buildings

MDPI

Article

The Stabilization of a Hellenistic City Square (Plaza) at the Kınık Höyük Archeological Site, Niğde Province, Türkiye

Deniz Üçer Erduran [1,*], Burak Yolaçan [2] and Lorenzo d'Alfonso [3,4]

1 Department of Architecture, Bilkent University, 06800 Ankara, Türkiye
2 Department of Archeology, Dokuz Eylül University, 35390 Izmir, Türkiye; burak.yolacan@deu.edu.tr
3 Department of Humanities, University of Pavia, 27100 Pavia, Italy; lorenzo.dalfonso@nyu.edu
4 ISAW, New York University, New York, NY 10028, USA
* Correspondence: deniz.ucer@bilkent.edu.tr

Abstract: In recent years, at the Kınık Höyük archeological site in Niğde province in Turkey, a city square (plaza) located in the town's acropolis was discovered. Context and spatial finds indicate that this stone-paved plaza dates to the Hellenistic era. It is made of a large cobblestone masonry structure made of local amorphous units that were fixed only with compacted earth. The conservation plan concentrated on enclosing the unbound free edges by using new pavement and a retaining wall to stop the ongoing decay because the plaza had already lost its integrity before the discovery. To distinguish between the original application and modern interventions, new cladding was designed and installed lower than the ancient pavement's level using smaller stones from the same source. Additionally, a retaining wall was planned and built to be plastered to achieve a plain surface, where the pavement's texture created contrast and highlighted neat craftsmanship. For this consolidation application, a hydraulic lime-based binder was combined with local earth for compatibility with the older application. The application's suitability and durability were demonstrated after it was observed for a few years while being subjected to atmospheric impacts without any protection. Therefore, the examination confirmed that the suggested method is safe to apply in situations where similar stabilization needs arise.

Keywords: Hellenistic Plaza; cobblestone floor; consolidation; eco-pozzolan

Citation: Üçer Erduran, D.; Yolaçan, B.; d'Alfonso, L. The Stabilization of a Hellenistic City Square (Plaza) at the Kınık Höyük Archeological Site, Niğde Province, Türkiye. *Buildings* **2024**, *14*, 2719. https://doi.org/10.3390/buildings14092719

Academic Editor: Yung Yau

Received: 4 July 2024
Revised: 21 August 2024
Accepted: 29 August 2024
Published: 30 August 2024

1. Introduction

The community's awareness of present heritage assets is a crucial component of landscape and built environment organizations that have been established later. Historical objects remain original, one-of-a-kind examples among contemporary structures while also bringing the historical details of their context into the present.

The parameters that govern the treatment of historical assets are typically shaped by settlement dynamics. Therefore, there are a variety of opportunities for and threats to preservation in populated urban centers, serene rural areas, and completely abandoned zones.

The design proposal to uncover buried air raid shelters in Borriana, Spain, which were actively used during the civil war, was a creative conservation suggestion for the city's public space [1]. Local governments made the decision to unearth a historically significant artifact that had been hidden, even if it was associated with a painful public wound, and incorporate it into the community's current life [1]. Considering this, an emphasized entrance design was created that maintained harmony with the surrounding older buildings while simultaneously providing access to underground shelters.

In the small-scale, rural appearance of Lübeck, Germany, a bold suggestion was made and put into practice: demolishing buildings from a later era to make room for the reconstruction of housing blocks from an earlier context [2]. Rebuilding a lost contextual layer with references to both tangible and intangible evidence appeared to be the main objective of the preservation strategy. To create a cluster that served as a powerful reminder of the past, new buildings were constructed utilizing the architectural style, methods, and materials of the time [2].

Integrating the heritage preservation approach into the possible repopulation of abandoned rural settlements offers a vital opportunity. A comprehensive study on the consolidation, restoration, and partial reconstruction of the existing vernacular architecture in the Spanish Central Pyrenees was carried out to create a livable and economically viable environment [3]. The study's conclusions demonstrated the dual benefits of optimum preservation and repair of the historically significant built environment and a reduction in the extreme human concentrations in urban areas [3].

Another effective preservation tactic is turning historic sites into open-air museums. While it contributes significantly to richness in both rural and urban areas, its value is highest in remote, already abandoned zones. Evident traces of Neolithic wooden architecture were discovered at the Aşağı Pınar archeological site in the Turkish province of Kırklareli [4]. Based on existing evidence and incorporating the ongoing vernacular practices of the surrounding rural settlements, an overall concept for an open-air museum was developed for the construction of a new lightweight shelter [4]. As a result, the general design strategy created the chance to revive the feeling of this Neolithic settlement during its original era for a contemporary audience.

Along with the potential benefits that come with preserving historic assets, there are also significant risks, particularly in relation to the application process. Making the right choices during the conservation approach for one contextual layer is crucial because doing so invariably causes the loss of other layers [5]. If these layers are sacrificed, a thorough recording using all the available media—such as sketches, images, texts, and preserved evidence—must be made [5].

For preservation projects, a delicate and reversible touch to existing heritage components is also essential. The new application should differentiate itself from the original in the most appropriate way possible, regardless of the extent of the intervention [5,6]. Similarly, to avoid confusion about what is original and what is recent, this difference needs to be easily noticeable [5]. This guarantees the audience receives trustworthy information from the asset, which is an important factor.

The Kınık Höyük archaeological site in Niğde province of Türkiye, on the northern edge of the Bor–Ereğli Plain in the south Cappadocia region, is situated in a rural area with nearby farming zones, small and distant settlements, and agricultural plots within its rich domain of heritage value. To rediscover and exhibit this legacy in modern times, excavations have been conducted since 2011, with the main goal of investigating the transition from the Late Bronze Age, Hittite period to the post-Hittite Iron Age [7,8]. The site, however, is characterized by multiple occupation periods [9]. Research from both the past and the present has led to a growing body of evidence linking the location to the Hittite city of Tupaziya and the classical and Byzantine centers of Dratai/Tracias/Drizion/Idrizion [10]. In particular, the 2006–2008 intensive survey at the site provided ceramic evidence of a Hellenistic occupation, and by 2013, archaeologists had unveiled atop the mound remains belonging to an urban center of the Hellenistic period.

A substantial number of finds at a range of scales were contained in this Hellenistic urban discovery. At the architectural scale, there were floors and walls of houses and streets, while the smaller scale featured unique votive finds shaped like bulls [11,12]. Above all, the urban scale finds included magnificent examples of walls and towers used for city defense, the monumental remnants of a cultic institution, and an exquisite plaza. After partially discovering this plaza, parts of which remain unearthed to this day, the team began documenting the original features and assessing the degree of deterioration over time. A preliminary examination indicated that consolidation was urgently required to stop the continued loss of stones.

As such, the present investigation comprises the full process of this discovery, its context, additional historical data, and the assessment of its significance in the introduction.

The continuing part of the introduction includes details on compatible materials, applicable consolidation strategies, and examples of similar construction methods in several contexts. The Materials and Methods section describes the design process for the consolidation, including technical drawings, considering key concepts and the anticipated results. It also outlines the application process, presenting key steps through text and photographs. The application's outcome, including its final appearance and follow-up of its condition, are described in the following section as the major results of this study. The Discussion section includes a comparison of the results with examples from the literature, with a focus on the material preference and long-term behavior. Lastly, for other researchers searching for answers to pavement deterioration of a comparable caliber, the conclusion includes the lessons learned from the entire process.

1.1. The Question of Hellenistic Sacred Cities in Central Anatolia

Building upon *The Geography* of Strabo and other ancient sources, historians have argued for the existence of a distinct type of urban center specific to the Anatolian Plateau during the Hellenistic period: the sacred city, or temple city. A temple city would have had a socio-economic organization different from the coeval poleis blossoming on the Mediterranean and Aegean coasts of Anatolia. In temple cities, wealth and political power would have been concentrated in the hands of the priesthood controlling the town cults; priestly power would have been institutionalized in the social and economic prominence of sanctuaries, which would have owned most of the cultivable land and herds around the city. Sanctuaries would have worked both as centralized cultic and storing institutions. Urban institutions such as theaters, boules, and Agoras, typical of a polis, would have been absent in temple cities. Recently, Greek historians and archaeologists have deconstructed the hard concept of a polis as opposed to other types of urban settlements: nonetheless, the difference from the Anatolian sacred cities presented above is still meaningful [13–16].

The whole question of the Hellenistic sacred cities of Central Anatolia is based on written sources, while archaeology has contributed very little evidence to it. In this respect, the excavation of the Hellenistic occupation at Kınık Höyük offers a new and, to date, unique case within the cultural heritage of Anatolia [9,17,18]. For this reason, the preservation of its archaeological remains represents an objective of primary importance for the current excavation project. The team of archaeologists, archaeometry experts, and restorers working at the Kınık Höyük research project have already treated several meaningful Hellenistic finds and have collaborated with the Niğde Archaeological Museum for their final location within the permanent collection exhibited at the museum [11,19]. From the very first campaign, a program on the preservation status of the architectural remains, tests on the composition and properties of the building materials, and sheltering of the excavation areas were implemented [12,20,21].

1.2. The Hellenistic Great Plaza and the Sacred District at Kınık Höyük

The ongoing excavations have shown that religious life at Kınık Höyük in the Hellenistic period was centered around an open space, the plaza (Figure 1). The great plaza was paved with stones and located at the northern edge of the town's citadel.

To the west, the plaza was defined by the poor remains of some steps and possibly a retaining wall dividing it from the small-pebble-paved court associated with a mudbrick building complex, named the "Northwestern Sanctuary" (Figure 2). A stone altar obtained through the reuse of limestone blocks was located in the plaza before the stairs leading to the sanctuary. To the north, the plaza was closed by the acropolis' defensive walls: the presence of a gate in these walls has been reconstructed. To the east, the plaza was limited by a building whose western wall is only partially exposed. There is an altar in front of this building, which leads researchers to interpret the building as a second sanctuary. Finally, the southern limit of the plaza was only partially explored in a sounding in 2022: there, remains of a staircase were unearthed. These stairs and a terracing system seem to connect the plaza to the upper part of the citadel where a residential area was unearthed in previous campaigns.

Figure 1. Drone photograph of the plaza, 2022.

Figure 2. Topographic survey of the plaza, 2022 (Red, dashed line indicates the border of the related year's investigation).

The rich assemblages of votive terracotta and marble zoomorphic statues and figurines unearthed on top of and in pits cutting the plaza are indicative of its role as the central public space for communal feasting, ritual processions, and the economic life of the ancient sacred city [9,11,18]. From an urbanistic and architectural point of view, this plaza and the whole district constitutes a unicum in Hellenistic Anatolia. Despite some pitting activity and a runoff impact which removed a portion of the floor, the state of preservation of the plaza is exceptional, and its construction technique and materials are so relevant that the Kınık Höyük research team, upon consultation with the Niğde Museum, opted for its stabilization in view of the restoration of the entire district.

1.3. The Plaza's Pavement and the Tradition of Cobblestone Floor Construction in Ancient Western Asia

Pebble and cobblestone floors were constructed in Western Asia from the Neolithic period at least. They were chosen to pave features requiring isolation from water and humidity, such as granaries, or even working and open-air portions of private and public buildings. Their use is also documented for paving lanes and alleys in settlements or even for paving large courts (e.g., [22–24]). From the Iron Age onwards, traditional versions of this flooring type were consistently favored in Anatolia. Thus, the cobblestone floor of the plaza dating to the second half of the 1st millennium BCE is the result of the application to a broad public space of a local architectural technique that had been in long-term use. Cobblestone and pebble stone pavements had been constructed at the very same site of Kınık Höyük at least from the 8th century BCE. One of them is a 2 × 2 m portion of a polychrome small pebble floor dating to the Middle Iron Age (8th–7th cc. BCE). This floor was exposed down to the southern section of the trench, but it likely continues to the south under the western portion of the great plaza. This allows us to speculate on the possibility of a continuity of a similar pebble-paved open space in the same area of the citadel between the first and the second half of the 1st millennium BCE [25].

The building technique of the cobblestone pavement of the great plaza shows quite an advanced degree of accuracy. Traditionally, no mortar was used in the preparation of this type of pavement in Central Anatolia: the use of a binder with approximately 7 cm cobbles became prevalent only in 19th–20th century decorative garden surfaces with cement-based mortars [26]. Before that, the stones were laid with their wider flat side upwards on a preparation of soil. In the Late Bronze Age large courtyard of the Temple of Area A at Uşaklı Höyük, the stones were laid onto a beaten earth surface [27]. The polychrome small pebbles defining the Iron Age floor exposed in Sector A2 at Kınık Höyük, instead, were laid into a clay layer, providing very compact embedment for the stone pavement. Compared to these earlier examples, the construction technique of the plaza follows the common structural layers of floors of the Greco-Roman period, including mosaics, comprising (from the top to the bottom) the paving, a bedding layer, and a load-bearing sub-base laid on the natural ground [22,23]. These pavements were mostly flexible in that they were separated from their sub-base. This flexibility was advantageous, as it allowed a certain degree of movement under impacts and percolated the water through the section [28,29].

The floor in question at Kınık Höyük was built over a surface at an average elevation of 1214.80 m asl. A deep trench discovered in a portion of the floor exposed a section of the layers under the floor. To provide a stable foundation for construction, a muddy compact make-up layer of soil was first applied, or the existing ground was firmly compacted. On top of it, there was a chipped-stone preparation layer, consisting of broken limestone chips of about a 2 cm thickness. It seems that this sub-floor was designed to ensure proper water penetration and to address surface leveling issues. Consistent with the flooring traditions documented in the literature, these aspects made for a flexible and permeable paving surface. Above the limestone chips, a sandy soil layer of 15 cm served as an embedment for the cobblestones and allowed water to percolate and avoided paddles and/or damage to the floor. Over this sandy bed, the stone pavement consisted of cobblestone. The surface sizes of these round flat paving stones range widely, from 10 to 40 cm, and they are typically buried in the earth at no less than 5 and 6 cm deep. The stones present different shades of black, white, yellow, and pink and alternate between soft and hard textures. The original stabilization of the flooring at its construction was enhanced by compacting earth between adjacent stones, a so-called interstice mortar. Figures 4 and 5 shows how they appear and Figure 6, Section A entails an approximate representation of these original construction layers.

1.4. Searching for the Consolidation Strategies: Repair Methods for Ancient Cobblestone Pavements

Prevalent wearing issues for this kind of flooring are generally classified according to two criteria: structural deterioration and surface damage [28–31]. Commonly faced structural problems are cracks, cavities, and voids that penetrate the lower layers; missing sections and borders; detachment between layers; and relative settlements and rises. Common surfaces changes are corrosion, crumbling, surface deposits, infill mortar loss, and color change.

Conservation procedures entail documenting the existing conditions, determining the damages, selecting the proper repair methods, cleaning, applying the repairs, documenting the final condition, and ensuring proper and timely maintenance. All alterations should be cognizant of the existing flooring patterns and the traditional bonding techniques, and they should be distinguishable and replaceable while offering a certain level of harmony with the existing material [5,28–32]. Predominant structural repairs include edge/border completion; the consolidation of missing sections or layers; and integrating old and new sections. Flexible and water-pervious solutions should be used to properly address the consistent mechanical behavior of the entire surface. Long-term stability can only be provided by this appropriate choice of materials [33]. Lime-based mortars are the most suitable in this kind of conservation treatment, as they are optimal in absorbing movement, and by being degradable, they do not damage floor units. Furthermore, naturally hydraulic lime mortar provides the best results under harsh environmental conditions [29,31]. A suitable generic mortar mix consists of one part naturally hydraulic lime to two parts of sharp/crushed sand of a suitable color, graded from 3 mm down to dust [29]. The proper contemporary aggregates are mostly quarry dust or fine gravel.

The in situ consolidation of ca. 2000-year-old cobblestone floors built without mortars is unprecedented in Anatolia. Hence, the most fitting comparisons are with terracotta or mosaic floors of the classical period. The traditional fired clay floor of the 5th century BCE Agora in Kybira (the Burdur region) showed structural damage and was consequently strengthened in 2015 [34]. The floor's original section consisted of ceramic drainpipes that were laid on a sub-base and covered and compacted with a crushed stone and earth mix. On top of these layers were fired clay tiles that were firmly inserted into the last sub-layer and fixed with interstice mortar at intervals. Initially, the conservation project addressed the shifted edges of the pavement by strengthening them. The proper volumetric mixture ratio was obtained after tests: 2 units of 0.2 mm river sand aggregate, 2 units of fossiliferous limestone (küfeki) dust of about 0.2 mm, 0.75 units of about 2 mm crushed clay roof tiles, 0.75 units of about 0.4 mm crushed clay roof tiles, 0.50 units of pulverized clay roof tiles, and 3 units of lime [34]. This mixture was only used for the damaged sections; the original cladding ceramics were relocated, and they were applied with a slightly altered composition of the same mortar to match the original color.

Both structural and surface problems appeared in the 4th century CE mosaic floor of the Agora in Smyrna (modern İzmir), and they were both addressed during a 2008 program of restoration and consolidation. Cracks, depressions, and the loss of sub-layers and tesserae were the major damages: therefore, the main repair strategy consisted of engineering a compatible mixture that could replace all the losses. The mixture consisted volumetrically of 1 unit of sieved river gravel, 1 unit of powdered brick, and 1 unit of stone dust, hydraulic lime, and acrylic resin [35].

Finally, the 5th century CE mosaic floor of the Basilica in Myndos (the Muğla region) underwent renovation due to decay affecting various levels. The lime-based mortar used in this project and consistent with the existing Nucleus and Rudus sections combined hydraulic lime, finely sifted sand, marble powder, and brick powder [36]. Beds were settled, depressions below the original surface level were raised, and mortar fills were added.

2. Materials and Methods

Although the paving had already lost its integrity long before its discovery, a series of distinct geometric clues allow us to speculate on its original layout and historical phases. The larger exposed section to date is approximately 11 m in length and 7 m in width.

After surface cleaning and visual inspections, it became evident that the major damage to the surface consisted of free edges that either had already drifted due to natural impacts or that were very susceptible to potential movement due to further natural settlement, pedestrian traffic, upcoming excavation sessions, and adverse weather conditions. Hence, the main conservation program focused on bordering the unbound free edges by employing two different repair strategies based on the characteristics of these edges. These interventions were implemented by an experienced team comprising a restorer and an architect under the direct guidance of the archeologists that had been involved in the excavation.

The free edges in Section A (Figure 3) were only about 50 cm from an opposite stone wall, resulting in there not being enough working space to build a retaining wall. Hence, the main repair in this area consisted of filling the gap with suitable materials and cladding the surface. The opposite stone provided the edge's limit for this infilling action, and it might very well have functioned as the original edge of the pavement in antiquity as well. The required dimensions of this intervention were approximately a 6 m length, a 4 square meter surface area, and a 50 cm infill depth, as diagrammatically shown in Figure 6, Section A. The initial step of the conservation was laying a geotextile fabric cloth at the bottom of the infill to ensure complete separation between the ancient layers and the recent interventions. Over this cloth were piled up, layer by layer, soil, stones, mortar, and stray ceramic sherds found in earlier excavation seasons, as dimensionally documented in Section A of Figure 6. River stones, measuring no more than 10 cm, were ultimately used to cover these strata (Figures 4 and 5). The main infilling involved stacking boulders that were between 15 and 20 cm in size to provide a solid and leveled foundation for the new compacted earth layer. The original application's concepts were then repeated using sherds and earth infills, and paving was added as the finishing touch.

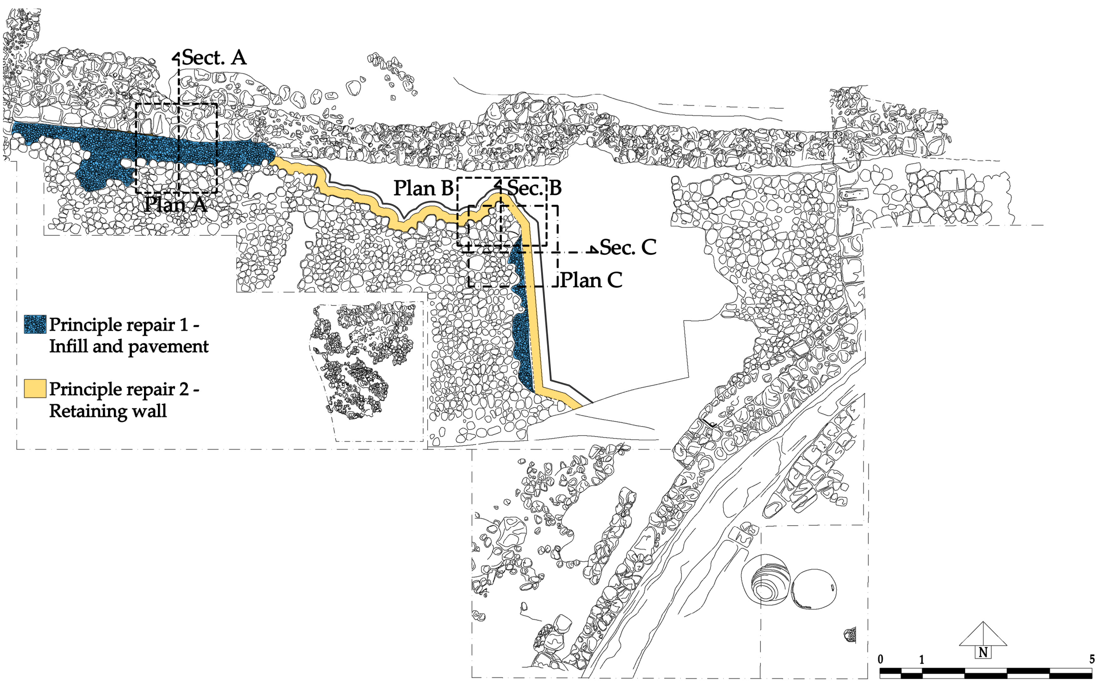

Figure 3. Two principal repair methods for the pavement.

Figure 4. Initial layers, geotextile and boulders, Section A.

Figure 5. Infilling and cladding, Section A.

The new stone floor cladding was designed to be lower than the original ancient pavement's level (Figure 6). Moreover, new cobblestones were picked so that they were distinctly smaller than the existing ones. These two parameters were integrated to emphasize the difference between the original and restored textures and make this explicit for all visitors. It is essential to ensure this distinction to accurately inform the audience about the extent of the conservation in relation to the actual context.

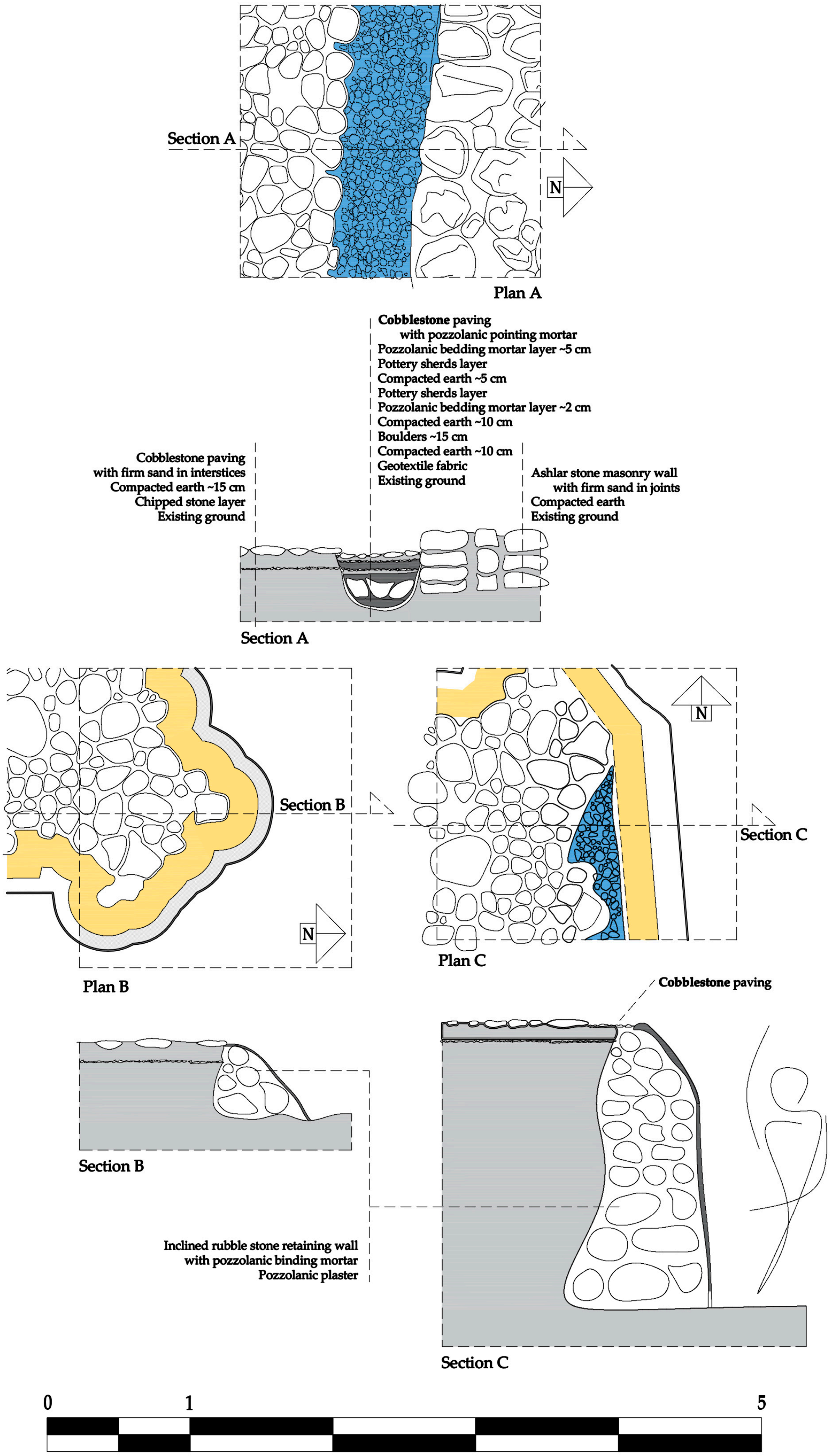

Figure 6. Repair details (Blue hatch stands for principal repair 1, infill and pavement; yellow hatch stands for principal repair 2, retaining wall construction. The color coding is consistent with Figure 3).

Due to the large gap in the flooring down to the relevant substrata around Sections B and C, it was decided to build a new retaining wall. It turned out that a wall about 12 m long would be needed to cover the necessary unbound edge. The wall height was adjusted according to the levels of the adjacent floor surface, resulting in an overall height varying from 50 cm to 150 cm. The wall was built utilizing appropriate stones that were in situ and did not have contextual significance if their size was also appropriate. At its base, the wall measured 60–70 cm in thickness, while the new wall's uppermost portion measured 20–25 cm. The inconsistency of the backing earth layer, where the new wall filled in all the space and compacted the soil, was the cause of this significant difference in thickness, as diagrammatically shown in Figure 6, Sections B and C. Utilizing present stone units ranging in size from 20 to 40 cm, a running bond was employed during construction for improved mechanical integration. The wall was designed to be plastered to obtain a solid, flat, and plain surface, where the texture of the pavement could create a contrast and be expressed much better. Moreover, earth-based plaster was chosen to recall the natural earth instead of indicating the presence of a wall under the delicate stone floor. Plaster added another layer of distinction between these walls and the original walls at the Höyük, bare ones, which helped us to accurately inform the community by pointing out the actual and recently introduced features. An identical new floor covering was also installed on top of a small portion, as given in Figure 3, Plan C, which turned out to have a surface area smaller than one meter squared.

All of the required components and materials mentioned above were sourced either from the site itself without significant contextual value or from the close surroundings, thus prioritizing the use of local materials.

The cladding stones were collected from a riverbed that is located 3 km from the Höyük, while the aggregates used in the new mortar were acquired from a quarry 10 km away. As for the binder for this mixture, it was decided to continue utilizing the same product that had already been tested on earlier interventions on similar stone and mudbrick masonry walls and that had given satisfactory results. The binder, MAPE-ANTIQUE F21, like the ingredients used in traditional masonry wall construction, is a mix of hydraulic lime and eco-pozzolan that fits very well within the criteria of flexibility and permeability, as indicated in the available literature dealing with floor conservation. As mentioned in the previous section, data from successful conservation efforts and their recommendations showed that the most common mortar ratios were one unit of binder to three to six units of different aggregates [34–36]. Accordingly, at the Hellenistic Plaza of Kınık Höyük, a volumetric ratio of 1 unit of binder, 3 units of different aggregates, and 0.75 units of water was preferred for the mortar. The aggregate comprises equal volumes of 5 mm crushed basalt, basalt dust, and 2 mm river sand. This mixture worked well as a bedding mortar for new cladding, as well as being a bonding element for the individual stones used to build the retaining wall.

In accordance with the floor conservation process, a geotextile fabric cloth was employed during the retaining wall construction in Sections B and C to differentiate between the original layers and the contemporary interventions. After construction, the wall was completely plastered over, as designed initially (Figure 7). Soil from the site was added to the mixture of the plaster, which contained 1.5 units of binder (MAPE-ANTIQUE F21), 1 unit of 5 mm crushed basalt, 1 unit of basalt dust, 1 unit of 2 mm river sand, 1 unit of earth, 0.5 units of straw, and 1.5 units of water.

The entire application process was realized in about two weeks with the active participation of the design team (i.e., the restorer and architect) and three experienced local workers, who worked under the direct guidance of the field archeologists. The implementation phase was conducted according to the principal planning details, and it was finalized without any further problems.

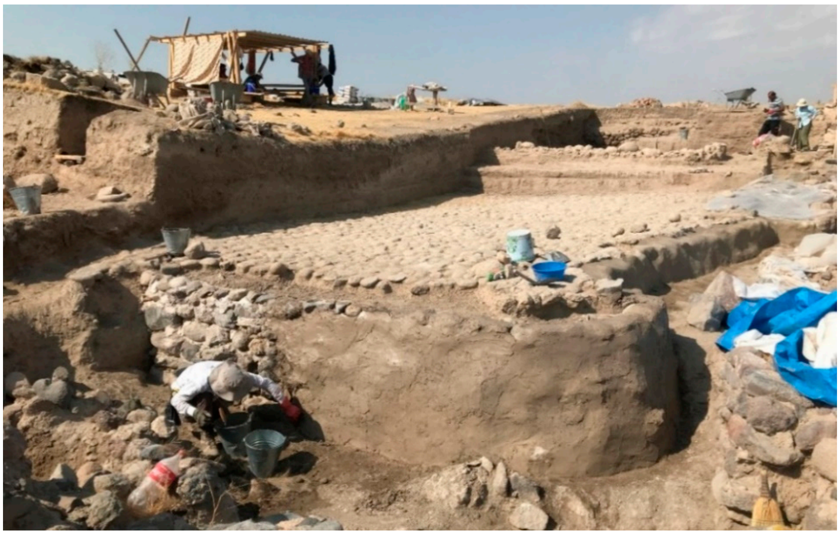

Figure 7. Construction of the retaining wall and plastering process.

3. Results

The application resulted in a final product that met the design goals visually. The unit material sizes, the surface levels, and the introduction of plaster all helped to satisfactorily ensure the ability to distinguish between the ancient remains and the recent interventions, as shown in Figures 8 and 9.

Figure 8. Section A after conservation.

Figure 9. Section C after conservation.

After the mortar had completely dried and the initial settlements had occurred, a control investigation was completed. The intactness and the unit loss prevented at the unbound edges provided evidence of a satisfactory mechanical level having been reached. The condition of the conserved area was in general successful, apart from two observable issues, as shown in Figure 10. The first one was the final color of the plaster on the retaining wall, which turned out to be more grayish than expected. The aim was to mimic the color of the local soil, but the preponderant use of gray hydraulic lime mortar to ensure the stability of the wall clearly affected the final appearance.

Figure 10. The Hellenistic Plaza after restoration in 2020.

This indicates that the amount of soil within the plaster mixture needs to be increased if color matching solutions are sought for future interventions. However, while this change in ratio will likely solve any issue of color matching, it will probably cause cracking or spalling due to the lack of binder in the plaster mixture. Therefore, further fine assessments for a mortar mixture exactly compatible with this kind of repair will need to be conducted in the event of future interventions.

The other observed issue is the accumulation of water in some areas of the new cladding. The reason behind this accumulation rests in minor workmanship errors and slight initial settlements, which are to be expected. Thanks to the permeability of the applied pavement technique, as well as the mortar itself, these small accumulations were not assessed as risky.

Three years later, in the 2023 season, after removing small plants that had grown within the interstice mortar, an initial visual assessment showed that the original pavement and the recent additions had withstood harsh seasonal changes (Figure 11). Even the color of the plaster had a more buff appearance when compared to the grayer color after the initial drying, and this resulted in a closer approximation to what the original design expectations had been. Excavations continued in areas all around the plaza, meaning that besides weathering, the intervention could also withhold pedestrian traffic and working activity. The visibility of the monuments to visitors is also an additional value of the intervention.

Further investigations revealed a certain degree of spalling of the mortar and some detachment of the cobblestones in some areas of the repaired portions. Although these spots were easily repaired following the same techniques employed during the previous year, these instances revealed the need to reconsider the ratio of material adopted in the mortar composition. These investigations are ongoing and involve consultations with chemical engineers that specialize in historical mortars. The results of any changes or upgrades in upcoming conservation strategies, materials, and implementations will be shared in future contributions.

Figure 11. The plaza three years after consolidation, in 2023.

4. Discussion

The importance of the observability of the interventions made to an existing structure is a crucial component of the ICOMOS recommendations [5]. This principle's significance rests in communicating with visitors accurately and informatively. Nevertheless, making an application that is wholly unrelated to the original also leads to similar major issues. As such, the primary task is to ensure that the new element is distinguishable while still being in harmony with the existing one. Discussions have been sparked by examples that were incongruous, like the renovation of the theater steps in Aspendos, Antalya, Turkey, which utilized white marble with a glossy finish to complete the original elements' rough, grayish texture [37]. While some conservation experts have focused on the long-term harmony—which is anticipated to match the existing tissue with expected decay over time—others have highlighted the issues with the material selection and application [37].

Thus, in several ways, the plaza's consolidation at Kınık Höyük revealed the parameters of this balance. The first was the choice of nearby material sources, which offered respectable continuity and harmony with the original pavement and had comparable geometries, color ranges, and textures. Conversely, to emphasize and reinforce recognition of the intervention, much smaller stone sizes were applied at a lower surface level. In addition to helping with this, the lower surface level around the edges technically made it easier for surface water to filter to the earth's level.

Similar discussions have been sparked when renovation has caused new issues in addition to solving the ones that already existed, as frequently observed in the reputable literature. One example is the conservation of the Ani City Walls in Kars province, Turkey, where the original construction dates to the tenth century [38]. To infill stone masonry walls, cement-based mortar was chosen over the original lime-based mortar. The selection of cement resulted in incompatibility; even though it was meant to be strong, caused impermeability; and stored water, eroding the original texture through cracks.

Taking everything into consideration, the retaining wall built for the plaza at Kınık Höyük has proven mechanical and physical compatibility. Harmony was ensured for long-term durability by using identical in situ stones and permeable and medium-strength mortar plaster mixtures. Additionally, plastering over the stones improved their preservation and provided a smooth surface that did not overpower the surrounding pavement's texture in terms of the overall view.

5. Conclusions

The stabilization of a unique Hellenistic Anatolian monument—a temple city's central plaza with stone pavement—brought three implications to light in this work.

The assessment of the plaza's significance at multiple scales is the first point of significance. The city, a significant asset at the time, indicates that society needed a place to congregate. The location of the plaza at the top of the hill, with its surrounding civic buildings, ideal natural surroundings, and cool breeze, seems likely to have efficiently fulfilled this need. Recent discoveries of neighboring sanctuaries, religious statues, and votive figures support this theory. Finally, the remarkable craftsmanship of the stone pavement attests to the relevance of the plaza at the time.

The second point of significance stems from the plaza's accumulated historical significance, which raises the question of how long it could last and still leave an impression on onlookers. Due to the dearth of information on the preservation of this kind of pavement in the relevant literature, research was conducted on general conservation principles and documented restorations of comparable floors, primarily mosaic floors, and an effective methodology for applicability was developed. The procedure involved discovering the original application, using the same techniques and methods again where it was feasible, and adding new ones when needed to target both the final appearance and the visitors' educational experience. With an emphasis on selecting the appropriate materials and techniques, this was accomplished in a reversible and non-destructive manner.

The creation of a thorough report, complete with step-by-step instructions, text-based explanations, and photographs of certain stages, detailing the intentions held during the design process and the actual applications made in situ, is the third important asset of the current study. The report was tailored to be a long-term record that incorporated observations of the consolidation's durability performance in the ensuing years.

The application that was processed revealed the following advice for researchers working on comparable conservation cases: Because cobblestone pavements installed in comparable environments are water-permeating and mechanically flexible, their consolidation calls for a version with these appropriate features. All the application layers should be planned in this manner, with special attention to the binder selection for plaster and mortar. Otherwise, despite the good intentions of conservation, the integration of a rigid and fixed body will result in mechanical cracks, and trapped water will deteriorate the surroundings, eventually damaging the original structure.

Due to the original method's unit-based masonry construction, this floor type tends to lose its unbound edges as individual stones break off over time. Bordering these loose edges has crucial importance for durability, where the definition of a reliable border is the key. As shown in the Section A drawing in this study in Figure 3, integrating an existing border, like a wall nearby, can be an option. In these situations, the indentation should be filled in using the original pavement's layers, and the application should be completed with the proper finish. Finishing ought to be carried out in accordance with conservation principles, which place an emphasis on distinguishability and harmony. As a suggestion, the current study's solution involved using identically sourced, similar-looking stones with a smaller size applied at a shifted surface level.

If a bordering body is not present, as in the case of the haphazard robbery pits that emerged in the current case, building a retaining wall is an effective solution. However, these walls are physically and visually heavy and run the risk of projecting themselves forward and taking over the historic scene. Researchers should try to find a way to lessen this visual dominance, as it is an undesired appearance in an archeological context. In the present study, the solution was to conceal the presence of new walls with plaster that had an earth tone. The idea's effectiveness is demonstrated in the final image, where the wall appears to be part of the earth itself. This result was guaranteed by the plaster mixture's incorporation of local aggregate, particularly the in situ soil, although the researchers are currently looking for ways to improve it with a more proper recipe.

Thanks to the developed consolidation strategy outlined in this text, the floor is still open to the public today, allowing them to discover its value in its actual atmosphere as an open-air public plaza.

Author Contributions: Literature survey on the archeological background, L.d. and B.Y.; introductory explanation of the Kınık Höyük excavation process, L.d.; literature survey on materials and consolidation techniques, B.Y. and D.Ü.E.; design of the intervention, L.d. and D.Ü.E.; application drawings and process photos, D.Ü.E.; drafting, editing, and proof-reading, L.d., B.Y. and D.Ü.E. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the ISAW-NYU research allowance of Dr. d'Alfonso with KINIK_2024 file name, and the APC was funded through the collaboration of the REHABEND conference organizing team and the Editorial Team of the Buildings journal.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors on request.

Acknowledgments: After being presented at the REHABEND 2024 conference, this paper was included in this journal due to the positive feedback from the organizing team. We would especially like to thank the conference organizing team and the editors of this Special Issue.

Conflicts of Interest: The authors declare no conflicts of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of the data; in the writing of the manuscript; or in the decision to publish the results.

References

1. Fausto, I.C.; Forner, E.F.; Lanzarote, B.S. The new entrance to the Camí d'Onda air-raid shelter in the historic center of Borriana, Spain. *TECHNE-J. Technol. Archit. Environ.* **2020**, *19*, 290–297.
2. Caja, M. Reconstructing historical context. German cities and the case of Lübeck. *ANUARI D'arquitectura I Soc.* **2021**, *1*, 38–58. [CrossRef]
3. Fernández, I.G.; Schoonjans, Y.; Gantois, G. The regenerative force of depopulated settlements. Reclaiming rural heritage in Jánovas. *ANUARI D'arquitectura I Soc.* **2022**, *2*, 52–85.
4. Eres, Z. An Experimental Model towards the Solution of Problems Concerning the Protection, Restoration and Presentation of Prehistoric Sites: The Case of Kırklareli–Aşağı Pınar. Master's Thesis, Istanbul Technical University, İstanbul, Türkiye, 1999.
5. ICOMOS. International Charter for the Conservation and Restoration of Monuments and Sites. The Venice Charter 1964. Available online: https://www.icomos.org/images/DOCUMENTS/Charters/Venice_Charter_EN_2023.pdf (accessed on 1 June 2023).
6. Williamson, K.; Martinez-Molina, A.; Dupont, W. In situ Assessment of HVAC system impact in façades of a UNESCO world heritage religious building. *ANUARI D'arquitectura I Soc.* **2021**, *1*, 146–168. [CrossRef]
7. d'Alfonso, L.; Balza, M.E.; Mora, C. Ten years of research in southern Cappadocia: History, archaeological investigations, and ancient landscapes. *News Lands Hittites* **2017**, *1*, 15–32.
8. d'Alfonso, L.; Matessi, A.; Mora, C. Kınık Höyük and south Cappadocia after the end of the Hittite empire: New results and a reassessment. *News Land Hatti* **2021**, *3*, 59–95.
9. d'Alfonso, L.; Yolacan, B.; Castellano, L.; Highcock, N.; Casagrande-Kim, R.; Gorrini, M.E.; Trameri, A. Niğde Kınık Höyük: New evidence on central Anatolia during the first millennium BCE. *Near East. Archaeol.* **2020**, *83*, 16–29. [CrossRef]
10. Matessi, A.; Gürel, A.; Kuzucuoğlu, C.; d'Alfonso, L. East of Konya: Settlements, routes and environment in southern Cappadocia, and the political landscape of south central Anatolia during the second millennium BCE. In *Crossroads-Kavşaklar: Konya Plain from Prehistory to the Byzantine Period*; Maner, Ç., Ed.; Ege Yayınları: İstanbul, Türkiye, 2019; pp. 131–160.
11. Casagrande-Kim, R.; Üçer Erduran, D.; Frank, E.; Güngör, I. From excavation to vitrine: The afterlife of late Hellenistic bovine terracottas from Niğde Kınık Höyük. *Near East. Archaeol.* **2022**, *85*, 44–53. [CrossRef]
12. Setti, M.; Nieto, P.; Sanchez, N.V.; Cultrone, G.; d'Alfonso, L. From ancient construction, through survival, towards modern conservation: Characterization of fine-grained building material at Niğde-Kınık Höyük (Cappadocia, TR). *J. Archaeol. Sci.* **2021**, *13*, 79. [CrossRef]
13. Ramsay, W.M. *The Historical Geography of Asia Minor*; William Clowes and Sons: London, UK, 1890.
14. Rostovtzeff, M.I. *The Social & Economic History of the Hellenistic World*; Clarendon Press: Oxford, UK, 1941.
15. Boffo, L. *I re Ellenistici e i Centri Religiosi dell'Asia Minore*; La Nuova Italia: Napoli, Italy, 1985.
16. Williamson, C.G. *Urban Rituals in Sacred Landscapes in Hellenistic Asia Minor*; Brill: Leiden, The Netherlands, 2021.
17. Yolaçan, B.; d'Alfonso, L. Niğde Kınık Höyük'te geç akhamenid ve Hellenistik dönem'de kült pratikleri: Bir kültürel etkileşim vakası/Le istituzioni cultuali di Niğde Kınık Höyük nell'età tardo achemenide ed ellenistica: Un caso di interazione culturale. *Arkeol. Ve Sanat* **2019**, *160*, 1–10.
18. Trameri, A.; d'Alfonso, L. The sacred city of Kınık Höyük: Continuity and change in Cappadocia (Turkey) between the late Achaemenid and late Hellenistic periods. In *The Transition from the Achaemenid to the Hellenistic Period in the Levant, Cyprus and Cilicia: Cultural Interruption vs. Cultural Continuity*; Held, W., Ed.; Eigenverlag des Archäologischen Seminars der Philipps-Universität Marburg: Marburg, Germany, 2020; pp. 65–81.
19. Highcock, N.E.; Yolaçan, B.; d'Alfonso, L. Archaeological excavations at Niğde-Kınık Höyük. Campaigns 2018–2019. *Athenaeum* **2020**, *108*, 568–579.

20. Cinieri, V.; d'Alfonso, L.; Morandotti, M. Building techniques of fortified structures at Kınık Höyük in southern Cappadocia (Turkey). In Proceedings of the 9th International Conference on Structural Analysis of Historical Constructions, Mexico City, Mexico, 14–17 October 2014.
21. Morandotti, M.; Zamperini, E.; Cinieri, V. Temporary shelters for the archaeological excavations at Kınık Höyük. Considerations after three years of work. In Proceedings of the World Conference on Timber Engineering (WCTE), Vienna, Austria, 22–25 August 2016; pp. 6179–6187.
22. Young, R. Early mosaics at Gordion. *Expedition* **1965**, *7*, 4–13.
23. Naumann, R. *Architektur Kleinasiens von Ihren Anfängen bis Zum Ende der Hethitischen Zeit*; Verlag E. Wasmuth: Tübingen, Germany, 1971.
24. Düring, B.S. *The Prehistory of Asia Minor: From Complex Hunter-Gatherers to Early Urban Societies*; Cambridge University Press: Cambridge, UK, 2011.
25. Yolaçan, B.; Pucci, M.; d'Alfonso, L. Archaeological excavations at Niğde–Kınık Höyük 2020–2021 Campaigns. *Athenaeum* **2022**, *110*, 584–596.
26. Ucar, A. Examples of pebble mosaic in Izmir houses. *Süleyman Demirel Üniversitesi Fen-Edeb. Fakültesi Sos. Bilim. Derg.* **2013**, *28*, 13–28.
27. D'Agostino, A. A mosaic floor from the Late Bronze Age building II of Uşaklı Höyük, Central Turkey. *Nature* **2019**, *93*, e36. [CrossRef]
28. The Getty Conservation Institute. *Mosaics in Situ Project: Illustrated Glossary*; The Getty Conservation Institute: Los Angeles, CA, USA, 2003.
29. McLoughlin, R. *Paving the Conservation of Historic Ground Surfaces*; Government Publications: Dublin, Ireland, 2015.
30. Lyons, A. *Materials for Architects and Builders*; Routledge: London, UK, 2014.
31. Şener, Y.S. Arkeolojik alanda in situ (yerinde) mozaik koruma yöntemleri. *J. Mosaic Res.* **2012**, *5*, 201–220.
32. Liu, D.; Meng, X.; Ao, T.; Cao, K. Experimental study and effectiveness evaluation on the rapid antiquing of red sandstone in ancient buildings restoration. *Buildings* **2024**, *14*, 751. [CrossRef]
33. Ali, B.S.; Castro, J.J.; Omi, S.; Nazimi, K. Preserving the past: Investigating Zanzibar's ancient construction materials for sustainable heritage conservation. *Buildings* **2024**, *14*, 2129. [CrossRef]
34. Sayın, E. Kibyra kenti Agora I. teras caddesinde yer alan zemin döşemelerinin koruma ve onarim çalışmaları. In *Sosyal Bilimlerde Güncel Akademik Çalışmalar*; Evsile, M., Serbestoğlu, I., Öcan, T., Eds.; Gece Kitapligi: Ankara, Türkiye, 2018; pp. 99–116.
35. Ersoy, A.; Yolaçan, D. Conservation work on the mosaics in the mosaic hall in Smyrna Agora. *J. Mosaic Res.* **2012**, *5*, 71–80.
36. Şahin, D.; Şener, Y.S. The Basilica mosaic on Asar island at Myndos. *J. Mosaic Res.* **2015**, *8*, 141–166.
37. Çınaroğlu, A.; Eskici, B.; Söğüt, B.; Çelik, N.; Alanyurt, U. Aspendos Tiyatrosu ve Restorasyon Tartışmaları. *Aktüel Arkeol.* **2020**, *3*, 36–42. Available online: https://aktuelarkeoloji.com.tr/kategori/roportajlar/aspendos-tiyatrosu-ve-restorasyon-tartismalari (accessed on 20 June 2024).
38. Yaşa, S.Ş. Ani city walls, preservation problems and suggestions for the solution. *J. Turk. Stud.* **2014**, *9*, 978–990.