RESEARCH PAPER

Adaptive Reuse of Heritage Buildings "Old Buildings in Mosul as A Case Study"

Mafaz T.¹, Anwar M.²

¹ Department of Architecture, University of Mosul,
² Department of Architecture, University of Mosul,

ABSTRACT:
The historical centers in Arab cities play a vital role in confirming their cultural and heritage dimension that are reflected of social, cultural, economic and environment in the urban fabric. Many contemporary changes have taken place made a great impact on the historical cities, and many of their heritage buildings have been changed in a way desecrated their identity rather than rehabilitated and reused them in a method that keeps up with the social development that meets with the needs of their inhabitants and the requirements of the time.

Mosul is one of the ancient cities, Throughualy the history, has left us a cultural and urban heritage that carried a great importance and a high value represented by many of historical and heritage buildings. Now and because of, the recent war that has a great harmed on the city by its urban organization, especially in its ancient area, and In order to preserve on this heritage from extinction, neglect and misuse, this research aims to Determination the valuables of re-use for historical buildings through reviewing the potential of the re-use with its capabilities, criterias, characteristics and the considerations that should be adopted on the process of conservation and re-use. Finely, The objectives should meet with the need and the function accordance to the requirements of the area and the age, and the old building should operation, preservation, economically, socially, and sustainably through generations.

KEY WORDS: adaptive reuse; heritage buildings.

INTRODUCTION:
The architecture and its functional uses have been connected with the other factors such as location, time, politics, social and economical context. Over the years, these contexts have changed due to life and technological developments, but the buildings themselves remained. for many generations, The historical buildings carried the cultural and civilizational identity for the society, but don't meet with the needs and contexts, that they were built for. They don't use for their original function, so that the reuse adaptive of these buildings have become imperative in order to conservation the Sustainability of the building and proportional with the needs of contemporary life. The re-use of the building is adaptive and create a new function close to the original function or completely different. But not to distort the historical building and Maintain the formality values that are essentially symbolic and moral values that characterize each generation and its identity. Reusing doesn't involve changes in the use of a particular function, but rather to extend the building's life. It is a combination of improvement, transformation and processing to
provide greater efficiency for the original building and achieve economic feasibility.

1. DEFINITION OF REUSE

Re-use refers to the re-function of an old site or building for the other purpose non the one built and designed for it. With land scarcity, the option of re-use has become one of the most important trends in conservation and sustainability. Adaptive re-use of buildings is the perfect alternative to traditional demolition and reconstruction. Re-use often deals with preservation issues on historic buildings, but at the same time it can be applied on modern buildings. Because of the heritage building must be preserved from the outside, therefore, we often focus on the design of the interior spaces of the building. It is a strategy that works to give new life to obsolete buildings without destroying them. Over time the surroundings change and people change. However, buildings as a physical form remain constant, that lead to reuse them for other purpose than that they were built for [Conejos, 2011]. Re-use of heritage buildings: is use them in a function suitable for the society in which they exist, so as not to affect internally or externally their structure or characteristics [Conejos, 2011].

1.1 Making- decision of Re-use

Firstly and before Making- decision in Re-use we must prepare a comprehensive plan for the situation by registration of historical buildings, the original function of building, and collection the informations, documents, drawings and photographs. Moreover, the field of organized and depth interviews of the region assesses the advantages and disadvantages of the adaptive re-use and its impact on the social, economic, cultural and environmental aspects. The interviews with the engineers and experts to define the historical background of the building and the type of adaptations and changes that took place during the lifetime of these buildings are very important [Haidara, 2013]. The authorities should be responsible for making- decision in Re-use to control the regulations and laws associated by the UNESCO Heritage Site and apply them to the selection of the new function. Funding for the re-use may be with local authorities or international organizations such as UNESCO, charities and others. Sometimes the owner may change the function of the building randomly and without complying with the laws of preservation and legislation which loses the original characteristics and historical values of buildings, and this is reflected in the urban characters of the whole city. Therefore, the authority must exercise its authority to maintain and application the regulations of the historic cities [Haidara, 2013].

1.2 The potential of reuse in the historical buildings

The valuable of historical buildings are a pivotal point because, They represented an important milestone, and A distinctive identity. This value is used in one of the economic, social or cultural activities to obtain a cultural and economical return and social interaction through preservation it, which can attract investors, renters, and raises the value of land. Historical buildings can provide a place or environment with unique characteristics that enhance the sense of affinity and spatial affiliation of the street, urban fabric as well as economic, social, Cultural, and environment Benefits. With the technological development and the information age new uses have emerged and practices of many businesses and needed for more flexibility in space and innovative solutions. Each building needs unique solutions to balance between the current building and the new use. Location, size and type of building are important factors in determining the process of re-use. The preservation of historical building requires determination of the level of intervention and the change in construction. We must know when the demolition is permitted and when the building should be preserved and re-use. The process of adapting the building to re-use may include changing part of the building as a replacement of the ground floor of many traditional houses to shops or offices because of its location on the important commercial streets in the city center. Thus, the economic motive is decisive in reuse [Haidara, 2013]. Sometimes the changing includes the function of the entire building, such as the transfer of abandoned stores to shops with the roof of the main street to become a shopping space, which increases the value of the area and its building as well as achieve economic feasibility of the building and its neighbors, which contributes in attracted Traders and investors in addition to increasing the growing attraction of
tourists and these benefits must be translated into other social and interactive benefits [Aylin, 2009].

1.3 Literature and Previous Studies in Adaptive Reuse

The literatures and previous studies that dealt with the issue of (reuse) studied the basic criteria which determined the potential of historical buildings and their suitability for the re-use or not. This stage precedes the final decision-making for the process of re-use. There are many studies in that field such as: (the Conejos study) which developed a number of comprehensive and uniform criteria for the successful application of re-use on historical buildings and focusing on physical, economic, functional, social and legal criteria [Conejos, 2011]. As adopted by (The Zimnicki study) on criteria that correlated with the goals of the preserving on historical buildings and principles of sustainable design and focusing on the environmental standard [Zimnicki, 2004]. Also (the Zushi study) was considered that successful re-use projects require not only a good design of building but also careful planning and study of the surrounding environment within the urban fabric and related with economic, social and cultural aspects [Zushi, 2005]. (Douglas study) put forward a number of basic aspects to be focused on and studied at the stage of deciding to re-use any building, That focusing on the technical side of building as well as other legal, economic and job aspects. This study considered that the option of re-use and the amount of intervention will determine the nature and extent of the amendments also depends on the state of the building and the wishes of the stakeholders [Dahane, 2013]. In 2007, the Japanese architectural institution set out a number of guidelines and principles for the study of historical buildings prior to make decision of re-use and preserve them, they divided them into five basic criteria: the historical, cultural, technological, artistic value, and the effects of context, location and social criterion on the building [Pinto, 2017]. The study (Abdel Hamid Dahna) considered the analysis of the elements of old and new functions of building is the basis of the success re-use, as well as the importance of study and careful analysis of the structure of building and the surrounding, which difference from one region to another depending on the

different customs, traditions and change over time [Dahane, 2013].

2. CHARACTERISTICS OF BUILDINGS MOST APPROPRIATE FOR ADAPTIVE REUSE 3.

Most buildings can adapt to another functions and uses rather than those built for them, but there are some latent characteristics that make some buildings more suitable for reuse and adaptation than other buildings. This is due to having certain qualities and features that are essential for the successful reuse, These characteristics can also determine the nature and rate of modification to be achieved in the process of change of use. The success of reuse depends on the context of the building and its original design [Conejos, 2011]. Reuse depends on the compatibility of the new function requirements with the original layout of the building [Othman, 2018]. The literature and architectural studies determine a number of these characteristics, which are derived from previous experiences and projects of reusing some historical buildings in different areas, including:

The value of the heritage building is a main factor in making decision for reuse [Othman, 2018]. As well as The location of the historic building and its proximity to other buildings, many historical buildings have become redundant because of their wrong location or because of the difficulty of access to them. also The structure and morphology of the building, flexibility and adaptability within the original building plan, as well as multiple entrances, Reuse Procedures with Legal Legislation [Dahane, 2013]. Also, the appropriateness of any building to reuse is dependent on the condition of the building itself, The building which is in bad condition requires extensive repairs and alterations, which may result in the destruction of its architectural or historical character, as well as other characteristics such as the ability of historical buildings to accept contemporary technological needs, also its the Acceptance to Changes in the structure due to the large increase in number of occupants of the building, and other characteristics related to the state of the original building, and the safety of its materials. Joglekar & Achliya study summarized the most important characteristics of historical buildings
that make them more suitable to reuse such as: open spaces, The building should contain large areas where new partitions can be added to the new function. The study also illustrated the necessity of owning the public and commercial buildings a good location and open spaces, and the possibility of reusing palaces to museums due to the availability of large areas and gardens around them which have the ability to absorb various cultural and tourist activities. On the level of services, the study stressed the importance of the services in the building, For example When converting the palace into a hotel it becomes necessary to provide services for each room individually [Joglekar, 2018].

Bullen and Love (2011) determine some factors that influence the decision-making process on the reuse of historic building like cultural and heritage value of building, orientation of building and ability of building to adapt [Othman, 2018], also the high quality of the construction of old buildings including characteristics such as thick walls, windows that can be opened, high ceilings etc., not found in new buildings [Pinto, 2017].

Also based on analysis some of previous experiences of some historical buildings that have been successfully reused in several countries, Other characteristics are drawn. The analysis of Aleazm palace in the city of Hama in Syria shows some characteristics that made it successful when reused to a museum, for example, the palace has a high historical and architectural value, It contains large halls and large inner courtyard which were used as exhibitions, also old climate treatments Improved the palace environment (see Fig.1). Also, when analyzing the Agha house in Syria, which was changed to a restaurant, it find out that the house has some characteristics, such as its location in an ancient heritage area, close to a number of historic mosques and churches, also the old climate treatments were used to hide health services ,the zoning in this building isolated private areas from the public one (see Fig.2).

The White Khan Building in Turkey, which has changed its function into a museum and a restaurant, contain other characteristics, such as flexible plan, large spaces that have been used as visitors' galleries, and contain several old elements that attract visitors (see Fig.3). Bayt al-Kritliya in Cairo, Egypt, which was reused as a museum, contains many heritage elements on the Ottoman Islamic style which attract the visitors, and surrounded by large areas and gardens that were used as exhibitions (see Fig.4).

2.1 Conclusion of literature review

Based on the work of several authors and From analysis of some successful Reused heritage buildings, we could find to the most important characteristics that make building suitable for adaptive reuse As follows:

**Building value:**
the heritage, architectural and historical value of the building, and aesthetic details enhance the success of reuse with new function that attracts visitors to this building.

**Building state:**
The building, which preserves all its heritage characteristics, ancient materials and original construction methods, is a building that preserves the identity and character of the old area.

**Building Location :**
* It means that the building have a good location close to the city center and to the main roads, proximity to the market, easy access to it, as far as possible from the narrow streets and with parking spaces close to this location.
* Opening and directing building towards the public buildings surrounding it more than opening on the residential buildings is a positive factor in order to preserve the privacy of nearby houses.

**Building function**
* The capacity of building to absorb the new function to be complementary and suitable for old use, and to absorb all the related modern techniques without affecting the nature and identity of the building.
* Zoning and functional isolation in heritage buildings helped the process of isolating the service parts of buildings from other public parts.

**Building layout**
* The design of the building is flexible and adaptable to be suitable for new function that requiring large and multiple spaces.
* Building plan contains large areas that are flexible and easy to move, and accept adding partitions.
* open spaces (such as skylights or interior courtyards) in historical buildings is an essential part of the success of the reuse process, because they are flexible and adaptive spaces, and they accept many new or temporary jobs such as temporary exhibitions.
* Large outdoor spaces and gardens around the building enable it to absorb various cultural activities
* The main entrances is on the most important main street.
* Multiple entrances help to separate the entrance of visitors and service entrances

**Structural integrity**
* Structural integrity and flexible design of the structure grid will make adding partitions for new use easy.

**Old climate treatments**
* The availability of ventilation and natural lighting through old climate treatments is an important and desirable factor for visitors to historic heritage buildings.

3. HERITAGE ARCHITECTURE IN MOSUL CITY

Architecture in Mosul city during the different ages is a part of a continuous series of architectural development that began thousands of years ago. This city has been known for its many architectural features including planning, design and numerous architectural elements. Mosul city, like other Islamic regions, has contributed to the development of the Arab-Islamic architecture with its various elements, but Mosul city has Unique characteristics from the rest of the other regions, which come from many factors such as the construction materials available, geographical factors and Cultural heritage of this city [Encyclopedia,1992]. So this city Had left us a large number of valuable historic and heritage buildings. And because of the recent events that have greatly harmed the city, especially in its old area. This heritage must be preserved and rebuilt, Therefore, this paper aims to develop an approach to reuse this valuable heritage buildings and find the properties of these buildings that make them more appropriate for adaptive reuse.

4. METHODOLOGY

The paper focuses on determine the characteristics of building that is more appropriate for adaptive reuse by:

- seven heritage buildings in old part in Mosul city are used as a case studies, (see Table 1).
- Extraction of indicators and measurements of the characteristics from architectural literature (see Table 2).
- Questionnaire were made with professionals to gain data of the heritage building (see Table 3).
- Finally paper conclusion are outlined.

**Questionnaire form**

The study sample is a collection of the heritage buildings of the city of Mosul and includes: (house of Ziadah, Dar Numan Dabbagh, Palace of the Bishop, Khan Al-Kamark, Eastern Preparatory, Al-Mahatta building, Royal Foyer)

| Icon | Verification score |
|------|--------------------|
| A    | High score         |
| C    | No score           |

5. CONCLUSIONS

- The results of the evaluation of the latent characteristics table and the questionnaires form were shown the most of the Samples have an identity, a specificity, a distinctive architectural character, and including a visual or symbolic figure that gave a sense of attachment to the place over time. the results of the questionnaire showed that the buildings in their present situation do not meet with the needs of functional users, they are neglected buildings and have not been reused, thus their current status not contributing in revitalizing the region and supporting it economically. So these heritage buildings do not represent an attractive point for investors and traders, so we need to reused these buildings.

- With regard to the most important characteristics in heritage buildings, which make them more suitable for reuse, also The paper concluded that the high heritage, historical and aesthetic value of the building and keeping of its original identity, which are clearly achieved in House of Ziada, Dar Numan Al-Dabbagh, Al-Motran Palace, Khan Al-Kimerk, Al-Sharqia Secondary, are basic and important characteristics to reuse them. As well as the location of these buildings and there proximity to the city center, the main street, and the old main market increase the possibility of their reuse process. When these indicators are not
The potentiality of reuse reduced because of the difficulty of accessibility by users and visitors. Also it is difficult to reuse the buildings that are open at the residential area like House of Ziada because of the high privacy.

The style of building also affects on the possibility of adaptive reuse, for example, the buildings of the -Islamic style like: House of Ziada, Dar Numan Al-Dabbagh, Al-Motran Palace, Khan Al-Kimerk, Al-Sharqia Secondary, have a number of characteristics that increase the possibility of reuse them, because these heritage buildings contain the inner courtyard which is allow for multi-use spaces, and making various cultural activities. Also they contain old climate treatments which attract visitors to these buildings. At the same time, there are some characteristics in these buildings designed that reduces the possibility of reuse, because they contained one entrance and one staircase and the small size of these buildings causes inability to absorb a large number of visitors and the difficulty movement in them.

The paper find the buildings that built at the beginning of the 20th century during the British rule of Iraq like: (The station building and the Royal Palace) have characteristics different from the characteristics of the buildings of Islamic style. Such as approximation to the modern main streets in the city with easy access to them, as well as the direction and opening of these buildings on non-residential public buildings is a positive factor that helps in adaptive reuse of these buildings. Successfully, also the large spaces, flexibility of the plans and the structure grid will help us to add partitions and division the large spaces into multiple spaces. Furthermore, The existence of multiple entrances in these buildings help to separate public areas from service areas, is also an important factor in increasing the possibility of a successful adaptive reuse.

Table 1. The Case Study Buildings and Their Description [The Nineveh Antiquities Institution, The Museum]

| Name                      | Building Description                                                                 |
|---------------------------|--------------------------------------------------------------------------------------|
| House of Ziada (Fig 5)    | This house was built in 1870, located in the Bab al-Bayad area near the wall of the old city of Mosul, close to an old historic mosque. The house was built in the Arab Islamic Style, in the middle of this house there is a large inner courtyard, also it contains many heritage elements and geometric and vegetal decoration on its walls (Fig 5). [Residential, 1982] |
| Dar Numan Al-Dabbagh      | One of the most beautiful heritage houses in Iraq in the old city of Mosul is the house of Numan Al-Dabbagh. It is located in the center of the city. This house is characterized by a lot of ancient architecture of Mosul, which varies between the Iwan and many columns which decorated with inscriptions and built of stone. The walls contains Arabic inscriptions and the Quranic verses carved on the walls of the Iwan. [Residential, 1982] |
| Al-Motran Palace          | The house was built in the year 1850, and is still standing in the locality of Dandan at the end of Al-Dawasah Street, it contains many heritage elements such as arcade (riwaq) and an Islamic decoration on its walls. |
| Khan Al-Kimerk            | Built in 1702 in the center of the old city behind the Mosque of AL-Iguat, one of the ancient mosques in the city, close to the main street that overlooking the Tigris River, and close to an important bridge in Mosul. It has a large inner courtyard in the middle, with two entrances, four ewan and seven stairs, |
| Al-Sharqia Secondary school | Built in 1905, the school is located in an important area on the main street near the Tigris River. The building built in Arab Islamic style. It contains some heritage elements such as arches and a big inner courtyard surrounded by a large number of classrooms. |
| The station building      | The station was built at the beginning of the twentieth century by English government, located at the intersection of three major main streets close to the city center, it is surrounded by large outdoor areas. The station was built in a European style popular at the beginning of the 20th century, built symmetrically. With modern construction materials such as steel, and roofing the waiting hall with a glass dome. |
| Royal Palace              | The Royal Palace was built at the beginning of the 20th century by English government, The building is located in an important area, on the main street that leading to a chief bridge in the city near the bank of Tigris River, and also near other important government buildings, as well as close to the Al-Shuhada Park, one of the oldest gardens in Mosul. The building was built in a European style popular at the beginning of the 20th century |
Table 2. Indicators and measurements of the characteristics of heritage buildings

| Criteria                                                                 | Questions                             | (1) House of Zaid |
|-------------------------------------------------------------------------|---------------------------------------|-------------------|
| Value of the building                                                  | Historical value                      | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Architectural and aesthetic value     | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Symbolic value                        | ○ ○ ○ ○ ○ ○ ○ ○ |
| Building location                                                      | City center Proximity                | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Market Proximity                      | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Location to main roads                | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Access to the building                | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Parking available                     | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Building Direction to Public region   | ○ ○ ○ ○ ○ ○ ○ ○ |
| Building Function                                                       | Zoning                                | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Sanitary services                     | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Basements                             | ○ ○ ○ ○ ○ ○ ○ ○ |
| Building layout                                                        | Large space                           | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Multiple Spaces                       | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Open spaces (inner courtyard)         | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Large outdoor spaces                  | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | gardens                               | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Multiple entries                      | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Entrance Location                     | ○ ○ ○ ○ ○ ○ ○ ○ |
| Structural Integrity                                                   | foundation and structure Integrity   | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Material Durability                   | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Design and flexibility of structural grid | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Maintainability and Support           | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Ability to add a new structure        | ○ ○ ○ ○ ○ ○ ○ ○ |
| Old Climate Treatments                                                 | Arcade (Riwaq)                        | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Ewan                                  | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Screens                               | ○ ○ ○ ○ ○ ○ ○ ○ |
|                                                                         | Inner courtyard                       | ○ ○ ○ ○ ○ ○ ○ ○ |
| Percentage                                                              |                                       | 71%, 84%, 78%, 65%, 71%, 65%, 81% |
A- Does the building have an identity and privacy that distinguishes it from other buildings?

B- Does the building have a distinctive architectural character (model, pattern, construction material, etc.)?

C- Is there a distinction in the nature of the architectural structure of the building of elements and relationships?

D- Is the building a symbolic or visual Characterized?

E- Did he give a sense of belonging or attachment to the place through successive generations?

F) Does the building emphasize on one of the visual or movement axes?

| The ratio Cent | 88% | 84% | 78% | 90% | 82% | 60% | 70% |
|----------------|-----|-----|-----|-----|-----|-----|-----|

A-is there respect for the social and cultural characteristics of the area In the nature of building: (formal or functional)

B- Does the building have an effective role in promoting social interaction?

| The ratio Cent | 50% | 40% | 44% | 75% | 80% | 30% | 60% |
|----------------|-----|-----|-----|-----|-----|-----|-----|

A-Does the building meet with the needs of functional users?

B- Does the building activate the region economically?

C- Does the current function building contribute to Sustainability it and increasing its life cycle?

D- Has the building been re-used before?

| The ratio Cent | 10% | 8% | 12% | 55% | 65% | 6% | 50% |
|----------------|-----|----|-----|-----|-----|----|-----|

A-Does the building raise the value of the physical land?

B-Is the building attractive for users?

C-Does the building bring investors, tenants and traders?

E) Does the building contribute in development the local economy of the region?

| The ratio Cent | 15% | 20% | 24% | 50% | 60% | 12% | 65% |
6. RECOMMENDATIONS

The paper recommended before making decision of reuse to the historical building, it should analyze the potential of these building and reach to the characteristics which most appropriate for adaptive reuse and reflected on social, cultural, economic and environment of the region.
REFERENCES
Aylin, O., (2009), Re-using existing buildings towards sustainable regeneration.
Conejos., Sh. & etc all.(2011),Improving the implementation of adaptive reuse strategies for historic buildings, EPublications@ bond.
Dahane, A., (2013), Principles and regulations for the rehabilitation of historical buildings In the old city of Aleppo, master's thesis, Aleppo University [2] Zine El Abidine , M. ,( 2010), Evaluation of The Experience of

Pinto, M., & etc all, (2017), Building Reuse: multi-criteria assessment for compatible design, International Journal of design Sciences and Technology, Volume 22 Number 2.

The Nineveh Antiquities Institution And The Museum Zimnicki, k. and Fournier,D,( 2004), Integrating Sustainable Design Principles into the Adaptive Reuse of Historical Properties, Washington DC: U.S.A.C.O. ENGINEERS.
Zushi, K.(2005), Potential Residential Buildings for Adaptive Reuse, Cincinnati's CBD. Master University of Cincinnati.

Rehabilitation of Some Ottoman Historical Buildings in Syria, master's thesis, Aleppo University
Encyclopedia of Civilization,(1992), Dar Al-Kutb for printing and publishing , University of Mosul.
Haidara., L., Talibb., A. , (2013), Adaptive Reuse in the Traditional Neighbourhood of the Old City Sana'a – Yemen, Malaysia, Asia Pacific International Conference on Environment-Behaviour.P811-812
Joglekar, S. & Achliya, N. (2018) , Adaptive Reuse an Emergent Trend for Conservation of Structures, International Journal of Engineering Research.
Othman, A.& Elsaay,H.,(2018) ,Adaptive reuse: an innovative for generating sustainable values for historic buildings in developing countries, DE GRUYTER OPEN. P 119
Residential Buildings in Mosul, (1982), General Directorate of Antiquities, Heritage Authority.
Service Buildings in Mosul, (1982), General Directorate of Antiquities, Heritage Authority.