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A Proposal for the Conservation and Integration of Historic Diyarbakır City Walls: the Urfa Gate, Towers and City Walls

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City walls, Conservation, Diyarbakır, Heritage, Structural damage, Urfa Gate

Abstract: Fortification, conservation, and restoration of the structures and buildings that can be considered as cultural heritage are very crucial. Diyarbakır, one of the cities included in the UNESCO Cultural Heritage List thanks to its historic city walls and Hevsel gardens, has been a host of many of these types of structures and buildings. The current study covers the observational examination of the Urfa Gate, towers, and city walls of the historic Diyarbakır City Walls. This study aims to determine the structural damages that occurred in these parts of city walls and then, constitute a path in order to conserve and integrate these historic structures. Besides, the study also contains the remedy and suggestion proposals sections for such kinds of damages coming into existence on these types of structures. Thanks to the observational examinations, remarkable structural damages on the load-carrying systems of the gate transitions and towers were revealed. Moreover, irregularities and soil coverings on the ground floors of the towers, material lost on the city walls and towers, slumping were sighted during the examinations. As a prosal for these problems, the fortification and integration suggestions have been listed in order to holistically conserve and sustain the city walls, gate transitions, and towers.

Tarihi Diyarbakır Surları: Urfa Kapı, Burçları ve Sur Duvarları Örneği için Koruma ve Tamamlama Önerisi

Anahtar Kelimeler
Surlar, Koruma, Diyarbakır, Miras, Yapısal hasar, Urfa Kapı

Öz: Kültürel miras olarak kabul edilebilecek yapıların ve binaların güçlendirmesi, korunması ve restorasyonu önem arz etmektedir. Tarihi şehir surları ve Hevsel Bahçeleri'nden ötürü UNESCO Kültür Mirası Listesine dahil edilen şehirlerden biri olan Diyarbakır bu tür yapı ve binaların bir çoğuna ev sahipliği yapmaktadır. Bu çalışma, tarihi Diyarbakır Surları'nın: Urfa Kapı, burçları ve sur duvarlarının, gözlemsel incelenmesini kapsamaktadır. Bu çalışmayla, surların bahsedilen bölgesinde meydana gelen yapısal hasarları belirlemek ve buna istinaden de bu tarz tarihi yapıların korunması ve tamamlanması için bir yol oluşturmak amaçlandı. Ayrıca, çalışma bu tür yapılarda oluşan bu tarz hasarlar için çözüm ve öneri bölümlerini de içermektedir. Gözlemsel incelemeler, kapı geçişlerinin ve kulelerin yük taşıma sistemlerinde dikkate değer yapısal hasarları ortaya çıkardı. Dahası burçların zemin katlarında bozukluklar ve toprak yığınları, ayrıca sur duvarları ve burçlarda malzeme kayıpları ve çökmeler de incelemeler esnasında görüldü. Bu sorunlar için surlar, kapı geçişleri ve burçlarda bütünsel koruma ve sürdürülebilirliği desteklemek için güçlendirmeye yönelik ve tamamlayıcı müdahale önerileri listelenmektedir.

1. INTRODUCTION

Diyarbakır located in southeast Turkey as indicated in Figure 1, and at the intersection of vital roads, has been included in the UNESCO Cultural Heritage List because of its historic city walls and Hevsel gardens [3]. This city has been continuously inhabited throughout many stages of history owing to its significant location. Many historic structures and buildings are populated in this city,

especially in the Suriçi region surrounded by city walls containing 4 main gates and 82 towers. These gates are known as the Dağ Gate, Yeni Gate, Urfa Gate, and Mardin Gate positioned in the north, east, west, and south, respectively. The schematic and photographic illustrations of the locations and plans of the main gates have been presented in Figure 2. Unfortunately, some of the outer walls and towers in the northern region of the city walls have collapsed.

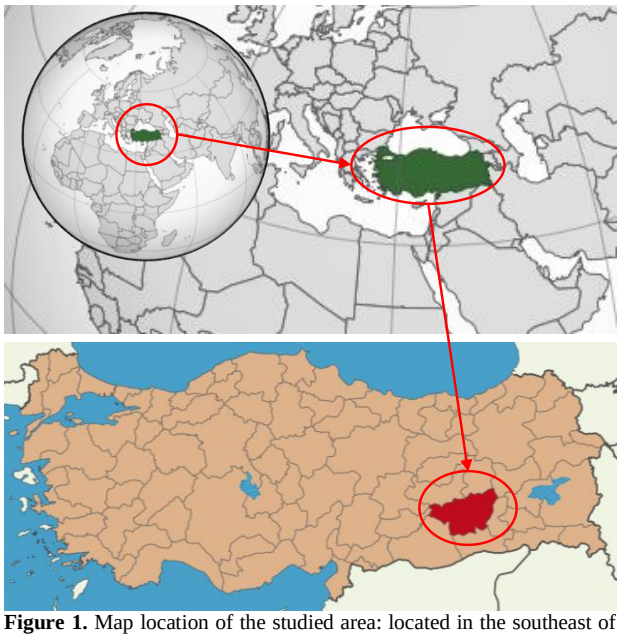


Figure 1. Map location of the studied area: located in the southeast of Turkey [1,2]

In the 4th century, the construction of the Diyarbakır City Walls has begun [4,5]. Various general and spatial interventions have been carried out in many historic structures and buildings in the Suriçi region, especially in the Diyarbakır City Walls [6]. As a consequence of these interventions, the load-carrying systems of these historic structures have been damaged and the deterioration is visible [7]. Despite periodic restoration attempts, the load-carrying systems of some places still have serious problems [6]. The main causes of these problems rely on faulty restoration attempts, increasing traffic density, loss of materials, troubles on the grounds and foundations, and faulty construction plannings [8]. Especially, the expanding deformations, partial and/or total, on the city walls threaten the load-carrying systems of the city walls.

Several restoration projects and implementations for the conservation of the structures and buildings under the danger of extinction have been conducted. But, it can be definitely stated that these studies failed to pay adequate attention to the problems of the load-carrying systems [7]. Moreover, several faulty restorations and conservation attempts have been applied to the load-carrying systems of the city walls. Unfortunately, interventions have been performed before identifying and describing the problems caused over time. Particularly, in respect to the load-carrying system, observational assessment of damage in terms of the type, level, and current status is vitally important to ascertain the extent of the damage and determine appropriate potential strengthening interventions. Categorizing potential interventions in accordance with the type of structures and their functions and amount of damage would constitute a vital contribution to fortification analysis and the development of proper amelioration proposals.

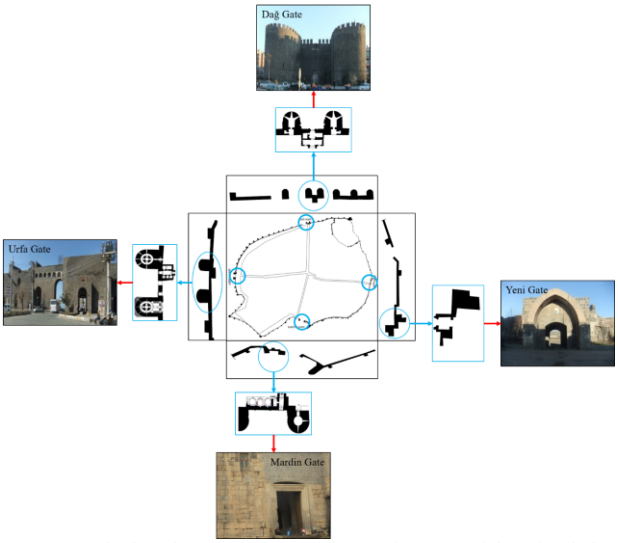


Figure 2. The locations and plans of four main gates of the Diyarbakır City Walls [4]

The damage assessment, methods, can be listed as the following [9]:

- Making relief drawings of the structure,
- Comparing the drawings to the current status of the structure,
- Identifying the damages and interventions (additions, destructions, etc.),
- Identifying and highlighting the damaged parts and locations in the structure,
- Identifying the required measurements,
- Performing destructive and non-destructive tests at the locations of interest.

Periodic damage observations due to natural disasters, such as earthquakes, corrosion of the structure, or environmental factors (wetting, melting, swelling, fracture, or ruptures), are conducted at the test site and in laboratory settings. The aim of these observations is to gain new insight into the undamaged structure for a final assessment [10]. Conducting an observational assessment, evaluate the level of the damage of the structures after documenting their current status, may also be useful for determining new damage. An observational analysis is vital in terms of the specific fortification and intervention measures that should be implemented in structures where damage has already been detected.

In this paper, observational analysis at the towers as well as the Urfa Gate fortification wall which is one of the main gates of the Diyarbakır City Walls was conducted. Before performing the observational assessments, the architectural properties and construction techniques of the Urfa Gate, outer walls, gate transitions, and towers interventions were examined. The work schedule was

developed based on the current status of the structures. The types of observational assessments were tabulated. One of the objectives of this study was promoting the sustainability of the structures by rebuilding near-authentic masonry structures to support the local and national economy. It was also intended to make suggestions regarding how the traditional masonry structures of Suriçi can be improved, which would serve as a reference source for future studies in the different regions. Having completed observational analysis and identified problems on the load-carrying systems of the Urfa Gate, outer walls, gate transitions, and towers, interventions for the fortification and integration works were suggested.

2. THE DIYARBAKIR CITY WALLS

2.1. Architectural and Structural Properties of the City Walls

The Diyarbakır City Walls surround two different regions known as interior and exterior castles. As demonstrated in Figure 3, the interior castle surrounds the very first settlement in the city whereas the exterior castle encircles the traditional urban centre. It can be easily seen from Figure 3 that the interior castle is located on the northeast side of the traditional urban centre and the exterior castle, on the other hand, constitutes from the towers and the outer walls.

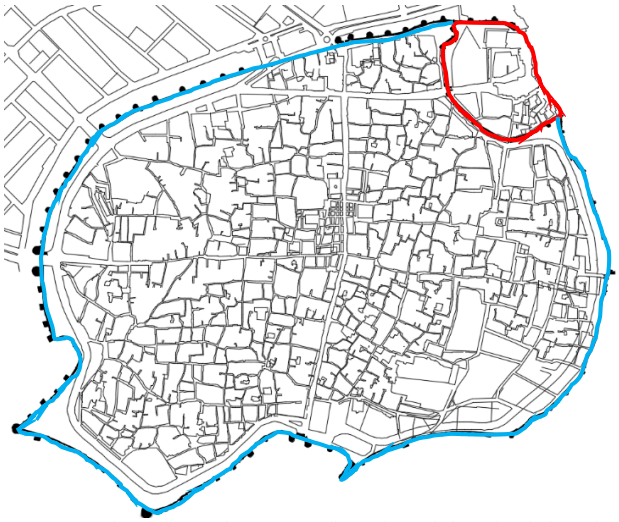


Figure 3. Plan order and tower configuration of the Diyarbakır City Walls (red line surrounding the interior castle, blue line surrounding the exterior castle)

The length of the interior castle walls is about 598 m while that of the exterior castle walls is about 4460 m. A total of 620 m of walls has been deformed and/or destroyed in time [4]. The towers in circular shape with thicker walls are located on the west side of the city walls. The most known and the most important towers are Keçi Tower, Yedi Kardeş Tower, Evli Beden Tower, and Nur Tower. Furthermore, the towers exhibit a difference in accordance with the number of the floor that they have; such as the towers with a single floor or two, three, and four floors. In general, the ground floors were utilized for storage purposes whereas the upper floors were employed for military purposes. In this context, it can be concluded that the dimensions and forms of the city walls in Diyarbakır were designed to supply the usage needs of the epoch in which they were constructed [8].

Ever since the epoch they were constructed, the most salient element of the urban environment of Diyarbakır has been the city walls [7]. Hence, in the past, these walls not only played a key role in safeguarding the lives and goods of city residents but also protected against the outside world whenever required. Apart from the structural view of the city walls; the architectural value, decorations, materials, and dimensions and also, the alignment of the towers can be considered the very finest and worthy examples of construction art. Therefore, the building material, as well as their dimensions, promotes not only the defensive purpose of the city walls but also their symbolic function. Besides, Diyarbakır was the city connecting the roads of the north and south as well as was the binding point of the western world with the Far East, namely, it was the city at the crossroads of the major trade routes. Thus, the city walls and their towers have been regarded as among the most effective and substantial defensive structures all around the world and regarding the structural features, the Diyarbakır castle has been one of the most important castles in the world [8].

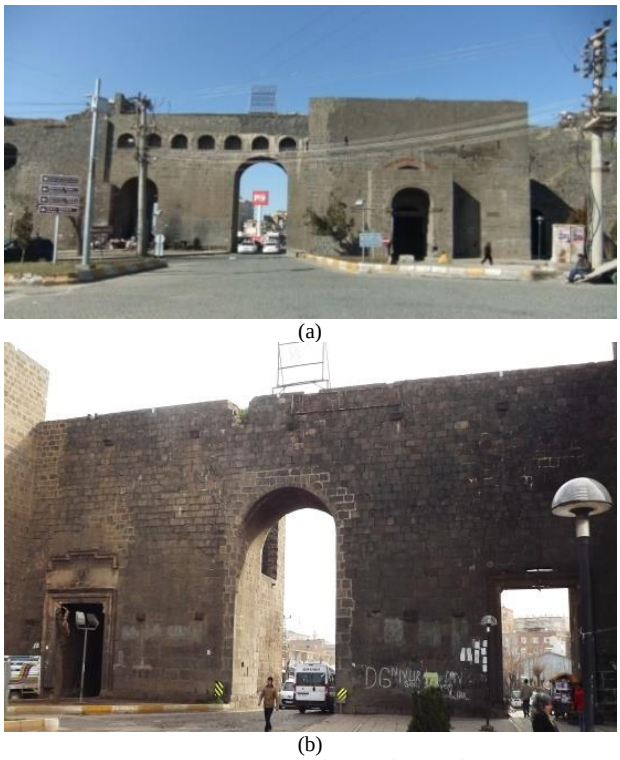
The Diyarbakır City Walls were erected on the rocky ground that is approximately 100 m above the Dicle River in the 4th century [11]. The Dağ Gate, Urfa Gate, and Mardin Gate were used to open the doors of the historic urban site surrounded by the city walls towards the north, west, and south, respectively, as can be seen in Figure 2, whereas the Yeni Gate was utilized to get a connection through the Dicle Valley and towards the east. The access to places outside of the traditional urban centre has been provided by these gates that have been located on the trading axis. In 1942, the Çift Gate (also known as Hindi Baba Gate) was opened after the restoration works conducted that year whereas, in 1944, the arched Middle Gate of Urfa Gate was opened [12].

The city walls were built by using the basalt stone which can be handily found in the Diyarbakır region. This building material can be found in the porous or nonporous form in nature. The floor, wall, and/or arches were built using basalt in porous form whereas the column, column head, and/or pool constructions were produced by handling the basalt in nonporous form. Although both basalt forms have been used in the construction of the Diyarbakır City Walls, particularly the carrier systems were built utilizing the basalt stones in the nonporous form. The masonry construction technique was utilized in the construction of the city walls [7]. In addition, several carrier elements like vaults, domes, and arches were employed in the construction. Some towers have a wall thickness of about 4.4 m at the ground level, however, the thickness decreases as the wall increase to the first and second floor whereas the outer walls have a wall thickness reaching 5.0 m. While the towers and outer walls have the uniform exterior surfaces laid up in an orderly

fashion, they have the inner surfaces laid up with rubble stones. The binding medium employed in the laying up of the stone was a lime-based mortar and above a certain height in the outer walls and towers, the hacking marks have been seen [7,8].

2.2. Architectural and Structural Properties of the Urfa Gate

The Urfa Gate, one of the four main gates, connects the traditional urban centre to the west. Indeed, there are three gates, designated as G1, G2, and G3, positioned between the two towers at the Urfa Gate. These gates provide the people with the opportunity to travel between the inner side of the city walls and outside of the city. In other words, these gates link the old city with new urban sites. The photographic views, taken from the inner and outer aspects of the city walls, of these three gates, have been shown in Figures 4a and 4b, respectively. Researches revealed that these gates were constructed in ancient times, however, the inscription found on the north gate dates back to the years of 1183-1194, namely, the Artuklu Period [13]. As demonstrated in Figure 5, two of these three gates were closed during the period of Islamic rule [7], that is to say, only the gate named G1 was in use. But after the restoration work of all three gates in 1944, they have been again brought into service.



(a)

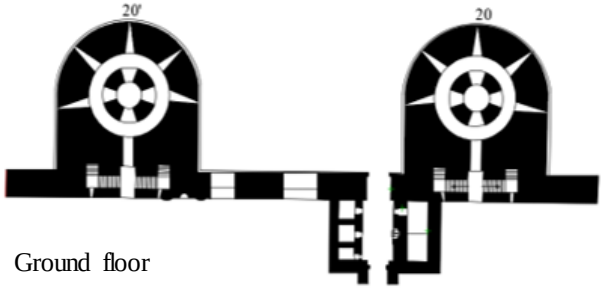
(b)

Figure 4. The photographic views of the Urfa Gate from: (a) the inner and (b) outer aspects of the city walls

During restoring the gates, the height of the arched section of the middle gate was increased to be suitable for traffic service. In this way, however, some original materials and marks on the middle gate were lost [5,13,15]. Besides, as seen from Figure 4a, all gates have the arched top section at the inner surface while only the middle gate has the arched top section at the outer surface as shown in Figure 4b. The vehicles can, today, enter and exit through the middle gate named G2, yet, the south gate designated as G3 is only in use for the pedestrians. This section of the city walls has a total length of 33.73 m and a thickness of 4.04 m. The north gate constitutes a corridor that extends towards the inside of the city having spaces on both sides and the width of the external walls of this gate was about 3.99 m. The corridor in this gate consists of one row in the south and three rows in the north, which are supposed to be allotted for the officers employing in the checkpoints duty at the gate as indicated in Figure 6a. The height and width of the arched middle gate named G2 are, respectively, 11.24 and 5.58 m. Increasing the arch of the gate caused a weakening of this section of the wall. The south gate designated as G3 has a length and width of 3.63 and 3.83 m, respectively.

Figure 5. Urfa Gates and towers in the early 20th century (two gates, G2 and G3, closed) [14]

These three gates were positioned between two towers in cylindrical forms. Gabriel [5] developed an enumeration system to give a number for the towers of the Diyarbakır City Walls. The labels for these two towers are 20 and 20' with respect to this enumeration system developed by Gabriel [5]. The entrance to the 3-story towers having the external view of U shape is done via an arched gate in the inside of the city walls. On the ground floor, there is a square entry corridor, and opposing this corridor, there is a circular-shaped gallery hall having stairs positioned on both sides used to access the upper story. There is a corridor around the core having four legs in its center. The wall thickness on the first-story is thicker than that on the ground floor and there are five deep-gridded frame units. The second story has also the same plan, but the number of deep-gridded frame units is seven and also, there are niches on the gates in the interior facade of the city walls as can be seen in Figures 6a and 6b.



(a)

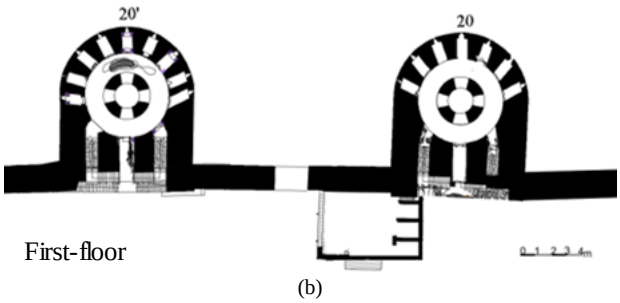


Figure 6. Floor plans for the Urfa Gate and towers: (a) ground floor and (b) first-floor levels

3. RESULTS AND DISCUSSION

Observational assessments of the Urfa Gate, thus enabling the identification of damage to the load-carrying system were conducted. These damages were recorded by taking photos and assessed the current status of the observable damage. Afterward, the results were tabulated and presented in Table 1 in order to easily evaluate the damage to the load-carrying elements.

Table 1. The damages recorded on the Diyarbakır City Walls, Urfa Gate, transitions, and towers

Building name		
Gate transitions	North gate	
	Middle gate	
	South gate	
City walls		
Tower 20	Dome	
	Floor	
	Wall	
	Stairs	
Tower 20'	Dome	
	Floor	
	Wall	
	Stairs	

Location of the Urfa Gate in the Suriçi

Mark description

Decomposition of walls	Slump in flooring
Cover replacement	Belt damage
Joint discharge	Axis shift
User damage	Faulty restoration
Moisture damage	Natural conditions damage
Material loss	Connector mortar loss

The ground floors of the two towers labeled 20 and 20' on either side of the Urfa Gate are irregular and covered with sand. There are partial or major deformations on the top layers of both towers, such that all of the load-carrying elements are exposed to external environmental conditions; this would lead to further damage in due course. The poor load transmission across the load-carrying elements makes all of the structures vulnerable, particularly the towers.

In addition, Işık et al. [16] used some non-destructive testing methods to investigate the structural damage on these city walls. Their results revealed that both ultrasonic pulse velocity and time were affected by seasonal changes. They also stated that the basalt stones having the cracks require to be urgently renewed since it was observed decreasing in the ultrasonic pulse velocity of the basalt stone. The suggestions given in the next section and the discussion presented herein are also achieved from evaluating the results presented in the study of Işık et al. [16].

Figure 7. The photographic view of the top of Tower 20

The visually observed damages on Tower 20 can be listed as follows:

- Looseness and abrasion in the majority of the steps on the stairs,
- Cracks and fissures in the grid niches of the tower,
- Destruction in all dendanes[1] on the top of the tower as shown in Figure 7,
- A significant amount of mortar loss at the upper end of the wall, on the south side of the tower,
- Loss of stone material at the lower end of the tower, and
- Humidity-caused damage to the stone rows near the ground.

The visually observed damages on Tower 20' can be listed as follows:

- Partial losses of material and mortar from the ground floor corridor, which was built with vaulted brick,
- Earth-filled ground floor,
- Vertical fissures on the south facade of the wall, which faces the exterior of the city wall,
- Slumps emerging from the vaults on the western side,
- Deep structural cracks that continue from the dome up to the grids on the west and south sides of the first floor as indicated in Figure 8, and
- Some slumped grid niches, which were then filled with earth, on the U-shaped first floor, and slit formations on the top layer dependent on these slumps as exhibited in Figure 9.

(a)

(b)

Figure 8. The photographic views of the cracks on Tower 20': (a) the first-floor cracks and (b) structural cracks

Figure 9. Slit formation on Tower 20' due to the slumps

The visually observed damages on gate transitions can be listed as follows:

- The poor conditioned upper section of the gates, which is interconnected via successive lines of arched arcades[2] (porticos), and adversely affected porticos by vibrations caused by motor vehicles and natural conditions as can be seen in Figure 10,

[1] Dendane: places where the soldiers are stowed on the bodies and signs on the planks.

[2] Arkat, arkata, arcade: Place Arches, porticoes system consists of arch.

Figure 10. A photographic view of porticos on the Urfa Gate

- 11 arched arcades/niches on the outer walls as shown in Figure 11; covering of 4 of the niches on the north gate with earth and rubble as demonstrated in Figure 12,

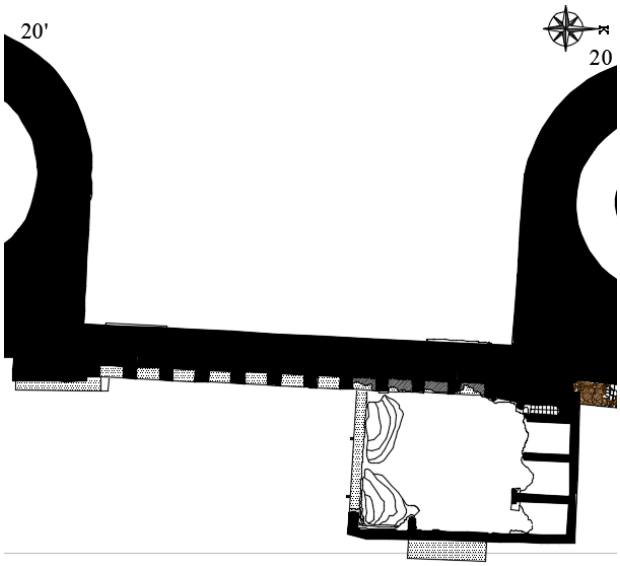
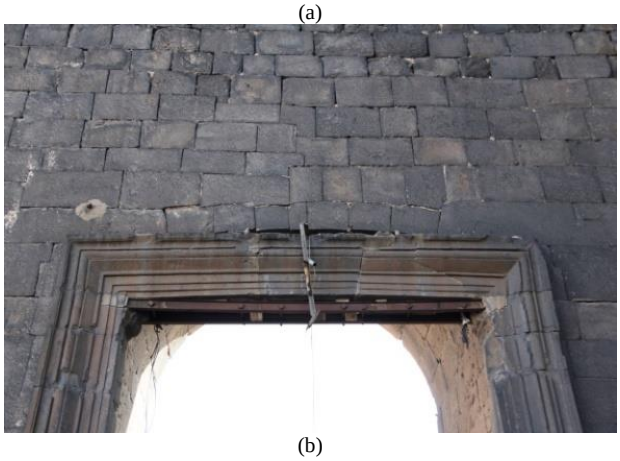


Figure 11. The niche plan at the elevation of 11.99 m

Figure 12. A photographic view of the soil and rubble-filled niches

- Broken stones close to the ground on the outer walls of the gate transitions due to pressure and mortar discharge as well as some partial fissures,
- Capillary cracks on the lintel of the north gate and soot on the walls owing to fires,
- Total demolishing of the south wall of the North Gate and fissures due to exposure of the east wall,
- Covering of the first floor of the north gate with soil and random deformations on it,
- Capillary cracks, loss of the stone, and mortar discharge at the western end of the middle gate (G2) transition, which faces the exterior of the city walls,
- Weakening at the wall section of the site ensue from prolonging the original gap in the arched middle gate (G2), through which there is intense vehicle traffic, in 1944 and random fissures and cracks caused by this weakening,
- The material loss at the bottom sections of the south gate due to structural breakdown and pressure from the stone material (shown in Figure 13a) and cracks on the gate lintel (shown in Figure 13b),

(a)



(b)

Figure 13. The south gate (designated as G3): (a) the material loss at the bottom and (b) cracks on the gate lintel

In the end, the damages on the east and west ends of the gate transitions were photographed for future records. These damages were highlighted in drawings of the facades as demonstrated in Figures 14a, 14b, 14c, and 14d.

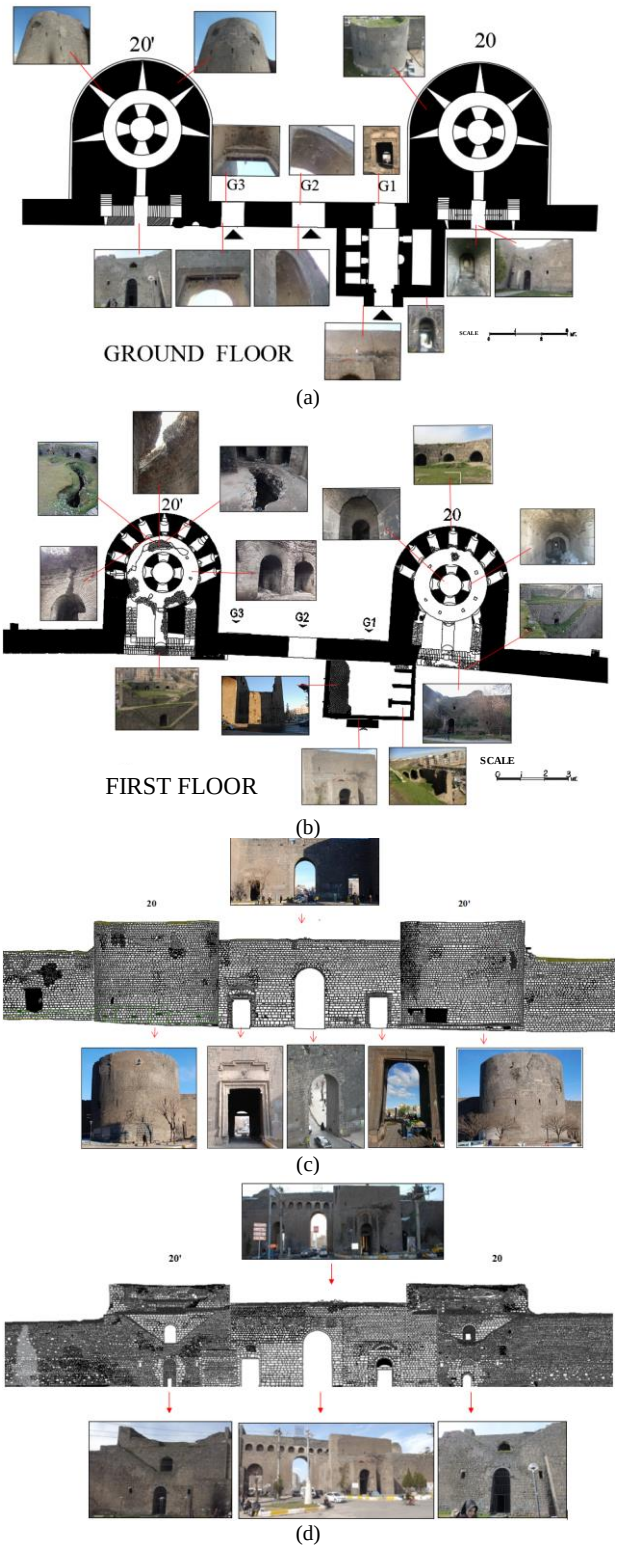


Figure 14. Photographic view and schematically representation of the fissures and cracks on the Urfa Gate, transition, and towers from: (a) ground floor level, (b) first-floor level, (c) outside the city walls, and (d) inside the city walls

4. SUGGESTIONS

Suggestions for fortifying the vertical load-carrying elements of the Urfa Gate, outer walls, gate transitions, and towers can be listed as follows:

1. By using a mixture that matches with authentic mortar it is suggested to fill all of the structural voids in all of the carrying walls of towers.
2. Partial joint fissions that move from upward to downward on the curved western face of Tower 20 should be extensively analyzed in tandem with problems in the inner tissue. Stones in the cracked area should be numbered and dismantled from downward to upward in the shape of V. By strengthening the interconnectivity of stones they should be laid accordingly.
3. In Tower 20 section, any dimensional differences of the material that stem from previous restoration works should be corrected. Continuity should be guaranteed in the material and loss of resistance should be prevented.
4. On the west facade-wall of Tower 20, holistic fission moving from upward to downward was observed. To prevent that fissure, excavation piles that create load in interior space must be cleared. If deemed necessary, the structure should be suspended after a second revision. Fortification works should be performed via partial dismantling and steel stitching method.
5. In Tower 20 top layer and flooring collapse led to a holistic loss and on the surface of the north outer-facade it triggered large swellings that pose threats. The surface should be extensively analyzed by field experts. If needed sectional dismantling should be conducted and in tandem with horizontal carrying elements in the interior space it is suggested to make reformation.
6. By using a mixture that matches with authentic mortar it is suggested to fill all of the structural voids to the end of elevating wall resistance.
7. Loss of stone material predominant in the lower ends of Arched Middle Gate should be completed with basalt stone that matches with the original material. In the bonding works of surfaces, these locations should be fortified by using mortar fillings that match with the original material.
8. In the arched middle gate the areas where static movement continued there were some irregularities in load transmission which led to structural gaps. To remedy this problem, it is suggested to fill structural voids upon consulting the field experts in selected points with equally authentic material.
9. Resistance loss that emerged in the interior transition corridor of the south gate due to loss of material should be corrected by using a near-authentic material, applicable technique, and workmanship.

Suggestions for fortifying the horizontal load-carrying elements of the Urfa Gate, outer walls, gate transitions, and towers can be listed as follows:

1. To prevent fission in the tower, wall any slumps and partially destroyed floorings and domes should be reconstructed.
2. Cracks detected in the north gate lintel should be conserved by field experts.
3. Resistance should be ensured in the brick material that existed in the arched arcades in the upper portion of outer walls and binding mortar.
4. As regards the concrete-covered surface on the lintel facing the city wall in the north and south gate, field experts should be in charge of clearing the procedure.

5. As regards pebble cracks observed partially on the entirety of outer walls, field experts should be commissioned to implement conservation procedures.
6. After the holistic fortification and entire restoration of the structure is completed, temporary metal suspenders that hang for security purposes on the transitions of north and south gate should be dismantled by field experts in the best way to protect the structure against any damages.
7. Fission and joint discharges threaten the safety of transition in arched middle gate hence arch resistance should be fortified and structural voids should be filled by using a material that matches the original mortar.
8. Earth fill and deposits that trigger load increase in Tower 20 and Tower 20' should be cleared by human power so as not to damage the structure.
9. In Tower 20' the dome that is significantly damaged should be suspended. It should be completed by using equally authentic material and techniques. If required, to prevent any tensile-stress and potential openings, it should be fortified via a steel ring or another method approved by experts.
10. The loss of materials in the brick vault and arches should be completed by an equally authentic material and technique. In particular, it is essential to follow the brick dimension and walling pattern used on city walls.
11. Fillings detected in the grid rooms located in the gallery floors of towers should be emptied. Losses of brick material and mortar should be completed by using equally authentic material and technique.
12. Dislocated or baseless step stones should be fortified in the stairs to reach the upper floor.

In addition to the suggested fortification works, further interventions are required to implement the extensive restitution and restoration projects. Together, these will constitute a holistic, effective, and sustainable conservation strategy for preserving the outer walls and towers of the Urfa Gate, which are considered cultural assets. In addition to our observational and instrumental assessments of the Urfa Gate, state authorities must authorize relief, restitution, and restoration projects. Detailed damage analyses will help experts to identify the restoration interventions required. Scientific councils should be formed to promote the exchange of scientific and academic views. Further interventions that are consistent with state-of-the-art restoration works should be introduced. Besides, Işık [7] proposed an analyzing model for the preparation of the fortification and integration. This model schematically describes the proposals for the vertical and horizontal carriers as well as the ground and foundation. In addition, the complementary recommendations were also identified, and an appropriate flow was submitted. Regarding this flow, the following concepts for the complementary recommendations can be given.

Clearing: earthwork and excavated piles on the outer walls and in the interior space, as well as the fillings observed in the interior parts of the arched arcades, should be cleared to minimize the structural load. The earth fill and material excavated from the north gate should be removed manually under the supervision of experts to prevent structural damage. Authentic iron gate wings should be cleared by authorized experts, and the gates should be conserved and restored. Paint, cement mortar, dust, and soot should be cleared from all of the outer surfaces.

Fortification: in addition to replacing any corroded materials, fortification work should begin on the stone and brick walls of all of the interior and exterior surfaces of the outer walls, gate transitions, and towers of the Urfa Gate. The materials and dimensions of the building elements should be selected in accordance with the views of the scientific council, which should be informed by detailed analysis.

Integration: materials lost from the outer walls that hosted the gate transitions should be replaced with authentic materials using appropriate techniques.

Rebuilding: the stairs for accessing the upper floor of the North Gate should be rebuilt as part of the extensive restoration project. The damaged lintel facing the city wall from the North Gate, which had weight-carrying properties, has been lost and should be rebuilt using authentic materials and techniques. The dendanes, which have been almost completely destroyed, should be rebuilt. Gates and transitions should be built in the locations where the original tower gates no longer stand.

Renovation: corroded gridirons should be renovated and covered with protective paint. The ground covering at the entrances of the towers should be dismantled and renovated.

5. CONCLUSIONS

Diyarbakır has maintained its existence through the reflections from the historic and cultural heritage of several civilizations as one of the salient historic centers of the Southeastern Anatolia Region. Among all of these assets, the most noteworthy one is Diyarbakır City Walls that encompass the historic city center and the Suriçi region inside the walls. The Urfa Gate, outer walls, gate transitions, and towers that connect Diyarbakır city walls with the west have coped with damages in due course (neglect of the authorities, neglect of the locals, improper restoration, etc.) and heavy traffic also added to the rise in already-prevalent damages.

In most cases historic masonry structures in which construction technique, periodic properties, material analyses, and structural problems are not analyzed in detail, authentic values may be forgotten. Therefore, with the help of a knowledgeable and professional expert team observational and instrumental tests should be conducted to unveil the type, degree, and impact level of the damage. In accordance with the analyses, applicable solutions for fortification and integration works should be developed to enable the conservation and sustainability of the structure. In the Urfa Gate towers,

the most critical damages assessed in the observational analysis are the partial collapse of top layers and slump and crack formations due to loss of material and mortar.

Observed damages in the Urfa Gate, outer walls, gate transitions, and towers that occurred due to a myriad of causes were also recorded in the photographic images. By drawing the plan and facades of Urfa Gate, outer walls, gate transitions and towers their damage condition was highlighted in drawings. Damages that were verified through architectural drawings and observational analyses in Urfa Gate, gate transitions, outer walls, and towers were symbolically expressed in Table 1.

In 1944 arched middle gate was elevated and it triggered a weakening of the wall section therefore damages observed in gate transitions and outer walls multiplied. Damages and crack formed in the arched "arcades" of 11.99 m the layer of gate transition's eastern façade that faces the Suriçi region reached critical dimensions.

It is aimed that with the suggested fortification and integration interventions provided for the Urfa Gate, gate transitions, outer walls, and towers of which load-carrying system problems were identified should be assessed via analyses that entail conservation and sustainability concepts in order to ensure structural unity and sustainability. At the end of observational assessments of Urfa Gate, outer walls, gate transitions, and towers, the general fortification suggestions have been developed for the identified damages. Nonetheless, in addition to structural works that would comply with general fortification suggestions, it is required to introduce new integration interventions and arrangements. These are;

- Gates should be closed to vehicle traffic. Intense traffic which is pervasive for the majority of day hours would lead to an increase in structural damages. On that account, it is suggested to seek alternative roads that cross outside of the Urfa Gate and traffic flow should be reformulated.
- As is the case for all the other sections of city walls landscape arrangement in Tower 20 and Tower 20' should also be analyzed by experts. Trees and green field adjacent to towers could harm the foundation of structures. In historic structures, it is essential to conduct an exclusive survey for landscape arrangements and choices of the tree. If possible it is suggested to make new arrangements in this particular area.
- As is the case in the entirety of the city walls there are drainages around the Urfa Gate, outer walls, gate transitions, and towers. Underground waters and environmental waters, as well as rainfalls, should be kept at a distance from city walls hence with a proper landscaping action it is suggested to form a holistic drainage project.
- Diyarbakır City walls and Hevsel Gardens were included in the list of UNESCO Cultural Heritage in 2012. Conservation of this cultural heritage that also gained a universal acclamation, relevant fortification, and restoration works call for more scientific studies, projects, applications, and briefings. Institutions that are authorized to make decisions regarding city walls should attach the utmost importance to this concern. To that end, an international-scale auditing board should be established.
- In the fortification and integration intervention works projected for the Urfa Gate, outer walls, gate transitions, and towers the latest earthquake regulation in effect should be followed.
- Fortification and integration interventions projected for the Urfa Gate, outer walls, gate transitions, and towers should comply with "ICOMOS 2013" and criteria from "The Venice Charter".
- Certification and intervention works should be applied specifically to each structure by conducting lab analyses of authentic materials such as stone, brick, adobe, and mortar extracted in the Urfa Gate, outer walls, gate transitions, and towers.
- By detecting the ground and foundation structure in the Urfa Gate, outer walls, gate transitions, and towers renovation and improvement methods should be applied whenever required on the ground.
- All of the damaged carrier elements in the Urfa Gate, outer walls, gate transitions, and towers should be fortified by applying an equally-authentic material and technique that would follow the methods compatible with the authenticity of the structure.

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