbul'daki Mevcut Hamamları*", Unpublished Master Thesis, İstanbul Technical University, İstanbul, 2002.

Ettinghausen R., Grabar O., *The Art and Architecture of Islam / 650-1250*, (Yale University Press, New Haven and London, 1987)

Eyice S., "İznik'te Büyük Hamam ve Osmanlı Devri Hamamları Hakkında Bir Deneme", *Tarih Dergisi*, volume **11**, n. 15, 1960, p.99-120.

Fletcher, B., *Sir Banister Fletcher's A History of Architecture*, edited by D. Cruickshank, **20**, (Architectural Press, London, 1996).

"Hamam", *Dünden Bugüne İstanbul Ansiklopedisi*, volume **3**, (Kültür Bakanlığı ve Tarih Vakfı Ortak Yayını, İstanbul, 1994), pp. 370- 374.

Haskan M. N., "*İstanbul Hamamları*", (Türkiye Turing ve Otomobil Kurumu Yayınları, İstanbul, 1995).

İzbırak R., "Sığacık Körfezi", *Türk Ansiklopedisi*, volume **28**, (Milli Eğitim Yayınları, Ankara, 1980), p. 513.

Kahya Y., "*İstanbul Bizans Mimarisinde Kullanılan Tuğlanın Fiziksel ve Mekanik Özellikleri*", Unpublished Ph.D. Thesis, İstanbul Technical University, İstanbul, 1992.

Kul F. N., "Restoration *Project of the Medrese in Düzce (Hereke) Village, Seferihisar, İzmir*", Unpublished Master Thesis, Middle East Technical University, Ankara, 2003.

Öney G., "*Beylikler Devri Sanatı XIV. – XV. Yüzyıl (1300–1453)*", (Kültür Bakanlığı Yayınları, Ankara, 1989).

Önge Y., " Konya – Beyşehir'de Esrefoğlu Süleyman Bey Hamamı", *Vakıflar Dergisi*, Baha Matbaası, İstanbul, 1968.

Önge Y., "*Anadolu' da XII. – XIII. Yüzyıl Türk Hamamları*", (Vakıflar Genel Müdürlüğü Yayınları, Ankara, 1995).

Önge Y., "Anadolu'da Türk Hamamları Hakkında Genel Bilgiler ve Mimar Sinan'ın İnşa Ettiği Hamamlar", *Mimarbaşı Koca Sinan Yaşadığı Çağ ve Eserleri – 1 –*, (Vakıflar Genel Müdürlüğü Yayınları, İstanbul, 1988), pp. 403- 428.

Ötüken, "Urla", *Yeni Türk Ansiklopedisi* , volume **11**, (Ötüken Neşriyat A. Ş. Yayınları, İstanbul, 1985), pp. 4462- 4464.

Öztuna Y., "İzmir", *Türk Ansiklopedisi*, volume **20**, (Milli Eğitim Yayınları, Ankara, 1972), pp. 467- 476.

"Seferihisar", *Türk Ansiklopedisi*, volume **28**, (Kültür Bakanlığı Yayınları, Ankara, 1980), s. 267- 268.

Taşçıoğlu T., "*The Turkish Hamam*", (Unilever ve Duran Ofset Ortak Yayını, İstanbul, 1998).

Uluengin F., Uluengin, B. , and Uluengin, M. B. , "*Osmanlı Anıt Mimarisinde Klasik Yapı Detayları (Classic Construction Details of Ottoman Monumental Architecture)*", (Yem Yayınları, İstanbul, 2001).

Ürer H., "*İzmir Hamamları*", (Kültür Bakanlığı Yayınları, Ankara, 2002).

Yaşaroğlu M. K., "Hamam", *Türk Diyanet Vakfı İslam Ansiklopedisi*, volume **15**, (Türkiye Diyanet Vakfı, İstanbul, 1997), pp. 402- 434.

Yavuz A. T., "*Anadolu Selçuklu Mimarisinde Tonoz ve Kemer"*, (Kelaynak Yayınları, Ankara, 1983).

Yavuz A. T., "Historic Buildings and Earthquake Factor in Their Design", *Protection of Architectural Heritage Against Earthquakes-Seminar*, 28 September - 2 October 1992, Ministry of Public Works and Settlement, İstanbul-Ankara, 1993, pp. 101-115.

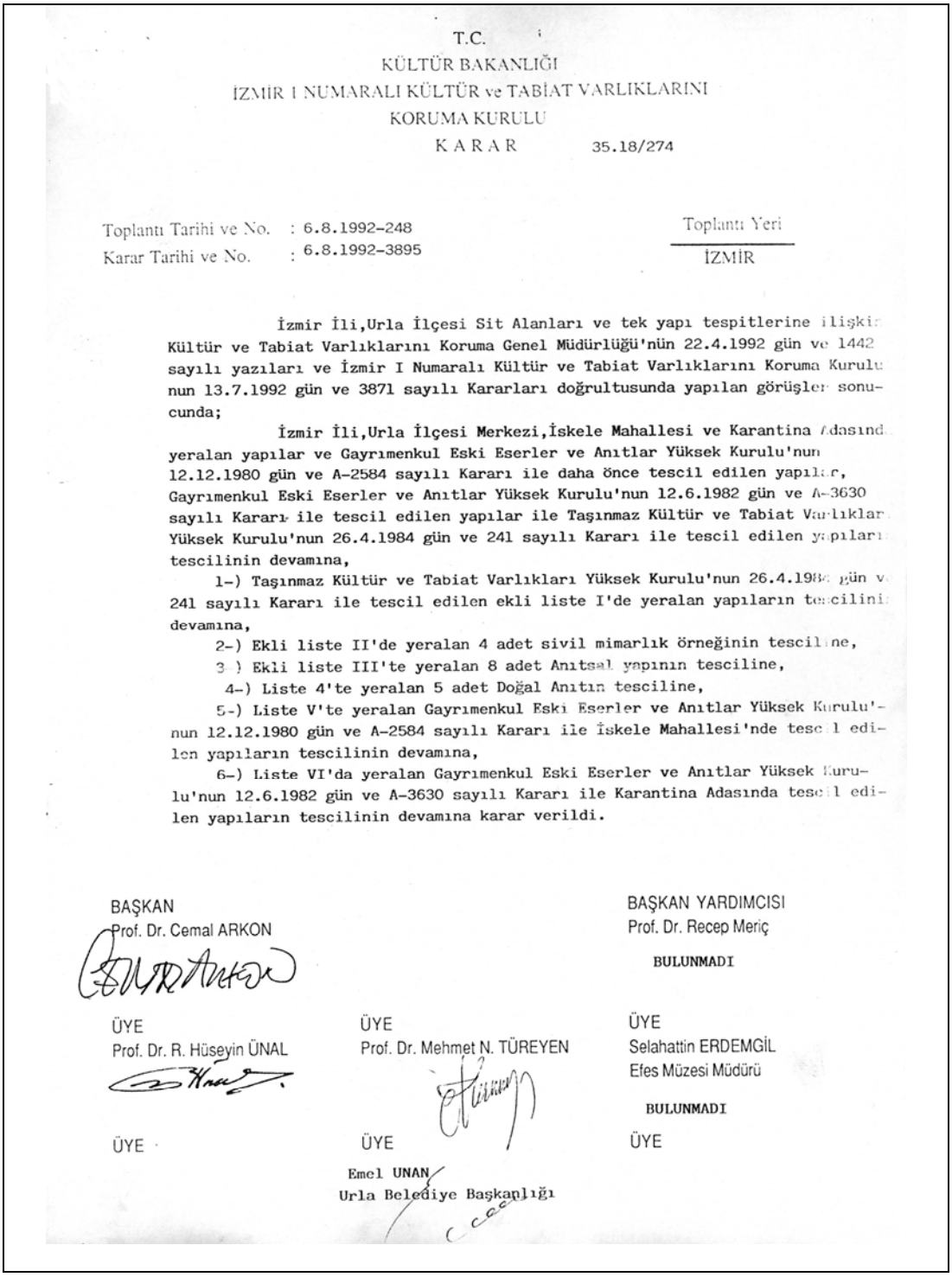
Yavuz A. T., "Anadolu Selçuklu Mimarisinin Yapı Özellikleri", *Selçuklu Çağında Anadolu Sanatı*, (Yapı Kredi Yayınları, İstanbul, 2002), pp. 271 – 290.

Yegül F., "*Baths and Bathing in Classical Antiquity*", (MA: MIT Press, Cambridge, 1992).

Yorulmaz M. and Ahunbay Z., "Sinan Camilerinde Taşıyıcı Sistem ve Yapım Teknikleri", *II. Uluslararası Türk-İslam Bilim ve Teknoloji Tarihi Kongresi*, İTÜ, İstanbul, 1986, pp. 123-143.

APPENDIX

Archive Documents of the Studied Baths from İzmir Council for Conservation of Cultural and Natural Heritage



T.C.
KÜLTÜR BAKANLIĞI
İZMİR I NUMARALI KÜLTÜR ve TABİAT VARLIKLARINI
KORUMA KURULU
K A R A R 35.18/274

Toplantı Tarihi ve No. : 6.8.1992-248
Karar Tarihi ve No. : 6.8.1992-3895

Toplantı Yeri
İZMİR

İzmir İli,Urla İlçesi Sit Alanları ve tek yapı tespitlerine ilişkin Kültür ve Tabiat Varlıklarını Koruma Genel Müdürlüğü'nün 22.4.1992 gün ve 1442 sayılı yazıları ve İzmir I Numaralı Kültür ve Tabiat Varlıklarını Koruma Kurulunun 13.7.1992 gün ve 3871 sayılı Kararları doğrultusunda yapılan görüşler sonucunda;

İzmir İli,Urla İlçesi Merkezi,İskele Mahallesi ve Karantina Adasında yeralan yapılar ve Gayrımenkul Eski Eserler ve Anıtlar Yüksek Kurulu'nun 12.12.1980 gün ve A-2584 sayılı Kararı ile daha önce tescil edilen yapılar, Gayrımenkul Eski Eserler ve Anıtlar Yüksek Kurulu'nun 12.6.1982 gün ve A-3630 sayılı Kararı ile tescil edilen yapılar ile Taşınmaz Kültür ve Tabiat Varlıklar Yüksek Kurulu'nun 26.4.1984 gün ve 241 sayılı Kararı ile tescil edilen yapıları tescilinin devamına,

1-) Taşınmaz Kültür ve Tabiat Varlıkları Yüksek Kurulu'nun 26.4.1984 gün ve 241 sayılı Kararı ile tescil edilen ekli liste I'de yeralan yapıların tescilinin devamına,

2-) Ekli liste II'de yeralan 4 adet sivil mimarlık örneğinin tesciline,

3-) Ekli liste III'te yeralan 8 adet Anıtsal yapının tesciline,

4-) Liste 4'te yeralan 5 adet Doğal Anıtın tesciline,

5-) Liste V'te yeralan Gayrımenkul Eski Eserler ve Anıtlar Yüksek Kurulu'nun 12.12.1980 gün ve A-2584 sayılı Kararı ile İskele Mahallesi'nde tescil edilen yapıların tescilinin devamına,

6-) Liste VI'da yeralan Gayrımenkul Eski Eserler ve Anıtlar Yüksek Kurulu'nun 12.6.1982 gün ve A-3630 sayılı Kararı ile Karantina Adasında tescil edilen yapıların tescilinin devamına karar verildi.

BAŞKAN
Prof. Dr. Cemal ARKON

BAŞKAN YARDIMCISI
Prof. Dr. Recep Meriç
BULUNMADI

ÜYE
Prof. Dr. R. Hüseyin ÜNAL

ÜYE
Prof. Dr. Mehmet N. TÜREYEN

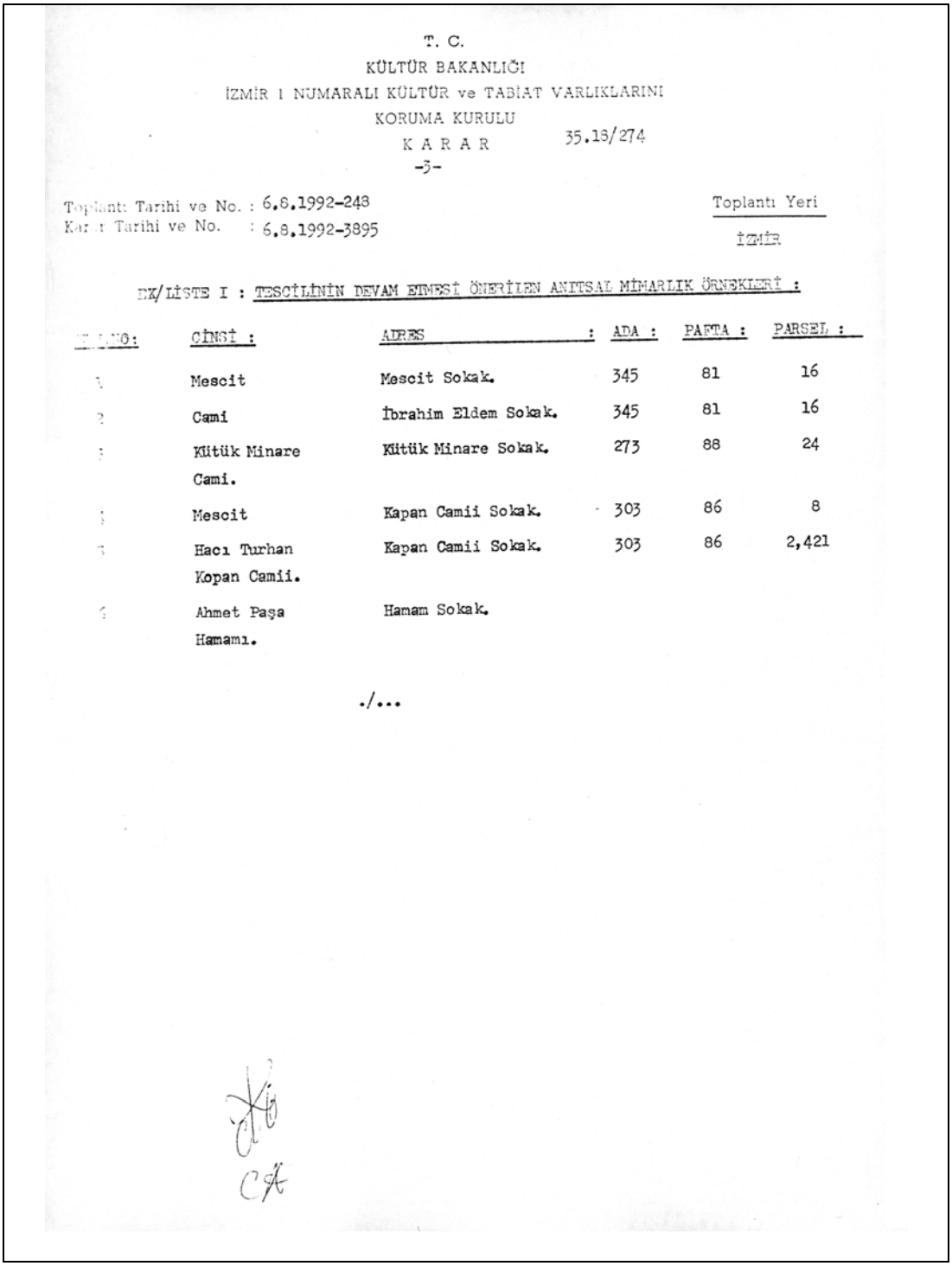
ÜYE
Selahattin ERDEMGİL
Efes Müzesi Müdürü
BULUNMADI

ÜYE

ÜYE
Emel UNAN
Urla Belediye Başkanlığı

ÜYE

Figure A.1. Decisions for Official Registration of the Baths



T. C.
KÜLTÜR BAKANLIĞI
İZMİR 1 NUMARALI KÜLTÜR ve TABİAT VARLIKLARINI
KORUMA KURULU
K A R A R 35.13/274
-3-

Toplantı Tarihi ve No. : 6.8.1992-248
Karar Tarihi ve No. : 6.8.1992-3895

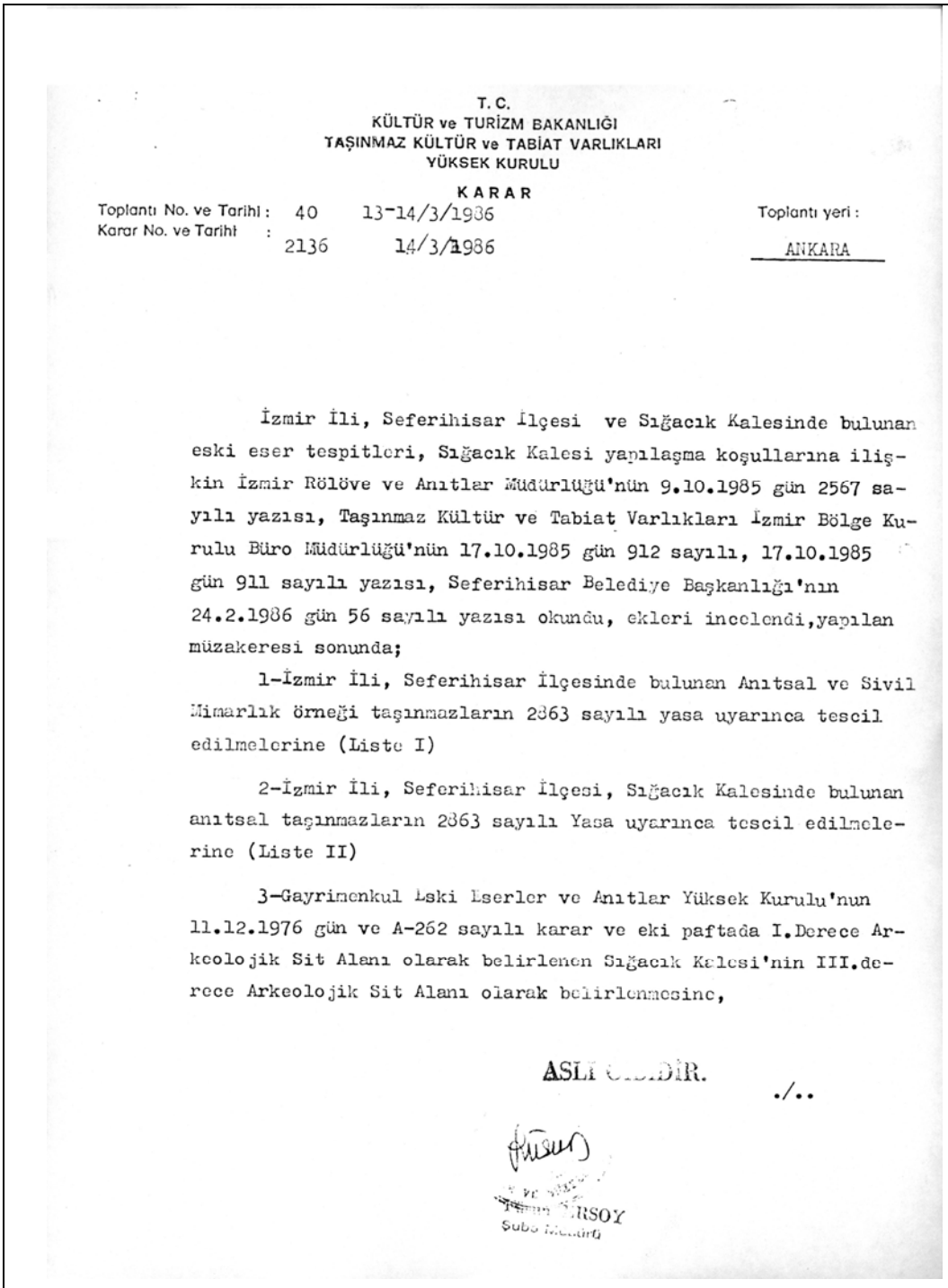
Toplantı Yeri
İZMİR

EK/LİSTE I : TESCİLİNİN DEVAM EDİLMESİ ÖNERİLEN ANITSAL MİMARLIK ÖRNEKLERİ :

SIRA NO:	CİNSİ :	ADRES :	ADA :	PAFTA :	PARSEL :
1	Mescit	Mescit Sokak.	345	81	16
2	Cami	İbrahim Eldem Sokak.	345	81	16
3	Kütük Minare Cami.	Kütük Minare Sokak.	273	88	24
4	Mescit	Kapan Camii Sokak.	303	86	8
5	Hacı Turhan Kopan Camii.	Kapan Camii Sokak.	303	86	2,421
6	Ahmet Paşa Hamamı.	Hamam Sokak.			

./...

Figure A.2. Suggested Buildings to Continue the Registered Situation



T. C.
KÜLTÜR ve TURİZM BAKANLIĞI
TAŞINMAZ KÜLTÜR ve TABİAT VARLIKLARI
YÜKSEK KURULU

KARAR

Toplantı No. ve Tarihi : 40 13-14/3/1986
Karar No. ve Tarihi : 2136 14/3/1986

Toplantı yeri : ANKARA

İzmir İli, Seferihisar İlçesi ve Sığacık Kalesinde bulunan eski eser tespitleri, Sığacık Kalesi yapılaşma koşullarına ilişkin İzmir Rölöve ve Anıtlar Müdürlüğü'nün 9.10.1985 gün 2567 sayılı yazısı, Taşınmaz Kültür ve Tabiat Varlıkları İzmir Bölge Kurulu Büro Müdürlüğü'nün 17.10.1985 gün 912 sayılı, 17.10.1985 gün 911 sayılı yazısı, Seferihisar Belediye Başkanlığı'nın 24.2.1986 gün 56 sayılı yazısı okundu, ekleri incelendi,yapılan müzakeresi sonunda;

1-İzmir İli, Seferihisar İlçesinde bulunan Anıtsal ve Sivil Mimarlık örneği taşınmazların 2863 sayılı yasa uyarınca tescil edilmelerine (Liste I)

2-İzmir İli, Seferihisar İlçesi, Sığacık Kalesinde bulunan anıtsal taşınmazların 2863 sayılı Yasa uyarınca tescil edilmelerine (Liste II)

3-Gayrimenkul Eski Eserler ve Anıtlar Yüksek Kurulu'nun 11.12.1976 gün ve A-262 sayılı karar ve eki paftada I.Derece Arkeolojik Sit Alanı olarak belirlenen Sığacık Kalesi'nin III.derece Arkeolojik Sit Alanı olarak belirlenmesine,

ASLI GİBİDİR.

./..

...RSOY
Şube Müdürü

Figure A.3. Desicions for Official Registration of the Baths

T.C.
KÜLTÜR BAKANLIĞI
İZMİR I NUMARALI KÜLTÜR VE TABİAT VARLIKLARINI
KORUMA KURULU
KARAR

35.16/818

Toplantı Tarihi ve No : 8.12.1999 -547
Karar Tarihi ve No : 8.12.1999 - 8204

Toplantı Yeri
İZMİR

İzmir İli, Urla İlçesi, Rüstem Mahallesi, Kızılhamam Mevkii'nde, tapunun 53 pafta, 640 ada, 25 parselinde yeralan, Osmanlı Dönemine ait hamamın dozerle tahrip edildiğine ilişkin İl Kültür Müdürlüğü'nün 20.7.1999 tarih ve 1025-2206 sayılı yazısı, Urla İlçe Emniyet Müdürlüğü'nün 26.7.1999 tarih ve 99 sayılı yazısı ile hazırlanan uzman raporu okundu, ekleri incelendi, yapılan görüşmeler sonunda;

İzmir İli, Urla İlçesi, Rüstem Mahallesi, Kızılhamam Mevkii'nde, tapunun 53 pafta, 640 ada, 25 parselinde yeralan, Osmanlı Dönemine ait hamamın tescil edilmesine, Hamam çevresindeki yapıları gösterir fotoğraflar ile birlikte hamamın etrafında 20 m.yi kapsayan Belediyesinden onaylı rölövenin Kurulumuza iletilmesinden sonra, koruma zonunun belirlenebileceğine, bu zon belirlenene kadar hamama 20 m. mesafedeki devam etmekte olan inşaatların durdurulmasına karar vedildi.

BAŞKAN
Yrd.Doç.Dr.Erkan UÇKAN
İMZA

ASLI ÇİBİDİ
Serpil YASA
Müdür V.

BAŞKAN YARDIMCISI
Tankut ÜNAL
İMZA

ÜYE
Prof.Dr.Ömer ÖZYİĞİT
İMZA

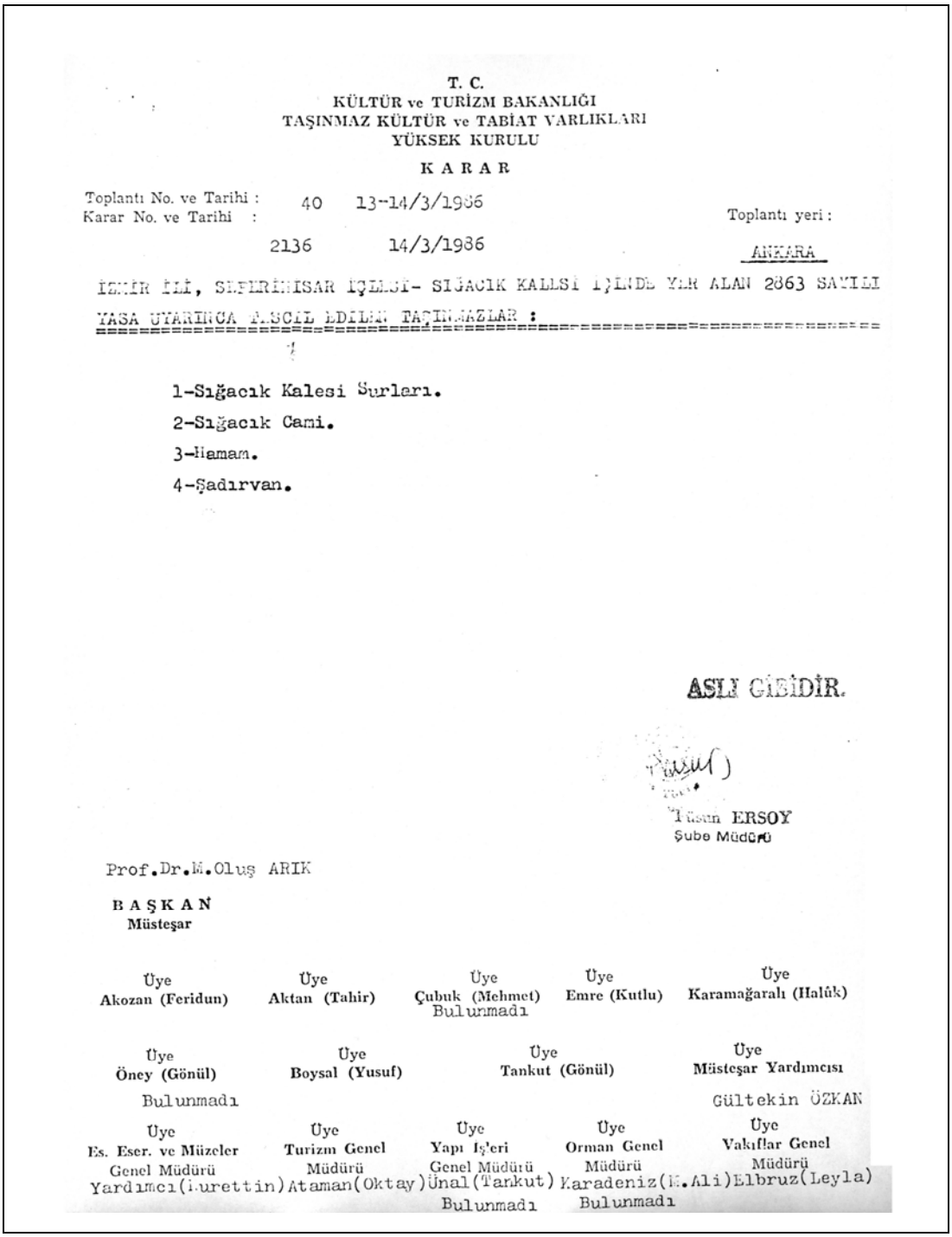
ÜYE
Doç.Dr.Emel GÖKSU
BULUNMADI

ÜYE
Yrd.Doç.Dr.Lale DOĞER
İMZA

ÜYE
Sabriye ARAS
Urla Belediye Başkanlığı
İMZA

ÜYE
Günseli ÖZŞAHİN
Vakıflar Bölge Müdürlüğü
İMZA

Figure A.4. Decision for Conservation of the Urla Rüstem Paşa Hamamı



T. C.
KÜLTÜR ve TURİZM BAKANLIĞI
TAŞINMAZ KÜLTÜR ve TABİAT VARLIKLARI
YÜKSEK KURULU

KARAR

Toplantı No. ve Tarihi : 40 13-14/3/1986
Karar No. ve Tarihi : 2136 14/3/1986
Toplantı yeri : ANKARA

İZMİR İLİ, SEFERİHİSAR İÇELİSİ- SIĞACIK KALESİ İÇİNDE YER ALAN 2863 SAYILI YASA UYARINCA ASALI EDİLEN TAŞINMAZLAR :

1-Sığacık Kalesi Surları.
2-Sığacık Cami.
3-Hamam.
4-Şadırvan.

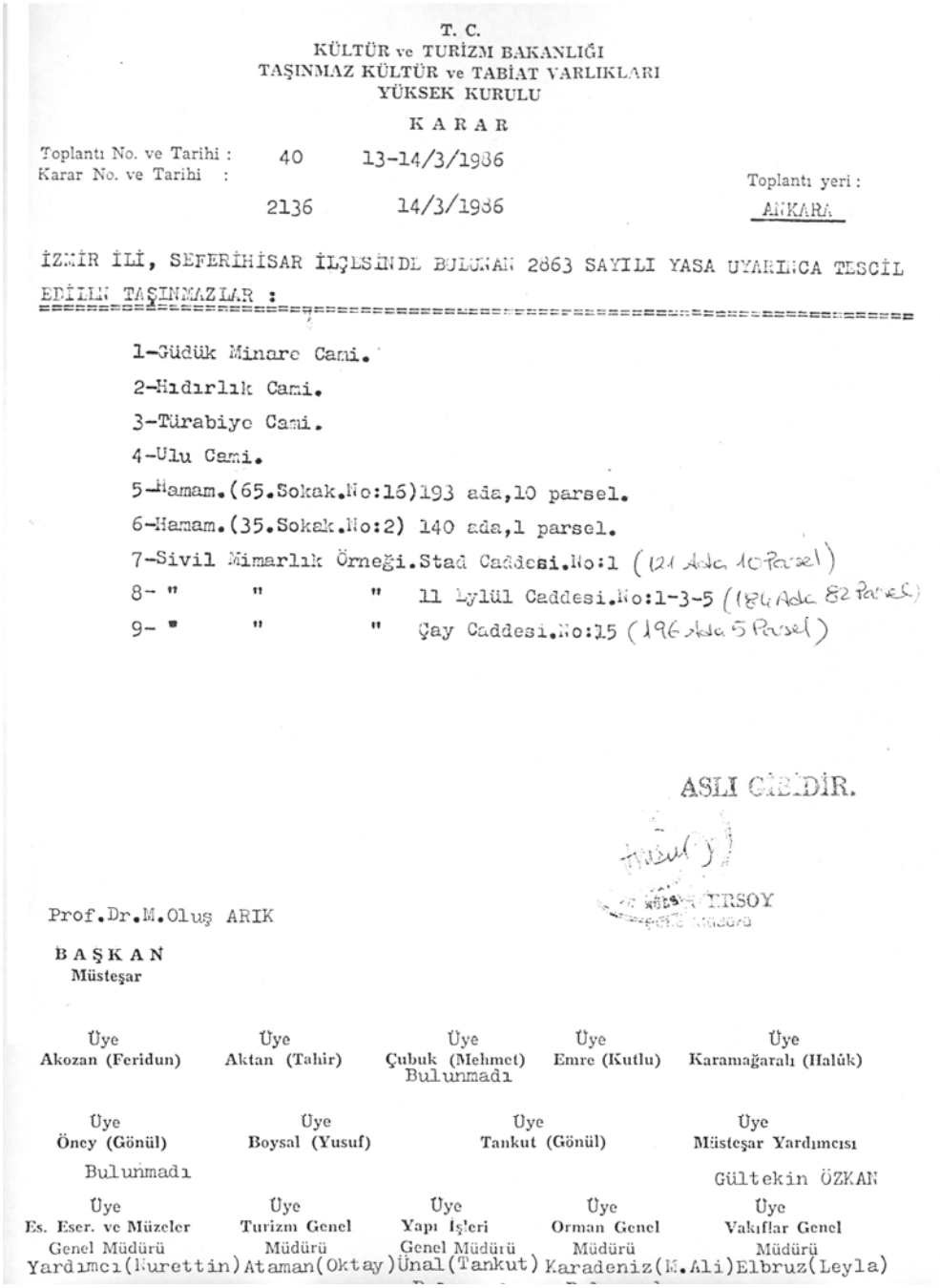
ASLI GİBİDİR.

Yusuf ERSOY
Şube Müdürü

Prof.Dr.M.Oluş ARIK
BAŞKAN
Müsteşar

Üye Akozan (Feridun)	Üye Aktan (Tahir)	Üye Çubuk (Mehmet) Bulunmadı	Üye Emre (Kutlu)	Üye Karamağaralı (Halûk)
Üye Öney (Gönül) Bulunmadı	Üye Boysal (Yusuf)	Üye Tankut (Gönül)		Üye Müsteşar Yardımcısı Gültekin ÖZKAN
Üye Es. Eser. ve Müzeler Genel Müdürü Yardımcısı(Nurettin)	Üye Turizm Genel Müdürü Ataman(Oktay)	Üye Yapı İş'leri Genel Müdürü Ünal(Tankut) Bulunmadı	Üye Orman Genel Müdürü Karadeniz(M.Ali) Bulunmadı	Üye Vakıflar Genel Müdürü Elbruz(Leyla)

Figure A.5. Registered Historic Buildings in Sığacık Neighborhood



T. C.
KÜLTÜR ve TURİZM BAKANLIĞI
TAŞINMAZ KÜLTÜR ve TABİAT VARLIKLARI
YÜKSEK KURULU

KARAR

Toplantı No. ve Tarihi : 40 13-14/3/1986
Karar No. ve Tarihi : 2136 14/3/1986

Toplantı yeri : ANKARA

İZMİR İLİ, SEFERİHİSAR İLÇESİNDE BULUNAN 2863 SAYILI YASA UYARINCA TESCİL EDİLEN TAŞINMAZLAR :

1-Güdük Minare Cami.
2-Hıdırlık Cami.
3-Türabiye Cami.
4-Ulu Cami.
5-Hamam.(65.Sokak.No:16)193 ada,10 parsel.
6-Hamam.(35.Sokak.No:2) 140 ada,1 parsel.
7-Sivil Mimarlık Örneği.Stad Caddesi.No:1 (121 Ada 10 Parsel)
8- " " " 11 Eylül Caddesi.No:1-3-5 (186 Ada 82 Parsel)
9- " " " Çay Caddesi.No:15 (196 Ada 5 Parsel)

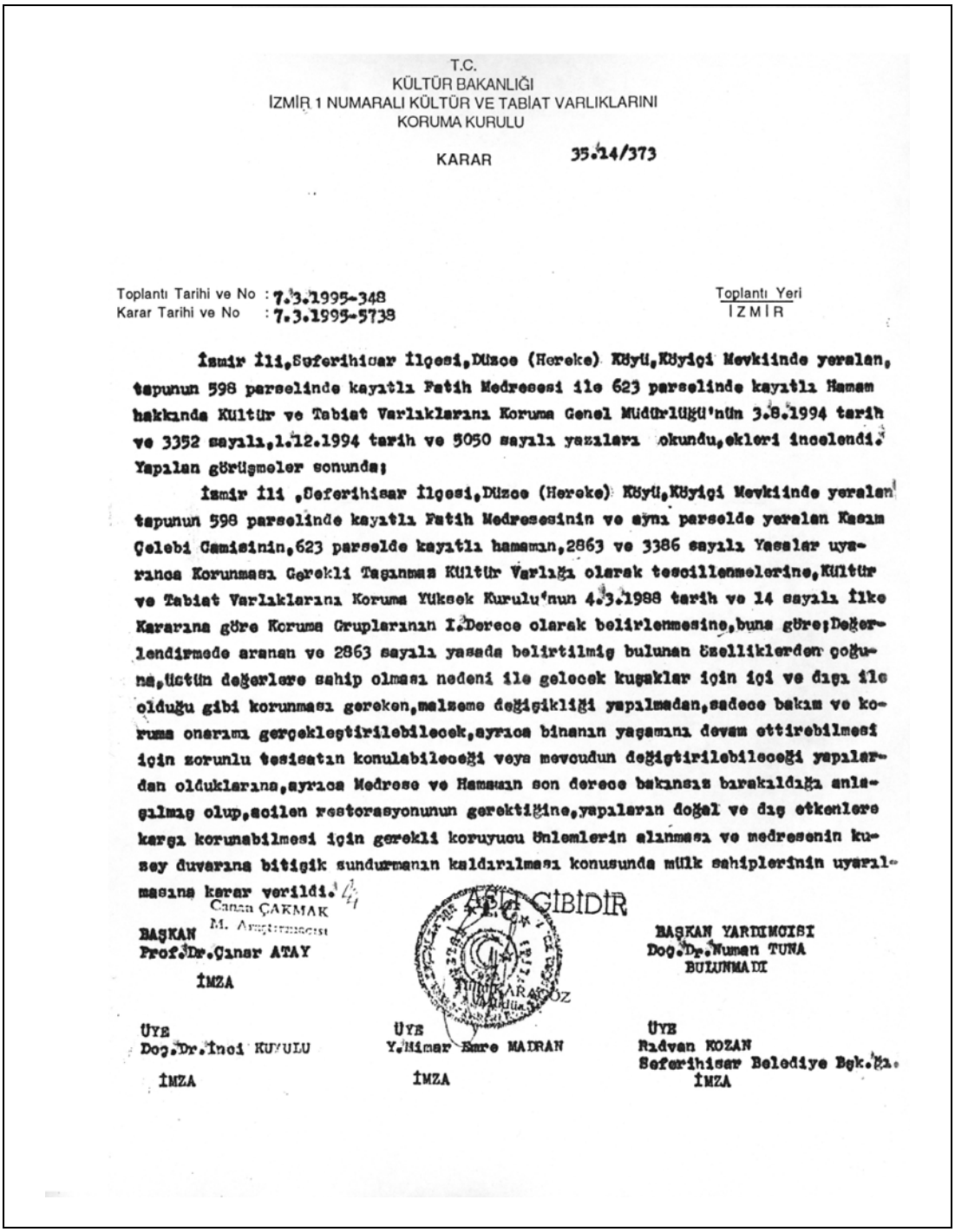
ASLI GİBİDİR.

TIRSOY

Prof.Dr.M.Oluş ARIK
BAŞKAN
Müsteşar

Üye	Üye	Üye	Üye	Üye
Akozan (Feridun)	Aktan (Tahir)	Çubuk (Mehmet) Bulunmadı	Emre (Kutlu)	Karamağaralı (Halûk)
Üye	Üye	Üye	Üye	
Öney (Gönül) Bulunmadı	Boysal (Yusuf)	Tankut (Gönül)	Müsteşar Yardımcısı Gültekin ÖZKAN	
Üye	Üye	Üye	Üye	Üye
Es. Eser. ve Müzeler Genel Müdürü	Turizm Genel Müdürü	Yapı İşleri Genel Müdürü	Orman Genel Müdürü	Vakıflar Genel Müdürü
Yardımcı(Nurettin)	Ataman(Oktay)	Ünal(Tankut)	Karadeniz(M.Ali)	Elbruz(Leyla)

Figure A.6. Registered Historic Buildings in Seferihisar Town



T.C.
KÜLTÜR BAKANLIĞI
İZMİR 1 NUMARALI KÜLTÜR VE TABİAT VARLIKLARINI
KORUMA KURULU

KARAR 35.24/373

Toplantı Tarihi ve No : 7.3.1995-348
Karar Tarihi ve No : 7.3.1995-5738

Toplantı Yeri
İZMİR

İzmir İli,Seferihisar İlçesi,Düzce (Hereke) Köyü,Köyiçi Mevkiinde yeralan, tapunun 598 parselinde kayıtlı Fatih Medresesi ile 623 parselinde kayıtlı Hamam hakkında Kültür ve Tabiat Varlıklarını Koruma Genel Müdürlüğü'nün 3.8.1994 tarih ve 3352 sayılı,1.12.1994 tarih ve 5050 sayılı yazıları okundu,ekleri incelendi. Yapılan görüşmeler sonunda;

İzmir İli ,Seferihisar İlçesi,Düzce (Hereke) Köyü,Köyiçi Mevkiinde yeralan tapunun 598 parselinde kayıtlı Fatih Medresesinin ve aynı parselde yeralan Kasım Çelebi Camisinin,623 parselde kayıtlı hamamın,2863 ve 3386 sayılı Yasalar uyarınca Korunması Gerekli Taşınmaz Kültür Varlığı olarak tescillenmelerine,Kültür ve Tabiat Varlıklarını Koruma Yüksek Kurulu'nun 4.3.1988 tarih ve 14 sayılı ilke Kararına göre Koruma Gruplarının I.Derece olarak belirlenmesine,buna göre;Değerlendirmede aranan ve 2863 sayılı yasada belirtilmiş bulunan özelliklerden çoğuna,üstün değerlere sahip olması nedeni ile gelecek kuşaklar için içi ve dışı ile olduğu gibi korunması gereken,malzeme değişikliği yapılmadan,sadece bakım ve koruma onarımı gerçekleştirilebilecek,ayrıca binanın yaşamını devam ettirebilmesi için zorunlu tesisatın konulabileceği veya mevcudun değiştirilebileceği yapılardan olduklarına,ayrıca Medrese ve Hamamın son derece bakımsız bırakıldığı anlaşılmış olup,sözü edilen restorasyonunun gerektiğine,yapıların doğal ve dış etkenlere karşı korunabilmesi için gerekli koruyucu önlemlerin alınması ve medresenin kuzey duvarına bitişik sundurmanın kaldırılması konusunda mülk sahiplerinin uyarılmasına karar verildi.

Canan ÇAKMAK
M. Araştırmacısı

ASLI GİBİDİR

BAŞKAN
Prof.Dr.Çınar ATAY
İMZA

BAŞKAN YARDIMCISI
Doç.Dr.Numan TUNA
BULUNMADI

ÜYE
Doç.Dr.İnci KUYULU
İMZA

ÜYE
Y.Mimar Emre MADRAN
İMZA

ÜYE
Rıdvan KOZAN
Seferihisar Belediye Bşk.Vk.
İMZA

Figure A.7. Decision for Conservation and Official Registration of Düzce Hamamı