Journal of Engineering and Sustainable Development
Vol. 22, No.05, September 2018
ISSN 2520-0917
https://doi.org/10.31272/jeasd.2018.5.10

PRESERVATION OF THE HERITAGE VALUES OF IRAQI TRADITIONAL HOUSES

*Dr. Ali Abdulhussein Al-Ghalib[1], Dr. Laith Sadiq Al-Assadi[1]

1) Lecturer, Civil Engineering Department, Mustansiriyah University, Baghdad, Iraq.

Abstract: The traditional Iraqi (Baghdadi) houses were being formed over centuries of effort and contribution, and reached their final shape in the end of the nineteenth century. These masterworks have nowadays arrived at a critical stage. The fundamental problem with these houses is that they were all built with non-durable materials, such as clay brick, timber and mud with straws. Therefore, the majority has ruined; very few survived or should be saved for the future. The survivors should be conserved in vigorous way to maintain their heritage values. Unfortunately, in Iraq to date, the process of dealing with historical buildings is rather artless and immature for various reasons. As a first conservation rule, it is always said that there are no rules; however, there is a group of standard ethics and principles must be thoroughly taken into consideration in conservation. The conservation ethics and principles are given in the context of this paper. Every technical decision made should be assessed alongside the principles and ethics. Given that the number of this type of historical structure is not rare, the paper aims at setting standards and rules to facilitate the mission of conservation. Despite the sheer volume of such houses in old dense zones of Baghdad, their structure is quite simple and original materials are advantageously identified. Some common structural defects along with their repair procedure are reviewed in this paper.

Keywords: *Traditional Baghdadi Houses, Conservation Ethics, Conservation Principal, Intervention Strategy.*

الحفاظ على القيم التراثية في تأهيل البيوت البغدادية التقليدية

الخلاصة: لقد تشكلت البيوت التراثية العراقية (البغدادية) بجهود ومساهمات البنائين والاسطوات على مدار قرون حتى وصلت الى شكلها الحالي في نهاية القرن التاسع عشر. ان ذلك المنتج الابداعي لتلك التحف الفنية وصل اليوم الى مفترق طرق حرج. أن المشكلة في ذلك المنتج تكمن في أنه بني بمواد بنائية ذات ديمومة واطئة مثل الطابوق الطيني، الخشب والطين المعالج بالقش. مما نتج عنه أن معظم تلك الدور أصبحت اليوم أطلالا، عدد قليل جدا نجا من الخراب، ويتعين ان يحافظ عليه للمستقبل. بيد أن الحفاظ على تلك الدور يتعين أن يجري بطرق متقدمة تحفظ القيم التراثية للمباني. يحسن التذكير أن طريقة التعامل مع تلك الابنية التاريخية اليوم يجري بطرق عفوية وشعبوية وغير فنية لاسباب متنوعة .أن المبدأ الاول لعملية الحفاظ يقول بعدم وجود قواعد ثابتة، بيد أن هناك مجموعة من الاخلاقيات ومجموعة مبادىء يتعين مراعاتها دوما خلال عملية الصيانة والتأهيل. أي قرار بصدد الترميم يتعين أن يقيم أزاء الاخلاقيات والمبادىء. تقدم الدراسة شرحا وافيا للاخلاقيات والمبادىء خلال المتن. أن العدد الحالي للبيوت التراثية البغدادية ليس بالقليل، فهو وافر. هذه الدراسة تهدف الى رسم مواصفات وقواعد تبسط مهمة الحفاظ على القيم التراثية للدورأثناء أعادة تأهيلها. من حسنات تلك الابنية التأريخية أن جميع المواد البنائية لها محددة مسبقا بعيوبها ومشاكلها وطرق معالجتها، وهو ماتقدمه هذه الدراسة.

**Corresponding Author:* ali.alghalib@uomustansiriyah.edu.iq

1. Introduction

Every nation has its own exclusive memory, which represents the outcome of the historical events. The historical events, whether they are good or bad, participate in shaping the features of the society, and play momentous role in outlining the present and future of the nation.

There many fields are responsible for preserving the heritage of the nation, such as literature, science and arts. The architecture, as a vigorous combination of arts and science signifies vigorous example of memory reservoir. The architecture is a great unambiguous method to register the history. Therefore, it is ethical and legal liability of the people in charge to follow rigorous strategies where necessary preservation is required. Although, the subject of conservation of historical buildings is now an overwhelming and restricted task in most nations, the process in Iraq is rather spontaneous and immature. In this discipline, many professions must be contributed to the conservation task. For instance, the conservation of listed buildings should be contributed by architect, historian, civil (structural engineer), craftsman, material engineer, and other secondary professions.

Areas of largely and dense historical Baghdadi houses were greatly removed over decades clearing way for new highways and modern districts. In an effort of Baghdad authorities to conserve some historical houses, two conservation areas of historical importance were set up in the beginning 1980s. These areas bound two holy shrines: Al-Kadhimain shrine and Al-Gaylani shrine [1]. Fig.1 shows areas of heritage value surround the holy shrine of Al-Kadhimain chosen by city authorities in the redevelopment programme. Currently, much evidence at the national level that the courtyard houses of Baghdad are in real risk, also the restoration programme of the listed houses has left disastrous examples on the cheap and vulgar practice. Doubtless, this practice insults the glorious picture of Iraqi architecture achievements and changes the design features of local civilian success.

The dominance of extempore dealing with the subject of conservation of listed buildings can be attributed to two reasons: the absence of qualified designers, artistic, aesthetics and ethical taste that leads to emerging of populist phenomena and the weakness of the scientific methodology of conservation practice.

Briefly, a historic building is one that gives us a sense of wonder and makes us want to know more about the people and culture that produced it. It has architectural, aesthetic, historic, documentary, archaeological, economic, social and even political and spiritual or symbolic values; but the first impact is always emotional, for it is a symbol of our cultural identity and continuity-a part of our heritage. If it has survived the hazards of 100 years of usefulness, it has a good claim to being called historic. Nowadays, there are many examples accentuate the pitiable culture of dealing with Iraqi heritage. Fig. 2 shows only case amid many ugly pictures that our daily life full of them.

This study aims at shedding light on the structural conservation of traditional Baghdadi houses. The study looks at the following objectives:

- Features of Baghdadi house (structure, building materials, causes of damage)

- Strategy of conservation of historical building and regulations for degree of intervention
- Types of damages of different structural elements and relevant intervention

The minimum effective action is always the best; if possible, the action should be reversible and not prejudice possible future interventions.

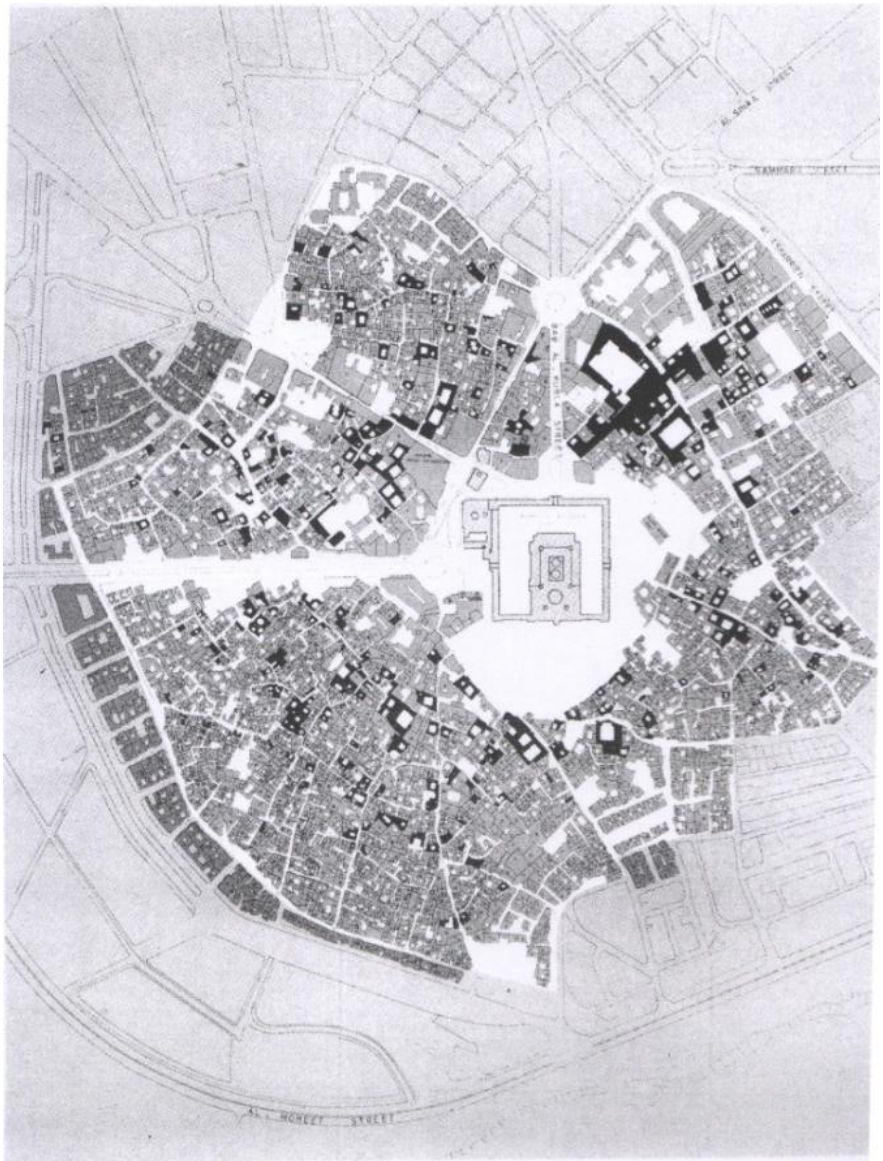


Figure 1. Conservation areas (given black colour) in Al-Kadhimain city (after Warren and Fethi, 1981[1]).

The research work presented in this paper is organized in six sections. Section 1 presents a brief description of the motives of this research, research aim and objectives. Section 2 provides a brief background review on the prominent institutions regulate the subject of conservation. Section 3 submits a complete description of the different structural elements of Baghdadi house, its building materials and types of damages. Section 4 introduces the ethics and principles of conservation. In the meantime, the seven ascending hierarchal degrees of intervention to conserve a historical monument is

carefully defined. The types of damage in each element and the practice to repair that damage are given in section 5. Eventually, the main observations, contributions and limitations are concluded in section 6.

Figure 2. Example of ruins of a traditional house.

2. Regulation of Conservation Process

The topic of conservation of historical (listed) monuments in the developed and industrial countries is a methodical and controlled practice. The first organization to safeguard historic buildings in England was established in 1877 and known as the Society for the Protection of Ancient Buildings (SPAB) that mainly intended to prevent any restoration go beyond weatherproofing. Over time societies were established to protect more modern structures, i.e. the Georgian Group in 1937 and the Victorian Society in 1958 [2].

A set of beliefs of conservation principles was expressed in the International Council of Monuments and Sites in a range of charters [3, 4, and 5]. The United Nations Educational, Scientific and Cultural Organization (UNESCO) alongside with some advisory bodies such as the International Centre for the Study of the Preservation and Restoration of Cultural Properties ICCROM are devoted to the conservation of listed buildings (UNESCO WHC) [6, 7, and 8]. Furthermore, ICOMOS produced in 1987 The Conservation of Historic Towns and Urban Areas Charter (Washington Charter) that involves historic large and small cities, towns and historic centres [9].

In Iraq, the Ministry of Culture is the monitor organization, which controls, supervises and organizes this vital subject. The Archaeology and heritage code No55, which was issued in 2002, is the current legislation manages the subject of preservation of national heritage in IRAQ [10]. The regulations of this code give the archaeological authority the power to cease every disruption, neglect and misuse of historical assets. The law defined the archaeological items when their age is at least 200 years, whereas heritage buildings or cultural materials of age of less than 200 years. The materials of the code No 55 stipulated in this legislation can be considered the last comprehensive

and severe safeguard to prevent the deterioration of Iraqi heritage. Nonetheless, the implementation of these regulations is sadly shelved due to the careless and weakness of administrations in charge of this subject.

In addition, national cultural authority is armed with extra powerful law known as 'The law of Possessive' No.12 issued in 1981 [11]. This law aimed at regulating the procedures of possession of historical-value properties by the government. This law facilitates the process of seizure of cultural places by the government authorities.

3.The Features of Traditional Baghdadi Houses

The Baghdadi historical house achieves all the three conditions proposed by Vitruvius Pollio, the great architect for the Roman Emperor, almost two thousand years ago when he stated:

'Structures shall be safe, functional and beautiful'

Indeed, the form of courtyard houses is nothing short of safety, functionality and beauty. The convenience and aesthetics of the glorious houses are attributed to the skillful master mason. The master mason of Baghdadi houses has responded over centuries to the architectural advancement in terms of slow modifications.

The present traditional houses of Baghdad, which belong to the nineteenth century, must be perceived as the ultimate and final result of prolonged stages of developments added. This final product gives a house of raised row of columns around its square courtyard, Fig. 3.

In its ideal form, through a house's ornamental doorway the passageway (mejaz) leads into courtyard (hosh). The hosh includes central openings and long ursi (room with large windows opened on the courtyard and normally has side access) between them. Rooms of fixed purpose such as kitchens, lavatories and bathrooms are kept unnoticeably in iwans, under the stairs and in corners of the ground floor. The rooms are kept in the first floor around the central courtyard and opened on to a common foyer or tarma [1].

Such houses have two stairs: one leading to the diwankhana (where strangers are received), the other leading to the harem (where the family can have access). The iwan and the talar (colonnaded iwan) are smaller openings off the tarma and basically served as open rooms that extend the space to the daily activities, Fig. 4.

Some of the features of traditional Iraqi houses such as the courtyard (hosh) and the narrow winding streets projected by decorative balconies and windows can elsewhere be found in varying form in cities across the Muslim world. Nonetheless, the Baghdadi (Iraqi) courtyard houses are unique in the colonnade (tarma) rose to the first floor level so that it views the courtyard [1].

Figure 3. Examples of traditional Baghdadi house showing the courtyard (hosh) and tarma (colonnade veranda).

The ursi room in the first floor occasionally opened to the outer world through oriel window (shanashil), Fig.4. The shanashil helps to provide natural fresh air and opportunity to watch the life of the street.

Figure 4. Examples of talar in Baghdadi house (left) shanashil landed into the street (right)

3.1 Building Materials of Traditional House

The historical houses until the end of the nineteenth century were constructed of local building materials. In the city, the burned brick formed the basic material of the load-bearing walls and foundations. Lime mortars were used as primary binders in form of hydrated lime which is more waterproof and less shrinkable. Mud along with straws was used as an insulating and waterproof material in roofs, although for prestigious constructions bitumen could be brought from wells in Basrah, Kufa or Hit [1]. Timber, as quick, on hand and light building material was largely used for construction of floors, girders and columns. The timber was superseded gradually from the twenties of the last century by steel girders in the jack arching flooring construction [12]. Ground and first floor were usually paved with square brick (farshi) of the same brick type used for walls.

Engraved, clean-cut and moulded bricks were used to introduce geometric and arabesque decorative brickwork to doorways, windows openings and facades. Occasionally, mosaic modelled bricks were utilised in spandrels, cornice and friezes over the surface of the building to make complex shapes, Fig. 5.

Figure 5. Decorated carved and mosaic brickwork of two different entrance doorways.

3.2 Defects of Traditional Houses

It is so rare to find now ancient houses belong to days of their first construction. If they have survived, they were inevitably restored in such a way for at least one cause: the eating-termites, which live in big colonies in the warm and damp soils of Iraq. This tiny destructive insect attacks almost all the construction materials, alone brickworks had survived against this insect. The timber that constitutes important part of the structure is mainly wrecked by termites. Despite its advantages, it is non-durable in severe climate and surrounding conditions, hence needs renewal, likewise the mud roofing systems. Furthermore, the lifetime of the fabrics of the houses has mostly been reached. The brickwork as well as the pointing experienced problems of decaying, cracking and crumbling due to dampness, sulfate attack, thermal changes and differential settlement of foundations. The ground floor surfaces were covered with solid square bricks. In such cases, the penetrating moisture through the capillary action is likely, and this produces totally heaved and fractured floors.

4. Process of conservation

The subject of conservation of an old structure starts with a difficult question, which is what is the acceptable change in that building?

In the subject of conservation of historical buildings, two main items should be put ahead: the ethics of conservation and the principles, as shown in Fig. 6 [14].

Conservation of buildings depends on a thorough study of the building as it stands, followed by any further analytical studies deemed necessary, in order to make a correct diagnosis of the structural actions of the building, and to act in economic and scientific way without crossing the boundaries of ethics and principles. It is then necessary to consider alternative lines of action. With a multidisciplinary team, it is difficult to obtain agreement, as each professional has different objectives, and often his training has enclosed an expert's mind with too much specialization. A structural engineer concentrates on stability and safety; an archaeologist concentrates on retention of original material; an art historian is a specialist critic who is trained to observe and interpret what is there, but is often unable to visualize alternatives to the status quo. Other members of the team may also have an undisclosed agenda, that of their particular profession. Moreover, conservation is the action taken to prevent decay and manage change dynamically. It embraces all acts that prolong the life of our cultural heritage, the object being to present to those who use and look at historic buildings with wonder the artistic and human messages that such buildings possess.

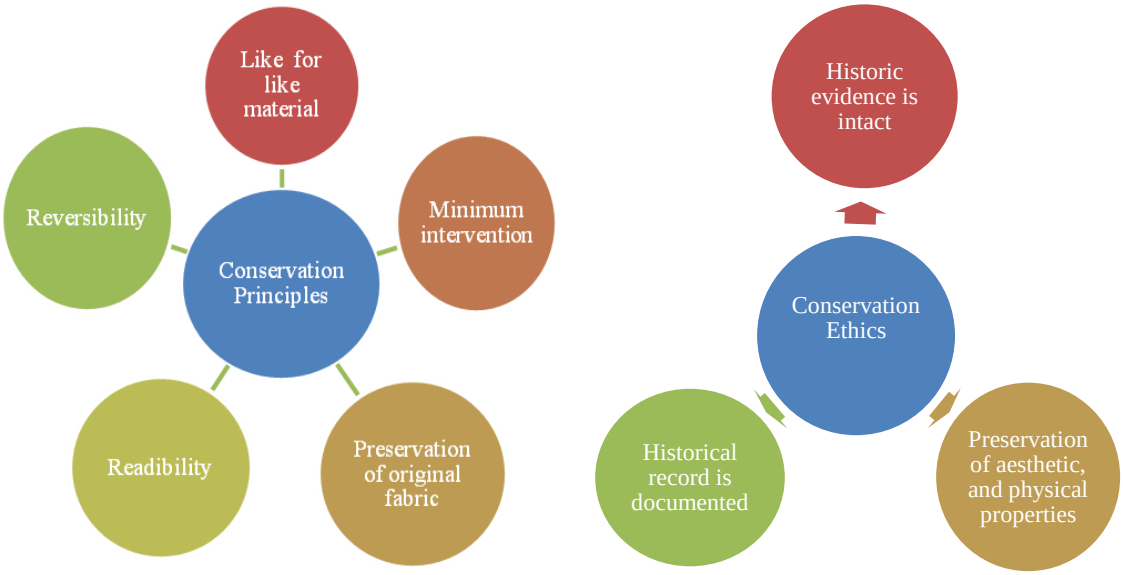


Figure 6. The principles and ethics of conservation procedure in historical property, [the notion after Ref.14].

4.1 Degree of Intervention in Historical Houses

The minimum degree of intervention necessary and the techniques used depend upon the conditions to which property is likely to be subjected. Interventions practically always involve some loss of a heritage value in the property, but are justified in order to preserve the objects for the future.

Conservation involves making interventions at various scales and levels of intensity which are determined by the physical condition, causes of deterioration and anticipated

future environment of the cultural property under treatment. Each case must be considered as a whole, and individually, taking all factors into account.

Always bearing in mind the final aim and the principles and rules of conservation, particularly that the minimum effective intervention is always the best, seven ascending degrees of intervention can be identified.

The Burra Charter [4] states that conservation processes, subjecting to the situations, entail a combination of more than one of the levels given in Fig.7. In any major conservation project, several of these degrees may take place simultaneously in various parts of the whole. Most importantly however, conservation process should be examined and justified with sets of ethics and principles stipulated by several charters [3, 4, and 14] before the developments start.

The scheme of conservation and renewal of historical houses commence with setting and listing zones of old houses. The programme of restoration must rely upon preservation of as much as possible of the original physical and aesthetic characteristics. Wherever the replacement is crucial, like for like material must be followed.

Crumbled brickworks are replaced with brick of same patina provided with damp proofing layer. It is very important that new bricks should match the old in color and texture, and that the old form of bonding and jointing should be followed. Fig. 8 shows a contrast between the new bricks and old bricks in conservation of Al-Mustansiriyah school of Baghdad.

The fragile devastated sections of timer are substituted with identical new members treated with termite-killing substances. There is always temptation to rectify earlier errors or shortcomings made by builders due to limited resources. These errors can be rectified, but the general ethics and principles are respected. For instance, the in flooring and roofing systems the technique of jack-arching to provide solid anti-termite floors can replace the worn out timber floors.

Equally important, the composite sections of brick and steel joist are very successful for shanashil and tarma cantilevers where larger, stiffer and durable spans are achieved. Exquisite skillful work of wood, glass and metals is renovated by using similar materials and modern techniques.

Having considered the situation of current houses, the conservation scheme is obviously beyond the first three action degrees given by Fig.7, but conserved houses during the development of Baghdad in the early eighties of last century probably now an action within the first three levels of the conservation scheme.

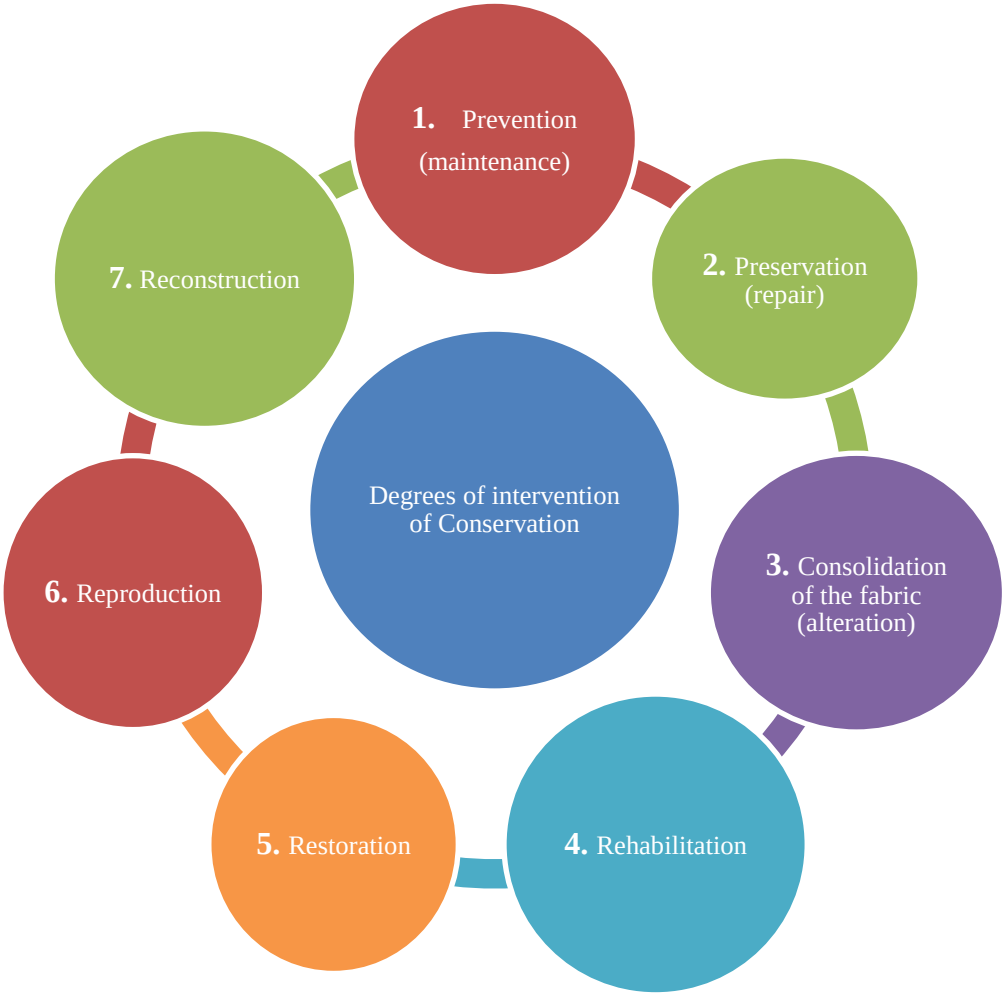


Figure 7. The seven hierarchal degrees of intervention to conserve a historical structure, [the notion after Ref.14]

5. Decay and Repair of Structural Elements

5.2 Problems of Beams and Columns

Decay in timber columns usually occurs as a result of dampness and insect attack close to the ground. In houses construction, the seat of columns is usually made out of brick pedestal or masonry place above the ground level. In such case, the decay and crumbling in timber columns will be eliminated. Decomposed timber beams usually occur where they are embedded in the brickwork without necessary insulation. They are subject of fungal and insect attack. In all cases, the penetrating rain and severe climatic changes cause decay and as a result theses structural elements might fail.

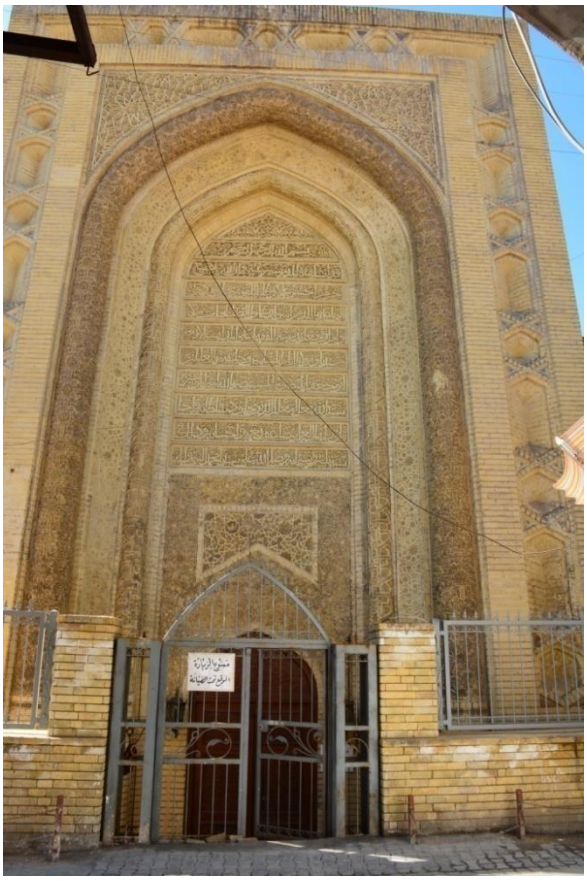


Figure 8. Example on bad conservation (new bricks do not match the old in color and texture)

5.2 Repair of Brickwork

Old renderings made out of lime plaster can be removed without difficulty, although some lime will be left in the holes of the brickwork and will add to the texture of its age. In order to re-render brick wall, the old rendering must be removed, and brickwork is cut and cleaned before it will be rendered. Always trial attempts of small scale walls small could be implemented prior to involve deeply in such practice.

One of the major defects of aged courtyard houses is the deterioration of the pointing. New mortar of same colour and texture should be provided to repointing and sealing the joints. The appearance of a brick wall is significantly affected by the colour and texture of pointing because the pointing sometimes cover 30-40% of the area. Cleaned and brushed edges of bricks are essential. In repointing action, old pointing of brickwork should be scratched and removed out to a minimum depth of 30mm and the pointing inserted with a special tool (mortar gun), as shown in Fig. 9. The new mortar is made of lime which is compensated with sand to give darker colour. The resistance of a brick wall to rain water and its durability mainly depend upon the success of the pointing. If it is too light in colour it gives a recently re-pointed wall a garish and stark appearance. Earth colours can be used to reduce the whiteness of some limes. If a natural darkish buff-coloured hydraulic lime can be obtained, this is the best. The colour

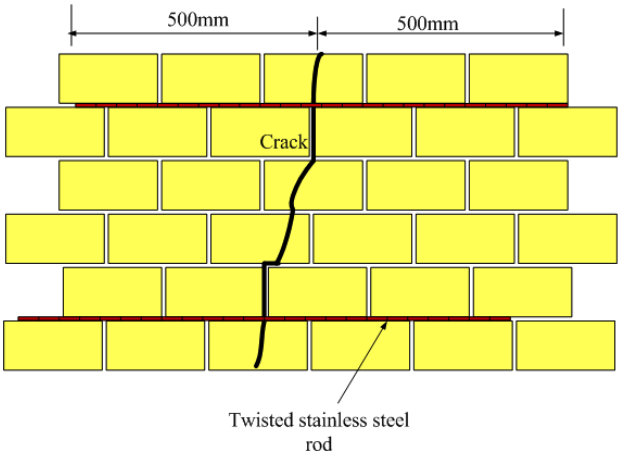
of pointing will depend upon the sand used, and in the short run the sand will decide the texture of the mortar, so choice of well-graded sharp gritty sand is important.

Figure 9. Repointing process using cement mortar in a brick wall.

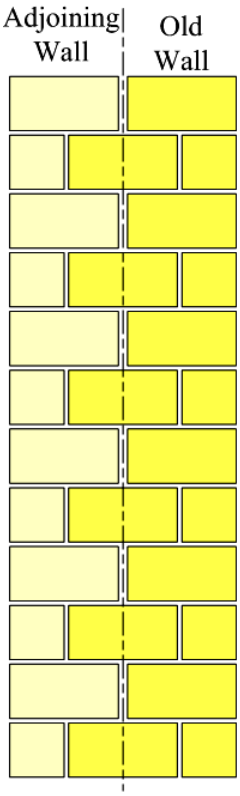
Vertical fractures/cracks shall be mended by replacing in new matching brickwork. In case greater strength is required and if wall thickness allows, particular precast narrow concrete beams of smaller dimension and of same depth as one course of brickwork could be concealed in the back of the brickwork. Otherwise, twisted stainless steel rod can be embedded in the brickwork at a depth of about 40mm, Fig.10 (a). This is an easy, cheap and successful system of strengthening the building. This system can be generalized all over the building in order to tie the walls together. For old and unsafe or aggressively damaged brickworks, the repair techniques given in Fig. 10 (b-d) are examples of treatments that can be utilized in conservation of historical houses [15, 16].

It is wholly unacceptable to cover up the damaged face of brick walls with cement mortar layer. The damaged wall should be renewed by tying the new brickwork all the way together with old wall as in construction of the cavity wall. The hollow void between the new and old could be grouted so as to avoid penetrating rain. The fresh brick must be produced to match the original old brick rather than to look as new brick [2]. All repair or replacement of decayed or missing parts of building shall match the original nearby fabric by using same technique, material, colour, texture and profile [2]. The Venice Charter [3] states that:

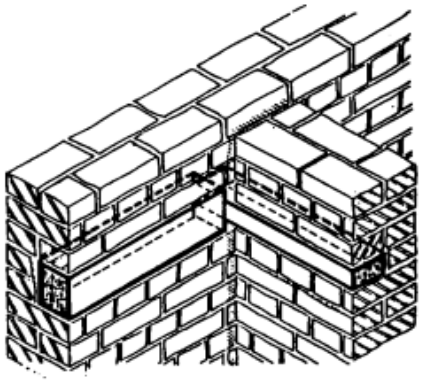
> '*Replacements of missing parts must integrate harmoniously with the whole, but at the same time must be distinguishable from the original so that restoration does not falsify the artistic or historic evidence.'*



(a)



(b)



(c)

(d)

Figure 10. Some repair techniques: (a) Wall widening; (b) Stitching of wall; (c) Pre-cast concrete elbow ties (after Beckmann, 1995 [15]); (d) Buttress.

5.3 Repair of Arches

Repointing and grouting brickwork in arches can, if applied to the maximum depth possible, greatly strengthen an arch. The repair of all types of arches may involve taking down the arch and rebuilding it, using a traditional false-work of timber and shoring with close-centred needles to carry the weights above the arch. On the other hand, if the

arch is wide and the voussoirs are not of the full width it may be possible to rebuild half at a time or to take out defective stones or bricks and replace them individually. This has the advantage of not affecting the walling above to such an extent. Repair by rebuilding is rather drastic as it relieves compressive stresses, raising questions of prestressing the arch to avoid new deformations, which may require great ingenuity. Such prestressing can well be carried out with hydraulic jacks. Occasionally an arch can be freed by cutting out mortar joints and pushed back into position using hydraulic jacks. Fig.11 shows cracks in two historical houses in Baghdad whereby repair is likely to apply by adopting technique given in Fig. 10 (a).

Figure 11. Cracks in two historical houses in Baghdad.

5.4 Structural Interventions on Foundations

It is necessary to go through full inspection of the house and its environment in order to get a sensible decision of the causes of structural damage, and to give initial proposals for conservation of the house through rectifying problems in the foundations.

Methods of strengthening of foundations depend on surrounding conditions, and several options can and be studied carefully. For instance, the soil can be improved by chemical grouting; by drilling boreholes of 50mm diameter at 0.5m centers apart providing pressure up to 202bar to produce piles with higher bearing capacity [14].

Foundations of houses are also developed by extension, or getting deeper, or the use of levers and anchorages and using of restraints. Underpinning strategies should be avoided in enlargement because of possible damage from local settlement during execution [14].

One of the well-designed techniques to enlarge a foundation is to supply the enlarged area in reinforced concrete and then to needle through the wall and prestress the new foundation using hydraulic jacks. Additionally, the typical procedure to deepen the foundations is by underpinning. Levers can also be built to apply a reverse turning

moment and hence reduce the effects of foundation failure on the opposite side. Tension rods can offset the eccentric loads caused by foundation settlements require counter anchorages to resist their tension.

5.5 Disadvantages of Portland Cement In Repairs To Historic Buildings

The repair materials must be compatible with the original materials, for all types of construction. This can be applied to the bricks as well as the mortar. Mortars of Portland cement have the advantages of workability, high stress level and their relatively impervious nature. Theses mortars may also be used to mitigate the soluble salts and frosting effects. It is appropriate for works subjected to high stress and use with actions required appropriate strength, such as building or rebuilding of brickworks, underpinning of foundation and repair of damaged walls. In order to compensate the disadvantages of Portland cement especially its high stress, it is advisable to replace Portland cement to sand mortar with appropriate proportions of Portland cement and lime. Mortars of cement: lime: sand are designed by replacing part of the cement in a 1:3 cement mortar by an equal volume of lime, so that the binder paste still fills the voids in the sand. In this way, good working qualities, water retention, bonding properties and early strength can be achieved without the mature strength being too high. Nonetheless, Portland cement is not designed for use in mortars or plaster on historic buildings due to its consequences and shortcomings on traditional materials. Disadvantages such as: its strength in compression, bonding and tension compared to weak materials of historic buildings [14]. Also, its impermeability and low porosity traps vapour and water and prevents evaporation. As a result, it is not good to be used in repairing damp walls. Additionally, it shrinks on setting, leaving cracks for water to enter, and because it is impermeable such water has difficulty in getting out. Therefore, it increases defects caused by moisture. Portland cement should not be used for mortars or plasters in historic buildings, but as a last resort a small proportion of Portland white cement should be added to the lime with no more than 10% of the volume of the lime without expert advice. Fig. 12 shows erroneous use of Portland cement in rendering walls historic building in Baghdad.

Figure 12. The problematic use of Portland cement in repairs

6. Conclusions

From this study the following main issues can be drawn:

1- A historic building is the object that gives us a feeling of wonder and interest and makes us want to know more about the people and culture that constructed it. It has architectural, aesthetic, historic, archaeological, economic, social and even political and spiritual or symbolic values.

2- William Morris the founder of Society for the Protection of Ancient Buildings (SPAB) was outspoken about the historic buildings, when stated [17]:

> '*These buildings do not belong to us only… they belong to our forefathers and they will belong to our descendants unless we play them false*'

3- Engineering and cultural Iraqi societies as well as Iraqi administrations lack the interest and motivation for conservation of the national heritage. Although there are enough tough legislation manages the subject of conservation of heritage, Iraqi cultural authorities have not been stopping the demolition, distraction, and ignorance of the historical houses. As long as the majority of the traditional houses is almost ruins or in devastated situation, it is wise to elect conservation areas of such houses in some of old Baghdadi zones and initiate a rigorous time bound programme of conservation.

4- The field survey done by the research authors have revealed that the zones of historical buildings are in their way to vanish. An emergency plan needs to set in order to safeguard the houses conserved during the major redevelopment programmes of Baghdad created in the early 1980s. Other great survivors must be included in the plan as an important evidence for the architectural achievements and way of living of the historic past, while the old city of Baghdad has being transformed.

5- New bonding and repairing products such as epoxy resin, mortar additives, renders, grouting and screeds could be advantageously exploited in the preservation campaign given that these materials are concealed, efficient and easy to apply.

7. References

1. Warren J, Fethi,I, (1982), Traditional Houses in Baghdad, COACH PUBLISHING HOUSE LTD, Horsham, England.
2. Allington-Jones, (2013) The Phoenix: The Role of Conservation Ethics in the Development of St Pancras Railway Station (London, UK), Journal of Conservation and Museum Studies, 11(1): 1, pp. 1-21.
3. ICOMOS (International Charter for the Conservation and Restoration of Monuments and Sites the Venice Charter), 1964.
4. ICOMOS (1999), The Burra Charter for Conservation of Places of cultural significance, Paris.
5. ICOMOS International Council on Monuments and Sites (2003). ICOMOS Charter Principles for the analysis, conservation and structural restoration of architectural heritage.
6. UNESCO World Heritage Centre WHC (1985), Operational Guidelines for the Implementation of the World Heritage Convention, World Cultural and Natural Heritage, Paris.
7. UNESCO World Heritage Convention (1985). Conventions and Recommendations of UNESCO Concerning the Protection of Cultural Heritage, UNESCO, Paris.
8. UNESCO World Heritage Centre WHC, 2015, Operational Guidelines for the Implementation of the World Heritage Convention, Paris.
9. ICOMOS (1987), Washington Charter for the Conservation of Historic Towns and Urban Areas, Paris.
10. Iraqi's Archaeology and Heritage Code, No.55, 2002.
11. 'The law of Possessive', No.12, 1981.
12. Al-Sultany K., (2014), Architectural Modernity in Baghdad, Formative Years, Adib Books, Amman, Jordan.
13. UKIC Code of Ethics and Rules of Practice. London: United Kingdom Institute for Conservation of Historic and Artistic Works, 1996.
14. Feilden B. M., 2003. Conversation of Historic Buildings, Third Edition. Elsevier.
15. Beckmann P., 1995, Structural Aspects of Building Conservation, McGraw-Hill Book Company, LONDON, UK.
16. Building Research Establishment (BRE) Digest, 1991, Concise review of building technology, Repairing Brick and Block Masonry, Garston, Watford.
17. Oxley R. (2015), Survey and Repair of Traditional Buildings: A Conservation and Sustainable approach, Routledge.