Figure 1: Cleaning and consolidation of mosaic floor in situ. Sardis, Turkey. Credit: Kent Severson
Resim 1: Mozaik tabanı in situ temizliği ve sağlanması. Sardis, Türkiye. Fotograf: Kent Severson

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Introduction
Mosaics are composite matrices consisting of small pieces of cut stone, pebbles, ceramic, or glass, embedded in a base of mortar or adhesive; where the embedded material is cut, the pieces are known as tesselae. Typical floor mosaic construction consists of a firm foundation of soil, subsoil or large stones, and several subsequent layers of mortar. The mortar used in most mosaics is a mixture of lime and aggregate (sand, pebbles and/or brick particles) with increasingly fine aggregates used in layers nearer the finished surface. The preparation of walls for mosaic construction is similar to that for floor mosaics, with generally thinner substrate layers and finer mortar aggregate particles. Rarely, floor mosaics will be bedded in mud mortar and wall mosaics constructed by embedding the tesselae in a layer of bitumen or natural resin-based adhesive.

Deterioration & Preservation Conditions
Damage to mosaics usually consists of breakage related to the detachment of substrates from supporting structures and the disassociation of tesselae from the mortar/tesselae matrix. Mosaics are fundamentally decorations for floor or wall surfaces, and so their preservation is integrally connected to the preservation of the primary structure in which they are constructed. Any movement in these structures will cause general cracking of bedding mortar and loosening of tesselae. Groundwater can also soften bedding mortars, leaving mosaics fragile and weak, and penetration by root growth can cause serious disruption. Mosaic matrices, and some materials used as tesselae (notably ceramics), are susceptible to damage from soluble salts present in groundwater. Similarly, water within the mosaic matrix may alternatively freeze and thaw, resulting in disruption and loosening of tesselae.

Excavation
Mosaics are best protected during excavation through control of movement on and around a deposit. Dislodged tesselae and mortar at broken edges create spaces for subsequent loosening of tesselae. The weight and movement of excavators will loosen tesselae and crush mortar beds where there are subsurface voids. All excavation traffic should be rerouted around a newly discovered mosaic and foot traffic limited to essential personnel.

When a mosaic is found, discontinue the use of heavy tools (picks or shovels). Damage during excavation can be mitigated by working backwards from existing boulders, provided sufficient depth of bulk is retained and the soil is compact and stable; otherwise, excavation must proceed either on a platform suspended above the mosaic, on well preserved floors, or on platforms resting on soft padding. The heavy weight and vertical orientation of wall mosaics make them especially vulnerable to detachment and collapse during excavation, since fill soil may be their only support.

Partially excavated mosaics require protection from rapid drying which may result in formation of salt efflorescence. Protection may consist of shading with a temporary structure,
a cover of plastic sheeting, and/or moisture-permeable synthetic mesh.

Initial cleaning can be accomplished with brushes or soft wooden picks; do not scrape with metal tools (trowels and knives). Remove small roots by cutting at the surface, not by pulling. While careful workmen may undertake initial cleaning, secondary cleaning should be done by trained personnel and may involve polishes containing aqueous chemical solutions or mechanical cleaning with low-power magnification and stainless steel scalps. In many cases, the appearance of a mosaic will be temporarily enhanced by wetting; however, pouring water on mosaics softens the bedding mortar and can cause erosion of supporting material. Limit wetting to the minimum number of events necessary for study and photography. When it is necessary to moisten mosaics, use a spray mist or damp sponge.

In Situ Preservation

In situ preservation of mosaics will likely include the application of mortar edgings. Consolidation and edging mortars are selected for thermodynamic and water transmission properties that closely resemble the original material. Slaked lime putty and hydraulic lime are the basic materials for most edging mortars and grouts. Modern Portland cement-based mortars have dramatically different properties from ancient mortars and plasters, and therefore should not be used for edging in situ mosaics. Consolidants consisting of thin mortar solutions (grouts) or synthetic resins can be injected to strengthen the mosaic matrix. The treatment of wall mosaics also includes facing and the insertion of metal (stainless steel or copper alloy) attachments to the substrate.

In situ preservation of mosaics usually requires construction of some form of protective shelter over the excavation, often prior to conservation treatment. Shelters must be designed to protect the mosaic from weather, vandalism and theft, and yet provide for access by visitors. A wide variety of shelters have been constructed for protection and display of mosaics in Turkey. The best examples are collaborative efforts between the architect, project director and conservator.

Lifting

Lifting mosaics from an excavation should only be considered when all possibilities for in situ preservation are exhausted or when excavation beneath the mosaic is absolutely required for research purposes. Prior to removal, a comprehensive plan for the subsequent conservation treatment (including backing and preparation of exhibition and/or storage space) should be developed and sufficient funds secured to complete the project. These plans will require coordination between the project director and local museum officials or regional Ministry of Culture representatives.

Lifting mosaics usually requires application of a strong, reversible facing. The mosaic is then cut from the bedding mortar and lifted or slid onto a temporary rigid support or possibly rolled, like a carpet. Once lifted, mosaics are duglayacak sentetik elyaf malzeme ile oluşturulacak geçici bir gölgelik yardımıyla yapılabilir.

Mozaik yüzeyinin ilk temizliği şarlar ve çok sert olmayan ahşap aletler ile yapılabilir; metal el aletleriyle kazımak (kirek ve kesikler) çok sakınmalıdır. Küçük bitki köklerini yüzey hizasında keserek terimizlemeli, asla geçerレス koparmaya çalışmalmandır. Deneysel ve dijital kapta bazı ölçüleri bu ön temizliği yapabilirler, ancak esas temizlik uygulamaları yalnızca eğilimli kişiler tarafından yürütülmeli; sivi kırışal gazetler emniyetli tamponlar veya paslanmaz çelik el aletleri yardımı ile mekanik temizlik yöntemlerine başvurulmalıdır. Pek çok durumda mozaik işlendikçe görünüşü geçici olarak iyileşir, desen ve renkler netlik kazanacaktır; ancak mozaik üzerine su dökme kanca yatağının zayiflamasına yol açacağı ve destekleyici tavanın erozyona uğramasına neden olacaktır. Özellikle çizim ve fotoğraflar çekimi sırasında gereklilik olabilecek "slatma işlemi"ni en aza indirmek gerekiyor. Bunun mozaik yüzeyine su püskürtülenek veya hassaf slatman bir stinger yardımıyla snelendirecek yapnak en doğru yakalar.

İn Situ Koruma


Mozaikın Kaldırılması

Kazi alanında mozaikin kaldırılması, in situ koruma seçene- klerinin hikâmesiz ve etkisiz kaldıgı koşullarda veya mozaikin bulunduğu alanın kaza çalışmalarının sürdürülmesi gerektiğinde (taban mozaikinin altındaki kalıntılar gün yüzüne çıkarılınmak istendiğinde) başvurulabilecek bir yöntemdir. Kaldırma işlemi öncesinde bu uygulanayı izleyerek tüm aşamaların hazırlan
Figure 2: Lifting mosaic by rolling onto a hollow drum after covering the surface with protective facing material. Sardis, Turkey. Credit: Kent Severson

Resin 2: Yüzeyi koruyucu destek malzemesi ile kaplanan mozaiğin içi boş tabıca santral kaldırılması. Sardes, Türkiye. Fotoğraf: Kent Severson

Figure 3: Removing adhesive from facing material after lifting mosaic fragment. Sardis, Turkey. Credit: Kent Severson

Resin 3: Mozaik parçası kaldırıldiktan sonra, yüzeyi kaplayan malzemeyi yerinde tutan yapıştırıcı temizlennmesi. Sardes, Türkiye. Fotoğraf: Kent Severson

Mozaiğin korunması ve sergileme için çeşitli yöntemler kullanılmaktadır. Sözlü konusuya planlama, proje yöneticisi, yerel müze yetkilileri veya Kültür Bakanlığı temsilcileri arasında bir işbirliği gereklidir.

Mozaiğin kaldırılması ve taşınması için sağlam ve geriye dönük olan bir yüzey desteği (yüzey kaplayıcı destek malzemesi) kullanılmaktadır. Bu destek uygulandıktan sonra mozaik yatak harcaması sona erer ve taşınma tabakası tabi tumbur üzerine çıkarlar, veya geçici serit bir panel üzerine kaydırılırak kazı alanından alınacak. Kaldırma işlemi tamamlanıktan sonra mozaikin son derece kirilmas ve tahribata açık olduğu unutulmamalıdır.

Yeni destek tabakası hazırlanmaya dek, orijinal yüzeyindeki destek tabakası taşınmayı güçlendirir; bu süreçte mozaiklerin güvenli, yanış riskine karşı korunaklı ve kurucu bir depoda saklanması önemlidir. Mozaiğin ağırlığı harc tabakalarının yerini alacak yeni taşıyıcı (destekleyici) malzeme ise bulunmanın sergilenmesine büyük ölçüde sebep olacaktır. "Petek" dokulu alüminyum paneller, kireçli harç karışım, sentetik reçineler veya bunların kombinasyonları kullanılabilir.

Mozaiğin Yüzeyin Yeniden Toprakla Örtülmesi

Kazı yapılan mozaikin korunmasına ve yeniden açılır haline getirilmesi için yeterli bütün aylamadığından güvenilebilir ilgili önlemler alınması sonunda, üzerinin kısa veya uzun süreli olarak yeniden
extremely vulnerable. Until new backing can be applied that will substitute for the original substrate, mosaics will require secure, fireproof, dry depot space. The choice of a backing material will depend on the ultimate destination and use of the artifact and may include "honeycomb" aluminum panels, new lime mortars, synthetic resins or a combination of the above.

Reburial
Increasingly, reburial is considered a good option for both short- and long-term preservation of excavated mosaics, particularly where resources are limited and there are security issues. Reburial usually includes installation of a stable, moisture-permeable material such as plastic mesh or geotextile (a synthetic resin mesh designed for subsoil applications). Subsequent protective layers may include a layer of sand, expanded clay or vermiculite, followed by a layer of soil.

Further Reading


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Field Notes is a series of essays written by professional conservators and archaeologists. They are intended for archaeologists, conservators and students as resource guides for the stabilization and preservation of excavated materials and archaeological sites.

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