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From Theodosian Harbour to Yenikapı Shipwrecks*

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The location of Byzantion at the point of transition between Anatolia and the Balkans, the Black Sea and the Aegean has facilitated the development of the city. Polybios of the second century BC had clearly noted the importance of Byzantion in his World History: "As far as the sea is concerned, Byzantium occupies a position the most secure and in every way the most advantageous of any town in our quarter of the world" (Müller-Wiener 1998, 1). In addition to controlling the trade routes, the city had a wide hinterland suitable for agriculture. Besides, fishing on the straits was an important input. The fact that the bonito fish migrating from the Black Sea to the Aegean is depicted on the coins of the city underlines the importance of fishing for Byzantion (Tekin 2005, 11-12).

The city stands on a high promontory extending into the sea and surrounded by the sea; thus easy to defend. Majority of the colonies founded in the eighth century BC were located on small peninsulas on the coastline, as was the case with west Anatolia; this can be explained with the seafaring origin of the settlers as well as their efforts to keep clear of the local peoples living inland. Especially the small peninsulas were very suitable for such locations and facilitated their security against attacks both from the sea and land. As a matter of fact, Herodotos (V.26, VI.33) tells that the citizens of Byzantion and Kalkhedon abandoned their cities and retreated inland toward the Black Sea when the Persian King Dareios I occupied Thrace. This event shows the importance of coastal settlements with regard to security. Another advantage the peninsular settlements presented was to have more than one harbour. In case one harbour became unusable due to unfavourable weather conditions, a second or even a third one could be used. In Antiquity, the geographic features of Istanbul's coastlines made many harbours available. Dionysios of

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Byzantion tells that the first corner of the Straits had three harbours and describes the vessels of the time as follows: "Byzantion had 500 ships and some of them had two rows of oars with rudders at both stem and stern, steered by two steering men."

The former ports on the Golden Horn side of the newly re-founded ci ty turned insufficient for the marine transportation with the increasing population and economic revival. Thus, new ports were built on the Propontic coast of the city in the reigns of the emperors Iulianus (r. AD 361-363) and Theodosius I (r. AD 379-295). The harbour built by Iulianus is thought to have had a vaulted semicircular colonnade on the land side and it is called Portus Novus ('the New Port') in *Notitia* and called Megistos Limên ('the Biggest Port') by Zosimos. In the reign of Anastasius (r. AD 491-518), the bottom of the harbour was dredged making it deeper and a mole was built thus enlarging it. Following the fire in 561, the harbour was rebuilt by Iustinus II (r. AD 565-578) and named Sophia after the empress. There are various opinions regarding its use. Some researchers claim that it was an economic port for there were granaries nearby; however, in 695 the revolt against Iustinianus II was started at the ships known as *dromon* anchored at this port; thus, it is plausible that it was used for military purposes as well. Later the port was called Kontoskalion and became the main base for the Byzantine navy (Müller-Wiener 1998, 8).

In the thirteenth century the bottom of the harbour was dredged and cleaned, the fortification walls around it were repaired and an iron door was installed at its entrance. Thus, the harbour became the longest-living harbour of the empire on the Marmara coast. Following the Turkish conquest in 1453, the harbour was used for sheltering the Ottoman naval galleys and turned to a swamp by the end of the 16th century; thus, the Grand Vizier Sokullu Mehmet Pasha had it entirely filled (Müller-Wiener 1998, 8-11, 30-33). The harbour was called Kadırga Limanı, i.e. Galley Harbour, and the neighbourhood behind it has been called Kadırga since then.

The second large harbour on the Marmara coast was the Theodosian Harbour, namely Portus Theodosiacus, possibly built by Theodosius I (r. AD 379-395) in the cove that indents deeply inland (Müller-Wiener 1998, 8-9). The Sea of Marmara became a natural harbour formed by a large bay here and the Stream Lykos flowed into the sea here. It is known that in the prehistoric period, the mouths of rivers opening into the sea were used as shelters for vessels and the river courses suitable for navigation allowed access inland. Cities located at such points served for both unloading and loading the vessels or marketing of the products of their region; thus, they developed more in socio-economic terms than cities located elsewhere.

With Constantinopolis becoming the new imperial capital, the trade also increased in parallel to the population. Thus, the capacity of the existing harbours became insufficient and it became necessary to build new harbours or to enlarge the existing ones. The natural deep cove at the mouth of Lykos was enlarged probably in the reign of Theodosius I by building a breakwater in the west- east direction on the south in order to be able to answer the needs of the time. There are various opinions regarding the name and foundation of this harbour in the Byzantine period. The Eleutherios Harbour mentioned in surviving texts is usually accepted to be the forerunner of the Theodosian Harbour and was founded in the reign of Constantinus I. Another claim is that Eleutherios should be looked for further east (Dirimtekin 1953, 59; Asal 2007, 183; Müller-Wiener 1998, 8; Gökçay 2007, 166), (Map 1).

Granaries called Horrea Alexandrina or Horrea Theodosiana, named after Alexandria, Egypt, and the emperor himself, respectively, were located on the Theodosian Harbour's east side which was within the Region IX; thus, these suggest that this harbour was used for unloading the grains brought from Egypt and other items and that this was a large commercial harbour (Map 2). It is known that the grain import continued until 641 when Egypt was conquered by Muslim Arabs (Müller-Wiener 1998, 18). The Theodosian Harbour lost its primary function when the grains transportation from Egypt came to an end toward the middle of the seventh century; however, it continued to serve as a harbour as attested from the shipwrecks uncovered dating from the seventh through the eleventh centuries. The harbour hosted cargo vessels of short distances and fishing boats. It fell out of use in the twelfth century when it was blocked with the silt carried by the Lykos (Bayrampaşa) Stream and was dumped with rubble thereafter. The facts that most of the shipwrecks uncovered are dated to the late tenth and early eleventh century and that none date to the later periods further support this hypothesis. The area was known as Vlanga in the Ottoman period and was entirely filled becoming vegetable gardens as understood from the accounts of the travellers. Petrus Gyllius writes the following about the filling of the Theodosian Harbour: "The harbour has been filled, vegetables have been planted in the wide fields and a few arbours have been planted. Fruits hang down from the trees, not sails as Fabios had told; the vegetable gardens are watered from inexhaustible fountains remaining from the ancient harbour" (Gyllius, Istanbul, IV: 8).

Marmaray-Metro Projects and discovery of the harbour

The 'Metro Project' for the subway/underground was designed to complement the Marmaray by constituting the north-south commuter corridor on the European side. The first subway of Istanbul, as Eugène Henri Gavand called it an underground funicular, sort of a lift, would decrease the time needed for covering the distance down to a couple of minutes. The construction of the funicular, known as Tünel in Turkish, was initiated in 1872 by the company "The Metropolitan Railway of Constantinople, from Galata to Pera", of Gavand connecting Karaköy (Galata) to Beyoğlu (Pera). The slow progressing work was finally completed in 1875 inaugurating the Istanbul Tüneli, the first funicular working on steam power and becoming one of the earliest examples of underground transportation in the world (Çelik 1998, 79). The Istanbul Tunnel built entirely under the ground in the reign of Sultan Abdülaziz is the second oldest subway of the world after the London Tube. However, it took 125 years to build new subways, the first inaugurated in 2000 from Taksim to 4. Levent. This line will be extended up to Hacıosman Bayırı and to Topkapı reaching a total length of 16 km. In Turkish subway is called *metro*, the underwater tunnel across the Bosporus is the *tüp geçit*, literally the 'tube passage', the tram-line sometimes travelling under the ground is *hafif raylı sistem* (the light rail system); therefore, we will call the subway as metro.

When the Marmaray and Metro projects are completed, the Yenikapı station will be one of the major commuting points of the European side while on the Asian side it will be the Üsküdar station assuming the same role. Both of these stations will include necessary commuting facilities for the passengers using the public bus, ferry, light rail system and tramline. At the points where the Yenikapı, Sirkeci and Üsküdar stations will be located within the dense historical urban fabric, rescue excavations were initiated by the Istanbul Archaeological Museums in 2004. The work at Yenikapı brought to daylight the Theodosian Harbour, the most important Byzantine port on the Marmara (Propontis) coast of the city. The site of the port was already known from ancient sources, maps and surveys; however, documents regarding the exact localisation, actual dimensions and layout were deficient. Unveiling of this information will contribute greatly to the cultural history of Istanbul. Capturing this chance, archaeologists initiated excavations at the Langa Bostanları, literally 'the Langa vegetable gardens', which supplied Istanbul with fresh vegetables for centuries and which indeed originally housed the Theodosian Harbour. The biggest in the history of Istanbul, the excavations are conducted at a point covering 58,000 sq. m., now about 500 m. inland, by experts from the Istanbul Archaeological Museums assisted by 50 archaeologists and almost 500 workers (Fig. 1). Documentation, lifting, conservation and reconstruction work on the majority of the shipwrecks uncovered in the biggest urban excavation of the world is carried out by the Department of Conservation and Restoration at the Faculty of Letters of Istanbul University.

Research of Yenikapı Shipwrecks

By the 15th of May, 2008, examination and documentation works of eleven wrecks have been completed and moved to the laboratory. Their detailed studies and full scale drawings are still in progress. Of all the eleven vessels we have lifted from the site, the original hull forms and slopes have been preserved as per original or with slight deformations. Thus, the Yenikapı wrecks have provided us with much more abundant information compared to the underwater-lying shipwrecks scattered around and decomposed due to damage by the *teredo navalis*. This favourable and exceptional condition of the wrecks at Yenikapı arose from different natural circumstances coexisting.

The wrecks could have survived as a whole, without suffering much from the *teredos*, at a point very close to the coast, where the waves break and lose their energy, only through rapid silting. The visual wholeness of the wrecks uncovered is evidence for the rapid silting. In spite of all these favourable conditions, examination has shown that the timbers of these vessels had already lost their physical strength. Thus, a very sensitive approach had to be made while lifting and new techniques had to be devised.

Following the completion of the documentation works, dismantling of the timber elements began. One of the goals here was to identify the construction method by separating the pieces whose joining details could not be seen. This was actually very important for the identification of the shipbuilding technique. For instance, the joint details of two planks may not be visible from above and below; however, when they are dismantled from each other, then it becomes possible to see the joint technique applied such as dowel, nail, mortise and tenon, etc. Besides, especially when the joining of planking and frames are examined on the surface they seem to have been fastened with treenails; however, when the frame of some vessels was removed in the course of dismantling, it was seen that the frame was also fixed with iron nails hammered from the planking side. Another point worth noting is that it is much more practical to conserve the pieces individually. Presence of many other archaeological items on site made it impossible to use heavy machinery for the lifting of the wreck's mass; therefore, apart from a small example, lifting as a single mass method was not implemented. The facts that the items were to be lifted with their forms protected, that the same team would be in charge from the beginning to the end, that is, on site examination, documentation, conservation and reconstruction works were to be implemented by the same team, provided great advantages for the handling of these boats and ships as a whole. In order to avoid any potential problems in the course of restoration and reconstruction, it was necessary to lift all the wooden ship members using supports that would protect their forms. Thus, supporting methods were devised and developed during lifting. Furthermore, manual contact with the items has been minimized.

Different techniques were implemented for the lifting of the planks regarding their protection level. The first one of the methods we devised for lifting the planking, retaining their forms with buttocks and for avoiding damage to the timber while lifting involved building negative copies or moulds. In this method, first the length and width of the plank to be lifted were determined and transferred to drawing. Then wooden legs with heights varying according to the buttock of the frame to be lifted were installed on a wooden carrier skeleton. These constructions were placed inside the vessel, on top of the timber elements to be lifted and then fixed with Styrofoam 'clips' (Fig. 2). Negative moulds built for lifting. Majority of the planking strakes forming the bottom of Yenikapı (YK) 6 were removed with this method.

Another method we devised for dismantling the planking involved lifting them from the bottom of the vessel, in other words from the exterior of the vessel, using L-shaped carriers. Timbers of 5x10 cm were cut at lengths needed and fitted to each other at right angles using zinc-plated treenails. Implementation started with the removal of sand underneath the planking, L-shaped profiles were placed under the planking leaving no gap between the plank and the carrier. All the L-shaped carriers were fixed on the timber of 5x10 cm extended above. Thus, the experts holding the construction at suitable points managed successfully to lift the item and place it inside the box specially manufactured for it. This system was more modular than the negative mould method. Thus, the planking strakes of YK 3, 8 and 12 and YK 7, 9, 15, 17 and 18 as well as the ceiling of YK 8 were lifted with this method (Fig. 3).

A different method, which we named as 'epoxy sheath', was used for lifting the ceiling of YK 12, which was uncovered surprisingly with its cargo and which has revealed important features regarding shipbuilding technology of its time. Following the removal of the cargo, archaeologists unexpectedly ended up with the ceiling of the ship, very unusual to find. This excitement could indeed lead to problems during lifting as some of the timbers had thinned down to 1-2 mm in thickness. In the method developed, aluminium foil was first spread on the timbers in order to protect them from epoxy and then epoxy was applied on them to obtain their moulds. Araldite® FC 52 (ABC), which solidifies very fast, was prepared at appropriate proportions and applied on the aluminium foil and supported with fibre textile. Before placing these carrier moulds on the ceiling, very fine synthetic fabrics were spread under the ceiling (Fig. 4). Then the carrier was placed on top of the ceiling strakes and the textiles spread underneath were tied around the carrier and thus the ceiling members were lifted retaining their forms hundred per cent (Fig. 5).

In addition to lifting members individually, the keel and six planking strakes joining to the keel of Metro 3 vessel were lifted as a whole. First a ditch of one-meter depth and one-meter width was excavated all around the wreck. Then the wreck was furnished with a scaffolding of 10x10 cm timbers (Fig. 6) and starting from the stem of the vessel, the sand underneath was removed in slices of 25 cm. The upper and bottom profiles of the exposed parts of the vessel were copied in full scale via a large profiler manufactured and copied unto a dense Styrofoam 5 cm in thickness. The profile of the vessel was decoupled and cut off; this profile in Styrofoam was placed in the 25 cm thick gap under the vessel and fitted unto the main construction of 10x10 cm built around the vessel. Thus, the vessel resting on a layer of sediment was placed on Styrofoam, and hence the wooden construction that would carry it, by placing a Styrofoam profile every 25 cm. In order to reinforce the construction increasing its carrying capacity, perpendicular and diagonal supports were placed along its sides and top and the remaining part of the vessel was lifted as a single mass and placed in the pool built at the excavation site (Fig. 7, 8).

Special chests of suitable lengths were built for ceiling, planking, frames, keel and stem- and sternposts lifted using carrier constructions. The chests of standard sizes were built with timber of 1 cm thickness and 10-12 cm width so that they could be placed on top of each other. They were fitted only with brass nails and galvanised screws. Pulley and block systems were used especially for lifting the long and heavy items dismantled in deep trenches. Smaller items were carried up the stairs normally used for access into the trench.

Work conducted on the wrecks involved minimised physical contact with them and therefore, various number of ‘bridges’ were built over each one and special scaffolding was built for working, lying on them (Fig. 9, 10).

Conservation and reconstruction for the shipwrecks

At Yenikapı, documentation and lifting of the shipwrecks on site progressed in parallel to the passive conservation of the vessel timbers. The dismantled shipwrecks were placed into stainless steel pools of 2x2x10 m with two compartments (Fig. 11). The pools were also roofed over to prevent unwanted effects of the direct sunlight. In order to desalinate, the water in the pools is circulated and refreshed with new fresh water. The incoming water line is at the bottom level of the pool while the outlet is at the top; thus, contamination with bacteria, fungi and algae due to still water is prevented while the desalination continues. In the time that has elapsed extensive investigation was done on methodology and reconstruction to be executed in active conservation. Comments and remarks by the experts at the museums and laboratories we visited were joined with our own expertise and data and parameters and finally we, the team of Istanbul University, decided to implement the drying method by freezing following PEG impregnation. Therefore, a vacuum freeze-dryer 10 m. in length and 2 m. in diameter is foreseen to be built at the new centre by the pools. Work on the technical features and manufacturing details of the abovementioned vacuum freeze-dryer is in progress at the time of writing. One of the foremost articles in the planning of the project was the establishment of a shipwreck museum, for which ideas have been exchanged with the Istanbul Archaeological Museums. Following the completion of the Marmaray and Metro stations at Yenikapı, the Istanbul Metropolitan Municipality foresees to create a cultural park around the station within the frame of Urban Transformation Project. The museum for the shipwrecks is also foreseen to be located within this area.

In spite of the thoughts for the foreseen shipwreck museum to be located around Yenikapı, we are of the opinion that the shore of Golden Horn would be more suitable for its historical texture. We propose the Golden Horn, which, as a natural harbour, has sheltered numerous ships and seamen for 2500 years, as the site for the new museum for it will provide advantages with its historical background and by allowing the shipwrecks to be displayed by the sea. Beside the shipwreck displays, as at the Viking Ships Museum, the visitors may experience the medieval seafaring in replicas of the wrecks. The Taşkızak Dockyard, evacuated by the Turkish Navy, on the shore of the historical Golden Horn, is very suitable for housing this future museum and displaying Byzantine and Ottoman shipwrecks here will certainly make a great contribution to Istanbul regarding museology. An alternative third proposal, which encompasses the first two, is that there should be two museums indeed, taking into consideration the high number of shipwrecks, one at Yenikapı and one at Golden Horn, connected to each other.

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Theodosius Limanı'ndan Yenikapı Batıklarına

Byzantion'un, Anadolu-Balkanlar, Karadeniz-Ege Dünyası arasında, zorunlu bir geçiş noktasında kurulmuş olması, kentin gelişimine büyük katkılar sağlamıştır. Ticaret yollarının kontrolünü elinde bulunduran kent, aynı zamanda tarımsal faaliyetlerin yürütüldüğü geniş bir hinterlanda sahiptir. Ayrıca, Boğaz'da yapılan balıkçılık kent için önemli bir gelir kaynağıdır. Bizanslı Dionysios, Boğaz'ın birinci dönemecinin üç limanı olduğunu yazmakta ve o dönem gemilerini "Byzantion'un beş yüz gemisi vardır ve bazı gemiler çift sıra kürekli, hem pruva hem de kıç tarafında dümeni olan, çift dümenci tarafından kullanılırdı", ifadesiyle tarif etmektedir.

I. Constantinus tarafından 330'da yeniden kurulan şehrin, Haliç kıyısındaki eski limanlarının kapasiteleri, ekonomik canlanma ve artan nüfusun etkileriyle yetersiz kalmaya başlamıştı. Böylece, İmparatorlar İulianus (Julianus) (361-363) ve I. Theodosius (379-395) dönemlerinde kentin *Propontis*'e (Marmara Denizi) bakan kıyılarında yeni limanlar inşa edildi. *Notitia'*da *Portus Novus* (Yeni Liman) olarak geçen, *Zosimus*'un ise *Megistos Limen* (En Büyük Liman) olarak adlandırdığı İulianus Limanı'nın kara tarafında yarım daire biçimli, üzeri tonoz örtülü büyük bir sütunlu galeriden oluştuğu düşünülmektedir.

Marmara Denizi kıyısında inşa edilen ikinci büyük liman ise, Theodosius Limanı (*Portus Theodosiacus)* adı verilen, muhtemelen I. Theodosius (379-395) tarafından XII. bölgede, zamanında kıyıya hayli derin bir girinti yapan koyda kurulmuştu. Marmara Denizi bu bölgede büyük bir körfez oluşturan doğal bir liman görünümünde idi ve içine Lykos Deresi akıyordu.

Theodosius Limanı, 7. yy ortalarına doğru Mısır'dan yapılan tahıl sevkiyatının sona ermesiyle, işlevini büyük ölçüde yitirmiştir. Ancak, kazılarda ortaya çıkan ve 7-11. yy'lar arasına tarihlenen gemi kalıntılarından anlaşıldığına göre, liman olarak kullanılmaya devam etmiş, bu dönemlerde daha çok yakın mesafelerde kullanılan yük gemileri ile balıkçı teknelerinin barındığı bir liman olarak kullanılmıştır. Tarih öncesi dönemlerden itibaren deniz ticaretine büyük oranda hizmet veren liman, Lykos (Bayrampaşa) Deresi'nin sürekli mil taşıyarak önünü doldurması neticesinde 12. yy'dan sonra terk edilmiş ve bu tarihten itibaren çevreden çıkan molozun döküm yeri olmuştur.

Marmaray-Metro Projeleri ve Limanın Keşfi

İstanbul'un trafik sorununun çözümüne yönelik olarak hazırlanan Marmaray ve Metro projelerinin Üsküdar, Sirkeci, Sultanahmet ve Yenikapı'daki istasyonlarının inşası öncesinde, tarihi dokuya sahip bu yerlerde İstanbul Arkeoloji Müzeleri Müdürlüğü 2004 yılında detaylı bir kurtarma kazısı başlattı. İstanbul tarihinin en kapsamlı arkeoloji kazılarına dönüşen bu çalışmalar sırasında, merkezi bir istasyonun kurulacağı Yenikapı'da, Antik ve Orta Çağ'ın bilinen en büyük limanlarından biri ortaya çıkarıldı. Yazılı kaynaklardan "Portus Theodosiacus/Theodosius Limanı" olduğunu bildiğimiz bu noktada, bir başkent limanının ihtişamına yakışan, bunun da ötesinde, Bizans Dönemi denizciliği, ticareti ve gemilerine ilişkin inanılmaz eserlere ulaşıldı.

Günümüzde denizden yaklaşık 500 m içeride kalmış olan bu noktadaki kazılar, İstanbul Arkeoloji Müzeleri uzmanlarının yanı sıra, elli arkeolog, sayıları beş yüzü bulan kazı işçisi ile elli sekiz bin m^2'lik bir alanda sürdürülmektedir (Res. 8). Dünyanın en büyük kent kazısı olan bu çalışmayla ortaya çıkartılan batık gemilerin çoğunluğunun belgeleme, yerinden kaldırma, konservasyon ve rekonstrüksiyon çalışmaları İstanbul Üniversitesi, Edebiyat Fakültesi Taşınabilir Kültür Varlıklarını Koruma ve Onarım Bölümü tarafından "İÜ Yenikapı Batıkları Projesi"[1] kapsamında sürdürülmektedir.

Batıklar Üzerindeki Çalışmalar

15 Mayıs 2008 itibarıyla on bir batık *in situ* olarak incelenmiş, belgeleme çalışmaları tamamlanmış ve kaldırılmıştır. Bu batıkların detay incelemeleri ve 1:1 ölçekli çizim çalışmaları ise halen devam etmektedir. Şimdiye kadar kaldırılan tekne ve gemilerin orijinal gövde formları ve eğimleri, olduğu şekli ile ya da küçük deformasyonlarla korunagelmiştir.

Dokümantasyon işlemlerinin ardından, gemileri oluşturan ahşap elemanların demonte edilme aşamasına geçilmiştir. Buradaki amaçlardan biri; birleşim detayı gözükmeyen parçaların ayrılarak inşa yöntemini belirlemekti. Diğer amaç ise, parçaların konservasyon için tek tek koruma altına alınmasındaki kolaylıktır. Gemilerin yattığı liman tabanında pek çok diğer arkeolojik eser bulunması, kütle kaldırmada iş makinesi kullanımını imkânsız kılmış, bundan dolayı, küçük bir örneğin dışında toptan kaldırma yöntemi tercih edilmemiştir.

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[1] Bu çalışma İstanbul Üniversitesi Bilimsel Araştırma Projeleri tarafından desteklenmektedir (Proje no: 2294).

Batıkların kaldırılmasında, değişik kaldırma yöntemleri kullanılmıştır. Gemilerin gövdelerini oluşturan kaplama tahtalarının "endaze" olarak adlandırılan eğimlerinin korunabilmesi ve ahşapların kaldırılma sırasında herhangi bir fiziksel zarara uğramadan yerlerinden alınabilmesi amacıyla geliştirdiğimiz yöntemlerin ilki, negatif kopyaların inşa edilmesiydi. Bu yöntemde ilk olarak, kaldırılacak kaplama tahtasının boy ve genişlik eğimi belirlenerek çizime aktarıldı. Oluşturulan taşıyıcı konstrüksiyonlar geminin içine, kaldırılacak kaplama tahtalarının üzerine yerleştirildi ve strafordan yapılan "ataçlarla" tek tek sabitlendi. Yenikapı (YK) 6 teknesinin karinasını oluşturan kaplama tahtalarının büyük bir kısmı bu yöntemle yerinden kaldırıldı.

Kaplama tahtalarının demonte edilmesi amacıyla geliştirdiğimiz diğer bir yöntem ise, geminin dış tarafından kullanılan "L" profilli taşıyıcılar ile kaplama tahtalarının, kaldırılması oldu. Bu uygulama "negatif kalıp" yöntemine göre çok daha modülerdi. Böylece YK 3, 8, 12, 7, 9, 15, 17 ve 18 batıklarının kaplama tahtalarının tamamı ile YK 3'ün farşları bu yöntemle başarıyla kaldırıldı.

YK 12'nin ambar kaplamalarının kaldırılmasında ise "epoksi gömlek" adını verdiğimiz öncekilerden farklı bir uygulamaya gidildi. Bazı yerlerinde 1-2 mm'ye kadar incelmiş ahşapların kaldırılmasına üzerlerine, tahtaları epoksi malzemeden korumak için ince alüminyum folyo serilmesi ile işe başlandı. Bunun da üzerine epoksi malzeme uygulanarak kalıpları çıkartıldı. Hızlı donan özellikte olan Araldite® FC 52 (ABC) uygun oranlarda hazırlanarak alüminyum folyonun üzerine sürüldü ve ardından elyaf kumaş ile desteklendi. Bu ince iskelet yine epoksi yardımı ile kalıba tutturuldu. Hazırlanan taşıyıcı kalıplar farş üzerine yerleştirilmeden önce çok ince sentetik tekstil kuşaklar farşın altından geçirildi. Ardından, hazırlanan taşıyıcı kaldırılacak farşın üzerine yerleştirildi ve farşın altından geçirilen tekstiller taşıyıcı konstrüksiyonun üzerine düğüm atılarak bağlandı ve formları %100 korunarak yerinden kaldırılabildi.

İç kaplama, eğri ve kaplama tahtalarının tek tek ayrılarak kaldırılmasının yanı sıra, özel bir teknik sayesinde, YK 6 teknesinin omurga ve omurgaya bağlı altı adet kaplaması birbirinden ayrılmadan, kütle olarak yerinden kaldırıldı. Teknenin mevcut kalıntısının etrafı 1 m genişliğinde ve 1 m derinliğinde kazıldı. Buraya 10x10 cm kesitli ahşap bir iskelet giydirildi. Strafor üzerine çizilen teknenin alttan ve üstten kesitleri dekupaj yardımı ile dikkatle kesildi ve yerlerine yerleştirildi. Böylece, sediment üzerinde yatan tekne 25 cm'de bir strafor yerleştirilerek, üzerinde yattığı kum tabakadan, tamamen strafor ve dolayısıyla kütle olarak taşınacağı ahşap konstrüksiyon üzerine alınmış oldu.

Konstrüksiyonun taşıyıcılığını artırmak üzere yan taraflarına ve üzerine dikme ve çapraz destekler atıldı. Bu sayede, teknenin kalan parçası kütle olarak yerinden alınarak, başarılı bir şekilde kazı alanında hazırlanan havuza yerleştirildi.

Batıkların Konservasyon ve Rekonstrüksiyonu

Yenikapı'da batıkların arazide devam eden belgeleme ve yerinden kaldırma çalışmalarına paralel olarak, gemi ahşaplarının pasif konservasyonu gerçekleştirilmiştir. Demonte edilen batıklar bu alanda oluşturulan 10 m boy ve 2x2 m genişlilikte, iki gözlü ve 1,20 m yükseklikte paslanmaz çelikten havuzların içine yerleştirilerek koruma altına alınmıştır. Havuzların üzeri ise bir çatı sistemi ile kapatılarak güneşin direkt ektileri engellenmiştir. Tuzdan arındırma prosedürü için ise havuzlardaki suyun sürekli yenilenen bir şekilde sirkülasyonu sağlanmıştır. Tüm bu süre zarfında da aktif konservasyonda kullanılacak metodoloji ve rekonstrüksiyon üzerinde bir dizi kapsamlı inceleme yürütülmüştür.

Batıkların suya doymuş ahşaplarının konservasyonunda PEG emdirmesinin ardından gerçekleştirilecek olan dondurarak kurutma yöntemi benimsenmiştir. Bu amaçla havuz bölgesinde inşa edilecek olan merkezimize yaklaşık 10 m boyunda, 2 m çapında bir vakumlu dondurarak kurutucunun kurulması kararı verilmiştir.

Batıklar üzerindeki inceleme ve konservasyon uygulamaların tamamlanmasının ardından oluşturulacak bir müzede sergi için rekonstrüksiyon çalışmalarına başlanacaktır.

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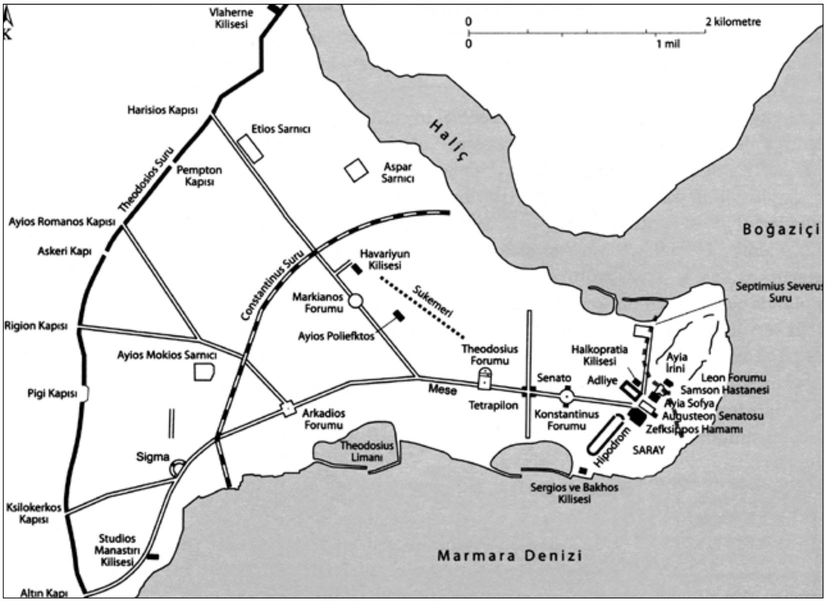
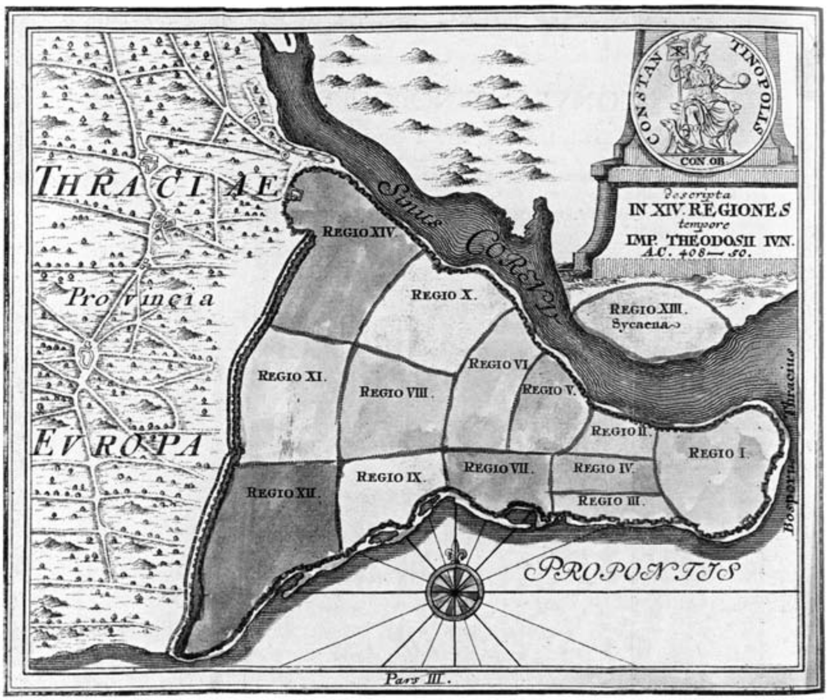


Map 1 Byzantine harbours along the Marmara coast (Haldon 2006: 72).



Map 2 Constantinopolis and Region XIV in the reign of Theodosius.

Fig. 1 View of Yenikapı excavation site (Photo: N. Kılıç).

Fig. 2 Negative moulds built for lifting planking fixed with Styrofoam 'clips' (YK 6) (Photo: I. Özsait Kocabaş).

Fig. 3 Lifting the ceiling using L-shaped carriers (YK 7) (Photo: U. Kocabaş).

Fig. 4 Stages of lifting very thin ceiling members with epoxy support (YK 12) (Photo: B. Kıyıcı).

Fig. 5 Stages of lifting very thin ceiling members with epoxy support (YK 12) (Photo: B. Kıyıcı).

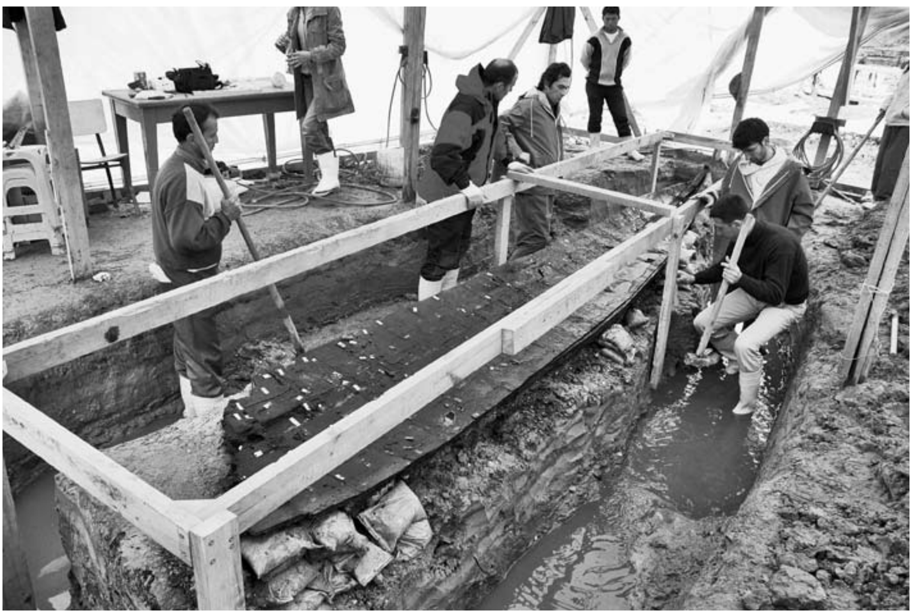


Fig. 6 Series of operations implemented from the beginning up to placing in the pool of the vessel in the method of lifting as a single mass (YK 6) (Photo: U. Kocabaş).

Fig. 7 Series of operations implemented from the beginning up to placing in the pool of the vessel in the method of lifting as a single mass (YK 6) (Photo: I. Özsait-Kocabaş).

Fig. 8 Series of operations implemented from the beginning up to placing in the pool of the vessel in the method of lifting as a single mass (YK 6) (Photo: D. Öztekin).

Fig. 9 Emplacing of ship elements into chests (YK 3) (Photo: U. Kocabaş).

Fig. 10 Emplacing of chests into desalinization pools (Photo: U. Kocabaş).

Fig. 11 Stainless steel pools manufactured for the conservation of the shipwrecks (Photo: N. Kılıç).